City of Aurora
Building Codes Division
15151 E Alameda Pkwy
Aurora, CO 80012
(303) 739-7420

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RSN
251428

PROJECT MANUAL

ISSUED FOR CONSTRUCTION
Date: 08 January 2007

~~392491~~

MEDICAL CENTER OF AURORA
SOUTH CAMPUS

PARKING GARAGE

AURORA, COLORADO

P+W Project Number: 142311.00

PERKINS
+WILL

10100 N. Central Expressway
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Dallas, TX 75231

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PROJECT MANUAL

Parking Garage, Medical Center of Aurora – South Campus
Aurora, Colorado

08 January 2007 **Issued for Construction**

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Project Numbers
P+W Project Number: **142311.000**
HCA Project No. 306660001

END OF DOCUMENT

DOCUMENT 00 01 07

PROFESSIONAL SEALS PAGE

The following Documents and Specifications have been furnished by the Owner for this Project, and were not prepared by or under the direct supervision of the Architect or any of the Architect's consultants:

OWNER

HCA
One Park Plaza
Nashville, TN 73203

BIDDING REQUIREMENTS

00 31 32 Geotechnical Data

CONTRACTING REQUIREMENTS

00 52 34 HCA Owner-Contractor Agreement

DIVISION 1 - GENERAL REQUIREMENTS

HCA Bulk Purchasing Vendor List
HCA Vendor List for Interior Finishes
HCA Interim Life Safety Program
HCA/Georgia-Pacific Job Profile Form

The following Documents and Specification Sections have been prepared by or under the direct supervision of the Architect:

ARCHITECT

Perkins + Will
10100 North Central Expressway, Suite 300
Dallas, Texas 75231



DOCUMENTS & SPECIFICATIONS

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00 26 00 Procurement Substitution Request

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01 50 00 Temporary Facilities and Controls
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DIVISION 5 - METALS
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05 15 05 Barrier Cable System
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06 16 43 Gypsum Sheathing

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07 16 13 Polymer Modified Cement Waterproofing
07 18 16 Vehicular Traffic Coating
07 21 16 Batt and Blanket Insulation
07 42 45 Aluminum Composite Panel System
07 52 16 SBS-Modified Bituminous Membrane Roofing
07 62 00 Sheet Metal Flashing and Trim
07 84 13 Through-Penetration Firestop Systems
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08 71 00 Door Hardware
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10 44 00 Fire Protection Specialties

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11 12 00 Parking Control Equipment

DIVISION 14 – CONVEYING SYSTEMS
14 21 23 Electric Traction Elevators



The following Specification Sections have been prepared by or under the direct supervision of the Landscape Architect:

Landscape Architect
Davis Partnership
2310 Blake Street, Suite 100
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SPECIFICATIONS

DIVISION 01 – General Requirements
01 56 39 Temporary Tree Protection

DIVISION 12 – Furnishings
12 93 00 Site Furnishings

DIVISION 32 – Exterior Improvements
32 14 00 Unit Pavers
32 84 00 Irrigations System
32 93 00 Landscape Work

The following Specification Sections have been prepared by or under the direct supervision of the Structural Engineer:

STRUCTURAL ENGINEERS
TRC International Ltd.
5050 Quarum Drive, Suite 700
Dallas, Texas 75254

SPECIFICATIONS

DIVISION 3 - CONCRETE
03 20 00 Concrete Reinforcing
03 30 00 Cast-In-Place Concrete
03 41 00 Precast Structural Concrete

DIVISION 4 - MASONRY
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05 31 00 Steel Decking
05 50 00 Metal Fabrications

DIVISION 31 - EARTHWORK
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31 63 29 Drilled Concrete Piers and Shafts



The following Specification Sections have been prepared by or under the direct supervision of the Mechanical / Electrical Engineer:

MECHANICAL / ELECTRICAL ENGINEERS
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Dallas, Texas 75219

SPECIFICATIONS

DIVISION 21 - FIRE SUPPRESSION

21 05 00 Common Work Results For Fire Suppression
21 10 00 Fire Protection Systems

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22 05 23 General-Duty Valves For Plumbing Piping
22 05 29 Hangers And Supports For Plumbing Piping And Equipment
22 05 53 Identification For Plumbing Piping And Equipment
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23 05 29 Hangers And Supports For HVAC Piping And Equipment
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26 56 00 Exterior Lighting

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY
28 05 00 Common Work Results for Electronic Safety and Security
28 31 00 Fire Detection and Alarm

END OF DOCUMENT

The following Specification Sections have been prepared by or under the direct supervision of the Civil Engineer:

CIVIL ENGINEER
Martin/Martin Consulting Engineers
Dan Delange
12499 West Colfax Avenue
Lakewood, CO 80215

SPECIFICATIONS

DIVISION 03 - CONCRETE
03 30 53 Miscellaneous Cast-In-Place Concrete (other than pavement)

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31 25 00 Temporary Erosion and Sedimentation Control

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33 41 00 Storm Utility Drainage Piping.....08 Jan 07

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I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

J. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

K. Examine terminal units, such as variable-air-volume boxes, to verify that they are accessible and their controls are connected and functioning.

L. Examine plenum ceilings used for supply air to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.

M. Examine strainers for clean screens and proper perforations.

N. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

O. Examine system pumps to ensure absence of entrained air in the suction piping.

P. Examine equipment for installation and for properly operating safety interlocks and controls.

Q. Examine automatic temperature system components to verify the following:

1. Dampers, valves, and other controlled devices are operated by the intended controller.
2. Dampers and valves are in the position indicated by the controller.
3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in multizone units, mixing boxes, and variable-air-volume terminals.
4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.
5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
6. Sensors are located to sense only the intended conditions.
7. Sequence of operation for control modes is according to the Contract Documents.
8. Controller set points are set at indicated values.
9. Interlocked systems are operating.
10. Changeover from heating to cooling mode occurs according to indicated values.
11. Refer to Commissioning Section 23 08 00 for additional requirements.

R. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system readiness checks and prepare system readiness reports. Verify the following:

1. Permanent electrical power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.

a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
b. Measure static pressure directly at the fan outlet or through the flexible connection.
c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

   a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.

3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers, under final balanced conditions.
4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
5. Make required adjustments to pulley sizes to accommodate fan-speed changes.
6. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.

   a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
4. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.

C. Measure terminal outlets and inlets without making adjustments.

4. Air pressure drop.
5. Refrigerant suction pressure and temperature.

3.9 PROCEDURES FOR TEMPERATURE MEASUREMENTS

A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.

B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.

C. Measure outside-air, wet- and dry-bulb temperatures.

3.10 PROCEDURES FOR SOUND-LEVEL MEASUREMENTS

A. Specify sound-level testing if sound is a significant design criterion and sound treatment measures are used to achieve stringent criteria.

B. Perform sound-pressure-level measurements with an octave-band analyzer complying with ANSI S1.4 for Type 1 sound-level meters and ANSI S1.11 for octave-band filters. Comply with requirements in ANSI S1.13, unless otherwise indicated.

C. Calibrate sound meters before each day of testing. Use a calibrator provided with the sound meter complying with ANSI S1.40 and that has NIST certification.

D. Use a microphone that is suitable for the type of sound levels measured. For areas where air velocities exceed 100 fpm use a windscreen on the microphone.

E. Perform sound-level testing after air and water balancing and equipment testing are complete.

F. Close windows and doors to the space.

G. Perform measurements when the space is not occupied and when the occupant noise level from other spaces in the building and outside are at a minimum.

H. Clear the space of temporary sound sources so unrelated disturbances will not be measured. Position testing personnel during measurements to achieve a direct line-of-sight between the sound source and the sound-level meter.

I. Take sound measurements at a height approximately 48 inches (1200 mm) above the floor and at least 36 inches (900 mm) from a wall, column, and other large surface capable of altering the measurements.

J. Take sound measurements in dBA and in each of the 8 unweighted octave bands in the frequency range of 63 to 8000 Hz.

K. Edit number of locations and areas to be tested to suit Project. Use the size of Project and importance of acoustics as design criteria to determine number of locations to be tested.

L. Perform sound testing at locations on Project for each of the following space types. For each space type tested, select a measurement location that has the greatest sound level. If testing multiple locations for each space type, select at least one location that is near and at least one location that is remote from the predominant sound source.

5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB firm who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer, type size, and fittings.
14. Notes to explain why certain final data in the body of reports varies from indicated values.
15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outside-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

E. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outside, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

F. Air-Handling Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data: Include the following:

    a. Unit identification.
    b. Location.
    c. Make and type.
    d. Model number and unit size.
    e. Manufacturer's serial number.
    f. Unit arrangement and class.
    g. Discharge arrangement.
    h. Sheave make, size in inches, and bore.

f. Entering-air, wet- and dry-bulb temperatures in deg F.
g. Leaving-air, wet- and dry-bulb temperatures in deg F.
h. Water flow rate in gpm.
i. Water pressure differential in feet of head or psig.
j. Entering-water temperature in deg F.
k. Leaving-water temperature in deg F.
l. Refrigerant expansion valve and refrigerant types.
m. Refrigerant suction pressure in psig.
n. Refrigerant suction temperature in deg F.
o. Inlet steam pressure in psig.

H. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Sheave dimensions, center-to-center, and amount of adjustments in inches.

2. Motor Data:

a. Make and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Sheave dimensions, center-to-center, and amount of adjustments in inches.
g. Number of belts, make, and size.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Unit make and model number.
    d. Compressor make.
    e. Compressor model and serial numbers.
    f. Refrigerant weight in lb.
    g. Low ambient temperature cutoff in deg F.

2. Test Data (Indicated and Actual Values):

    a. Inlet-duct static pressure in inches wg.
    b. Outlet-duct static pressure in inches wg.
    c. Entering-air, dry-bulb temperature in deg F.
    d. Leaving-air, dry-bulb temperature in deg F.
    e. Condenser entering-water temperature in deg F.
    f. Condenser leaving-water temperature in deg F.
    g. Condenser-water temperature differential in deg F.
    h. Condenser entering-water pressure in feet of head or psig.
    i. Condenser leaving-water pressure in feet of head or psig.
    j. Condenser-water pressure differential in feet of head or psig.
    k. Control settings.
    l. Unloader set points.
    m. Low-pressure-cutout set point in psig.
    n. High-pressure-cutout set point in psig.
    o. Suction pressure in psig.
    p. Suction temperature in deg F.
    q. Condenser refrigerant pressure in psig.
    r. Condenser refrigerant temperature in deg F.
    s. Oil pressure in psig.
    t. Oil temperature in deg F.
    u. Voltage at each connection.
    v. Amperage for each phase.
    w. Kilowatt input.
    x. Crankcase heater kilowatt.
    y. Number of fans.
    z. Condenser fan rpm.
    aa. Condenser fan airflow rate in cfm.
    bb. Condenser fan motor make, frame size, rpm, and horsepower.
    cc. Condenser fan motor voltage at each connection.
    dd. Condenser fan motor amperage for each phase.

M. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

    a. Unit identification.
    b. Location.
    c. Service.
    d. Make and size.
    e. Model and serial numbers.

B. Final Inspection:

1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Owner.
2. TAB firm test and balance engineer shall conduct the inspection in the presence of Owner.
3. Owner shall randomly select measurements documented in the final report to be rechecked. The rechecking shall be limited to either 10 percent of the total measurements recorded, or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If the rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
7. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

3.15 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near-peak summer and winter conditions.

END OF SECTION 23 05 93

SECTION 23 08 00

COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for commissioning the HVAC system and its subsystems and equipment. This Section supplements the general requirements specified in Division 01 Section "General Commissioning Requirements."

B. Related Sections include the following:
1. Division 01 Section "General Commissioning Requirements" for general requirements for commissioning processes that apply to this Section.

1.2 DEFINITIONS

A. Architect: Includes Architect identified in the Contract for Construction between Owner and Contractor, plus consultant/design professionals responsible for design of HVAC, electrical, communications, controls for HVAC systems, and other related systems.

B. BoD: Basis of Design.

C. BoD-HVAC: HVAC systems basis of design.

D. CxA: Commissioning Authority.

E. OPR: Owner's Project Requirements.

F. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.

G. TAB: Testing, Adjusting, and Balancing.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. The following responsibilities are in addition to those specified in Division 01 Section "General Commissioning Requirements."

B. Each Contractor:
1. Attend procedures meeting for TAB Work.
2. Certify that TAB Work is complete.

C. Mechanical Contractor:
1. Attend TAB verification testing.
2. Provide measuring instruments and logging devices to record test data, and data acquisition equipment to record data for the complete range of testing for the required test period.

D. HVAC Instrumentation and Control Contractor: With the CxA, review control designs for compliance with the OPR and BoD, controllability with respect to actual equipment to be installed, and recommend adjustments to control designs and sequence of operation descriptions.

E. TAB Contractor:

7. Electrical demand or power input at specified conditions.
8. Power quality and related measurements.
9. Expected performance of systems, subsystems, and equipment at each step of test.
10. Narrative description of observed performance of systems, subsystems, and equipment. Notation to indicate whether the observed performance at each step meets the expected results.
11. Interaction of auxiliary equipment.
12. Issues log.

1.5 SUBMITTALS

A. The following submittals are in addition to those specified in Division 01 Section "General Commissioning Requirements."

B. Testing Procedures: CxA shall submit detailed testing plan, procedures, and checklists for each series of tests. Submittals shall include samples of data reporting sheets that will be part of the reports.

C. Certificate of Readiness: CxA shall compile certificates of readiness from each Contractor certifying that systems, subsystems, equipment, and associated controls are ready for testing.

D. Certificate of Completion of Installation, Prestart, and Startup: CxA shall certify that installation, prestart, and startup activities have been completed. Certification shall include completed checklists provided by TAB Contractor as specified in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."

E. Certified Pipe Cleaning and Flushing Report: CxA shall certify that pipe cleaning; flushing, hydrostatic testing, and chemical treating have been completed.

F. Test and Inspection Reports: CxA shall compile and submit test and inspection reports and certificates, and shall include them in systems manual and commissioning report.

G. Corrective Action Documents: CxA shall submit corrective action documents.

H. Certified TAB Reports: CxA shall submit verified, certified TAB reports.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Prerequisites for Testing:
1. Certify that HVAC systems, subsystems, and equipment have been completed, calibrated, and started; are operating according to the OPR, BoD, and Contract Documents; and that Certificates of Readiness are signed and submitted.
2. Certify that HVAC instrumentation and control systems have been completed and calibrated; are operating according to the OPR, BoD, and Contract Documents; and that pretest set points have been recorded.

10. Partial occupancy conditions.
11. Special cycles.

3.2 TAB VERIFICATION

A. TAB Contractor shall coordinate with CxA for work required in Division 23 Section "Testing, Adjusting, and Balancing for HVAC" TAB Contractor shall copy CxA with required reports, sample forms, checklists, and certificates.

B. Each Contractor, HVAC Contractor, and CxA shall witness TAB Work.

C. TAB Preparation:
1. TAB Subcontractor shall provide CxA with data required for "Pre-Field TAB Engineering Reports" specified in Division 23 Section "Testing, Adjusting, and Balancing for HVAC."
   a. CxA shall use this data to certify that prestart and startup activities have been completed for systems, subsystems, and equipment installation.

D. Ductwork Air Leakage Testing:
1. Architect will identify, for HVAC Subcontractor and CxA, portions of duct systems to have ductwork air leakage testing. Ductwork air leakage testing shall be performed according to Division 23 Section "Metal Ducts," and shall be witnessed by the CxA.
2. On approval of preliminary ductwork air leakage testing report, the CxA shall coordinate verification testing of ductwork air leakage testing. Verification testing shall include random retests of portions of duct section tests, reported in preliminary ductwork air leakage testing report. The HVAC Subcontractor shall perform tests using the same instrumentation (by model and serial number) as for original testing; the CxA shall witness verification testing.

E. Verification of Final TAB Report:
1. CxA shall select, at random, 10 percent of report for field verification.
2. CxA shall notify TAB Subcontractor 10 days in advance of the date of field verification; however, notice shall not include data points to be verified. The TAB Subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item is defined as follows:
   a. For all readings other than sound, a deviation of more than 10 percent.
      1) For sound pressure readings, a deviation of 3 dB. (Note: Variations in background noise must be considered.)
4. Failure of more than 10 percent of selected items shall result in rejection of final TAB report.

F. If deficiencies are identified during verification testing, CxA shall notify the HVAC Subcontractor and Architect, and shall take action to remedy the deficiency. Architect shall review final tabulated checklists and data sheets to determine if verification is complete and that system is operating according to the Contract Documents.

G. CxA shall certify that TAB Work has been successfully completed.

3.3 TESTING

A. Test systems and intersystem performance after test checklists for systems, subsystems, and equipment have been approved.

4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

H. Energy Supply System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of steam, hot-water systems and equipment. Plan shall include the following:
   1. Sequence of testing and testing procedures for each equipment item and pipe section to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in system testing plan.
   2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

I. Heat-Generation System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of boilers, feedwater equipment, furnaces, and auxiliary equipment. Plan shall include the following:
   1. Sequence of testing and testing procedures for each item of equipment and section of pipe to be tested, identified by identification marker. Markers shall be keyed to Drawings for each pipe sector showing the physical location of each item of equipment and pipe test section. Drawings shall be formatted to allow each item of equipment and section of piping to be physically located and identified when referred to in the system testing plan.
   2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

J. Refrigeration System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. Plan shall include the following:
   1. Sequence of testing and testing procedures for each item of equipment and section of pipe to be tested, identified by identification marker. Markers shall be keyed to Drawings showing the physical location of each item of equipment and pipe test section. Drawings shall be formatted to allow each item of equipment and section of piping to be physically located and identified when referred to in the system testing plan.
   2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

K. HVAC Distribution System Testing: HVAC Subcontractor shall prepare a testing plan to verify performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems. Include HVAC terminal equipment and unitary equipment. Plan shall include the following:
   1. Sequence of testing and testing procedures for each item of equipment and section of pipe to be tested, identified by identification marker. Markers shall be keyed to Drawings showing the physical location of each item of equipment and pipe test section. Drawings shall be formatted to allow each item of equipment and section of piping to be physically located and identified when referred to in the system testing plan.
   2. Tracking checklist for managing and ensuring that all pipe sections have been tested.

12. Condensate pan, drain, and trap drains condensate properly.		
HEATING COILS:		
1. Coils clean and fins in good condition.		
2. Coils are properly supported.		
3. Thermometers, PT plugs, pressure gages properly installed.		
4. Control valve installed if coil is w/o integral face & bypass dampers		
5. Two position valve installed if coil has integral face & bypass dampers		
6. Clearances accommodate coil removal.		
7. Electrical connections properly installed.		

Air Handing Unit Comments:

_____

_____

Approvals:

_____Date_____ _____Date_____

Mechanical Installer Contractor

SECTION 23 23 00

REFRIGERANT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes refrigerant piping used for HVAC applications.

1.2 PERFORMANCE REQUIREMENTS

A. Line Test Pressure for Refrigerant R-22:

1. Suction Lines for Air-Conditioning Applications: 185 psig.
2. Suction Lines for Heat-Pump Applications: 325 psig.
3. Hot-Gas and Liquid Lines: 325 psig.

B. Line Test Pressure for Refrigerant R-134a:

1. Suction Lines for Air-Conditioning Applications: 115 psig.
2. Suction Lines for Heat-Pump Applications: 225 psig.
3. Hot-Gas and Liquid Lines: 225 psig.

C. Line Test Pressure for Refrigerant R-407C:

1. Suction Lines for Air-Conditioning Applications: 230 psig.
2. Suction Lines for Heat-Pump Applications: 380 psig.
3. Hot-Gas and Liquid Lines: 380 psig.

D. Line Test Pressure for Refrigerant R-410A:

1. Suction Lines for Air-Conditioning Applications: 300 psig.
2. Suction Lines for Heat-Pump Applications: 535 psig.
3. Hot-Gas and Liquid Lines: 535 psig.

1.3 SUBMITTALS

A. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:

1. Thermostatic expansion valves.
2. Solenoid valves.
3. Hot-gas bypass valves.
4. Filter dryers.
5. Strainers.
6. Pressure-regulating valves.

C. Wrought-Copper Unions: ASME B16.22.

D. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.

E. Brazing Filler Metals: AWS A5.8.

F. Flexible Connectors:

1. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
2. End Connections: Socket ends.
3. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch- long assembly.
4. Pressure Rating: Factory test at minimum 500 psig.
5. Maximum Operating Temperature: 250 deg F.

2.2 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; Type, Grade, and wall thickness as selected in Part 3 piping applications articles.

B. Wrought-Steel Fittings: ASTM A 234/A 234M, for welded joints.

C. Steel Flanges and Flanged Fittings: ASME B16.5, steel, including bolts, nuts, and gaskets, bevel-welded end connection, and raised face.

D. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

E. Flanged Unions:

1. Body: Forged-steel flanges for NPS 1 to NPS 1-1/2 and ductile iron for NPS 2 to NPS 3. Apply rust-resistant finish at factory.
2. Gasket: Fiber asbestos free.
3. Fasteners: Four plated-steel bolts, with silicon bronze nuts. Apply rust-resistant finish at factory.
4. End Connections: Brass tailpiece adapters for solder-end connections to copper tubing.
5. Offset Performance: Capable of minimum 3/4-inch misalignment in minimum 7-inch- long assembly.
6. Pressure Rating: Factory test at minimum 400 psig.
7. Maximum Operating Temperature: 330 deg F.

F. Flexible Connectors:

1. Body: Stainless-steel bellows with woven, flexible, stainless-steel-wire-reinforced protective jacket
2. End Connections:

a. NPS 2 and Smaller: With threaded-end connections.
b. NPS 2-1/2 and Larger: With flanged-end connections.

2. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
3. Seat: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 115-V ac coil.
6. Working Pressure Rating: 400 psig.
7. Maximum Operating Temperature: 240 deg F.
8. Manual operator.

F. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.

1. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
2. Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Seat Disc: Polytetrafluoroethylene.
4. End Connections: Threaded.
5. Working Pressure Rating: 400 psig.
6. Maximum Operating Temperature: 240 deg F.

G. Thermostatic Expansion Valves: Comply with ARI 750.

1. Body, Bonnet, and Seal Cap: Forged brass or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Capillary and Bulb: Copper tubing filled with refrigerant charge.
5. Suction Temperature: 40 deg F.
6. Superheat: Adjustable.
7. Reverse-flow option (for heat-pump applications).
8. End Connections: Socket, flare, or threaded union.
9. Working Pressure Rating: 700 psig .

H. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.

1. Body, Bonnet, and Seal Cap: Ductile iron or steel.
2. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
3. Packing and Gaskets: Non-asbestos.
4. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
5. Seat: Polytetrafluoroethylene.
6. Equalizer: Internal.
7. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch conduit adapter, and 24, 115, or 208-V ac coil as required.
8. End Connections: Socket.
9. Throttling Range: Maximum 5 psig.
10. Working Pressure Rating: 500 psig.
11. Maximum Operating Temperature: 240 deg F.

I. Straight-Type Strainers:

1. Body: Welded steel with corrosion-resistant coating.
2. Screen: 100-mesh stainless steel.
3. End Connections: Socket or flare.
4. Working Pressure Rating: 500 psig.

1. Body: Welded steel with corrosion-resistant coating.
2. End Connections: Socket or flare.
3. Working Pressure Rating: 500 psig.
4. Maximum Operating Temperature: 275 deg F.

O. Receivers: Comply with ARI 495.

1. Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
2. Comply with UL 207; listed and labeled by an NRTL.
3. Body: Welded steel with corrosion-resistant coating.
4. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
5. End Connections: Socket or threaded.
6. Working Pressure Rating: 500 psig.
7. Maximum Operating Temperature: 275 deg F.

P. Liquid Accumulators: Comply with ARI 495.

1. Body: Welded steel with corrosion-resistant coating.
2. End Connections: Socket or threaded.
3. Working Pressure Rating: 500 psig.
4. Maximum Operating Temperature: 275 deg F.

2.4 REFRIGERANTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Atofina Chemicals, Inc.
2. DuPont Company; Fluorochemicals Div.
3. Honeywell, Inc.; Genetron Refrigerants.
4. INEOS Fluor Americas LLC.

B. ASHRAE 34, R-22: Monochlorodifluoromethane.

C. ASHRAE 34, R-134a: Tetrafluoroethane.

D. ASHRAE 34, R-407C: Difluoromethane/Pentafluoroethane/1,1,1,2-Tetrafluoroethane.

E. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS FOR REFRIGERANT R-22

A. Suction Lines NPS 1-1/2 and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazedjoints.

M. Install refrigerant piping in protective conduit where installed belowground.

N. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.

O. Slope refrigerant piping as follows:

1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
2. Install horizontal suction lines with a uniform slope downward to compressor.
3. Install traps and double risers to entrain oil in vertical runs.
4. Liquid lines may be installed level.

P. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

Q. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:

1. Shot blast the interior of piping.
2. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
3. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
4. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
5. Finally, draw a clean, dry, lintless cloth through the tube or pipe.
6. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.

R. Install pipe sleeves at penetrations in exterior walls and floor assemblies.

S. Seal penetrations through fire and smoke barriers according to Division 07 Section "Penetration Firestopping."

T. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.

U. Install sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.

V. Seal pipe penetrations through exterior walls according to Division 07 Section "Joint Sealants" for materials and methods.

W. Identify refrigerant piping and valves according to Division 23 Section "Identification for HVAC Piping and Equipment."

3.3 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Support multifloor vertical runs at least at each floor.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

B. Tests and Inspections:

1. Comply with ASME B31.5, Chapter VI.
2. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
3. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.

    a. Fill system with nitrogen to the required test pressure.
    b. System shall maintain test pressure at the manifold gage throughout duration of test.
    c. Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
    d. Remake leaking joints using new materials, and retest until satisfactory results are achieved.

3.6 SYSTEM CHARGING

A. Charge system using the following procedures:

1. Install core in filter dryers after leak test but before evacuation.
2. Evacuate entire refrigerant system with a vacuum pump to 500 micrometers. If vacuum holds for 12 hours, system is ready for charging.
3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
4. Charge system with a new filter-dryer core in charging line.

3.7 ADJUSTING

A. Adjust thermostatic expansion valve to obtain proper evaporator superheat.

B. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.

C. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.

D. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:

1. Open shutoff valves in condenser water circuit.
2. Verify that compressor oil level is correct.
3. Open compressor suction and discharge valves.

SECTION 23 31 13

METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2 to plus 10-inch wg. Metal ducts include the following:
   1. Rectangular ducts and fittings.

B. Related Sections include the following:
   1. Division 23 Section "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select size and type of air-moving and -distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Architect. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.3 SUBMITTALS

A. Shop Drawings: CAD-generated and drawn to 1/4 inch equals 1 foot scale. Show fabrication and installation details for metal ducts.
   1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
   2. Duct layout indicating sizes and pressure classes.
   3. Elevations of top and bottom of ducts.
   4. Dimensions of main duct runs from building grid lines.
   5. Fittings.
   6. Reinforcement and spacing.
   7. Seam and joint construction.
   8. Penetrations through fire-rated and other partitions.
   9. Equipment installation based on equipment being used on Project.
   10. Duct accessories, including access doors and panels.
   11. Hangers and supports, including methods for duct and building attachment, vibration isolation, and seismic restraints.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
   1. Ceiling suspension assembly members.
   2. Other systems installed in same space as ducts.
   3. Ceiling- and wall-mounting access doors and panels required to provide access to dampers and other operating devices.

D. Stainless Steel: ASTM A 480/A 480M, Type 316, and having a No. 2D finish for concealed ducts and for exposed ducts.

E. Aluminum Sheets: ASTM B 209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 SEALANT MATERIALS

A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

B. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.

C. Tape Sealing System: Woven-fiber tape impregnated with gypsum mineral compound and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.

D. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.

E. Solvent-Based Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.

F. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.

G. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
   1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
   2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
   1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
   2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
   3. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

B. Install ducts with fewest possible joints.

C. Install fabricated fittings for changes in directions, size, and shape and for connections.

D. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of 3 screws in each coupling.

E. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

H. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

I. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.

J. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.

K. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.

L. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches.

M. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Division 23 Section "Air Duct Accessories." Firestopping materials and installation methods are specified in Division 07 Section "Penetration Firestopping."

N. Install ducts with hangers and braces designed to withstand, without damage to equipment, seismic force required by applicable building codes. Refer to

O. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."

P. Paint interiors of metal ducts, for 24 inches upstream of registers and grilles. Apply one coat of flat, black, latex finish coat over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 09 painting Sections.

3.3 SEAM AND JOINT SEALING

A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.
   1. For pressure classes lower than 2-inch wg, seal transverse joints.

B. Seal ducts before external insulation is applied.

D. Clean the following metal duct systems by removing surface contaminants and deposits:
   1. Air outlets and inlets (registers, grilles, and diffusers).
   2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
   3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
   4. Coils and related components.
   5. Return-air ducts, dampers, and actuators except in ceiling plenums and mechanical equipment rooms.
   6. Supply-air ducts, dampers, actuators, and turning vanes.

END OF SECTION 23 31 13

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Backdraft dampers.
2. Volume dampers.
3. Fire dampers.
4. Smoke dampers.
5. Combination fire and smoke dampers.
6. Turning vanes.
7. Duct-mounting access doors.
8. Flexible connectors.
9. Flexible ducts.
10. Duct accessory hardware.

B. Related Sections include the following:

1. Division 23 Section "Instrumentation and Control for HVAC" for electric and pneumatic damper actuators.
2. Division 28 Section "Fire Detection and Alarm" for duct-mounting fire and smoke detectors.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Backdraft dampers.
2. Volume dampers.
3. Fire dampers.
4. Smoke dampers.
5. Combination fire and smoke dampers.
6. Turning vanes.
7. Duct-mounting access doors.
8. Flexible connectors.
9. Flexible ducts.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Special fittings.
2. Manual-volume damper installations.
3. Motorized-control damper installations.

F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT DAMPERS

A. Manufacturers:
1. Greenheck.
2. Prefco Products, Inc.
3. Ruskin Company.

B. Description: Multiple-blade, parallel action gravity balanced, with blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

2.4 VOLUME DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. Flexmaster U.S.A., Inc.
3. McGill AirFlow Corporation.
4. Ruskin Company.

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

1. Pressure Classes of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.

C. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch- thick, galvanizedsheet steel.
3. Aluminum Frames: Hat-shaped, 0.10-inch- thick, aluminum sheet channels; frames with flanges where indicated for attaching to walls; and flangeless frames where indicated for installing in ducts.
4. Roll-Formed Aluminum Blades: 0.10-inch- thick aluminum sheet.
5. Extruded-Aluminum Blades: 0.050-inch- thick extruded aluminum.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

F. Mounting Orientation: Vertical or horizontal as indicated.

G. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized-steel blade connectors.

H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

I. Fusible Links: Replaceable, 165 deg F rated.

2.6 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers:
1. Greenheck.
2. Nailor Industries Inc.
3. Ruskin Company.

B. General Description: Labeled according to UL 555S. Combination fire and smoke dampers shall be labeled according to UL 555 for 1-1/2-hour rating.

C. Fusible Links: Replaceable, 165 deg F rated.

D. Frame and Blades: 0.064-inch- thick, galvanized sheet steel.

E. Mounting Sleeve: Factory-installed, 0.052-inch- thick, galvanized sheet steel; length to suit wall or floor application.

F. Damper Motors: Modulating and two-position action.

1. Honeywell actuators are not acceptable.
2. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
5. Outdoor Motors and Motors in Outside-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.

a. Ductmate Industries, Inc.
b. Flexmaster U.S.A., Inc.
c. Insert manufacturer's name.

2. Frame: Galvanized sheet steel, with spin-in notched frame.

D. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

E. Insulation: 1-inch- thick, fibrous-glass or polystyrene-foam board.

2.9 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Ductmate Industries, Inc.
2. Duro Dyne Corp.
3. Ventfabrics, Inc.

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Select metal compatible with ducts.

D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

E. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

F. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.

1. Minimum Weight: 16 oz./sq. yd..
2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

G. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.

1. Minimum Weight: 14 oz./sq. yd..
2. Tensile Strength: 450 lbf/inch in the warp and 340 lbf/inch in the filling.

E. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.

F. Provide test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire and smoke dampers, with fusible links, according to manufacturer's UL-approved written instructions.

H. Install duct silencers independent of ducts with flexible duct connectors, lagged with loaded vinyl sheet on inlets and outlets.

I. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:

1. On both sides of duct coils.
2. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.

J. Install the following sizes for duct-mounting, rectangular access doors:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body Plus Ladder Access: 25 by 17 inches.

K. Install the following sizes for duct-mounting, round access doors:

1. One-Hand or Inspection Access: 8 inches in diameter.
2. Two-Hand Access: 10 inches in diameter.
3. Head and Hand Access: 12 inches in diameter.
4. Head and Shoulders Access: 18 inches in diameter.
5. Body Access: 24 inches in diameter.

L. Install the following sizes for duct-mounting, pressure relief access doors:

1. One-Hand or Inspection Access: in diameter.
2. Two-Hand Access: 10 inches in diameter.
3. Head and Hand Access: 13 inches in diameter.
4. Head and Shoulders Access: 19 inches in diameter.

M. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment."

N. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

O. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

SECTION 23 34 23

HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Centrifugal roof ventilators.

1.2 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base fan-performance ratings on actual Project site elevations.

B. Operating Limits: Classify according to AMCA 99.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material thickness and finishes, including color charts.
5. Dampers, including housings, linkages, and operators.
6. Roof curbs.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Wiring Diagrams: Power, signal, and control wiring.
2. Design Calculations: Calculate requirements for selecting hurricane restraints and anchors.

C. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Roof framing and support members relative to duct penetrations.
2. Ceiling suspension assembly members.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Acme Engineering & Mfg. Corp.
2. Aerovent; a Twin City Fan Company
3. Greenheck.
4. Loren Cook Company.
5. Penn Ventilation.

B. Description: Direct- or belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

C. Housing: Removable, spun-aluminum, dome top and outlet baffle extruded-aluminum, rectangular top galvanized steel, mushroom-domed top; square, one-piece, aluminum base with venturi inlet cone.

1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains and grease collector.
2. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.

D. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

E. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
4. Fan and motor isolated from exhaust airstream.

F. Accessories:
1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outsidefan housing, factory wired through an internal aluminum conduit.
2. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
3. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
4. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

G. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.

G. Label units according to requirements specified in Division 23 Section "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories."

B. Install ducts adjacent to power ventilators to allow service and maintenance.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust damper linkages for proper damper operation.

B. Adjust belt tension.

SECTION 23 37 13

DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes ceiling- and wall-mounted diffusers, registers, and grilles.

B. Related Sections include the following:
1. Division 08 Section "Louvers and Vents" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
2. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.2 SUBMITTALS

A. Product Data: For each product indicated, include the following:
1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate Drawing designation, room location, quantity, model number, size, and accessories furnished.

B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Ceiling suspension assembly members.
2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

C. Samples for Initial Selection: For diffusers, registers, and grilles with factory-applied color finishes.

D. Samples for Verification: For diffusers, registers, and grilles, in manufacturer's standard sizes to verify color selected.

PART 2 - PRODUCTS

2.1 REFER TO DRAWINGS

1. Ceiling supply outlets, grilles and registers shall be provided in accordance with the schedule on the Drawings. Acceptable manufacturers are Price, Titus, Metalaire or Krueger.

SECTION 23 62 00

PACKAGED COMPRESSOR AND CONDENSER UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes air-cooled condensing units.

1.2 SUBMITTALS

A. Product Data: For each condensing unit, include rated capacities, operating characteristics, furnished specialties, and accessories. Include equipment dimensions, weights and structural loads, required clearances, method of field assembly, components, and location and size of each field connection.

B. Shop Drawings:

C. Field quality-control test reports.

D. Operation and Maintenance Data: For condensing units to include in emergency, operation, and maintenance manuals.

E. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of condensing units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Fabricate and label refrigeration system according to ASHRAE 15, "Safety Code for Mechanical Refrigeration."

1.4 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

F. Accessories:
1. Coastal Filter: Mesh screen to protect condenser coil from salt damage.
2. Crankcase heater.
3. Cycle Protector: Automatic-reset timer to prevent rapid compressor cycling.
4. Evaporator Freeze Thermostat: Temperature-actuated switch that stops unit when evaporator reaches freezing temperature.
5. Filter-dryer.
6. High-Pressure Switch: Automatic-reset switch cycles compressor off on high refrigerant pressure.
7. Liquid-line solenoid.
8. Low Ambient Controller: Cycles condenser fan to permit operation down to 0 deg F.
9. Low-Pressure Switch: Automatic-reset switch cycles compressor off on low refrigerant pressure.
10. PE mounting base to provide a permanent foundation.
11. Precharged and insulated suction and liquid tubing.
12. Thermostatic expansion valve.
13. Time-Delay Relay: Continues operation of evaporator fan after compressor shuts off.

G. Unit Casing: Galvanized steel, finished with baked enamel; with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Mount service valves, fittings, and gage ports on exterior of casing.

2.3 MOTORS

A. General requirements for motors are specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.

2.4 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate condensing units according to ARI 210/240 ARI 340/360.
1. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
2. Energy-Efficiency Ratio: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."

B. Test and inspect shell and tube condensers according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

F. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

C. Connect precharged refrigerant tubing to unit's quick-connect fittings. Install tubing so it does not interfere with access to unit. Install furnished accessories.

D. Connect refrigerant piping to air-cooled condensing units; maintain required access to unit. Install furnished field-mounted accessories. Refrigerant piping and specialties are specified in Division 23 Section "Refrigerant Piping."

E. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

F. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections and prepare test reports:
   1. Perform electrical test and visual and mechanical inspection.
   2. Leak Test: After installation, charge systems with refrigerant and oil and test for leaks. Repair leaks, replace lost refrigerant and oil, and retest until no leaks exist.
   3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   5. Verify proper airflow over coils.

B. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.

C. Remove and replace malfunctioning condensing units and retest as specified above.

3.5 STARTUP SERVICE

A. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
   1. Inspect for physical damage to unit casing.

SECTION 23 82 19

FAN COIL UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fan-coil units and accessories.

1.2 DEFINITIONS

A. BAS: Building automation system.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Wiring Diagrams: Power, signal, and control wiring.
   2. Ceiling suspension components.
   3. Structural members to which fan-coil units will be attached.
   4. Method of attaching hangers to building structure.
   5. Size and location of initial access modules for acoustical tile.
   6. Items penetrating finished ceiling, including the following:
      a. Lighting fixtures.
      b. Air outlets and inlets.
      c. Speakers.
      d. Sprinklers.
      e. Access panels.
   7. Perimeter moldings for exposed or partially exposed cabinets.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of fan-coil unit indicated.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For fan-coil units to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
   1. Maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

G. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Closed-cell insulation with foil or matt facing is provided by some manufacturers to reduce the possibility of fibers from glass-fiber insulation being introduced into the conditioned space.

D. Coil Section Insulation: 1/2-inch thick, neoprene coating (non erosion type) glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
   1. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.

E. Main and Auxiliary Drain Pans: Stainless steel Insulated galvanized steel with plastic liner formed to slope from all directions to the drain connection as required by ASHRAE 62.

F. Chassis: Galvanized steel where exposed to moisture. Floor-mounting units shall have leveling screws.

G. Cabinet: Steel with factory prime coating, ready for field painting baked-enamel finish in manufacturer's custom paint color as selected by Architect.
   1. Vertical Unit Front Panels: Removable, steel, with integral stamped discharge grille and channel-formed edges, cam fasteners, and insulation on back of panel.
   2. Horizontal Unit Bottom Panels: Fastened to unit with cam fasteners and hinge and attached with safety chain; with integral stamped discharge grilles.
   3. Stack Unit Discharge and Return Grille: Aluminum double-deflection discharge grille, and louvered- or panel-type return grille; color as selected by Architect from manufacturer's standard colors. Return grille shall provide maintenance access to fan-coil unit.
   4. Steel recessing flanges for recessing fan-coil units into ceiling or wall.

H. Outdoor-Air Damper: Galvanized-steel blades with edge and end seals and nylon bearings; with electronic, modulating actuators.

I. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
   1. Pleated Cotton-Polyester Media: 90 percent arrestance and 7 MERV.

J. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in galvanized-steel housing; with fuses in terminal box for over current protection and limit controls for high-temperature protection. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.

K. Fan and Motor Board: Removable.
   1. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.
   2. Motor: Permanently lubricated multispeed; resiliently mounted on motor board. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
   3. Wiring Termination: Connect motor to chassis wiring with plug connection.

L. Electrical Connection: Factory wire motors and controls for a single electrical connection.

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

3.5 ADJUSTING

A. Adjust initial temperature and humidity set points.

B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fan-coil units. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 23 82 19

SECTION 23 82 39

UNIT HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Cabinet unit heaters with centrifugal fans and hot-water and electric-resistance heating coils.
2. Propeller unit heaters with hot-water and electric-resistance heating coils.
3. Wall and ceiling heaters with propeller fans and electric-resistance heating coils.

1.2 DEFINITIONS

A. BAS: Building automation system.

B. CWP: Cold working pressure.

C. PTFE: Polytetrafluoroethylene plastic.

D. TFE: Tetrafluoroethylene plastic.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Location and size of each field connection.
3. Details of anchorages and attachments to structure and to supported equipment.
4. Equipment schedules to include rated capacities, operating characteristics, furnished specialties, and accessories.
5. Location and arrangement of piping valves and specialties.
6. Location and arrangement of integral controls.
7. Wiring Diagrams: Power, signal, and control wiring.

C. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

D. Samples for Initial Selection: Finish colors for units with factory-applied color finishes.

E. Samples for Verification: Finish colors for each type of cabinet unit heater and wall and ceiling heaters indicated with factory-applied color finishes.

F. Field quality-control test reports.

G. Operation and Maintenance Data: For cabinet unit heaters to include in emergency, operation, and maintenance manuals.

K. Fan: Propeller type with aluminum wheel directly mounted on motor shaft in the fan venturi.

L. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
1. Motor Type: Permanently lubricated, multispeed .

M. Control Devices:
1. Unit-mounted, fan-speed switch.
2. Unit-mounted thermostat.

2.2 WALL AND CEILING HEATERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Chromalox, Inc.; a division of Emerson Electric Company.
2. Indeeco.
3. QMark Electric Heating; a division of Marley Engineered Products.
4. Trane.

B. Description: An assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.

C. Cabinet:
1. Front Panel: Stamped-steel louver , with removable panels fastened with tamperproof fasteners.
2. Finish: Baked enamel over baked-on primer with manufacturer's standard color selected by Architect, applied to factory-assembled and -tested wall and ceiling heaters before shipping.

D. Surface-Mounting Cabinet Enclosure: Steel with finish to match cabinet.

E. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and hum, embedded in magnesium oxide refractory and sealed in corrosion-resistant metallic sheath. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware, and limit controls for high temperature protection. Provide integral circuit breaker for overcurrent protection.

F. Fan: Aluminum propeller directly connected to motor.
1. Motor: Permanently lubricated. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

G. Controls: Unit-mounted thermostat. Low-voltage relay with transformer kit.

H. Electrical Connection: Factory wire motors and controls for a single field connection with disconnect switch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for piping and electrical connections to verify actual locations before unit heater installation.

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

3.5 ADJUSTING

A. Adjust initial temperature set points.

B. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION 23 82 39

Division 26 – Electrical Specification

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. The requirements contained in this Section apply to all Section of this Division.

B. Section Includes:
1. Common terminology and requirements used throughout this Division.
2. Requirements for Acceptance Testing Agency.
3. Requirements for Manufacturer Seismic Qualification Certification.
4. Requirements for Professional Engineers responsible for Delegated Design.
5. Electrical equipment coordination and installation.
6. Sleeves for raceways and cables.
7. Sleeve seals.
8. Grout.
9. Common electrical installation requirements.

1.2 DEFINITIONS

A. AHJ: Authorities Having Jurisdiction.

B. ANSI GRAY: Where this Section and other Sections of this Division use the term "ANSI GRAY" it shall mean the manufacturer's standard ANSI Gray

C. Bound Material: Bound refers to materials permanently bound, as by stitching or glue, or materials securely fastened in their covers by multiple fasteners that penetrate all papers. Ring binders, spiral binders, brads and screw posts are acceptable fasteners. Loose papers clipped together or stapled at one corner are not acceptable.

D. Business Day: Where this Section and other Sections of this Division use the term "Business Day" it shall mean Monday thru Friday, excluding Holidays recognized by Federal, State and Local government.

E. EPDM: Ethylene-propylene-diene terpolymer rubber.

F. NBR: Acrylonitrile-butadiene rubber.

G. NIST: National Institute of Science and Technology

1.3 PERFORMANCE REQUIREMENTS

A. The Drawings diagrammatically show the sizes and locations of various equipment and devices, and the sizes of the major interconnecting wires,

and Division 01 Section "Project Management and Coordination". In addition to the requirements of Division 01 comply with the following:

1. Prepare Coordination Drawings using computerized drafting software compatible with AutoDesk's AutoCAD®. Drawings files must be composite with multiple distinctive layers for each of the various trades.
2. Submit hardcopy of Coordination Drawings in the quantity as required under Division 01. Hardcopies of Coordination Drawings shall have each sheet clearly labeled with a unique sheet identification number.
3. In addition to hardcopies required by Division 01, submit one copy of Shop Drawings in electronic format on CD or DVD. Files contained on disc shall be named to correspond with the sheet names contained in the hardcopy set. Files on disc shall be include both AutoCAD® compatible source files and files printed to Portable Document Format (.pdf).
4. Coordination Drawings shall be of appropriate scale but shall not be smaller than a scale of 1/4-inch equals one foot.

D. Common Requirements For Qualification Data:
   1. Professional Engineer Qualifications: Where this Section and other Sections of this Division require a Professional Engineer to be responsible for Delegated Design requirements; Submit Qualification data for Professional Engineer including, but not limited to, proof of registration in the Project location.
   2. Testing and Inspecting Agency Certification: Where this Section and other Sections of this Division require an Independent Testing and Inspecting agency to be responsible for Acceptance Testing and Field Quality Control requirements; Submit certification documentation for such agency that demonstrates compliance with the Quality Assurance paragraph of this Section.
   3. Manufacturer Seismic Qualification Certification: Where this Section and other Sections of this Division require products to meet seismic requirements; Submit certification that equipment, devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems" Include the following:
      a. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
         1) The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
      b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
      c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

E. Product Data: Submit product data for each of the following.
   1. Sleeves.
   2. Sleeve seals.
   3. Grout.

company regulations and the Contract Documents, the most stringent shall govern. Perform the following:

1. Promptly notify the Architect in writing of any such difference.
2. Obtain approval from Architect before proceeding with the Work.
3. Should the Contractor perform any work that knowingly does not comply with local codes, laws and ordinances, industry standards, or other governing regulations; the Work shall be corrected at no cost to the Owner.

D. Common Requirements for Compliance with AHJ Instructions: In cases where the Authority Having Jurisdiction requires deviations from the requirements of the Contract Drawings, perform the following:

1. Promptly notify the Architect in writing of any such difference.
2. Obtain approval from Architect before proceeding with the Work.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1. Wherever a UL standard has been established for a particular type of material, equipment or device, each item of such material, equipment or device provided shall meet the requirements of the UL standard.

1.6 PRODUCT SUBSTITUTIONS

A. Comply with provisions of Division 01 Section "Product Requirements".

1. If item of equipment or device offered as Substitution differs in dimension or configuration from that indicated in the Contract Documents, provide, as part of the substitution submittal, a drawing that shows that the equipment or devices proposed for Substitution can be installed in the space available without interfering with other trades or with access requirements for operations and maintenance in the completed project. Drawings shall be of appropriate scale but shall not be smaller than a scale of 1/4-inch equals one foot.
2. Where substitute equipment or devices requires different arrangement or connections from that indicated in the Contract Documents, install the equipment or devices to operate properly and in accordance with the requirements of the Contract Documents. Make incidental changes necessary in piping, ductwork or wiring which results from the inclusion of the substitute equipment or device without any additional cost to the Owner. Pay all additional costs incurred by other trades in connection with changes required by the inclusion of the substituted equipment or device in the Work.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Architect Construction Manager and Owner no fewer than five business days in advance of proposed interruption of electrical service.

2. Telecommunications Services: Coordinate the location of the telephone, data, fiber, cable television and the entrance of other telecommunications services with the respective franchise utility company and with all other trades. Provide materials and equipment required to connect these telecommunications service.

F. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

G. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.
1. Minimum Metal Thickness:
   a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
   b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.
2. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: Carbon steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

appurtenances required to complete the relocations and to restore to good operating order.

D. Substitution of New materials for Relocation: New materials of similar design and quality may be substituted for materials and items indicated to be relocated upon approval of Owner and Architect. Comply with Division 01 for Substitution Procedures.

3.4 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. All materials, equipment and devices shall be installed in accordance with the recommendations of their manufacturer.

B. Comply with NECA 1 - Standard Practices for Good Workmanship in Electrical Construction, as published by the National Electrical Contractors Association.

C. Use licensed technicians skilled in their respective trades for installation of the Work.

D. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items, unless otherwise indicated.

E. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

F. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a manner as to facilitate future disconnecting with minimum interference with other items in the vicinity.

G. Right of Way: Give to piping systems installed at a required slope.

H. Access Panels: Provide wall and ceiling access panels for unrestricted access to all concealed electrical equipment items and devices installed behind furrings, chases or non-removable suspended ceilings. Access Panel materials and installation requirements are specified in Division 08 Section "Access Doors and Frames."

I. Installation Inspections and Certifications
1. Obtain timely inspections of the installation by Authorities Having Jurisdiction. Remedy any deficiencies to the satisfaction of the inspecting official.
2. Upon final completion of the Work, obtain certificates of acceptance from the Authorities Having Jurisdiction. Deliver the certificates to the Owner.

3.5 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, or wireways, penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

M. Roof-Penetration Sleeves: Seal penetration of individual conduits and cables with flashing units applied in coordination with roofing work. Provide flashing unit as specified in Division 07 Section "Sheet Metal Flashing and Trim".

N. Aboveground, Exterior-Wall Penetrations: Seal penetrations using cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

O. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.6 OPTION TO RELOCATE DEVICES

A. The location of power, data and telephone outlets, wall switches and other similar devices along with their associated connections may be relocated at the Owner's option, at no additional cost to the Owner, to a point within 10 feet of their present location provided the Contractor is notified prior to rough-in or installation.

3.7 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.8 UTILITIES

A. The location and voltage of electrical lines and the location of telecommunication lines included within the Work are indicated in the Contract Documents in accordance with information furnished by the Owner. Existing utility lines not indicated in Contract Documents but encountered during construction shall be protected, relocated or capped as directed by the Owner.

B. Prior to excavation, examine the site and verify the location and elevation of all utilities and their relation to the Work. Identify and label all underground utilities occurring within the bounds of the area to be excavated. Contact the known utilities and engage a certified locator service to assist in this effort.

C. Prior to excavation, contact the known utilities and inform them of excavation work plan. Proceed with excavation only after receiving approval from Utilities.

D. All precautions shall be exercised to prevent damage to existing lines, but should work become necessary, it must be authorized prior to execution except in an emergency situation.

F. Owner Furnished Equipment: Power Connections and Control wiring required for Owner Furnished Equipment may not be shown on the Drawings. This wiring shall be provided. Coordinated connection requirements and locations with Owner.
   1. Request all rough-in documentation required for proper installation of the electrical work in ample time to permit preparation of the installation drawings.

3.10 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 26 05 00

SECTION 26 05 19

LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.
3. Sleeves and sleeve seals for cables.

1.2 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.3 SUBMITTALS

A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Common Work Results for Electrical" for products specified under PART 2 - PRODUCTS.

B. Product Data: For each type of product indicated. Provide data for conductors and cables including, but not be limited to, the following:
1. Complete physical properties of the conductors and cables.
2. Ampacity for use intended.
3. Allowable stresses and requirements for installations, including bend radii, linear stress, and other pertinent data.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

1.5 COORDINATION

A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN-THWN, single conductors in raceway.

D. Feeders below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN-THWN, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.

G. Branch Circuits below Slabs-on-Grade, and Underground in limited locations where indicated: Type THHN-THWN, single conductors in raceway.

H. Class 1 Control Circuits: Type THHN-THWN, in raceway.

I. Class 2 and 3 Control Circuits; Concealed in Ceilings, Walls or Partitions: Power-limited cable or Type THHN-THWN, in raceway.

J. Class 2 and 3 Control Circuits; Exposed: Type THHN-THWN, in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Run feeders in continuous lengths, without joints or splices. Where continuous runs are impractical; obtain Engineer's approval for splice locations and application.

B. Make joints in branch circuits only where circuits divide.

C. Do not use gutters of panelboards as raceways, junction boxes, or pull boxes for conductors not terminating in said panelboards.

D. Run conduits for emergency power conductors separate from all other wiring.

E. Make splices and terminations in cables with kits and instructions provided by the kit manufacturer. Each splice shall equal the integrity of the cable electrically and environmentally.

F. Bundling Conductors: Bundle conductors in switchboards, panelboards, cabinets, and the like, using nylon traps, made for the purpose. Bundle conductors larger than No. 10 in individual circuits. Smaller conductors may be bundled in larger groups.

G. Install all conductors in raceways, unless specifically noted otherwise.

H. Sizes:
   1. Provide conductors no smaller than No. 12 AWG, except for signal or control circuits.
   2. Provide No. 10 AWG conductors for home runs on 120-volt, 20-ampere branch circuits, where the conductor length exceeds 100 lineal feet from panelboard to the first outlet.

G. Use manufacturer-approved pulling compound or lubricant where necessary, of non-conducting type. Compounds used must not deteriorate the conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

H. Do not use cable pulling lubricants on conductors of ungrounded circuits which are electrically monitored by ground detector system, since such lubricant may increase the capacities to ground of these conductors.

3.5 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

D. Connectors: Make splices and connections in conductors using approved connectors.
   1. Provide lugs and connectors of proper size to match conductor size.
   2. Stranded Conductors: Solder-less, bolted pressure or compression connectors.
   3. Solid Conductors: Bolted pressure or spring connectors.
   4. Motor Lead Pigtails: Crimp lugs with through-bolt fasteners between lugs. Furnish proper sized dies and tools to apply connectors.
   5. Lighting Fixture Taps: Electrical spring connectors as specified for solid conductors.
   6. Ground Connections: Provide ground clamps or connectors of a type suitable for grounding applications.

E. Provide temperature ratings of connectors and splices to match wire rating.

3.6 SLEEVE AND SLEEVE SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Apply Sleeve and Sleeve Seal where raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies. Sleeve and Sleeve Seal materials and installation requirements are specified in Division 26 Section "Common Work Results for Electrical."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. NFPA 70 and IEEE C2 include basic grounding requirements for electrical safety. This Section supplements the minimum safety requirements of the Code with requirements for additional grounding and with optional grounding methods and materials for both power and electronic systems.

B. This Section includes methods and materials for grounding systems and equipment, plus the following special applications:
   1. Underground distribution grounding.
   2. Common ground bonding with lightning protection system.

1.2 SUBMITTALS

A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Common Work Results for Electrical" for products specified under PART 2 - PRODUCTS.

B. Product Data: For each type of product indicated.

C. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in Part 3 "Field Quality Control" Article, including the following:
   1. Ground rods.
   2. Grounding arrangements and connections for separately derived systems.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For grounding to include the following in emergency, operation, and maintenance manuals:
   1. Instructions for periodic testing and inspection of grounding features at grounding connections for separately derived systems based on NETA MTS.
      a. Tests shall be to determine if ground resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if they do not.
      b. Include recommended testing intervals.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 5/8 inch (16 mm) diameter by 120 inches (3000 mm) long.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 10 AWG and smaller, and stranded conductors for No. 8 AWG and larger, unless otherwise indicated.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 3/0 AWG minimum.
   1. Bury at least 30 inches (762 mm) below grade.

C. Grounding Bus: Install in electrical rooms, in rooms housing service equipment, and elsewhere as indicated.
   1. Install bus on insulated spacers 1 inch (25 mm), minimum, from wall 6 inches (150 mm) above finished floor, unless otherwise indicated.

D. Conductor Terminations and Connections:
   1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
   2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
   3. Connections to Ground Rods at Test Wells: Bolted connectors.
   4. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches (100 mm) will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2 inches (50 mm) above to 6 inches (150 mm) below concrete. Seal floor opening with waterproof, nonshrink grout.

C. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.

service location, terminal cabinet, wiring closet, and central equipment location.

1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4 (6-by-1000) grounding bus.
2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.

3.4 INSTALLATION

A. Provide permanent service neutral and equipment grounding in accordance with NFPA 70 and subject to the following additional requirements.

B. Connect the service neutral and equipment ground to a common point within the metallic enclosure containing the main service disconnecting means. Equipment grounds and the identified neutral of the wiring system shall not be interconnected beyond this point in the interior wiring system. From the common point of connection of the service neutral and the equipment ground, run in non-magnetic conduit a grounding electrode conductor without joint or splice to the grounding electrode system and connect it with an approved bolted pressure clamp.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
4. Where expansion joints or telescoping joints occur, provide bonding jumpers.

D. Grounding and Bonding for Piping:
1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

2. Prepare a report that identifies components checked and describes results. Include notation of deficiencies detected, remedial action taken, and observations and test results after remedial action.

END OF SECTION 26 05 26

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Hangers and supports for electrical equipment and systems.
   2. Construction requirements for concrete bases.

B. Related Sections include the following:
   1. Division 26 Section "Vibration And Seismic Controls For Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.2 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. IMC: Intermediate metal conduit.

D. RAC: Rigid aluminum conduit.

E. RMC: Rigid metal conduit.

F. RNC: Rigid nonmetallic conduit.

G. RSC: Rigid Steel conduit.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Device Box Mounting Brackets and Stabilizer: Factory-fabricated sheet steel brackets for support of device boxes adjacent to or between studs.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Cooper B-Line, Inc.; a division of Cooper Industries.
      b. ERICO International Corporation.

F. Through-Stud Cable and Raceway Support Clips: Factory-fabricated spring steel clip for cables or raceways where run horizontally through metal studs.
   1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Cooper B-Line, Inc.; a division of Cooper Industries.
      b. ERICO International Corporation.

G. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

H. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
   1. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
      a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         1) Cooper B-Line, Inc.; a division of Cooper Industries.
         2) Empire Tool and Manufacturing Co., Inc.
         3) Hilti Inc.
         4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
         5) MKT Fastening, LLC.
   2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
   3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
   4. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
   5. Toggle Bolts: All-steel springhead type.
   6. Hanger Rods: Solid, threaded steel.

B. Fasten junction, pull and devices boxes securely to the building construction, independent of raceway system.

C. Install Device Box Mounting Brackets supported between two studs where boxes are not located adjacent to stud and where multiple boxes are located between studs.

D. Install Device Box Stabilizer where single box is located adjacent to stud.

E. Install Through-Stud Cable and Raceway Support Clips where cables or raceways run horizontally through metal studs.

F. Provide minimum of two lock nuts per threaded support rod except where lock nut tightens against a threaded socket, one locknut may be used.

G. Support raceways at a distance above suspended ceilings to permit removal of ceiling panels and luminaires.

H. Locate raceways so as not to hinder access to mechanical equipment.

I. Do not secure conductors, raceways, or supports to suspended ceiling hanger rods or wires.

J. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

K. Mounting and Anchorage of Surface-Mounted or Recessed-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts. Where support anchors are required, establish their type and locate in concrete construction before concrete is poured, if possible. Fit each hanger rod with a nut at its upper end, and set nut in a universal concrete insert in the form. Where supported weight exceeds holding strength of a single insert, pass rods through top slot of inserts and interlock with reinforcing steel. Also, where particularly heavy loads are to be supported, suspend hanger rod or rods from a structural angle spanning two or more inserts and securely bolted thereto to distribute the weight.
   3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
   4. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69 or Spring-tension clamps.
   5. To Light Steel: Sheet metal screws.
   6. For Surface-Mounted Items on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to structure by means that meet seismic-

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 33

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Provide raceways and boxes for all the other systems, as specified in other Sections of Division 26, 27 and 28.

C. Related Sections include the following:
1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.

1.2 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. EPC: Electrical Plastic Conduit

C. EPDM: Ethylene-propylene-diene terpolymer rubber.

D. FMC: Flexible metal conduit.

E. IMC: Intermediate metal conduit.

F. LFMC: Liquidtight flexible metal conduit.

G. LFNC: Liquidtight flexible nonmetallic conduit.

H. NBR: Acrylonitrile-butadiene rubber.

I. RAC: Rigid aluminum conduit.

J. RMC: Rigid metal conduit.

K. RSC: Rigid Steel conduit.

1.3 SUBMITTALS

A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Common Work Results for Electrical" for products specified under PART 2 - PRODUCTS.

1. Molded thermoplastic insulating bushing at all boxes and cabinets, with locknuts inside and outside box or cabinet. In wet locations, provide watertight hubs for conduit entry into enclosures.
2. Thermoplastic insulated grounding bushing on all conduits where grounding bushings are required, with locknuts inside and outside the enclosure. In wet locations provide watertight hubs for conduit entry into enclosures.
3. Expansion joints: O-Z/Gedney or acceptable submission, with internal ground and external bonding jumper.
   a. Expansion fitting: Type AX.
   b. End type expansion fitting: Type EXE.
   c. Deflection fitting: Type DX.
   d. Pull box fitting: Type EXPB.
   e. Combination expansion/deflection fitting: Type AXDX.

E. Conduit fittings for Hazardous (Classified) Locations: Comply with UL 886.

F. PVC-Coated Steel Conduit: Comply with NEMA RN 1; PVC-coated RSC with 0.040 inch (1 mm), minimum coating thickness.

G. Coating for fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch(1 mm), with overlapping sleeves protecting threaded joints.

H. EMT: ANSI C80.3 and UL 797.

I. Fittings for EMT:
   1. Steel, set-screw couplings.
   2. Steel, set-screw insulated throat box connectors with molded thermoplastic insulating bushing at all boxes and cabinets, with locknuts inside box or cabinet
   3. Steel, set-screw insulated throat box connectors with thermoplastic insulated grounding bushing on all tubing where grounding bushings are required.
   4. Expansion joints: O-Z/Gedney, type TX or acceptable submission, with internal ground and external bonding jumper.

J. FMC: Comply with UL 1; Zinc-coated steel

K. LFMC: Comply with UL 360; Flexible steel conduit with neoprene jacket and copper grounding strand.

L. Fittings for FMC and LFMC:
   a. Adapters at connections between flexible and rigid conduit.
   b. Thermoplastic insulated throat, steel connectors at box or cabinet terminations.

M. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

N. Wire Support Bushings: Provide for vertical runs as required by the NFPA 70. Select for the conductor size involved.

8. Thomas & Betts Corporation.
9. Wiremold Company (The).

B. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Sheet Metal Pull and Junction Boxes: Comply with NEMA OS 1.
1. Construct boxes from code gauge sheet steel no lighter than 14 gauge with overlapped riveted or welded corners and with edges turned to receive trim.
2. Construct covers from same gauge as box with screw fasteners. Sectionalize boxes over 864 square inches.

E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1, galvanized, cast iron with gasketed cover.

F. Hinged-Cover Enclosures: Comply with NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.

G. Cabinets:
1. Comply with NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated. The parking garage will be considered an outdoor location up to 6'-0" above finished floor on each level.
1. Above Ground: RAC, RSC, or IMC.
2. Within Crawl Spaces: RAC, RSC, or IMC.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R, unless otherwise indicated.

B. Comply with the following indoor applications, unless otherwise indicated. The parking garage will be considered an indoor location from 6'-0" above finished floor to the bottom of structure on each level.

3.2 INSTALLATION

A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

B. Store conduit in dry locations during construction. Swab conduits out prior to pulling conductors.

C. Set metal floor boxes level and flush with finished floor surface.

D. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

E. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.

F. On concealed conduit systems where boxes are not otherwise accessible, set boxes flush with finished surfaces for access, and provide overlapping covers.

G. Provide boxes where shown and where necessary for the installation and pulling of cables and wires.

H. Install covers on junction boxes and conduit bodies after wiring and connections are completed.

I. Install raceways perpendicular or parallel to building surfaces with boxes set plumb and square. In areas where there are no suspended ceilings, run all conduits parallel and perpendicular to building surface planes.

J. Install conduits to prevent excessive strain or damage to conductors.

K. Run conductors over 48 Volts in raceway, unless otherwise indicated.

L. Install raceways a minimum of 6-inches (150 mm) away from parallel runs of flues, steam pipes, hot-water pipes, and other objects operating at high temperatures.

M. Install horizontal raceway runs above water and steam piping. Install raceways a minimum of 1-inch (25.4-mm) from pipe insulation.

N. Complete raceway installation before starting conductor installation.

O. Support raceways and boxes as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

P. Conceal conduit within finished walls, ceilings, unless otherwise indicated.

Q. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
   1. Change from ENT to RAC, RSC, or IMC before rising above the floor.

2. Use LFMC in damp or wet locations subject to severe physical damage including mechanical equipment rooms, at motor or equipment locations at or near pumps, and when installed outdoors.
3. Use LFMC in damp or wet locations not subject to severe physical damage.

EE. Where raceways do not terminate in a box or cabinet, install thermoplastic insulating bushings on end of raceway to protect future cabling from physical damage.

FF. Install pull wires free of splices in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Coil and identify each end of each line with plastic tag bearing complete information as to the purpose of the raceway and the location of its other end.

GG. Raceways for Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
1. 3/4-Inch (19-mm) Trade Size and Smaller: Install raceways in maximum lengths of 50 feet (15 m).
2. 1-Inch (25-mm) Trade Size and Larger: Install raceways in maximum lengths of 75 feet (23 m).
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

3.3 SLEEVE AND SLEEVE SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Apply Sleeve and Sleeve Seal where raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies. Sleeve and Sleeve Seal materials and installation requirements are specified in Division 26 Section "Common Work Results for Electrical."

3.4 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.5 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks, and in single duct runs.
   2. Handholes and boxes.
   3. Manholes.

B. Related Sections include the following:
   1. Division 26 Section "Raceways and Boxes for Electrical Systems" for raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 DEFINITION

A. EPC: Electrical Plastic Conduit

B. RMC: Rigid metal conduit.

C. RNC: Rigid nonmetallic conduit.

D. RSC: Rigid Steel conduit.

1.3 SUBMITTALS

A. Submit product data and shop drawings in accordance with Division 01 and Division 26 Section "Common Work Results for Electrical" for products specified under PART 2 - PRODUCTS.

B. Product Data: For the following:
   1. Duct-bank materials, including separators and miscellaneous components.
   2. Ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
   3. Accessories for manholes, handholes, boxes, and other utility structures.
   4. Warning tape.
   5. Warning planks.

C. Shop Drawings for Precast or Factory-Fabricated Underground Utility Structures: Include plans and elevations with dimensions and weights. Include sections, details, attachments to other work, and accessories, including the following:
   1. Duct entry provisions, including locations and duct sizes.
   2. Reinforcement details.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Electric Service: Comply with requirements defined in Division 26 Section "Common Work Results for Electrical".

1.7 COORDINATION

A. Coordinate layout and installation of ducts, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Verify field measurements, routing and termination locations of duct bank prior to excavation for rough-in. Coordinate duct bank installation with underground Work and site Work and other site improvement Work specified in other Divisions.

B. Coordinate elevations of ducts and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Duct bank routing as indicated on the Drawings is the approximate location. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Engineer.

C. Accurately record actual routing of duct bank on Project record documents, and submit in accordance with Division 01.

PART 2 - PRODUCTS

2.1 CONDUIT

A. RSC: Comply with ANSI C80.1 and UL 6; Galvanized rigid steel, each length with a coupling on one end and thread protector on opposite end.

B. RNC: NEMA TC 2, Type EPC-40-PVC and Type EPC-80-PVC as indicated, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.2 NONMETALLIC DUCTS AND DUCT ACCESSORIES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. ARNCO Corp.
2. Cantex, Inc.
3. Condux International, Inc.
4. Electri-Flex Company.
5. Lamson & Sessions; Carlon Electrical Products.
6. Manhattan/CDT; a division of Cable Design Technologies.
7. Spiraduct/AFC Cable Systems, Inc.

B. ENT: Comply with NEMA TC 13.

B. Comply with ASTM C 858 for design and manufacturing processes.

C. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.
   1. Frame and Cover: Weatherproof steel frame, with steel cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
   2. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
   3. Cover Legend: Molded lettering, selected to suit system or as otherwise required.
      a. Legend: "ELECTRIC-LV" for duct systems with power wires and cables operating at 600 V and less.
      b. Legend: "ELECTRIC-HV" for duct systems with power wires and cables operating over 600 V.
      c. Legend: "SIGNAL" for communications, data, and telephone duct systems.
   4. Configuration: Units shall be designed for flush burial and have integral closed bottom, unless otherwise indicated.
   5. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.
      a. Extension shall provide increased depth as required.
      b. Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.
   6. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12 inches (300 mm) vertically and horizontally to accommodate alignment variations.
      a. Windows shall be located no less than 6 inches (150 mm) from interior surfaces of walls, floors, or frames and covers of handholes, but close enough to corners to facilitate racking of cables on walls.
      b. Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
      c. Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.
   7. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
      a. Type and size shall match fittings to duct or conduit to be terminated.
      b. Fittings shall align with elevations of approaching ducts and be located near interior corners of handholes to facilitate racking of cable.
   8. Handholes 12 inches wide by 24 inches long (300 mm wide by 600 mm long) and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.4 HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Description: Comply with SCTE 77.

2.5 PRECAST MANHOLES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Christy Concrete Products.
   2. Oldcastle Precast Group.
   3. Riverton Concrete Products; a division of Cretex Companies, Inc.
   4. Utility Concrete Products, LLC.
   5. Dalworth Concrete Products, Inc.

B. ANSI/ACI 301 - Specifications for Structural Concrete for Buildings.

C. ANSI/ASTM A615 - Specifications for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

D. Comply with ASTM C 858, with structural design loading as specified in Part 3 "Underground Enclosure Application" Article and with interlocking mating sections, complete with accessories, hardware, and features.
   1. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12 inches (300 mm) vertically and horizontally to accommodate alignment variations.
      a. Windows shall be located no less than 6 inches (150 mm) from interior surfaces of walls, floors, or roofs of manholes, but close enough to corners to facilitate racking of cables on walls.
      b. Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
      c. Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.
   2. Duct Entrances in Manhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
      a. Type and size shall match fittings to duct or conduit to be terminated.
      b. Fittings shall align with elevations of approaching ducts and be located near interior corners of manholes to facilitate racking of cable.

E. Concrete Knockout Panels: 1-1/2 to 2 inches (38 to 50 mm) thick, for future conduit entrance and sleeve for ground rod.

2.6 CAST-IN-PLACE MANHOLES

A. Description: Underground utility structures, constructed in place, complete with accessories, hardware, and features. Include concrete knockout panels for conduit entrance and sleeve for ground rod.

B. Materials: Comply with ASTM C 858 and with Division 03 Section "Cast-in-Place Concrete."

E. Pulling-In and Lifting Irons in Concrete Floors: 7/8-inch- (22-mm-) diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.
   1. Ultimate Yield Strength: 40,000-lbf (180-kN) shear and 60,000-lbf (270-kN) tension.

F. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch (13-mm) ID by 2-3/4 inches (69 mm) deep, flared to 1-1/4 inches (32 mm) minimum at base.
   1. Tested Ultimate Pullout Strength: 12,000 lbf (53 kN) minimum.

G. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip with 1/2-inch (13-mm) bolt, 5300-lbf (24-kN) rated pullout strength, and minimum 6800-lbf (30-kN) rated shear strength.

H. Cable Rack Assembly: Steel, hot-dip galvanized, except insulators.
   1. Stanchions: T-section or channel; 2-1/4-inch (57-mm) nominal size; punched with 14 holes on 1-1/2-inch (38-mm) centers for cable-arm attachment.
   2. Arms: 1-1/2 inches (38 mm) wide, lengths ranging from 3 inches (75 mm) with 450-lb (204-kg) minimum capacity to 18 inches (460 mm) with 250-lb (114-kg) minimum capacity. Arms shall have slots along full length for cable ties and be arranged for secure mounting in horizontal position at any vertical location on stanchions.
   3. Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.

I. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F (2 deg C). Capable of withstanding temperature of 300 deg F (150 deg C) without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals. Capable of withstanding maximum hydrostatic pressures at the installation location with the ground-water level at grade.

J. Fixed Manhole Ladders: Arranged for attachment to roof or wall and floor of manhole. Ladder and mounting brackets and braces shall be fabricated from nonconductive, structural-grade, fiberglass-reinforced resin.

K. Cover Hooks: Heavy duty, designed for lifts 60 lbf (270 N) and greater. Two required.

2.8 SOURCE QUALITY CONTROL

A. Test and inspect precast concrete utility structures according to ASTM C 1037.

B. Nonconcrete Handhole and Pull-Box Prototype Test: Test prototypes of manholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

3.3 EARTHWORK

A. Excavation and Backfill: Comply with Division 31 Section "Earth Moving", but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 32.

D. Cut and patch existing pavement in the path of underground ducts and utility structures according to Division 01 Section "Cutting and Patching."

E. Prepare excavation, base material installation, and compaction necessary for the specific ductbank arrangement.

F. Verify that excavation, base material installation, and compaction is completed.

G. Backfill trenches as specified in Division 31.

3.4 DUCT INSTALLATION

A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.

B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches (1220 mm), both horizontally and vertically, at other locations, unless otherwise indicated.

C. Install conduits to locate top of ductbank at depths as indicated or as required to coordinate with other portions of the Work.

D. Apply corrosion resistance tape and primer to direct-buried or concrete-encased RSC.

E. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.

F. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches (250 mm) o.c. for 5-inch (125-mm) ducts, and vary proportionately for other duct sizes.
   1. Begin change from regular spacing to end-bell spacing 10 feet (3 m) from the end bell without reducing duct line slope and without forming a trap in the line.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. GE Infrastructure; a unit of General Electric Company.
2. Siemens Building Technologies, Inc.; Fire Safety Division.
3. SimplexGrinnell LP; a Tyco International company.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Alarm signals:
1. Fire-alarm signal initiation (General Alarm) shall be by one or more of the following devices and systems:
   a. Manual Fire-Alarm Boxes.
   b. Heat detectors.
   c. Flame detectors.
   d. Smoke detectors.
   e. Automatic sprinkler system water flow.
   f. Heat detectors in elevator shaft and pit.
   g. Fire-extinguishing system operation
2. Supervisory signal initiation (Supervisory Alarm) shall be by one or more of the following devices and actions:
   a. Duct smoke detectors.
   b. Valve supervisory switch. (Operation of a fire-protection system valve tamper switch.)
   c. Low-air-pressure switch of a dry-pipe sprinkler system.
   d. Elevator shunt-trip supervision.
3. System trouble signal initiation (Trouble Alarm) shall be by one or more of the following devices and actions:
   a. Open circuits, shorts, and grounds in designated circuits.
   b. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
   c. Loss of primary power at fire-alarm control unit.
   d. Ground or a single break in fire-alarm control unit internal circuits.
   e. Abnormal ac voltage at fire-alarm control unit.
   f. Break in standby battery circuitry.
   g. Failure of battery charging.
   h. Abnormal position of any switch at fire-alarm control unit or annunciator.

B. Alarm Actions:
1. Fire alarm signal (General Alarm) shall initiate the following actions:
   a. Continuously operate alarm notification appliances as indicated. Notification of a General Alarm conditions within the protected premises shall be similar to the following methodology:
      1) Activate audible and visible indicating devices throughout the entire facility.
   b. Identify alarm at fire-alarm control unit. Indication, notification and acknowledgement of alarm conditions at the fire-alarm control unit shall be similar to the following methodology:

3. Actuation of the elevator hoistway smoke detector shall activate elevator-hoistway ventilation systems in addition to initiating automatic recall.

D. Elevator Shunt-Trip Operation: Heat detectors designated for elevator power removal shall be connected to fire-alarm system. Alarm-initiating devices, except those listed, shall not start elevator power removal.
1. Actuation of heat detectors in the locations indicated below shall shut down power, via a shunt trip operator, to the elevators associated with the location without time delay:
   a. Heat detector in elevator machine room; locate detector within two feet of each sprinkler head.
   b. Heat detectors in elevator hoistway; locate detector within two feet of each sprinkler head.

E. Duct-mounted smoke detector shall initiate the following functions:
1. Initiate Supervisory Alarm.
2. Shutdown the local air handling unit.
3. Shut smoke or combination fire/smoke dampers associated with local air handling unit.

2.3 FIRE-ALARM CONTROL UNIT (PANEL)

A. General Requirements for Fire-Alarm Control Unit:
1. The system shall have the capability of being activated into alarm, supervisory and trouble modes of operation from both manual and automatic devices.
2. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
   a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
   b. Include a real-time clock for time annotation of events on the event recorder and printer.
3. Addressable initiation devices that communicate device identity and status.
   a. Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at fire-alarm control unit.
   b. Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
4. Addressable control circuits for operation of mechanical equipment.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
1. Annunciator and Display: LCD Touchscreen or Liquid-crystal type, with minimum of 2 line(s) of 80 characters.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be

1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key- or wrench-operated switch.
3. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.6 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:
1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be two-wire type.
3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
5. Integral Visible-Indicating Light: LED type indicating detector has operated and power-on status.

B. Photoelectric Smoke Detectors:
1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Four-wire Photoelectric type complying with UL 268A.
1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
   a. Primary status.
   b. Device type.
   c. Present average value.
   d. Present sensitivity selected.
   e. Sensor range (normal, dirty, etc.).
3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.

2.10 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:
1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:
1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply or loss of power.
5. Low battery.
6. Abnormal test signal.
7. Communication bus failure.

E. Secondary Power: Integral rechargeable battery and automatic charger.

F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

G.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Comply with NFPA 72 for installation of fire-alarm equipment.

B. Comply with NECA 305 "Standard for Fire Alarm System Job Practices" as published by the National Electrical Contractors Association.

C. Equipment Mounting: Install wall-mounted equipment, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

C. Wiring within Enclosures:
   1. Separate power-limited and non-power-limited conductors as recommended by manufacturer.
   2. Install conductors parallel with or at right angles to sides and back of the enclosure.
   3. Bundle, lace, and train conductors to terminal points with no excess.
   4. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks.
   5. Mark each terminal according to the system's wiring diagrams.
   6. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.

E. Wiring to Remote Alarm Transmitting Device: Provide 1-inch (25-mm) conduit between the FACP and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.

3.3 CONNECTIONS

A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet (1 m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
   1. Alarm-initiating connections to the following:
      a. Elevator Recall system and components.
      b. Smoke dampers and combination Fire/Smoke dampers in air ducts of designated air-conditioning duct systems.
      c. Air handling systems for shutdown control relay.
   2. Supervisory connections to the following:
      a. Valve supervisory switches.
      b. Low-air-pressure switch of each dry-pipe sprinkler system.
      c. Elevator shunt trip breaker.

B. Where fire-protection systems are specified in Division 08 Section "Door Hardware" to be integral to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section and Connect hardware and devices to fire-alarm system.
   1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

3.4 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
   1. Paint junction box cover plates using red paint. Stencil the letters "FA" in white paint over red background.

5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

D. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

E. Fire-alarm system will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

G. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

H. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.7 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.

B. Follow-Up Tests and Inspections: After date of Substantial Completion, test the fire alarm system complying with testing and visual inspection requirements in NFPA 72. Perform tests and inspections listed for three monthly, and one quarterly, periods.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION

Division 31 – Earthwork

SECTION 31 1000

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided, to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Protecting existing trees, shrubs, plants, and other vegetation to remain or as designated by Owner in pre-construction conference.
2. Removing existing trees, shrubs, plants, and other vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. Removing existing fill.

B. Related Sections include the following:

1. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
2. Division 31 Section "Temporary Erosion and Sedimentation Control" for storm water erosion and sediment mitigation.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to be stockpiled or to remain on Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving," (PART 2 – PRODUCTS).

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks, survey control points, monuments, property line pins and other reference points from disturbance during construction. If disturbed or destroyed, restore or replace at no cost to Owner.

B. Provide erosion control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust from leaving project site.

C. Locate and clearly flag trees and vegetation to remain or to be relocated.

D. Protect existing site improvements to remain from damage during construction.

1. Restore or replace damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

A. Erect and maintain temporary fencing around drip line of individual trees or around perimeter drip line of groups of trees to remain before starting site clearing. Remove fence when construction is complete.

1. Do not store construction materials, debris, or excavated material within fenced area.
2. Do not permit vehicles, equipment, or foot traffic within fenced area.
3. Maintain fenced area free of weeds and trash.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

1. Cover exposed roots with burlap and water regularly.
2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
3. Coat cut faces of roots more than 1-1/2 inches (38 mm) in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.

2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Grind stumps and completely remove roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
4. Use only hand methods for grubbing within drip line of remaining trees.
5. Chip removed tree branches and stockpile in areas approved by Owner's Representative.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or Earth Moving is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered or as determined by Geotechnical Engineer in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm) unless authorized by Owner's Representative.
2. Do not stockpile topsoil within drip line of remaining trees.
3. Dispose of excess topsoil as specified for waste material disposal.
4. Stockpile surplus topsoil to allow for respreading a thicker layer of topsoil.

3.6 SITE IMPROVEMENTS

A. Remove existing above and below grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated on plans.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

SECTION 31 2000

EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided, to this Section.

B. Additional information concerning Earth Moving may be found on the civil drawings, in the project geotechnical report and City of Aurora construction standards. In case of conflict between the drawings, jurisdictional criteria and the information specified herein, the more stringent requirements shall govern.

C. Additional information concerning Earth Moving may be found in the geotechnical investigation report by _____ dated _____. All requirements of this report shall be followed. The information shown in this report is for information and it shall be the contractors responsibility to field verify conditions indicated.

1.2 SUMMARY

A. This Section includes the following:

1. Preparing and grading subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
2. Excavating and backfilling for buildings and structures including overexcavation of existing unsatisfactory on-site soil materials and replacement with structural fill.
3. Drainage course for slabs-on-grade.
4. Subsurface drainage backfill for walls and trenches.

B. Related Sections include the following:

1. Division 31 Section "Site Clearing" site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 22 Section "Trenching" for excavating and backfilling of utilities.
3. Division 31 Section "Temporary Erosion and Sedimentation Control" for erosion and sedimentation control measures.

C. Permits and Fees: Obtain and pay for all permits and fees required for the work of this section, including erosion and sediment control and water quality permits required by the City of Aurora and the Colorado Department of Public Health and Environment, Water Quality Control Division.

L. Underslab Gravel: Imported Class 6 road base per Colorado Department of Transportation Standard Specifications for Road and Bridge Construction (1999) or material approved by Geotechnical Engineer.

M. Rock Excavation: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. (0.76 cu. m) for Bulk Excavation or 3/4 cu. yd. (0.57 cu. m) for footing, trench, and pit excavation which in the Geotechnical Engineer's opinion cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp (103-kW) flywheel power with bucket-curling force of not less than 28,090 lbf (125 kN) and stick-crowd force of not less than 18,650 lbf (83 kN); measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp (157-kW) flywheel power and developing a minimum of 48,510-lbf (216-kN) breakout force with a general-purpose bare bucket; measured according to SAE J-732.

N. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

O. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

P. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

Q. Utilities: Include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Material Test Reports: Provided by Owner from a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

B. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be

with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

A. Existing Utilities: Locations, sizes and depths or invert elevations of existing utilities as shown on the drawings are based on information provided by others, and believed to be correct, but may not be absolutely so. Such information is therefore presented only as approximations, and should be verified prior to construction. Protect from damage any sewer, water, gas, electric, phone or other pipe lines or conduits uncovered during the work until they have been examined by the Owner's Representative. If such lines are found to be abandoned and not in use, remove affected sections without extra cost. If such lines are found to be in use, carefully protect and carry on work around them. If Owner' Representative deems it advisable to move such lines, Owner will pay cost of moving. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner's Representative and then only after arranging to provide temporary utility services according to requirements indicated.

1. Contact utility-locator service for area where project is located before excavating.
2. Notify Owner's Representative not less than two days in advance of proposed utility interruptions.
3. Do not proceed with utility interruptions without Owner's Representative's written permission.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

C. Remove all existing fill deemed by Geotechnical Engineer to be unsatisfactorily placed.

D. Existing Contours and Elevations: Contours and spot elevations of existing ground elevations at the site, and approximate elevations of finish grade cuts, fills, and excavations for the Work are shown on Drawings. Contours and elevations for existing ground lines are based on information provided by others, and are believed to be correct, but may not be absolutely so. Existing contours and elevations should therefore be considered approximate, and should be verified at the site prior to construction.

E. Verification of Existing Conditions: Visit the site prior to submission of bids. Verify existing conditions, elevations, and contours. In the event of discrepancies between existing conditions and those indicated on the Contract Documents or survey, contact the Owner's Representative for clarification.

F. Existing Benchmarks: Carefully preserve and maintain existing benchmarks, monuments, property line pins, and other reference points. If disturbed or destroyed, restore or replace by a Professional Land Surveyor at no additional cost to Owner.

2.2 GEOTEXTILES

A. Subsurface Drainage and Separation Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288. Utilize Mirafi 140N or as recommended by Geotechnical Engineer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by Earth Moving operations.

B. Preparation of subgrade for Earth Moving operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Temporary Erosion and Sediment Control," during Earth Moving operations. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties and rights-of-way.

D. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

E. Cold Weather Work: Prevent frost from entering bearing stratus upon which construction will take place or in areas where fill will be placed in that season.

3.2 DEWATERING

A. Prevent surface water and subsurface ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
3. Obtain and comply with all provisions of the Colorado Department of Public Health and Environment, Water Quality Control Division, Construction Dewatering Permit.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

    a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

C. Stability:

1. Slope sides of excavations in compliance with OSHA requirements and local codes or ordinances. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
2. Continuously monitor cut slopes for distress. Take all necessary precautions to safeguard workers, structures, and utilities.
3. Provide all necessary shoring, sheeting, or bracing of sides of excavations required to prevent caving, erosion, and gullying. Provide underpinning of existing structures or other improvements adjacent to excavations which are subject to damage.

D. Unanticipated Conditions: Notify the Owner's Representative immediately upon finding evidence of previous structures or filled materials which penetrate below designated excavation levels, groundwater or water-bearing strata, or other conditions which are not shown or which cannot be reasonably assumed from existing surveys and geotechnical reports. Secure the Owner's Representative instruction before proceeding with further work in such areas.

E. Rock Excavation: Includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction. Rock excavation in unconfined areas is defined as removal and disposal of material which in the Geotechnical Engineer's opinion, cannot be excavated without continuous and systematic drilling and blasting, or continuous use of a suitable ripper or other special equipment.

1. Unanticipated Rock Excavation: Rock excavation that is not indicated on existing surveys or which cannot be reasonably assumed from geotechnical studies of the site and which could not have been anticipated without extensive investigations. Unanticipated rock excavation shall be subject to change order procedures or previously agreed upon unit prices.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10-foot. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner's Representative, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner's Representative, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Geotechnical Engineer. If approved by Geotechnical Engineer, structural fill placed at 100 percent ASTM D698, 2 percent below to 1 percent above optimum moisture may be used.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Owner's Representative.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials in approved locations without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
8. Acceptance of subgrade by Geotechnical Engineer.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under exterior flatwork, slabs, steps, and pavements, scarify and recompact top 8 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Underfootings and interior floor slabs, excavate to approved natural soils, in fill condition, compact to 95 percent.
3. Under lawn or unpaved areas, scarify and recompact top 8 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 90 percent.
4. Compact foundation wall backfill to 95 percent.
5. Compact scarified subgrade soils to 95 percent.
6. Compact retaining wall backfill to 95 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 0.10 feet .
2. Walks: Plus or minus 0.10 feet.
3. Pavements: Plus or minus 0.10 feet.
4. Grading inside Building Lines: Finish subgrade to a tolerance of ½-inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.17 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent Earth Moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification

SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavating for footings and slabs-on-grade.

1.2 RELATED SECTIONS

A. Document: Geotechnical report; bore hole locations and findings of subsurface materials.

1.3 UNIT PRICES

A. See Section 01 22 00 - Unit Prices, for general requirements applicable to unit prices for excavation.

1.4 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Protect plants, lawns, rock outcroppings, and other features to remain.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

3.2 EXCAVATING

A. Underpin adjacent structures which may be damaged by excavating work.

B. Excavate to accommodate new structures in accordance with the geotechnical report entitled "Geotechnical Exploration for Solara Addition LTAC and Wound Center" prepared by Quality Testing, Inc. and dated July 26, 2005.

C. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

D. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.

E. Do not interfere with 45 degree bearing splay of foundations.

F. Cut utility trenches wide enough to allow inspection of installed utilities.

G. Hand trim excavations. Remove loose matter.

H. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section Geotechnical Report.

SECTION 31 23 33

TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided, to this Section.

B. Additional information concerning trenching and backfilling may be found on the civil drawings, in the project geotechnical study/report and City of Aurora construction standards. In case of conflict between the drawings, jurisdictional criteria and the information specified herein, the more stringent requirements shall govern.

C. Additional information concerning Earth Moving may be found in the geotechnical investigation report by Kleinfelder, Inc. dated September 13, 2006. All requirements of this report shall be followed unless noted otherwise. The information shown in this report is for information and it shall be the contractors responsibility to field verify conditions indicated.

1.2 SUMMARY

A. This Section includes the following:

1. Subsurface drainage backfill for walls and trenches.
2. Excavating and backfilling for utility trenches.
3. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
4. Excavating and backfilling trenches within building lines.

B. Related Sections include the following:

1. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 31 Section "Earth Moving" for soil materials, site excavating, filling and grading.
3. Division 31 Section "Temporary Erosion and Sedimentation Control" for erosion and sediment control.
4. Divisions 22, and 26 Sections for installing underground plumbing and electrical utilities and buried mechanical and electrical structures, if available.
5. Division 33 Section "Storm Drainage" for storm sewer system installation.

C. Shoring Design: Provide the services of a professional engineer to design all shoring, bracing, and underpinning required to protect the safety of workers and integrity of adjacent existing structures or other improvements.

2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp (157-kW) flywheel power and developing a minimum of 48,510-lbf (216-kN) breakout force with a general-purpose bare bucket; measured according to SAE J-732.

J. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

L. Utilities: Includes on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Each type of plastic warning tape.

B. Samples: Contractor to submit representative samples of all materials proposed for use in bedding and trench backfilling operations to the testing and inspections agency for analysis and determination of compliance with the requirements specified herein.

C. Material Test Reports: Provided by Owner from a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

D. Pre-Excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by Earth Moving operations. Submit before Earth Moving begins.

1.5 QUALITY ASSURANCE

A. Testing Agency:

1. All testing and inspections required herein will be performed by an independent testing and inspection agency employed by the Owner.
2. Notify the testing and inspection agency not less than 48 hours in advance of all work requiring testing or inspection services.

to the Owner. Any structures damaged by settlement shall be restored to their original condition by the Contractor, at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Utility Trench Bedding Materials:

1. Agency Requirements: Bedding requirements shall be in accordance with jurisdiction having control over utility.

B. Utility Trench Backfill Materials:

1. Existing soils obtained from trench excavations, including granular or aggregate base course from removed pavements, broken and pulverized claystone or claystone-sandstone bedrock may be used for backfilling trenches, provided it meets any special requirements of the Utility Agency and Geotechnical Engineer. Bedrock must be processed and broken or pulverized so that the maximum particle or fragment size does not exceed three-inches (3").

C. Unsuitable Utility Trench Materials: Materials unsuitable for bedding and backfilling include highly organic soils, ASTM D2487 Group PT topsoil, and soils containing roots, vegetable matter, trash, and debris.

2.2 ACCESSORIES

A. Shoring and Bracing: Provide all materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good and serviceable condition, as required for safety and by governing authorities.

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green OR Dark Gray: Sewer systems.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work of this Section will be performed. Do not proceed with the work until unsatis-

F. Protect subgrades and trench bottoms soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

G. Cold Weather Work: Prevent frost from entering bearing strata upon which construction will taken place or in areas where fill will be placed in that season.

3.3 DEWATERING

A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations and to collection or runoff areas. Establish and maintain temporary drainage ditches and diversions away from trench excavations. Do not use trench excavations as temporary drainage ditches.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
3. Obtain and comply with all provisions of the Colorado Department of Public Health and Environment, Water Quality Control Division, Construction Dewatering Permit.

3.4 SHORING AND BRACING

A. Provide shoring and bracing of excavations as required for safety and by governing authorities. Carry down shoring and bracing as excavation progresses. Maintain shoring and bracing in excavations regardless of time period excavations will be open.

3.5 PAVEMENT REMOVAL AND REPLACEMENT

A. Where trenches or other utility excavations are made in existing paved areas, saw-cut pavement surface to create a clean break line. Cut pavement a minimum of 12" beyond trench width on each side of trench; remove and dispose of existing surface course and aggregate base course, leaving a 12" wide undisturbed subgrade lip on each side of trench.

B. After trench has been backfilled and compacted, place new pavement in accordance with applicable requirements of Division 32 Sections as applicable, for Asphaltic or Portland cement concrete pavement and in accordance with Authorities having jurisdiction.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials in approved locations without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 UTILITY TRENCH BACKFILL

A. After installation of utility piping or lines have been completed, locations recorded, trash or other debris removed from excavations, and bedding placed and approved, backfill promptly as work and weather conditions permit. Do not backfill trenches until all required pipe system tests and inspections have been made, unless partial backfilling is required to restrain pipe under test pressures. Use care in backfilling to avoid damage or displacement of pipe systems.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

D. Place backfill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand operated tampers. Use hand held tools or compacting devices for trench backfill, until a minimum compacted thickness of 3'-0" above top of pipe is achieved. Mechanical or power compactors may be used thereafter.

E. Before compaction, moisten or aerate each layer of backfill to specifications.

F. Compact each layer to not less than 95% of maximum standard Proctor density (ASTM D698). Thoroughly compact by means of mechanical tampers areas which cannot be properly compacted by means of rolling equipment.

G. Backfill to subgrade elevation shown for finish grading, topsoil placement, or paving.

H. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the utility pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

I. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

3.13 CLEANING AND ADJUSTMENT:

A. Reconditioning Compacted Areas: When completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and recompact to required density prior to further construction.

B. Cleanup: Remove excess materials not required for backfilling purposes, including excess spoil material, accumulated debris, and rubbish from site. Burning of waste material is prohibited.

3.14 RESTORATION:

A. Adjacent Improvements: Restore all fences, irrigation ditches, yards, lawns, and other structures or surfaces to condition equal to or better than before work began.

3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 31 2333

SECTION 31 2500

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided, to this Section.

B. Additional information concerning temporary erosion and sedimentation control may be found on the civil drawings and City of Aurora construction standards. In case of conflict between the drawings, jurisdictional criteria and the information specified herein, the more stringent requirements shall govern.

C. Additional information concerning erosion may be found in the geotechnical investigation report by _____ dated _____. All requirements of this report shall be followed unless stated otherwise.

1.2 SUMMARY

A. Work Included. Furnish, install, maintain, and remove temporary erosion and sedimentation controls as shown on the drawings or specified herein, or as required to complete the work.

B. Related Sections include the following:

1. Division 31 Section "Site Clearing" site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 31 Section "Earth Moving" for soil materials, site excavating, filling and grading.
3. Division 22 Section "Trenching" for excavating and backfilling of utilities.

C. Permits and Fees: Obtain and pay for all permits and fees required for the work of this section, including erosion and sediment control and water quality permits required by the authority having jurisdiction and the Colorado Department of Public Health and Environment, Water Quality Control Division.

D. Erosion Control: The Erosion and Sedimentation Control Drawings included in the Contract Documents is the minimum requirement to be implemented. Provide additional control as necessary to meet applicable local and State criteria.

1.3 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

Permits are to be filed with the Colorado Department of Public Health and Environment, Water Quality Control Division.

3. Contractor shall have the Storm Water Management Plan (SWMP) and report available on-site at all times.

1.5 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with applicable local, State and Federal ordinances, rules and regulations concerning sedimentation control and storm water runoff.

B. In case of conflict between the above codes, regulations, references and standards and these specifications, the more stringent requirements shall govern.

C. Preconstruction Conference: Conduct conference at Project site as directed by Owner's Representative prior to start of construction. Contractor to comply with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

1.6 PROJECT/SITE CONDITIONS

A. Existing Conditions: Verify all existing conditions affecting the work of this section prior to submitting bids or proposals. Additional compensation will not be allowed for revisions or modification of work resulting from failure to verify existing conditions.

1.7 WARRANTY

A. Temporary Erosion and Sediment Control measures shall be maintained until permanent measures are in place. All damaged, disturbed or devices filled with sediment, which may occur within the specified project warranty period, shall be corrected at no cost to the Owner. Any devices damaged by erosion or sediment shall be restored to their original condition by the Contractor, at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Erosion and Sedimentation Control Materials: Provide one or more of the following materials, as shown on the plans or as applicable for site conditions:

1. Sand bags.
2. Silt fences.
3. Rock riprap.
4. Temporary seeding.
5. Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh.

2. Roads and parking areas indicated to be paved may be covered with an appropriate aggregate base course in lieu of mulch. Temporary mulching or aggregate base course is not required if final pavement construction will take place within 30 days after grading to final contours.
3. Soils that will be stockpiled for more than 30 days must be mulched and seeded within 14 days after stockpile construction.
4. Prevent sediment from leaving the project site by installing a silt fence or other BMPs as indicated on the plans. Protect existing storm inlets adjacent to the site by an approved gravel filter.
5. Excavate the future detention/water quality pond and construct the outlet structure/storm sewer such that the pond may function as a temporary sediment basin during development of the site. Construct the sediment basin in accordance with authority having jurisdiction's criteria. Provide temporary swales to convey site runoff to the pond.
6. Locate stone stabilization pads at all points of vehicular ingress and egress to the construction site.
7. Provide temporary erosion controls consisting of berms at the top of slopes and interceptor ditches at ends of berms and at those locations which will eliminate or minimize erosion during construction, along with temporary seeding, temporary diversion, chutes, and down pipes and lining of water courses.
8. Temporary sedimentation controls shall consist of silt dams, traps, silt fence, barriers, and appurtenances at the top of spoil and borrow area slopes and where runoff water exits the site.
9. Maintain the available silt holding capacity of silt dams, fence traps and barriers until no longer needed. The sediment capacity of sediment retainage areas shall be at a minimum, the capacity shown on the plans in conformance with Urban Drainage Criteria Manual, Volume 3. Prior to removal, obtain concurrence of the Owner and Engineer.
10. Remove accumulated sediment and debris from a BMP when the sediment level reaches one-half the height of the BMP, or at any time the sediment or debris adversely impacts the functioning of the BMP.
11. Remove hay bales which have deteriorated and filter stone or cloth which has become dislodged. Place new hay bales and new filter and fence.
12. The erosion/sediment control plan shows the minimum required for the project. If it becomes apparent that additional controls are necessary, the Engineer shall be notified and with approval of the Owner's Representative additional controls shall be installed.

B. Chemicals and Pollutants:

1. Store construction materials and chemicals that could contribute pollutants to the runoff within an enclosure, container, or dike located around the perimeter of the storage area, to prevent discharge of these materials into runoff from the construction site.
2. Locate areas used for collection and temporary storage of solid and liquid waste away from the storm drainage system. Provide covering or fencing as required to prevent windblown materials; construct perimeter dike to contain liquid runoff. These measures may not be necessary if materials are immediately placed in covered waste containers.
3. Perform equipment maintenance in designated areas using measures such as drip pans to control petroleum products spillage.

SECTION 31 63 29

DRILLED CONCRETE PIERS AND SHAFTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Machine drilled shaft and rock sockets.

B. Concrete and reinforcement.

C. Shaft liner, if required.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete: Requirements for concrete.

1.3 UNIT PRICES - MEASUREMENT AND PAYMENT

A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

B. Designed Piers:
   1. Design Pier Quantity: Determined by the quantity of piers indicated in the Contract Documents.
   2. Design Pier Length: By the linear foot (meter) measured from bearing to top of pier elevation as indicated.
   3. Pier Casings: By the linear foot (meter).
   4. Pier Reinforcement: By the linear foot (meter) of full pier.

C. Actual Piers:
   1. Actual Pier Quantity: Determined by quantity of piers identified in the Project Record Documents.
   2. Actual Pier Length: Determined by length of piers identified in Project Record Documents.
      a. Base measurement on total linear measurement of piling from bearing to top of pier, except for test piers calculated at 5 feet (1.5 m) longer.

D. Adjustments to the Contract Sum/Price will be made if the Actual Pier Quantity or Length differs from Design Pier Quantity or Length, based on unit prices established in the Agreement and as follows:

E. Determination of Unit Measurements: Identified by site measurements and verified by Geotechnical Engineer.

1.4 REFERENCES

A. ACI 336.1 - Standard Specification for the Construction of Drilled Piers; American Concrete Institute International; 2001.

B. ASTM A 252 - Standard Specification for Welded and Seamless Steel Pipe Piles; 1998 (Reapproved 2002).

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Record actual locations of piers, pier diameter, and pier length. Accurately record the following:
   1. Sizes, lengths, and locations of piers and footing groups.
   2. Sequence of placement.

J. Set tops of piles to elevations indicated.

3.3 TOLERANCES

A. Install piers with maximum variation from location, plumbness, bottom area, diameter, and anchorage locations as specified in ACI 336.1.

B. Maximum Variation From Vertical: 1 in 48.

C. Maximum Variation From Design Top Elevation: Plus 3 inches (75 mm), minus 1 inch (25 mm).

D. Maximum Out-of-Position: 2 inches (50 mm).

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 40 00.

3.5 UNACCEPTABLE PIERS

A. Unacceptable Piers: Piers that fail, are placed out of position, are below elevations, or are damaged.

B. Provide additional piers or replace piers failing to conform to specified requirements.

END OF SECTION

Division 32 – Exterior Improvements

SECTION 32 1216

ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided to this Section.

B. Additional information concerning asphalt paving may be found on the civil drawings, in the project geotechnical report and City of Aurora construction standards. In case of conflict between the drawings, jurisdictional criteria and the information specified herein, the more stringent requirements shall govern.

C. Additional information concerning asphalt paving may be found in the geotechnical investigation report by _____ dated _____. All requirements of this report shall be followed unless noted otherwise. The information shown in this report is for information and it shall be the contractors responsibility to field verify conditions indicated.

1.2 SUMMARY

A. This Section includes the following:

1. Asphalt paving.
2. Asphalt patching.
3. Asphalt paving overlay.
4. Asphalt surface treatments.
5. Cold milling of existing hot-mix asphalt pavement.

B. Related Sections include the following:

1. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling and site grading.
2. Division 32 Section "Pavement Markings" for pavement striping and symbols.

C. References:

1. City of Aurora Standard Specifications for Design and Construction, latest edition.
2. Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, current edition and all appropriate standard special provisions.

1.3 DEFINITIONS

A. Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

D. Preconstruction Conference: Conduct conference at Project site as directed by Owner's Representative. Contractor to comply with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Tack Coats: Minimum surface or air temperature in the shade of 60 deg F (15 deg C).
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
3. Asphalt Base Course: Minimum surface or air temperature in the shade of 40 deg F and rising at time of placement.
4. Asphalt Surface Course: Minimum surface or air temperature in the shade of 50 deg F and rising at time of placement.

B. Coordination and Scheduling:

1. Cooperate with other trades and arrange scheduling to avoid damage to other work, including grading, site utilities and piping, exterior concrete, landscaping and irrigation systems.
2. Before commencing pavement operations, ascertain that utility lines, site lighting and wiring, piping, curb and gutter work, general grading and heavy trucking is complete so that such operations will not damage paving work.
3. Mask off and protect exposed building surfaces and abutting concrete from damage or staining by tack coat and paving operations.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations meeting the requirements of the CDOT Specifications.

B. Asphalt Concrete Aggregate: Clean, hard, durable particles of crushed stone, crushed slag, crushed gravel, or natural gravel conforming to the requirements of Subsection 703.04 of the CDOT Specifications, Item 703.04, Grading SX and S (Table 703-3).

C. Mineral Filler: Rock dust, slag dust, hydrated lime, hydraulic cement, or other suitable mineral material conforming to the requirements of Subsection 703.06 of the CDOT Specifications. Item 703.06.

2.2 ASPHALT MATERIALS

A. Asphalt Cement: The asphalt cement to be used on this project shall be PG 64-22 conforming to the requirements of Subsection 702.01 of the CDOT Specifications.

4. Repair or replace curbs, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Transport milled hot-mix asphalt to asphalt recycling facility.
7. Keep milled pavement surface free of loose material and dust.

3.3 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, Asphalt Paving at a rate of 0.05 to 0.2 gal./sq. yd. (0.2 to 0.8 L/sq. m).

1. Allow tack coat to cure undisturbed before applying Asphalt Paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch (6 mm).

1. Clean cracks and joints in existing hot-mix asphalt pavement.
2. Use emulsified-asphalt slurry to seal cracks and joints less than ¼ inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than ¼ inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150mm).
3. Offset transverse joints, in successive courses, 6 to 12 inches (150-300 mm).
4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.9 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. When paving surface temperature falls below 185 deg F (85 deg C) no further compaction effort will be permitted unless approved.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density in accordance with Subsection 401.17 of the CDOT Specifications.

1. Pavement shall be compacted to a density of 92% to 96% of the maximum theoretical density, determined according to Colorado

C. Provide temporary closures over openings until completion of rolling operations. Remove closures at completion of work.

3.12 ASPHALT CURBS

A. Construct hot-mix asphalt curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust. Spread mix at minimum temperature of 250 deg F (121 deg C).

1. Asphalt Mix: Same as pavement surface-course mix.

B. Place hot-mix asphalt to curb cross section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

3.13 SURFACE TREATMENTS

A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. (0.45 to 0.7 L/sq. m) to existing asphalt pavement and allow to cure. With a fine sand, lightly dust areas receiving excess fog seal.

B. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.

1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.14 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.

SECTION 32 1313

CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided to this Section.

1.2 SUMMARY

A. This Section includes constructing exterior cement concrete pavement on prepared subgrade or base course in accordance with these specifications. This work shall be in conformity with the lines, grades, thicknesses and typical cross-sections shown on the plans for the following:

1. Driveways and roadways.
2. Parking lots.
3. Curbs and gutters.
4. Sidewalks, steps, ramps.
5. Base material for unit paver.
6. Dumpster and loading dock pads.
7. As detailed on the plans.

B. Related Sections include the following:

1. Divisions 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
2. Division 32 Section "Pavement Markings" for pavement striping and symbols.
3. Division 32 Section "Pavement Joint Sealants" for expansion and contraction joints.

1.3 REFERENCES

A. City of Aurora Standard Specifications for Design and Construction, latest edition.

B. Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, current edition.

1.4 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94/C 94 M requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mix Concrete Association's (NRMCA) Plant Certification Program.

C. Testing Agency Qualifications: An independent agency qualified according to ASTM C1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

F. Concrete Testing Service: The Owner will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Preconstruction Conference: Conduct conference at project site as directed by Owner's Representative prior to start of construction. Contractor to comply with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

H. Regulatory Requirements:

I. Comply with City of Aurora standards for sidewalks, curbs, ramps, gutters, and driveway approaches or aprons, including standard dimensions, profiles, thicknesses, reinforcing, and compressive strength. In the event of conflict between the Contract Documents and the standards, the more stringent requirements will apply.

1. Comply with applicable requirements of ADA Handbook, ANSI A117.1, and local and State codes and ordinances regarding walks, steps, ramps and curb ramps.

1.7 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

C. Joint Dowel Bars: Plain steel bars, CDOT Section 709 and ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

D. Tie Bars: CDOT Section 709 and ASTM A 615/A 615M, Grade 60, deformed.

E. Supports for Reinforcement: Chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.4 EXPANSION JOINT FILLER

A. Sealed Joints: Preformed, compressible fiber or cork filler material complying with ASTM D1751 or D1752, Type II, guaranteed compatible with expansion joint sealant materials, ½" thick unless otherwise indicated. Provide high-impact polystyrene removable "void cap" to create ½" deep reveal for installation of sealant.

B. Self-Sealing Joints: Preformed, compressible asphalt fiber joint filler complying with ASTM D994, ½" thick unless otherwise indicated. Do not use asphalt fiber filler in joints to receive elastomeric joint sealants.

2.5 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: CDOT Section 701 and ASTM C 150, Type II, gray.

   a. Fly Ash: ASTM C 618, Class F.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: CDOT Section 703 and ASTM C 33, coarse aggregate, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Do not use fine or coarse aggregates containing substances that cause spalling.

C. Water: CDOT Section 712 and ASTM C 94/C 94M potable.

1. Compressive Strength (28 Days): 4,000 psi (27.6 MPa.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
3. Slump Limit: 4 inches (100 mm).
4. Minimum 594 lb. Cement per cubic yard.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 4.0 to 7.0 percent.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture, plasticizing and retarding admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals as follows:

1. Fly Ash or Pozzolan: 20 percent CDOT Section 601.05.
2. Ground Granulated Blast-Furnace Slag: 50 percent.
3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 20 percent.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.

Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
2. Contractor to provide plan of joint placement for the Engineers approval.
3. The distance between joints shall not exceed in feet, twice the pavement thickness in inches. (i.e.: 6" PCC pavement to utilize maximum 12-foot joint spacing.)

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at expansion joints.

1. Contractor may utilize preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
3. Provide tie bars at sides of pavement strips where indicated.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

C. Expansion Joints: Form expansion joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints in pavement where indicated on plans.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler no less than 1/2 inch or no more than 1 inch below finished surface for joint sealant.
4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
5. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the indicated radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
3. Tied Contraction Joints: Install deformed bars and support assemblies at joints where indicated.

maximum 5-foot intervals. Tool edges to rounded profile and finish as noted herein or shown on the drawings. Contractor may utilize sawed contraction joints. Pitch walks ¼" per foot for drainage unless otherwise indicated.

N. Ramps: Construct ramps similar to walks. Comply with applicable ADA Handbook, ANSI A117.1, and local and State codes, ordinances, and details including maximum allowable slope not to exceed 1 foot vertical in 12 foot horizontal, with maximum rise not to exceed 30" between level landings.

O. Steps: Minimum 6" thick at intersection of treads and risers, reinforced as indicated. Slope treads ¼" to nosing, and tool nosings to uniform ½" radius. Finish as specified below.

P. Paving: Minimum 6" thick unless otherwise indicated. Provide expansion joints as indicated on the drawings, and contraction joints at a minimum 12'-0" EWW. Place concrete paving over compacted subgrade as specified in Division 2 Section "Earth Moving". Provide minimum 1% slope for drainage unless otherwise indicated.

Q. Driveway Approaches: Minimum 6" thick, unless otherwise indicated or required by local public works standards or building codes. Construct to radius of flare indicated, and taper or warp into alignment with adjacent curbs, gutters, and walks. Place approaches over compacted subgrade as specified in Division 2 section "Earth Moving." Refer to drawing and details for any reinforcing requirements.

R. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

S. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

T. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

U. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. 5000 sq. ft. or fraction thereof of each concrete mix placed each day.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Owner's Representative when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 1313

SECTION 32 1363

PAVEMENT MARKINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the contract, including General and Supplementary Conditions, and Division 1 specification. Sections apply if provided, to this Section.

1.2 SUMMARY

A. This Section includes the following: Furnish and install all painted lines, directional arrows, handicapped symbols, or similar markings on paved surfaces, as shown on the drawings or specified herein, as required by jurisdiction having authority, and as required to complete the work.

B. Related Work:

1. Division 32 Section "Asphalt Paving" for materials, installation and minimum requirements.
2. Division 32 Section "Concrete Paving" for materials, installation and minimum requirements.

1.3 REFERENCES

A. Reference Standards: Comply with the requirements of the reference standards noted herein, except where more stringent requirements are described herein or otherwise required by the Contract Documents.

B. City of Aurora Standard Specifications for Design and Construction, latest edition.

C. Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, current edition.

D. "Manual on Uniform Traffic Control Devices" latest edition.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's published descriptive literature and complete specifications for products specified herein.

1.5 QUALITY ASSURANCE

3.3 APPLICATION

A. Traffic Marking Paint: Unless otherwise indicated, apply traffic marking paint in nominal 4" wide stripes at the rate of 100 to 110 sf/gal.

B. Epoxy Pavement Markings: Heat individual components to a temperature of 27° to 60° C (80° to 140° F). Apply to a minimum thickness of 15 mills and with an application rate of 100 to 110 sf per gallon.

C. Patterns and Symbols:

1. Unless otherwise indicated, apply traffic markings in nominal 4" wide stripes with clear and sharp dimensions. See drawings for striping patterns, directional arrows and symbols.
2. Unless otherwise indicated, use yellow markings at lane striping and directional symbols, white markings at parking striping and white and blue markings at international handicapped symbols.
3. Comply with ANSI 117.1 and ADA requirements for graphic symbols, stall widths, and access aisles at handicapped parking spaces. Provide approved templates for symbols and directional arrows.

END OF SECTION 32 1363

SECTION 32 1373

CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Expansion and contraction joints within cement concrete pavement.
2. Joints between cement concrete and buildings and structures.
3. Surface preparation including primers.
4. Joint backup material.

B. Related Sections include the following:

1. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

E. Warranty: As required by Division 1 – Warranty Section: Contractor agrees to repair or replace joint sealers (including labor, materials, and any necessary associated costs) which fail to perform as watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance or general durability; or appear to deteriorate in any other manner not clearly specified by submitted

2.2 HOT-APPLIED JOINT SEALANTS

A. Single-component formulation complying with ASTM D 3405 or D1190.

1. Refer to CDOT Standard Specification, Section 702.06 for hot-poured joint and crack sealant material requirements.
2. Refer to CDOT Standard Specification, Section 408.01-408.03 and 412.18 for joint and crack sealant installation requirements.

2.3 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from manufacturers recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

C. Where shown on drawings where depth of joint will not permit use of joint backing, or wherever recommended by sealant manufacturer, install bond-breaker tape to prevent three-sided adhesion.

D. Do not leave voids or gaps between ends of joint backing units.

3.6 APPLICATION/INSTALLATION OF JOINT SEALANT

A. Apply sealants neatly, in a good and workmanlike manner which meets following minimum requirements or standards. Specific instructions of manufacturer must also be followed.

B. Apply sealant using a gun with proper size nozzles. Use sufficient pressure to fill all voids and joints solid to backup material, with complete wetting of all joint bond surfaces.

C. Applied sealant shall form a full, smooth, uniform bead, free of ridges, wrinkles, sags, air pockets and embedded impurities.

D. After joint has been completely filled with sealant, neatly tool joint sealant to eliminate air pockets or voids, and to provide a smooth, slightly concave, neat appearing finish, with sealant surface slightly below adjoining surfaces. Wetting of finished surface with not be allowed.

E. Where horizontal joints are located between a horizontal surface and vertical surface, fill joint to form a slight cove, so joint will not trap moisture and dirt.

F. Protect adjacent surfaces and systems from sealant material. Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

G. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

H. Tooling of Non-Sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

I. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.

J. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

DOCUMENT 32 14 00

UNIT PAVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions and Division 1 Specification sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Truncated Domes.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 2 Section "Earthwork" for compacted subgrade under unit pavers.
2. Division 2 Section "Portland Cement Concrete Paving" for cast-in-place concrete paving, curbs and gutters serving as edge restraint for unit pavers.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data for the following products:

a. Truncated dome pavers with integral color.

B. Samples for initial selection purposes in form of actual units or sections of units showing full range of colors, textures, and patterns available for each type of unit paver indicated.

C. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has successfully completed unit paver installations similar in material, design, and extent to that

2.3 COLORS AND TEXTURES

A. Provide materials and products that result in colors and textures of exposed unit paver surfaces complying with the following requirements:

1. Truncated Domes: River Red color, parquet pattern.

2.4 SETTING BED

A. Base Course: In accordance with Section 02232: Earthwork, as indicated on plans.

B. Sand: Sand setting and joint material shall be clean, sharp, washed concrete sand to conform to ASTM C33 with the following gradation:

Sieve Size	% Passing
3/8"	100
#4	95-100
#8	80-100
#16	50-85
#30	40-75
#50	10-30
#100	5-15
#200	0-10

2.5 FILTER FABRIC

A. Filter Fabric: Mirafi 140N, non-woven filter fabric, or approved equal, conforming to the following physical requirements:

1. Permeability Rating 10 times greater than that of soil.
2. Apparent Opening Size (AOS). Small enough to prevent passage of fines from setting bed into subgrade.

2.6 FABRICATION TOLERANCES

A. Concrete Unit Pavers:

1. Length and Width Dimension : $\pm$ 1/16".
2. Thickness Dimension: $\pm$ 1/8".

2.7 MISCELLANEOUS MATERIALS

A. Herbicide Treatment: Commercial chemical for weed control, registered by Environmental Protection Agency. Provide granular, liquid, or wettable powder form.

1. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

a. Ciba-Geigy Corp.
b. Dow Chemical U.S.A.
c. E.I. Du Pont de Nemours & Co., Inc.
d. FMC Corp.

2. Install manufacturer's edge restraints in areas not bordered by concrete according to the manufacturer's written instructions.

3.4 UNGROUTED MORTARLESS CONCRETE PAVER APPLICATIONS

A. Level subgrade to a tolerance of 1/4 inch in 2'-0" and 1/2 inch in 10'-0" from level or slope as indicated, for finished surface of paving.

B. Compact soil subgrade uniformly to at least 95 percent of ASTM D 1557 laboratory density.

C. Place sand for leveling course and screed to a thickness of 1 inch to 1-1/4 inch, taking care that moisture content remains constant and the density is loose and constant until concrete pavers are set and compacted.

D. Treat leveling base with soil sterilizer to prohibit growth of grass and weeds.

E. Set concrete pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have space bars, place pavers hand tight against space bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8" with pieces cut to fit from full-size unit pavers.

F. Vibrate concrete pavers into leveling course with a low amplitude plate vibrator capable of a 3,500- to 5,000-pound compaction force at 80 to 90 H_z. Perform at least 3 passes across paving with vibrator. Vibrate under the following conditions:

1. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.
2. Before ending each day's work, fully compact installed concrete pavers within 3 feet of the laying face. Cover the open layers with nonstaining plastic sheets overlapped 4 feet on each side of laying face to protect it from rain.

G. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Brush and vibrate sand until joints are completely filled, then remove surplus sand.

H. Do not allow traffic on installed concrete pavers until sand has been vibrated into joints.

I. Repeat joint filling process 30 days later.

3.5 REPAIR, CLEANING, AND PROTECTION

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement.

B. Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit paver work being without damage or deterioration at time of final inspection.

END OF DOCUMENT 32 14 00

DOCUMENT 32 84 00

IRRIGATION SYSTEM

PART 1: GENERAL CONDITIONS

1.01 GENERAL STATEMENT

The specifications set forth herein pertain to the installation of an underground irrigation system.

Consultant refers to Owner's Representative

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 02480 - Planting, Sodding

Section 02440 -Earthwork

1.03 SCOPE OF WORK

A. The applicable provisions of the General Conditions and Supplementary Conditions of these specifications shall govern the work of this section as if it were written here in full.

B. This work shall consist of installing a complete underground irrigation system as shown on the drawings. The contractor shall include all labor, materials, permits, licenses, inspection tools, facilities, transportation and equipment necessary for the installation of a complete system according to the plans and specifications. No substitutions of material or the procedure shall be made concerning these documents without the written consent of an approved equal by the consultant. The work shall comply with the requirements of all legally constituted authorities having jurisdiction.

C. All work in this section shall be coordinated with all utilities and trades responsible for their installation.

D. Work called for on the drawings and details shall be furnished and installed whether or not specifically mentioned in the specifications.

1.04 QUALITY ASSURANCE

A. Irrigation Drawings: The irrigation drawings are essentially diagrammatic. Due to the scale of the drawings, all characteristics of the system (i.e., sleeving, fittings, etc.) may not be represented. The contractor shall carefully inspect the site and plan his work accordingly, supplying any materials and equipment necessary to install said characteristics.

The contractor shall notify the Town's Representative of any discrepancies between site dimensions, grade differences, obstructions, etc., and those on the drawings that might not have been known during preparation of irrigation drawings. If such written notifications are not made, contractor shall assume all expenses and responsibility for any revisions necessary.

1. A material list of all products and materials to be used in the project shall be submitted to the consultant prior to installation of irrigation system.

2. Consultant reserves the right to reject any and all materials that have been installed but have not been approved.

3. Contractor may request an approved equal to a product specified on the plans. Contractor must submit cut sheets of the product seven (7) days prior to bid opening to the consultant. Consultant shall respond to the request within three (3) days of receiving product information.

4. Manufacturer's warranties shall not relieve the contractor of his liability for project guarantee. Such warranties shall only supplement the project guarantee.

B. Operating and Maintenance Manuals:

1. Contractor is to deliver to owner's representatives the following before final acceptance of the irrigation system:

   a. Index sheet of Contractor's address and phone number.

   b. List of materials and manufacturer's representatives with addresses and phone numbers.

   c. Operating and maintenance instructions of all equipment with shutdown and start-up procedures for the irrigation system.

C. Additional Equipment:

1. Equipment to be furnished as part of this contract to the owner at the completion of the project before final acceptance of irrigation system:

   a. Two (2) manual drain valve keys of appropriate length;
   b. Two (2) gate valve or stop and waste valve keys of appropriate length;
   c. Three (3) quick coupler keys and two (2) matching hose swivels;
   d. Two (2) sets of special tools used for maintaining and adjusting each type of sprinkler head and valve supplied;
   e. Two (2) keys for each automatic controller;
   f. Two (2) sprinkler heads and nozzles for each type used.

D. As-Built Drawing:

1. Before final acceptance of the irrigation system, contractor shall supply owner with a reproducible Mylar As-Built Drawing. Drawing shall include dimensioned locations of all equipment and piping as listed in the irrigation schedule on the plans. Drawing to include dimensioned changes in location of sprinkler heads, zoning changes, connection to existing water lines, and any other items as requested. As-built drawings are to be updated weekly throughout the length of the project and to be made available to the consultant. The owner shall not approve any pay requests if the As-built Drawings are not current.

   If requested by owner, consultant shall review submitted As-built Drawings

Contractor shall endeavor to keep the site clean at all times. At the completion of the project, the contractor shall remove all construction equipment and surplus materials from the premises leaving the area in a clean and acceptable condition. Surplus materials shall include unsuitable excavated materials, rock, trash, and debris. Any equipment or debris which is not removed shall be removed at the expense of the contractor.

1.08 FLUSHING, TESTING AND COVERAGE

A. Flushing:

All lines shall be thoroughly flushed to eliminate any foreign matter before sprinkler heads are installed.

B. Testing:

1. In the presence of the consultant, the contractor shall conduct a pressure test on the mainline pipe at a pressure of 100 PSI for a period of two (2) hours. Any leaks or breaks during the test shall be repaired and the mainline will be tested until accepted. All test equipment and pumps shall be supplied by the contractor as part of the contract.

2. The contractor is responsible for providing the proper amount of water on sod and plant material to establish and sustain optimum plant growth. The watering program is to be included on As-built drawings.

C. Coverage:

After the sprinkler heads have been installed, and before installation of sod, the contractor shall conduct a coverage test in the presence of the consultant to determine if irrigated areas are receiving the proper amount of water. As directed by the consultant, the contractor shall make adjustments for proper coverage at no additional expense. This shall include changing of nozzle patterns and degrees of arc. Contractor shall perform, at no additional expense, the required work to correct any coverage problems due to deviations from irrigation plans or to problems caused by installing according to plans when it is obvious that the plans are inadequate, without bringing it first to the attention of the consultant. No overspray is permitted on any structure.

Any areas which do not conform to the designed characteristics of the drawings and unauthorized changes or poor installation practices shall be repaired or replaced by the contractor at his expense.

1.09 PRELIMINARY INSPECTION

A. Preliminary inspection will occur after completion of entire irrigation system. Provide 48 hours notice to consultant for inspection.

B. Preliminary inspection will evaluate the performance, coverage, appearance and conformance of the system to that of the drawings. Contractor shall rework or replace items that do not meet the Town Representative's approval.

C. The Town Representative will provide punch list of items to be corrected.

D. Contractor will correct all punch list items at his expense.

conforming to Astin Resin specification D1784-60 and project standard D2241 for P.V.C. 1120 SDR 26 or SDR 21. P.V.C. Pipe is to be belled end and solvent weld. Solvent cement and primer shall be of the type prescribed by manufacturer.

2. Marking and Declaration of Compliance

Marking shall show the size, series, identification, manufacturer's trade name at intervals of not more than 20 feet. Pipe shall include the seal of approval of the National Sanitation Foundation spaced at intervals required by NSF regulations.

B. P.V.C. Fittings:

All pipe fittings to be schedule 40 P.V.C. (ASTM D2466 and D1784) unless specifically noted otherwise. Solvent cement to conform to ASTM D2564.

C. Brass Pipe and Fittings:

1. Brass pipe shall be 85% red brass, (ANSI) Schedule 40.
2. Fittings shall be medium brass, 125 pound class, screwed type.

3. Use a dielectric union wherever a copper based metal (copper, brass, bronze) is connected to an iron based metal (iron, galvanized and stainless steel).

D. Copper Pipe:

Copper pipe shall have the requirements of Type K, ASTM B88. Fittings shall be copper or cast bronze. Silver solder shall be used for joints.

E. Sprinkler Heads:

Sprinkler heads shall be of the type and model as indicated on drawings.

F. Backflow Preventer:

Backflow preventer shall be of the type, model and size as indicated on drawings.

G. Automatic Control Valves:

Automatic control valves shall be of the make specified, designed to operate with the specified controller with size and model as listed on drawings. Control valve shall be normally closed type and shall have manual bleed nut and manual flow control.

H. Drip Valve Assemblies:

Drip valve assembly shall be of the type, size and style as indicated on the drawings. Strainer shall have 120 mesh nylon screen with 1/2" blow-out. Pressure reducing valve shall have manual adjusting nut.

I. Drip Emitters and Tubing:

Drip emitters shall be of the type, style and size as indicated on the drawings. Drip tubing shall conform to ASTM D1248 and ASTM D3350. Capillary tubing shall have 1/8" i.d.

Depth of lateral (rotor) from top of pipe is 18"

Depth of lateral (pop-up) from top of pipe is 12"

Depth of shrub (pop-up) from top of pipe is 18"

Depth of wiring – side of mainline

B. Plastic Pipe and Fittings:

1. All pipe and fittings shall be installed as per manufacturer's recommendations. No pipe shall be installed in temperatures of 40 degrees F or less. No pipe shall be installed on non-compacted fill dirt. Plastic pipe shall be snaked horizontally in trench and square cut with burrs removed from inside of pipe. Provide for thermal expansion and contraction. For threaded connections, use sealants that are recommended by the manufacturer for use with plastic. Do not use oil based pipe joint compounds. Assemble threaded connections by tightening 1 to 1-1/2 turns beyond finger tight. Keep piping clear of dirt and pipe scale. Keep open ends of assembled piping capped. Teflon tape is to be used on all plastic threaded joints.

2. Solvent weld joints shall be made according to manufacturer's recommendations. Allow joints to set at least 24 hours before pressure is applied to the piping.

C. Backfilling:

1. All backfilling shall be done with approved soil, free of any debris including rock and debris 1" in diameter or larger, and shall be puddled and/or mechanically tamped to prevent settling. Backfilling shall not be done with frozen or caked soil. Excess debris encountered during backfill process shall be removed at the contractor's expense. Backfill shall be compacted to 95% standard proctor density (ASTM D698-78). Any backfill soil removed due to unsuitability shall be replaced with new, approved soil at the contractor's expense. Any settling during the warranty period of the backfill material shall be repaired at the contractor's expense, including any damage to other items affecting by the settling.

2. All lateral lines shall be installed in trenches with a minimum of 6" clearance.
3. Do not install lateral lines within 2' of lines of other trades.

D. Installation of Piping Under Paving:

Contractor to coordinate installation of sleeving with other applicable trades. All piping that is to be located under areas where asphalt or concrete paving is to be installed shall at an 18" depth below top of road base. Piping is to be encased in sand 4" on all sides. Add backfill in 6" lifts and use mechanical tamping to reach 95" standard proctor density.

Contractor is to match and install new paving and base with existing paving and

1. Automatic controller shall be installed as per manufacturer's recommendations and/or irrigation details. Each controller shall have its own separate ground wire and reduced, laminated as-built drawing installed in the door. Controller charts shall be legible and color coded to show valve numbers and their respective zones. Charts are to be hermetically sealed between two layers of 20 mil. Thick plastic sheets and approved prior to final acceptance.

2. All work performed as electrical installation shall conform to applicable codes. All high voltage electrical work shall be performed by a licensed electrician. The contractor shall be responsible for the electrical connection of the controller with the metered electrical line at the base of the controller as provided by the owner.

3. Install one valve output surge protection arrestor on each control and common wire.

4. Install a circuit breaker and electrical on/off switch for each controller.

M. Control Wiring:

Installation of control wires shall be strung as close as possible to the mainline with such wires to be located on one side of pipe. Wiring to be installed in separate trench if not along mainline. All underground electrical connections shall be made with King Tan Gel Filled Wire Nut, Spears Dri-Splice Wire Connectors or 3M Direct Bury Splice Kit. Any splices not within control valve boxes shall be installed in a Carson #910-12 valve box. The contractor shall leave a minimum loop of 24" at each control valve, each splice and every 100 feet of wiring. Wiring is to be bundled every 20 feet with one (1) control wire used for every control valve. Install two (2) spare #14-1 wires along complete entirety of mainline from controllers to farthest control valve on each and every branch of mainline. Color to be blue.

N. Drain Valves:

Manual drain valves shall be installed as per details. Contractor shall supply, locate and install drain valves so as to drain entire mainline.

END OF DOCUMENT 32 84 00

DOCUMENT 32 93 00

LANDSCAPE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for the following items:

1. Trees.
2. Shrubs
3. Plants.
4. Ground cover.
5. Lawns.
6. Soil amendments.
7. Initial maintenance of landscape materials.

B. Related Sections: The following sections contain requirements that relate to this Section.

1. Excavation, filling, and rough grading required to establish elevations shown on drawings is specified in Division 2 Section, "Earthwork."
2. Underground sprinkler system is specified in Division 2 Section, "Irrigation Work."

1.3 QUALITY ASSURANCE

A. Subcontract landscape work to a single firm specializing in landscape work.

B. Source Quality Control:

1. General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
2. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Architect, together with proposal for use of equivalent material.
3. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
4. Topsoil: Before delivery of topsoil, furnish Architect with written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during past 2 years.

specified maintenance periods to provide maintenance from date of substantial completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

E. Maintenance Instructions: Typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period(s).

1.5 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

B. Trees and Shrubs: Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by Architect. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches, or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.

C. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture. No overnight storage of trees and shrubs shall be allowed. Plants shall be planted on delivery day.

D. Do not remove container-grown stock from containers until planting time.

1.6 JOB CONDITIONS

A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Architect before planting.

1.7 SEQUENCING AND SCHEDULING

A. Planting Time: Proceed with, and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.

1. Plant or install materials during normal planting seasons for each type of plant material required.
2. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

1. Schedule irrigation system to prevent wilting, puddling, erosion, or displacement of seed or mulch.
2. Monitor the watering of the seeded areas to not over water or stress plant material. Replacement of stresses or dead plant material caused by the watering or establishing of the seeded areas shall be completed immediately, prior to the beginning of the warranty period at the Contractor's expense.
3. Water seeded areas at a sufficient rate to promote proper germination.

E. Mowing:

1. Blue Grama grass: Mow no shorter than 6" to maintain tall weed growth only. Allow grass clumps to spread.

F. Post-Germination Fertilization:

1. Apply fertilizer when appropriate after mowing and when grass is dry.
2. Use a slow release fertilizer that will provide actual nitrogen of at least ½ pound per 1000-sq. ft. (0.45 kg/92.9 sq. m) at a frequency to quickly and properly promote seed establishment.

1.10 SPECIAL PROJECT WARRANTY

A. Warranty trees, shrubs and lawns, for a period of one year after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond Landscape Installer's control.

B. Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period. Replace trees and shrubs which are in doubtful condition at end of warranty period; unless, in opinion of Architect, it is advisable to extend warranty period for a full growing season.

1. Another warranty inspection will be conducted at end of extended warranty period, if any, to determine acceptance or rejection. Only one replacement (per tree, shrub or plant) will be required at end of warranty period, except for losses or replacements due to failure to comply with specified requirements.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Preserve and stockpile all on-site topsoil.

B. Topsoil for landscape work may not be available at site and must be furnished and as specified.

C. Provide new topsoil that is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones

C. Deciduous Shrubs: Provide shrubs of the height shown or listed and with not less than minimum number of canes required by ANSI Z60.1 for type and height of shrub required.

1. Provide container grown deciduous shrubs.

D. Coniferous and Broadleafed Evergreens: Provide evergreens of sizes shown or listed. Dimensions indicate minimum spread for spreading and semi-spreading type evergreens and height for other types. Provide normal quality evergreens with well balanced form complying with requirements for other size relationships to the primary dimension shown.

1. Provide balled and burlapped (B&B) evergreen trees.
2. Provide container grown evergreen shrubs.

2.5 GRASS MATERIALS

A. Sod: Provide strongly rooted sod, not less than 2 years old, free of weeds and undesirable native grasses, and machine cut to pad thickness of 3/4 inch (plus or minus 1/4 inch), excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).

1. Provide sod of uniform pad sizes with maximum 5 percent deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10 percent of pad will be rejected.

2. Provide sod composed principally of following:

a. Bluegrass/Fescue Blend

B. Detention Pond/Native Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed mixture composed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

1. Provide "PBSI Low Grow Mix" by Pawnee Buttes Seed, Inc; or approved alternate.

C. Blue Grama Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed mixture composed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

1. Provide "Hachita Blue Grama" (supplied by Western Native Seed, Pawnee Buttes, Wind River Seed.; or approved alternate).

2.6 GROUND COVER

PART 3 - EXECUTION

3.1 PREPARATION - GENERAL

A. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Architect's acceptance before start of planting work. Make minor adjustments as may be required.

3.2 PREPARATION OF PLANTING SOIL

A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.

B. Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days. Till soil amendments and fertilizers to a depth of 12 inches.

C. For pit and trench type backfill, mix planting soil prior to backfilling, and stockpile at site.

D. For Planting beds, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

3.3 PREPARATION OF SEEDED AREAS

A. Herbicide Treatment for Seeded Areas:

1. Herbicide Treatment: To be performed over the entire areas to be seeded. Allow sufficient time to successfully complete the entire Herbicide Treatment process before continuing with the seed installation.

    a. Herbicide treatment must be completed during the growing season.
    b. Water surface ½" per week for two weeks prior to application if natural precipitation does not supply this amount to encourage weed seed germination.
    c. Treat site with "Round-Up" herbicide in accordance with manufacturer's recommendations. Schedule the "Round-Up" application when the probability of forecasted rainfall is minimal for the next 48 hours.
    d. Two days after application, water surface ½" per week if natural precipitation does not supply this amount to encourage weed seed germination.
    e. Ten (10) days after the first "Round-Up" application, review surface for evidence of plant growth.
    f. Repeat steps b, c, d, and e, as many times as necessary until there is no evidence of plant growth after a 10-day period.
    g. Obtain Architect's approval of surface conditions fourteen (14) days after last herbicide application. Substantial acceptance for seed establishment requires that the entire seeded area is weed free.
    h. Remove plant debris from treated area.

3. Apply specified commercial fertilizer at a rate of 250 pounds per acre and thoroughly mix into upper 2 inches of topsoil. Delay application of fertilizer if lawn planting will not follow within a few days.

C. Fine grade lawn areas to smooth, even surface with loose, uniformly fine texture. Roll, rake, and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.

D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

E. Restore lawn areas to specified condition, if eroded or otherwise disturbed, after fine grading and prior to planting.

3.5 SEEDING

A. Broadcast seed and lightly rake into soil. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in tow directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Restore grade if eroded or otherwise disturbed after finish grading and before planting.
3. Broadcast seed not less than 5 pounds per 1000 s.f. of pure live seed (p.l.s.).
4. After broadcasting, rake surface of soil lightly. Incorporate seed into top ¼" of soil. Roll with a light lawn roller.
5. Broadcast weed free straw.

3.6 HYDROMULCH

A. Hydromulch: Mix slurry of fiber mulch and tackifier in water, using equipment specifically designed for hydromulch application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application. Apply Hydromulch at a uniform rate of 2000 pounds per acre. At this application rate the soil should be completely covered with no soil or shadows of soil visible.

1. Reapply hydromulch that has been displaced for any reason.
2. Remove any hydromulch, tackifier, or residue, left after the hydromulching process, from concrete areas.

B. Apply sterilized straw blanket.

1. Excelsior, or approved equal.

3.7 PREPARATION OF PLANTING BEDS

A. Remove 8 inches to 10 inches of existing soil as required, and replace with prepared planting soil mixture. Backfill for each bed with three parts topsoil and one part Compost thoroughly mixed prior to placing.

F. Staking and guy trees immediately after planting as indicated. Staking and guying must be removed within 1 year or less of planting date.

G. Wrap tree trunks of 2 inches caliper and larger. Start at ground and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures before wrapping.

3.10 SODDING NEW LAWNS

A. Lay sod within 24 hours from time of stripping. Do not plant dormant sod or if ground is frozen.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.

1. Anchor sod on slopes with wood pegs to prevent slippage.

C. Water sod thoroughly with a fine spray immediately after planting.

3.11 PLANTING GROUND COVER AND PERENNIALS

A. Space ground cover plants as indicated or scheduled.

B. Space ground cover plants as specified in the plant list.

C. Dig holes large enough to allow for spreading of roots and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover crowns of plants with wet soils.

D. Mulch areas between ground cover plants; place not less than 2 inches thick. Do not use filtration/separation fabric in ground cover and perennial areas.

3.12 MISCELLANEOUS LANDSCAPE WORK

A. Install steel edging where indicated. Anchor with steel stakes spaced not more than 3 feet o.c., and driven at least 1 inch below top elevation of edging.

B. Place rock mulch as specified in areas indicated on drawings. In rock mulch areas outside of planting beds, compact soil subgrades before placing rock mulch.

1. Lay filtration/separation fabric continuously over planting soil or compacted subgrade prior to placing rock mulch. Overlap edges 4 inches at joints between sheets.

factory-installed fasteners that are completely concealed and tamper resistant when door is closed.

1. Provide at least two hinges for each door 42 inches(1067 mm) high or less.

F. Projecting Handle and Latch: Manufacturer's standard positive automatic, prelocking, pry-resistant latch and pull; chromium-plated, heavy-duty, vandal-resistant, lift-up handle with padlock eye.

2.4 LOCKER ACCESSORIES

A. Interior Equipment: Furnish each locker with the following items, unless otherwise indicated:

1. Hooks: Manufacturer's standard zinc-plated, ball-pointed steel. Provide two single-prong wall hooks for double-, and multiple-tier units. Attach hooks with at least two fasteners.

B. Number Plates: Manufacturer's standard etched, embossed, or stamped, aluminum number plates with numerals at least 3/8 inch(9 mm) high. Number lockers in sequence indicated. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.

C. Filler Panels: Manufacturer's standard; fabricated from minimum 0.0478-inch-(1.20-mm-) thick steel sheet in an unequal leg angle shape, and finished to match lockers. Provide slip joint filler angle formed to receive filler panel.

D. Finished End Panels: Manufacturer's standard; fabricated from minimum 0.0598-inch-(1.50-mm-) thick steel sheet, with 1-inch-(25-mm-) wide edge dimension, finished to match lockers, and designed for concealing exposed ends of non-recessed lockers.

E. Center Dividers: Manufacturer's standard; fabricated from minimum 0.0239 inch thick steel sheet, full-depth and finished to match lockers.

F. Base: Provide custom wood, field-fabricated, platform base of size to receive scheduled base trim.

2.5 FABRICATION

A. Unit Principle: Fabricate each locker with an individual door and frame, individual top, bottom, back, and shelves, and common intermediate uprights separating compartments.

B. Knocked-Down Construction: Not permitted.

C. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch. Weld frame members together to form a rigid, one-piece assembly.

1. Form locker-body panels, doors, shelves and accessories from one-piece steel sheet, unless otherwise indicated.

2.6 FINISHES, GENERAL

A. Finish all steel surfaces and accessories, except pre-finished stainless-steel and chrome-plated surfaces.

C. Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

D. Attach finished end panels with concealed fasteners to conceal exposed ends of non-recessed lockers.

2.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

B. Clean interior and exposed exterior surfaces and polish stainless-steel and nonferrous-metal surfaces.

C. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit locker use during construction.

D. Touch up marred finishes, or replace locker units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 51 13

13B03

SECTION 10 99 00

MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Related Sections: Provisions established in General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and the Drawings are collectively applicable to this Section.

B. Section Includes:
1. Miscellaneous specialty items as listed herein.

1.2 SUBMITTALS

A. General: Submit following items in accordance with Section 01 33 00.

B. Product Data: Including all pertinent performance characteristics and criteria.

C. Shop Drawings: Indicate materials, construction, sizes, quantities, finishes, and installation details.

D. Manufacturer's Instructions: For installation, maintenance, and repair.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle, and protect products in accordance with Section 01600.

1.4 WARRANTY

A. Provide warranties in accordance with Section 01770.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide accessories by one of the following:
1. Transaction Window:
   a. Armortex, Safeguard Security Services, Ltd. (Telephone: 800-661-8308)
   b. Creative Industries, Inc. (Telephone: 317-248-1102)
   c. North American Bulletproof. (Telephone: 210-225-0982)
2. Voice Talk Thru: Creative Industries, Inc. (Telephone: 317-248-1102)
3. Package Pass Thru System: Creative Industries, Inc. (Telephone: 317-248-1102)

3.3 INSTALLATION

A. Install using skilled workers in accordance with manufacturer's published instructions and recommendations.

3.4 ADJUSTING

A. Adjust and fit items to be flush with adjacent construction.

B. Fasten or adhere for tight connections and joints.

3.5 CLEANING

A. Perform final cleaning in accordance with Section 01 77 00.

3.6 PROTECTION

A. Protect finished installation in accordance with Section 01 50 00.

END OF SECTION 10 99 00

Division 11
Equipment

09A02

SECTION 11 24 23

WINDOW WASHING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes, but is not limited to, design and furnishing portable davits, davit sleeves, and davit bases, including fasteners and appurtenances as required or necessary for complete installation.

B. Products Furnished But Not Installed Under This Section:
1. Davit bases, anchor bolts and lifeline tie-backs.
2. Quick release intermittent stabilization anchors and inserts on building facade.

C. Related Sections:
1. Section 03 30 00 - Cast-in-Place Concrete: Setting of anchor bolts and tie-backs.
2. Section 05 50 01 - Metal Fabrications: Setting of davit bases.
3. Division 22 - Plumbing: Water supply and faucets on roof.
4. Division 26 - Electrical: Power supply and outlets on roof.

1.2 SYSTEM REQUIREMENTS

A. Design Requirements: Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
1. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of window washing system.
2. Comply with ANSI A39.1, A120.1, and OSHA 1910.28 and 1910.66.
3. All Vertical Surfaces of Building Exterior: Accessible by means of powered platform or other means included as work of this Section.

B. Performance Requirements: Installation: Withstand 80 km/h (50 MPH) wind velocities while being used and remain fully operational at wind velocities up to 40 km/h (25 MPH).
1. Suspension Rope Angulation and Tie-In Lanyard System: Design to ensure minimum force of 45 N (10 pounds) against face of building.

C. Structural Requirements:
1. Anchorage shall be capable of sustaining a minimum load of 5,000 pounds in any direction without fracture or pullout (yield tensile strength.
2. Anchorage shall be capable of sustaining a minimum load of 2,500 lb. load in any direction without permanent deformation (tensile load).

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Provide window washing components and systems from same manufacturer or approved by manufacturer.

B. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of five years experience in design of window washing systems.

C. Manufacturer's Qualifications: Firm solely involved in design, manufacture, and installation of power operated window washing units, that has been actively engaged in this business for not less than 10 years.
   1. Submit evidence when requested, indicating that firm has successfully installed at least three platform powered window washing units of similar type as proposed for use on this Project on buildings over 39 000 mm (130 feet) in height. Include one installation not less than five years old.
   2. Submit with proposal, concept drawing which demonstrates manufacturer's proposed solution to building requirements showing aspects that may deviate from Drawings and Specifications. Show coordination with building structure, intermittent stabilization locations, layout, plumbing requirements, electrical requirements, and loads imposed on building structure along with description of proposed system operation.

D. Installer Qualifications: Installer employed by manufacturer or approved in writing by manufacturer.

E. Welder Qualifications: AWS certified within past 12 months for each type of weld required.

F. Regulatory Requirements:
   1. Electrical Components and Wiring: Comply with National Electrical Code (NEC) and National Electrical Manufacturer's Association (NEMA) standards.
   2. Comply with federal, state and local codes, ordinances, and requirements pertaining to work of this Section.
   3. Where requirements of governing codes, regulations, laws and rules conflict with these Specifications and are mandatory, comply with regulatory requirements.

G. Certifications: Submit following:
   1. Engineering certifications.

1.5 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 01 31 00.
   1. Plan necessary coordination with structural, curtain wall, roofing, plumbing, and electrical trades.

2.3 WINDOW WASHING DAVIT AND SUPPORT ASSEMBLIES

A. Davit Socket Bases: Permanently attached to structure at locations indicated in accordance with Drawings and manufacturer's recommendations.
   1. Socket Bases: Fabricate from pipe of such size and wall thickness suitable for design requirements. Perform welding in compliance with AWS D1.1.
   2. Gussets or other protrusions that interfere with flashing or roofing membrane not allowed.
   3. Socket Bases: Design to accommodate bolts or pins for attachment of portable sockets.
   4. Provide minimum of one anchor point for securing a safety line.
   5. Hot-dip galvanize steel after fabrication.

B. Portable Davit Sockets: Fabricated from seamless mechanical steel pipe or tubing with 4:1 factor of safety.
   1. Hinge to permanently attached socket bases by means of stainless steel pins or bolts to permit insertion of davit into socket and subsequent tilting into working position.
   2. Make provisions to securely lock davit in upright position.
   3. Provide pneumatic tires for portability on roof area.
   4. Hot-dipped galvanized steel finish unless otherwise indicated.

C. Davits: Fabricated of Schedule 80, 6061-T6 aluminum alloy pipe and sized to fit into davit socket fixtures.
   1. Rotatable type, designed to allow self-powered platform to be brought inboard over parapet to roof for transfer.
   2. Close end of each assembly with aluminum cast thrust bearing to ensure easy rotation. Fit upper base section with steel bearing sleeve to protect davit from abrasion when rotating in davit socket.
   3. Equip each davit with positive friction brake to prevent rotation of davit from desired work position.
   4. Hanger Bar: Equip each davit with multiple pick-up hanger bar to provide for variable suspension radius and to allow use of Type F (four wire) and Type T (two wire) work platforms.
      a. Construct hanger bar to permit suspension radius of at least 1500 mm (5 feet) and minimum of approximately 1170 mm (46 inches).
      b. Provide at least three suspension points between maximum and minimum radii.

D. Safety Tie-Backs: Position directly behind each davit base and at right angles to building face or integral with permanently supported socket base.
   1. Where right angle spacing cannot be achieved, furnish two safety tie-backs for each davit location.
   2. Determine design for safety tie-back on davit reactions. However, do not consider safety tie-back in davit design.
   3. Hot dip galvanize safety tie-backs after fabrication.

2.4 ROPE STABILIZERS

A. Wire Rope Stabilizers: No rope in excess of 91 000 mm (300 feet) long hangs between stabilizers or between davit attachment point and stabilizer.

3.4 DEMONSTRATION

A. Demonstration and Instruction of Owner's Personnel: Provide in accordance with Section 01 79 00.
   1. Manufacturer's Factory Trained Representative: After completion of installation, conduct full load and operation tests in accord with applicable standards under maximum design loading conditions and operate over full range (horizontally and vertically) of building surfaces to be maintained.
   2. Manufacturer's Factory Trained Representative: Instruct Owner's designated personnel in complete operation and maintenance of installed system.
   3. When necessary, make minor adjustments. Carefully document and submit adjustments to Owner.

END OF SECTION 11 24 23

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SECTION 11 52 23

TV HANGER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes TV and VCR hanger assembly and shelves.

1.2 SUBMITTALS

A. General: Submit in accordance with Section 01 33 00.

B. Product Data: Submit product data for TV and VCR Hanger Assembly.

C. Shop Drawings: Submit shop drawings for TV and VCR Hanger Assembly.
1. Show location and details including support assembly and television mount.

D. Informational Submittals: Submit following:
1. Certifications specified in Quality Assurance article.
2. Qualification Data: Manufacturer's qualification data.
3. Manufacturer's instructions.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years documented experience.

B. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:
1. Bretford Manufacturing, Inc., Schiller Park, IL.
2. Lucasey, Oakland, CA.
3. Peerless Industries, Inc., Melrose Park, IL.

B. Acceptable Product: Slimline Wall Mount Model SWM 354 by Peerless.

2.2 TV HANGER ASSEMBLY

A. Television Size:
1. Nominal Diagonal Screen Size: 19 to 20 inches (475 to 500 mm).

B. Load Capacity: 100 pounds.

3.4 CLEANING

A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.

3.5 PROTECTION

A. Protect finished work in accordance with Section 01 50 00.

END OF SECTION 11 52 23

01K02

SECTION 11 70 00

MEDICAL EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Contractor provided medical equipment.
   2. Contractor installed Owner furnished medical equipment.
   3. Refer to Major/Minor Equipment Schedule included at the end of this Section.

B. Contractor Provided Medical Equipment includes:
   1. Headwall system.

C. Contractor Installed Owner Furnished Medical Equipment:
   1. Refer to Major/Minor Equipment Schedule attached to this Section.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

B. Shop Drawings: Detailed drawings showing each piece of medical equipment in plan and elevation, indicating dimensions and details of construction, installation, and interface to related services.
   1. Equipment manufacturer shall review shop drawings with hospital staff to verify locations and "handing" of or installation of equipment.

C. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.

D. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each piece of medical equipment required.

E. Maintenance Data: For accessories to include in maintenance manuals specified in Division 1. Provide lists of replacement parts and service recommendations.

F. Material Certificates: Submit certification that products have been tested and comply with requirements herein.

1.3 QUALITY ASSURANCE

A. Source Limitations: Provide products of same manufacturer for each type of medical equipment exposed to view in same areas, unless otherwise approved by Architect.

b. Low voltage type for patient control of lighting by means of SideCom equipped bed unit.

7. Telephone Provisions: Separate conduit and telephone jack.
8. Code Blue Emergency Button: Provide space to accommodate switch button; provide conduit within headrail unit.
9. Nurse Call Station: Provide space to accommodate nurse call equipment; provide conduit within headrail unit.
10. SideCom Bed Interface: Provide conduit and connectors to interface between SideCom equipped bed unit and nurse call chassis.
11. Circuit Breakers: Single pole type with 10,000 amp interrupt capacity.
12. Isolation Power Components:
    a. Isolation transformer mounted in plenum above headrail unit.
    b. Line isolation monitor.

E. Medical Gas and Vacuum components: Copper tubing, manifolds, valves, and face plates for medical gas system with quick connect couplings.

F. Accessories and Equipment:
1. Vacuum Bottle Cove: Recessed, providing space for fluid collection bottles, with bumper and bottle slide.
2. Vacuum Bottle Slide: 4 inch long extruded aluminum with bottom stop.
3. Vacuum Bottle Storage: Provide space for up to four bottles, with bumper.
4. Monitoring Equipment: Provide space for monitoring equipment; provide conduit within headrail unit.
5. Monitor Bracket: Tilt and swivel type to accommodate monitoring equipment.
6. Blank openings with cover plates for future services expansion.
7. Accessory Tracks: Two extruded aluminum tracks for attachment of accessories.

G. Finishes:
1. Aluminum: Finish as selected by Architect from manufacturer's standard colors.
2. Plastic Laminate: Refer to Finish Legend.
3. Steel: Factory baked enamel. Refer to Finish Legend.

2.3 FABRICATION

A. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer.

31A05

SECTION 11 73 13

PATIENT CARE FIXTURES

PART 1- GENERAL

1.1 SUMMARY

A. Related Sections: Provisions established in General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and the Drawings are collectively applicable to this Section.

B. Section includes the following solid surface material patient care fixtures (PCF):
1. Vanity (S6 and S6A).
2. Shower (SH2 and SH3).
3. Patient Toiletries Unit (TA25).

C. Related Sections include the following:
1. Cementitious grout for leveling of shower pans: Section 03542.
2. Solid Surfacing Material: Section 06 61 16.
3. Valves and drains: Applicable Division 22 Section.
4. Plumbing Fixtures: Applicable Division 22 Section.
5. Fixture carrier for wall-hung vanity: Applicable Division 22 Section.
6. Connections to supply, waste, and vent piping: Division 22 Sections.

1.2 DEFINITIONS

A. Accessible Patient Care Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat, impact-, scratch-, and stain-resistance qualities.

1.3 SUBMITTALS

A. General: Submit following items in accordance with Section 01 3300.

B. Product Data: For each type of patient care fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, and construction details.

C. Shop Drawings: Show thickness, finish, layout, and anchorage details. Indicate attachment methods, joint treatments, and supports.

D. Manufacturer's Instructions: For installation, maintenance, and repair.

E. Operation and Maintenance Data: For patient care fixtures to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide solid surfacing material with the following surface-burning characteristics (if required by code) as determined by

2.2 MATERIALS

A. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

B. Colors and Patterns: As selected by Architect from manufacturer's full range.

2.3 PATIENT CARE PRODUCTS

A. Patient Toiletries Unit (TA25):
1. Basis of Design Product: Watermark Solid Surface Modularly Cast Recessed Wall Shelf, Model No. WMSS08184.63RWS.
2. Nominal Size: 8 inches wide by 18 inches high by 4.63 inches deep.
3. Color: As selected by Architect from manufacturer's full range of colors.

B. Vanity (PCF-V):
1. Square Front Vanity: Basis of Design Product: Watermark Custom Plus Vanity, Model No. WMSS36X22-5/8F, and as follows:
   a. Nominal Size: Custom size as indicated on Drawings. Refer to A5000 - S6A.
   b. 4-inch integral coved backsplash.
   c. Sidesplash, 0.40-inch thick, left or right side as required to suit conditions indicated on Drawings.
   d. 5-inch front and side apron with sculptured bottom edge.
   e. ADA-accessible integral solid surface bowl with offset overflow drain. Refer to Section 06 61 16.
   f. Color: As selected by Architect from manufacturer's full range of colors.
2. Rounded Front Vanity: Basis of Design Product: Watermark Curved Front Patient Vanity, Model No. WMSS36X22-1/4CURVE, and as follows:
   a. Nominal Size: Custom size as indicated on Drawings. Refer to A5000 - S6.
   b. 4-inch high x 3/4-inch thick integral coved backsplash.
   c. Sidesplash, 0.40-inch thick, left or right side as required to suit conditions indicated on Drawings.
   d. 5-inch front, integral wrapped, flush apron.
   e. Integral solid surface bowl. Refer to Section 06 61 16.
   f. Color: As selected by Architect from manufacturer's full range of colors.

2.4 SHOWER UNITS

A. Shower Unit – 42 Inch Corner Unit (SH2):
1. Basis of Design Product: Watermark 42 Inch Modular Cast Neo-Angle Shower System, consisting of the following:
   a. Solid surface shower receptor, with non-skid surface with integrally-molded water channels to direct water toward center drain. Refer to Plumbing Fixture Schedule.
   b. No. WMSS4284.25SWKIT solid surface shower wall panel kit, including 1-inch radius coved corner trim and 1-inch radius edge trim at opening and ceiling.
   c. No. WMSS15.25/8/3.25RSS recessed soap/shampoo holder.
   d. 3-inch wide x 4-inch high integral curb.
   e. One 18-inch vertical grab bar, in matching powder coat color.

J. Finish exposed surfaces smooth and polish to a sheen indicated.

K. Radius corners and edges.

PART 3- EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and conditions are ready to receive work of this Section.

B. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before patient care fixture installation.

C. Examine walls and partitions for suitable framing depth and blocking where recessed toiletry units will be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrate surfaces as recommended by manufacturer.

B. Prepare recesses for recessed toiletry units as required by type and size of unit and trim style.

3.3 INSTALLATION

A. Assemble patient care fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. Install using skilled workers in accordance with manufacturer's published instructions and recommendations.

C. Install fixtures level and plumb according to roughing-in drawings.

D. Vanities: Install using chair-type carrier supports with rectangular steel uprights for accessible fixtures as specified in applicable Division 15 Section.

E. Set showers in leveling bed of cement grout. Grout is specified in Division 3 Section (Cement-Based Underlayment."

F. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealant shall be as specified in Division 7 Section "Joint Sealants."

3.4 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.5 INSTALLATION TOLERANCES

A. Maximum Variation From True Dimension: 1/8 inch.

Division 12
Furnishings

18B03

SECTION 12 32 16

PLASTIC LAMINATE FACED MANUFACTURED CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Plastic-laminate-faced casework.
   2. Plastic-laminate countertops.
   3. Solid-surfacing-material countertops.

1.2 DEFINITIONS

A. Exposed Surfaces of Casework: Surfaces visible when doors and drawers are closed, including visible surfaces in open cabinets or behind glass doors.

B. Semi-exposed Surfaces of Casework: Surfaces behind opaque doors or drawer fronts, including interior faces of doors and interiors and sides of drawers. Bottoms of wall cabinets are defined as "semi-exposed."

C. Concealed Surfaces of Casework: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, bottoms of drawers, and ends of cabinets installed directly against and completely concealed by walls or other cabinets. Tops of wall cabinets and utility cabinets are defined as "concealed."

1.3 SUBMITTALS

A. Product Data: For the following:
   1. Cabinets.
   2. Plastic-laminate countertops.
   3. Solid-surfacing material.
   4. Cabinet hardware.

B. Shop Drawings: For cabinets and countertops. Include plans, elevations, details, and attachments to other work. Show materials, finishes, filler panels, hardware, edge and backsplash profiles, cutouts for plumbing fixtures, and methods of joining countertops.

C. Samples for Verification: As follows:
   1. One full-size, finished base cabinet complete with hardware, doors, and drawers, but without countertop.
   2. One full-size, finished wall cabinet complete with hardware, doors, and adjustable shelves.
   3. Plastic laminate for countertops, 8 by 10 inches(200 by 250 mm).
   4. Solid-surfacing material for countertops, 6 inches(150 mm) square.

D. Product Certificates: Signed by manufacturers of casework certifying that products furnished comply with requirements.

1. Manufactured Casework:
   a. Case Systems Inc.
   b. Fisher Hamilton L.L.C.
   c. LSI as distributed by:
      1) I.C. Galt Werkes, Steve Freeman.
      2) New River Cabinet & Fixture, Chris Plumley.
   d. TMI Systems Design, Kevin Kovash.
2. Substitutions: Under provisions of Section 01 25 00.
3. Basis of Design: TMI Systems Design.

2.2 MATERIALS, GENERAL

A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.

B. Hardwood Plywood: HPA HP-1, either veneer core or particleboard core unless otherwise indicated.

C. Softwood Plywood: DOC PS 1.

D. Particleboard: ANSI A208.1, Grade M-3.

E. MDF: ANSI A208.2, Grade 130.

F. Hardboard: AHA A135.4, Class 1 Tempered.

G. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Formica Corporation.
      b. Lamin-Art Inc.
      c. Nevamar Company, LLC; Decorative Products Div.
      d. Panolam Industries International Incorporated.
      e. Wilsonart International; Div. of Premark International Inc.

H. Thermoset Decorative Panels: Particleboard or MDF Finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

I. Edgebanding for Plastic Laminate: Rigid PV extrusions, through color with satin finish, 3 mm thick at doors and drawer fronts, 1 mm thick elsewhere.

J. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Avonite, Inc.
      b. DuPont Polymers, Corian.
      c. Formica Corp.
      d. Nevamar Company.
      e. WilsonArt: Ralph Wilson Plastics Co.

2.3 CABINET MATERIALS

A. Exposed Cabinet Materials: Comply with the following:
   1. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3, Grade VGS.
   2. Edging for Door and Drawer Fronts: Provide 3 mm color coordinated PVC edging on door and drawer front edges. Apply with adhesive.

F. Subtops: 3/4-inch (19-mm) particleboard thermoset decorative panels extending full depth and width of cabinet body.

G. Drawer Fronts: 3/4-inch (19-mm) particleboard, plastic-laminate faced.

H. Drawer Sides and Backs: 1/2-inch (12.7-mm) solid-wood thermoset, with glued multiple-dowel joints.

I. Drawer Bottoms: 1/4-inch (6.4-mm) thermoset decorative panels, glued and dadoed into front, back and sides of drawers, Use 1/2 inch (12.7mm) material for drawers more than 24 inches (600 mm) wide.

J. Doors: 3/4-inch (19-mm) particleboard or MDF, plastic-laminate faced.

K. Hutch Dividers: 1/4-inch (6.4-mm) tempered hardboard.

L. Filler Strips: Provide as needed to close spaces between cabinets and walls, soffits, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

M. Counter Supports: Powder-coated steel brackets as manufactured by A & M Hardware.

2.6 COUNTERTOPS

A. Countertops, General: Provide smooth, clean exposed tops and edges in uniform plane free of defects. Provide front and end overhang of 1 inch (25 mm) over base cabinets

B. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
1. Grade: HGS.
~~**2.Provide through-color plastic laminate.**~~
~~**3.**~~**2. Grade for Backer Sheet: BKL or thicker.**

C. PVC Edging for Plastic Laminate Countertop: Provide 3 mm color coordinated PVC edging. Apply with adhesive.

D. Particleboard: ANSI A208.1, Grade M-2.

E. Plywood: Exterior softwood plywood complying with PS 1, Grade C-C Plugged, touch sanded. Provide in counter containing a sink and other wet areas.

F. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements of ANSI Z124.3, Type 5 or Type 6, without a pre-coated finish.

2.7 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware (Scheduled by Naming Products)."
1. Acceptable Hinges and Drawer Slides: Blum or approved equal.

B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.

C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening typical, 110 degrees opening for cabinet doors adjacent to walls, three-way adjustable, zero protrusion, self-closing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of manufactured wood casework.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install level, plumb, and true; shim as required, using concealed shims. Where manufactured wood casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch (1.5 mm) of a single plane. Fasten cabinets to masonry or framing, wood blocking, or reinforcements in walls and partitions with fasteners spaced not more than 24 inches (600 mm) o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm).
   1. Where base cabinets are not installed adjacent to walls, fasten to floor at toe space with fasteners spaced 16 inches (400 mm) o.c. Secure sides of cabinets to floor, where they do not adjoin other cabinets, with not less than two fasteners.

C. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch (1.5 mm) of a single plane. Fasten to hanging strips, masonry, or framing, blocking, or reinforcements in walls or partitions. Align similar adjoining doors to a tolerance of 1/16 inch (1.5 mm).
   1. Fasten through back, near top and bottom, at ends, and not more than 16 inches (400 mm) o.c.
   2. Use toggle bolts at hollow masonry.
   3. Use expansion anchors at solid masonry.
   4. Use No. 10 wafer-head screws sized for minimum 1-inch (25-mm) penetration into in-wall wood blocking at metal stud partitions.
   5. Use No. 10 wood screws with countersunk finishing washers for fastening cabinets to each other, and when exposed to view on exposed surfaces of casework. Maintain uniform fastener spacing and consistent location with respect to cabinet members.

D. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

E. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
   1. Maintain uniform width of reveals between doors, between drawers, and between doors and drawers.
   2. Maintain doors and drawers in alignment with adjacent doors and drawers. Adjust as required to eliminate offsets.

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SECTION 12 46 19

CLOCKS

PART 1 GENERAL

1.1 SUMMARY

A. Related Sections: Provisions established in General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and the Drawings are collectively applicable to this Section.

B. Section Includes:
1. Clocks.

1.2 SUBMITTALS

A. General: Submit following items in accordance with Section 01 33 00.

B. Product Data: Including all pertinent performance characteristics and criteria.

C. Shop Drawings: Indicate materials, construction, sizes, quantities, finishes, and installation details.

D. Manufacturer's Instructions: For installation, maintenance, and repair.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle, and protect products in accordance with Section 01 61 00.

1.4 WARRANTY

A. Provide warranties in accordance with Section 01 77 00.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide clocks by one of the following:
1. Peter Pepper.

2.2 MANUFACTURED UNITS

A. Clock: Battery operated clock; aluminum; with security mount hardware.
1. Acceptable Product: Peter Pepper Model 343.

DOCUMENT 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Special Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. Provide landscape accessories as shown and specified. The work includes:

1. Trash Receptacles.
2. Bike Rack.
3. Benches.
4. Picnic Tables
5. Lighted Bollards
6. Trench Drain
7. Landscape Up-Lighting

B. Related Work:

1. Division 2 Section "Cement Concrete Paving."

1.3 SUBMITTALS

A. Submit manufacturer's product data and sample for each landscape accessory item to the Architect for approval prior to installation.

1.4 QUALITY ASSURANCE

A. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in this Section's "PART 2 - PRODUCTS."

1. Other manufacturer's products with equal characteristics may be considered. Submit manufacturer's product data to Architect for approval.
2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle landscape accessories to prevent damage and deterioration.

A. General:

1. Material: ½" thick by 2" wide steel end frames; ¼" thick steel slats for seating. All welded construction
2. Finish: Manufacturer's standard powdercoat.
3. Color: Match Victor Stanley, Inc. "VS Bronze."
4. Mounting: Anchor bolt to concrete.

B. Available Manufacturers And Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Victor Stanley, Inc.; Steelsites, Model No. 6ft. RB-28

2.4 PICNIC TABLES AND CHAIRS

A. General:

1. Material: Steel
2. Finish: Manufacturer's standard powdercoat.
3. Color: Match Victor Stanley, Inc. "VS Bronze".
4. Mounting: Surface Mounted as provided by manufacturer.

B. Available Manufacturers And Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Victor Stanley, Inc.; Steelsites, Model No. Model PRSCT-36R with Model PRSCC-8 (provide 4 chairs per table).

2.5 LIGHTED BOLLARDS

A. General:

1. Material: Extruded Aluminum Base and Galvanized Steel
2. Finish: Manufacturer's standard powdercoat.
3. Color: Match Gardco Lighting "BRP" color.
4. Mounting: Surface Mounted as provided by manufacturer.

B. Available Manufacturers And Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Gardco Lighting; Bevel Top Bollard, Model No. BRM824, 42" Height.

2.6 TRENCH DRAIN

A. General:

per foot slope.

B. Bike Racks:

1. Permanently fix each leg of bike rack to base using manufacturer's standard anchors.
2. If installation is on a slope, top of bike rack shall be set to no greater than ¼-inch per foot slope.

C. Benches:

1. Permanently fix each leg of bench to base using manufacturer's standard anchors.
2. If installation is on a slope, top of bench shall be set to no greater than ¼-inch per foot slope.

D. Picnic Tables:

1. Permanently fix each leg of table to base using manufacturer's standard anchors.
2. If installation is on a slope, top of table shall be set to no greater than ¼-inch per foot slope.

E. Lighted Bollards

1. Permanently fix bollard to concrete surface per manufacturer's written instructions

F. Trench Grate

1. Install Trench Grate System per Manufacturer's Written Instructions.

G. Landscape Up-Lights

1. Install per Manufacturer's Written Instructions set in concrete footer.

3.4 PROTECTION

A. Protect finishes of landscape accessories from damage during construction period with temporary protective coverings approved by accessories manufacturers. Remove protective coverings at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

3.5 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment.

END OF DOCUMENT 12 93 00

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SECTION 12 93 53

PREFINISHED PIPE BOLLARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following site and street furnishings:
   1. Pipe bollards.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.

B. Samples for Initial Selection: For units with factory-applied color finishes

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Size: Not less than 6-inch-(150-mm-) long linear components and 4-inch-(100-mm-) square sheet components.

D. Product Schedule: For site and street furnishings. Use same designations indicated on Drawings.

E. Maintenance Data: For site and street furnishings to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of site and street furnishings through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Product - Basis of Design:
   1. Pipe Bollards: Creative Pipe, Inc., Model CBR-6-RB-E-P-F.

B. Substitutions: Under provisions of Section 01 25 00.

2.2 MATERIALS

A. Steel: Free from surface blemishes and complying with the following:
   1. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53, or electric-resistance-welded pipe complying with ASTM A 135.

E. Factory Assembly: Assemble components in the factory to the greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.5 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 STEEL AND GALVANIZED STEEL FINISHES

A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Complete field assembly of site and street furnishings, where required.

B. Unless otherwise indicated, install site and street furnishings after landscaping and paving have been completed.

C. Install site and street furnishings level, plumb, true, and securely anchored and positioned at locations indicated on Drawings.

D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site and street

Division 13
Special Construction

28B03

SECTION 13 49 00

RADIATION PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Lead glass.
   2. Lead-lined building materials and products.
   3. View windows.
   4. Film transfer cabinets.
   5. Lead lined cabinets.
   6. Informational signs.

B. Conform to requirements of official report of physicist for requirements of lead protection. A copy of the report is available from the Architect upon request.

1.2 DEFINITIONS

A. Lead Equivalence: The thickness of lead that provides the same attenuation (reduction of radiation passing through) as the material in question under the specified conditions.
   1. Lead equivalence specified for materials used in diagnostic x-ray rooms is as measured at 100 kV, unless otherwise indicated.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

A. Materials, thicknesses, and configurations indicated are based on radiation protection design prepared by Owner's radiation health physicist. Provide radiation protection consistent with materials specified in thicknesses and locations indicated.
   1. Radiation protection design prepared by Owner's radiation health physicist is available to Contractor on request.

B. Make joints, fasten to substrates, and shield penetrations to maintain indicated lead equivalence at all points and in all directions.

C. Lead-Lined Assemblies: Unless otherwise indicated, the thickness of lead used in doors, door frames, window frames, penetration shielding, joint strips, film transfer cabinets, and other items located in lead-lined assemblies shall not be less than that indicated for assemblies in which they are installed.

D. Lead Glass: Unless otherwise indicated, provide lead equivalence not less than that indicated for assembly in which glass is installed.

1.4 SUBMITTALS

A. Product Data: For each item of radiation protection required. Include detailed technical product information and installation instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Radiation Protection Materials and Equipment, General:
   a. A & L Shielding, Inc.
   b. Ameray Company.
   c. Atomic International.
   d. Bar-Ray Products, Inc.
   e. Building Specialties Co. of Pittsburgh, Inc.
   f. Mayfield Manufacturing Co.; Radiation Engineering Div.
   g. NELCO.
   h. Norval Industries, Inc.; Radiation Protection Products Div.
   i. Ray-Bar Engineering Corp.
   j. S & S X-Ray Products Inc.
   k. Tecknit Shielding Systems.
   l. Willard Industries, Inc.; Nuclear Products Div.
2. Lead-Lined Steel Doors and Frames:
   a. American Steel Products Corp.
   b. Deronde Products.
   c. Karpen Steel Custom Doors & Frames.
   d. Kewanee Corp.
   e. Pioneer Industries.
   f. Precision Metals, Inc.
   g. Security Metal Products, Inc.
   h. Tex-Steel Corporation.
3. Lead-Lined Wood Doors:
   a. Algoma Hardwoods, Inc.
   b. Eggers Industries; Architectural Door Div.
   c. Ideal Wood Products, Inc.
   d. VT Industries, Inc.
   e. Weyerhaeuser Co.
4. Lead Glass:
   a. Deutsche Spezialglas AG; Distributed by Schott Corp., Technical Glass Div.
   b. RD-50 Radiation Shielding Glass as manufactured by Abrisa, Santa Paula, CA.

2.2 MATERIALS

A. Lead Sheet: FS QQ-L-201, Grade C, or ASTM B 749, alloy UNS No. L51120 (chemical lead).

B. Lead Glass: Lead-barium, polished plate glass containing more than 60 percent heavy metal oxide, including 55 percent lead oxide by weight.

C. Lead-Lined Gypsum Board: Gypsum board complying with Division 9 Section "Gypsum Board Assemblies," of width and length required for support spacing and to prevent cracking during handling, with a single lead sheet laminated to the back of the board.

1. Gypsum Board Thickness: 5/8 inch(15.9 mm).

5. Shield cutouts for locksets with lead sheet of same thickness used in door. Lap lining of cutouts with door lining.
6. Prepare doors to receive view windows and louvers as indicated. Provide removable wood stops for glazed openings.
7. Provide lead-lined astragals for pairs of doors.

D. View-Window Frames: Fabricate from 0.0428-inch-(1.1-mm-) thick, formed-steel sheet or 0.064-inch-(1.6-mm-) thick aluminum extrusions with mitered corners, welded or bolted with concealed fasteners.
1. Line with lead sheet formed to match frame contour, continuous in each jamb and across head and sill, lapping the stops, and fabricated wide enough to maintain an effective lap with lead of adjoining assemblies.
2. Construct so lead lining overlaps glazing material perimeter by at least 3/8 inch(9 mm) and provide removable stops.
3. Form sill with an opening for sound transmission. Offset sound passage to make opening lightproof and to maintain required lead equivalence at all points and in all directions.

E. Lead Lined Cabinets: Refer to Drawings for locations, sizes, and quanities.

2.4 INFORMATIONAL SIGNS

A. Informational Signs, General: Refer to Hospital Standards for style, color, font, and size.

B. Rooms Where the Level of Protection Is Uniform Throughout: Provide one sign at each entrance to a shielded room indicating lead equivalence of partitions, ceilings, floors, doors, and other portions of radiation protection enclosure. Indicate height of radiation protection above floor or indicate that partitions are radiation protected to full height.

C. Rooms Where the Level of Protection Is Not Uniform Throughout: Provide one sign for each room with different lead equivalences in different locations. Indicate, in tabular form, lead equivalence of each wall, partition, floor, ceiling, door, and window. Indicate height of radiation protection above floor or indicate that partitions are radiation protected to full height. Indicate where lead equivalence changes or is not continuous.

D. Rooms with Partitions without Radiation Protection: Provide one sign for each partition that contains radiation protection and indicate its lead equivalence. Indicate height of radiation protection above floor or indicate that partitions are radiation protected to full height.

E. Rooms Where Only the Door Has Radiation Protection: Provide one sign for each door indicating its lead equivalence.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates in areas to receive radiation protection, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of radiation protection. Do not proceed with installation until unsatisfactory conditions have been corrected.

1. Apply lead disks recessed flush with surface of board over screw heads securing trim.
2. Install control and expansion joints where indicated, with appropriate trim accessories. Install lead strip on face of framing, extending across joint, and lap with lead lining of gypsum board.

3.4 INSTALLATION OF DOORS AND FRAMES

A. Install lead-lined steel doors according to Division 8 Section "Steel Doors and Frames," unless otherwise indicated.

B. Install lead-lined steel door frames according to Division 8 Section "Steel Doors and Frames," unless otherwise indicated.

C. Install lead-lined wood doors according to Division 8 Section "Plastic Faced Wood Doors," unless otherwise indicated.

D. Frames: Install frames before constructing walls. Set frames accurately, plumb, and braced securely until permanent anchors are set.
1. Provide 3 anchors per jamb, located adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb.
2. In masonry construction, use wire or T-strap anchors.
3. In metal stud construction, use wall anchors attached to studs with screws.
4. In wood stud construction, use strap anchors attached to studs with screws.

E. Lap lead lining of frames over lining in walls at least 1 inch(25 mm).

F. Lead Lining of Frames: Line inside of frames with lead sheet of thickness not less than that required in doors and walls where frames are used. Form lead sheet to match frame contour, continuous in each jamb and across the head, lapping the stops. Form lead shields around areas prepared to receive hardware. Lap lining over lining in walls at least 1 inch(25 mm).

G. Line astragals with lead sheet.

H. Hardware: Line covers, escutcheons, and plates to provide effective shielding at cutouts and penetrations of frames and doors. See Division 8 Section "Door Hardware" for other installation requirements.

I. Touch up damaged finishes with compatible coating after sanding smooth.

J. Check and readjust operating hardware items, leaving doors and frames undamaged and in proper operating condition.

3.5 INSTALLATION OF PENETRATING ITEMS

A. At penetrations of lead linings, provide lead shields to maintain continuity of protection.

B. Provide lead linings, sleeves, shields, and other protection in thickness not less than that required in assembly being penetrated.

C. Secure shields at penetrations using adhesive or wire ties, but not penetrating fasteners, unless indicated on Drawings.

Division 14
Conveying Equipment

25B03

SECTION 14 21 13

ELECTRIC TRACTION ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes machine roomless, gearless electric traction passenger elevators.

1.2 DEFINITIONS

A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.3 SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.

B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch-(75-mm-) square samples of sheet materials; and 4-inch(100-mm) lengths of running trim members.

D. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, including emergency generator, as shown and specified, are adequate for elevator system being provided.

E. Maintenance Manuals: Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout as specified in Division 1.

F. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Elevator manufacturer or an experienced installer approved by elevator manufacturer who has completed elevator installations

force for the existing elevators, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide machine roomless, gearless electric traction elevators by one of the following:
   1. Montgomery KONE Inc.
   2. Otis Elevator Co.
   3. Thyssen Elevator Group North America (formerly Dover Elevator Systems).

B. Acceptable Product - Basis of Design: Refer to "Passenger Elevators" Article in this Section.

2.2 MATERIALS AND COMPONENTS

A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.

B. Passenger Elevator Machines: Provide variable-voltage, variable-frequency ac-type hoisting machines. Provide solid-state power converters using 10,000 pulse per second technology.
   1. Provide regenerative system.
   2. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
   3. Provide means for absorbing regenerated power when elevator system is operating on standby power.
   4. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.

C. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.

D. Roller Guides: Provide roller guides at top and bottom of car and counterweight frames.

E. Car Frame and Platform: Welded steel units.

F. Finish Materials: Provide the following materials and finishes for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated:
   1. Satin Stainless Steel: ASTM A 666, Type 304, with No. 4, directional satin finish.
   2. Stainless-Steel Bars: ASTM A 276, Type 304.
   3. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
   4. Bronze Plate and Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal).

6. Nuisance Call Cancel: When car calls exceed a preset number while the car load is less than a predetermined weight, all car calls are canceled. Preset number of calls can be adjusted.
7. Group Operation:
   a. Embed the group supervisory operation within selected car controllers. No separate group controller shall be supplied. The microprocessor shall constantly scan the system for hall calls. When hall calls are registered, the control system shall instantly calculate the estimated time of arrival, number of floors to travel from the current position, the time it takes to travel one floor at top speed, calls assigned to a car, and car reversal time to respond to a call in the opposite direction of travel. An internal constant shall be set, requiring a maximum time for a car to respond to a call. When a car's status changes or additional hall calls are registered, the estimated time of arrival shall be recalculated and calls reassigned if necessary.
      1) Traffic Pattern: The microprocessor shall provide flexibility to meet well defined patterns of traffic, including up peak, down peak, and heavy interfloor demands, and adjust for indeterminate variations in these patterns which occur in buildings.
      2) Fuzzy Logic: Fuzzy logic shall be an integral part of the group control system software. The enhanced fuzzy logic will optimize the interfloor traffic performance. Inputs for the fuzzy logic shall include accurate passenger load from an electronic loadweigher, probable car calls generated from each hall call, type of building and observed traffic patterns.
8. Motor Pre-Torque: Current shall be applied to the elevator drive before the brake is released and the speed pattern is dictated to eliminate roll back and sling shot effects of unbalanced loads in the car. The electronic loadweigher shall determine the load on the car determining a pre-torque reference to send to the drive.

C. Security Features: In addition to above operational features, provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
   1. Car-to-Lobby Feature: Feature, activated by a keyswitch at main lobby, that causes all cars in a group to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, cars complete calls registered before keyswitch activation and resume normal operation.

2.4 SIGNAL EQUIPMENT

A. General: Provide signal equipment for each elevator or group of elevators with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, non-yellowing translucent plastic.

B. Car Control Stations: Provide manufacturer's standard semi-recessed car control stations. Mount in return panel adjacent to car door, if not otherwise indicated.

C. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance

2.5 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening devices with a uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.
   1. Provide keyswitch in car operating panel for photoelectric device.
   2. Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.6 PASSENGER ELEVATOR CAR ENCLOSURES

A. General: Provide manufacturer's standard enameled-steel car enclosures with removable wall panels, suspended ceiling, trim, accessories, access doors, doors, power door operators, sills (thresholds), lighting, and ventilation unless noted otherwise.
   1. Fabricate car with recesses and cutouts for signal equipment.
   2. Fabricate car door frame integrally with front wall of car.
   3. Doors: Flush, hollow-metal construction.
   4. Sills: Extruded metal, with grooved surface.
   5. Floor Finish, Wall Panels, Ceiling, Handrails: Refer to Passenger Elevator article in Part 2 of this Section.

2.7 PASSENGER HOISTWAY ENTRANCES

A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
   1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.

B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:
   1. Steel Frames: Formed sheet.
   2. Steel Doors and Transoms: Flush, hollow-metal construction, fabricated from material indicated.
   3. Sills: Extruded metal, with grooved surface.
   4. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107.

2.8 PASSENGER ELEVATORS

A. General: Specific product references are those of Otis Elevator Company (unless noted otherwise) as a standard of quality.

B. Refer to Drawings for car locations.
   1. Type: Machine roomless, gearless traction passenger.
   2. Rated Load:
      a. Public Elevators: 4,000 lbs.
      b. Patient and Patient/Staff Elevators: 5,000 lbs.
   3. Rated Speed: 350 fpm.

f. Sills: Manufacturer's standard material; Black Pearl EW5 factory finish.

12. Hall Fixtures: Satin stainless steel.
13. Additional Requirements: As follows:
    a. Provide inspection certificate in each car, mounted under acrylic cover with satin stainless-steel frame.
    b. Provide protective blanket hooks in each car and two complete sets of full-height blankets.
14. Acceptable Product:
    a. Basis of Design: Otis Gen2 Machine Room-Less Gearless Electric Traction Elevator System.
        1) Car Operating Panel: Two row.
        2) Hall Indicator Lantern: Series 4, horizontal with arrow.
        3) Hall Station: Series 2.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.

D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/8 inch(3 mm), up or down, regardless of load and direction of travel.

SECTION 14 92 00

PNEUMATIC TUBE SYSTEMS

1. GENERAL:

1.1. RELATED DOCUMENTS:

1.1.1. Drawings and general provisions of the contract including general and supplementary conditions of Division 1 of the Specification sections apply to the work of this section.

1.2. DESCRIPTION OF WORK:

1.2.1. Furnish all engineering, materials and labor for a complete computer controlled pneumatic tube distribution system, hereinafter referred to as the "System". The System shall be manufactured and installed by TransLogic Corporation hereinafter referred to as the "Contractor".

1.2.1.1. Specific product references are those of TransLogic Corporation, unless noted otherwise, as a standard of quality.

1.2.1.2. Substitutions: Under provisions of Section 01 25 00.

1.2.2. The System shall be a computer controlled Matrix ESP pneumatic tube materials distribution system consisting of tubing, stations, transfer units, blower packages and carriers. The new equipment shall completely compatible with and controlled by the existing System Control Center.

1.2.3. All work shall be completed in a workmanlike manner, complete in all respects, including all items specified herein and as may be necessary for the satisfactory installation and operation of the specified system.

1.2.4. The types and locations of the stations in this specification shall be as indicated on the drawings and shall be in strict accordance with the standards established by the Contractor.

1.2.5. The Contractor shall work with the General Contractor and all trades to ensure coordination for System right-of-way.

1.3.7.6. Tissues for biopsy, and

1.3.7.7. Other body fluids.

1.3.8. The Contractor shall submit with bid at least one (1) laboratory study verifying that the equivalent system is a soft delivery system which maintains the integrity of sensitive laboratory test parameters to include:

1.3.8.1. LDH,

1.3.8.2. Hemoglobin,

1.3.8.3. Potassium, and

1.3.8.4. Coagulation Studies (PT, PTT).

1.3.9. Submit with bid a list of ten (10) hospitals sending controlled substances.

1.4. WORK INCLUDED IN THIS SECTION:

1.4.1. The Contractor shall furnish and install all motor starters with properly sized thermal overload protection in each phase at the blower packages.

1.4.2. The Contractor shall provide and install all low voltage control wiring and connections necessary for the proper operation of the System.

1.4.3. Hole cutting and sleeve setting in floors and walls

1.4.4. Patching/fireproofing of sleeves and openings in floors, wall and ceilings where required

1.5. WORK NOT INCLUDED IN THIS SECTION:

1.5.1. Items described herein relate to the installation of the System, but are excluded from this section of the specification. The Contractor shall provide information as required to perform the work.

1.5.2. General items.

1.5.2.1. Supply and installation of architectural enclosures for equipment as specified on the contract drawings or shop drawings.

1.5.2.2. Equipment fur-in to match existing surroundings.

1.5.4. Hazardous Materials:

1.5.4.1. Identification of all areas with unabated asbestos.

1.5.4.2. All inspections, testing, monitoring, abatement and containment for any hazardous material including asbestos, which is encountered anytime in the duration of the project.

1.6. SUBMITTALS:

1.6.1. Shop drawings which show tube routings on architectural floor plans, tubing riser diagram, electrical riser diagram, right-of-way, methods of suspending and anchoring tubing, station details, equipment locations and detailed dimensions of all major components. Tube routings shall be shown on owner-supplied architectural floor plan backgrounds in AutoCAD release 2004 or higher.

1.6.2. Contractor's marked literature showing illustrations, data and description of system to be furnished.

1.6.3. Single User Software License form with submittal for signing by the Owner and Contractor.

1.7. WARRANTY:

1.7.1. The Contractor shall guarantee all components to be free from defects in material and workmanship, under normal use, for a period of 12 months.

1.7.2. Defective material shall be repaired or replaced at the discretion of the Contractor, free of charge.

1.7.3. Specifically excluded from this warranty are failures resulting from normal wear, improper operation, improper maintenance or lack of prescribed owner preventive maintenance of the system.

1.7.4. Signed acceptance or use of the System by the Owner shall commence the warranty period.

1.7.5. The Contractor's liability shall not be enforceable until receipt of full payment for the System.

2.1.12. The System shall provide automatic empty carrier redistribution. The System shall enable operators to dispatch excess empty carriers to carrier-deficient stations which shall be automatically identified and selected by the System. The need shall be determined by the ratio of carriers assigned to carriers present taking into account carriers in transit to the station, carriers queued for dispatch to the station and carriers queued for dispatch from the station.

2.1.13. Individual stations or zones shall be able to be shut down without affecting the remainder of System.

2.1.14. Destinations which are unavailable (non-existing, full, out-of-service) shall be rejected at the origination station. Prior to dispatch the route to the destination station shall be checked twice to ensure that all sections of the System involved in the transaction are operating properly.

2.1.15. A transaction to a station that becomes unavailable after dispatch shall be rerouted to the origin station.

2.1.16. Transactions in process or pending when any part of the System is signed off shall deliver to their destinations. Any new requests to send shall be rejected.

2.1.17. If a power failure occurs, the system will continue to process carriers under UPS power and an advisory will be posted at the SCC. If UPS voltage drops below a programmable threshold, a second message will be posted at the SCC monitor and the system will automatically switch to Quick-off. All in-transit carriers will be processed to their destinations and all pending transactions will be cancelled.

2.1.18. If power fails at a blower, transfer unit or station, the controls will identify that device as unavailable voiding all transactions which involve the affected device.

2.1.19. Each station shall be able to be individually assigned up to ten scheduled events per day including; on/off times, send and receive priorities, carrier forwarding on/off and quantity of assigned carriers.

2.1.20. Station sending and receiving and System priorities shall ensure that carriers are processed to their destinations in the shortest time.

2.1.21. Closed loop control shall verify via feedback loops that a command to a System component is properly executed before the next segment of the transaction is initiated.

2.2.1.7. Hangers shall be pre-threaded, zinc plated rod attached to the building structure. Tube clamps or channels fastened to the rod shall support the tubing.

2.2.2. Transfer Units:

2.2.2.1. Transfer units enable a transmission tube connection from one tube to any one of several tubes, providing the tubing network for routing carriers between stations.

2.2.2.2. Transfer units shall be installed with split sleeves and sway braced against motion.

2.2.2.3. Transfer units shall be located to allow for complete and clear access to service mechanical and electrical components.

2.2.2.4. The offset through the transfer unit shall be gradual using a curved tube section.

2.2.2.5. All transfer units component position sensing and carrier sensing shall be by non-contact sensors.

2.2.2.6. All visible metal surfaces shall be factory painted with an electrostatically applied, baked-on, powder coat epoxy.

2.2.2.7. Transfer units shall be provided as required in 1 to 2 ports, 1 to 4 ports and 1 to 6 ports.

2.2.3. Blower packages;

2.2.3.1. Blower units shall be modular factory assembled complete with integral vibration isolators, screen cleanout boxes and air shifting valves as required.

2.2.3.2. Blowers shall be located to allow complete and clear access to service mechanical and electrical components.

2.2.3.3. Zone blower packages:

2.2.3.3.1. One zone blower package shall be provided per zone.

2.2.3.3.2. Zone blowers shall be the regenerative type.

2.2.3.3.3. Zone blower packages shall be designed to be mounted above ceilings or on floors.

2.2.3.3.4. Zone blower packages located above ceilings where the sound level three feet below the ceiling must be less than 65 dB(A) shall be sound deadened with sound insulation and intake and exhaust mufflers.

2.2.4.10. When station's receiver becomes full that station's receive and dispatch functions shall be disabled. A message on the station display and at the system control center shall indicate the full condition. The condition shall automatically reset upon carrier removal from receiver.

2.2.4.11. Stations shall provide air-cushioned carrier arrival at the receive slidegate.

2.2.4.12. Stations shall be capable of dispatching a seven pound payload.

2.2.4.13. Each station shall be equipped with one modular I.Q. operator control panel per dispatcher. The I.Q. operator control panel shall include:

2.2.4.13.1. A membrane keypad for destination and special function selection.

2.2.4.13.2. A liquid crystal display panel (LCD) with up to 8 lines of 40 characters each for message display. The LCD panel shall display:

2.2.4.13.2.1. The last six destination selections.

2.2.4.13.2.2. Help menu selections.

2.2.4.13.2.3. A directory of stations.

2.2.4.13.2.4. Special functions.

2.2.4.13.2.5. Operator feedback information.

2.2.4.13.3. "Up" and "Down" arrow keys for scrolling through the LCD displays.

2.2.4.13.4. A "Send/Enter" key to activate the dispatch after destination selection or to enter data for special functions.

2.2.4.13.5. A "Cancel/Clear" key to allow for transaction cancellation or clearing of the display during special function activation.

2.2.4.13.6. An "Empty Send" key for surplus carrier redistribution.

2.2.4.13.7. A "Call Carrier" key to have the next redistributed carrier directed to this station.

2.2.4.13.8. A "Track Carrier" key to track a transaction.

2.2.4.13.9. Up to six LED's for RPI visual indication..

2.2.4.13.15.8. Selection is secured

2.2.4.13.15.9. Selection not permitted

2.2.4.13.16. LCD message capability for the following conditions:

2.2.4.13.16.1. A carrier is incoming to the station.

2.2.4.13.16.2. The station carrier count exceeds its assigned number, return surplus carriers.

2.2.4.13.16.3. The station is full, remove carriers from receiver.

2.2.4.13.16.4. The station is not receiving carriers, traffic is forwarded to another station.

2.2.5. Recessed single dispatcher stations:

2.2.5.1. Recessed single dispatcher stations shall include one dispatch chamber and an integral receive bin. The receive bin shall provide open storage nominally for four carriers.

2.2.5.2. The station shall be designed to be wall recessed enabling all non-operator accessible equipment to be concealed behind walls. A trim frame shall be provided to conceal the joint between the wall and the station housing.

2.2.5.3. To minimize damage, stations shall be installed in two phases; a housing in the initial stages of construction, and a mechanical/electrical finish kit after construction work in the area is substantially complete.

2.2.5.4. Recessed stations shall be located at all locations.

2.2.6. Carriers:

2.2.6.1. Sealed carriers:

2.2.6.1.1. Provide _21_ sealed carriers as follows.

2.2.6.1.1.1. Clear molded plastic.

2.2.6.1.1.2. Full access side opening.

2.2.6.1.1.3. Bi-directional.

2.2.6.1.1.4. Replaceable wear bands which also serve as the hinges.

2.2.6.1.1.5. Easy open positive closure latches.

2.2.6.1.1.6. Compression gasket which seals the carrier halves when closed.

3. EXECUTION:

3.1. INSTALLATION:

3.1.1. The System and components shall be assembled and installed in strict accordance with contract documents, applicable codes and regulations, approved shop drawings, and Contractor's recommendations.

3.1.2. The System and components shall be anchored and fastened to building construction as required for a stable, secure installation. All exposed parts of the System and finish components shall be closely fit and joined to provide a neat uniform appearance.

3.2. SYSTEM TESTING AND ACCEPTANCE:

3.2.1. Contractor shall commit to a 100% compatibility factor with existing system control center and components. System shall maintain exiting system throughput and reliability standards.

3.2.2. Owner shall retain 10% of contract until current reliability standards are achieved.

3.2.3. Prior to a formal System performance test, the Contractor shall perform preliminary tests, verifying all components are in fully operational condition for carrier dispatch and receive between all possible station combinations.

3.2.4. The Contractor shall provide written notification to the Architect/Engineer thirty (30) days in advance of the scheduled System performance test. The Contractor shall provide all personnel, equipment and instruments required for such examination.

3.2.5. In the presence of the Architect and Owner, the Contractor shall perform all operational tests, inspecting System components and verifying that the equipment is installed and operating in proper condition, according to the intent of the contract.

3.2.6. The Owner's representative shall sign a written statement indicating that the System has been turned over and accepted by the Owner.

3.3.3. The Contractor shall provide operating and maintenance information in the following formats.

3.3.3.1. One (1) read-only CD ROM.

3.3.3.2. One (1) paper copy manual.

3.3.3.3. Included in the CD and manual shall be;

3.3.3.3.1. System components and part descriptions,

3.3.3.3.2. Starting and stopping procedures,

3.3.3.3.3. General operating instructions,

3.3.3.3.4. Specific maintenance and troubleshooting instructions,

3.3.3.3.5. Recommended service schedules for adjustment, lubrication and inspection.

3.3.3.3.6. Recommended spare parts inventory.

3.3.4. The Contractor shall provide record drawings (as-built shop drawings) on AutoCAD release 14.0 for instruction and future reference by the Owner. If Owner-supplied architectural electronic backgrounds are not available in the design phase, three (3) sets of paper copies may be substituted.

3.4. EXCEPTIONS:

3.4.1. Exceptions to the specification shall be clearly identified in a separate proposal section entitled, "Exceptions to Specifications".

END OF SECTION 14 92 00

Division 21
Fire Suppression

SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Mechanical sleeve seals.
3. Sleeves.
4. Escutcheons.
5. Grout.
6. Fire-suppression equipment and piping demolition.
7. Equipment installation requirements common to equipment sections.
8. Painting and finishing.
9. Concrete bases.
10. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.

C. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 21 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 21 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

C. One-Piece, Floor-Plate Type: Cast-iron floor plate.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 FIRE-SUPPRESSION DEMOLITION

A. Refer to Division 01 Section "Cutting and Patching" and Division 02 Section "Selective Structure Demolition" for general demolition requirements and procedures.

B. Disconnect, demolish, and remove fire-suppression systems, equipment, and components indicated to be removed.

1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used

2. Existing Piping: Use the following:

   a. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
   b. Insulated Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
   c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
   d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and spring clips.
   e. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
   f. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
   g. Bare Piping in Unfinished Service Spaces: Split-casting, cast-brass type with polished chrome-plated finish.
   h. Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed hinge and set screw or spring clips.
   i. Bare Piping in Equipment Rooms: Split-casting, cast-brass type.

M. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

   a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
   b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.
   c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

      1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth,

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

3.4 PAINTING

A. Painting of fire-suppression systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.5 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.

SECTION 21 10 00

FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 GENERAL

A. Related work and materials are specified under Section 221119, General Provisions - Mechanical; Section 221119, Basic Materials and Methods, and other appropriate Sections of this Division.

B. This Section of the Specifications pertains to all other labor, material, equipment, and service necessary for and incidental to the fire protection systems as shown on the Drawings and/or specified herein.

C. All devices and equipment shall be listed for fire protection service by Underwriter's Laboratories, Inc. or other recognized testing laboratory, and components, valves and thread type shall be in accordance with local Fire Department requirements.

D. All hanging of pipe to be in accordance with NFPA.

1.2 SCOPE OF WORK

A. It is the intent of these Specifications to cover the engineering, hydraulic calculations, design and complete installation of the wet type automatic sprinkler, pre-action sprinkler and standpipe system. The sprinkler contractor shall furnish and install the entire fire protection system, from the connection to the site water supply to the final installation of each sprinkler head.

B. Revise the existing sprinkler system to meet new criteria and space utilization.

C. It shall be a specific requirement that insofar as possible, all sprinkler system mains and branches shall be installed as close as possible to the structural steel members.

D. All piping for all systems shall be coordinated with lighting fixtures, air conditioning ducts, piping and air handling unit. Sprinkler heads shall be located as closely as possible to the center of the ceiling tiles aligned with adjacent light fixtures. Final exact locations shall be verified with the Architect upon shop drawing submittal, and immediately prior to installation. Any head installed closer than 3" to the ceiling grid will be relocated at no additional cost to the Owner.

E. The system shall be designed to provide the densities per NFPA 13.

F. Before any work is commenced the contractor shall examine the existing hospital areas which will be renovated. Contractor shall become familiar with existing sprinkler system that will be modified to suit the new architectural

L. The sprinkler contractor shall design a hydraulically automatic sprinkler system to provide a density for the following areas:

1. Light Hazard: 0.10 GPM/SF Over 1,500 SF

2. Ordinary Hazard I: 0.125 SF Over 3,000 SF (Open Areas)

0.14 Over 2,000 SF (Partitioned Areas)

3. Ordinary Hazard II: 0.17 Over 3,000 SF

1.3 WORK EXCLUDED

A. Painting of exposed sprinkler system piping, controls, valves, etc., shall be accomplished under the work of the Painting Section.

B. Caulking and sealing of sleeves for piping through floors and walls shall be included under the scope of the work of Caulking and Sealing. The installation of all sleeves, regardless of location, and the insulation of sprinkler system lines passing through insulated walls and partitions shall be in this section of the work as specified hereinafter.

1.4 CODE REQUIREMENTS AND STANDARDS

A. All aspects of design, installation and equipment shall conform in all respects to the rules, regulations and requirements of the current standards of National Fire Protection Association (NFPA), Underwriter's Laboratories, the City of Aurora, Colorado codes.

1.5 SHOP DRAWINGS AND APPROVALS

A. The fire protection subcontractor shall prepare complete shop drawings and submittal data shall be submitted specifically for, but not limited to, the following items: sprinkler heads, valves, pipe, pipe hangers and couplings, hose valves and accessories, and fire department connections with dimensional working drawings for the entire installation. Shop drawings and working drawings shall indicate all ductwork and shall be coordinated with the mechanical contractor to prevent conflicts.

B. Provide submittal data for sprinklers, valves, pipe, pipe hangers, couplings, siamese connections, water flow switchers, tamper switches, hose valves, water gong, roof manifold, fire pump, flow meter system, jockey pump and test header.

C. The automatic sprinkler subcontractor shall first submit to the Architect for approval of the basic agreement and layout, hydraulic calculations and such submittal will be noted for corrections or changes if required, submit in four (4) copies. The corrected drawings shall then be submitted by the subcontractor to the above listed code authorities, agencies and the City of Aurora, Colorado. Upon securing written approval of these agencies, submit to the

in every detail, conform to Standard Specifications for Welded and Seamless Steel Pipe ASTM Designation: A-53 or A-135. Grooved coupling and fittings shall be rated at 300 PSI as manufactured by Victaulic Company of America. Contractor shall not mix manufacturer of grooved products. Schedule 10 piping may be used for standpipes, standpipe mains, sprinkler mains, and cross mains. Schedule 40 piping shall be used for sprinkler branch piping.

C. Exterior Fire Protection Lines: Cast iron or ductile iron water pipe and fittings, cement lined, assembled using mechanical joints, or bell and grooved spigot end push-on joints with rubber gaskets in accordance with NFPA.

2.2 FIRE HOSE VALVES

A. Fire hose valves shall be a 2-1/2-inch angle valve with 2 ½" x 1 ½" reducer, cap and chain. Potter-Roemer Fig. 4065.

1. Where valve is installed without a cabinet, it shall be mounted on a stub out from the fire protection riser and the spanner shall be mounted on brackets on the wall adjacent to the valve.

2. Where valve is installed in a cabinet, which is selected. Provide cabinet as specified in Division 10 "Fire Protection Specialties".

B. Identification: Laminated plastic plate with legend "FIRE DEPT. VALVE" incised through one color into a second color background shall be attached to exterior of cabinet door containing valve, and in the case of exposed valves, to adjacent wall.

2.3 SIAMESE FITTINGS

A. The free-standing siamese fittings shall be equal to Potter-Roemer 5785 series Four Way 2-1/2-inch x 2-1/2-inch x 2-1/2-inch x 2-1/2-inch x 6-inch size, chrome plated, escutcheon, front plate with raised lettering, and chrome plated caps attached with substantial chains. Lettering on head shall read "STANDPIPE AND AUTO. SPRKR."

B. Threads shall be per the local fire department standard.

2.4 ELECTRIC FIRE PUMP

A. Where scheduled, the fire pump shall be a horizontally split-case bronze-fitted centrifugal pump mounted on the same baseplate with and driven through a flexible coupling by a squirrel cage induction motor. Unit shall be complete with all controls, valves and accessories such as splash guard, suction and discharge pressure gauges, air relief, casing relief valve, and closed loop fire pump test meter assembly. In addition to the above listed trim, all other trim shall be provided as necessary to comply with UL and associated Factory Mutual requirements, as well as NFPA Pamphlet 20.

B. The unit shall be as scheduled on the Drawings. Total dynamic head at shutoff shall not exceed 120% of total dynamic head at rating point. Power input

I. Pump shall be an Aurora pump as scheduled on the Drawings, or approved equal of Patterson Pump, Fairbanks Morse or Peerless make.

J. Provide a remote alarm panel in the Fire Command Room for the fire pump, similar to the Metron 1701B, and as per NFPA 20.

2.5 JOCKEY PUMP

A. Where scheduled, the jockey pump shall be a Aurora pump, Burkes or Grundfos as scheduled on the Drawings or approved equal.

B. Pump shall have stainless steel shaft, bronze impellers and wearing rings, and mechanical seals.

C. Provide a jockey pump controller with across- the-line magnetic starter, 3 overloads, disconnect switch, adjustable pressure switch and minimum running time delay relay which is job adjustable. Pressure switch shall be set to start the jockey pump at a water pressure slightly higher than the fire pump starting setting, and to stop the jockey pump at a lower setting than for the fire pump.

2.6 ALARM VALVE ASSEMBLY

A. The alarm valve assembly shall consist of a service shutoff valve, a clapper type main check valve, an auxiliary seat (alarm outlet), a retarding chamber, an electric circuit closer, gauges, check valves, gate valves, globe or angle valves, cocks, etc.

2.7 SPRINKLER HEADS (ALL HEADS TO BE QUICK RESPONSE)

A. All heads in public areas, Operating, Delivery, and Imaging rooms provided with suspended ceilings shall be adjustable equal to Tyco "RFII" (Flush concealed pendent) with thread-on/off and bright white cover plate, arranged insofar as possible to pattern with air diffusers, grilles and lights. Where practicable they shall be centered in lay-in ceiling panels. Sprinkler heads in back of house areas or non-public areas shall be semi-recessed, similar to Tyco Model "TY-FRL", chrome plate with escushon to match ceiling tile.

B. Sprinkler heads non-finished areas such as elevator shafts, mechanical equipment rooms, electrical rooms, janitors closet, etc. shall be chrome plated brass pendent or upright, similar to Tyco Model "TY-FRB". Heads in areas without ceilings shall be of the upright type.

C. Sprinkler heads at window in the atrium at patient room. Head type shall be chrome plated similar to Tyco model WS.

D. Sidewall type heads shall be chrome plated brass similar to Tyco Model "TY-FRL".

E. Furnish a wall mounted cabinet, where directed, containing a supply of sprinkler heads of the same types installed and suitable sprinkler head wrenches.

2.13 IDENTIFICATION TAGS

A. General: All controls, drain, test alarms and alarm valves shall be provided with identification signs as required by NFPA.

2.14 WATER MOTOR GONGS

A. Water powered gong with clapper roller, clapper, strainer, water wheel, shaft, housings, cover plates, and other standard components.

2.15 FLOW SWITCHES

A. Provide an approved flow switch in each sprinkler system connection serving each sprinkler zone. Switches shall be suitable for connection into the fire alarm system.

2.16 MONITOR SWITCHES

A. Each manual sectionalizing valve and/or shutoff valve in the standpipe and sprinkler system shall be provided with an approved valve monitoring switch to indicate whether the valve is open or closed. Wiring from switches to the fire alarm system will be done under Division 16. The switch shall give a tamper indication if removed from its mounting or the housing cover is removed; it shall signal an alarm when the valve position is altered.

2.17 SPECIAL VALVES

A. General: Provide valves, UL listed/FM approved, in accordance with the following. Provide sizes and types which mate and match, piping and equipment connections.

B. Alarm Check Valve: Provide cast-iron water flow alarm check valve, 175 psi working pressure.

C. Fire Hose Valve: Hose valve for Fire Department use where pressure is 100 psi or higher shall be Zurn Z-3000 pressure - Tru valve, bronze body, UL listed, 2-1/2" male outlet reducer with cap and chain. Thread to fit Fire Department.

D. Floor Control Valve: Valve for sprinkler service (where pressure is less than 100 psi) shall be equal to Milwaukee #BB-SC100 bronze body, stainless steel disc and stem with temperature -30°F to 350°F rating UL listed.

E. Drains: The sprinkler system shall be provided with complete drainage facilities as indicated and in accordance with NFPA No. 13.

END OF SECTION 21 10 00

Division 22
Plumbing

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Equipment installation requirements common to equipment sections.
9. Painting and finishing.
10. Concrete bases.
11. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.7 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Floor-Plate Type: Cast-iron floor plate.

D. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1.

END OF SECTION 22 05 00

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following general-duty valves:

1. Bronze angle valves.
2. Cast-iron angle valves.
3. Bronze ball valves.
4. Ferrous-alloy ball valves.
5. Ductile-iron butterfly valves.
6. High-pressure butterfly valves.
7. Bronze check valves.
8. Cast-iron swing check valves.
9. Spring-loaded, lift-disc check valves.
10. Bronze gate valves.
11. Cast-iron gate valves.
12. Bronze globe valves.
13. Cast-iron globe valves.
14. Cast-iron plug valves.
15. Resilient-seated, cast-iron, eccentric plug valves.
16. Chainwheel actuators.

B. Related Sections include the following:

1. Division 21 fire-suppression piping and fire pump Sections for fire-protection valves.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and charts.
3. Division 22 piping Sections for specialty valves applicable to those Sections only.

1.3 DEFINITIONS

A. The following are standard abbreviations for valves:

1. CWP: Cold working pressure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze Valves: NPS 2 (DN 50) and smaller with threaded ends, unless otherwise indicated.

C. Ferrous Valves: NPS 2-1/2 (DN 65) and larger with flanged ends, unless otherwise indicated.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

F. Valve Actuators:

   1. Chainwheel: For attachment to valves, of size and mounting height, as indicated in the "Valve Installation" Article in Part 3.
   2. Gear Drive: For quarter-turn valves NPS 8 (DN 200) and larger.
   3. Handwheel: For valves other than quarter-turn types.
   4. Lever Handle: For quarter-turn valves NPS 6 (DN 150) and smaller, except plug valves.
   5. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug head.

G. Extended Valve Stems: On insulated valves. Valves shall have 2-inch (50-mm) stem extensions and the following features:

   1. Gate Valves: Shall be rising-stem type.
   2. Ball Valves: Shall have extended operating handle of non-thermal-conductive material, protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation, and memory stops that are fully adjustable after insulation is applied.

      a. Basis-of-Design Product: NIBCO Nib-seal handle extension or a comparable product by one of the following:

         1) Conbraco Industries, Inc.; Apollo Div.

         2) Watts:

2.5 BRONZE BALL VALVES

A. Bronze Ball Valves, General: MSS SP-110 and have bronze body complying with ASTM B 584 Alloy 844, except for Class 250 which shall comply with ASTM B 61, full-depth ASME B1.20.1 threaded or solder ends, and blowout-proof stems.

B. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: Chrome-plated bronze ball and bronze stem and; reinforced TFE seats; threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing, solder or threaded ends; and 150 psig (1034 kPa) SWP 600-psig (4140-kPa)CWP rating.

1. Basis-of-Design Product: NIBCO Model S-585-70 or T-585-70, or a comparable product by one of the following:

a. Conbraco Industries, Inc.; Apollo Div. Model 77-Series

b. Crane Co. Model 9210 Series

c. Watts Model B-6080-Series

C. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim: Type 316 stainless-steel vented ball and stem, reinforced TFE seats, threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing, soldered or threaded ends; 150 psig (1034 kPa) SWP and 600-psig (4140-kPa) CWP ratings.

1. Basis-of-Design Product: NIBCO Model S-585-70-66 or T-585-70-66, or a comparable product by one of the following:

a. Conbraco Industries, Inc.; Apollo Div. Model 77-140 Series
b. Crane Co. Model 9210-S Series
c. Watts Model 6080-SS Series

D. Three-Piece, Full Port, Bronze Ball Valves with Stainless-Steel Trim: Type 316 stainless-steel vented ball and stem, threaded body packnut design (no threaded stem designs allowed) with adjustable stem packing, stainless nuts and bolts on valve body, soldered or threaded ends; 150 psig (1034 kPa) SWP and 600-psig (4140-kPa) CWP rating.

1. Basis-of-Design Product: NIBCO Model S-595-Y-66-SS or T-595-Y-66-SS, or a comparable product by one of the following:

a. Conbraco Industries, Inc.; Apollo Div. 82-140 Series

b. Crane Co. Model 9300-S –Series

2.6 CARBON STEEL-ALLOY BALL VALVES

A. Ball Valves, General: MSS SP-72, with ASTM A-216 Type WCB, carbon-steel body; ASTM A-351, Type CF8M vented stainless-steel ball; and ASTM A-276, Type 316

D. Grooved-End, Ferrous-Alloy Butterfly Valves with EPDM-Encapsulated Ductile-Iron Disc or electroless nickel coated ductile iron disc with EPDM seal, Ductile-iron body with grooved ends, polyamide coating inside and outside or alkyd enamel inside and outside, two-piece Type 416 stainless-steel stem, PTFE bronze sintered on steel bushing or TFE lined fiberglass and brass bushing, fasteners and pins shall not be used to attach stem to disc, no pins or fasteners in waterway, and 300-psig (2070-kPa) CWP Rating for Valves NPS 2 through NPS 8 (DN 50 through DN 200), 200 psig (1380 kPa) CWP Rating for Valves NPS 10 through NPS 12 (DN 250 through DN 300).

1. Basis-of-Design Product: NIBCO Model GD-4765-3/5, or a comparable product by one of the following:

   a. Victaulic Co. of America. Model Vic-300-Master Seal

2.8 CARBON STEEL HIGH-PRESSURE BUTTERFLY VALVES

A. High-Pressure Butterfly Valves, General: MSS SP-68 API 609 seat pressure and temperature ratings, ANSI B1634A body pressure and temperature ratings, ANSI B16.5 flange dimensions, ISO 5211, EN 12116 actuator mounting top works, capable of bi-directional dead-end service at full-rated pressure without use of downstream flange, carbon-steel body, offset design, extended-neck for insulation, permanently lubricated 300-series stainless-steel bushings with graphite and modified PTFE seats, graphite packing and gasket, one-piece duplex stainless-steel stem, and stainless-steel disc. Maximum steam rating of 50 psig (345 kPa). Valves NPS 6 (DN 150) and smaller shall have lever-lock operator; valves NPS 8 (DN 200) and larger shall have weatherproof gear operator.

B. Class 150, Full-Lug, 285 psig (1964 kPa) CWP Rating, High-Pressure Butterfly Valves:

1. Basis-of-Design Product: NIBCO Model LCS6822-3/5, or a comparable product by one of the following:

   a. Jamesbury, Inc. Model *(Size)* 815L-11-22-36-TT-*
   b. WKM Model *(Size)* Model B 113-05-SO1-11-*

2.9 BRONZE CHECK VALVES

A. Bronze Check Valves, General: MSS SP-80.

B. Class 125, Bronze, Lift Check Valves with TFE Disc: ASTM B-584 bronze body and integral seat with soldered or threaded end connections, and having 250-psig (1378 kPa) CWP rating.

1. Basis-of-Design Product: NIBCO Model S-480-Y or T-480-Y, or a comparable product by one of the following:

   a. CPV Manufacturing, Inc: Model 36

B. Class 125, Globe, Flanged Lift-Disc Check Valves: Globe style with cast-iron body and flanged ends, and having 200 psig (1378 kPa) CWP rating.

1. Basis-of-Design Product: NIBCO Model F-910-B, or a comparable product by one of the following:
   a. Val-Matic Valve & Mfg. Corp. Model 18** Series
   b. CPV Manufacturing, Inc. Model 20-D

2.12 BRONZE GATE VALVES

A. Bronze Gate Valves, General: MSS SP-80, with malleable-iron handwheel.

B. Class 150, Rising-Stem, Union-Ring Bonnet, Bronze Gate Valves: ASTM B-62 bronze body, bonnet, and wedge, copper-silicone bronze stem, union-ring bonnet, soldered or threaded end connections; and having 300 psig (2067 kPa) CWP rating.

1. Basis-of-Design Product: NIBCO Model S-134 or T-134, or a comparable product by one of the following:

   a. Crane Co. Model 431-UB
   b. Powell, Wm. Co. Model 2714

2.13 CAST-IRON GATE VALVES

A. Cast-Iron Gate Valves, General: MSS SP-70, Type I with bolted bonnet, flanged end connections, and non-asbestos packing and gasket.

B. Class 125, OS&Y, Bronze-Mounted, Cast-Iron Gate Valves: ASTM A-126, Class B cast-iron body and bonnet with bronze trim, and solid-wedge disc; and having 200 psig (1378 kPa) CWP rating.

1. Basis-of-Design Product: NIBCO Model F-617-O, or a comparable product by one of the following:

   a. Crane Co. Model 465 1/2
   b. Powell, Wm. Co. Model 1793

2.14 BRONZE GLOBE VALVES

A. Bronze Globe Valves, General: MSS SP-80, with malleable-iron handwheel.

B. Class 150, TFE Disc, Bronze Globe Valves: ASTM B-62 bronze body, bonnet, and seat, TFE disc, copper-silicone bronze stem, union-ring bonnet, soldered or threaded end connections; and having 300 psig (2067 kPa) CWP rating.

1. Basis-of-Design Product: NIBCO Model S-235-Y or T-235-Y, or a comparable product by one of the following:

   a. Crane Co. Model 7-TF

C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

D. Examine threads on valve and mating pipe for form and cleanliness.

E. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

F. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE APPLICATIONS

A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly, gate, or plug valves.
2. Throttling Service: Angle, ball, butterfly, or globe valves.
3. Pump Discharge: Spring-loaded, lift-disc check valves.

B. If valves with specified CWP ratings are not available, the same types of valves with higher CWP ratings may be substituted.

C. Domestic Water Piping: Use the following types of valves:

1. Angle Valves, NPS 2 (DN 50) and Smaller: Class 150, with TFE disc, bronze.
2. Angle Valves, NPS 2-1/2 (DN 65) and Larger: Class 125, cast iron.
3. Ball Valves, NPS 2 (DN 50) and Smaller: Two -piece, full port, stainless-steel trim, bronze.
4. Ball Valves, NPS 2-1/2 (DN 65) and Larger: Class 150, full port, ferrous alloy.
5. Butterfly Valves, NPS 2 to NPS 12 (DN 50 to DN 300): Single-flange, full lug, 200-psig (1380-kPa) CWP rating, bronze disc, EPDM liner, ductile iron.
6. Butterfly Valves, NPS 14 (DN 350) and Larger: Single-flange, full lug, 150-psig (1035-kPa) CWP rating, bronze disc, EPDM liner, ductile iron.
7. High-Pressure Butterfly Valves, NPS 2-1/2 (DN 65) and Smaller: Single-flange full lug, 285 psig (1964 kPa) CWP rating.
8. Grooved-End, Ductile-Iron Butterfly Valves, NPS 2 to NPS 8 (DN 50 to DN 200): 300-psig (2070-kPa) CWP rating, EPDM- encapsulated ductile-iron disc.
9. Grooved-End, Ductile-Iron Butterfly Valves, NPS 10 to NPS 12 (DN 250 to DN 300): 200-psig (1380-kPa) CWP rating, EPDM- encapsulated ductile-iron disc.
10. Lift Check Valves, NPS 2 (DN 50) and Smaller: Class 125, bronze with TFE disc.
11. Swing Check Valves, NPS 2 (DN 50) and Smaller: Class 150, bronze with TFE disc.
12. Swing Check Valves, NPS 2-1/2 (DN 65) and Larger: Class 125, cast-iron, standard.
13. Grooved-End Swing Check Valves, NPS 2-1/2 (DN 65) and Larger: Grooved-end, ductile-iron, swing check valves.

3.4 JOINT CONSTRUCTION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.

B. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

END OF SECTION 22 05 23

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following hangers and supports for plumbing system piping and equipment:

1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Fiberglass pipe hangers.
4. Metal framing systems.
5. Fiberglass strut systems.
6. Thermal-hanger shield inserts.
7. Fastener systems.
8. Pipe stands.
9. Pipe positioning systems.
10. Equipment supports.

B. Related Sections include the following:

1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Division 21 Section "Water-Based Fire-Suppression Systems" for pipe hangers for fire-suppression piping.
3. Division 22 Section "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
4. Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

1.2 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.3 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

2.2 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. Globe Pipe Hanger Products, Inc.
3. Grinnell Corp.
4. National Pipe Hanger Corporation.
5. Tolco Inc.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Manufacturers:

1. B-Line Systems, Inc.; a division of Cooper Industries.
2. Tolco Inc.
3. Unistrut Corp.; Tyco International, Ltd.

C. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- (690-kPa-) minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

1. Manufacturers:

a. ERICO/Michigan Hanger Co.
b. MIRO Industries.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

1. Manufacturers:

a. MIRO Industries.

D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

1. Manufacturers:

a. ERICO/Michigan Hanger Co.
b. MIRO Industries.
c. Portable Pipe Hangers.

2. Base: Stainless steel.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.

1. Manufacturers:

a. Portable Pipe Hangers.

2. Bases: One or more plastic.
3. Vertical Members: Two or more protective-coated-steel channels.
4. Horizontal Member: Protective-coated-steel channel.
5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).
2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F (49 to 232 deg C) pipes, NPS 4 to NPS 16 (DN 100 to DN 400), requiring up to 4 inches (100 mm) of insulation.
3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24 (DN 20 to DN 600), requiring clamp flexibility and up to 4 inches (100 mm) of insulation.
4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24 (DN 15 to DN 600), if little or no insulation is required.
5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8 (DN 20 to DN 200).
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8 (DN 15 to DN 200).
8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8 (DN 15 to DN 200).
9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2 (DN 15 to DN 50).
10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8 (DN 10 to DN 200).
11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3 (DN 10 to DN 80).
12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
16. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36 (DN 65 to DN 900), if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
17. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30 (DN 25 to DN 750), from 2 rods if longitudinal movement caused by expansion and contraction might occur.
18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20 (DN 65 to DN 500), from single rod if horizontal movement caused by expansion and contraction might occur.
19. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42 (DN 50 to DN 1050), if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes, NPS 2 to NPS 24 (DN 50 to DN 600), if small horizontal movement caused by

11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:

    a. Horizontal (MSS Type 54): Mounted horizontally.

2. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

G. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 Section "Roof Accessories" for curbs.

H. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.

I. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

J. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

K. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

L. Install lateral bracing with pipe hangers and supports to prevent swaying.

M. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

N. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

O. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.

P. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
c. Do not exceed pipe stress limits according to ASME B31.9 for building services piping.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).

3.6 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 22 05 29

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Stencils.
5. Valve tags.
6. Warning tags.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.3 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel self-tapping screws.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.4 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; and minimum letter height of 3/4 inch (19 mm) for access panel and door labels, equipment labels, and similar operational instructions.

1. Stencil Material: Aluminum.
2. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Identification Paint: Use for contrasting background.
2. Stencil Paint: Use for pipe marking.

C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Pipe Label Color Schedule:

1. Low-Pressure, Compressed-Air Piping:

   a. Background Color: Black.
   b. Letter Color: Yellow.

2. Domestic Water Piping:

   a. Background Color: Black.
   b. Letter Color: Black.

3. Sanitary Waste and Storm Drainage Piping:

   a. Background Color: White.
   b. Letter Color: Black.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

   a. Cold Water: 1-1/2 inches (38 mm), round.
   b. Hot Water: 1-1/2 inches (38 mm), round.

SECTION 22 07 00

PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:

   a. Calcium silicate.
   b. Cellular glass.
   c. Flexible elastomeric.
   d. Mineral fiber.
   e. Phenolic.
   f. Polyisocyanurate.
   g. Polyolefin.
   h. Polystyrene.

2. Fire-rated insulation systems.
3. Insulating cements.
4. Adhesives.
5. Mastics.
6. Lagging adhesives.
7. Sealants.
8. Factory-applied jackets.
9. Field-applied fabric-reinforcing mesh.
10. Field-applied cloths.
11. Field-applied jackets.
12. Tapes.
13. Securements.
14. Corner angles.

B. Related Sections:

1. Division 21 Section "Fire-Suppression Systems Insulation."
2. Division 23 Section "HVAC Insulation."
3. Division 23 Section "Metal Ducts" for duct liners.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.5 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Owens-Corning

B. Johns-Manville

C. Pittsburg-Corning

D. Certain Teed Manson

E. Knauf Fiberglass

2.2 BASIC INSULATION MATERIALS, FITTINGS, FINISHES

A. Insulation materials shall conform to the following requirements:

	Maximum	Density

2.4 STEAM VALVE INSULATING JACKET

A. Provide a removable jacket for all steam shut-off valves, steam pressure reducing valves, traps and condensate return valves.

B. Jackets shall utilize asbestos-free flexible insulation blanket and covering. The jackets to have Velcro fasteners for easy installation and removal.

C. Jackets shall be equal to that as manufactured by Spence Engineering Company.

PART 3 - EXECUTION

3.1 GENERAL

A. Materials shall be applied by a qualified insulation applicator/workman skilled in this trade. Insulation shall be installed in accordance with the manufacturers written instructions and in accordance with recognized industry standards. Mechanical fasteners shall be used whenever possible to assure permanent construction. Unsightly Work shall be cause for rejection.

B. Materials shall be applied only after surfaces have been tested and cleaned.

C. Non-compressible insulation material shall be installed at hanger supports on cold piping to prevent damage to insulation and vapor barrier.

D. Insulation of cold surfaces shall be vapor-sealed to prevent condensation.

E. Minimum thickness of insulation shall be as scheduled; however, sufficient insulation shall be provided to eliminate condensation on the cold surfaces, and to maintain a maximum exterior insulation surface temperature of 125°F on the hot surfaces.

F. Where piping system insulation is specified, cover valves, strainers, unions, flanges, and fittings.

G. Install protective metal shields where pipe hangers bear on the outside of insulation. Provide wood blocking from the shield through the insulation or O.C. Kaylo (minimum 24" long) to prevent crushing of the insulation (Refer to Section 15060, 2.8, B.).

H. Extend piping insulation without interruption through walls, floors and similar piping penetrations, there shall be no exceptions.

I. Prior to installation of any insulation materials to ferrous piping systems, the piping surfaces shall be thoroughly cleaned of all mill scale, grease and dirt.

8. P6A2 and P6B2: Cellular Glass outdoors: Same as P6A1 and P6B1, respectively, except do not field apply an all service jacket (ASJ). Apply metal jacketing on pipes and fittings as specified in this section for outdoor piping.
9. P6A3 and P6B3: Cellular Glass outdoors with heat trace: Same as P6A1 and P6B1, respectively, except do not field apply an all service jacket (ASJ) Apply metal jacketing on pipes and fittings as specified in this section for outdoor piping.
10. P6B: Insulation for Fittings and Accessories:
    a. Pipe insulation shall have ends thoroughly coated with a vapor barrier coating not more than 6 inches from each flange, union, valve, anchor, or fitting in all directions.
    b. Insulation shall be premolded or segmented. Insulation of the same thickness and conductivity as the adjoining pipe insulation shall be used. If nesting size insulation is used, the insulator should be overlapped 2 inches or one pipe diameter. Insulation or insulating cement shall be used to fill the voids. Insulation for elbows less than 3 inch size shall be premolded. Insulation for elbows 3 inch size and larger shall be either premolded or segmented. Elbows insulated using segments shall not have less than 3 segments per elbow. Insulation may be secured by wire or tape until finish is applied.
    c. Upon completion of installation of insulation on flanges, unions, valves, anchors, fittings and accessories, all terminations and all insulation not protected by factory vapor barrier jackets or PVC fitting covers shall be protected with two coats of vapor barrier coating with a minimum total thickness of $1/16^{th}$ inch, applied with glass tape embedded between coats. Tape seams shall overlap 1 inch. The coating shall extend out onto the adjoining pipe insulation 2 inches.
    d. Insulation terminations shall be tapered to unions at a 45-degree angle. The ends of the insulation shall be coated and taped as above.
    e. Anchors attached directly to the pipe shall be insulated for a sufficient distance to prevent condensation but not less than 6 inches from the insulation surface.
    f. PVC Fitting Covers: One or two piece PVC fitting covers shall be applied. The covers shall be secured by PVC vapor barrier tape, adhesive, seal-welding or with tacks made for securing PVC covers. All seams in the cover, and tacks and laps to adjoining pipe insulation jacket, will be sealed with vapor barrier tape to ensure that the assembly has a continuous vapor seal.

PIPE FITTINGS

	FITTING TYPE			FITTING FINISH TYPE		
	INDOOR CONCEALED	INDOOR EXPOSED	OUTDOOR	INDOOR CONCEALED	INDOOR EXPOSED	OUTDOOR
Domestic cold water; bottom of roof drains & overflow drains; horizontal storm drains & overflow drains within building; waste piping conveying cooling coil condensate; cooling condensation drains; waste from chilled drinking water fountains.	1	1	1	8	8	8 & 3
Domestic hot water supply & recirculation	1	1	1	8	8	8 & 3
Heating water supply & return; steam, condensate return, pumped return.	1 or 2	1 or 2	1 or 2	8	8	8 & 3
Mains & branches for chilled water supply & return; condenser water supply & return; refrigerant suction piping.	Refer to Table "PIPES" and to Table N4. Use methods P6B, P6B1, P6B3.					
Indoor:	1	1	1	8	8	--
Outdoor:	1	1	1	--	--	8 & 3
H/C lavatory & sink tailpiece, offset trap & trap arm.	1	1	1	--	4	--

3.3 PIPE INSULATION THICKNESS SCHEDULES

DOMESTIC HOT WATER SYSTEMS (N_1)

SUPPLY WATER TEMPERATURE	NON-CIRCULATING RUNOUTS UP TO 1"	CIRCULATING MAINS AND BRANCHES		
		UP TO 1 ¼"	1 ½" & 2"	OVER 2"
170 - 180°F	½"	1"	1 ½"	2"
140 - 160°F	½"	½"	1"	1 ½"
100 - 130°F	½"	½"	½"	1"

HEATING WATER AND STEAM SYSTEMS (N_2)
INSULATION THICKNESS FOR PIPE SIZES

FLUID TEMP.	RUNOUTS UP TO 2"	1" & LESS	1 ¼" TO 2"	2 ½" TO 4"	5" & 6"	8" AND LARGER
High Pressure/Temp. 306-450°F (Includes HPS)	2.5"	2.5"	2.5"	3.0"	3.5"	3.5"
Medium Pressure/Temp. 251-305°F (Includes HPR, BF)	2.0"	2.0"	2.5"	2.5"	3.5"	3.5"
Low Pressure/Temp. 201-250°F (Includes LPS, LPR)	1.5"	1.5"	1.5"	2.0"	2.0"	3.5"
Low Temp. 120-200°F (Includes HS, HR)	1.5"	1.5"	1.5"	1.5"	1.5"	1.5"
Vents, Drains, Blow-downs, Relief's All Temp.	--	1.0"	1.5"	2.0"	2.0"	2.0"

* Runouts to individual units, less than 48" in length.

3.4 INSTALLATION OF PRE-FABRICATED HANGER SHIELDS

A. Refer to Section 15060 for metal-jacketed insulation inserts at the various locations described.

B. Provide the following insulation work: Coat butt ends of insulation and inset with a vapor barrier adhesive; cover butt joints with vapor barrier jacket butt strips; and, apply vapor barrier tape on longitudinal overlap of metal jacket for insulation insert.

END OF SECTION 22 07 00

SECTION 22 07 00

PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:

   a. Calcium silicate.
   b. Cellular glass.
   c. Flexible elastomeric.
   d. Mineral fiber.
   e. Phenolic.
   f. Polyisocyanurate.
   g. Polyolefin.
   h. Polystyrene.

2. Fire-rated insulation systems.
3. Insulating cements.
4. Adhesives.
5. Mastics.
6. Lagging adhesives.
7. Sealants.
8. Factory-applied jackets.
9. Field-applied fabric-reinforcing mesh.
10. Field-applied cloths.
11. Field-applied jackets.
12. Tapes.
13. Securements.
14. Corner angles.

B. Related Sections:

1. Division 21 Section "Fire-Suppression Systems Insulation."
2. Division 23 Section "HVAC Insulation."
3. Division 23 Section "Metal Ducts" for duct liners.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.5 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Owens-Corning

B. Johns-Manville

C. Pittsburg-Corning

D. Certain Teed Manson

E. Knauf Fiberglass

2.2 BASIC INSULATION MATERIALS, FITTINGS, FINISHES

A. Insulation materials shall conform to the following requirements:

	Maximum	Density

2.4 STEAM VALVE INSULATING JACKET

A. Provide a removable jacket for all steam shut-off valves, steam pressure reducing valves, traps and condensate return valves.

B. Jackets shall utilize asbestos-free flexible insulation blanket and covering. The jackets to have Velcro fasteners for easy installation and removal.

C. Jackets shall be equal to that as manufactured by Spence Engineering Company.

PART 3 - EXECUTION

3.1 GENERAL

A. Materials shall be applied by a qualified insulation applicator/workman skilled in this trade. Insulation shall be installed in accordance with the manufacturers written instructions and in accordance with recognized industry standards. Mechanical fasteners shall be used whenever possible to assure permanent construction. Unsightly Work shall be cause for rejection.

B. Materials shall be applied only after surfaces have been tested and cleaned.

C. Non-compressible insulation material shall be installed at hanger supports on cold piping to prevent damage to insulation and vapor barrier.

D. Insulation of cold surfaces shall be vapor-sealed to prevent condensation.

E. Minimum thickness of insulation shall be as scheduled; however, sufficient insulation shall be provided to eliminate condensation on the cold surfaces, and to maintain a maximum exterior insulation surface temperature of 125°F on the hot surfaces.

F. Where piping system insulation is specified, cover valves, strainers, unions, flanges, and fittings.

G. Install protective metal shields where pipe hangers bear on the outside of insulation. Provide wood blocking from the shield through the insulation or O.C. Kaylo (minimum 24" long) to prevent crushing of the insulation (Refer to Section 15060, 2.8, B.).

H. Extend piping insulation without interruption through walls, floors and similar piping penetrations, there shall be no exceptions.

I. Prior to installation of any insulation materials to ferrous piping systems, the piping surfaces shall be thoroughly cleaned of all mill scale, grease and dirt.

8. P6A2 and P6B2: Cellular Glass outdoors: Same as P6A1 and P6B1, respectively, except do not field apply an all service jacket (ASJ). Apply metal jacketing on pipes and fittings as specified in this section for outdoor piping.
9. P6A3 and P6B3: Cellular Glass outdoors with heat trace: Same as P6A1 and P6B1, respectively, except do not field apply an all service jacket (ASJ) Apply metal jacketing on pipes and fittings as specified in this section for outdoor piping.
10. P6B: Insulation for Fittings and Accessories:
    a. Pipe insulation shall have ends thoroughly coated with a vapor barrier coating not more than 6 inches from each flange, union, valve, anchor, or fitting in all directions.
    b. Insulation shall be premolded or segmented. Insulation of the same thickness and conductivity as the adjoining pipe insulation shall be used. If nesting size insulation is used, the insulator should be overlapped 2 inches or one pipe diameter. Insulation or insulating cement shall be used to fill the voids. Insulation for elbows less than 3 inch size shall be premolded. Insulation for elbows 3 inch size and larger shall be either premolded or segmented. Elbows insulated using segments shall not have less than 3 segments per elbow. Insulation may be secured by wire or tape until finish is applied.
    c. Upon completion of installation of insulation on flanges, unions, valves, anchors, fittings and accessories, all terminations and all insulation not protected by factory vapor barrier jackets or PVC fitting covers shall be protected with two coats of vapor barrier coating with a minimum total thickness of $1/16^{th}$ inch, applied with glass tape embedded between coats. Tape seams shall overlap 1 inch. The coating shall extend out onto the adjoining pipe insulation 2 inches.
    d. Insulation terminations shall be tapered to unions at a 45-degree angle. The ends of the insulation shall be coated and taped as above.
    e. Anchors attached directly to the pipe shall be insulated for a sufficient distance to prevent condensation but not less than 6 inches from the insulation surface.
    f. PVC Fitting Covers: One or two piece PVC fitting covers shall be applied. The covers shall be secured by PVC vapor barrier tape, adhesive, seal-welding or with tacks made for securing PVC covers. All seams in the cover, and tacks and laps to adjoining pipe insulation jacket, will be sealed with vapor barrier tape to ensure that the assembly has a continuous vapor seal.

PIPE FITTINGS

	FITTING TYPE			FITTING FINISH TYPE		
	INDOOR CONCEALED	INDOOR EXPOSED	OUTDOOR	INDOOR CONCEALED	INDOOR EXPOSED	OUTDOOR
Domestic cold water; bottom of roof drains & overflow drains; horizontal storm drains & overflow drains within building; waste piping conveying cooling coil condensate; cooling condensation drains; waste from chilled drinking water fountains.	1	1	1	8	8	8 & 3
Domestic hot water supply & recirculation	1	1	1	8	8	8 & 3
Heating water supply & return; steam, condensate return, pumped return.	1 or 2	1 or 2	1 or 2	8	8	8 & 3
Mains & branches for chilled water supply & return; condenser water supply & return; refrigerant suction piping.	Refer to Table "PIPES" and to Table N4. Use methods P6B, P6B1, P6B3.					
Indoor:	1	1	1	8	8	--
Outdoor:	1	1	1	--	--	8 & 3
H/C lavatory & sink tailpiece, offset trap & trap arm.	1	1	1	--	4	--

3.3 PIPE INSULATION THICKNESS SCHEDULES

DOMESTIC HOT WATER SYSTEMS (N_1)

SUPPLY WATER TEMPERATURE	NON-CIRCULATING RUNOUTS UP TO 1"	CIRCULATING MAINS AND BRANCHES		
		UP TO 1 ¼"	1 ½" & 2"	OVER 2"
170 - 180°F	½"	1"	1 ½"	2"
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100 - 130°F	½"	½"	½"	1"

HEATING WATER AND STEAM SYSTEMS (N_2)
INSULATION THICKNESS FOR PIPE SIZES

FLUID TEMP.	RUNOUTS UP TO 2"	1" & LESS	1 ¼" TO 2"	2 ½" TO 4"	5" & 6"	8" AND LARGER
High Pressure/Temp. 306-450°F (Includes HPS)	2.5"	2.5"	2.5"	3.0"	3.5"	3.5"
Medium Pressure/Temp. 251-305°F (Includes HPR, BF)	2.0"	2.0"	2.5"	2.5"	3.5"	3.5"
Low Pressure/Temp. 201-250°F (Includes LPS, LPR)	1.5"	1.5"	1.5"	2.0"	2.0"	3.5"
Low Temp. 120-200°F (Includes HS, HR)	1.5"	1.5"	1.5"	1.5"	1.5"	1.5"
Vents, Drains, Blow-downs, Relief's All Temp.	--	1.0"	1.5"	2.0"	2.0"	2.0"

* Runouts to individual units, less than 48" in length.

3.4 INSTALLATION OF PRE-FABRICATED HANGER SHIELDS

A. Refer to Section 15060 for metal-jacketed insulation inserts at the various locations described.

B. Provide the following insulation work: Coat butt ends of insulation and inset with a vapor barrier adhesive; cover butt joints with vapor barrier jacket butt strips; and, apply vapor barrier tape on longitudinal overlap of metal jacket for insulation insert.

END OF SECTION 22 07 00

SECTION 22 11 13

FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of utility services, including all related systems and accessories.

B. This Plumbing Subcontractor shall extend the sanitary sewer service, storm drainage, water service and natural gas service to the indicated points of connection shown on the drawings. The scope of this work shall include all labor and materials to the indicated connection point on drawings, code and permit fees, and materials required for the installation of various utility services as herein specified, adhering to the general routing and methods of distribution as shown by the drawings.

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

1.3 DEFINITIONS

A. PVC: Polyvinyl chloride plastic. (Match material with the utility contractor.)

1.4 SUBMITTALS

A. Product Data: For each type of product indicated in Part 2.

B. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves specialty locations, and elevations.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L, water tube, annealed temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

B. Hard Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L, water tube, drawn temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.

D. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

1. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C). Include insulating material that isolates dissimilar metals and ends with inside threads according to ASME B1.20.1.
2. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure to suit system pressures.
3. Dielectric-Flange Insulation Kits: Field-assembled companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

    a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure to suit system pressures.

4. Dielectric Couplings: Galvanized-steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).
5. Dielectric Nipples: Electroplated steel nipples with inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types, and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

2.4 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. American AVK Co.; Valves & Fittings Div.
    b. American Cast Iron Pipe Co.; American Flow Control Div.
    c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
    d. Crane Co.; Crane Valve Group; Stockham Div.
    e. East Jordan Iron Works, Inc.
    f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
    g. McWane, Inc.; Kennedy Valve Div.
    h. McWane, Inc.; M & H Valve Company Div.
    i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
    j. Mueller Co.; Water Products Div.
    k. NIBCO INC.
    l. U.S. Pipe and Foundry Company.

2. Nonrising-Stem, Metal-Seated Gate Valves:

    a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.

        1) Standard: AWWA C500.
        2) Minimum Pressure Rating: 200 psig (1380 kPa).

f. McWane, Inc.; M & H Valve Company Div.
g. Mueller Co.; Water Products Div.
h. NIBCO INC.
i. U.S. Pipe and Foundry Company.

2. UL/FMG, Nonrising-Stem Gate Valves:

a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig (1207 kPa).
3) End Connections: Flanged.

3. OS&Y, Rising-Stem Gate Valves:

a. Description: Iron body and bonnet and bronze seating material.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig (1207 kPa).
3) End Connections: Flanged.

C. Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Div.
d. Hammond Valve.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Red-White Valve Corporation.

2. OS&Y, Rising-Stem Gate Valves:

a. Description: Bronze body and bonnet and bronze stem.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig (1207 kPa).
3) End Connections: Threaded.

3. Nonrising-Stem Gate Valves:

a. Description: Class 125, Type 1, bronze with solid wedge, threaded ends, and malleable-iron handwheel.

1) Standard: MSS SP-80.

h. McWane, Inc.; M & H Valve Company Div.
i. Mueller Co.; Water Products Div.
j. NIBCO INC.
k. Watts Water Technologies, Inc.

2. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.

a. Standard: AWWA C508.
b. Pressure Rating: 175 psig (1207 kPa).

B. UL/FMG, Check Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
b. Crane Co.; Crane Valve Group; Stockham Div.
c. Globe Fire Sprinkler Corporation.
d. Kidde Fire Fighting.
e. MATCO-NORCA, Inc.
f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
g. McWane, Inc.; Kennedy Valve Div.
h. Mueller Co.; Water Products Div.
i. NIBCO INC.
j. Reliable Automatic Sprinkler Co., Inc.
k. Tyco Fire & Building Products.
l. United Brass Works, Inc.
m. Victaulic Company of America.
n. Viking Corporation.
o. Watts Water Technologies, Inc.

2. Description: Swing-check type with pressure rating; rubber-face checks, unless otherwise indicated; and ends matching piping.

a. Standards: UL 312 and FMG approved.
b. Pressure Rating: 175 psig (1207 kPa).

2.7 BUTTERFLY VALVES

A. AWWA Butterfly Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DeZURIK/Copes-Vulcan; a unit of SPX Corporation.
b. Milliken Valve Company.
c. Mueller Co.; Water Products Div.
d. Pratt, Henry Company.

d. Zurn Plumbing Products Group; Wilkins Water Control Products Div.

2. Description: Pilot-operation, diaphragm-type, single-seated main water control valve with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot control valve, restrictor device, specialty fittings, and sensor piping.

a. Pressure Rating: Initial pressure of 150 psig (1035 kPa) minimum.
b. Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.

1) Pattern: Angle or Globe-valve design.
2) Trim: Stainless steel.

c. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.

2.9 RELIEF VALVES

A. Air-Release Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Crispin-Multiplex Manufacturing Co.
b. GA Industries, Inc.
c. Val-Matic Valve & Manufacturing Corp.

2. Description: Hydromechanical device to automatically release accumulated air.

a. Standard: AWWA C512.
b. Pressure Rating: 300 psig (2070 kPa).
c. Body Material: Cast iron.
d. Trim Material: Stainless steel.

2.10 VACUUM BREAKERS

A. Pressure Vacuum Breaker Assembly:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ames Fire & Waterworks; a division of Watts Regulator Co.
b. Conbraco Industries, Inc.
c. FEBCO; SPX Valves & Controls.
d. Watts Water Technologies, Inc.
e. Zurn Plumbing Products Group; Wilkins Water Control Products Div.

4. Pressure Loss: 5 psig (35 kPa) maximum, through middle 1/3 of flow range.
5. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 for NPS 2-1/2 (DN 65) and larger.
6. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
7. Configuration: Designed for horizontal flow.
8. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground water-service piping NPS 4 thru 6 to NPS 8 shall be the following:

1. Shall match site utility contractor piping.

F. Underground Fire-Service-Main Piping NPS 8 shall be the following:

1. Shall match site utility contractor piping.

3.3 PIPING SYSTEMS - COMMON REQUIREMENTS

A. See Division 22 Section "Common Work Results for Plumbing" for piping-system common requirements.

C. Do not install bypass piping around backflow preventers. Manufacturered floor type pipe supports.

D. Support NPS 2-1/2 (DN 65) and larger backflow preventers, valves, and piping near floor and on brick or concrete piers. Manufacturered floor type pipe supports.

3.8 CONNECTIONS

A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.9 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.10 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Section "Earth Moving."

B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Division 22 Section "Common Work Results for Plumbing" for identifying devices.

3.11 CLEANING

A. Clean and disinfect water-distribution piping as follows:

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes domestic water piping inside the building.

B. Water meters will be furnished and installed by utility company.

C. Water meters will be furnished by utility company for installation by Contractor.

D. Related Sections include the following:

1. Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and fittings.
2. Division 22 Section "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.
3. Division 22 Section "Domestic Water Piping Specialties" for water distribution piping specialties.

1.2 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing domestic water piping systems with 80 psig (550 kPa) unless otherwise indicated.

1.3 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Water Samples: Specified in Part 3 "Cleaning" Article.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

a. Grooved-End-Tube Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

2.4 VALVES

A. Bronze and cast-iron, general-duty valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

B. Balancing and drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

C. Union Ball Valves: MSS SP-122, with full-port ball, socket or threaded detachable end connectors, and pressure rating not less than 125 psig (860 kPa) at 73 deg F (23 deg C).

D. Non-Union Ball Valves: MSS SP-122, with full- or reduced-port ball, socket or threaded ends, and pressure rating not less than 125 psig (860 kPa) at 73 deg F (23 deg C).

E. Butterfly Valves: With lever handle and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).

F. Check Valves: Swing or ball-check design and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPE AND FITTING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Domestic Water Piping under building slab inside the Building: Use the following piping materials for each size range:
1. NPS 1/2 to NPS 6 (DN 100 to DN 150): Hard copper tube, Type K; copper pressure fittings; and soldered joints.

3.4 PIPING INSTALLATION

A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Install under-building-slab copper tubing according to CDA's "Copper Tube Handbook."

C. Install sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."

D. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Wall penetration systems are specified in Division 22 Section "Common Work Results for Plumbing."

E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Pressure gages are specified in Division 22 Section "Meters and Gages for Plumbing Piping," and drain valves and strainers are specified in Division 22 Section "Domestic Water Piping Specialities."

F. Install water-pressure regulators downstream from shutoff valves if noted on the drawings. Water-pressure regulators are specified in Division 22 Section " Domestic Water Piping Specialities."

G. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

3.5 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

C. Grooved Joints: Assemble joints with grooved-end-pipe or grooved-end-tube coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition dielectric fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve, and extend and connect to the following:

1. Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Refer to Division 22 Section "Plumbing Fixtures."
4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.
5. Balance domestic hot water recirculation, to ensure proper flow through all mains and branches.
6. Install reduced pressure backflow preventers in each makeup water line as indicated on the Drawings and as required by the City Inspection Department.
7. Install the scheduled backflow preventer in the main domestic water service to the building.
8. Install reduced pressure backflow preventers in water lines to film processors, ice machines, dishwashers, humidifiers etc. as required by code.
9. Pipe full size drain from reduced pressure backflow preventer air gap fitting to nearest floor drain to other suitable receptor.

3.8 FIELD QUALITY CONTROL

A. Inspect domestic water piping as follows:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

    a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
    b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
b. Fill and isolate system according to either of the following:

1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION

SECTION 22 11 19

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated water mixing valves.
6. Strainers.
7. Outlet boxes.
8. Hose stations.
9. Hose bibbs.
10. Wall hydrants.
11. Drain valves.
12. Water hammer arresters.
13. Trap-seal primer valves.
14. Trap-seal primer systems.

B. Related Sections include the following:
1. Division 22 Section "Healthcare Plumbing Fixtures" for thermostatic mixing valves for sitz baths, thermostatic mixing-valve assemblies for hydrotherapy equipment, and outlet boxes for dialysis equipment.
2. Division 22 Section "Drinking Fountains and Water Coolers" for water filters for water coolers.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa), unless otherwise indicated.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

C. Pressure Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Ames Co.
   b. Conbraco Industries, Inc.
   c. FEBCO; SPX Valves & Controls.
   d. Watts Industries, Inc.; Water Products Div.
   e. Zurn Plumbing Products Group; Wilkins Div.

D. Laboratory-Faucet Vacuum Breakers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Conbraco Industries, Inc.
   b. Watts Industries, Inc.; Water Products Div.
   c. Woodford Manufacturing Company.
   d. Zurn Plumbing Products Group; Wilkins Div.

2. Standard: ASSE 1035.
3. Size: NPS 1/4 or NPS 3/8 (DN 8 or DN 10) matching faucet size.
4. Body: Bronze.
5. End Connections: Threaded.
6. Finish: Chrome plated.

2.2 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Ames Co.
   b. Conbraco Industries, Inc.
   c. FEBCO; SPX Valves & Controls.
   d. Watts Industries, Inc.; Water Products Div.
   e. Zurn Plumbing Products Group; Wilkins Div.

2. Body: Bronze for NPS 2 (DN 50) and smaller; for NPS 2-1/2 (DN 65) and larger.
3. End Connections: Threaded for NPS 2 (DN 50) and smaller; for NPS 2-1/2 (DN 65) and larger.
4. Accessories:

   a. Valves: Ball type with threaded ends on inlet and outlet ofNPS 2 (DN 50) and smaller; outside screw and yoke gate-type with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.
   b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

2.4 BALANCING VALVES

A. Copper-Alloy Calibrated Balancing Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Armstrong International, Inc.
b. ITT Industries; Bell & Gossett Div.
c. Flow Design Inc. Model AC
d. NIBCO INC.
e. Taco, Inc.
f. Watts Industries, Inc.; Water Products Div.

2. Type: Ball valve with two readout ports and memory setting indicator.
3. Body: Bronze,
4. Size: Same as connected piping, but not larger than NPS 2 (DN 50).
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

2.5 TEMPERATURE-ACTUATED WATER MIXING VALVES

A. Water-Temperature Limiting Devices:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Armstrong International, Inc.
b. Leonard Valve Company.
c. Powers; a Watts Industries Co.
d. Symmons Industries, Inc.

2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig (860 kPa).
4. Type: Thermostatically controlled water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded union inlets and outlet.
7. Accessories: Manual temperature control check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Valve Pressure Rating: 125 psig (860 kPa) minimum, unless otherwise indicated.
9. Valve Finish: Rough bronze.
10. Piping Finish: Copper.

B. Individual-Fixture, Water Tempering Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Leonard Valve Company.
b. Powers; a Watts Industries Co.
c. Watts Industries, Inc.; Water Products Div.

2. Standard: ASSE 1016, thermostatically controlled water tempering valve.

8. Drain Hose: One 48-inch- (1200-mm-) long, rubber household clothes washer drain hose with hooked end.

B. Icemaker Outlet Boxes:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Acorn Engineering Company.
   b. IPS Corporation.
   c. LSP Products Group, Inc.
   d. Oatey.

2. Mounting: Recessed.
3. Material and Finish: Stainless-steel box and faceplate.
4. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 (DN 15) or smaller copper tube outlet.
5. Supply Shutoff Fitting: NPS 1/2 (DN 15) gate, globe, or ball valve and NPS 1/2 (DN 15) copper, water tubing.

2.8 HOSE STATIONS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong International, Inc.
2. Leonard Valve Company.
3. T & S Brass and Bronze Works, Inc.

B. Single-Temperature-Water Hose Stations:

1. Standard: ASME A112.18.1.
2. Cabinet: Stainless-steel enclosure with exposed valve handle, hose connection, and hose rack. Include thermometer in front.
3. Hose-Rack Material: Stainless steel.
4. Body Material: Bronze.
5. Body Finish: Rough bronze, chrome plated.
6. Mounting: Wall, with reinforcement.
7. Supply Fitting: NPS 3/4 (DN 20) gate, globe, or ball valve and check valve and NPS 1/2 (DN 15) copper, water tubing. Omit check valve if check stop is included with fitting.
8. Hose: Manufacturer's standard, for service fluid, temperature, and pressure; 25 feet (7.6 m) long.
9. Nozzle: With hand squeeze on-off control.
10. Vacuum Breaker: Integral or factory-installed, nonremovable, manual-drain-type, hose-connection vacuum breaker complying with ASSE 1011 or backflow preventer complying with ASSE 1052; and garden-hose thread complying with ASME B1.20.7 on outlet.

2.11 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig (2760-kPa) minimum CWP.
3. Size: NPS 3/4 (DN 20).
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

B. Gate-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-80 for gate valves.
2. Pressure Rating: Class 125.
3. Size: NPS 3/4 (DN 20).
4. Body: ASTM B 62 bronze.
5. Inlet: NPS 3/4 (DN 20) threaded or solder joint.
6. Outlet: Garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.12 WATER HAMMER ARRESTERS

A. Water Hammer Arresters:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company.
b. PPP Inc.
c. Sioux Chief Manufacturing Company, Inc.
d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Copper tube with piston.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.13 AIR VENTS

A. Bolted-Construction Automatic Air Vents:

B. Welded-Construction Automatic Air Vents:

1. Body: Stainless steel.
2. Pressure Rating: 150-psig (1035-kPa) minimum pressure rating.
3. Float: Replaceable, corrosion-resistant metal.

B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
3. Do not install bypass piping around backflow preventers.

C. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

D. Install water control valves with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

E. Install balancing valves in locations where they can easily be adjusted.

F. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install thermometers and water regulators if specified.
2. Install cabinet-type units recessed in or surface mounted on wall as specified.

G. Install Y-pattern strainers for water on supply side of each control valve, and pump.

H. Install outlet boxes recessed in wall. Install 2-by-4-inch (38-by-89-mm) fire-retardant-treated-wood blocking wall reinforcement between studs. Fire-retardant-treated-wood blocking is specified in Division 06 Section "Rough Carpentry."

I. Install hose stations with check stops or shutoff valves on inlets and with thermometer on outlet.

1. Install shutoff valve on outlet if specified.
2. Install cabinet-type units recessed in or surface mounted on wall as specified. Install 2-by-4-inch (38-by-89-mm) fire-retardant-treated-wood blocking wall reinforcement between studs. Fire-retardant-treated-wood blocking is specified in Division 06 Section "Rough Carpentry."

J. Install water hammer arresters in water piping according to PDI-WH 201.

K. Install air vents at high points of water piping. Install drain piping and discharge onto floor drain.

L. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

3.5 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION 22 11 19

SECTION 22 11 23

DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following all-bronze and bronze-fitted centrifugal pumps for domestic cold- and hot-water circulation:

1. Close-coupled, in-line, sealless centrifugal pumps.
2. Close-coupled, horizontally mounted, in-line centrifugal pumps.
3. Close-coupled, vertically mounted, in-line centrifugal pumps.

B. Related Sections include the following:

1. Division 22 Section "Domestic-Water Packaged Booster Pumps" for booster systems.

1.2 SUBMITTALS

A. Product Data: For each type and size of domestic water pump specified. Include certified performance curves with operating points plotted on curves; and rated capacities of selected models, furnished specialties, and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For domestic water pumps to include in emergency, operation, and maintenance manuals.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of domestic water pumps and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

2.3 CLOSE-COUPLED, HORIZONTALLY MOUNTED, IN-LINE CENTRIFUGAL PUMPS

A. Manufacturers:

1. Bell & Gossett Domestic Pump; ITT Industries.
2. Paco Pumps, Inc.
3. Syncro Flo.

B. Description: Factory-assembled and -tested, overhung impeller, single-stage, close-coupled, horizontally mounted, in-line centrifugal pumps as defined in HI 1.1-1.2 and HI 1.3; and designed for installation with pump and motor shafts mounted horizontally.

1. Pump Construction: All bronze.

a. Casing: Radially split, cast iron, with threaded companion-flange connections for pumps with NPS 2 (DN 50) pipe connections and flanged connections for pumps with NPS 2-1/2 (DN 65) pipe connections.
b. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, closed, and keyed to shaft.
c. Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve.
d. Seal: Mechanical, with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and rubber bellows and gasket. Include water slinger on shaft between motor and seal.
e. Bearings: Oil-lubricated; bronze-journal or ball type.

2. Shaft Coupling: Rigid type if pump is provided with coupling.
3. Motor: Single speed, with grease-lubricated ball bearings. Comply with requirements in Division 22 Section "Common Motor Requirements for Plumbing Equipment."

C. Capacities and Characteristics:

1. Refer to equipment plumbing schedule sheet for pump capacities.

2.4 CLOSE-COUPLED, VERTICALLY MOUNTED, IN-LINE CENTRIFUGAL PUMPS

A. Manufacturers:

1. Bell & Gossett Domestic Pump; ITT Industries.
2. Grundfos Pumps Corp.
3. Paco Pumps, Inc.
4. Taco, Inc.

B. Description: Factory-assembled and -tested, overhung impeller, single-stage, close-coupled, vertically mounted, in-line centrifugal pumps as defined in HI 1.1-1.2 and HI 1.3; and designed for installation with pump and motor shafts mounted vertically.

1. Pump Construction: Bronze fitted.

2.6 BUILDING-AUTOMATION-SYSTEM INTERFACE

A. Provide auxiliary contacts in pump controllers for interface to building automation system. Include the following:

1. On-off status of each pump.
2. Alarm status.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of domestic-water-piping system to verify actual locations of connections before pump installation.

3.2 PUMP INSTALLATION

A. Comply with HI 1.4.

B. Install pumps with access for periodic maintenance including removal of motors, impellers, couplings, and accessories.

C. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

D. Install in-line, sealless centrifugal pumps with motor and pump shafts horizontal.

E. Install continuous-thread hanger rods of sufficient size to support pump weight. Vibration isolation devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment." Fabricate brackets or supports as required. Hanger and support materials are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

F. Suspend vertically mounted, in-line centrifugal pumps independent of piping. Install pumps with motor and pump shafts vertical. Use continuous-thread hanger rods and of sufficient size to support pump weight. Vibration isolation devices are specified in Division 21 Section "Vibration and Seismic Controls for Fire-Suppression Piping and Equipment." Hanger and support materials are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

3.3 CONTROL INSTALLATION

A. Install immersion-type thermostats in hot-water return piping.

B. Install timers on wall in engineer's office.

8. Open discharge valve slowly.
9. Adjust temperature settings on thermostats.
10. Adjust timer settings.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 22 11 23

SECTION 22 11 23.13

DOMESTIC-WATER PACKAGED BOOSTER PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes constant-speed, multiplex, packaged booster pumps for domestic water piping systems.

B. Related Sections include the following:

1. Division 22 Section "Domestic Water Pumps" for domestic water circulation pumps.

1.2 SUBMITTALS

A. Product Data: For each packaged booster pump specified. Include certified performance curves with operating points plotted on curves; and rated capacities of selected models, furnished specialties, and accessories.

B. Shop Drawings: For packaged booster pumps and accessories. Include plans, elevations, sections, details, and attachments to other work.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails and equipment mounting frames.
4. Wiring Diagrams: Detail power, signal, and control wiring.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of packaged booster pumps and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASME Compliance: Comply with ASME B31.9 for piping.

2) Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, closed, and keyed to shaft.
3) Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve.
4) Seal: Mechanical.

E. Motors: Single speed, with oil-lubricated bearings, unless otherwise indicated. Select motor that will not overload through full range of pump performance curve. Comply with Division 22 Section "Common Motor Requirements for Plumbing Equipment."

F. Control Valves: Adjustable, automatic, pilot-operated pressure regulator on each pump discharge.

G. Relief Valves: Adjustable, pressure relief type on pump discharge.

H. Piping: ASME B31.9 for piping materials and installation.

1. NPS 4 (DN 100) and Smaller: ASTM B 88, Type L (ASTM B 88M, Type B), drawn copper water tube; with copper solder-joint pressure fittings, and brazed joints.
2. NPS 5 (DN 125) and Larger: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with threaded, cast-iron fittings and threaded joints.
3. Header End Connections:

a. NPS 2 (DN 50) and Smaller: Threaded.
b. NPS 2-1/2 (DN 65) and Larger: Flanged.

4. Piping Option: Piping, including valves and other components, may have grooved ends for grooved joints.

I. Valves: Include shutoff valve at each pump suction, and shutoff valve and check valve at each pump discharge.

1. Shutoff Valves, NPS 2 (DN 50) and Smaller: MSS SP-80, Class 125, bronze rising-stem gate valve or MSS SP-110, 600-psig (4135-kPa) minimum CWP, bronze ball valve with ends matching piping.
2. Shutoff Valves, NPS 2-1/2 (DN 65) and Larger: MSS SP-70, Class 125, bronze-trim, OS&Y, cast-iron gate valve with flanged ends or MSS SP-67, Type I for tight shutoff, 175-psig (1200-kPa) CWP, single-flanged, cast-iron butterfly valve.
3. Check Valves, NPS 2 (DN 50) and Smaller: Spring MSS SP-80, Class 125, bronze, swing check valve.
4. Check Valves, NPS 2-1/2 (DN 65) and Larger: Spring- or lever-loaded, MSS SP-71, Class 125, bronze-trim, cast-iron, swing check valve.

J. Sensors: Pressure and flow switches.

K. Dielectric Fittings: With insulating material isolating joined dissimilar metals to prevent galvanic action and to stop corrosion.

B. Description: Corrugated, bronze inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze-welded to tubing. Include 175-psig (1200-kPa) minimum working-pressure rating and ends according to the following:

1. NPS 2 (DN 50) and Smaller: Threaded. Provide flanged ends if pump has flanged connections.
2. NPS 2-1/2 (DN 65) and Larger: Flanged.

2.4 BUILDING-AUTOMATION-SYSTEM INTERFACE

A. Provide auxiliary contacts in pump controllers for interface to building automation system. Include the following:

1. On-off status of each pump.
2. Alarm status.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for packaged booster pumps to verify actual locations of connections before booster pump installation.

3.2 CONCRETE BASES

A. Install concrete bases of dimensions indicated for packaged booster pumps. Refer to Division 22 Section "Common Work Results for Plumbing."

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of base.
2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be imbedded.
4. Install anchor bolts to elevation required for proper attachment to supported equipment.

B. Cast-in-place concrete materials and placement requirements are specified in Division 03.

4. Verify that pump controls are correct for required application.

B. Perform the following startup checks for each pump of packaged booster pump unit before starting:

1. Verify bearing lubrication.
2. Prime pumps by opening suction valves and closing discharge valves, and prepare pumps for operation.
3. Start motors.
4. Open discharge valves slowly.
5. Adjust settings.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting packaged booster pumps to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.

3.6 LABELING AND IDENTIFICATION

A. Install identifying equipment markers and equipment signs on booster pumps. Labeling and identification materials are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged booster pumps. Refer to Division 01 Section "Demonstration and Training"

END OF SECTION 22 11 23.13

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following for soil, waste, and vent piping inside the building:

1. Pipe, tube, and fittings.
2. Special pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections include the following:
1. Division 22 Section "Chemical Waste Systems for Laboratory and Healthcare Facilities" for chemical-waste and vent piping systems.

1.2 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

1.3 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Shop Drawings: For facility sanitary waste and vent piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of sanitary waste and vent piping. Detail location of piping and location of all risers and stacks.

1. Shop Drawing Scale: ¼ inch per foot (1:50).
2. For sanitary waste and vent piping include details of supports and anchors.

C. Field quality-control inspection and test reports.

D. Coordination Drawings: Plans and details, drawn to scale, on which sanitary waste and vent piping is shown and coordinated with other installations, using input from installers of the items involved.

2.5 COPPER TUBE AND FITTINGS

A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.

1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

2.6 PVC PIPE AND FITTINGS (BELOW SLAB IN GROUND ONLY)

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns, Schedule 40.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 (DN 100) and smaller shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; and hubless-coupling joints.
3. Copper DWV tube, copper drainage fittings, and soldered joints.

C. Aboveground, soil and waste piping NPS 6 (DN 125) and larger shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.

D. Aboveground, vent piping NPS 4 (DN 100) and smaller shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
3. Copper DWV tube, copper drainage fittings, and soldered joints.

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

I. Install engineered soil and waste drainage and vent piping systems as follows:

1. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.

J. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

K. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

C. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

D. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 HANGER AND SUPPORT INSTALLATION

A. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Install individual, straight, horizontal piping runs according to the following:
    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

D. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main or sanitary manhole.

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks. Prior to inspection a 16 hour fill test is required on all sewer and vent piping mains, branches and risers.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

SECTION 22 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:

1. Cleanouts.
2. Floor drains.
3. Trench drains.
4. Roof flashing assemblies.
5. Miscellaneous sanitary drainage piping specialties.
6. Flashing materials.
7. Solids interceptors.
8. Drip pans.

B. Related Sections include the following:

1. Division 22 Section "Storm Drainage Piping Specialties" for trench drains for storm water, channel drainage systems for storm water, roof drains, and catch basins.
2. Division 22 Section "Healthcare Plumbing Fixtures" for plaster sink interceptors.

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.

1. Wiring Diagrams: Power, signal, and control wiring.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

a. Josam Company; Josam Div.
b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
c. Tyler Pipe; Wade Div.
d. Watts Drainage Products Inc.
e. Zurn Plumbing Products Group; Specification Drainage Operation.

2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hub-and-spigot, cast-iron soil pipe T-branch as required to match connected piping.
5. Closure: Countersunk or raised-head, drilled-and-threaded plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
8. Wall Access: Round stainless-steel wall-installation frame and cover.

2.3 FLOOR DRAINS

A. Cast-Iron Floor Drains:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company; Josam Div.
b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
c. Watts Drainage Products Inc.
d. Zurn Plumbing Products Group; Specification Drainage Operation.

2.4 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Acorn Engineering Company; Elmdor/Stoneman Div.
b. Thaler Metal Industries Ltd.

B. Description: Manufactured assembly made of 6.0-lb/sq. ft. (30-kg/sq. m), 0.0938-inch- (2.4-mm-) thick, lead flashing collar and skirt extending at least 8 inches (200 mm) from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.

1. Open-Top Vent Cap: Without cap.
2. Low-Silhouette Vent Cap: With vandal-proof vent cap.
3. Extended Vent Cap: With field-installed, vandal-proof vent cap.

G. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

H. Expansion Joints:

1. Standard: ASME A112.21.2M.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

2.6 FLASHING MATERIALS

A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness.
2. Vent Pipe Flashing: 3.0-lb/sq. ft. (15-kg/sq. m), 0.0469-inch (1.2-mm) thickness.
3. Burning: 6-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness.

B. Copper Sheet: ASTM B 152/B 152M, of the following minimum weights and thicknesses, unless otherwise indicated:

1. General Applications: 12 oz./sq. ft. (3.7 kg/sq. m or 0.41-mm thickness).
2. Vent Pipe Flashing: 8 oz./sq. ft. (2.5 kg/sq. m or 0.27-mm thickness).

C. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch (1.01-mm) minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

D. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.

E. Fasteners: Metal compatible with material and substrate being fastened.

F. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

G. Solder: ASTM B 32, lead-free alloy.

H. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

H. Install deep-seal traps on floor drains and other waste outlets, if indicated.

I. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.
2. Size: Same as floor drain inlet.

J. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

K. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

L. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

M. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness or thinner.
2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

SECTION 22 13 23

SANITARY WASTE INTERCEPTORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of interceptors outside the building:

1. Grease interceptors.
2. Sediment interceptors.

1.2 SUBMITTALS

A. Product Data: For each type of interceptor indicated. Include materials of fabrication, dimensions, rated capacities, retention capacities, operating characteristics, size and location of each pipe connection, furnished specialties, and accessories.

B. Shop Drawings: For each type and size of precast concrete interceptor indicated.

1. Include materials of construction, dimensions, rated capacities, retention capacities, location and size of each pipe connection, furnished specialties, and accessories.

C. Coordination Drawings: Interceptors, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Interceptors.
2. Piping connections. Include size, location, and elevation of each.
3. Interface with underground structures and utility services.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 22 Section "Earth Moving."

3.2 INSTALLATION

A. Install interceptor inlets and outlets at elevations indicated.

B. Set tops of manhole frames and covers flush with finished surface in pavements. Set tops above finish surface elsewhere, unless otherwise indicated.

C. Set tops of grating frames and grates flush with finished surface.

D. Set metal interceptors level and plumb.

E. Prepare and paint metal components, to be field painted, according to SSPC-Paint 16.

F. Repair and restore protective coatings to original condition.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Make piping connections between interceptors and piping systems.

3.4 IDENTIFICATION

A. Identification materials and installation are specified in Division 22 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground interceptors.

1. Use warning tapes or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

END OF SECTION 22 13 23

SECTION 22 14 13

FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following storm drainage piping inside the building:

1. Pipe and fittings.
2. Special pipe fittings.

B. Related Sections include the following:

1. Division 22 Section "Sump Pumps."

1.2 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

B. TPE: Thermoplastic elastomer.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working-pressure, unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.

1.4 SUBMITTALS

A. Product Data: For pipe, fittings and couplings.

B. Shop Drawings:

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

2) Mission Rubber Co.
3) Tyler Pipe; Soil Pipe Div.
4) Clamp-All Corp.

3. Heavy-Duty, Shielded, Cast-Iron Couplings: ASTM A 48/A 48M, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve.

a. Manufacturers:

1) MG Piping Products Co.

C. Rigid, Unshielded Couplings: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Manufacturer:

a. ANACO.

2.5 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade A or B, Standard Weight or Schedule 40, galvanized. Include ends matching joining method.

B. Drainage Fittings: ASME B16.12, galvanized, threaded, cast-iron drainage pattern.

C. Pressure Fittings:

1. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.
2. Malleable-Iron Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
3. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
4. Cast-Iron Flanges: ASME B16.1, Class 125.
5. Cast-Iron, Flanged Fittings: ASME B16.1, Class 125, galvanized.

2.6 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end, unless grooved or flanged ends are indicated.

1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

b. Fernco, Inc.
c. Logan Clay Products Company (The).
d. Mission Rubber Co.
e. NDS, Inc.
f. Plastic Oddities, Inc.

2. Sleeve Materials:

a. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
b. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
c. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

B. Shielded Nonpressure Pipe Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Manufacturers:

a. Cascade Waterworks Mfg. Co.
b. Mission Rubber Co.
c. Clamp-All Corp.

C. Rigid, Unshielded, Nonpressure Pipe Couplings: ASTM C 1461, sleeve-type reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Manufacturer:

a. ANACO.

D. Flexible Ball Joints: Ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include gasketed ball-joint section and ductile-iron gland, rubber gasket, and steel bolts.

1. Manufacturer:

a. EBAA Iron Sales, Inc.

E. Expansion Joints: Two or three-piece, ductile-iron assembly consisting of telescoping sleeve(s) with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

1. Manufacturers:

a. EBAA Iron Sales, Inc.

E. Underground, storm drainage piping NPS 8 (DN 200) and larger shall be the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

3.3 PIPING INSTALLATION

A. Storm sewer and drainage piping outside the building are specified in Division 33 Section "Storm Utility Drainage Piping."

B. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."

C. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers. Cleanouts are specified in Division 22 Section "Storm Drainage Piping Specialities."

D. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping.

E. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Fire Plumbing."

F. Install wall-penetration fitting system at each service pipe penetration through foundation wall. Make installation watertight.

G. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105.

H. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

I. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

J. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:

a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 (DN 150): 60 inches (1500 mm) with 3/4-inch (19-mm) rod.
5. NPS 8 to NPS 12 (DN 200 to DN 300): 60 inches (1500 mm) with 7/8-inch (22-mm) rod.
6. Spacing for 10-foot (3-m) lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).

G. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

H. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 (DN 32): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/2 (DN 40): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
3. NPS 2 (DN 50): 10 feet (3 m) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 11 feet (3.4 m) with 1/2-inch (13-mm) rod.
5. NPS 3 (DN 80): 12 feet (3.7 m) with 1/2-inch (13-mm) rod.
6. NPS 4 and NPS 5 (DN 100 and DN 125): 12 feet (3.7 m) with 5/8-inch (16-mm) rod.
7. NPS 6 (DN 150): 12 feet (3.7 m) with 3/4-inch (19-mm) rod.
8. NPS 8 to NPS 12 (DN 200 to DN 300): 12 feet (3.7 m) with 7/8-inch (22-mm) rod.

I. Install supports for vertical steel piping every 15 feet (4.5 m).

J. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping[, except outside leaders,] on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.8 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 14 13

SECTION 22 14 23

STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following storm drainage piping specialties:
1. Cleanouts.
2. Roof drains.
3. Miscellaneous storm drainage piping specialties.
4. Flashing materials.

B. Related Sections include the following:

1. Division 22 Section "Sanitary Waste Piping Specialties" for backwater valves, floor drains, trench drains and channel drainage systems connected to sanitary sewer, air admittance valves, FOG disposal systems, grease interceptors and removal devices, oil interceptors, and solid interceptors.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

1.4 COORDINATION

A. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company; Josam Div.
b. MIFAB, Inc.

2.3 MISCELLANEOUS STORM DRAINAGE PIPING SPECIALTIES

A. Expansion Joints:

1. Standard: ASME A112.21.2M.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected piping.

B. Downspout Boots:

1. Description: Manufactured, ASTM A 48/A 48M, gray-iron casting, with strap or ears for attaching to building; NPS 4 (DN 100) outlet; and shop-applied bituminous coating.
2. Size: Inlet size to match downspout.
3. Description: ASTM A 74, Service class, hub-and-spigot, cast-iron soil pipe.
4. Size: Same as or larger than connected downspout.

C. Conductor Nozzles:

1. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
2. Size: Same as connected conductor.

2.4 FLASHING MATERIALS

A. Copper Sheet: ASTM B 152/B 152M, 12 oz./sq. ft. (3.7 kg/sq. m or 0.41-mm) thickness.

B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch (1.01-mm) minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.

D. Fasteners: Metal compatible with material and substrate being fastened.

E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

F. Solder: ASTM B 32, lead-free alloy.

G. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft. (30-kg/sq. m), 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch (1.6-mm) thickness or thinner.
2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches (250 mm), and skirt or flange extending at least 8 inches (200 mm) around pipe.
2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 14 23

SECTION 22 14 29

SUMP PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following sump pumps and accessories, inside the building, for building storm drainage systems:

1.2 SUBMITTALS

A. Product Data: For each type and size of sump pump specified. Include certified performance curves with operating points plotted on curves, and rated capacities of selected models, furnished specialties, and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For each sump pump to include in emergency, operation, and maintenance manuals.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of sump pumps and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's written rigging instructions for handling.

1.5 COORDINATION

A. Coordinate size and location of concrete pits. Concrete, reinforcement, and formwork requirements are specified in Division 03.

C. Install pumps and arrange to provide access for maintenance including removal of motors, impellers, couplings, and accessories.

D. Set submersible sump pumps on pit floor.

E. Support piping so weight of piping is not supported by pumps.

3.3 CONNECTIONS

A. Piping installation requirements are specified in Division 22 Section "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to sump pumps to allow service and maintenance.

C. See detail on drawing for pump piping.

D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 22 14 29

SECTION 22 31 00

DOMESTIC WATER SOFTENERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes commercial water softeners.

1. Chemicals.
2. Water testing kits.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Water Softeners. Include rated capacities, operating characteristics, furnished specialties, and accessories.
2. Water testing kits.

B. Shop Drawings: For water softeners. Include plans, elevations, sections, details, and connections to piping systems.

1. Wiring Diagrams: Power, signal, and control wiring.

C. Manufacturer Certificates: Signed by manufacturers certifying that water softeners comply with requirements.

D. Source quality-control test reports.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For water softeners to include in emergency, operation, and maintenance manuals.

G. Warranty: Special warranty specified in this Section.

H. Maintenance service agreement.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of water softeners and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 COMMERCIAL WATER SOFTENERS

A. Description: Factory-assembled, pressure-type water softener.

1. Manufacturers:

   a. Culligan International Company.
   b. Marlo, Inc.
   c. Stay-Rite.

2. Comply with NSF 61, "Drinking Water System Components--Health Effects."
3. Configuration: Double unit with two mineral tanks and one brine tank.

4. Mineral Tanks: Steel, electric welded; pressure-vessel quality.

   a. Construction: Non-ASME code.
   b. Pressure Rating: 100 psig (690 kPa) minimum.
   c. Wetted Components: Suitable for water temperatures from 40 to at least 100 deg F (5 to at least 38 deg C).
   d. Freeboard: 50 percent minimum for backwash expansion above normal resin bed level.
   e. Handholes: 4 inches (102 mm) round or 4 by 6 inches (102 by 152 mm) elliptical, in top head and lower sidewall of tanks 30 inches (762 mm) and smaller in diameter.
   f. Manhole: 11 by 15 inches (280 by 380 mm) in top head of tanks larger than 30 inches (762 mm) in diameter.
   g. Support Legs or Skirt: Constructed of structural steel, welded to tank.
   h. Finish: Hot-dip galvanized on exterior and interior of tank after fabrication unless tank is stainless steel.
   i. Finish: Exterior of tank spray painted with rust-resistant prime coat, 2- to 3-mil (0.051- to 0.076-mm) dry film thickness. Interior sandblasted and lined with epoxy-polyamide coating, 8- to 10-mil (0.203- to 0.254-mm) dry film thickness.
   j. Upper Distribution System: Single, point type, fabricated from PVC pipe and fittings.
   k. Liner: PE, ABS, or other material suitable for potable water.

5. Controls: Automatic; factory mounted on unit and factory wired.

   a. Adjustable duration of various regeneration steps.
   b. Push-button start and complete manual operation.
   c. Electric time clock and switch for automatic operation, except for manual return to service.
   d. Sequence of Operation: Program multiport pilot-control valve to automatically pressure-actuate main operating valve through steps of regeneration.
   e. Pointer on pilot-control valve shall indicate cycle of operation.

PART 3 - EXECUTION

3.1 CONCRETE BASES

A. Install concrete bases of dimensions indicated for commercial water softeners. Refer to Division 22 Section "Common Work Results for Plumbing."

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around full perimeter of base.
2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

B. Cast-in-place concrete materials and placement requirements are specified in Division 03.

3.2 WATER SOFTENER INSTALLATION

A. Install commercial water softener equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor mineral and brine tanks and floor-mounting accessories to substrate.

B. Install brine lines and fittings furnished by equipment manufacturer but not specified to be factory installed.

C. Prepare mineral-tank distribution system and underbed for minerals and place specified mineral into mineral tanks.

D. Install water testing sets mounted on wall, unless otherwise indicated, and near water softeners.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Make piping connections between water-softener-unit headers and dissimilar-metal water piping with dielectric fittings. Dielectric fittings are specified in Division 22 Section "Common Work Results for Plumbing."

D. Install shutoff valves on raw-water inlet and soft-water outlet piping of each mineral tank.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water softeners. Refer to Division 01 "Demonstration and Training" Section

END OF SECTION 22 31 00

SECTION 22 35 00

DOMESTIC WATER HEAT EXCHANGERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following heat exchangers:

1. Heating-fluid-in-coil, instantaneous heat exchangers.
2. Heat-exchanger accessories.
3. Compression Tanks

1.3 SUBMITTALS

A. Product Data: For each type and size of heat exchanger indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Product Certificates: For each type of instantaneous heat exchanger, signed by product manufacturer.

D. Source quality-control test reports.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For heat exchangers to include in emergency, operation, and maintenance manuals.

G. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain same type of heat exchangers through one source from a single manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 INSTANTANEOUS HEAT EXCHANGERS

A. Heating-Fluid-in-Coil, Instantaneous Heat Exchangers:

1. Manufacturers:

a. AERCO International, Inc.

2. Description: Packaged assembly of tank, heat-exchanger coils, controls, and specialties for heating domestic water with steam in heat-exchanger coils.
3. Construction: ASME-code, negligible-capacity, copper-lined, carbon-steel shell with 150-psig (1035-kPa) minimum working-pressure rating.

a. Tappings: Factory fabricated of materials compatible with heat-exchanger shell. Attach tappings to shell before testing and labeling.

1) NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1.
2) NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.

b. Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire shell and nozzle except connections and controls.
c. Heat-Exchanger Coils: Copper nickel, helix-wound coils for heating fluid with pressure rating equal to or greater than heating-fluid supply pressure.
d. Temperature Control: Adjustable thermostat that operates control valve and that is capable of maintaining outlet-water temperature within 4 deg F (2 deg C) of setting.
e. Safety Control: Automatic, high-temperature-limit cutoff device or system.
f. Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select one relief valve with sensing element that extends into storage tank.

4. Miscellaneous Components for Steam Unit: Strainers, steam-control valve, steam trap, valves, pressure gage, thermometer, and piping. Include components fitted for pneumatic control.

a. Exception: Steam trap is not required if manufacturer's written instructions direct that it not be used.

5. Stand: Factory fabricated for floor mounting.

PART 3 - EXECUTION

3.1 HEAT-EXCHANGER INSTALLATION

A. Install heat exchangers on concrete bases.

1. Concrete base construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Install heat exchangers level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

C. Anchor heat exchangers to substrate.

D. Install combination temperature and pressure relief valves in water piping for heat exchangers without storage. Extend relief-valve outlet, with drain piping same as water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

E. Install heat-exchanger drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for heat exchangers that do not have tank drains. Refer to Division 22 Section "Domestic Water Piping Specialties" for hose-end drain valves.

F. Install thermometer on each heat-exchanger domestic-water outlet piping, and install thermometer on each heat-exchanger heating-fluid inlet and outlet piping.

G. Install pressure gages on heat-exchanger heating-fluid piping.

H. Fill heat exchangers with water.

I. Charge compression tanks with air.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to heat exchangers to allow service and maintenance. Arrange piping for easy removal of heat exchangers.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following conventional plumbing fixtures and related components: (See Drawings For Fixtures Schedules)

1. Faucets for lavatories, bathtubs, bathtub/showers, showers, and sinks.
2. Laminar-flow faucet-spout outlets.
3. Flushometers.
4. Toilet seats.
5. Protective shielding guards.
6. Fixture supports.
7. Interceptors.
8. Water closets.
9. Urinals.
10. Lavatories.
11. Commercial sinks.
12. Individual showers.
13. Kitchen sinks.
14. Service sinks.
15. Owner-furnished fixtures.

B. Related Sections include the following:

1. Division 10 Section "Toilet, Bath, and Accessories."
2. Division 22 Section "Domestic Water Piping Specialties" for backflow preventers, floor drains, and specialty fixtures not included in this Section.
3. Division 22 Section "Domestic Water Filtration Equipment" for water filters.
4. Division 22 Section "Healthcare Plumbing Fixtures."
5. Division 22 Section "Emergency Plumbing Fixtures."
6. Division 22 Section "Security Plumbing Fixtures."
7. Division 22 Section "Drinking Fountains and Water Coolers."
8. Division 31 Section "Facility Water Distribution Piping" for exterior plumbing fixtures and hydrants.

1.2 SUBMITTALS

A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.

2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
4. Faucets: ASME A112.18.1.
5. Hose-Connection Vacuum Breakers: ASSE 1011.
6. Hose-Coupling Threads: ASME B1.20.7.
7. NSF Potable-Water Materials: NSF 61.
8. Pipe Threads: ASME B1.20.1.
9. Supply Fittings: ASME A112.18.1.
10. Brass Waste Fittings: ASME A112.18.2.

I. Comply with the following applicable standards and other requirements specified for bathtub and shower faucets:

1. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3M.
2. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.
3. Faucets: ASME A112.18.1.
4. Hand-Held Showers: ASSE 1014.
5. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F 445.
6. Hose-Coupling Threads: ASME B1.20.7.
7. Manual-Control Antiscald Faucets: ASTM F 444.
8. Pipe Threads: ASME B1.20.1.
9. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.

J. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:

1. Brass and Copper Supplies: ASME A112.18.1.
2. Dishwasher Air-Gap Fittings: ASSE 1021.
3. Manual-Operation Flushometers: ASSE 1037.

K. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Disposers: ASSE 1008 and UL 430.
2. Dishwasher Air-Gap Fittings: ASSE 1021.
3. Flexible Water Connectors: ASME A112.18.6.
4. Floor Drains: ASME A112.6.3.
5. Grab Bars: ASTM F 446.
6. Hose-Coupling Threads: ASME B1.20.7.
7. Off-Floor Fixture Supports: ASME A112.6.1M.
8. Pipe Threads: ASME B1.20.1.
9. Supply and Drain Protective Shielding Guards: ICC A117.1.
10. Whirlpool Bathtub Equipment: UL 1795.

2.3 BATHTUB FAUCETS

A. Bathtub Faucets:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Speakman Company.
b. Symmons Industries, Inc.

2.4 SHOWER FAUCETS

A. Shower Faucets:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Speakman Company.
b. Symmons Industries, Inc.

2.5 SINK FAUCETS

A. Sink Faucets:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Chicago Faucets.
b. Speakman Company.
c. T & S Brass and Bronze Works, Inc.

2.6 FLUSHOMETERS

A. Flushometers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Coyne & Delany Co.
b. Sloan Valve Company.
c. Zurn Plumbing Products Group; Commercial Brass Operation.

2.7 TOILET SEATS

A. Toilet Seats
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bemis Manufacturing Company.
b. Church Seats.
c. Olsonite Corp.

a. American Standard Companies, Inc.
b. Kohler Co.

2.11 URINALS

A. Urinals:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Standard Companies, Inc.
b. Kohler Co.

2.12 LAVATORIES

A. Lavatories:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Standard Companies, Inc.
b. Kohler Co.

2.13 SINKS

A. Sinks:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Elkay Manufacturing Co.
b. Just Manufacturing Company.

2.14 BATHTUBS

A. Bathtubs:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Kohler Co.
b. American Standard Companies, Inc.

2.15 INDIVIDUAL SHOWERS

A. Individual Showers:
1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. Watermark.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

H. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

I. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

J. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.

K. Install toilet seats on water closets.

L. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

M. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.
2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

N. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results for Plumbing."

O. Set bathtubs shower receptors and service basins in leveling bed of cement grout. Grout is specified in Division 22 Section "Common Work Results for Plumbing."

P. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants."

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

SECTION 22 61 13

COMPRESSED-AIR PIPING FOR HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Medical air piping and specialties, designated "medical air," operating at 50 to 55 psig (345 to 380 kPa).

1.2 DEFINITIONS

A. D.I.S.S.: Diameter-index safety system.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

C. Medical Compressed-Air Piping Systems: Include medical air piping systems.

1.3 CODES AND STANDARDS

A. Medical gas and vacuum systems shall be provided in accordance with the recommendations and requirements of the latest edition of the following as adopted by the authority having jurisdiction:

1. National Fire Protection Association (NFPA), NFPA 99C Gas and Vacuum Systems, 2002 Edition.
2. National Fire Protection Association (NFPA), NEC National Electric Code.
3. American Society of Sanitary Engineers (ASSE) 6000 Profession Qualification Standards for Medical Gas System Installers.

B. Ensure compliance with all local, state or federal codes applicable to this installation.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Compressed-air tubes and fittings.
2. Compressed-air valves and valve boxes.
3. Medical compressed-air service connections.
4. Medical compressed-air pressure control panels.

C. Source Limitations: Obtain compressed-air service connections of same type and from same manufacturer as service connections provided for in Division 22 Section "Gas Piping for Laboratory and Healthcare Facilities."

D. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications," or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. Comply with NFPA 99, "Health Care Facilities," for medical compressed-air system materials and installation in healthcare facilities.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate medical compressed-air service connections with other service connections. Medical vacuum service connections are specified in Division 22 Section "Vacuum Piping for Laboratory and Healthcare Facilities," and medical gas service connections are specified in Division 22 Section "Gas Piping for Laboratory and Healthcare Facilities."

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Copper Medical Gas Tube: ASTM B 819, Types K and L, seamless, drawn temper, that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," in green for Type K tube and in blue for Type L tube.

1. General Requirements for Copper Fittings: Manufacturer cleaned, purged, and bagged for oxygen service according to CGA G-4.1.
2. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, with dimensions for brazed joints.
3. Copper Unions: ASME B16.22 or MSS SP-123, wrought copper or cast-copper alloy.

B. Copper Water Tube: ASTM B 88, Type M (ASTM B 88M, Type C), seamless, drawn temper.

1. Copper Fittings: ASME B16.18, cast-copper or ASME B16.22, wrought-copper, solder-joint pressure type.

b. Amico Corporation.
c. BeaconMedaes.

2. Pressure Rating: 300 psig (2070 kPa) minimum.
3. Ball: Full-port, chrome-plated brass.
4. Seats: PTFE or TFE.
5. Handle: Lever type with locking device.
6. Stem: Blowout proof with PTFE or TFE seal.
7. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
8. Pressure Gage: Manufacturer installed on one copper-tube extension.

E. Zone Valve Boxes: Formed steel with anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Healthcare Products, Inc.; Chemetron Div.
b. Amico Corporation.
c. BeaconMedaes.

2. Interior Finish: Factory-applied white enamel.
3. Cover Plate: Stainless steel with NAAMM AMP 503, No. 4 finish with frangible or removable windows.
4. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.

F. Zone Valve Boxes: Formed or extruded aluminum with anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Beacon Medaes.
b. Allied Health Care Products.
c. Amico Corporation.

2. Interior Finish: Factory-applied white enamel.
3. Cover Plate: Stainless steel with NAAMM AMP 503, No. 4 finish with frangible or removable windows.
4. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.

G. Safety Valves: Bronze-body, ASME-construction, poppet, pressure-relief type with settings to match system requirements.

H. Pressure Regulators: Bronze body and trim; spring-loaded, diaphragm-operated relieving type; manual pressure-setting adjustment; rated for 250-psig (1725-kPa)

2.5 MEDICAL COMPRESSED-AIR PRESSURE CONTROL PANELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Healthcare Products, Inc.; Chemetron Div.
2. Amico Corporation.
3. BeaconMedaes.

B. Panels for medical compressed-air piping systems may be combined in single panels with medical vacuum and medical gas piping systems.

C. Components: Designed for continuous service and to operate on power supplied from 120 V ac power source to alarm panels and with connections for low-voltage wiring to remote sensing devices. Include step-down transformers if required.

D. Dew Point Monitors: Continuous line monitoring, having panel with gage or digital display, pipeline sensing element, electrical connections for alarm system, factory- or field-installed valved bypass, and visual and cancelable audio signal for dryer site and master alarm panels. Alarm signals when pressure dew point rises above 39 deg F (4 deg C) at 55 psig (380 kPa).

1. Operation: Hygrometer moisture analyzer with sensor probe.

E. Pressure Switches or Transducer Sensors: Continuous line monitoring with electrical connections for alarm system.

1. Low-Pressure Operating Range: 0- to 100-psig (0- to 690-kPa).

F. Carbon Monoxide Monitors: Panel with gage or digital display, pipeline sensing element, electrical connections for alarm system, and factory- or field-installed valved bypass. Alarm signals when carbon monoxide level rises above 10 ppm.

G. General Requirements for Medical Compressed-Air Alarm Panels: Factory wired with audible and color-coded visible signals to indicate specified functions.

1. Mounting: Recessed installation.
2. Enclosures: Fabricated from minimum 0.047-inch- (1.2-mm-) thick steel or minimum 0.05-inch- (1.27-mm-) thick aluminum, with knockouts for electrical and piping connections.

H. Master Alarm Panels: Separate trouble alarm signals, pressure gages, and indicators for medical compressed-air piping systems.

1. Include alarm signals when the following conditions exist:

a. Medical Air: Pressure drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa), backup air compressor is in operation, pressure drop across filter assembly increases more than 2 psig (13.8 kPa), dew point rises above 39 deg F (4 deg C) at 55 psig (380 kPa), carbon monoxide

2.9 ESCUTCHEONS

A. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.

B. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Escutcheons: With set screw.

1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Escutcheons: With concealed hinge and set screw.

1. Finish: Polished chrome-plated.

E. One-Piece, Stamped-Steel Escutcheons: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Escutcheons: With concealed hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Escutcheons: Cast iron.

H. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.

2.10 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.11 NITROGEN

A. Description: Comply with USP 28 - NF 23 for oil-free dry nitrogen.

3.4 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Comply with ASSE Standard #6010 for installation of compressed-air piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install air and drain piping with 1 percent slope downward in direction of flow.

H. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications below unless otherwise indicated.

I. Install eccentric reducers, if available, where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

J. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

K. Install thermometer and pressure gage on discharge piping from each air compressor and on each receiver.

L. Install piping to permit valve servicing.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

O. Install medical compressed-air piping to medical compressed-air service connections specified in this Section, to medical compressed-air service connections in equipment specified in Division 22 Section "Gas Piping for Laboratory and Healthcare Facilities," and to equipment specified in other Sections requiring medical compressed-air service.

3.8 MEDICAL COMPRESSED-AIR-PIPING ALARM SYSTEM INSTALLATION

A. Alarm panels for medical compressed-air piping systems may be combined in single panels with medical vacuum piping systems and medical gas piping systems.

B. Install alarm system components for medical compressed-air-piping according to and in locations required by NFPA 99.

C. Install area and master alarm panels for medical compressed-air piping system where indicated.

D. Install computer interface cabinet with connection to medical compressed-air-piping alarm system and to facility computer.

3.9 ELECTRICAL WORK

A. Power wiring of ceiling columns, alarms, vacuum pump, air compressor and accessories associated with the systems will be performed as work of Division 26.

B. Low voltage signal wiring shall be the work of Division 22.

3.10 SLEEVE INSTALLATION

A. Sleeves are not required for core-drilled holes.

B. Permanent sleeves are not required for holes formed by removable PE sleeves.

C. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs using galvanized-steel pipe.

1. Wall Penetrations: Cut sleeves to length for mounting flush with both surfaces.
2. Floor Penetrations: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

D. Install sleeves in new walls and slabs as new walls and slabs are constructed.

E. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

1. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger penetrating gypsum board partitions.
2. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) above finished floor

H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1/4 (DN 8): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3/8 and NPS 1/2 (DN 10 and DN 15): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 3/4 (DN 20): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
4. NPS 1 (DN 25): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
5. NPS 1-1/4 (DN 32): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
6. NPS 1-1/2 (DN 40): 10 feet (3 m) with 3/8-inch (10-mm) rod.
7. NPS 2 (DN 50): 11 feet (3.4 m) with 3/8-inch (10-mm) rod.
8. NPS 2-1/2 (DN 65): 13 feet (4 m) with 1/2-inch (13-mm) rod.
9. NPS 3 (DN 80): 14 feet (4.3 m) with 1/2-inch (13-mm) rod.
10. NPS 3-1/2 (DN 90): 15 feet (4.6 m) with 1/2-inch (13-mm) rod.
11. NPS 4 (DN 100): 16 feet (4.9 m) with 1/2-inch (13-mm) rod.
12. NPS 5 (DN 125): 18 feet (5.5 m) with 1/2-inch (13-mm) rod.
13. NPS 6 (DN 150): 20 feet (6 m) with 5/8-inch (16-mm) rod.
14. NPS 8 (DN 200): 23 feet (7 m) with 3/4-inch (19-mm) rod.

I. Install supports for vertical copper tubing every 10 feet (3 m).

3.13 LABELING AND IDENTIFICATION

A. Install identifying labels and devices for nonmedical laboratory compressed-air piping, valves, and specialties. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment."

B. Install identifying labels and devices for medical compressed-air piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:

1. Medical Air: Black letters on yellow background.

3.14 FIELD QUALITY CONTROL FOR MEDICAL COMPRESSED-AIR PIPING IN HEALTHCARE FACILITIES

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections of medical compressed-air piping in healthcare facilities and prepare test reports.

B. Perform tests and inspections of medical compressed-air piping systems in healthcare facilities and prepare test reports.

C. Tests and Inspections:

1. Medical Compressed-Air Testing Coordination: Perform tests, inspections, verifications, and certification of medical compressed-air piping systems concurrently with tests, inspections, and certification of medical vacuum piping and medical gas piping systems.

SECTION 22 61 19

COMPRESSED-AIR EQUIPMENT FOR HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Packaged, oil-free reciprocating air compressors.
2. Inlet-air filters.
3. Desiccant compressed-air dryers.
4. Compressed-air purification systems.
5. Compressed-air filter assemblies.
6. Medical compressed-air equipment alarm systems.
7. Computer interface cabinet.

1.2 DEFINITIONS

A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

B. Medical Air Equipment: Compressed-air equipment and accessories for healthcare facilities.

C. Standard Air: Free air at 68 deg F (20 deg C) and 1 atmosphere (29.92 in. Hg) before compression or expansion and measured in scfm (standard L/s).

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1. Wiring Diagrams: For power, signal, and control wiring.

B. Delegated-Design Submittal: For compressed-air equipment mounting indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of supports.
2. Design Calculations: Calculate requirements for selecting vibration isolator and for designing vibration isolation bases.

F. Comply with UL 544, "Medical and Dental Equipment," for medical compressed-air equipment.

1.6 COORDINATION

A. Coordinate sizes and locations of concrete bases with equipment provided.

PART 2 - PRODUCTS

2.1 QUALIFICATION OF MANUFACTURER(S)

A. Medical Gas System Components

1. One manufacturer shall supply all the medical gas piping system(s) and equipment including outlets, valves, gauges, valve boxes, alarm panels, manifolds, air compressors and vacuum pumps.

B. Medical Air Compressor

1. Manufacturer shall have had at least 5 years experience in the manufacture of oil free medical air compressors.
2. Manufacturer's personnel assembling medical air systems shall meet NFPA 99C 5.1.10.6.12 Qualification of Brazing Procedures and Brazer Performance and hold medical gas endorsements under ASSE 6000.

C. Medical Vacuum Pumps and WAGD Producers

1. Manufacturer shall have at least 5 years experience in the manufacture of medical vacuum pumps.
2. Manufacturer's personnel assembling medical vacuum and WAGD plant shall meet NFPA 99C 5.1.10.6.12 Qualification of Brazing Procedures and Brazer Performance and hold medical gas endorsements under ASSE 6000.

D. Installation and Start-up

1. Manufacturer shall provide factory authorized representative to review installation and perform initial start-up of system.

2. Manufacturer shall have a pipeline system engineer or product specialist available to coordinate with the Contractor during installation of equipment.

E. Maintenance

1. Manufacturer shall demonstrate a national service capability able to perform major overhauls.
2. Manufacturer shall offer preventative maintenance contract for the Owner's consideration.

2. Allied Heathlcare Products.

B. Description: Packaged unit.

C. Air Compressor(s): Single stage Oil-free, (nonlubricated) Scroll type, with sealed oil-free bearings, that will deliver air of quality equal to intake air.

1. High discharge-air temperature switch.
2. Intercooler between stages of two-stage units.
3. Belt guard totally enclosing pulleys and belts.

D. Capacities and Characteristics: (See Schedule on Drawings)

2.4 INLET-AIR FILTERS

A. Description: Combination inlet-air filter-silencer, suitable for remote installation, for each air compressor.

1. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.
2. Capacity: Match capacity of air compressor, with collection efficiency of 99 percent retention of particles larger than 10 micrometers.

B. Description: Combination inlet-air filter-silencer, suitable for remote installation, for multiple air compressors.

1. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.
2. Capacity: Match total capacity of connected air compressors, with collection efficiency of 99 percent retention of particles larger than 10 micrometers.

2.5 DESICCANT COMPRESSED-AIR DRYERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Description: Twin-tower unit with purge system, mufflers, and capability to deliver plus 10 deg F (minus 12 deg C), 100-psig (690-kPa) air at dew point. Include dew point controlled purge, step-down transformers, disconnect switches, inlet and outlet pressure gages, thermometers, automatic controls, and filters.

2.6 MEDICAL COMPRESSED-AIR EQUIPMENT ALARM SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Healthcare Products, Inc.; Chemetron Div.
2. Amico Corporation.

2.7 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 22 Section "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 26 Sections.

2.8 COMPUTER INTERFACE CABINET

A. Description:

1. Wall mounting.
2. Welded steel with white-enamel finish.
3. Gasketed door.
4. Grounding device.
5. Factory-installed signal circuit boards.
6. Power transformer.
7. Circuit breaker.
8. Wiring terminal board.
9. Internal wiring capable of interfacing 20 alarm signals.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean compressed-air equipment, accessories, and components that have not been cleaned for oxygen service and sealed or that are furnished unsuitable for medical air applications, according to CGA G-4.1, "Cleaning Equipment for Oxygen Service."

3.2 COMPRESSED-AIR EQUIPMENT INSTALLATION

A. General Requirements for Compressed-Air Equipment Installation:

1. Install compressed-air equipment to allow maximum headroom unless specific mounting heights are indicated.
2. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces unless otherwise indicated.
3. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

3.5 CONNECTIONS

A. Comply with requirements for water-supply piping specified in Division 22 Section "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Comply with requirements for drain piping specified in Division 22 Section "Sanitary Waste and Vent Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

C. Comply with requirements for compressed-air piping specified in Division 22 Section "Compressed-Air Piping for Laboratory and Healthcare Facilities." Drawings indicate general arrangement of piping, fittings, and specialties.

D. Install piping adjacent to equipment to allow service and maintenance.

E. Connect compressed-air piping to compressed-air equipment, accessories, and specialties with shutoff valve and union or flanged connection.

3.6 IDENTIFICATION

A. Identify medical compressed-air equipment system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment." and comply with NFPA 99.

3.7 FIELD QUALITY CONTROL FOR HEALTHCARE-FACILITY MEDICAL COMPRESSED-AIR EQUIPMENT

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

3.8 TESTING, VERIFICATION AND CERTIFICATION

A. Perform Installer pressure testing, cross connection testing and final testing as specified and as per NFPA 99C, 5.1.12.2.

B. Retain a qualified third party verifier acceptable to the Architect and Owner to perform and attest to final verification of the systems. Proposed verifier shall provide a reference list, which includes at least three references on projects of similar size and complexity.

C. Coordinate with Owner verifier in final verification of the systems.

D. Make corrections as required, including additional testing if necessary to attain full and unqualified certification.

E. Testing and verification shall include all existing systems that have been breached, renovated or repaired.

5. Check for equipment vibration-control supports and flexible pipe connectors and verify that equipment is properly attached to substrate.
6. Check safety valves for correct settings. Ensure that settings are higher than air-compressor discharge pressure but not higher than rating of system components.
7. Check for proper seismic restraints.
8. Drain receiver tanks.
9. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
10. Test and adjust controls and safeties.

3.10 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air compressors, compressed-air dryers and compressed-air filter assemblies.

END OF SECTION 22 61 19

SECTION 22 62 13

VACUUM PIPING FOR HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Medical surgical vacuum piping and specialties, designated "medical vacuum" operating at 15 inches mercury (380 mm mercury or 50.7 kPa vacuum).
2. Waste anesthetic gas disposal piping and specialties, designated "WAGD evacuation" operating at 15 inches mercury (380 mm mercury or 50.7 kPa vacuum).

1.2 DEFINITIONS

A. D.I.S.S.: Diameter-index safety system.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

C. WAGD: Waste anesthetic gas disposal.

D. Medical vacuum piping systems include medical vacuum and WAGD evacuation piping systems.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Vacuum pipes and fittings.
2. Vacuum valves and valve boxes.
3. Medical vacuum service connections and vacuum-bottle brackets.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Piping Material Certification: Signed by Installer certifying that medical vacuum piping materials comply with NFPA 99 requirements.

D. Qualification Data: For Installer and testing agency.

E. Brazing certificates.

F. Field quality-control test reports.

G. NFPA Compliance: Comply with NFPA 99, "Health Care Facilities," for medical vacuum system materials and installation in healthcare facilities.

1.6 COORDINATION

A. Coordinate medical vacuum service connections with other service connections. Medical compressed-air service connections are specified in Division 22 Section "Compressed-Air Piping for Laboratory and Healthcare Facilities," and medical gas service connections are specified in Division 22 Section "Gas Piping for Laboratory and Healthcare Facilities."

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. All vacuum and wagd tubing shall be type 'L' copper. Braze all vacuum joints with cadmium free brazing alloy with a meeting point of 1000 degrees for greater.

B. Copper Water Tube: ASTM B 88, Type M (ASTM B 88M, Type C), seamless, drawn temper.

2.2 VALVES

A. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.

1. Exception: Factory cleaning and bagging are not required for valves for WAGD service.

B. Copper-Alloy Ball Valves: MSS SP-110, 3-piece body, brass or bronze.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Allied Healthcare Products, Inc.; Chemetron Div.
b. Amico Corporation.
c. BeaconMedaes.

2. Pressure Rating: 300 psig (2070 kPa) minimum.
3. Ball: Full-port, chrome-plated brass.
4. Seats: PTFE or TFE.
5. Handle: Lever type with locking device.
6. Stem: Blowout proof with PTFE or TFE seal.
7. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.

C. Bronze Check Valves: In-line pattern.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Beacon Medaes.
    b. Allied Healthcare Products.
    c. Amico Corporation.

2. Interior Finish: Factory-applied white enamel.
3. Cover Plate: Stainless steel with NAAMM AMP 503, No. 4 finish with frangible or removable windows.
4. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.

G. Safety Valves: Bronze-body, ASME-construction, pressure-relief type with settings to match system requirements.

H. Automatic Drain Valves: Stainless-steel body and internal parts, rated for capable of automatic discharge of collected condensate.

2.3 MEDICAL VACUUM SERVICE CONNECTIONS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Healthcare Products, Inc.; Chemetron Div.
2. Amico Corporation.
3. BeaconMedaes.

B. Connection Devices: For specific medical vacuum service listed. Include roughing-in assemblies, finishing assemblies, and cover plates. Individual cover plates are not required if service connection is in multiple unit or assembly with cover plate. Furnish recessed-type units made for concealed piping unless otherwise indicated.

1. Roughing-in Assembly:

    a. Steel outlet box for recessed mounting and concealed piping.
    b. Brass-body inlet block.
    c. Seals that will prevent vacuum leakage.
    d. ASTM B 819, NPS 3/8 (DN 10) copper outlet tube brazed to valve with service marking and tube-end dust cap.

2. Finishing Assembly:

    a. Brass housing with primary check valve.
    b. Seals that will prevent vacuum leakage.
    c. Cover plate with gas-service label.

3. Quick-Coupler Service Connections: Suction inlets for medical vacuum and WAGD evacuation service outlets with noninterchangeable keyed indexing to prevent interchange between services, constructed to permit one-handed

a. Medical Vacuum: Vacuum drops below 12-in. Hg (40 kPa vacuum) and backup vacuum pump is in operation.
b. WAGD Evacuation: Vacuum drops below 12-in. Hg (40 kPa vacuum).

G. Anesthetizing-Area Alarm Panels: Separate trouble alarm signals; vacuum gages; and indicators for medical vacuum piping systems.

1. Include alarm signals when the following conditions exist:

a. Medical Vacuum: Vacuum drops below 12-in. Hg (40 kPa vacuum).
b. WAGD Evacuation: Vacuum drops below 12-in. Hg (40 kPa vacuum).

H. Area Alarm Panels: Separate trouble alarm signals; vacuum gages; and indicators for medical vacuum piping systems.

1. Include alarm signals when the following condition exists:

a. Medical Vacuum: Vacuum drops below 12-in. Hg (40 kPa vacuum).

2.5 COMPUTER INTERFACE CABINET

A. Description: Wall-mounting, welded-steel, control cabinet with gasketed door, mounting brackets, grounding device, and white-enamel finish for connection of medical vacuum piping system alarms to facility computer. Include factory-installed signal circuit boards, power transformer, circuit breaker, wiring terminal board, and internal wiring capable of interfacing 20 alarm signals.

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.7 ESCUTCHEONS

A. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.

B. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Escutcheons: With set screw.

a. Scrub to ensure complete cleaning.
b. Rinse with clean, hot water to remove cleaning solution.

3.2 PIPING APPLICATIONS

A. Medical Vacuum Piping: Use the following piping materials for each size range:
1. NPS 8 (DN 125 to DN 200) and smaller: Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.

B. WAGD Evacuation Piping: Use the following piping materials for each size range:

1. NPS 8 (DN 125 to DN 200) and smaller: Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.

C. Drain Piping: Use the following piping materials:

1. Copper water tube, cast- or wrought-copper fittings, and soldered joints.

3.3 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of vacuum piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Comply with ASSE Standard #6010 for installation of vacuum piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install vacuum and drain piping with 1 percent slope downward in direction of flow.

H. Install nipples, unions, and special fittings, and valves with pressure ratings same as or higher than piping pressure rating used in applications below unless otherwise indicated.

F. Install automatic drain valves on equipment, specialties, and piping with drain connection. Run drain piping to floor drain, so contents spill over or into it.

G. Install flexible pipe connectors in suction inlet piping to each vacuum producer.

3.6 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Threaded Joints: Apply appropriate tape to external pipe threads.

E. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter. Continuously purge joint with oil-free dry nitrogen during brazing.

F. Soldered Joints: Apply ASTM B 813, water-flushable flux to tube end. Join copper tube and fittings according to ASTM B 828.

3.7 MEDICAL VACUUM PIPING ALARM SYSTEM INSTALLATION

A. Panels for medical vacuum piping systems may be combined in single panels with medical compressed-air piping systems and medical gas piping systems.

B. Install medical vacuum piping system alarm system components in locations required by and according to NFPA 99.

C. Install medical vacuum piping system area and master alarm panels where indicated.

D. Install computer interface cabinet with connection to medical vacuum piping alarm system and to facility computer.

E. Power wiring of ceiling columns, alarms, vacuum pump, air compressor and accessories associated with the systems will be performed as work of Division 26.

F. Low voltage signal wiring shall be the work of Division 22

3.8 SLEEVE INSTALLATION

A. Sleeves are not required for core-drilled holes.

B. Permanent sleeves are not required for holes formed by removable PE sleeves.

3.10 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

B. Vertical Piping: MSS Type 8 or 42, clamps.

C. Individual, Straight, Horizontal Piping Runs:

1. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel, clevis hangers.
2. Longer Than 100 Feet (30 m): MSS Type 43, adjustable, roller hangers.

D. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for trapeze hangers.

E. Base of Vertical Piping: MSS Type 52, spring hangers.

F. Support horizontal piping within 12 inches (300 mm) of each fitting and coupling.

G. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1/4 (DN 8): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3/8 and NPS 1/2 (DN 10 and DN 15): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 3/4 (DN 20): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
4. NPS 1 (DN 25): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
5. NPS 1-1/4 (DN 32): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
6. NPS 1-1/2 (DN 40): 10 feet (3 m) with 3/8-inch (10-mm) rod.
7. NPS 2 (DN 50): 11 feet (3.4 m) with 3/8-inch (10-mm) rod.
8. NPS 2-1/2 (DN 65): 13 feet (4 m) with 1/2-inch (13-mm) rod.
9. NPS 3 (DN 80): 14 feet (4.3 m) with 1/2-inch (13-mm) rod.
10. NPS 3-1/2 (DN 90): 15 feet (4.6 m) with 1/2-inch (13-mm) rod.
11. NPS 4 (DN 100): 16 feet (4.9 m) with 1/2-inch (13-mm) rod.
12. NPS 5 (DN 125): 18 feet (5.5 m) with 1/2-inch (13-mm) rod.
13. NPS 6 (DN 150): 20 feet (6 m) with 5/8-inch (16-mm) rod.
14. NPS 8 (DN 200): 23 feet (7 m) with 3/4-inch (19-mm) rod.

I. Install supports for vertical copper tubing every 10 feet (3 m).

3.11 LABELING AND IDENTIFICATION

A. Install identifying labels and devices for laboratory vacuum piping, valves, and specialties. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment."

c. Test methods used.
d. Results of tests.

D. Remove and replace components that do not pass tests and inspections and retest as specified above.

3.13 DEMONSTRATION

A. Engage factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain medical vacuum alarm systems. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 22 62 13

SECTION 22 62 19

VACUUM EQUIPMENT FOR HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Packaged, reciprocating vacuum pumps.
2. Medical vacuum equipment alarm systems.
3. Computer interface cabinets.

1.2 DEFINITIONS

A. Actual Air: Air delivered at vacuum producer inlet. Flow rate is air measured in expanded cfm (expanded L/s).

B. HVE: High-volume oral evacuation for dental applications in healthcare facilities.

C. Laboratory Vacuum Equipment: Equipment and accessories for nonmedical laboratory facilities.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

E. Medical vacuum equipment includes medical vacuum and WAGD evacuation equipment and accessories for healthcare facilities.

F. Standard Air: Free air at 68 deg F (20 deg C) and 1 atmosphere (29.92 in. Hg) before compression or expansion and measured in scfm (standard L/s).

G. WAGD Evacuation: Waste anesthetic gas disposal for medical-surgical applications in healthcare facilities.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1. Wiring Diagrams: For power, signal, and control wiring.

B. Delegated-Design Submittal: For vacuum-producing equipment mounting indicated to comply with performance requirements and design criteria, including analysis

D. ASME Compliance: Fabricate and label receivers to comply with ASME Boiler and Pressure Vessel Code.

E. Comply with NFPA 99, "Health Care Facilities," for vacuum equipment and accessories for medical vacuum systems.

1.6 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 QUALIFICATION OF MANUFACTURER(S)

A. Medical Gas System Components

1. One manufacturer shall supply all the medical gas piping system(s) and equipment including outlets, valves, gauges, valve boxes, alarm panels, manifolds, air compressors and vacuum pumps.

B. Medical Air Compressor

1. Manufacturer shall have had at least 5 years experience in the manufacture of oil free medical air compressors.
2. Manufacturer's personnel assembling medical air systems shall meet NFPA 99C 5.1.10.6.12 Qualification of Brazing Procedures and Brazer Performance and hold medical gas endorsements under ASSE 6000.

C. Medical Vacuum Pumps and WAGD Producers

1. Manufacturer shall have at least 5 years experience in the manufacture of medical vacuum pumps.
2. Manufacturer's personnel assembling medical vacuum and WAGD plant shall meet NFPA 99C 5.1.10.6.12 Qualification of Brazing Procedures and Brazer Performance and hold medical gas endorsements under ASSE 6000.

D. Installation and Start-up

1. Manufacturer shall provide factory authorized representative to review installation and perform initial start-up of system.

2. Manufacturer shall have a pipeline system engineer or product specialist available to coordinate with the Contractor during installation of equipment.

E. Maintenance

1. Manufacturer shall demonstrate a national service capability able to perform major overhauls.

B. Description: Packaged unit.

C. Vacuum Pump(s): Oil-less, direct driven, non-contacting rotary claw vacuum pumps.

1. Drive: Direct.
2. Cooling System: Air-cooled.
3. Control System: Automatic lead/lag sequencing, circuit breaker disconnects with external operators for each pump, full voltage motor starters with overload protection. A programmable logic controller controls the automatic alternation of the units.

D. Capacities and Characteristics:

1. Vacuum Service: Medical vacuum. (See Schedule on Drawings)
2. Vacuum Pump(s): Four.
3. Standard-Air Capacity of Each Vacuum Pump: 120 scfm free air.
4. Vacuum Required: 20-in. Hg (68-kPa) vacuum.
5. Motor (Each Vacuum Pump):

2.4 MEDICAL VACUUM EQUIPMENT ALARM SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Allied Healthcare Products, Inc.; Chemetron Div.
2. Amico Corporation.
3. BeaconMedaes.

B. General Requirements for Medical Vacuum Equipment Alarm System: Compatible alarm panels, remote sensing devices, and other related components as required by NFPA 99 for Level 1 alarm systems. Refer to Division 22 Section "Vacuum Piping for Laboratory and Healthcare Facilities" for medical vacuum piping and alarm systems. Power wiring is specified in Division 26 Sections.

C. Components: Designed for continuous service and to operate on power supplied from 120 V ac power source to alarm panels and with connections for low-voltage wiring to remote sensing devices. Include step-down transformers if required.

D. Vacuum Switches or Transducer Sensors: Continuous equipment monitoring with electrical connections for alarm system.

1. Vacuum Switches: 0- to 30-in. Hg (0- to 101-kPa) vacuum operating range.

E. General Requirements for Medical Vacuum Equipment Alarm Panels: Factory wired with audible and color-coded visible signals to indicate specified functions.

1. Mounting: Recessed installation.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean vacuum equipment, accessories, and components that have not been cleaned for oxygen service and sealed or that are furnished unsuitable for medical vacuum applications, according to CGA G4.1, "Cleaning Equipment for Oxygen Service."

3.2 VACUUM EQUIPMENT INSTALLATION

A. Install vacuum equipment for healthcare facilities according to ASSE 6010 and NFPA 99.

B. Equipment Mounting: Install vacuum producers on concrete bases using. Comply with requirements in Division 03 Section "Cast-in-Place Concrete." Comply with requirements for vibration isolation devices specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

1. Minimum Deflection: 1 inch (25 mm).
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.3 MEDICAL VACUUM EQUIPMENT ALARM SYSTEM INSTALLATION

A. Alarm panels for medical vacuum equipment may be combined in single panels with medical air equipment and medical gas piping systems.

B. Install medical vacuum equipment alarm system components in locations required by and according to NFPA 99.

C. Install medical vacuum equipment local and master alarm panels where indicated.

D. Power wiring of ceiling columns, alarms, vacuum pump, air compressor and accessories associated with the systems will be performed as work of Division 26.

E. Low voltage signal wiring shall be the work of Division 22

3.4 COMPUTER INTERFACE CABINET INSTALLATION

A. Install computer interface cabinet with connection to facility computer.

2. Preparation: Perform medical vacuum equipment tests according to requirements in NFPA 99 for the following:

   a. System operation test.

3. Equipment Verification: Comply with requirements in ASSE 6020, ASSE 6030, and NFPA 99 for verification of medical vacuum equipment.
4. Replace damaged and malfunctioning controls and equipment.
5. Testing Certification: Certify that specified tests, inspections, and procedures have been performed and certify report results. Include the following:

   a. Inspections performed.
   b. Procedures and materials used.
   c. Test methods used.
   d. Results of tests.

E. Components will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports.

3.8 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check for lubricating oil in lubricated-type equipment.
3. Check belt drives for proper tension.
4. Verify that vacuum producer outlet piping is clear.
5. Check for equipment vibration-control supports and flexible pipe connectors and verify that equipment is properly attached to substrate.
6. Check safety valves for correct settings.
7. Check for proper seismic restraints.
8. Drain receiver tank(s).
9. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
10. Test and adjust controls and safeties.

B. Verify that vacuum equipment is installed and connected according to the Contract Documents.

C. Verify that electrical wiring installation complies with manufacturer's submittal and written installation requirements in Division 26 Sections.

D. Prepare written report documenting testing procedures and results.

SECTION 22 63 13

MEDICAL GAS PIPING FOR HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Nitrogen piping and specialties designated "medical nitrogen" operating at 160 to 185 psig (1100 to 1275 kPa).
2. Nitrous oxide piping and specialties designated "medical nitrous oxide" operating at 50 to 55 psig (345 to 380 kPa).
3. Oxygen piping and specialties designated "medical oxygen" operating at 50 to 55 psig (345 to 380 kPa).

B. Owner-Furnished Material:

1. Bulk gas storage tanks.
2. Owner will furnish gases for medical gas concentration testing specified in this Section.

1.2 DEFINITIONS

A. CR: Chlorosulfonated polyethylene synthetic rubber.

B. D.I.S.S.: Diameter-index safety system, or quick connect. Contractor to verify with owner prior to purchase.

C. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

D. Medical gas piping systems include medical carbon dioxide, medical nitrogen, medical nitrous oxide, and medical oxygen nonflammable gas for healthcare facility patient care or for healthcare laboratory applications.

E. Specialty Gas: Gas, other than medical gas, for nonmedical laboratory facility applications.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Tubes and fittings.
2. Valves and valve boxes.

1. Qualify testing personnel according to ASSE Standard #6020 for inspectors and ASSE Standard #6030 for verifiers.

C. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications"; or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. ASME Compliance: Fabricate and label bulk medical gas storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

F. NFPA Compliance:

1. Comply with NFPA 50, "Bulk Oxygen Systems at Consumer Sites," for bulk oxygen storage tanks.
2. Comply with NFPA 99, "Health Care Facilities," for medical gas piping system materials and installation.

G. CGA Compliance: Comply with CGA G-8.1, "Nitrous Oxide Systems at Consumer Sites," for bulk nitrous oxide storage tanks.

H. UL Compliance:

1. Comply with UL 498, "Attachment Plugs and Receptacles," for electrical service connections.
2. Comply with UL 544, "Medical and Dental Equipment," for medical gas specialties.

1.5 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate medical gas service connections with other service connections. Compressed-air service connections are specified in Division 22 Sections "Compressed-Air Piping for Laboratory and Healthcare Facilities" and "Vacuum Piping for Laboratory and Healthcare Facilities."

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Copper Medical Gas Tube: ASTM B 819, Type L, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Healthcare Products, Inc.; Chemetron Div.
    b. Amico Corporation.
    c. BeaconMedaes.

2. Pressure Rating: 300 psig (2070 kPa) minimum.
3. Ball: Full-port, chrome-plated brass.
4. Seats: PTFE or TFE.
5. Handle: Lever type with locking device.
6. Stem: Blowout proof with PTFE or TFE seal.
7. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
8. Pressure Gage: Manufacturer-installed on one copper-tube extension.

E. Zone Valve Boxes: Formed steel with anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves.
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        a. Allied Healthcare Products, Inc.; Chemetron Div.
        b. Amico Corporation.
        c. BeaconMedaes.

    2. Interior Finish: Factory-applied white enamel.
    3. Cover Plate: Stainless steel with NAAMM AMP 503, No. 4 finish with frangible or removable windows.
    4. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.

F. Emergency Oxygen Connections: Low-pressure oxygen inlet assembly for connection to building oxygen piping systems.
    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        a. Allied Healthcare Products, Inc.; Chemetron Div.
        b. Amico Corporation.
        c. BeaconMedaes.

    2. Enclosure: Weatherproof hinged locking cover with caption similar to "Emergency Low-Pressure Gaseous Oxygen Inlet."
    3. Inlet: Manufacturer-installed, NPS 1 or NPS 1-1/4 (DN 25 or DN 32), ASTM B 819, copper tubing with NPS 1 (DN 25) minimum ball valve and plugged inlet.
    4. Safety Valve: Bronze-body, pressure relief valve set at 75 or 80 psig (520 or 550 kPa).
    5. Instrumentation: Pressure gage.

b. Double seals that will prevent gas leakage.
c. Cover plate with gas-service label.

3. Quick-Coupler Service Connections: Pressure outlets for carbon dioxide, nitrous oxide, oxygen, air, and vacuum service connections with noninterchangeable keyed indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment, and with positive-locking ring that retains equipment stem in valve during use.
4. D.I.S.S. Service Connections: Pressure outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.

   a. Medical Carbon Dioxide Service Connections: D.I.S.S. No. 1080.
   b. Medical Nitrogen Service Connections: D.I.S.S. No. 1120.
   c. Medical Nitrous Oxide Service Connections: D.I.S.S. No. 1040.
   d. Medical Oxygen Service Connections: D.I.S.S. No. 1240.

5. Cover Plates: One piece, stainless steel, with NAAMM AMP 503, No. 4 finish and permanent, color-coded, identifying label matching corresponding service.

2.5 ELECTRICAL SERVICE CONNECTIONS

A. See Divison 26

2.6 PATIENT SERVICE CONSOLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Amico Corporation.
   2. BeaconMedaes.

B. General Requirements for Patient Service Consoles: Recessed- or semirecessed-mounting wall units with medical gas service connections as specified in "Medical Gas Service Connections" Article. Include labels indicating services, and the following:

   1. Recessed- or semirecessed-mounting steel console box or mounting bracket.
   2. Concealed supplies.
   3. Cover Plate: One piece, anodized aluminum and permanent identifying label with service connections for the following:

      a. Medical Air: Quick-coupler pressure outlet.
      b. Medical Oxygen: Quick-coupler pressure outlet.
      c. Medical Vacuum: Quick-coupler suction inlet.
      d. Medical vacuum bottle bracket.

1. Mounting: Recessed installation.
2. Enclosures: Fabricated from minimum 0.047-inch- (1.2-mm-) thick steel or minimum 0.05-inch- (1.27-mm-) thick aluminum, with knockouts for electrical and piping connections.

F. Master Alarm Panels: With separate trouble alarm signals, pressure gages, and indicators for medical gas piping systems.

1. Include alarm signals when the following conditions exist:

a. Medical Nitrogen: Pressure drops below 145 psig (1000 kPa) or rises above 200 psig (1380 kPa) and changeover is made to alternate bank.
b. Medical Nitrous Oxide: Liquid level is low, pressure downstream from main shutoff valve drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa), changeover is made to reserve, reserve is in use, and reserve level is low.
c. Medical Nitrous Oxide: Pressure drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa) and changeover is made to alternate bank.
d. Medical Oxygen: Liquid level is low, pressure downstream from main shutoff valve drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa), changeover is made to reserve, reserve is in use, reserve level is low, and reserve pressure is low.
e. Medical Oxygen: Pressure downstream from main shutoff valve drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa) and changeover is made to alternate bank.

G. Anesthetizing-Area Alarm Panels: Separate trouble alarm signals; pressure gages; and indicators for medical gas piping systems.

1. Include alarm signals when the following conditions exist:

a. Medical Nitrous Oxide: Pressure drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa).
b. Medical Nitrogen: Pressure drops below 145 psig (1000 kPa) or rises above 200 psig (1380 kPa)].
c. Medical Oxygen: Pressure drops below [40 psig (275 kPa)] <Insert pressure> or rises above 60 psig (415 kPa).

H. Area Alarm Panels: Separate trouble alarm signals; pressure and vacuum gages; and indicators for medical gas piping systems.

1. Include alarm signals when the following conditions exist:

a. Oxygen: Pressure drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa).

C. Medical Nitrogen Piping: Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.

D. Medical Nitrogen Piping NPS 2-1/2 (DN 65) and Smaller: Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.

E. Medical Nitrogen Piping NPS 3 (DN 80) and Larger: Type K, copper tube; wrought-copper fittings; and brazed joints.

F. Protective Conduit: Use PVC pipe, PVC fittings, and solvent-cemented joints.

3.4 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of gas piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Comply with ASSE Standard #6010 for installation of medical gas piping.

C. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.

F. Install piping adjacent to equipment and specialties to allow service and maintenance.

G. Install nipples, unions, and special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications below unless otherwise indicated.

H. Install piping to permit valve servicing.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Install medical gas piping to medical gas service connections specified in this Section, to medical gas service connections in equipment specified in this Section, and to equipment specified in other Sections requiring medical gas service.

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. Apply primer and join according to ASME B31.9 for solvent-cemented joints and to ASTM D 2672.

3.7 GAS SERVICE COMPONENT INSTALLATION

A. Assemble patient service console with service connections. Install with supplies concealed, in walls. Attach console box or mounting bracket to substrate.

B. Install nitrogen pressure-control panels in walls. Attach to substrate.

C. Assemble ceiling columns and install anchored to substrate. Provide structural steel, hanger rods, anchors, and fasteners in addition to components furnished with specialties necessary to fabricate supports.

D. Assemble ceiling assemblies and install anchored to substrate. Provide structural steel, hanger rods, anchors, and fasteners in addition to components furnished with specialties necessary to fabricate supports.

E. Install gas manifolds on concrete base anchored to substrate.

F. Install gas cylinders and connect to manifold piping.

G. Install bulk gas storage tanks and reserve supply tanks level on concrete bases. Set tanks and connect gas piping to tanks according to applicable requirements in NFPA 50 for bulk oxygen storage systems. Install tanks level and plumb, firmly anchored to concrete bases; maintain NFPA 50 and tank manufacturer's recommended clearances. Orient tanks so controls and devices are accessible for servicing.

3.8 MEDICAL GAS PIPING ALARM SYSTEM INSTALLATION

A. Install medical gas alarm system components in locations required by and according to NFPA 99.

B. Install medical gas area and master alarm panels where indicated.

C. Install computer interface cabinet with connection to medical gas piping alarm system and facility computer.

3.9 SLEEVE INSTALLATION

A. Sleeves are not required for core-drilled holes.

B. Permanent sleeves are not required for holes formed by removable PE sleeves.

E. Base of Vertical Piping: MSS Type 52, spring hangers.

F. Support horizontal piping within 12 inches (300 mm) of each fitting and coupling.

G. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1/4 (DN 8): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3/8 and NPS 1/2 (DN 10 and DN 15): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 3/4 (DN 20): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
4. NPS 1 (DN 25): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
5. NPS 1-1/4 (DN 32): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
6. NPS 1-1/2 (DN 40): 10 feet (3 m) with 3/8-inch (10-mm) rod.
7. NPS 2 (DN 50): 11 feet (3.4 m) with 3/8-inch (10-mm) rod.
8. NPS 2-1/2 (DN 65): 13 feet (4 m) with 1/2-inch (13-mm) rod.
9. NPS 3 (DN 80): 14 feet (4.3 m) with 1/2-inch (13-mm) rod.
10. NPS 3-1/2 (DN 90): 15 feet (4.6 m) with 1/2-inch (13-mm) rod.
11. NPS 4 (DN 100): 16 feet (4.9 m) with 1/2-inch (13-mm) rod.
12. NPS 5 (DN 125): 18 feet (5.5 m) with 1/2-inch (13-mm) rod.
13. NPS 6 (DN 150): 20 feet (6 m) with 5/8-inch (16-mm) rod.
14. NPS 8 (DN 200): 23 feet (7 m) with 3/4-inch (19-mm) rod.

I. Install supports for vertical copper tubing every 10 feet (3 m).

3.11 LABELING AND IDENTIFICATION

A. Install identifying labels and devices for specialty gas piping, valves, and specialties. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment."

B. Install identifying labels and devices for healthcare medical gas piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:

1. Nitrogen: White letters on black background.
2. Nitrous Oxide: White letters on blue background.
3. Oxygen: White letters on green background or green letters on white background.

3.12 FIELD QUALITY CONTROL FOR HEALTHCARE FACILITY MEDICAL GAS

A. Testing Agency: The Contractor will engage a qualified testing agency to perform tests and inspections of medical gas piping systems in healthcare facilities and prepare test reports.

D. Remove and replace components that do not pass tests and inspections and retest as specified above.

3.13 DEMONSTRATION

A. Engage factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain bulk gas storage tanks and medical gas alarm system. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 22 63 13

SECTION 22 67 00

PROCESSED WATER SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes deionized and reverse-osmosis-water piping.

1.2 DEFINITIONS

A. PP: Polypropylene plastic.

B. CPVC: Chlorinated polyvinyl chloride plastic

C. PVDF: Polyvinylidene fluoride plastic.

1.3 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing piping with the following minimum working-pressure ratings, unless otherwise indicated:
   1. Deionized and Reverse-Osmosis-Water Piping: 80 psig , unless otherwise indicated.

1.4 SUBMITTALS

A. Product Data: For each type of pipe and fitting indicated.

B. Field quality-control test reports.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing laboratory.

B. ASME Compliance: Comply with ASME B31.3, "Process Piping."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic pipe and fittings in direct sunlight.

B. Protect pipe and fittings from dirt and damage.

2.4 PLASTIC VALVES

A. CPVC Valves: Made from ASTM D 1784, CPVC compounds.

1. Ball Valves, NPS 2 (DN 50) and Smaller: MSS SP-122, union type with socket ends and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).
2. Butterfly Valves, NPS 3 (DN 80) and Larger: With lever handle and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).
3. Check Valves: Swing or ball type with pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).

B. PVDF Valves: Made from ASTM D 3222, PVDF resin.

1. Ball Valves, NPS 2 (DN 50) and Smaller: MSS SP-122, union type with socket ends and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).
2. Butterfly Valves, NPS 3 (DN 80) and Larger: With lever handle and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).
3. Check Valves: Swing or ball type with pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).

C. PP Valves: Made from ASTM D 4101, PP resin.

1. Ball Valves, NPS 2 (DN 50) and Smaller: MSS SP-122, union type with socket ends and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).
2. Butterfly Valves, NPS 3 (DN 80) and Larger: With lever handle and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).
3. Check Valves: Swing or ball type with pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to and of material same as, or compatible with, piping may be used in applications in this article, unless otherwise indicated.

B. Deionized and Reverse-Osmosis-Water Piping: Use any of the following piping materials for each size range:

1. NPS 4 and Smaller: Schedule 40 PP pipe and fittings and heat-fusion joints.
2. NPS 4 and smaller: Schedule 40 PVDF pipe and fittings and heat-fusion joints.
3. NPS 4 and smaller: Schedule 40 CPVC pipe and fittings and solvent-cemented joints.

C. Install shutoff valve on each supply to equipment.

3.6 HANGER AND SUPPORT INSTALLATION

A. Pipe hanger and support devices and installation requirements are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:

1. Clamps for Vertical Piping: MSS Type 8 or Type 42.
2. Individual, Straight, Horizontal Piping Runs:
    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.
3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting, valve, and coupling.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, to minimum of 3/8 inch (10 mm).

E. Install padded hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 (DN 25) and Smaller: 36 inches (900 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/4 to NPS 2 (DN 32 to DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
3. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
4. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
5. NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.
6. NPS 8 (DN 200): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.

F. Install padded supports for vertical CPVC piping every 60 inches (1500 mm) for NPS 1-1/4 (DN 32) and smaller, and every 72 inches (1800 mm) for NPS 1-1/4 (DN 32) and larger.

G. Install padded hangers for PP piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 (DN 32) and Smaller: 30 inches (750 mm) with 3/8-inch (10-mm) rod.

3.9 FIELD QUALITY CONTROL

A. Test new piping, and parts of existing piping that have been altered, extended, or repaired, for leaks and defects.

1. Schedule tests and their inspections by authorities having jurisdiction, with at least 24 hours' advance notice.
2. Do not cover or put into service before inspection and approval.
3. Test completed piping according to authorities having jurisdiction. If authorities having jurisdiction do not have published procedures, perform tests as follows:

   a. Hydrostatic Tests: Test piping at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 100 psig (690 kPa).

4. Replace leaking joints with new materials and retest until no leaks exist.
5. Submit separate reports for each test.

3.10 CLEANING

A. Use procedures prescribed by authorities having jurisdiction or, if not prescribed, use procedures described below:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Clean piping by flushing with system deionized and reverse-osmosis water.

END OF SECTION 22 67 00

Division 23

Heating, Ventilating, and Air Conditioning

SECTION 23 05 00

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The requirements contained in this Section apply to all Work performed under Division 23 of these Specifications.

B. The Work covered by this Division of the Specifications comprises the furnishing of labor, material, equipment, transportation, tools and services, and performing operations required for, and reasonably incidental to, the installation of the Work in accordance with the applicable Contract Documents, and subject to the terms and conditions of the Contract.

C. The Work shall include modifications and extensions to existing systems, and the modification of the existing structure as required accommodating the installation of the Work.

D. Refer to other Divisions of the Specifications for related Work.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:
1. CPVC: Chlorinated polyvinyl chloride plastic.
2. PE: Polyethylene plastic.
3. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:
1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

D. The work shall be in accordance with, but not limited to, the requirements of:
   1. National Fire Protection Association
   2. National Safety Code
   3. Colorado Building Codes
   4. Colorado Department of Health
   5. International Building Code – 2003
   6. International Fire Code – 2003
   7. International Mechanical Code - 2003

E. Codes and standards referred to are minimum standards. Where the requirements of these specifications or drawings exceed those of the codes and regulations, the drawings and specifications govern.

F. The Contractor shall obtain permits, plan checks, inspections and approvals applicable to the Work as required by the regulatory authorities. Fees and costs of any nature whatsoever incidental to these permits, inspections and approvals shall be assumed and paid by the Contractor. The pro-rata costs, if any, for utilities serving this property will be paid for by the Owner and shall not be included as part of this Contract.

1.7 INSTALLATION INSPECTIONS AND CERTIFICATIONS

A. Obtain timely inspections of the installation by the constituted authorities. Remedy any deficiencies to the satisfaction of the inspecting authority.

B. Upon final completion of the work, obtain certificates of acceptance from the constituted authorities. Deliver the certificates to the Architect for transmission to the Owner.

1.8 REFERENCE STANDARDS

A. Materials, equipment, devices and workmanship shall comply with applicable local, county, state and national codes, laws and ordinances, utility company regulations and industry standards.

B. In case of differences between building codes, state laws, local ordinances, industry standards, utility company regulations and the Contract Documents, the most stringent shall govern. The Contractor shall promptly notify the Owner's Representative in writing of any such difference. Should the Contractor perform any Work that does not comply with local codes, laws and ordinances, industry standards or other governing regulations, the Work shall be corrected on noncompliance deficiencies with the Contractor bearing all costs.

C. In addition to the aforementioned ordinances, industry standards published by the following organizations shall apply:

AABC	-	ASSOCIATED AIR BALANCE COUNCIL
AASHO	-	AMERICAN ASSOCIATED OF STATE HIGHWAY OFFICIALS
ACI	-	AMERICAN CONCRETE INSTITUTE
ADC	-	AIR DIFFUSION COUNCIL
AGA	-	AMERICAN GAS ASSOCIATION
AISC	-	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AMCA	-	AIR MOVING AND CONDITIONING ASSOCIATION
ANSI	-	AMERICAN NATIONAL STANDARDS INSTITUTE
API	-	AMERICAN PETROLEUM INSTITUTE
ARI	-	AIR CONDITIONING & REFRIGERATION INSTITUTE

1.11 MATERIALS, EQUIPMENT AND DEVICE DESCRIPTION

A. Materials, equipment and devices shall be of the best quality customarily applied in quality commercial practice, and shall be the products of reputable manufacturers. Each major component shall bear a nameplate giving the name and address of the manufacturer, and the catalog number or designation of the component.

B. Materials, equipment and devices furnished under this Division of the Specifications shall be essentially the standard product of the specified manufacturer, or where allowed, an alternate manufacturer. Where two or more units of the same kind or class of a specific item are required, these shall be the products of a single manufacturer; however, the component parts of the item need not be the products of one manufacturer.

C. In describing the various materials, equipment and devices, in general each item will be described singularly, even though there may be a multiplicity of identical items. Also, where the description is only general in nature, exact sizes, duties, space arrangements, horsepower requirements and other data shall be determined by reference to the Contract Documents.

D. Equipment called for on the plans and not listed herein shall be provided and installed as though it were fully described herein.

E. Equipment called for herein shall be completely provided and installed, whether fully detailed or not on the plans, and/or scheduled.

F. All equipment as indicated on the plans and as described herein shall be installed per manufacturer's recommendations to allow for proper operation and maintenance of the equipment.

1.12 SCHEDULE AND SEQUENCE OF WORK

A. The Contractor shall meet and cooperate with the Owner and Owner's Representative to schedule and sequence this Work so as to insure meeting scheduled completion dates and avoid delaying other portions of the Work. Work requiring special sequencing shall be at no additional cost to the Owner and shall have no impact on the schedule.

B. Work schedules and completion dates as established must be rigidly adhered to. Cooperate in establishing these schedules and perform the work under this Division at such times as directed so as to insure meeting scheduled dates and avoid delaying any other Contractor.

C. Should it be necessary to perform certain operations on an "overtime" basis in order not to interrupt the normal usage of the building, include the costs of such overtime without change in the Contract amount.

1.13 WORKMANSHIP AND INSTALLATION

A. In no case shall the Contractor provide a class of material, equipment, device or workmanship less than that required by the Contract Documents or applicable codes, regulations, ordinances or standards. All modifications which may be required by a local authority having legal jurisdiction over all or any part of the Work shall be made by the Contractor without any additional charge. In all cases where such authority requires deviations from the requirements of the Drawings or

obstructions, or to illustrate the installation of a substitute equipment item. Shop drawings shall be provided for the following:

a. Fire Protection Systems (prepared at a minimum scale of 1/8"=1'-0")
b. Sheet Metal and Duct Systems and plumbing systems, including all underfloor work (prepared at a minimum scale of 1/8"=1'-0")
c. Temperature Control Diagrams with Sequence of Operations on same drawing.
d. Piping and equipment systems for chilled water, condenser water, refrigerant, heating water, steam and other HVAC piping systems. (Preferably at 1/4" = 1' – 0").

B. Installation Drawings
1. Prepare special drawings as called for elsewhere herein or directed by the Architect to coordinate this work with the work of other Divisions, to illustrate changes in this work to facilitate its concealment in finished spaces, to avoid obstructions, or to illustrate the installation of a substitute equipment item.
2. Use these drawings in the field for the installation of the work. Unless otherwise directed, do not submit these drawings for review, but provide 3 copies to the Architect for information.

C. Product Data: For the following:
1. Transition fittings.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Escutcheons.

D. Welding certificates.

1.17 QUALITY ASSURANCE

A. Materials, equipment and devices shall be new and of the quality specified, and shall be free from defects at the time of installation. Materials, equipment and devices damaged in shipment or otherwise damaged or found defective prior to acceptance by the Owner shall not be repaired at the job site, but shall be replaced with new materials, equipment or devices identical with those damaged, unless specifically approved otherwise by the Owner's Representative.

B. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

C. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

D. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

E. Wherever a UL standard has been established for a particular type of material, equipment or device, each item of such material, equipment or device provided on this project shall meet the requirements of the UL standard in every way, and shall be UL listed and labeled.

1.22 ELECTRIC WIRING

A. All electric wiring will be done under Division 26, except for such equipment items as are prewired at their point of manufacture and so delivered to the project, and except for the following:
   1. Temperature Control Wiring and Power Wiring provided by controls contractor.
   2. Medical gas master alarm wiring provided by Med Gas contractor.
   3. Fire pump annunciator wiring provided by Fire Protection contractor.

B. Prepare and submit for review wiring diagrams for all equipment furnished under this Division. Show on these diagrams all power, interlock, and control circuits. When the Architect takes no exception to these drawings, they shall become installation drawings for the Contractor.

C. All chilled water, condenser water piping, domestic cold and hot water piping, and wet fire protection system shall be heat traced when routed external to the building or in areas susceptible to freezing conditions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In Part 2 articles of the sections of this Division listed below, where subparagraph lists manufacturers, the following requirements apply for product selection:
   1. Applies to the following sections:
      a. 230900 - Instrumentation and Control for HVAC
      b. 235239 - Fire-Tube Boilers
      c. 236416 - Centrifugal Water Chillers
      d. 236500 - Cooling Towers
      e. 237313 - Modular Variable Aspect Indoor Central-Station Air-Handling Units
      f. 237413 – Packaged, Outdoor Central-Station Air Handler Units
   2. Base Manufacturer: The contractor shall use the basis of design manufacturer as scheduled as the Base manufacturer. The contractors bid shall assume this manufacturer will be required to be furnished. The Owner reserves the right to select one of the alternate manufacturers after the successful bidder is selected and adjust the bid amount up or down as is indicated on the bid form for the selected alternate manufacturer.
   3. Alternate Manufacturers: For each additional manufacturer listed the contractor shall include in the bid forms the addition or deduct cost of the Owner selecting the particular manufacturer for the project. The indicated costs shall include all associated changes required to provide the equipment of the alternate manufacturer. If the alternate manufacturer is selected by the Owner, the bid amount will be adjusted according to the indicated costs and the contractor shall be required to furnish the equipment by the selected alternate manufacturer.

B. In all other Part 2 articles of other sections of this Division where subparagraph titles introduce lists of manufacturers, the following requirements apply for product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

C. Each piping system shall be complete with pipe, fittings, joining materials, valves, cocks, hangers, supports and other accessories; prove tight under test; repair leaks; clean.

D. All items shall be suitable for the pertinent system's pressures and temperatures and the fluid within including chemical treatments.

E. The following tabulation describes the basic materials and standards for the piping, fittings, and specials which shall be provided for this section and the other sections of these specifications and where they are indicated by note on the drawings. These materials shall be used only where specified in this section and other sections of these specifications and only where they are indicated by note on the drawings. Any accessory deemed necessary by the manufacturer to make a complete installation shall be provided regardless of whether it has been mentioned in these specifications. This tabulation is NOT a "shopping List" of materials, and thus, the contractor shall NOT substitute materials from this tabulation for the materials specifically required in this section and other sections of these specifications and on the drawings for a particular piping system or its components:

DESCRIPTION	STANDARD
Ductile iron water pipe for 250 PSI internal pressure, thickness per ANSI A21.50 for laying condition "B" with 8 feet of cover.	ANSI A21.51
Cast iron water pipe for 250 PSI internal pressure, thickness per ANSI A21.50 for laying condition "B" with ANSI A21.6 or 8 feet of cover.	ANSI A21.8
Cast or ductile iron water pipe fittings Class 250	ANSI A21.10
Rubber gaskets for joining cast or ductile iron water lines	ANSI A21.11
Polyethylene (PE) pipe and fittings for gas pressure pipe and fittings	ASTM D-2513
Reinforced thermosetting pipe	ASTM D-2105
Polypropylene (PP) pipe and fittings, Type II Schedule 40 weight, flame retardant in accordance with ASTM D-635 test method; DWV pattern fittings; for acid resulting service	ASTM D-2146
Steel pipe, black and galvanized	ASTM A-120
Steel welding fittings	ANSI B16.9
Cast iron flanged fittings, Class 125	ANSI B16.1
Cast iron flanged fittings, Class 250	ANSI B16.2
Fiberglass Pipe 2" through 6"	ASTM D-2296
Fiberglass Pipe 8" through 16"	ASTM D-2310
PVC, SDR-26, Class 160 & SDR-21, Class 200	ASTM D-2241 & ASTM D-1784
PVC Sch. 40, DWV	ASTM D-2665
Steel flanges (150 and 300 pounds)	ASTM A-181
Cast iron screwed pressure fittings (125 & 250 pounds)	ANSI B16.4

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F. Similar to Zurn Model QHWD for ½" through 2".

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
1. Separate companion flanges and steel bolts and nuts shall have 150- or 300- minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F.

2.5 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
1. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel. Include two for each sealing element.
3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.
4. Similar to Thunderline "Link-Seal".

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral water stop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
1. Under deck Clamp: Clamping ring with set screws.

E. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

3. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
4. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
5. Equipment to Be Removed: Disconnect and cap services and remove equipment.
6. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
7. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Except for the layout of the sprinkler system, including heads, test connections, drains, etc., the mechanical Drawings diagrammatically show sizes and locations of outlets and equipment items and the sizes of the major interconnecting pipes and ducts, without delineating exact elevations, offsets, control lines, and other installation details. Carefully lay out work at the site to conform to the architectural and structural conditions, to avoid obstructions, and permit proper grading of lines. In cooperation with other Contractors, determine exact locations of outlets, apparatus and connections thereto by reference to the general, detail, equipment and rough-in drawings, and by measurements at the building; in all cases subject to Architectural approval. Where necessitated by conditions at the site or directed by the Architect, make minor relocations without additional cost to the Owner.

D. Run all ducts and pipes concealed in suspended ceilings where they occur and in furring's and chases where shown, except for those connections to plumbing fixtures and equipment items which must necessarily be exposed. Wherever conditions exist which would cause any normally concealed materials to be exposed in finished spaces, immediately call the situation to the attention of the Architect and stop work in those areas until the Architect directs the resumption of the work and the procedures to be followed.

E. Install all concealed pipes and ducts as required by the pace of the general construction.

F. These Specifications and the accompanying Drawings are intended to describe and illustrate systems which will not interfere with the building structure and which will fit into the available spaces. Prepare an installation drawing for any critical area, illustrating the installation of the work in this Division as related to the work of all

3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

   a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
   b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
   c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
      1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

R. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

T. Verify final equipment locations for roughing-in.

U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

V. Where a pipe passes through a floor in a pipe chase which is not a slab on grade, use a galvanized steel pipe sleeve, extending to a height of 2 inches above the floor slab and cemented watertight; make the inside diameter of the sleeve at least 1/2

B. Access panels shall be Milcor, Elmdor or equivalent steel access panels with hinged doors with latching devices. In fire rated location UL 1-1/2 hour B labeled door; minimum size to 12 inch by 12 inch. In unrated surfaces they shall be in accordance with the following:

BUILDING SURFACE	MILCOR STYLE	MINIMUM SIZE
Masonry & Ceramic Tile	M	INCHES
walls	K	16 x 20
Metal Lath & Plaster Walls	DW	16 x 20
Gypsum Board Walls	K	14 x 14
Plaster Ceilings	AT	12 x 12
Acoustical Tile Ceilings	DW	12 x 12
Gypsum Board Ceilings		14 x 14

C. For ceiling access, through non-accessible ceilings, to terminal boxes, humidifiers, filters, heating coils and other similar equipment, provide a minimum of one 24" X 24" access door suitable for accessing, servicing and removal of the largest section of the equipment.

3.5 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

C. Where machinery and equipment has been shipped with an enameled factory finish, touch up to repair any damage to the finish.

D. Suitably prepare all surfaces before painting. Remove all oil, rust, scale, dirt and other foreign materials. Make surfaces smooth by grinding, filling, brushing or other approved method.

E. Clean all un-insulated steel lines, support and hangers in underfloor spaces and apply two coats of asphalt varnish. Clean copper and cast iron lines in these areas but do not paint.

F. For painting of insulated lines in underfloor spaces, see the INSULATION Section of these Specifications.

G. All other finish painting will be accomplished under Division 9 of the Specifications.

H. Ceiling and wall grilles, diffusers and registers shall be factory painted as scheduled. If field painting is necessary it shall be in a color directed by the Architect and Owner.

I. All rooftop equipment shall be factory painted.

J. All exterior bare ferrous piping shall be painted.

K. All exposed sheet metal ductwork in areas other than mechanical AHU rooms to be painted.

3.9 CONCRETE BASES

A. Unless otherwise noted, concrete foundations, furnished under this Division of the Specifications, shall be not less than 4 inches high, poured in forms built of new dressed lumber with corners chamfered using sheet metal or triangular wood strips nailed to the form. Use 6x6 No. 3 mesh for reinforcing. Use Decatur Engineering Company's heavy duty adjustable anchor bolts, set in the form and positioned using templates, prior to pouring concrete. Allow at least one inch between equipment bases and foundations for alignment, leveling and grouting. Use non-shrinking grout equal to Embeco Pre-Mixed Grout. After grouting, remove the forms and hand-rub the foundation with carborundum.

B. Concrete foundations or pads will be required for all floor mounted equipment.

C. Internally isolated air handling units to have 6" high concrete pads to allow a deep condensate trap.

D. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.

Structural members, supports, etc. shall be of the size and shape and installed as directed by the Architect.

C. Do not cut any structural member in a way to lessen its strength, without specific permission.

D. Openings cut in the building to install materials covered by this Division of the Specifications or to repair or replace defects which may appear up to the expiration of the guarantee, or to repair damage to the work of other trades occasioned by those cutting operations, shall be repaired by the trade whose work is disturbed, but payment therefore shall be by the Contractor cutting the opening or causing the damage.

E. Cut all openings required to install the work or to repair any defective work. Do all of this cutting under the Owner's Representatives direction and exercise due diligence to avoid cutting openings larger than required or in the wrong locations.

F. No cutting or drilling of any sort will be permitted in the webs of prestressed, precast concrete structural elements. Use core drills or power driven saws to cut openings in the flanges of other such elements; the use of reciprocating drills will not be permitted. The cutting of structural members without first having received written permission from the Owner's Representative is prohibited.

G. Where openings are cut in fire-rated walls or floors, seal the annular space between the work installed and the fire-rated construction. Sealant, as applied, shall be fire rated to maintain the fire rating of the construction penetrated. Sealant shall be re-enterable (before fire) to alter penetrations. Apply in strict accordance with manufacturer's instructions.

3.14 BURIAL DEPTH FOR EXTERIOR PIPING

A. Except as otherwise indicated or required by conditions at the site, the minimum cover from the top of the pipe to the finished grade for underground, exterior piping shall be: 24 inch for storm, sanitary drain and sewer lines; and 48 inch for water and gas lines unless otherwise directed by the Civil Engineer's plans and specifications.

3.15 EXCAVATION AND BACKFILLING

A. Do all excavating and backfilling required in installing the work under this Division; generally use procedures and materials as described in Division 2 under SITE WORK.

B. The Contractor shall be responsible for submitting a site specific trench safety system prepared by a registered engineer which meets OSHA standards and any additional state and local standards.

3.16 EXTERIOR EXCAVATING

A. Perform all exterior excavating of whatever substances encountered and to the depths required.

B. During excavation, stack material suitable for backfilling in an orderly manner a sufficient distance from the banks of the trenches to prevent slides or cave-ins. Remove all excavated material not required or suitable for backfill, or waste as directed.

roadbeds, or property; all shoring and sheeting shall be in accordance with applicable codes and regulations.

B. Whenever required by soft ground, or for protection of any person, structure, or property, sheeting shall be driven, without extra compensation, to such a depth below bottom of trench as may be required or directed.

C. Bracing, shoring and sheeting shall be in compliance with the requirements of the State of Missouri Safety Code.

3.18 BACKFILLING OF EXTERIOR EXCAVATIONS

A. Do not backfill a trench until the piping system is installed in conformance with specified requirements and has been tested and accepted.

B. Except as directed otherwise, bracing, shoring and sheeting shall be removed in a manner to avoid damage or disturbances to work, and excavations shall be free of forms and cleaned of trash. Backfill shall be brought up evenly on each side of a pipe and shall not be placed on surfaces that are muddy, frozen or that contain frost.

C. Backfill material shall be free from trash, putrescible refuse, ashes, large stones and material. Except as otherwise specified, all backfill shall be uniformly deposited and carefully compacted in layers not exceeding 8 inches in loose thickness by use of vibratory compaction equipment to at least 90% of maximum density at a moisture content within 2% of optimum in accordance with AASHO Standard T99.

D. Trenches Under Pavement: All trenches beneath existing or proposed roadways, shoulders, parking areas, curbs, sidewalks or similar use pavements shall be backfilled as specified above, except that all backfill material shall be compacted to at 95% of maximum density at a moisture content within 2% of optimum in accordance with AASHO Standard T99.

E. The top 6 inches of backfill in areas outside of pavements shall be topsoil that is free of weeds and other unwanted materials.

F. Settling of granular non-cohesive backfill material with water in trenches lying outside of pavements will be permitted, and will be a requirement when so directed.

G. Trenches improperly backfilled, or where settlement occurs, shall be reopened to depth required for proper compaction, then refilled and compacted as specified, or otherwise corrected as permitted by the Architect.

3.19 OPENING AND RECLOSING PAVEMENT

A. Where excavation requires the opening of existing walks, streets, drives or other existing pavement, including "black topping", cut the pavement as required to install new lines and to make new connections to existing lines. Hold the size of the cut to a minimum consistent with the work to be accomplished. After completing the piping installation, backfill the excavation as hereinbefore specified; replace both the base and surface courses using materials to match those removed, both in degree of compaction and kind of material; replace any reinforcing and splice to existing reinforcing. New finished surfaces shall be level with the original surfaces and thoroughly bond with them.

2. All pipes buried in the ground or beneath floors on grade shall be accurately located both by horizontally and vertical elevations.
3. Upon completion of the work, the record drawings shall be delivered to the Architect.

B. Upon anticipated completion of the job, the Contractor shall accumulate and compile in duplicate hard copies of all construction related documentation and in triplicate an electronic copy of all construction related documentation.

1. The hard copy shall consist of the following:

a. One (1) complete reproducible set of the original drawings on which to neatly, legibly and accurately transfer from the working set of bluelines described above all project related notations to accurately reflect the as-built condition. The second, and any subsequent copies, may be made from the reproducible copy. These record drawings shall be delivered to the Engineer for the review and subsequent delivery to the Owner at job completion. This information shall be delivered prior final acceptance and final payment.

b. Two (2) indexed 3-ring loose-leaf, hard-back sets of binders sized for 8 ½ inch by 11 inch (and folded 11 inch by 17 inch) sheets. No binder shall exceed 3 ½ inches thick. The data shall be turned over to the Engineer for review and subsequent delivery to the Owner. The information shall be delivered prior to final acceptance and final payment. The data within the binder shall include the following:

1) Warranties, guarantees and manufacturer's directions on material, equipment and devices covered by the Contract.
2) Approved wiring diagrams and control diagrams.
3) Copies of approved submittals and shop drawings.
4) Operating instructions and recommended maintenance procedures for major apparatus.
5) Copies of all other data and/or drawings required during construction.
6) Repair parts list of major apparatus, including name, address and telephone number of local supplier or representative.
7) Tag charts and diagrams hereinbefore specified.

2. The electronic copy shall consist of the following:

a. Three (3) electronic copies (in AutoCAD format) of the original drawings on which all project related notations have been accurately transferred from the working set of bluelines described above reflecting the as-built condition. These electronic record drawings shall be delivered to the Engineer for review and subsequent delivery to the Owner at job completion. The Engineer will retain one (1) electronic copy for their records and forward two (2) electronic copies to the Owner. This information shall be delivered prior to final acceptance and final payment.

b. Three (3) electronic copies (on compact disc (CD) in PDF format) of all project data presented in a 8 ½ by 11 inch (or folded 11 inch by 17 inch) format. The data shall be turned over to the Engineer for review and subsequent delivery to the Owner. The Engineer will retain one (1)

SECTION 23 07 00

HVAC AND PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:

    a. Calcium silicate.
    b. Cellular glass.
    c. Flexible elastomeric.
    d. Mineral fiber.
    e. Phenolic.
    f. Polyisocyanurate.
    g. Polyolefin.
    h. Polystyrene.

2. Fire-rated insulation systems.
3. Insulating cements.
4. Adhesives.
5. Mastics.
6. Lagging adhesives.
7. Sealants.
8. Factory-applied jackets.
9. Field-applied fabric-reinforcing mesh.
10. Field-applied cloths.
11. Field-applied jackets.
12. Tapes.
13. Securements.
14. Corner angles.

B. Related Sections:

1. Division 21 Section "Fire-Suppression Systems Insulation."
2. Division 22 Section "Plumbing Insulation."
3. Division 23 Section "Metal Ducts" for duct liners.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

1.5 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Owens-Corning

B. Johns-Manville

C. Pittsburg-Corning

D. Certain Teed Manson

E. Knauf Fiberglass

2.2 BASIC INSULATION MATERIALS, FITTINGS, FINISHES

A. Insulation materials shall conform to the following requirements:

2.4 STEAM VALVE INSULATING JACKET

A. Provide a removable jacket for all steam shut-off valves, steam pressure reducing valves, traps and condensate return valves.

B. Jackets shall utilize asbestos-free flexible insulation blanket and covering. The jackets to have Velcro fasteners for easy installation and removal.

C. Jackets shall be equal to that as manufactured by Spence Engineering Company.

PART 3 - EXECUTION

3.1 GENERAL

A. Materials shall be applied by a qualified insulation applicator/workman skilled in this trade. Insulation shall be installed in accordance with the manufacturers written instructions and in accordance with recognized industry standards. Mechanical fasteners shall be used whenever possible to assure permanent construction. Unsightly Work shall be cause for rejection.

B. Materials shall be applied only after surfaces have been tested and cleaned.

C. Non-compressible insulation material shall be installed at hanger supports on cold piping to prevent damage to insulation and vapor barrier.

D. Insulation of cold surfaces shall be vapor-sealed to prevent condensation.

E. Minimum thickness of insulation shall be as scheduled; however, sufficient insulation shall be provided to eliminate condensation on the cold surfaces, and to maintain a maximum exterior insulation surface temperature of 125°F on the hot surfaces.

F. Where piping system insulation is specified, cover valves, strainers, unions, flanges, and fittings.

G. Install protective metal shields where pipe hangers bear on the outside of insulation. Provide wood blocking from the shield through the insulation or O.C. Kaylo (minimum 24" long) to prevent crushing of the insulation (Refer to Section 15060, 2.8, B.).

H. Extend piping insulation without interruption through walls, floors and similar piping penetrations, there shall be no exceptions.

I. Prior to installation of any insulation materials to ferrous piping systems, the piping surfaces shall be thoroughly cleaned of all mill scale, grease and dirt.

8. P6A2 and P6B2: Cellular Glass outdoors: Same as P6A1 and P6B1, respectively, except do not field apply an all service jacket (ASJ). Apply metal jacketing on pipes and fittings as specified in this section for outdoor piping.
9. P6A3 and P6B3: Cellular Glass outdoors with heat trace: Same as P6A1 and P6B1, respectively, except do not field apply an all service jacket (ASJ) Apply metal jacketing on pipes and fittings as specified in this section for outdoor piping.
10. P6B: Insulation for Fittings and Accessories:
    a. Pipe insulation shall have ends thoroughly coated with a vapor barrier coating not more than 6 inches from each flange, union, valve, anchor, or fitting in all directions.
    b. Insulation shall be premolded or segmented. Insulation of the same thickness and conductivity as the adjoining pipe insulation shall be used. If nesting size insulation is used, the insulator should be overlapped 2 inches or one pipe diameter. Insulation or insulating cement shall be used to fill the voids. Insulation for elbows less than 3 inch size shall be premolded. Insulation for elbows 3 inch size and larger shall be either premolded or segmented. Elbows insulated using segments shall not have less than 3 segments per elbow. Insulation may be secured by wire or tape until finish is applied.
    c. Upon completion of installation of insulation on flanges, unions, valves, anchors, fittings and accessories, all terminations and all insulation not protected by factory vapor barrier jackets or PVC fitting covers shall be protected with two coats of vapor barrier coating with a minimum total thickness of $1/16^{th}$ inch, applied with glass tape embedded between coats. Tape seams shall overlap 1 inch. The coating shall extend out onto the adjoining pipe insulation 2 inches.
    d. Insulation terminations shall be tapered to unions at a 45-degree angle. The ends of the insulation shall be coated and taped as above.
    e. Anchors attached directly to the pipe shall be insulated for a sufficient distance to prevent condensation but not less than 6 inches from the insulation surface.
    f. PVC Fitting Covers: One or two piece PVC fitting covers shall be applied. The covers shall be secured by PVC vapor barrier tape, adhesive, seal-welding or with tacks made for securing PVC covers. All seams in the cover, and tacks and laps to adjoining pipe insulation jacket, will be sealed with vapor barrier tape to ensure that the assembly has a continuous vapor seal.

C. Ductwork
1. D1: Apply fiberglass board insulation to ducts with mechanical fasteners such as stick-clips or weld-pins (with tape and mastic) spaced as required to install full pieces of board insulation. Space on 12" centers (maximum) on the bottom of each duct and plenum. Cover joints and seams in vapor barrier facings with 3" wide matching tape. Provide an additional layer of insulation board where duct-standing seams exceed the insulation thickness. Seal all laps and penetrations in vapor barrier jacket with an approved vapor barrier mastic.
2. D2: Wrap flexible fiberglass insulation around ducts and secure with outward-clinching staples. Additionally, ducts 24 inches wide and larger shall secure insulation with stick clips on 18" centers. Lap insulation a minimum of

PIPES

	INSULATION TYPE	THICKNESS	APPLICATION TYPE	INSULATION FINISH INDOOR CONCEALED	INSULATION FINISH INDOOR EXPOSED	INSULATION FINISH OUTDOOR
Domestic cold water; bottom of roof drains and overflow drains; horizontal storm drains and overflow drains within building; waste piping conveying cooling coil condensate; cooling condensation drains; waste from chilled drinking water fountains.						
Indoor:	2	1"	P2	8	8	--
Outdoor:	2	1"	P4	--	--	8 & 3
Domestic hot water supply & recirculation.	2	*N_1	P1	8	8	8 & 3
Heating water supply and return; steam condensate return and pumped return piping.						
Indoor:	2	*N_2	P1	8	8	--
Outdoor:	2	*N_2	P1	--	--	8 & 3
Runouts for chilled water supply and return.	42	*N_5	P6A1	8	8	--
Mains and branches for chilled water supply and return.						
Indoor In Mech. Room:	42	*N_5	P6A	--	--	--
Indoor not in Mech rm.	42	*N_5	P6A1	--	--	--
Outdoor:	42	*N_5	P6A3	--	--	--
Condenser water supply and return.						
Outdoor:	42	*N_5	P6A3	--	--	--
Refrigerant suction piping.						
Indoor:	2	*N_3	P2	8	8	--
Outdoor:	2	*N_3	P5	--	--	8 & 3

* See "Schedule Notes", this Section.
** Provide insulation where piping is heat traced.

EQUIPMENT

	INSULATION TYPE	THICKNESS	APPLICATION TYPE	INSULATION FINISH	
				INDOOR	OUTDOOR
Boiler breeching (plate steel)	1	4″	E1	2 & 1	8 & 3
Steam-to-water heat exchanger; heating water-to-water heat exchanger; steam system surge tank, deaerator, blowdown heat recovery unit, blowdown separator flash tanks.	1	4″	E1	2 & 1	8 & 3
Hot water or chilled water tank or expansion/compression tank, domestic water storage tank.	2	1 ½″	E1	2 & 1	8 & 3
Chillers; chilled water pumps.	2 42 5	2″ 2″ 2″	E1 E1 E1	2 & 1 7 9	3 2 & 3 9
Generator field fabricated exhaust piping & muffler.	8	3″	E1	2 & 1	3
Laundry equipment exhausts ducts.	6	2″	D1	6 & 3	6 & 3
Humidifiers	6	2″	E1	10	--

3.3 PIPE INSULATION THICKNESS SCHEDULES

DOMESTIC HOT WATER SYSTEMS (N_1)

SUPPLY WATER TEMPERATURE	NON-CIRCULATING RUNOUTS UP TO 1"	CIRCULATING MAINS AND BRANCHES		
		UP TO 1 ¼"	1 ½" & 2"	OVER 2"
170 - 180°F	½"	1"	1 ½"	2"
140 - 160°F	½"	½"	1"	1 ½"
100 - 130°F	½"	½"	½"	1"

HEATING WATER AND STEAM SYSTEMS (N_2)
INSULATION THICKNESS FOR PIPE SIZES

FLUID TEMP.	RUNOUTS UP TO 2"	1" & LESS	1 ¼" TO 2"	2 ½" TO 4"	5" & 6"	8" AND LARGER
High Pressure/Temp. 306-450°F (Includes HPS)	2.5"	2.5"	2.5"	3.0"	3.5"	3.5"
Medium Pressure/Temp. 251-305°F (Includes HPR, BF)	2.0"	2.0"	2.5"	2.5"	3.5"	3.5"
Low Pressure/Temp. 201-250°F (Includes LPS, LPR)	1.5"	1.5"	1.5"	2.0"	2.0"	3.5"
Low Temp. 120-200°F (Includes HS, HR)	1.5"	1.5"	1.5"	1.5"	1.5"	1.5"
Vents, Drains, Blow-downs, Relief's All Temp.	--	1.0"	1.5"	2.0"	2.0"	2.0"

* Runouts to individual units, less than 48" in length.

SECTION 23 73 13

VARIABLE ASPECT INDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes variable-volume, modular air-handling units with coils for indoor installations.

B. Related Sections include the following:
   1. Division 23 Section "Humidifiers" for steam grid and evaporative humidifiers not an integral part of modular indoor air-handling units specified in this Section.

1.2 SUBMITTALS

A. Product Data: For each type of modular indoor air-handling unit indicated. Include the following:
   1. Certified fan-performance curves with system operating conditions indicated.
   2. Certified fan-sound power ratings.
   3. Certified coil-performance ratings with system operating conditions indicated.
   4. Motor ratings, electrical characteristics, and motor and fan accessories.
   5. Material gages and finishes.
   6. Filters with performance characteristics.
   7. Dampers, including housings, linkages, and operators.
   8. Wiring Diagrams: Power, signal, and control wiring.

B. Coordination Drawings: Submit with Shop Drawings. Show mechanical-room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.

C. Field Quality-Control Test Reports: From manufacturer.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain modular indoor air-handling units through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of modular indoor air-handling units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. NFPA Compliance: Modular indoor air-handling units and components shall be designed, fabricated, and installed in compliance with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."

gage clear-coated galvanized steel cross members. Each shipping section shall be provided with removable lifting lugs. Structural framework shall fully support the unit casing and all components during installation such that no section deflects more than L/1000 during rigging of that section, where L is defined as the distance between lifting lugs.

2. Floor shall be constructed from 16 gauge smooth galvanized steel . The floor surface shall be welded and all spaces and joints completely sealed with dams around all bottom penetrations. Floor deflection shall not exceed L/200 under a point load of 200 pounds, where L is defined as the floor span.
3. Insulation that meets a minimum R-value of 12 shall be provided underneath the entire unit floor. Insulation shall completely fill the panel cavity in all directions so that no voids exist. Base assemblies shall comply with NFPA 90 A.

C. Walls
1. Wall assemblies shall be double-wall construction with galvanized steel solid exterior and galvanized steel interior. The entire unit shall have a solid wall liner on the interior. All spaces and joints of wall assemblies shall be completely sealed. Wall shall meet the casing deflection limits contained herein.
2. A Class "B" thermal break shall be provided throughout the entire wall assembly.
3. Insulation that meets a minimum R-value of 12 shall be provided throughout all unit wall assemblies. Insulation shall completely fill the panel cavity in all directions so that no voids exist and settling of insulation is prevented. Wall assemblies shall comply with NFPA 90 A.
4. Removable wall access panels shall be provided in coil sections for service removal of components.

D. Access Doors
1. Access doors shall be provided throughout units as indicated on the schedules and drawings. Access doors shall be double wall construction. Interior and exterior door panels shall be of the same construction as the interior and exterior wall panels, respectively.
2. A Class "A" thermal break shall be provided on all door assemblies throughout the unit.
3. Insulation that meets a minimum R-value of 12 shall be provided throughout all door assemblies. Insulation shall completely fill the panel cavity in all directions so that no voids exist and settling of insulation is prevented. Door assemblies shall comply with NFPA 90 A.
4. All doors shall be a minimum of 60" high if sufficient height is available, or the maximum height allowed by the unit height. All doors shall open against pressure to ensure an airtight seal and to prevent a safety hazard.
5. Door hinges shall be 304 stainless steel continuous type. Door handles shall be Allegis design for minimized leakage and to provide a Class "A" thermal break. All handles shall fasten against the door frame with a roller cam to eliminate wear of the door frame. On indoor units, if Allegis handles are not provided, Ventlok 310 handles shall be provided on all doors to ensure positive seal of the door and to avoid wear of the door frame. Ventlok handles on outdoor units shall not be acceptable.
6. Windows shall be provided in doors as indicated on the schedule and drawings. Windows shall be mounted in a metal frame and shall be a minimum of 8" x 8", with safety glass. For any instance where a window

support structure and equipped with formed-steel channel base for integral mounting of fan, motor, and casing panels. Mount fan with vibration isolation.

B. Centrifugal Fan Housings: Formed- and reinforced-steel panels to make curved scroll housings with shaped cutoff, spun-metal inlet bell, and access doors or panels to allow entry to internal parts and components.
   1. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
   2. Performance Class: AMCA 99-2408, Class II or III.
   3. Horizontal Flanged Split Housing: Bolted construction.
   4. Plug Fans: With steel cabinet. Fabricate without fan scroll and volute housing.

C. Fan Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and motor horsepower.

D. Backward-Inclined Fan Wheels: Steel construction with curved inlet flange, backplate, and backward-inclined blades.

E. Forward-Curved Fan Wheels: Black-enamel or galvanized-steel construction with inlet flange, backplate, and shallow blades with inlet and tip curved forward in direction of airflow and mechanically secured to flange and backplate; cast-steel hub swaged to backplate and fastened to shaft with set screws.

F. Airfoil-Fan Wheels: Steel construction with smooth-curved inlet flange, heavy backplate, and hollow die-formed airfoil-shaped blades continuously welded at tip flange and backplate; cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

G. Axial-Fan Wheels: Cast aluminum, with airfoil-shaped blades mounted on cast-iron wheel plate keyed to shaft with solid-steel key.
   1. Fan Hub and Blade-Bearing Assemblies: Cast aluminum, machined and fitted with threaded bearing wells to receive blade-bearing assemblies.
   2. Blades: Replaceable, cast aluminum; factory mounted and balanced to hub assembly.
   3. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

H. Shafts: Statically and dynamically balanced and designed for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
   1. Turned, ground, and polished hot-rolled steel with keyway. Ship with a protective coating of lubricating oil.
   2. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

I. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.
   1. Ball-Bearing Rating Life: ABMA 9, L_{10} of 120,000 hours.

J. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
   1. Roller-Bearing Rating Life: ABMA 11, L_{10} of 120,000 hours.

K. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
   1. Ball-Bearing Rating Life: ABMA 9, L_{10} of 120,000 hours.
   2. Roller-Bearing Rating Life: ABMA 11, L_{10} of 120,000 hours.

B. Humidifiers shall be provided as indicated on the schedule and drawings. Humidifier type and performance shall be provided as indicated on the schedule and drawings.

C. No component shall be located downstream of the humidifier within the absorption distance cataloged by the humidifier manufacturer. A double-sloped (sloped in 2 planes) 304 stainless steel drain pan shall be provided under the humidifier and shall extend downstream of the humidifier for a minimum distance as indicated in the drawings.

D. The AHU Manufacturer shall furnish and install humidifiers inside the AHUs. The AHU Manufacturer shall extend the steam supply piping through the side of the units. Connection locations (handing) shall be as indicated on the schedule and drawings.

E. Steam separators, control valves, traps, and strainers shall be provided by the AHU Manufacturer and shipped loosed for field installation.

F. Humidifiers shall consist of a dispersion panel with a steam supply header/separator and a bank of steam dispersion tubes. Each active tube shall be fitted with a series of nozzles which extend from the center of the tube. The nozzles shall be sized and spaced to accept steam from the separator/header and provide a dry and uniform discharge of steam. All wetted tubes and headers shall be 304 stainless steel.

2.8 DAMPERS

A. General: Leakage rate, according to AMCA 500, "Laboratory Methods for Testing Dampers for Rating," shall not exceed 2 percent of air quantity at 2000-fpm face velocity through damper and 4-inch wg pressure differential.

B. Damper Operators: Electric specified in Division 23 Section "Instrumentation and Control for HVAC."

C. Low-Leakage, Outside-Air Dampers: Double-skin, airfoil-blade galvanized-steel dampers with compressible jamb seals and extruded-vinyl blade edge seals, in parallel-blade arrangement with steel operating rods rotating in stainless-steel sleeve bearings mounted in a single galvanized-steel frame, and with operating rods connected with a common linkage. Leakage rate shall not exceed 5 cfm/sq. ft. at 1-inch wg and 9 cfm/sq. ft. at 4-inch wg.

2.9 FILTER SECTION

A. Filters: Comply with NFPA 90A.

B. Filter Section: Provide filter holding frames arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side.

C. Extended-Surface, Non supported-Media Filters: Factory-fabricated, dry, extended-surface, self-supporting filters with holding frames.
   1. Media: Fibrous material constructed so individual pleats are maintained in tapered form by flexible internal supports under rated-airflow conditions.
   2. Filter-Media Frame: Galvanized steel.
   3. Duct-Mounting Frames: Welded, galvanized steel with gaskets and fasteners, suitable for bolting together into built-up filter banks.

B. Install piping adjacent to machine to allow service and maintenance.

C. Connect piping to indoor air-handling units mounted on vibration isolators with flexible connectors.

D. Connect condensate drain pans using NPS 1-1/4, Type M copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

E. Hot- and Chilled-Water Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping." Connect to supply and return coil tapings with shutoff or balancing valve and union or flange at each connection.

F. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connections.

G. Electrical: Comply with applicable requirements in Division 26 Sections for power wiring, switches, and motor controls.

H. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

I. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
   1. Leak Test: After installation, fill water and steam coils with water and test coils and connections for leaks. Repair leaks and retest until no leaks exist.
   2. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
   3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 FACTORY TESTING

A. Air Leakage Tests.
   1. The AHU Manufacturer shall conduct factory air leakage tests on one unit as selected by owner or consultant 10 days prior to shipment. Positive-pressure sections of units shall be tested under positive pressure and negative-pressure sections of units shall be tested under negative pressure. Unit air leakage shall not exceed 1.0% of design cfm at maximum operating pressure. Leakage shall be calculated by totaling all leakage either in to or out of the unit.

B. Panel Deflection Test.
   1. The AHU Manufacturer shall conduct factory panel deflection tests one unit as selected by owner or consultant 10 days prior to shipment as indicated in the schedule and drawings. Positive-pressure sections of units shall be tested under positive pressure and negative-pressure sections of units shall be

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain modular indoor air-handling units. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 23 73 13

SECTION 23 82 39

UNIT HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Cabinet unit heaters with centrifugal fans and hot-water and electric-resistance heating coils.
2. Propeller unit heaters with hot-water and electric-resistance heating coils.
3. Wall and ceiling heaters with propeller fans and electric-resistance heating coils.

1.2 DEFINITIONS

A. BAS: Building automation system.

B. CWP: Cold working pressure.

C. PTFE: Polytetrafluoroethylene plastic.

D. TFE: Tetrafluoroethylene plastic.

1.3 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Location and size of each field connection.
3. Details of anchorages and attachments to structure and to supported equipment.
4. Equipment schedules to include rated capacities, operating characteristics, furnished specialties, and accessories.
5. Location and arrangement of piping valves and specialties.
6. Location and arrangement of integral controls.
7. Wiring Diagrams: Power, signal, and control wiring.

C. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

D. Samples for Initial Selection: Finish colors for units with factory-applied color finishes.

E. Samples for Verification: Finish colors for each type of cabinet unit heater and wall and ceiling heaters indicated with factory-applied color finishes.

F. Field quality-control test reports.

G. Operation and Maintenance Data: For cabinet unit heaters to include in emergency, operation, and maintenance manuals.

G. Hot-Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch and rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain.

H. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with fuses in terminal box for overcorrect protection and limit controls for high-temperature protection. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.

I. Fan and Motor Board: Removable.
   1. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.
   2. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
   3. Wiring Terminations: Connect motor to chassis wiring with plug connection.

J. Basic Unit Controls:
   1. Control voltage transformer.
   2. Wall-mounting thermostat with the following features.
      a. Heat-off switch.
      b. Fan on-auto switch.
      c. Manual fan speed switch.
      d. Adjustable deadband.
      e. Exposed set point.
      f. Deg F indication.
   3. Wall-mounting, Unit-mounted temperature sensor.

K. Electrical Connection: Factory wire motors and controls for a single field connection.

2.2 PROPELLER UNIT HEATERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Chromalox, Inc.; a division of Emerson Electric Company.
   2. QMark Electric Heating; a division of Marley Engineered Products.
   3. Trane.

B. Description: An assembly including casing, coil, fan, and motor in vertical and horizontal discharge configuration with adjustable discharge louvers.

C. Comply with UL 2021.

D. Comply with UL 823.

E. Cabinet: Removable panels for maintenance access to controls.

F. Cabinet Finish: Manufacturer's standard baked enamel applied to factory-assembled and -tested propeller unit heater before shipping.

G. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units.

1. Motor: Permanently lubricated. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

G. Controls: Unit-mounted thermostat. Low-voltage relay with transformer kit.

H. Electrical Connection: Factory wire motors and controls for a single field connection with disconnect switch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in for piping and electrical connections to verify actual locations before unit heater installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wall boxes in finished wall assembly; seal and weatherproof. Joint-sealant materials and applications are specified in Division 07 Section "Joint Sealants."

B. Install cabinet unit heaters to comply with NFPA 90A.

C. Install propeller unit heaters level and plumb.

D. Suspend cabinet unit heaters from structure with . Vibration isolators are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

E. Suspend propeller unit heaters from structure with all-thread hanger rods. Hanger rods and attachments to structure are specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment." Vibration hangers are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

F. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.

G. Install new filters in each fan-coil unit within two weeks of Substantial Completion.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

C. Connect piping to cabinet unit heater's factory, hot-water piping package. Install the piping package if shipped loose.

D. Connect supply and return ducts to cabinet unit heaters with flexible duct connectors specified in Division 23 Section "Air Duct Accessories."

E. Comply with safety requirements in UL 1995.

Division 26
Electrical

SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks, and in single duct runs.
2. Handholes and boxes.
3. Manholes.

B. Related Sections include the following:
1. Division 26 Section "Raceways and Boxes for Electrical Systems" for raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.2 DEFINITION

A. EPC: Electrical Plastic Conduit

B. RMC: Rigid metal conduit.

C. RNC: Rigid nonmetallic conduit.

D. RSC: Rigid Steel conduit.

1.3 SUBMITTALS

A. Submit product data and shop Drawings in accordance with Division 01 for products specified under PART 2 - PRODUCTS.

B. Product Data: For the following:
1. Duct-bank materials, including separators and miscellaneous components.
2. Ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
3. Accessories for manholes, handholes, boxes, and other utility structures.
4. Warning tape.
5. Warning planks.

C. Shop Drawings for Precast or Factory-Fabricated Underground Utility Structures: Include plans and elevations with dimensions and weights. Include sections, details, attachments to other work, and accessories, including the following:
1. Duct entry provisions, including locations and duct sizes.
2. Reinforcement details.
3. Frame and cover design and manhole frame support rings.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Electric Service: Comply with requirements defined in Division 26 Section "Common Work Results for Electrical".

1.7 COORDINATION

A. Coordinate layout and installation of ducts, manholes, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field. Verify field measurements, routing and termination locations of duct bank prior to excavation for rough-in. Coordinate duct bank installation with underground Work and site Work and other site improvement Work specified in other Divisions.

B. Coordinate elevations of ducts and duct-bank entrances into manholes, handholes, and boxes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Duct bank routing as indicated on the Drawings is the approximate location. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Engineer.

C. Accurately record actual routing of duct bank on Project record documents, and submit in accordance with Division 01.

PART 2 - PRODUCTS

2.1 CONDUIT

A. RSC: Comply with ANSI C80.1 and UL 6; Galvanized rigid steel, each length with a coupling on one end and thread protector on opposite end.

B. RNC: NEMA TC 2, Type EPC-40-PVC and Type EPC-80-PVC as indicated, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.2 NONMETALLIC DUCTS AND DUCT ACCESSORIES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. ARNCO Corp.
2. Cantex, Inc.
3. Condux International, Inc.
4. Electri-Flex Company.
5. Lamson & Sessions; Carlon Electrical Products.
6. Manhattan/CDT; a division of Cable Design Technologies.
7. Spiraduct/AFC Cable Systems, Inc.

B. ENT: Comply with NEMA TC 13.

B. Comply with ASTM C 858 for design and manufacturing processes.

C. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or box.
   1. Frame and Cover: Weatherproof steel frame, with steel cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
   2. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
   3. Cover Legend: Molded lettering, selected to suit system or as otherwise required.
      a. Legend: "ELECTRIC-LV" for duct systems with power wires and cables operating at 600 V and less.
      b. Legend: "ELECTRIC-HV" for duct systems with power wires and cables operating over 600 V.
      c. Legend: "SIGNAL" for communications, data, and telephone duct systems.
   4. Configuration: Units shall be designed for flush burial and have integral closed bottom, unless otherwise indicated.
   5. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.
      a. Extension shall provide increased depth as required.
      b. Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.
   6. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12 inches (300 mm) vertically and horizontally to accommodate alignment variations.
      a. Windows shall be located no less than 6 inches (150 mm) from interior surfaces of walls, floors, or frames and covers of handholes, but close enough to corners to facilitate racking of cables on walls.
      b. Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
      c. Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.
   7. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
      a. Type and size shall match fittings to duct or conduit to be terminated.
      b. Fittings shall align with elevations of approaching ducts and be located near interior corners of handholes to facilitate racking of cable.
   8. Handholes 12 inches wide by 24 inches long (300 mm wide by 600 mm long) and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.4 HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Description: Comply with SCTE 77.

2.5 PRECAST MANHOLES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Christy Concrete Products.
2. Oldcastle Precast Group.
3. Riverton Concrete Products; a division of Cretex Companies, Inc.
4. Utility Concrete Products, LLC.
5. Dalworth Concrete Products, Inc.

B. ANSI/ACI 301 - Specifications for Structural Concrete for Buildings.

C. ANSI/ASTM A615 - Specifications for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

D. AASHTO HS-20 - Standard Specification for Highway Bridges.

E. Comply with ASTM C 858, with structural design loading as specified in Part 3 "Underground Enclosure Application" Article and with interlocking mating sections, complete with accessories, hardware, and features.
1. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional 12 inches (300 mm) vertically and horizontally to accommodate alignment variations.
   a. Windows shall be located no less than 6 inches (150 mm) from interior surfaces of walls, floors, or roofs of manholes, but close enough to corners to facilitate racking of cables on walls.
   b. Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
   c. Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.
2. Duct Entrances in Manhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
   a. Type and size shall match fittings to duct or conduit to be terminated.
   b. Fittings shall align with elevations of approaching ducts and be located near interior corners of manholes to facilitate racking of cable.

F. Concrete Knockout Panels: 1-1/2 to 2 inches (38 to 50 mm) thick, for future conduit entrance and sleeve for ground rod.

2.6 CAST-IN-PLACE MANHOLES

A. Description: Underground utility structures, constructed in place, complete with accessories, hardware, and features. Include concrete knockout panels for conduit entrance and sleeve for ground rod.

B. Materials: Comply with ASTM C 858 and with Division 03 Section "Cast-in-Place Concrete."

E. Pulling-In and Lifting Irons in Concrete Floors: 7/8-inch- (22-mm-) diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.
   1. Ultimate Yield Strength: 40,000-lbf (180-kN) shear and 60,000-lbf (270-kN) tension.

F. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; 1/2-inch (13-mm) ID by 2-3/4 inches (69 mm) deep, flared to 1-1/4 inches (32 mm) minimum at base.
   1. Tested Ultimate Pullout Strength: 12,000 lbf (53 kN) minimum.

G. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip with 1/2-inch (13-mm) bolt, 5300-lbf (24-kN) rated pullout strength, and minimum 6800-lbf (30-kN) rated shear strength.

H. Cable Rack Assembly: Steel, hot-dip galvanized, except insulators.
   1. Stanchions: T-section or channel; 2-1/4-inch (57-mm) nominal size; punched with 14 holes on 1-1/2-inch (38-mm) centers for cable-arm attachment.
   2. Arms: 1-1/2 inches (38 mm) wide, lengths ranging from 3 inches (75 mm) with 450-lb (204-kg) minimum capacity to 18 inches (460 mm) with 250-lb (114-kg) minimum capacity. Arms shall have slots along full length for cable ties and be arranged for secure mounting in horizontal position at any vertical location on stanchions.
   3. Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.

I. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F (2 deg C). Capable of withstanding temperature of 300 deg F (150 deg C) without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals. Capable of withstanding maximum hydrostatic pressures at the installation location with the ground-water level at grade.

J. Fixed Manhole Ladders: Arranged for attachment to roof or wall and floor of manhole. Ladder and mounting brackets and braces shall be fabricated from nonconductive, structural-grade, fiberglass-reinforced resin.

K. Cover Hooks: Heavy duty, designed for lifts 60 lbf (270 N) and greater. Two required.

2.8 SOURCE QUALITY CONTROL

A. Test and inspect precast concrete utility structures according to ASTM C 1037.

B. Nonconcrete Handhole and Pull-Box Prototype Test: Test prototypes of manholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

B. Manholes: Precast or cast-in-place concrete.
   1. Units Located in Roadways and Other Deliberate Traffic Paths by Heavy or Medium Vehicles: H-20 structural load rating according to AASHTO HB 17.
   2. Units Not Located in Deliberate Traffic Paths by Heavy or Medium Vehicles: H-10 load rating according to AASHTO HB 17.

3.3 EARTHWORK

A. Excavation and Backfill: Comply with Division 31 Section "Earth Moving", but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 32.

D. Cut and patch existing pavement in the path of underground ducts and utility structures according to Division 01 Section "Cutting and Patching."

E. Prepare excavation, base material installation, and compaction necessary for the specific ductbank arrangement.

F. Verify that excavation, base material installation, and compaction is completed.

G. Backfill trenches as specified in Division 31.

3.4 DUCT INSTALLATION

A. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.

B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches (1220 mm), both horizontally and vertically, at other locations, unless otherwise indicated.

C. Use manufactured rigid steel conduit elbows wrapped with corrosion resistance tape for all changes in direction 45 degrees and over. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.

D. Install conduits to locate top of ductbank at depths as indicated or as required to coordinate with other portions of the Work.

E. Apply corrosion resistance tape and primer to direct-buried or concrete-encased RSC.

manufacturer's written recommendations, or use other specific measures to prevent expansion-contraction damage.

b. If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch (19-mm) reinforcing rod dowels extending 18 inches (450 mm) into concrete on both sides of joint near corners of envelope.

c. For Cast-In-Place manholes: Connect to manhole wall using dowels.

4. Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.

5. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.

6. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.

7. Minimum Space between Ducts: 3 inches (75 mm) between ducts and exterior envelope wall, 2 inches (50 mm) between ducts for like services, and 4 inches (100 mm) between power and signal ducts.

8. Depth: Install top of duct bank at least 24 inches (600 mm) below finished grade in areas not subject to deliberate traffic, and at least 30 inches (750 mm) below finished grade in deliberate traffic paths for vehicles, unless otherwise indicated.

9. Stub-Ups: Use manufactured rigid steel conduit elbows wrapped with corrosion resistance tape for stub-ups at poles and equipment and at building entrances through the floor.

   a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete.

   b. Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of base. Install insulated grounding bushings on terminations at equipment.

10. Label top of encased duct bank with stenciled lettering 2-inch- (50-mm-) high letters at not less than 10-foot intervals, after curing. Label selected to suit system or as otherwise required.

    a. Legend: "ELECTRIC-LV" for duct systems with power wires and cables operating at 600 V and less.

    b. Legend: "ELECTRIC-HV" for duct systems with power wires and cables operating over 600 V.

    c. Legend: "SIGNAL" for communications, data, and telephone duct systems.

11. Warning Tape: Bury warning tape approximately 12 inches (300 mm) above all concrete-encased ducts and duct banks. Align tape parallel to and within 3 inches (75 mm) of the centerline of duct bank. Provide an additional warning tape for each 12-inch (300-mm) increment of duct-bank width over a nominal 18 inches (450 mm). Space additional tapes 12 inches (300 mm) apart, horizontally.

3.5 INSTALLATION OF CONCRETE MANHOLES, HANDHOLES, AND BOXES

A. Cast-in-Place Manhole Installation:
1. Finish interior surfaces with a smooth-troweled finish.
2. Windows for Future Duct Connections: Form and pour concrete knockout panels 1-1/2 to 2 inches (38 to 50 mm) thick. Repair all unused conduit knockouts and other openings in sides of manhole.
3. Cast-in-place concrete, formwork, and reinforcement are specified in Division 03 Section "Cast-in-Place Concrete."

B. Precast Concrete Handhole and Manhole Installation:
1. Comply with ASTM C 891, unless otherwise indicated.
2. Install units level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances.
3. Unless otherwise indicated, support units on a minimum 6-inch (150-mm) level bed of crushed stone or gravel, graded from 1-inch (25-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.

C. Elevations:
1. Manhole Roof: Install with rooftop at least 15 inches (380 mm) below finished grade or as required to prevent floating of manhole.
2. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames 1 inch (25 mm) above finished grade.
3. Install handholes with bottom below the frost line.
4. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes 1 inch (25 mm) above finished grade.
5. Where indicated, cast handhole cover frame integrally with handhole structure.

D. Manhole Access: Circular opening in manhole roof; sized to match cover size.
1. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.
2. Install chimney, constructed of precast concrete collars and rings to support frame and cover and to connect cover with manhole roof opening. Provide moisture-tight masonry joints and waterproof grouting for cast-iron frame to chimney.

E. Waterproofing: Apply waterproofing to exterior surfaces of manholes after concrete has cured at least three days. Waterproofing materials and installation are specified in Division 07 Section "Elastomeric Sheet Waterproofing" or "Thermoplastic Sheet Waterproofing." After ducts have been connected and grouted, and before backfilling, waterproof joints and connections and touch up abrasions and scars. Waterproof exterior of manhole chimneys after mortar has cured at least three days.

F. Dampproofing: Apply dampproofing to exterior surfaces of manholes and handholes after concrete has cured at least three days. Dampproofing materials and installation are specified in Division 07 Section "Bituminous

concrete ring encircling, and in contact with, enclosure and with top surface screeded to top of box cover frame. Bottom of ring shall rest on compacted earth.

1. Concrete: 3000 psi (20 kPa), 28-day strength, complying with Division 03 Section "Cast-in-Place Concrete," with a troweled finish.
2. Dimensions: 10 inches wide by 12 inches deep (250 mm wide by 300 mm deep).

3.7 GROUNDING

A. Ground underground ducts and utility structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."

3.8 SLEEVE AND SLEEVE SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Apply Sleeve and Sleeve Seal where raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, exterior walls, sub-grade walls or fire-rated floor and wall assemblies. Sleeve and Sleeve Seal materials and installation requirements are specified in Division 26 Section "Common Work Results for Electrical."

3.9 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:
1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
2. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
3. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 Section "Grounding and Bonding for Electrical Systems."

B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.10 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Before any equipment or cable is installed, remove all dirt and debris and pump out the manhole or pull box so that it is free of standing water. Manholes and pull boxes shall be dry, clean, and repaired of damages resulting from construction after initial installation. Clean internal surfaces of manholes, including sump and remove foreign material.

END OF SECTION 26 05 43

SECTION 26 09 43

NETWORK LIGHTING CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes automatically operated lighting controls with relays and control module.

B. Related Sections include the following:
1. Division 26 Section "Lighting Control Devices" for time switches, photoelectric switches, occupancy sensors, and multipole contactors.

1.2 DEFINITIONS

A. BAS: Building automation system.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling and power-limited circuits.

C. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.

D. Power Line Carrier: Use of radio-frequency energy to transmit information over transmission lines whose primary purpose is the transmission of power.

E. RS-485: A serial network protocol, similar to RS-232, complying with TIA/EIA-485-A.

1.3 SUBMITTALS

A. Product Data: For control modules, power distribution components, manual switches and plates, and conductors and cables.

B. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on this Project.
1. Outline Drawings: Indicate dimensions, weights, arrangement of components, and clearance and access requirements.
2. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
3. Wiring Diagrams: Power, signal, and control wiring. Coordinate nomenclature and presentation with a block diagram.

3. Lithonia Lighting; Acuity Lighting Group, Inc.
4. Lutron Electronics Company, Inc.
5. Watt Stopper (The).

2.2 SYSTEM REQUIREMENTS

A. Performance Requirements: Manual switch operation sends a signal to programmable-system control module that processes the signal according to its programming and routes an open or close command to one or more relays in the power-supply circuits to groups of lighting fixtures or other loads.

2.3 CONTROL MODULE

A. Control Module Description: Comply with UL 916 (CSA C22.2, No. 205); microprocessor-based, solid-state, 365-day timing and control unit. Unit shall be programmable for control of indicated number of output circuits. Output circuits shall be switched on or off by internally programmed time signals or by program-controlled analog or digital signals from external sources. Output circuits shall be pilot-duty relays compatible with power switching devices, all located in other enclosures. An integral keypad shall provide local programming and control capability. A key-locked cover and a programmed security access code shall protect keypad use. An integral alphanumeric LCD shall display manual-control and programming steps. Modules and their associated control panels shall include the following features:
1. Multiple inputs and multichannel outputs as indicated on drawings.

2.4 POWER DISTRIBUTION COMPONENTS

A. Modular Relay Panel: Comply with UL 508 (CSA C22.2, No. 14) and UL 916 (CSA C22.2, No. 205); factory assembled with modular single-pole relays, power supplies, and accessory components required for specified performance.
1. Cabinet: Steel with hinged, locking door.
   a. Barriers separate low-voltage and line-voltage components.
   b. Directory: Mounted on back of door. Identifies each relay as to load groups controlled and each programmed pilot device if any.
   c. Control Power Supply: Transformer and full-wave rectifier with filtered dc output.
2. Single-Pole Relays: Mechanically held unless otherwise indicated; split-coil, momentary-pulsed type.
   a. Low-Voltage Leads: Plug connector to the connector strip in cabinet and pilot light power where indicated.
   b. Rated Capacity (Mounted in Relay Panel): 20 A, 125-V ac for tungsten filaments; 20 A, 277-V ac for ballasts.
   c. Endurance: 50,000 cycles at rated capacity.
   d. Mounting: Provision for easy removal and installation in relay cabinet.

B. Line-Voltage Surge Suppression: Factory installed as an integral part of 120- and 277-V ac, solid-state control panels or field-mounting surge suppressors that comply with Division 26 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits" for Category A locations.

4. Test system diagnostics by simulating improper operation of several components selected by Architect.

3.3 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors and to assist Owner's personnel in making program changes to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

END OF SECTION 26 09 43

SECTION 26 24 13

SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes service and distribution switchboards rated 600 V and less.

1.2 DEFINITIONS

A. AFCI: Arc-fault circuit interrupter.

B. EMI: Electromagnetic interference.

C. GFCI: Ground-fault circuit interrupter.

D. GFEP: Ground-fault equipment protection.

E. DPM: Multifunction Digital-Metering Monitor

F. RFI: Radio-frequency interference.

G. RMS: Root mean square.

H. SPDT: Single pole, double throw.

1.3 PERFORMANCE REQUIREMENTS

A. Overcurrent Protective Device Coordination: All overcurrent protective devices proposed for inclusion in the Work shall be selected to be selectively coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for all branches of normal and emergency power. Refer to Division 26 Section "Overcurrent Protective Device Coordination Study" for additional requirements.

1.4 SUBMITTALS

A. Submit product data and shop drawings in accordance with Division 01 for products specified under PART 2 - PRODUCTS.

B. Product Data: For each type of switchboard, overcurrent protective device, transient voltage suppression device, ground-fault protector, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
3. Time-current curves, including selectable ranges for each type of circuit breaker. Include directory listing each adjustable breaker included in the Work and their final set points.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain switchboards through one source from a single manufacturer, unless otherwise indicated.

B. Product Options: Drawings indicate spatial allocation for switchboards, including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum spatial allocation. Refer to Division 01 Section "Product Requirements."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NEMA PB 2, "Deadfront Distribution Switchboards."

E. Comply with NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver in sections or lengths that can be moved past obstructions in delivery path.

B. Store switchboards indoors in clean dry space with uniform temperature to prevent condensation. Protect switchboards from exposure to dirt, fumes, water, corrosive substances, and physical damage.

C. If stored in areas subjected to weather, cover switchboards to provide protection from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside switchboards; install electric heating (250 W per section) to prevent condensation.

D. Handle switchboards according to NEMA PB 2.1 and NECA 400.

1.7 PROJECT CONDITIONS

A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.

B. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
1. Ambient Temperature for Circuit Breakers: Not less than 23 deg F (minus 5 deg C) and not exceeding 104 deg F (40 deg C).
2. Ambient Temperature for Fused Switches: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).

C. Nominal System Voltage: As indicated on the Drawings

D. Main-Bus Continuous: As indicated on the Drawings

E. Fabricate and test switchboards according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

F. Enclosure: Steel, rated for environmental conditions at installed location.
   1. Indoor Locations: NEMA 250, Type 1.

G. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard ANSI Gray enamel over corrosion-resistant treatment or rust-inhibiting primer coat.

H. Barriers: Between TVSS compartment and adjacent switchboard sections.

I. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

J. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

K. Buses and Connections: Three phase, four wire, unless otherwise indicated.
   1. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent conductivity.
      a. Lugs: Mechanical style, one or two hole style to suit conditions, suitable for quantity and size of conductor, dual rated for use with copper- or aluminum conductors; UL 486 B listed, marked AL7CU for 75 degrees C rated circuits.
      b. Connectors shall be UL 486 B listed, marked AL7CU for 75 degrees C rated circuits.
   2. Ground Bus: 1/4-by-2-inch- (6-by-50-mm-) minimum-size, hard-drawn copper of 98 percent conductivity, equipped with pressure connectors for feeder and branch-circuit ground conductors. For busway feeders, extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.
   3. Contact Surfaces of Buses: Silver plated.
   4. Main Phase Buses, Neutral Buses, and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
   5. Neutral Buses: 100 percent of the ampacity of phase buses, unless otherwise indicated, equipped with pressure connectors for outgoing circuit neutral cables. Bus extensions for busway feeder neutral bus are braced.

L. Future Device Provisions: Equip compartments with unused space with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.

D. Molded-Case Circuit-Breaker Accessories: Standard frame sizes, trip ratings, and number of poles.
1. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator, where indicated.
2. Auxiliary Switch: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts, where indicated..
3. Key Interlock Kit: To prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position, where indicated.

E. Enclosed, Insulated-Case Circuit Breaker Requirements: Fully rated, encased-power circuit breaker with interrupting capacity rating to meet available fault current.
1. Fixed circuit-breaker mounting.
2. Two-step, stored-energy closing.
3. Microprocessor-based trip units with interchangeable rating plug, LED trip indicators, and the following field-adjustable settings:
   a. Long- and short-time pickup levels.
   b. Long- and short-time time adjustments with I^2t response.
   c. Instantaneous trip.
   d. Ground-fault pickup level, time delay, and I^2t response, where indicated.
   e. Ground-fault indication alarm, where indicated.
4. Remote trip indication and control.
5. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
6. Control Voltage: To match control-power supply provided.

F. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.

G. Fuses are specified in Division 26 Section "Fuses."

2.4 INSTRUMENTATION

A. Instrument Transformers: NEMA EI 21.1, IEEE C57.13, and the following:
1. Potential Transformers: Secondary voltage rating of 120 V and NEMA accuracy class of 0.3 with burdens of W, X, and Y.
2. Current Transformers: Ratios shall be as indicated with accuracy class and burden suitable for connected relays, meters, and instruments.
3. Control-Power Transformers: Dry type, mounted in separate compartments for units larger than 3 kV.
4. Current Transformers for Neutral and Ground-Fault Current Sensing: Connect secondaries to ground overcurrent relays to provide selective tripping of main and tie circuit breaker. Coordinate with feeder circuit-breaker ground-fault protection.

PART 3 - EXECUTION

3.1 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

3.2 EXAMINATION

A. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Install switchboards and accessories according to NEMA PB 2.1 and NECA 40.

B. Install and anchor switchboards level on concrete bases, 4-inch (100-mm) nominal thickness. Concrete base is specified in Division 26 Section "Hangers and Supports for Electrical Systems," and concrete materials and installation requirements are specified in Division 03.
   1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated or otherwise required by manufacturer, install dowel rods
   2. Install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Install anchor bolts to elevations required for proper attachment to switchboards.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from switchboard units and components.

D. Operating Instructions: Frame and mount the printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.

E. Install overcurrent protective devices, transient voltage suppression devices, and instrumentation.

3.4 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Identification for Electrical Systems."

D. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.6 ADJUSTING

A. Set field-adjustable switches and circuit-breaker trip ranges according to results of Division 26 Section "Overcurrent Protective Device Coordination Study."

3.7 CLEANING

A. On completion of installation, inspect interior and exterior surfaces and perform the following:
   1. Remove paint splatters and other spots.
   2. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
   3. Repair exposed surfaces to match original finish.

3.8 PROTECTION

A. Temporary Heating: Apply temporary heat to switchgear, according to manufacturer's written instructions, throughout periods when switchboard environment is not controlled for temperature and humidity within manufacturer's stipulated service conditions.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain switchboards, overcurrent protective devices, instrumentation, and accessories. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 26 24 13

SECTION 26 28 13

FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Cartridge fuses rated 600 V and less for use in switches, switchboards, controllers and motor-control centers.
2. Spare-fuse cabinets.

1.2 SUBMITTALS

A. Product Data: Include the following for each fuse type indicated:
1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
2. Let-through current curves for fuses with current-limiting characteristics.
3. Time-current curves, coordination charts and tables, and related data. Include hardcopy of characteristic curve and TCC Number for use with Power Tools by SKM Systems Analysis, Inc.
4. Tabulated schedule which indicates type, characteristics, and ratings of individual fuses and lists the devices and equipment in which they will be applied.
5. Fuse size for elevator feeders and elevator disconnect switches.

B. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
1. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
2. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.

C. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals.
1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
a. Let-through current curves for fuses with current-limiting characteristics.
b. Time-current curves, coordination charts and tables, and related data.
c. Ambient temperature adjustment information.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses from a single manufacturer.

4. Fuse Pullers: For each size of fuse.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Feeders rated 600 Amperes or less: Class RK1, time delay.

B. Feeders rated 601 Amperes and above: Class L, time delay.

C. Motor Branch Circuits: Class RK1, time delay.

D. Other Branch Circuits: Class RK1, time delay.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

B. Install spare-fuse cabinet(s).

3.4 IDENTIFICATION

A. Install labels indicating fuse replacement information on inside door of each fused switch.

B. Install labels indicating Type and Rating of fuse installed on outside of door of each fused switch.

END OF SECTION 26 28 13

SECTION 26 36 00

TRANSFER SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes transfer switches rated 600 V and less, including the following:
   1. Automatic transfer switches.
   2. Remote annunciation systems.

B. Related Sections include the following:
   1. Division 21 Section "Fire Protection Systems" for automatic transfer switches for fire pumps.

1.2 PERFORMANCE REQUIREMENTS

A. Overcurrent Protective Device Coordination: All overcurrent protective devices proposed for inclusion in the Work shall be selected to be selectively coordinated with the overcurrent protective devices installed on their supply side such that an overcurrent event (overload, short-circuit, or ground-fault) occurring at the lowest level in the system (branch circuit) cannot cause the feeder protective device supplying the branch circuit panelboard to open. This coordination shall be carried through each level of distribution for all branches of normal and emergency power. Refer to Division 26 Section "Overcurrent Protective Device Coordination Study" for additional requirements.

B. Sequence of Operation for Automatic Transfer
   1. Loss of Normal Source:
      a. After an adjustable time delay period of 0-10 seconds (default setting of 1 seconds), the Engine starting contacts shall close to initiate the starting of the standby engine-generator set when any of the following occur:
         1) Voltage on any phase of the normal source drops below 80-percent of nominal or increases to 120-percent of nominal.
         2) Frequency drops below 90-percent of nominal or increases to 110-percent of nominal.
         3) Voltage differential between phases is greater than 20-percent.
      b. When the emergency source has reached a voltage value of 90-percent of nominal and achieved frequency within 95-percent of the rated value, the load shall be transferred to the emergency source based on the following:
         1) Delayed Transition Switches:
            a) When the emergency source has reached the values listed above, the load shall be transferred to the neutral position for an adjustable time period of 0-10 seconds.

C. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
   1. Control schematics and wiring diagrams.

D. Manufacturer Seismic Qualification Certification: certification that panelboards, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration and Seismic Controls for Electrical Systems" including items as defined in Division 26 Section "Common Work Results for Electrical".

E. Source quality-control test reports.

F. Field quality-control test reports.

G. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
   1. Features and operating sequences, both automatic and manual.
   2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Maintain a service center available on a 24-hour a day, 365 days a year, on-call basis, via a toll-free call center, capable of providing training, parts, and emergency maintenance repairs within a response period of less than eight hours from time of notification. Maintain records of each transfer switch, by serial number, for service purposes.

B. Testing Agency Qualifications: For independent agency as defined in Division 26 Section "Common Work Results for Electrical".

C. Source Limitations: Obtain automatic transfer switches and remote annunciators through one source from a single manufacturer.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Comply with NEMA ICS 1.

F. Comply with NFPA 70.

G. Comply with NFPA 99.

H. Comply with NFPA 110.

I. Comply with UL 1008, unless requirements of these Specifications are stricter.
   1. During the UL 1008 withstand and closing tests, there shall be no contact welding or damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Contactor Transfer Switches:
      a. Emerson; ASCO Power Technologies, LP; Series 7000.
      b. GE Zenith Controls; Series ZTS / SBTS.
      c. Onan/Cummins Power Generation; Industrial Business Group; Series OTPC / BTPC.
      d. Russelectric, Inc; Series RMTD with Model 2000 Plus Control.

2.2 GENERAL TRANSFER-SWITCH PRODUCT REQUIREMENTS

A. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

B. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
   1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.

C. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C and 0 to 99 percent relative humidity, non-condensing.

D. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1. Micro-Processor capable of withstanding surges in accordance with ANSI/IEEE C-37.90A

E. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.

F. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
   1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit breaker components are not acceptable.
   2. Switch Action: Double throw; mechanically held in both directions.
   3. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.

G. Neutral Switching. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles.

G. Automatic Delayed-Transition Transfer Switches using Programmed Neutral Switch Position: Switch operator has a programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer. Pause is adjustable from 0.5 to 30 seconds minimum and factory set for 0.5 second, unless otherwise indicated. Time delay occurs for both transfer directions. Pause is disabled unless both sources are live.

H. Automatic Transfer-Switch Features:
1. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
2. Overvoltage Sensing for Each Phase of Normal Source: Sense h igh phase-to-ground voltage on each phase. Pickup shall be adjustable from 110 to 120 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 120 percent and dropout at 110 percent.
3. Under-frequency Sensing of Normal Source: Sense low frequency. Pickup frequency shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 95 percent and dropout at 90 percent.
4. Over-frequency Sensing of Normal Source: Sense high frequency. Pickup frequency shall be adjustable from 105 to 120 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 110 percent and dropout at 105 percent.
5. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
6. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
7. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
8. Local Test Switch: Simulate normal-source failure.
9. Switch-Position Pilot Lights: Indicate source to which load is connected.
10. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
    a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
    b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
11. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
12. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power

PART 3 - EXECUTION

3.1 APPLICATION

A. Transfer Switches: Apply switch products as specified below, unless otherwise indicated:
   1. Life Safety Branch: Automatic, Delayed Transition.
   2. Critical Branch: Automatic, Delayed Transition.
   3. Equipment Emergency System: Automatic, Delayed Transition.

B. Remote Annunciator Panel Locations: Provide annunciator panels in the following locations, unless otherwise indicated:
   1. Building Engineering Office.
   2. PBX

3.2 INSTALLATION

A. Design each fastener and support to carry load indicated by seismic requirements and according to seismic-restraint details per Division 26 Section "Vibration and Seismic Controls for Electrical Systems."

B. Floor-Mounting Switch: Support on Concrete base and anchor to floor by bolting.
   1. Concrete Bases: 4 inches (100 mm) high, reinforced, with chamfered edges. Extend base no more than 4 inches (100 mm) in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support. Construct concrete bases according to Division 26 Section "Hangers and Supports for Electrical Systems."

C. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.

3.3 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

B. Connect start signal and other necessary wiring to Engine Generator control system; coordinate requirements with. Each Automatic transfer switch shall have dedicated control wiring homerun to generator start control. Do not 'daisy-chain' control wiring between switches.

C. Connect relay wiring to Elevator controller; coordinate requirements with Division 14 "Conveying Equipment."

D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

7. Infrared Scanning: Perform Thermographic Survey in accordance with NETA ATS, Section 9.0.
   a. Initial Infrared Scanning: Within 60 Days after Substantial Completion, perform an infrared scan of each switch. Open or remove doors and covers so connections are accessible to portable scanner.
   b. Instruments, Equipment:
      1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

C. Correct Deficiencies and Report:
   1. Correct unsatisfactory conditions, and retest to demonstrate compliance; replace switches, relays, conductors, units, and devices as required to bring system into compliance.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
   3. Prepare a report that identifies switch, connection, conductors and devices checked and describes results. Include notation of deficiencies detected, remedial action taken, and observations and test results after remedial action.

D. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.6 ADJUSTING

A. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

3.7 CLEANING

A. On completion of installation, inspect interior and exterior surfaces and perform the following:
   1. Remove paint splatters and other spots.
   2. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
   3. Repair exposed surfaces to match original finish.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's personnel to adjust, operate, and maintain transfer switches and related equipment as specified below. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 26 36 00

SECTION 26 43 13

TRANSIENT-VOLTAGE SUPPRESSION FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes TVSSs for low-voltage power, control, and communication equipment.

B. Related Sections include the following:
1. Division 26 Section "Wiring Devices" for devices with integral TVSSs.
2. Division 26 Section "Switchboards" for factory-installed TVSSs.
3. Division 26 Section "Panelboards" for factory-installed TVSSs.

1.2 DEFINITIONS

A. SVR: Suppressed voltage rating.

B. TVSS: Transient voltage surge suppressor.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating weights, operating characteristics, furnished specialties, and accessories.

B. Product Certificates: For transient voltage suppression devices, signed by product manufacturer certifying compliance with the following standards:
1. UL 1283.
2. UL 1449.
3. MIL-STD 220A. Conduct spectrum analysis of each unit based on test procedures between 50kHz and 200kHz indicating the device noise attenuation.
4. ANSI/IEEE C62.41 and ANSI/IEEE C62.45: Provide certified documentation of applicable Location Category Testing in full compliance guidelines.

C. Shop Drawings: Submit shop drawings to indicate information not fully described by the product data.
1. Include electrical characteristics and ratings for the specified equipment.
2. Include wiring diagrams indicating the internal connections of the specified equipment within its enclosure.
3. Indicate device dimensions, weights, mounting provisions, and connection details.

2. Operating Temperature: 30 to 120 deg F (0 to 50 deg C)
3. Storage Temperature: -40 to 185 deg F (-40 to 85 deg C)
4. Operating Frequency: 47 to 63 Hertz.
5. Humidity: 0 to 85 percent, noncondensing
6. Altitude: Less than 20,000 feet (6090 m) above sea level.

1.6 COORDINATION

A. Coordinate location of field-mounted surge suppressors to allow adequate clearances for maintenance.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within five years from date of Substantial Completion.

1.8 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Replaceable Protection Modules: One of each size and type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Current Technology, Inc.
2. EFI Electronics; a Schneider Electric Company.
3. LEA International.
4. Leviton Mfg. Company Inc.
5. Liebert Corporation; a division of Emerson.

2.2 COMMON REQUIREMENTS FOR SUPPRESSORS

A. Surge Protection Device Description: Modular design with field-replaceable modules, sine-wave-tracking type with the following features and accessories:
1. Fabrication using bolted compression lugs for internal wiring.
2. Redundant suppression circuits.
3. Redundant replaceable modules.
4. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
5. LED indicator lights for power and protection status.
6. Audible alarm, with silencing switch, to indicate when protection has failed.
7. One set of dry contacts rated at 5 A and 250-V ac, for remote monitoring of protection status. Coordinate with building power monitoring and control system.
8. Surge-event operations counter.

1. Provide multipole, 100-A frame circuit breaker as a dedicated disconnect for suppressor, unless otherwise indicated. Comply with manufacturer's written recommendation for conductor and trip rating of circuit-breaker for connecting TVSS devices to distribution system. Match circuit-breaker size to conductor size.

3.2 PLACING SYSTEM INTO SERVICE

A. Do not energize or connect panelboards to their sources until surge protection devices are installed and connected.

3.3 FIELD QUALITY CONTROL

A. Prepare for acceptance tests as follows:
   1. Test insulation resistance for each component, connecting supply, feeder, and control circuit.
   2. Test continuity of each circuit.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Assist factory-authorized service representative during testing and correct deficiencies as required. Report results in writing.
   1. After installing surge protection devices, but before electrical circuitry has been energized, test for compliance with requirements.
   2. Complete startup checks according to manufacturer's written instructions.
   3. Perform each visual and mechanical inspection and electrical test stated in NETA ATS 7.19.1, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.
   4. Infrared Scanning: Perform Thermographic Survey in accordance with NETA ATS, Section 9.0.
      a. Initial Infrared Scanning: Within 60 Days after Substantial Completion, perform an infrared scan of each unit. Open or remove doors and covers so connections are accessible to portable scanner.
      b. Instruments, Equipment:
         1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

C. Correct Deficiencies and Report:
   1. Correct unsatisfactory conditions, and retest to demonstrate compliance; replace TVSS, conductors, units, and devices as required to bring system into compliance.
   2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
   3. Prepare a report that identifies switch, connection, conductors and devices checked and describes results. Include notation of deficiencies detected, remedial action taken, and observations and test results after remedial action.

Division 27
Communications

SECTION 27 11 00

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Telecommunications mounting elements.
2. Backboards.
3. Telecommunications equipment racks and cabinets.
4. Telecommunications service entrance pathways.
5. Grounding.

B. Related Sections:

1. Division 27 Section "Communications Backbone Cabling" for voice and data cabling associated with system panels and devices.
2. Division 28 Section "Conductors and Cables for Electronic Safety and Security" for voice and data cabling associated with system panels and devices.

1.3 DEFINITIONS

A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.

B. BICSI: Building Industry Consulting Service International.

C. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel not exceeding 12 inches (152 mm) in width.

D. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).

E. LAN: Local area network.

F. RCDD: Registered Communications Distribution Designer.

G. Solid-Bottom or Non-ventilated Cable Tray: A fabricated structure consisting of a bottom without ventilation openings within integral or separate longitudinal side rails.

H. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.

1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
2. Install cable trays to route cables if conduits cannot be located in these positions.
3. Secure conduits to backboard when entering room from overhead.
4. Extend conduits 3 inches (76 mm) above finished floor.
5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

C. Cable Support: NRTL labeled. Cable support brackets shall be designed to prevent degradation of cable performance and pinch points that could damage cable. Cable tie slots fasten cable ties to brackets.

1. Comply with NFPA 70 and UL 2043 for fire-resistant and low-smoke-producing characteristics.
2. Support brackets with cable tie slots for fastening cable ties to brackets.
3. Lacing bars, spools, J-hooks, and D-rings.
4. Straps and other devices.

D. Cable Trays:

B-line Cable Runway, part number SB-17-18-TG, with associated couplings and supports, shall be installed in the communications rooms as indicated on the CM5.00 series construction drawings. All cable raceway shall be securely fastened at a minimum height of 7'-0" and a maximum height of 7' 6".

E. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."

1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels specified in Division 06 Section "Rough Carpentry."

2.3 EQUIPMENT FRAMES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

Homaco - , 84" floor mount racks, part number 19-84-T2SD. Equip with wire management as indicated on the CM5.00 series construction drawing. Vertical wire management shall be part number VO-84-T6FTE, and horizontal wire management shall be part number HFM-19-2SRC or equivalent.

Systems." Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

B. See Division 27 Section "Communications Horizontal Cabling" for additional identification requirements. See Evaluations for discussion of TIA/EIA standard as it applies to this Section. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A. Labels shall be preprinted or computer-printed type.

END OF SECTION 27 11 00

SECTION 27 13 00

COMMUNICATIONS BACKBONE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Section Includes:
1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Pathways.
2. UTP cable.
3. Single mode optical fiber cabling.
4. Coaxial cable.
5. Cable connecting hardware, patch panels, and cross-connects.
6. Cabling identification products.

B. Related Sections:
1. Division 28 Section "Conductors and Cables for Electronic Safety and Security" for voice and data cabling associated with system panels and devices.

1.3 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

C. EMI: Electromagnetic interference.

D. IDC: Insulation displacement connector.

E. LAN: Local area network.

F. RCDD: Registered Communications Distribution Designer.

G. UTP: Unshielded twisted pair.

3) Patch cords.

12. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
13. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
    a. Vertical and horizontal offsets and transitions.
    b. Clearances for access above and to side of cable trays.
    c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
    d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

B. Construction
1. Submit a Microsoft Project timeline to include, but not limited to, the following milestones.
2. Material order to date.
3. Material receipt to date.
4. Project start date (by phase if required).
5. Weekly status report, to be submitted each Friday, of Work progress until Project is complete. Status reports should be submitted as follows:
    a. General Contractor Representative
    b. Karl Surdyke, Senior Telecommunications Engineer, HCA Design and Construction, One Park Plaza, Nashville, TN 37203.
6. Invoices should be submitted to, and as directed by, the Contractor.
7. As built Drawings showing outlet labeling and voice riser labeling from the IDF to the MDF. Outlets should be numbered with a scheme that is consistent with the numbering scheme currently in use at the hospital. These Drawings must be provided to the PBX equipment vendor for set installation and station cross connections. The Contractor shall meet with the equipment vendor to establish an equipment installation schedule.

C. Final
1. The following submittals must be submitted and approved prior to final billing and payment. They should be submitted within thirty days of completion of the Project.
2. Certification of level of performance as evidenced by comprehensive test results for fiber riser, copper riser and UTP horizontal cabling as specified in this document. Electronic test results should be submitted to the HDIS.
3. Record Drawings with as-built information and finalized versions of the shop Drawings. Numbered outlets in each room shall be shown on these Drawings using a numbering scheme consistent with the current numbering scheme in use at the hospital. This numbering scheme shall be approved by the HDIS. These submittals shall be on the base plan as provided by the Architect or Owner. These submittals shall be four copies in reproducible print form and one in electronic format (AutoCAD or DXF file). One copy of these Drawings shall be provided to the PBX vendor, as required in paragraph 1.B.4, and the remaining copies submitted to the HDIS.
4. Manufacturer's system certification supporting the product warranty. It is the Contractor's responsibility to arrange a job inspection by a Belden/CDT representative who is authorized to approve the cabling system 25-year warranty. Contractor shall contact Mr. Scott Fencik, 678-450-8090, HCA's Belden/CDT representative, to arrange this inspection.

1. Cable Support: NRTL labeled for support of Category 5e/6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
2. Cable support devices used above ceilings outside the communications room shall be provided by the Contractor. Cable support devices in the communication rooms, D rings or J hooks, shall be provided by the Contractor.

B. Cable Trays:
1. B-line Cable Runway, part number SB-17-18-TG, with associated couplings and supports, shall be installed in the communications rooms as indicated on construction Drawing. All cable raceway shall be securely fastened at a minimum height of 7 feet and a maximum height of 7' 6".

C. Conduit and Boxes:

D. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems
1. Backboards
   a. Backboards: Plywood, fire-retarded, 3/4 by 48 by 96 inches. Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.

E. UTP Cable
1. Belden/CDT 24 AWG CMR CAT 3 riser cable. CMP shall be substituted if required by local code.

2. UTP Cable Hardware

   a. Riser cable shall be terminated on Belden/CDT 300 pair 110-type hardware equipped with C5 modules, part number AX100696.
   b. Wire management rings shall be mounted vertically and horizontally between columns of blocks to provide management of cross-connect wire.
   c. Blocks shall be oriented with backbone terminations located on the left and horizontal terminations located on the right of the termination field when facing the frame assembly.
   d. Cables will be terminated in numerical order starting with the smallest number.

2.2 OPTICAL FIBER CABLE

A. Belden/CDT Single Mode Fiber Optic cable
1. The optical fiber shall be single mode 900 um core/cladding diameter.
2. The cable must be Optical Fiber Nonconductive Riser (OFNR) rated or as required by local code.
3. The optical fiber must be FDDI and ATM compliant and conform to all relevant ANSI and EIA/TIA standards.

B. Optical Fiber Cable Hardware
1. Optical fiber connectors shall be field installable Belden/CDT LC connectors or as requested by the HDIS.

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
   1. Install plenum cable in environmental air spaces, including plenum ceilings.
   2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
      a. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
      b. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF PATHWAYS

A. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings." Drawings indicate general arrangement of pathways and fittings.
   1. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
   2. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wire ways.
   3. Pathway Installation in Communications Equipment Rooms:
      a. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
      b. Install cable trays to route cables if conduits cannot be located in these positions.
      c. Secure conduits to backboard when entering room from overhead.
      d. Extend conduits 3 inches above finished floor.
      e. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
   4. Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.3 INSTALLATION OF CABLES

A. Comply with NECA 1.
   1. General Requirements for Cabling:
      a. Comply with TIA/EIA-568-B.1.
      b. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
      c. Install 110-style IDC termination hardware unless otherwise indicated.
      d. Terminate all conductors; no cable shall contain un-terminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.

a) Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches.
b) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
c) Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches.

3) Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
a) Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches.
b) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
c) Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches.

4) Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
a) Electrical Equipment Rating Less Than 2 kVA: No requirement.
b) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
c) Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
d) Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
e) Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.4 FIRESTOPPING

A. Comply with requirements in Division 07 Section "Penetration Fire-stopping. "Comply with TIA/EIA-569-A, Annex A, "Firestopping."

B. Comply with BICSI TDMM, "Firestopping Systems" Article.

C. Comply with EZ-Path firestop systems installation guidelines.

3.5 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with ANSI-J-STD-607-A.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

c. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA 606-A, for the following:
   1) Cables use flexible vinyl or polyester that flexes as cables are bent.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.
   1. Tests and Inspections:
      a. Visually inspect UTP and optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
      b. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
      c. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
      d. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
   2. Optical Fiber Cable Tests:
      a. All fiber links will be tested with an optical power meter and light source.
      b. Tests will be made at 1310 and 1550 nm windows in both directions.
      c. All fiber optic links shall be tested for loss in dB/km. The maximum acceptable link loss shall be the expected loss due to cable attenuation at the wavelength being measured plus 0.5 dB per connector.
      d. A hard copy of the display screen shall be provided for each link.
      e. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
      f. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
      g. End-to-end cabling will be considered defective if it does not pass tests and inspections.
      h. Prepare test and inspection reports.

END OF SECTION 27 13 00

SECTION 27 52 13

PATIENT MONITORING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes providing or installing, as indicated, the following items as part of the Patient Monitoring System:
   1. Pulling Patient Monitoring System cable.
   2. Patient Monitoring Systems cable. Refer to CM0.00 for cable type and – CM2 series drawings for device locations.

B. Products provided under other contracts:
   1. Patient Monitoring equipment, provided by Owner.

C. Related Sections:
   1. Sections 27 05 00
   2. Sections 27 11 00
   3. Sections 27 15 00
   4. Through-Penetration Fires-top Systems, for sealing of penetrations through smoke and fire rated partitions.
   5. Basic Electrical Requirements.
   6. Supporting Devices and Hangers.

1.2 Submittals

A. Submittals shall be in accordance with Sections 27 05 00, Sections 27 11 00, Section 27 15 00.

1.3 WORK INCLUDED

A. Placement of all Patient Monitoring equipment cable in accordance with Division 270 requirements.

B. All Work specified in this section shall comply with the provisions of Division 260.

C. Contractor to receive, store and protect all equipment and cable.

PART 2 - PRODUCTS

2.1 MATERIALS

1. Systems cable. Refer to CM0.00 for cable type and – CM2 series drawings for device locations.

SECTION 27 52 23

NURSE CALL AND CODE BLUE SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes providing or installing, as indicated, the following items as part of the Nurse Call and Code Blue System:
   1. Pulling Nurse Call and Code Blue System cable.
   2. Nurse Call and Code Blue system cable. Refer to CM0.00/CM 3 series drawings for cable type and CM 3 series drawings for device locations.

B. Products provided under other contracts:

   1. Nurse Call and Code Blue System equipment, provided by Owner.

C. Related Sections:
   1. Sections 27 05 00
   2. Sections 27 11 00
   3. Sections 27 15 00
   4. Through-Penetration Fire-stop Systems, for sealing of penetrations through smoke and fire rated partitions: Division 07
   5. Basic Electrical Requirements.
   6. Supporting Devices and Hangers.

1.2 SUBMITTALS

A. Submittals shall be as specified in Divisions 27 05 00, 27 11 00 and 27 15 00.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. The Nurse Call vendor, under contract with the Owner, will furnish system equipment, power unit cabinets, special back boxes.

2.2 MATERIALS

A. Provide system cabling as shown on CM0.00 and CM 3 series drawings for devices as shown on the CM 3 series drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. All system cable to be installed as shown on CM0.00 and CM 3 series drawings for cable type and CM 3 series drawings for cable/device locations.

SECTION 27 60 00

IN-BUILDING RADIO COVERAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. In-building radio coverage system for 800 MHz frequency range for wireless voice communications.

1.2 DEFINITIONS

A. BDA: Bi-Directional Amplifier

B. FCC: Federal Communications Commission

C. MHz: Megahertz

D. NRTL: Nationally Recognized Testing Laboratory

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design an In-Building Radio Coverage System for both the new portion of work and the existing building for entire building coverage, including comprehensive analysis by a certified company, using performance requirements and design criteria indicated and as required by the City of Aurora, Colorado 2003 International Building Code Amendments.
1. When building is enclosed and prior to ceilings being installed measure existing signal strength of the city's 800 MHz control channel. If signal strength is less than -88 dbm at the innermost point of the building, an in-building system will be required.
2. If building does not meet the -88 dbm requirements, design and provide a radio coverage system. A radiating cable system or internal multiple antenna system (with or without bi-directional 800 MHz amplifiers) is acceptable in order to achieve the required in-building radio coverage.
3. If system is not required based on initial measurements final field test are still required and if at that time the signal strength of -88 dbm or less is measured an in-building radio coverage system will be required to meet city requirements prior to the city issuing a certificate of occupancy.

B. Installed equipment must be FCC type accepted and in compliance with FCC rules and regulations.

1.4 ALTERNATES

A. Provide separate line-item pricing for In-Building Radio Coverage System per Division 01 requirements for each of the following areas:

Erie, CO 80202
Contact: Curtis Nations
Phone: (303) 280-3090

2. Wide Band Communications
8200 S Akron St # 111
Centennial, CO 80112-3505
Contact: Mark Sexton
Phone: (303) 806-8102
3. Legacy Communications
11211 E Arapahoe Rd # 120
Centennial, CO 80112-3851
Contact: Mike Hunzinker
Phone: (303)799-3933
4. Pericle Communications
1910 Vindicator Dr
Colorado Springs, CO 80919-3623
Phone: (719)548-1040
5. Triple C Communications
7076 South Alton Way
Suite A , Centennial, CO 80112
Phone: 303 850-9000
Contact Gabrielle Sharkey

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store equipment indoors in clean dry space with uniform temperature to prevent condensation. Protect equipment from exposure to dirt, fumes, water, corrosive substances, and physical damage.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install products until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. Andrew Corporation
2. TESSCO Technologies Incorporated

B. Provide an independent battery system for a minimum of twelve (12) hours without external power input.

2.2 PATHWAYS

transmitted from the nearest Aurora public safety radio communications system site.

D. Correct Deficiencies, Retest and Report:
   1. After initial review, correct unsatisfactory conditions and retest to demonstrate compliance.
   2. Revise and Resubmit report multiple times as necessary to demonstrate compliance with requirements.
   3. Prior to issuance of a certificate of occupancy, a final acceptance test must be completed to ensure adequate in-building radio coverage per City of Aurora requirements.

E. Prepare test and inspection reports.

END OF SECTION 27 60 00

Division 28

Electronic Safety and Security

SECTION 28 13 00

ACCESS CONTROL SYSTEM

1 GENERAL

1.1 WORK INCLUDED

A. All work specified in this section shall comply with the provisions of Section 26 01 00.

B. The work includes furnishing all labor, materials, tools, equipment, and documentation required for a complete access control system.

1.2 SUBMITTALS

A. The contractor shall submit all items in accordance with the requirements of Division Submittals and shall include but not be limited to the following:

1. Manufacturer's catalog data sheets for all components

2. Input power requirements for all components

3. Complete vendor specific engineered drawings indicating:
4.
   a. Manufacturer model numbers and specifications
   b. Dimensions, layouts, installation details
   c. Point-to-point wiring diagrams for all devices
   d. Termination details for all devices
   e. Single-line system drawings representing the entire system
   f. Interfaces with all sub-systems, if any

5. Six (6) sets of the Manufacturer's User's Manuals and Installation Manuals.

6. Course outlines for each of the end user training programs. The course outlines shall include the course duration, location, pre-requisites, and a brief description of the subject matter.

1. Access Control
2. Alarm Monitoring.
3. Video Badging.
4. Annunciation and CCTV control and viewing.

2.3 COMPUTER SYSTEM HARDWARE

A. File Servers shall be an industry-standard new computer and meet appropriate minimum specifications. As computer capabilities are subject to constant revision, specifications will be made available upon request.

B. Workstations shall be an industry-standard new computer and meet appropriate minimum specification. As computer capabilities are subject to constant revision, specifications will be made available upon request.

C. The system File Server and Workstations shall be interconnected via an industry-standard Ethernet Local/Wide Area Network (LAN/WAN), utilizing either 10baseT twisted pair, 10base2-thinnet, 10Base5-thicknet or 10BaseF-fiber optics and TCP/IP protocol.

D. System shall be supplied with two (2) PC's and associated software. One PC shall be installed at the security office for monitoring and maintenance purposed. The second PC shall be installed in the Human Resources Department. This PC will be utilized for the issuance of cards.

2.4 INTEGRATION TO OWNER SUPPLIED EQUIPMENT

A. The system supplied shall be able to interface to the hospital supplied time and attendance system. It shall provide the ability to utilize a single passive proximity card for both the access control system and the hospital supplied time and attendance system.

B. The system supplied shall be able to interface with the infant abduction system. The infant abduction system will be a microprocessor-based system utilizing RF signaling as a means of transmitting a warning signal from the transponder (worn by the infant) to the receiving equipment.

C. The access control vendor shall install proximity readers in lieu of the keypads normally supplied by the infant abduction system vendor. These readers will be part of the access control system, but will provide signaling to the infant abduction system

C. REPORT MANAGER

1. All historical log data will be stored in the database system on the server machine. Multiple volumes can be created to provide users with the ability to segregate their historical log information.
2. The system shall allow users to generate reports of standard database tables (i.e. Cardholder lists, device lists, etc.).
3. The system Report Manager shall support a FAX print driver. The report manager shall be able to set a destination as a FAX print driver that will print the report out to a file in a FAX format.
4. The system shall allow a user to modify a 'default' report and shall then prompt the user to save the modifications as a different named report.
5. When generating a report through the Report Manager, the system shall allow the operator to override the default sorting order stored in the report definition through the user interface.
6. Custom reports shall be modifiable, and shall be able to be used as defaults for creating new Custom Reports.
7. All report headings shall contain the date and time the report was run. It shall also include the operator who was logged in when the report was run.
8. Whenever a point name or cardholder is printed on the report, the report shall accommodate the maximum width of the name (user defined).
9. All hardware reports shall list the hardware hierarchy of each point. These reports shall show the controller, module connection point and address for each point.
10. Each report shall have three potential destinations. The destinations are File, Printer/Fax, and Screen (User defined Workstation or Server).
11. The system shall allow the operator to modify the sort criteria, either by adding criteria, removing criteria, or reordering the criteria.
12. The ESS shall allow the operator to modify the report, either by adding fields, removing fields, or reordering the fields.

D. INPUT / OUTPUT LINKING

1. The ESS shall allow the definition of automatic linkage between input points and output points. The system shall allow each input point to be defined to automatically activate a single or group of outputs without operator intervention. Controllers shall be able to communicate on a peer-to-peer basis so that Input to Output linking within a loop of controllers shall not require host intervention. The ESS shall provide a means for reviewing input to linking relationships without leaving the configuration application.

H. ELEVATOR CONTROL

1. The system shall store the following information for each elevator controlled by the system:

   a. Name of the elevator
   b. Name of the controller
   c. Name of the reader
   d. Name of each accessible floor
   e. List of available accessible floors for each system access level

I. EVENT / ALARM MANAGEMENT

1. The ESS shall provide status of system activity based on the current configurations of the ESS when the trigger point has been activated.
2. The ESS shall allow each window panel of the Event/Alarm Display Screen to be restricted from operator viewing based on password authorization.
3. The ESS shall provide Event Icons to assist operators in the immediate understanding of system activity.
4. The ESS shall provide for the custom definition and display of alarm specific action messages to supply the operator with detailed alarm response information when an alarm condition is generated.
5. The ESS shall display the alarm priority color in the action message windows for additional visual recognition of the alarm priority.
6. The ESS shall allow the user to associate a color with a given event. This color will be used in the Event/Alarm display screen application when displaying the text of the event.
7. The ESS shall allow any output point or CCTV video alarm within the ESS network to be activated based on an alarm condition.
8. The ESS shall allow each output point or video alarm to be optionally reset when the alarm condition is reset.
9. Each video alarm shall represent a combination of cameras and monitors automatically activated when the alarm condition is active.
10. The ESS shall allow each output point or video alarm to require an operator to manually reset it from the ESS workstation.
11. The ESS shall support break through alarm annunciation that causes alarms above a user selectable priority threshold to take display priority of the monitor and automatically present the alarm annunciation screen display.

3. Dial up communications between the host computer and remote ISCs shall be supported using dedicated (POTS) voice grade telephone lines and / or dedicated powered loop leased lines.

2.7 PERIPHERAL EQUIPMENT

A. CARD READERS

1. PROXIMITY TYPE - At the doors indicated on the plans, provide proximity type card readers that require that the access control card be held in close proximity from the card reader for the card to be read. Insertion of or swiping of the card through the card reader is not acceptable. The encoded data from the access card shall be sent to the card reader controller for processing. The card reader shall provide both audible and visual indication of a properly read card. The LED shall provide a different flash rate when a visitor escort or second cardholder is required for access. The card reader output shall utilize the standard Wiegand output protocol and feature a re-present mode to prevent multiple reads from a single card presentation. The reader housing shall be constructed of polycarbonate material, suitable for mounting on a single gang electrical box. The card reader shall be fully weatherized and shall have an operating temperature of -22°F to 150°F (-30°C to 65°C) and shall have an operating range of 5 to 95% relative humidity, non-condensing.

2. PROXIMITY TYPE MULLION MOUNT - At the doors indicated on the plans, provide proximity type card readers that require only that the access control card be held in close proximity from the card reader for the card to be read. Insertion of or swiping of the card through the card reader is not acceptable. The encoded data from the access card shall be sent to the card reader controller for processing. The card reader shall provide both audible and visual indication of a properly read card. The LED shall provide a different flash rate when a visitor escort or second cardholder is required for access. The card reader output shall utilize the standard Wiegand output protocol and feature a re-present mode to prevent multiple reads from a single card presentation. The reader housing shall be constructed of polycarbonate material, suitable for mounting on a doorframe or mullion. The card reader shall be fully weatherized and shall have an operating temperature of -22°F to 150°F (-30°C to 65°C) and shall have an operating range of 5 to 95% relative humidity, non-condensing.

C. DOOR POSITION SWITCH

1. SURFACE MOUNTED - Provide hermetically sealed surface mount door position switches at all doors where door position switch cannot be concealed. The contact shall be rated for 10 million cycles and shall not exceed a gap tolerance +/- 20%.

2. CONCEALED - Provide hermetically sealed concealed mount door position switches at all doors with access control. The contact shall be rated for 10 million cycles and shall not exceed a gap tolerance +/- 20%.

D. PIR MOTION SENSOR

1. Provide a Passive Infrared (PIR) motion sensor as shown on the drawings. The Passive Infrared Motion Detector shall utilize adaptive signal processing with gliding focus mirror optics to analyze the size, speed and shape to determine the alarm threshold. The unit shall be configurable for up to seven different patterns, have a range of 34 feet and a 90-degree view. The unit shall wire directly to the same intelligent device loop as the intelligent fire detection and control where permitted by the authority having jurisdiction. The unit shall not require power from an external source. The unit addressing shall be electronic, jumpers or DIP switches shall not be considered as equivalent to electronic addressing. Removing the cover shall automatically activate the tamper switch and put the unit in the alignment mode. The unit shall be constructed of thermoplastic housing with integral (removable) cover and integral tamper switch.

E. ELECTRONIC DOOR STRIKE

1. Provide a heavy duty electric strikes at the doors indicated on the plans. The strike shall contain an internal electrically operated solenoid mechanism having field selectable 12/24VDC operating voltage, and feature built in transient voltage suppression. The strike shall provide 20 lbs. resistance to side load pressure and be designed to accommodate cylindrical or non-deadbolt mortise locksets. The strike shall have a stainless steel housing, and provide horizontal adjustments. The strike shall be UL listed for A Label fire-rated openings and for burglary.

2.9 BADGE PRINTER

A. A color dye sublimation badge printer shall be provided as the output device from the video badging software. The printer shall contain current Windows® software drivers capable of communicating to Windows® ME, 2000, and XP operating systems.

B. A color resin thermal transfer badge printer shall be provided as the output device from the video badging software. . The printer shall contain current Windows® software drivers capable of communicating to Windows® ME, 2000, or XP operating systems.

C. The printer shall be capable of printing on two card sides.

3 EXECUTION

3.1 COORDINATION

A. Intent:

1. These sections of specifications and drawings form a complete set of documents for the electrical work of this project. Neither is complete without the other. Any item mentioned in one shall be as binding as though mentioned in both.

2. The intent of these specifications and drawings is to form a guide for a complete electrical installation. Where an item is reasonably necessary for a complete system but not specifically mentioned, such as pull boxes, fittings, expansion fittings, support hangers, etc., provide same without additional cost to Owner.

3. Electrical layouts indicated on drawings are diagrammatical only. Exact location of outlets to be governed by project conditions. The Designer reserves the right to make any reasonable changes (approximately 6 feet) in location of junction boxes, or equipment prior to roughing-in of such without additional cost to Owner.

3.3 TESTING AND COMMISSIONING

A. The ESS supplier shall be responsible for final system hardware hook-up and checkout prior to commissioning the system to the end-user. The ESS supplier shall furnish documentation of commissioning to the Contractor and the Designer.

3.4 TRAINING AND INSTRUCTION

A. The access control system provider shall customize a training program to be implemented at the customer site. Training period shall be 3 working days.

3.5 PROGRAMMING SERVICES

A. Additional programming services shall be available from the system supplier's representatives in the following areas:

1. Database/data importation
2. Customized system programming
3. Operational programming
4. Custom report design / development generation
5. Custom video badge design
6. Graphical map design/development and test

3.6 WARRANTY

A. The system Software shall be warranted for a period of 90 days from date of delivery.

B. The product (as distinguished from Software) shall be warranted to be free from defects in material and workmanship under normal use for a period one year from the date of first beneficial of all or any part of the product or 12 months after product shipment, whichever is earlier.

C. Designer reserves right to accept or reject any part of installation which does not successfully meet requirements as set out in these specifications.

SECTION 28 35 00

REFRIGERANT DETECTION AND ALARM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes refrigerant monitors, notification appliances, and SCBA.

1.2 DEFINITIONS

A. PIR: Photoacoustic infrared.

B. SCBA: Self-contained breathing apparatus.

1.3 SUBMITTALS

A. Product Data:
   1. For each type of refrigerant monitor, include refrigerant sensing range in ppm, temperature and humidity range, alarm outputs, display range, furnished specialties, installation requirements, and electric power requirement.
   2. For SCBA, include mounting details, service requirements, and compliance with authorized Federal agency.

B. Shop Drawings:
   1. Air-Sampling Tubing: Size, routing, and termination including elevation above finished floor.
   2. Wiring Diagrams: Power, signal, and control wiring.

C. Coordination Drawings: Include machinery-room layout showing location of monitoring devices and air-sampling tubing with filter/inlet locations in relation to refrigerant equipment.

D. Product Certificates: For monitoring devices and SCBA, signed by product manufacturer.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For refrigerant monitoring equipment and SCBA to include in emergency, operation, and maintenance manuals.

1.4 COORDINATION

A. Coordinate refrigerant detection and alarm system with refrigerant contained in refrigeration equipment for compatibility.

7. Site Elevation: Maximum 0 feet.

E. Input/Output Features:
1. Maximum Power Input: 120-V ac, 60 Hz, 75 W.
2. Number of Air-Sampling Points: Eight.
3. Air-Sampling Point Inlet Filter: 0.10-micron filter element for each sampling point.
4. Air-Sampling Point Analog Output: 0- to 10-V dc into 2k ohms, or 4- to 20-mA into 1k ohms matched to sensor output.
5. Alarm Relays: Minimum 4 relays at a minimum of 5-A resistive load each.
6. Alarm Set Points: Displayed and adjustable through keypad on front of meter.
7. Alarm Silence Switch: Mount in the front panel of the monitor to stop audible and visual notification appliances, but alarm LED remains illuminated.
8. Alarm Manual Reset: Momentary-contact push button in the front panel of the monitor stops audible and visual notification appliances, extinguishes alarm LED, and returns monitor to detection mode at current detection levels.
9. Display: Alphanumeric LCD, LED indicating lights for each detection level; acknowledge switch and test switch mounted on front panel; alarm status LEDs and service fault/trouble LEDs.
10. Audible Output: Minimum 75 dB at 10 feet (3 m).
11. Visible Output: Strobe light.
12. Sensor Analog Output: 0- to 10-V dc into 2k ohms, or 4- to 20-mA into 1k ohms.
13. Serial Output: RS-232 or RS-485 compatible with HVAC controls.
14. Enclosure: NEMA 250, Type 1, with locking quarter-turn latch and key.

2.2 MONITOR ALARM SEQUENCE

A. Detection Level 1: Notify HVAC control workstation of detection in the refrigeration equipment room on a rise or fall of refrigerant concentration to this level. Start ventilation system at low speed to allow occupancy by maintenance technicians to identify leaks. Cycle blue strobe lights.

B. Detection Level 2: Notify the HVAC control workstation of the detection in the refrigeration equipment room on a rise or fall of refrigerant concentration to this level. Run ventilation system at high speed on a rise in concentration to this level, and change to low speed on a reduction in concentration below this level. Operate the ventilation system at high speed for a minimum of five minutes. Cycle amber strobe lights.

C. Detection Level 3: Notify the HVAC control workstation of the detection in the refrigeration equipment room on a rise or fall of refrigerant concentration to this level. Sound alarm horns and cycle red strobe lights inside and outside refrigeration equipment room. Terminate operation of any combustion-process equipment located in the refrigeration equipment room. Provide manual reset for this detection level.

flame-resistant material, reinforced with stainless-steel cable, and attached with T-nuts, washers, and screws.

G. Air Cylinder, Regulator, and Pressure Gages: 45-minute, low-pressure 2216-psig (15.3-MPa), carbon-fiber composite, fiberglass composite, or all-aluminum cylinders fitted with quick-fill assembly for refilling and air transfer. Two-stage regulator, and gage with end of service time whistle signal.

H. Wall-Mounted Case: Watertight, high visibility orange or yellow, corrosion-resistant, tough, lockable plastic case.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with ASHRAE 15.

B. Install air-sampling inlets, or diffusion type monitors in pits, tunnels, or trenches in machinery room that are accessible to personnel.

C. Floor mount diffusion-type monitor, sensor/transmitters, or air-sampling inlets on slotted channel frame 12 to 18 inches (300 to 450 mm) above the floor in a location near the refrigerant source or between the refrigerant source and the ventilation duct inlet.

D. Wall mount air-sampling multiple-point monitors with top of unit 60 inches (1525 mm) above finished floor.

E. Run air-sampling tubing from monitor to air-sampling point, in size as required by monitor manufacturer. Install tubing with maximum unsupported length of 36 inches (915 mm), for tubing exposed to view. Terminate air-sampling tubing at sampling point with filter recommended by monitor manufacturer.

F. Install air-sampling tubing with sufficient slack and flexible connections to allow for vibration of tubing and movement of equipment.

G. Purge air-sampling tubing with dry, oil-free compressed air before connecting to monitor.

H. Number-code or color-code air-sampling tubing for future identification and service of air-sampling multiple-point monitors.

I. Extend air-sampling tubing from exhaust part of multiple-point monitors to outside.

J. Extend air-sampling tubing from outdoors to outdoor inlet connection of NDIR monitors. Terminate air-sampling tubing at outdoor inlet location with filter recommended by monitor manufacturer.

K. Install warning signs, labels, and nameplates to identify detection devices and SCBA according to Division 23 Section "Identification for HVAC Piping and Equipment."

Division 31
Earthwork

SECTION 31 1000

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided, to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Protecting existing trees, shrubs, plants, and other vegetation to remain or as designated by Owner in pre-construction conference.
2. Removing existing trees, shrubs, plants, and other vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities.
7. Removing existing fill.

B. Related Sections include the following:

1. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.
2. Division 31 Section "Temporary Erosion and Sedimentation Control" for storm water erosion and sediment mitigation.

1.3 DEFINITIONS

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil or other materials indicated to be stockpiled or to remain on Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving," (PART 2 – PRODUCTS).

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks, survey control points, monuments, property line pins and other reference points from disturbance during construction. If disturbed or destroyed, restore or replace at no cost to Owner.

B. Provide erosion control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust from leaving project site.

C. Locate and clearly flag trees and vegetation to remain or to be relocated.

D. Protect existing site improvements to remain from damage during construction.

1. Restore or replace damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

A. Erect and maintain temporary fencing around drip line of individual trees or around perimeter drip line of groups of trees to remain before starting site clearing. Remove fence when construction is complete.

1. Do not store construction materials, debris, or excavated material within fenced area.
2. Do not permit vehicles, equipment, or foot traffic within fenced area.
3. Maintain fenced area free of weeds and trash.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

1. Cover exposed roots with burlap and water regularly.
2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
3. Coat cut faces of roots more than 1-1/2 inches (38 mm) in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.

2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
3. Grind stumps and completely remove roots, obstructions, and debris extending to a depth of 18 inches (450 mm) below exposed subgrade.
4. Use only hand methods for grubbing within drip line of remaining trees.
5. Chip removed tree branches and stockpile in areas approved by Owner's Representative.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or Earth Moving is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered or as determined by Geotechnical Engineer in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm) unless authorized by Owner's Representative.
2. Do not stockpile topsoil within drip line of remaining trees.
3. Dispose of excess topsoil as specified for waste material disposal.
4. Stockpile surplus topsoil to allow for respreading a thicker layer of topsoil.

3.6 SITE IMPROVEMENTS

A. Remove existing above and below grade improvements as indicated and as necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated on plans.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

SECTION 31 2000

EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided, to this Section.

B. Additional information concerning Earth Moving may be found on the civil drawings, in the project geotechnical report and City of Aurora construction standards. In case of conflict between the drawings, jurisdictional criteria and the information specified herein, the more stringent requirements shall govern.

C. Additional information concerning Earth Moving may be found in the geotechnical investigation report by Kleinfelder dated April 17, 2000. All requirements of this report shall be followed. The information shown in this report is for information and it shall be the contractors responsibility to field verify conditions indicated.

1.2 SUMMARY

A. This Section includes the following:

1. Preparing and grading subgrades for slabs-on-grade, walks, pavements, lawns and grasses, and exterior plants.
2. Excavating and backfilling for buildings and structures including overexcavation of existing unsatisfactory on-site soil materials and replacement with structural fill.
3. Drainage course for slabs-on-grade.
4. Subsurface drainage backfill for walls and trenches.

B. Related Sections include the following:

1. Division 31 Section "Site Clearing" site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 22 Section "Trenching" for excavating and backfilling of utilities.
3. Division 31 Section "Temporary Erosion and Sedimentation Control" for erosion and sedimentation control measures.

C. Permits and Fees: Obtain and pay for all permits and fees required for the work of this section, including erosion and sediment control and water quality permits required by the City of Aurora and the Colorado Department of Public Health and Environment, Water Quality Control Division.

L. Underslab Gravel: Imported Class 6 road base per Colorado Department of Transportation Standard Specifications for Road and Bridge Construction (1999) or material approved by Geotechnical Engineer.

M. Rock Excavation: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. (0.76 cu. m) for Bulk Excavation or 3/4 cu. yd. (0.57 cu. m) for footing, trench, and pit excavation which in the Geotechnical Engineer's opinion cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- (1065-mm-) wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp (103-kW) flywheel power with bucket-curling force of not less than 28,090 lbf (125 kN) and stick-crowd force of not less than 18,650 lbf (83 kN); measured according to SAE J-1179.
2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp (157-kW) flywheel power and developing a minimum of 48,510-lbf (216-kN) breakout force with a general-purpose bare bucket; measured according to SAE J-732.

N. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

O. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

P. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

Q. Utilities: Include on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Material Test Reports: Provided by Owner from a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

B. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be

with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

A. Existing Utilities: Locations, sizes and depths or invert elevations of existing utilities as shown on the drawings are based on information provided by others, and believed to be correct, but may not be absolutely so. Such information is therefore presented only as approximations, and should be verified prior to construction. Protect from damage any sewer, water, gas, electric, phone or other pipe lines or conduits uncovered during the work until they have been examined by the Owner's Representative. If such lines are found to be abandoned and not in use, remove affected sections without extra cost. If such lines are found to be in use, carefully protect and carry on work around them. If Owner' Representative deems it advisable to move such lines, Owner will pay cost of moving. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Owner's Representative and then only after arranging to provide temporary utility services according to requirements indicated.

1. Contact utility-locator service for area where project is located before excavating.
2. Notify Owner's Representative not less than two days in advance of proposed utility interruptions.
3. Do not proceed with utility interruptions without Owner's Representative's written permission.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.

C. Remove all existing fill deemed by Geotechnical Engineer to be unsatisfactorily placed.

D. Existing Contours and Elevations: Contours and spot elevations of existing ground elevations at the site, and approximate elevations of finish grade cuts, fills, and excavations for the Work are shown on Drawings. Contours and elevations for existing ground lines are based on information provided by others, and are believed to be correct, but may not be absolutely so. Existing contours and elevations should therefore be considered approximate, and should be verified at the site prior to construction.

E. Verification of Existing Conditions: Visit the site prior to submission of bids. Verify existing conditions, elevations, and contours. In the event of discrepancies between existing conditions and those indicated on the Contract Documents or survey, contact the Owner's Representative for clarification.

F. Existing Benchmarks: Carefully preserve and maintain existing benchmarks, monuments, property line pins, and other reference points. If disturbed or destroyed, restore or replace by a Professional Land Surveyor at no additional cost to Owner.

2.2 GEOTEXTILES

A. Subsurface Drainage and Separation Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288. Utilize Mirafi 140N or as recommended by Geotechnical Engineer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by Earth Moving operations.

B. Preparation of subgrade for Earth Moving operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Temporary Erosion and Sediment Control," during Earth Moving operations. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties and rights-of-way.

D. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

E. Cold Weather Work: Prevent frost from entering bearing stratus upon which construction will take place or in areas where fill will be placed in that season.

3.2 DEWATERING

A. Prevent surface water and subsurface ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
3. Obtain and comply with all provisions of the Colorado Department of Public Health and Environment, Water Quality Control Division, Construction Dewatering Permit.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.

    a. Intermittent drilling; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

C. Stability:

1. Slope sides of excavations in compliance with OSHA requirements and local codes or ordinances. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
2. Continuously monitor cut slopes for distress. Take all necessary precautions to safeguard workers, structures, and utilities.
3. Provide all necessary shoring, sheeting, or bracing of sides of excavations required to prevent caving, erosion, and gullying. Provide underpinning of existing structures or other improvements adjacent to excavations which are subject to damage.

D. Unanticipated Conditions: Notify the Owner's Representative immediately upon finding evidence of previous structures or filled materials which penetrate below designated excavation levels, groundwater or water-bearing strata, or other conditions which are not shown or which cannot be reasonably assumed from existing surveys and geotechnical reports. Secure the Owner's Representative instruction before proceeding with further work in such areas.

E. Rock Excavation: Includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction. Rock excavation in unconfined areas is defined as removal and disposal of material which in the Geotechnical Engineer's opinion, cannot be excavated without continuous and systematic drilling and blasting, or continuous use of a suitable ripper or other special equipment.

1. Unanticipated Rock Excavation: Rock excavation that is not indicated on existing surveys or which cannot be reasonably assumed from geotechnical studies of the site and which could not have been anticipated without extensive investigations. Unanticipated rock excavation shall be subject to change order procedures or previously agreed upon unit prices.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10-foot. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner's Representative, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner's Representative, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Geotechnical Engineer. If approved by Geotechnical Engineer, structural fill placed at 100 percent ASTM D698, 2 percent below to 1 percent above optimum moisture may be used.

1. Fill unauthorized excavations under other construction or utility pipe as directed by Owner's Representative.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials in approved locations without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
8. Acceptance of subgrade by Geotechnical Engineer.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under exterior flatwork, slabs, steps, and pavements, scarify and recompact top 8 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Underfootings and interior floor slabs, excavate to approved natural soils, in fill condition, compact to 95 percent.
3. Under lawn or unpaved areas, scarify and recompact top 8 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 90 percent.
4. Compact foundation wall backfill to 95 percent.
5. Compact scarified subgrade soils to 95 percent.
6. Compact retaining wall backfill to 95 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Lawn or Unpaved Areas: Plus or minus 0.10 feet .
2. Walks: Plus or minus 0.10 feet.
3. Pavements: Plus or minus 0.10 feet.
4. Grading inside Building Lines: Finish subgrade to a tolerance of ½-inch (13 mm) when tested with a 10-foot (3-m) straightedge.

3.17 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent Earth Moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification

SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavating for footings and slabs-on-grade.

1.2 RELATED SECTIONS

A. Document: Geotechnical report; bore hole locations and findings of subsurface materials.

1.3 UNIT PRICES

A. See Section 01 22 00 - Unit Prices, for general requirements applicable to unit prices for excavation.

1.4 PROJECT CONDITIONS

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Protect plants, lawns, rock outcroppings, and other features to remain.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

3.2 EXCAVATING

A. Underpin adjacent structures which may be damaged by excavating work.

B. Excavate to accommodate new structures in accordance with the geotechnical report entitled "Geotechnical Exploration for Solara Addition LTAC and Wound Center" prepared by Quality Testing, Inc. and dated July 26, 2005.

C. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.

D. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.

E. Do not interfere with 45 degree bearing splay of foundations.

F. Cut utility trenches wide enough to allow inspection of installed utilities.

G. Hand trim excavations. Remove loose matter.

H. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section Geotechnical Report.

SECTION 31 2333

TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided, to this Section.

B. Additional information concerning trenching and backfilling may be found on the civil drawings, in the project geotechnical study/report and City of Aurora construction standards. In case of conflict between the drawings, jurisdictional criteria and the information specified herein, the more stringent requirements shall govern.

C. Additional information concerning Earth Moving may be found in the geotechnical investigation report by Kleinfelder dated April 17, 2000. All requirements of this report shall be followed unless noted otherwise. The information shown in this report is for information and it shall be the contractors responsibility to field verify conditions indicated.

1.2 SUMMARY

A. This Section includes the following:

1. Subsurface drainage backfill for walls and trenches.
2. Excavating and backfilling for utility trenches.
3. Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried utility structures.
4. Excavating and backfilling trenches within building lines.

B. Related Sections include the following:

1. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 31 Section "Earth Moving" for soil materials, site excavating, filling and grading.
3. Division 31 Section "Temporary Erosion and Sedimentation Control" for erosion and sediment control.
4. Divisions 22, and 26 Sections for installing underground plumbing and electrical utilities and buried mechanical and electrical structures, if available.
5. Division 33 Section "Storm Drainage" for storm sewer system installation.

C. Shoring Design: Provide the services of a professional engineer to design all shoring, bracing, and underpinning required to protect the safety of workers and integrity of adjacent existing structures or other improvements.

2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp (157-kW) flywheel power and developing a minimum of 48,510-lbf (216-kN) breakout force with a general-purpose bare bucket; measured according to SAE J-732.

J. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

L. Utilities: Includes on-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Each type of plastic warning tape.

B. Samples: Contractor to submit representative samples of all materials proposed for use in bedding and trench backfilling operations to the testing and inspections agency for analysis and determination of compliance with the requirements specified herein.

C. Material Test Reports: Provided by Owner from a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

D. Pre-Excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by Earth Moving operations. Submit before Earth Moving begins.

1.5 QUALITY ASSURANCE

A. Testing Agency:

1. All testing and inspections required herein will be performed by an independent testing and inspection agency employed by the Owner.
2. Notify the testing and inspection agency not less than 48 hours in advance of all work requiring testing or inspection services.

to the Owner. Any structures damaged by settlement shall be restored to their original condition by the Contractor, at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Utility Trench Bedding Materials:

1. Agency Requirements: Bedding requirements shall be in accordance with jurisdiction having control over utility.

B. Utility Trench Backfill Materials:

1. Existing soils obtained from trench excavations, including granular or aggregate base course from removed pavements, broken and pulverized claystone or claystone-sandstone bedrock may be used for backfilling trenches, provided it meets any special requirements of the Utility Agency and Geotechnical Engineer. Bedrock must be processed and broken or pulverized so that the maximum particle or fragment size does not exceed three-inches (3").

C. Unsuitable Utility Trench Materials: Materials unsuitable for bedding and backfilling include highly organic soils, ASTM D2487 Group PT topsoil, and soils containing roots, vegetable matter, trash, and debris.

2.2 ACCESSORIES

A. Shoring and Bracing: Provide all materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good and serviceable condition, as required for safety and by governing authorities.

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green OR Dark Gray: Sewer systems.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work of this Section will be performed. Do not proceed with the work until unsatis-

F. Protect subgrades and trench bottoms soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

G. Cold Weather Work: Prevent frost from entering bearing strata upon which construction will taken place or in areas where fill will be placed in that season.

3.3 DEWATERING

A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations and to collection or runoff areas. Establish and maintain temporary drainage ditches and diversions away from trench excavations. Do not use trench excavations as temporary drainage ditches.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.
2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
3. Obtain and comply with all provisions of the Colorado Department of Public Health and Environment, Water Quality Control Division, Construction Dewatering Permit.

3.4 SHORING AND BRACING

A. Provide shoring and bracing of excavations as required for safety and by governing authorities. Carry down shoring and bracing as excavation progresses. Maintain shoring and bracing in excavations regardless of time period excavations will be open.

3.5 PAVEMENT REMOVAL AND REPLACEMENT

A. Where trenches or other utility excavations are made in existing paved areas, saw-cut pavement surface to create a clean break line. Cut pavement a minimum of 12" beyond trench width on each side of trench; remove and dispose of existing surface course and aggregate base course, leaving a 12" wide undisturbed subgrade lip on each side of trench.

B. After trench has been backfilled and compacted, place new pavement in accordance with applicable requirements of Division 32 Sections as applicable, for Asphaltic or Portland cement concrete pavement and in accordance with Authorities having jurisdiction.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials in approved locations without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 UTILITY TRENCH BACKFILL

A. After installation of utility piping or lines have been completed, locations recorded, trash or other debris removed from excavations, and bedding placed and approved, backfill promptly as work and weather conditions permit. Do not backfill trenches until all required pipe system tests and inspections have been made, unless partial backfilling is required to restrain pipe under test pressures. Use care in backfilling to avoid damage or displacement of pipe systems.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

D. Place backfill materials in layers not more than 8" in loose depth for material compacted by heavy compaction equipment, and not more than 4" in loose depth for material compacted by hand operated tampers. Use hand held tools or compacting devices for trench backfill, until a minimum compacted thickness of 3'-0" above top of pipe is achieved. Mechanical or power compactors may be used thereafter.

E. Before compaction, moisten or aerate each layer of backfill to specifications.

F. Compact each layer to not less than 95% of maximum standard Proctor density (ASTM D698). Thoroughly compact by means of mechanical tampers areas which cannot be properly compacted by means of rolling equipment.

G. Backfill to subgrade elevation shown for finish grading, topsoil placement, or paving.

H. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the utility pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

I. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

3.13 CLEANING AND ADJUSTMENT:

A. Reconditioning Compacted Areas: When completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and recompact to required density prior to further construction.

B. Cleanup: Remove excess materials not required for backfilling purposes, including excess spoil material, accumulated debris, and rubbish from site. Burning of waste material is prohibited.

3.14 RESTORATION:

A. Adjacent Improvements: Restore all fences, irrigation ditches, yards, lawns, and other structures or surfaces to condition equal to or better than before work began.

3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

END OF SECTION 31 2333

SECTION 31 2500

TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided, to this Section.

B. Additional information concerning temporary erosion and sedimentation control may be found on the civil drawings and City of Aurora construction standards. In case of conflict between the drawings, jurisdictional criteria and the information specified herein, the more stringent requirements shall govern.

C. Additional information concerning erosion may be found in the geotechnical investigation report by Kleinfelder dated April 17, 2000. All requirements of this report shall be followed unless stated otherwise.

1.2 SUMMARY

A. Work Included. Furnish, install, maintain, and remove temporary erosion and sedimentation controls as shown on the drawings or specified herein, or as required to complete the work.

B. Related Sections include the following:

1. Division 31 Section "Site Clearing" site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 31 Section "Earth Moving" for soil materials, site excavating, filling and grading.
3. Division 22 Section "Trenching" for excavating and backfilling of utilities.

C. Permits and Fees: Obtain and pay for all permits and fees required for the work of this section, including erosion and sediment control and water quality permits required by the authority having jurisdiction and the Colorado Department of Public Health and Environment, Water Quality Control Division.

D. Erosion Control: The Erosion and Sedimentation Control Drawings included in the Contract Documents is the minimum requirement to be implemented. Provide additional control as necessary to meet applicable local and State criteria.

1.3 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

Permits are to be filed with the Colorado Department of Public Health and Environment, Water Quality Control Division.

3. Contractor shall have the Storm Water Management Plan (SWMP) and report available on-site at all times.

1.5 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with applicable local, State and Federal ordinances, rules and regulations concerning sedimentation control and storm water runoff.

B. In case of conflict between the above codes, regulations, references and standards and these specifications, the more stringent requirements shall govern.

C. Preconstruction Conference: Conduct conference at Project site as directed by Owner's Representative prior to start of construction. Contractor to comply with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

1.6 PROJECT/SITE CONDITIONS

A. Existing Conditions: Verify all existing conditions affecting the work of this section prior to submitting bids or proposals. Additional compensation will not be allowed for revisions or modification of work resulting from failure to verify existing conditions.

1.7 WARRANTY

A. Temporary Erosion and Sediment Control measures shall be maintained until permanent measures are in place. All damaged, disturbed or devices filled with sediment, which may occur within the specified project warranty period, shall be corrected at no cost to the Owner. Any devices damaged by erosion or sediment shall be restored to their original condition by the Contractor, at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Erosion and Sedimentation Control Materials: Provide one or more of the following materials, as shown on the plans or as applicable for site conditions:

1. Sand bags.
2. Silt fences.
3. Rock riprap.
4. Temporary seeding.
5. Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh.

2. Roads and parking areas indicated to be paved may be covered with an appropriate aggregate base course in lieu of mulch. Temporary mulching or aggregate base course is not required if final pavement construction will take place within 30 days after grading to final contours.
3. Soils that will be stockpiled for more than 30 days must be mulched and seeded within 14 days after stockpile construction.
4. Prevent sediment from leaving the project site by installing a silt fence or other BMPs as indicated on the plans. Protect existing storm inlets adjacent to the site by an approved gravel filter.
5. Excavate the future detention/water quality pond and construct the outlet structure/storm sewer such that the pond may function as a temporary sediment basin during development of the site. Construct the sediment basin in accordance with authority having jurisdiction's criteria. Provide temporary swales to convey site runoff to the pond.
6. Locate stone stabilization pads at all points of vehicular ingress and egress to the construction site.
7. Provide temporary erosion controls consisting of berms at the top of slopes and interceptor ditches at ends of berms and at those locations which will eliminate or minimize erosion during construction, along with temporary seeding, temporary diversion, chutes, and down pipes and lining of water courses.
8. Temporary sedimentation controls shall consist of silt dams, traps, silt fence, barriers, and appurtenances at the top of spoil and borrow area slopes and where runoff water exits the site.
9. Maintain the available silt holding capacity of silt dams, fence traps and barriers until no longer needed. The sediment capacity of sediment retainage areas shall be at a minimum, the capacity shown on the plans in conformance with Urban Drainage Criteria Manual, Volume 3. Prior to removal, obtain concurrence of the Owner and Engineer.
10. Remove accumulated sediment and debris from a BMP when the sediment level reaches one-half the height of the BMP, or at any time the sediment or debris adversely impacts the functioning of the BMP.
11. Remove hay bales which have deteriorated and filter stone or cloth which has become dislodged. Place new hay bales and new filter and fence.
12. The erosion/sediment control plan shows the minimum required for the project. If it becomes apparent that additional controls are necessary, the Engineer shall be notified and with approval of the Owner's Representative additional controls shall be installed.

B. Chemicals and Pollutants:

1. Store construction materials and chemicals that could contribute pollutants to the runoff within an enclosure, container, or dike located around the perimeter of the storage area, to prevent discharge of these materials into runoff from the construction site.
2. Locate areas used for collection and temporary storage of solid and liquid waste away from the storm drainage system. Provide covering or fencing as required to prevent windblown materials; construct perimeter dike to contain liquid runoff. These measures may not be necessary if materials are immediately placed in covered waste containers.
3. Perform equipment maintenance in designated areas using measures such as drip pans to control petroleum products spillage.

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SECTION 31 31 16

TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following for termite control:
   1. Soil treatment.

1.2 DEFINITIONS

A. EPA: Environmental Protection Agency.

B. PCO: Pest control operator.

1.3 SUBMITTALS

A. Product Data: Treatments and application instructions, including EPA-Registered Label.

B. Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.

C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:
   1. Date and time of application.
   2. Moisture content of soil before application.
   3. Brand name and manufacturer of termiticide.
   4. Quantity of undiluted termiticide used.
   5. Dilutions, methods, volumes, and rates of application used.
   6. Areas of application.
   7. Water source for application.

E. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: A PCO who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located and who is experienced and has completed termite control treatment similar to that indicated for this Project and whose work has a record of successful in-service performance.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate. Remove extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.

C. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.

1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers, piers, and chimney bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.

SECTION 31 63 29

DRILLED CONCRETE PIERS AND SHAFTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Machine drilled shaft and rock sockets.

B. Concrete and reinforcement.

C. Shaft liner, if required.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete: Requirements for concrete.

1.3 UNIT PRICES - MEASUREMENT AND PAYMENT

A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

B. Designed Piers:
   1. Design Pier Quantity: Determined by the quantity of piers indicated in the Contract Documents.
   2. Design Pier Length: By the linear foot (meter) measured from bearing to top of pier elevation as indicated.
   3. Pier Casings: By the linear foot (meter).
   4. Pier Reinforcement: By the linear foot (meter) of full pier.

C. Actual Piers:
   1. Actual Pier Quantity: Determined by quantity of piers identified in the Project Record Documents.
   2. Actual Pier Length: Determined by length of piers identified in Project Record Documents.
      a. Base measurement on total linear measurement of piling from bearing to top of pier, except for test piers calculated at 5 feet (1.5 m) longer.

D. Adjustments to the Contract Sum/Price will be made if the Actual Pier Quantity or Length differs from Design Pier Quantity or Length, based on unit prices established in the Agreement and as follows:

E. Determination of Unit Measurements: Identified by site measurements and verified by Geotechnical Engineer.

1.4 REFERENCES

A. ACI 336.1 - Standard Specification for the Construction of Drilled Piers; American Concrete Institute International; 2001.

B. ASTM A 252 - Standard Specification for Welded and Seamless Steel Pipe Piles; 1998 (Reapproved 2002).

C. Project Geotechnical Report - The General Contractor shall obtain a copy of the report and follow all recommendations.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Project Record Documents: Record actual locations of piers, pier diameter, and pier

H. Progressively raise shaft liner during concrete placement. Do not permit top of pier to deform to a mushroom shape due to premature removal of liner.

I. Extend reinforcement for connection of caps.

J. Set tops of piles to elevations indicated.

3.3 TOLERANCES

A. Install piers with maximum variation from location, plumbness, bottom area, diameter, and anchorage locations as specified in ACI 336.1.

B. Maximum Variation From Vertical: 1 in 48.

C. Maximum Variation From Design Top Elevation: Plus 3 inches (75 mm), minus 1 inch (25 mm).

D. Maximum Out-of-Position: 2 inches (50 mm).

3.4 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 40 00.

3.5 UNACCEPTABLE PIERS

A. Unacceptable Piers: Piers that fail, are placed out of position, are below elevations, or are damaged.

B. Provide additional piers or replace piers failing to conform to specified requirements.

END OF SECTION

Division 32
Exterior Improvements

SECTION 32 1216

ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided to this Section.

B. Additional information concerning asphalt paving may be found on the civil drawings, in the project geotechnical report and City of Aurora construction standards. In case of conflict between the drawings, jurisdictional criteria and the information specified herein, the more stringent requirements shall govern.

C. Additional information concerning asphalt paving may be found in the geotechnical investigation report by Kleinfelder dated April 17, 2000. All requirements of this report shall be followed unless noted otherwise. The information shown in this report is for information and it shall be the contractors responsibility to field verify conditions indicated.

1.2 SUMMARY

A. This Section includes the following:

1. Asphalt paving.
2. Asphalt patching.
3. Asphalt paving overlay.
4. Asphalt surface treatments.
5. Cold milling of existing hot-mix asphalt pavement.

B. Related Sections include the following:

1. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling and site grading.
2. Division 32 Section "Pavement Markings" for pavement striping and symbols.

C. References:

1. City of Aurora Standard Specifications for Design and Construction, latest edition.
2. Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, current edition and all appropriate standard special provisions.

1.3 DEFINITIONS

A. Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

D. Preconstruction Conference: Conduct conference at Project site as directed by Owner's Representative. Contractor to comply with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp or if the following conditions are not met:

1. Tack Coats: Minimum surface or air temperature in the shade of 60 deg F (15 deg C).
2. Slurry Coat: Comply with weather limitations of ASTM D 3910.
3. Asphalt Base Course: Minimum surface or air temperature in the shade of 40 deg F and rising at time of placement.
4. Asphalt Surface Course: Minimum surface or air temperature in the shade of 50 deg F and rising at time of placement.

B. Coordination and Scheduling:

1. Cooperate with other trades and arrange scheduling to avoid damage to other work, including grading, site utilities and piping, exterior concrete, landscaping and irrigation systems.
2. Before commencing pavement operations, ascertain that utility lines, site lighting and wiring, piping, curb and gutter work, general grading and heavy trucking is complete so that such operations will not damage paving work.
3. Mask off and protect exposed building surfaces and abutting concrete from damage or staining by tack coat and paving operations.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use materials and gradations that have performed satisfactorily in previous installations meeting the requirements of the CDOT Specifications.

B. Asphalt Concrete Aggregate: Clean, hard, durable particles of crushed stone, crushed slag, crushed gravel, or natural gravel conforming to the requirements of Subsection 703.04 of the CDOT Specifications, Item 703.04, Grading SX and S (Table 703-3).

C. Mineral Filler: Rock dust, slag dust, hydrated lime, hydraulic cement, or other suitable mineral material conforming to the requirements of Subsection 703.06 of the CDOT Specifications. Item 703.06.

2.2 ASPHALT MATERIALS

A. Asphalt Cement: The asphalt cement to be used on this project shall be PG 64-22 conforming to the requirements of Subsection 702.01 of the CDOT Specifications.

4. Repair or replace curbs, manholes, and other construction damaged during cold milling.
5. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
6. Transport milled hot-mix asphalt to asphalt recycling facility.
7. Keep milled pavement surface free of loose material and dust.

3.3 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches (300 mm) into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, Asphalt Paving at a rate of 0.05 to 0.2 gal./sq. yd. (0.2 to 0.8 L/sq. m).

1. Allow tack coat to cure undisturbed before applying Asphalt Paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.4 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch (6 mm).

1. Clean cracks and joints in existing hot-mix asphalt pavement.
2. Use emulsified-asphalt slurry to seal cracks and joints less than ¼ inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.
3. Use hot-applied joint sealant to seal cracks and joints more than ¼ inch (6 mm) wide. Fill flush with surface of existing pavement and remove excess.

3.5 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Place paving in consecutive strips not less than 10 feet (3 m) wide unless infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.

C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 JOINTS

A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat to joints.
2. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150mm).
3. Offset transverse joints, in successive courses, 6 to 12 inches (150-300 mm).
4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements."
5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.9 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. When paving surface temperature falls below 185 deg F (85 deg C) no further compaction effort will be permitted unless approved.

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density in accordance with Subsection 401.17 of the CDOT Specifications.

1. Pavement shall be compacted to a density of 92% to 96% of the maximum theoretical density, determined according to Colorado

C. Provide temporary closures over openings until completion of rolling operations. Remove closures at completion of work.

3.12 ASPHALT CURBS

A. Construct hot-mix asphalt curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust. Spread mix at minimum temperature of 250 deg F (121 deg C).

1. Asphalt Mix: Same as pavement surface-course mix.

B. Place hot-mix asphalt to curb cross section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

3.13 SURFACE TREATMENTS

A. Fog Seals: Apply fog seal at a rate of 0.10 to 0.15 gal./sq. yd. (0.45 to 0.7 L/sq. m) to existing asphalt pavement and allow to cure. With a fine sand, lightly dust areas receiving excess fog seal.

B. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.

1. Roll slurry seal to remove ridges and provide a uniform, smooth surface.

3.14 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.

SECTION 32 1313

CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided to this Section.

1.2 SUMMARY

A. This Section includes constructing exterior cement concrete pavement on prepared subgrade or base course in accordance with these specifications. This work shall be in conformity with the lines, grades, thicknesses and typical cross-sections shown on the plans for the following:

1. Driveways and roadways.
2. Parking lots.
3. Curbs and gutters.
4. Sidewalks, steps, ramps.
5. Base material for unit paver.
6. Dumpster and loading dock pads.
7. As detailed on the plans.

B. Related Sections include the following:

1. Divisions 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
2. Division 32 Section "Pavement Markings" for pavement striping and symbols.
3. Division 32 Section "Pavement Joint Sealants" for expansion and contraction joints.

1.3 REFERENCES

A. City of Aurora Standard Specifications for Design and Construction, latest edition.

B. Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, current edition.

1.4 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, expansive hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume.

and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94/C 94 M requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mix Concrete Association's (NRMCA) Plant Certification Program.

C. Testing Agency Qualifications: An independent agency qualified according to ASTM C1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

E. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by the requirements of the Contract Documents.

F. Concrete Testing Service: The Owner will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Preconstruction Conference: Conduct conference at project site as directed by Owner's Representative prior to start of construction. Contractor to comply with requirements, which may also be included in Division 1 Section "Project Management and Coordination."

H. Regulatory Requirements:

I. Comply with City of Aurora standards for sidewalks, curbs, ramps, gutters, and driveway approaches or aprons, including standard dimensions, profiles, thicknesses, reinforcing, and compressive strength. In the event of conflict between the Contract Documents and the standards, the more stringent requirements will apply.

1. Comply with applicable requirements of ADA Handbook, ANSI A117.1, and local and State codes and ordinances regarding walks, steps, ramps and curb ramps.

1.7 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

C. Joint Dowel Bars: Plain steel bars, CDOT Section 709 and ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.

D. Tie Bars: CDOT Section 709 and ASTM A 615/A 615M, Grade 60, deformed.

E. Supports for Reinforcement: Chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.4 EXPANSION JOINT FILLER

A. Sealed Joints: Preformed, compressible fiber or cork filler material complying with ASTM D1751 or D1752, Type II, guaranteed compatible with expansion joint sealant materials, ½" thick unless otherwise indicated. Provide high-impact polystyrene removable "void cap" to create ½" deep reveal for installation of sealant.

B. Self-Sealing Joints: Preformed, compressible asphalt fiber joint filler complying with ASTM D994, ½" thick unless otherwise indicated. Do not use asphalt fiber filler in joints to receive elastomeric joint sealants.

2.5 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: CDOT Section 701 and ASTM C 150, Type II, gray.

   a. Fly Ash: ASTM C 618, Class F.
   b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: CDOT Section 703 and ASTM C 33, coarse aggregate, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Do not use fine or coarse aggregates containing substances that cause spalling.

C. Water: CDOT Section 712 and ASTM C 94/C 94M potable.

1. Compressive Strength (28 Days): 4,000 psi (27.6 MPa.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
3. Slump Limit: 4 inches (100 mm).
4. Minimum 594 lb. Cement per cubic yard.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 4.0 to 7.0 percent.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing admixture, plasticizing and retarding admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals as follows:

1. Fly Ash or Pozzolan: 20 percent CDOT Section 601.05.
2. Ground Granulated Blast-Furnace Slag: 50 percent.
3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 20 percent.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 15 tons.

Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
2. Contractor to provide plan of joint placement for the Engineers approval.
3. The distance between joints shall not exceed in feet, twice the pavement thickness in inches. (i.e.: 6" PCC pavement to utilize maximum 12-foot joint spacing.)

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour, unless pavement terminates at expansion joints.

1. Contractor may utilize preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
2. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
3. Provide tie bars at sides of pavement strips where indicated.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

C. Expansion Joints: Form expansion joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints in pavement where indicated on plans.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler no less than 1/2 inch or no more than 1 inch below finished surface for joint sealant.
4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
5. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to the indicated radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
3. Tied Contraction Joints: Install deformed bars and support assemblies at joints where indicated.

maximum 5-foot intervals. Tool edges to rounded profile and finish as noted herein or shown on the drawings. Contractor may utilize sawed contraction joints. Pitch walks ¼" per foot for drainage unless otherwise indicated.

N. Ramps: Construct ramps similar to walks. Comply with applicable ADA Handbook, ANSI A117.1, and local and State codes, ordinances, and details including maximum allowable slope not to exceed 1 foot vertical in 12 foot horizontal, with maximum rise not to exceed 30" between level landings.

O. Steps: Minimum 6" thick at intersection of treads and risers, reinforced as indicated. Slope treads ¼" to nosing, and tool nosings to uniform ½" radius. Finish as specified below.

P. Paving: Minimum 6" thick unless otherwise indicated. Provide expansion joints as indicated on the drawings, and contraction joints at a minimum 12'-0" EWW. Place concrete paving over compacted subgrade as specified in Division 2 Section "Earth Moving". Provide minimum 1% slope for drainage unless otherwise indicated.

Q. Driveway Approaches: Minimum 6" thick, unless otherwise indicated or required by local public works standards or building codes. Construct to radius of flare indicated, and taper or warp into alignment with adjacent curbs, gutters, and walks. Place approaches over compacted subgrade as specified in Division 2 section "Earth Moving." Refer to drawing and details for any reinforcing requirements.

R. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

S. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

T. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

U. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:

1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.8 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.9 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. 5000 sq. ft. or fraction thereof of each concrete mix placed each day.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective, or does not meet requirements in this Section.

B. Drill test cores where directed by Owner's Representative when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 1313

SECTION 32 1363

PAVEMENT MARKINGS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the contract, including General and Supplementary Conditions, and Division 1 specification. Sections apply if provided, to this Section.

1.2 SUMMARY

A. This Section includes the following: Furnish and install all painted lines, directional arrows, handicapped symbols, or similar markings on paved surfaces, as shown on the drawings or specified herein, as required by jurisdiction having authority, and as required to complete the work.

B. Related Work:

1. Division 32 Section "Asphalt Paving" for materials, installation and minimum requirements.
2. Division 32 Section "Concrete Paving" for materials, installation and minimum requirements.

1.3 REFERENCES

A. Reference Standards: Comply with the requirements of the reference standards noted herein, except where more stringent requirements are described herein or otherwise required by the Contract Documents.

B. City of Aurora Standard Specifications for Design and Construction, latest edition.

C. Colorado Department of Transportation Standard Specifications for Road and Bridge Construction, current edition.

D. "Manual on Uniform Traffic Control Devices" latest edition.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's published descriptive literature and complete specifications for products specified herein.

1.5 QUALITY ASSURANCE

3.3 APPLICATION

A. Traffic Marking Paint: Unless otherwise indicated, apply traffic marking paint in nominal 4" wide stripes at the rate of 100 to 110 sf/gal.

B. Epoxy Pavement Markings: Heat individual components to a temperature of 27° to 60° C (80° to 140° F). Apply to a minimum thickness of 15 mills and with an application rate of 100 to 110 sf per gallon.

C. Patterns and Symbols:

1. Unless otherwise indicated, apply traffic markings in nominal 4" wide stripes with clear and sharp dimensions. See drawings for striping patterns, directional arrows and symbols.
2. Unless otherwise indicated, use yellow markings at lane striping and directional symbols, white markings at parking striping and white and blue markings at international handicapped symbols.
3. Comply with ANSI 117.1 and ADA requirements for graphic symbols, stall widths, and access aisles at handicapped parking spaces. Provide approved templates for symbols and directional arrows.

END OF SECTION 32 1363

SECTION 32 1373

CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if provided to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Expansion and contraction joints within cement concrete pavement.
2. Joints between cement concrete and buildings and structures.
3. Surface preparation including primers.
4. Joint backup material.

B. Related Sections include the following:

1. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

E. Warranty: As required by Division 1 – Warranty Section: Contractor agrees to repair or replace joint sealers (including labor, materials, and any necessary associated costs) which fail to perform as watertight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance or general durability; or appear to deteriorate in any other manner not clearly specified by submitted

2.2 HOT-APPLIED JOINT SEALANTS

A. Single-component formulation complying with ASTM D 3405 or D1190.

1. Refer to CDOT Standard Specification, Section 702.06 for hot-poured joint and crack sealant material requirements.
2. Refer to CDOT Standard Specification, Section 408.01-408.03 and 412.18 for joint and crack sealant installation requirements.

2.3 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from manufacturers recommendations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.

C. Where shown on drawings where depth of joint will not permit use of joint backing, or wherever recommended by sealant manufacturer, install bond-breaker tape to prevent three-sided adhesion.

D. Do not leave voids or gaps between ends of joint backing units.

3.6 APPLICATION/INSTALLATION OF JOINT SEALANT

A. Apply sealants neatly, in a good and workmanlike manner which meets following minimum requirements or standards. Specific instructions of manufacturer must also be followed.

B. Apply sealant using a gun with proper size nozzles. Use sufficient pressure to fill all voids and joints solid to backup material, with complete wetting of all joint bond surfaces.

C. Applied sealant shall form a full, smooth, uniform bead, free of ridges, wrinkles, sags, air pockets and embedded impurities.

D. After joint has been completely filled with sealant, neatly tool joint sealant to eliminate air pockets or voids, and to provide a smooth, slightly concave, neat appearing finish, with sealant surface slightly below adjoining surfaces. Wetting of finished surface with not be allowed.

E. Where horizontal joints are located between a horizontal surface and vertical surface, fill joint to form a slight cove, so joint will not trap moisture and dirt.

F. Protect adjacent surfaces and systems from sealant material. Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

G. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

H. Tooling of Non-Sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

I. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.

J. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

DOCUMENT 32 14 00

UNIT PAVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions and Division 1 Specification sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Truncated Domes.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 2 Section "Earthwork" for compacted subgrade under unit pavers.
2. Division 2 Section "Portland Cement Concrete Paving" for cast-in-place concrete paving, curbs and gutters serving as edge restraint for unit pavers.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

1. Product data for the following products:

a. Truncated dome pavers with integral color.

B. Samples for initial selection purposes in form of actual units or sections of units showing full range of colors, textures, and patterns available for each type of unit paver indicated.

C. Qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has successfully completed unit paver installations similar in material, design, and extent to that indicated for Project.

A. Provide materials and products that result in colors and textures of exposed unit paver surfaces complying with the following requirements:

1. Truncated Domes: River Red color, parquet pattern.

2.4 SETTING BED

A. Base Course: In accordance with Section 02232: Earthwork, as indicated on plans.

B. Sand: Sand setting and joint material shall be clean, sharp, washed concrete sand to conform to ASTM C33 with the following gradation:

Sieve Size	% Passing
3/8"	100
#4	95-100
#8	80-100
#16	50-85
#30	40-75
#50	10-30
#100	5-15
#200	0-10

2.5 FILTER FABRIC

A. Filter Fabric: Mirafi 140N, non-woven filter fabric, or approved equal, conforming to the following physical requirements:

1. Permeability Rating 10 times greater than that of soil.
2. Apparent Opening Size (AOS). Small enough to prevent passage of fines from setting bed into subgrade.

2.6 FABRICATION TOLERANCES

A. Concrete Unit Pavers:

1. Length and Width Dimension : $\pm$ 1/16".
2. Thickness Dimension: $\pm$ 1/8".

2.7 MISCELLANEOUS MATERIALS

A. Herbicide Treatment: Commercial chemical for weed control, registered by Environmental Protection Agency. Provide granular, liquid, or wettable powder form.

1. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

a. Ciba-Geigy Corp.
b. Dow Chemical U.S.A.
c. E.I. Du Pont de Nemours & Co., Inc.
d. FMC Corp.

Section "Cast-in-place Concrete."

2. Install manufacturer's edge restraints in areas not bordered by concrete according to the manufacturer's written instructions.

3.4 UNGROUTED MORTARLESS CONCRETE PAVER APPLICATIONS

A. Level subgrade to a tolerance of 1/4 inch in 2'-0" and 1/2 inch in 10'-0" from level or slope as indicated, for finished surface of paving.

B. Compact soil subgrade uniformly to at least 95 percent of ASTM D 1557 laboratory density.

C. Place sand for leveling course and screed to a thickness of 1 inch to 1-1/4 inch, taking care that moisture content remains constant and the density is loose and constant until concrete pavers are set and compacted.

D. Treat leveling base with soil sterilizer to prohibit growth of grass and weeds.

E. Set concrete pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have space bars, place pavers hand tight against space bars. Use string lines to keep straight lines. Fill gaps between units that exceed 3/8" with pieces cut to fit from full-size unit pavers.

F. Vibrate concrete pavers into leveling course with a low amplitude plate vibrator capable of a 3,500- to 5,000-pound compaction force at 80 to 90 H_z. Perform at least 3 passes across paving with vibrator. Vibrate under the following conditions:

1. After edge pavers are installed and there is a completed surface or before surface is exposed to rain.
2. Before ending each day's work, fully compact installed concrete pavers within 3 feet of the laying face. Cover the open layers with nonstaining plastic sheets overlapped 4 feet on each side of laying face to protect it from rain.

G. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Brush and vibrate sand until joints are completely filled, then remove surplus sand.

H. Do not allow traffic on installed concrete pavers until sand has been vibrated into joints.

I. Repeat joint filling process 30 days later.

3.5 REPAIR, CLEANING, AND PROTECTION

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units as intended. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment to eliminate evidence of replacement.

B. Provide final protection and maintain conditions in a manner acceptable to Installer, which ensures unit paver work being without damage or deterioration at time of final inspection.

END OF DOCUMENT 32 14 00

SECTION 32 17 14

CONCRETE PARKING BUMPERS

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents: General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and Drawings are applicable to this Section.

B. Section Includes:
   1. Precast concrete parking bumpers (wheel stops).

1.2 QUALITY ASSURANCE

A. Job Conditions
   1. Verify that concrete paving and pavement marking is completed and ready for installation of parking bumpers.
   2. Coordinate installation of concrete parking bumpers with pavement marking layout.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's literature and installation instructions in accordance with Section 01330.

B. Certificates: Submit manufacturer's certification that materials meet specification requirements.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE PARKING BUMPERS

A. Qualities: Precast concrete parking bumpers reinforced, and having 2 pre-drilled pin holes and having 2 cast-in anchor pins.
   1. Concrete: Normal weight concrete, minimum 4000 psi 28-day compressive strength.
   2. Reinforcing: 2 continuous No. 3 deformed reinforcement bars.
   3. Size: 8-1/2 inch wide by 6 inch high by 72 inch length.
   4. Anchor Pins: 5/8 inch deformed bar, 2 for each parking bumper, extending a minimum of 3 inches below bottom of parking bumper.

B. Standards
   1. Concrete: ASTM C 94.
   2. Reinforcing: ASTM A 615, Grade 40.

DOCUMENT 32 84 00

IRRIGATION SYSTEM

PART 1: GENERAL CONDITIONS

1.01 GENERAL STATEMENT

The specifications set forth herein pertain to the installation of an underground irrigation system.

Consultant refers to Owner's Representative

1.02 RELATED WORK SPECIFIED ELSEWHERE

Section 02480 - Planting, Sodding

Section 02440 -Earthwork

1.03 SCOPE OF WORK

A. The applicable provisions of the General Conditions and Supplementary Conditions of these specifications shall govern the work of this section as if it were written here in full.

B. This work shall consist of installing a complete underground irrigation system as shown on the drawings. The contractor shall include all labor, materials, permits, licenses, inspection tools, facilities, transportation and equipment necessary for the installation of a complete system according to the plans and specifications. No substitutions of material or the procedure shall be made concerning these documents without the written consent of an approved equal by the consultant. The work shall comply with the requirements of all legally constituted authorities having jurisdiction.

C. All work in this section shall be coordinated with all utilities and trades responsible for their installation.

D. Work called for on the drawings and details shall be furnished and installed whether or not specifically mentioned in the specifications.

1.04 QUALITY ASSURANCE

A. Irrigation Drawings: The irrigation drawings are essentially diagrammatic. Due to the scale of the drawings, all characteristics of the system (i.e., sleeving, fittings, etc.) may not be represented. The contractor shall carefully inspect the site and plan his work accordingly, supplying any materials and equipment necessary to install said characteristics.

The contractor shall notify the Town's Representative of any discrepancies between site dimensions, grade differences, obstructions, etc., and those on the drawings that might not have been known during preparation of irrigation drawings. If such written notifications are not made, contractor shall assume all expenses and responsibility for any revisions necessary.

Work called for on the Drawings by notes or on details shall be furnished and

2. Consultant reserves the right to reject any and all materials that have been installed but have not been approved.

3. Contractor may request an approved equal to a product specified on the plans. Contractor must submit cut sheets of the product seven (7) days prior to bid opening to the consultant. Consultant shall respond to the request within three (3) days of receiving product information.

4. Manufacturer's warranties shall not relieve the contractor of his liability for project guarantee. Such warranties shall only supplement the project guarantee.

B. Operating and Maintenance Manuals:

1. Contractor is to deliver to owner's representatives the following before final acceptance of the irrigation system:

a. Index sheet of Contractor's address and phone number.

b. List of materials and manufacturer's representatives with addresses and phone numbers.

c. Operating and maintenance instructions of all equipment with shutdown and start-up procedures for the irrigation system.

C. Additional Equipment:

1. Equipment to be furnished as part of this contract to the owner at the completion of the project before final acceptance of irrigation system:

a. Two (2) manual drain valve keys of appropriate length;
b. Two (2) gate valve or stop and waste valve keys of appropriate length;
c. Three (3) quick coupler keys and two (2) matching hose swivels;
d. Two (2) sets of special tools used for maintaining and adjusting each type of sprinkler head and valve supplied;
e. Two (2) keys for each automatic controller;
f. Two (2) sprinkler heads and nozzles for each type used.

D. As-Built Drawing:

1. Before final acceptance of the irrigation system, contractor shall supply owner with a reproducible Mylar As-Built Drawing. Drawing shall include dimensioned locations of all equipment and piping as listed in the irrigation schedule on the plans. Drawing to include dimensioned changes in location of sprinkler heads, zoning changes, connection to existing water lines, and any other items as requested. As-built drawings are to be updated weekly throughout the length of the project and to be made available to the consultant. The owner shall not approve any pay requests if the As-built Drawings are not current.

If requested by owner, consultant shall review submitted As-built Drawings and reject the drawings if they are not legible, etc., or do not contain the proper equipment.

1.06 PROTECTION OF PROPERTY AND SAFETY MEASURES

A. Property and Utilities:

A. Flushing:

All lines shall be thoroughly flushed to eliminate any foreign matter before sprinkler heads are installed.

B. Testing:

1. In the presence of the consultant, the contractor shall conduct a pressure test on the mainline pipe at a pressure of 100 PSI for a period of two (2) hours. Any leaks or breaks during the test shall be repaired and the mainline will be tested until accepted. All test equipment and pumps shall be supplied by the contractor as part of the contract.

2. The contractor is responsible for providing the proper amount of water on sod and plant material to establish and sustain optimum plant growth. The watering program is to be included on As-built drawings.

C. Coverage:

After the sprinkler heads have been installed, and before installation of sod, the contractor shall conduct a coverage test in the presence of the consultant to determine if irrigated areas are receiving the proper amount of water. As directed by the consultant, the contractor shall make adjustments for proper coverage at no additional expense. This shall include changing of nozzle patterns and degrees of arc. Contractor shall perform, at no additional expense, the required work to correct any coverage problems due to deviations from irrigation plans or to problems caused by installing according to plans when it is obvious that the plans are inadequate, without bringing it first to the attention of the consultant. No overspray is permitted on any structure.

Any areas which do not conform to the designed characteristics of the drawings and unauthorized changes or poor installation practices shall be repaired or replaced by the contractor at his expense.

1.09 PRELIMINARY INSPECTION

A. Preliminary inspection will occur after completion of entire irrigation system. Provide 48 hours notice to consultant for inspection.

B. Preliminary inspection will evaluate the performance, coverage, appearance and conformance of the system to that of the drawings. Contractor shall rework or replace items that do not meet the Town Representative's approval.

C. The Town Representative will provide punch list of items to be corrected.

D. Contractor will correct all punch list items at his expense.

1.10 FINAL INSPECTION

A. Upon completion of punch list items, contractor will give consultant 48 hours notice to set up final inspection. Final inspection will take place after all as-built drawings, controller charts and submittals have been provided to and accepted by the owner.

B. If, after inspection, the consultant determines that all work conforms to the drawings, he will issue a written notice of acceptance.

C. Final acceptance will not be given until all punch list items and subsequent new

B. P.V.C. Fittings:

All pipe fittings to be schedule 40 P.V.C. (ASTM D2466 and D1784) unless specifically noted otherwise. Solvent cement to conform to ASTM D2564.

C. Brass Pipe and Fittings:

1. Brass pipe shall be 85% red brass, (ANSI) Schedule 40.
2. Fittings shall be medium brass, 125 pound class, screwed type.

3. Use a dielectric union wherever a copper based metal (copper, brass, bronze) is connected to an iron based metal (iron, galvanized and stainless steel).

D. Copper Pipe:

Copper pipe shall have the requirements of Type K, ASTM B88. Fittings shall be copper or cast bronze. Silver solder shall be used for joints.

E. Sprinkler Heads:

Sprinkler heads shall be of the type and model as indicated on drawings.

F. Backflow Preventer:

Backflow preventer shall be of the type, model and size as indicated on drawings.

G. Automatic Control Valves:

Automatic control valves shall be of the make specified, designed to operate with the specified controller with size and model as listed on drawings. Control valve shall be normally closed type and shall have manual bleed nut and manual flow control.

H. Drip Valve Assemblies:

Drip valve assembly shall be of the type, size and style as indicated on the drawings. Strainer shall have 120 mesh nylon screen with 1/2" blow-out. Pressure reducing valve shall have manual adjusting nut.

I. Drip Emitters and Tubing:

Drip emitters shall be of the type, style and size as indicated on the drawings. Drip tubing shall conform to ASTM D1248 and ASTM D3350. Capillary tubing shall have 1/8" i.d.

J. Drip Line Blow Out Stubs:

Install drip line blow out stubs at all ends of drip tubing.

G. Quick Couplers:

Quick coupler valves shall be of the type, size and style as indicated on the drawings. Quick coupler valves shall be two piece with rubber locking cover.

L. Gate Valves:

Gate valves up to 2-1/2" and larger shall be brass with non-rising stem and I.P.S threads. Gate valves shall be as shown on drawings.

from inside of pipe. Provide for thermal expansion and contraction. For threaded connections, use sealants that are recommended by the manufacturer for use with plastic. Do not use oil based pipe joint compounds. Assemble threaded connections by tightening 1 to 1-1/2 turns beyond finger tight. Keep piping clear of dirt and pipe scale. Keep open ends of assembled piping capped. Teflon tape is to be used on all plastic threaded joints.

2. Solvent weld joints shall be made according to manufacturer's recommendations. Allow joints to set at least 24 hours before pressure is applied to the piping.

C. Backfilling:

1. All backfilling shall be done with approved soil, free of any debris including rock and debris 1" in diameter or larger, and shall be puddled and/or mechanically tamped to prevent settling. Backfilling shall not be done with frozen or caked soil. Excess debris encountered during backfill process shall be removed at the contractor's expense. Backfill shall be compacted to 95% standard proctor density (ASTM D698-78). Any backfill soil removed due to unsuitability shall be replaced with new, approved soil at the contractor's expense. Any settling during the warranty period of the backfill material shall be repaired at the contractor's expense, including any damage to other items affecting by the settling.

2. All lateral lines shall be installed in trenches with a minimum of 6" clearance.
3. Do not install lateral lines within 2' of lines of other trades.

D. Installation of Piping Under Paving:

Contractor to coordinate installation of sleeving with other applicable trades. All piping that is to be located under areas where asphalt or concrete paving is to be installed shall at an 18" depth below top of road base. Piping is to be encased in sand 4" on all sides. Add backfill in 6" lifts and use mechanical tamping to reach 95" standard proctor density.

Contractor is to match and install new paving and base with existing paving and base where cutting of paving is necessary for installation of piping. Contractor must obtain written approval from the consultant for the process.

Installation of piping under existing walks is to be done with jacking or boring. Any cracking or breaking of the walk is to be repaired at contractor's expense. Contractor shall repair or replace to its original condition any damage caused by settling of sleeving during the warranty period.

E. Sprinkler Heads:

All sprinkler heads located in turf areas shall be adjusted vertically to be flush with final finish grades. Install heads as per details with spacing according to plans. Install heads on double swing joint assemblies. Angle of nipples relative to lateral lines shall be no more than 45 degrees and no less than 15 degrees. Locate rotary sprinklers 6" (spray heads 3") away from walls, fences and paved areas. Under no circumstances shall the spacing exceed the maximum spacing recommended by the manufacturers.

Installation of control wires shall be strung as close as possible to the mainline with such wires to be located on one side of pipe. Wiring to be installed in separate trench if not along mainline. All underground electrical connections shall be made with King Tan Gel Filled Wire Nut, Spears Dri-Splice Wire Connectors or 3M Direct Bury Splice Kit. Any splices not within control valve boxes shall be installed in a Carson #910-12 valve box. The contractor shall leave a minimum loop of 24" at each control valve, each splice and every 100 feet of wiring. Wiring is to be bundled every 20 feet with one (1) control wire used for every control valve. Install two (2) spare #14-1 wires along complete entirety of mainline from controllers to farthest control valve on each and every branch of mainline. Color to be blue.

N. Drain Valves:

Manual drain valves shall be installed as per details. Contractor shall supply, locate and install drain valves so as to drain entire mainline.

END OF DOCUMENT 32 84 00

DOCUMENT 32 93 00

LANDSCAPE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes provisions for the following items:

1. Trees.
2. Shrubs
3. Plants.
4. Ground cover.
5. Lawns.
6. Soil amendments.
7. Initial maintenance of landscape materials.

B. Related Sections: The following sections contain requirements that relate to this Section.

1. Excavation, filling, and rough grading required to establish elevations shown on drawings is specified in Division 2 Section, "Earthwork."
2. Underground sprinkler system is specified in Division 2 Section, "Irrigation Work."

1.3 QUALITY ASSURANCE

A. Subcontract landscape work to a single firm specializing in landscape work.

B. Source Quality Control:

1. General: Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.
2. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability to Architect, together with proposal for use of equivalent material.
3. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.
4. Topsoil: Before delivery of topsoil, furnish Architect with written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during past 2 years.
5. Trees, Shrubs and Plants: Provide trees, shrubs, and plants of quantity, size, genus, species, and variety shown and scheduled for landscape work and

completion. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.

E. Maintenance Instructions: Typewritten instructions recommending procedures to be established by Owner for maintenance of landscape work for one full year. Submit prior to expiration of required maintenance period(s).

1.5 DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

B. Trees and Shrubs: Provide freshly dug trees and shrubs. Do not prune prior to delivery unless otherwise approved by Architect. Do not bend or bind-tie trees or shrubs in such manner as to damage bark, break branches, or destroy natural shape. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery.

C. Deliver trees and shrubs after preparations for planting have been completed and plant immediately. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by covering with mulch, burlap or other acceptable means of retaining moisture. No overnight storage of trees and shrubs shall be allowed. Plants shall be planted on delivery day.

D. Do not remove container-grown stock from containers until planting time.

1.6 JOB CONDITIONS

A. Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.

B. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Architect before planting.

1.7 SEQUENCING AND SCHEDULING

A. Planting Time: Proceed with, and complete landscape work as rapidly as portions of site become available, working within seasonal limitations for each kind of landscape work required.

1. Plant or install materials during normal planting seasons for each type of plant material required.
2. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

B. Coordination with Lawns: Plant trees and shrubs after final grades are established and prior to planting of lawns, unless otherwise acceptable to Architect. If planting of trees

1. Schedule irrigation system to prevent wilting, puddling, erosion, or displacement of seed or mulch.
2. Monitor the watering of the seeded areas to not over water or stress plant material. Replacement of stresses or dead plant material caused by the watering or establishing of the seeded areas shall be completed immediately, prior to the beginning of the warranty period at the Contractor's expense.
3. Water seeded areas at a sufficient rate to promote proper germination.

E. Mowing:

1. Blue Grama grass: Mow no shorter than 6" to maintain tall weed growth only. Allow grass clumps to spread.

F. Post-Germination Fertilization:

1. Apply fertilizer when appropriate after mowing and when grass is dry.
2. Use a slow release fertilizer that will provide actual nitrogen of at least ½ pound per 1000-sq. ft. (0.45 kg/92.9 sq. m) at a frequency to quickly and properly promote seed establishment.

1.10 SPECIAL PROJECT WARRANTY

A. Warranty trees, shrubs and lawns, for a period of one year after date of substantial completion, against defects including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents which are beyond Landscape Installer's control.

B. Remove and replace trees, shrubs, or other plants found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period. Replace trees and shrubs which are in doubtful condition at end of warranty period; unless, in opinion of Architect, it is advisable to extend warranty period for a full growing season.

1. Another warranty inspection will be conducted at end of extended warranty period, if any, to determine acceptance or rejection. Only one replacement (per tree, shrub or plant) will be required at end of warranty period, except for losses or replacements due to failure to comply with specified requirements.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Preserve and stockpile all on-site topsoil.

B. Topsoil for landscape work may not be available at site and must be furnished and as specified.

C. Provide new topsoil that is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 2 inches in any dimension, and other extraneous or toxic matter harmful to plant growth.

C. Deciduous Shrubs: Provide shrubs of the height shown or listed and with not less than minimum number of canes required by ANSI Z60.1 for type and height of shrub required.

1. Provide container grown deciduous shrubs.

D. Coniferous and Broadleafed Evergreens: Provide evergreens of sizes shown or listed. Dimensions indicate minimum spread for spreading and semi-spreading type evergreens and height for other types. Provide normal quality evergreens with well balanced form complying with requirements for other size relationships to the primary dimension shown.

1. Provide balled and burlapped (B&B) evergreen trees.
2. Provide container grown evergreen shrubs.

2.5 GRASS MATERIALS

A. Sod: Provide strongly rooted sod, not less than 2 years old, free of weeds and undesirable native grasses, and machine cut to pad thickness of 3/4 inch (plus or minus 1/4 inch), excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).

1. Provide sod of uniform pad sizes with maximum 5 percent deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10 percent of pad will be rejected.

2. Provide sod composed principally of following:

a. Bluegrass/Fescue Blend

B. Detention Pond/Native Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed mixture composed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

1. Provide "PBSI Low Grow Mix" by Pawnee Buttes Seed, Inc; or approved alternate.

C. Blue Grama Grass Seed: Provide fresh, clean, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide seed mixture composed of grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

1. Provide "Hachita Blue Grama" (supplied by Western Native Seed, Pawnee Buttes, Wind River Seed.; or approved alternate).

2.6 GROUND COVER

3.1 PREPARATION - GENERAL

A. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations and outline areas and secure Architect's acceptance before start of planting work. Make minor adjustments as may be required.

3.2 PREPARATION OF PLANTING SOIL

A. Before mixing, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth.

B. Mix specified soil amendments and fertilizers with topsoil at rates specified. Delay mixing of fertilizer if planting will not follow placing of planting soil within a few days. Till soil amendments and fertilizers to a depth of 12 inches.

C. For pit and trench type backfill, mix planting soil prior to backfilling, and stockpile at site.

D. For Planting beds, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

3.3 PREPARATION OF SEEDED AREAS

A. Herbicide Treatment for Seeded Areas:

1. Herbicide Treatment: To be performed over the entire areas to be seeded. Allow sufficient time to successfully complete the entire Herbicide Treatment process before continuing with the seed installation.

    a. Herbicide treatment must be completed during the growing season.
    b. Water surface ½" per week for two weeks prior to application in natural precipitation does not supply this amount to encourage weed seed germination.
    c. Treat site with "Round-Up" herbicide in accordance with manufacturer's recommendations. Schedule the "Round-Up" application when the probability of forecasted rainfall is minimal for the next 48 hours.
    d. Two days after application, water surface ½" per week if natural precipitation does not supply this amount to encourage weed seed germination.
    e. Ten (10) days after the first "Round-Up" application, review surface for evidence of plant growth.
    f. Repeat steps b, c, d, and e, as many times as necessary until there is no evidence of plant growth after a 10-day period.
    g. Obtain Architect's approval of surface conditions fourteen (14) days after last herbicide application. Substantial acceptance for seed establishment requires that the entire seeded area is weed free.
    h. Remove plant debris from treated area.

B. Soil Preparations for Seeded Areas:

3. Apply specified commercial fertilizer at a rate of 250 pounds per acre and thoroughly mix into upper 2 inches of topsoil. Delay application of fertilizer if lawn planting will not follow within a few days.

C. Fine grade lawn areas to smooth, even surface with loose, uniformly fine texture. Roll, rake, and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.

D. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface moisture to dry before planting lawns. Do not create a muddy soil condition.

E. Restore lawn areas to specified condition, if eroded or otherwise disturbed, after fine grading and prior to planting.

3.5 SEEDING

A. Broadcast seed and lightly rake into soil. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in tow directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Restore grade if eroded or otherwise disturbed after finish grading and before planting.
3. Broadcast seed not less than 5 pounds per 1000 s.f. of pure live seed (p.l.s.).
4. After broadcasting, rake surface of soil lightly. Incorporate seed into top ¼" of soil. Roll with a light lawn roller.
5. Broadcast weed free straw.

3.6 HYDROMULCH

A. Hydromulch: Mix slurry of fiber mulch and tackifier in water, using equipment specifically designed for hydromulch application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application. Apply Hydromulch at a uniform rate of 2000 pounds per acre. At this application rate the soil should be completely covered with no soil or shadows of soil visible.

1. Reapply hydromulch that has been displaced for any reason.
2. Remove any hydromulch, tackifier, or residue, left after the hydromulching process, from concrete areas.

B. Apply sterilized straw blanket.

1. Excelsior, or approved equal.

3.7 PREPARATION OF PLANTING BEDS

A. Remove 8 inches to 10 inches of existing soil as required, and replace with prepared planting soil mixture. Backfill for each bed with three parts topsoil and one part Compost thoroughly mixed prior to placing.

F. Staking and guy trees immediately after planting as indicated. Staking and guying must be removed within 1 year or less of planting date.

G. Wrap tree trunks of 2 inches caliper and larger. Start at ground and cover trunk to height of first branches and securely attach. Inspect tree trunks for injury, improper pruning and insect infestation and take corrective measures before wrapping.

3.10 SODDING NEW LAWNS

A. Lay sod within 24 hours from time of stripping. Do not plant dormant sod or if ground is frozen.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to ensure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.

1. Anchor sod on slopes with wood pegs to prevent slippage.

C. Water sod thoroughly with a fine spray immediately after planting.

3.11 PLANTING GROUND COVER AND PERENNIALS

A. Space ground cover plants as indicated or scheduled.

B. Space ground cover plants as specified in the plant list.

C. Dig holes large enough to allow for spreading of roots and backfill with planting soil. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Water thoroughly after planting, taking care not to cover crowns of plants with wet soils.

D. Mulch areas between ground cover plants; place not less than 2 inches thick. Do not use filtration/separation fabric in ground cover and perennial areas.

3.12 MISCELLANEOUS LANDSCAPE WORK

A. Install steel edging where indicated. Anchor with steel stakes spaced not more than 3 feet o.c., and driven at least 1 inch below top elevation of edging.

B. Place rock mulch as specified in areas indicated on drawings. In rock mulch areas outside of planting beds, compact soil subgrades before placing rock mulch.

1. Lay filtration/separation fabric continuously over planting soil or compacted subgrade prior to placing rock mulch. Overlap edges 4 inches at joints between sheets.

Division 33

Utilities

SECTION 33 1100

WATER UTILITY DISTRIBUTION PIPING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

B. Additional information concerning water distribution systems may be found on the Civil Drawings. In case of conflict between the drawings and the information specified herein, the more stringent requirements shall govern.

1.2 SUMMARY

A. Work Included: Excavation, trenching, exploratory excavation (pothole), backfill, bedding, soil stabilization, ground water removal, connection to existing mains, and installation of pipe, fire hydrants, taps, valves, fittings, valve boxes, and all necessary appurtenances. Also includes removal and replacement of existing paving or concrete where required, haul and import of adequate backfill material to meet compaction requirements and removal of existing thrust blocks where necessary.

B. Related Sections:

1. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 31 Section "Earth Moving" for soil materials, site excavating, filling and grading.
3. Division 31 Section "Temporary Erosion and Sedimentation Control" for erosion and sediment mitigation.
4. Division 22 Section "Trenching" for excavating and backfilling of utilities.
5. Division 32 Section "Asphalt Paving" for asphalt pavement removal, replacement, materials and testing.
6. Division 32 Section "Concrete Paving" for concrete pavement removal, replacement, materials and testing.

C. Permits and Fees: Contractor to obtain and pay for all permits required for work in this Section. Pay all fees for inspections by local authorities and utility agency for work specified in this Section.

1.3 REFERENCE TO CITY OF AURORA STANDARDS AND SPECIFICATIONS

All work of this section shall be performed in conformance to the current published City of Aurora Public Utility Rules and Regulations Regarding Standards and Specifications, May 1, 2001 with revisions and as subsequently revised, which are incorporated into these specifications by reference. Supplementary requirements may be developed by the Engineer to address project-specific conditions, which may supersede the above-referenced specification.

END OF SECTION 33 1100

SECTION 33 3100

SANITARY UTILITY SEWERAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Additional information concerning the sanitary sewer distribution systems may be found on the Civil Drawings. In case of conflict between the drawings and the information specified herein, the more stringent requirements shall govern.

1.2 SUMMARY

A. Work Included: Excavation, trenching, removal of existing manholes and piping, backfill, compaction, bedding, soil stabilization, groundwater removal, connection to existing manholes, and installation of pipe, manholes, aggregate base course and gravel where required, service wyes, service lines, asphalt removal and replacement, and all necessary appurtenances and safety precautions. Also includes removal and replacement of existing paving, concrete, topsoil and landscaping where required.

B. Related Sections:
1. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 31 Section "Earthwork" for soil materials, site excavating, filling and grading.
3. Division 31 Section Temporary Erosion and Sedimentation Control" for erosion and sediment mitigation.
4. Division 22 Section "Trenching" for excavating and backfilling of utilities.
5. Division 32 Section "Hot Mix Asphalt Paving" for asphalt pavement removal, replacement, materials and testing.
6. Division 32 Section "Cement Concrete Pavement" for concrete pavement removal, replacement, materials and testing.

C. Permits and Fees: Contractor to obtain and pay for all permits required for work in this Section. Pay all fees for inspections by local authorities and utility agency for work specified in this Section.

1.3 REFERENCE TO CITY OF AURORA STANDARDS AND SPECIFICATIONS

All work of this section shall be performed in conformance to the current published City of Aurora Public Utility Rules and Regulations Regarding Standards and Specifications. May 1, 2001 with revisions and as subsequently revised, which are incorporated into these specifications by reference. Supplementary requirements may be developed by the Engineer to address project-specific conditions, which may supersede the above-referenced specification.

END OF SECTION 33 3100

SECTION 33 4100

STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply if available to this Section.

B. Additional information concerning storm water distribution systems may be found on the Civil Drawings. In case of conflict between the drawings and the information specified herein, the more stringent requirements shall govern.

1.2 SUMMARY

A. Work Included: Excavation, trenching, removal of existing manholes and piping, backfill, compaction, bedding, soil stabilization, ground water removal, connection to existing manholes, and installation of pipe, manholes, inlets, outfalls, aggregate base course and gravel where required, asphalt removal and replacement, and all necessary appurtenances and safety precautions. Also includes removal and replacement of existing paving, concrete, topsoil and landscaping where required.

B. Related Sections:

1. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
2. Division 31 Section "Earth Moving" for soil materials, site excavating, filling and grading.
3. Division 31 Section Temporary Erosion and Sedimentation Control" for erosion and sediment mitigation.
4. Division 22 Section "Trenching" for excavating and backfilling of utilities.
5. Division 32 Section "Asphalt Paving" for asphalt pavement removal, replacement, materials and testing.
6. Division 32 Section "Concrete Paving" for concrete pavement removal, replacement, materials and testing.

C. Permits and Fees: Contractor to obtain and pay for all permits required for work in this Section. Pay all fees for inspections by local authorities and utility agency for work specified in this Section.

1.3 REFERENCE TO CITY OF AURORA STANDARDS AND SPECIFICATIONS

All work of this section shall be performed in conformance to the current published City of Aurora, Storm Utility Drainage Piping (L.F. and S.F.) Design and Technical Criteria, dated January 2005 and Roadway Design and Construction Specifications, dated January 2002 and as subsequently revised, which are incorporated into these specifications by reference. Supplementary requirements may be developed by the Engineer to address project-specific conditions, which may supersede the above-referenced specification.

END OF SECTION 33 4100

SECTION 33 46 13

SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents: General and Supplementary Conditions of the Contract, Division 1 - General Requirements, and Drawings are applicable to this Section.

B. Section Includes:
1. Drainage panels for subdrainage.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's literature and installation instructions in accordance with Section 01 33 00.

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Product - Basis of Design: Protecto Wrap Protecto Drain 2000V.

B. Substitutions: Under provisions of Section 01 25 00.

2.2 DRAINAGE PANELS

A. Molded-Sheet Drainage Panels: Geotextile-filter-fabric-faced, prefabricated, high compression, dimpled drainage boards designed for single-sided, sub-surface drainage; dimples interlock panels to form continuous drainage-protection course over substrate.
1. Compressive Strength, ASTM D 1621: 18,000 psf.
2. Flow Rate, ASTM D 4716: 15 gal/ft-width.
3. Thickness, ASTM D 1777: 0.38.
4. Woven Fabric Tensile Strength, ASTM D 4632: 100 lbs.
5. Nonwoven Fabric Burst Strength, ASTM D 3786: 240 lbs.
6. Permability, ASTM D 4491: 0.2 cm/sec.

2.3 RELATED MATERIALS

A. Mastic, tape, or other accessories as recommended by drainage panel manufacturer for complete installation.

SECTION 23 11 13

FACILITY FUEL-OIL PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes diesel-fuel-oil distribution systems and the following:

1. Pipes, tubes, and fittings.
2. Piping and tubing joining materials.
3. Piping specialties.
4. Valves.
5. FRP fuel-oil USTs.
6. Fuel-oil AST accessories.
7. Fuel-oil UST accessories.
8. Fuel-oil storage tank piping specialties.
9. Fuel-oil storage tank pumps.
10. Fuel-transfer pumps.
11. Fuel maintenance system.
12. Liquid-level gage system.
13. Leak-detection and monitoring system.
14. Mechanical sleeve seals.
15. Grout.
16. Concrete bases.

1.3 DEFINITIONS

A. FPM: Vinylidene fluoride-hexafluoropropylene copolymer rubber.

B. FRP: Glass-fiber-reinforced plastic.

C. UST: Underground storage tank.

1.4 PERFORMANCE REQUIREMENTS

A. Maximum Operating-Pressure Ratings: 3-psig (21-kPa) fuel-oil supply pressure at oil-fired appliances.

H. Welding certificates.

I. Field quality-control reports.

J. Operation and Maintenance Data: For fuel-oil equipment and accessories to include in emergency, operation, and maintenance manuals.

K. Warranty: Sample of special warranty.

1.6 QUALITY ASSURANCE

A. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

B. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Comply with ASME B31.9, "Building Services Piping," for fuel-oil piping materials, installation, testing, and inspecting.

F. Comply with requirements of the EPA and of state and local authorities having jurisdiction. Include recording of fuel-oil storage tanks and monitoring of tanks and piping.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Lift and support fuel-oil storage tanks only at designated lifting or supporting points, as shown on Shop Drawings. Do not move or lift tanks unless empty.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store pipes and tubes with protective PE coating to avoid damaging the coating and to protect from direct sunlight.

D. Store PE pipes and valves protected from direct sunlight.

1.8 PROJECT CONDITIONS

A. Interruption of Existing Fuel-Oil Service: Do not interrupt fuel-oil service to facilities occupied by Owner or others unless permitted under the following

3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

    a. Material Group: 1.1.
    b. End Connections: Threaded or butt welding to match pipe.
    c. Lapped Face: Not permitted underground.
    d. Gasket Materials: Asbestos free, ASME B16.20 metallic, or ASME B16.21 nonmetallic, gaskets compatible with fuel oil.
    e. Bolts and Nuts: ASME B18.2.1, cadmium-plated steel.

5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.

    a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

2.2 DOUBLE-CONTAINMENT PIPE AND FITTINGS

A. Rigid, Double-Containment Piping: Comply with UL 971.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Ameron International; Fiberglass Pipe Group.
    b. Conley Corporation.
    c. Perma-Pipe, Inc.
    d. Smith Fibercast.

2. RTRP: ASTM D 2996 or ASTM D 2997 carrier and containment piping and mechanical couplings to seal carrier and containment piping or individually bonded joints.

    a. Minimum Operating-Pressure Rating for RTRP NPS 2 and NPS 3 (DN 50 and DN 80): 150 psig (1035 kPa).
    b. Minimum Operating-Pressure Rating for RTRP NPS 4 and NPS 6 (DN 100 and DN 150): 125 psig (860 kPa). Compliance with UL 971 is not required for NPS 6 (DN 150) and larger piping.
    c. Fittings: RTRF complying with ASTM D 2996 or ASTM D 2997, and made by RTRP manufacturer; watertight sump entry boots, termination, or other end fittings.

3. Include design and fabrication of double-containment pipe and fitting assemblies with provision for field installation of cable leak-detection system in annular space between carrier and containment piping.

2.3 PIPING SPECIALTIES

A. Flexible Connectors: Comply with UL 567.

2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
3. Strainer Screen: 60-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (860 kPa).

C. Basket Strainers:

1. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
3. Strainer Screen: 60-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig (860 kPa).

D. T-Pattern Strainers:

1. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
2. End Connections: Grooved ends.
3. Strainer Screen: 60-mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
4. CWP Rating: 750 psig (5170 kPa).

E. Manual Air Vents:

1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2 (DN 15).
5. Discharge Connection: NPS 1/8 (DN 6).
6. CWP Rating: 150 psig (1035 kPa).
7. Maximum Operating Temperature: 225 deg F (107 deg C).

2.4 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for fuel oil.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F (540 deg C) complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

D. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.

e. Perfection Corporation; A Subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in the valve schedule.
8. CWP Rating: 600 psig (4140 kPa).
9. Service Mark: Initials "WOG" shall be permanently marked on valve body.

F. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. BrassCraft Manufacturing Company; a Masco company.
b. Conbraco Industries, Inc.; Apollo Div.
c. Lyall, R. W. & Company, Inc.
d. McDonald, A. Y. Mfg. Co.
e. Perfection Corporation; A Subsidiary of American Meter Company.

2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in the valve schedule.
8. CWP Rating: 600 psig (4140 kPa).
9. Service Mark: Initials "WOG" shall be permanently marked on valve body.

2.6 SPECIALTY VALVES

A. Pressure Relief Valves: Comply with UL 842.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Anderson Greenwood; Division of Tyco Flow Control.
b. Fulflo Specialties, Inc.
c. Webster Fuel Pumps & Valves; a division of Capital City Tool, Inc.

2. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
3. Body: Brass, bronze, or cast steel.
4. Springs: Stainless steel, interchangeable.
5. Seat and Seal: Nitrile rubber.
6. Orifice: Stainless steel, interchangeable.
7. Factory-Applied Finish: Baked enamel.
8. Maximum Inlet Pressure: 150 psig (1035 kPa).
9. Relief Pressure Setting: 60 psig (414 kPa).

b. Red Jacket Pumps; a division of Veeder-Root.

3. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
4. Body: ASTM A 126, cast iron.
5. O-Rings: Elastomeric compatible with fuel oil.
6. Piston and Stem Seals: PTFE.
7. Stem and Spring: Stainless steel.
8. Piston Cylinder: Burnished brass.
9. Indicated Leak Rate: Maximum 3 gph (3 mL/s) at 10 psig (69 kPa).
10. Leak Indication: Reduced flow.

2.7 FRP FUEL-OIL UST

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Containment Solutions, Inc.
2. Xerxes Corporation.

C. Description: Horizontal, FRP UST; UL 1316, double wall, with interstitial space and integral, hydrostatic, leak-detection and monitoring system.

D. Construction: Fabricated with fiberglass-reinforced polyester resins; suitable for operation at atmospheric pressure; fabricated for the following loads:

1. Depth of Bury: 3 feet (1 m) from top of tank to finished surface.
2. External Hydrostatic Pressure: To withstand general buckling with safety factor of 2:1 if hole is fully flooded.
3. Surface Loads: AASHTO's "Specifications for Highway Bridges," H-20 axle loads of 32,000 lb (14 515 kg).

E. Capacities and Characteristics (See Schedule on Drawings):

2.8 FUEL-OIL UST ACCESSORIES

A. Tank Manholes: 22-inch- (560-mm-) minimum diameter; bolted, flanged, and gasketed, with extension collar; for access to inside of tank.

B. Threaded pipe connection fittings on top of tank for fill, supply, return, vent, sounding, and gaging, in locations and of sizes indicated. Include cast-iron plugs for shipping.

C. Striker Plates: Inside tank, on bottom below fill, vent, sounding, gage, and other tube openings.

D. Lifting Lugs: For handling and installation.

D. Fill Boxes: Flush mounting, with threaded fill-pipe connection and wrench operation.

E. Locking Fill Boxes: Flush mounting, with locking-type inner fill cap for standard padlock and threaded fill-pipe connection.

F. Supply and Sounding Drop Tubes: Fuel-oil supply piping or fitting, inside tank, terminating 6 inches (150 mm) above bottom of tank, and with end cut at a 45-degree angle (1:1 slope).

G. Pipe Adapters and Extensions: Compatible with piping and fittings.

H. Suction Strainers and Check Valves: Bronze or corrosion-resistant metal components.

I. Foot Valves and Antisiphon Valves: Poppet-type, bronze or corrosion-resistant metal components.

J. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

K. Metal Manholes: 22-inch- (560-mm-) minimum diameter frame and cover. Furnish manhole units of adequate size for access to fittings if size is not indicated.

L. Monitoring Well Caps: Locking pipe plug and manhole.

2.10 LIQUID-LEVEL GAGE SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Caldwell Systems Corporation.
2. Clawson Tank Company.
3. EBW, Inc.
4. Highland Tank & Manufacturing Company, Inc.
5. INCON, Inc.
6. King Engineering Corp.
7. Krueger Sentry Gauge.
8. Pneumercator Inc.
9. Preferred Utilities Manufacturing Corporation.
10. Rochester Gauges, Inc.
11. Tuthill Corporation; Tuthill Transfer Systems; Sotera Systems.
12. Uehling Instrument Company.
13. Venture Measurement Company, LLC.

C. Description: Calibrated, liquid-level gage system complying with UL 180 with floats or other sensors and remote annunciator panel.

e. Highland Tank & Manufacturing Company, Inc.
f. INCON, Inc.
g. In-Situ, Inc.
h. MSA; Instrument Div.
i. Perma-Pipe, Inc.
j. Pneumercator Inc.
k. Raychem Corp; Tyco Electronics Corporation.
l. Tuthill Corporation; Tuthill Transfer Systems; Sotera Systems.
m. Veeder-Root; a Danaher Corporation Company.

3. Calibrated, leak-detection and monitoring system with brine antifreeze solution, reservoir sensor, and electronic control panel to monitor leaks in inner and outer tank walls.
4. Include fittings and devices required for testing.
5. Controls: Electrical, operating on 120-V ac.
6. Calibrated, liquid-level gage complying with UL 180 with floats or other sensors and remote annunciator panel.
7. Remote Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms, fuel indicator with registration in gallons (liters), and overfill alarm. Include gage volume range that covers fuel-oil storage capacity.
8. Controls: Electrical, operating on 120-V ac.

2.12 FUEL OIL

A. Fuel Oil: ASTM D 396, Grade No. 2.

B. Diesel Fuel Oil: ASTM D 975, Grade Low Sulfur No. 2-D, general-purpose, high volatility. Provide full tank at sign off of construction.

2.13 SLEEVES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

2.14 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Advance Products & Systems, Inc.
b. Calpico Inc.
c. Metraflex Company (The).
d. Pipeline Seal and Insulator, Inc.

description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (762 mm) deep; colored yellow.

2.18 CONCRETE MANHOLES

A. Precast Concrete Manhole Sections: ASTM C 478 (ASTM C 478M), base and concentric-cone sections with integral ladder or steps.

B. Cast-Iron Frame and Cover: Heavy-duty, water-resistant, cast-iron manhole frame, gasket, and bolted cover; 24-inch- (609-mm-) diameter, inside opening dimension; 8-inch (203-mm) frame riser height.

2.19 SOURCE QUALITY CONTROL

A. Pressure test and inspect fuel-oil storage tanks, after fabrication and before shipment, according to ASME and the following:

B. Affix standards organization's code stamp.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for fuel-oil piping system to verify actual locations of piping connections before equipment installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.3 PREPARATION

A. Close equipment shutoff valves before turning off fuel oil to premises or piping section.

B. Comply with NFPA 30 and NFPA 31 requirements for prevention of accidental ignition.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install escutcheons for penetrations of walls, ceilings, and floors.

1. New Piping:

   a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
   b. Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
   c. Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
   d. Piping at Ceiling Penetrations in Finished Spaces: One-piece cast-brass type with polished chrome-plated finish.
   e. Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type and set screw.
   f. Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
   g. Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed hinge and set screw.
   h. Piping in Equipment Rooms: One-piece, cast-brass type.
   i. Piping in Equipment Rooms: One-piece, stamped-steel type with set screw spring clips.
   j. Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

2. Existing Piping:

   a. Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
   b. Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and spring clips.
   c. Piping at Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
   d. Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
   e. Piping in Unfinished Service Spaces: Split-casting, cast-brass type with polished chrome-plated finish.
   f. Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed hinge and set screw or spring clips.
   g. Piping in Equipment Rooms: Split-casting, cast-brass type.
   h. Piping in Equipment Rooms: Split-plate, stamped-steel type with set screw or spring clips.

H. Install one-piece, bronze ball valve with hose end connection at low points in fuel-oil piping.

I. Install manual air vents at high points in fuel-oil piping.

J. Install emergency shutoff valves at dispensers.

3.7 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to "Quality Assurance" Article.

1. Bevel plain ends of steel pipe.
2. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flanged Joints: Install gasket material, size, type, and thickness for service application. Install gasket concentrically positioned.

G. Flared Joints: Comply with SAE J513. Tighten finger tight, then use wrench according to fitting manufacturer's written recommendations. Do not overtighten.

H. Fiberglass-Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.8 FUEL-OIL UST INSTALLATION

A. Excavate to sufficient depth for a minimum of 3 feet (1 m) of earth cover from top of tank to finished grade. Allow for cast-in-place, concrete-ballast base plus 6 inches (150 mm) of sand or pea gravel between ballast base and tank. Extend excavation at least 12 inches (300 mm) around perimeter of tank.

6. NPS 4 (DN 100): Maximum span, 13 feet (4 m); minimum rod size, 5/8 inch (16 mm).

C. Support vertical steel pipe at each floor and at spacing not greater than 15 feet (4.5 m).

D. Install hangers for horizontal, drawn-temper copper tubing with the following maximum spacing and minimum rod sizes:

1. NPS 3/4 (DN 20) and Smaller: Maximum span, 60 inches (1524 mm); minimum rod size, 3/8 inch (10 mm).
2. NPS 1 (DN 25): Maximum span, 72 inches (1830 mm); minimum rod size, 3/8 inch (10 mm).
3. NPS 1-1/4 (DN 32): Maximum span, 84 inches (2130 mm); minimum rod size, 3/8 inch (10 mm).
4. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): Maximum span, 96 inches (2440 mm); minimum rod size, 3/8 inch (10 mm).
5. NPS 2-1/2 (DN 65): Maximum span, 108 inches (2740 mm); minimum rod size, 1/2 inch (13 mm).
6. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 1/2 inch (13 mm).
7. NPS 4 (DN 100): Maximum span, 11 feet (3.4 m); minimum rod size, 5/8 inch (16 mm).

E. Support vertical copper tube at each floor and at spacing not greater than 10 feet (3 m).

3.10 FUEL-OIL PUMP INSTALLATION

A. Transfer Pumps:

1. Install pumps with access space for periodic maintenance including removal of motors, impellers, and accessories.
2. Set pumps on and anchor to concrete base.

B. Install two-piece, full-port ball valves at suction and discharge of pumps.

C. Install mechanical leak-detector valves at pump discharge.

D. Install Y-pattern strainer on inlet side of simplex fuel-oil pumps.

E. Install check valve on discharge of duplex fuel-oil pumps.

F. Install suction piping with minimum fittings and change of direction.

G. Install vacuum and pressure gage, upstream and downstream respectively, at each pump to measure the differential pressure across the pump. Pressure gages are specified in Division 23 Section "Meters and Gages for HVAC Piping."

1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.

C. Install detectable warning tape directly above fuel-oil piping, 12 inches (304 mm) below finished grade, except 6 inches (152 mm) below subgrade under pavements and slabs. Terminate tracer wire in an accessible area, and identify as "tracer wire" for future use with plastic-laminate sign.

1. Piping: Over underground fuel-oil distribution piping.
2. Fuel-Oil Storage Tanks: Over edges of each UST.

3.16 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (457-mm) centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.17 Use 3000-psig (20.7-MPa), 28-day, compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete." FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:

1. Tanks: Minimum hydrostatic or compressed-air test pressures for fuel-oil storage tanks that have not been factory tested and do not bear the ASME code stamp or a listing mark acceptable to authorities having jurisdiction:
   a. Double-Wall Tanks:

3.19 OUTDOOR PIPING SCHEDULE

A. Underground fuel-oil piping shall be one of the following. Size indicated is carrier-pipe size.

1. Rigid, double-containment piping.

B. Underground fuel-oil-tank fill and vent piping shall be one of the following:

1. NPS 2 (DN 50) and Smaller: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints. Coat pipe and fittings with protective coating for steel piping.
2. NPS 2-1/2 (DN 65) and Larger: Steel pipe, steel welding fittings, and welded joints. Coat pipe and fittings with protective coating for steel piping.

C. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

D. Aboveground fuel-oil piping shall be one of the following:

1. NPS 2 (DN 50) and Smaller: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints.
2. NPS 2-1/2 (DN 65) and Larger: Steel pipe, steel welding fittings, and welded joints.

3.20 INDOOR PIPING SCHEDULE

A. Aboveground fuel-oil piping shall be one of the following:

1. NPS 5/8 to NPS 2 (DN 18 to DN 50): Steel pipe, steel or malleable-iron threaded fittings, and threaded joints.
2. NPS 2-1/2 (DN 65) and Larger: Steel pipe, steel fittings, and welded or flanged joints.
3. Steel pipe with malleable-iron fittings and threaded joints.
4. Steel pipe with wrought-steel fittings and welded joints.
5. Annealed-temper copper tube, brass fittings, and flared joints.
6. Drawn-temper copper tubing, copper fittings, and brazed joints.

3.21 ABOVEGROUND MANUAL FUEL-OIL SHUTOFF VALVE SCHEDULE

A. Distribution piping valves for pipe NPS 2 (DN 50) and smaller shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.

B. Distribution piping valves for pipe NPS 2-1/2 (DN 65) and larger shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze, lubricated plug valve.

SECTION 23 11 23

FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Piping and tubing joining materials.
4. Valves.
5. Pressure regulators.
6. Mechanical sleeve seals.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.3 PERFORMANCE REQUIREMENTS

A. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.
2. Service Regulators: 65 psig 100 psig minimum unless otherwise indicated.

B. Natural-Gas System Pressure within Buildings: 0.5 psig or less.

C. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.4 SUBMITTALS

A. Product Data: For each type of the following:

1.6 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

1.7 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:

1. Notify Construction Manager no fewer than two days in advance of proposed interruption of natural-gas service.
2. Do not proceed with interruption of natural-gas service without Construction Manager's written permission.

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:

2.4 MANUAL GAS SHUTOFF VALVES

A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.

1. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
2. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
3. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.

1. CWP Rating: 125 psig].
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

2.5 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements:
2. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:

a. Actaris.
b. American Meter Company.
c. Fisher Control Valves and Regulators; Division of Emerson Process Management.
d. Invensys.
e. Richards Industries; Jordan Valve Div.

3. Body and Diaphragm Case: Cast iron or die-cast aluminum.
4. Springs: Zinc-plated steel; interchangeable.

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. Hart Industries International, Inc.
d. McDonald, A. Y. Mfg. Co.
e. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
f. Wilkins; Zurn Plumbing Products Group.

2. Minimum Operating-Pressure Rating: 150 psig.
3. Combination fitting of copper alloy and ferrous materials.
4. Insulating materials suitable for natural gas.
5. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

B. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements:

a. Capitol Manufacturing Company.
b. Central Plastics Company.
c. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
d. Wilkins; Zurn Plumbing Products Group.

2. Minimum Operating-Pressure Rating: 150 psig.
3. Combination fitting of copper alloy and ferrous materials.
4. Insulating materials suitable for natural gas.
5. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

2.7 SLEEVES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.8 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers: Subject to compliance with requirements:

a. Advance Products & Systems, Inc.
b. Calpico Inc.
c. Metraflex Company (The).
d. Pipeline Seal and Insulator, Inc.

D. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.

E. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

F. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Locate valves for easy access.

H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

I. Install piping free of sags and bends.

J. Install fittings for changes in direction and branch connections.

K. Install escutcheons at penetrations of interior walls, ceilings, and floors.

T. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

U. Do not use natural-gas piping as grounding electrode.

V. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

3.5 VALVE INSTALLATION

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install anode for metallic valves in underground PE piping.

3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

3.9 LABELING AND IDENTIFYING

A. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for piping and valve identification.Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 PAINTING

A. Comply with requirements in Division 09 painting Sections for painting interior and exterior natural-gas piping.

3.11 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.12 OUTDOOR PIPING SCHEDULE

A. Underground natural-gas piping shall be the following:

1. Steel pipe with wrought-steel fittings and welded joints, or mechanical couplings. Coat pipe and fittings with protective coating for steel piping.

B. Aboveground natural-gas piping shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

3.13 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground, branch piping NPS 1 and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

C. Underground, below building, piping shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with wrought-steel fittings and welded joints.

END OF SECTION 23 11 23

SECTION 23 21 23

HYDRONIC PUMPS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of pumping equipment, including all related systems and accessories.

B. Provide water circulating pumps of the type, rotational speed and arrangement indicated and scheduled; each rated to deliver the capacity indicated in the tabulation on the Drawings against the head of the system in which it operates. Provide each centrifugal pump with an impeller whose diameter is 90% or less of the maximum impeller which the manufacturer shows in his published curves for that pump. Pump selection shall be such that variation of plus or minus 15% of head estimated can be accomplished by "trimming" impellers by the manufacturer.

C. Efficiencies for the pumps selected for submittal shall be equal to or greater than the efficiency of the scheduled pumps at the scheduled design conditions.

D. Provide each pump with a constant speed or variable speed (as scheduled), premium efficiency (with minimum efficiencies as listed in Division 23 "Common Motor Requirements for HVAC Equipment) open drip proof motor, unless noted to be a totally enclosed, fan cooled motor, wound for operation on the current characteristics indicated in the tabulation on the Drawings. Size each motor with relation to the pump impeller so that the required brake horsepower will not exceed the rated motor horsepower at any point on the pump curve.

1.2 SUMMARY

A. This Section includes the following:
1. Separately coupled, base-mounted, end-suction centrifugal pumps.

1.3 DEFINITIONS

A. Buna-N: Nitrile rubber.

B. EPT: Ethylene propylene terpolymer.

1.4 SUBMITTALS

A. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.

B. Shop Drawings: Show pump layout and connections. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
1. Wiring Diagrams: Power, signal, and control wiring.

C. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.

suitable for operation under the static heads and fluid temperatures tabulated. Provide in all bronze construction where so noted. Pumps shall be suitable for the existing and new chemical water treatment in the chilled and hot water systems. Pumps shall be built to standards of the Hydraulic Institute. Pumps to be selected at best efficiency point or to the left of it.

2.3 CLOSE-COUPLED, IN-LINE CENTRIFUGAL PUMPS

A. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally or vertically.

B. Pump Construction:

1. Casing: Radially split, cast iron, with replaceable bronze wear rings, threaded gage tappings at inlet and outlet, and threaded companion-flange or union end connections, unless otherwise indicated.
2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
3. Pump Shaft: Stainless steel.
4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket. Include water slinger on shaft between motor and seal.
5. Pump Bearings: Permanently lubricated ball bearings for motors up to 5 hp and oil lubricated; bronze-journal or thrust type for motors larger than 5 hp.

C. Motor: Single speed, with permanently lubricated or grease-lubricated ball bearings, unless otherwise indicated; and rigidly mounted to pump casing. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

2.4 SEPARATELY COUPLED, BASE-MOUNTED, END-SUCTION CENTRIFUGAL PUMPS

A. Manufacturers:
1. Armstrong Pumps Inc.
2. Aurora Pump; Division of Pentair Pump Group.
3. Bell & Gossett; Div. of ITT Industries.
4. PACO Pumps.
5. Taco, Inc.

B. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal. Rate pump for 125-psig minimum working pressure and a continuous water temperature of.

C. Pump Construction:
1. Casing: Radially split, cast iron, with threaded gage tappings at inlet and outlet, drain plug at bottom and air vent at top of volute, and connections.
2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
3. Pump Shaft: Stainless Steel.

2.6 PUMP SPECIALTY FITTINGS

A. Suction Diffuser: Angle pattern, 175-psig pressure rating, ductile-iron body and end cap, pump-inlet fitting; with bronze startup and bronze or stainless-steel permanent strainers; bronze or stainless-steel straightening vanes; drain plug; and factory-fabricated support.

B. Triple-Duty Valve: Angle or straight pattern, 175-psig pressure rating, cast-iron body, pump-discharge fitting; with drain plug and bronze-fitted shutoff, balancing, and check valve features. Brass gage ports with integral check valve, and orifice for flow measurement.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.

C. Examine foundations and inertia bases for suitable conditions where pumps are to be installed.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PUMP INSTALLATION

A. Comply with HI 1.4.

B. Install pumps with access for periodic maintenance including removal of motors, impellers, couplings, and accessories.

C. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.

D. Set base-mounted pumps on concrete foundation. Disconnect coupling before setting. Do not reconnect couplings until alignment procedure is complete.
1. Support pump base plate on rectangular metal blocks and shims, or on metal wedges with small taper, at points near foundation bolts to provide a gap of 3/4 to 1-1/2 inches between pump base and foundation for grouting.
2. Adjust metal supports or wedges until pump and driver shafts are level. Check coupling faces and suction and discharge flanges of pump to verify that they are level and plumb.

E. Automatic Condensate Pump Units: Install units for collecting condensate and extend to open drain.

3.3 ALIGNMENT

A. Align pump and motor shafts and piping connections after setting on foundation, grout has been set and foundation bolts have been tightened, and piping connections have been made.

B. Comply with pump and coupling manufacturers' written instructions.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain hydronic pumps. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 23 21 23

SECTION 23 22 23

STEAM CONDENSATE PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes electric-driven and steam condensate pumps.

1.2 SUBMITTALS

A. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated. Indicate pump's operating point on curves. Include receiver capacity and material.

B. Shop Drawings: Show pump layout and connections. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
   1. Wiring Diagrams: Power, signal, and control wiring.

C. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain steam condensate pumps through one source from a single manufacturer.

B. Product Options: Drawings indicate size, profiles, and dimensional requirements of steam condensate pumps and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. ASME Compliance: Fabricate and label steam condensate pumps to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.

B. Store steam condensate pumps in dry location.

C. Retain protective covers for flanges and protective coatings during storage.

D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.

E. Comply with pump manufacturer's written rigging instructions.

2.3 MOTORS

A. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Examine rough installation of steam condensate piping.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install pumps according to HI 1.1-1.5, "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation."

B. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.

C. Support pumps and piping separately so piping is not supported by pumps.

D. Install pumps on concrete bases. Anchor pumps to bases using inserts or anchor bolts.

E. Install thermometers and pressure gages.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to machine to allow service and maintenance.

C. Install steam supply for pressure-powered pumps as required by Division 23 Section "Steam and Condensate Heating Piping."

D. Install compressed-air supply for pressure-powered pumps as required by Division 22 Section "General-Service Compressed-Air Piping."

E. Install gate and check valves on inlet and outlet of pressure-powered pumps.

F. Install check valve, gate valve, and globe valve at pump discharge connections for each electric-driven pump.

G. Pipe drain to nearest floor drain for overflow and drain piping connections.

H. Install full-size vent piping to outdoors, terminating in 180-degree elbow at point above highest steam system connection or as indicated.

I. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

J. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

SECTION 23 25 00

HVAC WATER TREATMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following HVAC water-treatment systems:
   1. Bypass chemical-feed equipment and controls.
   2. Biocide chemical-feed equipment and controls.
   3. Chemical treatment test equipment.
   4. HVAC water-treatment chemicals.

1.2 DEFINITIONS

A. EEPROM: Electrically erasable, programmable read-only memory.

B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

C. TDS: Total dissolved solids.

1.3 PERFORMANCE REQUIREMENTS

A. Water quality for HVAC systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of HVAC equipment without creating a hazard to operating personnel or the environment.

B. Base HVAC water treatment on quality of water available at Project site, HVAC system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.

C. Closed hydronic systems, including hot-water heating chilled water and glycol cooling, shall have the following water qualities:
   1. pH: Maintain a value within 9.0 to 10.5.
   2. "P" Alkalinity: Maintain a value within 100 to 500 ppm.
   3. Boron: Maintain a value within 100 to 200 ppm.
   4. Chemical Oxygen Demand: Maintain a maximum value of 100ppm.
   5. Soluble Copper: Maintain a maximum value of 0.20 ppm.
   6. TDS: Maintain a maximum value of 10ppm.
   7. Ammonia: Maintain a maximum value of 20ppm.
   8. Free Caustic Alkalinity: Maintain a maximum value of 20ppm.
   9. Microbiological Limits:
      a. Total Aerobic Plate Count: Maintain a maximum value of 1000 organisms/ml.
      b. Total Anaerobic Plate Count: Maintain a maximum value of 100 organisms/ml.
      c. Nitrate Reducers: Maintain a maximum value of 100 organisms/ml.

D. Steam Boiler and Steam Condensate:
   1. Steam Condensate:

10. Chemical material safety data sheets.
11. Water softeners.
12. Multimedia filters.
13. Bag- or cartridge-type filters.
14. Centrifugal separators.

B. Shop Drawings: Pretreatment and chemical treatment equipment showing tanks, maintenance space required, and piping connections to HVAC systems. Include plans, elevations, sections, details, and attachments to other work.
1. Wiring Diagrams: Power and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For sensors, injection pumps, and controllers to include in emergency, operation, and maintenance manuals.

E. Other Informational Submittals:
1. Water-Treatment Program: Written sequence of operation on an annual basis for the application equipment required to achieve water quality defined in the "Performance Requirements" Article above.
2. Water Analysis: Illustrate water quality available at Project site.
3. Passivation Confirmation Report: Verify passivation of galvanized-steel surfaces, and confirm this observation in a letter to Architect.

1.5 QUALITY ASSURANCE

A. HVAC Water-Treatment Service Provider Qualifications: An experienced HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as specified in this Section.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 MAINTENANCE SERVICE

A. Scope of Maintenance Service: Provide chemicals and service program to maintain water conditions required above to inhibit corrosion, scale formation, and biological growth for cooling, chilled-water piping heating, hot-water piping heating, steam and condensate piping steam and condensate system for humidifier and cooking appliance applications condenser-water piping and equipment. Services and chemicals shall be provided for a period of one year from date of Substantial Completion, and shall include the following:
1. Initial water analysis and HVAC water-treatment recommendations.
2. Startup assistance for Contractor to flush the systems, clean with detergents, and initially fill systems with required chemical treatment prior to operation.
3. Periodic field service and consultation.
4. Customer report charts and log sheets.
5. Laboratory technical analysis.
6. Analyses and reports of all chemical items concerning safety and compliance with government regulations.

1. Microprocessor-based controller, 1 percent accuracy in a range from zero to 14 units. Incorporate solid-state integrated circuits and digital LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation and Control for HVAC."
2. Digital display and touch pad for input.
3. Sensor probe adaptable to sample stream manifold.
4. High, low, and normal pH indication.
5. High or low pH alarm light, trip points field adjustable; with silence switch.
6. Hand-off-auto switch for acid pump.
7. Internal adjustable hysteresis or deadband.

D. TDS Controller:
1. Microprocessor-based controller, 1 percent accuracy in a range from zero to 5000 micromhos. Incorporate solid-state integrated circuits and digital LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation and Control for HVAC."
2. Digital display and touch pad for input.
3. Sensor probe adaptable to sample stream manifold.
4. High, low, and normal conductance indication.
5. High or low conductance alarm light, trip points field adjustable; with silence switch.
6. Hand-off-auto switch for solenoid bleed-off valve.
7. Bleed-off valve activated indication.
8. Internal adjustable hysteresis or deadband.
9. Bleed Valves:
   a. Cooling Systems: Forged-brass body, globe pattern, general-purpose solenoid with continuous-duty coil, or motorized valve.
   b. Steam Boilers: Motorized ball valve, steel body, and TFE seats and seals.

E. Biocide Feeder Timer:
1. Microprocessor-based controller with digital LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation and Control for HVAC."
2. 24-hour timer with 14-day skip feature to permit activation any hour of day.
3. Precision, solid-state, bleed-off lockout timer and clock-controlled biocide pump timer. Prebleed and bleed lockout timers.
4. Solid-state alternator to enable use of two different formulations.
5. 24-hour display of time of day.
6. 14-day display of day of week.
7. Battery backup so clock is not disturbed by power outages.
8. Hand-off-auto switches for biocide pumps.
9. Biocide A and Biocide B pump running indication.

F. Chemical Solution Tanks:
1. Chemical-resistant reservoirs fabricated from high-density opaque polyethylene with minimum 110 percent containment vessel.
2. Molded cover with recess for mounting pump.
3. Capacity: 50 gal.

G. Chemical Solution Injection Pumps:

C. Corrosion Test-Coupon Assembly: Constructed of corrosive-resistant material, complete with piping, valves, and mild steel and copper coupons. Locate copper coupon downstream from mild steel coupon in the test-coupon assembly.
   1. Two-station rack for closed-loop systems.
   2. Four-station rack for open systems.

2.6 CHEMICALS

A. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with piping system components and connected equipment, and that can attain water quality specified in Part 1 "Performance Requirements" Article.

B. Water Softener Chemicals:
   1. Mineral: High-capacity, sulfonated-polystyrene ion-exchange resin that is stable over entire pH range with good resistance to bead fracture from attrition or shock. Resin exchange capacity minimum 30,000 grains/cu. ft. of calcium carbonate of resin when regenerated with 15 lb of salt.
   2. Salt for Brine Tanks: High-purity sodium chloride, free of dirt and foreign material. Rock and granulated forms are not acceptable.

PART 3 - EXECUTION

3.1 WATER ANALYSIS

A. Perform an analysis of supply water to determine quality of water available at Project site.

3.2 INSTALLATION

A. Install chemical application equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor chemical tanks and floor-mounting accessories to substrate.

B. Install water testing equipment on wall near water chemical application equipment.

C. Install interconnecting control wiring for chemical treatment controls and sensors.

D. Mount sensors and injectors in piping circuits.

E. Bypass Feeders: Install in closed hydronic systems, including hot-water heating chilled water and glycol cooling, and equipped with the following:
   1. Install bypass feeder in a bypass circuit around circulating pumps, unless otherwise indicated on Drawings.
   2. Install water meter in makeup water supply.
   3. Install test-coupon assembly in bypass circuit around circulating pumps, unless otherwise indicated on Drawings.
   4. Install a gate or full-port ball isolation valves on inlet, outlet, and drain below feeder inlet.
   5. Install a swing check on inlet after the isolation valve.

F. Install automatic chemical-feed equipment for steam boiler and steam condensate systems and include the following:
   1. Install makeup water softener.
   2. Install water meter in makeup water supply.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.

B. Perform tests and inspections and prepare test reports.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Tests and Inspections:
   1. Inspect field-assembled components and equipment installation, including piping and electrical connections.
   2. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational before introducing chemicals for water-treatment system.
   3. Place HVAC water-treatment system into operation and calibrate controls during the preliminary phase of HVAC systems' startup procedures.
   4. Do not enclose, cover, or put piping into operation until it is tested and satisfactory test results are achieved.
   5. Test for leaks and defects. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
   6. Leave uncovered and unconcealed new, altered, extended, and replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
   7. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow test pressure to stand for four hours. Leaks and loss in test pressure constitute defects.
   8. Repair leaks and defects with new materials and retest piping until no leaks exist.

D. Remove and replace malfunctioning units and retest as specified above.

E. Sample boiler water at one-week intervals after boiler startup for a period of five weeks, and prepare test report advising Owner of changes necessary to adhere to Part 1 "Performance Requirements" Article for each required characteristic. Sample boiler water at four-week intervals following the testing noted above to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section.

F. At four-week intervals following Substantial Completion, perform separate water analyses on hydronic systems to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section. Submit written reports of water analysis advising Owner of changes necessary to adhere to Part 1 "Performance Requirements" Article.

G. Comply with ASTM D 3370 and with the following standards:
   1. Silica: ASTM D 859.
   2. Steam System: ASTM D 1066.
   3. Acidity and Alkalinity: ASTM D 1067.
   4. Iron: ASTM D 1068.
   5. Water Hardness: ASTM D 1126.

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Backdraft dampers.
2. Volume dampers.
3. Motorized control dampers.
4. Fire dampers.
5. Smoke dampers.
6. Combination fire and smoke dampers.
7. Duct silencers.
8. Turning vanes.
9. Duct-mounting access doors.
10. Flexible connectors.
11. Flexible ducts.
12. Duct accessory hardware.

B. Related Sections include the following:

1. Division 23 Section "Instrumentation and Control for HVAC" for electric and pneumatic damper actuators.
2. Division 28 Section "Fire Detection and Alarm" for duct-mounting fire and smoke detectors.

1.2 SUBMITTALS

A. Product Data: For the following:

1. Backdraft dampers.
2. Volume dampers.
3. Motorized control dampers.
4. Fire dampers.
5. Smoke dampers.
6. Combination fire and smoke dampers.
7. Duct silencers.
8. Turning vanes.
9. Duct-mounting access doors.
10. Flexible connectors.
11. Flexible ducts.

C. Stainless Steel: ASTM A 480/A 480M.

D. Aluminum Sheets: ASTM B 209, alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

E. Extruded Aluminum: ASTM B 221, alloy 6063, temper T6.

F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

G. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT DAMPERS

A. Manufacturers:
1. Greenheck.
2. Prefco Products, Inc.
3. Ruskin Company.

B. Description: Multiple-blade, parallel action gravity balanced, with blades of maximum 6-inch width, with sealed edges, assembled in rattle-free manner with 90-degree stop, steel ball bearings, and axles; adjustment device to permit setting for varying differential static pressure.

2.4 VOLUME DAMPERS

A. Manufacturers:

1. Air Balance, Inc.
2. Flexmaster U.S.A., Inc.
3. McGill AirFlow Corporation.
4. Ruskin Company.

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.

1. Pressure Classes of 3-Inch wg or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.

C. Standard Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.

1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch thick, with mitered and welded corners; frames with flanges where

B. General Description: AMCA-rated, opposed-blade design; minimum of 0.1084-inch-thick, galvanized-steel frames with holes for duct mounting; minimum of 0.0635-inch- thick, galvanized-steel damper blades with maximum blade width of 8 inches.

1. Secure blades to 1/2-inch- diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F.
3. Provide closed-cell neoprene edging.

2.6 FIRE DAMPERS

A. Manufacturers:
1. Greenheck.
2. McGill AirFlow Corporation.
3. Prefco Products, Inc.
4. Ruskin Company.

B. Fire dampers shall be labeled according to UL 555.

C. Fire Rating: 1-1/2 hours.

D. Frame: Curtain type with blades outside airstream Multiple-blade type; fabricated with roll-formed, 0.034-inch- thick galvanized steel; with mitered and interlocking corners.

E. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.052 or 0.138 inch thick as indicated and of length to suit application.
2. Exceptions: Omit sleeve where damper frame width permits direct attachment of perimeter mounting angles on each side of wall or floor, and thickness of damper frame complies with sleeve requirements.

F. Mounting Orientation: Vertical or horizontal as indicated.

G. Blades: Roll-formed, interlocking, 0.034-inch- thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- thick, galvanized-steel blade connectors.

H. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

I. Fusible Links: Replaceable, 165 deg F rated.

2.7 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers:
1. Greenheck.
2. Nailor Industries Inc.

E. Round Units:

1. Outer Casings:

a. ASTM A 653/A 653M, G90, galvanized sheet steel.
b. Up to 24 Inches in Diameter: 0.034 inch thick.
c. 26 through 40 Inches in Diameter: 0.040 inch thick.
d. 42 through 52 Inches in Diameter: 0.052 inch thick.
e. 54 through 60 Inches in Diameter: 0.064 inch thick.
f. Casings fabricated of spiral lock-seam duct may be one size thinner than that indicated.

2. Interior Casing, Partitions, and Baffles:

a. ASTM A 653/A 653M, G90, galvanized sheet steel.
b. At least 0.034 inch thick and designed for minimum aerodynamic losses.

F. Sheet Metal Perforations: 1/8-inch diameter for inner casing and baffle sheet metal.

G. Fill Material:

1. Erosion Barrier: Polymer bag enclosing fill and heat-sealed before assembly.

H. Fabricate silencers to form rigid units that will not pulsate, vibrate, rattle, or otherwise react to system pressure variations.

1. Do not use nuts, bolts, or sheet metal screws for unit assemblies.
2. Lock form and seal or continuously weld joints.
3. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
4. Reinforcement: Cross or trapeze angles for rigid suspension.

I. Source Quality Control:

1. Acoustic Performance: Test according to ASTM E 477.
2. Record acoustic ratings, including dynamic insertion loss and self-noise power levels with an airflow of at least 2000-fpm face velocity.
3. Leak Test: Test units for airtightness at 200 percent of associated fan static pressure or 6-inch wg static pressure, whichever is greater.

2.9 TURNING VANES

A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.

B. Manufactured Turning Vanes: Fabricate 1-1/2-inch- wide, double-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.

1. Manufacturers:

2.11 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Ductmate Industries, Inc.
2. Duro Dyne Corp.
3. Ventfabrics, Inc.

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch- wide, 0.028-inch- thick, galvanized sheet steel or 0.032-inch- thick aluminum sheets. Select metal compatible with ducts.

D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

E. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

F. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.

1. Minimum Weight: 16 oz./sq. yd..
2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

G. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.

1. Minimum Weight: 14 oz./sq. yd..
2. Tensile Strength: 450 lbf/inch in the warp and 340 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

2.12 FLEXIBLE DUCTS

A. Manufacturers:

1. Flexmaster U.S.A., Inc.
2. Hart & Cooley, Inc.
3. McGill AirFlow Corporation.

H. Install duct silencers independent of ducts with flexible duct connectors, lagged with loaded vinyl sheet on inlets and outlets.

I. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:

1. On both sidesone side of duct coils where an access door exists integral to the equipment for coil inspection, adjusting and maintenance. A duct mounted access door is not required.
2. Adjacent to fire or smoke dampers, providing access to reset or reinstall fusible links.

J. Install the following sizes for duct-mounting, rectangular access doors:

1. One-Hand or Inspection Access: 8 by 5 inches.
2. Two-Hand Access: 12 by 6 inches.
3. Head and Hand Access: 18 by 10 inches.
4. Head and Shoulders Access: 21 by 14 inches.
5. Body Access: 25 by 14 inches.
6. Body Plus Ladder Access: 25 by 17 inches.

K. Install the following sizes for duct-mounting, round access doors:

1. One-Hand or Inspection Access: 8 inches in diameter.
2. Two-Hand Access: 10 inches in diameter.
3. Head and Hand Access: 12 inches in diameter.
4. Head and Shoulders Access: 18 inches in diameter.
5. Body Access: 24 inches in diameter.

L. Install the following sizes for duct-mounting, pressure relief access doors:

1. One-Hand or Inspection Access: in diameter.
2. Two-Hand Access: 10 inches in diameter.
3. Head and Hand Access: 13 inches in diameter.
4. Head and Shoulders Access: 19 inches in diameter.

M. Label access doors according to Division 23 Section "Identification for HVAC Piping and Equipment."

N. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

O. For fans developing static pressures of 5-inch wg and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.

P. Connect diffusers or light troffer boots to low pressure ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

Q. Connect flexible ducts to metal ducts with draw bands.

R. Install duct test holes where indicated and required for testing and balancing purposes.

SECTION 23 52 39

FIRE-TUBE BOILERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes packaged, factory-fabricated and -assembled boilers, trim, and accessories for generating hot water and steam with the following configurations and burners:
   1. Horizontal, fire-tube boiler.
   2. Combination gas and oil burner.

1.2 SUBMITTALS

A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
   1. Design calculations and vibration isolation base details, signed and sealed by a qualified professional engineer.
      a. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
      b. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails and equipment mounting frames.
   2. Wiring Diagrams: Power, signal, and control wiring.

C. Source quality-control test reports.

D. Field quality-control test reports.

E. Operation and Maintenance Data: For boilers, components, and accessories to include in emergency, operation, and maintenance manuals.

F. Warranty: Special warranty specified in this Section.

G. Other Informational Submittals:
   1. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.
   2. Startup service reports.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.

C. Front and Rear Doors:
1. Davited, sealed with heat-resistant gaskets and fastened with lugs and cap screws.
2. Designed so tube sheets and flues are fully accessible for inspection or cleaning when doors are open.
3. Include observation ports in doors at both ends of boiler for inspection of flame conditions.
4. Door refractory shall be accessible for inspection and maintenance.

D. Casing:
1. Insulation: Minimum 2-inch- thick, mineral-fiber insulation surrounding the boiler shell.
2. Flue Connection: Flange at top of boiler.
3. Jacket: Sheet metal, with screw-fastened closures and baked-enamel protective finish.
4. Mounting base to secure boiler to concrete base.
   a. Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" when mounting base is anchored to building structure.
5. Control Compartment Enclosure: NEMA 250, Type 1 .

E. Barometric Damper: Galvanized-steel assembly with flue-gas thermometer having a minimum 3-1/2-inch- diameter dial.

2.3 BURNER

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cleaver-Brooks; div. of Aqua-Chem, Inc.
2. ICS International
3. Warsopt.
4. Gordon Piatt

B. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for fuel oil and natural gas.

C. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
1. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."
   a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

D. Oil Supply: Control devices and modulating control sequence shall comply with requirements in ASME CSD-1 IRI .
1. Oil Pump: Two-stage, gear-type oil pump shall be capable of producing 300-psig discharge pressure and 15-inch Hg vacuum.
2. Oil Piping Specialties:
   a. Suction-line, manual, gate valve.
   b. Removable-mesh oil strainer.
   c. 0- to 30-inch Hg vacuum; 0- to 30-psig vacuum-pressure gage.

2.5 CONTROLS

A. Refer to Division 23 Section "Instrumentation and Control for HVAC."

B. Boiler operating controls shall include the following devices and features:
   1. Control transformer.
   2. Set-Point Adjust: Set points shall be adjustable.
   3. Operating Pressure Control: Factory wired and mounted to cycle burner.
   4. Low-Water Cutoff and Pump Control: Operate feedwater pump(s) on/off for water control.
   5. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain a constant steam pressure. Maintain pressure set point plus or minus 10 percent.
      a. Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.

C. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
   1. High Cutoff: Automatic reset stops burner if operating conditions rise above maximum boiler design temperature pressure.
   2. Low-Water Cutoff Switch: Electronic probe shall prevent burner operation on low water. Cutoff switch shall be manual -reset type.
   3. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.

D. Building Management System Interface: Factory-install hardware and software to enable building management system to monitor, control, and display boiler status and alarms.
   1. Hardwired Points:
      a. Monitoring: On/off status, common trouble alarm low water level alarm.
      b. Control: On/off operation, hot water supply temperature set-point adjustment steam pressure adjustment.
   2. A communication interface with building management system shall enable building management system operator to remotely control and monitor the boiler from an operator workstation. Control features available, and monitoring points displayed, locally at boiler control panel shall be available through building management system.
   3. Provide additional monitoring, alarm panel to locate within PBX Room.

2.6 ELECTRICAL POWER

A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.

B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
   1. House in NEMA 250, Type 1 enclosure.
   2. Wiring shall be numbered and color-coded to match wiring diagram.
   3. Install wiring outside of an enclosure in a raceway.
   4. Field power interface shall be to fused disconnect switch .
   5. Provide branch power circuit to each motor and to controls with a disconnect switch or circuit breaker.

D. Connect oil piping full size to burner inlet with shutoff valve and union.

E. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tappings with shutoff valve and union or flange at each connection.

F. Install piping from safety valves to drip-pan elbow and to nearest floor drain.

G. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.

H. Connect breeching full size to boiler outlet. Comply with requirements in Division 23 Section "Breechings, Chimneys, and Stacks" for venting materials.

I. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

J. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:
   1. Perform installation and startup checks according to manufacturer's written instructions.
   2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
   3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
   4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
      a. Burner Test: Adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency.
      b. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature steam pressure.
      c. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

C. Remove and replace malfunctioning units and retest as specified above.

D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

E. Performance Tests:
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
   2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment in order to comply.

SECTION 23 53 13

BOILER FEEDWATER PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Feedwater pumps and receivers.
2. Vacuum-type feedwater pumps and receivers.

1.2 DEFINITION

A. NPSH: Net-positive suction head.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacity, temperature and NPSH required, pump performance curves with selection points clearly indicated, and furnished specialties and accessories.

B. Shop Drawings: Include plans, elevations, sections, details, dimensions, weights, loadings, required clearances, method of field assembly, and attachments to other work.

1. Wiring Diagrams: Power, signal, and control wiring.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Fabricate and test unit according to ASME PTC 12.1, "Closed Feedwater Heaters."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. ASME Compliance: ASME B31.1, "Power Piping," for systems more than 15 psig. Safety valves and pressure vessels shall bear the appropriate ASME label.

SECTION 23 53 16

DEAERATORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes packaged, factory-assembled deaerators.

1.2 DEFINITIONS

A. Feedwater Pump: Pump that moves feedwater from the deaerator to the boiler.

B. Transfer Pump: Pump that moves feedwater from the surge tank to the deaerator.

C. NPSH: Net-positive suction head.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated makeup water, feedwater, and steam flow rates; working pressure; tank capacities; storage capacity in minutes; temperature and NPSH required; pump performance curves with selection points clearly indicated; furnished specialties; and accessories.

B. Shop Drawings: For deaerators, signed and sealed by a qualified professional engineer; include plans, elevations, sections, details, dimensions, weights, loadings, required clearances, and attachments to other work.
   1. For installed products indicated to comply with design loads, include structural analysis data.
   2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing deaerator bases.
   3. Wiring Diagrams: Power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For deaerators to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASME Compliance: ASME B31.1, "Power Piping," for systems more than 15 psig ASME B31.9, "Building Services Piping," for systems equal to or less than 15 psig. Safety valves and pressure vessels shall bear the appropriate ASME label.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect flanges, pipe openings, nozzles, bearings, and couplings from damage during shipping and storage.

B. Comply with manufacturer's written rigging instructions.

5. Factory-Installed Pipe, NPS 2-1/2 and Smaller: ASTM A 53/A 53M, Type S (seamless), Grade B; or ASTM A 106, Type S, Grade B, Schedule 80; with threaded joints and fittings.
   a. Cast-Iron Threaded Fittings: ASME B16.4, Class 250.
   b. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150 .
   c. Forged-Steel Fittings: ASME B16.11, Class 3000.
   d. Malleable-Iron Unions: ASME B16.39, Class 150 .
   e. Forged-Steel Unions: MSS SP-83, Class 3000.
6. Factory-Installed Pipe, NPS 3 and Larger: ASTM A 53/A 53M, Type E (electric-resistance welded), Grade B; or ASTM A 106, Type S, Grade B, Schedule 80; with welded joints and carbon-steel fittings and flanges.
   a. Wrought-Steel Fittings: ASME B16.9, wall thickness to match adjoining pipe.
   b. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, Class 150 , including bolts, nuts, and gaskets.

F. Accessories:
1. Lifting eyes.
2. Companion flanges on discharge side of each boiler feedwater pump.
3. Pump suction piping with vortex breaker, isolation valve, and flexible connector. Suction piping sized for a maximum velocity of 2.9 feet per second at rated pump flow.
4. Pump discharge piping with check valve, isolation valve, approved flow control valve and liquid-filled pressure gage graduated in pounds force per square inch. Piping to meet requirements of ASME Section I and all local code requirements.
5. Makeup Water Assembly to Storage Tank Section:
   a. Factory -mounted, electric, on-off valve with factory-mounted, probe-type water-level controller; or factory-mounted and piped external on-off float switch assembly.
6. Steam Temperature Control Valve(s): Pilot operated, and sized to maintain deaerator design temperature using steam at boiler design operating pressure.
7. Meters and Gages:
   a. Full-height, water-level gage glass and stop valve set.
   b. Bimetal dial-type thermometer graduated in Fahrenheit mounted to measure temperature in storage and steam section of tank.
   c. Compound pressure gage, graduated in pounds force per square inch for pressure and inches of Hg for vacuum, mounted to measure pressure or vacuum in steam section of tank.
8. Provision for chemical injection quill.
9. Chemical injection quill.
10. Sampling connection with valve.
11. Tank drain connection with valve.

G. Support Frame: Structural-steel tube frame for supporting tank and pumps. Weld or bolt to tank.
1. Fabricate support frame with bracing adequate for seismic forces according to authorities having jurisdiction and to allow installation by anchoring deaerators to floor only.

H. Feedwater Pump: Cast-iron, base-mounted volute; with bronze or stainless-steel, multistage centrifugal impeller, renewable bronze case ring, and stainless-steel shaft.

2.4 SOURCE QUALITY CONTROL

A. Fabricate and label deaerator tanks according to ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

B. Factory install and test piping that connects pumps to tanks according to ASME B31.1, "Power Piping ASME B31.9, " Building Services Piping."

C. Factory test performance and certify test results on packaged deaerator units, according to ASME PTC 12.3, before shipping to Project.

D. The feedwater leaving the deaerator shall contain oxygen levels of less than 7 parts per billion (.005 cc/liter) without any chemical oxygen reagents. The deaeration system shall meet these performance requirements at all load conditions regardless of the magnitude of the load or the variations. The system shall provide preheated, deaerated feed water from the time of the feedwater pumps are started.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before deaerator installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting performance, maintenance, and operations.
   1. Final deaerator locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
   2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install deaerators level on concrete base. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.

B. Vibration Isolation: Elastomeric isolator pads with a minimum static deflection of 0.25 inch. Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

C. Install deaerators to permit access for service and maintenance.

D. Support piping independent of pumps.

E. Install base-mounted pumps on concrete base with grouted base frame.

F. Install all parts and materials not factory installed.

G. Extend overflow drains to floor drains.

H. Extend full sized vent piping to outside and terminate with manufacturer-approved cap.

I. Install piping adjacent to machine to allow service and maintenance.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service, do adjusting and cleaning, and train Owner's maintenance personnel as detailed in this paragraph, and in Paragraphs 3.6 and 3.7.

B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
   1. Set deaerator makeup water-level controls.
   2. Verify bearing lubrication.
   3. Verify proper motor rotation.
   4. Start pumps according to manufacturer's written instructions.

3.6 ADJUSTING AND CLEANING

A. Adjust initial temperature and pressure set points.

B. Set field-adjustable switches and circuit-breaker trip ranges.

C. Clean strainers.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain deaerators. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION 23 53 16

SECTION 23 57 00

HEAT EXCHANGERS FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Shell and tube heat exchanger
   2. Plate and frame heat exchanger

1.2 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   1. Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.

C. Coordination Drawings: Equipment room, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

   1. Tube-removal space.
   2. Structural members to which heat exchangers will be attached.
   3. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
   4. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Operation and Maintenance Data: For heat exchangers to include in emergency, operation, and maintenance manuals.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, performance, and dimensional requirements of heat exchangers and are based on the specific equipment indicated. Refer to Division 01 Section "Product Requirements."

B. ASME Compliance: Fabricate and label heat exchangers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas for compliance with requirements for installation tolerances and for structural rigidity, strength, anchors, and other conditions affecting performance of heat exchangers.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 HEAT-EXCHANGER INSTALLATION

A. Install shell-and-tube heat exchangers on saddle supports.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Maintain manufacturer's recommended clearances for service and maintenance. Install piping connections to allow service and maintenance of heat exchangers.

C. Install shutoff valves at heat-exchanger inlet and outlet connections.

D. Install relief valves on heat-exchanger heated-fluid connection and install pipe relief valves, full size of valve connection, to floor drain.

E. Install vacuum breaker at heat-exchanger steam inlet connection.

F. Install hose end valve to drain shell.

3.4 FIELD QUALITY CONTROL

A. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.5 CLEANING

A. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

SECTION 23 64 16

CENTRIFUGAL WATER CHILLERS

PART 1 - GENERAL

1.1 SUMMARY

This Section includes packaged, water-cooled, electric-motor-driven, centrifugal water chillers with the following features:

1. Variable-frequency controller. (Alternate)
2. Microprocessor-based controls complying with ASHRAE 135.

B. Related Sections include the following:

1. Division 28 Section "Refrigerant Detection and Alarm" for refrigerant monitors, alarms, supplemental breathing apparatus, and ventilation equipment interlocks.

1.2 DEFINITIONS

A. EER: Energy-efficiency ratio.

B. IPLV: Integrated part-load value.

C. NPLV: Non-standard part-load value.

1.3 SUBMITTALS

A. Product Data: Include refrigerant, rated capacities, operating characteristics, furnished specialties, and accessories.

B. Shop Drawings: Complete set of manufacturer's certified prints of water chiller assemblies, control panels, sections and elevations, and unit isolation. Include the following:

1. Assembled unit dimensions.
2. Operating weight and load distribution.
3. Required clearances for maintenance and operation.
4. Size and location of piping and wiring connections.
5. Vibration Isolation Calculations and Details: Signed and sealed by a qualified professional engineer.
   a. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
   b. Vibration Isolation Base Detail: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails and equipment mounting frames.
6. Wiring Diagrams: Power, signal, and control wiring.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of water chillers that fails in materials or workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Carrier; a United Technologies Company.
3. Trane Company (The).
4. YORK International Corporation.

2.2 PACKAGED WATER CHILLERS

A. Description: Factory-assembled and tested water chiller complete with compressor, evaporator, condenser, controls, interconnecting unit piping and wiring, indicated accessories, and mounting frame. Provide factory furnished head pressure control valve and controls for cold condenser water starts.

2. Carrier: 2 Alternates.

WATER COOLED CHILLER SCHEDULE			
DESIGNATION		**CH-06-1,2**	**CH-06-1,2**
TYPE		CENTRIFUGAL	CENTRIFUGAL
SELECTION TYPE		ALTERNATE	ALTERNATE
EVAPORATOR DATA	GPM	**1200**	**1200**
	EWT (°F)	42	42
	LWT (°F)	54	54
	P.D. (FT)	**20**	**20**
CONDENSER DATA	GPM	**1800**	**1800**
	EWT (°F)	85	85
	LWT (°F)	95	95
	P.D. (FT)	**24**	**24**
KW / TON		**0.600**	**0.599**
NPLV		**0.569**	**0.392**
VOLT / PH / FREQ		480 / 3 / 60	480 / 3 / 60
PRIMARY LRA (A)		**520**	**548**
MCA (A)		**653**	**625**
MOCP (A)		**1000**	**900**
REFRIGERANT		R-134a	R-134a
OPERATING WEIGHT (LBS.		28700	29000
MANUFACUTURER		CARRIER	CARRIER
MODEL		19XR	19XR
NOTES		**1-7, 9**	ALL

NOTES:

1. CONDENSER FOULING FACTOR = .00025
2. EVAPORATOR FOULING FACTOR = .00010
3. TWO PASS CONDENSER
4. TWO PASS EVAPORATOR
5. MARINE WATER BOXES ON EVAPORATOR
6. MARINE WATER BOXES ON CONDENSER
7. EVAPORATOR AND CONDENSER CONNECTIONS ON SAME END OF UNIT.
8. UNIT MOUNTED VFD.
9. **PROVIDE FACTORY FURNISHED HEAD PRESSURE CONTROL VALVE & CONTROLS FOR COLD CONDENSER WATER STARTS.**

2.3 COMPRESSORS

A. Description: Variable displacement
   1. Casing: Cast iron, precision ground.
   2. Impeller: High strength, cast-aluminum alloy on carbon- or forged-steel shaft; dynamically balanced.

B. Capacity Control: Variable-inlet guide-vane assembly for stable operation that is free of surge, cavitation, or vibration throughout throttling range from 100 to 10 percent of full load.

C. Oil Lubrication System: Positive-displacement submersible pump with heater, oil filter, and sight glass.

D. Refrigerant: HCFC-123 or HFC-134a.

E. Refrigerant Compatibility: Seals, O-rings, motor windings, and internal water chiller parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.

2.4 HEAT EXCHANGERS

A. Evaporator:
   1. Description: Shell-and-tube design, ASME labeled.
   2. Shell Material: Carbon steel.
   3. Tube Construction: Individually replaceable, expanded into tube sheets.
      a. Material: Copper, copper-nickel alloy, or titanium.
      b. Minimum Size: 3/4-inch OD; 0.028-inch wall thickness.
      c. Internal Finish: Enhanced.
   4. Water Box: Marine, with design working pressure of 150 psig, and having grooved mechanical-joint coupling water-nozzle connections with a thermistor-type temperature sensor factory installed in each nozzle.

B. Condenser:
   1. Description: Shell-and-tube design, ASME labeled.
   2. Shell Material: Carbon steel.
   3. Tube Construction: Externally enhanced and individually replaceable, expanded into tube sheets.
      a. Material: Copper-nickel alloy, or titanium.
      b. Minimum Size: 3/4-inch OD; 0.028-inch wall thickness.
      c. Internal Finish: Enhanced.
   4. Water Box: Marine, with design working pressure of 150 psig , and having grooved mechanical-joint coupling water-nozzle connections with a thermistor-type temperature sensor factory installed in each nozzle.

2. Entering and leaving chilled-water temperatures, control set points, and motor load limit. Chilled-water temperature shall be reset based on return-water temperature.
3. Current limit and demand limit.
4. Condenser-water temperature.
5. External water chiller emergency stop.

E. Manually Reset Safety Controls: The following conditions shall shut down water chiller and require manual reset:
1. Low evaporator pressure temperature; high condenser pressure.
2. Low chilled-water temperature.
3. Low oil differential pressure.
4. High or low oil pressure.
5. High oil temperature.
6. High compressor-discharge temperature.
7. Loss of chilled- or condenser-water flow.
8. Electrical overload.
9. Sensor- or detection-circuit fault.
10. Processor communication loss.
11. Starter fault.
12. Extended compressor surge.
13. Excessive air-leakage detection if using HCFC-123.

F. Building Management System Interface: Factory-installed hardware and software to enable existing building management system to monitor and control chilled-water set point and chiller-control displays and alarms. Verify existing BMS compatibility prior to chiller purchase and provide interface as required for integration into new DDC controls system and workstation.

2.8 MOTORS

A. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
1. Open-drive motors shall have flanged or flexible coupling suitable for direct connection to compressor.

2.9 MAGNETIC ENCLOSED CONTROLLERS

A. Enclosure: Unit mounted, NEMA 250, Type 1, with hinged access door with lock and key or padlock and key.

B. Control Circuit: 120 V; obtained from integral control power transformer with a control power transformer of enough capacity to operate connected pilot and indicating and control devices.

C. Overload Relay: Shall be sized according to UL 1995 or shall be an integral component of water chiller control microprocessor.

D. Reduced voltage wye-delta

2. Input frequency tolerance of 60 Hz, plus or minus 2 Hz.
3. Capable of driving full load, under the following conditions, without derating:
   a. Ambient Temperature: 0 to 40 deg C.
   b. Humidity: Less than 90 percent (non-condensing).
   c. Altitude: 3300 feet.
4. Minimum Efficiency: 96 percent at 60 Hz, full load.
5. Minimum Displacement Primary-Side Power Factor: 95 percent without optional harmonic filter, and 98 percent with optional filter.
6. Overload Capability: 1.05 times the full-load current for 7 seconds.
7. Starting Torque: 100 percent of rated torque or as indicated.
8. Speed Regulation: Plus or minus 1 percent.
9. Isolated control interface to allow controller to follow control signal over an 11:1 speed range.

D. Internal Adjustability Capabilities:
   1. Minimum Speed: 50 percent of maximum rpm.
   2. Maximum Speed: 100 percent of maximum rpm.
   3. Acceleration: 2 to a minimum of 12 seconds.
   4. Current Limit: 50 to a minimum of 110 percent of maximum rating.

E. Self-Protection and Reliability Features:
   1. Input transient protection by means of surge suppressors.
   2. Snubber networks to protect against malfunction due to system voltage transients.
   3. Under- and overvoltage trips; inverter overtemperature, overload, and overcurrent trips.
   4. Motor Overload Relay: Adjustable and capable of NEMA 250, Class 10 performance.
   5. Instantaneous line-to-line and line-to-ground overcurrent trips.
   6. Loss-of-phase protection.
   7. Reverse-phase protection.
   8. Short-circuit protection.
   9. Motor overtemperature fault.

F. Automatic Reset and Restart: To attempt three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction.
   1. Maximum Restarts per Hour: 15.

G. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped.

I. Status Lights: Door-mounted, liquid-crystal-display or light-emitting-diode indicators shall indicate the following conditions:
   1. Power on.
   2. Run.
   3. Overvoltage.
   4. Line fault.
   5. Overcurrent.
   6. External fault.

2.11 SOURCE QUALITY CONTROL

A. Factory test and rate water chillers, before shipping, according to ARI 550/590, "Water Chilling Packages Using the Vapor Compression Cycle." Stamp with ARI label.

B. Factory test heat exchangers hydrostatically at 1.50 times the design pressure.

C. Factory test and inspect evaporator and water cooled-condenser according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1. Stamp with ASME label.

D. Factory test and inspect water boxes at 150 percent of working pressure.

E. Rate sound power level according to ARI 575 procedure.

F. Allow Owner access to places where water chillers are being source quality-control tested. Notify Architect 14 days in advance of testing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Before water chiller installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, piping, and electrical to verify actual locations, sizes, and other conditions affecting water chiller performance, maintenance, and operations.
   1. Final water chiller locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WATER CHILLER INSTALLATION

A. Install water chillers on concrete base. Concrete base is specified in Division 23 Section "Common Work Results for HVAC," and concrete materials and installation requirements are specified in Division 03.

B. Concrete Bases: Anchor chiller mounting frame to concrete base.
   1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
   2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
   3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   4. Install anchor bolts to elevations required for proper attachment to supported equipment.
   5. Cast-in-place concrete materials and placement requirements are specified in Division 03.

C. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
   1. Verify that refrigerant charge is sufficient and water chiller has been leak tested.
   2. Verify that pumps are installed and functional.
   3. Verify that thermometers and gages are installed.
   4. Operate water chiller for run-in period according to manufacturer's written instructions.
   5. Check bearing lubrication and oil levels.
   6. Verify that refrigerant pressure relief is vented outside.
   7. Verify proper motor rotation.
   8. Verify static deflection of vibration isolators, including deflection during water chiller startup and shutdown.
   9. Verify and record performance of chilled- and condenser-water flow and low-temperature interlocks.
   10. Verify and record performance of water chiller protection devices.
   11. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.

D. Prepare a written startup report that records results of tests and inspections.

E. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water chillers. Refer to Division 01 Section "Demonstration and Training."

END OF SECTION

SECTION 23 65 00

COOLING TOWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Open-circuit, induced-draft, crossflow cooling towers.

1.2 DEFINITIONS

A. BMS: Building management system.

B. FRP: Fiber-reinforced polyester.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, pressure drop, fan performance data, rating curves with selected points indicated, furnished specialties, and accessories.
1. Maximum flow rate.
2. Minimum flow rate.
3. Drift loss as percent of design flow rate.
4. Volume of water in suspension for purposes of sizing a remote storage tank.
5. Sound power levels in eight octave bands for operation with fans off, fans at minimum, and design speed.
6. Performance curves for the following:
   a. Varying entering-water temperatures from design to minimum.
   b. Varying ambient wet-bulb temperatures from design to minimum.
   c. Varying water flow rates from design to minimum.
   d. Varying fan operation (off, minimum, and design speed).
7. Fan airflow, brake horsepower, and drive losses.
8. Pump flow rate, head, brake horsepower, and efficiency.
9. Motor amperage, efficiency, and power factor at 100, 75, 50, and 25 percent of nameplate horsepower.
10. Electrical power requirements for each cooling tower component requiring power.

B. Shop Drawings: Complete set of manufacturer's prints of cooling tower assemblies, control panels, sections and elevations, and unit isolation. Include the following:
1. Assembled unit dimensions.
2. Weight and load distribution.
3. Required clearances for maintenance and operation.
4. Sizes and locations of piping and wiring connections.

B. Coordinate sizes, locations, and anchoring attachments of structural-steel support structures.

C. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace the following components of cooling towers that fail in materials or workmanship within specified warranty period:
1. Fan assembly including fan, drive, and motor.
2. All components of cooling tower.
3. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 OPEN-CIRCUIT, INDUCED-DRAFT, CROSSFLOW COOLING TOWERS

A. Products: Subject to compliance with requirements, provide one of the following:
1. Baltimore Aircoil Company; Series 1500 and 3000.
2. Marley Cooling Technologies, an SPX Corporation; Models Aquatower, AV series, NC Class (basis of design), Primus.

E. Collection Basin: Stainless Steel

F. Mechanically Operated, Collection Basin Water-Level Control: Manufacturer's standard adjustable, mechanical float assembly and valve.

H. Electric Basin Heater:
1. Stainless-Steel Electric Immersion Heaters: Installed in a threaded coupling on the side of the collection basin.
2. Heater Control Panel: Mounted on the side of each cooling tower cell.
3. Enclosure: NEMA 250, Type 3R .
4. Magnetic contactors controlled by a temperature sensor/controller to maintain collection basin water-temperature set point. Water-level probe shall monitor cooling tower water level and de-energize the heater when the water reaches low-level set point.
5. Control-circuit transformer with primary and secondary side fuses.
6. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
7. Single-point, field-power connection to a fused disconnect switch and heater branch circuiting complying with NFPA 70.
8. Factory Wiring Method: Metal raceway for factory-installed wiring outside of enclosures, except make connections to each electric basin heater with liquid-tight conduit.

I. Gravity Water Distribution Basin: Nonpressurized design with head of water level in basin adequate to overcome spray nozzle losses and designed to evenly distribute water over fill throughout the flow range indicated.
1. Material: Stainless steel.
2. Location: Over each bank of fill with easily replaceable plastic spray nozzles mounted in bottom of basin.
3. Inlet Connection: ASME B16.5, Class 150 flange.
4. Joints and Seams: Sealed watertight.
5. Partitioning Dams: Same material as basin to distribute water over the fill to minimize icing while operating throughout the flow range indicated.
6. Removable Panels: Same material as basin to completely cover top of basin. Secure panels to basin with removable stainless-steel hardware.
7. Valves: Manufacturer's standard valve installed at each inlet connection and arranged to balance or shut off flow to each gravity distribution basin.
8. Single-Inlet, Field Pipe Connection: Galvanized-steel pipe arranged to provide balancing of flow within cooling tower cell without the need for additional balancing valves. Pipe each cooling tower cell internally to a single, field connection suitable for mating to ASME B16.5, Class 150 flange and located on the bottom unless otherwise indicated.

J. Fill:
1. Materials: PVC, with maximum flame-spread index of 5 according to ASTM E 84.
2. Minimum Thickness: 20 mils, before forming.
3. Fabrication: Fill-type sheets, fabricated, formed, and bonded together after forming into removable assemblies that are factory installed by manufacturer.

K. Air-Intake Louvers:

2. Stack Termination: Wire-mesh, galvanized-steel screens; complying with OSHA regulations.

Q. Vibration Switch: For each fan drive.
1. Enclosure: NEMA 250, Type 4 .
2. Vibration Detection: Sensor with a field-adjustable, acceleration-sensitivity set point in a range of 0 to 1 g and frequency range of 0 to 3000 cycles per minute. Cooling tower manufacturer shall recommend switch set point for proper operation and protection.
3. Provide switch with manual-reset button for field connection to a BMS and hardwired connection to fan motor electrical circuit.
4. Switch shall, on sensing excessive vibration, signal an alarm through the BMS and shut down the fan.

R. Controls: Comply with requirements in Division 23 Section "Instrumentation and Control for HVAC." Equipment shall interface with Siemens based building management system to monitor and control cooling tower performance and operational setpoints.

S. Personnel Access Components:
1. Doors: Large enough for personnel to access cooling tower internal components from both cooling tower end walls. Doors shall be operable from both sides of the door.
2. External Ladders with Safety Cages: Aluminum, galvanized- or stainless-steel, fixed ladders with ladder extensions to access external platforms and top of cooling tower from adjacent grade without the need for portable ladders. Comply with 29 CFR 1910.27.
3. External Platforms with Handrails: Aluminum, FRP, or galvanized-steel bar grating at cooling tower access doors when cooling towers are elevated and not accessible from grade.
4. Handrail: Aluminum, galvanized steel, or stainless steel complete with kneerail and toeboard, around top of cooling tower. Comply with 29 CFR 1910.23.
5. Internal Platforms: Aluminum, FRP, or galvanized-steel bar grating.
   a. Spanning the collection basin from one end of cooling tower to the other and positioned to form a path between the access doors. Platform shall be elevated so that all parts are above the high water level of the collection basin.
   b. Elevated internal platforms with handrails accessible from fixed vertical ladders to access the fan drive assembly when out of reach from collection basin platform.

2.2 SOURCE QUALITY CONTROL

A. Verification of Performance: Test and certify cooling tower performance according to CTI STD 201, "Certification Standard for Commercial Water-Cooling Towers Thermal Performance."

F. Domestic Water Piping: Comply with applicable requirements in Division 22 Section "Domestic Water Piping." Connect to water-level control with shutoff valve and union, flange, or mechanical coupling at each connection.

G. Supply and Return Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping." Connect to entering cooling tower connections with shutoff valve, balancing valve, thermometer, plugged tee with pressure gage, and drain connection with valve. Connect to leaving cooling tower connection with shutoff valve. Make connections to cooling tower with a flange .

H. Equalizer Piping: Piping requirements to match supply and return piping. Connect an equalizer pipe, full size of cooling tower connection, between tower cells. Connect to cooling tower with shutoff valve.

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Cooling towers will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

B. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.

C. Obtain performance data from manufacturer.
1. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
   a. Clean entire unit including basins.
   b. Verify that accessories are properly installed.
   c. Verify clearances for airflow and for cooling tower servicing.
   d. Check for vibration isolation and structural support.
   e. Lubricate bearings.
   f. Verify fan rotation for correct direction and for vibration or binding and correct problems.
   g. Adjust belts to proper alignment and tension.
   h. Operate variable-speed fans through entire operating range and check for harmonic vibration imbalance. Set motor controller to skip speeds resulting in abnormal vibration.
   i. Check vibration switch setting. Verify operation.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements for Joining Plastic Piping ASTM F493

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

1. Manufacturers:

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

    a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
    b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
    c. Insulated Piping: One-piece, stamped-steel type with spring clips.
    d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
    e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
    f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PAINTING

A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1.

END OF SECTION 22 05 00

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following general-duty valves:

1. Bronze angle valves.
2. Cast-iron angle valves.
3. Bronze ball valves.
4. Ferrous-alloy ball valves.
5. Ductile-iron butterfly valves.
6. High-pressure butterfly valves.
7. Bronze check valves.
8. Cast-iron swing check valves.
9. Spring-loaded, lift-disc check valves.
10. Bronze gate valves.
11. Cast-iron gate valves.
12. Bronze globe valves.
13. Cast-iron globe valves.
14. Cast-iron plug valves.
15. Resilient-seated, cast-iron, eccentric plug valves.
16. Chainwheel actuators.

B. Related Sections include the following:

1. Division 21 fire-suppression piping and fire pump Sections for fire-protection valves.
2. Division 22 Section "Identification for Plumbing Piping and Equipment" for valve tags and charts.
3. Division 22 piping Sections for specialty valves applicable to those Sections only.

1.3 DEFINITIONS

A. The following are standard abbreviations for valves:

1. CWP: Cold working pressure.
2. EPDM: Ethylene-propylene-diene terpolymer rubber.
3. NBR: Acrylonitrile-butadiene rubber.
4. PTFE: Polytetrafluoroethylene plastic.

2.2 VALVES, GENERAL

A. Refer to Part 3 "Valve Applications" Article for applications of valves.

B. Bronze Valves: NPS 2 (DN 50) and smaller with threaded ends or sweat connections, unless otherwise indicated.

C. Ferrous Valves: NPS 2-1/2 (DN 65) and larger with flanged ends, unless otherwise indicated.

D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.

F. Valve Actuators:

1. Handwheel: For valves other than quarter-turn types.
2. Lever Handle: For quarter-turn valves NPS 6 (DN 150) and smaller, except plug valves.
3. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug head.

G. Extended Valve Stems: On insulated valves. Valves shall have 2-inch (50-mm) stem extensions and the following features:

1. Gate Valves: Shall be rising-stem type.
2. Ball Valves: Shall have extended operating handle of non-thermal-conductive material, protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation, and memory stops that are fully adjustable after insulation is applied.

    a. Basis-of-Design Product: NIBCO Nib-seal handle extension or a comparable product by one of the following:

        1) Conbraco Industries, Inc.; Apollo Div.
        2) Watts:
        3) Crane Co.

3. Butterfly Valves: Shall have extended necks.

H. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.

I. Valve Grooved Ends: AWWA C606.

J. Solder Joint: With sockets according to ASME B16.18.

1. Caution: Use solder with melting point below 840 deg F (454 deg C) for angle, check, gate, and globe valves; below 421 deg F (216 deg C) for ball valves.

K. Threaded: With threads according to ASME B1.20.1.

2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500), if longer ends are required for riser clamps.

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
2. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
3. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
6. C-Clamps (MSS Type 23): For structural shapes.
7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:

    a. Light (MSS Type 31): 750 lb (340 kg).
    b. Medium (MSS Type 32): 1500 lb (680 kg).
    c. Heavy (MSS Type 33): 3000 lb (1360 kg).

13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

F. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.

G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 (DN 65) and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.

N. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

    a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
    b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    c. Do not exceed pipe stress limits according to ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

    a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN 100) and larger if pipe is installed on rollers.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 22 05 29

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Stencils.
5. Valve tags.
6. Warning tags.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.3 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Stainless steel, 0.025-inch (0.64-mm)minimum thickness, and having predrilled or stamped holes for attachment hardware.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.4 STENCILS

A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; and minimum letter height of 3/4 inch (19 mm) for access panel and door labels, equipment labels, and similar operational instructions.

1. Stencil Material: Aluminum.
2. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

2.5 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.

1. Tag Material: Brass, 0.025-inch (0.64-mm} minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link, beaded chain or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

D. Pipe Label Color Schedule:

1. Domestic Water Piping:

a. Background Color: Black.
b. Letter Color: White.

2. Sanitary Waste and Storm Drainage Piping:

a. Background Color: White.
b. Letter Color: Black.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 1-1/2 inches (38 mm), round.

2. Valve-Tag Color:

a. Cold Water: Natural.

3. Letter Color:

a. Cold Water: Black.

3.5 WARNING-TAG INSTALLATION

A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 22 05 53

SECTION 22 07 00

PLUMBING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Insulation Materials:

   a. Calcium silicate.
   b. Cellular glass.
   c. Flexible elastomeric.
   d. Mineral fiber.
   e. Phenolic.
   f. Polyisocyanurate.
   g. Polyolefin.
   h. Polystyrene.

2. Fire-rated insulation systems.
3. Insulating cements.
4. Adhesives.
5. Mastics.
6. Lagging adhesives.
7. Sealants.
8. Factory-applied jackets.
9. Field-applied fabric-reinforcing mesh.
10. Field-applied cloths.
11. Field-applied jackets.
12. Tapes.
13. Securements.
14. Corner angles.

B. Related Sections:

1. Division 21 Section "Fire-Suppression Systems Insulation."
2. Division 23 Section "HVAC Insulation."
3. Division 23 Section "Metal Ducts" for duct liners.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).

B. Qualification Data: For qualified Installer.

C. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Owens-Corning

B. Johns-Manville

C. Pittsburg-Corning

D. Certain Teed Manson

E. Knauf Fiberglass

2.2 BASIC INSULATION MATERIALS, FITTINGS, FINISHES

A. Insulation materials shall conform to the following requirements:

	Type	Maximum K Factor @75°F	Density Lb. Per Temp. Limit-°F	Federal Cubic Foot	Spec. Compliance
1	Calcium Silicate	0.38	1200	14	HH-I-523C
2	Fiberglass (Rigid)	0.23	450	3	HH-I-558B
3	Fiberglass Flexible Duct Wrap	0.25	250	4-Mar	HH-I-558B
4	Foamed Glass (Cellular)	0.36	850	9	HH-I-1751/3A
5	Foamed Plastic (Flexible)	0.25	220	5	HH-I-573
6	High Temperature Fiberglass	0.23	850	3	HH-I-558B
7	Insulating Cement	0.7	1700		SS-C-160
8	Mineral Wool Rigid Wrap w/ASJ (Paroc Basalt)	1050			

B. Fittings & Valves (Types)

1. Fiberglass: Preformed P.V.C. fitting covers with flexible inserts for 2" and smaller piping, density and conductivity as the adjoining pipe covering equal to Pro-Tec-T-Kote fittings.
2. Fiberglass: Field fabricated fitting covers of same or similar material as pipe covering with preformed rigid inserts as specified above.
3. Cellular glass: Use mitered sections of cellular glass.

C. Finishes (Types)

I. Prior to installation of any insulation materials to ferrous piping systems, the piping surfaces shall be thoroughly cleaned of all mill scale, grease and dirt.

3.2 APPLICATION TYPES

A. Equipment

1. E1

a. Cut insulation to fit contour of equipment, and secure by means of bands, stick-clips, weld-pins and lugs or adhesives as required for each individual piece of equipment. Provide vapor barrier and finish as required for each specific application. Provide new cold surfaces of pumps with accessible boxes that easily separate coincidental with parting line of evaporator heads and pump casings. Resulting insulation joints shall be covered with a self-sealing, vapor-barrier tape. Seal all laps and penetrations in vapor barrier jacket with an approved vapor barrier mastic.

B. Piping

1. P1: Butt insulation together and securely staple in place with outward-clinching staples on 3" centers. Install factory-furnished laps at the butt joints. Neatly bevel and finish insulation where it terminates. Use of double tape self-sealing adhesives systems will negate requirements for staples.
2. P2: Butt insulation together and securely staple in place with outward- joints. Neatly bevel and finish insulation where it terminates. Seal all laps and penetrations in vapor barrier jacket with an approved vapor barrier mastic. Use of double tape self-sealing adhesive systems will negate requirement for staples.
3. P3: Butt insulation together and secure with mechanical fasteners. Fill joints with insulation cement prior to insulation finish.
4. P4: Same as P2, except install insulation over heat trace tape. Finish with metal jacket.
5. P5: Same as P4, except there is no heat trace tape.
6. P6A: Insulation for Straight Runs (Cellular Glass in Mechanical Rooms)

a. Insulation shall be applied to the pipe with joints tightly butted. The ends of fibrous insulation shall be sealed off with vapor barrier coating at intervals not to exceed 15 feet.
b. Longitudinal laps of the jacket material shall overlap not less than 1½ inches. Butt strips 3 inches wide shall be provided for circumferential joints.
c. Laps and butt strips shall be secured with adhesive and staples on 4 inch centers.
d. Staples and seams shall be coated with a vapor barrier coating.
e. Breaks and punctures in the jacket material shall be patched by wrapping a strip of jacket material around the pipe and securing it with adhesive, stapling, and coating as specified for butt strips. The patch shall extend not less than 1½ inches past the break.
f. At penetrations such as thermometers, the voids in the insulation shall be filled and sealed with vapor barrier coating.

* See "Schedule Notes", this Section.
** Provide insulation where piping is heat traced.

PIPE FITTINGS

	FITTING TYPE			FITTING FINISH TYPE		
	INDOOR CONCEALED	INDOOR EXPOSED	OUTDOOR	INDOOR CONCEALED	INDOOR EXPOSED	OUTDOOR
Domestic cold water supply.	1	1	1	8	8	8 & 3

END OF SECTION 22 07 00

SECTION 22 11 13

FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of utility services, including all related systems and accessories.

B. This Plumbing Subcontractor shall extend the sanitary sewer service, storm drainage, water service to the indicated points of connection shown on the drawings. The scope of this work shall include all labor and materials to the indicated connection point on drawings, code and permit fees, and materials required for the installation of various utility services as herein specified, adhering to the general routing and methods of distribution as shown by the drawings.

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains.

1.3 DEFINITIONS

A. PVC: Polyvinyl chloride plastic. (Match material with the utility contractor.)

1.4 SUBMITTALS

A. Product Data: For each type of product indicated in Part 2.

B. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves specialty locations, and elevations.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L, water tube, annealed temper.

1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.

B. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.2 JOINING MATERIALS

A. Refer to Division 22 Section "Common Work Results for Plumbing" for commonly used joining materials.

B. Brazing Filler Metals: AWS A5.8, BCuP Series.

C. Flexible Connectors:

1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
2. Ferrous-Metal Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

D. Dielectric Fittings: Combination of copper alloy and ferrous; threaded, solder, or plain end types; and matching piping system materials.

1. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C). Include insulating material that isolates dissimilar metals and ends with inside threads according to ASME B1.20.1.
2. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure to suit system pressures.

h. U.S. Pipe and Foundry Company.

2. Description: Sleeve and valve compatible with drilling machine.

a. Standard: MSS SP-60.
b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
c. Valve: AWWA, cast-iron, nonrising-stem, metal or resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.

B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches (125 mm) in diameter.

1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.

C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.5 CHECK VALVES

A. AWWA Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American AVK Co.; Valves & Fittings Div.
b. American Cast Iron Pipe Co.; American Flow Control Div.
c. APCO Williamette; Valve and Primer Corporation.
d. Crane Co.; Crane Valve Group; Crane Valves.
e. Crane Co.; Crane Valve Group; Stockham Div.
f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
g. McWane, Inc.; Kennedy Valve Div.
h. McWane, Inc.; M & H Valve Company Div.
i. Mueller Co.; Water Products Div.
j. NIBCO INC.
k. Watts Water Technologies, Inc.

2. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.

a. Standard: AWWA C508.
b. Pressure Rating: 175 psig (1207 kPa).

B. UL/FMG, Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Double-Check, Backflow-Prevention Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Ames Fire & Waterworks; a division of Watts Regulator Co.
   b. Conbraco Industries, Inc.
   c. FEBCO; SPX Valves & Controls.
   d. Flomatic Corporation.
   e. Watts Water Technologies, Inc.
   f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.

2. Standard: ASSE 1015.
3. Operation: Continuous-pressure applications, unless otherwise indicated.
4. Pressure Loss: 5 psig (35 kPa) maximum, through middle 1/3 of flow range.
5. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 for NPS 2-1/2 (DN 65) and larger.
6. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
7. Configuration: Designed for horizontal flow.
8. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground water-service piping NPS 4 thru 6 to NPS 8 shall be the following:

1. Shall match site utility contractor piping.

F. Underground Fire-Service-Main Piping NPS 8 shall be the following:

1. Shall match site utility contractor piping.

B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.8 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psig (350-kPa) increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig (0 kPa). Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts (1.89 L) per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.9 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Section "Earth Moving."

B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Division 22 Section "Common Work Results for Plumbing" for identifying devices.

3.10 CLEANING

A. Clean and disinfect water-distribution piping as follows:

1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
3. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:

a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.

SECTION 22 11 16

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes domestic water piping inside the building.

B. Water meters will be furnished and installed by utility company.

C. Water meters will be furnished by utility company for installation by Contractor.

D. Related Sections include the following:

1. Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and fittings.
2. Division 22 Section "Facility Water Distribution Piping" for water-service piping outside the building from source to the point where water-service piping enters the building.
3. Division 22 Section "Domestic Water Piping Specialties" for water distribution piping specialties.

1.2 PERFORMANCE REQUIREMENTS

A. Provide components and installation capable of producing domestic water piping systems with 80 psig (550 kPa) unless otherwise indicated.

1.3 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Water Samples: Specified in Part 3 "Cleaning" Article.

C. Field quality-control test reports.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for potable domestic water piping and components.

2.4 VALVES

A. Bronze and cast-iron, general-duty valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

B. Balancing and drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

C. Union Ball Valves: MSS SP-122, with full-port ball, socket or threaded detachable end connectors, and pressure rating not less than 125 psig (860 kPa) at 73 deg F (23 deg C).

D. Non-Union Ball Valves: MSS SP-122, with full- or reduced-port ball, socket or threaded ends, and pressure rating not less than 125 psig (860 kPa) at 73 deg F (23 deg C).

E. Check Valves: Swing or ball-check design and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C).

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPE AND FITTING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

B. Flanges may be used on aboveground piping, unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Domestic Water Piping under building slab inside the Building: Use the following piping materials for each size range:

1. NPS 1/2 to NPS 6 (DN 100 to DN 150): Hard copper tube, Type K; copper pressure fittings; and soldered joints.

E. Aboveground Domestic Water Piping: Use the following piping materials for each size range:

1. NPS 1 (DN 25) and Smaller: Hard copper tube, Type L; copper pressure fittings; and soldered joints.

F. Non-Potable-Water Piping: Use the following piping materials for each size range:

1. NPS 4 (DN 90) and Smaller: Hard copper tube, Type L ; copper pressure fittings; and soldered joints.

3.5 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.6 HANGER AND SUPPORT INSTALLATION

A. Pipe hanger and support devices are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.

3. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.

F. Install supports for vertical copper tubing every 10 feet (3 m).

G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition dielectric fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve, and extend and connect to the following:

4. Remove plugs used during testing of piping and plugs used for temporary sealing of piping during installation.
5. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.10 CLEANING

A. Clean and disinfect potable and non-potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Prepare and submit reports of purging and disinfecting activities.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 22 11 16

SECTION 22 11 19

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Backflow preventers.
2. Hose bibbs.
3. Wall hydrants.
4. Water hammer arresters.
5. Trap-seal primer valves.

1.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig (860 kPa), unless otherwise indicated.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. NSF Compliance:

1. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 VACUUM BREAKERS (Not for constant pressure)

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

B. Hose-Connection Backflow Preventers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Conbraco Industries, Inc.
b. Watts Industries, Inc.; Water Products Div.
c. Woodford Manufacturing Company.

2. Standard: ASSE 1052.
3. Operation: Up to 10-foot head of water (30-kPa) back pressure.
4. Inlet Size: NPS 1/2 or NPS 3/4 (DN 15 or DN 20).
5. Outlet Size: Garden-hose thread complying with ASME B1.20.7.
6. Capacity: At least 3-gpm (0.19-L/s) flow.

2.3 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig (860 kPa).
7. Vacuum Breaker: Integral, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Chrome or nickel plated.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: Operating key.
13. Operation for Finished Rooms: Operating key.
14. Include operating key with each operating-key hose bibb.
15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.4 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company.
b. MIFAB, Inc.
c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
d. Tyler Pipe; Wade Div.
e. Watts Drainage Products Inc.

7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.
2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.
3. Do not install bypass piping around backflow preventers.

C. Install water hammer arresters in water piping according to PDI-WH 201.

D. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

E. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Pressure vacuum breakers.
2. Reduced-pressure-principle backflow preventers.
3. Supply-type, trap-seal primer valves.

SECTION 22 13 16

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following for soil, waste, and vent piping inside the building:

1. Pipe, tube, and fittings.
2. Special pipe fittings.
3. Encasement for underground metal piping.

B. Related Sections include the following:

1. Division 22 Section "Chemical Waste Systems for Laboratory and Healthcare Facilities" for chemical-waste and vent piping systems.

1.2 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

1.3 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Shop Drawings: For facility sanitary waste and vent piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of sanitary waste and vent piping. Detail location of piping and location of all risers and stacks.

1. Shop Drawing Scale: ¼ inch per foot (1:50).

C. Field quality-control inspection and test reports.

D. Coordination Drawings: Plans and details, drawn to scale, on which sanitary waste and vent piping is shown and coordinated with other installations, using input from installers of the items involved.

1.4 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns, Schedule 40.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 (DN 100) and smaller shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; and hubless-coupling joints.
3. Copper DWV tube, copper drainage fittings, and soldered joints.

C. Aboveground, soil and waste piping NPS 6 (DN 125) and larger shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.

D. Aboveground, vent piping NPS 4 (DN 100) and smaller shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.
3. Copper DWV tube, copper drainage fittings, and soldered joints.

    a. Option for Vent Piping, NPS 2-1/2 and NPS 3 (DN 65 and DN 90): Hard copper tube, Type M (Type C); copper pressure fittings; and soldered joints.

4. Dissimilar Pipe-Material Couplings: Flexible, Shielded, nonpressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

E. Aboveground, vent piping NPS 6 (DN 125) and larger shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and hubless-coupling joints.

3.3 PIPING INSTALLATION

A. Sanitary sewer piping outside the building is specified in Division 22 Section "Facility Sanitary Sewers."

B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

C. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

D. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 HANGER AND SUPPORT INSTALLATION

A. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Install individual, straight, horizontal piping runs according to the following:

   a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.

B. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
4. NPS 6 (DN 150): 60 inches (1500 mm) with 3/4-inch (19-mm) rod.
5. NPS 8 to NPS 12 (DN 200 to DN 300): 60 inches (1500 mm) with 7/8-inch (22-mm) rod.

F. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).

G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 (DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
3. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
4. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.

H. Install supports for vertical copper tubing every 10 feet (3 m).

4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.8 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 13 16

SECTION 22 13 19

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following sanitary drainage piping specialties:

1. Cleanouts.
2. Floor drains.
3. Miscellaneous sanitary drainage piping specialties.
4. Flashing materials.
5. Sand oil interceptors.

B. Related Sections include the following:

1. Division 22 Section "Storm Drainage Piping Specialties" for trench drains for storm water, channel drainage systems for storm water, roof drains, and catch basins.

1.2 SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for frost-resistant vent terminals.

1. Wiring Diagrams: Power, signal, and control wiring.

B. Field quality-control test reports.

C. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate size and location of roof penetrations.

a. Josam Company; Josam Div.
b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
c. Watts Drainage Products Inc.
d. Zurn Plumbing Products Group; Specification Drainage Operation.

2.3 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains:

1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
2. Size: Same as connected waste piping with increaser fitting of size indicated.

B. Floor-Drain, Trap-Seal Primer Fittings:

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
2. Size: Same as floor drain outlet with NPS 1/2 (DN 15) side inlet.

C. Expansion Joints:

1. Standard: ASME A112.21.2M.
2. Body: Cast iron with bronze sleeve, packing, and gland.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19

SECTION 22 13 23

SAND/OIL INTERCEPTORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of interceptors outside the building:

1. Sand/oil interceptors.

1.2 SUBMITTALS

A. Product Data: For each type of interceptor indicated. Include materials of fabrication, dimensions, rated capacities, retention capacities, operating characteristics, size and location of each pipe connection, furnished specialties, and accessories.

B. Shop Drawings: For each type and size of precast concrete interceptor indicated.

1. Include materials of construction, dimensions, rated capacities, retention capacities, location and size of each pipe connection, furnished specialties, and accessories.

C. Coordination Drawings: Interceptors, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Interceptors.
2. Piping connections. Include size, location, and elevation of each.
3. Interface with underground structures and utility services.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SAND/OIL INTERCEPTORS

A. Sand/Oil Interceptors: Precast concrete complying with ASTM C 913. Include rubber-gasketed joints, vent connections, manholes, compartments or baffles, and piping or openings to retain sand/oil and to permit wastewater flow.

1. Structural Design Loads:

C. Set tops of grating frames and grates flush with finished surface.

D. Set metal interceptors level and plumb.

E. Prepare and paint metal components, to be field painted, according to SSPC-Paint 16.

F. Repair and restore protective coatings to original condition.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Make piping connections between interceptors and piping systems.

3.4 IDENTIFICATION

A. Identification materials and installation are specified in Division 22 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground interceptors.

1. Use warning tapes or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

END OF SECTION 22 13 23

SECTION 22 14 13

FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following storm drainage piping inside the building:

1. Pipe and fittings.
2. Special pipe fittings.

B. Related Sections include the following:

1. Division 22 Section "Sump Pumps."

1.2 DEFINITIONS

A. PVC: Polyvinyl chloride plastic.

B. TPE: Thermoplastic elastomer.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working-pressure, unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.

1.4 SUBMITTALS

A. Product Data: For pipe, fittings and couplings.

B. Shop Drawings:

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

1. Manufacturer:

   a. ANACO.

2.5 PVC PIPE AND FITTINGS (BELOW SLAB ON GRADE ONLY)

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.

1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Cellular-Core, Sewer and Drain Series, PVC Pipe: ASTM F 891, Series PS 100.

1. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Series PS 100 sewer and drain pipe.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

B. Aboveground storm drainage piping NPS 6 (DN 150) and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and coupled joints.

C. Aboveground, storm drainage piping NPS 8 (DN 200) and larger shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-teel couplings; and coupled joints.

D. Underground storm drainage piping NPS 6 (DN 150) and smaller shall be the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

E. Underground, storm drainage piping NPS 8 (DN 200) and larger shall be the following:

1. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

N. Install PVC storm drainage piping according to ASTM D 2665.

O. Install underground PVC storm drainage piping according to ASTM D 2321.

P. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results Plumbing."

B. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

C. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.

D. Hubless Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

E. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

F. Grooved Joints: Cut groove ends of pipe and assemble grooved ends of pipes, grooved-end fittings, and grooved-end-piping couplings according to AWWA C606.

G. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.5 HANGER AND SUPPORT INSTALLATION

A. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42, clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

    a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.

    b. Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

C. Support vertical piping and tubing at base and at each floor.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water (30 kPa). From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.8 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

END OF SECTION 22 14 13

SECTION 22 14 23

STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following storm drainage piping specialties:

1. Cleanouts.
2. Roof drains.
3. Miscellaneous storm drainage piping specialties.
4. Flashing materials.

B. Related Sections include the following:

1. Division 22 Section "Sanitary Waste Piping Specialties" for backwater valves, floor drains, trench drains and channel drainage systems connected to sanitary sewer, air admittance valves, FOG disposal systems, grease interceptors and removal devices, oil interceptors, and solid interceptors.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

1.4 COORDINATION

A. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Exposed Metal Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company; Josam Div.
b. MIFAB, Inc.
c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
d. Watts Drainage Products Inc.
e. Zurn Plumbing Products Group; Specification Drainage Operation.

3. End Connections: Matching connected piping.
4. Size: Same as connected piping.

B. Downspout Boots:

1. Description: Manufactured, ASTM A 48/A 48M, gray-iron casting, with strap or ears for attaching to building; NPS 4 (DN 100) outlet; and shop-applied bituminous coating.
2. Size: Inlet size to match downspout.
3. Description: ASTM A 74, Service class, hub-and-spigot, cast-iron soil pipe.
4. Size: Same as or larger than connected downspout.

C. Conductor Nozzles:

1. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
2. Size: Same as connected conductor.

2.4 FLASHING MATERIALS

A. Copper Sheet: ASTM B 152/B 152M, 12 oz./sq. ft. (3.7 kg/sq. m or 0.41-mm) thickness.

B. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch (1.01-mm) minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.

C. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, 40-mil (1.01-mm) minimum thickness.

D. Fasteners: Metal compatible with material and substrate being fastened.

E. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

F. Solder: ASTM B 32, lead-free alloy.

G. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4 (DN 100). Use NPS 4 (DN 100) for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 14 23

SECTION 22 14 29

SUMP PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following sump pumps and accessories, inside the building, for building storm drainage systems:

1.2 SUBMITTALS

A. Product Data: For each type and size of sump pump specified. Include certified performance curves with operating points plotted on curves, and rated capacities of selected models, furnished specialties, and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and Maintenance Data: For each sump pump to include in emergency, operation, and maintenance manuals.

1.3 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of sump pumps and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Retain shipping flange protective covers and protective coatings during storage.

B. Protect bearings and couplings against damage.

C. Comply with pump manufacturer's written rigging instructions for handling.

1.5 COORDINATION

A. Coordinate size and location of concrete pits. Concrete, reinforcement, and formwork requirements are specified in Division 03.

3.3 CONNECTIONS

A. Piping installation requirements are specified in Division 22 Section "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to sump pumps to allow service and maintenance.

C. See detail on drawing for pump piping.

D. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

END OF SECTION 22 14 29

Division 23 – HVAC Specification

SECTION 23 05 00

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. The requirements contained in this Section apply to all Work performed under Division 23 of these Specifications.

B. The Work covered by this Division of the Specifications comprises the furnishing of labor, material, equipment, transportation, tools and services, and performing operations required for, and reasonably incidental to, the installation of the Work in accordance with the applicable Contract Documents, and subject to the terms and conditions of the Contract.

C. The Work shall include modifications and extensions to existing systems, and the modification of the existing structure as required accommodating the installation of the Work.

D. Refer to other Divisions of the Specifications for related Work.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:
1. CPVC: Chlorinated polyvinyl chloride plastic.
2. PE: Polyethylene plastic.
3. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:
1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

D. The work shall be in accordance with, but not limited to, the requirements of:
   1. National Fire Protection Association
   2. National Safety Code
   3. Colorado Building Codes
   4. Colorado Department of Health
   5. International Building Code – 2003
   6. International Fire Code – 2003
   7. International Mechanical Code - 2003

E. Codes and standards referred to are minimum standards. Where the requirements of these specifications or drawings exceed those of the codes and regulations, the drawings and specifications govern.

F. The Contractor shall obtain permits, plan checks, inspections and approvals applicable to the Work as required by the regulatory authorities. Fees and costs of any nature whatsoever incidental to these permits, inspections and approvals shall be assumed and paid by the Contractor. The pro-rata costs, if any, for utilities serving this property will be paid for by the Owner and shall not be included as part of this Contract.

1.7 INSTALLATION INSPECTIONS AND CERTIFICATIONS

A. Obtain timely inspections of the installation by the constituted authorities. Remedy any deficiencies to the satisfaction of the inspecting authority.

B. Upon final completion of the work, obtain certificates of acceptance from the constituted authorities. Deliver the certificates to the Architect for transmission to the Owner.

1.8 REFERENCE STANDARDS

A. Materials, equipment, devices and workmanship shall comply with applicable local, county, state and national codes, laws and ordinances, utility company regulations and industry standards.

B. In case of differences between building codes, state laws, local ordinances, industry standards, utility company regulations and the Contract Documents, the most stringent shall govern. The Contractor shall promptly notify the Owner's Representative in writing of any such difference. Should the Contractor perform any Work that does not comply with local codes, laws and ordinances, industry standards or other governing regulations, the Work shall be corrected on noncompliance deficiencies with the Contractor bearing all costs.

C. In addition to the aforementioned ordinances, industry standards published by the following organizations shall apply:

AABC	-	ASSOCIATED AIR BALANCE COUNCIL
AASHO	-	AMERICAN ASSOCIATED OF STATE HIGHWAY OFFICIALS
ACI	-	AMERICAN CONCRETE INSTITUTE
ADC	-	AIR DIFFUSION COUNCIL
AGA	-	AMERICAN GAS ASSOCIATION
AISC	-	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AMCA	-	AIR MOVING AND CONDITIONING ASSOCIATION
ANSI	-	AMERICAN NATIONAL STANDARDS INSTITUTE
API	-	AMERICAN PETROLEUM INSTITUTE
ARI	-	AIR CONDITIONING & REFRIGERATION INSTITUTE

1.11 MATERIALS, EQUIPMENT AND DEVICE DESCRIPTION

A. Materials, equipment and devices shall be of the best quality customarily applied in quality commercial practice, and shall be the products of reputable manufacturers. Each major component shall bear a nameplate giving the name and address of the manufacturer, and the catalog number or designation of the component.

B. Materials, equipment and devices furnished under this Division of the Specifications shall be essentially the standard product of the specified manufacturer, or where allowed, an alternate manufacturer. Where two or more units of the same kind or class of a specific item are required, these shall be the products of a single manufacturer; however, the component parts of the item need not be the products of one manufacturer.

C. In describing the various materials, equipment and devices, in general each item will be described singularly, even though there may be a multiplicity of identical items. Also, where the description is only general in nature, exact sizes, duties, space arrangements, horsepower requirements and other data shall be determined by reference to the Contract Documents.

D. Equipment called for on the plans and not listed herein shall be provided and installed as though it were fully described herein.

E. Equipment called for herein shall be completely provided and installed, whether fully detailed or not on the plans, and/or scheduled.

F. All equipment as indicated on the plans and as described herein shall be installed per manufacturer's recommendations to allow for proper operation and maintenance of the equipment.

1.12 SCHEDULE AND SEQUENCE OF WORK

A. The Contractor shall meet and cooperate with the Owner and Owner's Representative to schedule and sequence this Work so as to insure meeting scheduled completion dates and avoid delaying other portions of the Work. Work requiring special sequencing shall be at no additional cost to the Owner and shall have no impact on the schedule.

B. Work schedules and completion dates as established must be rigidly adhered to. Cooperate in establishing these schedules and perform the work under this Division at such times as directed so as to insure meeting scheduled dates and avoid delaying any other Contractor.

C. Should it be necessary to perform certain operations on an "overtime" basis in order not to interrupt the normal usage of the building, include the costs of such overtime without change in the Contract amount.

1.13 WORKMANSHIP AND INSTALLATION

A. In no case shall the Contractor provide a class of material, equipment, device or workmanship less than that required by the Contract Documents or applicable codes, regulations, ordinances or standards. All modifications which may be required by a local authority having legal jurisdiction over all or any part of the Work shall be made by the Contractor without any additional charge. In all cases where such authority requires deviations from the requirements of the Drawings or

Mechanical sleeve seals.

Sleeves.

Escutcheons.

Grout.

HVAC demolition.

Equipment installation requirements common to equipment sections.

Painting and finishing.

Concrete bases.

Supports and anchorages.

Pipe Flashing.

Pitch Pans.

1.16 SUBMITTALS

A. Shop Drawings
   1. See the material under General Conditions.
   2. Prepare shop drawings as called for elsewhere herein or directed by the Architect to coordinate this work with the work of other Divisions, to illustrate changes in this work to facilitate its concealment in finished spaces, to avoid obstructions, or to illustrate the installation of a substitute equipment item. Shop drawings shall be provided for the following:
      a. Fire Protection Systems (prepared at a minimum scale of 1/8"=1'-0")
      b. Sheet Metal and Duct Systems and plumbing systems, including all underfloor work (prepared at a minimum scale of 1/8"=1'-0")
      c. Temperature Control Diagrams with Sequence of Operations on same drawing.
      d. Piping and equipment systems for chilled water, condenser water, refrigerant, heating water, steam and other HVAC piping systems. (Preferably at 1/4" = 1' – 0").

B. Installation Drawings
   1. Prepare special drawings as called for elsewhere herein or directed by the Architect to coordinate this work with the work of other Divisions, to illustrate changes in this work to facilitate its concealment in finished spaces, to avoid obstructions, or to illustrate the installation of a substitute equipment item.
   2. Use these drawings in the field for the installation of the work. Unless otherwise directed, do not submit these drawings for review, but provide 3 copies to the Architect for information.

C. Product Data: For the following:

   Adjust list below to suit Project.
   1. Transition fittings.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

D. Responsibility for the protection of apparatus shall extend to presently installed apparatus. Erect temporary sheltering structures, provide temporary bracing and supports, or cover equipment as required or directed to afford proper protection.

1.20 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

D. Where any piece of apparatus is too large for ingress through normal building openings, it shall be placed in its containing space before the enclosing structure is completed.

1.21 TEMPORARY HEATING AND COOLING

A. The mechanical contractor shall purchase the necessary temporary heating and cooling equipment for spaces that require continued use.

B. Should the work in the designated areas affect any services to areas that are to remain in use, the mechanical contractor shall provide temporary services as required to enable those occupied areas to function properly. Additional valves, ductwork, equipment and piping required shall be installed without added cost to the Owner.

1.22 ELECTRIC WIRING

A. All electric wiring will be done under Division 26, except for such equipment items as are prewired at their point of manufacture and so delivered to the project, and except for the following:
   1. Temperature Control Wiring and Power Wiring provided by controls contractor.
   2. Medical gas master alarm wiring provided by Med Gas contractor.
   3. Fire pump annunciator wiring provided by Fire Protection contractor.

B. Prepare and submit for review wiring diagrams for all equipment furnished under this Division. Show on these diagrams all power, interlock, and control circuits. When the Architect takes no exception to these drawings, they shall become installation drawings for the Contractor.

C. All chilled water, condenser water piping, domestic cold and hot water piping, and wet fire protection system shall be heat traced when routed external to the building or in areas susceptible to freezing conditions.

2. By noting the term "deviation" or "D", it shall be understood that the manufacturer prefers to provide a different component in lieu of that specified. Manufacturer shall indicate all deviations.
3. By noting the term "alternate" or "A", it shall be understood that the manufacturer proposes to provide the same operating function but prefers to do it in a different manner. An alternate shall be fully described as to what the manufacturer proposes to provide.
4. By noting the term "not applicable" or "N/A", it shall be understood that the specified item is not applicable to the project.

E. The Owner's Representative reserves the right to call for samples of any item of material, equipment or device offered in substitution, together with a sample of the specific item when, in their opinion, the quality of the item and/or the appearance is involved, and it is deemed that an evaluation of the item may be better made by visual inspection.

F. When any request for a substitution of material, equipment or device is submitted and rejected, the item named in the Contract Documents shall be furnished. Repetitive submittal of substitutions for the same item will not be considered.

G. Space Allocations:
1. It shall be understood that space allocations have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. If any item of equipment or device is offered in substitution which differs substantially in dimension or configuration from that indicated on the Drawings or specifications, provide as part of the submittal 1/4 inch equals 1 foot scaled drawings showing that the equipment or devices can be installed in the space available without interfering with other portions of the work or with access for operations and maintenance in the completed project.
2. Where substitute equipment or devices requiring different arrangement or connections from that indicated is accepted by the Owner's Representative, install the equipment or devices to operate properly and in harmony with the intent of the Contract Documents, making all incidental changes in piping, ductwork or wiring resulting from the equipment or device selection without any additional cost to the Owner. The Contractor shall pay all additional costs incurred by other portions of the work in connection with the substituted equipment or device.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

C. Each piping system shall be complete with pipe, fittings, joining materials, valves, cocks, hangers, supports and other accessories; prove tight under test; repair leaks; clean.

D. All items shall be suitable for the pertinent system's pressures and temperatures and the fluid within including chemical treatments.

E. The following tabulation describes the basic materials and standards for the piping, fittings, and specials which shall be provided for this section and the other sections of these specifications and where they are indicated by note on the drawings.

Seamless copper drainage tube, Type DWV	ASTM B-306
Cast bronze solder joint pressure fittings	ANSI B16.18
Cast bronze solder joint drainage fittings	ANSI B16.23
Wrought copper solder joint pressure fittings	ANSI B16.22
Wrought copper solder joint drainage fittings	ANSI B16.29
Pipe threads	ANSI B2.1

2.3 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
   1. Steam service: Flexitallic Style CG, TEADIT Style 913, Garlock Flexseal Style RW, Lamons SpiraSeal Style WR, or Leader Style LG-13.
   2. Chilled water, condenser water, steam condensate, and heating hot water: Style IFG 5507 as manufactured by Garlock or approved equivalent.
   3. Refrigerants: Style IFG 5500 as manufactured by Garlock or approved equivalent.
   4. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
      a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
      b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
   5. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:
   1. CPVC Piping: ASTM F 493.
   2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

Sleeve in paragraph below is without seepage holes.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

Retain subparagraph below if required.

1. Under deck Clamp: Clamping ring with set screws.

E. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.7 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

Do not delete or combine types of escutcheons in seven paragraphs below until selections in Part 3 "Piping Systems - Common Requirements" Article are made.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.
1. Finish: Polished chrome-plated.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
1. Finish: Polished chrome-plated.

E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.

G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.8 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
1. Characteristics: Post-hardening, volume-adjusting, non-staining, non-corrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

2.9 PIPE FLASHING FOR BUILT-UP ROOFS

A. Sheet lead; minimum weight of 4 pounds per square foot.

B. Reference to architectural roof flashing details for penetration flashings.

K. Install piping free of sags and bends.

L. Install fittings for changes in direction and branch connections.

M. Install piping to allow application of insulation.

N. Select system components with pressure rating equal to or greater than system operating pressure.

O. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Insulated Piping: One-piece, stamped-steel type with spring clips.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
f. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
g. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
h. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

Existing Piping: Use the following:

Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
Insulated Piping: Split-plate, stamped-steel type with concealed hinge and spring clips.
Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
Bare Piping at Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
Bare Piping in Unfinished Service Spaces: Split-casting, cast-brass type with rough-brass finish.
Bare Piping in Equipment Rooms: Split-casting, cast-brass type.
Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.

P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

V. Where a pipe passes through a floor in a pipe chase which is not a slab on grade, use a galvanized steel pipe sleeve, extending to a height of 2 inches above the floor slab and cemented watertight; make the inside diameter of the sleeve at least 1/2 inch greater than the outside diameter of either the insulation on a covered pipe or of any bare pipe.

W. Except where a pipe passes through a floor on grade or where noted to the contrary, provide a pipe passing through a floor and exposed in any space with a standard weight galvanized steel pipe sleeve set to extend to a height of 3 inches above the floor. Make the inside diameter of the sleeve at least 1/2 inch greater than the outside diameter of either the insulation on a covered line or of any bare pipe.

X. Where a line penetrates a floor that is provided with a waterproof membrane, provide a two piece standard weight galvanized steel pipe and a cast iron riser sleeve with anchor lugs, flashing clamping device and inside threads on both ends. The riser sleeve shall be set in the lower part of the floor and clamped onto the membrane. The steel sleeve members shall extend through the floor, finishing flush with the underside of any floor above grade and extending to a height of 3 inches above the floor.

1. The inside diameter of the above sleeve shall be 1/2 inch greater than the outside diameter of the pipe. Following installation of the pipe, fill the annular space between the sleeve and the pipe using a packing and then filling the sleeve with mastic which shall set and form a watertight seal under normal use conditions.

Y. Provide a pipe passing through an interior concrete beam or wall with a standard weight galvanized steel pipe sleeve. Make the inside diameter of the sleeve at least 1/2 inch greater than the outside diameter of either the insulation on a covered line or of any bare pipe.

Z. Provide a pipe passing through an exterior wall with a standard weight galvanized pipe having an inside diameter 2 inches larger than the outside diameter of the carrier pipe. Fill the annular space between the pipe and its sleeve with a synthetic rubber mechanical seal; Thunderline "Link-Seal" or Mason-Dallas "InnerLinx". Stainless steel bolts should be used.

3.2 FLOOR AND CEILING PLATES

A. Except as otherwise noted, provide and install a concealed hinge, chrome plated steel floor and ceiling plate with a spring catch around each pipe passing exposed through any wall, floor or ceiling in any space, except in mechanical rooms and except where steel pipe sleeves extend above the floor line. Size the plate to fit snugly against the outside of the pipe or against the outside of insulation on an insulated line.

3.3 ACCESS PANELS

A. Furnish an access panel for each location where mechanical equipment such as a manual valve, automatic control valve, automatic damper mechanism, (fire damper, etc. is installed behind a furring, chase, or non-removable suspended ceiling). These panels will be installed in the walls or ceilings by the trade involved under the applicable Division of the general specifications. Size and position each

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
4. PVC Nonpressure Piping: Join according to ASTM D 2855.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.5 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.6 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

B. Concrete foundations or pads will be required for all floor mounted equipment.

C. Internally isolated air handling units to have 6" high concrete pads to allow a deep condensate trap.

D. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete."

3.9 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.10 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.11 GROUTING

A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

3.14 EXCAVATION AND BACKFILLING

A. Do all excavating and backfilling required in installing the work under this Division; generally use procedures and materials as described in Division 2 under SITE WORK.

B. The Contractor shall be responsible for submitting a site specific trench safety system prepared by a registered engineer which meets OSHA standards and any additional state and local standards.

3.15 EXTERIOR EXCAVATING

A. Perform all exterior excavating of whatever substances encountered and to the depths required.

B. During excavation, stack material suitable for backfilling in an orderly manner a sufficient distance from the banks of the trenches to prevent slides or cave-ins. Remove all excavated material not required or suitable for backfill, or waste as directed.

C. Control grading to prevent surface water from flowing into excavations and remove any water accumulating therein by pumping.

D. Use open cut grading and make trenches the necessary width for proper installation of the line, with banks as nearly vertical as practicable. Provide sheeting and shoring as necessary for the proper protection of the work and the safety of personnel.

E. Use open cut grading except that short sections of a trench may be tunneled if, in the Architect's opinion, the line can be safely and properly installed and the tunnel can be suitably backfilled and tamped. Make trenches the necessary width for proper installation of the line, with banks as nearly vertical as practicable. Provide sheeting and shoring as necessary for the proper protection of the work and the safety of personnel.

F. Dig trenches not less than 12 inches nor more than 16 inches wider than the diameter of the pipe to be installed and excavate true to line so that the pipe may be centered therein. This trench width applies at and below the level of the top of the pipe. Dig the trench above that level as wide as necessary for proper installation of the work and protection of personnel.

G. Grade trench bottoms to provide uniform bearing and support for the pipe on undisturbed soil as every point along its length except for lines excavated in rock and in soil incapable of supporting the pipe and except for excavation for bell holes and for proper sealing of pipe joints. Following grading of the trench bottom, create a depression at each joint as required to assemble the joint in accordance with its manufacturer's recommendations and to provide space to physically accommodate the joint. Remove stones to prevent point bearing. Round bottoms of trenches excavated for sewers so that at least 1/3 of the circumference of the pipes will rest firmly on undisturbed soil.

H. Where rock excavation is required, remove the rock to a minimum overdepth of 8 inches. Backfill the overdepth excavation with sand, 3/4 inch crushed rock, the equivalent in gravel, or other approved backfill material, prior to installing the pipe.

I. Where trenches are inadvertently over excavated, fill to the bottom level of the pipe with backfill material as specified above, prior to installing the pipe.

F. Settling of granular non-cohesive backfill material with water in trenches lying outside of pavements will be permitted, and will be a requirement when so directed.

G. Trenches improperly backfilled, or where settlement occurs, shall be reopened to depth required for proper compaction, then refilled and compacted as specified, or otherwise corrected as permitted by the Architect.

3.18 OPENING AND RECLOSING PAVEMENT

A. Where excavation requires the opening of existing walks, streets, drives or other existing pavement, including "black topping", cut the pavement as required to install new lines and to make new connections to existing lines. Hold the size of the cut to a minimum consistent with the work to be accomplished. After completing the piping installation, backfill the excavation as hereinbefore specified; replace both the base and surface courses using materials to match those removed, both in degree of compaction and kind of material; replace any reinforcing and splice to existing reinforcing. New finished surfaces shall be level with the original surfaces and thoroughly bond with them.

3.19 INTERIOR TRENCHES AND BACKFILLING

A. For trenches of lines installed below a floor to be poured on grade, follow in general the procedures set out for exterior lines except install with a minimum amount of cover. Backfill with a suitable material and compact to no less than 95% Standard Proctor density immediately prior to the pouring of the floor.

B. Dispose of all surplus materials occasioned by these trenching operations as directed by the Architect.

C. Scoop out trenches in the underhouse areas as required to accommodate all equipment lines, ducts and piping, except waste, drain and sewer lines. Make these trenches adequate in width and depth to keep any such lines or duct a minimum of 6 inches from finished earth grade, and slope the sides of such trenches so that there will be no possibility of the trench walls caving or appreciably sloughing.

D. Waste, drain and sewer lines run in crawl spaces below the floor, may either be suspended from the construction above or supported by the ground in trenches, using procedures set out for exterior lines.

E. Sub-soil drain lines installed in underhouse areas shall be laid true to grade and shall be backfilled using crushed rock completely surrounding the lines as indicated.

3.20 MANUALS

A. Upon completion of the work, provide to the Architect for delivery to the Owner, 2 copies of a bound manual or manuals of equipment, machinery and/or apparatus furnished under this Division of the Specifications. This shall include revised material from shop drawing submittals showing numbers, sizes and ratings of equipment actually installed together with any descriptions as to methods of installation. It shall also include manufacturer's service and maintenance data, warranties, guarantees, etc.

5) Copies of all other data and/or drawings required during construction.
6) Repair parts list of major apparatus, including name, address and telephone number of local supplier or representative.
7) Tag charts and diagrams hereinbefore specified.

2. The electronic copy shall consist of the following:

a. Three (3) electronic copies (in AutoCAD format) of the original drawings on which all project related notations have been accurately transferred from the working set of bluelines described above reflecting the as-built condition. These electronic record drawings shall be delivered to the Engineer for review and subsequent delivery to the Owner at job completion. The Engineer will retain one (1) electronic copy for their records and forward two (2) electronic copies to the Owner. This information shall be delivered prior to final acceptance and final payment.

b. Three (3) electronic copies (on compact disc (CD) in PDF format) of all project data presented in a 8 ½ by 11 inch (or folded 11 inch by 17 inch) format. The data shall be turned over to the Engineer for review and subsequent delivery to the Owner. The Engineer will retain one (1) electronic copy of their records and forward two (2) electronic copies to the Owner. The information shall be delivered prior to final acceptance and final payment. The data on the CD shall include the following:

1) Warranties, guarantees and manufacturer's directions on material, equipment and devices covered by the Contract.
2) Approved lighting fixture brochures, wiring diagrams and control diagrams.
3) Copies of approved submittals and shop drawings.
4) Operating instructions and recommended maintenance procedures for major apparatus.
5) Copies of all other data and/or drawings required during construction.
6) Repair parts list of major apparatus, including name, address and telephone number of local supplier or representative.
7) Tag charts and diagrams hereinbefore specified.

END OF SECTION 23 05 00

SECTION **23 05 13**

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.2 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
   1. Motor controllers.
   2. Torque, speed, and horsepower requirements of the load.
   3. Ratings and characteristics of supply circuit and required control sequence.
   4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

PART 3 -

a. ACCEPTABLE MANUFACTURERS

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   1. MagneTek/Century
   2. Baldor
   3. Reliance
   4. General Electric

3.2 GENERAL MOTOR REQUIREMENTS

A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.

B. Comply with NEMA MG 1 unless otherwise indicated.

C. Comply with IEEE 841 for severe-duty motors.

D. Select and install motors to deliver required power and performance at installed elevation as scheduled.

3.3 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.

See "Multispeed and Variable-Speed Considerations" Article in the Evaluations for discussion of thermally protected motors. Thermal protection is not usually required for HVAC equipment and energy- or premium-efficient motors specified in this Section. Retain subparagraph below to require the added protection from overheating or if inverter-duty motors are required.

4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

Retain paragraph below only if Project requires severe-duty motors, based on environmental conditions.

C. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

3.6 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
   1. Permanent-split capacitor.
   2. Split phase.
   3. Capacitor start, inductor run.
   4. Capacitor start, capacitor run.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 4 - EXECUTION

4.1 MOTORS

A. Furnish motors as required for all equipment provided under this Division. Motors shall conform to the following requirements unless noted or specified otherwise.
   1. Capacity: Be able to start and operate the driven equipment without exceeding full load current nameplate rating at speed specified, or at the speed and load imposed by the drive actually furnished. In the case of a hermetic motor with water or refrigerant cooling, actual motor running current may exceed nameplate full load current by not more than 25% at specified operating conditions.
   2. Motor 3/4 Horsepower and Larger: 3-phase, drip-proof, squirrel cage induction type; suitable for the current characteristics scheduled; NEMA Design B.
   3. Motor Less than 3/4 Horsepower: Single-phase, unless scheduled different, drip-proof; of the type normally used for the intended service, except where capacitor type is called for; suitable for current characteristics scheduled.
   4. Design and Service Factors: In accordance with current NEMA, IEEE, ANSI and Anti-Friction Bearing Manufacturers Association Codes, Standards and

automatically controlled require "Hand-Auto" or "Hand-off-Auto" magnetic or electronic starters, no exceptions. All magnetic and electronic starters shall have H-O-A switches.

B. Provide each motor that does not require a starter, a manual starting switch with thermal overload protection with identifying nameplate, green pilot light and stainless steel cover plate equal to Westinghouse Type MS. Switches installed on finished walls shall be flush type.

C. Starter shall have overload protection on all phases. This will require three overload relays for three phase motors and one overload relay for one phase/line voltage motor. Provide NEMA 1B control voltage transformer, "on" green pilot light, and 1-normally open and 2-normally closed auxiliary contacts on each starter, unless otherwise noted.

D. Certain starters and motor controls for motors furnished under this Division are scheduled on the Drawings to be elements of motor control centers provided under Division 26. Except for those scheduled starters, provide a suitable starter for control of each motor furnished under this Division.

E. Each starter shall have a capacity rating within the required limits of the motor which it serves; it shall have overload elements selected to provide protection for the motor.

F. Where a combination starter and disconnect switch or starter and circuit breaker in a common enclosure is scheduled, provide auxiliary contacts on the switch or breaker as required to assure that, when the disconnecting means is open, there are no "live" contact points on the starter.

G. Where a holding coil voltage differs from line voltage, install a transformer with secondary fusing in the starter enclosure.

H. Unless otherwise indicated, furnish starters mounted indoors with NEMA Type 1 enclosures; and furnish those exposed to the weather with NEMA Type 3R enclosures.

I. Where starters are not installed in heated and cooled spaces, the heater elements shall be of the ambient temperature-compensated, bimetallic type.

J. All motor starters and control devices shall be of one make and manufactured by one of the following: General Electric, Square D, Siemens or Westinghouse.

4.3 SAFETY GUARDS

A. Provide and install a belt guard covering the entire drive assembly for each belt drive equipment item provided under this Contract. Use factory assembled belt guards when they are available. Where a guard must be fabricated, rigidly construct it with a sheet metal rim and aside panel of sheet metal or 2 inch metal hardware cloth, with openings for tachometer insertion. Size each guard to permit full travel of the motor slide rails for belt tightening and install each guard so as to permit removal for servicing the drive.

B. Guards shall also be installed to protect all projecting shafts and all rotating shafts, couplings, keyways, etc. Generally, these shall be formed of not lighter than 18-gauge galvanized steel bent to the proper shape and secured in place using removable fastening devices.

END OF SECTION 23 05 13

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following hangers and supports for HVAC system piping and equipment:
   1. Steel pipe hangers and supports.
   2. Trapeze pipe hangers.
   3. Metal framing systems.
   4. Thermal-hanger shield inserts.
   5. Fastener systems.
   6. Pipe stands.
   7. Equipment supports.

B. Related Sections include the following:
   1. Division 05 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
   2. Division 21 Section "Water-Based Fire-Suppression Systems" for pipe hangers for fire-protection piping.
   3. Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" for vibration isolation devices.
   4. Division 23 Section(s) "Metal Ducts" for duct hangers and supports.

1.2 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.3 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

B. Pipe hangers and supports shall conform to the recommendations of ASHRAE, ASPE, ANSI, and MSS

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Except as otherwise indicated, provide factory-fabricated pipe hangers and supports in which materials, design, and manufacture comply with ANSI/MSS SP-58. Select and apply pipe hangers and supports in compliance with MSS SP-69, and manufacturer's published product information. Fabricate and install pipe hangers and supports in compliance with MSS SP-89.

E. Use only one type hangers and supports, by one manufacturer, for each piping service.

2.3 METAL FRAMING SYSTEMS

A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.

B. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated stainlesssteel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STAND FABRICATION

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
1. Base: Stainless steel.
2. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
3. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
1. Bases: One or more plastic.
2. Vertical Members: Two or more protective-coated-steel channels.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
   2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
   3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
   4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
   5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
   6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
   7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
   8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
   9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
   10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.
   11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.
   12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
   13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
   14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
   15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
   16. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
   17. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
   18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
   19. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
   20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes, NPS 2 to NPS 24, if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.

15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
   2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
   3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
   2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
   3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
   4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
   5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
   6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
   7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
   8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
      a. Horizontal (MSS Type 54): Mounted horizontally.
      b. Vertical (MSS Type 55): Mounted vertically.
      c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

N. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

3.2 INSTALLATION OF BUILDING ATTACHMENTS

A. Install building attachments at required locations within concrete or on structural steel for proper support. Space attachments within maximum piping span length specified in this Section. Install additional building attachments where support is required for additional concentrated loads, including valves, flanges, guides, strainers, and expansion joints; at changes in direction of piping; and, where

1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:
   1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
   2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 Section "Roof Accessories" for curbs.

G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

N. Insulated Piping: Comply with the following:
   1. Attach clamps and spacers to piping.
      a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
      b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
      c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.
   2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
      a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
   3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
      a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
   4. Shield Dimensions for Pipe: Not less than the following:
      a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.7 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1/2 inches.

3.8 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
   1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.9 SECURING UNDERGROUND LINES

A. Install pipe clamps and braces using poured in place concrete blocks, or other anchors and supports required to insure stability of all underground lines to prevent joint separation either during tests or thereafter when lines are in service.

B. Pipe Braces and nuts installed in the ground shall be fabricated of stainless steel to resist corrosion.

END OF SECTION 23 05 29

SECTION 23 05 48

VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Isolation pads.
2. Isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Restrained spring isolators.
5. Housed spring mounts.
6. Elastomeric hangers.
7. Spring hangers.
8. Spring hangers with vertical-limit stops.
9. Pipe riser resilient supports.
10. Resilient pipe guides.
11. Restrained air-mounting system.
12. Restrained vibration isolation roof-curb rails.
13. Seismic snubbers.
14. Restraining braces and cables.
15. Inertia, vibration isolation equipment bases.

1.2 SCOPE OF WORK

A. Provide labor, materials, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of vibration isolation, including all related systems and accessories.

B. Furnish and install such special vibration isolators as are required to effectively isolate vibration from moving equipment. All vibration isolation devices, including auxiliary steel bases, shall be designed and furnished by a single manufacturer or his qualified representative who will be responsible for adequate coordination of all phases of this work and for providing such supervision as may be necessary to assure correct installation and adjustment of the isolators.

C. General Contractor shall provide concrete and reinforcing members for the bases described therein.

1.3 DEFINITIONS

A. IBC: International Building Code.

B. ICC-ES: ICC-Evaluation Service.

C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.

4. Seismic-Restraint Details:
   a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
   b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
   c. Coordinate seismic-restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Division 22 Sections for equipment mounted outdoors.
   d. Preapproval and Evaluation Documentation: By an evaluation service member of ICC-ES , showing maximum ratings of restraint items and the basis for approval (tests or calculations).

C. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.

D. Welding certificates.

E. Air-Mounting System Performance Certification: Include natural frequency, load, and damping test data[performed by an independent agency].

F. Field quality-control test reports.

G. Operation and Maintenance Data: For air-mounting systems to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.

C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
   a. Include supports for suction and discharge elbows for pumps.
   b. Inertia blocks shall be sized to extend not less than four inches (4") beyond the base of the supported equipment in each direction.
   c. The inertia blocks shall be T-shaped where necessary to conserve space.
2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
4. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.
5. All edges of the block shall have a minimum 1-inch chamfer.

C. Type B-2: A 4" thick reinforced concrete "housekeeping" pad. All edges of the block shall have a minimum 1" chamfer. The pads shall be T-shaped where necessary for double suction pumps and /or to match inertia bases Type B-1.

D. Type B-3: A 6" thick reinforced concrete "housekeeping" pad. All edges of the block shall have a minimum 1" chamfer. The pads shall be T-shaped where necessary for double suction pumps and /or to match inertia bases Type B-1.

E. Type B-4: Steel Base: Factory-fabricated, welded, structural-steel bases and rails.
1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
   a. Include supports for suction and discharge elbows for pumps.
2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.

2.3 VIBRATION ISOLATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ace Mountings Co., Inc.
2. Amber/Booth Company, Inc.
3. California Dynamics Corporation.
4. Isolation Technology, Inc.
5. Kinetics Noise Control.
6. Korfund Co.,
7. Mason Industries.
8. Vibration Eliminator Co., Inc.
9. Vibration Isolation.
10. Vibration Mountings & Controls, Inc.

2.4 Type 1: A base mount type isolator with an adjustable, freestanding, open-spring mounting with combination leveling bolt and equipment fastening bolt. The spring

D. Type 5: Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
   1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
   7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

E. Type 6: Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
   1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
   2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
   5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
   7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

2.5 Type 7: A pad type mounting consisting of two (2) layers of 3/8-inch thick, ribbed or waffled neoprene pads bonded to a 16-gauge galvanized steel separator plate. Bolting is not required. Pads shall be sized for approximately 20 to 40 psi load, or a deflection.

2.6 Type 8: A pad type isolator with steam-baked machinery grade cork 1-inch thick with a minimum density of 16 to 24 lb/ft^3. The cork shall be furnished in sheets for cutting as required.

2.7 Type 9: A pad type isolator with 1/2-inch thick closed cell neoprene, ASTM Grade, SEC 40, in sheets cut to fit penetrations as required.

2.8 Type 10: "Floating Slab" shall be poured on an isolation panel consisting of exterior grade plywood with 2" high density glass fiber isolation pads with low density (1.58

2.10 RESTRAINED VIBRATION ISOLATION ROOF-CURB RAILS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
   1. Amber/Booth Company, Inc.
   2. California Dynamics Corporation.
   3. Isolation Technology, Inc.
   4. Kinetics Noise Control.
   5. Mason Industries.
   6. Thybar Corporation.
   7. Vibration Eliminator Co., Inc.
   8. Vibration Isolation.
   9. Vibration Mountings & Controls, Inc.

B. General Requirements for Restrained Vibration Isolation Roof-Curb Rails: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment and to withstand seismic forces.

C. Lower Support Assembly: Formed sheet-metal section containing adjustable and removable steel springs that support upper frame. Upper frame shall provide continuous support for equipment and shall be captive to resiliently resist seismic forces. Lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of 2 inches of rigid, glass-fiber insulation on inside of assembly.

D. Spring Isolators: Adjustable, restrained spring isolators shall be mounted on 1/4-inch- thick, elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.
   1. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
      a. Housing: Steel with resilient vertical-limit stops and adjustable equipment mounting and leveling bolt.
      b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
      c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
      d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
      e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   2. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
      a. Resilient Material: Oil- and water-resistant standard neoprene.

E. Snubber Bushings: All-directional, elastomeric snubber bushings at least 1/4 inch thick.

F. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counter flashed over roof materials.

K. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

L. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

M. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

2.12 FACTORY FINISHES

A. Finish: Manufacturer's standard prime-coat finish ready for field painting.

B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
1. Powder coating on springs and housings.
2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
3. Baked enamel or powder coat for metal components on isolators for interior use.
4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
1. Powder coating on springs and housings.
2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
3. Baked enamel or powder coat for metal components on isolators for interior use.
4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

B. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

H. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

I. Drilled-in Anchors:
1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid pre-stressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.

3.5 Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.6 FANS AND AIR HANDLING UNITS

A. Fans and air handling units shall have flexible electrical connections not less than 36 inches long and flexible duct connections with a free length of not less than eight (8) inches.

3.7 PIPING

A. Floor mounted isolators shall be of the same type as those which are provided for the nearest isolated equipment connected to the piping.

B. The pipe hanger system shall have provisions for piping to be shimmed or blocked in place until connections are made and the systems filled with water, then the isolators adjusted to support the weights and the shim blocks removed.

C. The first three (3) support points in each direction from each piece of isolated equipment and all support points within 20 feet of such equipment shall be provided with vibration isolation hangers or supports having the same static deflection as the equipment isolators.

D. Springs supporting piping shall be capable of additional 1/2-inch deflection without becoming solid and spring supporting vertical risers have provisions for limit stops.

3.8 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they

3.12 HVAC VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE SCHEDULE

A. Tabulated below is a schedule of equipment for this project requiring reinforced concrete inertia blocks and vibration isolators of the types listed above. Any equipment, system, construction or condition that may be altered, added or changed, or that is not specifically considered herein or on the Drawings, shall be treated in a manner similar to that set out for similar equipment, systems or construction, in order to comply with these requirements.

B. Provide Type B-2 pad between floors and each isolator set or inertia pad/isolator set.

EQUIPMENT TYPE	BASE TYPE	ISOLATOR TYPE	ISOLATOR DEFLECTION
Pumps:			
Fire, motor-driven	B1	1	1.5"
Jockey	B3	None	--
Chilled water	B1	1	1.5"
Condenser water	B1	1	1.5"
Heating water	B1	1	1.5"
Grit Separator (condenser water)	B1	1	1.5"
Domestic water	B1	1	1.5"
Fans:			
Cabinet, floor-mounted	B2	2	2"
Centrifugal, DWDI, floor-mounted	B2	2	2"
Axial flow, suspended	None	6	2"
Centrifugal, in-line, floor-mounted	B2	2	2"
Centrifugal, in-line, suspended	None	6	2"
Utility vent sets	B2	2	2"
Roof exhausters, curb-mounted	None[a]	8	--

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.
5. Stencils.
6. Valve tags.
7. Warning tags.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For color, letter style, and graphic representation required for each identification material and device.

C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.

D. Valve numbering scheme.

E. Valve Schedules: For each piping system to include in maintenance manuals.

1.3 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Coordinate colors of letters and backgrounds for all pipe and duct labels with facility prior to installation, unless otherwise indicated.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:
1. Material and Thickness: Brass, Stainless steel, or anodized aluminum, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2 ½" by ¾ inch.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pre-tensioned Pipe Labels: Pre-coiled, semi-rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

E. Identify each run of piping exposed in any space, including machinery space, attic areas, and under floor areas, by means of Seton, or equivalent Brady or Westline plastic markers with pressure sensitive backing. Identify each system using black or white lettering with an arrow to indicate direction of flow on a background color coded to conform to ANSI A13.1. Use legends designed for parallel marking along length of pipe and sized as follows:

O.D. OF LINE OR COVERING (INCHES)	LENGTH OF COLOR BAND (INCHES)	HEIGHT OF LETTERS (INCHES)
Less than 3/4	8	1/2
3/4 to 2	8	3/4
2 1/2 thru 6	12	1 1/2
Over 6	24	2 1/2

F. Legends shall be installed following completion of all painting of piping and insulation finishes.

G. Place pipe legends on piping at each connection to an item of equipment, on each drop to an outlet, and on each run of piping at intervals not exceeding 50 feet, except that in no case shall an exposed line enter a room without being identified as specified herein. Locate markers so as to be readily visible.

H. Secure identification markers to piping by firmly pressing markers in place, following removal of protective covering. Additionally secure by banding ends of markers in place using 1/2 inch wide aluminum bands of the type normally used to secure insulation in place.

2.4 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulates.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."

B. Mechanical piping in mechanical rooms, boiler rooms, and powerhouses shall be entirely painted for color coding. Use PVC wrap-around labels to identify piping and flow direction (in addition steam piping shall be labeled indicating pressure). All emergency shutoff valves shall be identified with a permanent engraved tag hung from valve with 1-inch high lettering.

C. Piping shall be labeled at 20-foot intervals and at least once in each separate space through which the pipe passes.

D. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

3.4 DUCT LABEL INSTALLATION

A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:
1. ANSI A13.1.

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes TAB to produce design objectives for the following:

1. Air Systems:

a. Constant-volume air systems.

2. HVAC equipment quantitative-performance settings.
3. Sound level measuring.
4. Verifying that automatic control devices are functioning properly.
5. Reporting results of activities and procedures specified in this Section.

1.2 DEFINITIONS

A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.

C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.

D. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.

E. NC: Noise criteria.

F. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

G. RC: Room criteria.

H. Report Forms: Test data sheets for recording test data in logical order.

I. Smoke-Control System: An engineered system that uses fans to produce airflow and pressure differences across barriers to limit smoke movement.

J. Smoke-Control Zone: A space within a building that is enclosed by smoke barriers and is a part of a zoned smoke-control system.

K. Stair Pressurization System: A type of smoke-control system that is intended to positively pressurize stair towers with outdoor air by using fans to keep smoke from contaminating the stair towers during an alarm condition.

L. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

e. Coordination and cooperation of trades and subcontractors.
f. Coordination of documentation and communication flow.

C. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard forms from NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."TAB firm's forms approved by Architect.

E. Instrumentation Type, Quantity, and Accuracy: As described in NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems, " Section II, " Required Instrumentation for NEBB Certification."

F. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer.

1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

1.5 PROJECT CONDITIONS

A. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.6 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.7 WARRANTY

A. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee includes the following provisions:

B. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:

1. Add polymer admixture to portland cement and aggregates according to manufacturer's written instructions. Blend together with mechanical mixer or by hand to required consistency.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and other surfaces where waterproofing is to be applied with Applicator present, for compliance with requirements for surface preparation, cleaning, and other conditions affecting waterproofing performance.
   1. Proceed with application only after unsatisfactory conditions have been corrected.
   2. Begin waterproofing application only after unsatisfactory conditions have been corrected.
   3. Application of waterproofing indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Protect other work from fallout or overspray from modified cement waterproofing during application. Provide temporary enclosure to confine spraying operation, to prevent polluting the air, and to ensure adequate ambient temperatures and ventilation conditions for application.

B. Stop active water leaks according to waterproofing manufacturer's written instructions.

C. Schedule cleaning and surface preparation so dust and other contaminants from the cleaning and preparation process will not fall on wet, newly coated surfaces.

D. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to concrete or masonry surfaces.
   1. Clean concrete surfaces according to ASTM D 4258.
      a. Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic (hydrochloric) acid solution according to ASTM D 4260.
      b. Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.
   2. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

3.3 APPLICATION

A. General: Comply with waterproofing manufacturer's written instructions, unless more stringent requirements are indicated.

B. Mix waterproofing components according to waterproofing manufacturer's written instructions.

SECTION 07 18 16

VEHICULAR TRAFFIC COATING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes traffic coatings for the following applications:
   1. Vehicular Traffic:
      a. Standard duty coating system.
      b. Heavy duty coating system.
      c. Pavement markings.
   2. Salt Storage.

B. Related Sections include the following:
   1. Division 03 Section "Cast-in-Place Concrete" for concrete substrates.

1.2 DEFINITIONS

A. Traffic Coating: Traffic-bearing, fluid-applied, waterproof, elastomeric membrane intended for weather and ultra-violet exposure as well as for exposure to vehicular traffic on floors and parking decks.

1.3 PERFORMANCE REQUIREMENTS

A. Design Requirements: Traffic coating shall be watertight and not deteriorate for normal weather exposure and for normal traffic in applications indicated, nor for manufacturer-recommended cleaning procedures, for period of warranty.

B. Vehicular Traffic: Traffic topping shall not deteriorate under spillage of motor oil, transmission fluids, and other motor vehicle operating compounds, nor for exposure to normal ice/snow melting substances not specifically excluded by manufacturer's product information.

1.4 ACTION SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 00.

B. Product Data: For each product indicated.

C. Shop Drawings: Show extent of each traffic coating. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions.
   1. Indicate layout of pavement markings.

D. Samples for Initial Selection: Furnish manufacturer's complete color selection showing full range of colors and finish characteristics.

E. Samples for Verification: For each type of traffic coating required, prepared on rigid backing and of same thickness and material indicated for the Work.

2. Notify participants at least seven days before conference.
3. Where work is warranted by manufacturer, require manufacturer's technical representative to participate in conference.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels showing the following information:
1. Manufacturer's brand name.
2. Type of material.
3. Directions for storage.
4. Date of manufacture and shelf life.
5. Lot or batch number.
6. Mixing and application instructions.
7. Color.

B. Store materials in a clean, dry location protected from exposure to direct sunlight. In storage areas, maintain environmental conditions within range recommended in writing by manufacturer.

1.9 PROJECT CONDITIONS OR SITE CONDITIONS

A. Environmental Limitations: Apply traffic coatings within the range of ambient and substrate temperatures recommended in writing by manufacturer. Do not apply traffic coatings to damp or wet substrates, when temperatures are below 45 deg F, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.

B. Do not apply traffic coatings in snow, rain, fog, or mist, or when such weather conditions are imminent during the application and curing period. Apply only when frost-free conditions occur throughout the depth of the substrate.

C. Do not install traffic coating until items that will penetrate membrane have been installed.

1.10 WARRANTY

A. Special Warranty: Written warranty, signed by traffic coating manufacturer agreeing to repair or replace traffic coatings that do not comply with requirements or that deteriorate during the specified warranty period. Warranty does not include deterioration or failure of traffic coating due to unusual weather phenomena, failure of prepared and treated substrate, formation of new substrate cracks exceeding 1/16 inch (1.6 mm) in width, fire, vandalism, or abuse by maintenance equipment.
1. Deterioration of traffic coatings includes, but is not limited to, the following:
a. Adhesive or cohesive failures.
b. Abrasion or tearing failures.
c. Surface crazing or spalling.

B. Warranty Period: Not less than 5 years from date of Substantial Completion.

c. Basis of Design Product:
1) Carlisle Coatings & Waterproofing "CCW-5123-HD."

2. Vertical Surfaces: Liquid elastomer coating, consisting of primer, base coat, two top coats.
a. Dry film thickness not less than 60 mils applied at manufacturer's recommended rate.
b. Color: As selected by Architect from manufacturer's full line.
c. Basis of Design Product:
1) Carlisle Coatings & Waterproofing "CCW-501-V."

2.3 MISCELLANEOUS MATERIALS

A. Joint Sealants: As specified in Division 07 Section "Joint Sealants."

B. Sheet Flashing: Nonstaining.
1. Minimum Thickness: 50 mils (1.3 mm).
2. Material: Sheet material recommended in writing by traffic coating manufacturer.

C. Adhesive: Contact adhesive recommended in writing by traffic coating manufacturer.

D. Reinforcing Strip: Fiberglass mesh recommended in writing by traffic coating manufacturer.

2.4 PAVEMENT MARKINGS

A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 45 minutes.
1. Color: White unless otherwise indicated.
a. Use blue for spaces accessible to people with disabilities.

B. Glass Beads: AASHTO M 247, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Applicator present, for compliance with requirements and for other conditions affecting performance of traffic coatings.
1. Verify compatibility with and suitability of substrates.
2. Begin coating application only after minimum concrete curing and drying period recommended by traffic coating manufacturer has passed, after unsatisfactory conditions have been corrected, and after surfaces are dry.
3. Verify that substrates are visibly dry and free of moisture.
a. Test for moisture vapor transmission by plastic sheet method according to ASTM D 4263, unless otherwise recommended by traffic coating manufacturer.

B. Begin coating application only after unsatisfactory conditions have been corrected.

1. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.
2. Comply with recommendations in ASTM C 1193 for joint-sealant installation.

3.5 INSTALLATION

A. General: Install system in accordance with manufacturer's printed installation instructions, submittals, applicable industry standards, and governing regulatory requirements for the Work.
   1. Apply traffic coating material according to ASTM C 1127 and manufacturer's written recommendations.
   2. Apply membrane liquids by spraying, roller coating, or distributing with notched squeegee to provide uniform thickness. Trowel heavy-bodied mixtures in place uniformly as recommended by manufacturer.
   3. Apply total thickness of traffic topping in number of coats recommended by manufacturer, using special top coating to achieve wear resistance and weather resistance as required and to provide color and texture required.
      a. Verify that wet film thickness of each component coat complies with requirements every 100 sq. ft (9 sq. m).
   4. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated and omit aggregate on vertical surfaces.

B. Start installation of deck covering in presence of manufacturer's technical representative where terms of warranty require inspection and acceptance of installation as it proceeds.

C. Elastomeric Urethane: Apply base membrane of urethane elastomer and aggregate-bearing top course in accordance with manufacturer's instructions.

D. Coatings for Vehicular Traffic Areas: Elastomeric urethane system:
   1. Apply membrane liquids by spraying, roller coating, or distributing with notched squeegee to provide uniform thickness. Trowel heavy-bodied mixtures in place uniformly as recommended by manufacturer.
   2. Apply total thickness of traffic topping in number of coats recommended by manufacturer, using special top coating to achieve wear resistance and weather resistance as required and to provide color and texture required.

E. Coating for Salt Storage Areas:
   1. Horizontal Surfaces:
      a. Apply membrane liquids by spraying, roller coating, or distributing with notched squeegee to provide uniform thickness. Trowel heavy-bodied mixtures in place uniformly as recommended by manufacturer.
      b. Apply total thickness of traffic topping in number of coats recommended by manufacturer, using special top coating to achieve wear resistance and weather resistance as required and to provide color and texture required.
      c. Apply system 6" up walls.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 CURING AND PROTECTION

A. Cure traffic coatings according to manufacturer's written recommendations. Prevent contamination and damage during application and curing stages.

B. Protect traffic coatings from damage and wear during remainder of construction period.

C. Clean spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

D. Protect the Work so it will not deteriorate or be damaged. Remove protection at time of Substantial Completion.

3.9 SCHEDULES

A. Heavy Duty Vehicular Traffic Coating:
   1. Over occupied and/or storage spaces.
   2. Turning areas.
   3. Electrical vaults.
   4. Ramps.

B. Vehicular Traffic Coating:
   1. All other locations.

END OF SECTION

SECTION 07 21 16

BATT AND BLANKET INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Concealed batta nd blanket building insulation.
   2. Vapor retarders.

B. Related Sections include the following:
   1. Division 09 Sections "Gypsum Board Assemblies" and "Gypsum Board Shaft-Wall Assemblies" for installation in metal-framed assemblies of insulation specified by reference to this Section.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Surface-Burning Characteristics: ASTM E 84.
   2. Fire-Resistance Ratings: ASTM E 119.
   3. Combustion Characteristics: ASTM E 136.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
   1. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
   2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. For metal-framed wall cavities where cavity heights exceed 96 inches(2438 mm), support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.

E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

F. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.7 PROTECTION

A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07 42 45

ALUMINUM COMPOSITE PANEL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Aluminum composite wall panel system with sealant-filled route and return reveals / joints.

B. Related Sections include the following:
1. Division 05 Section "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal-faced composite wall panels.

1.2 DEFINITIONS

A. Metal-Faced Composite Wall Panel Assembly: Metal-faced composite wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

B. Rout and Return Wet: Composite Wall Panel Assembly with reveal joint consisting of silicone sealant over backer rod as specified in Section 07 92 00.

1.3 DESIGN REQUIREMENTS

A. Delegated Design: Design metal-faced composite wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated

B. Manufacturer: Provide system design including anchorage to structural system and modifications that are necessary to meet specified requirements. Maintain visual design concepts.

C. Drawings and Specifications: The Drawings are diagrammatic only and are intended to establish the basic dimension requirements of the units, sight lines, and unit profiles. The requirements shown by the details are intended to establish basic dimensions of the module and the sight lines and profiles of members.
1. Within these parameters, design the composite wall panel assembly, including adjustments and refinements as may be required to meet the specified performance requirements and maintain the intended aesthetic effects.
2. Dimension and profile adjustments may be made in the proposed design in the interest of fabrication or erection methods or techniques, the weatherability factor, or the ability of the design to satisfy the design and performance requirements, provided that the intended aesthetic effects are maintained.

D. Panels shall include no visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.

b. Parapets and Corners: Uniform pressure of 30 lbf/sq. ft. (1436 Pa), acting inward or outward

2. Deflection Limits: Metal-faced composite wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/175 of the span at the perimeter and 1/60 of the span anywhere in the panel.
   a. Maximum Perimeter Framing Deflection, normal to plane of wall between supports, deflection of secured perimeter framing members: Maximum L/175 or 3/4 inch, whichever is less.
   b. Maximum Panel Deflection: L/60 of full span normal to plane of wall.
   c. Maximum Anchor Deflection: 1/16 inch.
   d. Maximum Permanent Deflection of Framing Members: L/100 of span length at 1-1/2 times design pressure and components shall not experience failure or gross permanent distortion. Maximum 1/16 inch permanent set at connection points of framing members to anchors.

E. Panel Construction Performance Requirements: Fabricate panels to comply with the following:
1. Bond Integrity: Per ASTM D 1781, no adhesive failure of bond between core and skin nor cohesive failure within core below the following values:
   a. Bond Strength: 214 psi, vertical pull.
   b. Peel Strength:
      1) 22.5 in. pounds/inch as manufactured.
      2) 22.5 in. pounds/inch after 8 hours in water at 200 degrees F.
      3) 22.5 in. pounds/inch after 21 days soaking in water at 70 degree F.
2. Fabrication Tolerances: Fabricate panels to comply with the following:
   a. Panel Bow: 0.8 percent maximum of panel dimension in width and length for 72 inch panel.
   b. Maximum Deviation from Panel Flatness: 1/8 inch in 5 feet on panel in each direction for assembled units, non-cumulative.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss:
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal-faced composite wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal-faced composite wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish among factory-, shop-, and field-assembled work.

B. Warranties: Samples of special warranties.

1.8 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of metal-faced composite wall panel from single source from single manufacturer.

B. Manufacturer Qualifications: Not less than 10 years successful production of this product.

C. Installer Qualifications: Certified in writing by system manufacturer as qualified to design, fabricate, and install manufacturer's system, and who has completed systems similar in material, design, and extent to those indicated for this Project and with a record of successful in-service performance.
   1. Installer shall have not less than 5 years specialized experience with this product.

D. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
   1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

E. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

F. Fire-Resistance Ratings: Where indicated, provide metal-faced composite wall panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical wall and corner panel as shown on Drawings; approximately one bay wide by one story high by full thickness, including supports, attachments, and accessories.
      a. Include four-way joint for metal-faced composite wall panels.
   2. Utilize sample panel for coordination with trades whose work is adjacent to or interfaces with composite metal panel assemblies.
   3. Conduct water-spray test of mockup of metal-faced composite wall panel assembly, testing for water penetration according to AAMA 501.2.
   4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal wall panels without field measurements, or allow for field trimming of panels.
   2. Coordinate wall construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.11 COORDINATION

A. Coordinate metal-faced composite wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-faced composite wall panel assemblies that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures, including rupturing, cracking, or puncturing.
      b. Deterioration of metals and other materials beyond normal weathering.
   2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal-faced composite wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Provide composite wall panel assemblies as manufactured by one of the following, only if the specific product or material can evidence compliance with requirements of the Contract Documents.

2.4 MISCELLANEOUS MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated.

B. Composite Panel Stiffeners:
1. Aluminum extrusion as indicated on Drawings.
2. Minimum Spacing: 1/20 square feet of panel area.
3. Panels in excess of 14.99 square feet: Stiffeners required.
4. Calculate additional stiffeners at high wind load areas.
5. Hold temporary with two-sided tape. Attach with structural silicone.
6. No alternate type stiffeners permitted such as galvanized steel angles, plates, subgirts, flat or formed strips of composite panels.

C. Perimeter Seals: Extruded aluminum, ASTM B 209.

D. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal-faced composite wall panels by means of plastic caps or factory-applied coating. Provide EPDM or neoprene sealing washers.

E. Flashing Materials: Fabricate from 0.030 inch minimum thickness aluminum sheet painted to match the adjacent panel system where exposed. Provide a lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bed of non-hardening sealant.

2.5 ALUMINUM COMPOSITE PANELS

A. General: Provide factory-formed and -assembled, metal-faced composite wall panels fabricated from two metal facings bonded, using no glues or adhesives, to solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment system components and accessories required for weathertight system.
1. Fire-Retardant Core: Noncombustible, with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 450 or less.

B. Basis of Design Products: Subject to compliance with requirements, provide one of the following:
1. Route and Return Wet System:
a. Alcan Composites USA Inc.; Alucobond Plus.
b. Alcoa Inc.; Reynobond PE.
c. ALPOLIC, Division of Mitsubishi Chemical America, Inc.; ALPOLIC/fr.
d. Firestone Metal Products; UNA-FAB Series 1000.
2. Panel Thickness: Not less than 4 mm (0.157 inch).
3. Core: Fire retardant.
4. Aluminum Face and Backer Sheet: Minimum 0.02 inch thick.
5. Exterior Finish: Clear anodized.
a. Color: As selected by Architect from manufacturer's full range.

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
   1. Examine primary and secondary wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
   2. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
      a. Conditions of Surfaces:
         1) Flat, plumb, level.
         2) Clean, free of oil, water, moisture, laitance, or any other deleterious substances.
      b. Conditions of Opening Size (dimension and tolerances): Per manufacturer's latest published specifications.
   3. Verify that weather-resistant air / moisture barrier has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal-faced composite wall panels to verify actual locations of penetrations relative to seam locations of panels before panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare the structure to ensure proper and adequate structural support for the materials specified.

B. Prepare substrate surfaces to ensure proper and adequate installation, in accordance with the Contract Documents and approved Shop Drawings, or manufacturer's requirements.

C. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C 754 and metal wall panel manufacturer's written recommendations.
   1. Install subgirts on spacing determined by manufacturer to comply with design and performance requirements.
   2. Install subgirts parallel to each other, securely fastened to structure to transfer live and dead loads to structure.
   3. Install girts, angles, and other secondary structural panel support members and anchorage in accordance with AISC Manual of Steel Construction "Code of Standard Practice."

D. Coordinate installation of panels with adjacent construction to ensure watertight enclosure.

E. Protect adjacent areas and surfaces from damage as a result of the Work of this Section.

1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Division 07 Section "Joint Sealants."

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete metal-faced composite wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.5 ERECTION TOLLERANCES

A. Installation Tolerances: Shim and align metal-faced composite wall panel units to be within the following tolerances:
   1. Maximum deviation from vertical and horizontal alignment of erected panels: 1/4 inch in 20 feet nonaccumulative.
   2. Maximum offset from true alignment between adjacent members butting or in line: 1/8 inch.
   3. Maximum variation from plane or location indicated on Drawings: 1/4 inch in 20 feet nonaccumulative.

B. Field adjust and align using adjustments within fastening methods.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner reserves the right to engage a qualified testing agency to perform tests and inspections.

B. Water Penetration: Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inward-acting, wind-load

C. After installation and until Owner acceptance, protect the Composite Metal Panel system from damage. Leave protective film on panels until punch list items have been corrected.

END OF SECTION

23A06

SECTION 07 52 16

SBS-MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Two-ply, modified bituminous membrane roofing.
   2. Roofing insulation.
   3. Walkways.

1.2 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 for definitions of terms related to roofing work not otherwise defined in this Section.

B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt within a range of plus or minus 25 deg F(14 deg C) measured at the mop cart or mechanical spreader immediately before application.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install a watertight, modified bituminous membrane roofing and base flashing system with compatible components that will not permit the passage of liquid water and will withstand wind loads, thermally induced movement, and exposure to weather without failure.

B. FM Listing: Provide modified bituminous membrane, base flashings, and component materials that meet requirements of FM 4450 and FM 4470 as part of a roofing system and that are listed in FM's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM markings.
   1. Roofing system shall comply with the following:
      a. Fire/Windstorm Classification: Class 1A-180.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roofing product specified. Include data substantiating that materials comply with requirements.

B. Shop Drawings: Include plans, sections, details, and attachments to other work, for the following:
   1. Base flashings, cants, and membrane terminations.
   2. Tapered insulation, including slopes.
   3. Crickets, saddles, and tapered edge strips, including slopes.

C. Samples for Verification: Of the following products:

manufacturer to install manufacturer's product; and who is eligible to receive the standard roofing manufacturer's warranty.

B. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method indicated below by UL, FM, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Exterior Fire-Test Exposure: Class A; complying with ASTM E 108, for application and slopes indicated.
   2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing materials are a part.

C. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site. Meet with the same participants and review the same items listed for the pre-installation conference. In addition, review status of submittals and coordination of work related to roof construction. Notify participants at least 5 working days before conference.

D. Pre-installation Conference: Before installing roofing system, conduct conference at Project site to comply with requirements of Division 01 Section "Project Meetings." Notify participants at least 5 working days before conference.
   1. Meet with Owner; Architect; Owner's insurer, if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and attachment to structural members.
   4. Review loading limitations of deck during and after roofing.
   5. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.
   6. Review governing regulations and requirements for insurance, certifications, and inspection and testing, if applicable.
   7. Review temporary protection requirements for roofing system during and after installation.
   8. Review roof observation and repair procedures after roofing installation.
   9. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store roofing materials in a dry, well-ventilated, weathertight location to ensure no significant moisture pickup and maintain at a temperature exceeding roofing system manufacturer's written instructions. Store rolls of felt and other sheet materials on end on pallets or other raised surfaces. Do not double-stack rolls.

b. Johns Manville Roofing Systems.
c. Siplast, Inc.
d. Soprema Roofing and Waterproofing, Inc.
e. Tamko Roofing Products, Inc.

2. Polyisocyanurate Board Insulation:
a. Atlas Roofing Corporation.
b. Firestone Building Products Co.
c. Johns Manville Roofing Systems.
d. NRG Barriers, Inc.

2.2 SBS-MODIFIED BITUMINOUS SHEET

A. SBS-Modified Bituminous Sheet, Smooth Surfaced: SBS-modified asphalt sheet, smooth surfaced, dusted with fine parting agent on both sides; suitable for application method specified; manufacturer's standard thickness and weight; for use and of reinforcing type as follows:
1. Use: Base ply of 2-ply, modified bituminous membrane roofing.
2. Reinforcing: Glass-fiber mesh or non-woven glass-fiber mat.

B. SBS-Modified Bituminous Sheet, Mineral-Granule Surfaced: SBS-modified asphalt sheet, with continuous layer of mineral granules factory applied to top exposed surface; suitable for application method specified; manufacturer's standard thickness and weight; for use and of reinforcing type and granule color as follows:
1. Use: Finish ply of 2-ply, modified bituminous membrane roofing and base flashing.
2. Reinforcing: Glass-fiber mesh or non-woven glass-fiber mat.
3. Granule Color: Tan.

C. Physical Properties: Provide SBS-modified bituminous membrane materials with the following properties when tested according to ASTM D 5147:
1. Thickness: 94 mils (2.4 mm).
2. Tensile-Tear Strength: 40 lbf/in. (0.18 kN) in each direction.
3. Elongation at Maximum Load: 3.0 percent minimum at 0 deg F(minus 18 deg C) in each direction.
4. Water Absorption: Maximum 2 percent.
5. Low-Temperature Flexibility: Pass at minus 13 deg F(minus 25 deg C).
6. Compound Stability: Not less than 212 deg F(f100 deg C).

2.3 AUXILIARY MEMBRANE MATERIALS

A. General: Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with SBS-modified bituminous roofing.
1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdiction.

B. Roofing Asphalt: ASTM D 312, Type III or Type IV, as recommended by modified bituminous membrane manufacturer.
1. Label each container or provide certification with each load of bulk asphalt identifying type of roofing asphalt and indicating softening point,

A. General: Furnish roofing insulation accessories recommended by insulation manufacturer for intended use and compatible with sheet roofing material.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions of FM 4470, designed for fastening roofing insulation to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

C. Tapered Edge Strips: Rigid, perlite insulation board, complying with ASTM C 728.

D. Substrate Joint Tape: 6 or 8 inches(150 or 200 mm) wide, coated, glass-fiber joint tape.

2.6 ROOF WALKWAYS

A. Walkway Pads: Traffic resistant, polymer-modified bitumen, reinforced with a polyester mat and surfaced with mineral granules, 0.235 inches (6 mm thick), 30 inches wide, manufactured specifically for adhering to modified bituminous membrane roofing as a protection course for foot traffic.
1. Acceptable Product: Paratread by Siplast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions under which roofing will be applied, with Installer present, for compliance with requirements.

B. Verify that roof openings and penetrations are in place and set and braced and that roof drains are properly clamped into position.

C. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at roof penetrations and terminations and match the thicknesses of insulation required.
1. Verify that wood nailer strips are located perpendicular to roof slope and are spaced according to requirements of roofing system manufacturer.

D. Do not proceed with installation until after the minimum concrete curing period recommended by roofing system manufacturer.
1. Test concrete substrate for excessive moisture by pouring 1 pint(0.5 L) of roofing asphalt at equiviscous temperature on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.

E. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installing roofing insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated and to Shop Drawings.

D. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

E. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches(50 mm) or greater, install required thickness in 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches(150 mm) in each direction.

F. Trim surface of insulation where necessary at roof drains so completed surface is flush with ring of drain.

G. Nailer Strips: Where roof slopes are greater than 1/2 inch per 12 inches(1:24), mechanically fasten to deck 4-inch nominal-(89-mm actual-) wide, wood nailer strips of same thickness as insulation, spaced not more than 20 to 21 feet(6.0 to 6.4 m) apart. Run nailers perpendicular to slope of roof.

H. Install insulation with long joints of insulation in continuous straight lines with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch(6 mm) with insulation.
   1. Cut and fit insulation within 1/4 inch(6 mm) of nailers, projections, and penetrations.

I. Attached Insulation: Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal./100 sq. ft.(0.3 L/sq. m), unless a greater weight is required by roofing system manufacturer, and allow primer to dry. Set each layer of insulation in a solid mopping of hot roofing asphalt.
   1.
   2.

3.5 BASE-SHEET INSTALLATION

A. Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal./100 sq. ft.(0.3 L/sq. m) and allow primer to dry.

B. Install one lapped course of base sheet according to roofing system manufacturer's written instructions, extending sheet over and terminating beyond cants. Attach base sheet as follows:
   1. Adhere to substrate in a solid mopping of hot roofing asphalt.

3.6 ROOF MEMBRANE INSTALLATION

A. General: Install modified bituminous membrane over area to receive roofing, according to manufacturer's written instructions. Extend modified bituminous membrane over and terminate beyond cants.

D. Install modified bituminous stripping where metal flanges and edgings are set on membrane roofing, according to roofing system manufacturer's written instructions.

E. Roof Drains: Set 30-by-30-inch(760-by-760-mm) metal flashing in bed of asphalt roofing cement on completed modified bituminous membrane roofing. Cover metal flashing with modified bituminous stripping extending a minimum of 4 inches(100 mm) beyond edge of metal flashing onto field of roof membrane. Clamp roof membrane, metal flashing, and stripping into roof-drain clamping ring.

3.8 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
   1. Notify Architect and Owner 48 hours in advance of the date and time of inspection.

3.9 PROTECTING AND CLEANING

A. Protect modified bituminous membrane roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove modified bituminous roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair base flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.10 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
   1. Owner:
   2. Address:
   3. Building Name/Type:
   4. Address:
   5. Area of Work:
   6. Acceptance Date:
   7. Warranty Period:
   8. Expiration Date:

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20___.
   1. Authorized Signature:
   2. Name:
   3. Title:

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sheet metal flashing and trim in the following categories:
   1. Copings.
   2. Exposed trim and fasciae.
   3. Gutters and downspouts.
   4. Metal flashing.
   5. Overhead-piping safety pans.
   6. Gravel stops.

1.2 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

B. Fabricate and install flashings at roof edges to comply with recommendations of FM Loss Prevention Data Sheet 1-49 for the wind zone appropriate to the local code requirements for wind speed.

1.3 ACTION SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

C. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

D. Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.
   1. 8-inch-(200-mm-) square Samples of specified sheet materials to be exposed as finished surfaces.
   2.

1.4 INFORMATIONAL SUBMITTALS

F. Epoxy Seam Sealer: 2-part, non-corrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior and interior nonmoving joints, including riveted joints.

G. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.

H. Paper Slip Sheet: 5-lb/square(0.244 kg/sq. m) red rosin, sized building paper conforming to FS UU-B-790, Type I, Style 1b.

I. Polyethylene Underlayment: ASTM D 4397, minimum 6-mil-(0.15-mm-) thick black polyethylene film, resistant to decay when tested according to ASTM E 154.

J. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; non-corrosive; size and thickness required for performance.

K. Roofing Cement: ASTM D 4586, Type I, asbestos free, asphalt based.

2.3 FABRICATION, GENERAL

A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.

B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

D. Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.

E. Expansion Provisions: Space movement joints at maximum of 10 feet(3 m) with no joints allowed within 24 inches(610 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch(25 mm) deep, filled with mastic sealant (concealed within joints).

F. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

G. Separate metal from non-compatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.

2.5 ALUMINUM EXTRUSION FABRICATIONS

A. Aluminum Extrusion Units: Fabricate extruded-aluminum running units with formed or extruded-aluminum joint covers for installation behind main members where possible. Fabricate mitered and welded corner units.

2.6 ALUMINUM FINISHES

A. General: Comply with Aluminum Association's (AA) "Designation System for Aluminum Finishes" for finish designations and application recommendations.

B. Class I, Color Anodic Finish: AA-C22A42/A44 (Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.
1. Color: Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which sheet metal flashing and trim are to be installed and verify that Work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Unless otherwise indicated, install sheet metal flashing and trim to comply with performance requirements, manufacturer's installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Anchor units of Work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install Work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

C. Roof-Edge Flashings: Secure metal flashings at roof edges according to FM Loss Prevention Data Sheet 1-49 for specified wind zone.
1. Expansion Provisions: Provide for thermal expansion of exposed sheet metal Work. Space movement joints at maximum of 10 feet(3 m) with no joints allowed within 24 inches(610 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form

J. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.

K. Equipment Support Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.

L. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:
   1. Seal and clamp flashing to pipes penetrating roof, other than lead flashing on vent piping.

M. Splash Pans: Install where downspouts discharge on low-sloped roofs, unless otherwise shown. Set in roof cement or sealant compatible with roofing membrane.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.

B. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

END OF SECTION

SECTION 07 84 13

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
   1. Floors.
   2. Roofs.
   3. Walls and partitions.
   4. Smoke barriers.
   5. Construction enclosing compartmentalized areas.

1.2 PERFORMANCE REQUIREMENTS

A. General: For the following constructions, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly penetrated.
   1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
   2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
   3. Fire-resistance-rated floor assemblies.
   4. Fire-resistance-rated roof assemblies.

B. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.

C. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, as determined per ASTM E 814, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
   1. Penetrations into storage areas containing combustible materials.

D. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that after curing do not deteriorate when exposed to these conditions both during and after construction.
   1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
   2. For floor penetrations with annular spaces exceeding 4 inches(100 mm) in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.

3. Installer shall be qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements.
   a. Individuals performing the installation of firestop systems must be trained by a direct representative of the firestop materials manufacturer, not a distributor or agent.
   b. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualification on buyer.

B. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

C. Source Limitations: Obtain through-penetration firestop systems from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per ASTM E 814. Provide rated systems complying with the following requirements:
   a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
   b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
      1) UL in "Fire Resistance Directory."

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by

B. Provide sealants and putties that are integrally colored by manufacturer so they are readily identifiable as firestopping products. White or light colored products, or field-colored products will not be acceptable.

C. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
   1. Permanent forming/damming/backing materials, including the following:
      a. Slag-/rock-wool-fiber insulation.
      b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
      c. Fire-rated form board.
      d. Fillers for sealants.
   2. Temporary forming materials.
   3. Substrate primers.
   4. Collars.
   5. Steel sleeves.

2.3 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic or plastic casing lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.

C. Follow manufacturer's installation instructions. In situations where the requirements of this Section differ from those of the manufacturer, the more conservative requirements shall govern.

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with written recommendations of firestop system manufacturer and the following requirements:
1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with "Performance Requirements" Article and firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
1. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

A. Where UL-classified systems are indicated, they refer to the alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Firestop Systems with No Penetrating Items (FS-1): Comply with the following:
   1. Pipes, plastic or metal, conduit in vertical runs, installed through cast-in-place firestop devices.
      a. Acceptable UL-Classified Systems with FA 1000 Series Systems equivalent to, but not limited to, the following:
         1) FA1016, FA1017, FA2053, FA2054 by Hilti.
         2) CP 680 Cast-in Firestop Device by Hilti

C. Firestop Systems with No Penetrating Items (FS-2): Comply with the following:
   1. Acceptable UL-Classified Systems with CAJ 0000 Series Systems equivalent to, but not limited to, the following: CAJ0055, CAJ0070 by Hilti or CAJ0012, CAJ0102 by Grace.
   2. Type of Fill Materials: One or more of the following:
      a. Latex sealant.
      b. Silicone sealant.
      c. Acrylic sealant.
      d. Intumescent putty.
      e. Mortar.
      f. Preformed intumescent blocks.
      g. Pillows/Bags

D. Firestop Systems for Metallic Pipes, Conduit, or Tubing (FS-3): Comply with the following:
   1. Acceptable UL-Classified Systems with CAJ, WL, or FC 1000 Series Systems, equivalent to, but not limited to, the following: CAJ1184, CAJ1291, CAJ1277, CAJ1382, CAJ1388, WL1054, WL1249, FC1009 by Hilti or CAJ1403, CAJ1235, CAJ1406, WL1152, WL1207, FC1020 by Grace.
   2. Type of Fill Materials: One or more of the following:
      a. Latex sealant.
      b. Silicone sealant.
      c. Acrylic sealant.
      d. Intumescent putty.
      e. Mortar.
      f. Polyurethane firestop foam.

E. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing (FS-4): Comply with the following:
   1. Acceptable UL-Classified Systems with CAJ, FA, or WL 2000 Series Systems, equivalent to, but not limited to, the following: CAJ2109, FA2053, WL2078, WL2128 by Hilti or CAJ2212, CAJ2171, CAJ2210, WL2167, WL2185, WL2170, WL2259 by Grace.
   2. Type of Fill Materials: One or more of the following:
      a. Intumescent sealant.
      b. Intumescent putty.
      c. Intumescent wrap strips.
      d. Firestop device.

J. Firestop Systems for Miscellaneous Mechanical Penetrations (FS-9): Comply with the following:
   1. Acceptable UL-Classified Systems with CAJ 7000 Series Systems equivalent to, but not limited to, the following: CAJ7046, CAJ7051, CAJ7040, CAJ7021 by Hilti or CAJ7067, CAJ7075, CAJ7082 by Grace.
   2. Type of Fill Materials: One or both of the following:
      a. Intumescent sealant.
      b. Latex sealant.
      c. Mortar.
      d. Acrylic sealant.
      e. Silicone sealant.

K. Firestop Systems for Groupings of Penetrations (FS-10): Comply with the following:
   1. Acceptable UL-Classified Systems with CAJ or WL 8000 Series Systems, equivalent to, but not limited to, the following: CAJ8056, CAJ8096, WJ8007, WL8014, WL8019 by Hilti or CAJ8042, CAJ8101, CAJ8133, WL8007 by Grace.
   2. Type of Fill Materials: One or more of the following:
      a. Latex sealant.
      b. Mortar.
      c. Intumescent wrap strips.
      d. Firestop device.
      e. Intumescent composite sheet.
      f. Pre-formed intumescent blocks.
      g. Polyurethane firestop foam.

END OF SECTION

SECTION 07 84 43

FIRE RESISTANT JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fire-resistive joint systems for the following:
   1. Floor-to-floor joints.
   2. Floor-to-wall joints.
   3. Head-of-wall joints.
   4. Wall-to-wall joints.
   5. Joints between perimeter edge of fire-resistance-rated floor assemblies and back of non-fire-resistance-rated, exterior, glazed aluminum curtain walls.

1.2 PERFORMANCE REQUIREMENTS

A. General: For joints in the following constructions, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed:
   1. Fire-resistance-rated load-bearing walls, including partitions, with and without fire-protection-rated openings.
   2. Fire-resistance-rated non-load-bearing walls, including partitions, with and without fire-protection-rated openings.
   3. Fire-resistance-rated floor assemblies.
   4. Exterior curtain-wall assemblies and fire-resistance-rated floor assemblies.

B. Fire Resistance of Joint Systems: Assembly ratings and movement capabilities indicated, but with assembly ratings not less than that equaling or exceeding fire-resistance rating of constructions in which joints are located, as determined by UL 2079.
   1. Load-bearing capabilities as determined by evaluation during the time test.

C. Fire Resistance of Perimeter Fire-Containment Systems: Integrity and insulation ratings indicated as determined by applicable codes and UL 2079.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed and relationships to adjoining construction. Include fire-resistive joint system design designation of

classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A.

B. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Basis-of-Design Products: The design for each fire-resistive joint system is based on products named in Part 2 articles. Subject to compliance with requirements, provide either the named products or comparable products by one of the following:
   a. Fire-Resistive Joint Systems:
      1) Hilti, Inc.
      2) Nelson Firestop Products.
      3) Specified Technologies Inc.
      4) 3M Fire Protection Products.
      5) Tremco, Inc.

E. Wall-to-Wall, Fire-Resistive Joint System (FRJS-4):
   1. Acceptable UL-Classified Products:
      a. WWD1011, WWD1012, WWD0017 by Hilti.
      b. WWD1028 & WWD1029 – Grace Flamesafe®
   2. Assembly Rating: Refer to Drawings.
   3. Nominal Joint Width: As indicated.
   4. Movement Capabilities: Class II; refer to Drawings.

2.4 PERIMETER FIRE-CONTAINMENT SYSTEMS

A. Where fire-rated floor assemblies are required, seal voids at intersection of exterior wall and floor assembly with an approved material per building code requirements.

B. Perimeter Fire Containment Systems are only valid if the certain wall construction details exactly match those called for in a selected UL/Omega Point-classified system. If the details do not match, submit an engineer judgement drawing from the firestop material manufacturer in accordance with the requirements of Part 1 of this Section.

C. Perimeter Fire-Containment System:
   1. Acceptable Omega Point-Classified Products:
      a. CEJ216P, CEJ244P, CEJ245P, CEJ246P, CEJ259P, CEJ260P, CEJ261P, CEJ262P, CEJ263P by Hilti.
      b. CEJ150P, CEJ151P, CEJ152P,CEJ153P, CEJ154P, CEJ-273P, CEJ-274P, CEJ-275P, CEJ-276P, CEJ-296P & CEJ-297P – Grace Flamesafe®
   2. Assembly Rating: Refer to Drawings.
   3. Nominal Joint Width: As indicated.
   4. Movement Capabilities: Class II; refer to Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
   1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes sealants for the following applications, including those specified by reference to this Section:

B. This Section includes sealants for the following applications:
   1. Exterior joints in the following vertical surfaces and non-traffic horizontal surfaces:
      a. Control and expansion joints in cast-in-place concrete.
      b. Joints between different materials listed above.
      c. Perimeter joints between materials listed above and frames of doors and windows.
      d. Control and expansion joints in ceiling and overhead surfaces.
      e. Other joints as indicated.
   2. Exterior joints in the following horizontal traffic surfaces:
      a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
      b. Joints between different materials listed above.
      c. Other joints as indicated.
   3. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Perimeter joints of exterior openings where indicated.
      c. Tile control and expansion joints.
      d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
      e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      f. Other joints as indicated.
   4. Interior joints in the following horizontal traffic surfaces:
      a. Control and expansion joints in cast-in-place concrete slabs.
      b. Control and expansion joints in tile flooring.
      c. Other joints as indicated.

1.2 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

D. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:
   1. Locate test joints where indicated or, if not indicated, as directed by Architect.
   2. Conduct field tests for each application indicated below:
      a. Each type of elastomeric sealant and joint substrate indicated.
      b. Each type of nonelastomeric sealant and joint substrate indicated.
   3. Notify Architect seven days in advance of dates and times when test joints will be erected.
   4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
   5. Test Method: Test joint sealants by hand-pull method described below:
      a. Install joint sealants in 60-inch-(1500-mm-) long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.
      b. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches(50 mm) long at sides of joint and meeting cross cut at one end. Place a mark 1 inch(25 mm) from cross-cut end of 2-inch(50-mm) piece.
      c. Use fingers to grasp 2-inch(50-mm) piece of sealant between cross-cut end and 1-inch(25-mm) mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
      d. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
   6. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
   7. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of Part 3.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's complete line of colors.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

B. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

C. Stain-Test-Response Characteristics: Where elastomeric sealants are specified in the Elastomeric Joint-Sealant Schedule to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.4 SOLVENT-RELEASE JOINT SEALANTS

A. Acrylic-Based Solvent-Release Joint-Sealant Standard: Comply with ASTM C 1311 for each product of this description indicated in the Solvent-Release Joint-Sealant Schedule at the end of Part 3.

2.5 LATEX JOINT SEALANTS

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
   1. Remove foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
      a. Concrete.
      b. Unglazed surfaces of ceramic tile.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
      a. Metal.
      b. Glass.
      c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

c. Sikaflex – 2c NS, Sika Corporation

2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 25.
4. Additional Movement Capability: 50 percent movement in extension and 50 percent in compression for a total of 100 percent movement.
5. Use Related to Exposure: NT (nontraffic).
6. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
   a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, granite, limestone, marble, ceramic tile, and wood.

D. Multicomponent Pourable Urethane Sealant (Designation U-TB): Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Available products include the following:
   a. THC-900-901, Tremco.
   b. Vulkem 245, Tremco.
   c. Sikaflex 2c/SL, Sika.
   d. SL 2 Sealant, Sonneborn.
   e. Dynatred, Pecora.
2. Type and Grade: M (multicomponent) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic) and NT (nontraffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
   a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, granite, limestone, marble, ceramic tile, and wood.

3.8 LATEX JOINT-SEALANT SCHEDULE

A. Latex Sealant (Designation AL): Where joint sealants of this type are indicated, provide products complying with the following:
1. Products: Available products include the following:
   a. Tremflex 834; Tremco.
   b. AC-20; Pecora Corporation.
   c. Sonolac; Sonneborn Building Products Div., ChemRex, Inc.
   d. Chem-Calk 600; Bostik Inc.

3.9 SEALANT SCHEDULE

A. Items Not to be Sealed:
1. Joints covered by joint covers and seals specified in Section 05 81 1.
2. Joints, perimeter, and penetrations in fire-rated assemblies. Use firestop sealants as specified in Section 07 84 13.
3. Joints, perimeter, and penetrations in sound-rated assemblies. Use acoustical sealant specified with sound-rated assembly in Section 09 29 00.
4. Weep holes in masonry, storefront, and windows.

B. Sealant Schedule:

Division 08 – Openings

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Steel doors.
   2. Steel door frames.
   3. Fire-rated door and frame assemblies.

1.2 DEFINITIONS

A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

B. Shop Drawings: Show the following:
   1. Elevations of each door design.
   2. Details of doors including vertical and horizontal edge details.
   3. Frame details for each frame type including dimensioned profiles.
   4. Details and locations of reinforcement and preparations for hardware.
   5. Details of each different wall opening condition.
   6. Details of anchorages, accessories, joints, and connections.

1.4 INFORMATIONAL SUBMITTALS

A. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

B. Samples:
   1. Submit 2 head to jamb corner samples of each frame type, 6 inches by 6 inches in correct dimensional profile, and illustrating factory primed finish.

C. Certificates:
   1. Certify that Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4-inch-(100-mm-) high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch(6-mm) spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Steel Doors and Frames:
      a. Amweld Building Products, Inc.
      b. Ceco Door Products; a United Dominion Company.
      c. Curries Company.
      d. Republic Builders Products.
      e. Steelcraft Manufacturing.

2.2 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40(ZF120) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher-leveled standard of flatness where used for face sheets.

2.3 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
   1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).

2.4 FRAMES

I. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

J. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

K. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.
   1. Unless otherwise indicated, provide thermal-rated assemblies with U-value of 0.29 value or better.

L. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
   1. For concealed overhead door closers, provide space, cutouts, reinforcement, and provisions for fastening in top rail of doors or head of frames, as applicable.

M. Frame Construction: Fabricate frames to shape shown, die cut, fully welded units.
   1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints, unless otherwise indicated.
   2. Provide welded frames with temporary spreader bars.

N. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

O. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

P. Astragals: As required by NFPA 80 to provide fire ratings indicated.

2.6 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
   1. Place frames before construction of enclosing walls and ceilings.

SECTION 08 43 13

ALUMINUM FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Exterior storefront systems.

1.2 SYSTEM DESCRIPTION

A. General: Provide aluminum storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
   1. Air infiltration and water penetration exceeding specified limits.
   2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing: Physically and thermally isolate glazing from framing members.

C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.

D. Wind Loads: Provide storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
   1. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch(19 mm), whichever is smaller, unless otherwise indicated.
   2. Static-Pressure Test Performance: Provide storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
      a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
      b. Duration: As required by design wind velocity; fastest 1 mile(1.609 km) of wind for relevant exposure category.

E. Seismic Loads: Provide storefront systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 09, "Earthquake Loads," whichever are more stringent.

B. Shop Drawings: For storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.

C. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

D. Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch(150-mm) lengths of full-size components and showing details of the following:
   1. Joinery.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.
   5. Flashing and drainage.

1.4 INFORMATIONAL SUBMITTALS

A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

B. Field Test Reports: Indicate and interpret test results for compliance with storefront systems' performance requirements.

C. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of storefront systems with requirements based on comprehensive testing of current systems.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing storefront systems similar to those required for this Project and who is acceptable to manufacturer.
   1. Engineering Responsibility: Prepare data for storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Source Limitations: Obtain each type of storefront system through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 01 Section "Substitutions."
   1. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Kawneer Company, Inc.
   2. United States Aluminum.
   3. Vistawall Architectural Products.

B. Acceptable Product – Basis of Design:
   1. Storefront Systems: HP 102 by Vistawall.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
   1. Sheet and Plate: ASTM B 209(ASTM B 209M).
   2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221(ASTM B 221M).
   3. Extruded Structural Pipe and Tubes: ASTM B 429.
   4. Bars, Rods, and Wire: ASTM B 211(ASTM B 211M).
   5. Welding Rods and Bare Electrodes: AWS A5.10.

B. Steel Reinforcement: Complying with ASTM A 36(ASTM A 36M) for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570(ASTM A 570M) for hot-rolled sheet and strip.

C. Glazing as specified in Division 08 Section "Glazing."

D. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

E. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.

F. Sealants and joint fillers for joints at perimeter of storefront systems as specified in Division 07 Section "Joint Sealants."

G. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil(0.762-mm) thickness per coat.

2.3 COMPONENTS

A. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide non-staining, nonferrous shims for aligning system components.

B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
   1. Reinforce members as required to retain fastener threads.
   2. Do not use exposed fasteners.

the range of approved Samples and are assembled or installed to minimize contrast.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

E. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.

F. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.

G. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 07 Section "Joint Sealants."

E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.

F. Install glazing to comply with requirements of Division 08 Section "Glazing," unless otherwise indicated.

SECTION 08 44 13

GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes conventionally glazed aluminum curtain walls installed as stick systems.

B. Related Sections include the following:
1. Division 07 Section "Building Insulation" for insulation materials field installed with glazed aluminum curtain-wall systems.
2. Division 07 Section "Fire-Resistant Joint Sealants" for perimeter fire-containment systems (safing insulation) field installed with glazed aluminum curtain-wall systems.
3. Division 07 Section "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain-wall systems and for sealants to the extent not specified in this Section.
4. Division 08 Section "Glazing" for insulating-glass requirements.
5. Division 08 Section "Structural-Sealant-Glazed Curtain Walls" for curtain-wall systems installed with structural sealant.
6. Division 08 Section "Sloped Glazing Systems" for sloped glazing installed with glazed aluminum curtain-wall systems.
7. Division 08 Section "Louvers and Vents" for units installed with glazed aluminum curtain-wall systems.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding, without failure, the effects of the following:
1. Structural loads.
2. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
3. Dimensional tolerances of building frame and other adjacent construction.
4. Failure includes the following:
   a. Deflection exceeding specified limits.
   b. Thermal stresses transferred to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
   d. Noise or vibration created by wind and thermal and structural movements.
   e. Loosening or weakening of fasteners, attachments, and other components.
   f. Sealant failure.

B. Structural Loads:
1. Wind Loads: As indicated on Drawings

I. Water Penetration Under Dynamic Pressure: Provide glazed aluminum curtain-wall systems that do not evidence water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive design wind load, but not less than 10 lbf/sq. ft.(479 Pa).
   1. Maximum Water Leakage: According to AAMA 501.1 No uncontrolled water penetrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.

J. Condensation Resistance: Provide glazed aluminum curtain-wall systems with condensation-resistance factor (CRF) of not less than 55 when tested according to AAMA 1503.

K. Average Thermal Conductance: Provide glazed aluminum curtain-wall systems with average U-factor of not more than 0.66 Btu/sq. ft. x h x deg F(3.75 W/sq. m x K) when tested according to AAMA 1503.

L. Sound Transmission: Provide glazed aluminum curtain-wall systems with minimum STC 32 according to ASTM E 413 and an OITC 26 according to ASTM E 1332, as determined by testing according to ASTM E 90.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Include details indicating how curtain wall system is supported and braced by building structural system. Clearly identify sizes, materials, and locations of supporting clips, brackets, and anchors.
   2. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
   3. Include details for items which are connected to or interface with curtain wall system framing members.
   4. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
      a. Joinery, including concealed welds.
      b. Anchorage.
      c. Expansion provisions.
      d. Glazing.
      e. Flashing and drainage.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Submit concurrently with Shop Drawings.

measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 WARRANTY

A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain-wall systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Deterioration of metals and other materials beyond normal weathering.
      d. Water leakage.
   2. Warranty Period: [**Two**] [**Five**] [**10**] years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Kawneer.
   2. United States Aluminum.
   3. Vistawall Architectural Products.
   4. YKK AP America Inc.

Edit following for project.

B. Acceptable Product – Basis of Design: CW-250 as manufactured by Vistawall

2.2 FRAMING SYSTEMS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Sheet and Plate: ASTM B 209(ASTM B 209M).
   2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221(ASTM B 221M).
   3. Extruded Structural Pipe and Tubes: ASTM B 429.
   4. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
   1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
   2. Cold-Rolled Sheet and Strip: ASTM A 611.
   3. Hot-Rolled Sheet and Strip: ASTM A 570/A 570M.

5. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.
6. Provisions for re-glazing from interior for vision glass and exterior for spandrel glazing or panels.

C. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.6 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:
1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure non-movement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.

under Part 1 "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft.(300 Pa) and shall not evidence water penetration.

3. Water Spray Test: After the installation of minimum area of 75-feet-(23-m-) by-2-story glazed aluminum curtain-wall system has been completed but before installation of interior finishes has begun, a 2-bay area of system designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

C. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE – PREAMBLE ONLY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Provide all items of finish hardware required to adequately trim, hang, and operate all doors, as is hereinafter specified and listed in the Hardware Schedule.
   1. Provide hardware for doors and frames of unusual profile or shape or other special conditions.
   2. Provide all necessary standard and special fasteners, screws, bolts, expansion shields or anchors to properly secure hardware to its intended door, frame, or other surface.

B. Related Sections include the following:
   1. Steel Doors and Frames: Section 08 11 13.

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section:
   1. Permanent cores to be installed by Owner.

1.2 REFERENCES

A. The following reference standards and model code documents shall be used in estimating and detailing door hardware, and shall considered as a standard of quality, function, and performance, as applicable:

1.	I.B.C.	2000 Edition.
2.	NFPA-80	Fire Doors & Windows (current year adopted).
3.	NFPA-101	Life Safety Code (current year adopted).
4.	NFPA-105	Smoke Control Door Assembly. (current year adopted)
5.	ANSI-117.1	1992 Edition Providing Accessibility and Usability for Physically Handicapped People.
6.	A.D.A.A.G	Americans with Disabilities Act Accessibility Guidelines.
7.	T.A.S.	Texas Accessibility Standards.

1.3 ACTION SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 00.

b. authorized person wants to exit;
c. unauthorized person wants to enter;
d. unauthorized person wants to exit.

E. Samples for Verification: If so requested by the Architect, provide a sample of any product or item requested, properly marked and tagged, for the opening for which it is intended.

F. Keying: Provide a keying schedule, listing the levels of keying, (GGMK, GKD, MKD or KA) as well as an explanation of the key system's function, the key symbols used and the numbers of the doors controlled. Provide in conjunction with the Door Index/Keying Schedule (which lists the door number, schedule heading, lock type and individual key symbol and remarks or special instructions) mentioned in above. Project shall be Masterkeyed and/or Grand Masterkeyed and provide two (2) keys per lockset or cylinder.

1.4 INFORMATIONAL SUBMITTALS

A. Operation and Maintenance Data: For each type of door hardware to include in maintenance manuals. Provide latest, revised and updated schedule of finish hardware, complete with catalog cuts and keying schedule. In addition, furnish one (1) copy of maintenance and parts manuals for those items for which they are readily available and normally provided.
1. Submit in accordance with provisions of Section 01 78 23.

1.5 QUALITY ASSURANCE

A. Substitutions: Request for substitutions for alternative hardware items will not be accepted on this Project unless specifically indicated. Specification indicates one (1) specified product, listed hereinafter in the Hardware Schedule, and two (2) acceptable alternative manufacturers for that product. If any specified product is listed as a "No Substitution" product, only that specified product shall be provided as indicated.

B. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
1. The hardware supplier shall be engaged regularly in the furnishing, delivery and servicing of contract builder's hardware and must be experienced and knowledgeable in all phases of estimating, detailing, scheduling, masterkeying, shipping and installation practices.
2. When electro-mechanical or electronic hardware is supplied, a qualified individual with a minimum five- (5) year's experience shall be available for assistance.

D. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door

detection devices, access control system, security system, and building control system, as applicable.

1.8 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: If there are any products listed hereinafter that normally require a maintenance or service contract, provide the Owner and Architect with details and costs of standard maintenance or service contract.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
   1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Hardware Schedule" Article.

B. Product manufacturers listed with an asterisk (*) denote the specified manufacturers listed in the Hardware Schedule. The remaining two (2) listed manufacturers will be acceptable substitutions. If only one manufacturer is listed this shall be considered a "No Substitution" specification as set forth in "Quality Assurance" Article, for that particular item.

2.2 MATERIALS

A. Screws and Fasteners: Provide all screws and fasteners of the proper size and type to properly anchor or attach the item of hardware scheduled. Provide all fasteners with Phillips heads, unless security type screws (spanner-head or torx-head) are hereinafter specified.

B. Hinges: Provide as follows:
   1. Where regular ball bearing hinges are listed for other doors, provide one hinge for each 30-inch of door height.
   2. The width of the hinges shall be sufficient to clear all trim that is mounted to the doorframe.
   3. Hinges shall be guaranteed for life of opening if installed per manufacturer's recommendations.
   4. Acceptable Manufacturers:
      a. Ives*
      b. Stanley.
      c. Hager.

C. Locks: All locks shall incorporate a seven pin tumbler system and be keyed to a GRANDMASTER SYSTEM as not to breach security of system in place. Keying

J. Door Stops and Holders: Where a door strikes a wall at approximately 90 degrees, a suitable door stop shall be provided, either a wall bumper or floor stop. Where doors are undercut, provide floor stops with adequate height to properly stop the door. If door would not otherwise strike a wall, an overhead stop shall be provided. In-wall blocking for wall bumpers at stud walls shall be provided in accordance with Section 06 10 53. Provide reinforcing in frame and door for overhead stops.
   1. Acceptable Manufacturers:
      a. Ives*
      b. Trimco.
      c. Rockwood
      d. Glynn-Johnson.

K. Thresholds and Weatherstrip: Weatherstripping to have aluminum housing, specified insert, and elongated mounting holes. Door sweeps shall be surface mounted, of aluminum/stainless steel housing with specified insert. Overhead drip caps to be of aluminum, have a 2 1/2-inch projection and be 4 inches wider than the door opening. Thresholds shall be of saddle type with no more than 1/2 inch rise. Weatherstripping and smoke seals shall be surface-mounted on doorstop and have 1/4" adjustment slots.
   1. Acceptable Manufacturers:
      a. Pemko*
      b. Hager.
      c. NGP.

L. Smoke Gasket: Smoke gasket shall comply with door and frame manufacturers for positive pressure tests for fire and smoke. (UBC7-2, Parts 1 & 2/UL10C).
   1. Acceptable Manufacturers:
      a. Pemko*
      b. Hager.
      c. NGP.

2.3 FINISHES

A. Hardware finishes shall match and be maintained to BHMA symbols, as indoicated in the Hardware Schedule. Strict adherence to base metals and finish is required.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.4 KEYING

A. Keying of locks and cylinders throughout project shall be scheduled through a key meeting with Architect, Owner, and hardware supplier. Key schedule shall be prepared and submitted to the Owner for approval. Copies of final key schedule with the bitting instructions shall be submitted as part of the Project Record Documents.

2.5 KEY CONTROL

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

D. Key Control System: Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.

E. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect prior to installation.

F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

3.4 FIELD QUALITY CONTROL

A. Perform final inspection with hardware installer and hardware supplier present to ensure correct installation and operation, and check for any damaged or defective items. Observe and inspect that all hardware has been installed to its correct destination in proper working order.

B. Independent Architectural Hardware Consultant: Owner reserves the right to engage a qualified independent Architectural Hardware Consultant to perform a separate independent inspection and to prepare an inspection report.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended.
1. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

B. At completion of the installation and prior to Substantial Completion, make final adjustments to door closures and other items of hardware. Leave all hardware clean and fully operable. Should any item be found to be defective, it shall be repaired or replaced as directed.

C. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Glazed Curtain Walls.
   2. Storefront.

1.2 DEFINITIONS

A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.

B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

C. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

D. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
   1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
      a. Specified Design Wind Loads: As indicated.

B. Samples: For the following products, in the form of 12-inch-(300-mm-) square Samples for glass.
   1. Each color of tinted float glass.
   2. Coated vision glass.
   3. Insulating glass for each designation indicated.
   4. For each color (except black) of exposed glazing sealant indicated.

C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.

D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.

E. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

F. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

C. Source Limitations for Clear Glass: Obtain clear float glass from one primary-glass manufacturer.

D. Source Limitations for Tinted Glass: Obtain tinted, heat-absorbing, and light-reducing float glass from one primary-glass manufacturer for each tint color indicated.

E. Source Limitations for Coated Glass: Obtain coated glass from one manufacturer for each type of coating and each type and class of float glass indicated.

F. Source Limitations for Insulating Glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.

G. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

H. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glass type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants.

A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F(4.4 deg C).

1.8 WARRANTY

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Special Warranty on Coated-Glass Products: Written warranty, made out to Owner and signed by coated-glass manufacturer agreeing to furnish replacements for those coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Substantial Completion.

C. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products indicated in the Glazing Schedule.

2.2 PRIMARY FLOAT GLASS

A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); class as indicated in the Glazing Schedule.

C. Sealing System: Dual seal, with primary and secondary sealants as follows:
   1. Manufacturer's standard sealants.

D. Spacer Specifications: Manufacturer's standard spacer material and construction.
   1. Aluminum with mill or clear-anodized finish.
   2. Desiccant: Molecular sieve or silica gel, or blend of both.
   3. Corner Construction: Manufacturer's standard corner construction.

2.7 FIRE-RATED GLAZING PRODUCTS

A. Laminated Glass with Intumescent Interlayers: Proprietary Category II safety glazing product in the form of multiple lites of Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Kind FT (fully tempered) float glass laminated with intumescent interlayers; and as follows:

   1. Fire-Protection Rating: 60 minutes and 120 minutes, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
   2. Product: Subject to compliance with requirements, "PyroStop" by Pilkington Building Products North America and distributed by Technical Glass Products.

2.8 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:
   1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
   3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.

B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
   1. Additional Movement Capability: Where additional movement capability is specified in the Glazing Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.

C. Glazing Sealant for Fire-Resistive Glazing Products: Identical to product used in test assembly to obtain fire-protection rating.

2.9 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; non-staining and non-migrating in contact

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.12 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

C. Grind smooth and polish exposed glass edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing glazing, with Installer present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep system.
3. Minimum required face or edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site.

E. Do not remove release paper from tape until just before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 PROTECTION AND CLEANING

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than

Division 09 – Finishes

29K05

SECTION 09 61 16

CONCRETE FLOOR SEALING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Sealing of concrete floor areas not scheduled to receive finish floor covering.
   2. Cleaning and sealing of existing concrete floors not scheduled to receive finish floor covering.

1.2 DESIGN REQUIREMENTS

A. Verify concrete slab is properly prepared to receive coating system.

1.3 ACTION SUBMITTALS

A. General: Submit in accordance with Section 01 33 00.

B. Product Data: For each type of product indicated.
   1. Include data to indicate chemical, solvent, and detergent resistance.
   2. Include information for primer, sealants, accessories and other required components.

1.4 QUALITY ASSURANCE

A. Single Source Responsibility: Furnish products from one manufacturer for entire Project, unless otherwise acceptable to Architect.

B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.

C. Applicator Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with Section 01 61 00.
   1. Deliver materials in manner to prevent damage to containers and bags.
   2. Store materials in accordance with manufacturer's instructions in clean and dry location with temperature between 60 F and 90 F (16 C and 32 C).
   3. Keep products away from fire or open flame.

1.6 PROJECT CONDITIONS

A. Environmental Requirements:

b. Deviations beyond allowable tolerance for concrete slab work.
c. Surface curing agents or sealers that would inhibit bond.
d. Surface defects such as cracks that could transfer through to finished flooring surface if not corrected.

2. Do not begin flooring work until concrete substrate has cured 28 days, minimum.
3. Do not begin work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare Substrate: Tests concrete substrate for pH, contaminants, and moisture content in accordance with manufacturer's recommendations. Ensure concrete is within manufacturers recommended limits prior to installation.

B. Concrete Sub-floors: Verify that concrete slabs comply with ASTM F 710 and the following:
1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
2. Mechanically abrade or shot-blast existing concrete flooring to remove inappropriate curing agents and to open pores of concrete surfaces to allow penetration of bonding agent. Completely remove cleaning residue. Acid washing is not acceptable.
3. Repair cracks, divots and surface imperfections according to manufacturer's instructions.
4. Vacuum to remove dust and debris.

3.3 APPLICATION

A. Sealer/Hardener: Apply in accordance with manufacturer's instructions.

3.4 CURING

A. Cure flooring materials according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process.
1. Indoor Air Quality Procedures: Ventilate in accordance with Section 01 35 43.

3.5 CLEANING

A. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.
1. Cleaner: Volatile Organic Compound: In accordance with applicable codes.
2. Remove temporary covering and clean flooring prior to final inspection. Use cleaning materials and procedures recommended by flooring manufacturer.
3. Do not permit traffic over finished flooring surfaces.

3.6 PROTECTION

SECTION 09 65 19

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Vinyl composition floor tile.
   2. Rubber floor tile.

1.2 SUBMITTALS

A. Product Data: For each type of product specified.

B. Samples for Verification: Full-size tiles of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.

C. Maintenance Data: For resilient floor tile to include in the maintenance manuals specified in Division 1.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
   2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

D. Substrate Moisture and pH Testing:
   1. Perform pre-installation testing of the concrete slab by a calcium chloride test, or as otherwise required by flooring manufacturer, prior to the application of flooring products in accordance with ASTM F 1869 – 98.
   2. Perform testing by qualified personnel.
   3. Determine the change in weight of moisture-absorbing anhydrous calcium chloride and represent the amount of moisture transmitting out of the concrete slab area.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
   1. Furnish not less than one box for each 50 boxes or fraction thereof, of each type, color, pattern, class, wearing surface, and size of resilient tile flooring installed.
   2. Furnish not less than 10 linear feet(3 linear m) for each 500 linear feet(150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient accessory installed.
   3. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: ARMSTRONG 1/8" THK, 12"x12"

2.2 RESILIENT TILE

A. Vinyl Composition Floor Tile: Products complying with ASTM F 1066. Refer to Finish Legend.

B. Vinyl Tile: Refer to Finish Legend.

2.3 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives:
   1. Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of tiles, and in maximum available lengths to minimize running joints.

2.4 FABRICATION

A. Resilient Tile Cutting Method: Factory cut radiused patterns by water jet method. No other cutting method is acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's

1. Lay tiles in pattern of colors and sizes indicated on Drawings.

D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on sub-floor. Use chalk or other nonpermanent, non-staining marking device.

G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.

H. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Handroll tiles according to tile manufacturer's written instructions.

3.4 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:
1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
2. Sweep or vacuum floor thoroughly.
3. Do not wash floor until after time period recommended by flooring manufacturer.
4. Damp-mop floor to remove marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.
a. Use commercially available product acceptable to flooring manufacturer.
b. Coordinate selection of floor polish with Owner's maintenance service.
2. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.
3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

SECTION 09 91 00

PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and field painting of the following:
   1. Exposed exterior items and surfaces.
   2. Exposed interior items and surfaces.
   3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
   1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
   2. Painting includes identifying fire-rated wall assemblies with stenciled lettering above ceiling.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Prefinished items include the following factory-finished components:
      a. Architectural woodwork and casework.
      b. Metal lockers.
      c. Elevator entrance doors and frames.
      d. Elevator equipment.
      e. Finished mechanical and electrical equipment.
      f. Light fixtures.
      g. Distribution cabinets.
   2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
      a. Furred areas.
      b. Ceiling plenums.
      c. Utility tunnels.
      d. Pipe spaces.
      e. Duct shafts.
      f. Elevator shafts.
   3. Finished metal surfaces include the following:
      a. Anodized aluminum.
      b. Stainless steel.
      c. Chromium plate.
      d. Copper.
      e. Bronze and brass.

b. Concrete Masonry: Provide two 4-by-8-inch (100-by-200-mm) samples of masonry, with mortar joint in the center, for each finish and color.

c. Ferrous Metal: Provide two 4-inch-(100-mm-) square samples of flat metal and two 8-inch-(200-mm-) long samples of solid metal for each color and finish.

C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.

1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted.
   a. Wall Surfaces: Provide samples on at least 100 sq. ft.(9 sq. m) of wall surface.
   b. Small Areas and Items: The Architect will designate an item or area as required.
2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.
   a. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.
3. Final approval of colors will be from job-applied samples.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
   1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Provide custom colors of the finished paint systems to match the Architect's samples.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
   1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
   2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
   1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
   1. Paint colors, surface treatments, and finishes are indicated in the schedules.
   2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
   3. Provide finish coats that are compatible with primers used.
   4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
   5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
   7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
   8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
   9. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
   2. Omit primer on metal surfaces that have been shop primed and touchup painted.
   3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
   4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

K. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

L. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats.

M. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

N. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

O. Identification: Provide 3 inch high stenciled block letters in red to identify each rated wall assembly.

3.4 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:
1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
2. The testing agency will perform appropriate tests for the following characteristics as required by the Owner:
a. Quantitative material analysis.
b. Abrasion resistance.
c. Apparent reflectivity.
d. Flexibility.
e. Washability.
f. Absorption.
g. Accelerated weathering.
h. Dry opacity.
i. Accelerated yellowness.
j. Recoating.
k. Skinning.
l. Color retention.
m. Alkali and mildew resistance.
3. The Owner may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from

b. Second Coat: DTM Acrylic B66W1, 2.5 mils DFT.
c. Third Coat: Same as second.

3.8 INTERIOR PAINT SCHEDULE

A. Gypsum Board, Flat Latex-Based Acrylic Finish: 2 finish coats over a primer.
1. PPG:
a. Primer: 6-2 Speedhide Interior Latex Sealer
b. Second Coat: 86-6 Manor Hall Interior Flat Acrylic Latex, 1.3 mils DFT
c. Third Coat: Same as second coat.
2. Sherwin-Williams:
a. Primer: Roller applied latex texturing compound, PrepRite 200 Latex Wall Primer, B25W2000.
b. Second Coat: EverClean Interior Latex Flat, 1.3 mils DFT.
c. Third Coat: Same as second coat.

B. Gypsum Board, Semi-Gloss, Epoxy, Low VOC: 2 finish coats over a primer.
1. PPG:
a. Primer: 6-2 Speedhide Interior Latex Sealer.1.4 mils DFT.
b. Second Coat: Pitt-Glaze Interior Waterborne Acrylic Epoxy Semigloss, 16-551 Series, 2.7 mils DFT.
c. Third Coat: Same as second coat.
2. Sherwin-Williams:
a. Primer: PrepRite 200 Latex Primer, 1.4 mils DFT.
b. Second Coat: Water Based Catalyzed Epoxy, B70-200 Series, 3.0 mils DFT.
c. Third Coat: Same as second coat.

C. Gypsum Board, Semi-Gloss, Enamel 2 finish coats over a primer.
1. PPG:
a. Primer: 6-2 Speedhide Interior Latex Sealer, 1.4 mils DFT.
b. Second Coat: 87-6 Manor Hall Interior Semigloss Latex, 1.3 mils DFT.
c. Third Coat: Same as second coat.
2. Sherwin-Williams:
a. Primer: ProMar 200 Latex Wall Primer, 1.5 mils DFT.
b. Second Coat: IncrediCoat Interior Latex Semi-Gloss Enamel, B31WJ2, 1.5 mils DFT.
c. Third Coat: Same as second coat.

D. Gypsum Board, Eggshell, Low Odor: 2 finish coats over a primer.
1. PPG:
a. Primer: 9-2 Pure Performance Int. Latex Primer, Zero VOC-Green Seal A Certification, 1.5 mils DFT.
b. Second Coat: 9-510 Pure Performance Int. Eggshell, Zero VOC-Green Seal A Certification, 1.5 mils DFT.
c. Third Coat: Same as second coat.
2. Sherwin-Williams:
a. Primer: Harmony Low Odor Interior Latex Primer, 1.5 mils DFT.
b. Second Coat: Harmony Low Odor Interior Latex Eggshell, 1.5 mils DFT.
c. Third Coat: Same as second coat.

Division 10 – Specialties

25B03

SECTION 10 44 00

FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Portable fire extinguishers.
   2. Fire-protection cabinets for portable fire extinguishers.
   3. Fire-protection accessories.

1.2 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection specialties.
   1. Fire Extinguishers: Include rating and classification.
   2. Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Samples for Verification: For each type of exposed cabinet finish required, prepared on Samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
   1. Size: 6-by-6-inch-(150-by-150-mm-) square samples.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain fire extinguishers and cabinets through one source from a single manufacturer.

B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."

C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
   1. Provide extinguishers listed and labeled by FM.

1.4 COORDINATION

A. Coordinate size of cabinets to ensure that type and capacity of fire extinguishers are accommodated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Semi-Recessed: Cabinet box semi-recessed in walls of sufficient depth to suit style of trim indicated.

D. Cabinet Trim Style: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.
1. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
a. Rolled edge, 3 inches deep.

E. Cabinet Trim Material: Manufacturer's standard, as follows:
1. Same metal and finish as door.

F. Door Material: Manufacturer's standard, as follows:
1. 16 gage cold rolled steel sheet.

G. Door Glazing: Manufacturer's standard, as follows:
1. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, as follows:
a. Class 1 (clear).

H. Door Style: Manufacturer's standard design, as follows:
1. Vertical glass lite, centered in door.

I. Door Construction: Fabricate doors according to manufacturer's standards, of materials indicated, and coordinated with cabinet types and trim styles selected.
1. Provide minimum 1/2-inch-(13-mm-) thick door frames, fabricated with tubular stiles and rails, and hollow-metal design.

J. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam-action latch, or exposed or concealed door pull and friction latch. Provide concealed or continuous-type hinge permitting door to open 180 degrees. Comply with requirements of Americans with Disabilities Accessibility Standards.

2.6 ACCESSORIES

A. Mounting Brackets: Manufacturer's standard steel, designed to secure extinguisher, of sizes required for types and capacities of extinguishers indicated, with plated or baked-enamel finish.
1. Provide brackets for extinguishers not located in cabinets.

B. Identification: Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location. Locate as indicated by Architect.
1. Identify bracket-mounted extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to wall surface.
2. Identify fire extinguisher in cabinet with the words "FIRE EXTINGUISHER" applied to door.
a. Application Process: Vinyl letters.
b. Lettering Color: Red.
c. Orientation: Vertical.

C. Examine fire extinguishers for proper charging and tagging.
   1. Remove and replace damaged, defective, or undercharged units.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing fire-protection specialties.

B. Install in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
   1. Prepare recesses for cabinets as required by type and size of cabinet and trim style.
   2. Fasten cabinets to structure, square and plumb.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust cabinet doors that do not swing or operate freely.

B. Refinish or replace cabinets and doors damaged during installation.

C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

3.4 SCHEDULE

A. Provide fire extinguisher in cabinet where indicated on Drawings.

B. Provide one wall hung fire extinguisher in each electrical room and each storage room over 100 square feet.

END OF SECTION

Division 11 – Equipment

18K05

SECTION 11 12 00

PARKING CONTROL EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Automatic barrier gates.
2. Vehicle detectors.
3. Ticket dispensers.
4. Card-control units.
5. Cashier's clocks.
6. Electronic fee computer.
7. Parking facility management software.
8. Cashier's booths.

1.2 ACTION SUBMITTALS

A. Product Data: For each item of parking control equipment. Include manufacturer's standard details and installation and maintenance instructions.

B. Shop Drawings: For each item of parking control equipment. Include plans, elevations, and details of typical members and other components. Show layout and installation details, including anchorage details.
1. Wiring Diagrams: Detail wiring for parking control equipment operator, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.
a. Show locations of connections to electrical service provided in other Sections.

C. Samples for Verification: Of cashier's booth wall finishes in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected. Prepare Samples from same material to be used for the Work.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For parking control equipment components to include in the maintenance manuals specified in Division 01.
1. Include recommended methods and frequency for maintaining equipment in optimum operating condition under anticipated traffic and use conditions.
2. Include precautions against materials and methods that may be detrimental to finishes and performance.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the parking control equipment manufacturer for both

b. Delta Scientific Corporation.
c. Henges Manufacturing, Inc.
d. Intertex Parking Systems.
e. Mardan Fabricators, Inc.
f. Parking Booth Company, Inc.
g. Par-Kut International.
h. Porta-King.

3. Aluminum Cashier's Booths:
a. Austin Fabricating, Inc.
b. Mardan Fabricators, Inc.
c. Porta-King.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by aluminum manufacturer and finisher for type of use and finish indicated, and with not less than strength and durability properties of alloy and temper designated below for each aluminum form required.
1. Extruded Aluminum: ASTM B 221(ASTM B 221M), 6063-T6.
2. Aluminum Sheet: ASTM B 209(ASTM B 209M), 5005-H15.
3. Aluminum Floor Plate: ASTM B 632/B 632M, 6061.

B. Cold-Rolled Steel Sheet: ASTM A 366/A 366M.

C. Galvanized Steel Floor Plate: ASTM A 786/A 786M, hot-dip galvanized according to ASTM A 123.

D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90(Z275) coating designation; commercial quality.

E. Steel Structural Tubing: ASTM A 500, cold-formed steel structural tubing, Grade B.

F. Steel Mechanical Tubing: ASTM A 513, welded steel mechanical tubing.
1. Hot-Dip Galvanized: According to ASTM A 123.

G. Stainless-Steel Sheet: ASTM A 666, Type 302 or 304.

H. Plastic-Laminate Panels: NEMA LD 3, Type HWS, high-pressure decorative laminate, on 1/2-inch-(12.7-mm-) thick particleboard.

I. Plywood Sub-floors: Exterior classified plywood complying with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood."

J. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type I (transparent glass, flat), Class 1 (clear).

2.3 AUTOMATIC BARRIER GATES

A. General: Provide UL-approved, automatic, barrier-gate parking control system.

B. Cabinets: Fabricate cabinets of 0.0966-inch-(2.5-mm-) thick steel sheet or 0.125-inch(3.2-mm) sheet aluminum, internally reinforced. Weld seams and grind smooth. Provide weatherproof, gasketed access doors with flush-mounted locks; furnish two keys for each gate, keyed alike.

A. General: Provide ticket dispenser units, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction, consisting of base cabinet and cap housing, ticket printing and issuing mechanism, ticket magazine, control panel, and electrical switches.

B. Cabinets: Fabricate base cabinet and cap housing of 0.0966-inch-(2.5-mm-) thick steel sheet, reinforced internally with welded steel-angle framing. Weld seams and grind smooth.
   1. Provide cabinet with a weatherproof, gasketed access door with flush-mounted lock keyed the same as cap lock.
   2. Fabricate cabinet cap so it can be unlocked and slid back to allow ticket loading and maintenance. Provide a flush-mounted lock in rear of cap, keyed the same as base cabinet lock.
   3. Equip unit with a removable ticket tray with a capacity of 5000 fan-fold tickets.
   4. Provide a "Please Take Ticket" sign on approach side of cabinet cap and an illuminated clock face visible to driver as ticket is removed.
      a. Provide units activated by a loop detector.
      b. Provide units activated by push-button operation.
      c. Provide units activated by a card key.
   5. Finish interior and exterior of cabinet with manufacturer's standard baked-enamel finish over primer.

C. Ticket Dispensing Mechanisms: Removable assembly, with plug-in-type electrical connections for easy maintenance. Provide a self-sharpening ticket cutter. Before dispensing, ticket shall be imprinted with time and date.
   1. Time Indicator: Provide a 24-hour-cycle time indicator with an A.M. and P.M. clock mechanism.

2.6 CARD CONTROL UNITS

A. General: Provide pedestal-mounted card-control units to activate barrier gates. Fabricate housing of welded cold-rolled steel sheet with weatherproof access panel on front. Provide flush-mounted lock and two keys to operate access panel. Mount housing on a 2-inch-(50-mm-) square, steel tube pedestal with a curved top to receive housing and a trim plate to cover anchor bolts. Finish units with manufacturer's standard baked-enamel coating system.

B. Operation: Inserting a specially prepared plastic card with an inner magnetic-core coding causes magnetically actuated internal elements to activate barrier gate.

2.7 CASHIER'S CLOCKS

A. Provide a cashier's clock for ticket dispenser at each exiting control location. Provide units that record time and date above same information printed by ticket dispenser; units shall record time in same manner as ticket dispenser.
   1. Fabricate clock case of steel sheet and finish with manufacturer's standard coating system. Provide unit with an unbreakable crystal and a large, easy-to-read clock face.

2.8 ELECTRONIC FEE COMPUTER

B. Steel Booths: Manufacturer's standard steel cashier's booth with structural tubular steel frame and pre-finished, insulated, galvanized steel sheet wall and roof panels.
   1. Structural Framework: Fabricated from 2-by-2-by-0.0747-inch(50-by-50-by-1.9-mm) steel structural or mechanical tubing.
   2. Booth Bases: 4-inch-(100-mm-) high assemblies consisting of a perimeter frame fabricated from 2-by-4-by-0.079-inch(50-by-100-by-2.0-mm) galvanized steel tubing with corners mitered and welded, and a 3/4-inch-(19-mm-) thick, exterior plywood sub-floor. Provide exterior mounting brackets welded to base.
   3. Floor: 0.108-inch-(2.8-mm-) thick, standard-pattern, galvanized steel floor plate.
   4. Insulated Wall Panels: Fabricated from 0.079-inch-(2.0-mm-) thick, galvanized steel exterior panels and 0.052-inch-(1.3-mm-) thick, galvanized steel interior panels with 1-inch-(25-mm-) thick, rigid fiberglass board insulation in cavity between exterior and interior face panels.
   5. Roof and Canopy: Fabricated from 0.064-inch-(1.6-mm-) thick, galvanized steel sheet with continuously welded seams. Furnish canopy with integral downspout extending 3 inches(75 mm) beyond booth walls. Provide removable lifting ring centered on roof.
   6. Ceiling: Fabricated from 0.079-inch-(2.0-mm-) thick, galvanized steel ceiling panels. Provide manufacturer's standard insulation in cavity between ceiling and roof.
   7. Door: Fully weather-stripped, top-hung, suspended sliding door; 1-3/4 inches(44 mm) thick; fabricated from 0.052-inch-(1.3-mm-) thick galvanized steel; top half glazed with 6-mm-thick, clear tempered glass. Include manufacturer's standard locking device.
   8. Finish: Paint steel surfaces with manufacturer's standard rust-inhibitive primer. Electrostatically paint exposed interior and exterior steel surfaces with one finish coat of manufacturer's standard industrial air-dry enamel in colors as selected by Architect from manufacturer's full range of colors.

C. Aluminum Booths: Manufacturer's standard aluminum cashier's booth with structural tubular aluminum frame and pre-finished, insulated, aluminum sheet wall and roof panels; sliding door; and operable windows.
   1. Structural Framework: Fabricated from extruded, 1-1/2-by-1-1/2-by-1/8-inch(38-by-38-by-3-mm), anodized-aluminum alloy 6063-T3 tubing or channels.
   2. Booth Bases: 4-inch-(100-mm-) high assemblies consisting of a perimeter frame fabricated from 2-by-4-by-1/8-inch(50-by-100-by-3-mm) aluminum tubing with corners mitered and welded; cross members fabricated from 2-by-3-by-1/8-inch(50-by-75-by-3-mm) tubing with welded joints; and a 3/4-inch-(19-mm-) thick, exterior plywood sub-floor.
   3. Floor: 0.125-inch-(3.2-mm-) thick, aluminum-alloy safety-tread plate.
   4. Insulated Wall Panels: Fabricated from 0.063-inch-(1.6-mm-) thick, anodized-aluminum exterior panels and plastic laminate panels with 1-inch-(25-mm-) thick, rigid board insulation in cavity between exterior and interior face panels.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure parking control equipment is without damage or deterioration at the time of Substantial Completion.

3.5 DEMONSTRATION

A. Instruct Owner's maintenance personnel on proper operation and maintenance of parking control equipment. Train personnel on procedures to follow if operation fails or malfunctions.

END OF SECTION

Division 12 – Furnishings

DOCUMENT 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Special Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. Provide landscape accessories as shown and specified. The work includes:

1. Trash Receptacles.
2. Bike Rack.
3. Benches.

B. Related Work:

1. Division 2 Section "Cement Concrete Paving."

1.3 SUBMITTALS

A. Submit manufacturer's product data and sample for each landscape accessory item to the Architect for approval prior to installation.

1.4 QUALITY ASSURANCE

A. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in this Section's "PART 2 - PRODUCTS."

1. Other manufacturer's products with equal characteristics may be considered. Submit manufacturer's product data to Architect for approval.
2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle landscape accessories to prevent damage and deterioration.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

welded construction
2. Finish: Manufacturer's standard powdercoat.
3. Color: Match Victor Stanley, Inc. "VS Bronze."
4. Mounting: Anchor bolt to concrete.

B. Available Manufacturers And Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Victor Stanley, Inc.; Steelsites, Model No. 6ft. RB-28

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine finished base surfaces and installation conditions. Do not start landscape accessories work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Remove loose material and debris from base surface before placing landscape accessories.

B. Locate and layout all landscape accessory items. Obtain Architect's acceptance of layout prior to installation.

3.3 INSTALLATION

A. Trash Receptacles:

1. Permanently fix each leg of trash receptacle to base using manufacturer's standard anchors.
2. If installation is on a slope, top of receptacle shall be set to no greater than ¼-inch per foot slope.

B. Bike Racks:

1. Permanently fix each leg of bike rack to base using manufacturer's standard anchors.
2. If installation is on a slope, top of bike rack shall be set to no greater than ¼-inch per foot slope.

C. Benches:

1. Permanently fix each leg of bench to base using manufacturer's standard anchors.
2. If installation is on a slope, top of bench shall be set to no greater than ¼-inch per foot slope.

Division 14 – Conveying Systems

SECTION 14 21 23

ELECTRIC TRACTION PASSENGER ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes electric traction passenger elevators.

1.2 DEFINITIONS

A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

1.3 ACTION SUBMITTALS

A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.

B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

C. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch square samples of sheet materials; and 4-inch lengths of running trim members.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, including emergency generator, as shown and specified, are adequate for elevator system being provided.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Manuals: Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout as specified in Division 01.

used in the manufacture and installation of original equipment. [Include location of complete parts and service center.]

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
   a. Response Time: Two hours or less.

B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner in the form of a standard yearly (or other period) maintenance agreement added to the maintenance agreement currently in force for the existing elevators, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide electric traction elevators by one of the following:

B.

1. Montgomery KONE Inc.
2. Otis Elevator Co.
3. Thyssen Elevator Group North America (formerly Dover Elevator Systems).

C. Acceptable Product - Basis of Design: Refer to "Passenger Elevators" Article in this Section.

2.2 MATERIALS AND COMPONENTS

A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.

B. Passenger Elevator Machines: Provide variable-voltage, variable-frequency ac-type hoisting machines. Provide solid-state power converters using 10,000 pulse per second technology.

1. Provide regenerative system.
2. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
3. Provide means for absorbing regenerated power when elevator system is operating on standby power.
4. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.

C. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Specification Section.

operation. If car is not placed in operation within a preset time after being called, it is returned to group operation.

3. Independent Service: Keyswitch in car control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to the door close button.
4. Loaded-Car Bypass: When car load exceeds a predetermined weight, car will respond only to car calls, not to hall calls. Predetermined weight can be adjusted.
5. Automatic Dispatching of Loaded Car: When car load exceeds a predetermined weight, doors will begin closing.
6. Nuisance Call Cancel: When car calls exceed a preset number while the car load is less than a predetermined weight, all car calls are canceled. Preset number of calls can be adjusted.
7. Group Operation:
   a. Embed the group supervisory operation within selected car controllers. No separate group controller shall be supplied. The microprocessor shall constantly scan the system for hall calls. When hall calls are registered, the control system shall instantly calculate the estimated time of arrival, number of floors to travel from the current position, the time it takes to travel one floor at top speed, calls assigned to a car, and car reversal time to respond to a call in the opposite direction of travel. An internal constant shall be set, requiring a maximum time for a car to respond to a call. When a car's status changes or additional hall calls are registered, the estimated time of arrival shall be recalculated and calls reassigned if necessary.
      1) Traffic Pattern: The microprocessor shall provide flexibility to meet well defined patterns of traffic, including up peak, down peak, and heavy interfloor demands, and adjust for indeterminate variations in these patterns which occur in buildings.
      2) Fuzzy Logic: Fuzzy logic shall be an integral part of the group control system software. The enhanced fuzzy logic will optimize the interfloor traffic performance. Inputs for the fuzzy logic shall include accurate passenger load from an electronic loadweigher, probable car calls generated from each hall call, type of building and observed traffic patterns.
8. Motor Pre-Torque: Current shall be applied to the elevator drive before the brake is released and the speed pattern is dictated to eliminate roll back and sling shot effects of unbalanced loads in the car. The electronic loadweigher shall determine the load on the car determining a pre-torque reference to send to the drive.

2.4 SIGNAL EQUIPMENT

A. General: Provide signal equipment for each elevator or group of elevators with hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements of acrylic or other permanent, non-yellowing translucent plastic.

I. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations with text and graphics according to ASME A17.1, Appendix H.

2.5 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening devices with a uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.
1. Provide keyswitch in car operating panel for photoelectric device.
2. Nudging Feature: After car doors are prevented from closing for a predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.6 PASSENGER ELEVATOR CAR ENCLOSURES

A. General: Provide manufacturer's standard enameled-steel car enclosures with removable wall panels, suspended ceiling, trim, accessories, access doors, doors, power door operators, sills (thresholds), lighting, and ventilation.
1. Floor finish is specified in another Section.
2. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to 1/2-inch(13-mm) fire-retardant-treated particleboard with plastic-laminate panel backing complying with NEMA LD 3, Type BKV and manufacturer's standard protective edge trim. Panels have a flame-spread rating of 25 or less, when tested according to ASTM E 84.
3. Fabricate car with recesses and cutouts for signal equipment.
4. Fabricate car door frame integrally with front wall of car.
5. Stainless-Steel Doors: Flush, hollow-metal construction, fabricated from stainless steel.
6. Sills: Extruded metal, with grooved surface, 1/4 inch(6.4 mm) thick. Provide polished finish on nickel silver.
7. Polished Metal Ceiling: Flush panels, of metal indicated, with low-voltage downlights in the center of each panel.
8. Handrails: Manufacturer's standard handrails, of metal indicated.

2.7 PASSENGER HOISTWAY ENTRANCES

A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.

B. Materials and Fabrication: Provide manufacturer's standards but not less than the following:
1. Stainless-Steel Frames: Formed stainless-steel sheet.
2. Stainless-Steel Doors and Transoms: Flush, hollow-metal construction, fabricated from stainless steel.

1) Car operating panel: Two row.
2) Hall indicator lantern: Series 4, horizontal with arrow.
3) Hall station: Series 2.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions.

B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.

C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.

D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.

E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.

F. Leveling Tolerance: 1/8 inch(3 mm), up or down, regardless of load and direction of travel.

G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

3.3 FIELD QUALITY CONTROL

A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and governing regulations and agencies.

Division 21 – Fire Suppression

SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Mechanical sleeve seals.
3. Sleeves.
4. Escutcheons.
5. Grout.
6. Fire-suppression equipment and piping demolition.
7. Equipment installation requirements common to equipment sections.
8. Painting and finishing.
9. Concrete bases.
10. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 21 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 21 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 21 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

   a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
   b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
   c. Insulated Piping: One-piece, stamped-steel type with spring clips.

2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Underground, Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 21 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

3.6 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor fire-suppression materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.7 GROUTING

A. Mix and install grout for fire-suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 21 05 00

with air diffusers, grilles and lights. Where practicable they shall be centered in lay-in ceiling panels. Sprinkler heads in back of house areas or non-public areas shall be semi-recessed, similar to Tyco Model "TY-FRL", chrome plate with escushon to match ceiling tile.

B. Sprinkler heads non-finished areas such as elevator shafts, mechanical equipment rooms, electrical rooms, janitors closet, etc. shall be chrome plated brass pendent or upright, similar to Tyco Model "TY-FRB". Heads in areas without ceilings shall be of the upright type.

C. Sprinkler heads at window in the atrium at patient room. Head type shall be chrome plated similar to Tyco model WS.

D. Sidewall type heads shall be chrome plated brass similar to Tyco Model "TY-FRL".

E. Sprinkler heads shall be Tyco "DS-C" dry fully concealed heads with cover plate matching color of painted area where vehicle traffic areas.

F. Furnish a wall mounted cabinet, where directed, containing a supply of sprinkler heads of the same types installed and suitable sprinkler head wrenches. Provide a separate cabinet for each style sprinkler head (six) min. on the project.

G. Sprinkler heads shall be of the temperature rating as required by NFPA and in elevator equipment rooms at the top of hoistways shall have a temperature rating of 200°F, based on power shutdown by a 175°F. heat detector. Coordinate with the fire alarm system.

2.5 IDENTIFICATION TAGS

A. General: All controls, drain, test alarms and alarm valves shall be provided with identification signs as required by NFPA.

2.6 WATER MOTOR GONGS

A. Water powered gong with clapper roller, clapper, strainer, water wheel, shaft, housings, cover plates, and other standard components.

2.7 FLOW SWITCHES

A. Provide an approved flow switch in each sprinkler system connection serving each sprinkler zone. Switches shall be suitable for connection into the fire alarm system.

2.8 MONITOR SWITCHES

A. Each manual sectionalizing valve and/or shutoff valve in the standpipe and sprinkler system shall be provided with an approved valve monitoring switch to indicate whether the valve is open or closed. Wiring from switches to the fire alarm system will be done under Division 16. The switch shall give a tamper indication if removed from its mounting or the housing cover is removed; it shall signal an alarm when the valve position is altered.

J. Installation of piping and supports shall be as described in Section 15050, including methods of fabrications, grading and other procedures described therein. The installation shall also be in conformity with the requirements of NFPA Standard No. 13, the requirements of the Fire Code and City of Aurora, Colorado Codes and Ordinances.

K. Where possible, drains shall be piped to floor drains or hub drains and discharged into the drainage system. Drains, which must discharge through the side of the building, shall be located so as not to strain the building or cause water damage. Obtain approval from the Architect before installing any drain piping through exterior walls.

END OF SECTION 21 10 00

Division 22 – Plumbing Specification

SECTION 22 05 00

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Mechanical sleeve seals.
5. Sleeves.
6. Escutcheons.
7. Grout.
8. Equipment installation requirements common to equipment sections.
9. Painting and finishing.
10. Concrete bases.
11. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CPVC: Chlorinated polyvinyl chloride plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

SECTION 01 57 19

AIRBORNE CONTAMINANTS CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Hospital airborne contaminants control policy and procedures.
   2. Ceiling access control of airborne contaminants.

B. This section applies once the owner occupies any portion of the project.

1.2 DEFINITIONS

A. Containment Areas: (Negative Pressurization) As determined by Architect and as shown on the Drawings as Containment Areas. Includes area of construction, adjacent staging and storage areas, and passage areas for contractors, supplies, and waste; includes ceiling spaces above and adjacent to construction.

B. Protection Areas: (Positive Pressurization) As determined by Architect and as shown on the Drawings as Protection Areas. Includes hospital areas adjacent to Containment Area, either occupied or used for passage, as well as areas connected to construction area by mechanical system air intake, exhaust and ductwork.

C. "Minor" ceiling access is defined as visual observation or minor adjustments or other activity that does not disturb dust. Acoustical panels shall be replaced or access panel shall be closed immediately when the contractor leaves the work site.

D. "Major" ceiling access describes any other access not defined as "minor."

E. "Thorough" cleaning of surfaces which become exposed to dust shall be accomplished by the use of either a HEPA-filtered vacuum cleaner or Water Vac with Hepa Filtration on outlet. Note: Wet mop shall not be used since moisture will activate dormant fungus and mold spores in dust.

F. Negative Air Machine: Portable mechanical units to provide a negative air pressure in the Containment Areas, as specified in this Section.

1.3 SYSTEM DESCRIPTION

A. Design Requirements: Owner will establish acceptable, baseline levels of airborne contaminants based on air monitoring of existing conditions prior to start of Work.
   1. Aspergillosisi and related nosocomial fungal infections are caused through inhalation by immuno-compromised patients of aspergillus spores, or other related spores which can be present in the construction environment.

B. Contractor Qualifications: Company specializing in performing Work of this extent and nature with minimum five years experience.

C. Regulatory Requirements: Ensure flammable components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke developed indices.

1.6 OWNER'S USE OF SPACE

A. Accomplish work with a minimum of interruptions to Owner's operation within the building. Coordinate work with the Owner's Representative.

B. In the event HVAC systems provide space heating the duration of system shut downs must be limited or the contractor shall provide temporary heating systems to ensure room temperatures of at least 50 degrees F. are maintained.

1.7 PROTECTION

A. If work is being done above a lay-in ceiling and if work must be performed while the space below is occupied, provide temporary work surfaces to provide a safe working platform and protect the ceiling and the spaces below from falling objects and materials. Take necessary precautions to protect the people and spaces below from injury due to the contractor's operations.

B. Exercise caution when handling fluids, particularly heating water, in the interstitial space. When working with fluids provide a water-tight barrier beneath the work area to catch and retain spillage before it reaches the ceiling below.

C. Notify the Architect at least 48 hours prior to commencing work in ceiling or interstitial spaces above occupied areas to allow at-risk patients to be relocated or protected.

1.8 COORDINATION OF WORK

A. Submit a cleaning work schedule for each HVAC unit/duct system a minimum of 30 days prior to beginning work. Indicate dates, times and activities for each phase or portion of the work. In addition, describe in detail what systems, fans, and HVAC equipment will be affected (no air flow) and what rooms, spaces or areas will require access. Include procedures proposed for the project.

B. Coordinate work activities with other affected trades and Subcontractors.

C. Do not begin cleaning activities until other construction activities are complete except for Testing, Adjusting, and Balancing (TAB) activities in which case TAB activities shall be performed after acceptance of cleaning activities.

D. Prearrange and preschedule with the Architect and Owner's Representative the switching off of any HVAC unit to commence a cleaning operation.

1.9 PRE-INSTALLATION CONFERENCE

A. Conduct pre-installation conference in accordance with Section 01 31 00.

sheets in lieu of vacuumed mats. Vacuuming of areas not under negative pressure shall be with a certified HEPA-filtered vacuum.

1. Acceptable product and manufacturer – Adhesive faced contamination control mat:
   a. Tacky Mat by Liberty Industries, 133 Commerce Street, East Berlin, CT 06023, 1-800-828-5656.

B. Dust Caps: Block off existing ventilation ducts within construction area. Capping method shall be dust tight and withstand air flow.

C. Portable Enclosures: Sufficient to seal off area tight to ceiling.

D. Temporary Prefabricated Partition for work in Sterile Corridors:
1. Acceptable product and manufacturer:
   a. Kontrol Kube by Fiberlock Technologies, Inc., P.O. Box 432, Cambridge, MA, 617-876-8020, including the following:
      1) Adjustable Aluminum Frame #6440.
      2) Vinyl Enclosure #6442.
      3) Wheel Base Platform #6443.
      4) Inspection window and pressure differential porthole.
      5) Nilfisk 87 cfm vacuum device and manometer.

E. Polyethylene: ASTM D210, Minimum thickness: 6 mil, FR treated.

F. Biocide: Copper-8-quinolinolate.
1. Acceptable product and manufacturer: MAG Chemical, Vero Beach, FL.

G. Spray Adhesive:
1. Acceptable product and manufacturer: Ram-Tack Adhesive from Aramsco, 906 Gray Street, Elgin, IL 60120.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before any demolition or construction begins in occupied areas, a complete field review of all airborne contaminant control policies will be conducted. A checklist will be filled out and signed by the Airborne Contaminant Control Nurse and the Contractor, confirming that the area is ready for work to begin.

B. Provide temporary barriers and other controls to control airborne contaminants. Extend barriers above ceilings as required to seal off and contain airborne contaminants.

3.2 GENERAL CEILING ACCESS DIRECTIVES

A. Perform Work in accordance with Section 01 72 00, applicable local standards, and approved shop drawings and work plans.

B. Report to Owner and fill out a ceiling access form. Attach approved work tag to the ceiling access enclosure before work will be allowed to proceed.

C. Work Tag:
1. Attach a completed, approved work tag on the ceiling access enclosure before work can proceed.

I. Implement the following procedure when construction personnel are required to pass through a Protected Area to enter the Containment Area.
   1. Provide air lock entry vestibules in dustproof enclosures when shown on Drawings or required by Owner's Representative.
   2. Personnel shall wear protective clothing while passing through the Protective Area. Protective clothing shall be removed in the air lock vestibule prior to entering the Containment Area.
   3. When exiting the Containment Area, personnel shall put protective clothing on before reentering the Protected Area.

J. Contractor Personnel: Instruct personnel to refrain from tracking dust into adjacent hospital areas or opening windows or doors that may allow airborne contaminants into adjacent hospital areas.

K. Exterior Work: Direct exhaust from equipment away from building air intakes. Ensure that filters on building air intakes are operational and protected from excessive amounts of airborne contaminants.

L. Ceiling access panels opened for investigation beyond sealed areas shall be replaced immediately when unattended.
   1. Whenever access panels are opened in occupied areas, for work above ceiling, provide portable enclosure enclosing ladder and seal off opening, fitted tight to ceiling.

M. Provide thorough cleaning of existing, exposed surfaces before start of Owner's room occupancy.

N. Removal of construction barriers and ceiling protection shall be done carefully, possibly outside of normal work hours. Vacuum and clean adjacent surfaces after removal.

O. Perform vacuuming of areas not under negative pressure with a certified, Owner approved, HEPA-filtered vacuum.

3.3 AIRBORNE CONTAMINANT CONTROL ENCLOSURES AND BARRIERS

A. Install dustproof enclosures for work as indicated and when required to protect areas occupied by Owner from dust, debris, and damage.

B. It is the Contractor's responsibility to determine when a dustproof enclosure is required to protect any adjoining area; however, Contractor shall provide a dustproof enclosure where indicated and whenever requested by Owner.

C. Airborne Contaminant Control General Requirements: Floor to structure, air-tight enclosures, and gypsum board barriers, using tape and foam padding.
   1. Keep traffic between Containment Areas and open areas to a minimum. Keep door to areas closed at all times. Transport materials and refuse into an area from an external site without violating patient care areas by transporting in covered containers.
   2. Provide negative pressure in construction areas as specified herein.
      a. Provide adequate forced ventilation of enclosed areas to cure installed materials, to prevent excessive humidity, and to prevent hazardous accumulations of dust fumes, vapors, or gases.

D. Dustproof Enclosures: Full height, noncombustible construction, with minimum 1/2 inch gypsum board both sides with 3-1/2 inch R-11 insulation batts to

I. Coordinate and phase remodeling work in certain rooms which serve other rooms with the phasing of the remodeled rooms if required, so that at no time are both rooms simultaneously inoperative. Any downtime necessitated by the remodeling work is to be fully discussed and coordinated with the Owner's Representative in advance of the shutdown.
   1. Dust: Generation of significant quantities of airborne dust will not be tolerated. Clean the work area prior to starting work as necessary to minimize existing dust which may become airborne during construction. Provide drop cloths and dust partitions as necessary to contain dust and debris generated by the work.
   2. Remove demolition material, dust, and dirt in tightly sealed, covered, rubber tired plastic dump carts. Containers shall be fitted with clean polyethylene covers, completely sealed at perimeter by wire tying or taping. Before leaving area, all containers shall be wiped clean to prevent tracking of dust. Place rugs inside barrier entrance, keep them clean or changed daily. Provide debris chutes if allowed.
   3. Hot Processes: Welding and flame cutting which generate smoke shall be scheduled with the Owner's fire detection system deactivated.
   4. Use portable vinyl tunnel or a polyethylene enclosure for single ceiling accesses. Enclosure opening shall have a 3-foot overlap of plastic to decrease risk of airborne dust.

J. Portable vinyl tunnel or polyethylene enclosures, if used, shall remain in place until the ceiling is secured (all accesses closed).
   1. If access is larger than vinyl tunnel, use a portable polyethylene enclosure also enclosing the ladder. Enclosures opening shall have a 2-foot overlap of plastic to decrease risk of airborne dust.
   2. Secure polyethylene enclosures/barriers in place to walls and floor with use of tape. Reinforce seam on ceiling with frame and flat head screws.
   3. When accessing pipes, ducts, or other building infrastructure to investigate a condition, use additional procedures including masks, disposable white coveralls, and disposable shoe covers, before going into the access. Afterwards, strip off the additional procedures carefully, turning the coveralls "inside-out," and depositing the mask, coverall, and shoe covers into a plastic trash bag inside the enclosure. Secure (tie-off) plastic trash bag and discard as directed by Owner's Representative. Do not discard within "patient care areas."
   4. When Contractor leaves the work site, the access, especially at ceiling, shall either be completely closed or protected by an appropriate barrier.
   5. In patient care areas, dismantle the enclosure and replace access (ceiling tiles); or complete work of access at the end of each day.
   6. Thoroughly clean surfaces which become exposed to dust before leaving the area of construction. Accomplish cleaning by use of either an HEPA-filtered vacuum cleaner.

3.4 ENFORCEMENT AND FINES

A. Owner will monitor aspergillus count in vicinity of project in Protection Areas. Such areas will be located as indicated on Drawings. Whenever safe levels are exceeded, Contractor will be notified to correct conditions immediately to avoid fine and work stoppage described.

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SECTION 01 61 00

COMMON PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following administrative and procedural requirements: selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections include the following:
1. Procurement Substitution Procedures: Document 00 26 00.
2. Substitution Procedures (post-award): Section 01 25 00.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

C. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

D. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials in a manner that will not endanger Project structure.
7. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
9. Protect stored products from damage.

B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

another manufacturer. Comply with provisions in "Product Substitutions" Article.

8. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product[s]" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
   a. Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily.
   a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.
11. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division 01 for allowances that control product selection and for procedures required for processing such selections.

2.2 COMPARABLE PRODUCTS

A. Where product manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
   1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
   2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
   3. Evidence that proposed product provides specified warranty.

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SECTION 01 62 05

HCA PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the procurement of products, materials, and equipment from Owner-preferred or Owner-required vendors and manufacturers for certain products scheduled to be incorporated into the Work of this Project.

B. Related Sections include the following:
1. Common Product Requirements: Section 01 61 00.

1.2 PROCUREMENT REQUIREMENTS

A. Ordering Information: The Owner has negotiated purchasing agreements for finish Products. The Contractor shall price and purchase all materials through the Vendors listed. All materials may not be readily in stock. Contractor shall allow enough time to order and receive goods prior to scheduled installation date. All orders shall be properly tagged with the HCA account/account number and the name of the HCA facility.

1.3 BULK PURCHASING VENDOR LIST

A. Attached are the Bulk Purchasing Vendor List and Vendor List for Interior Finishes as prepared and furnished by HCA to indicate companies with whom they have purchasing agreements or an historical preference.

B. In case of discrepancy, the HCA Vendor List for Interior Finishes takes precedence over the Bulk Purchasing Vendor List. In case of discrepancy between manufacturers included in the Specifications and those included on either list, those on the list shall take precedence.

C. These documents are included as information only. Verify directly with HCA to ensure receipt of current and applicable information.

D. Refer to website for current information and to verify most up-to-date list.

PART 2 - PRODUCTS (Not Used)

HCA BULK PURCHASING VENDOR LIST

Scope	Vendor	Contact Information			Notes
07 24 13	**EIFS (Exterior Insulation and Finish System)**				
	Dryvit Robert Waltersdorf	Phone Fax	(860)285-8341 (860)285-8347		NO SUBSTITUTIONS
	Senergy Steven DonFrancesco	Phone Fax	(678)574-3778		NO SUBSTITUTIONS
07 50 00	**Roofing All types - MFG**				
	Roofing Guidelines Moe Loughran	Phone Fax	(615)344-2814		Contact Moe Loughran for HCA Hospital Corporation of America, Roofing Guidelines. All roofing to be performed according to these Guidelines.
07 81 16	**Fireproofing**				
	Isolatek International (CAFCO) Kurt Neff	Phone Fax	(800)631-9600 (973)347-9170		NO SUBSTITUTIONS
	W.R. Grace Raymond Berggreen	Phone Fax	(770)622-4977 (770)622-4972		NO SUBSTITUTIONS
08 14 00	**Wood and Plastic Laminate Doors**				
	Girtman & Associates, Inc. Stephen St. Amour	Phone Fax	(615)350-6000 (615)350-6686		INTERIOR PLASTIC LAMINATE DOORS ONLY, NO SUBSTITUTIONS
	McCarthy Jones & Woodard David Scott	Phone Fax	(615)244-3208 (615)244-4706		NO SUBSTITUTIONS
08 42 00	**Automatic Doors**				
	Besam Maryanne Schwarz	Phone Fax	(888)732-3726 (609)443-6167	x20345	NO SUBSTITUTIONS
	Stanley Technologies Brian Baker	Phone Fax	(615)584-8734 (615)595-6251		NO SUBSTITUTIONS
08 51 00	**Windows with integral blinds**				
	Traco Jack Moseley	Phone Fax	(334)221-4926		NO SUBSTITUTIONS
	Vistawall Bernie Slayton	Phone Fax	(615)776-1472		NO SUBSTITUTIONS
	Wausau Metals Ken Carpenter	Phone Fax	(715)846-3288		NO SUBSTITUTIONS

Scope	Vendor	Contact Information			Notes
09 72 00	**Wall Coverings**				
	Arton South Kathy Martin	Phone Fax	(800)222-7866 (615)264-0064	x1109	See architectural finish plan/legend. Quote: HCA and name of HCA Facility
	Design Tex Patricia Kennedy	Phone Fax	(800)767-2015 (901)365-2915		See architectural finish plan/legend. Quote: , Account OOL 41007 & name of HCA Facility
	Eykon Wall Source Kathy Martin	Phone Fax	(800)222-7866 (901)366-0447	x1001	Quote: HCA and Name of Facility; for samples, call Chrissy Marola at 800-222-7866, x1001
	Genesys Val Clark	Phone Fax	(800)647-3633 (404)351-7893		
	Guard Wallcovering Edna Pleasents	Phone Fax	(800)936-7237 (614)492-3977	x1616	See architectural finish plan/legend.
	JM Lynne (Essex Wallcoverings) Joe Stewart	Phone Fax	(800)645-5044 (631)582-4112		Quote: 523982
	koroseal Customer Service Dept	Phone Fax	(800)543-0412 (513)398-3246		Quote: State HCA and name of Facility, City, and State for all samples and orders
	Maharam Fabrics Melissa Sloterdijk	Phone Fax	(713)623-6272 (713)623-8864		Quote: 6011 and name of HCA Facility For Wall covering & Borders Quote: 3012 and name of HCA Facility for cubicles and Drapery Fabric
	MDC Wallcoverings Kathy Stricklin	Phone Fax	(877)586-1665 (770)319-5756		
	MuraSpec Richard Cole	Phone Fax	(800)717-5651 (781)963-4975	x7752	Quote: 6011 and Name of Facility for Wall covering and borders Quote: 6012 and Name of Facility for cubicles and drapery fabrics
	Seabrook Wallcoverings Greg Marx	Phone Fax	(800)972-3492 (901)320-3674		Quote: G4799 and Name of Facility
10 21 23	**Cubicle Curtains**				
12 22 00	**Draperies and Curtains**				
	ArcCom Fabrics ShowRoom	Phone Fax	(800)833-9288 (404)233-3720		Quote: Use alias product # and list as an HCA project.
	Design Tex Patricia Kennedy	Phone Fax	(800)767-2015 (901)365-2915		See architectural finish plan/legend. Quote: , Account OOL 41007 & name of HCA Facility
	Maharam Fabrics Melissa Sloterdijk	Phone Fax	(713)623-6272 (713)623-8864		Quote: 6011 and name of HCA Facility for Wall covering & Borders Quote: 3012 and name of HCA Facility for cubicles and Drapery Fabric

Scope	Vendor	Contact Information			Notes
12 48 00	**Pedimat/Pedigrid**				
	Deco Guard Products (Acrovyn) Amy Devore	Phone Fax	(800)233-8493 (717)546-7771	x4577	NO SUBSTITUTIONS (Wall and Corner Protection only).
14 20 00	**Elevators**				
	Montgomery Kone Tim Disher	Phone Fax	(770)360-0045 (770)360-0040		No Substituions
	Otis Eddie McDowell	Phone Fax	(901)756-2444		NO SUBSTITUTIONS
	Thysessen Krupp Elevators (Dover) Tim Isbell	Phone Fax	(901)365-5100 (901)365-5501		NO SUBSTITUTIONS
14 92 00	**Pneumatic Tube Systems**				
	Pevco Systems International Jim Valerino	Phone Fax	(800)296-7382		NO SUBSTITUTIONS
	TransLogic Leigh Chewning	Phone Fax	(843)623-5079		NO SUBSTITUTIONS
22 63 00	**Medical Gas Systems**				
	Amico Corporation Jeff	Phone Fax	(877)462-6426 (905)764-0862		NO SUBSTITUTIONS
	Beacon Medical (Puritan/Bennett) Don Gerchow	Phone Fax	(985)727-4019 (985)727-4042		NO SUBSTITUTIONS
	Hill-Rom (Medaes) Customer Service	Phone Fax	(800)433-6245 (770)416-7030	x7074	NO SUBSTITUTIONS
23 09 00	**DDC (control systems)**				
	Invensys Building Systems Mike Zukowski	Phone Fax	(651)792-2240 (651)493-1830		NO SUBSTITUTIONS
	Johnson Controls Mike Rippetoe	Phone Fax	(615)646-0824 (615)771-6926		NO SUBSTITUTIONS
	Siemens Building Technologies (Landis Terry Aldridge	Phone Fax	(847)215-1050 (847)215-8326	x5238	NO SUBSTITUTIONS

Scope	Vendor	Contact Information			Notes
26 20 00	**Electrical Gear & Panels**				
	Cutler-Hammer/Westinghouse Mort Hill	Phone Fax	(615)460-1592 (615)298-9400		NO SUBSTITUTIONS
	GE ED & C Jud Meyer	Phone Fax	(615)831-6005 (615)831-6044		NO SUBSTITUTIONS
	Siemens Energy & Automation, Inc. Clarke Clingenpeel	Phone Fax	(615)367-5930 (678)297-8970		NO SUBSTITUTIONS:
	Square D Jon Waggener	Phone Fax	(615)844-8434 (859)817-4133		NO SUBSTITUTIONS
26 32 00	**Power Generation**				
	Caterpillar John Deason	Phone Fax	(615)251-8675		NO SUBSTITUTIONS
	Cummins Cumberland/Onan Louie Schweickhardt	Phone Fax	(615)366-4341 (615)366-5693		NO SUBSTITUTIONS
	Kohler Frank Windsor	Phone Fax	(920)457-4441 (920)459-1658	x76329	NO SUBSTITUTIONS
	Nixon Power Services Mike Martin	Phone Fax	(615)244-0650 (615)244-0689		NO SUBSTITUTIONS
	Thompson Power Tony Jackson	Phone Fax	(615)744-7842 (615)251-8606		NO SUBSTITUTIONS
28 31 00	**Fire Alarm Systems**				
	Edwards Systems Technology - EST Ken McNeill	Phone Fax	(952)277-0015 (775)743-7749		NO SUBSTITUTIONS
	Siemens Cerberus Division James O'Connell	Phone Fax	(407)585-2360 (407)585-2361		
	Simplex Grinnell Steven Farrell	Phone Fax	(978)731-7026 (978)731-4026		NO SUBSTITUTIONS

END OF VENDOR LIST

VENDOR LIST FOR INTERIOR FINISHES

HCA VENDOR LIST:

Samples and Order Information: HCA has negotiated purchasing agreements for finish Products. The Contractor/Subcontractor must price and purchase all materials through the Vendors listed. Minimum quantities are stated. All orders under bolt/roll are subject to a cutting charge. All materials may not be readily in stock. Contractors/Subcontractors orders should allow enough time to receive goods before installation date. All orders must be properly tagged with the HCA account/account number and the name of the HCA facility.

1. ACROVYN:
   For Samples and Orders:
   Candace Sheasley
   Construction Specialties
   P.O. Box 380
   Muncy, PA 17756
   (800) 233-8458
   (771)546-7771
   Quote: Name of HCA Facilty

2. ARC COM.
   For Samples and Orders:
   Atlanta Showroom
   351 Peachtree hills Avenue, NE. Suite 411
   Atlanta, GA. 30305
   (800) 833-9288
   (404) 233-0722
   Fax: (404) 233-3720
   For Sample Orders:
   Email: atlshowrrom@arc-com.com
   Please indicate this in HCA Sample Request:
   Quote: Use Alias Product # and List as an HCA Project.

3. AMERICAN OLEAN:
   Sample Express:
   Phone: (215) 822-7300
   Fax: (215) 822-7977
   For Orders:
   Neil Honaker or Natalie Bennett
   Louisville Tile
   4520 Bishop Lane
   Louisville, KY 40218
   Phone: (800) 369-7671
   Fax: (502) 451-6519
   Email: nhpnpker@louisville-tile.com
   Quote: HCA and Name of HCA Facility

6. CROSSVILLE CERAMCS
   For Samples: (800) 221-9093
   Sales Rep: Pattie Smith
   Louisville Tile Distributors of TN
   650 Melrose Avenue
   Nashville, TN 37211
   Phone: 615-248-8453
   Fax: (615) 248-6055
   Email: psmith@louisville-tile.com
   Quote: RCA and Name of Facility
   Sample and Orders:
   Neil Honaker or Natalie Bennett
   4520 Bishop Lane
   Louisville, KY. 40218
   Phone: (800) 369-7671
   Fax: (502) 451-6519
   Email: nhonaker@louisville-tile.com
   Quote: RCA and Name of TWA Facility
7. DALITLE CORPORATION
   For Samples and Orders:
   Randy Hoffman
   2520 Bransford Avenue
   Nashville, TN 37204
   Phone: (615) 297-7518 x224
   Phone: (800) 521-8865
   Fax: (615) 279-0426
   Email: randy.hoffman@daltile.com
   Quote: NA-I320

8. DESIGNTEX INC. JM LYNNE AND ESSEX.
   For Samples and Orders:
   Patricia Kennedy/Deborah Cunningham
   2899 South Mendenhall #3
   Memphis, TN. 38 15
   Phone: (800) 221-1540
   Fax: (901) 365-2915
   Email: tkennedy@dtex.com or dcunningham@dtex.com
   Quote: 2003990 and Name of RCA Facility

14. LEES CARPET:
    For Samples and Contact Pricing:
    Local Rep: Max Holland
    575 Brixham Park Drive
    Franklin, TN. 37069
    Phone: (800) 523-5647, Prompt 2 VMD#75 13
    Phone: Cell (615) 294-5449
    Fax: (615) 261-9309
    Email: lee carpets@comcast.net
    Quote. FY and Name of EICA Facility

15. LOUISVILLE TILE (CAMBRIA):
    For Samples and Orders:
    Louisville Tile Distributors of Tennessee
    650 Melrose Avenue
    Nashville, TN 37211
    Patti Smith
    Phone: (615) 248-8453
    Fax: (615) 248-6055
    Email: psmith@louisville-tile.com
    Quote: HCA and name of Facility
    Samples and orders:
    Neil Honaker or Natalie Bennett
    4520 Bishop Lane
    Louisville, KY 40218
    Phone: (800) 369-7671
    Fax: (502)451-6519 Email. nhonaker@louisville-tile.com

16. MAHARAM::
    For Samples:
    Karen Bolt
    5120 Woodway
    Suite 7016
    Houston, TX 77056
    Phone: (713) 623-6272
    Fax: (713) 623-8864
    Email: kholt@maharam.com
    For Orders:
    Jean Marie Hinton
    5210 Woodway— Suite 7016
    Houston, 77056
    Phone: (713) 623-6272
    Fax: (713)623-8864
    Email: jhinton@maharam.com
    Quote: 6011 COl. and Name of RCA Facility for Wallcoverings and Borders
    Quote: 6012C0L and Name of HCA Facility for Privacy Curtains

21. SINGER WALLCOVERINGS:
    For Samples:
    Lisa Halmi
    3143 Western Row Road
    Kings Island, OH 45034
    Phone: (800) 543-0412
    Fax: (513) 398-3246
    Email: www.singerwallcoverings.com
    For Orders:
    Jackie Rimele
    Singer Wallcoverings
    3143 Western Row Road
    Kings Island, OH. 45034
    Phone: (800) 543-0412
    Fax: (513) 398-3246
    Email :jrinele@singerwallcoverings.com
    Quote: NAHCA-04

22. TOLI:
    For Samples:
    Phone: (800) 446-5476
    Fax: (631) 864-8151
    Or Fred Conti (800) 446-5476- ext 346
    Fax: (631) 864-8151
    For Pricing:
    Phyllis Wolf (800) 446-5476. ext. 340
    Fax: (631) 864-8151
    For Orders:
    Through Local Distributors
    Quote: Name of FICA Facility for National Account Pricing

END OF VENDOR LIST

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SECTION 01 72 00

COMMON EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
   1. Construction layout.
   2. Field engineering and surveying.
   3. General installation of products.
   4. Coordination of Owner-installed products.
   5. Progress cleaning.
   6. Starting and adjusting.
   7. Protection of installed construction.
   8. Correction of the Work.

B. Related Sections include the following:
   1. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
   2. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.2 SUBMITTALS

A. Qualification Data: For land surveyor to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

D. Certified Surveys: Submit two copies signed by land surveyor.

E. Final Property Survey: Submit two copies showing the Work performed and record survey data.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Owner not less than five days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Owner's written permission.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents. Submit requests on CSI Form 13.2A, "Request for Interpretation" form included at the end of in Section 01 26 13.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   3. Inform installers of lines and levels to which they must comply.
   4. Check the location, level and plumb, of every major element as the Work progresses.
   5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
   6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, comply with provisions of Section 01 31 06. Install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
   4. Maintain minimum headroom clearance of 8 feet (2.4 m) in spaces without a suspended ceiling.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.

I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

K. Limiting Exposures: Supervise construction operations to ensure that no part of the Work, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

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SECTION 01 73 29

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

1.2 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.3 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
   1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
   2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
   3. Products: List products to be used and firms or entities that will perform the Work.
   4. Dates: Indicate when cutting and patching will be performed.
   5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
   6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
   7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.4 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
   1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

E. Roofing: Where penetrations are made through the roof system to accommodate mechanical, electrical, or plumbing systems, or any other reason associated with the Work, repair in accordance with the original manufacturer's requirements. Install curbs, cants, flashing and other roof system components in accordance with Specifications within this Project Manual and recommendations by the manufacturer of the roof system presently in place. Return assembly to weather-tight condition.

F. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

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SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Inspection procedures.
   2. State accessibility standards inspection.
   3. Accessibility standard inspection for compliance with ANSI A117.1, Americans with Disabilities Act Accessibility Guidelines (ADAAG) and local requirements if more stringent.
   4. Warranties.
   5. Instruction of Owner's personnel.
   6. Final cleaning.

1.2 SUBSTANTIAL COMPLETION

A. "Substantial Completion" is the stage in the progress of Work when Work or designated portion thereof is sufficiently complete in accordance with Contract Documents so Owner can occupy or utilize Work for use which it is intended.
   1. Work will not be considered suitable for Substantial Completion review until all systems and equipment are operational; all designated or required governmental inspections and certifications have been made and posted, designated instruction of Owner's personnel in operation of systems and equipment has been completed, operation and maintenance data has been satisfactorily turned over to the Owner, and all finishes are in place. In general, the only remaining Work shall be minor in nature, such that the Owner could occupy project or designated portion thereof on following day, and completion of Work by Contractor would not materially interfere or hamper Owner's normal business operations.
   2. Contractor shall certify that all remaining Work will be completed within a reasonable time, agreed upon by Owner, following date of Substantial Completion. Failure of the Contractor to complete the Work within the stipulated time shall automatically re-institute the provisions for liquidated damages due Owner as contained elsewhere in Contract Documents, or as provided by law for such period of time as may be required by Contractor to fully complete Work whether Owner has occupied the Project or not.

B. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
   1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.

6. Revise paragraph and subparagraph below to comply with office policy and Project requirements.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
   1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use attached CSI Form 14.1A revising direction as from Contractor to Architect. Architect may use same form for Architect's report to Contractor.
   1. Organize list of spaces in sequential order.
   2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
   3. Include the following information at the top of each page:
      a. Project name.
      b. Date.
      c. Name of Architect.
      d. Name of Contractor.
      e. Page number.

1.5 STATE DEPARTMENT OF HEALTH INSPECTION COORDINATION, PREPARATION, AND DOCUMENTATION

A. Coordinate inspection requests with Architect. Make specific requests at 80 percent and 100 percent completion or as specifically required by the Department of Health.

B. Final Inspection Submittals: Provide bound volume or volumes containing following data for presentation to State Health Department at final inspection:
   1. Flame spread and smoke developed criteria for interior finishes.
      a. Test report for interior finish materials.
      b. Signed letter or statement corroborating the installation of the product in the project.
   2. Flame resistance documentation for loosely hanging furnishings and decorations.
      a. Examples: Draperies, curtains, cubicle curtains.
      b. Passing both large and small scale tests of NFPA 701.
      c. Signed letter or statement corroborating the installation of the product in the project.

(ADAAG) for the purpose of determining compliance with ADAAG. Inspector must be licensed with the state fire marshal to perform the required inspection.

B. Upon receipt of Inspector's report, immediately make corrections of any reported non-compliant items. Provide documentation to Owner of completed corrective measures.

1.7 CLOSEOUT DOCUMENTS

A. Progress Documents: Refer to Section 01 78 39.

B. Operation and Maintenance Manuals: Refer to Section 01 78 23.

1.8 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
   1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch(115-by-280-mm) paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

D. Provide additional copies of each warranty to include in operation and maintenance manuals. Refer to Section 01 78 23.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

n. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

o. Replace parts subject to unusual operating conditions.

p. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

q. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

r. Clean ducts, blowers, and coils if units were operated without filters during construction.

s. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

t. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

Attachment:
Completion/Correction Form, CSI Form 14.1A

CSI Advancement of Construction Technology

Project: Parking Garage, Medical Center of Aurora - South Campus
Aurora, Colorado

To (Contractor): _____

From (A/E): Perkins+Will

Site Visit Date: _____

A/E Project Number: 142311.000

Contract For: _____

The following items require the attention of the Contractor for completion or correction. This list may not be all-inclusive, and the failure to include any items on this list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

Item Number	Room Number	Location (Area)	Description	Correction/Completion Date	Verification A/E Check

☐ Attachments

Signed by: _____ Date: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

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September 1996
CSI Form 14.1A

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SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Emergency manuals.
   3. Operation manuals for systems, subsystems, and equipment.
   4. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.

B. Related Sections include the following:
   1. Division 01 Section "Progress Documents" for preparing Record Drawings for operation and maintenance manuals.
   2. Divisions 02 through 39 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 SUBMITTALS

A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return 1 copy of draft and mark whether general scope and content of manual are acceptable.

B. Final Submittal: Submit 1 copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
   1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

1.4 COORDINATION

A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
   1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch(115-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
      a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
      b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
   2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
   3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
   4. Supplementary Text: Prepared on 8-1/2-by-11-inch(115-by-280-mm), 20-lb/sq. ft.(75-g/sq. m) white bond paper.
   5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
      a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
      b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   1. Fire.
   2. Flood.
   3. Gas leak.
   4. Water leak.

7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:
1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in the manual, identified by product name and arranged to match

B. Emergency Manual: Assemble complete set of emergency information indicating procedures for use by emergency personnel and Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
   1. Do not use original Progress Documents as part of operation and maintenance manuals.
   2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Progress Documents."

G. Comply with Division 01 Section "Closeout Procedures" for the schedule for submitting operation and maintenance documentation.

END OF SECTION

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SECTION 01 78 39

PROGRESS DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for Progress Documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Record Product Information.

B. Related Sections include the following:
   1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
   2. Divisions 02 through 39 Sections for specific requirements for Progress Documents of the Work in those Sections.

1.2 SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit copies of Record Drawings as follows:
      a. Initial Submittal: Submit one set of blueline prints or copies marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return plots and prints for organizing into sets, printing, binding, and final submittal.
      b. Final Submittal: Submit two sets of revised marked-up Record Prints, and one set of reproducible as-built documents.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Information: Submit one copy of each Product Information submittal.
   1. Where Record Product Information is required as part of operation and maintenance manuals, submit marked-up Product Information as an insert in the manual instead of submittal as Record Product Information.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

b. CAD Software Program: The Contract Drawings are available in AutoCAD 2000 or later version.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult with Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each Record Drawing; include the designation "PROGRESS DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
3. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation "PROGRESS DRAWINGS."
   d. Name of Architect.
   e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of the manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Information has been submitted in operation and maintenance manuals instead of submitted as Record Product Information.
5. Note related Change Orders, Record Drawings, and Product Information where applicable.

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SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and training videotapes.

B. Related Sections include the following:
   1. Divisions 02 through 39 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. At completion of training, submit two complete training manuals for Owner's use.

B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Demonstration and Training Videotape: Submit two copies at end of each training module.

1.3 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Progress Documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.
   b. Checking adjustments.
   c. Noise and vibration adjustments.
   d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.

3.3 DEMONSTRATION AND TRAINING VIDEOTAPES

A. General: Engage a qualified commercial photographer to record demonstration and training videotapes. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
   1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Videotape Format: Provide high-quality VHS color videotape in full-size cassettes.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

D. Narration: Describe scenes on videotape by audio narration by microphone while videotape is recorded, or by dubbing audio narration off-site after videotape is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.

END OF SECTION

Division 03 – Concrete

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 04 27 31 - Reinforced Unit Masonry: Reinforcement for engineered masonry.

1.3 UNIT PRICE - MEASUREMENT AND PAYMENT

A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

B. Bar Reinforcement: By the ton (metric ton). Includes reinforcement, placement, and accessories.

C. Wire Mesh Reinforcement: By the square foot (square m). Includes wire mesh reinforcement, placement, and accessories.

1.4 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; Latest Edition.

B. ACI 318 - Building Code Requirements For Structural Concrete and Commentary; American Concrete Institute International; Latest Edition

C. ACI SP-66 - ACI Detailing Manual; American Concrete Institute International; 2004.

D. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2002.

E. ASTM A 184/A 184M - Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement; 2005.

F. ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2002.

G. ASTM A 497/A 497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2002.

H. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2004b.

I. AWS D1.4/D1.4M - Structural Welding Code - Reinforcing Steel; American Welding Society; 2005.

J. CRSI (DA4) - Manual of Standard Practice; Concrete Reinforcing Steel Institute; 2001.

K. CRSI (P1) - Placing Reinforcing Bars; Concrete Reinforcing Steel Institute; Eighth Edition.

B. Do not displace or damage vapor barrier.

C. Accommodate placement of formed openings.

D. Conform to ACI 318-02 code for concrete cover over reinforcement.

3.2 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 40 00, will inspect installed reinforcement for conformance to contract documents before concrete placement.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete formwork.

B. Concrete for composite floor construction.

C. Floors and slabs on grade.

D. Concrete shear walls and foundation walls.

E. Joint devices associated with concrete work.

F. Miscellaneous concrete elements, including light pole bases and monument sign foundation.

G. Concrete curing.

1.2 RELATED SECTIONS

A. Section 03 20 00 - Concrete Reinforcing.

1.3 UNIT PRICES - MEASUREMENT AND PAYMENT

A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

B. Concrete - Slab-on-Fill or Slab-on-Grade: Includes formwork as specified in Section 03 10 00, reinforcement as specified in Section 03 20 00, concrete, placement accessories, consolidating and leveling, troweling, and curing. Provide unit price by:
   1. Cubic yard (meter).

C. Concrete - Vertical in Forms: Includes formwork as specified in Section 03 10 00, reinforcement as specified in Section 03 20 00, concrete, placement accessories, consolidating, and curing. Provide unit price by:
   1. Cubic yard (meter).

D. Concrete - Miscellaneous Locations: Includes formwork as specified in Section 03 10 00, reinforcement as specified in Section 03 20 00, concrete, placement accessories, consolidating, and curing. Provide unit price by:
   1. Cubic yard (meter).

E. Concrete - Grouting: Includes preparation of substrate, grout, placement, consolidating, troweling, and curing. Provide unit price by the cubic yard (meter).

F. Construction Joint Devices: Includes component, accessories, and installation. Provide unit price by the linear foot (meter).

1.4 REFERENCES

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).

B. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; American Concrete Institute International; 1998 (Reapproved 2004).

Pozzolan for Use in Concrete; 2003.

Y. ASTM C 881/C 881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2002.

Z. ASTM C 1059 - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 1999.

AA. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2002.

AB. ASTM D 1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004.

AC. ASTM E 1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 1997 (Reapproved 2004).

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.

C. Samples: Submit samples of underslab vapor retarder to be used.

D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.

E. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.6 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.
   1. Maintain one copy of each document on site.

B. Acquire cement from same source and aggregate from same source for entire project.

C. Follow recommendations of ACI 305R when concreting during hot weather.

D. Follow recommendations of ACI 306R when concreting during cold weather.

PART 2 PRODUCTS

2.1 FORMWORK

A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
   2. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   3. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches (38 mm) of concrete surface.

2.2 REINFORCEMENT

C. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
   1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

D. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.

E. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: As indicated on drawings.
   2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
   3. Total Air Content: 4 percent, determined in accordance with ASTM C 173/C 173M.
   4. Maximum Slump: 4 inches (100 mm).
   5. Maximum Aggregate Size: 1 inch (25.4 mm).

F. Structural Lightweight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C 39/C 39M at 28 days: As indicated on drawings.
   2. Water-Cement Ratio: Maximum 40 percent by weight.
   3. Total Air Content: 3 percent, determined in accordance with ASTM C 173/C 173M.
   4. Maximum Slump: 4 inches (100 mm).
   5. Maximum Aggregate Size: 3/4 inch (19 mm).
   6. Maximum dry unit weight: 107-116 lb per cubic foot

2.8 MIXING

A. Transit Mixers: Comply with ASTM C 94/C 94M.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

F. Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches (150 mm) and seal watertight by taping edges and ends. Cover with sand to depth shown on drawings; repair damaged vapor retarder before covering.

1. Wood float surfaces that will receive quarry tile, ceramic tile, and terrazzo with full bed setting system.
2. Steel trowel surfaces that will receive carpeting, resilient flooring, seamless flooring, thin set quarry tile, and thin set ceramic tile.
3. Steel trowel surfaces that will be left exposed.
   a. Chemical Hardener: After slab has cured, apply water-diluted hardener in three coats per manufacturer's instructions, allowing 24 hours between coats.

E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

3.5 CURING AND PROTECTION

A. Comply with requirements of ACI 308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   1. Normal concrete: Not less than 7 days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:
   1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Begin final curing after initial curing but before surface is dry.
      a. Moisture-retaining cover: Seal in place with waterproof tape or adhesive.
      b. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.6 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.

E. Compressive Strength Tests: ASTM C 39/C 39M. For each test, mold and cure four concrete test cylinders. Obtain test samples for every 100 cu yd (76 cu m) or less of each class of concrete placed.

F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

G. Perform one slump test, one fresh concrete air content and one fresh concrete unit weight test for each set of test cylinders taken, following referenced ASTM procedures.

3.7 DEFECTIVE CONCRETE

SECTION 03 3053

MISCELLANEOUS CAST-IN-PLACE CONCRETE (OTHER THAN PAVEMENT)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes for the following:

1. Drainage Structures.
2. Retaining Walls.
3. Box Base Manholes.
4. As indicated on the plans.

B. Related sections include the following:

1. Division 31 Section "Earth Moving" for excavation and backfill.
2. Division 32 Section "Pavement Joint Sealants".
3. Division 33 Section "Storm Utility Drainage Piping (L.F. and S.F.)".

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Samples: For waterstops.

representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

C. Water: ASTM C 94 and potable.

D. Air-Entraining Admixture: ASTM C 260.

E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
2. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.5 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

1. Manufacturer and Type:
   a. As indicated on plans.

2.6 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating.

2.7 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, ½" thick unless indicated otherwise on the plans.

2.8 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

2.12 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Provide ¾-inch chamfer at exterior corners and edges of permanently exposed concrete, unless indicated otherwise on the plans.

D. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.

E. Construct forms tight enough to prevent loss of concrete mortar.

F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Owner's Representative.

1. Place joints perpendicular to main reinforcement, continue reinforcement across construction joints, unless otherwise indicted.

3.6 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Owner's Representative.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

G. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to all formed concrete surfaces.

B. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated on the drawings.

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

3.11 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Owner's Representative. Remove and replace concrete that cannot be repaired and patched to Owner's Representative's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3.12 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
   a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each type of concrete mix. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method; one test for each compressive strength test, but not less than one test for each day's pour of each type of concrete mix.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each set of compressive strength specimens.
5. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test, unless otherwise indicated. Cylinders shall be molded and stored for laboratory-cured test specimens unless field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd.. One specimen shall be tested at 7 days and two specimens at 28 days; one specimen shall be retained in reserve for later testing if required.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, current operations shall be evaluated and corrective procedures shall be provided for protecting and curing in-place concrete.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results shall be reported in writing to Owner's Representative, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, concrete type and class, location of concrete batch in pour, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

SECTION 03 41 00

PRECAST STRUCTURAL CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Columns and bearing saddles.

B. Beams, spandrels, girders, purlins.

C. Floor double tees and channel slabs.

D. Grout packing.

E. Connection and supporting devices.

F. Lintels and bond beams.

1.2 UNIT PRICES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

B. Precast Column and Beam Members:
   1. By the unit.

1.3 REFERENCES

A. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2005.

B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.

C. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2005.

D. ASTM A 185/A 185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2006.

E. ASTM A 416/A 416M - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete; 2005.

F. ASTM A 497/A 497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2006.

G. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2006.

H. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2003.

I. ASTM A 767/A 767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2005.

J. ASTM A 775/A 775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2004a.

K. ASTM C 150 - Standard Specification for Portland Cement; 2005.

L. ASTM D 3963/D 3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy Coated Reinforcing Steel Bars; 2001.

M. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2006.

D. Samples: Submit two _____, ____x____ inch in size, illustrating surface finish treatment.

E. Design Data: Submit design data reports indicating calculations for loadings and stresses of fabricated, designed framing.

1.6 QUALITY ASSURANCE

A. Perform work of this section in accordance with requirements of PCI MNL-116, PCI MNL-120, PCI MNL-123, and PCI MNL-135.

B. Fabricator Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

C. Erector Qualifications: Company specializing in erecting products of this section with minimum ____ years of documented experience.

D. Design precast concrete members under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in state in which the project is located.

E. Welder: Qualified within previous 12 months in accordance with AWS D1.1 and AWS D1.4.

1.7 PRE-INSTALLATION MEETING

A. Convene a pre-installation conference one week prior to commencing work of this section.

B. Instruct others when field cutting of required openings are 10 inches and smaller.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Handle precast members in position consistent with their shape and design. Lift and support only from support points.

B. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.

C. Protect members to prevent staining, chipping, or spalling of concrete.

D. Mark each member with date of production and final position in structure.

1.9 PROJECT CONDITIONS

A. Coordinate the work of framing components not pre-tensioned but associated with the work of this section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Structural Precast Concrete:
1. Any manufacturer holding a PCI Group C Plant Certification for the types of products specified; see www.pci.org/find/manufacturer.
2. _____.
3. _____.
4. _____.
5. Substitutions: See Section 01 6000 - Product Requirements.

2.2 MATERIALS

A. Cement: White Portland, conforming to ASTM C 150, Type I.

B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements and PCI MNL-116.

2.3 REINFORCEMENT

E. Exposed-to-View Finish (Finish __): Normal plant finish with fins and protrusions removed, ground edges and ends, flat face surfaces.

F. Architectural Finish (Finish __): Surface holes or bubbles over 1/4 inch filled with matching cementitious paste, fins or protrusions removed and surface ground smooth.

G. Rubbed Finish (Finish __): Surface holes or bubbles over 1/4 inch filled with matching cementitious paste, fins or protrusions removed and surface ground smooth, surface then rubbed with neat cementitious paste to smooth and even color and texture.

H. Sandblast Finish (Finish __): Lightly sandblast to achieve partial exposure of aggregate.

2.7 FABRICATION TOLERANCES

A. Conform to fabrication tolerances specified in PCI MNL-116.

2.8 SOURCE QUALITY CONTROL AND TESTS

A. Section 01 4000 - Quality Requirements: Provide mix design for concrete.

B. Provide shop inspection for _____.

C. Test samples in accordance with applicable ASTM standard.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that site conditions are ready to receive work and field measurements are as shown on shop drawings.

3.2 PREPARATION

A. Prepare support equipment for the erection procedure, temporary bracing, and induced loads during erection.

3.3 ERECTION

A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.

B. Align and maintain uniform horizontal and vertical joints, as erection progresses.

C. Maintain temporary bracing in place until final support is provided. Protect members from staining.

D. Provide temporary lateral support to prevent bowing, twisting, or warping of members.

E. Adjust differential camber between precast members to tolerance before final attachment.

F. Install bearing pads.

G. Level differential elevation of adjoining horizontal members with grout to maximum slope of 1:12.

H. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers.

I. Grout underside of column bearing plates.

J. Secure units in place. Perform welding in accordance with AWS D1.1.

3.4 ERECTION TOLERANCES

A. Erect members level and plumb within allowable tolerances.

Division 04 – Masonry

SECTION 04 27 31

REINFORCED UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete Block.

B. Mortar and Grout.

C. Reinforcement and Anchorage.

D. Flashings.

E. Accessories.

1.2 RELATED SECTIONS

A. Section 03 20 00 - Concrete Reinforcing: Reinforcing steel for grouted masonry.

1.3 REFERENCES

A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; 2005.

B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2005.

C. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2002.

D. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2004.

E. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2004b.

F. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2004a.

G. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2003.

H. ASTM C 90 - Standard Specification for Loadbearing Concrete Masonry Units; 2003.

I. ASTM C 91 - Standard Specification for Masonry Cement; 2003a.

J. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2004a.

K. ASTM C 140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2003.

L. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar; 2004.

M. ASTM C 150 - Standard Specification for Portland Cement; 2004a.

N. ASTM C 270 - Standard Specification for Mortar for Unit Masonry; 2004a.

O. ASTM C 404 - Standard Specification for Aggregates for Masonry Grout; 2004.

P. ASTM C 476 - Standard Specification for Grout for Masonry; 2002.

2.1 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 x 8 inches (400 x 200 mm) and nominal depths as indicated on the drawings for specific locations.
   2. Special Shapes: Provide non-standard blocks configured for corners.
   3. Load-Bearing Units: ASTM C 90, normal weight.
      a. Hollow block, as indicated.
      b. Exposed faces: Manufacturer's standard color and texture where indicated.

2.2 MORTAR AND GROUT MATERIALS

A. Masonry Cement: ASTM C 91 Type N.

B. Portland Cement: ASTM C 150, Type I; color as required to produce approved color sample.
   1. Mortar Aggregate: ASTM C 144.
   2. Grout Aggregate: ASTM C 404.

C. Water: Clean and potable.

D. Accelerating Admixture: Nonchloride type for use in cold weather.

E. Moisture-Resistant Admixture: Water repellent compound designed to reduce capillarity.

2.3 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. Dur-O-Wal: www.dur-o-wal.com.
   2. Hohmann & Barnard, Inc: www.h-b.com.
   3. Masonry Reinforcing Corporation of America: www.wirebond.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420).
   1. Deformed billet-steel bars.
   2. Unfinished.

C. Single Wythe Joint Reinforcement: Truss type; ASTM A 82 steel wire, hot dip galvanized after fabrication to ASTM A 153/A 153M, Class B; 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure.

D. Adjustable Multiple Wythe Joint Reinforcement: Ladder type with adjustable ties or tabs spaced at 16 in (406 mm) on center ASTM A 82 steel wire, hot dip galvanized after fabrication to ASTM A 153/A 153M, Class B; 0.1875 inch (4.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods and adjustable components of 0.1875 inch (4.8 mm) wire; width of components as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage from each masonry face.
   1. Vertical adjustment: Not less than 2 inches (50 mm).

2.4 FLASHINGS

A. Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 coating, 24 gage (0.61 mm) total thickness.

B. Stainless Steel: ASTM A 666, Type 304, soft temper; 26 gage (0.45 mm) thick;

B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C 476 for fine and coarse grout.

C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.

D. Do not use anti-freeze compounds to lower the freezing point of grout.

2.10 PRECONSTRUCTION TESTING

A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 40 00.

B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C 780 recommendations for preconstruction testing.

C. Grout Mixes: Test grout batches in accordance with ASTM C 1019 procedures.

D. Compressive Strength: Test masonry prisms in accordance with ASTM C 1314.
   1. Prepare two sets of prisms; test one set at 7 days and the other at 28 days.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Clean reinforcement of loose rust.

C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

D. For areas where high-lift grouting will be employed, provide cleanout openings as follows:
   1. Hollow Masonry: Not less than 4 inches (100 mm) high at the bottom of each cell to be grouted, formed by cutting out face shell of masonry unit.

3.3 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
   3. Mortar Joints: Concave.

3.4 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed

drip.

C. Lap end joints of flashings at least 4 inches (100 mm) and seal watertight with mastic or elastic sealant.

3.7 GROUTING

A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.

B. Low-Lift Grouting:
   1. Limit height of pours to 12 inches (300 mm).
   2. Limit height of masonry to 16 inches (400 mm) above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

C. High-Lift Grouting:
   1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
   2. Clean out masonry cells and other cavities to be grouted by high pressure water spray or compressed air. Remove debris, allow to dry, and inspect before sealing cleanout openings.
   3. Hollow Masonry: Limit lifts to maximum 4 feet (1.2 m) and pours to maximum height of 24 feet (7.3 m).
   4. Place grout for spanning elements in single, continuous pour.

3.8 CONTROL AND EXPANSION JOINTS

A. Do not continue horizontal joint reinforcement through control and expansion joints.

B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

D. Form expansion joint as detailed.

3.9 BUILT-IN WORK

A. As work progresses, install built-in metal door frames, window frames, anchor bolts, and plates and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches (300 mm) from framed openings.

D. Do not build into masonry construction organic materials that are subject to deterioration.

SECTION 04 72 00

CAST STONE MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Cast stone windowsills.
   2. Cast stone coping.
   3. Cast stone wall caps.
   4. Cast stone water table.

B. Related Sections include the following:
   1. Reinforced Unit Masonry: Section 04 27 31.
   2. Steel lintels and shelf angles for unit masonry are specified in Division 05 Section "Metal Fabrications."
   3. Division 07 Section "Joint Sealants" for sealing joints in cast stone with elastomeric sealants.

1.2 DEFINITIONS

A. Cast Stone: Architectural precast concrete building units intended to simulate natural cut stone.

1.3 ACTION SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for cast stone units.

B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions; details of reinforcement and anchorages, if any; and indication of finished faces.
   1. Include building elevations showing layout of units and locations of joints and anchors.

C. Samples: For each color and texture of cast stone required, 10 inches (250 mm) square in size.

D. Samples for Verification: For each mortar color required, showing the full range expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label samples to indicate type and amount of colorant used.

E. Full-Size Samples: For each type of cast stone unit required. Make available for Architect's review at Project site before installing cast stone.
   1. Approved Samples may be installed in the Work.

1.4 INFORMATIONAL SUBMITTALS

1. Architectural Cast Stone, Inc.
2. Classic Cast Stone of Dallas, Inc.
3. Continental Cast Stone Manufacturing, Inc.
4. Dallas Cast Stone Co., Inc.
5. Dura Art Stone.
6. Stone Legends.
7. United Cast Stone.

B. Substitutions: Under provisions of Section 01 25 00.

2.2 CAST STONE MATERIALS

A. General: Comply with ASTM C 1364 and the following:

B. Portland Cement: ASTM C 150, Type I, containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures.

D. Fine Aggregates: Manufactured or natural sands complying with ASTM C 33, gradation as needed to produce required textures.

E. Air-Entraining Admixture: ASTM C 260, certified by the manufacturer to be compatible with other admixtures used.
1. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 5 to 7 percent.

F. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M.
1. Epoxy Coating: ASTM A 775/A 775M.
2. Galvanized Coating: ASTM A 767/A 767M.

G. Embedded Anchors and Other Inserts: Fabricated from steel complying with ASTM A 36/A 36M, and hot-dip galvanized to comply with ASTM A 123.

2.3 CAST STONE UNITS

A. Provide cast stone units complying with ASTM C 1364.
1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364.

B. Reinforce units as indicated and as required by ASTM C 1364. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches(38 mm) of material.

C. Material Qualities:
1. Stone shall have a minimum compressive strength of 6000 psi at 28 days when tested in accordance with ASTM C 1194.
2. Moisture absorption shall not exceed 7% by dry weight at 28 days when tested in accordance with ASTM C 1195.

4. Colored-Aggregate Mortar: Produce color required by combining colored aggregates with portland cement of selected color.

2.7 CAST STONE FABRICATION

A. Fabricate stone by vibrant dry tamp process to avoid bugholes, air voids, or other blemishes in finish surface.

B. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
1. Slope exposed horizontal surfaces at least 1:12, unless otherwise indicated.
2. Anchors: Provide necessary holes and recesses in stones to accept anchors.
3. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
4. Provide drips on projecting elements, unless otherwise indicated.

C. Cure and finish units as follows:
1. Cure units in totally enclosed curing room under dense fog and water spray at 95 percent relative humidity for 24 hours.
2. Yard cure units until the sum of the mean daily temperatures for each day equals or exceeds 350 deg F.
3. Acid etch units to remove cement film from surfaces indicated to be finished.

D. Colors and Textures: As selected by Architect from manufacturer's full range for these characteristics.

E. Fabrication Tolerances:
1. Dimensions: Plus or minus 1/8".
2. Squareness: Not more than 1/8" in 6' out of square.
3. Warpage: Not more than 1/8" per 6' of length.
4. Location of Anchors and Inserts: Deviation of anchors or inserts from center line of location shown on Drawings - not greater than plus or minus 3/8".

2.8 SOURCE QUALITY CONTROL

A. Employ an independent testing agency to sample and test cast stone units according to ASTM C 1364.
1. Include testing for freezing and thawing resistance.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.

D. Variation in Plane between Adjacent Surfaces (Lipping): Do not exceed 1/16-inch(1.5-mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.4 ADJUSTING AND CLEANING

A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.

B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.

C. In-Progress Cleaning: Clean cast stone as work progresses. Remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
4. Clean cast stone by bucket and brush hand-cleaning method described in BIA Technical Notes No. 20 Revised II, using job-mixed detergent solution.

END OF SECTION

Division 05 – Metals

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural steel framing members, support members.

B. Base plates, shear stud connectors.

C. Grouting under base plates.

1.2 RELATED SECTIONS

A. Section 05 31 00 - Steel Decking: Support framing for small openings in deck.

1.3 UNIT PRICES - MEASUREMENT AND PAYMENT

A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.

B. Structural Steel Framing:
   1. Basis of Measurement: By the ton (metric ton).
   2. Basis of Payment: Includes structural members fabricated, placed and anchored.

1.4 REFERENCES

A. AISC (AMAN) - ASD Manual of Steel Construction; American Institute of Steel Construction, Inc.; 1989, Ninth Edition.

B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2005.

C. AISC S348 - Specification for Structural Joints Using ASTM A325 or A490 Bolts; 2004.

D. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.

E. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2004a.

F. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2003.

G. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2004.

H. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2004b.

I. ASTM A 490 - Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 ksi Minimum Tensile Strength; 2004a.

J. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003a.

K. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2004a.

L. ASTM A 588/A 588M - Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm)

F. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.1 MATERIALS

A. Steel Angles, Plates, Channels, and S Shapes: ASTM A 36/A 36M.

B. Steel W Shapes and Tees: ASTM A 992/A 992M.

C. Rolled Steel Structural Shapes: ASTM A 992/A 992M.

D. Cold-Formed Structural Tubing: ASTM A 500, Grade B.

E. Pipe: ASTM A 53/A 53M, Grade B, Finish black.

F. Shear Stud Connectors: Made from ASTM A 108 Grade 1015 bars.

G. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, medium carbon, galvanized.

H. High-Strength Structural Bolts: ASTM A 490 (ASTM A 490M), with matching ASTM A 563 (ASTM A 563M) nuts and ASTM F 436 washers; Type 1 alloy steel.

I. Anchor Bolts: ASTM A 307, Grade C.

J. High-Strength Anchor Bolts: ASTM A 325, Type 1 medium carbon, plain.

K. Load Indicator Washers: Provide washers complying with ASTM F 959 at all connections requiring high-strength bolts.

L. Welding Materials: AWS D1.1; type required for materials being welded.

M. Sliding Bearing Plates: Teflon coated.

N. Grout: Non-shrink, non-metallic aggregate type, complying with ASTM C 1107 and capable of developing a minimum compressive strength of 7,000 psi (48 MPa) at 28 days.

O. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

P. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION

A. Shop fabricate to greatest extent possible.

B. Fabricate connections for bolt, nut, and washer connectors.

C. Develop required camber for members.

2.3 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP _2 unless required otherwise for compatibility with shop and field primers and fireproofing.

B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

C. Welded Connections: Visually inspect all field-welded connections and test at least 10 percent of welds using one of the following:
   1. Radiographic testing performed in accordance with ASTM E 94.
   2. Ultrasonic testing performed in accordance with ASTM E 164.
   3. Liquid penetrant inspection performed in accordance with ASTM E 165.
   4. Magnetic particle inspection performed in accordance with ASTM E 709.

END OF SECTION

SECTION 05 15 05

BARRIER CABLE SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Seven-wire steel strand barrier cable system.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide barrier cable system capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Pedestrian Protection: Minimum 42 inches high and constructed so that a sphere greater than 4 inches in diameter cannot pass through any opening.
   2. Space supports so that total deflection of system under design loading will not result in damage to other building materials, adjacent property, or general public.
   3. Meet the pedestrian handrail loading requirements of the 2003 International Buidling code with City of Denver Amendments.
   4. Coordinate design with Precast Concrete Manufacturer. Provide Precast Concrete Manufacturer with the following:
      a. Embed plates, inserts, and connection hardware.
      b. Drawings locating embedded plates, inserts, and connection hardware.
      c. Design reaction loads caused by the cable system on the supporting precast members.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of the barrier cable system, as well as procedures and diagrams.
   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.

D. Qualification Data: For professional engineer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Certified by Post-Tensioning Institute (PTI).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for, installation tolerances, and other conditions affecting performance of work.

3.2 INSTALLATION, GENERAL

A. Minimum Cable Spacing: 4 inches on center to a minimum height of 42 inches.

B. Use properly calibrated stressing equipment.

C. Force per Cable: 2 kips to prevent sagging.

D. At intermediate walls, provide holes with a minimum 1/8 inch diameter larger than the barrier cable used (including coating material). See Drawings for correct spacing and location.

E. At end columns or walls:
   1. Anchors shall be recessed in the column prior to concrete placement or shall bear against the columns, or alternatively
   2. Threaded anchoring devices shall be installed into inserts that develop the single cable design load.

F. Backstress fixed and stressing anchorages after the cable is stressed to a force equal to 80 percent of the minimum ultimate tensile strength (MUTS) of the strand.
   1. Use a slotted plate to prevent damage to the backside of the member by the jack nose.

3.3 FINISHING OF ANCHOR RECESSES AND HOLES

A. Remove barrier cable tails within 1 inch from the face of the column using either an oxyacetylene torch or a metal cut-off saw.

B. Fill anchor recesses with non-metallic non-shrink grout as soon as practical after stressing and cutting. Grout shall not contain chlorides or other chemicals known to be deleterious to the steel.

C. Prior to installing grout, clean inside of recess to remove laitance or grease to enhance the bond of the grout.

D. Where barrier cables pass through columns, seal holes with elastomeric sealant to prevent moisture from following the path of the barrier cable to the anchorage. Extend sealant a minimum of 1 inch past the face of the column.

END OF SECTION 05155

SECTION 05 31 00

STEEL DECKING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roof deck.

B. Composite floor deck.

C. Metal form deck.

D. Supplementary framing for openings up to and including 18 inches (450 mm).

E. Bearing plates and angles.

F. Stud shear connectors.

1.2 RELATED SECTIONS

A. Section 03 20 00 - Concrete Reinforcing.

B. Section 03 30 00 - Cast-in-Place Concrete: Concrete topping over metal deck.

C. Section 05 12 00 - Structural Steel Framing: Support framing for openings larger than 18 inches (450 mm) and shear stud connectors.

1.3 REFERENCES

A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.

B. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2003.

C. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2004a.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2004 and errata.

F. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society; 1998.

G. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute; 2001.

H. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); The Society for Protective Coatings; 2002 (Ed. 2004).

I. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings; 1997 (Ed. 2004).

1.4 PERFORMANCE REQUIREMENTS

A. Select and design metal deck in accordance with SDI Design Manual.

B. Calculate to structural working stress design and structural properties specified.

6. Formed Sheet Width: 36 inch (900 mm).
7. Side Joints: Lapped, welded.
8. End Joints: Lapped, welded.

C. Metal Form Deck: Corrugated sheet steel, with provision for ventilation of concrete:
1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
2. Minimum Metal Thickness, Excluding Finish: 24 gage (0.6 mm).
3. Nominal Height: 1 5/16 inch (33.34 mm).
4. Formed Sheet Width: 32 inch (800 mm).
5. Side Joints: Lapped, welded.
6. End Joints: Lapped, welded.

2.3 ACCESSORY MATERIALS

A. Bearing Plates and Angles: ASTM A 36/A 36M steel, galvanized per ASTM A 123/A 123M.

B. Stud Shear Connectors: Made from ASTM A 108 Grade 1015 bars.

C. Welding Materials: AWS D1.1.

D. Fasteners: Galvanized hardened steel, self tapping.

E. Weld Washers: Mild steel, uncoated, 3/4 inch (19 mm) outside diameter, 1/8 inch (3 mm) thick.

F. Shop and Touch-Up Primer: SSPC-Paint 25, zinc oxide, complying with VOC limitations of authorities having jurisdiction.

G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

2.4 FABRICATED DECK ACCESSORIES

A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage (0.8 mm) thick sheet steel; of profile and size as indicated; galvanized.

B. Roof Sump Pans: 14 gage (1.8 mm thick) sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches (38 mm) below roof deck surface, bearing flange 3 inches (75 mm) wide, sealed watertight.

C. Floor Drain Pans: 14 gage (1.8 mm thick) sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches (38 mm) below floor deck surface, bearing flange 3 inches (75 mm) wide, sealed watertight.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

B. On concrete and masonry surfaces provide minimum 4 inch (100 mm) bearing.

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Exterior load-bearing wall framing.
2. Interior load-bearing wall framing.
3. Exterior non-load-bearing wall framing.
4. Floor joist framing.
5. Roof trusses.
6. Roof rafter framing.
7. Ceiling joist framing.

B. Related Sections include the following:
1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
a. Design Loads: As indicated.
2. Deflection Limits: Design framing systems to withstand[**design loads**] without deflections greater than the following:
a. Exterior Non-Load-Bearing Framing: **1/360** of the wall height.
b. **1/360** of the horizontally projected span.
c. Ceiling Joist Framing: Vertical deflection of **1/360** of the span.
3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
a. Upward and downward movement of 1/2 inch (13 mm).

B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
   1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
   2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

H. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
   1. Clark Steel Framing.
   2. Consolidated Fabricators Corp.; Building Products Division.
   3. Dale/Incor.
   4. Design Shapes in Steel.
   5. Dietrich Metal Framing; a Worthington Industries Company.
   6. Formetal Co. Inc. (The).
   7. MarinoWare; a division of Ware Industries.

2. Inner Track: Of web depth indicated, and as follows:
   a. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm)
   b. Flange Width: Outer deflection track flange width plus 1 inch (25 mm).

E. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.4 CEILING JOIST FRAMING

A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, **punched with enlarged service holes,** with stiffened flanges, and as follows:
   1. Minimum Base-Metal Thickness: As required by design.
   2. Flange Width: As required by design.

2.5 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
   1. Supplementary framing.
   2. Bracing, bridging, and solid blocking.
   3. Web stiffeners.
   4. Anchor clips.
   5. End clips.
   6. Foundation clips.
   7. Gusset plates.
   8. Stud kickers, knee braces, and girts.
   9. Joist hangers and end closures.
   10. Hole reinforcing plates.
   11. Backer plates.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade [**36**] threaded carbon-steel hex-headed bolts, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

1. Install double deep-leg deflection tracks and anchor outer track to building structure.
2. Connect vertical deflection clips to infill studs and anchor to building structure.
3. Connect drift clips to cold formed metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches (450 mm) of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   a. Install solid blocking at centers indicated on Shop Drawings.
2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.5 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:
1. Joist Spacing: 16 inches (406 mm).

D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Shop fabricated steel items.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

1.3 UNIT PRICES

A. See Section 01 22 00 - Unit Prices, for additional requirements.

B. Components:
   1. Basis of Measurement: By the pound (kg).
   2. Basis of Payment: Includes fabrication, finishing, and installation.

1.4 REFERENCES

A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2002.

B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.

C. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2004a.

D. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

E. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2004.

F. ASTM A 283/A 283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2003.

G. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 2004.

H. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2004b.

I. ASTM A 325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2004b.

J. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003a.

K. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2001.

L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 1998.

M. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2004 and errata.

specifically noted otherwise.

2.3 FABRICATED ITEMS

A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
   1. Side Rails: 3/8 x 2 inches (9 x 50 mm) members spaced at 20 inches (500 mm).
   2. Rungs: one inch (25 mm) diameter solid round bar spaced 12 inches (300 mm) on center.
   3. Space rungs 7 inches (175 mm) from wall surface.

B. Telescopic Steel Columns: Steel pipe; prime paint finish.
   1. Diameter: 3 inch (75 mm).
   2. Height: 6 to 9 feet (1.83 to 2.75 m).

C. Bumper Posts and Guard Rails: As detailed; prime paint finish.

D. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

E. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.

F. Lintels: As detailed; galvanized finish.

G. Door Frames for Overhead Door Openings, Wall Openings: Channel sections; prime paint finish.

H. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.

2.4 FINISHES - STEEL

A. Prime paint all steel items.
   1. Exceptions: Galvanize items to be embedded in concrete or masonry and items specified for galvanized finish.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: Two coats.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A 123/A 123M requirements.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A 123/A 123M requirements.

2.5 FABRICATION TOLERANCES

A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).

C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).

D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).

E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

PART 3 EXECUTION

23H06

SECTION 05 55 16

METAL STAIR NOSINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Abrasive metal nosings.

B. Related Section include the following:
   1. Division 03 Section "Cast-In-Place Concrete" for installing embedded-type treads and nosings indicated to be cast into concrete.

1.2 ACTION SUBMITTALS

A. General: Submit the following under provisions of Section 01 33 00.

B. Product Data: Metal nosings and treads.

C. Shop Drawings: Submit for action. Show fabrication and installation of the Work.

D. Samples for Verification: For each type and finish of extruded nosing
   1. Casting: 6" long in range of finish selected.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An installer trained in the use of the materials and equipment to be employed in the Work.

B. Regulatory Requirements: Comply with all applicable requirements of the laws, codes, ordinances and regulations of Federal, State and Municipal authorities having jurisdiction. Obtain necessary approvals from all such authorities.

C. Single Source Responsibility: Obtain work from a single manufacturer.

D. Pre-Installation Meetings: Contractor to conduct meetings at site with installer prior to start of Work. Familiarize installer with conditions at site and related Work.

1.4 DELIVERY, STORAGE, AND HANDLING

A. General: Deliver materials in manufacturer's original packaging with label indicating pertinent information identifying the item. Store materials in accordance with manufacturer's instructions in a protected dry location off ground. Do not open packaging nor remove labels until time of installation.

1. Provide 2 rows of holes for units more than 5 inches (125 mm) wide, with 2 holes aligned at ends and intermediate holes staggered.

C. Apply bituminous paint to concealed bottoms, sides, and edges of cast-metal units set into concrete.

D. Apply clear lacquer to concealed bottoms, sides, and edges of extruded units set into concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions: Examine and correct conditions of area to receive the Work prior to installation.
1. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate and Furnish: Provide items for embedding in concrete. Coordinate delivery of such items to the project site.

3.3 INSTALLATION

A. General: Install system in accordance with manufactuter's printed installation instructions, submittals, applicable industry standards, and governing regulatory requirements for the Work.

B. Center nosings on tread widths.

C. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

3.4 CLEANING AND PROTECTION

A. At the end of each work day, remove unused materials, debris and containers from the site.

B. Protect the Work so it will not deteriorate or be damaged. Remove protection at time of Substantial Completion.

END OF SECTION

Division 06 – Woods and Plastics

SECTION 06 10 53

MISCELLANEOUS CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Rooftop equipment bases and support curbs.
   2. Wood blocking, cants, and nailers.
   3. Wood furring and grounds.
   4. Plywood backing panels.
   5. In wall blocking for wall mounting equipment and accessories.

1.2 DEFINITIONS

A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
   1. NELMA - Northeastern Lumber Manufacturers Association.
   2. NLGA - National Lumber Grades Authority.
   3. SPIB - Southern Pine Inspection Bureau.
   4. WCLIB - West Coast Lumber Inspection Bureau.
   5. WWPA - Western Wood Products Association.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
   2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
   3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

D. Application: Treat items indicated on Drawings, and the following:
   1. Wood nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, air barriers, weather barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated or required by code, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
   2. Use treatment that does not promote corrosion of metal fasteners.
   3. Use Exterior type for exterior locations and where indicated.
   4. Use Interior Type A High Temperature (HT), unless otherwise indicated.

2.4 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including the following:
   1. Rooftop equipment bases and support curbs.
   2. Blocking.
   3. Cants.
   4. Nailers.
   5. Furring.
   6. Grounds.

B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and any of the following species:
   1. Mixed southern pine; SPIB.
   2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
   3. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.
   4. Eastern softwoods; NELMA.
   5. Northern species; NLGA.
   6. Western woods; WCLIB or WWPA.

C. For exposed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:

2.7 METAL FRAMING ANCHORS

A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and acceptable to authorities having jurisdiction.

B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60(Z180) coating designation.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

D. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.

E. Countersink fastener heads on exposed carpentry work and fill holes with wood filler.

F. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

C. Provide fire retardant treated in-wall blocking and structural support for wall mounted equipment and accessories including, but not limited to:
1. Copings

D. Where indicated or where wood blocking is not allowed by code, utilize galvanized sheet metal bracing in thickness as required to adequately support imposed loads, but not less than 16 gage.

3.3 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

SECTION 06 16 43

GYPSUM SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Glass-mat gypsum sheathing board.
   2. Sealing joints and penetrations in and associated with gypsum sheathing.

B. Related Sections include the following:
   1. Fluid-Applied Membrane Air Barrier: Section 07 27 26.

1.2 DEFINITIONS

A. Gypsum Board Construction Terminology Standard: Refer to ASTM C 11 for definitions of terms for gypsum sheathing board construction not defined in this Section or in other referenced standards.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Comply with provisions of Section 05 41 00 – Structural Metal Stud Framing. On Shop Drawings required by that Section, indicate exterior sheathing screw fastener spacing to be utilized at field, perimeter, and corners to comply with design wind loads.

1.4 CLOSEOUT SUBMITTALS

A. Quantities: Notify HCA of total quantities of gypsum sheathing used on this project 60 days prior to Substantial Completion.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For assembles with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Fire-Resistance Ratings: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, or other causes. Stack sheathing flat on leveled supports off the ground, under cover, and fully protected from weather.

B. Cut boards at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
   1. Install boards with a 3/8-inch(9-mm) setback where non-load-bearing construction abuts structural elements.
   2. Install boards with a 1/4-inch(6.4-mm) setback where they abut masonry or similar materials that might retain moisture, to prevent wicking.

C. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed exterior wall assembly.

D. Apply fasteners so screw heads bear tightly against face of sheathing boards but do not cut into facing.

E. Do not bridge building expansion joints with sheathing; cut and space edges to match spacing of structural support elements.

F. Horizontal Installation: Install sheathing with ends of boards over centers of stud flanges, and stagger end joints of adjacent boards not less than one stud spacing. Screw-attach boards at perimeter and within field of board to each steel stud.
   1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch(9 mm) from edges and ends of boards.
      a. Decrease spacing between fasteners where required to comply with design wind loads, and as indicated in shop drawings submitted under Section 05 41 00.
   2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

G. Vertical Installation: Install board with vertical edges centered over flanges of steel studs. Abut ends and edges of each board with those of adjacent boards. Screw-attach boards at perimeter and within field of board to each steel stud.
   1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch(9 mm) from edges and ends of boards.
      a. Decrease spacing between fasteners where required to comply with design wind loads, and as indicated in shop drawings submitted under Section 05 41 00.
   2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

3.2 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written recommendations.
   1. Apply elastomeric sealant on joints and fasteners and trowel flat. Apply sufficient quantity of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
   2. Taping of joints will not be accepted as an alternative or substitute for application of joint sealant.

Division 07 – Thermal and Moisture Protection

SECTION 07 11 13

BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Cold-applied, asphalt emulsion dampproofing.

1.2 ACTION SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 00.

B. Product Data: For each type of product specified. Including data substantiating that materials comply with requirements for each dampproofing material specified. Include recommended method of application, recommended primer, number of coats, coverage or thickness, and recommended protection course.

1.3 INFORMATIONAL SUBMITTALS

A. Manufacturer's Certification:
   1. Certification by dampproofing manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
   2. Certification by dampproofing manufacturer that products supplied do not contain asbestos.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed bituminous dampproofing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Single-Source Responsibility: Obtain primary dampproofing materials and primers from one source and by a single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Substrate: Proceed with dampproofing only after substrate construction and penetrating work have been completed.

B. Weather Limitations: Proceed with dampproofing only when existing and forecasted weather conditions will permit work to be performed according to manufacturer's recommendations and warranty requirements.

3.2 PREPARATION

A. Clean substrate of projections and substances detrimental to work; comply with recommendations of prime materials manufacturer.

B. Install cant strips and similar accessories as shown and as recommended by prime materials manufacturer even though not shown.

C. Fill voids, seal joints, and apply bond breakers, if any, as recommended by prime materials manufacturer, with particular attention at construction joints.

D. Install separate flashings and corner protection stripping, as recommended by prime materials manufacturer, where indicated to precede application of dampproofing. Comply with details shown and with manufacturer's recommendations. Pay particular attention to requirements at building expansion joints, if any.

E. Prime substrate as recommended by prime materials manufacturer.

F. Protection of Other Work: Do not allow liquid and mastic compounds to enter and clog drains and conductors. Prevent spillage and migration onto other surfaces of work by masking or otherwise protecting adjoining work.

3.3 INSTALLATION, GENERAL

A. Comply with manufacturer's recommendations except where more stringent requirements are indicated and where Project conditions require extra precautions to ensure satisfactory performance of work.

B. Application: Apply dampproofing to the following surfaces.
1. Outer face of gypsum sheathing at masonry veneer exterior walls with metal stud backup.

C. Reinforcement: At changes in plane or where otherwise shown as "reinforced," install lapped course of glass fabric in first coat of dampproofing compound before it thickens.

D. Bituminous Cant Strips: Install 2-by-2-inch(50-by-50-mm) cant strip of bituminous grout at base of vertical dampproofing where it meets horizontal surface.

3.4 COLD-APPLIED, ASPHALT EMULSION DAMPPROOFING

A. Semimastic Grade: Brush or spray apply a coat of asphalt emulsion dampproofing at a rate of 5 gal./100 sq. ft.(2 L/sq. m), to produce a uniform, dry-film thickness of not less than 30 mils(0.8 mm).

END OF SECTION

SECTION 07 16 13

POLYMER MODIFIED CEMENT WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following, for application at interior horizontal and vertical surfaces of elevator pits:
   1. Negative-side polymer modified cement waterproofing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product specified.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: An experienced applicator who has completed modified cement waterproofing similar in material, design, and extent to that indicated for this Project and whose work has resulted in application with a record of successful in-service performance.

1.4 JOB CONDITIONS

A. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after concrete and masonry substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

B. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg F (4 deg C) or above during work and cure period and space is well ventilated and kept free of water.

1.5 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agrees to repair or replace components of modified cement waterproofing that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure to maintain watertight conditions within specified warranty period.
      b. Bond failure.

2.4 SOURCE QUALITY CONTROL AND TESTS

A. Provide shop testing and analysis of structural steel.

B. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 10 percent of bolts at each connection.

C. Welded Connections: Visually inspect all shop-welded connections and test at least 10 percent of welds using one of the following:
   1. Radiographic testing performed in accordance with ASTM E 94.
   2. Ultrasonic testing performed in accordance with ASTM E 164.
   3. Liquid penetrant inspection performed in accordance with ASTM E 165.
   4. Magnetic particle inspection performed in accordance with ASTM E 709.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.2 ERECTION

A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".

B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

C. Field weld components indicated on shop drawings.

D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".

E. Do not field cut or alter structural members without approval of Architect.

F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

G. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

3.3 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

3.4 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.

B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts", testing at least 10 percent of bolts at each connection.

SECTION 05 31 00

STEEL DECKING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roof deck.

B. Composite floor deck.

C. Supplementary framing for openings up to and including 18 inches (450 mm).

D. Bearing plates and angles.

E. Stud shear connectors.

1.2 RELATED SECTIONS

A. Section 03 20 00 - Concrete Reinforcing.

B. Section 03 30 00 - Cast-in-Place Concrete: Concrete topping over metal deck.

C. Section 05 12 00 - Structural Steel Framing: Support framing for openings larger than 18 inches (450 mm) and shear stud connectors.

1.3 REFERENCES

A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.

B. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2003.

C. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2004a.

E. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2004 and errata.

F. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society; 1998.

G. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, Roof Decks; Steel Deck Institute; 2001.

H. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); The Society for Protective Coatings; 2002 (Ed. 2004).

I. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings; 1997 (Ed. 2004).

1.4 PERFORMANCE REQUIREMENTS

A. Select and design metal deck in accordance with SDI Design Manual.

B. Calculate to structural working stress design and structural properties specified.

1.5 SUBMITTALS

8. End Joints: Lapped, welded.

2.3 ACCESSORY MATERIALS

A. Bearing Plates and Angles: ASTM A 36/A 36M steel, galvanized per ASTM A 123/A 123M.

B. Stud Shear Connectors: Made from ASTM A 108 Grade 1015 bars.

C. Welding Materials: AWS D1.1.

D. Fasteners: Galvanized hardened steel, self tapping.

E. Weld Washers: Mild steel, uncoated, 3/4 inch (19 mm) outside diameter, 1/8 inch (3 mm) thick.

F. Shop and Touch-Up Primer: SSPC-Paint 25, zinc oxide, complying with VOC limitations of authorities having jurisdiction.

G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

2.4 FABRICATED DECK ACCESSORIES

A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage (0.8 mm) thick sheet steel; of profile and size as indicated; galvanized.

B. Roof Sump Pans: 14 gage (1.8 mm thick) sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches (38 mm) below roof deck surface, bearing flange 3 inches (75 mm) wide, sealed watertight.

C. Floor Drain Pans: 14 gage (1.8 mm thick) sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches (38 mm) below floor deck surface, bearing flange 3 inches (75 mm) wide, sealed watertight.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions prior to beginning work.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.

B. On concrete and masonry surfaces provide minimum 4 inch (100 mm) bearing.

C. On steel supports provide minimum 3 inch (75 mm) bearing.

D. Weld deck in accordance with AWS D1.3.

E. At deck openings from 6 inches (150 mm) to 18 inches (450 mm) in size, provide 2 x 2 x 1/4 inch (50 x 50 x 6 mm) steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.

F. Where deck changes direction, install 6 inch (150 mm) minimum wide sheet steel cover plates, of same thickness as deck. Fusion weld 12 inches (300 mm) on center maximum.

SECTION 05 40 00

COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formed steel canopy roof and exterior non load bearing framing and bridging.

1.2 RELATED SECTIONS

A. Section 05 31 00 - Steel Decking.

1.3 REFERENCES

A. AISI SG02-1 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2001 with 2004 supplement. (replaced SG-971)

B. AISI SG-971 - Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 1996, with 2000 supplement.

C. AISI SG03-2 - 2002 edition of the Cold-Formed Steel Design Manual; American Iron and Steel Institute; 2002.

D. ANSI A208.1 - American National Standard for Particleboard; 1999.

E. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2004.

F. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2004a.

G. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability; 2004b.

H. ASTM A 1011/A 1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability; 2004a.

I. ASTM C 955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2003.

J. ASTM C 1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2004.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2004 and errata.

L. AWS D1.3 - Structural Welding Code - Sheet Steel; American Welding Society; 1998.

M. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2004).

N. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

B. Metal Framing Connectors and Accessories:
   1. Same manufacturer as framing.
   2. Dietrich Metal Framing: www.dietrichindustries.com.
   3. The Steel Network Inc: www.SteelNetwork.com.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 FRAMING MATERIALS

A. Studs and Track: ASTM C 955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
   1. Gage and depth: As required to meet specified performance levels.
   2. Galvanized in accordance with ASTM A 653/A 653M G90/Z275 coating.
   3. Provide components fabricated from ASTM A 1008/A 1008M, Designation SS steel.

B. Joists and Purlins: Fabricated from either ASTM A 1008/A 1008M, Designation SS, or ASTM A 1011/A 1011M, Designation SS steel sheet, shop painted.
   1. Gage and depth: As required to meet specified performance levels.
   2. Finish: Manufacturer's standard, rust-inhibitive paint.

C. Framing Connectors: Factory-made formed steel sheet, ASTM A 653/A 653M SS Grade 50, with G60/Z180 hot dipped galvanized coating and factory punched holes.
   1. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI North American Specification for the Design of Cold Formed Steel Structural Members; minimum 16 gage, 0.06 inch (1.5 mm) thickness.
   2. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, screws and anti-friction bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
   3. Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.

2.3 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

B. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

C. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.4 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A 153/A 153M.

B. Anchorage Devices: Power actuated.

C. Welding: In conformance with AWS D1.1.

2.5 SHOP FABRICATED ASSEMBLIES

A. Shop fabricate metal framing to the greatest extent possible.

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SECTION 05 45 23

MEDICAL SUPPORTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Metal support systems for surgical lights, x-ray equipment and other medical equipment as required.

1.2 SYSTEM DESCRIPTION

A. Requirements: Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
   1. Manufacturer: Responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
   2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of medical support systems.
      a. Coordinate design of system with information provided by the equipment manufacturer.
   3. Attachment Considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.
   4. Make modifications only to meet field conditioned and ensure fitting of system components.
   5. Obtain Architect's approval of modifications and for connections to building elements at locations other than indicated on Drawings.
   6. Support Structure: Locate support members at ceiling plane as indicated on Drawings. Make possible attachment of equipment support rails at any point along support system without drilling or welding into system.
   7. Ceiling Anchorage: Attach to ceiling by means of imbedded concrete inserts, through bolts or direct attachment to structural framing.
   8. Rigidly fix and brace support structure against sway.
   9. Loading: Design support structure to support vertical load, maximum eccentricity of vertical load from support point, transverse force acting on longitudinal rail, longitudinal force acting on longitudinal rail, and deflection criteria established for each piece of supported equipment.
      a. If loads are not defined for piece of supported equipment assume concentrated load of 1500 pounds at any point along equipment rails. Concentrated load is maximum encountered by positioning of equipment at extremities of its travel (maximum load configuration).
   10. Safety Factor: Design support structure for minimum safety factor of three based on ultimate strength under static loading conditions. Structure shall not deflect more than 1/720 span vertically or horizontally

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Medical Support Systems:
1. B-Line Systems, Inc., Highland, IL.
2. Grinnell Supply Sales, Cranston, RI.
3. Unistrut Building Systems, Wayne MI.

2.2 MEDICAL SUPPORT SYSTEMS

A. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web with 9/16 inch wide slotted holes in webs at 2 inches on center.
1. Width, Depth, Thickness: As required by design to meet structural performance.

B. Materials:
1. Steel Sheet Structural Quality: ASTM A 570, Grade 33.
2. Zinc-Coated Steel Sheet: ASTM A 653, Quality SQ, Grade 33, G90.
3. Hot-Rolled Steel Bar: ASTM A 575.
4. Hot-Rolled Steel Sheet and Strip: ASTM A 569.
5. Fasteners and Anchors: Concrete inserts, bolts or direct attachment to structural framing.

C. Finish: System components; corrosion resistant. Hardware; electro-galvanized.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions and proceed with Work in accordance with Section 01 43 00.

3.2 INSTALLATION

A. Medical Support Systems: Install in accordance with approved shop drawings and manufacturers instructions.

B. Structural Assembly: Install supporting framework plumb and true. Tolerances:
1. Mount surfaces of support structure horizontal within tolerance of 1/32 inch in 24 inches and within 1/16 inch in 18 foot length.
2. Elevation of one rail mounting surface to other shall be within 1/16 inch in any 24 inches length of rails.

3.3 PROTECTION

A. Protect finished installation under provisions of Section 01 50 00.

END OF SECTION 05 45 23

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Shop fabricated steel items.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

1.3 UNIT PRICES

A. See Section 01 22 00 - Unit Prices, for additional requirements.

B. Components:
   1. Basis of Measurement: By the pound (kg).
   2. Basis of Payment: Includes fabrication, finishing, and installation.

1.4 REFERENCES

A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2002.

B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.

C. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2004a.

D. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

E. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2004.

F. ASTM A 283/A 283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2003.

G. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 2004.

H. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2004b.

I. ASTM A 325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2004b.

J. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003a.

K. ASTM A 501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2001.

L. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 1998.

M. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2004 and errata.

2.3 FABRICATED ITEMS

A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
   1. Side Rails: 3/8 x 2 inches (9 x 50 mm) members spaced at 20 inches (500 mm).
   2. Rungs: one inch (25 mm) diameter solid round bar spaced 12 inches (300 mm) on center.
   3. Space rungs 7 inches (175 mm) from wall surface.

B. Telescopic Steel Columns: Steel pipe; prime paint finish.
   1. Diameter: 3 inch (75 mm).
   2. Height: 6 to 9 feet (1.83 to 2.75 m).

C. Bumper Posts and Guard Rails: As detailed; prime paint finish.

D. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

E. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.

F. Lintels: As detailed; galvanized finish.

G. Door Frames for Overhead Door Openings, Wall Openings, and _____: Channel sections; prime paint finish.

H. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.

I. Elevator Lifting Beams: Beam Sections as required by elevator supplier; prime paint finish.

2.4 FINISHES - STEEL

A. Prime paint all steel items.
   1. Exceptions: Galvanize items to be embedded in concrete or masonry and items specified for galvanized finish.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: Two coats.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A 123/A 123M requirements.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A 123/A 123M requirements.

2.5 FABRICATION TOLERANCES

A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).

C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).

D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).

E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

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SECTION 05 50 01

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Loose bearing and leveling plates.
2. Steel framing and supports for overhead doors.
3. Steel framing and supports for accordion folding partitions.
4. Steel framing and supports for countertops.
5. Steel framing and supports for mechanical and electrical equipment.
6. Steel framing and supports for applications where framing and supports are not specified in other Sections.
7. Metal angle corner guards.
8. Metal edgings.
9. Miscellaneous metal trim.
10. Metal floor plate and supports.

1.2 SUBMITTALS

A. Product Data: For the following:
1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Paint products.
3. Grout.

B. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
1. Provide templates for anchors and bolts specified for installation under other Sections.

C. Welding Certificates: Copies of certificates for welding procedures and personnel.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.3 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

H. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Zinc-Rich Shop Primer for Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Carboline 621; Carboline Company.
      b. Aquapon Zinc-Rich Primer 97-670; PPG Industries, Inc.
      c. Tneme-Zinc 90-97; Tnemec Company, Inc.

C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

D. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FASTENERS

A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A(ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563(ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36.

D. Machine Screws: ASME B18.6.3(ASME B18.6.7M).

E. Lag Bolts: ASME B18.2.1(ASME B18.2.3.8M).

F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.

G. Plain Washers: Round, carbon steel, ASME B18.22.1(ASME B18.22M).

H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1(ASME B18.21.2M).

I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
   1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.

I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

J. Remove sharp or rough areas on exposed traffic surfaces.

K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

2.8 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates after fabrication.

2.9 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches(32 mm) wide by 1/4 inch(6 mm) thick by 8 inches(200 mm) long at 24 inches(600 mm) o.c., unless otherwise indicated.
2. Furnish inserts if units must be installed after concrete is placed.
3. Refer to Section 05 45 23 for medical supports.

C. Fabricate supports for operable partitions as follows:

1. Beams: Continuous steel shapes of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Galvanize miscellaneous framing and supports where indicated.

2.10 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6

exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Protection of Dissimilar Materials: When dissimilar materials come in contact, provide bituminous paint protective coating. Conditions include, but are not limited to:
1. Ferrous metal to aluminum.
2. Ferrous metal or aluminum in contact with concrete.
3. Steel to copper.

3.2 SETTING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings, if any.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.4 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Apply by brush or spray to provide a minimum 2.0-mil(0.05-mm) dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."

SECTION 05 51 00

METAL STAIRS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural steel stair framing and supports.

B. Pan treads to receive concrete fill, and landings.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete fill in stair pans and landings; mesh reinforcement for landings.

B. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal anchors in concrete.

C. Section 04 27 31 - Reinforced Unit Masonry: Placement of metal fabrications in masonry.

D. Section 05521 - Steel Railings: Metal handrails and balusters other than specified in this section.

1.3 REFERENCES

A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.

B. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2004a.

C. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

D. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2004.

E. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2004.

F. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2004b.

G. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003a.

H. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability; 2004b.

I. ASTM E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2000.

J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 1998.

K. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2004 and errata.

L. NAAMM AMP 510 - Metal Stairs Manual; The National Association of Architectural

J. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

K. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.2 FABRICATION - GENERAL

A. Fit and shop assemble components in largest practical sections, for delivery to site.

B. Fabricate components with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Fabricate components accurately for anchorage to each other and to building structure.

2.3 FABRICATION - PAN STAIRS AND LANDINGS

A. Form treads with minimum 14 gauge sheet steel stock.

B. Secure reinforced tread pans to stringers with clip angles; welded in place.

C. Form stringers with rolled steel channels, 12 inches (300 mm) deep. Weld fascia plates to channels using 14 gage (1.8 mm thick) steel sheet across channel toes.

D. Form landings with minimum 14 gage (1.8 mm thick) sheet stock. Reinforce underside with angles to attain design load requirements.

E. Prime paint components.

2.4 FABRICATION - UNIT STAIR TOWERS

A. Manufacturers:
1. Alfab, Inc: www.alfabinc.com.
2. American Stair Corporation: www.americanstair.com.
3. The Sharon Companies Ltd: www.sharonstair.com.
4. Substitutions: Not permitted.

B. Fabricate self-supporting steel stair towers with formed treads and risers; steel channel stringers; landing platforms; sectioned for transport; corner structural support members designed to support full weight of complete stair tower plus design live load; with steel railings.

C. Fabricate stair towers to height not exceeding 40 feet (12 m) for transportation purposes; designed for stacking to height of building as a self-supporting structure.

2.5 FINISHING

A. Prepare surfaces to be primed in accordance with SSPC-SP 2.

B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

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SECTION 05 52 13

PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Steel pipe and tube handrails and railings.

1.2 PERFORMANCE REQUIREMENTS

A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:
   1. Structural Steel: AISC S335, "Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary."
   2. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."

B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding structural loads required by applicable building code without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections.

C. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

A. Product Data: For the following:
   1. Grout, anchoring cement, and paint products.

B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.
   1. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

PART 2 - PRODUCTS

2.1 METALS

A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.

B. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:
   1. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:
      a. Black finish, unless otherwise indicated.
      b. Galvanized finish for exterior installations and where indicated.
      c. Type F, or Type S, Grade A, standard weight (Schedule 40), unless another grade and weight are required by structural loads.
   2. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
   3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
   4. Iron Castings: Malleable iron complying with ASTM A 47, Grade 32510(ASTM A 47M, Grade 22010).

C. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.2 WELDING MATERIALS, FASTENERS, AND ANCHORS

A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
   1. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

C. Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from same basic metal as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
   1. Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless otherwise indicated.
   2. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

D. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
   1. Cast-in-place anchors.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.

G. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.

H. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches(150 mm) long with inside dimensions not less than 1/2 inch(12 mm) greater than outside dimensions of post, and steel plate forming bottom closure.

I. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

J. Ease exposed edges to a radius of approximately 1/32 inch(1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

K. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

L. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.

M. Fabricate joints that will be exposed to weather in a watertight manner.

N. Close exposed ends of handrail and railing members with prefabricated end fittings.

O. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch(6 mm) or less.

P. Toe Panels: Where indicated, provide panel boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

Q. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet(2 mm in 1 m).
3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet(5 mm in 3 m).

C. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

A. Form or core-drill holes (no core drilling in composite slab) not less than 5 inches(125 mm) deep and 3/4 inch(20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:
   1. Nonshrink, nonmetallic grout or anchoring cement.

B. Cover anchorage joint with flange of same metal as post, attached to post as follows:
   1. Welded to post after placing anchoring material.

C. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch(3-mm) build-up, sloped away from post.

D. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
   1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

3.5 ANCHORING RAILING ENDS

A. Anchor railing ends into concrete and masonry with round flanges connected to railing ends and anchored into wall construction with postinstalled anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.
   1. Weld flanges to railing ends.

02E02

SECTION 05 58 00

FORMED-METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Closures and trim.
   2. Filler panels.

B. Related Sections include the following:
   1. Division 5 Section "Ornamental Metal" for items made primarily from plate, bars, extrusions, tubes, castings, and other forms of metal, but which may include sheet metal components.
   2. Division 7 Section, "Sheet Metal Flashing and Trim" for items made of formed metal for flashing purposes.
   3. Division 10 Section "Louvers and Vents" for louvers made of formed metal.

1.2 PERFORMANCE REQUIREMENTS

A. Corrosion Control: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

A. Product Data: For the following:
   1. Column covers.
   2. Sound-deadening insulation.
   3. Insulation adhesive.
   4. Gaskets.
   5. Structural anchors.
   6. Nonstructural anchors.
   7. Paint products.

B. Shop Drawings: Detail fabrication and installation of the following formed-metal fabrications. Include plans, elevations, sections, and details of components and their connections. Show anchorage and accessory items.

C. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of formed-metal fabrication indicated.

D. Samples for Verification: For each type of exposed finish required, prepared on 6-inch-(150-mm-) square samples of metal of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.

and finish indicated, and with not less than strength and durability properties of alloy 5005-H15.

C. Galvanized Steel Sheet: ASTM A 653/A 653M, G90(Z275) coating, either commercial quality or lock-forming quality, stretcher-leveled standard of flatness.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Class C coating, commercial quality, stretcher-leveled standard of flatness.

E. Uncoated, Cold-Rolled Steel Sheet: ASTM A 366/A 366M, matte finish, stretcher-leveled standard of flatness. Electrolytic zinc-coated steel sheet complying with ASTM A 591/A 591M, Class C coating, commercial quality, stretcher-leveled standard of flatness, may be substituted at fabricator's option.

F. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

G. Stainless-Steel Sheet: ASTM A 666, Type 316, stretcher-leveled standard of flatness.

2.3 MISCELLANEOUS MATERIALS

A. Sound-Deadening Insulation: Unfaced, mineral-fiber blanket insulation complying with ASTM C 665, Type I, and passing ASTM E 136 test.

B. Insulation Adhesive: Duct thermal-insulation adhesive complying with ASTM C 916, Type I or Type III.

C. Flexible Cellular Neoprene Gaskets: ASTM D 1056, Type 1, Class A, grade as recommended by gasket manufacturer to obtain airtight seal for application indicated.

D. Joint Sealants for Concealed Joints: One-part, nonsag, solvent-release-curing, polymerized butyl sealant complying with ASTM C 1085 and formulated with minimum of 75 percent solids.

E. Filler Metal and Electrodes: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded or brazed and as necessary for strength, corrosion resistance, and compatibility in fabricated items.
   1. Use filler metals that will match the color of metal being joined and will not cause discoloration.

F. Fasteners: Use fasteners fabricated from same basic metal and alloy as fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
   1. Provide concealed fasteners for interconnecting formed-metal fabrications and for attaching them to other work, unless otherwise indicated.
   2. Provide concealed fasteners for interconnecting formed-metal fabrications and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method.
   3. Provide Phillips flat-head machine screws for exposed fasteners, unless otherwise indicated.

back exposed edges of unsupported sheet metal to form a 1/2-inch-(12-mm-) wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch(1 mm) and support with concealed stiffeners.

D. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness specified for stretcher-leveled sheet metal and sufficient strength for indicated use.
   1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.

E. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce formed-metal units as needed to attach and support other construction.

F. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install formed-metal fabrications.

G. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.
   1. Use welding and brazing procedures that will blend with and not cause discoloration of metal being joined.

2.6 CLOSURES AND TRIM

A. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction.
   1. Metal for Interior Installations: Steel sheet, 0.0428 inch(1.09 mm).
   2. Closures and trim may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view and not exposed to weather.

B. Conceal fasteners where possible; otherwise, locate where they will be as inconspicuous as possible. Size fasteners to support closures and trim, with fasteners spaced to prevent buckling or waviness in finished surfaces.

C. Drill and tap holes needed for securing closures and trim to other surfaces.

D. Incorporate gaskets where indicated or needed for concealed, continuous seal at abutting surfaces.

E. Miter or cope trim members at corners and reinforce with bent metal splice plates to form tight joints.

2.7 FILLER PANELS

A. Form filler panels for closing ends of partition systems and for other applications indicated. Form from two sheets of metal of type and thickness indicated below, separated by channels formed from the same material, producing a panel of same thickness as partitions, unless otherwise indicated. Incorporate reveals, trim, and concealed anchorages for attaching to adjacent surfaces.
   1. Galvanized Steel Sheet: 0.064 inch(1.63 mm).

coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer immediately after cleaning and pre-treating.

2.11 STEEL SHEET FINISHES

A. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."

B. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating applied over it.

C. Factory Priming for Field-Painted Finish: Immediately after cleaning and pretreating, apply shop primer.

D. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils(0.05 mm).

E. Powder-Coated Finish: Immediately after cleaning and pretreating, apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils(0.04 mm). Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.
1. Color and Gloss: Match Architect's sample.

2.12 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Bright, Directional Polish: No. 4 finish.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place formed-metal fabrications level, plumb, and in alignment with adjacent construction.

Division 6

Wood, Plastics, and Composites

25B02

SECTION 06 20 00

FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Interior standing and running trim.
   2. Paneling.

B. Related Section:
   1. Section 10 28 13.02 - Toilet Accessories: Mirror frame.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Include construction details, material descriptions, dimensions of individual components and profiles, textures, and colors.
   1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
   2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Samples for Verification:
   1. For each species and cut of lumber and panel products with nonfactory-applied finish, with 1/2 of exposed surface finished, 50 sq. in.(300 sq. cm) for lumber and 8 by 10 inches(203 by 250 mm) for panels.
   2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in.(300 sq. cm) for lumber and 8 by 10 inches(203 by 250 mm) for panels.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer.

B. Fire-Test-Response Characteristics: Where fire-retardant materials are indicated or required by code, provide materials with specified fire-test-response characteristics as determined by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency on surfaces of materials that will be concealed from view after installation.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

2.3 INTERIOR STANDING AND RUNNING TRIM

A. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish): Clear, kiln-dried, finished lumber (S4S), selected for compatible grain and color.
   1. Species and Grain: Refer to Finish Legend.

B. Moldings: Made to patterns included in WMMPA WM 7 unless noted otherwise. Wood moldings made from kiln-dried stock and graded under WMMPA WM 4.
   1. Moldings for Transparent Finish (Stain or Clear Finish): N-grade.
      a. Provide material selected for compatible grain and color.
      b. Species and Grain: Refer to Finish Legend.
   2. Wood Profile Base (WD2 Wall Base - Lobby): AWI BAS-1054.
   3. Casing (Mirror Frame): AWI CAS-2078-2 inches.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
   1. Where finish carpentry materials are exposed in areas of high humidity, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153/A 153M.

B. Glue: Aliphatic- or phenolic-resin wood glue recommended by manufacturer for general carpentry use.

C. Flashing: Comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim" for flashing materials installed in finish carpentry.

2.5 FABRICATION

A. Wood Moisture Content: Comply with requirements of specified inspection agencies and with manufacturer's written recommendations for moisture content of finish carpentry at relative humidity conditions existing during time of fabrication and in installation areas.

B. Back out or kerf backs of the following members, except members with ends exposed in finished work:
   1. Interior standing and running trim, except shoe and crown molds.

C. Ease edges of lumber less than 1 inch(25 mm) in nominal thickness to 1/16-inch(1.5-mm) radius and edges of lumber 1 inch(25 mm) or more in nominal thickness to 1/8-inch(3-mm) radius.

D. Flush Wood Paneling:
   1. Lumber Trim and Edges: At fabricator's option, trim and edges indicated as solid wood (except moldings) may be either lumber or veneered construction compatible with grain and color of veneered panels.
   2. Matching of Adjacent Veneer Leaves: Book match.
   3. Veneer matching within Panel Face: Balance match.
   4. Panel-matching method: In each separate area, use premanufactured sets selectively reduced in width.

5. Install wall railings on indicated metal brackets securely fastened to wall framing.
6. Install standing and running trim with no more variation from a straight line than 1.8 inch in 96 inches (3 mm in 2400 mm).

3.5 PANELING INSTALLATION

A. Plywood Paneling: Refer to Drawings for details.

B. Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening, unless covered by trim.

3.6 ADJUSTING

A. Replace finish carpentry that is damaged or does not comply with requirements. Finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.7 CLEANING

A. Clean finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 20 00

25B03

SECTION 06 40 23

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Plastic-laminate countertops.
   2. Solid-surfacing-material countertops.
   3. Wood veneered clad casework.
   4. Shop finishing interior woodwork.

1.2 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated, including cabinet hardware and accessories, and finishing materials and processes.
   1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
   1. Show details full size.
   2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
   3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, and other items installed in architectural woodwork.

C. Samples for Verification: For the following:
   1. Plastic-laminate-clad panel products, 8 by 10 inches(200 by 250 mm), for each type, color, pattern, and surface finish.
   2. Thermoset decorative-overlay surfaced panel products, 8 by 10 inches(200 by 250 mm), for each type, color, pattern, and surface finish.
   3. Hardwood veneer plywood and solid wood, with approved finish, 8 by 10 inches in size.
   4. Solid-surfacing materials, 6 inches(150 mm) square.
   5. Corner pieces as follows:
      a. Cabinet front frame joints between stiles and rail, as well as exposed end pieces, 18 inches(450 mm) high by 18 inches(450 mm) wide by 6 inches(150 mm) deep.

6. Demolish and remove unacceptable mockups when directed.
7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:
1. Hardboard: AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade Suprafine.
3. Particleboard: ANSI A208.1, Grade M-2.
4. Softwood Plywood: DOC PS 1.

C. Hardwood Lumber
1. Quality standard: FS MM-L-736C.
2. Grading standard: AWI custom grade.

1. Interior Type A: Low-hygroscopic formulation.
2. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
3. Kiln-dry material before and after treatment to levels required for untreated material.

C. Fire-Retardant-Treated Lumber and Plywood by Nonpressure Process: Apply nontoxic, water-soluble, fire-retardant treatment by dip, spray, roller, curtain coating, vacuum chamber, or soaking to achieve flame-spread rating of 25 or less and smoke-developed rating of 450 or less per ASTM E 84.

D. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread rating of 25 or less and smoke-developed rating of 25 or less per ASTM E 84.
1. For panels 3/4 inch(19 mm) thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: density, 45-lb/cu. ft(720-kg/cu. m); modulus of rupture, 1600 psi(11 MPa); modulus of elasticity, 300,000 psi(2000 MPa); internal bond, 80 psi(550 kPa); and screw-holding capacity on face and edge, 250 lbf(1100 N) and 225 lbf(1000 N), respectively.
2. For panels 13/16 to 1-1/4 inches(20 to 32 mm) thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: density, 44-lb/cu. ft(705-kg/cu. m); modulus of rupture, 1300 psi(9 MPa); modulus of elasticity, 250,000 psi(1700 MPa); linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 lbf(1100 N) and 175 lbf(780 N), respectively.
3. Product: Subject to compliance with requirements, provide "Duraflake FR" by Willamette Industries, Inc.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware (Scheduled by Naming Products)."

B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.

C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 165 or 170 degrees of opening, three-way adjustable, zero protrusion, self-closing.
1. Acceptable Manufacturers:
   a. Blum.
   b. Grass.
   c. Häfele.

D. Back-Mounted Pulls: BHMA A156.9, B02011, 4-inch wire.

E. Adjustable Shelf Rests: BHMA A156.9, B04013**; galvanized steel pin for insertion into standard 5 mm holes.**~~.~~
1. Acceptable Product: Hafele No. 282.81.727.

Q. Concealed Hardware Finishes: Provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

R. Silencers: For doors and drawers, provide 3/8 inch to 1/2 inch diameter self-adhesive neoprene disks.
1. Color: Clear.

S. Glass Door Track (Giftshop Glass Track): Plastic double guide track or double running track as indicated or as selected by Architect; designed for glass thickness indicated.
1. Product: Subject to compliance with requirements, provide "Series 410" as manufactured by Doug Mockett and Co., Inc.
a. Double glide track for 6 mm glass: 410.05.109.
b. Double running track for 6 mm glass: 410.15.105.

2.4 CABINET AND WALL PANEL REVEALS AND MOLDINGS

A. Acceptable Manufacturers:
1. Millwork Reveals:
a. Julius Blum & Co., Inc.
2. Cabinet Inserts and Moldings:
a. Julius Blum & Co., Inc.
3. Wall Reveals:
a. Fry Reglet.

B. Materials:
1. Aluminum: Extruded aluminum alloy, ASTM B 221 6063-T5 or 6063-T52 bar stock.
2. Stainless Steel: Extruded stainless steel, ASTM A 276, Type 304 (18-8).

C. Fabricate in profiles as detailed on Drawings.

D. Finish:
1. Millwork Reveals: Brushed aluminum finish or satin finished stainless steel.
2. Cabinet Inserts and Moldings: Clear anodized aluminum.
3. Wall Reveals (Wall Panel Reveals): Clear anodized.

E. Metal Trim Pieces:
1. MT2: 1/8 inch by 1/2 inch aluminum metal flat bar; rounded corners.
a. Finish: Match Nevamar 251 Sonoma.
2. MT3: 3/8 inch by 3/4 inch aluminum metal angle; rounded corners.
a. Finish: Match Nevamar 251 Sonoma.
3. MT4: 1/4 inch aluminum radius corner trim; rounded corners.
a. Finish: Match Nevamar 251 Sonoma.
4. MT5: 1/4 inch by 1/2 inch aluminum metal flat bar; rounded corners.
a. Finish: Match Nevamar 251 Sonoma.
5. MT6: 1-1/4 inch by 1-1/4 inch aluminum metal angle; rounded corners.
a. Finish: Match Nevamar 251 Sonoma.
6. MT7: 1/4 inch by 1/4 inch aluminum metal "V" angle; rounded corners.
a. Finish: Match Nevamar 251 Sonoma.
~~6.~~**7. MT8: 1/2 inch by 1/2 inch aluminum metal C-channel; rounded corners.**
a. Finish: Match Nevamar 251 Sonoma.

C. AWI Type of Cabinet Construction: Modified flush overlay, refer to Drawings.

D. Reveal Dimension: As indicated.

E. Materials for Exposed Surfaces:
   1. Exposed Laminate Surfaces: High-pressure decorative laminate complying with the following requirements:
      a. Horizontal Surfaces Other Than Tops: HGS laminate.
      b. Vertical Surfaces: HGS laminate.
   2. Exposed Edging for Door and Drawer Fronts: Provide PVC color coordinated edging on door and drawer front edges. Apply with hot adhesive.

F. Materials for Semiexposed Surfaces: Provide surface materials indicated below:
   1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
   2. Drawer Sides and Backs: Thermoset decorative overlay.
   3. Drawer Bottoms: Thermoset decorative overlay.

G. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
   1. Color: Refer to Finish Legend.

H. Provide dust panels of 1/4-inch(6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.8 PLASTIC-LAMINATE COUNTERTOPS

A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.

B. High-Pressure Decorative Laminate Grade: HGS.

C. Chemical-Resistant, High-Pressure Decorative Laminate: NEMA LD 3, Grade PF-42, and as follows:
   1. Laminate has the following ratings when tested with indicated reagents according to NEMA LD 3 test procedure 3.9.5:
      a. Nitric acid (30 percent): moderate effect.
      b. Sulfuric acid (77 percent): moderate effect.
      c. Hydrochloric acid (37 percent): moderate effect.
      d. Phosphoric acid (75 percent): no effect.
      e. Acetic acid (98 percent): no effect.
      f. Carbon tetrachloride: no effect.
      g. Formaldehyde: no effect.
      h. Ethyl acetate: no effect.
      i. Ethyl ether: no effect.
      j. Phenol (85 percent): moderate effect.
      k. Benzene: no effect.
      l. Xylene: no effect.
      m. Butyl alcohol: no effect.
      n. Furfural: no effect.
      o. Methyl ethyl ketone: no effect.
      p. Sodium hydroxide (25 percent): no effect.

C. Shop finish transparent finished items in accordance with the following.
1. Transparent finish: AWI System Number 2; and as follows:
NOTE: All materials in following Finish Systems are applications of one coat unless indicated otherwise. Products are those as manufactured by Sherwin Williams Co. as a standard.
a. AWI Finish System No. 2 - Catalyzed Lacquer
1) Stain - S64 Series Wiping Stains (to match approved sample). Refer to Finish Legend for stain color.
2) Vinyl Washcoat - T67F3 Vinyl Sealer 24 percent (Reduced 1:6).
3) Filler - D70T1 Natural Filler.
4) Vinyl Sealer - T67F3 Vinyl Sealer 24 percent.
5) Topcoat - T77 Series Catalyzed Lacquer.
i) Gloss: Refer to Finish Legend. Match approved sample.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.

B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches(3 mm in 2400 mm).

C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with recommendations of chemical treatment manufacturer, including those for adhesives used to install woodwork.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

24B03

SECTION 06 61 16

SOLID SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes solid surfacing material for the following:
   1. Countertops.
   2. Countertops with integral bowls and trim.
   3. Transaction countertops (for Nurse Stations and Admitting Desks).
   4. Vanity tops in patient rooms and patient toilet rooms.
   5. Window sills.
   6. Thresholds.
   7. Millwork base.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show thickness, finish, layout, and anchorage details. Indicate attachment methods, joint treatments, and supports.

C. Samples for Verification: For the following:
   1. Solid-surfacing materials, 6 inches(150 mm) square.

D. Maintenance Data: Submit manufacturer's recommended cleaning and maintenance procedures.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide solid surfacing material with the following surface-burning characteristics (if required by code) as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. Class I per ASTM E-84 including:
      a. Flame Spread: 25 or less.
      b. Smoke Developed: 30 or less.

B. Mockups: Before installing, build mockups for each form of construction required to verify selections made under sample Submittals and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
   1. Refer to Section 01 43 39.
   2. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
   3. Build mockup of typical countertop.
   4. Notify Architect seven days in advance of dates and times when mockups will be constructed.
   5. Demonstrate the proposed range of aesthetic effects and workmanship.

2.3 MISCELLANEOUS MATERIALS

A. Embedded or Inserted Hardware: Noncombustible, noncorrosive, units that are integrated into the solid surfacing and are not visible on the finish face.

B. Sealants and Adhesive: Comply with solid surfacing manufacturer's written recommendations.
   1. Acceptable Product: Silicone Sealant for DuPont Corian.

C. Fasteners: Comply with solid surfacing manufacturer's written recommendations.

D. Polishing Cream: As recommended by solid surfacing manufacturer; of type to achieve specified sheen.

E. Special Features: Provide edge treatments, integral color feature strips, special inserts, and other detailed features.

2.4 INTEGRAL LAVATORY BOWL

A. Inside Dimensions:
   1. Width (measured side to side): 14-5/8 inches.
   2. Depth (measured front to back): 10-7/16 inches.
   3. Bowl Depth: 5-3/8 inches (maximum 6-1/2 inches).

2.5 FABRICATION

A. Assemble work at shop and deliver to job ready for installation. Manufacture in largest practical lengths with seams in least conspicuous locations.

B. Fabricate work square and to required lines.

C. Recess and conceal fasteners, connections, and reinforcing.

D. Design construction and installation details to allow for expansion and contraction of materials. Properly frame material with tight, hairline joints held rigidly in place.

E. Comply with adhesive manufacturer's recommendations for adhesive shelf life, pot life, working life, mixing, spreading, assembly time, time under pressure and ambient temperatures.

F. Fabricate countertops with backsplash and side splashes to profiles indicated or detailed.

G. Fabricate items to profiles shown with connections and supports as detailed or as required for proper installation per manufacturer's recommendations.

H. Provide cut-outs for plumbing fixtures and trim, washroom accessories, appliances, and related items. Confirm layout with manufacturer's cut-outs templates before beginning work. Round corners of cut-outs and sand edges smooth.

I. Do not exceed manufacturer's recommended unsupported overhang distances.

J. Finish exposed surfaces smooth and polish to a sheen indicated.

K. Radius corners and edges as shown in architectural drawings.

20B03

SECTION 06 61 19

QUARTZ SURFACING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes quartz surfacing for the following:
   1. Countertops and transaction countertops (in selected areas)

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show thickness, finish, layout, and anchorage details. Indicate attachment methods, joint treatments, and supports.

C. Samples for Verification: For the following:
   1. Quartz surfacing materials, 6 inches(150 mm) square.

D. Maintenance Data: Submit manufacturer's recommended cleaning and maintenance procedures.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide surfacing material with the following surface-burning characteristics (if required by code) as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
   1. Class I per ASTM E-84 including:
      a. Flame Spread: 25 or less.
      b. Smoke Developed: 40 or less.

B. Mockups: Before installing, build mockups for each form of construction required to verify selections made under sample Submittals and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
   1. Refer to Section 01 43 00.
   2. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
   3. Build mockup of typical countertop.
   4. Notify Architect seven days in advance of dates and times when mockups will be constructed.
   5. Demonstrate the proposed range of aesthetic effects and workmanship.
   6. Obtain Architect's approval of mockups before starting interior plastic ornamentation construction.
   7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   8. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

2.3 MISCELLANEOUS MATERIALS

A. Joint Adhesive: Surfacing material manufacturer's two-part adhesive kit to create color matched, nonporous joints with a chemical bond.

B. Sealants: Surfacing material manufacturer's mildew-resistant silicone sealant in color as selected by Architect.

C. Embedded or Inserted Hardware: Noncombustible, noncorrosive, units that are integrated into the surfacing and are not visible on the finish face.

D. Fasteners: Comply with surfacing manufacturer's written recommendations.

E. Special Features: Provide edge treatments as detailed in Drawings.

2.4 FABRICATION

A. Assemble work at shop and deliver to job ready for installation. Manufacture in largest practical lengths with seams in least conspicuous locations.

B. Fabricate work square and to required lines.

C. Recess and conceal fasteners, connections, and reinforcing.

D. Design construction and installation details to allow for expansion and contraction of materials. Properly frame material with tight, hairline joints held rigidly in place.

E. Comply with adhesive manufacturer's recommendations for adhesive shelf life, pot life, working life, mixing, spreading, assembly time, time under pressure and ambient temperatures.

F. Fabricate countertops with backsplash and side splashes to profiles indicated or detailed.

G. Fabricate items to profiles shown with connections and supports as detailed or as required for proper installation per manufacturer's recommendations.

H. Provide cut-outs for plumbing fixtures and trim, washroom accessories, appliances, and related items. Confirm layout with manufacturer's cut-outs templates before beginning work. Round corners of cut-outs and sand edges smooth.

I. Do not exceed manufacturer's recommended unsupported overhang distances.

J. Finish exposed surfaces smooth and polish to a sheen indicated.

K. Radius corners and edges.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's printed instructions and approved shop drawings. Provide templates and rough-in measurements.

B. Install surfacing true in line and plane, level, rigid and solidly adhered to substrate.

SECTION 06 64 00

THERMOPLASTIC (SOLID POLYMER) MATERIAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to this Section

1.2 SUMMARY

A. This Section includes the following:
1. Thermoplastic (solid polymer) material for designated fabrications.

1.3 SUBMITTALS

A. Product Data: Indicate product description, fabrication information, compliance with specified performance requirements.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection:
1. Submit minimum 4 inch by 4 inch samples. Indicate full color and pattern variation.

D. Samples for Verification:
1. Submit minimum 6 inch by 6 inch sample for each type, texture, pattern and color of material.

E. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project close-out documents.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide fabrications that comply with the following requirements:

1. Rate of Burning:

a. ASTM D635Class: CC2 for a nominal thickness of 1.5 mm (0.060 in.)

2. Self-Ignition Temperature:

a. ASTM D1929: greater than 650°F

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: Refer to Finish Legend.

B. Substitutions: Submit under provisions of Section 01600.

2.2 MATERIALS

A. Thermoplastic (solid polymer) Material: Unfilled acrylic with embedding fabrics, metals, natural foliage, wood veneers, and assorted additional core elements.

B. Seaming Adhesive: Two-part methacrylate cement as recommended by thermoplastic (solid polymer) manufacturer to create non-porous joints with chemical bond.

C. Edge Sealant: One of following types as recommended by thermplastic (solid polymer) manufacturer for project application.
1. Two-part methacrylate cement to fill routed groove in edge as homogeneous fill sealer. Color as selected by Architect.
2. Two-part methacrylate cement to bond acrylic based secondary material to edge as homogeneous fill sealer. Color as selected by Architect.
3. Two-part epoxy base gel adhesive, to fill routed groove in edge as a homogeneous fill sealer.
4. Mildew resistant, FDA/UL recognized acid-free silicone sealant. Color as selected by Architect.

2.3 FABRICATION

A. General: Fabricate solid polymer fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings. Finish edges as indicated on Drawings or as directed by Architect.

B. Comply with manufacturer's written recommendations for fabrication, including seaming.

C. Route and finish edges with smooth, uniform finish. Rout cutouts, then sand edges smooth. Repair or reject defective or inaccurate work. Surfaces shall have uniform finish.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaner: Type recommended by manufacturer.

SECTION 06 82 56

BULLET-RESISTANT FIBERGLASS PANELS

PART 1 GENERAL

1.1 SUMMARY

A. Related Documents: Provisions established in General and Supplementary Conditions of the Contract, Division 1 – General Requirements, and the Drawings are collectively applicable to this Section.

B. Reference: The publication listed below forms a part of this specification.

1. UNDERWRITERS LABORATORY UL 752 9th Edition, Standard for Bullet Resisting Equipment dated Jan. 27, 1995.

1.2 SUBMITTALS

A. Submit in accordance with Sections 01330 for approval prior to fabrication: Catalog cut sheets, brochures, specifications, **UL Listing verification**, and printed data in sufficient detail to indicate compliance with the contract documents, and manufacturer's instruction for installation of Bullet-Resistant Fiberglass. Submit further verification of compliance with ASTM E 119-00e One Hour Fire Rating from recognized testing laboratory.

1.3 DESIGN

A. Through the design, manufacturing technique and material application, the Bullet-Resistant Fiberglass shall be of the "non-ricochet type." This design is intended to permit the encapture and retention of an attacking projectile, lessening the potential of a random injury or lateral penetration

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver the materials to the project with the manufacturer's UL Labels intact and legible. Handle the material with care to prevent damage. Store the materials inside under cover, stack flat and off the floor.

PART 2 PRODUCTS

2.1 BULLET-RESISTANT FIBERGLASS MATERIAL

A. Panels made of multiple layers of starch-oil woven roving ballistic-grade fiberglass cloth, impregnated with a thermoset polyester resin and compressed into flat rigid sheets. The production technique and materials used shall provide the controlled internal delamination to permit the encapture of a penetrating projectile.

B. Bullet-Resistant Fiberglass Panel:

1. 7/16" maximum thickness, 4.0 pounds per square foot maximum weight, **Armortex® O.F. 300** manufactured by Safeguard Security Services, inc., San Antonio, Texas; phone (210) 661-8306, (800) 880-8306, fax (210) 661-8308.

2.2 SECURITY LEVEL

A. The Bullet-Resistant Fiberglass must be **UL LISTED RATED FOR LEVEL 3**.

Division 7

Thermal and Moisture Protection

15D02

SECTION 07 11 13

BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Cold-applied, asphalt emulsion dampproofing.
   2. Self-adhering flexible flashing at openings in sheathing.
   3. Semi-rigid jamb and head flashing.

1.3 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for each type of product specified, including data substantiating that materials comply with requirements for each dampproofing material specified. Include recommended method of application, recommended primer, number of coats, coverage or thickness, and recommended protection course.

C. Manufacturer's Certification:
   1. Certification by dampproofing manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
   2. Certification by dampproofing manufacturer that products supplied do not contain asbestos.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed bituminous dampproofing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Single-Source Responsibility: Obtain primary dampproofing materials and primers from one source and by a single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
   b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Plus Self-Adhered Flashing.
   c. MFM Building Products Corp.; Window Wrap.
   d. Polyguard Products, Inc.; Polyguard 300.
   e. Protecto Wrap Company; PS-45.

B. Primer for Self-Adhering Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

2.4 SEMI-RIGID JAMB AND HEAD FLASHING

A. Semi-rigid Jamb and Head Flashing: 40 mils thick; semi-rigid, seamless, extruded chemical- and UV-resistant polypropylene fabricated at Shore A durometer hardness of 87; designed for use at jambs and heads of openings as water barrier and air barrier.
   1. Acceptable Product:
      a. Lennel Specialties Corporation; Jamflash.

B. Fasteners for Semi-rigid Jamb and Head Flashing: Types as recommended by manufacturer of flashing for each substrate and application encountered.

C. Sealant for Semi-rigid Jamb and Head Flashing: Silicone sealant as recommended by manufacturer of flashing.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrate of projections and substances detrimental to work; comply with recommendations of prime materials manufacturer.

B. Install cant strips and similar accessories as shown and as recommended by prime materials manufacturer even though not shown.

C. Fill voids, seal joints, and apply bond breakers, if any, as recommended by prime materials manufacturer, with particular attention at construction joints.

D. Install separate flashings and corner protection stripping, as recommended by prime materials manufacturer, where indicated to precede application of dampproofing. Comply with details shown and with manufacturer's recommendations. Pay particular attention to requirements at building expansion joints, if any.

E. Prime substrate as recommended by prime materials manufacturer.

F. Protection of Other Work: Do not allow liquid and mastic compounds to enter and clog drains and conductors. Prevent spillage and migration onto other surfaces of work by masking or otherwise protecting adjoining work.

~~**3.Outer face of exterior sheathing at aluminum composite panels walls with metal stud backup.**~~

2. Outer face of inner concrete shear wall of stone veneer walls.

END OF SECTION 07 11 13

05D02

SECTION 07 16 13

MODIFIED CEMENT WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Acrylic-modified, cement-based waterproofing.
   2. Use for installation on interior of elevator pits.

1.2 SUBMITTALS

A. Product Data: For each type of product specified.

1.3 QUALITY ASSURANCE

A. Applicator Qualifications: An experienced applicator who has completed modified cement waterproofing similar in material, design, and extent to that indicated for this Project and whose work has resulted in application with a record of successful in-service performance.

1.4 JOB CONDITIONS

A. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after concrete and masonry substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.

B. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg F(4 deg C) or above during work and cure period and space is well ventilated and kept free of water.

1.5 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, signed by Applicator and countersigned by Contractor agreeing to repair or replace waterproofing that does not comply with requirements or that fails to perform as required, and to maintain watertight conditions within specified warranty period. Warranty includes responsibility for removing and replacing other work that conceals modified cement waterproofing. During warranty period, repairs and replacements required because of unusual weather phenomena and other events beyond Contractor's or Applicator's control shall be completed by Contractor or Applicator and paid for by Owner at prevailing rates.

2. Begin waterproofing application only after unsatisfactory conditions have been corrected.
3. Application of waterproofing indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Protect other work from fallout or overspray from modified cement waterproofing during application. Provide temporary enclosure to confine spraying operation, to prevent polluting the air, and to ensure adequate ambient temperatures and ventilation conditions for application.

B. Stop active water leaks according to waterproofing manufacturer's written instructions.

C. Schedule cleaning and surface preparation so dust and other contaminants from the cleaning and preparation process will not fall on wet, newly coated surfaces.

D. Surface Preparation of Concrete: Comply with waterproofing manufacturer's written instructions and requirements indicated below to ensure that waterproofing bonds to concrete surfaces. Clean concrete surfaces according to ASTM D 4258 by using one or a combination of procedures as needed to effectively remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, curing compounds, and form-release agents.
   1. Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.
   2. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

3.3 APPLICATION

A. General: Comply with waterproofing manufacturer's written instructions, unless more stringent requirements are indicated.

B. Mix waterproofing components according to waterproofing manufacturer's written instructions.

C. Protect all adjacent surfaces. Dampen wall surface with water before applying waterproofing.

D. Apply waterproofing to interior, below-grade walls according to waterproofing manufacturer's written instructions.

E. Apply waterproofing coating evenly and fill voids and pores of substrate with waterproofing slurry. Keep tools clean and free from build-up.

F. Apply the number of coats at the rates recommended by the manufacturer for each coat. After allowing previous coat to cure, dampen the wall before applying additional coats.

G. Mist-cure waterproofing for two to three days immediately after application as recommended by the manufacturer.

H. Wet-cure waterproofing when temperatures are above 85 deg F(29 deg C), relative humidity is below 30 percent, wind speed exceeds 15 mph(24 km/h), or waterproofing is exposed to direct sunlight for 72 hours after placement.

13A05

SECTION 07 26 35

WATER VAPOR EMISSION CONTROL SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes topically-applied liquid vapor barrier systems for controlling vapor diffusion through concrete slabs and detrimental increases in pH level.
   1. Vapor Emission Control System: For application to concrete sub-floor surfaces where MVETR is less than 10 lbs. / 1000 sq. ft. / 24 hrs.

B. Unit prices for water vapor emission control system are included in Division 1 Section "Unit Prices," and will be applied under the following conditions:
   1. In the event that the results of pre-construction testing determine or reveal that moisture content, vapor emission levels, or pH of concrete floor slabs fall within adhesive and finish flooring system manufacturer's recommended maximum levels, Owner may elect to omit system.

C. Related Sections include the following:
   1. Waterproofing Admixture: Section 03 30 00.
   2. Sheet Vapor Barrier: Section 03 30 35.
   3. Finish Flooring: Applicable Division 9 Sections.

1.3 DEFINITIONS

A. MVETR: Moisture Vapor Emission Transmission Rate, measured in pounds of moisture transmitted per 1,000 square feet of floor area per 24 hours.

1.4 SYSTEM DESCRIPTION

A. Water Vapor Emission Control System: Penetrating fluid-applied acrylic resin vapor barrier and a cementitious underlayment topcoat to mechanically and chemically restrict excessive levels of water vapor emission and pH in concrete substrates, to ensure compliance with floor finish and coating material manufacturer's installation instructions and recommendations.

B. Material Compatibility: Provide vapor emission control system materials that are compatible with one another under conditions of service and application required, as demonstrated by system manufacturer based on testing and long-term field experience.

C. Manufacturer Qualifications:
   1. Minimum 5 years of producing moisture vapor control emission products.
   2. Minimum 5 years of product application experience.
   3. Job history depicting installation experience and jobs completed.
   4. Minimum 5 published references to previous contract experience in the trade.
   5. Warranty program covering costs associated with repair or replacement of concrete vapor emission control system and finish floor covering or coating, including repair or replacement labor.
   6. Warranty program covering costs for both system materials and system installation for prescribed vapor emission control system treatment.

D. Source Limitations: Obtain specified products from one source from a single manufacturer with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

E. Substrate Moisture and pH Testing:
   1. Engage services of independent Testing Agency to perform pre-installation testing of the concrete slab by a calcium chloride test, or as otherwise required by flooring manufacturer, prior to the application of flooring products in accordance with ASTM F 1869 – 98.
   2. Testing shall be performed by qualified personnel of the Testing Agency.
   3. Determine the change in weight of moisture-absorbing anhydrous calcium chloride and represent the amount of moisture transmitting out of the concrete slab area.
   4. Express the value in pounds as the equivalent weight of water that is emitted from a 1,000 square foot concrete slab surface area in a 24 hour period of time.
   5. Provide pH testing of substrate.
   6. Provide a diagram of the building verifying each testing location with its results.
   7. Provide 4 tests per 1000 square feet of floor area plus one additional test for each 200 square feet thereafter. Locate tests in various parts of the floor area including the center of the floor and sites of potential moisture such as the perimeter of the floor, joints, or cracks.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00, "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.

B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.8 PROJECT CONDITIONS

A. Close spaces to traffic during vapor emission control system application and for time period after installation recommended in writing by manufacturer.

B. Primer: Product of vapor emission control system manufacturer recommended in writing for substrate, conditions, and application indicated.
   1. Acceptable Product: "#P-1 Primer" as manufactured by Concure.

C. Vapor Emission Control System, for application to concrete subfloor surfaces where MVETR is less than 10 lbs. / 1000 sq. ft. / 24 hrs.:
   1. Liquid Vapor Barrier Base Coat: Manufacturer's formulated blend of water-based acrylic resins and reactive inorganic ingredients that penetrate into the concrete slab and encapsulate the moisture to create a permanent barrier in the capillaries of the concrete.
      a. Acceptable Product: "Vapor Barrier, Step A" as manufactured by Concure.
   2. Cementitious Topcoat: Polymer-enhanced cement-based coating to provide a smooth, seamless, surface to help increase the adhesion of finish floor coverings.
      a. Acceptable Product: "Vapor Barrier, Step B" as manufactured by Concure.

D. Water: Potable and at a temperature of not more than 70 deg F(21 deg C).

2.3 TESTING EQUIPMENT

A. Acceptable Manufacturer: American Moisture Test, www.DomeTest.com (866) 670.9700.

B. ASTM F 1869 Anhydrous Calcium chloride:
   1. Non-pre-weighed, non-recycled, 94% purity
   2. Dome with self adhesive butyl sealant
   3. Dish container size of 69mm +/- 1mm, calcium chloride weight of 16 grams +/- 1 gram.

C. ASTM F 710 pH (alkalinity) Testing:
   1. Pre-packaged color chart and pH paper
   2. Wide range 1 -14 pH paper
   3. Distinct color chart for each pH level
   4. Clean tap water

PART 3 - EXECUTION

3.1 EXAMINATION

A. Testing: Perform testing of the concrete slab by a calcium chloride test prior to the application of Water Vapor Emission Control System. Comply with testing requirements included in Quality Assurance Article.
   1. Testing shall be performed by qualified personnel of the testing agency.
   2. Test shall determine the change in weight of moisture-absorbing anhydrous calcium chloride and represents the amount of moisture transmitting out of concrete slab area. The value shall be expressed in "pounds" and is the equivalent weight of the water that is emitted from a 1,000 square foot (90 m5) concrete slab surface area in a 24 hour period of time.

3.4 CEMENTITIOUS TOPCOAT

A. General: Mix and apply topcoat components according to manufacturer's written instructions.
   1. Coordinate application of components to provide optimum topcoat-to-substrate and intercoat adhesion.
   2. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.

B. Apply topcoat to produce uniform, level surface. Smooth bonding surface for specified flooring, as required for normal flooring installations.
   1. Cover preparation methods, holes, cracks and joints.
   2. Coverage rates shall be in accordance with manufacturer's recommendations.
   3. Feather edges to match adjacent floor elevations.
   4. Final Surface: Smooth and fully compatible with specified floorings and flooring adhesives.

C. Cure topcoat according to manufacturer's written instructions. Prevent contamination during application and curing processes.

D. Do not install finish flooring until after curing time period recommended by underlayment manufacturer.

E. Remove and replace topcoat areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services:
   1. Conduct pre-installation and post-installation testing and system treatment installation in the presence of manufacturer's representative.
   2. Perform testing of the installed water vapor control system in accordance with ASTM F 1869 requirements.
      a. Refer to "Quality Assurance" Article for frequency of testing.
   3. Submit results to Owner and Architect for review.

B. Testing: Upon completion of application, perform testing of the concrete slab by a calcium chloride test. Comply with testing requirements included in Quality Assurance Article.
   1. Testing shall be performed by qualified personnel of the testing agency.
   2. Test shall determine the change in weight of moisture-absorbing anhydrous calcium chloride and represents the amount of moisture transmitting out of concrete slab area. The value shall be expressed in "pounds" and is the equivalent weight of the water that is emitted from a 1,000 square foot (90 m5) concrete slab surface area in a 24 hour period of time.
   3. Test results shall fall within the following parameters:
      a. Maximum concrete moisture level: 3.0 pounds.
      b. Maximum pH level: 10 or less.
   4. Do not install adhesively-attached finish flooring, resinous flooring, or floor coating materials when results are above specified levels.

23H06

SECTION 07 27 19

PLASTIC SHEET AIR BARRIER

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes plastic sheet air barrier in the following locations:
   1. Over sheathing behind masonry veneer at metal studs.
   2. Over sheathing behind aluminum composite panels at metal studs.
   3. Over sheathing behind cement plaster (stucco) at metal studs or self-furring lath.

1.2 DEFINITIONS

A. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 ACTION SUBMITTALS

A. General: Submit the following in accordance with Section 01 33 00.

B. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier. Include the following:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Show layouts of flexible flashings, including isometrics relating to window and door head, sill and jamb details.
   1. Identify material, thickness, and basis weight for each item and location in Project.
   2. Indicated details for installing flashings, including profiles, shapes, seams and dimensions.
   3. Details shall be Project-specific. Use of manufacturer's standard pre-printed detail sheets will not be accepted.

D. Samples for Verification: Actual pieces of materials specified, not less than 6 inches (150 mm) square.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

B. Storage and Protection: Protect materials from rain and physical damage. Provide cover on top and on all sides, allowing for adequate ventilation. Store flashing where temperatures will not exceed 90 degrees F (32 degrees C) for

3. Basis of Design Product:
   a. Behind Masonry Veneer and Aluminum Composite Panels: Tyvek CommercialWrap by DuPont Company, Wilmington, DE.
   b. Behind Portland Cement Plaster (Stucco): Tyvek StuccoWrap by DuPont Company, Wilmington, DE.

B. Self-Adhering Flexible Flashing:
1. Elasticized flexible flashing tape complying with the following
   a. Face Material Composition: Elasticized polyethylene laminate.
   b. Face color: White.
   c. Adhesive Composition: Butyl adhesive containing non-halogen fire retardant additive.
   d. Thickness: > 60 mils.
   e. Release Liner: 2 part siliconized paper.
   f. Elastic Elongation, MD (length @ Full Extension/ Length @ Relaxed): >230% @ 70 F.
   g. Basis of Design Products/Systems: Self-Adhering Flexible flashing tape, DuPont™ FlexWrap™.
2. Durable Polyethlyene Laminate Flashing Tape complying with the following:
   a. Face Material composition: Polyethylene laminate.
   b. Face color: White.
   c. Adhesive Compostion: Butyl adhesive containing fire retardant additive.
   d. Thickness: 30 mils.
   e. Release Liner: 1 piece siliconized paper.
   f. Proprietary Products/Systems: Self Adhering Straight flashing tape, DuPont™ StraightFlash ™.

2.2 AUXILIARY MATERIALS

A. Fasteners:
1. For Steel Frame Construction: Rust resistant screws with caps as recommended by sheet dampproofing manufacturer.
2. Caps: Minimum 1 inch diameter high density polyethylene cap with triple-feather seal.
   a. Acceptable Product: DuPont Tyvek Wrap Caps by Dupont Company, Wilmington, DE.

B. Seaming and Joint Tape:
1. Material: Pressure sensitive, polypropylene substrate with acrylic based adhesive. Provides permanently elastic, nonsag, nontoxic, nonstaining tape, and compatible with specified sheet dampproofing and flexible flashing products.
2. Acceptable Product: DuPont Tyvek Contractor's Tape by DuPont Company, Wilmington, DE.

3.4 CLEANING AND PROTECTION

A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
   1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed to these conditions for more than 90 days.

B. Clean spills, stains, and soiling from adjacent construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

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SECTION 07 42 14

LOUVERED EQUIPMENT SCREENS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Exterior metal equipment screen panels with concealed fasteners at the following locations:
      a. Roof top equipment screens.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide manufactured wall panel assemblies complying with performance requirements indicated and capable of withstanding structural movement, thermally induced movement, and exposure to weather without failure or infiltration of water into the building interior.

B. Structural Performance: Provide manufactured wall panel assemblies capable of withstanding design wind loads indicated under in-service conditions with deflection no greater than the following, based on testing manufacturer's standard units according to ASTM E 330 by a qualified independent testing and inspecting agency.
   1. Maximum Deflection: 1/180 of the span.

1.3 SUBMITTALS

A. Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations, as applicable to materials and finishes for each component and for total panel assemblies.

B. Shop Drawings: Show layouts of panels, details of corner conditions, joints, panel profiles, supports, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work.

C. Samples for Verification: Provide sample panels 12 inches(300 mm) long by actual panel width, in the profile, style, color, and texture indicated. Include clips, caps, battens, fasteners, closures, and other exposed panel accessories.

D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Product Test Reports: Indicate compliance of manufactured wall panel assemblies and materials with performance and other requirements based on comprehensive testing of current products.

2.2 METALS AND FINISHES

A. Aluminum Extrusions: ASTM B 221M, alloy 6063-T5.

B. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy 3003 or as standard with manufacturer for painted finishes, with temper as required to suit forming operations and structural performance required.
   1. Surface: Smooth, flat finish.
   2. Exposed Finishes: Apply the following coating as specified.
      a. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
         1) Fluoropolymer Three-Coat Coating System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
         2) Color: Medium bronze to match storefront.

2.3 LOUVERED WALL PANEL ASSEMBLIES

A. Panels: Fabricate louvers to the profile or configuration indicated; and of the material, finish, and thickness indicated. Design joints between panels to form weathertight seals.
   1. Thickness: 0.080 inch thick minimum.
   2. Free Area: Not less than 5.2 square feet (0.47 square meter) for 48 inches (1220 mm) wide by 48 inches (1220 mm) high louver assembly.
   3. No blade joints in sections less than 30 feet in length.
   4. Blades: Fixed, horizontal; reinforced; 60 degree sight-proof "Y" blade.
   5. Blade Depth: 4 inches.
   6. Spacing between Blades: 3.75 inches.
   7. Panel Height: As shown on Drawings.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners: Concealed type; self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads.
   1. Use stainless-steel fasteners.

B. Accessories: Unless otherwise specified, provide components required for a complete assembly including trim, mullions, sills, corner units, clips, seam covers, flashings, louvers, sealants, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.
   1. Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone-rubber sealant as recommended by panel manufacturer.

C. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil(0.4-mm) dry film thickness per coat, unless otherwise indicated.

B. Promptly remove protective film, if any, from exposed surfaces of metal panels. Strip with care to avoid damage to finish.

C. Secondary Structural Supports: Install girts, angles, and other secondary structural panel support members and anchorage according to the Light Gage Structural Institute's "Guide Specifications," Section 07410, "Manufactured Roof and Wall Panels."

3.3 PANEL INSTALLATION

A. General: Comply with panel manufacturer's written instructions and recommendations for installation, as applicable to project conditions and supporting substrates. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cutting exterior panels by torch is not permitted.
2. Install panels with concealed fasteners.

B. Accessories: Install components required for a complete panel assembly including trim, mullions, sills, corner units, clips, seam covers, flashings, louvers, sealants, gaskets, fillers, closure strips, and similar items.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not otherwise indicated, types recommended by panel manufacturer.
1. Seal panel end laps with a bead of tape or sealant, full width of panel. Seal side joints where recommended by panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealants."

D. Wall Panels: Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as necessary for waterproofing. Handle and apply sealant and back-up according to sealant manufacturer's written instructions.
1. Align bottom of wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
2. Install screw fasteners with power tools having controlled torque adjusted to compress neoprene washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
3. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

E. Separate dissimilar metals by painting each metal surface in area of contact with a bituminous coating or by other permanent separation as recommended by manufacturers of dissimilar metals.

F. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4 inch in 20 feet(6 mm in 6 m) on level, plumb, and location lines as indicated and within 1/8-inch(3-mm) offset of adjoining faces and of alignment of matching profiles.

3.4 CLEANING AND PROTECTING

09A02

SECTION 07 42 43

ALUMINUM COMPOSITE PANEL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes: Aluminum composite panel system.

1.2 SYSTEM DESCRIPTION

A. Design Requirements:
   1. Manufacturer: Provide system design including anchorage to structural system and modifications that are necessary to meet specified requirements. Maintain visual design concepts.
   2. Drawings and Specifications:
      a. The Drawings are diagrammatic only and are intended to establish the basic dimension requirements of the units, sight lines, and unit profiles. The requirements shown by the details are intended to establish basic dimensions of the module and the sight lines and profiles of members.
      b. Within these parameters, design the System, including whatever modifications or additions may be required to meet the specified requirements and maintain the visual design concept.
   3. Dimension and profile adjustments may be made in the proposed design in the interest of fabrication or erection methods or techniques, the weatherability factor, or the ability of the design to satisfy the design and performance requirements, provided that the design intent and the intent of the specification are maintained.
   4. Adjustments to dimension and profile may only be made within the limits of the established "design intent" of the Owner's Representative's drawings, and any and all such adjustments are subject to the Owner's Representative's review and approval.
   5. No visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.
   6. Attachment Considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening, or fracturing connections.
   7. Design proposal submissions which follow exactly the detail indicated on the drawings will not relieve the Contractor of responsibility for the design, fabrication, erection, or performance of the Work included in this Section.
   8. To avoid divided responsibility, the wall system manufacturer shall be responsible for the complete weathertight installation of the wall system.
   9. Wall system shall include items required for a complete and proper system, including but not limited to the following: Panels, subgirts, screws, nuts, washers, bolts, structural steel anchors, clips, sills, coping covers, paint, metal joint sealant, and perimeter sealing.

D. Thermal Requirements:
1. Make adequate provisions for expansion and contraction of the component parts of the wall system and its fastenings to prevent harmful damage caused by buckling, opening of joints, undue stress on fastenings or other detrimental effects as will be caused by a metal surface temperature range of 180 degrees F.

E. Air Infiltration Requirements:
1. Limit air infiltration through system to 0.06 cfm per square foot of wall area measured at an air pressure difference of 6.24 psf as measured in accordance with ASTM E 283 test.

F. Water Penetration Requirements:
1. Design system so that there is no water leakage under static air pressure with an air pressure difference equal to 20 percent of the positive design wind pressure with a minimum of 6.24 psf and a maximum of 12.0 psf as measured in accordance with ASTM E 331 test.
2. Design system so that there is no water leakage under dynamic air pressure with an air stream equivalent to a static air pressure equal to 20 percent of the positive design wind pressure with a minimum of 6.24 psf and a maximum of 12.0 psf.
3. Water leakage is defined as any uncontrolled water that appears on any normally exposed interior surface, that is not contained or drained back to the exterior, or that can cause damage to adjacent materials or finishes. Water contained within drained flashings, gutters, and sills is not considered water leakage. The collection of up to one half ounce of water (14.8 cc) in a 15 minute test period on top of an interior stop or stool integral with the wall system shall not be considered water leakage.

G. Items Specifically Prohibited:
1. Exposed fasterners.
2. Sealants other than silicone for panel fabrication.
3. Flashing at corners.
4. Modules other than shown.

H. Tolerances:
1. Maximum deviation from vertical and horizontal alignment of erected panels: 1/4 inch in 20 feet.
2. Panel Dimensions: Allowance for field adjustments, as recommended by manufacturer, where final dimensions cannot be established by field measurement before completion of panel manufacturing.
3. Panel lines, breaks and angles shall be sharp, true and surfaces free from warp or buckle.

1.3 SUBMITTALS

A. Samples:
1. Panel Assembly: Two samples each type of assembly. 12 inches by 12 inches minimum.
2. Two samples each color or finish selected, 3 inches by 3 inches minimum.

B. Design Data:
1. Submit complete and specific design data for products specified.

D. Designer Qualification:
   1. If required by Local Building Code Official, submit design calculations and erection drawings, bearing the registered structural engineer's stamp.

E. Welder Qualification:
   1. AWI (American Welding Society) D1.1, D1.4.
   2. AWI Certified.

F. Mock-ups: As directed by the Owner's Representative and in accordance with Section 01450.

G. Pre-Installation Conference: As directed by the Owner's Representative and in accordance with Section 01310.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle products in accordance with manufacturer's latest published requirements and specifications.

B. Protect finish and edges in accordance with manufacturer's recommendations.

1.6 WARRANTY

A. Refer to and conform to requirements in Section 01770, include the following.

B. The system subcontractor shall furnish a written Guarantee covering defects in workmanship and materials during the period of the guarantee.

C. System subcontractor shall guarantee that system shall remain free from "through water leakage" during the period of the guarantee.

D. Should any defect develop during the guarantee period due to improper workmanship or defective materials, system subcontractor shall repair or replace defective work at no cost to the Owner.

E. Factory Finish: Provide manufacturer's 10 year warranty stating finish will be:
   1. Free of fading of color change in excess of 5 NBS units as measured per ASTM D 2244.
   2. Will not chalk in excess of maximum 8 units change when measured in accordance with ASTM A 214.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. A specific product or material manufactured by any of the following listed manufacturers is acceptable only if the specific product or material can evidence compliance with requirements of the Contract Documents.
   1. Alucobond by Alusuisse Composites, Inc, St. Louis, MO.
   2. Alpolic by Mitsubishi Chemical America Inc.

4. Topcoat: PVDF, Dry film thickness:
   a. Coil: 0.80 mil.
   b. Extrusion: 1.0 mil.
5. Clear Coat: PVDF, Dry film thickness:
   a. Coil: 0.50 mil.
   b. Extrusion: 0.40 mil.
6. Color: As selected by Architect from manufacturer's full range of colors.
7. Acceptable Coatings Manufacturers:
   a. Akzo Coatings, Inc., Columbus, OH.
   b. Lilly Industries, Inc., Indianapolis, IN.
   c. Morton International, Inc., Chicago, IL.
   d. PPG industries, Inc., Delaware, OH.
   e. Valspar Corporation, Garland, Texas.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine and verify that receiving substrate surfaces framing system, system back-up, of the structure have no defects or errors which would result in poor or potentially defective application or cause latent defects in workmanship.
   1. Conditions of Surfaces:
      a. Flat, plumb, level
      b. Clean, free of oil, water, moisture, laitance, or any other deleterious substances
   2. Conditions of Opening Size (dimension and tolerances): Per manufacturer's latest published specifications.

B. Report any unsatisfactory conditions to the Owner's Representative.

C. Starting installation shall imply acceptance of surfaces.

3.2 PREPARATION

A. Prepare the structure to ensure proper and adequate structural support for the materials specified.

B. Prepare substrate surfaces to ensure proper and adequate installation, in accordance with the Contract Documents and approved Shop Drawings, or manufacturer's requirements.

C. Field measure and verify dimensions as required.

D. Protect adjacent areas or surfaces from damage as a result of the Work of this Section.

3.3 INSTALLATION

A. Subgirts:
   1. Install subgirts on spacing determined by manufacturer to comply with design requirements.
   2. Install subgirts parallel to each other, securely fastened to structure to transfer live and dead loads to structure.

C. Clean as recommended by manufacturer. Do not use materials or methods which may damage finished surfaces or surrounding construction.

D. Clean in accordance with Section 017140.

E. Immediately remove spots, smears, stains, residues, adhesives, etc., from the Work of this Section and upon adjacent areas or surfaces which result from the Work of this Section.

F. Upon completion of Work of this Section, dispose of, away from Site, debris, trash, containers, residue, remnants and scraps which result from Work of this Section.

3.6 PROTECTION

A. Protect panel system from damage, staining, or soiling after installation. Replace components which have been scratched, dented, or otherwise showing signs of damage or improper installation.

B. Remove damaged panels and replace with new, undamaged panels or repair, at no cost to Owner.

C. After installation and until Owner acceptance, protect the Composite Metal Panel system from damage. Leave protective film on panels until punch list items have been corrected.

END OF SECTION 07 42 43

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SECTION 07 54 00

TPO SINGLE-PLY MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Adhered sheet roofing.
2. Walkway pads.

1.2 DEFINITIONS

A. Roofing Terminology: Refer to ASTM D 1079 for definition of terms related to roofing work not otherwise defined in this Section.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet membrane roofing and base flashing that are watertight; will not permit the passage of liquid water; and will withstand wind loads, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

C. FM Listing: Provide sheet membrane, base flashings, and component materials that meet requirements of FM 4450 and FM 4470 as part of a roofing system and that are listed in FM's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM markings.
1. Roofing system shall comply with the following:
   a. Fire/Windstorm Classification: Class 1A-120.
   b. Wind Speed: 105 mph (3-second gust).
2. All above deck roof components shall be Factory Mutual Research Approved together as a system, and installed in accordance with the Factory Mutual Research Approval Guide and standards guidelines without deviation. Roof system submittals shall address specifics including coverings, and the applicable type and rate of fastening/securement for each. Manufacturer name and type/model should be referenced on all materials.

1.4 SUBMITTALS

A. Product Data: For each type of roofing product specified. Include data substantiating that materials comply with requirements.

B. Shop Drawings: Include plans, sections, and details of the following:
1. Base flashings and membrane terminations.

D. Pre-installation Conference: Before installing roofing system, conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Notify participants at least 5 working days before conference.
   1. Meet with Owner; Architect; Owner's insurer, testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   4. Review loading limitations of deck during and after roofing.
   5. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.
   6. Review governing regulations and requirements for insurance, certificates, and inspection and testing, if applicable.
   7. Review temporary protection requirements for roofing system during and after installation.
   8. Review roof observation and repair procedures after roofing installation.
   9. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
   1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.7 PROJECT CONDITIONS

A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to manufacturers' written instructions and warranty requirements.

1.8 WARRANTY

A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other

Solar Reflectance (albedo X 100), %	ASTM E 903	White - 80 Typ. Gray - 25 Typ.	
Breaking Strength, min, lbf (kN)	ASTM D 751 Grab Method	225 (1.0) Min. 340 (1.5) Typ.	225 (1.0) Min 340 (1.5) Typ.
Elongation at Break of Fabric, min, %	ASTM D 751	25 Typ.	25 Typ.
Tearing Strength, min, lbf (N) 8" by 8" speciman	ASTM D 751 B Tongue Tear	55 (245) Min. 130 (578) Typ.	55 (245) Min. 130 (578) Typ.
Brittleness Point, max, °F (°C)	ASTM D 2137	-40 (-40) Min. -50 (-46) Typ.	
Linear Dimensional Change (shrinkage), %	ASTM D 1204		+/- 1.0 Max. -0.5 Typ.
Ozone Resistance* Condition after exposure to 100 pphm Ozone in air for 168 hours @ 104°F (40°C) Specimen wrapped around 3 in. mandrel	ASTM D 1149	No Cracks	No Cracks
Resistance to Water Absorption* After 7 days immersion @ 158°F (70°C) Change in mass, max, %	ASTM D 471		4.0 Max. 2.0 Typ.
Resistance to microbial surface growth, rating (1 is very poor, 10 is no growth)	ASTM D 3274 2 yr. S. Florida		9 - 10 Typ.
Field seam strength, lbf/in. (kN/m) Seam tested in peel	ASTM D1876	40 (7.0) Min. 60 (10.5) Typ.	
Water vapor permeance, Perms	ASTM E 96	0.10 Max. 0.05 Typ.	
Puncture resistance, lbf (N)	FTM 101C Method 2031	250 (1110) Min. 300 (1330) Typ.	250 (1110) Min. 300 (1330) Typ.

D. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 ADHERED SHEET INSTALLATION

A. Start installation of sheet in presence of roofing system manufacturer's technical personnel.

B. Install TPO sheets over area to receive roofing according to roofing system manufacturer's written instructions. Unroll sheet and allow to relax.

C. Cut sheets to maximum size possible to minimize seams.

D. Overlap edges and ends a distance as recommended by manufacturer.

E. A minimum of one perimeter sheet shall be installed at edges of each roof level 10' wide membrane shall be installed in the field of the roof.

F. Sheets shall be adhesively fastened with the appropriate adhesive material.

G. Hot air weld the membrane sheets together with a minimum of 1-1/2" overlap with an automatic hot air welding machine.

H. Membrane that has been exposed to the elements for approximately 7 days must be prepared with membrane cleaner. Wipe surface that have been cleaned to remove cleaner residue prior to hot air welding.

I. Shingle joints on sloped substrate in direction of drainage. Verify direction of run on high slope surfaces with manufacturer.

J. Minimize wrinkles and bubbles.

K. Seal membrane to adjoining surfaces.

L. Continue membrane up vertical surfaces minimum 8 inches above cant top or edge strip unless otherwise noted. Fasten top of membrane with devices and at locations and frequency as recommended by manufacturer.

M. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or moving.

B. Correct deficiencies in or remove roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair sheet flashings to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.8 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
1. Owner:
2. Address:
3. Building Name/Type:
4. Address:
5. Area of Work:
6. Acceptance Date:
7. Warranty Period:
8. Expiration Date:

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
   a. lightning;
   b. peak gust wind speed exceeding **<INSERT WIND SPEED>** mph(m/sec);
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
   f. vapor condensation on bottom of roofing; and
   g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.

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SECTION 07 61 13

STANDING SEAM SHEET METAL ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following custom-fabricated sheet metal roofing:
1. Standing-seam metal roofing.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide complete sheet metal roofing and gutter system, including, but not limited to, custom-fabricated metal roof pans, cleats, clips, anchors and fasteners, sheet metal flashing and drainage components related to sheet metal roofing, gutters, downspouts, fascia panels, trim, underlayment, and accessories as indicated and as required for a weathertight installation.

B. Wind-Uplift Resistance: Provide custom-fabricated sheet metal roofing capable of resisting the following design negative uplift pressure. Provide clips, fasteners, and clip spacings of type indicated and with capability to sustain, without failure, a load equal to 3 times the design negative uplift pressure.
1. Design Wind Speed: 105 mph

C. Thermal Movements: Provide sheet metal roofing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal roofing thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.

D. Water Infiltration: Provide sheet metal roofing that does not allow water infiltration to building interior, with metal flashing and connections of sheet metal roofing lapped to allow moisture to run over and off the material.

E. Fabricate and install flashings at roof edges and gutter system to comply with recommendations of FM Loss Prevention Data Sheet 1-49.

1.3 SUBMITTALS

A. Product Data: For each product indicated. Include details of construction relative to materials, dimensions of individual components and profiles, and finishes.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

E. Pre-installation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to sheet metal roofing including, but not limited to, the following:

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal roofing pans, components, and other sheet metal roofing materials so as not to be damaged or deformed. Package sheet metal roofing materials for protection during transportation and handling.

B. Unload, store, and erect sheet metal roofing materials in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Store sheet metal roofing materials to ensure dryness. Do not store sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage.
1. Store aluminum away from uncured concrete and masonry.

D. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal roofing installation.

1.6 COORDINATION

A. Coordinate installation of roof curbs, equipment supports, and roof penetrations, which are specified in Division 7 Section "Roof Accessories."

B. Coordinate sheet metal roofing with rain drainage work, flashing, trim, and construction of metal decks, parapets, walls, and other adjoining work to provide a leakproof, secure, and non-corrosive installation.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

B. Special Installer's Warranty: Roofing Installer's warranty, on warranty form at end of this Section, signed by Roofing Installer, in which Roofing Installer agrees to repair or replace components of custom-fabricated sheet metal roofing that fail in materials or workmanship within specified warranty period.

2.3 UNDERLAYMENT MATERIALS

A. Underlayment: ASTM D 1970; self-adhering, polymer-modified, bituminous sheet membrane. Thickness as recommended by roofing manufacturer. Provide primer recommended by underlayment manufacturer.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.

B. Fasteners: Self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
   1. Exposed Fasteners: Heads matching color of sheet metal roofing by means of plastic caps or factory-applied coating.
   2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
   3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape.

D. Elastomeric Joint Sealant: ASTM C 920, of base polymer, type, grade, class, and use classifications required to produce joints in sheet metal roofing that will remain weathertight and as recommended by roll-formed sheet metal roofing manufacturer for installation indicated.

E. Expansion-Joint Sealant: For hooked-type expansion joints, which must be free to move, provide non-setting, non-hardening, non-migrating, heavy-bodied polyisobutylene sealant.

F. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil(0.4-mm) dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.5 ACCESSORIES

A. Sheet Metal Roofing Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of sheet metal roofing, unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as sheet metal roofing.
   2. Cleats: Mechanically seamed cleats formed from the following material:
      a. Metallic-Coated Steel Roofing: 0.0250-inch-(0.65-mm-) thick, stainless-steel or nylon-coated aluminum sheet.
   3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
   4. Closures: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-

D. Sealant Joints: Where movable, non-expansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.

E. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturers of dissimilar metals or by fabricator.

F. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.
   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
   3. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
   4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
   5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, non-corrosive metal.
      a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

2.7 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, sheet metal roofing supports, and other conditions affecting performance of work.

7. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition.
8. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.

B. Fasteners: Use fasteners of sizes that will not penetrate completely through substrate.
1. Steel Roofing: Use stainless-steel fasteners.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of dissimilar metals.

D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

E. Fascia: Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal sheet metal roofing with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.5 CUSTOM-FABRICATED SHEET METAL ROOFING INSTALLATION

A. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form a hem on concealed side of exposed edges, unless otherwise indicated.
1. Install cleats to hold sheet metal panels in position. Attach each cleat with two fasteners to prevent rotation.
2. Nail cleats not more than 12 inches(300 mm) o.c. Bend tabs over nails.

B. Seal joints as shown and as required for leakproof construction. Provide low-slope transverse seams using cleats where backup of moisture may occur.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch(25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F(4 and 21 deg C), set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F(4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

C. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches(38 mm), except where pre-tinned surface would show in finished Work.
1. Do not solder metallic-coated steel sheet.

3.7 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal roofing within installed tolerance of 1/4 inch in 20 feet(6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch(3-mm) offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING AND PROTECTION

A. Clean and neutralize flux materials. Clean off excess solder and sealants.

B. Remove temporary protective coverings and strippable films, if any, as sheet metal roofing is installed. On completion of sheet metal roofing installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

C. Replace panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.9 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
1. Owner: _____.
2. Address: _____.
3. Building Name/Type: _____.
4. Address: _____.
5. Area of Work: _____.
6. Acceptance Date: _____.
7. Warranty Period: _____.
8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
   a. lightning;
   b. peak gust wind speed exceeding _105_ mph(m/sec);
   c. fire;
   d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
   e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;

15G03

SECTION 07 81 00

SPRAYED FIRE-RESISTIVE MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Concealed sprayed fire-resistive materials (SFRM).

1.2 DEFINITIONS

A. Concealed sprayed fire-resistive material is applied to surfaces that are concealed from view behind other construction when the Work is completed.

1.3 SUBMITTALS

A. Product Data: For each fire-resistive product specified.

B. Shop Drawings: Structural framing plans indicating the following:
   1. Locations and types of surface preparations required before applying sprayed fire-resistive material.
   2. Extent of sprayed fire-resistive material for each construction and fire-resistance rating, including the following:
      a. Applicable fire-resistive design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
      b. Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies.
      c. Designation of restrained and unrestrained conditions based on definitions in ASTM E 119, Appendix X3 as determined by a qualified professional engineer.

C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Compatibility and Adhesion Test Reports: For primers and other coatings applied to structural steel. Provide reports from a qualified independent testing and inspecting agency engaged by Contractor. Confirm that primers and coatings proposed for application in shop or field are compatible with fire-resistive material. Instruct laboratory to determine compatibility according to requirements specified in "Quality Assurance" Article.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as having

authorities having jurisdiction, for sprayed fire-resistive material serving as direct-applied protection, tested per ASTM E 119.

2. Surface-Burning Characteristics: As indicated for each sprayed fire-resistive product required, tested per ASTM E 84.

H. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR, Part 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; shelf life, if applicable; and fire-resistance ratings applicable to Project.

B. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.

C. Store materials inside, under cover, aboveground, so they are kept dry until ready for use. Remove from Project site and discard materials that have deteriorated.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not apply sprayed fire-resistive material when ambient or substrate temperatures are 40 deg F(4 deg C) or lower, unless temporary protection and heat is provided to maintain temperatures at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of sprayed fire-resistive material. Use natural means or, where this is inadequate, forced-air circulation until fire-resistive material dries thoroughly.

1.7 SEQUENCING

A. Sequence and coordinate application of sprayed fire-resistive materials with other related work specified in other Sections to comply with the following requirements:

1. Provide temporary enclosures for interior applications to prevent deterioration of fire-resistive material due to exposure to unfavorable environmental conditions.
2. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
3. Do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
4. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.

2. Thickness: Provide minimum average thickness required for fire-resistive design indicated according to the following criteria, but not less than 0.375 inch(9 mm), per ASTM E 605.
   a. Where the referenced fire-resistive design lists a thickness of 1 inch(25 mm) or greater, the minimum allowable individual thickness of sprayed fire-resistive material is the design thickness minus 0.25 inch(6 mm).
   b. Where the referenced fire-resistive design lists a thickness of less than 1 inch(25 mm) but more than 0.375 inch(9 mm), the minimum allowable individual thickness of sprayed fire-resistive material is the greater of 0.375 inch(9 mm) or 75 percent of the design thickness.
   c. No reduction in average thickness is permitted for those fire-resistive designs whose fire-resistance ratings were established at densities of less than 15 lb/cu. ft.(240 kg/cu. m).
3. Bond Strength: 150 lbf/sq. ft.(7.2 kPa) per ASTM E 736 under the following conditions:
   a. Field test sprayed fire-resistive material that is applied to flanges of wide-flange structural-steel members on surfaces matching those that will exist for remainder of steel receiving fire-resistive material.
   b. If surfaces of structural steel receiving sprayed fire-resistive material are primed or otherwise painted, perform series of bond tests specified in UL's "Fire Resistance Directory" for coating materials.
   c. Minimum thickness of sprayed fire-resistive material tested in laboratory shall be 0.75 inch(19 mm).
4. Compressive Strength: 5.21 lbf/sq. in.(35.9 kPa) as determined in the laboratory per ASTM E 761. Minimum thickness of sprayed fire-resistive material tested shall be 0.75 inch(19 mm) and minimum dry density shall be as specified, but not less than 15 lb/cu. ft.(240 kg/cu. m).
5. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
6. Deflection: No cracking, spalling, delamination, or the like per ASTM E 759.
7. Effect of Impact on Bonding: No cracking, spalling, delamination, or the like per ASTM E 760.
8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft.(0.27 g/sq. m) in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of sprayed fire-resistive material is 0.75 inch(19 mm), maximum dry density is 15 lb/cu. ft.(240 kg/cu. m), test specimens are not pre-purged by mechanically induced air velocities, and tests are terminated after 24 hours.

D. Fire-Test-Response Characteristics: Provide sprayed fire-resistive materials with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Flame Spread: 10 or less.
   2. Smoke Developed: 0.
   3. Fungal Resistance: No observed growth on specimens per ASTM G 21.

E. Products: Subject to compliance with requirements, provide products by one of the following:
   1. Monokote MK-6/HY by W.R. Grace & Company.

C. Do not proceed with installation of fire-resistive material until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances that could impair bond of fire-resistive material, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.

B. Prime substrates where recommended in writing by fire-resistive material manufacturer, unless compatible shop primer has been applied and is in satisfactory condition to receive fire-resistive material.

C. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application. Provide temporary enclosure as required to confine spraying operations, protect the environment, and ensure maintenance of adequate ambient conditions for temperature and ventilation.

3.3 INSTALLATION, GENERAL

A. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to convey and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

B. Install metal lath, as required, to comply with fire-resistance ratings and fire-resistive material manufacturer's written recommendations for conditions of exposure and intended use. Securely attach lath to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by fire-resistive material manufacturer. Attach lathing accessories where indicated or required for secure attachment to substrate.

C. Coat substrates with adhesive before applying fire-resistive material where required to achieve fire-resistance rating or as recommended in writing by fire-resistive material manufacturer for material and application indicated.

D. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by fire-resistive material manufacturer, install body of fire-resistive covering in a single course.

E. Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by manufacturer.

3.4 INSTALLING CONCEALED SPRAYED FIRE-RESISTIVE MATERIALS

A. Apply concealed fire-resistive material in thicknesses and densities indicated, but not less than those required to achieve fire-resistance ratings designated for each condition, and comply with requirements for thickness specified in Part 2 "Concealed Sprayed Fire-Resistive Materials" Article.

3.6 CLEANING, PROTECTING, AND REPAIR

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect fire-resistive material, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at the time of Substantial Completion.

C. Coordinate application of fire-resistive material with other construction to minimize the need to cut or remove fire protection. As installation of other construction proceeds, inspect fire-resistive material and patch any damaged or removed areas.

D. Repair or replace work that has not been successfully protected.

3.7 SCHEDULE

A. Refer to Drawings.

END OF SECTION 07 81 00

SECTION 07 81 60

GREASE DUCT FIRE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Foil-faced duct wrap fire protection for Kitchen exhaust hood grease duct.

B. Related Sections include the following:
   1. Division 7 Section "Building Insulation" for rigid and blanket insulation.
   2. Division 7 Section "Through-Penetration Firestop Systems."
   3. Division 9 Section "Gypsum Board Assemblies" for gypsum wallboard fire-resistive assemblies and non-fire-rated gypsum-board assemblies.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Certificates: For each type of grease duct fire protection, signed by product manufacturer.

C. Research/Evaluation Reports: For grease duct fire protection.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain grease duct fire-protection materials through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide grease duct fire protection with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL, Omega Point Laboratories, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Surface-Burning Characteristics: ASTM E 84.
   2. Fire-Resistance Ratings: ASTM E 119.
   3. Combustion Characteristics: ASTM E 136.
   4. Fire-resistance-rated assemblies are indicated by design designations from UL's "Fire Resistance Directory," Omega Point Laboratories, or from the listings of another testing and inspecting agency.

Division 00 – Procurement and Contracting Requirements

DOCUMENT 00 26 00

PROCUREMENT SUBSTITUTION REQUEST

1.1 SUBSTITUTIONS DURING BIDDING PERIOD

A. Bids shall be submitted only on the basis of materials, products, and equipment specified in the Specifications, indicated on the Drawings, or as named by Addenda pursuant to approval of Requests for Substitution.

B. Materials, products, and equipment included in the Bidding Documents are specified for the purpose of establishing a minimum standard of quality, cost, appearance, design, and function. It is not the intent to limit the acceptance of materials, products or equipment specified, but rather to name or describe a material, product or piece of equipment as the absolute minimum standard that is desired and acceptable. Where proprietary names are used, whether or not followed by the words "or acceptable substitution," requests for substitution will nevertheless be considered if properly submitted to and received by the Architect prior to the designated date.

C. If any Bidder wishes to substitute equipment or materials, which is believed to be equal to those specified, the Bidder shall make a request in writing to the Architect for approval of such substitute equipment or materials at least seven (7) calendar days prior to the date for receipt of Bids, following the rules stated herein. If the Architect should approve of such substitute equipment or materials, an Addendum evidencing such approval will be promulgated by the Architect and issued to all prospective Prime Bidders of whom the Architect has a record.

D. All requests for substitutions shall be accompanied by manufacturer's product data, specifications, drawings, catalog cuts, samples, installation instructions, performance data, list of projects completed of similar size and scope, and other references and information necessary to completely describe the item, and to facilitate a thorough and complete review by the Architect. Requests not meeting all these requirements may be rejected without evaluation.

E. The Substitution Request Form included as an attachment to this Document shall be used for all Substitution requests. Failure to use the attached Substitution Request form, or the failure of the Bidder to fully execute the form as required, will result in rejection of the proposed substitution request without review.

F. Manufacturers, manufacturer's representatives, dealers, distributors, suppliers, and subcontractors shall not direct or make requests to substitute equipment or materials. All requests shall originate from a Prime Bidder.

G. Substitutions shall be submitted to the Architect only; no substitutions shall be submitted directly to any consultant, the Owner, or any of the Owner's consultants.

1.2 SUBSTITUTIONS AFTER AWARD OF CONTRACT

A. Comply with provisions of Section 01 25 00. Contractor shall execute the Substitution Request Form attached thereto.

SUBSTITUTION REQUEST FORM

PROJECT: _____ **(Procurement Period)**

TO: Perkins+Will
10100 North Central Expressway, Suite 300
Dallas, TX 75231

FROM: _____

_____

NO. P+W _____ DATE: _____

Bidder hereby requests acceptance of the following product or system as a substitution in accordance with provisions of the Document 00 21 13 - Instructions to Bidders, and Section 01 25 00:

1. SPECIFIED PRODUCT OR SYSTEM

Substitution request for: _____

Specification Section No.: _____ Article: _____

2. SUPPORTING DATA

☐ Product data for proposed substitution is attached (description of product, reference standards, performance and test data).

☐ Sample is attached. ☐ Sample will be sent if requested.

3. QUALITY COMPARISON

	SPECIFIED PRODUCT	SUBSTITUTION
Name, Brand:	_____	_____
Catalog No.:	_____	_____
Manufacturer:	_____	_____
Vendor:	_____	_____
Variations:	_____	_____
	_____	_____
	_____	_____

(Add Additional Sheets If Necessary)

Maintenance Service Available: ☐ Yes ☐ No

Spare Parts Source: _____

Warranty: ☐ Yes ☐ No _____ Years

4. PREVIOUS INSTALLATIONS

Identification of similar projects on which proposed substitution was used:

Project:: _____ Project: _____

Address: _____ Address: _____

_____ _____

Architect: _____ Architect: _____

Owner: _____ Owner: _____

Date Installed: _____ Date Installed: _____

5. REASON FOR NOT GIVING PRIORITY TO SPECIFIED ITEM

_____

_____

6. EFFECT OF SUBSTITUTION

Proposed substitution affects other work or trades: ☐ No ☐ Yes (if yes, explain)

_____

_____

_____

Substitution requires dimensional revisions or redesign of structural, M/E/P, or other work:

☐ No ☐ Yes (if yes, attach data explaining revisions)

7. BIDDER'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS

I/we have investigated the proposed substitution. I/we:

A. believe that it is equal or superior in all respects to specified product, except as stated above;
B. will provide same warranty as specified for specified product;
C. have included complete cost data and implications of the substitution:
D. will pay redesign and special inspection costs caused by the use of this product;
E. will coordinate the incorporation of the proposed substitution into the Work;
F. waive future claims for added cost to Contract caused by the substitution.

Bidder: _____
(Name of prime bidding contractor)

Date: _____ By: _____

All questions must be answered and all blanks filled in. Enter "NA" if not applicable. Unresponsive or incomplete requests will be rejected and returned without review.

8. ARCHITECT'S REVIEW AND ACTION

☐ Resubmit substitution request:

☐ Provide more information in the following areas: _____

_____

_____

☐ Prime Bidder must sign Bidder's Statement of Conformance

☐ Substitution is accepted.

☐ Substitution is accepted, with the following comments: _____

_____

_____

☐ Substitution is not accepted.

☐ Substitution Request received too late.

Perkins+Will

By:_____ Date:_____

Perkins+Will has relied upon the information provided by the Bidder, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Bidding Documents or Contract Documents, Bidder / Contractor shall provide the specified product at no additional cost to Owner.

END OF DOCUMENT

DOCUMENT 00 31 32

GEOTECHNICAL DATA

1.1 SUMMARY

A. This document includes information pertaining to geotechnical data.

1.2 INVESTIGATION

A. Investigations of subsurface soil conditions at the building site were authorized by the Owner, and were subsequently performed by Kleinfelder, Inc. Reports are as follows:
   1. Geotechnical Investigation, Parking Structure, Medical Center of Aurora, Aurora, Colorado," File No. 66295-4, dated September 13, 2006.

B. The Geotechnical Investigation Reports bound herein are for Bidder's convenience and information only, and are not a warranty of subsurface conditions.

C. The complete text of the Reports may also be examined by qualified Bidders at the office of the Architect, and where documents are on file for bidding purposes.

D. The Reports are made available for Bidder's information only, and are not Contract Documents.

E. The information contained in the Reports represents design criteria, recommendations, and guidelines that were utilized as the basis of design for the engineering of the earthwork operations, paving design, and foundation design indicated in the Contract Documents. No changes in this design criteria will be considered or permitted.

1.3 RESPONSIBILITY

A. Bidders are expected to examine the site and subsurface investigation reports and then decide for themselves the character of the materials to be encountered.

B. The Architect and Owner assume no responsibility for variations in subsoil conditions, quality, or stability, or for the presence, level, and extent of underground water.

C. The Architect and Owner assume no responsibility for Bidder's interpretation of data contained in the Reports.

END OF DOCUMENT

KLEINFELDER

GEOTECHNICAL INVESTIGATION
PARKING STRUCTURE
MEDICAL CENTER OF AURORA
AURORA, COLORADO

September 13, 2006

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September 13, 2006
File 66295-4

Mr. Rodney Allen
HCA Management Services, L.P.
P.O. Box 550 (37202-0550)
Nashville, TN 37203

Subject: Geotechnical Investigation
Parking Structure
Medical Center of Aurora
Aurora, Colorado

Dear Mr. Allen:

Kleinfelder is pleased to present the results of our geotechnical investigation for the proposed parking structure located on the Medical Center of Aurora campus in Aurora, Colorado. Our work consisted of subsurface exploration, laboratory testing, engineering analyses and preparation of this report.

We appreciate this opportunity to be of service to you, and look forward to future endeavors. If you have any questions regarding this report or need additional information or services, please feel free to contact the undersigned in our office.

Respectfully submitted,

KLEINFELDER, INC.

DAVID H. ADAMS REGISTERED 14486 9/13/06 PROFESSIONAL ENGINEER STATE OF COLORADO

David H. Adams, P.E.
Senior Professional

Samantha C. Sherwood, P.E.
Project Manager

DHA/xr
Enclosures

Cc: Perkins + Will (3 copies)

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A Vicinity Map and Boring Location Plan
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1 INTRODUCTION

1.1 GENERAL

This report presents the results of a geotechnical investigation performed for the proposed parking structure at the Medical Center of Aurora campus located at 1501 S. Potomac Street in Aurora, Colorado. The attached Vicinity Map (Figure A-1) shows the location of the project. Our investigation was performed for HCA Management Services, L.P., and was authorized by Mr. Dimitri Englert of Perkins + Will.

The report includes our recommendations relating to the geotechnical aspects of project design and construction. The conclusions and recommendations stated in this report are based on the subsurface conditions found at the locations of our exploratory borings at the time our exploration was performed. They also are subject to the provisions stated in the report sections titled **Additional Services** and **Limitations**. Our findings, conclusions, and recommendations should not be extrapolated to other areas or used for other projects without our prior review. Furthermore, they should not be used if the site has been altered, or if a prolonged period has elapsed since the date of the report, without Kleinfelder's prior review to determine if these recommendations remain valid.

1.2 PROJECT DESCRIPTION

The parking structure will be located north of an existing parking structure that will be razed. The new structure will have four parking levels with the first level near present grade. Cast-in-place or precast concrete construction is anticipated. Maximum column loads are unknown, but expected to be in the 600-kip range.

If loadings, locations or conditions are significantly different from those described above, we should be notified to re-evaluate the recommendations contained in this report.

1.3 PURPOSE AND SCOPE

The purpose of our investigation was to explore and evaluate subsurface conditions at various locations on the site and, based on the conditions found, develop recommendations relating to the geotechnical aspects of project design and

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2 FIELD EXPLORATION AND LABORATORY TESTING

2.1 FIELD EXPLORATION

A field exploration performed on August 23, 2006 included drilling seven exploratory borings at the locations indicated on the Boring Location Plan (Figure A-2) to the maximum depth drilled, 50 feet. The borings were advanced using a truck-mounted CME-55 drill rig equipped with 4-inch diameter continuous-flight, solid-stem auger. Drive samples were obtained during exploration using a modified California sampler (2.5-inch I.D.) driven into the strata with blows from a 140-pound hammer falling through a 30-inch drop in accordance with local practice. The blows required to drive the sampler six inches were recorded. This blow count is an indication of the relative density or consistency of the strata.

Appendix B to this report includes logs describing the subsurface conditions. A legend to the boring logs and summary of the Unified Soil Classification System used to describe the soils is presented at the front of the appendix. The logs are shown in profile at the end of the appendix. The lines defining boundaries between soil and bedrock types on the logs are based on drill behavior and interpolation between samples, and are therefore approximate. Transition between soil types and bedrock may be abrupt or may be gradual.

2.2 LABORATORY TESTING

Laboratory tests were performed on selected soil samples to estimate their relative engineering properties. Tests performed included:

Description and Identification of Soils (Visual-Manual Procedure)
Moisture Determination and Unit Weight
Particle Size Gradation Analysis
Unconfined Compressive Strength
Water Soluble Sulfate Concentration
Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Results of the laboratory tests are included in Appendix C of this report. Selected test results are also shown on the boring logs.

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3.3.2 Clay

A clay layer about 10 to 12½ feet thick was found below the sand in each boring, except boring TB-1 where only clayey sand was identified. The clay had a medium stiff to stiff consistency based on penetration resistance tests. Unconfined compression tests on two samples of clay measured strengths of about 1,370 and 3,860 psf.

3.3.3 Bedrock

Bedrock was encountered at depths varying from 16 to 27 feet below the existing ground surface. The bedrock was comprised mostly of claystone with some sandstone interbeds and layers. The bedrock hardness was classified as medium hard to very hard using local designations. Penetration resistance blow counts varied from 50 blows to drive the sampler 4 to 11 inches. Unconfined compression tests on three samples of claystone measured strengths between about 8,560 and 8,810 psf. Bedrock is weaker and at shallower depths than that found for the bed tower addition to the hospital located about 300 feet to the south.

3.3.4 Groundwater

Groundwater was found in five of the seven borings at depths from 15 to 26 feet during drilling. Due to the high traffic areas all but three of the borings were backfilled and patched upon completion. Borings TB-1, TB-3, and TB-7 were capped and groundwater was checked one day later. Groundwater levels were measured at depths of 10½ to 17 feet. It appears the groundwater level is several feet above the bedrock surface.

Soil moisture levels and groundwater levels commonly vary over time depending upon seasonal precipitation, irrigation practices, land use, and runoff conditions. Accordingly, the soil moisture and groundwater data in this report pertain only to the locations and times at which exploration was performed.

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material. OSHA requires that temporary, unsupported cuts be laid back to ratios no steeper than 1½:1 (horizontal to vertical) for Type C material and 1:1 for Type B material. In general, we believe that these slope ratios will be temporarily stable under unsaturated conditions. If groundwater seepage was to occur, flatter slopes may be appropriate. Please note that an OSHA-qualified "competent person" must make the actual determination of soil and rock type and allowable sloping in the field.

4.2.2 Site Preparation

All site preparation and earthwork operations should be performed in accordance with applicable codes, safety regulations and other Local, State or Federal guidelines. All references to maximum dry density values are referencing ASTM D698 standard Proctor.

Initial site work should consist of removal of the existing asphalt pavement, concrete curbs, and any loose existing fill. The asphalt pavement was about 5 inches thick as shown on the boring logs in Appendix B.

4.2.3 Compacted Fill

The native granular soils are suitable for use as compacted fill anywhere on the site. Compacted fill should be placed in horizontal lifts compatible with the type of compaction equipment being used, moisture conditioned to within 2 percent of optimum moisture content, and compacted to at least 95 percent of maximum standard Proctor dry density. Imported material, if necessary, should be granular, non-expansive material having less than 40 percent passing the No. 200 sieve and a liquid limit less than 25. Kleinfelder should approve proposed import material prior to importing to the site.

4.2.4 Utility Trench Backfill

Backfill material for utility trenches should be essentially free of organic material and other deleterious matter and rock particles larger than 3 inches. Backfill material in the "pipe zone" (from the trench floor to 1-foot above the top of pipe) should not contain rock particles larger than 1-inch. Strictly observe any requirements specified by the utility agency for bedding and pipe-zone fill. In general, backfill above the pipe zone in utility trenches should be placed in thin, loose lifts adequate to achieve the compaction recommended above.

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near the building.

4.3 FOUNDATIONS

After evaluation of the subsoil conditions and consideration of the proposed construction, we recommend the parking structure be founded with straight-shaft piers drilled into the underlying bedrock. Our evaluation is based on the low strength of the overburden soils, the type of structure, anticipated heavy building loads, construction costs and our experience with similar projects in the Denver area.

Construction of straight-shaft drilled piers for the support of the heavily loaded structure has the advantage of providing a single high capacity pier for transfer of column loads to the underlying bedrock, partially through peripheral shear stresses that develop on the sides of the pier in bedrock and partially through end bearing pressure. The presence of ground water and potentially caving sands above bedrock might require dewatering and casing to complete the pier hole.

4.3.1 Bearing Capacity

The ability of the underlying bedrock to carry high loads has been based on an analysis of the penetration resistance tests, laboratory testing, and our experience in design and performance of the similar materials within this general area. We believe the piers at this site should be designed for a maximum allowable end bearing pressure of 25,000 psf and a side shear value of 2,500 psf applied for the portion of the pier in bedrock. These design parameters are lower than the bed tower addition due to the weaker bedrock. Piers should penetrate bedrock at least 6 feet. To assure that all piers are constructed in the desired competent bearing material and to verify construction of the pier hole, we recommend pier drilling operations be observed on a full-time basis by a representative of the geotechnical engineer.

4.3.2 Settlement

Based on the results of our field exploration, laboratory testing and our experience with similar properly constructed pier foundations, we estimate that pier settlement under the above design pressures may be on the order of ½-inch. Actual settlements measured both in pier load tests and on existing buildings suggest that settlements will be small.

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to eliminate the requirements for shear rings if it appears their installation is not beneficial. This could occur if the drilling process provides a rough surface or if the presence of water and/or weakly cemented materials results in a degradation of the drilled pier hole during the installation of shear rings.

- A pier diameter of at least 24 inches is recommended to allow for pier cleaning, dewatering, and inspection.
- The minimum spacing requirement between piers should be three pier diameters from center to center. At this spacing no reduction in axial or horizontal soil modulus values is required. Piers grouped less than three diameters should be studied on an individual basis.
- Concrete used in the drilled piers should be a fluid mix with a slump in the range of 5 to 7 inches so it will fill the void between reinforcing steel and the pier hole.
- Drilled pier holes should be properly cleaned prior to placement of concrete. The presence of water within the overburden soils indicates casing and dewatering equipment might be required. The pier drilling contractor should be prepared to case and dewater pier holes. In no case should concrete be placed in more than 3 inches of water. If water cannot be sufficiently removed with dewatering equipment, concrete placement must occur from the bottom of the pier hole. This is typically accomplished in this area using a pump truck with an extension capable of reaching the bottom of the pier hole, and will also allow adequate length for the casing, if needed, to be raised above the ground surface in order to develop sufficient concrete head.
- A representative of the geotechnical engineer should observe installation of the drilled piers on a full-time basis to check that the appropriate bearing stratum is being penetrated and to monitor other pier construction procedures.

4.4 GARAGE FLOOR

The existing native soils are suitable for support of concrete garage floor slabs. We recommend a minimum concrete thickness of 5.5 inches for support of automobile traffic. To reduce damage due to differential slab movement, the slabs should be separated from all bearing walls and columns with a positive expansion joint. The slabs should be provided with frequent control joints to reduce damage due to shrinkage cracking. We suggest joints on the order of 12 to 15 feet on center.

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5 ADDITIONAL SERVICES

5.1 REQUIREMENTS FOR ADDITIONAL SERVICES

In most cases, other services beyond completion of a geotechnical report are necessary or desirable to complete a project satisfactorily. It also sometimes happens that, while performing our services, we discover conditions or circumstances that require the performance of additional work that was not anticipated when the geotechnical report was written. Kleinfelder offers a range of environmental, geological, geotechnical, and construction services to suit the varying needs of our clients. This section outlines some of those services that may pertain to this project. Kleinfelder will be happy to submit a proposal for performing any such services upon request.

5.2 REVIEW OF PLANS AND SPECIFICATIONS

We strongly recommend that Kleinfelder be given an opportunity to review the plans and specifications for this project before they are finalized. Such a review allows us to verify that our recommendations and concerns have been adequately incorporated in the design. It also gives us an opportunity to discuss those recommendations and concerns with other members of the design team so that we can clear up misunderstandings or ambiguities before the project reaches the construction stage.

5.3 PREBID AND PRECONSTRUCTION MEETINGS

Subcontractors often contact us during the bidding process to discuss the geotechnical aspects of projects. Informal contacts between Kleinfelder and individual subcontractors can result in incorrect or incomplete information being provided to the subcontractor. Therefore, we recommend that a prebid meeting be held to answer any questions about the report prior to submittal of bids. If this is not possible, questions or requests for clarifications regarding this report should be directed to the Owner or his designated representative. After consultation with Kleinfelder, the Owner (or his representative) should provide clarifications or additional information to all subcontractors bidding the job.

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6 LIMITATIONS

The recommendations in this report are based on our field observations, laboratory testing, and our present understanding of the proposed construction. It is possible that subsurface conditions can vary between or beyond the points explored. If the conditions found during construction differ from those described in this report, please notify us immediately so that we can review our report in light of those conditions and provide supplemental recommendations as necessary. We should also review the report if the scope of the proposed construction, including the proposed loads or structure locations, changes from that described in this report.

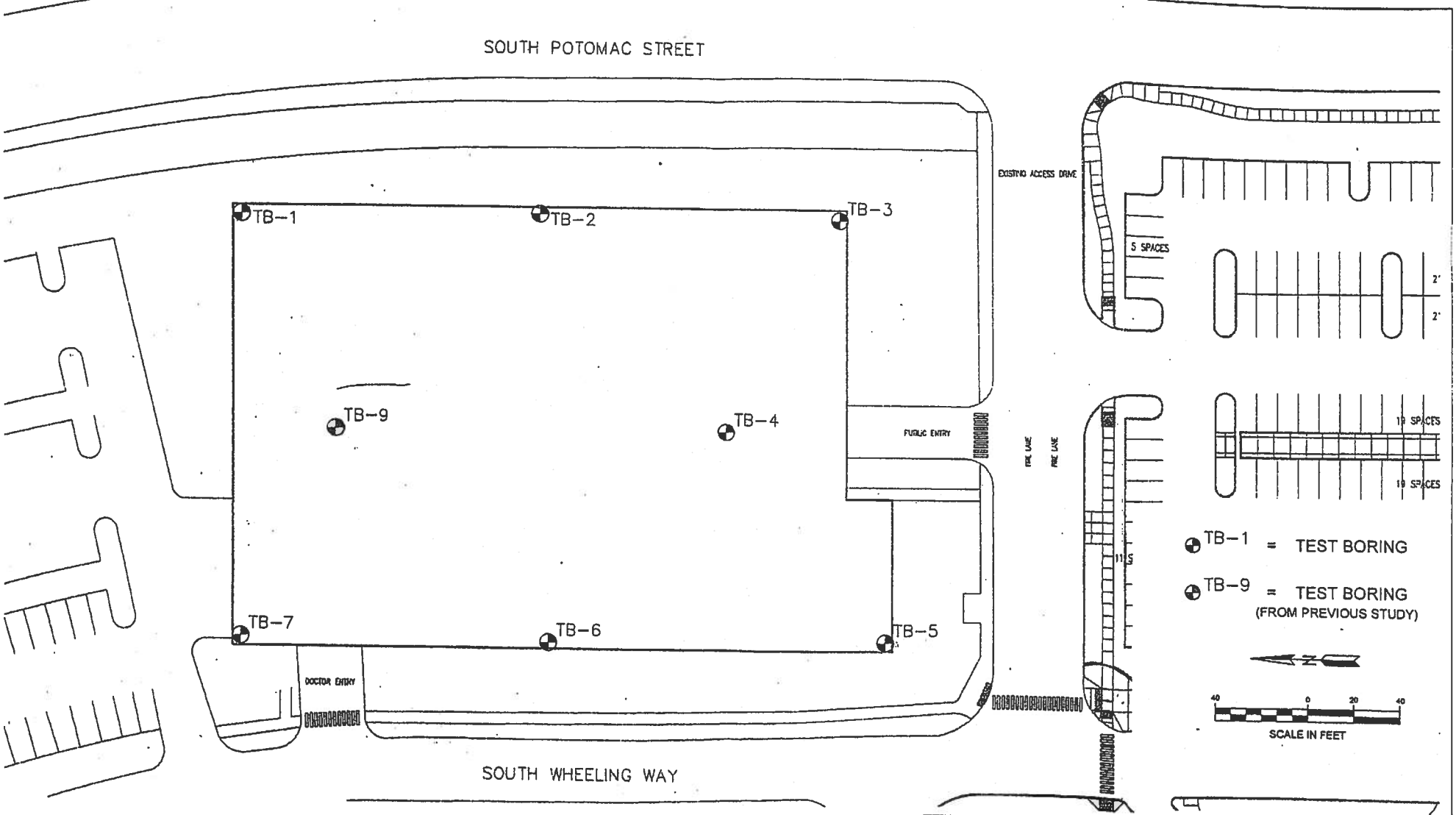
Kleinfelder has prepared this report for the exclusive use of HCA Management Services, L.P. for the parking structure at the Medical Center of Aurora in Aurora, Colorado. The report was prepared in substantial accordance with the generally accepted standards of practice for geotechnical engineering as exist in the site area at the time of our investigation. No warranty is expressed or implied. The recommendations in this report are based on the assumption that Kleinfelder will conduct an adequate program of construction testing and observation to evaluate compliance with our recommendations.

This report may be used only by the Client, and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on- and off-site), or other factors may change over time, so that additional investigation or revision of our recommendations may be required with the passage of time. It is the Client's responsibility to see that all parties to the project including the designer, contractor, and subcontractors, are made aware of this report in its entirety. The use of information contained in this report for bidding purposes shall be at the Contractor's option and risk. Any party other than the Client who wishes to use this report must notify Kleinfelder of such intended use. Based on that intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Noncompliance with these requirements by the Client or anyone else will release Kleinfelder from any liability resulting from the use of this report by an unauthorized party.

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APPENDIX A

Vicinity Map and Boring Location Plan



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Checked By: D. Adams	Drafted By: J. Edwards
Project Number: 66295.4	Date: August 28, 2006

BORING LOCATION PLAN
MEDICAL CENTER OF AURORA
PROPOSED PARKING GARAGE
AURORA, COLORADO

Figure
A-2

APPENDIX B

Logs of Exploratory Borings

LEGEND OF SYMBOLS USED ON BORING LOGS

LOG SYMBOLS



BULK / GRAB SAMPLE



MODIFIED CALIFORNIA SAMPLER
(2.5 inch inside diameter)



STANDARD PENETRATION
SPLIT SPOON SAMPLER
(2.0-inch O.D. X 1.4-inch I.D.)



SHELBY TUBE
(3 inch outside diameter)



BDBGM SIZE CORE BARREL
(1.65-inch I.D.)



BW44 SIZE CORE BARREL
(1.875-inch I.D.)



HQ-3 SIZE CORE BARREL
(2.4-inch I.D.)



WATER LEVEL
(level where first encountered)



WATER LEVEL
(level after completion)

GENERAL NOTES

1. Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.
2. No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
3. Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
4. In general, Unified Soil Classification designations presented on the logs were based on visual classification in the field and were modified where appropriate by visual classifications in the office, and/or laboratory gradation and index property testing.
5. NV = No Value; NA = Not Analyzed; NP = No Plasticity
6. Exp = percent expansion under defined surcharge pressure.
7. Com = Percent compression under defined surcharge pressure.
8. 50/X indicates number of blows required to drive the indentified sampler X inches with a 140 lb hammer falling 30 inches.

USCS SYMBOL	SOIL DESCRIPTIONS
GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
ML	INORGANIC SILTS & VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
--	CLAYSTONE
--	INTERBEDDED SANDSTONE/CLAYSTONE
--	SANDSTONE
--	SILTSTONE
--	FILL

Note: Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.

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Drafted By: J. Edwards | Project Number:

BORING LOG LEGEND

Medical Center of Aurora - Future Parking Garage

LEGEND 86295-4 ...NG GARAGE.GPJ www.kleinfelder.com 8/21/2008

Location:	See boring location plan			Date Started:	8/23/2006
Groundwater (ft):	Initial (▽): 15.0 feet while drilling. Final (▽): 10.6 feet 8/24/06 after drilling.			Date Completed:	8/23/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	38.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Appx. Surface Elevation (ft): 100.00 Surface Condition: Asphaltic Concrete											
			ASPHALT - 5"											
95	5		SAND: clayey, loose, moist to very moist, brown		5 5	MCAL		103	7.8	20	7		30	
90	10				8 7	MCAL								
85	15		CLAYSTONE: sandy, hard, moist, brown		50/6	MCAL		100	22.8					
80	20													
75	25				50/6	MCAL								
70	30													
65	35		CLAYSTONE: medium hard, moist, olive with iron staining		50/10	MCAL		99	25.0					UC=8558 psf
60	40													
55	45													
50	50													

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Drafted By: J. Edwards | Project Number:

BORING LOG

Medical Center of Aurora - Future Parking Garage

BORING TB-1

ER_GEO 86285-4 PARKING GARAGE.GPJ www.kleinfelder.com 9/21/2006

Location:	See boring location plan			Date Started:	8/23/2006
Groundwater (ft):	Initial (▽): 16.0 feet while drilling.			Date Completed:	8/23/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	40.0

Appx. Surface Elevation (ft): 100.00
Surface Condition: Asphaltic Concrete

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
100	0		ASPHALT - 5"											
95	5		SAND: clayey, medium dense, moist, brown		8 11	MCAL								
90	10		CLAY: sandy, stiff, moist, brown		6 9	MCAL		98	25.5					UC=1368 psf WSS = 0%
85	15		▽											
80	20		SANDSTONE and CLAYSTONE: interbedded, hard to very hard, moist, brown		50/4	MCAL								
75	25													
70	30				50/6	MCAL		106	20.0					
65	35		CLAYSTONE: medium hard, moist, olive											
60	40				50/10	MCAL		99	25.2					
55	45													
50	50													

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Drafted By: J. Edwards | Project Number:

BORING LOG

Medical Center of Aurora - Future Parking Garage

BORING TB-2

ER_GEO 66295-4 PARKING GARAGE.GPJ www.kleinfelder.com 8/21/2006

Location:	See boring location plan			Date Started:	8/23/2006
Groundwater (ft):	Initial (▽): 17.0 feet while drilling. Final (▽): 17.0 feet 8/24/06 after drilling.			Date Completed:	8/23/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	49.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Appx. Surface Elevation (ft): 100.00 Surface Condition: Asphaltic Concrete											
			ASPHALT - 5"											
95	5		SAND: clean to clayey, loose, moist, light brown		3 4	MCAL		105	5.2				5	
90	10				4 5	MCAL								
85	15		CLAY: sandy, stiff, moist to wet, brown ▼		8 7	MCAL		101	24.2				72	
80	20													
75	25		SANDSTONE: clayey, medium hard, moist, brown		50/11	MCAL								
70	30													
65	35		CLAYSTONE: medium hard to hard, moist, olive-gray		50/9	MCAL		103	20.9					UC=8812 psf
60	40													
55	45				50/6	MCAL								
50	50													

VER_GEO 86295-4 PARKING GARAGE.GPJ www.kleinfelder.com 9/21/2006

KLEINFELDER

Drafted By: J. Edwards | Project Number:

BORING LOG

Medical Center of Aurora - Future Parking Garage

BORING TB-3

Location:	See boring location plan			Date Started:	8/23/2006
Groundwater (ft):	Initial (▽): 18.0 feet while drilling.			Date Completed:	8/23/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	50.0

Appx. Surface Elevation (ft): 100.00
Surface Condition: Asphaltic Concrete

Elevation (feet)	Depth (feet)	DESCRIPTION	Sample Interval	Blow Counts per 6" Interval	Sample Type	Continuous Penetration Resistance	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plasticity Index	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests
		ASPHALT - 5"											
95	5	SAND: clean to clayey, loose, moist, brown		5 5	MCAL		108	5.3			100	7	
90	10			5 7	MCAL								
85	15	CLAY: sandy to very sandy, stiff, moist to wet, brown ▽											
80	20			5 7	MCAL		102	22.6					
75	25	CLAYSTONE: medium hard, moist, gray to dark brown		50/9	MCAL								
70	30												
65	35												
60	40			50/9	MCAL								
55	45	SANDSTONE and CLAYSTONE; Interbedded, moist, brown, with iron staining\											
50	50			50/6	MCAL		98	25.1					

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Drafted By: J. Edwards | Project Number:

BORING LOG

Medical Center of Aurora - Future Parking Garage

BORING TB-4

ER_GEO 86295-4 PARKING GARAGE.GPJ www.kleinfelder.com 8/21/2006

Location:	See boring location plan			Date Started:	8/24/2006
Groundwater (ft):	Initial (▽): 25.0 feet while drilling.			Date Completed:	8/24/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	50.0

Appx. Surface Elevation (ft): 100.00
Surface Condition: Asphaltic Concrete

Elevation (feet)	Depth (feet)	DESCRIPTION	Sample Interval	Blow Counts per 6" Interval	Sample Type	Continuous Penetration Resistance	Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plasticity Index	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests
		ASPHALT - 5"											
95	5	SAND: clean to clayey, loose, moist, brown to dark brown		8 9	MCAL								
90	10			5 6	MCAL								
85	15												
80	20	CLAY: sandy, medium stiff, very moist, brown		4 5	MCAL								
75	25	▽											
70	30	CLAYSTONE: mediium hard, moist, gray to olive, with iron staining		50/11	MCAL		102	23.7					UC=8715 psf
65	35												
60	40			50/7	MCAL		113	16.7					
55	45												
50	50			50/7	MCAL								

KLEINFELDER

BORING LOG

Medical Center of Aurora - Future Parking Garage

Aurora, Colorado

BORING TB-5

Drafted By: J. Edwards | Project Number:

VER_GEO 66295-1_KING GARAGE.GPJ www.kleinfelder.com 9/21/2006

Location:	See boring location plan			Date Started:	8/24/2006
Groundwater (ft):	No Free Groundwater Encountered			Date Completed:	8/24/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	30.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Appx. Surface Elevation (ft): 100.00 Surface Condition: Asphaltic Concrete											
			ASPHALT - 5"											
95	5		SAND: clayey, loose, moist, dark brown (possible fill)		4 5	MCAL								
			CLAY: sandy, stiff, moist to very moist, brown		6 6	MCAL		111	12.4				56	
90	10													
85	15													
80	20		CLAYSTONE: weathered to medium hard, moist, brown		4 14	MCAL								
75	25		CLAYSTONE and SANDSTONE: medium hard, moist, brown and gray		50/11	MCAL		107	18.6	NV	NP		45	
70	30													
65	35													
60	40													
55	45													
50	50													

KLEINFELDER

Drafted By: J. Edwards | Project Number:

BORING LOG

Medical Center of Aurora - Future Parking Garage

Aurora, Colorado

BORING

TB-6

...RKING GARAGE.GPJ www.kleinfelder.com 9/21/2006
...VER_GEO 66295

Location:	See boring location plan			Date Started:	8/23/2006
Groundwater (ft):	Initial (▽): 26.0 feet while drilling. Final (▽): 14.2 feet 8/24/06 after drilling.			Date Completed:	8/23/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	38.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Appx. Surface Elevation (ft): 100.00 Surface Condition: Asphaltic Concrete											
			ASPHALT - 5"											
95	5		SAND: clayey, medium dense, moist, dark brown (possible fill)		18 20	MCAL		121	8.2				16	
			CLAY: sandy, stiff, moist to very moist, brown, slightly calcareous		6 9	MCAL		99	23.1					UC=3857 psf
90	10													
85	15													
			CLAYSTONE: medium hard, moist, brown to olive		50/10	MCAL								
80	20													
75	25				50/7	MCAL		95	24.9					
70	30													
65	35				50/10	MCAL								
60	40													
55	45													
50	50													

KLEINFELDER

Drafted By: J. Edwards | Project Number:

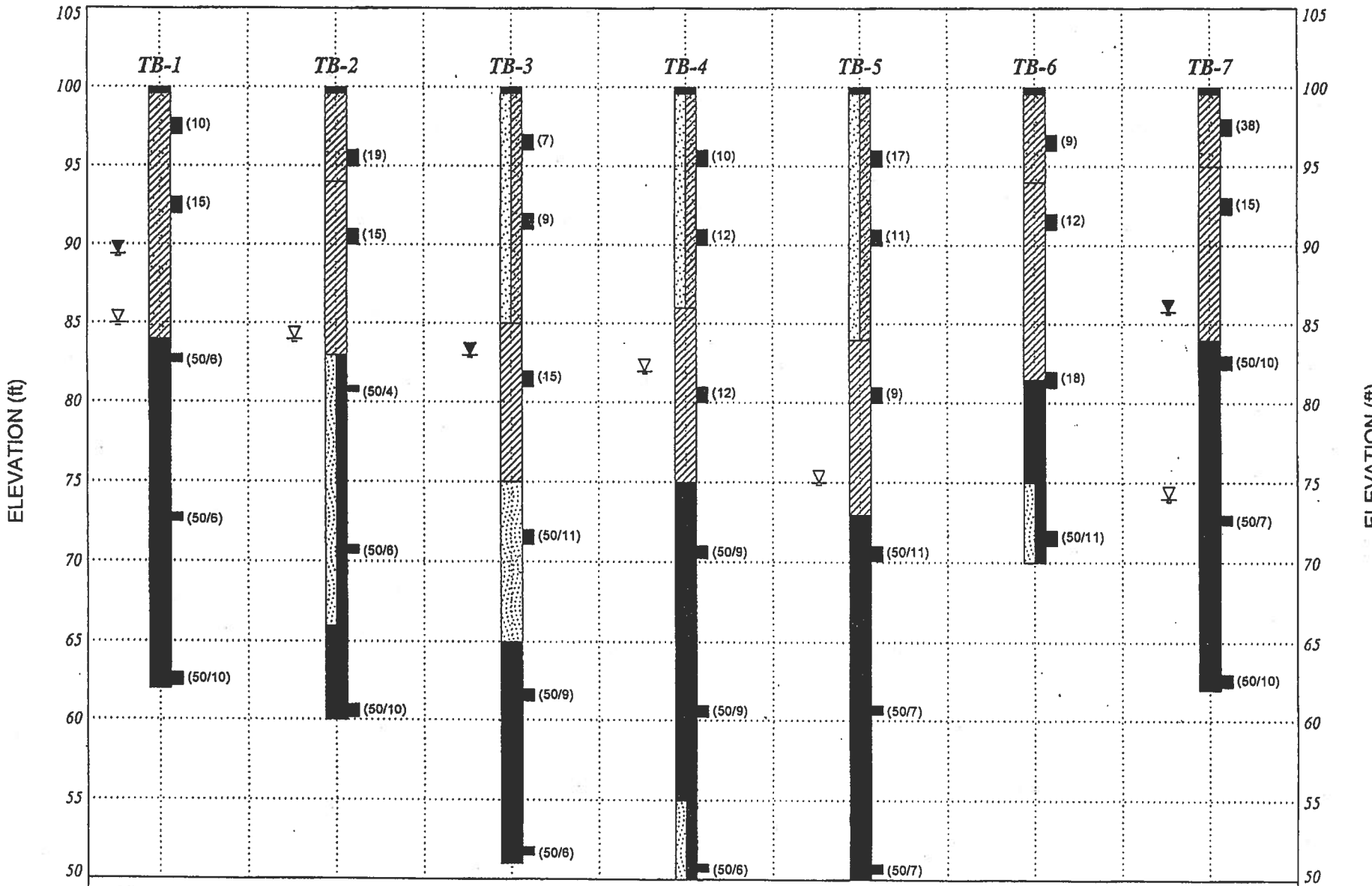
BORING LOG

Medical Center of Aurora - Future Parking Garage

BORING

TB-7

ER_GEO 66295-4 PARKING GARAGE.GPJ www.kleinfelder.com 9/21/2006



PROFILE OF BORING LOGS

PROJECT NAME: Aurora Medical Center Parking Garage
PROJECT NUMBER: 66295-4

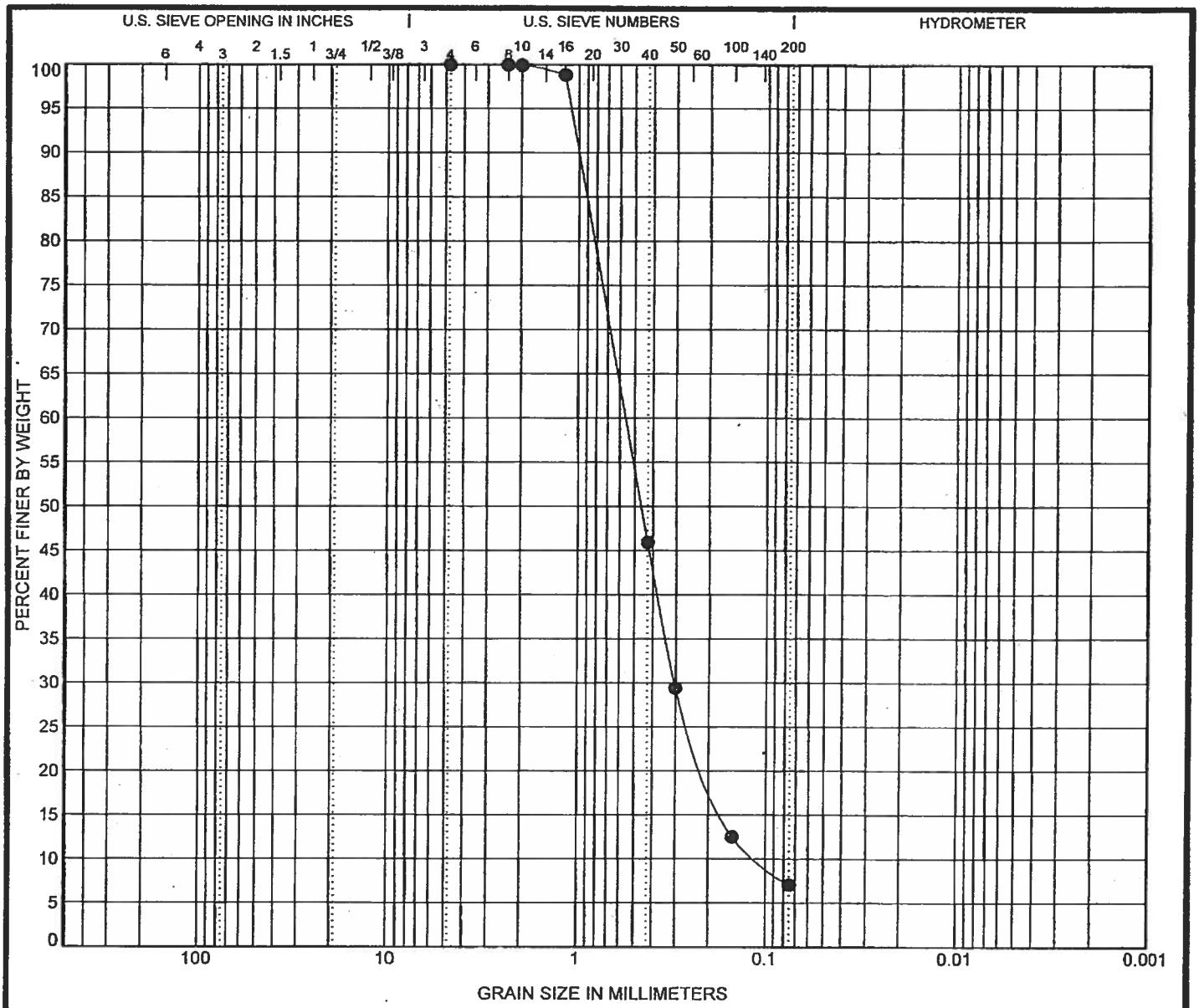
KLEINFELDER

LEGEND

12 N-value (SPT sampler blows per foot)
(27) Modified California sampler blows per foot

APPENDIX C

Laboratory Test Results



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB-4 at an approximate depth of **4** '	**sand**				**1.52**	**5.13**

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75	**0.558**	**0.304**	**0.109**	**0.0**	**92.9**	**7.1**	

Kleinfelder, Inc.
611 Corporate Circle, Ste. C
Golden, CO 80401
Telephone: 303-237-6601
Fax: 303-237-6602

GRAIN SIZE DISTRIBUTION

Project: Medical Center of Aurora -Future Parking Garage

Location: Aurora, Colorado

Number: 66295-4

Figure C-1

TABLE I
SUMMARY OF LABORATORY TESTING

PROJECT NO. 66295-4

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	PERCENT PASSING #200 SIEVE	LIQUID LIMIT	PLASTICITY INDEX	WATER SOLUBLE SULFATES (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)	SOIL TYPE
BORING	DEPTH								
TB-1	2	7.8	103	30	20	7			Clayey Sand
TB-1	17	22.8	100						Claystone
TB-1	37	25.0	99					8558	Claystone
TB-2	9	25.5	98				ND*	1368	Sandy Clay
TB-2	29	20.0	106						Sandstone/Claystone
TB-2	39	25.2	99						Claystone
TB-3	3	5.2	105	5					Sand
TB-3	18	24.2	101	72					Sandy Clay
TB-3	38	20.9	103					8812	Claystone
TB-4	4	5.3	108	7					Slightly Clayey Sand
TB-4	19	22.6	102						Sandy Clay
TB-4	49	25.1	98						Claystone
TB-5	29	23.7	102					8715	Claystone
TB-5	39	16.7	113						Claystone
TB-6	8	12.4	111	56					Sandy Clay
TB-6	28	18.6	107	45	NV	NP			Sandstone/Claystone
TB-7	2	8.2	121	16					Clayey Sand
TB-7	7	23.1	99					3857	Sandy Clay
TB-7	27	24.9	95						Claystone
TB-9	4	14.6	108						Sandy Clay
TB-9	25	25.7	91	88	48	29			Claystone
	*ND = non-detect								

DOCUMENT 00 52 34

HCA OWNER-CONTRACTOR AGREEMENT

1.1 FORM OF AGREEMENT

A. The form of Agreement for this Project will be HCA's Agreement Between Owner and Contractor for Work on a Cost Plus Fee Basis with a Guaranteed Maximum Contract Price.

B. This agreement form is part of the Contract Documents, and is incorporated herein by reference and shall be construed to be a part hereof, with the same effect as if such were repeated at length herein, or physically attached hereto.

END OF DOCUMENT

Division 01 – General Requirements

04J05H

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Identification: Project consists of new Parking Garage at the Medical Center of Aurora - South Campus, Aurora, CO, for the Owner, HCA The Healthcare Corporation, Nashville, TN.

B. The Work consists of the following:
   1. Construction of a new four-story precast concrete parking structure. Work includes 206,452 square feet of building containing parking spaces for 547 vehicles.
   2. In addition to the building construction, the project includes site improvements.

C. Architect Identification: The Contract Documents were prepared for the Project by Perkins+Will, 10100 North Central Expressway, Suite 300, Dallas, Texas 75231; telephone 214-283-8700; facsimile 214-283-8701.

1.2 TYPE OF CONTRACT

A. Project will be constructed under a general construction contract.

1.3 WORK UNDER OTHER CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.
   1. Concurrent Work: none

1.4 USE OF PREMISES

A. Contractor shall have limited use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited to areas indicated or approved by the Owner, and by Owner's right to perform work or to retain other contractors on portions of Project.
   1. Allow for Owner occupancy and use by the public of, and to and from, the existing building.

B. Make each entity engaged in work on the project aware that the present buildings house operating facilities that must continue in operation during the construction period, except as the Architect and Owner may otherwise direct. Continue function of plumbing, heating, ventilating, electrical, fire alarm, and telephone systems with a minimum of interruptions in service. Do not block any required fire exits.

from the Work. Contractor shall provide and maintain at all times any OSHA-required danger signs, guards, and obstructions necessary to protect the public and construction personnel from any dangers inherent with or created by the Work in progress.

1. All federal, state, and city rules and requirements pertaining to safety, and all EPA standards, OSHA standards, and NESHAP regulations pertaining to asbestos as required shall be complied with.

B. Twenty-four (24) Hour Call: The Contractor shall have personnel on call 24 hours per day, for emergencies during the course of the Project. The Owner shall be provided with a 24- hour emergency contact number of Contractor's personnel. Contractor shall be able to respond to any emergency call and have personnel on-site within two (2) hours after contact. Numbers to be made available to the Owner shall include home, office and mobile numbers for the following:

1. Contractor's project manager.
2. Contractor's field superintendent.
3. Owner or company officer of Contractor.

1.7 CONTRACTOR DUTIES

A. VOC Compliance: Contractor shall insure that all assemblies, components, and systems comply with all VOC (Volatile Organic Components) requirements and regulations of the Environmental Protection Agency (EPA) Occupational Safety Health Administration (OSHA), State, County, City, and Local Air Control District.

B. Except as specifically noted, provide and pay for:

1. Labor, materials and equipment.
2. Tools, construction equipment and machinery.
3. Water, heat, and utilities required for construction.
4. Other facilities and services necessary for proper execution and completion of work.

C. Secure and pay for, as necessary for proper execution and completion of Work, and as applicable at time of receipt of bids:

1. Building Permit.
2. Licenses.

D. Give required notices.

E. Comply with all applicable local Building Codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work.

F. Promptly submit written notice to Architect of observed variance of Contract Documents from requirements of authorities having jurisdiction. Assume responsibility for Work performed without such notice known to be contrary to code or regulatory requirements.

1.8 OWNER'S OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner will occupy site and existing adjacent building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work

Manual to determine numbers and names of sections in the Contract Documents.

2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.11 BULK PURCHASING VENDOR LIST

A. The Bulk Purchasing Vendor List is prepared by HCA to indicate companies with whom they have purchasing agreements. Refer to Section 01 62 05 for the Bulk Purchasing Vendor List. Refer to Section 01 62 05 for the HCA Vendor List for Interior Finishes. The HCA Vendor List for Interior Finishes takes precedence over the Bulk Purchasing Vendor List.

B. These documents are included as information only. Verify directly with HCA to ensure receipt of current and applicable information.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

04J05H

SECTION 01 14 00

WORK RESTRICTIONS

PART 1 - GENERAL

1.1 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits

B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
   1. Limits: Confine construction operations to areas designated.
   2. Owner Occupancy: Allow for Owner occupancy of site and use by the public.
   3. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      a. Schedule deliveries to minimize use of driveways and entrances.
      b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

D. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except otherwise indicated.
   1. All construction times other than normal construction times listed above are to be coordinated between the contractor and the Owner on a case by case basis, including but not limited to the following:
      a. Weekend hours.
      b. Early morning hours.
      c. Hours for utility shutdowns.
      d. Hours for core drilling or other noisy activity.

E. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
   1. Notify Construction Manager and Owner not less than three days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Construction Manager's and Owner's written permission.

1.2 OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner will occupy site and existing adjacent building during entire construction period. Cooperate with Owner during construction

04J05H

SECTION 01 22 00

UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for unit prices.

1.2 DEFINITIONS

A. Unit price is stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Price by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

A. The Unit Price shall include the furnishing by the Contractor of all labor, tools, materials, machinery, appliances, plant and equipment appurtenant to and necessary for, the construction in every detail and the completion of all work to be performed under these Specifications.

B. Unit Price shall also include all profit, overhead expenses, bond, insurance, patent fees, royalties, risk due to the elements, delay, profit, injuries, damages, claims, and all other items not specifically mentioned that may be required to construct fully each item of the Work, complete in place.

C. No other charges or mark-ups will be allowed to be applied to the Unit Price when the appropriate Contract Document modification is written.

D. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

E. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

F. List of Unit Prices: A list of unit prices is included at the end of this Section. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

04J05H

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Price to incorporate alternate into the Work. No other adjustments are made to the Contract Price.

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

04J05H

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting and processing product substitutions after execution of the Agreement.

B. For administrative and procedural requirements for product substitutions during the procurement process and prior to execution of the Agreement, refer to Document 00 26 00.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
   1. Substitution requests will only be considered prior to receipt of Bids except when a specified product or system is no longer available.
   2. Owner-requested cost-reduction proposals shall be submitted on Substitution Request Form.

1.3 DESIGN REQUIREMENTS

A. Materials, products, and equipment included in the Contract Documents are specified for the purpose of establishing a minimum standard of quality, cost, appearance, design, and function. It is not the intent to limit the acceptance of materials, products or equipment specified, but rather to name or describe a material, product or piece of equipment as the absolute minimum standard that is desired and acceptable. Where proprietary names are used, whether or not followed by the words "or acceptable substitution," requests for substitution will nevertheless be considered if properly submitted to and received by the Architect prior to the designated date.

1.4 SUBMITTALS

A. Substitution Requests after Award of Contract: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

B. The Substitution Request Form included as an attachment to this Document shall be used for all Substitution requests. Failure to use the attached Substitution Request form, or failure to fully execute the form as required, will result in rejection of the proposed substitution request without review.
   1. Do not make substitution request with shop drawings or product data submittals.

1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
2. Requested substitution does not require extensive revisions to the Contract Documents.
3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
4. Substitution request is fully documented and properly submitted.
5. Requested substitution will not adversely affect Contractor's Construction Schedule.
6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.

C. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION

3.1 CONTRACTOR RESPONSIBILITIES

A. All requests shall originate from the Contractor. Manufacturers, manufacturer's representatives, dealers, distributors, suppliers, and subcontractors shall not direct or make requests to substitute equipment or materials.

B. Substitutions shall be submitted to the Architect only; no substitutions shall be submitted directly to any consultant, the Owner, or any of the Owner's consultants.

C. All requests for substitutions shall be accompanied by manufacturer's product data, specifications, drawings, catalog cuts, samples, installation instructions, performance data, list of projects completed of similar size and scope, and

SUBSTITUTION REQUEST FORM

PROJECT: **Parking Garage,** **(After Contract Award)**
Medical Center of Aurora –South Campus
Aurora, Colorado

TO: Perkins+Will
1000 North Central Expressway, Suite 300
Dallas, TX 75231

FROM: _____

_____

NO. _____

DATE: _____

Contractor hereby requests acceptance of the following product or system as a substitution in accordance with provisions of Section 01 25 00 of the Specifications:

1. SPECIFIED PRODUCT OR SYSTEM

Substitution request for: _____

Specification Section No.: _____ Article: _____ Paragraph: _____

2. SUPPORTING DATA

☐ Product data for proposed substitution is attached (description of product, reference standards, performance and test data).

☐ Sample is attached. ☐ Sample will be sent if requested.

3. QUALITY COMPARISON

	SPECIFIED PRODUCT	SUBSTITUTION
Name, Brand:	_____	_____
Catalog No.:	_____	_____
Manufacturer:	_____	_____
Vendor:	_____	_____
Variations:	_____	_____
	_____	_____
	_____	_____
	_____	_____

(Add Additional Sheets If Necessary)

Maintenance Service Available: ☐ Yes ☐ No

Spare Parts Source: _____

Warranty: ☐ Yes ☐ No _____ Years

4. PREVIOUS INSTALLATIONS

Identification of similar projects on which proposed substitution was used:

Project:: _____ Project: _____
Address: _____ Address: _____
_____ _____
Architect: _____ Architect: _____
Owner: _____ Owner: _____
Date Installed: _____ Date Installed: _____

5. REASON FOR NON-AVAILABILITY OF SPECIFIED ITEM

Attach affidavit, certification, or other data as proof of non-availability.

☐ Strike ☐ Bankruptcy ☐ Discontinuation of production
☐ Lockout ☐ Proven Shortage ☐ Similar occurrence (explain below)

_____
_____

6. EFFECT OF SUBSTITUTION

Proposed substitution affects other work or trades: ☐ No ☐ Yes (if yes, explain)

_____
_____
_____

Substitution requires dimensional revisions or redesign of structural, M/E/P or other Work:

☐ No ☐ Yes (if yes, attach data explaining revisions)

Substitution changes Contract Time ☐ No ☐ Yes Add / Deduct _____ Days

Saving or credit, if any, to Owner for accepting Substitution: $_____

Additional cost, if any, to Owner for accepting Substitution: $_____

7. CONTRACTOR'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS

I/we have investigated the proposed substitution. I/we:

A. believe that it is equal or superior in all respects to specified product, except as stated above;
B. will provide same warranty as specified for specified product;
C. have included complete cost data and implications of the substitution:
D. will pay redesign and special inspection costs caused by the use of this product;
E. will pay additional costs incurred by other contractors caused by the substitution;
F. will coordinate the incorporation of the proposed substitution into the Work;
G. will modify other parts of the Work as may be necessary to fully integrate the substitution into the Work;

H. waive future claims for added cost to Contract caused by the substitution.

Contractor: _____
(Name of prime Contractor)

Date: _____ By: _____

All questions must be answered and all blanks filled in. Enter "NA" if not applicable. Unresponsive or incomplete requests will be rejected and returned without review.

8. ARCHITECT'S REVIEW AND ACTION

☐ Resubmit substitution request:

☐ Provide more information in the following areas: _____

_____

_____

☐ Prime Contractor must sign Contractor's Statement of Conformance

☐ Substitution is accepted.

☐ Substitution is accepted, with the following comments: _____

_____

_____

☐ Substitution is not accepted.

☐ Substitution Request received too late.

☐ Redesign is required. Perkins+Will will submit proposal for additional services.

Perkins+Will

By: _____ Date: _____

Perkins+Will has relied upon the information provided by the Contractor, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Contract Documents, Contractor shall provide the specified product.

OWNER REVIEW AND ACTION

☐ Substitution is accepted; prepare Change Order.
☐ Substitution is not accepted.
☐ Owner will pay Perkins+Will directly for redesign fees.
☐ Include Perkins+Will fees for implementing the substitution in the Change Order.

By: _____ Date: _____

END OF FORM

04J05H

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections include the following:
1. Division 01 Section "Unit Prices" for administrative requirements for using unit prices.
2. Division 01 Section "Substitution Procedures" for administrative procedures for handling requests for substitutions made after Contract award.
3. Division 01 Section "Requests for Interpretation" for administrative procedures for handling RFIs.

1.2 MINOR CHANGES IN THE WORK

A. Architectural Supplemental Instruction: Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Price or the Contract Time, on Architect's Supplemental Instructions Form.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Price or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Price and the Contract Time necessary to execute the change.
   a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
   b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
   c. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Contractor shall issue a Change Order for signatures of Owner and Architect on Owner's Change Order Form included as Exhibit "P" to Document 00 52 34 – Agreement Form.

1.6 CHANGE DIRECTIVE

A. Change Directive: Architect or Owner may issue a Change Directive on AIA Document G714, or substantially similar form generated and furnished by the Architect. Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
   1. Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Price or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Change Directive.
   1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

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SECTION 01 26 13

REQUESTS FOR INTERPRETATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative provisions for submitting and processing Requests for Interpretation (RFIs) after execution of the Agreement:

1.2 DEFINITIONS

A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.3 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
   1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
   1. Project name.
   2. Date.
   3. Name of Contractor.
   4. Name of Architect.
   5. RFI number, numbered sequentially.
   6. Specification Section number and title and related paragraphs, as appropriate.
   7. Drawing number and detail references, as appropriate.
   8. Field dimensions and conditions, as appropriate.
   9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Price, Contractor shall state impact in the RFI.
   10. Contractor's signature.
   11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
      a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.

C. Hard-Copy RFIs: CSI Form 13.2A included at end of this Section, or substantially similar form generated by Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

Attachment:
Request for Interpretation, CSI Form 13.2A

Advancement of Construction Technology

REQUEST FOR INTERPRETATION

Project: Parking Garage, Medical Center of Aurora
Aurora, Colorado

To: Perkins+Will
Dallas, Texas

Re:

R.F.I. Number:

From:

Date:

A/E Project Number: 142311.000

Contract For:

Specification Section: Paragraph: Drawing Reference: Detail:

Request:

Signed by: Date:

Response:

☐ Attachments

Response From: To: Date Rec'd: Date Ret'd:

Signed by: Date:

Copies: ☐ Owner ☐ Consultants ☐ ____ ☐ ____ ☐ ____ ☐ ____ ☐ File

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601 Madison Street, Alexandria, VA 22314-1791

July 1994
CSI Form 13.2A

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SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
      a. Application for Payment forms with Continuation Sheets. Use Owner's Change Order Form included as Exhibit "L" to Document 00 52 34 – Agreement Form.
      b. Submittals Schedule.
   2. Submit the Schedule of Values to Architect at earliest possible date but no later than fourteen days before the date scheduled for submittal of initial Application for Payment.
   3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
   1. Identification: Include the following Project identification on the Schedule of Values:
      a. Project name and location.
      b. Name of Architect.
      c. Architect's project number.
      d. Contractor's name and address.
      e. Date of submittal.
   2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
      a. Related Specification Section or Division.

a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.

9. In addition to line item costs of Sections in Divisions 02-39, furnish line item costs for each of the following general administrative and procedural cost items:
   a. Bonds
   b. Insurance
   c. Mobilization
   d. Field Superintendence
   e. Temporary Facilities
   f. Trench Safety
   g. Clean-up and Disposal
   h. Project Close Out
   i. Final Cleaning
   j. Demobilization
   k. Overhead and General Conditions
   l. Contractor's Fee
10. Mechanical, Electrical, and Plumbing work shall be broken down in accordance with the following subcategories, as a minimum:
   a. Mechanical
      1) Units
      2) Controls
      3) Ductwork and Rough-In (by floor)
      4) Grills and Diffusers (by floor)
      5) Testing, Adjusting, Balancing
   b. Plumbing
      1) Service to Building including meter
      2) Rough-In (by floor)
      3) Top-out
      4) Fixtures (by floor)
      5) Trim (by Phase)
   c. Fire Protection
      1) Service to Building
      2) Rough-in (by floor)
      3) Finish-out (by floor)
   d. Electrical
      1) Service to Building
      2) Switch Gear
      3) Conduit and Boxes (by floor)
      4) Panels (by floor)
      5) Wiring (by floor)
      6) Fixtures (by floor)
      7) Devices (by floor)
      8) Trim (by floor)
11. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Change Directives result in a change in the Contract Price.

5. Products list.
6. Schedule of unit prices.
7. Submittals Schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Initial progress report.
11. Report of preconstruction conference.
12. Certificates of insurance and insurance policies.
13. Performance and payment bonds.
14. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Price.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Price.
   4. Contractor's Affidavit and Final Waiver and Release Form included as Exhibit "N" to Document 00 52 34 – Agreement Form.
   5. Evidence that claims have been settled.
   6. Include documentation that the facility has been inspected by a registered or licensed representative of the state's Department of Licensing and Regulations and that any items noted as non-compliant have been corrected and approved.

1.5 RETAINAGE

A. Until work is 50 percent complete, 10 percent retainage will be withheld from total value of work completed, and material stored. At the Owner's sole discretion, no further retainage will be required to be withheld after work is 50 percent complete, provided Contractor maintains work schedule, and performs work satisfactorily.
   1. If subsequently, commitments are not met and work is not satisfactorily performed, 10 percent retainage will be resumed.

B. Upon Substantial Completion of Work and upon application by Contractor and certification by Architect, the Owner will make payment sufficient to increase total payments to 100 percent of Contract Price, less a sum equal to 200% of the reasonable value, as determined by the Owner, for incomplete work and for unsettled claims.

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SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. General project coordination procedures.
   2. Coordination Drawings.
   3. Administrative and supervisory personnel.
   4. Conservation.
   5. Project meetings.

B. Related Sections include the following:
   1. Division 01 Section "Requests for Interpretation" for administrative procedures for handling RFIs.

1.2 COORDINATION

A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.
   4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor's Construction Schedule.
   2. Preparation of the Schedule of Values.

3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 5 days of the meeting.

B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Phasing.
   c. Critical work sequencing.
   d. Designation of responsible personnel.
   e. Procedures for processing field decisions and Change Orders.
   f. Procedures for processing Applications for Payment.
   g. Distribution of the Contract Documents.
   h. Submittal procedures.
   i. Preparation of Record Documents.
   j. Use of the premises.
   k. Responsibility for temporary facilities and controls.
   l. Parking availability.
   m. Office, work, and storage areas.
   n. Equipment deliveries and priorities.
   o. First aid.
   p. Security.
   q. Progress cleaning.
   r. Working hours.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   a. Contract Documents.
   b. Options.
   c. Related Change Orders.

7) Site utilization.
8) Temporary facilities and controls.
9) Work hours.
10) Progress cleaning.
11) Change Orders.
12) Documentation of information for payment requests.

3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
   a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

04J05H

SECTION 01 31 06

COORDINATION DRAWINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative provisions for providing Coordination Drawings.

1.2 DESCRIPTION

A. Coordination Drawings: Reproducible overlay drawings showing work with horizontal and vertical dimensions to avoid interference with structural framing, ceilings, partitions, equipment, lights, mechanical, electrical, conveying systems, and other services:
   1. Under slabs-on-grade.
   2. In and above ceilings.
   3. Within walls.
   4. Within chases.
   5. In mechanical spaces.
   6. In electrical spaces.

B. Sleeve, Core Drill, and Block-out Layout Drawings: Reproducible overlay drawings showing proposed locations and sizes of sleeves, core drills, block-outs, and embedded items in concrete walls, columns, floors, and beams.
   1. Refer to fire protection, plumbing, HVAC, electrical, and other systems drawings for items penetrating floor, roof, and structural systems.
      a. Unless otherwise indicated, sleeves shall be provided for all utility and service (Divisions 21 through 28) items scheduled to traverse vertically through the building structure or penetrate structural members, whether or not sleeves have been specifically shown.
   2. Core-drilling through structural members, as a substitute for proper layout and installation of sleeves, will not be permitted.

C. Prior to Start of Work: Require written approval from each subcontractor of coordination drawings affecting subcontractor's area of work.

D. At no additional cost to the Owner, make modifications required as a result of failure to resolve interference, provide correct Coordination Drawings and Layout Drawings, or call attention to changes required in other work as a result of modifications.
   1. Core-drilling and other remedial work resulting from missing or mis-located sleeves shall be provided at no additional cost to Owner.
   2. In the event core-drilling severs reinforcing or otherwise weakens the structure, provide additional reinforcing and support as required, as determined by the structural engineer, to restore the structure's originally-designed load-carrying capability.

E. Coordination Meetings: Schedule with affected Contractors. Refer to Section 01 31 00.

1.6 APPROVAL

A. After written approval of Coordination Drawings and Layout Drawings by each affected subcontractor, determine method used to resolve interferences not previously identified.

B. Give written approval of acceptable changes to Coordination Drawings and Layout Drawings prior to start of work in affected area.

C. Maintain one copy of current approved Coordination Drawings and Layout Drawings on Project Site.

1.7 SUBMITTALS

A. Submit in accordance with Section 01 31 00.

B. Project Information:
   1. Contractor's stamped, approved Coordination Drawings.
      a. Letter indicating one copy of approved Coordination Drawings available at project site.
      b. One copy of approved coordination Drawings delivered to Architect for information and file.
   2. Contractor's proposed sleeve, core drill, and block-out Layout Drawings.
      a. One copy of drawing to Architect for information and file.

C. Architect's Action: Refer to Section 01 33 00 for Information Submittals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

04J05H

SECTION 01 32 00

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Preliminary Construction Schedule.
   2. Contractor's Construction Schedule.
   3. Submittals Schedule.
   4. Daily construction reports.
   5. Material location reports.
   6. Field condition reports.
   7. Special reports.

B. Related Sections include the following:
   1. Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
   2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
   3. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
   4. Division 01 Section "Photographic Documentation" for submitting construction photographs.

1.2 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
   2. Predecessor activity is an activity that must be completed before a given activity can be started.

B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.

D. Event: The starting or ending point of an activity.

E. Float: The measure of leeway in starting and completing an activity.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.

G. Daily Construction Reports: Submit two copies at weekly intervals.

H. Material Location Reports: Submit two copies at monthly intervals.

I. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

J. Special Reports: Submit two copies at time of unusual event.

1.4 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:
1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, and interim milestones.
4. Review delivery dates for Owner-furnished products.
5. Review time required for review of submittals and resubmittals.
6. Review requirements for tests and inspections by independent testing and inspecting agencies.
7. Review time required for completion and startup procedures.
8. Review and finalize list of construction activities to be included in schedule.
9. Review submittal requirements and procedures.
10. Review procedures for updating schedule.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.
   2. Work under More Than One Contract: Include a separate activity for each contract.
   3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
   4. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary of Work." Delivery dates indicated stipulate the earliest possible delivery date. Indicate latest possible delivery date that will not affect critical path.
   5. Work Restrictions: Show the effect of the following items on the schedule:
      a. Coordination with existing construction.
      b. Limitations of continued occupancies.
      c. Uninterruptible services.
      d. Use of premises restrictions.
      e. Provisions for future construction.
      f. Seasonal variations.
      g. Environmental control.
   6. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
      a. Subcontract awards.
      b. Submittals.
      c. Purchases.
      d. Mockups.
      e. Fabrication.
      f. Sample testing.
      g. Deliveries.
      h. Installation.
      i. Tests and inspections.
      j. Adjusting.
      k. Curing.
      l. Startup and placement into final use and operation.
   7. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
      a. Structural completion.
      b. Permanent space enclosure.
      c. Completion of mechanical installation.
      d. Completion of electrical installation.
      e. Substantial Completion.

F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

d. Fabrication.
e. Installation.

2. Processing: Process data to produce output data or a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
3. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
   a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

D. Initial Issue of Schedule: Prepare initial network diagram from a list of straight "early start-total float" sort. Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediate preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Average size of workforce.
10. Dollar value of activity (coordinated with the Schedule of Values).

E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
2. Changes in early and late start dates.
3. Changes in early and late finish dates.
4. Changes in activity durations in workdays.
5. Changes in the critical path.
6. Changes in total float or slack time.
7. Changes in the Contract Time.
8. Schedule early completion of areas in accordance with Phasing requirements. Refer to Section 01 11 00.

F. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
   a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
   b. Submit value summary printouts one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate Actual Completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

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SECTION 01 32 33

PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:
   1. Preconstruction photographs.
   2. Periodic construction photographs.
   3. Preconstruction videotapes.
   4. Demonstration and training videotapes.

B. Related Sections include the following:
   1. Division 01 Section "Submittal Procedures" for submitting photographic documentation.
   2. Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.

1.2 SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph and videotape. Indicate elevation or story of construction. Include same label information as corresponding set of photographs and videotape.

B. Construction Photographs: Submit three prints of each photographic view within seven days of taking photographs.
   1. Format: 8-by-10-inch (203-by-254-mm) smooth-surface matte prints on single-weight commercial-grade photographic paper, enclosed back to back in clear plastic sleeves that are punched for standard 3-ring binder.
   2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
      a. Name of Project.
      b. Name and address of photographer.
      c. Name of Architect.
      d. Name of Contractor.
      e. Date photograph was taken if not date stamped by camera.
      f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
      g. Unique sequential identifier.
   3. Negatives: Submit a complete set of photographic negatives in individually protected negative sleeves with each submittal of prints. Identify negatives with label matching photographic prints.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
   1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Film Images:
   1. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
   2. Field Office Prints: Retain one set of prints of progress photographs in the field office at Project site, available at all times for reference. Identify photographs same as for those submitted to Architect.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
   1. Date and Time: Include date and time in filename for each image.
   2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Architect.

D. Preconstruction Photographs: Before commencement of site clearing, excavation, and demolition, take color print and digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
   1. Flag excavation areas and construction limits before taking construction photographs.
   2. Take twelve photographs to show existing conditions adjacent to property before starting the Work.
   3. Take twelve photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
   4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

E. Periodic Construction Photographs: Take 12 color print and digital photographs monthly, coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of color print and digital photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

G. Final Completion Construction Photographs: Take twelve color photographs after date of Substantial Completion for submission as Project Record Documents. Architect will direct photographer for desired vantage points.
   1. Do not include date stamp.

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SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Information, Samples, and other miscellaneous submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.3 SUBMITTAL PROCEDURES

A. General: Electronic CAD files of the Contract Drawings will NOT be furnished by Architect for Contractor's use in preparing submittals unless procedures stated within the attached Appendix A are agreed to by all parties and all parties sign the Agreement Form.
   1. The drawings represented in the CAD files are not Contract Documents.
   2. Attached Agreement Form applies to Architectural Drawings only. If Contractor desires electronic drawing files for Drawings prepared by one of Architect's consultants, Contractor may contact consultant directly to obtain such files.
   3. Contractor shall recognize that various consultants retained by the Architect for this Project may have agreements that differ from that included in Appendix A, and may have differing costs and procedures involved with obtaining electronic drawing files.
   4. Architect makes no assertion that consultants will furnish electronic files of their Drawings. Additionally, not all Drawings may be available electronically. Files generally available for transfer will be limited to an impediments file as described in the Agreement.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using approved transmittal form which is attached. Architect will return submittals, without review received from sources other than Contractor.
1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
3. Transmittal Form: Use sample form included in Appendix C at end of Section.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Use only final submittals with mark indicating "Approved" or "Approved as Noted" action taken by Architect in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.
1. Number of Copies:
a. Submit four copies of each submittal, unless otherwise indicated. Architect will retain one copy and return three copies. Mark up and retain one returned copy as a Project Record Document. Copies shall be distributed as follows:
1) One copy for Contractor's use.
2) One copy for subcontractor's use.
3) One copy shall be provided to the Owner. Furnish Owner with final copy designated as "Approved" or "Approved as Noted" only.
4) Contractor shall be responsible for providing additional copies as required for additional personnel, field use, etc.
b. Submit one extra set of submittals to be retained by Architect's consultant, where the consultant was delegated design responsibility for that item of work to which submittal pertains.
c. Submit one extra set of applicable Division 23-related submittals for Commissioning of HVAC system.

5. Number of Copies: Submit one correctable, translucent, reproducible print and three opaque prints of each submittal. Architect will return the marked-up reproducible print and two opaque prints for Contractor to make copies and distribute.

D. Samples: Prepare physical units of materials or products, including the following:
   1. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.
   2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
      a. Submit color charts showing actual colors (photographic representations or reproductions will not be accepted).
   3. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   4. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
      a. Generic description of Sample.
      b. Product name or name of manufacturer.
      c. Sample source.
   5. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:
      a. Size limitations.
      b. Compliance with recognized standards.
      c. Availability.
      d. Delivery time.
   6. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
      a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
      b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

b. Submit one extra set of applicable Division 23 and other mechanical and controls-related submittals for commissioning of HVAC System.

2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

3. Test and Inspection Reports: Comply with requirements in Division 01 Section "Quality Requirements."

B. Coordination Drawings: Refer to Section 01 31 06.

C. Contractor's Construction Schedule: Comply with requirements in Division 01 Section "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

L. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.

M. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

U. Material Safety Data Sheets: Not a required submittal, nor subject to Architect's review or approval, since Contractor remains solely responsible for job site safety controls, procedures, and programs. Submit information directly to Owner as part of Closeout Submittals unless otherwise directed. If submitted to Architect, Architect will not review this information and will return it with no action taken.

2.3 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Information, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
1. Verify:
   a. Field measurements.
   b. Field construction criteria.
   c. Catalog numbers and similar data.
   d. Proper interface with adjacent or related work.
2. Coordinate each submittal with requirements of Work of Contract Documents.
3. Assign submittal number in accordance with the following:
   a. 6-digit Specification Section number.
   b. 2-digit number representing product, material, or item in referenced Section to which submittal pertains (01, 02, 03, 04, etc.).
   c. Single letter representing submittal sequence (A for initial submittal, B for first re-submittal, C for second re-submittal, etc.).
4. Each specified material, product, or item shall be submitted individually, as a separate, uniquely identified submittal. Assembled booklets containing multiple products or systems will not be permitted, and will be returned without action.

PERKINS
+WILL

DATE: _____

NAME: _____

COMPANY: _____

ADDRESS: _____

_____

PROJECT: **Parking Garage, Medical Center of Aurora-South Campus**
Aurora, Colorado

ELECTRONIC DRAWING FILE TRANSFER AGREEMENT FORM

At the *Contractor's* request, Perkins+Will, will provide electronic files for the *Contractor's* convenience and use in the preparation of shop drawings related to the above-referenced Project, subject to the following terms and conditions:

Perkins+Will makes no representation as to the compatibility of these files with the *Contractor's* hardware or software.

The electronic files are not Contract Documents. The undersigned *Contractor* acknowledges that the true and accurate record of the design is the most recent issued printed hard copy of the design, not the requested electronic data. In the event that a conflict arises between the *Architect's* signed and sealed hard-copy Contract Documents and the electronic files, the signed and sealed hard-copy Contract Document shall govern. *The Contractor* is responsible for determining if any conflict exists. **The undersigned *Contractor* agrees to hold harmless and indemnify Perkins+Will from and against all claims, liabilities, losses, damages and costs, including but not limited to attorney's fees, arising out of or in any way connected with the modification, misinterpretation, misuse or reuse by others of the electronic information provided by Perkins+Will.**

Data contained on these electronic files are part of the Architect's instruments of service and shall not be used by *the Contractor* or anyone else receiving these data through or from *the Contractor* for any purpose other than as a convenience in the preparation of shop drawings for the above-referenced Project. The use of these drawing files does not relieve *the Contractor* of any of the requirements or responsibilities for checking and coordination of the Work as described in the Contract Documents. When modified for project-related services, *the Contractor* shall add *Contractor's* company name, address, telephone number and contact information to the title block of each sheet. Because of the potential that the information presented on the electronic files can be modified, unintentionally or otherwise, Perkins+Will reserves the right to remove all indicia of ownership and/or involvement from each electronic display.

Perkins + Will will furnish the undersigned *Contractor* electronic files of the following Drawing sheets: (*Contractor to list drawings here*)

_____

_____

The electronic information will include only an impediments file (walls, doors, windows, millwork, columns, column grid and grid identifiers, room names, room numbers, drawing name and drawing scale). Legal disclaimers will be added to the files when required by state licensing authorities.

A service fee of $250 (two hundred and fifty dollars) per single plan file drawing shall be remitted.

Under no circumstances shall delivery of the electronic files for use by the undersigned *Contractor* be deemed a sale by Perkins+Will, and Perkins+Will makes no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall Perkins + Will be liable for any loss of profit or any consequential damages as a result of the *Contractor's* use or reuse of these electronic files.

All reports, plans, specifications, computer files, field data, notes and other documents and instruments prepared by the *Architect* as instruments of service shall remain the property of the *Architect*. The *Architect* shall retain all common law, statutory and other reserved rights, including the copyright thereto.

Upon return receipt of this signed agreement and a certified check made payable to Perkins + Will, the drawing files will be transmitted to the designated *Contractor* via courier, electronic mail or posted on the Perkins+Will file transfer protocol site or project web site.

ACKNOWLEDGED AND ACCEPTED:
(The Contractor)

PERKINS+WILL
(The Architect)

_____
Company

_____
Printed Name

_____
Printed Name of Recipient

_____
Signature

_____
Signature of Recipient

_____
Title

_____
Title

_____
Date

_____
Date

END OF AGREEMENT

Advancement of Construction Technology

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: Parking Garage, Medical Center of Aurora-South Campus
Aurora, Colorado

To (A/E): Perkins+Will

From (Contractor): _____

Date: _____

A/E Project Number: 142311.000

Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact

☐ Attachments

Signed by: _____ Date: _____

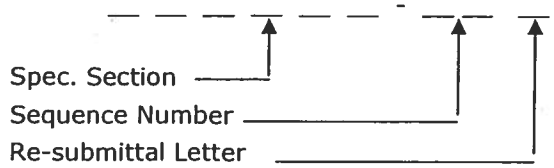
Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

Copyright 1994, Construction SpecificationsInstitute,
501 Madison Street, Alexandria, VA 22314-1791

SUBMITTAL TRANSMITTAL

SUBMITTAL NUMBER:

PROJECT: **Parking Garage**
Medical Center of Aurora
South Campus, Aurora, CO
P+W Project No: 142311.000



SPECIFICATION SECTION:
Number:_____

Title: _____

DESCRIPTION OF PRODUCT:

_____

NOTES:

1. Submittal Transmittal to Architect indicates Construction Manager's, Contractor's, and Subcontractor's Approval of Submittal.
2. This Transmittal Form shall stay with Submittal throughout routing. Copy for your file.

ROUTING SEQUENCE	CHECKED BY	DATE REC'D.	DATE SENT	No. of COPIES	ACTION TAKEN*
SUBCONTRACTOR OR VENDOR		N/A			A (See Note 1 above)
CONTRACTOR					A (See Note 1 above)
ARCHITECT					
CONSULTANT					
ARCHITECT					
CONTRACTOR					
SUBCONTRACTOR OR VENDOR			N/A		
OWNER	N/A		N/A		N/A

ACTION LEGEND: (*Indicate in ACTION TAKEN column above.)

A - APPROVED
B - APPROVED AS NOTED
C - REVISE AND RESUBMIT
D - NOT APPROVED
E - NO ACTION REQUIRED BY ARCHITECT
1 Submittal not required.
2 Project Closeout information.
3 Informational Submittal.

REMARKS:

[ ] SEE ATTACHED COMMENTS

[ ] SEE ENCLOSED SUBMITTAL FOR COMMENTS

[ ] LANGUAGE ON CONTRACTOR'S SUBMITTAL STAMP IS NOT CONSISTENT WITH CONTRACT REQUIREMENTS

_____
_____
_____
_____

Last Updated 08-23-05

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SECTION 01 35 13

HOSPITAL PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes environmental control specific to occupied medical care facilities.

1.2 PUBLISHED REGULATIONS

A. Abide by published hospital regulations and amendments, including those that may be issued during the Contract. Particular attention is called to regulations pertaining to circulation, noise, sanitation, safety, security, and behavior.

1.3 OWNER'S REPRESENTATIVE

A. Abide by directions of Owner's Representative in matters affecting operation, safety, and security of Hospital, patients, and visitors.

B. Abide by directions of Hospital Fire Marshal in matters pertaining to fire safety and preventative measures.
   1. Immediately implement oral instructions by local Fire Marshal. Confirmation or explanation of oral instructions will be made by Owner by written notice or at next scheduled progress meeting.

C. Instruct personnel employed by Contractor, including sub-contractors and their employees, to abide by published regulations, and directives of Owner's Representative and Fire Marshal.

1.4 ENVIRONMENTAL CONTROLS

A. Noise Control: Execute Work as quietly as practicable to avoid unnecessary disturbance of patients.
   1. Complaints duly registered by Owner of unacceptable noise levels is cause for implementation of special precautions and methods of operation, as directed by Owner, to reduce noises to acceptable levels.
   2. Owner is sole judge of noise level tolerability.
   3. Submit "Noise Schedule" as soon as practicable indicating type of demolition and other noise inducing construction operations showing dates, times, and duration of such work.

B. Temporary Partitions: Provide 1 hour fire rated temporary partitions and door openings.

1.5 PERSONNEL IDENTIFICATION

A. Employees of Contractor and subcontractors are required to wear Owner approved numbered identification badges while on Hospital premises.

B. If in Owner's judgment, any item of work is being unreasonably delayed and interfering with progress of other dependent work through no fault of Owner, overtime work may be ordered at Contractor's expense.

C. Owner may direct Contractor to perform overtime work not originally required by Contract. When overtime work is requested for convenience, additional payment to Contractor will be made for premium time only.

1.11 TORCH-CUTTING AND WELDING PERMITS

A. Refer to Section 02 41 20 for additional requirements.

B. Welding: Neither welding nor arc-welding will be permitted without appropriate permit from Hospital Fire Marshal.
1. Hospital has right to stop work at any time if it is determined that unsafe conditions exist.
2. Correct unsafe conditions as directed by local Fire Marshal and obtain approval of such corrections prior to commencing further work.
3. Provide electrical power directly from panel box for use by arc-welding equipment. Ascertain that electrical panel has capacity to support welding operations without negative impact on Hospital electrical loads. Do not use Hospital outlets for power sources.
4. Use of single-phase transformer welding equipment is not permitted.
5. No welding will be permitted when critical procedures are taking place in adjacent areas; coordinate with Owner.

C. Fire Protection: Keep required exit corridors and passageways clear and unobstructed.
1. Remove flammable materials to location not closer than 35 feet from welding operations.
2. Instruct workmen to location of nearest fire alarm.
3. Completely cover fixed flammable items with fire-resistant blankets.
4. Existing smoke detectors and fire sprinkler systems shall remain operational throughout Project. If possible false alarms are anticipated during specific construction operations, detectors may be covered during that specific operation with proper notifications and concurrence of local jurisdiction, but must be cleared and operable at end of each working day.

1.12 BUILDING PERMIT

A. Obtain building permit and be responsible for securing any necessary inspection fees. Include cost in Contract Sum.

B. Conspicuously display permit at Project site.

PART 2 - PRODUCTS

2.1 EXISTING UNATTACHED EQUIPMENT

A. Existing unattached equipment scheduled for salvage or reuse will be removed from work area by Owner prior to start of construction.

IMPLEMENTATION OF INTERIM LIFE SAFETY PROGRAM

FOR HCA PROJECTS

Definition: Interim Life Safety Measures (ILSM) = A series of eleven administrative actions required to temporarily compensate for the hazards posed by existing NFPA 101 2000 Life Safety Code deficiencies or construction activities.

Policies:

1. Implementation of ILSM shall be required in or adjacent to all construction areas and throughout buildings with existing LSC deficiencies.

2. ILSM shall apply to all personnel (including construction workers) and shall be implemented upon project development and be continuously enforced through project completion.

3. The ILSM shall consist of the following actions:

    a. Ensuring free and unobstructed exits. Personnel receive additional training when alternative exits are designated. Buildings or areas under construction must maintain escape routes for construction workers at all times. Means of exiting construction areas are inspected daily.

    b. Ensuring fire alarm and unobstructed access to emergency services and for fire, police, and other emergency forces.

    c. Ensuring fire alarm, detection, and suppression systems are in good working order. A temporary but equivalent system shall be provided when any fire system is impaired. Temporary systems must be inspected and tested monthly.

    d. Ensuring temporary construction partitions are smoke tight and built of non combustible or limited combustible materials that will not contribute to the development or spread of fire.

    e. Providing additional fire-fighting equipment and training personnel in its use.

    f. Prohibiting smoking according to EC.5 throughout the organization's buildings, and in and adjacent to construction areas.

    g. Developing and enforcing storage, housekeeping, and debris removal practices that reduce the building's flammable and combustible fire load to the lowest feasible level.

    h. Conducting a minimum of two fire drills per shift per quarter.

    i. Increasing hazard surveillance of buildings, grounds and equipment, with special attention to excavations, construction areas, construction storage, and field offices.

    j. Training personnel to compensate for impaired structural or compartmentalization features of fire safety.

    k. Conducting organization-wide safety education programs to promote awareness of LSC deficiencies, construction hazards and ILSM.

ATTACHMENT A

Report of construction activities and/or situations in which there are Existing NFPA 101 2000 Life Safety Code deficiencies to Safety Committee.

Date: _____

Facility: _____

Describe nature and extent of construction activities and/or situations in which there are existing NFPA 101 2000 LSC deficiencies (include length of time estimated for project):

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Considerations:

1. Will exits in project area be obstructed? ( )Yes ( )No
   If yes, what plans are in place to provide alternate egress?

_____

_____

_____

2. If alternate exits must be designated or if other fire safety features are impaired, who will be responsible to train personnel?

_____

_____

3. Will access to the emergency services of the facility be obstructed? ( )Yes ( )No
   If yes, how will traffic be rerouted?

_____

_____

Decision of Safety Committee:

The following ILSM shall be initiated for the duration of the construction project and/or existence of deficiencies:

A Y A appropriate measures

( ) a. Ensuring free and unobstructed exits. Personnel receive additional training when alternative exits are designated. Buildings or areas under construction must maintain escape routes for construction workers at all times. Means of exiting construction areas are inspected daily.

( ) b. Ensuring free and unobstructed access to emergency services and for fire, police and other emergency forces.

( ) c. Ensuring fire alarm, detection and suppression systems are in good working order. A temporary but equivalent system shall be provided when any fire system is impaired. Temporary systems must be inspected and tested monthly.

( ) d. Ensuring temporary construction partitions are smoke tight and built of noncombustible or limited combustible materials that will not contribute to the development or spread of fire.

( ) e. Providing additional fire-fighting equipment and training personnel in its use.

( ) f. Prohibiting smoking according to EC.5 throughout the organization's buildings and in and adjacent to construction areas.

( ) g. Developing and enforcing storage, housekeeping and debris removal practices that reduce the building's flammable and combustible fire load to the lowest feasible level.

( ) h. Conducting a minimum of two fire drills per shift per quarter.

( ) i. Increasing hazard surveillance of buildings, grounds and equipment with special attention to excavations, construction areas, construction storage and field offices.

( ) j. Training personnel to compensate for impaired structural or compartmentalization features of fire safety.

( ) k. Conducting organization-wide safety education programs to promote awareness of LSC deficiencies, construction hazards and ILSM.

_____

_____ _____

Signature of Plant Operations Director Date

ATTACHMENT C

INTERIM LIFE SAFETY MEASURES CHECKLIST

1.	Do all exits provide free and unobstructed egress? If not, describe:	____Yes ____No
2.	Do buildings or areas under construction maintain escape routes for construction workers?	____Yes ____No
3.	Have personnel received training if alternative exits have been designated or if any other fire safety features are impaired?	____Yes ____No
4.	Is there free and unobstructed access to the emergency departments/services and for emergency forces?	____Yes ____No
5.	If the fire alarm system is impaired, is there a temporary, but equivalent system provided?	____Yes ____No
	Is there appropriate posting in the department to notify employees that an interim life safety fire plan is in place? If not, describe:	____Yes ____No
6.	Are additional fire drills being performed (at least 2 per shift/quarter)?	____Yes ____No
7.	Are temporary construction partitions smoke tight and built of noncombustible or limited combustible materials that will not contribute to the development or spread of fire? If not, describe:	____Yes ____No
8.	Is additional fire fighting equipment available for personnel in construction area? If not, describe:	____Yes ____No
9.	Is there evidence of smoking in or adjacent to all construction areas? If so, describe:	____Yes ____No
10.	Does the storage, housekeeping and debris removal indicate that the flammable and combustible fire load has been reduced to the lowest level necessary for daily operations? If not, describe:	____Yes ____No

Other comments: _____

Date: _____ Time: _____

Person conducting the surveillance: _____

Facility: _____ Site observed: _____

* Send to Safety Office. Safety Office will distribute referrals to appropriate department directors and/or the construction foreman if needed.

23H05

SECTION 01 35 16

ALTERATION PROJECT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Products and installation for patching and extending Work within construction areas of existing facilities.
   2. Providing transition and adjustments.
   3. Repair of damaged surfaces and finishes.

1.2 OCCUPANCY, ACCESS, AND PROTECTION

A. Entire facility will be occupied during progress of construction for conduct of normal operations. Phase Work in accordance with Section 01 11 00.

B. Normal business hours for facility are generally from 8:00 AM through 5:00 PM, seven days a week.
   1. Patient Areas of Medical Care Facilities: 24 hours per day, seven days a week.

C. Cooperate with Owner in scheduling operations to minimize conflict and to permit continuous usage. Perform work not to interfere with operations of occupied areas.

D. Existing facilities will remain in full operation during execution of this Work. Exercise every precaution to ensure safety and protection for existing facilities, occupants, merchandise, pedestrians, and vehicles.
   1. Maintain safe access and egress at all times for occupants, pedestrians, and vehicles.
   2. Provide protection to prevent damage to facilities, merchandise, and vehicles from dust, water, weather, and other similar harmful elements. Refer to Section 01 50 00 - Temporary Facilities and Controls for additional requirements.
   3. Maintain exiting from facilities to provide safe passage complying with applicable codes.

1.3 SCHEDULING OF WORK

A. Make arrangements with Owner and schedule Work to avoid interference with normal operations of occupied areas. Submit schedule and summary of applicable Work within occupied areas and obtain Owner approval not less than two days prior to commencement of such Work.
   1. Requests for use of certain existing loading docks, passage ways, and other similar spaces within areas outside limits of construction operations will be limited to day-by-day basis and must be approved in advance by Owner.

B. Coordinate access and scheduling of Work within tenant areas with Owner.

C. Salvaged Materials: Salvage sufficient quantities of cut or removed material to replace damaged Work of existing construction, when material is not readily obtainable on current market.
   1. Store salvaged items in dry, secure place on site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Comply with provisions of Section 01 43 00.
   1. Verify that areas are ready for alteration and remodeling.

B. Discrepancies: Verify dimensions and elevations indicated in layout of existing work.
   1. Prior to commencing work, carefully compare and check Contract Documents for discrepancies in locations or elevations of work to be executed.
   2. Refer discrepancies among Drawings and existing conditions to Architect for adjustment before work affected is performed.

3.2 PREPARATION

A. Cut, move, or remove items as necessary for access to alteration and renovation Work.
   1. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, deteriorated masonry and concrete, and other deteriorated materials. Replace materials as specified for finished Work.
   2. Remove debris and abandoned items from area and from concealed spaces.

B. Cutting and Removal: Perform cutting and removal work to remove minimum necessary, and in manner to avoid damage to adjacent work. Cut finish surfaces such as masonry, tile, plaster, or metals by methods to terminate surfaces in straight line at natural point of division.

C. Prepare surface and remove surface finishes as necessary to provide for proper installation of new materials and finishes.

D. Close openings in exterior surfaces to protect existing Work from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.

E. Provide temporary barriers and closures to control operations to prevent spread of dust to occupied portions of building; refer to Section 01500.

3.3 INSTALLATION

A. Coordinate Work of alterations and renovations to expedite completion and to accommodate Owner occupancy.

B. Remove, cut, and patch Work in manner to minimize damage and to provide means of restoring products and finishes to specified condition.

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SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in Document 00 52 34 – Owner-Contractor Agreement Form.

B. "Approved": The term "approved," when used in conjunction with Architect's action on Contractor's submittals, applications, and requests, is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by Architect, requested by Architect, and similar phrases.

D. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on Drawings; or to other paragraphs or schedules in Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference.

E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": The term "furnish" means to supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": The term "install" describes operations at Project site including unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities, either exclusively or in conjunction with others performing other work as part of Project. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

J. "Installer": An installer is Contractor or another entity engaged by Contractor, as an employee, subcontractor, or contractor of lower tier, to perform a particular construction operation, including installation, erection, application, and similar operations.

F. Industry Organizations: Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of these entities. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

04J05H

SECTION 01 43 00

QUALITY ASSURANCE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
   1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
   2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
   3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:
   1. Divisions 02 through 39 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

D. Reports: Prepare and submit certified written reports that include the following:
1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Refer to Section 01 43 19 and individual sections of the Specifications for mockup requirements.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated in individual sections as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and as required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.
2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.
1. Testing agency will notify Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

04J05H

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:
1. Sewers and drainage.
2. Water service and distribution.
3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
4. Heating and cooling facilities.
5. Ventilation.
6. Electric power service.
7. Lighting.
8. Telephone service.

C. Support facilities include, but are not limited to, the following:
1. Temporary roads and paving.
2. Dewatering facilities and drains.
3. Project identification and temporary signs.
4. Waste disposal facilities.
5. Field offices.
6. Storage and fabrication sheds.
7. Lifts and hoists.
8. Temporary elevator usage.
9. Temporary stairs.
10. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities include, but are not limited to, the following:
1. Environmental protection.
2. Stormwater control.
3. Tree and plant protection.
4. Pest control.
5. Site enclosure fence.
6. Security enclosure and lockup.
7. Barricades, warning signs, and lights.
8. Covered walkways.
9. Temporary enclosures.
10. Temporary partitions.
11. Fire protection.

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
   1. Keep temporary services and facilities clean and neat.
   2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. Undamaged, previously used materials in serviceable condition may be used if approved by Architect. Provide materials suitable for use intended.

B. Pavement: Comply with Division 32 Section "Concrete Paving".

C. Chain-Link Fencing: Minimum 2-inch(50-mm), 0.148-inch-(3.76-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet(1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch-(60-mm-) OD line posts and 2-7/8-inch-(73-mm-) OD corner and pull posts, with 1-5/8-inch-(42-mm-) OD top rails

D. Lumber and Plywood: Comply with requirements in Division 06 Section "Miscellaneous Carpentry".

E. Gypsum Board: Minimum 1/2 inch(12.7 mm) thick by 48 inches(1219 mm) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 1396.

F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively.

G. Paint: Comply with requirements in Division 09 Section "Painting."

H. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

I. Water: Potable.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Field Offices: Prefabricated with lockable entrances, operable windows, and serviceable finishes; heated and air conditioned; on foundations adequate for normal loading.

C. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

B. Uninterrupted utilities services to the existing facilities is imperative. Provide temporary utilities as necessary during required change over times for each utility to ensure uninterrupted service.

C. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge of effluent, provide containers to remove and dispose of effluent off-site in a lawful manner.
   1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
   2. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.
   3. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.

D. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction until permanent water service is in use. Sterilize temporary water piping before use.
   1. Provide rubber hoses as necessary to serve Project site.
   2. As soon as water is required at each level, extend service to form a temporary water- and fire-protection standpipe. Provide distribution piping. Space outlets so water can be reached with a 100-foot (30-m) hose. Provide one hose at each outlet.
   3. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
   4. Provide pumps to supply a minimum of 30-psi(200-kPa) static pressure at highest point. Equip pumps with surge and storage tanks and automatic controls to supply water uniformly at reasonable pressures.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Disposable Supplies: Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Maintain adequate supply. Provide covered waste containers for disposal of used material.
   2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.
   3. Drinking-Water Facilities: Provide bottled-water, drinking-water units.
      a. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 deg F(7.2 to 12.7 deg C).
   4. Locate toilets and drinking-water fixtures so personnel need not walk more than two stories vertically or 200 feet (60 m) horizontally to facilities.

F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or

K. Telephone Service: Provide temporary telephone service throughout construction period for common-use facilities used by all personnel engaged in construction activities. Install separate telephone line for each field office and first-aid station.
   1. Provide additional telephone lines for the following:
      a. In field office with more than two occupants, install a telephone for each additional occupant or pair of occupants.
      b. Provide a dedicated telephone line for each facsimile machine
      c. Provide high-speed internet service for each computer with modem in each field office.
      d. Provide a separate telephone line for Owner's use.
   2. At each telephone, post a list of important telephone numbers.
      a. Police and fire departments.
      b. Ambulance service.
      c. Contractor's home office.
      d. Architect's office.
      e. Engineers' offices.
      f. Owner's office.
      g. Principal subcontractors' field and home offices.
   3. Provide voice-mail service on superintendent's telephone.
   4. Provide a portable cellular telephone with voice-mail capability for superintendent's use in making and receiving telephone calls when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
   2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet(9 m) of building lines. Comply with NFPA 241.
   3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate to support loads and to withstand exposure to traffic during construction period. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
   1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
   2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Excavation and Fill."
   3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
   4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt

personnel and meetings of 10 persons at Project site. Keep office clean and orderly.

1. Furnish and equip offices as follows:
   a. Desk and four chairs, four-drawer file cabinet, a plan table, a plan rack, and bookcase.
   b. Water cooler and private toilet complete with water closet, lavatory, and medicine cabinet with mirror.
   c. Provide a room of not less than 240 sq. ft.(22.5 sq. m) for Project meetings. Furnish room with conference table, 12 folding chairs, and 4-foot-(1.2-m-) square tack board.
2. Provide resilient floor covering and painted gypsum wallboard or wood paneled walls and acoustical ceiling. Provide operable windows with adjustable blinds and insect screens.
3. Provide an electric heater with thermostat capable of maintaining a uniform indoor temperature of 68 deg F(20 deg C). Provide an air-conditioning unit capable of maintaining an indoor temperature of 72 deg F(23 deg C).
4. Provide fluorescent light fixtures capable of maintaining average illumination of 20 fc(215 lx) at desk height. Provide 110- to 120-V duplex outlets spaced at not more than 12-foot(4-m) intervals, 1 per wall in each room.

I. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility services. Sheds may be open shelters or fully enclosed spaces within building or elsewhere on-site.
   1. Construct framing, sheathing, and siding using fire-retardant-treated lumber and plywood.
   2. Paint exposed lumber and plywood with exterior-grade acrylic-latex emulsion over exterior primer.

J. Lifts and Hoists: Provide facilities for hoisting materials and personnel. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

K. Temporary New Elevator Usage: Refer to Division 14 Sections for temporary use of new elevators.
   1. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
   2. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

L. Existing Building Elevator Usage: Use of Owner's existing elevators will not be permitted.

M. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

of possible hazard. Where appropriate and needed, provide lighting, including flashing red or amber lights.

1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch-(16-mm-) thick exterior plywood.

H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Vertical Openings: Close openings of 25 sq. ft.(2.3 sq. m) or less with plywood or similar materials.
3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
5. Where temporary wood or plywood enclosure exceeds 100 sq. ft.(9.2 sq. m) in area, use fire-retardant-treated material for framing and main sheathing.

I. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.

1. Construct dustproof partitions of not less than nominal 4-inch(100-mm) studs, 5/8-inch(16-mm) gypsum wallboard with joints taped on occupied side, and 1/2-inch(13-mm) fire-retardant plywood on construction side.
2. Insulate partitions to provide noise protection to occupied areas.
3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
4. Protect air-handling equipment.
5. Weatherstrip openings.

J. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
   a. Field Offices: Class A stored-pressure water-type extinguishers.
   b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
   c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.

DOCUMENT 01 56 39

TEMPORARY TREE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the protection and trimming of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent construction.

B. For additional requirements on Protection of Transplanted Trees and Existing Trees to Remain review the City of Aurora's "Standards for Protecting Trees During Construction". Contact The City of Aurora Forestry Division at 303-739-7177 for a copy of the Standards and additional information.

C. Related Sections include the following:

1. Division 1 Section "Summary" for limits placed on Contractor's use of the site.
2. Division 1 Section "Temporary Facilities and Controls" for temporary tree protection.
3. Division 2 Section "Site Clearing" for removal limits of trees, shrubs, and other plantings affected by new construction.
4. Division 2 Section "Earthwork" for building and utility trench excavation, backfilling, compacting and grading requirements, and soil materials.
5. Division 2 Section "Exterior Plants" for tree and shrub planting, tree support systems, and soil materials.

1.3 DEFINITIONS

A. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Tree Pruning Schedule: Written schedule from arborist detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

C. Qualification Data: For tree service firm and arborist.

E. Organic Mulch: Shredded hardwood free of deleterious materials.

PART 3 - EXECUTION

3.1 PREPARATION

A. Temporary Fencing: Install temporary fencing around tree protection zones to protect remaining trees and vegetation from construction damage. Maintain temporary fence and remove when construction is complete.

1. Install chain-link fence according to ASTM F 567 and manufacturer's written instructions.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems.

D. Maintain tree protection zones free of weeds and trash.

E. Do not allow fires within tree protection zones.

3.2 EXCAVATION

A. Install shoring or other protective support systems to minimize sloping or benching of excavations.

B. Do not excavate within tree protection zones, unless otherwise indicated.

C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.

1. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction.
2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

D. Where utility trenches are required within tree protection zones, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.

1. Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

1. Provide new trees of same size and species as those being replaced; plant and maintain as specified in Division 2 Section "Exterior Plants."
2. Provide new trees of 6-inch (150-mm) caliper size and of a species selected by Architect when damaged trees more than 6 inches (150 mm) in caliper size, measured 12 inches (300 mm) above grade, are required to be replaced. Plant and maintain new trees as specified in Division 2 Section "Landscape Work."

C. Aerate surface soil, compacted during construction, 10 feet (3 m) beyond drip line and no closer than 36 inches (900 mm) to tree trunk. Drill 2-inch- (50-mm-) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) o.c. Backfill holes with an equal mix of augered soil and sand.

3.6 DISPOSAL OF WASTE MATERIALS

A. Burning is not permitted.

B. Disposal: Remove excess excavated material and displaced trees from Owner's property.

END OF DOCUMENT 01 56 39

design of UL, Omega Point, or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Joint Treatment and Finishing Materials: For exhaust duct applications, provide joint treatment tape and joint compounds recommended in writing by grease duct fire protection manufacturer for finishing surfaces of lapped joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected

3.2 PREPARATION

A. Where welded-stud (impaling pin) anchorage system is used, remove rust and scale from steel substrates at locations to receive steel studs.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for particular conditions of installation in each case.

B. Install grease duct fire protection to comply with requirements for thicknesses, number of courses (layers), construction of joints and corners, and anchorage methods applicable to fire-resistance-rated assemblies indicated.

3.4 PROTECTION

A. Coordinate installation of grease duct fire protection with other construction to minimize cutting into, or removal of, installed fire-resistive materials. As other construction is successively completed, replace or repair grease duct fire protection that has been cut away to facilitate this other construction. Maintain complete coverage of full thickness on members and substrates protected by grease duct fire protection.

B. Provide final protection and maintain conditions in a manner acceptable to Installer, manufacturer, and authorities having jurisdiction that ensure that grease duct fire protection is without damage or deterioration at time of Substantial Completion.

END OF SECTION 07 81 60

SECTION 07 87 00

ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Smoke detector activated elevator door smoke containment screen and control system designed to provide a tight-fitting, smoke- and draft-control assembly.

B. Products Supplied But Not Installed Under This Section:
   1. End-of-line diode (3.9V, 2W). Installed at smoke detector to monitor the circuit.

1.02 SUBMITTALS

A. Reference Section 01330–Submittal Procedures; submit following items:
   1. Product Data.
   2. Shop Drawings: Include door width and height, jamb width, jamb and head projection, screen width, mounting height, and housing width. Show and identify related work performed under other sections of the specifications.
   3. Quality Assurance/Control Submittals:
      a. Qualifications:
         1) Proof of manufacturer qualifications.
         2) Proof of Installer qualifications.
      b. Certifications: Copy of specified items.
      c. Manufacturer's installation instructions and testing procedures

B. Closeout Submittals: Reference Section 01 77 00; submit following items:
   1. Operation and Maintenance Manual.
   2. Manufacturer's Warranties

1.03 QUALITY ASSURANCE

A. Overall Standards:
   1. Manufacturer shall maintain a quality control program in accordance with ICBO-ES Acceptance Criteria AC 77.

B. Qualifications:
   1. Manufacturer Qualifications: Minimum seven years experience in producing smoke containment systems of the type specified.
   2. Installer Qualifications: Factory trained by manufacturer.

C. Certifications:
   1. Manufacturer's ICC Evaluation Service report ESR-1136.
   2. California Department of Forestry and Fire Protection and Office of the State Fire Marshal Listing.
   3. Testing Laboratory Label.
   4. UL Listing.
   5. OSHPD Anchorage Pre-Approval No. OPA-0318

2.03 COMPONENTS

A. Screen:
   1. Film: Minimum 1 mil (0.025 mm) thick transparent polyimide film reinforced with minimum 100 denier Nomex yarn at .25 in (6.35 mm) each way.
   2. Magnetic Strips: Flexible multi-pole strips attached to longitudinal edges of film with low modulus silicone adhesive.

B. Housing: 20 gauge, powder coated, cold rolled steel container with dust cover and door with concealed hinges. Housings are 55, 64, or 73" in length plus 1-1/2 inches for a junction box on the left side.

C. Auxiliary Rails (for elevator frames that are nonferrous or stainless steel, or do not have flat 2 inch wide face, or are recessed in or flush with finished wall surface):
   1. Material: 16 gage ASTM A 240/240M, Type 430, ferritic stainless steel.
   2. Size: 2 inches (51 mm) wide; 1 inch (25 mm), 3/4 inch (19 mm) or 1/2 inches (13 mm) deep, depth as required to project beyond face of elevator door frame, as shown in Shop Drawings.

D. Rewind Motor: NFPA 70, 90v DC.

E. Release Mechanism: Comply with UL Standard No. 864.

F. Screen Rewind Switch: Include switch to rewind screen into housing.

2.04 IDENTIFICATION

A. Label each smoke containment system with following information:
   1. Manufacturer's name.
   2. Maximum leakage rating at specified pressure and temperature conditions.
   3. Label of quality control agency.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates upon which work will be installed.
   1. Verify related work performed under other sections is complete and in accordance with Shop Drawings.
   2. Verify wall surfaces and elevator door frames are acceptable for installation of smoke containment system components.
   3. Verify existing field painted elevator door frames to be used for screen adherence have been repainted in accordance with smoke containment system manufacturer's instructions or they have the original factory paint.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.

C. Commencement of work by installer is acceptance of substrate.

15E02

SECTION 07 95 13

ARCHITECTURAL JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Types of joints for which architectural joint systems are specified include the following:
   1. Wall and ceiling joints, floor joints, roof joints.

1.2 DEFINITIONS

A. Architectural Joint System: Any filler or cover used to span, fill, cover, or seal a joint, except expanding foam seals and poured or foamed in-place sealants.

B. Cyclic Movement: Periodic change between widest and narrowest joint widths in an automatically mechanically controlled system.

C. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist passage of flame and hot gases through a movement joint.

D. Maximum Joint Width: Widest linear gap a joint system tolerates and performs its designed function without damaging its functional capabilities.

E. Minimum Joint Width: Narrowest linear gap a joint system tolerates and performs its designed function without damaging its functional capabilities.

F. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint opening typically expressed in numerical values (mm or inches) or a percentage of nominal value of joint width.

G. Nominal Joint Width: Width of linear gap indicated as representing the conditions existing when architectural joint systems will be installed or, if no nominal joint width is indicated, a width equal to the sum of maximum and minimum joint widths divided by two.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide factory-fabricated architectural joint systems capable of withstanding the types of loads and of accommodating the kinds of movement, and the other functions for which they are designed including those specified below, without failure. Types of failure include those listed in Appendix X3 of ASTM E 1399.
   1. Vehicular Traffic Joints: Support vehicular traffic across joint.
   2. Pedestrian Traffic Joints: Support pedestrian traffic across joint.
   3. Exterior Joints: Maintain continuity of weather enclosure.
   4. Joints in Fire-Resistance-Rated Assemblies: Maintain fire-resistance ratings of assemblies.
   5. Joints in Smoke Barriers: Maintain integrity of smoke barrier.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: The design for each architectural joint system specified in Part 2 "Architectural Joint Systems" Article below is based on the products named. Subject to compliance with requirements, provide either the named products or comparable products by one of the other manufacturers listed.
   1. Architectural Art Manufacturing, Inc.
   2. Balco/Metalines.
   3. Construction Specialties.
   4. InPro Jointmaster.
   5. MM Systems Corp.
   6. Watson Bowman.

2.2 MATERIALS

A. Aluminum: ASTM B 221(ASTM B 221M), alloy 6063-T5 for extrusions; ASTM B 209 (ASTM B 209M), alloy 6061-T6 for sheet and plate.
   1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.

B. Preformed Seals: Single or multicellular extruded elastomeric seals designed with or without continuous, longitudinal, internal baffles. Formed to be installed in frames or with anchored flanges, in color indicated or, if not indicated, as selected by Architect from manufacturer's standard colors.

C. Strip Seals: Elastomeric membrane or tubular extrusions with a continuous longitudinal internal baffle system throughout complying with ASTM E 1783; used with compatible frames, flanges, and molded-rubber anchor blocks.

D. Compression Seals: Preformed, elastomeric extrusions having internal baffle system complying with ASTM E 1612 in sizes and profiles indicated or as recommended by manufacturer.

E. Preformed Cellular Foams: Neoprene or polyurethane extruded, compressible foam.

F. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint.

G. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, flexible moisture barrier and filler materials, drain tubes, lubricants, adhesives, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.3 ARCHITECTURAL JOINT SYSTEMS

A. General: Provide joint systems of design, basic profile, materials, and operation indicated. Provide units with the capability to accommodate joint widths indicated and variations in adjacent surfaces. Refer to Schedule at end of Section.

threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for handling and installing architectural joint assemblies and materials, unless more stringent requirements are indicated.

B. Coordinate installation of architectural joint assembly materials and associated work so complete assemblies comply with assembly performance requirements.

C. Terminate exposed ends of exterior architectural joint assemblies with factory-fabricated termination devices to maintain waterproof system.

D. Install factory-fabricated transitions between building expansion-joint cover assemblies and roof expansion-joint assemblies, specified in Division 7 Section "Roof Expansion Assemblies," to provide continuous, uninterrupted, watertight construction.

E. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required to install joint systems.
   1. Install joint cover assemblies in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
   2. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling.
   3. Set covers in horizontal surfaces at elevations that place exposed surfaces flush with adjoining finishes.
   4. Locate wall, ceiling, and soffit covers in continuous contact with adjacent surfaces.
   5. Securely attach in place with required accessories.
   6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches(75 mm) from each end and not more than 24 inches(600 mm) o.c.

F. Continuity: Maintain continuity of joint systems with a minimum number of end joints and align metal members. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames. Adhere flexible filler materials, if any, to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

G. Extruded Preformed Seals: Install seals to comply with manufacturer's written instructions and with minimum number of end joints.
   1. For straight sections, provide preformed seals in continuous lengths.
   2. Vulcanize or heat-weld field splice joints in preformed seal material to provide watertight joints using procedures recommended by manufacturer.
   3. Apply adhesive, epoxy, or lubricant adhesive approved by manufacturer to both frame interfaces before installing preformed seals.
   4. Seal transitions according to manufacturer's written instructions.
   5. Install foam seals with adhesive recommended by manufacturer and heat seal all splices.

Division 8
Openings

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SECTION 08 33 13

OVERHEAD COILING COUNTER DOORS – FIRE RATED

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of overhead coiling doors:
   1. Fire-rated counter doors, electrically operated.

1.2 DEFINITIONS

A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

A. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 20,000 cycles and for 10 cycles per day.
   1. Include tamperproof cycle counter.

1.4 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
   1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
   2. Summary of forces and loads on walls and jambs.
   3. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
   4. Fire-Rated Doors: Information describing fire-release system, including testing and resetting instructions.

B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.

C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

D. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, either stainless-steel or steel extrusions to suit type of curtain slats.
   1. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene, between angles or fitted to shape, as a cushion bumper for interior door.
   2. Provide motor-operated doors with combination bottom astragal and sensor edge.

E. Curtain Jamb Guides: Fabricate curtain jamb guides of angles, or channels and angles of material and finish to match curtain slats, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Provide continuous integral wear strips to prevent metal-to-metal contact and minimize noise of travel and removable stops on guides to prevent overtravel of curtain.

2.3 HOODS AND ACCESSORIES

A. Integral Frame, Hood, and Fascia: Provide welded assemblies of the following sheet metal:
   1. Stainless Steel: Minimum 24 gage stainless-steel sheet, Type 304, complying with ASTM A 666.

B. Integral Sills: Fabricate sills as integral part of frame assembly of same sheet metal, but not less than 0.078 inch(2.0 mm) thick.

C. Smoke Seals: Provide UL-listed and -tested smoke-seal perimeter gaskets.

D. Push/Pull Handles: For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.
   1. Provide pull-down straps or pole hooks for doors more than 84 inches(2130 mm) high.

E. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
   1. Slide bolt locks, operable from inside only.
   2. Lock cylinder is specified in another Division 8 Section.

F. Where door unit is power operated, provide safety interlock switch to disengage power supply when door is locked.

G. Provide automatic-closing device inoperative during normal door operations, with governor unit complying with requirements of NFPA 80, with easily tested and reset release mechanism, and designed to be activated by the following:
   1. Governor: Oscillating type.
   2. Temperature rise and melting point of 165 deg F(74 deg C) replaceable fusible links, interconnected and on both sides of wall of door opening.
   3. Manufacturer's standard UL-labeled smoke detector and door-holder-release devices.
   4. Building fire alarm and detection system and door-holder-release devices.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel

C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.

F. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head-type door operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and quick disconnect-release for manual operation.

G. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 fps (0.2 m/s) or more than 1 fps (0.3 m/s), without exceeding nameplate ratings or considering service factor.
   1. Type: Polyphase, medium-induction type.
   2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
   3. Coordinate wiring requirements and electric characteristics of motors with building electrical system.
   4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.

H. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
   1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

I. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
   1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
      a. Self-Monitoring Type: Provide self-monitoring sensor designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.

J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

K. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.

PART 3 - EXECUTION

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SECTION 08 33 24

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of overhead coiling doors:
   1. Non-fire-rated service doors, motor operated.

1.2 DEFINITIONS

A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

A. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 50,000 cycles and for 25 cycles per day.
   1. Include tamperproof cycle counter.

B. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward

C. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components

1.4 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
   1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
   2. Summary of forces and loads on walls and jambs.

B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.

C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead coiling door manufacturer for both installation and maintenance of units required for this Project.

2.3 HOODS AND ACCESSORIES

A. Integral Frame, Hood, and Fascia: Provide welded assemblies of the following sheet metal:
   1. Fabricate of not less than 0.024-inch thick, hot-dip galvanized steel sheet with G90(Z275) zinc coating, complying with ASTM A 653(ASTM A 653M).

B. Integral Sills: Fabricate sills as integral part of frame assembly of same sheet metal, but not less than 0.078 inch(2.0 mm) thick.

C. Push/Pull Handles: For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.
   1. Provide pull-down straps or pole hooks for doors more than 84 inches(2130 mm) high.

D. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
   1. Locking Bars: Single-jamb side, operable from inside and outside.
   2. Lock cylinder is specified in another Division 8 Section.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel connected to door curtain with required barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft.(2.5 mm/m) of span under full load.

C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.

D. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate with bell-mouth guide groove for curtain.

2.5 FINISHES, GENERAL

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

H. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
   1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

I. Obstruction Detection Device: Provide each motorized grille with indicated external automatic safety sensor able to protect full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.
   1. Sensor Edge: Provide each motorized grille with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward grille travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
      a. Provide pneumatically actuated automatic bottom bar.
      b. Self-Monitoring Type: Provide self-monitoring, 4-wire configured device.

J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

K. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.

L. Emergency Egress Release: Provide grille with flush, wall-mounted handle mechanism, for ADA-compliant egress feature, not dependent on electric power, that allows grille to open to permit passage and automatically resets motor drive, without affecting limit switches, with return of handle to original position

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
   1. Install fire-rated doors to comply with NFPA 80.

3.2 ADJUSTING

A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.3 DEMONSTRATION

A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
   1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive

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SECTION 08 41 13

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Exterior entrance systems.
   2. Interior entrance systems.
   3. Exterior storefront systems.
   4. Interior storefront systems.

1.2 SYSTEM DESCRIPTION

A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
   1. Air infiltration and water penetration exceeding specified limits.
   2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing: Physically and thermally isolate glazing from framing members.

C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.

D. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span or 3/4 inch(19 mm), whichever is smaller, unless otherwise indicated.
   2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.
   3. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
      a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
      b. Duration: As required by design wind velocity; fastest 1 mile(1.609 km) of wind for relevant exposure category.

J. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.

K. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.

L. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.69 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

M. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.3 SUBMITTALS

A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.
   1. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.

C. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

D. Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch(150-mm) lengths of full-size components and showing details of the following:
   1. Joinery.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.
   5. Flashing and drainage.

E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

F. Field Test Reports: Indicate and interpret test results for compliance with storefront systems' performance requirements.

G. Product Test Reports: Based on evaluation of tests performed by qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

H. Maintenance Data: Include maintenance data for aluminum-framed systems in maintenance manuals.

Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
   1. Structural failures including, but not limited to, excessive deflection.
   2. Noise or vibration caused by thermal movements.
   3. Failure of system to meet performance requirements.
   4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   5. Failure of operating components to function normally.
   6. Water leakage through fixed glazing and frame areas.

C. Warranty Period: 2 years from date of Substantial Completion.

D. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 10 years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Kawneer Company, Inc.
   2. United States Aluminum.
   3. Vistawall Architectural Products.

B. Acceptable Products – Basis of Design:
   1. Storefront Systems:
      a. Ground Floor: Vistawall EZ Set, 2 inch x 6 inch mullion profile.
      b. Floors 2 through 5: Vistawall HP Mor::Front System, 2 inch x 6 inch mullion profile.
   2. Doors: Vistawall Medium Stile.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

finished to match framing members or hardware being fastened, unless otherwise indicated.

F. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

G. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.
   1. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

H. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
   1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.
   2. Sliding Weather Stripping: Wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements.

2.4 HARDWARE

A. Refer to Hardware Schedule in Section 08 71 00.

B. General: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated.

C. At smoke tight doors into ICU/CCU: Provide positive latching doors with smoke seals which, as a unit, has been tested per UL 1784 as smoke tight.

2.5 FABRICATION

A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
   1. Fabricate components for screw-spline frame construction.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Prepare components to receive concealed fasteners and anchor and connection devices.

D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Fabricate with provisions for field replacement of glazing from exterior.

F. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
   1. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.

C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 section, "Joint Sealants."

E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.

F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
   1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.

G. Install glazing to comply with requirements of Division 8 section, "Glazing," unless otherwise indicated.

H. Install insulation materials a specified in Division 7 section, "Building Insulation."

I. Install perimeter sealants to comply with requirements of Section 07 92 00, "Joint Sealants," unless otherwise indicated.

J. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
   1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet(3 mm in 3.7 m); 1/4 inch(6 mm) over total length.
   2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch(1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch(0.8 mm).

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SECTION 08 42 30

SLIDING AUTOMATIC ENTRANCE DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes automatic entrance door systems operating as follows:
   1. Biparting sliding operation.
   2. Telescoping sliding operation.

B. Refer to Section 08 71 00 for additional requirements on fire-rated door hardware.

1.2 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door systems that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:
   1. Thermal Movements: Provide automatic entrance doors that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
      a. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.
   2. Operating Temperature Range: Provide automatic entrance door operators capable of operating between minus 10 deg F and plus 120 deg F(minus 23 deg C and plus 49 deg C).
   3. Structural Performance: Provide automatic entrance doors capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
      a. Basic Wind Speed: As indicated in miles per hour(meters per second) at 33 feet(10 m) above grade. Determine wind loads and resulting design pressures applicable to Project according to the following, based on mean roof heights above grade as indicated on Drawings:
         1) Wind Loads: ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure."

C. Manufacturer Qualifications: A firm experienced in manufacturing systems similar to those indicated for this Project and with a record of successful in-service performance.
   1. Company Certificate: Issued by the American Association of Automatic Door Manufacturers.

D. Source Limitations: Obtain automatic entrance doors through one source from a single manufacturer.

E. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

F. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

G. ANSI/BHMA Standard: ANSI/BHMA A156.10, "Power Operated Pedestrian Doors."

H. UL Standard: Provide power door operators that comply with UL 325.

I. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

J. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify automatic entrance door openings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 COORDINATION

A. Coordinate size and location of recesses in concrete floors for the following automatic entrance door components. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section.
   1. Recessed sliding tracks.

1.8 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing."
1. Exterior Entrances: Single pane, tint to match adjacent glazing.
2. Interior Entrances: Single pane, clear.

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining grout; complying with ASTM C 1107; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil(0.76-mm) thickness per coat.

2.3 AUTOMATIC ENTRANCE DOOR SYSTEMS

A. General: Provide manufacturer's standard automatic entrance door system, complete with doors, sidelite and transom framing, operators, controls, activation devices, safety devices, and accessories as indicated. Comply with the following:
1. Configuration: Biparting sliding doors, with sidelite on each side of door.
   a. Traffic Pattern: Two-way.
   b. Emergency Breakaway Capability: Doors only.
   c. Mounting: Refer to Drawings.

B. Activation Devices: Activate doors by the following equipment:
1. Microwave-scanner motion detector.
2. Remote button.

C. Operator Safety Devices: Control door opening and closing by the following equipment:
1. Photoelectric beams.

2.4 COMPONENTS

A. Doors: Provide manufacturer's standard 1-3/4-inch-(44.5-mm-) thick glazed doors with minimum 0.125-inch-(3.2-mm-) thick, extruded tubular stile and rail members. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails.
1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on, extruded-aluminum, square glazing stops and preformed resilient glazing gaskets.
2. Stile Design: Medium stile; 3-1/2-inch (89-mm) nominal width.
3. Rail Design: 5-inch (127-mm) nominal height.

B. Framing Members: Fabricate from extruded aluminum or formed-aluminum sheet or plate.
1. Main Extrusions: Minimum wall thickness of 0.125 inch(3.2 mm).
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch(1.6 mm).

c. Automatic door re-open if stopped while closing.

4. Microprocessor Control: System that automatically defines and sets opening and closing parameters.
5. On/Off Feature: Provide on/off/hold-open switch to control electric power to operator.

B. Electromechanical Operators: Self-contained overhead units, with power opening and closing mechanism indicated below and with checking in both opening and closing cycles. Provide safety-release clutch for obstructed closing. Provide for manual sliding when power is off. Provide operator action as indicated.
1. Closing Mechanism: Power operated.
2. Mounting: Concealed.

2.6 ACTIVATION AND SAFETY DEVICES

A. Microwave-Scanner Motion Detector: Self-contained motion detector consisting of a microwave-scanner sensing device to activate door operator. Sensing device shall be adjustable to provide detection patterns and sensitivity equivalent to those required for control mats. Provide time delay for closing set at no less than 1.5 seconds. Provide metal or plastic housing with black finish for sensing device.

B. Photoelectric-Beam Control System: Manufacturer's standard horizontal photoelectric-beam system, arranged as indicated.

C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

D. Opening-Width Control Switch: Two-position switch that in the normal position allows sliding doors to travel to full opening width and in the alternate position reduces opening to a selected partial opening width.

2.7 HARDWARE

A. General: Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those indicated to be provided by automatic entrance door manufacturer.

B. Heavy-Duty Hardware: Provide units as indicated in size, number, and type recommended by manufacturer for entrances required. Finish exposed parts to match door finish, unless otherwise indicated.

C. Emergency Breakaway Hardware: Provide release hardware that allows panel to swing out in the direction of egress to a full 90 degrees from any position in the sliding mode. Maximum force to open panel shall be 50 lbf(222 N) according to ANSI/BHMA A156.10. Interrupt operation of breakaway panel operator while in the breakaway mode.

D. Compression Weather Stripping: Manufacturer's standard replaceable, compressible gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287. Include bumper-type gaskets at door stops and laps.

1. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

2.9 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Finish aluminum automatic entrance door system components to match adjacent aluminum curtain wall or storefront.

D. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrance doors.

B. Examine roughing-in for compressed-air piping systems to verify actual locations of piping connections before equipment installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

B. Recessed Sills: Level recess using non-shrink grout.

3.3 INSTALLATION

A. General: Comply with automatic entrance door manufacturer's written installation instructions, unless more stringent requirements are indicated. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.

B. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.

3.6 CLEANING AND PROTECTION

A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
   1. Comply with requirements in Division 8 Section "Glazing" for cleaning and maintaining glass.

B. Provide final protection and maintain conditions, including limiting construction traffic, that ensure automatic entrance doors are without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage manufacturer's inspector certified by the American Association of Automatic Door Manufacturers to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrance doors as specified below:
   1. Train Owner's maintenance personnel on procedures and schedules for starting up and shutting down, troubleshooting, servicing, complying with safety requirements, and maintaining equipment and schedules. Refer to Section 01 79 00.
   2. Review data in maintenance manuals. Refer to Division 1 Section 01 78 23, "Operation and Maintenance Data."
   3. Schedule training with Owner with at least seven days' advance notice.

END OF SECTION 08 42 30

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SECTION 08 42 43

ICU/CCU ENTRANCE DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following assemblies:
   1. Combination swing/slide manual ICU/CCU entrance door assemblies.
   2. Combination swing/bi-fold manual ICU/CCU entrance door assemblies.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for entrance doors.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other Work.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
   1. Size: 12-inch-(300-mm-) long sections of extrusions or formed shapes.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of the entrance door manufacturer for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain entrance doors through one source from a single manufacturer.

C. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with standards indicated below:

1. Extruded: ASTM B 221(ASTM B 221M).
2. Sheet and Plate: ASTM B 209(ASTM B 209M).
3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing."

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining grout; complying with ASTM C 1107; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil(0.76-mm) thickness per coat.

2.3 ICU/CCU ENTRANCE DOOR ASSEMBLIES

A. General: Provide manufacturer's standard ICU/CCU entrance door assembly, complete with doors, sidelite framing, and accessories as indicated. Comply with the following:
1. Number of Doors: As indicated.
2. Emergency Breakaway Capability: Door and sidelights.
3. Floor Track Configuration: Trackless across door opening and recessed, pin-guide track system at sidelites.

B. Opening Force: Provide entrance doors that require no more than 5 lbf(22.2 N) to stop door movement.

2.4 COMPONENTS

A. Doors: Provide manufacturer's standard 1-3/4-inch-(44.5-mm-) thick glazed doors with minimum 0.125-inch-(3.2-mm-) thick, extruded tubular stile and rail members. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails.
1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on, extruded-aluminum, square glazing stops and preformed resilient glazing gaskets.
2. Stile Design: As indicated on Drawings.
3. Rail Design: As indicated on Drawings.

B. Framing Members: Fabricated from extruded-aluminum or formed-aluminum sheet or plate.
1. Main Extrusions: Minimum wall thickness of 0.125 inch(3.2 mm).
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch(1.6 mm).

C. Headers: Fabricated from minimum 0.125-inch-(3.2-mm-) thick, extruded aluminum or formed-aluminum sheet or plate. Conceal roller track in header,

2.6 FABRICATION

A. General: Fabricate entrance door assembly components to designs, sizes, and thicknesses specified and to comply with indicated standards.

B. Prefabrication: Provide entrance doors as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
   1. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.
   2. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
   3. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
   4. Prepare components to receive concealed fasteners and anchor and connection devices.
   5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.

C. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

D. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."

E. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

F. Hardware: Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.

G. Doors: Fabricate doors in profiles indicated. Reinforce as required to support imposed loads and for installing hardware. Factory assemble door and frame units.

H. Framing: Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide sub-frames and reinforcement of types indicated or, if not indicated, as required for a complete system to support required loads.

I. Electrical Grounding: Fabricate entrance doors to be internally grounded, complying with requirements of authorities having jurisdiction.

2.7 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

3.4 ADJUSTING

A. Adjust door hardware for smooth and safe operation.

B. Readjust doors after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware and other moving parts.

C. Test grounding system for compliance with requirements of authorities having jurisdiction.

3.5 CLEANING AND PROTECTION

A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
   1. Comply with requirements in Division 8 Section "Glazing" for cleaning and maintaining glass.

B. Provide final protection and maintain conditions, including limiting construction traffic, that ensure entrance doors are without damage or deterioration at time of Substantial Completion.

END OF SECTION 08 42 43

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SECTION 08 44 13

GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes conventionally glazed aluminum curtain walls installed as stick systems.

B. Related Sections include the following:
1. Division 7 Section "Building Insulation" for insulation materials field installed with glazed aluminum curtain-wall systems.
2. Division 7 Section "Fire-Resistive Joint Systems " for perimeter fire-containment systems (safing insulation) field installed with glazed aluminum curtain-wall systems.
3. Division 7 Section "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain-wall systems and for sealants to the extent not specified in this Section.
4. Division 8 Section "Glazing" for insulating-glass requirements.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding, without failure, the effects of the following:
1. Structural loads.
2. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
3. Dimensional tolerances of building frame and other adjacent construction.
4. Failure includes the following:
   a. Deflection exceeding specified limits.
   b. Thermal stresses transferred to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
   d. Noise or vibration created by wind and thermal and structural movements.
   e. Loosening or weakening of fasteners, attachments, and other components.
   f. Sealant failure.

B. Structural Loads:
1. Wind Loads: 105 mph or as otherwise required by code.
2. Seismic Loads: Refer to structural drawings.

C. Structural-Test Performance: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding test pressure indicated without material and deflection failures and permanent deformation of structural members exceeding 0.2 percent of span when tested according to ASTM E 330.

J. Condensation Resistance: Provide glazed aluminum curtain-wall systems with condensation-resistance factor (CRF) of not less than 55 when tested according to AAMA 1503.

K. Average Thermal Conductance: Provide glazed aluminum curtain-wall systems with average U-factor of not more than 0.66 Btu/sq. ft. x h x deg F(3.75 W/sq. m x K) when tested according to AAMA 1503.

L. Sound Transmission: Provide glazed aluminum curtain-wall systems with minimum STC 32 according to ASTM E 413 and an OITC 26 according to ASTM E 1332, as determined by testing according to ASTM E 90.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of glazed aluminum curtain-wall systems.
   1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Qualification Data: For Installer.

E. Field quality-control test reports.

F. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing Work of this Section and who is acceptable to manufacturer.
   1. Engineering Responsibility: Preparation of data for glazed aluminum curtain-wall systems including the following:
      a. Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.

C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

2.2 FRAMING SYSTEMS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Sheet and Plate: ASTM B 209(ASTM B 209M).
   2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221(ASTM B 221M).
   3. Extruded Structural Pipe and Tubes: ASTM B 429.
   4. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
   1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
   2. Cold-Rolled Sheet and Strip: ASTM A 611.
   3. Hot-Rolled Sheet and Strip: ASTM A 570/A 570M.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
   1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   2. Reinforce members as required to receive fastener threads.
   3. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.

E. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

F. Concealed Flashing: Dead-soft, 0.018-inch-(0.457-mm-) thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.

G. Framing Gaskets: As recommended by manufacturer for joint type.

H. Framing Sealants: As recommended by manufacturer for joint type.

2.3 GLAZING SYSTEMS

A. Glazing: As specified in Division 8 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer for joint type.

2.4 ACCESSORY MATERIALS

A. Perimeter Fire-Containment Systems (Safing Insulation): Specified in Division 7 Section "Fire-Resistive Joint Systems."

B. Insulating Materials: Specified in Division 7 Section "Building Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:
   1. Comply with manufacturer's written instructions.
   2. Do not install damaged components.
   3. Fit joints to produce hairline joints free of burrs and distortion.
   4. Rigidly secure non-movement joints.
   5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   6. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
   2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified Division 8 Section "Glazing."

F. Install sealants as specified in Division 7 Section "Joint Sealants."

G. Install insulation materials as specified in Division 7 Section "Building Insulation."

H. Install perimeter fire-containment systems (safing insulation) as specified in Division 7 Section "Fire-Resistive Joint Systems."

I. Erection Tolerances: Install glazed aluminum curtain-wall systems to comply with the following maximum tolerances:
   1. Plumb: 1/8 inch in 10 feet(3 mm in 3 m); 1/4 inch in 40 feet(6 mm in 12 m).
   2. Level: 1/8 inch in 20 feet(3 mm in 6 m); 1/4 inch in 40 feet(6 mm in 12 m).
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch(13 mm) wide, limit offset from true alignment to 1/16 inch(1.6 mm).

SECTION 08 50 00

BETWEEN GLASS VENETIAN BLINDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Blinds for factory-installation in aluminum windows.

B. Blinds for field installation in hollow metal doors and sidelights.

1.2 REFERENCES

A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels; 1998.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Window manufacturer's shop drawings showing blind configurations and sizes.

D. Selection Samples: Two complete color charts representing manufacturer's full range of available colors.

E. Verification Samples: For custom colors, two samples, minimum size 6 inches (150 mm) square, representing actual production color.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to window manufacturer in time to avoid construction delays.

1.5 EXTRA MATERIALS

A. Provide 1 percent extra blinds of each size for Owner's use in maintenance and repair.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Window Accessory Company Incorporated; PO Box

E. Lift and Tilt Mechanisms: Designed with slip clutch mechanism preventing damage to blind and hardware if tilt mechanism is turned beyond closed position.
   1. Ladder/Tape Drum: Made of 33 percent glass fiber filled nylon to minimize discoloration of cords, with plated steel pins for lift cord bearing surfaces; ladder cords wrapped around drum, lift cords routed through head rail end cap; secured in head rail with snap-in clips.
   2. Tilt Rod in Head Rail: Operating all ladder/tape drums in unison; spring loaded to allow approximately 1 inch (25 mm) lateral movement from tilt control end of head rail.
   3. Tilt Cables: Flexible brass or bronze coated high tensile strength steel wire wound in four layers to outside diameter of 0.130 inch (3.3 mm); 6 inches (150 mm) long.
   4. Set-Screwed Cable Fittings for Control Rod Attachment: Minimum 0.3125 inch (7.9 mm) diameter brass fittings crimped onto cable ends in six locations to ensure fittings will not work loose under normal use conditions, with stainless steel set screws for rod attachment.
   5. Vertical Control Rods: D-shaped steel rod attached to cable assemblies.
   6. Tilt Control Knobs: Thumb turn; with flexible control cable.
   7. Covers for Exposed Cables and Rods: Vinyl, weatherstrip grade, 0.015 inch (0.4 mm) thick.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install blinds in factory in accordance with manufacturer's instructions.
B. Test to confirm proper operation.

END OF SECTION 08 50 00

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SECTION 08 51 13

FIXED ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. AW 60 Grade exterior aluminum windows, fixed type, with integral blinds.

B. Related Sections:
1. Section 08 50 00 - Between-Glass Venetian Blinds: Integral blinds.

1.2 DEFINITIONS

A. Performance class number, included as part of the window designation system, is the actual design pressure in pounds force per square foot(pascals) used to determine structural test pressure and water test pressure.
1. Structural test pressure, wind load test, is equivalent to 150 percent of the design pressure.
2. Water-leakage-resistance test pressure is equivalent to 20 percent of the design pressure with 12.0 lbf/sq. ft. as a minimum for Architectural Grade windows.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, classes, and sizes required for Project according to test methods indicated.

B. Test Criteria: Testing shall be performed by a qualified independent testing agency based on the following criteria:
1. Design wind velocity at Project site is 105 mi./h.
2. Heights of window units above grade at window centerline are indicated on or can be determined from the Drawings. Consult with the Architect, if necessary, to confirm required loading and test pressures.
3. Test Procedures: Test window units according to ASTM E 283 for air infiltration, ASTM E 547 for water penetration, and ASTM E 330 for structural performance.

C. Performance Requirements: Testing shall demonstrate compliance with requirements indicated in AAMA 101 for air infiltration, water penetration, and structural performance for type, grade, and performance class of window units required. Where required design pressure exceeds the minimum for the specified window grade, comply with requirements of AAMA 101, Section 3, "Optional Performance Classes," for higher than minimum performance class.

performance requirements specified for air infiltration and water resistance tests.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of window required, including the following:
1. Construction details and fabrication methods.
2. Profiles and dimensions of individual components.
3. Data on hardware, accessories, and finishes.
4. Recommendations for maintaining and cleaning exterior surfaces.

C. Shop Drawings showing fabrication and installation of each type of window required including information not fully detailed in manufacturer's standard Product Data and the following:
1. Layout and installation details, including anchors.
2. Elevations at 1/4 inch = 1 foot(1:50) scale and typical window unit elevations at 3/4 inch = 1 foot(1:20) scale.
3. Full-size section details of typical composite members, including reinforcement and stiffeners.
4. Location of weep holes.
5. Glazing details.
6. Accessories.

D. Samples for Verification: The Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.

E. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated. Test results based on use of down-sized test units will not be accepted.

F. Structural Calculations: Prepared by a registered structural engineer indicating adequacy of materials furnished under this Section, meeting uniform and structural load requirements specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in material, design, and extent to those required for this Project and with a record of successful in-service performance.

B. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Single-Source Responsibility: Obtain aluminum windows from one source and by a single manufacturer.

2.2 MATERIALS

A. Aluminum Extrusions: Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi(150-MPa) ultimate tensile strength and not less than 0.125 inch thick at any location for main frame and sash members.

B. Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.
   1. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.

D. Compression-Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

E. Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating. Comply with Division 7 Section "Joint Sealants" of these Specifications for selection and installation of sealants.

2.3 HARDWARE

A. Components:
   1. Steel Components: 300 Series stainless steel.
   2. Aluminum Components: 6063-T5 or T6.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessories that comply with indicated standards.

B. Integral Venetian Blinds: Refer to Section 08 50 00.

2.5 FABRICATION

A. General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.
   1. Provide units that are re-glazable without dismantling sash or ventilator framing.

1. Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.
2. Metal surfaces shall be dry; clean; free of grease, oil, dirt, rust and corrosion, and welding slag; without sharp edges or offsets at joints.

3.2 INSTALLATION

A. Refer to Division 8 Section "Glazed Aluminum Curtain Walls" for requirements for installing aluminum window units in glazed curtain walls.

B. Comply with manufacturer's specifications and recommendations for installing window units, hardware, operators, and other components of the Work.

C. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.
   1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.

D. Set sill members and other members in a bed of sealant or with joint fillers or gaskets, as shown on Shop Drawings, to provide weathertight construction. Refer to Division 7 Section "Joint Sealants" for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the Work.
   1. Sealants, joint fillers, and gaskets to be installed after installation of window units are specified in another Division 7 Section.

3.3 FIELD QUALITY CONTROL

A. Conduct on-site tests for air and water infiltration with window manufacturer's representative present. The Architect will select units to be tested. Tests not meeting specified requirements and units having similar deficiencies shall be corrected at no cost to the Owner. Testing shall be performed by a qualified independent testing agency selected by the Architect.
   1. Air-Infiltration Tests: Conduct tests according to requirements of ASTM E 783. Allowable infiltration shall not exceed 1.5 times the amount indicated.
   2. Water-Resistance Tests: Conduct tests according to requirements of ASTM E 1105. No water leakage is permitted.

3.4 CLEANING

A. Clean aluminum surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.

B. Clean glass of pre-glazed units promptly after installing windows. Comply with requirements of Division 8 Section "Glazing" for cleaning and maintenance.

25B03

SECTION 08 63 00

METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Aluminum-framed skylights with retaining caps.
   2. Two-sided, structural-sealant-glazed, aluminum-framed skylights with retaining caps at rafters.

B. Related Sections include the following:
   1. Division 7 Section "Joint Sealants" for sealants installed at metal-framed skylight perimeters.
   2. Division 8 Section "Glazing" for glass units installed in metal-framed skylights.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide metal-framed skylights capable of withstanding loads and thermal and structural movements indicated without failure. Failure includes the following:
   1. Deflection exceeding specified limits.
   2. Thermal stresses transferred to the building structure.
   3. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing.
   4. Noise or vibration created by thermal and structural movement and wind.
   5. Loosening or weakening of fasteners, attachments, and other components.
   6. Sealant failure.

B. Structural-Sealant Glazing: As follows:
   1. Structural silicone sealant does not carry gravity load of glazing.
   2. Tensile and shear stress in structural silicone sealant joints is less than 20 psi(138 kPa).
   3. Structural silicone sealant joints accommodate thermal and mechanical movement, prevent glazing-to-glazing contact, and maintain required glazing-edge clearances.
   4. Structural silicone sealant fails cohesively before sealant releases from substrate when tested for adhesive compatibility with each substrate and joint condition required.
      a. Adhesive failure occurs when sealant pulls away from a substrate cleanly, leaving no sealant material behind.
      b. Cohesive failure occurs when sealant breaks or tears within a joint but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

I. Water Penetration: Provide metal-framed skylights that do not evidence uncontrolled water penetration when tested according to ASTM E 331 at 12.0 psf (574 Pa).

J. Dynamic Water Penetration: Provide metal-framed skylights that do not evidence uncontrolled water penetration when tested according to AAMA 501 at 12.0 psf (573 Pa).

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions and profiles of components, and finishes for metal-framed skylights.

B. Shop Drawings: For metal-framed skylights. Include plans, elevations, sections, details, and attachments to other Work.
1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Verification: For each exposed aluminum finish required, prepared on 12-inch-(300-mm-) long sections of extrusions or formed shapes in same thickness and material indicated for the Work. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

E. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with sealants; include sealant manufacturer's interpretation of test results for sealant performance and recommendations for primers and substrate preparation needed for adhesion.

F. Field Test Reports: Indicate and interpret test results for compliance with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer to assume engineering responsibility who has specialized in installing metal-framed skylights similar to those indicated for this Project and who is acceptable to manufacturer.
1. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of skylights that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

2. Sealant failures.
3. Failure of systems to meet performance requirements.
4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
5. Water leakage; defined as uncontrolled water appearing on normally exposed interior surfaces of skylights from sources other than condensation. Water controlled by flashing and gutters and drained back to the exterior and that cannot damage adjacent materials or finishes is not water leakage.
6. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Fisher Skylights, Inc.
2. Naturalite/EPI Skylight Systems.
3. O'Keeffe's Inc.
4. Super Sky Products, Inc.

B. Acceptable Product – Basis of Design: Naturalite BMS 3000.

2.2 FRAMING MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for use and finish indicated, and as follows:
1. Extrusions: ASTM B 221(ASTM B 221M).
2. Sheet and Plate: ASTM B 209(ASTM B 209M).
3. Bars, Rods, and Wire: ASTM B 211(ASTM B 211M).

B. Brackets and Reinforcements: Provide manufacturer's standard high-strength aluminum brackets and reinforcements. Provide non-staining, nonferrous shims to install and align skylights.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing; compatible with adjacent materials.

D. Exposed Flashing and Closures: Aluminum sheet.
1. Minimum Thickness: 0.040 inch(1 mm) for anodized finish.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories; compatible with adjacent materials.
1. Movement Joints: Provide slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
2. Aluminum-Retaining-Cap Fasteners: ASTM A 193/A 193M, Series 300 stainless-steel screws; type as recommended by manufacturer.
3. Connections to Supporting Structure: ASTM A 307, zinc-coated steel fasteners.
4. Anchor Bolts: ASTM A 307, Grade A, zinc-coated steel anchor bolts.
5. Concrete or Masonry Inserts: Zinc-coated cast-iron, malleable-iron, or steel inserts; hot-dip galvanized according to ASTM A 123.

3. Fabricate components to accommodate expansion, contraction, and field adjustment, and to provide for minimum clearance and shimming at skylight perimeter.
4. Fabricate components to ensure that glazing is thermally and physically isolated from framing members.
5. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
6. Fit and assemble components to greatest extent practicable before finishing.
7. Fit and secure joints with screw and spline, internal reinforcement, or welding.
8. Reinforce members as required to retain fastener threads.
9. Where fasteners are exposed to view from interior, countersink bolt or screw heads and finish to match framing.
10. Weld components before finishing and in concealed locations to greatest extent practicable to minimize distortion.
11. Before shipping, shop assemble, mark, and disassemble components that cannot be permanently shop assembled.

B. Provide continuous aluminum curb with weatherproof expansion joints and locked and sealed or fully welded corners. Locate weep holes in the curb at each rafter connection to drain condensation.

C. Prepare framing to receive anchor and connection devices and fasteners.

D. Metal Protection: As follows:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended by manufacturer.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class I, Color Anodic Finish: AA-M10C22A42/A44 (Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.
1. Color: Match storefront.

2. Structural Silicone Sealant Glazing: Prepare surfaces that will contact sealant and install sealant according to sealant manufacturer's written instructions. Preparation includes, but is not limited to, cleaning and priming. Mechanically fasten glazing in place until sealant cures. Clean excess sealant from surfaces before sealant cures.

D. Install secondary-sealant weatherseal according to sealant manufacturer's written instructions to provide weatherproof joints. Install joint fillers behind sealant as recommended by sealant manufacturer.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field quality-control tests and to prepare test reports.

B. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field quality-control tests and to prepare test reports.

C. Sealant Adhesion Tests: Test installed sealant in a minimum of two areas and as follows:
1. Test structural silicone sealant according to field adhesion test method described in AAMA CW 13, "Structural Sealant Glazing Systems (A Design Guide)."
2. Test weatherseal sealant as recommended in writing by sealant manufacturer.

D. Water-Spray Test: Test skylights for compliance with requirements according to procedures in AAMA 501.2.

E. Air Infiltration: Test skylights according to AAMA 503, which requires testing according to ASTM E 783.
1. Static-Air-Pressure Differential: 1.57 lbf/sq. ft.(75 Pa) minimum.
2. Air Leakage: 0.06 cfm/sq. ft.(0.03 L/s per sq. m) of surface maximum.

F. Water Penetration: Test skylights for compliance with requirements according to AAMA 503, which requires testing according to ASTM E 1105.
1. Uniform Static-Air-Pressure Difference: 20 percent of positive design wind load, but not less than 6.24 lbf/sq. ft.(300 Pa).

G. Repair or replace Work that does not meet requirements or that is damaged by testing; repair or replace to comply with specifications.

3.5 CLEANING

A. Clean skylights inside and outside, immediately after installation and after sealants have cured, according to manufacturer's written recommendations.
1. Remove temporary protective coverings and strippable coatings from pre-finished metal surfaces. Remove labels and markings from all components.

B. Remove excess sealant according to sealant manufacturer's written recommendations.

END OF SECTION 08 63 00

Hardware Group No. 0.05
For use on door(s):
5005B
Provide each SL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	SET	HARDWARE	ALL HARDWARE BY DOOR/FRAME MFR.	FBO	UNK

Hardware Group No. 0.06 DPS
For use on door(s):
1129D
Provide each RU door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	HARDWARE	BALANCE OF HARDWARE BY DOOR/FRAME MFR.	FBO	UNK
1	EA	DPS	DOOR POSITION SWITCH BY DOOR/FRAME MFR.	FBO	UNK

DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 0.07
For use on door(s):
1129C-B
Provide each RU door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	HARDWARE	BALANCE OF HARDWARE BY DOOR/FRAME MFR.	FBO	UNK

Hardware Group No. 1.01
For use on door(s):
1125 2108 3076 4108 5108
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	28-10G05 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 2.02 CR
For use on door(s):

2075A	2075B	2096A	2096B	3075A	3075B
4075A	4075B	4096B	5075A	5075B	5096B

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	OVERHEAD STOP	100S	630	GLY
1	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.03 CR
For use on door(s):

1075	2076A	2076B	2095	2097	3063
3072	4076A	4076B	4095	4097	5076A
5076B	5095	5097	T-002		

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.06 CR
For use on door(s):

1035B	1057	1090	1096B	1097	1104B
1107E	1116	3059	4096A	5026	5096A

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.07 DPS
For use on door(s):
6004
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	FLUSH BOLT	FB457	626	IVE
1	EA	STOREROOM LOCK	28-10G04 LL	626	SAR
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
1	EA	CLOSER/STOP	4111SCNS	689	LCN
1	EA	OVERHEAD STOP	410S	630	GLY
1	EA	WEATHERSTRIP	297AV (HEAD & JAMBS)	628	PEM
1	EA	DRIP CAP	346C	628	PEM
2	EA	SWEEP	315SSN	630	PEM
1	EA	THRESHOLD	171A X MS&A	628	PEM
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH

DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.10 CR
For use on door(s):
1063B
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
5	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	PR	CONST LATCHING BOLT	FB61P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
1	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.11
For use on door(s):
1090A
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	FLUSH BOLT	FB358	626	IVE
1	EA	STOREROOM LOCK	28-10G04 LL	626	SAR
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
1	EA	CLOSER	4041 X TB	689	LCN
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 3.02
For use on door(s):

1028	1041	1056	1072	1073	1082
1094	1095	1101	1111	1139	2034
2036	3019A	3019B	4034	4036	5034
5036					

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 3.03
For use on door(s):

2072	3057	4072	5072

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 3.04
For use on door(s):

2073	3043	4073	5073

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	CLOSER	4031 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 3.05
For use on door(s):

1008B	1008C	1008D	1009B	1009C

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM71HD	628	PEM
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	DOOR STOP	WS65	627	IVE

Hardware Group No. 5.02 HO
For use on door(s):

2037A 2037B 3021A 3021B 4037A 4037B
5037A 5037B

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	COORDINATOR	COR7G	626	IVE
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP/HOLDER	WS45	626	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 5.03 AUTO
For use on door(s):

2043 3027 4043A 5043

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
1	EA	CONTINUOUS HINGE	CFM83HD	628	PEM
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	ELECTRIC STRIKE	6221 FSE	630	VON
1	EA	COORDINATOR	COR7G	626	IVE
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
2	EA	AUTO-OPENER	AUTO-OPENER (RELATED SECTION)	689	UNK
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
2	EA	ACTUATOR	PUSH PAD (RELATED SECTION)	689	UNK

POWER SUPPLY TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 5.08
For use on door(s):

1024B 1102 1104A 1121 T-008

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	OVERHEAD HOLDER	410H	630	GLY

Hardware Group No. 5.09
For use on door(s):

1026

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	COORDINATOR	COR7G	626	IVE
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 5.10
For use on door(s):

1037A	1037B	1038	1039	1040	1042
1046A	1051	1064	1077	1078	1085
1093	1100	1122	1136A	1136B	1138

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 5.11
For use on door(s):

1048

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 6.03 ISOL
For use on door(s):

2002B 4002B 5002B

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH/PULL LATCH	HL6-ASA	630	GLY
1	EA	CLOSER	4041-H X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 6.04
For use on door(s):

2005	2006	2009	2010	2013	2014
2017	2018	2021	2022	2046	2048
2049	2052	2053	2056	2057	2060
2061	2064	2065	2068	4005	4006
4009	4010	4013	4014	4017	4018
4021	4022	4046	4048	4049	4052
4053	4056	4057	4060	4061	4064
4065	4068	5005A	5006	5009	5010
5013	5014	5017	5018	5021	5022
5046	5048	5049	5052	5053	5056
5057	5060	5061	5064	5065	5068

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	SWING CLEAR HINGE	5BB1SCHW 5	652	IVE
1	EA	PUSH/PULL LATCH	HL6-ASA	630	GLY
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 6.05 ISOL
For use on door(s):

2027 3010B 3011B 5027

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH/PULL LATCH	HL6-ASA	630	GLY
1	EA	CLOSER	4041-H X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 7.02 MHO
For use on door(s):

1007	1061B	1107C	2044A	2102	2112
3080A	4044	4102	4112	5102	5112

Provide each DE door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD	628	PEM
2	EA	EXIT DEVICE	9927EO-F-LBR X SNB	626	VON
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL MAGNET	SEM 7850	689	LCN
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

WALL MAGNETS TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 7.03
For use on door(s):

2044B 5044

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD	628	PEM
1	EA	EXIT DEVICE	99L-F X 06L-F X SNB	626	VON
1	EA	RIM CYLINDER	63-34	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 7.04 CR-REMOTE
For use on door(s):

3028

Provide each DE door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
2	EA	EXIT DEVICE	EL9927EO-F X LBR X SNB	626	VON
1	EA	MAGNETIC LOCK	390DEL	628	SCH
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	POWER SUPPLY	PS873-2	600	VON
1	EA	REMOTE SWITCH	660-PB	628	SCH
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER/DELAY ALARM OR REMOTE SWITCH. EGRESS BY EXIT DEVICE.
DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.
POWER SUPPLIES TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 7.07 CR
For use on door(s):
1001 1107B 1140
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
1	EA	EXIT DEVICE	ERX9975L 06L FSE	626	VON
1	EA	MORTISE CYLINDER	63-41	626	SAR
1	EA	CLOSER	4041	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	DOOR STOP	WS11X	626	IVE
1	SET	WEATHERSTRIP	29310CPK (HEAD & JAMBS)	628	PEM
1	EA	DRIP CAP	346C	628	PEM
1	EA	SWEEP	315SSN	630	PEM
1	EA	THRESHOLD	171A X MS&A	628	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK

INGRESS BY READER OR KEY OVERIDE. EGRESS BY EXIT DEVICE/REX.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 7.08 CR
For use on door(s):
1004 1068A 1130A 1135B 1146B
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
1	EA	EXIT DEVICE	ERX9975L 06L FSE	626	VON
1	EA	MORTISE CYLINDER	63-41	626	SAR
1	EA	CLOSER/STOP	4111SCNS	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	SET	WEATHERSTRIP	29310CPK (HEAD & JAMBS)	628	PEM
1	EA	DRIP CAP	346C	628	PEM
1	EA	SWEEP	315SSN	630	PEM
1	EA	THRESHOLD	171A X MS&A	628	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK

INGRESS BY READER OR KEY OVERIDE. EGRESS BY EXIT DEVICE/REX.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 7.11 CR-AUTO
For use on door(s):

1061A

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
2	EA	EXIT DEVICE	ELRX9927L-F X 06L-F X LBR X SNB	626	VON
2	EA	RIM CYLINDER	63-34	626	SAR
2	EA	AUTO-OPENER	AUTO-OPENER (RELATED SECTION)	689	UNK
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	PS873-2	600	VON
1	EA	ACTUATOR	PUSH PAD (RELATED SECTION)	689	UNK
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK

INGRESS BY READER OR KEY OVERIDE. EGRESS BY EXIT DEVICES/REX OR PUSH PAD.
DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.
POWER SUPPLY TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 7.12 AUTO
For use on door(s):

1107D

Provide each DE door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
2	EA	EXIT DEVICE	EL9927EO-F X SNB	626	VON
2	EA	AUTO-OPENER	AUTO-OPENER (RELATED SECTION)	689	UNK
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	PS873-2	600	VON
2	EA	ACTUATOR	PUSH PAD (RELATED SECTION)	689	UNK

POWER SUPPLY TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 9.03 PRO
For use on door(s):

1112 2071 2094 3042 3077 4071
5071

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	PRO LOCK	PRO5196-17	626	SCH
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

INGRESS BY KEYPAD. EGRESS BY LOCKSET.

Hardware Group No. 9.04 PRO
For use on door(s):

2087A 2087B 4087A 4087B 5087A ~~5087B~~

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	PRO LOCK	PRO5196-17	626	SCH
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	OVERHEAD STOP	100S	630	GLY
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

INGRESS BY KEYPAD. EGRESS BY LOCKSET.

Hardware Group No. 9.05 PRO
For use on door(s):

1080 2091A 2091B 3014 3055A 3055B
3061A 3061B 3062 4089 4091A 4091B
4094 5091A 5091B 5094

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	PRO LOCK	PRO5196-17	626	SCH
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

INGRESS BY KEYPAD. EGRESS BY LOCKSET.

25F03

SECTION 08 71 13

AUTOMATIC DOOR CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes mechanically operated automatic opening device for swinging doors operating as follows:
   1. Swinging operation for interior doors.
   2. Double egress where indicated.

1.2 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide automatic openers that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:
   1. Opening Force: Comply with the following maximum opening-force requirements for locations indicated:
      a. Exterior Doors: 15 lbf(67N).
      b. Interior Doors: 5 lbf(22.2 N).

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other Work.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

C. Hardware Schedule: Organize schedule into sets based on hardware specified. Include name of item and manufacturer, and complete designation of every item required for each automatic entrance door.

D. Product Certificates: Signed by manufacturers of automatic opener certifying that products furnished comply with emergency exit door requirements.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of the automatic entrance door system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
   1. Faulty operation of operators and hardware.

C. Warranty Period: Two years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Maintenance: Beginning at Substantial Completion, provide 24 months' full maintenance by skilled employees of automatic opener Installer. Include quarterly planned and preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.
   1. Engage an inspector certified by the American Association of Automatic Door Manufacturers to perform a safety inspection after each adjustment or repair, and at the end of the maintenance period. Submit the completed inspection form to Owner.
   2. Perform maintenance, including emergency callback service, during normal working hours.
   3. Include 24-hour-per-day, 7-day-per-week emergency callback service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Besam.
   2. Dor-O-Matic; an Ingersoll-Rand Company.
   3. Horton Automatics; Div. of Overhead Door Corporation.
   4. Stanley Access Technologies; Div. of The Stanley Works.

B. Acceptable Products – Basis of Design:
   1. Low-Energy Operator:
      a. Series 7000 Easy Access Operator by Horton.
      b. Magic Access by Stanley.
   2. Low-Energy Operator, Heavy Duty: Series 4000LE Low Energy, Heavy-Duty Operator by Horton.

2.2 AUTOMATIC DOOR OPERATOR

A. General: Provide manufacturer's standard automatic door operator, complete with operators, controls, activation devices, safety devices, and accessories as indicated. Comply with the following:
   1. Configurations:
      a. Swinging doors for two-way traffic.
      b. Swinging doors for double egress.

1. Material: Stainless steel.
2. Message: International symbol of accessibility and "Push to Open."

C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.5 ACCESSORIES

A. Signage:
1. Comply with ANSI/BHMA A156.19.

2.6 FABRICATION

A. General: Fabricate automatic opener components to designs, sizes, and thicknesses specified and to comply with indicated standards.

B. Prefabrication: Provide automatic opener as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

2.7 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker).
1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrance doors.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

SECTION 08 81 13

DECORATIVE GLASS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following decorative glass for interior applications:
   1. Tempered.

B. Related Sections include the following:
   1. Division 8 Section "Glass and Glazing" for glass and glazing requirements.

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 PERFORMANCE REQUIREMENTS

A. Provide decorative glass and glazing capable of withstanding normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following:defective manufacture, fabrication, and installation; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and shall not be reduced.

1.5 SUBMITTALS

A. Product Data: For each decorative-glass and glazing product indicated.

B. Shop Drawings: Show fabrication and installation details for decorative glass. Include the following:
   1. Size and location of penetrations.
   2. Glazing method.
   3. Mounting method.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect decorative glass to comply with manufacturer's written directions and as needed to prevent damage to glass and any decorative and protective surfaces.

B. Retain packaging and sequencing numbers for decorative-glass units.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install decorative glass until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Verify dimensions to fit by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer, agreeing to replace laminated-glass units that develop defects from normal use including edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MONOLITHIC-GLASS PRODUCTS

A. Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated glass), Type I (transparent flat glass), Class 1 (clear), Quality-Q3, unless otherwise indicated; Kind HS (heat strengthened) and Kind FT (fully tempered) where indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

2.2 SEALANTS

A. Glazing Gaskets, Sealants, Tapes, and Miscellaneous Glazing Materials: Specified in Division 8 Section "Glass and Glazing."
1. Elastomeric Glazing Sealants: ASTM C 920.
a. Color: As selected by Architect from manufacturer's full range.

B. Joint Sealants: As specified in Division 7 Section "Joint Sealants."

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise indicated.

F. Clean joint surfaces; apply primers to joint surfaces where required for adhesion of sealants.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm) as follows:
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances, and to comply with system performance requirements.
   2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

3.4 DECORATIVE GLASS SCHEDULE

A. Refer to Finish Legend.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers between glass lites and glazing stops to maintain glass-face clearance. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants smooth.

3.6 CLEANING AND PROTECTION

A. Protect decorative glass from damage immediately after installation by attaching crossed streamers to framing and held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect decorative glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Remove and replace decorative glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

D. Wash decorative glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date

06C02

SECTION 08 83 13

MIRRORED GLASS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Safety (tempered) mirrored glass.

1.2 DEFINITIONS

A. Deterioration of Silvered Mirrored Glass: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning silvered mirrored glass contrary to mirrored glass manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.3 PERFORMANCE REQUIREMENTS

A. Provide mirrored glass that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.4 SUBMITTALS

A. Product Data: For the following:
1. Mirror mastic.
2. Mirror hardware.

B. Product Certificates: Signed by manufacturers of mirrored glass and mirror mastic certifying that products furnished comply with requirements.

C. Mirror Mastic Glass Coating Compatibility Test Reports: From an organic protective coating manufacturer indicating that mirror mastic has been tested for compatibility and adhesion with organic protective coating applied to silvered mirrored glass. Include organic coating manufacturers' interpretation of test results relative to performance and recommendations for use of mastics with organic protective coating.

D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed mirrored glass installations similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Mirrored Glass: Obtain mirrored glass from one source for each type of mirrored glass indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Mirror Company, Inc.
2. Carolina Mirror Company.
3. Virginia Mirror Co., Inc.
4. VVP America, Inc.; Binswanger Mirror Products.
5. Walker Glass Co., Ltd.

2.2 FLOAT GLASS

A. Tempered Float Glass: ASTM C 1048, Type I (transparent glass, flat), Condition A (uncoated), Kind FT (fully tempered), Quality q3 (glazing select) float glass, complying with the following requirements:
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of mirror as installed, unless otherwise indicated.
2. Clear Tempered Float Glass: Class 1 (clear).
   a. Thickness: 4 mm.

2.3 MIRRORED GLASS

A. Silvered Mirrored Glass:, clear float glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic protective coating applied to second glass surface to produce a coating system complying with FS DD-M-411.
1. Provide fully tempered, ASTM C 1048 Type FT, where indicated or required by code.

2.4 FABRICATION

A. Mirrored Glass Sizes: Cut mirrored glass to final sizes and shapes to suit Project conditions.

B. Cutouts: Fabricate cutouts for notches and holes in mirrored glass without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrored glass.

C. Mirrored Glass Edge Treatment: Treat edges as indicated below.
1. Flat polished edge.
2. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.
3. Require mirrored glass manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.5 MISCELLANEOUS MATERIALS

A. Setting Blocks: Neoprene, 70 to 90 Shore A hardness.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.3 GLAZING

A. General: Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GANA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.

B. Provide space for air circulation between back of mirrored glass units and face of mounting surface.

C. Mastic Spot Installation System: Install mirrored glass units with mastic as follows:
1. Apply barrier coat to mirrored glass backing where approved in writing by manufacturers of mirrored glass and backing material.
2. Apply mastic in spots to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrored glass units and face of mounting surface.
3. After mastic is applied, align mirrored glass units and press into place while maintaining a minimum air space of 1/8 inch(3 mm) between back of mirrored glass and mounting surface.

D. For wall-mounted mirrored glass units, install permanent means of support at bottom and top edges with bottom support designed to withstand mirrored glass weight and top support designed to prevent mirrored glass from coming away from wall along top edges.
1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrored glass units.
2. For continuous bottom supports, provide setting blocks 1/8 inch(2 mm) thick by 4 inches(100 mm) long at quarter points. For channels or other continuous supports in which water could be trapped, provide, between setting blocks, two slotted weeps not less than 1/4 inch(3 mm) wide by 3/8 inch(4.5 mm) long.
3. Where indicated, install bottom and top trim. Fabricate trim in single lengths to fit and cover top and bottom edges of mirrored glass units.

3.4 PROTECTION AND CLEANING

A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.
1. Do not permit edges of silvered mirrored glass to be exposed to standing water.
2. Maintain environmental conditions that will prevent silvered mirrored glass from being exposed to moisture from condensation or other sources for continuous periods of time.

B. Wash mirrored glass not more than four days before date scheduled for inspections intended to establish date for Substantial Completion. Wash

18B03

SECTION 08 91 00

STORM RESISTANT ALUMINUM LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Fixed, extruded-aluminum louvers, storm resistant.

1.2 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

1.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.

B. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Samples for Verification: For each type of metal finish required.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. Welding: Qualify procedures and personnel according to the following:

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
   1. Frame Type: Channel, unless otherwise indicated.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches(1830 mm) o.c., whichever is less.
   1. Exterior Corners: Prefabricated corner units with mitered blades, welded or concealed close-fitting splices as selected by Architect, and with fully recessed or semirecessed mullions at corners as indicated on Drawings.

F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Storm-Resistant Louver:
   1. Products:
      a. Storm Resistant Fixed Horizontal Louver Model RS-7315 by Construction Specialties, Inc. (C/S).
   2. Louver Depth: 7 inches.
   3. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.060 inch(1.5 mm) for blades and 0.080 inch(2.0 mm) for frames.
      a. Blades: Front lip gutter and secondary multiple gutter designed to catch and direct water to jamb and mullion downspouts.
   4. Louvers: Mechanical fastened using stainless steel or aluminum fasteners; minimum 4 inch high by full depth sill flashing formed from minimum 0.050 inch (1.27 mm) thick aluminum.
      a. Sill Flashing: Welded side panels.
   5. Performance Requirements:
      a. Free Area: Not less than 8.9 sq. ft. (0.75 sq. m) for 48-inch- (1.2-m-) wide by 48-inch- (1.2-m-) high louver.
      b. Percent Free Air: Minimum 50 percent.
      c. Air Performance:
         1) Intake Pressure Drop at 900 fpm with free area velocity of 0.32 inch water.
         2) Exhaust Pressure Drop at 900 fpm with free area velocity of 0.44 inch water.
      d. Wind-Driven Rain Performance: Not less than 99 percent effectiveness when subjected to a rain fall rate of 3 inches(75 mm) per hour and a wind speed of 29 mph(13 m/s) at a core area intake velocity of 351 fpm(1.8 m/s).
   6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
   7. BSRIA: Certified test data for wind-driven rain performance from an accredited BSRIA laboratory.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

design of UL, Omega Point, or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Joint Treatment and Finishing Materials: For exhaust duct applications, provide joint treatment tape and joint compounds recommended in writing by grease duct fire protection manufacturer for finishing surfaces of lapped joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected

3.2 PREPARATION

A. Where welded-stud (impaling pin) anchorage system is used, remove rust and scale from steel substrates at locations to receive steel studs.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for particular conditions of installation in each case.

B. Install grease duct fire protection to comply with requirements for thicknesses, number of courses (layers), construction of joints and corners, and anchorage methods applicable to fire-resistance-rated assemblies indicated.

3.4 PROTECTION

A. Coordinate installation of grease duct fire protection with other construction to minimize cutting into, or removal of, installed fire-resistive materials. As other construction is successively completed, replace or repair grease duct fire protection that has been cut away to facilitate this other construction. Maintain complete coverage of full thickness on members and substrates protected by grease duct fire protection.

B. Provide final protection and maintain conditions in a manner acceptable to Installer, manufacturer, and authorities having jurisdiction that ensure that grease duct fire protection is without damage or deterioration at time of Substantial Completion.

END OF SECTION 07 81 60

SECTION 07 87 00

ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Smoke detector activated elevator door smoke containment screen and control system designed to provide a tight-fitting, smoke- and draft-control assembly.

B. Products Supplied But Not Installed Under This Section:
   1. End-of-line diode (3.9V, 2W). Installed at smoke detector to monitor the circuit.

1.02 SUBMITTALS

A. Reference Section 01330–Submittal Procedures; submit following items:
   1. Product Data.
   2. Shop Drawings: Include door width and height, jamb width, jamb and head projection, screen width, mounting height, and housing width. Show and identify related work performed under other sections of the specifications.
   3. Quality Assurance/Control Submittals:
      a. Qualifications:
         1) Proof of manufacturer qualifications.
         2) Proof of Installer qualifications.
      b. Certifications: Copy of specified items.
      c. Manufacturer's installation instructions and testing procedures

B. Closeout Submittals: Reference Section 01 77 00; submit following items:
   1. Operation and Maintenance Manual.
   2. Manufacturer's Warranties

1.03 QUALITY ASSURANCE

A. Overall Standards:
   1. Manufacturer shall maintain a quality control program in accordance with ICBO-ES Acceptance Criteria AC 77.

B. Qualifications:
   1. Manufacturer Qualifications: Minimum seven years experience in producing smoke containment systems of the type specified.
   2. Installer Qualifications: Factory trained by manufacturer.

C. Certifications:
   1. Manufacturer's ICC Evaluation Service report ESR-1136.
   2. California Department of Forestry and Fire Protection and Office of the State Fire Marshal Listing.
   3. Testing Laboratory Label.
   4. UL Listing.
   5. OSHPD Anchorage Pre-Approval No. OPA-0318

2.03 COMPONENTS

A. Screen:
   1. Film: Minimum 1 mil (0.025 mm) thick transparent polyimide film reinforced with minimum 100 denier Nomex yarn at .25 in (6.35 mm) each way.
   2. Magnetic Strips: Flexible multi-pole strips attached to longitudinal edges of film with low modulus silicone adhesive.

B. Housing: 20 gauge, powder coated, cold rolled steel container with dust cover and door with concealed hinges. Housings are 55, 64, or 73" in length plus 1-1/2 inches for a junction box on the left side.

C. Auxiliary Rails (for elevator frames that are nonferrous or stainless steel, or do not have flat 2 inch wide face, or are recessed in or flush with finished wall surface):
   1. Material: 16 gage ASTM A 240/240M, Type 430, ferritic stainless steel.
   2. Size: 2 inches (51 mm) wide; 1 inch (25 mm), 3/4 inch (19 mm) or 1/2 inches (13 mm) deep, depth as required to project beyond face of elevator door frame, as shown in Shop Drawings.

D. Rewind Motor: NFPA 70, 90v DC.

E. Release Mechanism: Comply with UL Standard No. 864.

F. Screen Rewind Switch: Include switch to rewind screen into housing.

2.04 IDENTIFICATION

A. Label each smoke containment system with following information:
   1. Manufacturer's name.
   2. Maximum leakage rating at specified pressure and temperature conditions.
   3. Label of quality control agency.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates upon which work will be installed.
   1. Verify related work performed under other sections is complete and in accordance with Shop Drawings.
   2. Verify wall surfaces and elevator door frames are acceptable for installation of smoke containment system components.
   3. Verify existing field painted elevator door frames to be used for screen adherence have been repainted in accordance with smoke containment system manufacturer's instructions or they have the original factory paint.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.

C. Commencement of work by installer is acceptance of substrate.

15E02

SECTION 07 95 13

ARCHITECTURAL JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Types of joints for which architectural joint systems are specified include the following:
   1. Wall and ceiling joints, floor joints, roof joints.

1.2 DEFINITIONS

A. Architectural Joint System: Any filler or cover used to span, fill, cover, or seal a joint, except expanding foam seals and poured or foamed in-place sealants.

B. Cyclic Movement: Periodic change between widest and narrowest joint widths in an automatically mechanically controlled system.

C. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist passage of flame and hot gases through a movement joint.

D. Maximum Joint Width: Widest linear gap a joint system tolerates and performs its designed function without damaging its functional capabilities.

E. Minimum Joint Width: Narrowest linear gap a joint system tolerates and performs its designed function without damaging its functional capabilities.

F. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint opening typically expressed in numerical values (mm or inches) or a percentage of nominal value of joint width.

G. Nominal Joint Width: Width of linear gap indicated as representing the conditions existing when architectural joint systems will be installed or, if no nominal joint width is indicated, a width equal to the sum of maximum and minimum joint widths divided by two.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide factory-fabricated architectural joint systems capable of withstanding the types of loads and of accommodating the kinds of movement, and the other functions for which they are designed including those specified below, without failure. Types of failure include those listed in Appendix X3 of ASTM E 1399.
   1. Vehicular Traffic Joints: Support vehicular traffic across joint.
   2. Pedestrian Traffic Joints: Support pedestrian traffic across joint.
   3. Exterior Joints: Maintain continuity of weather enclosure.
   4. Joints in Fire-Resistance-Rated Assemblies: Maintain fire-resistance ratings of assemblies.
   5. Joints in Smoke Barriers: Maintain integrity of smoke barrier.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: The design for each architectural joint system specified in Part 2 "Architectural Joint Systems" Article below is based on the products named. Subject to compliance with requirements, provide either the named products or comparable products by one of the other manufacturers listed.
   1. Architectural Art Manufacturing, Inc.
   2. Balco/Metalines.
   3. Construction Specialties.
   4. InPro Jointmaster.
   5. MM Systems Corp.
   6. Watson Bowman.

2.2 MATERIALS

A. Aluminum: ASTM B 221(ASTM B 221M), alloy 6063-T5 for extrusions; ASTM B 209 (ASTM B 209M), alloy 6061-T6 for sheet and plate.
   1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.

B. Preformed Seals: Single or multicellular extruded elastomeric seals designed with or without continuous, longitudinal, internal baffles. Formed to be installed in frames or with anchored flanges, in color indicated or, if not indicated, as selected by Architect from manufacturer's standard colors.

C. Strip Seals: Elastomeric membrane or tubular extrusions with a continuous longitudinal internal baffle system throughout complying with ASTM E 1783; used with compatible frames, flanges, and molded-rubber anchor blocks.

D. Compression Seals: Preformed, elastomeric extrusions having internal baffle system complying with ASTM E 1612 in sizes and profiles indicated or as recommended by manufacturer.

E. Preformed Cellular Foams: Neoprene or polyurethane extruded, compressible foam.

F. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint.

G. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, flexible moisture barrier and filler materials, drain tubes, lubricants, adhesives, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.3 ARCHITECTURAL JOINT SYSTEMS

A. General: Provide joint systems of design, basic profile, materials, and operation indicated. Provide units with the capability to accommodate joint widths indicated and variations in adjacent surfaces. Refer to Schedule at end of Section.

threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for handling and installing architectural joint assemblies and materials, unless more stringent requirements are indicated.

B. Coordinate installation of architectural joint assembly materials and associated work so complete assemblies comply with assembly performance requirements.

C. Terminate exposed ends of exterior architectural joint assemblies with factory-fabricated termination devices to maintain waterproof system.

D. Install factory-fabricated transitions between building expansion-joint cover assemblies and roof expansion-joint assemblies, specified in Division 7 Section "Roof Expansion Assemblies," to provide continuous, uninterrupted, watertight construction.

E. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required to install joint systems.
   1. Install joint cover assemblies in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
   2. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling.
   3. Set covers in horizontal surfaces at elevations that place exposed surfaces flush with adjoining finishes.
   4. Locate wall, ceiling, and soffit covers in continuous contact with adjacent surfaces.
   5. Securely attach in place with required accessories.
   6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches(75 mm) from each end and not more than 24 inches(600 mm) o.c.

F. Continuity: Maintain continuity of joint systems with a minimum number of end joints and align metal members. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames. Adhere flexible filler materials, if any, to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

G. Extruded Preformed Seals: Install seals to comply with manufacturer's written instructions and with minimum number of end joints.
   1. For straight sections, provide preformed seals in continuous lengths.
   2. Vulcanize or heat-weld field splice joints in preformed seal material to provide watertight joints using procedures recommended by manufacturer.
   3. Apply adhesive, epoxy, or lubricant adhesive approved by manufacturer to both frame interfaces before installing preformed seals.
   4. Seal transitions according to manufacturer's written instructions.
   5. Install foam seals with adhesive recommended by manufacturer and heat seal all splices.

Division 8
Openings

25B03

SECTION 08 33 13

OVERHEAD COILING COUNTER DOORS – FIRE RATED

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of overhead coiling doors:
   1. Fire-rated counter doors, electrically operated.

1.2 DEFINITIONS

A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

A. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 20,000 cycles and for 10 cycles per day.
   1. Include tamperproof cycle counter.

1.4 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
   1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
   2. Summary of forces and loads on walls and jambs.
   3. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
   4. Fire-Rated Doors: Information describing fire-release system, including testing and resetting instructions.

B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.

C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

D. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, either stainless-steel or steel extrusions to suit type of curtain slats.
   1. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene, between angles or fitted to shape, as a cushion bumper for interior door.
   2. Provide motor-operated doors with combination bottom astragal and sensor edge.

E. Curtain Jamb Guides: Fabricate curtain jamb guides of angles, or channels and angles of material and finish to match curtain slats, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Provide continuous integral wear strips to prevent metal-to-metal contact and minimize noise of travel and removable stops on guides to prevent overtravel of curtain.

2.3 HOODS AND ACCESSORIES

A. Integral Frame, Hood, and Fascia: Provide welded assemblies of the following sheet metal:
   1. Stainless Steel: Minimum 24 gage stainless-steel sheet, Type 304, complying with ASTM A 666.

B. Integral Sills: Fabricate sills as integral part of frame assembly of same sheet metal, but not less than 0.078 inch(2.0 mm) thick.

C. Smoke Seals: Provide UL-listed and -tested smoke-seal perimeter gaskets.

D. Push/Pull Handles: For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.
   1. Provide pull-down straps or pole hooks for doors more than 84 inches(2130 mm) high.

E. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
   1. Slide bolt locks, operable from inside only.
   2. Lock cylinder is specified in another Division 8 Section.

F. Where door unit is power operated, provide safety interlock switch to disengage power supply when door is locked.

G. Provide automatic-closing device inoperative during normal door operations, with governor unit complying with requirements of NFPA 80, with easily tested and reset release mechanism, and designed to be activated by the following:
   1. Governor: Oscillating type.
   2. Temperature rise and melting point of 165 deg F(74 deg C) replaceable fusible links, interconnected and on both sides of wall of door opening.
   3. Manufacturer's standard UL-labeled smoke detector and door-holder-release devices.
   4. Building fire alarm and detection system and door-holder-release devices.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel

C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.

F. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head-type door operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and quick disconnect-release for manual operation.

G. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 fps (0.2 m/s) or more than 1 fps (0.3 m/s), without exceeding nameplate ratings or considering service factor.
   1. Type: Polyphase, medium-induction type.
   2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
   3. Coordinate wiring requirements and electric characteristics of motors with building electrical system.
   4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.

H. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
   1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

I. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
   1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
      a. Self-Monitoring Type: Provide self-monitoring sensor designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.

J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

K. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.

PART 3 - EXECUTION

25B03

SECTION 08 33 24

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of overhead coiling doors:
   1. Non-fire-rated service doors, motor operated.

1.2 DEFINITIONS

A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

A. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 50,000 cycles and for 25 cycles per day.
   1. Include tamperproof cycle counter.

B. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward

C. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components

1.4 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
   1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
   2. Summary of forces and loads on walls and jambs.

B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.

C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead coiling door manufacturer for both installation and maintenance of units required for this Project.

2.3 HOODS AND ACCESSORIES

A. Integral Frame, Hood, and Fascia: Provide welded assemblies of the following sheet metal:
   1. Fabricate of not less than 0.024-inch thick, hot-dip galvanized steel sheet with G90(Z275) zinc coating, complying with ASTM A 653(ASTM A 653M).

B. Integral Sills: Fabricate sills as integral part of frame assembly of same sheet metal, but not less than 0.078 inch(2.0 mm) thick.

C. Push/Pull Handles: For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.
   1. Provide pull-down straps or pole hooks for doors more than 84 inches(2130 mm) high.

D. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
   1. Locking Bars: Single-jamb side, operable from inside and outside.
   2. Lock cylinder is specified in another Division 8 Section.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel connected to door curtain with required barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft.(2.5 mm/m) of span under full load.

C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.

D. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate with bell-mouth guide groove for curtain.

2.5 FINISHES, GENERAL

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

H. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
   1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

I. Obstruction Detection Device: Provide each motorized grille with indicated external automatic safety sensor able to protect full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.
   1. Sensor Edge: Provide each motorized grille with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward grille travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
      a. Provide pneumatically actuated automatic bottom bar.
      b. Self-Monitoring Type: Provide self-monitoring, 4-wire configured device.

J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

K. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.

L. Emergency Egress Release: Provide grille with flush, wall-mounted handle mechanism, for ADA-compliant egress feature, not dependent on electric power, that allows grille to open to permit passage and automatically resets motor drive, without affecting limit switches, with return of handle to original position

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
   1. Install fire-rated doors to comply with NFPA 80.

3.2 ADJUSTING

A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.3 DEMONSTRATION

A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
   1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive

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SECTION 08 41 13

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Exterior entrance systems.
   2. Interior entrance systems.
   3. Exterior storefront systems.
   4. Interior storefront systems.

1.2 SYSTEM DESCRIPTION

A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
   1. Air infiltration and water penetration exceeding specified limits.
   2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing: Physically and thermally isolate glazing from framing members.

C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.

D. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span or 3/4 inch(19 mm), whichever is smaller, unless otherwise indicated.
   2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.
   3. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
      a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
      b. Duration: As required by design wind velocity; fastest 1 mile(1.609 km) of wind for relevant exposure category.

J. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.

K. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.

L. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.69 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

M. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.3 SUBMITTALS

A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.
   1. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.

C. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

D. Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch(150-mm) lengths of full-size components and showing details of the following:
   1. Joinery.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.
   5. Flashing and drainage.

E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

F. Field Test Reports: Indicate and interpret test results for compliance with storefront systems' performance requirements.

G. Product Test Reports: Based on evaluation of tests performed by qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

H. Maintenance Data: Include maintenance data for aluminum-framed systems in maintenance manuals.

Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
   1. Structural failures including, but not limited to, excessive deflection.
   2. Noise or vibration caused by thermal movements.
   3. Failure of system to meet performance requirements.
   4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   5. Failure of operating components to function normally.
   6. Water leakage through fixed glazing and frame areas.

C. Warranty Period: 2 years from date of Substantial Completion.

D. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 10 years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Kawneer Company, Inc.
   2. United States Aluminum.
   3. Vistawall Architectural Products.

B. Acceptable Products – Basis of Design:
   1. Storefront Systems:
      a. Ground Floor: Vistawall EZ Set, 2 inch x 6 inch mullion profile.
      b. Floors 2 through 5: Vistawall HP Mor::Front System, 2 inch x 6 inch mullion profile.
   2. Doors: Vistawall Medium Stile.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

finished to match framing members or hardware being fastened, unless otherwise indicated.

F. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

G. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.
   1. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

H. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
   1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.
   2. Sliding Weather Stripping: Wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements.

2.4 HARDWARE

A. Refer to Hardware Schedule in Section 08 71 00.

B. General: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated.

C. At smoke tight doors into ICU/CCU: Provide positive latching doors with smoke seals which, as a unit, has been tested per UL 1784 as smoke tight.

2.5 FABRICATION

A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
   1. Fabricate components for screw-spline frame construction.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Prepare components to receive concealed fasteners and anchor and connection devices.

D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Fabricate with provisions for field replacement of glazing from exterior.

F. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
   1. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.

C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 section, "Joint Sealants."

E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.

F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
   1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.

G. Install glazing to comply with requirements of Division 8 section, "Glazing," unless otherwise indicated.

H. Install insulation materials a specified in Division 7 section, "Building Insulation."

I. Install perimeter sealants to comply with requirements of Section 07 92 00, "Joint Sealants," unless otherwise indicated.

J. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
   1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet(3 mm in 3.7 m); 1/4 inch(6 mm) over total length.
   2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch(1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch(0.8 mm).

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SECTION 08 42 30

SLIDING AUTOMATIC ENTRANCE DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes automatic entrance door systems operating as follows:
   1. Biparting sliding operation.
   2. Telescoping sliding operation.

B. Refer to Section 08 71 00 for additional requirements on fire-rated door hardware.

1.2 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door systems that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:
   1. Thermal Movements: Provide automatic entrance doors that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
      a. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.
   2. Operating Temperature Range: Provide automatic entrance door operators capable of operating between minus 10 deg F and plus 120 deg F(minus 23 deg C and plus 49 deg C).
   3. Structural Performance: Provide automatic entrance doors capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
      a. Basic Wind Speed: As indicated in miles per hour(meters per second) at 33 feet(10 m) above grade. Determine wind loads and resulting design pressures applicable to Project according to the following, based on mean roof heights above grade as indicated on Drawings:
         1) Wind Loads: ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure."

C. Manufacturer Qualifications: A firm experienced in manufacturing systems similar to those indicated for this Project and with a record of successful in-service performance.
   1. Company Certificate: Issued by the American Association of Automatic Door Manufacturers.

D. Source Limitations: Obtain automatic entrance doors through one source from a single manufacturer.

E. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

F. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

G. ANSI/BHMA Standard: ANSI/BHMA A156.10, "Power Operated Pedestrian Doors."

H. UL Standard: Provide power door operators that comply with UL 325.

I. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

J. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify automatic entrance door openings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 COORDINATION

A. Coordinate size and location of recesses in concrete floors for the following automatic entrance door components. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section.
   1. Recessed sliding tracks.

1.8 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing."
1. Exterior Entrances: Single pane, tint to match adjacent glazing.
2. Interior Entrances: Single pane, clear.

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining grout; complying with ASTM C 1107; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil(0.76-mm) thickness per coat.

2.3 AUTOMATIC ENTRANCE DOOR SYSTEMS

A. General: Provide manufacturer's standard automatic entrance door system, complete with doors, sidelite and transom framing, operators, controls, activation devices, safety devices, and accessories as indicated. Comply with the following:
1. Configuration: Biparting sliding doors, with sidelite on each side of door.
   a. Traffic Pattern: Two-way.
   b. Emergency Breakaway Capability: Doors only.
   c. Mounting: Refer to Drawings.

B. Activation Devices: Activate doors by the following equipment:
1. Microwave-scanner motion detector.
2. Remote button.

C. Operator Safety Devices: Control door opening and closing by the following equipment:
1. Photoelectric beams.

2.4 COMPONENTS

A. Doors: Provide manufacturer's standard 1-3/4-inch-(44.5-mm-) thick glazed doors with minimum 0.125-inch-(3.2-mm-) thick, extruded tubular stile and rail members. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails.
1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on, extruded-aluminum, square glazing stops and preformed resilient glazing gaskets.
2. Stile Design: Medium stile; 3-1/2-inch (89-mm) nominal width.
3. Rail Design: 5-inch (127-mm) nominal height.

B. Framing Members: Fabricate from extruded aluminum or formed-aluminum sheet or plate.
1. Main Extrusions: Minimum wall thickness of 0.125 inch(3.2 mm).
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch(1.6 mm).

c. Automatic door re-open if stopped while closing.

4. Microprocessor Control: System that automatically defines and sets opening and closing parameters.
5. On/Off Feature: Provide on/off/hold-open switch to control electric power to operator.

B. Electromechanical Operators: Self-contained overhead units, with power opening and closing mechanism indicated below and with checking in both opening and closing cycles. Provide safety-release clutch for obstructed closing. Provide for manual sliding when power is off. Provide operator action as indicated.
1. Closing Mechanism: Power operated.
2. Mounting: Concealed.

2.6 ACTIVATION AND SAFETY DEVICES

A. Microwave-Scanner Motion Detector: Self-contained motion detector consisting of a microwave-scanner sensing device to activate door operator. Sensing device shall be adjustable to provide detection patterns and sensitivity equivalent to those required for control mats. Provide time delay for closing set at no less than 1.5 seconds. Provide metal or plastic housing with black finish for sensing device.

B. Photoelectric-Beam Control System: Manufacturer's standard horizontal photoelectric-beam system, arranged as indicated.

C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

D. Opening-Width Control Switch: Two-position switch that in the normal position allows sliding doors to travel to full opening width and in the alternate position reduces opening to a selected partial opening width.

2.7 HARDWARE

A. General: Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those indicated to be provided by automatic entrance door manufacturer.

B. Heavy-Duty Hardware: Provide units as indicated in size, number, and type recommended by manufacturer for entrances required. Finish exposed parts to match door finish, unless otherwise indicated.

C. Emergency Breakaway Hardware: Provide release hardware that allows panel to swing out in the direction of egress to a full 90 degrees from any position in the sliding mode. Maximum force to open panel shall be 50 lbf(222 N) according to ANSI/BHMA A156.10. Interrupt operation of breakaway panel operator while in the breakaway mode.

D. Compression Weather Stripping: Manufacturer's standard replaceable, compressible gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287. Include bumper-type gaskets at door stops and laps.

1. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

2.9 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Finish aluminum automatic entrance door system components to match adjacent aluminum curtain wall or storefront.

D. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrance doors.

B. Examine roughing-in for compressed-air piping systems to verify actual locations of piping connections before equipment installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

B. Recessed Sills: Level recess using non-shrink grout.

3.3 INSTALLATION

A. General: Comply with automatic entrance door manufacturer's written installation instructions, unless more stringent requirements are indicated. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.

B. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.

3.6 CLEANING AND PROTECTION

A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
   1. Comply with requirements in Division 8 Section "Glazing" for cleaning and maintaining glass.

B. Provide final protection and maintain conditions, including limiting construction traffic, that ensure automatic entrance doors are without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage manufacturer's inspector certified by the American Association of Automatic Door Manufacturers to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrance doors as specified below:
   1. Train Owner's maintenance personnel on procedures and schedules for starting up and shutting down, troubleshooting, servicing, complying with safety requirements, and maintaining equipment and schedules. Refer to Section 01 79 00.
   2. Review data in maintenance manuals. Refer to Division 1 Section 01 78 23, "Operation and Maintenance Data."
   3. Schedule training with Owner with at least seven days' advance notice.

END OF SECTION 08 42 30

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SECTION 08 42 43

ICU/CCU ENTRANCE DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following assemblies:
   1. Combination swing/slide manual ICU/CCU entrance door assemblies.
   2. Combination swing/bi-fold manual ICU/CCU entrance door assemblies.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for entrance doors.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other Work.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
   1. Size: 12-inch-(300-mm-) long sections of extrusions or formed shapes.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of the entrance door manufacturer for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain entrance doors through one source from a single manufacturer.

C. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with standards indicated below:

1. Extruded: ASTM B 221(ASTM B 221M).
2. Sheet and Plate: ASTM B 209(ASTM B 209M).
3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing."

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining grout; complying with ASTM C 1107; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil(0.76-mm) thickness per coat.

2.3 ICU/CCU ENTRANCE DOOR ASSEMBLIES

A. General: Provide manufacturer's standard ICU/CCU entrance door assembly, complete with doors, sidelite framing, and accessories as indicated. Comply with the following:
1. Number of Doors: As indicated.
2. Emergency Breakaway Capability: Door and sidelights.
3. Floor Track Configuration: Trackless across door opening and recessed, pin-guide track system at sidelites.

B. Opening Force: Provide entrance doors that require no more than 5 lbf(22.2 N) to stop door movement.

2.4 COMPONENTS

A. Doors: Provide manufacturer's standard 1-3/4-inch-(44.5-mm-) thick glazed doors with minimum 0.125-inch-(3.2-mm-) thick, extruded tubular stile and rail members. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails.
1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on, extruded-aluminum, square glazing stops and preformed resilient glazing gaskets.
2. Stile Design: As indicated on Drawings.
3. Rail Design: As indicated on Drawings.

B. Framing Members: Fabricated from extruded-aluminum or formed-aluminum sheet or plate.
1. Main Extrusions: Minimum wall thickness of 0.125 inch(3.2 mm).
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch(1.6 mm).

C. Headers: Fabricated from minimum 0.125-inch-(3.2-mm-) thick, extruded aluminum or formed-aluminum sheet or plate. Conceal roller track in header,

2.6 FABRICATION

A. General: Fabricate entrance door assembly components to designs, sizes, and thicknesses specified and to comply with indicated standards.

B. Prefabrication: Provide entrance doors as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
   1. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.
   2. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
   3. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
   4. Prepare components to receive concealed fasteners and anchor and connection devices.
   5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.

C. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

D. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."

E. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

F. Hardware: Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.

G. Doors: Fabricate doors in profiles indicated. Reinforce as required to support imposed loads and for installing hardware. Factory assemble door and frame units.

H. Framing: Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide sub-frames and reinforcement of types indicated or, if not indicated, as required for a complete system to support required loads.

I. Electrical Grounding: Fabricate entrance doors to be internally grounded, complying with requirements of authorities having jurisdiction.

2.7 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

3.4 ADJUSTING

A. Adjust door hardware for smooth and safe operation.

B. Readjust doors after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware and other moving parts.

C. Test grounding system for compliance with requirements of authorities having jurisdiction.

3.5 CLEANING AND PROTECTION

A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
   1. Comply with requirements in Division 8 Section "Glazing" for cleaning and maintaining glass.

B. Provide final protection and maintain conditions, including limiting construction traffic, that ensure entrance doors are without damage or deterioration at time of Substantial Completion.

END OF SECTION 08 42 43

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SECTION 08 44 13

GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes conventionally glazed aluminum curtain walls installed as stick systems.

B. Related Sections include the following:
1. Division 7 Section "Building Insulation" for insulation materials field installed with glazed aluminum curtain-wall systems.
2. Division 7 Section "Fire-Resistive Joint Systems " for perimeter fire-containment systems (safing insulation) field installed with glazed aluminum curtain-wall systems.
3. Division 7 Section "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain-wall systems and for sealants to the extent not specified in this Section.
4. Division 8 Section "Glazing" for insulating-glass requirements.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding, without failure, the effects of the following:
1. Structural loads.
2. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
3. Dimensional tolerances of building frame and other adjacent construction.
4. Failure includes the following:
   a. Deflection exceeding specified limits.
   b. Thermal stresses transferred to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
   d. Noise or vibration created by wind and thermal and structural movements.
   e. Loosening or weakening of fasteners, attachments, and other components.
   f. Sealant failure.

B. Structural Loads:
1. Wind Loads: 105 mph or as otherwise required by code.
2. Seismic Loads: Refer to structural drawings.

C. Structural-Test Performance: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding test pressure indicated without material and deflection failures and permanent deformation of structural members exceeding 0.2 percent of span when tested according to ASTM E 330.

J. Condensation Resistance: Provide glazed aluminum curtain-wall systems with condensation-resistance factor (CRF) of not less than 55 when tested according to AAMA 1503.

K. Average Thermal Conductance: Provide glazed aluminum curtain-wall systems with average U-factor of not more than 0.66 Btu/sq. ft. x h x deg F(3.75 W/sq. m x K) when tested according to AAMA 1503.

L. Sound Transmission: Provide glazed aluminum curtain-wall systems with minimum STC 32 according to ASTM E 413 and an OITC 26 according to ASTM E 1332, as determined by testing according to ASTM E 90.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of glazed aluminum curtain-wall systems.
   1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Qualification Data: For Installer.

E. Field quality-control test reports.

F. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing Work of this Section and who is acceptable to manufacturer.
   1. Engineering Responsibility: Preparation of data for glazed aluminum curtain-wall systems including the following:
      a. Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.

C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

2.2 FRAMING SYSTEMS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Sheet and Plate: ASTM B 209(ASTM B 209M).
   2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221(ASTM B 221M).
   3. Extruded Structural Pipe and Tubes: ASTM B 429.
   4. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
   1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
   2. Cold-Rolled Sheet and Strip: ASTM A 611.
   3. Hot-Rolled Sheet and Strip: ASTM A 570/A 570M.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
   1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   2. Reinforce members as required to receive fastener threads.
   3. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.

E. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

F. Concealed Flashing: Dead-soft, 0.018-inch-(0.457-mm-) thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.

G. Framing Gaskets: As recommended by manufacturer for joint type.

H. Framing Sealants: As recommended by manufacturer for joint type.

2.3 GLAZING SYSTEMS

A. Glazing: As specified in Division 8 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer for joint type.

2.4 ACCESSORY MATERIALS

A. Perimeter Fire-Containment Systems (Safing Insulation): Specified in Division 7 Section "Fire-Resistive Joint Systems."

B. Insulating Materials: Specified in Division 7 Section "Building Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:
   1. Comply with manufacturer's written instructions.
   2. Do not install damaged components.
   3. Fit joints to produce hairline joints free of burrs and distortion.
   4. Rigidly secure non-movement joints.
   5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   6. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
   2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified Division 8 Section "Glazing."

F. Install sealants as specified in Division 7 Section "Joint Sealants."

G. Install insulation materials as specified in Division 7 Section "Building Insulation."

H. Install perimeter fire-containment systems (safing insulation) as specified in Division 7 Section "Fire-Resistive Joint Systems."

I. Erection Tolerances: Install glazed aluminum curtain-wall systems to comply with the following maximum tolerances:
   1. Plumb: 1/8 inch in 10 feet(3 mm in 3 m); 1/4 inch in 40 feet(6 mm in 12 m).
   2. Level: 1/8 inch in 20 feet(3 mm in 6 m); 1/4 inch in 40 feet(6 mm in 12 m).
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch(13 mm) wide, limit offset from true alignment to 1/16 inch(1.6 mm).

SECTION 08 50 00

BETWEEN GLASS VENETIAN BLINDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Blinds for factory-installation in aluminum windows.

B. Blinds for field installation in hollow metal doors and sidelights.

1.2 REFERENCES

A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels; 1998.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Window manufacturer's shop drawings showing blind configurations and sizes.

D. Selection Samples: Two complete color charts representing manufacturer's full range of available colors.

E. Verification Samples: For custom colors, two samples, minimum size 6 inches (150 mm) square, representing actual production color.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to window manufacturer in time to avoid construction delays.

1.5 EXTRA MATERIALS

A. Provide 1 percent extra blinds of each size for Owner's use in maintenance and repair.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Window Accessory Company Incorporated; PO Box

E. Lift and Tilt Mechanisms: Designed with slip clutch mechanism preventing damage to blind and hardware if tilt mechanism is turned beyond closed position.
   1. Ladder/Tape Drum: Made of 33 percent glass fiber filled nylon to minimize discoloration of cords, with plated steel pins for lift cord bearing surfaces; ladder cords wrapped around drum, lift cords routed through head rail end cap; secured in head rail with snap-in clips.
   2. Tilt Rod in Head Rail: Operating all ladder/tape drums in unison; spring loaded to allow approximately 1 inch (25 mm) lateral movement from tilt control end of head rail.
   3. Tilt Cables: Flexible brass or bronze coated high tensile strength steel wire wound in four layers to outside diameter of 0.130 inch (3.3 mm); 6 inches (150 mm) long.
   4. Set-Screwed Cable Fittings for Control Rod Attachment: Minimum 0.3125 inch (7.9 mm) diameter brass fittings crimped onto cable ends in six locations to ensure fittings will not work loose under normal use conditions, with stainless steel set screws for rod attachment.
   5. Vertical Control Rods: D-shaped steel rod attached to cable assemblies.
   6. Tilt Control Knobs: Thumb turn; with flexible control cable.
   7. Covers for Exposed Cables and Rods: Vinyl, weatherstrip grade, 0.015 inch (0.4 mm) thick.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install blinds in factory in accordance with manufacturer's instructions.
B. Test to confirm proper operation.

END OF SECTION 08 50 00

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SECTION 08 51 13

FIXED ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. AW 60 Grade exterior aluminum windows, fixed type, with integral blinds.

B. Related Sections:
1. Section 08 50 00 - Between-Glass Venetian Blinds: Integral blinds.

1.2 DEFINITIONS

A. Performance class number, included as part of the window designation system, is the actual design pressure in pounds force per square foot(pascals) used to determine structural test pressure and water test pressure.
1. Structural test pressure, wind load test, is equivalent to 150 percent of the design pressure.
2. Water-leakage-resistance test pressure is equivalent to 20 percent of the design pressure with 12.0 lbf/sq. ft. as a minimum for Architectural Grade windows.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, classes, and sizes required for Project according to test methods indicated.

B. Test Criteria: Testing shall be performed by a qualified independent testing agency based on the following criteria:
1. Design wind velocity at Project site is 105 mi./h.
2. Heights of window units above grade at window centerline are indicated on or can be determined from the Drawings. Consult with the Architect, if necessary, to confirm required loading and test pressures.
3. Test Procedures: Test window units according to ASTM E 283 for air infiltration, ASTM E 547 for water penetration, and ASTM E 330 for structural performance.

C. Performance Requirements: Testing shall demonstrate compliance with requirements indicated in AAMA 101 for air infiltration, water penetration, and structural performance for type, grade, and performance class of window units required. Where required design pressure exceeds the minimum for the specified window grade, comply with requirements of AAMA 101, Section 3, "Optional Performance Classes," for higher than minimum performance class.

performance requirements specified for air infiltration and water resistance tests.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of window required, including the following:
1. Construction details and fabrication methods.
2. Profiles and dimensions of individual components.
3. Data on hardware, accessories, and finishes.
4. Recommendations for maintaining and cleaning exterior surfaces.

C. Shop Drawings showing fabrication and installation of each type of window required including information not fully detailed in manufacturer's standard Product Data and the following:
1. Layout and installation details, including anchors.
2. Elevations at 1/4 inch = 1 foot(1:50) scale and typical window unit elevations at 3/4 inch = 1 foot(1:20) scale.
3. Full-size section details of typical composite members, including reinforcement and stiffeners.
4. Location of weep holes.
5. Glazing details.
6. Accessories.

D. Samples for Verification: The Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.

E. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated. Test results based on use of down-sized test units will not be accepted.

F. Structural Calculations: Prepared by a registered structural engineer indicating adequacy of materials furnished under this Section, meeting uniform and structural load requirements specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in material, design, and extent to those required for this Project and with a record of successful in-service performance.

B. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Single-Source Responsibility: Obtain aluminum windows from one source and by a single manufacturer.

2.2 MATERIALS

A. Aluminum Extrusions: Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi(150-MPa) ultimate tensile strength and not less than 0.125 inch thick at any location for main frame and sash members.

B. Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.
   1. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.

D. Compression-Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

E. Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating. Comply with Division 7 Section "Joint Sealants" of these Specifications for selection and installation of sealants.

2.3 HARDWARE

A. Components:
   1. Steel Components: 300 Series stainless steel.
   2. Aluminum Components: 6063-T5 or T6.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessories that comply with indicated standards.

B. Integral Venetian Blinds: Refer to Section 08 50 00.

2.5 FABRICATION

A. General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.
   1. Provide units that are re-glazable without dismantling sash or ventilator framing.

1. Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.
2. Metal surfaces shall be dry; clean; free of grease, oil, dirt, rust and corrosion, and welding slag; without sharp edges or offsets at joints.

3.2 INSTALLATION

A. Refer to Division 8 Section "Glazed Aluminum Curtain Walls" for requirements for installing aluminum window units in glazed curtain walls.

B. Comply with manufacturer's specifications and recommendations for installing window units, hardware, operators, and other components of the Work.

C. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.
   1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.

D. Set sill members and other members in a bed of sealant or with joint fillers or gaskets, as shown on Shop Drawings, to provide weathertight construction. Refer to Division 7 Section "Joint Sealants" for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the Work.
   1. Sealants, joint fillers, and gaskets to be installed after installation of window units are specified in another Division 7 Section.

3.3 FIELD QUALITY CONTROL

A. Conduct on-site tests for air and water infiltration with window manufacturer's representative present. The Architect will select units to be tested. Tests not meeting specified requirements and units having similar deficiencies shall be corrected at no cost to the Owner. Testing shall be performed by a qualified independent testing agency selected by the Architect.
   1. Air-Infiltration Tests: Conduct tests according to requirements of ASTM E 783. Allowable infiltration shall not exceed 1.5 times the amount indicated.
   2. Water-Resistance Tests: Conduct tests according to requirements of ASTM E 1105. No water leakage is permitted.

3.4 CLEANING

A. Clean aluminum surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.

B. Clean glass of pre-glazed units promptly after installing windows. Comply with requirements of Division 8 Section "Glazing" for cleaning and maintenance.

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SECTION 08 63 00

METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Aluminum-framed skylights with retaining caps.
   2. Two-sided, structural-sealant-glazed, aluminum-framed skylights with retaining caps at rafters.

B. Related Sections include the following:
   1. Division 7 Section "Joint Sealants" for sealants installed at metal-framed skylight perimeters.
   2. Division 8 Section "Glazing" for glass units installed in metal-framed skylights.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide metal-framed skylights capable of withstanding loads and thermal and structural movements indicated without failure. Failure includes the following:
   1. Deflection exceeding specified limits.
   2. Thermal stresses transferred to the building structure.
   3. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing.
   4. Noise or vibration created by thermal and structural movement and wind.
   5. Loosening or weakening of fasteners, attachments, and other components.
   6. Sealant failure.

B. Structural-Sealant Glazing: As follows:
   1. Structural silicone sealant does not carry gravity load of glazing.
   2. Tensile and shear stress in structural silicone sealant joints is less than 20 psi(138 kPa).
   3. Structural silicone sealant joints accommodate thermal and mechanical movement, prevent glazing-to-glazing contact, and maintain required glazing-edge clearances.
   4. Structural silicone sealant fails cohesively before sealant releases from substrate when tested for adhesive compatibility with each substrate and joint condition required.
      a. Adhesive failure occurs when sealant pulls away from a substrate cleanly, leaving no sealant material behind.
      b. Cohesive failure occurs when sealant breaks or tears within a joint but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

I. Water Penetration: Provide metal-framed skylights that do not evidence uncontrolled water penetration when tested according to ASTM E 331 at 12.0 psf (574 Pa).

J. Dynamic Water Penetration: Provide metal-framed skylights that do not evidence uncontrolled water penetration when tested according to AAMA 501 at 12.0 psf (573 Pa).

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions and profiles of components, and finishes for metal-framed skylights.

B. Shop Drawings: For metal-framed skylights. Include plans, elevations, sections, details, and attachments to other Work.
1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Verification: For each exposed aluminum finish required, prepared on 12-inch-(300-mm-) long sections of extrusions or formed shapes in same thickness and material indicated for the Work. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

E. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with sealants; include sealant manufacturer's interpretation of test results for sealant performance and recommendations for primers and substrate preparation needed for adhesion.

F. Field Test Reports: Indicate and interpret test results for compliance with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer to assume engineering responsibility who has specialized in installing metal-framed skylights similar to those indicated for this Project and who is acceptable to manufacturer.
1. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of skylights that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

2. Sealant failures.
3. Failure of systems to meet performance requirements.
4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
5. Water leakage; defined as uncontrolled water appearing on normally exposed interior surfaces of skylights from sources other than condensation. Water controlled by flashing and gutters and drained back to the exterior and that cannot damage adjacent materials or finishes is not water leakage.
6. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Fisher Skylights, Inc.
2. Naturalite/EPI Skylight Systems.
3. O'Keeffe's Inc.
4. Super Sky Products, Inc.

B. Acceptable Product – Basis of Design: Naturalite BMS 3000.

2.2 FRAMING MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for use and finish indicated, and as follows:
1. Extrusions: ASTM B 221(ASTM B 221M).
2. Sheet and Plate: ASTM B 209(ASTM B 209M).
3. Bars, Rods, and Wire: ASTM B 211(ASTM B 211M).

B. Brackets and Reinforcements: Provide manufacturer's standard high-strength aluminum brackets and reinforcements. Provide non-staining, nonferrous shims to install and align skylights.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing; compatible with adjacent materials.

D. Exposed Flashing and Closures: Aluminum sheet.
1. Minimum Thickness: 0.040 inch(1 mm) for anodized finish.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories; compatible with adjacent materials.
1. Movement Joints: Provide slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
2. Aluminum-Retaining-Cap Fasteners: ASTM A 193/A 193M, Series 300 stainless-steel screws; type as recommended by manufacturer.
3. Connections to Supporting Structure: ASTM A 307, zinc-coated steel fasteners.
4. Anchor Bolts: ASTM A 307, Grade A, zinc-coated steel anchor bolts.
5. Concrete or Masonry Inserts: Zinc-coated cast-iron, malleable-iron, or steel inserts; hot-dip galvanized according to ASTM A 123.

3. Fabricate components to accommodate expansion, contraction, and field adjustment, and to provide for minimum clearance and shimming at skylight perimeter.
4. Fabricate components to ensure that glazing is thermally and physically isolated from framing members.
5. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
6. Fit and assemble components to greatest extent practicable before finishing.
7. Fit and secure joints with screw and spline, internal reinforcement, or welding.
8. Reinforce members as required to retain fastener threads.
9. Where fasteners are exposed to view from interior, countersink bolt or screw heads and finish to match framing.
10. Weld components before finishing and in concealed locations to greatest extent practicable to minimize distortion.
11. Before shipping, shop assemble, mark, and disassemble components that cannot be permanently shop assembled.

B. Provide continuous aluminum curb with weatherproof expansion joints and locked and sealed or fully welded corners. Locate weep holes in the curb at each rafter connection to drain condensation.

C. Prepare framing to receive anchor and connection devices and fasteners.

D. Metal Protection: As follows:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended by manufacturer.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class I, Color Anodic Finish: AA-M10C22A42/A44 (Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.
1. Color: Match storefront.

2. Structural Silicone Sealant Glazing: Prepare surfaces that will contact sealant and install sealant according to sealant manufacturer's written instructions. Preparation includes, but is not limited to, cleaning and priming. Mechanically fasten glazing in place until sealant cures. Clean excess sealant from surfaces before sealant cures.

D. Install secondary-sealant weatherseal according to sealant manufacturer's written instructions to provide weatherproof joints. Install joint fillers behind sealant as recommended by sealant manufacturer.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field quality-control tests and to prepare test reports.

B. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field quality-control tests and to prepare test reports.

C. Sealant Adhesion Tests: Test installed sealant in a minimum of two areas and as follows:
1. Test structural silicone sealant according to field adhesion test method described in AAMA CW 13, "Structural Sealant Glazing Systems (A Design Guide)."
2. Test weatherseal sealant as recommended in writing by sealant manufacturer.

D. Water-Spray Test: Test skylights for compliance with requirements according to procedures in AAMA 501.2.

E. Air Infiltration: Test skylights according to AAMA 503, which requires testing according to ASTM E 783.
1. Static-Air-Pressure Differential: 1.57 lbf/sq. ft.(75 Pa) minimum.
2. Air Leakage: 0.06 cfm/sq. ft.(0.03 L/s per sq. m) of surface maximum.

F. Water Penetration: Test skylights for compliance with requirements according to AAMA 503, which requires testing according to ASTM E 1105.
1. Uniform Static-Air-Pressure Difference: 20 percent of positive design wind load, but not less than 6.24 lbf/sq. ft.(300 Pa).

G. Repair or replace Work that does not meet requirements or that is damaged by testing; repair or replace to comply with specifications.

3.5 CLEANING

A. Clean skylights inside and outside, immediately after installation and after sealants have cured, according to manufacturer's written recommendations.
1. Remove temporary protective coverings and strippable coatings from pre-finished metal surfaces. Remove labels and markings from all components.

B. Remove excess sealant according to sealant manufacturer's written recommendations.

END OF SECTION 08 63 00

Hardware Group No. 0.05
For use on door(s):
5005B
Provide each SL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	SET	HARDWARE	ALL HARDWARE BY DOOR/FRAME MFR.	FBO	UNK

Hardware Group No. 0.06 DPS
For use on door(s):
1129D
Provide each RU door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	HARDWARE	BALANCE OF HARDWARE BY DOOR/FRAME MFR.	FBO	UNK
1	EA	DPS	DOOR POSITION SWITCH BY DOOR/FRAME MFR.	FBO	UNK

DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 0.07
For use on door(s):
1129C-B
Provide each RU door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	HARDWARE	BALANCE OF HARDWARE BY DOOR/FRAME MFR.	FBO	UNK

Hardware Group No. 1.01
For use on door(s):
1125 2108 3076 4108 5108
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	28-10G05 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 2.02 CR
For use on door(s):

2075A	2075B	2096A	2096B	3075A	3075B
4075A	4075B	4096B	5075A	5075B	5096B

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	OVERHEAD STOP	100S	630	GLY
1	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.03 CR
For use on door(s):

1075	2076A	2076B	2095	2097	3063
3072	4076A	4076B	4095	4097	5076A
5076B	5095	5097	T-002		

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.06 CR
For use on door(s):

1035B	1057	1090	1096B	1097	1104B
1107E	1116	3059	4096A	5026	5096A

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.07 DPS
For use on door(s):
6004
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	FLUSH BOLT	FB457	626	IVE
1	EA	STOREROOM LOCK	28-10G04 LL	626	SAR
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
1	EA	CLOSER/STOP	4111SCNS	689	LCN
1	EA	OVERHEAD STOP	410S	630	GLY
1	EA	WEATHERSTRIP	297AV (HEAD & JAMBS)	628	PEM
1	EA	DRIP CAP	346C	628	PEM
2	EA	SWEEP	315SSN	630	PEM
1	EA	THRESHOLD	171A X MS&A	628	PEM
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH

DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.10 CR
For use on door(s):
1063B
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
5	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	PR	CONST LATCHING BOLT	FB61P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
1	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.11
For use on door(s):
1090A
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	FLUSH BOLT	FB358	626	IVE
1	EA	STOREROOM LOCK	28-10G04 LL	626	SAR
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
1	EA	CLOSER	4041 X TB	689	LCN
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 3.02
For use on door(s):

1028	1041	1056	1072	1073	1082
1094	1095	1101	1111	1139	2034
2036	3019A	3019B	4034	4036	5034
5036					

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 3.03
For use on door(s):

2072	3057	4072	5072

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 3.04
For use on door(s):

2073	3043	4073	5073

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	CLOSER	4031 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 3.05
For use on door(s):

1008B	1008C	1008D	1009B	1009C

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM71HD	628	PEM
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	DOOR STOP	WS65	627	IVE

Hardware Group No. 5.02 HO
For use on door(s):

2037A 2037B 3021A 3021B 4037A 4037B
5037A 5037B

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	COORDINATOR	COR7G	626	IVE
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP/HOLDER	WS45	626	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 5.03 AUTO
For use on door(s):

2043 3027 4043A 5043

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
1	EA	CONTINUOUS HINGE	CFM83HD	628	PEM
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	ELECTRIC STRIKE	6221 FSE	630	VON
1	EA	COORDINATOR	COR7G	626	IVE
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
2	EA	AUTO-OPENER	AUTO-OPENER (RELATED SECTION)	689	UNK
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
2	EA	ACTUATOR	PUSH PAD (RELATED SECTION)	689	UNK

POWER SUPPLY TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 5.08
For use on door(s):

1024B 1102 1104A 1121 T-008

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	OVERHEAD HOLDER	410H	630	GLY

Hardware Group No. 5.09
For use on door(s):

1026

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	COORDINATOR	COR7G	626	IVE
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 5.10
For use on door(s):

1037A	1037B	1038	1039	1040	1042
1046A	1051	1064	1077	1078	1085
1093	1100	1122	1136A	1136B	1138

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 5.11
For use on door(s):

1048

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 6.03 ISOL
For use on door(s):

2002B 4002B 5002B

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH/PULL LATCH	HL6-ASA	630	GLY
1	EA	CLOSER	4041-H X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 6.04
For use on door(s):

2005	2006	2009	2010	2013	2014
2017	2018	2021	2022	2046	2048
2049	2052	2053	2056	2057	2060
2061	2064	2065	2068	4005	4006
4009	4010	4013	4014	4017	4018
4021	4022	4046	4048	4049	4052
4053	4056	4057	4060	4061	4064
4065	4068	5005A	5006	5009	5010
5013	5014	5017	5018	5021	5022
5046	5048	5049	5052	5053	5056
5057	5060	5061	5064	5065	5068

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	SWING CLEAR HINGE	5BB1SCHW 5	652	IVE
1	EA	PUSH/PULL LATCH	HL6-ASA	630	GLY
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 6.05 ISOL
For use on door(s):

2027 3010B 3011B 5027

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH/PULL LATCH	HL6-ASA	630	GLY
1	EA	CLOSER	4041-H X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 7.02 MHO
For use on door(s):

1007	1061B	1107C	2044A	2102	2112
3080A	4044	4102	4112	5102	5112

Provide each DE door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD	628	PEM
2	EA	EXIT DEVICE	9927EO-F-LBR X SNB	626	VON
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL MAGNET	SEM 7850	689	LCN
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

WALL MAGNETS TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 7.03
For use on door(s):

2044B 5044

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD	628	PEM
1	EA	EXIT DEVICE	99L-F X 06L-F X SNB	626	VON
1	EA	RIM CYLINDER	63-34	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 7.04 CR-REMOTE
For use on door(s):

3028

Provide each DE door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
2	EA	EXIT DEVICE	EL9927EO-F X LBR X SNB	626	VON
1	EA	MAGNETIC LOCK	390DEL	628	SCH
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	POWER SUPPLY	PS873-2	600	VON
1	EA	REMOTE SWITCH	660-PB	628	SCH
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER/DELAY ALARM OR REMOTE SWITCH. EGRESS BY EXIT DEVICE.
DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.
POWER SUPPLIES TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 7.07 CR
For use on door(s):
1001 1107B 1140
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
1	EA	EXIT DEVICE	ERX9975L 06L FSE	626	VON
1	EA	MORTISE CYLINDER	63-41	626	SAR
1	EA	CLOSER	4041	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	DOOR STOP	WS11X	626	IVE
1	SET	WEATHERSTRIP	29310CPK (HEAD & JAMBS)	628	PEM
1	EA	DRIP CAP	346C	628	PEM
1	EA	SWEEP	315SSN	630	PEM
1	EA	THRESHOLD	171A X MS&A	628	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK

INGRESS BY READER OR KEY OVERIDE. EGRESS BY EXIT DEVICE/REX.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 7.08 CR
For use on door(s):
1004 1068A 1130A 1135B 1146B
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
1	EA	EXIT DEVICE	ERX9975L 06L FSE	626	VON
1	EA	MORTISE CYLINDER	63-41	626	SAR
1	EA	CLOSER/STOP	4111SCNS	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	SET	WEATHERSTRIP	29310CPK (HEAD & JAMBS)	628	PEM
1	EA	DRIP CAP	346C	628	PEM
1	EA	SWEEP	315SSN	630	PEM
1	EA	THRESHOLD	171A X MS&A	628	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK

INGRESS BY READER OR KEY OVERIDE. EGRESS BY EXIT DEVICE/REX.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 7.11 CR-AUTO
For use on door(s):

1061A

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
2	EA	EXIT DEVICE	ELRX9927L-F X 06L-F X LBR X SNB	626	VON
2	EA	RIM CYLINDER	63-34	626	SAR
2	EA	AUTO-OPENER	AUTO-OPENER (RELATED SECTION)	689	UNK
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	PS873-2	600	VON
1	EA	ACTUATOR	PUSH PAD (RELATED SECTION)	689	UNK
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK

INGRESS BY READER OR KEY OVERIDE. EGRESS BY EXIT DEVICES/REX OR PUSH PAD.
DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.
POWER SUPPLY TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 7.12 AUTO
For use on door(s):

1107D

Provide each DE door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
2	EA	EXIT DEVICE	EL9927EO-F X SNB	626	VON
2	EA	AUTO-OPENER	AUTO-OPENER (RELATED SECTION)	689	UNK
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	PS873-2	600	VON
2	EA	ACTUATOR	PUSH PAD (RELATED SECTION)	689	UNK

POWER SUPPLY TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 9.03 PRO
For use on door(s):

1112 2071 2094 3042 3077 4071
5071

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	PRO LOCK	PRO5196-17	626	SCH
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

INGRESS BY KEYPAD. EGRESS BY LOCKSET.

Hardware Group No. 9.04 PRO
For use on door(s):

2087A 2087B 4087A 4087B 5087A ~~5087B~~

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	PRO LOCK	PRO5196-17	626	SCH
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	OVERHEAD STOP	100S	630	GLY
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

INGRESS BY KEYPAD. EGRESS BY LOCKSET.

Hardware Group No. 9.05 PRO
For use on door(s):

1080 2091A 2091B 3014 3055A 3055B
3061A 3061B 3062 4089 4091A 4091B
4094 5091A 5091B 5094

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	PRO LOCK	PRO5196-17	626	SCH
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

INGRESS BY KEYPAD. EGRESS BY LOCKSET.

25F03

SECTION 08 71 13

AUTOMATIC DOOR CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes mechanically operated automatic opening device for swinging doors operating as follows:
   1. Swinging operation for interior doors.
   2. Double egress where indicated.

1.2 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide automatic openers that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:
   1. Opening Force: Comply with the following maximum opening-force requirements for locations indicated:
      a. Exterior Doors: 15 lbf(67N).
      b. Interior Doors: 5 lbf(22.2 N).

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other Work.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

C. Hardware Schedule: Organize schedule into sets based on hardware specified. Include name of item and manufacturer, and complete designation of every item required for each automatic entrance door.

D. Product Certificates: Signed by manufacturers of automatic opener certifying that products furnished comply with emergency exit door requirements.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of the automatic entrance door system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
   1. Faulty operation of operators and hardware.

C. Warranty Period: Two years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Maintenance: Beginning at Substantial Completion, provide 24 months' full maintenance by skilled employees of automatic opener Installer. Include quarterly planned and preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.
   1. Engage an inspector certified by the American Association of Automatic Door Manufacturers to perform a safety inspection after each adjustment or repair, and at the end of the maintenance period. Submit the completed inspection form to Owner.
   2. Perform maintenance, including emergency callback service, during normal working hours.
   3. Include 24-hour-per-day, 7-day-per-week emergency callback service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Besam.
   2. Dor-O-Matic; an Ingersoll-Rand Company.
   3. Horton Automatics; Div. of Overhead Door Corporation.
   4. Stanley Access Technologies; Div. of The Stanley Works.

B. Acceptable Products – Basis of Design:
   1. Low-Energy Operator:
      a. Series 7000 Easy Access Operator by Horton.
      b. Magic Access by Stanley.
   2. Low-Energy Operator, Heavy Duty: Series 4000LE Low Energy, Heavy-Duty Operator by Horton.

2.2 AUTOMATIC DOOR OPERATOR

A. General: Provide manufacturer's standard automatic door operator, complete with operators, controls, activation devices, safety devices, and accessories as indicated. Comply with the following:
   1. Configurations:
      a. Swinging doors for two-way traffic.
      b. Swinging doors for double egress.

1. Material: Stainless steel.
2. Message: International symbol of accessibility and "Push to Open."

C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.5 ACCESSORIES

A. Signage:
1. Comply with ANSI/BHMA A156.19.

2.6 FABRICATION

A. General: Fabricate automatic opener components to designs, sizes, and thicknesses specified and to comply with indicated standards.

B. Prefabrication: Provide automatic opener as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

2.7 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker).
1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrance doors.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

SECTION 08 81 13

DECORATIVE GLASS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following decorative glass for interior applications:
   1. Tempered.

B. Related Sections include the following:
   1. Division 8 Section "Glass and Glazing" for glass and glazing requirements.

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 PERFORMANCE REQUIREMENTS

A. Provide decorative glass and glazing capable of withstanding normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following:defective manufacture, fabrication, and installation; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and shall not be reduced.

1.5 SUBMITTALS

A. Product Data: For each decorative-glass and glazing product indicated.

B. Shop Drawings: Show fabrication and installation details for decorative glass. Include the following:
   1. Size and location of penetrations.
   2. Glazing method.
   3. Mounting method.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect decorative glass to comply with manufacturer's written directions and as needed to prevent damage to glass and any decorative and protective surfaces.

B. Retain packaging and sequencing numbers for decorative-glass units.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install decorative glass until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Verify dimensions to fit by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer, agreeing to replace laminated-glass units that develop defects from normal use including edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MONOLITHIC-GLASS PRODUCTS

A. Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated glass), Type I (transparent flat glass), Class 1 (clear), Quality-Q3, unless otherwise indicated; Kind HS (heat strengthened) and Kind FT (fully tempered) where indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

2.2 SEALANTS

A. Glazing Gaskets, Sealants, Tapes, and Miscellaneous Glazing Materials: Specified in Division 8 Section "Glass and Glazing."
1. Elastomeric Glazing Sealants: ASTM C 920.
a. Color: As selected by Architect from manufacturer's full range.

B. Joint Sealants: As specified in Division 7 Section "Joint Sealants."

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise indicated.

F. Clean joint surfaces; apply primers to joint surfaces where required for adhesion of sealants.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm) as follows:
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances, and to comply with system performance requirements.
   2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

3.4 DECORATIVE GLASS SCHEDULE

A. Refer to Finish Legend.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers between glass lites and glazing stops to maintain glass-face clearance. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants smooth.

3.6 CLEANING AND PROTECTION

A. Protect decorative glass from damage immediately after installation by attaching crossed streamers to framing and held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect decorative glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Remove and replace decorative glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

D. Wash decorative glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date

06C02

SECTION 08 83 13

MIRRORED GLASS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Safety (tempered) mirrored glass.

1.2 DEFINITIONS

A. Deterioration of Silvered Mirrored Glass: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning silvered mirrored glass contrary to mirrored glass manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.3 PERFORMANCE REQUIREMENTS

A. Provide mirrored glass that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.4 SUBMITTALS

A. Product Data: For the following:
1. Mirror mastic.
2. Mirror hardware.

B. Product Certificates: Signed by manufacturers of mirrored glass and mirror mastic certifying that products furnished comply with requirements.

C. Mirror Mastic Glass Coating Compatibility Test Reports: From an organic protective coating manufacturer indicating that mirror mastic has been tested for compatibility and adhesion with organic protective coating applied to silvered mirrored glass. Include organic coating manufacturers' interpretation of test results relative to performance and recommendations for use of mastics with organic protective coating.

D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed mirrored glass installations similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Mirrored Glass: Obtain mirrored glass from one source for each type of mirrored glass indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Mirror Company, Inc.
2. Carolina Mirror Company.
3. Virginia Mirror Co., Inc.
4. VVP America, Inc.; Binswanger Mirror Products.
5. Walker Glass Co., Ltd.

2.2 FLOAT GLASS

A. Tempered Float Glass: ASTM C 1048, Type I (transparent glass, flat), Condition A (uncoated), Kind FT (fully tempered), Quality q3 (glazing select) float glass, complying with the following requirements:
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of mirror as installed, unless otherwise indicated.
2. Clear Tempered Float Glass: Class 1 (clear).
   a. Thickness: 4 mm.

2.3 MIRRORED GLASS

A. Silvered Mirrored Glass:, clear float glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic protective coating applied to second glass surface to produce a coating system complying with FS DD-M-411.
1. Provide fully tempered, ASTM C 1048 Type FT, where indicated or required by code.

2.4 FABRICATION

A. Mirrored Glass Sizes: Cut mirrored glass to final sizes and shapes to suit Project conditions.

B. Cutouts: Fabricate cutouts for notches and holes in mirrored glass without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrored glass.

C. Mirrored Glass Edge Treatment: Treat edges as indicated below.
1. Flat polished edge.
2. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.
3. Require mirrored glass manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.5 MISCELLANEOUS MATERIALS

A. Setting Blocks: Neoprene, 70 to 90 Shore A hardness.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.3 GLAZING

A. General: Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GANA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.

B. Provide space for air circulation between back of mirrored glass units and face of mounting surface.

C. Mastic Spot Installation System: Install mirrored glass units with mastic as follows:
1. Apply barrier coat to mirrored glass backing where approved in writing by manufacturers of mirrored glass and backing material.
2. Apply mastic in spots to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrored glass units and face of mounting surface.
3. After mastic is applied, align mirrored glass units and press into place while maintaining a minimum air space of 1/8 inch(3 mm) between back of mirrored glass and mounting surface.

D. For wall-mounted mirrored glass units, install permanent means of support at bottom and top edges with bottom support designed to withstand mirrored glass weight and top support designed to prevent mirrored glass from coming away from wall along top edges.
1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrored glass units.
2. For continuous bottom supports, provide setting blocks 1/8 inch(2 mm) thick by 4 inches(100 mm) long at quarter points. For channels or other continuous supports in which water could be trapped, provide, between setting blocks, two slotted weeps not less than 1/4 inch(3 mm) wide by 3/8 inch(4.5 mm) long.
3. Where indicated, install bottom and top trim. Fabricate trim in single lengths to fit and cover top and bottom edges of mirrored glass units.

3.4 PROTECTION AND CLEANING

A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.
1. Do not permit edges of silvered mirrored glass to be exposed to standing water.
2. Maintain environmental conditions that will prevent silvered mirrored glass from being exposed to moisture from condensation or other sources for continuous periods of time.

B. Wash mirrored glass not more than four days before date scheduled for inspections intended to establish date for Substantial Completion. Wash

18B03

SECTION 08 91 00

STORM RESISTANT ALUMINUM LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Fixed, extruded-aluminum louvers, storm resistant.

1.2 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

1.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.

B. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Samples for Verification: For each type of metal finish required.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. Welding: Qualify procedures and personnel according to the following:

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
   1. Frame Type: Channel, unless otherwise indicated.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches(1830 mm) o.c., whichever is less.
   1. Exterior Corners: Prefabricated corner units with mitered blades, welded or concealed close-fitting splices as selected by Architect, and with fully recessed or semirecessed mullions at corners as indicated on Drawings.

F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Storm-Resistant Louver:
   1. Products:
      a. Storm Resistant Fixed Horizontal Louver Model RS-7315 by Construction Specialties, Inc. (C/S).
   2. Louver Depth: 7 inches.
   3. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.060 inch(1.5 mm) for blades and 0.080 inch(2.0 mm) for frames.
      a. Blades: Front lip gutter and secondary multiple gutter designed to catch and direct water to jamb and mullion downspouts.
   4. Louvers: Mechanical fastened using stainless steel or aluminum fasteners; minimum 4 inch high by full depth sill flashing formed from minimum 0.050 inch (1.27 mm) thick aluminum.
      a. Sill Flashing: Welded side panels.
   5. Performance Requirements:
      a. Free Area: Not less than 8.9 sq. ft. (0.75 sq. m) for 48-inch- (1.2-m-) wide by 48-inch- (1.2-m-) high louver.
      b. Percent Free Air: Minimum 50 percent.
      c. Air Performance:
         1) Intake Pressure Drop at 900 fpm with free area velocity of 0.32 inch water.
         2) Exhaust Pressure Drop at 900 fpm with free area velocity of 0.44 inch water.
      d. Wind-Driven Rain Performance: Not less than 99 percent effectiveness when subjected to a rain fall rate of 3 inches(75 mm) per hour and a wind speed of 29 mph(13 m/s) at a core area intake velocity of 351 fpm(1.8 m/s).
   6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
   7. BSRIA: Certified test data for wind-driven rain performance from an accredited BSRIA laboratory.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

design of UL, Omega Point, or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Joint Treatment and Finishing Materials: For exhaust duct applications, provide joint treatment tape and joint compounds recommended in writing by grease duct fire protection manufacturer for finishing surfaces of lapped joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected

3.2 PREPARATION

A. Where welded-stud (impaling pin) anchorage system is used, remove rust and scale from steel substrates at locations to receive steel studs.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for particular conditions of installation in each case.

B. Install grease duct fire protection to comply with requirements for thicknesses, number of courses (layers), construction of joints and corners, and anchorage methods applicable to fire-resistance-rated assemblies indicated.

3.4 PROTECTION

A. Coordinate installation of grease duct fire protection with other construction to minimize cutting into, or removal of, installed fire-resistive materials. As other construction is successively completed, replace or repair grease duct fire protection that has been cut away to facilitate this other construction. Maintain complete coverage of full thickness on members and substrates protected by grease duct fire protection.

B. Provide final protection and maintain conditions in a manner acceptable to Installer, manufacturer, and authorities having jurisdiction that ensure that grease duct fire protection is without damage or deterioration at time of Substantial Completion.

END OF SECTION 07 81 60

SECTION 07 87 00

ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Smoke detector activated elevator door smoke containment screen and control system designed to provide a tight-fitting, smoke- and draft-control assembly.

B. Products Supplied But Not Installed Under This Section:
   1. End-of-line diode (3.9V, 2W). Installed at smoke detector to monitor the circuit.

1.02 SUBMITTALS

A. Reference Section 01330–Submittal Procedures; submit following items:
   1. Product Data.
   2. Shop Drawings: Include door width and height, jamb width, jamb and head projection, screen width, mounting height, and housing width. Show and identify related work performed under other sections of the specifications.
   3. Quality Assurance/Control Submittals:
      a. Qualifications:
         1) Proof of manufacturer qualifications.
         2) Proof of Installer qualifications.
      b. Certifications: Copy of specified items.
      c. Manufacturer's installation instructions and testing procedures

B. Closeout Submittals: Reference Section 01 77 00; submit following items:
   1. Operation and Maintenance Manual.
   2. Manufacturer's Warranties

1.03 QUALITY ASSURANCE

A. Overall Standards:
   1. Manufacturer shall maintain a quality control program in accordance with ICBO-ES Acceptance Criteria AC 77.

B. Qualifications:
   1. Manufacturer Qualifications: Minimum seven years experience in producing smoke containment systems of the type specified.
   2. Installer Qualifications: Factory trained by manufacturer.

C. Certifications:
   1. Manufacturer's ICC Evaluation Service report ESR-1136.
   2. California Department of Forestry and Fire Protection and Office of the State Fire Marshal Listing.
   3. Testing Laboratory Label.
   4. UL Listing.
   5. OSHPD Anchorage Pre-Approval No. OPA-0318

2.03 COMPONENTS

A. Screen:
   1. Film: Minimum 1 mil (0.025 mm) thick transparent polyimide film reinforced with minimum 100 denier Nomex yarn at .25 in (6.35 mm) each way.
   2. Magnetic Strips: Flexible multi-pole strips attached to longitudinal edges of film with low modulus silicone adhesive.

B. Housing: 20 gauge, powder coated, cold rolled steel container with dust cover and door with concealed hinges. Housings are 55, 64, or 73" in length plus 1-1/2 inches for a junction box on the left side.

C. Auxiliary Rails (for elevator frames that are nonferrous or stainless steel, or do not have flat 2 inch wide face, or are recessed in or flush with finished wall surface):
   1. Material: 16 gage ASTM A 240/240M, Type 430, ferritic stainless steel.
   2. Size: 2 inches (51 mm) wide; 1 inch (25 mm), 3/4 inch (19 mm) or 1/2 inches (13 mm) deep, depth as required to project beyond face of elevator door frame, as shown in Shop Drawings.

D. Rewind Motor: NFPA 70, 90v DC.

E. Release Mechanism: Comply with UL Standard No. 864.

F. Screen Rewind Switch: Include switch to rewind screen into housing.

2.04 IDENTIFICATION

A. Label each smoke containment system with following information:
   1. Manufacturer's name.
   2. Maximum leakage rating at specified pressure and temperature conditions.
   3. Label of quality control agency.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates upon which work will be installed.
   1. Verify related work performed under other sections is complete and in accordance with Shop Drawings.
   2. Verify wall surfaces and elevator door frames are acceptable for installation of smoke containment system components.
   3. Verify existing field painted elevator door frames to be used for screen adherence have been repainted in accordance with smoke containment system manufacturer's instructions or they have the original factory paint.

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.

C. Commencement of work by installer is acceptance of substrate.

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SECTION 07 95 13

ARCHITECTURAL JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Types of joints for which architectural joint systems are specified include the following:
   1. Wall and ceiling joints, floor joints, roof joints.

1.2 DEFINITIONS

A. Architectural Joint System: Any filler or cover used to span, fill, cover, or seal a joint, except expanding foam seals and poured or foamed in-place sealants.

B. Cyclic Movement: Periodic change between widest and narrowest joint widths in an automatically mechanically controlled system.

C. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist passage of flame and hot gases through a movement joint.

D. Maximum Joint Width: Widest linear gap a joint system tolerates and performs its designed function without damaging its functional capabilities.

E. Minimum Joint Width: Narrowest linear gap a joint system tolerates and performs its designed function without damaging its functional capabilities.

F. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint opening typically expressed in numerical values (mm or inches) or a percentage of nominal value of joint width.

G. Nominal Joint Width: Width of linear gap indicated as representing the conditions existing when architectural joint systems will be installed or, if no nominal joint width is indicated, a width equal to the sum of maximum and minimum joint widths divided by two.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide factory-fabricated architectural joint systems capable of withstanding the types of loads and of accommodating the kinds of movement, and the other functions for which they are designed including those specified below, without failure. Types of failure include those listed in Appendix X3 of ASTM E 1399.
   1. Vehicular Traffic Joints: Support vehicular traffic across joint.
   2. Pedestrian Traffic Joints: Support pedestrian traffic across joint.
   3. Exterior Joints: Maintain continuity of weather enclosure.
   4. Joints in Fire-Resistance-Rated Assemblies: Maintain fire-resistance ratings of assemblies.
   5. Joints in Smoke Barriers: Maintain integrity of smoke barrier.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: The design for each architectural joint system specified in Part 2 "Architectural Joint Systems" Article below is based on the products named. Subject to compliance with requirements, provide either the named products or comparable products by one of the other manufacturers listed.
   1. Architectural Art Manufacturing, Inc.
   2. Balco/Metalines.
   3. Construction Specialties.
   4. InPro Jointmaster.
   5. MM Systems Corp.
   6. Watson Bowman.

2.2 MATERIALS

A. Aluminum: ASTM B 221(ASTM B 221M), alloy 6063-T5 for extrusions; ASTM B 209 (ASTM B 209M), alloy 6061-T6 for sheet and plate.
   1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.

B. Preformed Seals: Single or multicellular extruded elastomeric seals designed with or without continuous, longitudinal, internal baffles. Formed to be installed in frames or with anchored flanges, in color indicated or, if not indicated, as selected by Architect from manufacturer's standard colors.

C. Strip Seals: Elastomeric membrane or tubular extrusions with a continuous longitudinal internal baffle system throughout complying with ASTM E 1783; used with compatible frames, flanges, and molded-rubber anchor blocks.

D. Compression Seals: Preformed, elastomeric extrusions having internal baffle system complying with ASTM E 1612 in sizes and profiles indicated or as recommended by manufacturer.

E. Preformed Cellular Foams: Neoprene or polyurethane extruded, compressible foam.

F. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint.

G. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, flexible moisture barrier and filler materials, drain tubes, lubricants, adhesives, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.3 ARCHITECTURAL JOINT SYSTEMS

A. General: Provide joint systems of design, basic profile, materials, and operation indicated. Provide units with the capability to accommodate joint widths indicated and variations in adjacent surfaces. Refer to Schedule at end of Section.

threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for handling and installing architectural joint assemblies and materials, unless more stringent requirements are indicated.

B. Coordinate installation of architectural joint assembly materials and associated work so complete assemblies comply with assembly performance requirements.

C. Terminate exposed ends of exterior architectural joint assemblies with factory-fabricated termination devices to maintain waterproof system.

D. Install factory-fabricated transitions between building expansion-joint cover assemblies and roof expansion-joint assemblies, specified in Division 7 Section "Roof Expansion Assemblies," to provide continuous, uninterrupted, watertight construction.

E. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required to install joint systems.
   1. Install joint cover assemblies in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
   2. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling.
   3. Set covers in horizontal surfaces at elevations that place exposed surfaces flush with adjoining finishes.
   4. Locate wall, ceiling, and soffit covers in continuous contact with adjacent surfaces.
   5. Securely attach in place with required accessories.
   6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches(75 mm) from each end and not more than 24 inches(600 mm) o.c.

F. Continuity: Maintain continuity of joint systems with a minimum number of end joints and align metal members. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames. Adhere flexible filler materials, if any, to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

G. Extruded Preformed Seals: Install seals to comply with manufacturer's written instructions and with minimum number of end joints.
   1. For straight sections, provide preformed seals in continuous lengths.
   2. Vulcanize or heat-weld field splice joints in preformed seal material to provide watertight joints using procedures recommended by manufacturer.
   3. Apply adhesive, epoxy, or lubricant adhesive approved by manufacturer to both frame interfaces before installing preformed seals.
   4. Seal transitions according to manufacturer's written instructions.
   5. Install foam seals with adhesive recommended by manufacturer and heat seal all splices.

Division 8
Openings

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SECTION 08 33 13

OVERHEAD COILING COUNTER DOORS – FIRE RATED

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of overhead coiling doors:
   1. Fire-rated counter doors, electrically operated.

1.2 DEFINITIONS

A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

A. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 20,000 cycles and for 10 cycles per day.
   1. Include tamperproof cycle counter.

1.4 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
   1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
   2. Summary of forces and loads on walls and jambs.
   3. Motors: Show nameplate data and ratings; characteristics; mounting arrangements; size and location of winding termination lugs, conduit entry, and grounding lug; and coatings.
   4. Fire-Rated Doors: Information describing fire-release system, including testing and resetting instructions.

B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring and between components provided by door manufacturer and those provided by others.

C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

D. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, either stainless-steel or steel extrusions to suit type of curtain slats.
   1. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene, between angles or fitted to shape, as a cushion bumper for interior door.
   2. Provide motor-operated doors with combination bottom astragal and sensor edge.

E. Curtain Jamb Guides: Fabricate curtain jamb guides of angles, or channels and angles of material and finish to match curtain slats, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Provide continuous integral wear strips to prevent metal-to-metal contact and minimize noise of travel and removable stops on guides to prevent overtravel of curtain.

2.3 HOODS AND ACCESSORIES

A. Integral Frame, Hood, and Fascia: Provide welded assemblies of the following sheet metal:
   1. Stainless Steel: Minimum 24 gage stainless-steel sheet, Type 304, complying with ASTM A 666.

B. Integral Sills: Fabricate sills as integral part of frame assembly of same sheet metal, but not less than 0.078 inch(2.0 mm) thick.

C. Smoke Seals: Provide UL-listed and -tested smoke-seal perimeter gaskets.

D. Push/Pull Handles: For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.
   1. Provide pull-down straps or pole hooks for doors more than 84 inches(2130 mm) high.

E. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
   1. Slide bolt locks, operable from inside only.
   2. Lock cylinder is specified in another Division 8 Section.

F. Where door unit is power operated, provide safety interlock switch to disengage power supply when door is locked.

G. Provide automatic-closing device inoperative during normal door operations, with governor unit complying with requirements of NFPA 80, with easily tested and reset release mechanism, and designed to be activated by the following:
   1. Governor: Oscillating type.
   2. Temperature rise and melting point of 165 deg F(74 deg C) replaceable fusible links, interconnected and on both sides of wall of door opening.
   3. Manufacturer's standard UL-labeled smoke detector and door-holder-release devices.
   4. Building fire alarm and detection system and door-holder-release devices.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel

C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging sprocket-chain operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.

F. Door-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head-type door operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, chain and sprocket secondary drive, and quick disconnect-release for manual operation.

G. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors, complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction, from any position, at not less than 2/3 fps (0.2 m/s) or more than 1 fps (0.3 m/s), without exceeding nameplate ratings or considering service factor.
   1. Type: Polyphase, medium-induction type.
   2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
   3. Coordinate wiring requirements and electric characteristics of motors with building electrical system.
   4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.

H. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
   1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

I. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
   1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
      a. Self-Monitoring Type: Provide self-monitoring sensor designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.

J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

K. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.

PART 3 - EXECUTION

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SECTION 08 33 24

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of overhead coiling doors:
   1. Non-fire-rated service doors, motor operated.

1.2 DEFINITIONS

A. Operation Cycle: One complete cycle of a door begins with the door in the closed position. The door is then moved to the open position and back to the closed position.

1.3 PERFORMANCE REQUIREMENTS

A. Operation-Cycle Requirements: Design overhead coiling door components and operator to operate for not less than 50,000 cycles and for 25 cycles per day.
   1. Include tamperproof cycle counter.

B. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward

C. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components

1.4 SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes. Provide roughing-in diagrams, operating instructions, and maintenance information. Include the following:
   1. Setting drawings, templates, and installation instructions for built-in or embedded anchor devices.
   2. Summary of forces and loads on walls and jambs.

B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's data sheets.

C. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who is an authorized representative of the overhead coiling door manufacturer for both installation and maintenance of units required for this Project.

2.3 HOODS AND ACCESSORIES

A. Integral Frame, Hood, and Fascia: Provide welded assemblies of the following sheet metal:
   1. Fabricate of not less than 0.024-inch thick, hot-dip galvanized steel sheet with G90(Z275) zinc coating, complying with ASTM A 653(ASTM A 653M).

B. Integral Sills: Fabricate sills as integral part of frame assembly of same sheet metal, but not less than 0.078 inch(2.0 mm) thick.

C. Push/Pull Handles: For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.
   1. Provide pull-down straps or pole hooks for doors more than 84 inches(2130 mm) high.

D. Fabricate locking device assembly with lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.
   1. Locking Bars: Single-jamb side, operable from inside and outside.
   2. Lock cylinder is specified in another Division 8 Section.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of adjustable-tension steel helical torsion spring, mounted around a steel shaft and contained in a spring barrel connected to door curtain with required barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft.(2.5 mm/m) of span under full load.

C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.

D. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate with bell-mouth guide groove for curtain.

2.5 FINISHES, GENERAL

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

H. Remote-Control Station: Provide momentary-contact, 3-button control station with push-button controls labeled "Open," "Close," and "Stop."
   1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

I. Obstruction Detection Device: Provide each motorized grille with indicated external automatic safety sensor able to protect full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.
   1. Sensor Edge: Provide each motorized grille with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward grille travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
      a. Provide pneumatically actuated automatic bottom bar.
      b. Self-Monitoring Type: Provide self-monitoring, 4-wire configured device.

J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

K. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.

L. Emergency Egress Release: Provide grille with flush, wall-mounted handle mechanism, for ADA-compliant egress feature, not dependent on electric power, that allows grille to open to permit passage and automatically resets motor drive, without affecting limit switches, with return of handle to original position

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install door and operating equipment complete with necessary hardware, jamb and head mold strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.
   1. Install fire-rated doors to comply with NFPA 80.

3.2 ADJUSTING

A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

3.3 DEMONSTRATION

A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:
   1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
   2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive

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SECTION 08 41 13

ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Exterior entrance systems.
   2. Interior entrance systems.
   3. Exterior storefront systems.
   4. Interior storefront systems.

1.2 SYSTEM DESCRIPTION

A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
   1. Air infiltration and water penetration exceeding specified limits.
   2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing: Physically and thermally isolate glazing from framing members.

C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.

D. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span or 3/4 inch(19 mm), whichever is smaller, unless otherwise indicated.
   2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.
   3. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
      a. Test Pressure: 150 percent of inward and outward wind-load design pressures.
      b. Duration: As required by design wind velocity; fastest 1 mile(1.609 km) of wind for relevant exposure category.

J. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.

K. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.

L. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.69 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

M. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.3 SUBMITTALS

A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.
   1. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.

C. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

D. Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch(150-mm) lengths of full-size components and showing details of the following:
   1. Joinery.
   2. Anchorage.
   3. Expansion provisions.
   4. Glazing.
   5. Flashing and drainage.

E. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

F. Field Test Reports: Indicate and interpret test results for compliance with storefront systems' performance requirements.

G. Product Test Reports: Based on evaluation of tests performed by qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

H. Maintenance Data: Include maintenance data for aluminum-framed systems in maintenance manuals.

Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
   1. Structural failures including, but not limited to, excessive deflection.
   2. Noise or vibration caused by thermal movements.
   3. Failure of system to meet performance requirements.
   4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   5. Failure of operating components to function normally.
   6. Water leakage through fixed glazing and frame areas.

C. Warranty Period: 2 years from date of Substantial Completion.

D. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 10 years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Kawneer Company, Inc.
   2. United States Aluminum.
   3. Vistawall Architectural Products.

B. Acceptable Products – Basis of Design:
   1. Storefront Systems:
      a. Ground Floor: Vistawall EZ Set, 2 inch x 6 inch mullion profile.
      b. Floors 2 through 5: Vistawall HP Mor::Front System, 2 inch x 6 inch mullion profile.
   2. Doors: Vistawall Medium Stile.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

finished to match framing members or hardware being fastened, unless otherwise indicated.

F. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

G. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing, compatible with adjacent materials, and of type recommended by manufacturer.
   1. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.

H. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
   1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.
   2. Sliding Weather Stripping: Wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements.

2.4 HARDWARE

A. Refer to Hardware Schedule in Section 08 71 00.

B. General: Provide heavy-duty hardware units indicated in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated.

C. At smoke tight doors into ICU/CCU: Provide positive latching doors with smoke seals which, as a unit, has been tested per UL 1784 as smoke tight.

2.5 FABRICATION

A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
   1. Fabricate components for screw-spline frame construction.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Prepare components to receive concealed fasteners and anchor and connection devices.

D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

E. Fabricate with provisions for field replacement of glazing from exterior.

F. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
   1. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.

C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 section, "Joint Sealants."

E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.

F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
   1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.

G. Install glazing to comply with requirements of Division 8 section, "Glazing," unless otherwise indicated.

H. Install insulation materials a specified in Division 7 section, "Building Insulation."

I. Install perimeter sealants to comply with requirements of Section 07 92 00, "Joint Sealants," unless otherwise indicated.

J. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
   1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet(3 mm in 3.7 m); 1/4 inch(6 mm) over total length.
   2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch(1.5 mm). Where surfaces meet at corners, limit offset from true alignment to 1/32 inch(0.8 mm).

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SECTION 08 42 30

SLIDING AUTOMATIC ENTRANCE DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes automatic entrance door systems operating as follows:
   1. Biparting sliding operation.
   2. Telescoping sliding operation.

B. Refer to Section 08 71 00 for additional requirements on fire-rated door hardware.

1.2 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide automatic entrance door systems that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:
   1. Thermal Movements: Provide automatic entrance doors that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
      a. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.
   2. Operating Temperature Range: Provide automatic entrance door operators capable of operating between minus 10 deg F and plus 120 deg F(minus 23 deg C and plus 49 deg C).
   3. Structural Performance: Provide automatic entrance doors capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
      a. Basic Wind Speed: As indicated in miles per hour(meters per second) at 33 feet(10 m) above grade. Determine wind loads and resulting design pressures applicable to Project according to the following, based on mean roof heights above grade as indicated on Drawings:
         1) Wind Loads: ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure."

C. Manufacturer Qualifications: A firm experienced in manufacturing systems similar to those indicated for this Project and with a record of successful in-service performance.
   1. Company Certificate: Issued by the American Association of Automatic Door Manufacturers.

D. Source Limitations: Obtain automatic entrance doors through one source from a single manufacturer.

E. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

F. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

G. ANSI/BHMA Standard: ANSI/BHMA A156.10, "Power Operated Pedestrian Doors."

H. UL Standard: Provide power door operators that comply with UL 325.

I. Emergency Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrance doors serving as a required means of egress.

J. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify automatic entrance door openings by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.7 COORDINATION

A. Coordinate size and location of recesses in concrete floors for the following automatic entrance door components. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section.
   1. Recessed sliding tracks.

1.8 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing."
1. Exterior Entrances: Single pane, tint to match adjacent glazing.
2. Interior Entrances: Single pane, clear.

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining grout; complying with ASTM C 1107; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil(0.76-mm) thickness per coat.

2.3 AUTOMATIC ENTRANCE DOOR SYSTEMS

A. General: Provide manufacturer's standard automatic entrance door system, complete with doors, sidelite and transom framing, operators, controls, activation devices, safety devices, and accessories as indicated. Comply with the following:
1. Configuration: Biparting sliding doors, with sidelite on each side of door.
   a. Traffic Pattern: Two-way.
   b. Emergency Breakaway Capability: Doors only.
   c. Mounting: Refer to Drawings.

B. Activation Devices: Activate doors by the following equipment:
1. Microwave-scanner motion detector.
2. Remote button.

C. Operator Safety Devices: Control door opening and closing by the following equipment:
1. Photoelectric beams.

2.4 COMPONENTS

A. Doors: Provide manufacturer's standard 1-3/4-inch-(44.5-mm-) thick glazed doors with minimum 0.125-inch-(3.2-mm-) thick, extruded tubular stile and rail members. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails.
1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on, extruded-aluminum, square glazing stops and preformed resilient glazing gaskets.
2. Stile Design: Medium stile; 3-1/2-inch (89-mm) nominal width.
3. Rail Design: 5-inch (127-mm) nominal height.

B. Framing Members: Fabricate from extruded aluminum or formed-aluminum sheet or plate.
1. Main Extrusions: Minimum wall thickness of 0.125 inch(3.2 mm).
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch(1.6 mm).

c. Automatic door re-open if stopped while closing.

4. Microprocessor Control: System that automatically defines and sets opening and closing parameters.
5. On/Off Feature: Provide on/off/hold-open switch to control electric power to operator.

B. Electromechanical Operators: Self-contained overhead units, with power opening and closing mechanism indicated below and with checking in both opening and closing cycles. Provide safety-release clutch for obstructed closing. Provide for manual sliding when power is off. Provide operator action as indicated.
1. Closing Mechanism: Power operated.
2. Mounting: Concealed.

2.6 ACTIVATION AND SAFETY DEVICES

A. Microwave-Scanner Motion Detector: Self-contained motion detector consisting of a microwave-scanner sensing device to activate door operator. Sensing device shall be adjustable to provide detection patterns and sensitivity equivalent to those required for control mats. Provide time delay for closing set at no less than 1.5 seconds. Provide metal or plastic housing with black finish for sensing device.

B. Photoelectric-Beam Control System: Manufacturer's standard horizontal photoelectric-beam system, arranged as indicated.

C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

D. Opening-Width Control Switch: Two-position switch that in the normal position allows sliding doors to travel to full opening width and in the alternate position reduces opening to a selected partial opening width.

2.7 HARDWARE

A. General: Refer to Division 8 Section "Door Hardware" for requirements for hardware items other than those indicated to be provided by automatic entrance door manufacturer.

B. Heavy-Duty Hardware: Provide units as indicated in size, number, and type recommended by manufacturer for entrances required. Finish exposed parts to match door finish, unless otherwise indicated.

C. Emergency Breakaway Hardware: Provide release hardware that allows panel to swing out in the direction of egress to a full 90 degrees from any position in the sliding mode. Maximum force to open panel shall be 50 lbf(222 N) according to ANSI/BHMA A156.10. Interrupt operation of breakaway panel operator while in the breakaway mode.

D. Compression Weather Stripping: Manufacturer's standard replaceable, compressible gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287. Include bumper-type gaskets at door stops and laps.

1. Exterior Framing: Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior. Provide anchorage and alignment brackets for concealed support of assembly from the building structure. Allow for thermal expansion of exterior units.

2.9 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Finish aluminum automatic entrance door system components to match adjacent aluminum curtain wall or storefront.

D. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrance doors.

B. Examine roughing-in for compressed-air piping systems to verify actual locations of piping connections before equipment installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

B. Recessed Sills: Level recess using non-shrink grout.

3.3 INSTALLATION

A. General: Comply with automatic entrance door manufacturer's written installation instructions, unless more stringent requirements are indicated. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight.

B. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.

3.6 CLEANING AND PROTECTION

A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
   1. Comply with requirements in Division 8 Section "Glazing" for cleaning and maintaining glass.

B. Provide final protection and maintain conditions, including limiting construction traffic, that ensure automatic entrance doors are without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage manufacturer's inspector certified by the American Association of Automatic Door Manufacturers to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrance doors as specified below:
   1. Train Owner's maintenance personnel on procedures and schedules for starting up and shutting down, troubleshooting, servicing, complying with safety requirements, and maintaining equipment and schedules. Refer to Section 01 79 00.
   2. Review data in maintenance manuals. Refer to Division 1 Section 01 78 23, "Operation and Maintenance Data."
   3. Schedule training with Owner with at least seven days' advance notice.

END OF SECTION 08 42 30

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SECTION 08 42 43

ICU/CCU ENTRANCE DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following assemblies:
   1. Combination swing/slide manual ICU/CCU entrance door assemblies.
   2. Combination swing/bi-fold manual ICU/CCU entrance door assemblies.

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for entrance doors.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other Work.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below and of same thickness and material indicated for the Work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
   1. Size: 12-inch-(300-mm-) long sections of extrusions or formed shapes.

D. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is an authorized representative of the entrance door manufacturer for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain entrance doors through one source from a single manufacturer.

C. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Welding Standards: Comply with AWS D1.2, "Structural Welding Code--Aluminum."

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with standards indicated below:

1. Extruded: ASTM B 221(ASTM B 221M).
2. Sheet and Plate: ASTM B 209(ASTM B 209M).
3. Welding Rods and Bare Electrodes: AWS A5.10.

B. Glazing: As specified in Division 8 Section "Glazing."

C. Sealants and Joint Fillers: Refer to Division 7 Section "Joint Sealants" for joints at perimeter of entrance system.

D. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, non-corrosive, non-staining grout; complying with ASTM C 1107; of consistency suitable for application.

E. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil(0.76-mm) thickness per coat.

2.3 ICU/CCU ENTRANCE DOOR ASSEMBLIES

A. General: Provide manufacturer's standard ICU/CCU entrance door assembly, complete with doors, sidelite framing, and accessories as indicated. Comply with the following:
1. Number of Doors: As indicated.
2. Emergency Breakaway Capability: Door and sidelights.
3. Floor Track Configuration: Trackless across door opening and recessed, pin-guide track system at sidelites.

B. Opening Force: Provide entrance doors that require no more than 5 lbf(22.2 N) to stop door movement.

2.4 COMPONENTS

A. Doors: Provide manufacturer's standard 1-3/4-inch-(44.5-mm-) thick glazed doors with minimum 0.125-inch-(3.2-mm-) thick, extruded tubular stile and rail members. Fabricate corners with mechanically fastened reinforcing brackets or by welding. Incorporate concealed tie-rods that span full length of top and bottom rails.
1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on, extruded-aluminum, square glazing stops and preformed resilient glazing gaskets.
2. Stile Design: As indicated on Drawings.
3. Rail Design: As indicated on Drawings.

B. Framing Members: Fabricated from extruded-aluminum or formed-aluminum sheet or plate.
1. Main Extrusions: Minimum wall thickness of 0.125 inch(3.2 mm).
2. Extruded Glazing Stops and Applied Trim: Minimum wall thickness of 0.062 inch(1.6 mm).

C. Headers: Fabricated from minimum 0.125-inch-(3.2-mm-) thick, extruded aluminum or formed-aluminum sheet or plate. Conceal roller track in header,

2.6 FABRICATION

A. General: Fabricate entrance door assembly components to designs, sizes, and thicknesses specified and to comply with indicated standards.

B. Prefabrication: Provide entrance doors as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
   1. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.
   2. Perform fabrication operations, including cutting, fitting, forming, drilling, and grinding of metalwork in manner that prevents damage to exposed finish surfaces. For hardware, perform these operations before applying finishes.
   3. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
   4. Prepare components to receive concealed fasteners and anchor and connection devices.
   5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.

C. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

D. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to GANA's "Glazing Manual."

E. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

F. Hardware: Install hardware, except surface-mounted hardware, at fabrication plant. Remove only as required for final finishing operation and for delivery to and installation at Project site.

G. Doors: Fabricate doors in profiles indicated. Reinforce as required to support imposed loads and for installing hardware. Factory assemble door and frame units.

H. Framing: Fabricate tubular and channel frame assemblies in configuration indicated, with welded or mechanical joints according to manufacturer's standards. Provide sub-frames and reinforcement of types indicated or, if not indicated, as required for a complete system to support required loads.

I. Electrical Grounding: Fabricate entrance doors to be internally grounded, complying with requirements of authorities having jurisdiction.

2.7 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

3.4 ADJUSTING

A. Adjust door hardware for smooth and safe operation.

B. Readjust doors after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles). Lubricate hardware and other moving parts.

C. Test grounding system for compliance with requirements of authorities having jurisdiction.

3.5 CLEANING AND PROTECTION

A. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
   1. Comply with requirements in Division 8 Section "Glazing" for cleaning and maintaining glass.

B. Provide final protection and maintain conditions, including limiting construction traffic, that ensure entrance doors are without damage or deterioration at time of Substantial Completion.

END OF SECTION 08 42 43

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SECTION 08 44 13

GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes conventionally glazed aluminum curtain walls installed as stick systems.

B. Related Sections include the following:
1. Division 7 Section "Building Insulation" for insulation materials field installed with glazed aluminum curtain-wall systems.
2. Division 7 Section "Fire-Resistive Joint Systems " for perimeter fire-containment systems (safing insulation) field installed with glazed aluminum curtain-wall systems.
3. Division 7 Section "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain-wall systems and for sealants to the extent not specified in this Section.
4. Division 8 Section "Glazing" for insulating-glass requirements.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding, without failure, the effects of the following:
1. Structural loads.
2. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
3. Dimensional tolerances of building frame and other adjacent construction.
4. Failure includes the following:
   a. Deflection exceeding specified limits.
   b. Thermal stresses transferred to building structure.
   c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
   d. Noise or vibration created by wind and thermal and structural movements.
   e. Loosening or weakening of fasteners, attachments, and other components.
   f. Sealant failure.

B. Structural Loads:
1. Wind Loads: 105 mph or as otherwise required by code.
2. Seismic Loads: Refer to structural drawings.

C. Structural-Test Performance: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding test pressure indicated without material and deflection failures and permanent deformation of structural members exceeding 0.2 percent of span when tested according to ASTM E 330.

J. Condensation Resistance: Provide glazed aluminum curtain-wall systems with condensation-resistance factor (CRF) of not less than 55 when tested according to AAMA 1503.

K. Average Thermal Conductance: Provide glazed aluminum curtain-wall systems with average U-factor of not more than 0.66 Btu/sq. ft. x h x deg F(3.75 W/sq. m x K) when tested according to AAMA 1503.

L. Sound Transmission: Provide glazed aluminum curtain-wall systems with minimum STC 32 according to ASTM E 413 and an OITC 26 according to ASTM E 1332, as determined by testing according to ASTM E 90.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.

B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of glazed aluminum curtain-wall systems.
   1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Qualification Data: For Installer.

E. Field quality-control test reports.

F. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Capable of assuming engineering responsibility and performing Work of this Section and who is acceptable to manufacturer.
   1. Engineering Responsibility: Preparation of data for glazed aluminum curtain-wall systems including the following:
      a. Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.

C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
   1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

2.2 FRAMING SYSTEMS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Sheet and Plate: ASTM B 209(ASTM B 209M).
   2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221(ASTM B 221M).
   3. Extruded Structural Pipe and Tubes: ASTM B 429.
   4. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
   1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
   2. Cold-Rolled Sheet and Strip: ASTM A 611.
   3. Hot-Rolled Sheet and Strip: ASTM A 570/A 570M.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
   1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
   2. Reinforce members as required to receive fastener threads.
   3. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.

E. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

F. Concealed Flashing: Dead-soft, 0.018-inch-(0.457-mm-) thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.

G. Framing Gaskets: As recommended by manufacturer for joint type.

H. Framing Sealants: As recommended by manufacturer for joint type.

2.3 GLAZING SYSTEMS

A. Glazing: As specified in Division 8 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer for joint type.

2.4 ACCESSORY MATERIALS

A. Perimeter Fire-Containment Systems (Safing Insulation): Specified in Division 7 Section "Fire-Resistive Joint Systems."

B. Insulating Materials: Specified in Division 7 Section "Building Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:
   1. Comply with manufacturer's written instructions.
   2. Do not install damaged components.
   3. Fit joints to produce hairline joints free of burrs and distortion.
   4. Rigidly secure non-movement joints.
   5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   6. Seal joints watertight, unless otherwise indicated.

B. Metal Protection:
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
   2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Install components plumb and true in alignment with established lines and grades.

E. Install glazing as specified Division 8 Section "Glazing."

F. Install sealants as specified in Division 7 Section "Joint Sealants."

G. Install insulation materials as specified in Division 7 Section "Building Insulation."

H. Install perimeter fire-containment systems (safing insulation) as specified in Division 7 Section "Fire-Resistive Joint Systems."

I. Erection Tolerances: Install glazed aluminum curtain-wall systems to comply with the following maximum tolerances:
   1. Plumb: 1/8 inch in 10 feet(3 mm in 3 m); 1/4 inch in 40 feet(6 mm in 12 m).
   2. Level: 1/8 inch in 20 feet(3 mm in 6 m); 1/4 inch in 40 feet(6 mm in 12 m).
   3. Alignment:
      a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch(13 mm) wide, limit offset from true alignment to 1/16 inch(1.6 mm).

SECTION 08 50 00

BETWEEN GLASS VENETIAN BLINDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Blinds for factory-installation in aluminum windows.

B. Blinds for field installation in hollow metal doors and sidelights.

1.2 REFERENCES

A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels; 1998.

1.3 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Window manufacturer's shop drawings showing blind configurations and sizes.

D. Selection Samples: Two complete color charts representing manufacturer's full range of available colors.

E. Verification Samples: For custom colors, two samples, minimum size 6 inches (150 mm) square, representing actual production color.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to window manufacturer in time to avoid construction delays.

1.5 EXTRA MATERIALS

A. Provide 1 percent extra blinds of each size for Owner's use in maintenance and repair.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Window Accessory Company Incorporated; PO Box

E. Lift and Tilt Mechanisms: Designed with slip clutch mechanism preventing damage to blind and hardware if tilt mechanism is turned beyond closed position.
   1. Ladder/Tape Drum: Made of 33 percent glass fiber filled nylon to minimize discoloration of cords, with plated steel pins for lift cord bearing surfaces; ladder cords wrapped around drum, lift cords routed through head rail end cap; secured in head rail with snap-in clips.
   2. Tilt Rod in Head Rail: Operating all ladder/tape drums in unison; spring loaded to allow approximately 1 inch (25 mm) lateral movement from tilt control end of head rail.
   3. Tilt Cables: Flexible brass or bronze coated high tensile strength steel wire wound in four layers to outside diameter of 0.130 inch (3.3 mm); 6 inches (150 mm) long.
   4. Set-Screwed Cable Fittings for Control Rod Attachment: Minimum 0.3125 inch (7.9 mm) diameter brass fittings crimped onto cable ends in six locations to ensure fittings will not work loose under normal use conditions, with stainless steel set screws for rod attachment.
   5. Vertical Control Rods: D-shaped steel rod attached to cable assemblies.
   6. Tilt Control Knobs: Thumb turn; with flexible control cable.
   7. Covers for Exposed Cables and Rods: Vinyl, weatherstrip grade, 0.015 inch (0.4 mm) thick.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install blinds in factory in accordance with manufacturer's instructions.
B. Test to confirm proper operation.

END OF SECTION 08 50 00

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SECTION 08 51 13

FIXED ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. AW 60 Grade exterior aluminum windows, fixed type, with integral blinds.

B. Related Sections:
1. Section 08 50 00 - Between-Glass Venetian Blinds: Integral blinds.

1.2 DEFINITIONS

A. Performance class number, included as part of the window designation system, is the actual design pressure in pounds force per square foot(pascals) used to determine structural test pressure and water test pressure.
1. Structural test pressure, wind load test, is equivalent to 150 percent of the design pressure.
2. Water-leakage-resistance test pressure is equivalent to 20 percent of the design pressure with 12.0 lbf/sq. ft. as a minimum for Architectural Grade windows.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide aluminum windows engineered, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading without failure, as demonstrated by testing manufacturer's standard window assemblies representing types, grades, classes, and sizes required for Project according to test methods indicated.

B. Test Criteria: Testing shall be performed by a qualified independent testing agency based on the following criteria:
1. Design wind velocity at Project site is 105 mi./h.
2. Heights of window units above grade at window centerline are indicated on or can be determined from the Drawings. Consult with the Architect, if necessary, to confirm required loading and test pressures.
3. Test Procedures: Test window units according to ASTM E 283 for air infiltration, ASTM E 547 for water penetration, and ASTM E 330 for structural performance.

C. Performance Requirements: Testing shall demonstrate compliance with requirements indicated in AAMA 101 for air infiltration, water penetration, and structural performance for type, grade, and performance class of window units required. Where required design pressure exceeds the minimum for the specified window grade, comply with requirements of AAMA 101, Section 3, "Optional Performance Classes," for higher than minimum performance class.

performance requirements specified for air infiltration and water resistance tests.

1.4 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each type of window required, including the following:
1. Construction details and fabrication methods.
2. Profiles and dimensions of individual components.
3. Data on hardware, accessories, and finishes.
4. Recommendations for maintaining and cleaning exterior surfaces.

C. Shop Drawings showing fabrication and installation of each type of window required including information not fully detailed in manufacturer's standard Product Data and the following:
1. Layout and installation details, including anchors.
2. Elevations at 1/4 inch = 1 foot(1:50) scale and typical window unit elevations at 3/4 inch = 1 foot(1:20) scale.
3. Full-size section details of typical composite members, including reinforcement and stiffeners.
4. Location of weep holes.
5. Glazing details.
6. Accessories.

D. Samples for Verification: The Architect reserves the right to require additional samples that show fabrication techniques, workmanship, and design of hardware and accessories.

E. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with performance requirements indicated. Test results based on use of down-sized test units will not be accepted.

F. Structural Calculations: Prepared by a registered structural engineer indicating adequacy of materials furnished under this Section, meeting uniform and structural load requirements specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in material, design, and extent to those required for this Project and with a record of successful in-service performance.

B. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

C. Single-Source Responsibility: Obtain aluminum windows from one source and by a single manufacturer.

2.2 MATERIALS

A. Aluminum Extrusions: Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi(150-MPa) ultimate tensile strength and not less than 0.125 inch thick at any location for main frame and sash members.

B. Fasteners: Provide aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.
   1. Exposed Fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

C. Anchors, Clips, and Window Accessories: Fabricate anchors, clips, and window accessories of aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.

D. Compression-Type Glazing Strips and Weatherstripping: Unless otherwise indicated, and at manufacturer's option, provide compressible stripping for glazing and weatherstripping such as molded EPDM or neoprene gaskets complying with ASTM D 2000 Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287, or molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.

E. Sealant: For sealants required within fabricated window units, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, non-shrinking, and non-migrating. Comply with Division 7 Section "Joint Sealants" of these Specifications for selection and installation of sealants.

2.3 HARDWARE

A. Components:
   1. Steel Components: 300 Series stainless steel.
   2. Aluminum Components: 6063-T5 or T6.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessories that comply with indicated standards.

B. Integral Venetian Blinds: Refer to Section 08 50 00.

2.5 FABRICATION

A. General: Fabricate aluminum window units to comply with indicated standards. Include a complete system for assembly of components and anchorage of window units.
   1. Provide units that are re-glazable without dismantling sash or ventilator framing.

1. Masonry surfaces shall be visibly dry and free of excess mortar, sand, and other construction debris.
2. Metal surfaces shall be dry; clean; free of grease, oil, dirt, rust and corrosion, and welding slag; without sharp edges or offsets at joints.

3.2 INSTALLATION

A. Refer to Division 8 Section "Glazed Aluminum Curtain Walls" for requirements for installing aluminum window units in glazed curtain walls.

B. Comply with manufacturer's specifications and recommendations for installing window units, hardware, operators, and other components of the Work.

C. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.
   1. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified under "Dissimilar Materials" Paragraph in appendix to AAMA 101.

D. Set sill members and other members in a bed of sealant or with joint fillers or gaskets, as shown on Shop Drawings, to provide weathertight construction. Refer to Division 7 Section "Joint Sealants" for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the Work.
   1. Sealants, joint fillers, and gaskets to be installed after installation of window units are specified in another Division 7 Section.

3.3 FIELD QUALITY CONTROL

A. Conduct on-site tests for air and water infiltration with window manufacturer's representative present. The Architect will select units to be tested. Tests not meeting specified requirements and units having similar deficiencies shall be corrected at no cost to the Owner. Testing shall be performed by a qualified independent testing agency selected by the Architect.
   1. Air-Infiltration Tests: Conduct tests according to requirements of ASTM E 783. Allowable infiltration shall not exceed 1.5 times the amount indicated.
   2. Water-Resistance Tests: Conduct tests according to requirements of ASTM E 1105. No water leakage is permitted.

3.4 CLEANING

A. Clean aluminum surfaces promptly after installing windows. Exercise care to avoid damage to protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances. Lubricate hardware and other moving parts.

B. Clean glass of pre-glazed units promptly after installing windows. Comply with requirements of Division 8 Section "Glazing" for cleaning and maintenance.

25B03

SECTION 08 63 00

METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Aluminum-framed skylights with retaining caps.
   2. Two-sided, structural-sealant-glazed, aluminum-framed skylights with retaining caps at rafters.

B. Related Sections include the following:
   1. Division 7 Section "Joint Sealants" for sealants installed at metal-framed skylight perimeters.
   2. Division 8 Section "Glazing" for glass units installed in metal-framed skylights.

1.2 PERFORMANCE REQUIREMENTS

A. General: Provide metal-framed skylights capable of withstanding loads and thermal and structural movements indicated without failure. Failure includes the following:
   1. Deflection exceeding specified limits.
   2. Thermal stresses transferred to the building structure.
   3. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing.
   4. Noise or vibration created by thermal and structural movement and wind.
   5. Loosening or weakening of fasteners, attachments, and other components.
   6. Sealant failure.

B. Structural-Sealant Glazing: As follows:
   1. Structural silicone sealant does not carry gravity load of glazing.
   2. Tensile and shear stress in structural silicone sealant joints is less than 20 psi(138 kPa).
   3. Structural silicone sealant joints accommodate thermal and mechanical movement, prevent glazing-to-glazing contact, and maintain required glazing-edge clearances.
   4. Structural silicone sealant fails cohesively before sealant releases from substrate when tested for adhesive compatibility with each substrate and joint condition required.
      a. Adhesive failure occurs when sealant pulls away from a substrate cleanly, leaving no sealant material behind.
      b. Cohesive failure occurs when sealant breaks or tears within a joint but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

I. Water Penetration: Provide metal-framed skylights that do not evidence uncontrolled water penetration when tested according to ASTM E 331 at 12.0 psf (574 Pa).

J. Dynamic Water Penetration: Provide metal-framed skylights that do not evidence uncontrolled water penetration when tested according to AAMA 501 at 12.0 psf (573 Pa).

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions and profiles of components, and finishes for metal-framed skylights.

B. Shop Drawings: For metal-framed skylights. Include plans, elevations, sections, details, and attachments to other Work.
1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Verification: For each exposed aluminum finish required, prepared on 12-inch-(300-mm-) long sections of extrusions or formed shapes in same thickness and material indicated for the Work. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

E. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with sealants; include sealant manufacturer's interpretation of test results for sealant performance and recommendations for primers and substrate preparation needed for adhesion.

F. Field Test Reports: Indicate and interpret test results for compliance with requirements.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer to assume engineering responsibility who has specialized in installing metal-framed skylights similar to those indicated for this Project and who is acceptable to manufacturer.
1. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of skylights that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

2. Sealant failures.
3. Failure of systems to meet performance requirements.
4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
5. Water leakage; defined as uncontrolled water appearing on normally exposed interior surfaces of skylights from sources other than condensation. Water controlled by flashing and gutters and drained back to the exterior and that cannot damage adjacent materials or finishes is not water leakage.
6. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Fisher Skylights, Inc.
2. Naturalite/EPI Skylight Systems.
3. O'Keeffe's Inc.
4. Super Sky Products, Inc.

B. Acceptable Product – Basis of Design: Naturalite BMS 3000.

2.2 FRAMING MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for use and finish indicated, and as follows:
1. Extrusions: ASTM B 221(ASTM B 221M).
2. Sheet and Plate: ASTM B 209(ASTM B 209M).
3. Bars, Rods, and Wire: ASTM B 211(ASTM B 211M).

B. Brackets and Reinforcements: Provide manufacturer's standard high-strength aluminum brackets and reinforcements. Provide non-staining, nonferrous shims to install and align skylights.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing; compatible with adjacent materials.

D. Exposed Flashing and Closures: Aluminum sheet.
1. Minimum Thickness: 0.040 inch(1 mm) for anodized finish.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories; compatible with adjacent materials.
1. Movement Joints: Provide slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
2. Aluminum-Retaining-Cap Fasteners: ASTM A 193/A 193M, Series 300 stainless-steel screws; type as recommended by manufacturer.
3. Connections to Supporting Structure: ASTM A 307, zinc-coated steel fasteners.
4. Anchor Bolts: ASTM A 307, Grade A, zinc-coated steel anchor bolts.
5. Concrete or Masonry Inserts: Zinc-coated cast-iron, malleable-iron, or steel inserts; hot-dip galvanized according to ASTM A 123.

3. Fabricate components to accommodate expansion, contraction, and field adjustment, and to provide for minimum clearance and shimming at skylight perimeter.
4. Fabricate components to ensure that glazing is thermally and physically isolated from framing members.
5. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
6. Fit and assemble components to greatest extent practicable before finishing.
7. Fit and secure joints with screw and spline, internal reinforcement, or welding.
8. Reinforce members as required to retain fastener threads.
9. Where fasteners are exposed to view from interior, countersink bolt or screw heads and finish to match framing.
10. Weld components before finishing and in concealed locations to greatest extent practicable to minimize distortion.
11. Before shipping, shop assemble, mark, and disassemble components that cannot be permanently shop assembled.

B. Provide continuous aluminum curb with weatherproof expansion joints and locked and sealed or fully welded corners. Locate weep holes in the curb at each rafter connection to drain condensation.

C. Prepare framing to receive anchor and connection devices and fasteners.

D. Metal Protection: As follows:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended by manufacturer.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class I, Color Anodic Finish: AA-M10C22A42/A44 (Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.
1. Color: Match storefront.

2. Structural Silicone Sealant Glazing: Prepare surfaces that will contact sealant and install sealant according to sealant manufacturer's written instructions. Preparation includes, but is not limited to, cleaning and priming. Mechanically fasten glazing in place until sealant cures. Clean excess sealant from surfaces before sealant cures.

D. Install secondary-sealant weatherseal according to sealant manufacturer's written instructions to provide weatherproof joints. Install joint fillers behind sealant as recommended by sealant manufacturer.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field quality-control tests and to prepare test reports.

B. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field quality-control tests and to prepare test reports.

C. Sealant Adhesion Tests: Test installed sealant in a minimum of two areas and as follows:
1. Test structural silicone sealant according to field adhesion test method described in AAMA CW 13, "Structural Sealant Glazing Systems (A Design Guide)."
2. Test weatherseal sealant as recommended in writing by sealant manufacturer.

D. Water-Spray Test: Test skylights for compliance with requirements according to procedures in AAMA 501.2.

E. Air Infiltration: Test skylights according to AAMA 503, which requires testing according to ASTM E 783.
1. Static-Air-Pressure Differential: 1.57 lbf/sq. ft.(75 Pa) minimum.
2. Air Leakage: 0.06 cfm/sq. ft.(0.03 L/s per sq. m) of surface maximum.

F. Water Penetration: Test skylights for compliance with requirements according to AAMA 503, which requires testing according to ASTM E 1105.
1. Uniform Static-Air-Pressure Difference: 20 percent of positive design wind load, but not less than 6.24 lbf/sq. ft.(300 Pa).

G. Repair or replace Work that does not meet requirements or that is damaged by testing; repair or replace to comply with specifications.

3.5 CLEANING

A. Clean skylights inside and outside, immediately after installation and after sealants have cured, according to manufacturer's written recommendations.
1. Remove temporary protective coverings and strippable coatings from pre-finished metal surfaces. Remove labels and markings from all components.

B. Remove excess sealant according to sealant manufacturer's written recommendations.

END OF SECTION 08 63 00

Hardware Group No. 0.05
For use on door(s):
5005B
Provide each SL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	SET	HARDWARE	ALL HARDWARE BY DOOR/FRAME MFR.	FBO	UNK

Hardware Group No. 0.06 DPS
For use on door(s):
1129D
Provide each RU door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	HARDWARE	BALANCE OF HARDWARE BY DOOR/FRAME MFR.	FBO	UNK
1	EA	DPS	DOOR POSITION SWITCH BY DOOR/FRAME MFR.	FBO	UNK

DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 0.07
For use on door(s):
1129C-B
Provide each RU door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	HARDWARE	BALANCE OF HARDWARE BY DOOR/FRAME MFR.	FBO	UNK

Hardware Group No. 1.01
For use on door(s):
1125 2108 3076 4108 5108
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	28-10G05 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 2.02 CR
For use on door(s):

2075A	2075B	2096A	2096B	3075A	3075B
4075A	4075B	4096B	5075A	5075B	5096B

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	OVERHEAD STOP	100S	630	GLY
1	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.03 CR
For use on door(s):

1075	2076A	2076B	2095	2097	3063
3072	4076A	4076B	4095	4097	5076A
5076B	5095	5097	T-002		

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.06 CR
For use on door(s):

1035B	1057	1090	1096B	1097	1104B
1107E	1116	3059	4096A	5026	5096A

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.07 DPS
For use on door(s):
6004
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	FLUSH BOLT	FB457	626	IVE
1	EA	STOREROOM LOCK	28-10G04 LL	626	SAR
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
1	EA	CLOSER/STOP	4111SCNS	689	LCN
1	EA	OVERHEAD STOP	410S	630	GLY
1	EA	WEATHERSTRIP	297AV (HEAD & JAMBS)	628	PEM
1	EA	DRIP CAP	346C	628	PEM
2	EA	SWEEP	315SSN	630	PEM
1	EA	THRESHOLD	171A X MS&A	628	PEM
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH

DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.10 CR
For use on door(s):
1063B
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
5	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	ELEC. HINGE	5BB1HW 4.5 X 4.5 TW4	652	IVE
1	PR	CONST LATCHING BOLT	FB61P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	ELECTRIC LOCK	28-10G71 LL	626	SAR
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
1	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER. EGRESS BY LOCKSET/REX SENSOR.
DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 2.11
For use on door(s):
1090A
Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	FLUSH BOLT	FB358	626	IVE
1	EA	STOREROOM LOCK	28-10G04 LL	626	SAR
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
1	EA	CLOSER	4041 X TB	689	LCN
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 3.02
For use on door(s):

1028	1041	1056	1072	1073	1082
1094	1095	1101	1111	1139	2034
2036	3019A	3019B	4034	4036	5034
5036					

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 3.03
For use on door(s):

2072	3057	4072	5072

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 3.04
For use on door(s):

2073	3043	4073	5073

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	CLOSER	4031 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 3.05
For use on door(s):

1008B	1008C	1008D	1009B	1009C

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM71HD	628	PEM
1	EA	PRIVACY	28-10U65 LL	626	SAR
1	EA	DOOR STOP	WS65	627	IVE

Hardware Group No. 5.02 HO
For use on door(s):

2037A 2037B 3021A 3021B 4037A 4037B
5037A 5037B

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	COORDINATOR	COR7G	626	IVE
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP/HOLDER	WS45	626	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 5.03 AUTO
For use on door(s):

2043 3027 4043A 5043

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
1	EA	CONTINUOUS HINGE	CFM83HD	628	PEM
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	ELECTRIC STRIKE	6221 FSE	630	VON
1	EA	COORDINATOR	COR7G	626	IVE
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
2	EA	AUTO-OPENER	AUTO-OPENER (RELATED SECTION)	689	UNK
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
2	EA	ACTUATOR	PUSH PAD (RELATED SECTION)	689	UNK

POWER SUPPLY TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 5.08
For use on door(s):

1024B 1102 1104A 1121 T-008

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	OVERHEAD HOLDER	410H	630	GLY

Hardware Group No. 5.09
For use on door(s):

1026

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
6	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	AUTO FLUSH BOLT	FB41T	630	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	COORDINATOR	COR7G	626	IVE
1	EA	ASTRAGAL	ASTRAGAL BY DOOR MFR.	FBO	UNK
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 5.10
For use on door(s):

1037A	1037B	1038	1039	1040	1042
1046A	1051	1064	1077	1078	1085
1093	1100	1122	1136A	1136B	1138

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 5.11
For use on door(s):

1048

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	28-10G37 LL	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 6.03 ISOL
For use on door(s):

2002B 4002B 5002B

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH/PULL LATCH	HL6-ASA	630	GLY
1	EA	CLOSER	4041-H X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE

Hardware Group No. 6.04
For use on door(s):

2005	2006	2009	2010	2013	2014
2017	2018	2021	2022	2046	2048
2049	2052	2053	2056	2057	2060
2061	2064	2065	2068	4005	4006
4009	4010	4013	4014	4017	4018
4021	4022	4046	4048	4049	4052
4053	4056	4057	4060	4061	4064
4065	4068	5005A	5006	5009	5010
5013	5014	5017	5018	5021	5022
5046	5048	5049	5052	5053	5056
5057	5060	5061	5064	5065	5068

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	SWING CLEAR HINGE	5BB1SCHW 5	652	IVE
1	EA	PUSH/PULL LATCH	HL6-ASA	630	GLY
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 6.05 ISOL
For use on door(s):

2027 3010B 3011B 5027

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH/PULL LATCH	HL6-ASA	630	GLY
1	EA	CLOSER	4041-H X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 7.02 MHO
For use on door(s):

1007	1061B	1107C	2044A	2102	2112
3080A	4044	4102	4112	5102	5112

Provide each DE door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD	628	PEM
2	EA	EXIT DEVICE	9927EO-F-LBR X SNB	626	VON
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL MAGNET	SEM 7850	689	LCN
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

WALL MAGNETS TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 7.03
For use on door(s):

2044B 5044

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD	628	PEM
1	EA	EXIT DEVICE	99L-F X 06L-F X SNB	626	VON
1	EA	RIM CYLINDER	63-34	626	SAR
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

Hardware Group No. 7.04 CR-REMOTE
For use on door(s):

3028

Provide each DE door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
2	EA	EXIT DEVICE	EL9927EO-F X LBR X SNB	626	VON
1	EA	MAGNETIC LOCK	390DEL	628	SCH
2	EA	CLOSER	4041 X TB	689	LCN
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	POWER SUPPLY	PS873-2	600	VON
1	EA	REMOTE SWITCH	660-PB	628	SCH
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK
1	EA	REX SENSOR	REX SENSOR BY CONTRACTOR.	FBO	UNK

INGRESS BY READER/DELAY ALARM OR REMOTE SWITCH. EGRESS BY EXIT DEVICE.
DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.
POWER SUPPLIES TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 7.07 CR
For use on door(s):
1001 1107B 1140
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
1	EA	EXIT DEVICE	ERX9975L 06L FSE	626	VON
1	EA	MORTISE CYLINDER	63-41	626	SAR
1	EA	CLOSER	4041	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	DOOR STOP	WS11X	626	IVE
1	SET	WEATHERSTRIP	29310CPK (HEAD & JAMBS)	628	PEM
1	EA	DRIP CAP	346C	628	PEM
1	EA	SWEEP	315SSN	630	PEM
1	EA	THRESHOLD	171A X MS&A	628	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK

INGRESS BY READER OR KEY OVERIDE. EGRESS BY EXIT DEVICE/REX.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 7.08 CR
For use on door(s):
1004 1068A 1130A 1135B 1146B
Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
1	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
1	EA	EXIT DEVICE	ERX9975L 06L FSE	626	VON
1	EA	MORTISE CYLINDER	63-41	626	SAR
1	EA	CLOSER/STOP	4111SCNS	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	SET	WEATHERSTRIP	29310CPK (HEAD & JAMBS)	628	PEM
1	EA	DRIP CAP	346C	628	PEM
1	EA	SWEEP	315SSN	630	PEM
1	EA	THRESHOLD	171A X MS&A	628	PEM
1	EA	POWER SUPPLY	POWER SUPPLY BY CONTRACTOR.	600	UNK
1	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK

INGRESS BY READER OR KEY OVERIDE. EGRESS BY EXIT DEVICE/REX.
DOOR POSITION SWITCH TO INTERFACE WITH SECURITY SYSTEM.

Hardware Group No. 7.11 CR-AUTO
For use on door(s):

1061A

Provide each PR door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
2	EA	EXIT DEVICE	ELRX9927L-F X 06L-F X LBR X SNB	626	VON
2	EA	RIM CYLINDER	63-34	626	SAR
2	EA	AUTO-OPENER	AUTO-OPENER (RELATED SECTION)	689	UNK
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	PS873-2	600	VON
1	EA	ACTUATOR	PUSH PAD (RELATED SECTION)	689	UNK
2	EA	DPS	679-05 - DOOR POSITION SWITCH	BLK	SCH
1	EA	CARD READER	CARD READER BY CONTRACTOR.	FBO	UNK

INGRESS BY READER OR KEY OVERIDE. EGRESS BY EXIT DEVICES/REX OR PUSH PAD.
DOOR POSITION SWITCHES TO INTERFACE WITH SECURITY SYSTEM.
POWER SUPPLY TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 7.12 AUTO
For use on door(s):

1107D

Provide each DE door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
2	EA	CONTINUOUS HINGE	CFM83HD CC8 (SERVICEABLE)	628	PEM
2	EA	EXIT DEVICE	EL9927EO-F X SNB	626	VON
2	EA	AUTO-OPENER	AUTO-OPENER (RELATED SECTION)	689	UNK
2	EA	KICK PLATE	8400 (10" X 1" LDW)	630	IVE
2	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM
1	EA	POWER SUPPLY	PS873-2	600	VON
2	EA	ACTUATOR	PUSH PAD (RELATED SECTION)	689	UNK

POWER SUPPLY TO INTERFACE WITH FIRE ALARM SYSTEM.

Hardware Group No. 9.03 PRO
For use on door(s):

1112 2071 2094 3042 3077 4071
5071

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	PRO LOCK	PRO5196-17	626	SCH
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

INGRESS BY KEYPAD. EGRESS BY LOCKSET.

Hardware Group No. 9.04 PRO
For use on door(s):

2087A 2087B 4087A 4087B 5087A ~~5087B~~

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	PRO LOCK	PRO5196-17	626	SCH
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	OVERHEAD STOP	100S	630	GLY
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

INGRESS BY KEYPAD. EGRESS BY LOCKSET.

Hardware Group No. 9.05 PRO
For use on door(s):

1080 2091A 2091B 3014 3055A 3055B
3061A 3061B 3062 4089 4091A 4091B
4094 5091A 5091B 5094

Provide each SGL door(s) with the following:

Quantity		Description	Model Number	Finish	Mfr
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CYLINDER	CYLINDER AS REQUIRED.	626	SAR
1	EA	PRO LOCK	PRO5196-17	626	SCH
1	EA	CLOSER	4041 X TB	689	LCN
1	EA	KICK PLATE	8400 (10" X 2" LDW)	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SMOKE GASKET	S88D (HEAD AND JAMBS)	BLK	PEM

INGRESS BY KEYPAD. EGRESS BY LOCKSET.

25F03

SECTION 08 71 13

AUTOMATIC DOOR CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes mechanically operated automatic opening device for swinging doors operating as follows:
   1. Swinging operation for interior doors.
   2. Double egress where indicated.

1.2 DEFINITIONS

A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

B. Safety Device: Device that prevents a door from opening or closing.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide automatic openers that have the following capabilities based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:
   1. Opening Force: Comply with the following maximum opening-force requirements for locations indicated:
      a. Exterior Doors: 15 lbf(67N).
      b. Interior Doors: 5 lbf(22.2 N).

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other Work.
   1. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring.

C. Hardware Schedule: Organize schedule into sets based on hardware specified. Include name of item and manufacturer, and complete designation of every item required for each automatic entrance door.

D. Product Certificates: Signed by manufacturers of automatic opener certifying that products furnished comply with emergency exit door requirements.

E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of the automatic entrance door system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
   1. Faulty operation of operators and hardware.

C. Warranty Period: Two years from date of Substantial Completion.

1.8 MAINTENANCE SERVICE

A. Maintenance: Beginning at Substantial Completion, provide 24 months' full maintenance by skilled employees of automatic opener Installer. Include quarterly planned and preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.
   1. Engage an inspector certified by the American Association of Automatic Door Manufacturers to perform a safety inspection after each adjustment or repair, and at the end of the maintenance period. Submit the completed inspection form to Owner.
   2. Perform maintenance, including emergency callback service, during normal working hours.
   3. Include 24-hour-per-day, 7-day-per-week emergency callback service.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Besam.
   2. Dor-O-Matic; an Ingersoll-Rand Company.
   3. Horton Automatics; Div. of Overhead Door Corporation.
   4. Stanley Access Technologies; Div. of The Stanley Works.

B. Acceptable Products – Basis of Design:
   1. Low-Energy Operator:
      a. Series 7000 Easy Access Operator by Horton.
      b. Magic Access by Stanley.
   2. Low-Energy Operator, Heavy Duty: Series 4000LE Low Energy, Heavy-Duty Operator by Horton.

2.2 AUTOMATIC DOOR OPERATOR

A. General: Provide manufacturer's standard automatic door operator, complete with operators, controls, activation devices, safety devices, and accessories as indicated. Comply with the following:
   1. Configurations:
      a. Swinging doors for two-way traffic.
      b. Swinging doors for double egress.

1. Material: Stainless steel.
2. Message: International symbol of accessibility and "Push to Open."

C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.5 ACCESSORIES

A. Signage:
1. Comply with ANSI/BHMA A156.19.

2.6 FABRICATION

A. General: Fabricate automatic opener components to designs, sizes, and thicknesses specified and to comply with indicated standards.

B. Prefabrication: Provide automatic opener as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.

2.7 ALUMINUM FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: non-specular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker).
1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrance doors.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Templates and Diagrams: Furnish templates, diagrams, and other data to fabricators and installers of related work, as necessary for coordinating automatic entrance door installation.

SECTION 08 81 13

DECORATIVE GLASS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following decorative glass for interior applications:
   1. Tempered.

B. Related Sections include the following:
   1. Division 8 Section "Glass and Glazing" for glass and glazing requirements.

1.3 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 PERFORMANCE REQUIREMENTS

A. Provide decorative glass and glazing capable of withstanding normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following:defective manufacture, fabrication, and installation; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and shall not be reduced.

1.5 SUBMITTALS

A. Product Data: For each decorative-glass and glazing product indicated.

B. Shop Drawings: Show fabrication and installation details for decorative glass. Include the following:
   1. Size and location of penetrations.
   2. Glazing method.
   3. Mounting method.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect decorative glass to comply with manufacturer's written directions and as needed to prevent damage to glass and any decorative and protective surfaces.

B. Retain packaging and sequencing numbers for decorative-glass units.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install decorative glass until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Verify dimensions to fit by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form, made out to Owner and signed by laminated-glass manufacturer, agreeing to replace laminated-glass units that develop defects from normal use including edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MONOLITHIC-GLASS PRODUCTS

A. Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated glass), Type I (transparent flat glass), Class 1 (clear), Quality-Q3, unless otherwise indicated; Kind HS (heat strengthened) and Kind FT (fully tempered) where indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.

2.2 SEALANTS

A. Glazing Gaskets, Sealants, Tapes, and Miscellaneous Glazing Materials: Specified in Division 8 Section "Glass and Glazing."
1. Elastomeric Glazing Sealants: ASTM C 920.
a. Color: As selected by Architect from manufacturer's full range.

B. Joint Sealants: As specified in Division 7 Section "Joint Sealants."

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise indicated.

F. Clean joint surfaces; apply primers to joint surfaces where required for adhesion of sealants.

G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm) as follows:
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances, and to comply with system performance requirements.
   2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

3.4 DECORATIVE GLASS SCHEDULE

A. Refer to Finish Legend.

3.5 SEALANT GLAZING (WET)

A. Install continuous spacers between glass lites and glazing stops to maintain glass-face clearance. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants smooth.

3.6 CLEANING AND PROTECTION

A. Protect decorative glass from damage immediately after installation by attaching crossed streamers to framing and held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.

B. Protect decorative glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

C. Remove and replace decorative glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

D. Wash decorative glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date

06C02

SECTION 08 83 13

MIRRORED GLASS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Safety (tempered) mirrored glass.

1.2 DEFINITIONS

A. Deterioration of Silvered Mirrored Glass: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning silvered mirrored glass contrary to mirrored glass manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1.3 PERFORMANCE REQUIREMENTS

A. Provide mirrored glass that will not fail under normal usage. Failure includes glass breakage and deterioration attributable to defective manufacture, fabrication, and installation.

1.4 SUBMITTALS

A. Product Data: For the following:
1. Mirror mastic.
2. Mirror hardware.

B. Product Certificates: Signed by manufacturers of mirrored glass and mirror mastic certifying that products furnished comply with requirements.

C. Mirror Mastic Glass Coating Compatibility Test Reports: From an organic protective coating manufacturer indicating that mirror mastic has been tested for compatibility and adhesion with organic protective coating applied to silvered mirrored glass. Include organic coating manufacturers' interpretation of test results relative to performance and recommendations for use of mastics with organic protective coating.

D. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed mirrored glass installations similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Mirrored Glass: Obtain mirrored glass from one source for each type of mirrored glass indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Mirror Company, Inc.
2. Carolina Mirror Company.
3. Virginia Mirror Co., Inc.
4. VVP America, Inc.; Binswanger Mirror Products.
5. Walker Glass Co., Ltd.

2.2 FLOAT GLASS

A. Tempered Float Glass: ASTM C 1048, Type I (transparent glass, flat), Condition A (uncoated), Kind FT (fully tempered), Quality q3 (glazing select) float glass, complying with the following requirements:
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of mirror as installed, unless otherwise indicated.
2. Clear Tempered Float Glass: Class 1 (clear).
   a. Thickness: 4 mm.

2.3 MIRRORED GLASS

A. Silvered Mirrored Glass:, clear float glass with successive layers of chemically deposited silver, electrically or chemically deposited copper, and manufacturer's standard organic protective coating applied to second glass surface to produce a coating system complying with FS DD-M-411.
1. Provide fully tempered, ASTM C 1048 Type FT, where indicated or required by code.

2.4 FABRICATION

A. Mirrored Glass Sizes: Cut mirrored glass to final sizes and shapes to suit Project conditions.

B. Cutouts: Fabricate cutouts for notches and holes in mirrored glass without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrored glass.

C. Mirrored Glass Edge Treatment: Treat edges as indicated below.
1. Flat polished edge.
2. Seal edges of silvered mirrored glass after edge treatment to prevent chemical or atmospheric penetration of glass coating.
3. Require mirrored glass manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

2.5 MISCELLANEOUS MATERIALS

A. Setting Blocks: Neoprene, 70 to 90 Shore A hardness.

3.2 PREPARATION

A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating surfaces with mastic manufacturer's special bond coating where applicable.

3.3 GLAZING

A. General: Install mirrored glass units to comply with written instructions of mirrored glass manufacturer and with referenced GANA and NAAMM publications. Mount mirrored glass accurately in place in a manner that avoids distorting reflected images.

B. Provide space for air circulation between back of mirrored glass units and face of mounting surface.

C. Mastic Spot Installation System: Install mirrored glass units with mastic as follows:
1. Apply barrier coat to mirrored glass backing where approved in writing by manufacturers of mirrored glass and backing material.
2. Apply mastic in spots to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrored glass units and face of mounting surface.
3. After mastic is applied, align mirrored glass units and press into place while maintaining a minimum air space of 1/8 inch(3 mm) between back of mirrored glass and mounting surface.

D. For wall-mounted mirrored glass units, install permanent means of support at bottom and top edges with bottom support designed to withstand mirrored glass weight and top support designed to prevent mirrored glass from coming away from wall along top edges.
1. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrored glass units.
2. For continuous bottom supports, provide setting blocks 1/8 inch(2 mm) thick by 4 inches(100 mm) long at quarter points. For channels or other continuous supports in which water could be trapped, provide, between setting blocks, two slotted weeps not less than 1/4 inch(3 mm) wide by 3/8 inch(4.5 mm) long.
3. Where indicated, install bottom and top trim. Fabricate trim in single lengths to fit and cover top and bottom edges of mirrored glass units.

3.4 PROTECTION AND CLEANING

A. Protect mirrored glass from breakage and contaminating substances resulting from construction operations.
1. Do not permit edges of silvered mirrored glass to be exposed to standing water.
2. Maintain environmental conditions that will prevent silvered mirrored glass from being exposed to moisture from condensation or other sources for continuous periods of time.

B. Wash mirrored glass not more than four days before date scheduled for inspections intended to establish date for Substantial Completion. Wash

18B03

SECTION 08 91 00

STORM RESISTANT ALUMINUM LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Fixed, extruded-aluminum louvers, storm resistant.

1.2 DEFINITIONS

A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.

1.3 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.

B. Air-Performance, Water-Penetration, Air-Leakage, and Wind-Driven Rain Ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Samples for Verification: For each type of metal finish required.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain louvers and vents through one source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

B. Welding: Qualify procedures and personnel according to the following:

C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
   1. Frame Type: Channel, unless otherwise indicated.

D. Include supports, anchorages, and accessories required for complete assembly.

E. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or 72 inches(1830 mm) o.c., whichever is less.
   1. Exterior Corners: Prefabricated corner units with mitered blades, welded or concealed close-fitting splices as selected by Architect, and with fully recessed or semirecessed mullions at corners as indicated on Drawings.

F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.4 FIXED, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Storm-Resistant Louver:
   1. Products:
      a. Storm Resistant Fixed Horizontal Louver Model RS-7315 by Construction Specialties, Inc. (C/S).
   2. Louver Depth: 7 inches.
   3. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.060 inch(1.5 mm) for blades and 0.080 inch(2.0 mm) for frames.
      a. Blades: Front lip gutter and secondary multiple gutter designed to catch and direct water to jamb and mullion downspouts.
   4. Louvers: Mechanical fastened using stainless steel or aluminum fasteners; minimum 4 inch high by full depth sill flashing formed from minimum 0.050 inch (1.27 mm) thick aluminum.
      a. Sill Flashing: Welded side panels.
   5. Performance Requirements:
      a. Free Area: Not less than 8.9 sq. ft. (0.75 sq. m) for 48-inch- (1.2-m-) wide by 48-inch- (1.2-m-) high louver.
      b. Percent Free Air: Minimum 50 percent.
      c. Air Performance:
         1) Intake Pressure Drop at 900 fpm with free area velocity of 0.32 inch water.
         2) Exhaust Pressure Drop at 900 fpm with free area velocity of 0.44 inch water.
      d. Wind-Driven Rain Performance: Not less than 99 percent effectiveness when subjected to a rain fall rate of 3 inches(75 mm) per hour and a wind speed of 29 mph(13 m/s) at a core area intake velocity of 351 fpm(1.8 m/s).
   6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
   7. BSRIA: Certified test data for wind-driven rain performance from an accredited BSRIA laboratory.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

C. Form closely fitted joints with exposed connections accurately located and secured.

D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

F. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 7 Section "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

A. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.

B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

OWNER FURNISHED EQUIPMENT BROCHURE

Revision: August 9, 2006

The Medical Center Aurora

A02429 – Bed Tower Expansion

Aurora, CO

PROJECT # 306660001

Jimmy Cagle
MANAGER, MEDICAL EQUIPMENT
(615) 344-2179
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HCA
The Healthcare Company.

Table of Contents

- Owner Furnished Equipment Index
- Specifications
- Project Information Sheet
- Owner Furnished/ Contractor Installed Equipment Delivery Schedule
- Owner/ Vendor Installed Equipment Delivery Schedule
- Engineered Systems Information and Telephone Systems Equipment Delivery Schedule
- Responsibility Matrix
- Vendor Contact Matrix

Owner Furnished/ Contractor Installed Equipment Notes

NOTE: Include date for special backboxes (such as OR Lights, Illuminators) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment, nurse call, ect.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor is required to store in secure environmentally controlled space and confirm with HCA Medical Equipment Manager.

NOTE: HCA required that the enclosed Owner Furnished/ Contractor Installed Equipment Delivery Schedule (excel), Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule form (word) to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed.

NOTE: No payments can be made, until receipt of the schedule(s) by the HCA Construction Manager.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:
HCA Equipment Manager
HCA Construction Manager
Hospital Construction Contact
Hospital Materials Manger

PROJECT INFORMATION SHEET

Project Title:_____ **Date of Issue:**_____
Owner Project:_____ **Revision Date:**_____
HOSPITAL:_____
ADDRESS:_____
TELEPHONE:_____ FAX:_____
ADMINISTRATOR:_____ CONTACT:_____
MATERIAL MGR:_____ PLANT MGR:_____
CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____
PROJECT MAILING ADDRESS:_____
E-MAIL ADDRESS:_____
ARCHITECT:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
INTERIOR DESIGN FIRM:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
M.P.E. ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
STRUCTURAL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
CIVIL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
MECHANICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
ELECTRICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
HCA
ONE PARK PLAZA, BLDG. 2 – 3E, NASHVILLE, TN 37203
P.O. BOX 550 (37202-0550)
TELEPHONE: 615-327-9551
DIRECTOR CONSTRUCTION:_____ PH:_____
CONSTRUCTION MANAGER:_____ PH:_____
EQUIPMENT ENG. SYS. MGR:_____ PH:_____
IS/TELECOM:_____ PH:_____

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

203200	FOLLETT CORPORATION	4	#110FB400A; ICE MAKER DISP.115/1 12.2A , SENSORSAFE DISPENSING PKG (#SENSORSAFE; $98.00), FR STANDING STG 24 1/2"W X 28.25"D X 68.125"H, 90 LBS STG, 400 LBS/DAY ICE PRODUCTION AIR COOLED. INCLUDES WATER STATION, WATER FILTER(NOT INCLUDED) **FLOOR DRAIN REQUIRED** 2--2099/1, 3--3073/1, 4--4099/1, 5--5099/1
203210	FOLLETT CORPORATION	5	#25CT400A; ICEMAKER DISPENSER, ($2,892.00) 21"W X 47.125"H X 23"D- COUNTERTOP, AIR COOLED, 25LB STORAGE CAPACITY, 400LB PER 24HR ICE PROD. TO INCL WATER STATION, SENSORSAFE DISPENSING (#SENSORSAFE; $98.00) 1--1085/1, 1--1112/1, 2--2082/1, 4--4082/1, 5--5082/1
430279	GENERAL ELECTRIC CO	14	#JEM25; MICROWAVE OVEN DIMENSIONS: 11 11/64"H X 23 25/32"W X 12 55/64"D. 120V - 60-CYCLE. CONTRACTOR TO SHELF MOUNT SELECT COLOR: BLACK - JEM25BF OR WHITE JEM25WF. 1--1040/1, 1--1085/1, 1--1112/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3042/1, 3--3073/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5071/1, 5--5082/1, 5--5099/1
475603	GENERAL ELECTRIC CO	6	#GTS18WCP, REFRIGERATOR, 17.9 CU. FT. NO FROST, W/FACTORY INSTALLED ICEMAKER; 66 5/8" H X 32 1/8"D X 29 1/2 "W. 120V/60 HZ/15AMPS. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT. 1--1040/1, 1--1112/1, 2--2071/1, 3--3042/1, 4--4071/1, 5--5071/1
475604	GENERAL ELECTRIC CO	1	#GTS18KBP; REFRIGERATOR, TOP FREEZER, 17.9 CU. FT. CAP. NO FROST. 66 5/8"H X 32 1/8"D X 29 1/2"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: BLACK, WHITE, BISQUE. HINGE: LEFT OR RIGHT. 3--3054/1
477300	GENERAL ELECTRIC CO	2	#GMR04AAM; REFRIGERATOR, UNDERCOUNTER 4.3 CU FT CAPACITY. 32 7/8"H X 21 3/4"D X 20"W, 110V. RIGHT HINGED. SELECT COLOR: BB/BLACK OR WW/WHITE 1--1085/2

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
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A02429 - BED TOWER EXPANSION
306660001

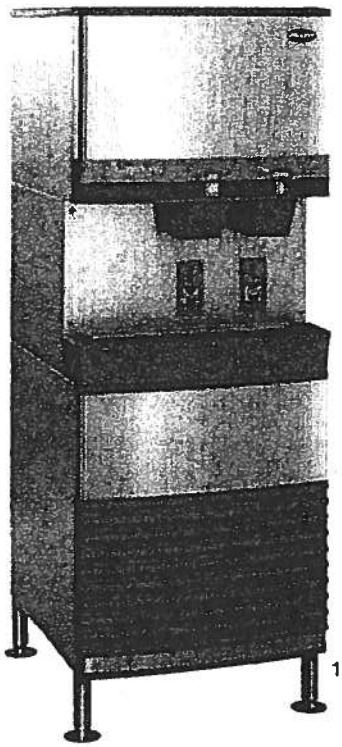
714519	FOLLETT CORPORATION	9	#QC4-FL4S; WATER FILTER SYSTEM (ACCESSORY FOR ICEMAKER DISPENSERS). #QC4-FL4S 1--1085/1, 1--1112/1, 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
715053	SARA LEE COFFEE & TEA	19	COFFEE MAKER, LO-PROFILE MODEL #8573, 3-STATION, AUTOMATIC COFFEE BREWER, FROM SUPERIOR COFFEE FOR REFERENCE ONLY, HOSPITAL TO LEASE (MFG. - BLOOMFIELD) PLUMBING REQUIREMENT: 1/4" OR 3/8" WATER CONNECTION 1--1070/1, 1--1085/1, 1--1112/1, 2--2030/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3017/1, 3--3027B/1, 3--3042/1, 3--3073/1, 4--4030/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5030/1, 5--5071/1, 5--5082/1, 5--5099/1
715152	RADIOLOGY SPECIALTY	1	# 101461; ILLUMINATOR, 1 PANEL RECESSED MT 4 BULB 3--3066/1
715344	GENERAL ELECTRIC CO	7	#GTS17KBR, REFRIGERATOR: TOP MOUNT. NO FROST, 4 SPILT SPILL PROOF ADJ. GLASS SHELVES. 16.6 CU. FT. CAP. 64 3/4"H X 31"D X 28"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
717197	STERIS/AMSCO PRODUCTS	1	#DJ04112033-01; WARMING CABINET 24" DIGITAL; SEISMIC 3--3055/1
718171	FOLLETT CORPORATION	7	#REF5; REFRIGERATOR, UNDERCOUNTER, WITH LOCK AND KEY, STAINLESS STEEL INTERIOR/EXTERIOR, 4.8 CU. FT., 115 V, 60HZ, 1PH, 8.0 AMPS, MAX.FUSE 15 AMPS, HOSPITAL GRADE CORD & PLUG - NEMA 5-15, 33 DEGREES F - 40 DEGREES F (1 DEGREE C - 5 DEGREES C) REVERSIBLE DOOR SWING/HANDLE, 34HX23.75WX25.5D, NSF, UL & CUL LISTED. 2--2076/1, 2--2097/1, 3--3072/1, 4--4076/1, 4--4097/1, 5--5076/1, 5--5097/1

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

JC2725	GERMFREE LABORATORIES INC.	1	LAMINAR FLOW GLOVEBOX ISOLATOR - 4 FOOT QUOTE # 200605929 58" W X 32"D X 87"H STANDARD 115V 3--3054/1
JC2859	BARING INDUSTRIES, INC.	1	DISPLAY CASE & REFRIGERATOR *****SPEC SHEET NOT INCLUDED WITH THIS DOCUMENT******* GALA SOURCE -12 CU FT REFRIGERATOR - TUR - 48SD ZESCO - COMBINATION NON-REFRIGERATED ABOVE/REFRIGERATED SERVICE CASE BELOW - 40" WIDE ENCORE 699-A-021 ********ARCHITECT TO SPEC SPACE & ELECTRICAL******** 1--1002/1

Symphony™

110FB400A air-cooled integral icemaker
110FB400W water-cooled integral icemaker



110FB400A/W shown with SensorSAFE accessory



Freestanding, automatic load, ice and water dispensers with air- or water-cooled icemaker located in the base of unit. Stainless steel frame and exterior with plastic trim. Water station standard. Up to 90 lbs (41kg) storage. Produces approximately 400 lbs (181kg) of compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet™ compressed nugget ice is slow melting, easy to chew

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone
- Clear chute directs ice cleanly into cups, pitchers, carafes, ice bags

Space-saving, attractive design

- 24.5" (623mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally friendly Maestro™ icemakers

- New, state-of-the-art R404A icemakers automatically load dispensers with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high wastewater
- Quiet production, no noisy harvest cycles

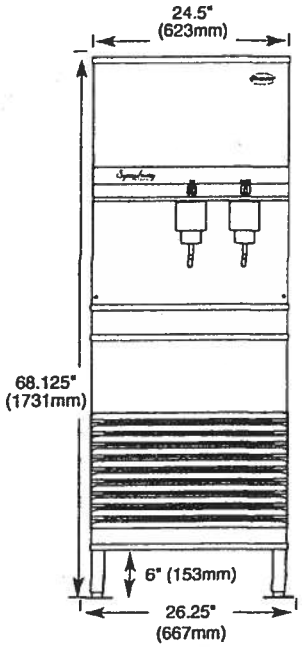
Accessories

- SensorSAFE actuation package
- Chilled water option
- Water filter kit
- Casters
- Up to 6 beverage valves (no beverage cooling)

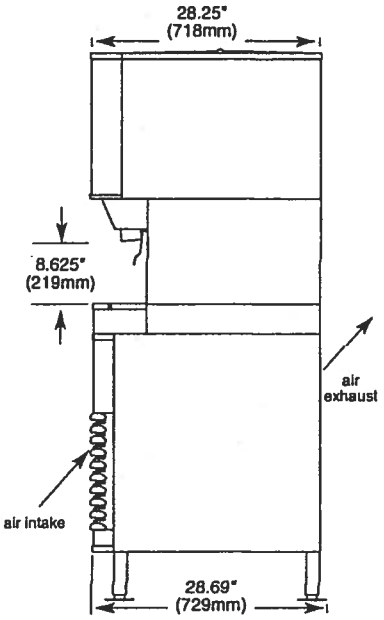
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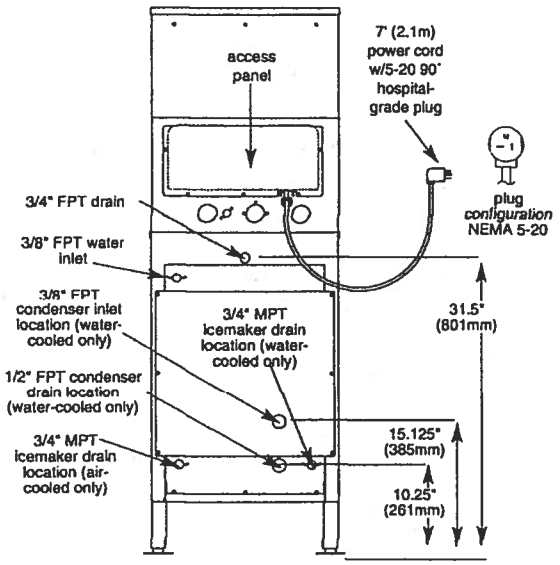
Front View



Side View



Rear View



Ice Production per 24 hours

Air-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	510 / 232	454 / 206	397 / 180	335 / 152	273 / 124	lbs. / kg.
60 / 16	482 / 219	435 / 198	389 / 177	329 / 150	270 / 123	lbs. / kg.
70 / 21	454 / 206	417 / 190	380 / 173	323 / 147	266 / 121	lbs. / kg.
80 / 27	424 / 193	385 / 175	347 / 158	297 / 135	247 / 112	lbs. / kg.
90 / 32	394 / 179	354 / 161	313 / 142	270 / 123	227 / 103	lbs. / kg.

Water-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	451 / 204	447 / 203	442 / 200	437 / 198	428 / 194	lbs. / kg.
60 / 16	423 / 192	413 / 187	409 / 185	399 / 181	394 / 179	lbs. / kg.
70 / 21	394 / 179	390 / 177	380 / 172	371 / 168	361 / 163	lbs. / kg.
80 / 27	371 / 168	361 / 164	352 / 160	342 / 155	333 / 151	lbs. / kg.
90 / 32	352 / 160	342 / 155	333 / 151	323 / 146	309 / 140	lbs. / kg.

Required clearances
12" (305mm) at top recommended for service, 4" (102mm) at rear for cleaning and ventilation

Connections
Cord and plug provided with dispenser. Wire in accordance with all local codes.

Approximate Shipping Weight 265 lbs (120kg)

Electrical Data
Standard electrical – 115V, 60Hz, 1 phase, 13.0 amps, max. fuse 20 amps

Specifications
Ice and water dispenser to be Follett freestanding, automatic load, in the following configuration with water station and _____ (air- or water-) cooled icemaker in base. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Environmentally friendly R404A icemaker to be mounted in base and to be removable as one unit for cleaning and maintenance. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispenser to have automatic bin level control to start and stop icemaker and separate circuitry to allow dispensing to continue with icemaker removed. Dispenser to be equipped with 6" (153mm) adjustable legs, flanged feet and lightweight plastic top that allows full access to the ice storage area for manual loading of back-up ice. Storage area to be insulated with high-density, non-CFC foam polyurethane. 7' cord and NEMA 5-20 hospital-grade plug provided. Dispenser to be NSF, UL and cUL listed.

Item # 203200

END OF SPECIFICATION

Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

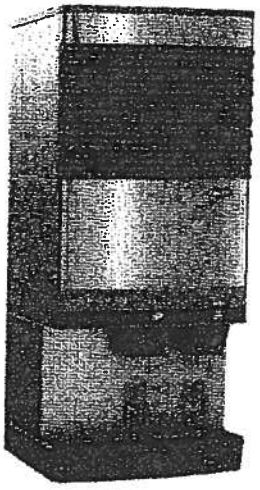
25 Series

Countertop models with (A) air- or (W) water-cooled icemaker

→ **25CT400A/W** – 115V, 60Hz, integral icemaker
25CR400A/W – 115V, 60Hz, satellite-fill icemaker
C25CT400A/W – 220V, 60Hz, integral icemaker
C25CR400A/W – 220V, 60Hz, satellite-fill icemaker
E25CT400A/W – 230V, 50Hz, integral icemaker
E25CR400A/W – 230V, 50Hz, satellite-fill icemaker

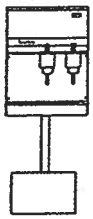
Wall mount models with (A) air- or (W) water-cooled icemaker

25HT400A/W – 115V, 60Hz, integral icemaker
25HR400A/W – 115V, 60Hz, satellite-fill icemaker
C25HT400A/W – 220V, 60Hz, integral icemaker
C25HR400A/W – 220V, 60Hz, satellite-fill icemaker
E25HT400A/W – 230V, 50Hz, integral icemaker
E25HR400A/W – 230V, 50Hz, satellite-fill icemaker

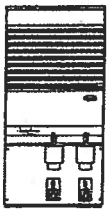


Countertop model shown with SensorSAFE accessory

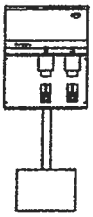
Symphony.



Countertop model with satellite-fill icemaker



Wall mount model with integral icemaker



Wall mount model with satellite-fill icemaker

Countertop and wall mount ice and water dispensers with air- or water-cooled icemaker. Stainless steel frame and exterior with plastic trim. Up to 25 lbs (11kg) storage. Produces approximately 400 lbs (181kg) of Chewblet compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever dispensing standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet compressed nugget ice is slow melting, easy to chew
- Clear chute ensures sanitary delivery and focuses ice cleanly into cups, pitchers, carafes, ice bags

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone

Space-saving, attractive design

- 21" (534mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally-friendly Maestro icemakers

- State-of-the-art R404A icemaker automatically loads dispenser with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high waste water
- Quiet production, no noisy harvest cycles
- Satellite-fill icemakers can be located up to 20 feet (6m) from dispenser; remove heat, noise and bulk from customer area

Accessories

- SensorSAFE actuation package (standard on wall mount models)
- Chilled water option (item# AFH20CHIL2550)
- Water filter kit (item# 00130229)
- Base stand (for models 25CT400A/W, C/E25CT400A/W) (item# AF50BASESTD)
- Slide-out track for satellite-fill icemakers (item# AFGSLIDER400A (air-cooled icemakers) and item# AFGSLIDER400W (water-cooled icemakers))
- Drain pan assembly for wall mount models (item# AFH25WBASE)

Job: _____

Item: 203210 Page 1 of 2

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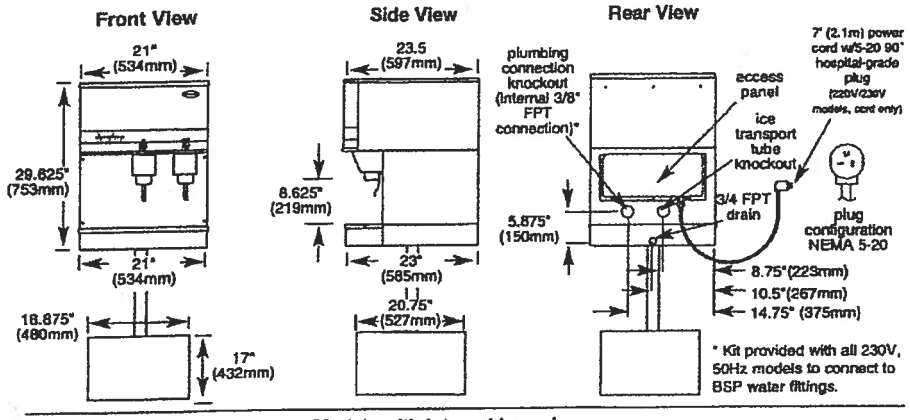
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Form #2065

25 Series

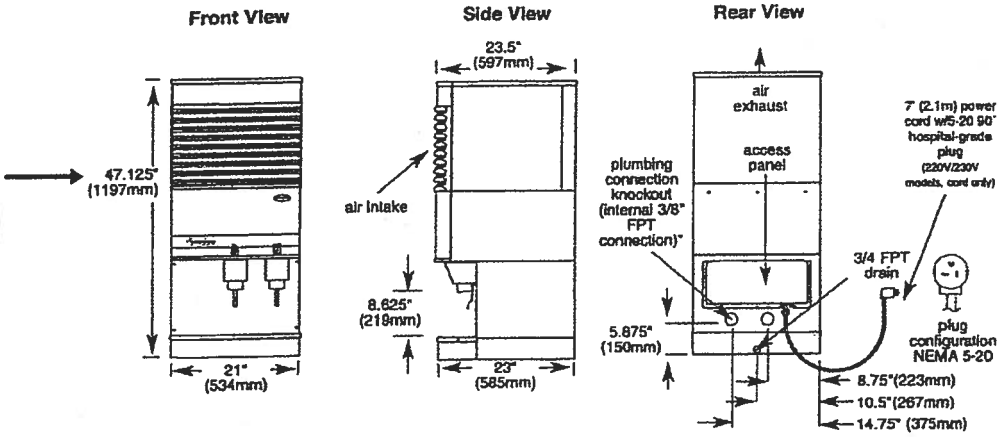
Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

Models with satellite-fill icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Models with integral icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Approximate Shipping Weights

C/E/25CT400A/W	295 lbs (134kg)	C/E/25HT400A/W	310 lbs (141kg)
C/E/25CR400A/W	250 lbs (113kg)	C/E/25HR400A/W	295 lbs (134kg)

Electrical

Standard electrical – 115V, 60Hz, 1 ph. Icemaker 11 amps, dispenser 4 amps. Cord and plug provided with each icemaker and dispensers. If local code requires hard-wiring, separate disconnects also required. Satellite-fill icemaker models require separate circuits for dispenser and icemaker.

Alternate electrical – 220V, 60Hz, 1 ph, 6.5 amps (icemaker 5 amps). 230V, 50Hz, 1 ph, 6.5 amps (icemaker 5 amps). Cord only provided with each icemaker and dispenser. Wire in accordance with all local codes.

Wall Mount Models

- Deduct 3.625" (92mm) from height shown
- Add .5" (13mm) to depth shown
- Standard with wall mounting bracket
- Standard without drain pan (drain pan available – contact factory)

Connections Utilities connect through back or bottom. Back entry shown. Supplied 2" (51mm) duct and louver must be installed for undercounter satellite-fill icemaker installations.

7 ft (2.1m) cord and NEMA 5-20 hospital-grade plug provided with each dispenser. 220V/230V models, cord only.

Required clearances

- C/E/25CT400A/W, C/E/25HT400A/W – 6" (153mm) at top for ventilation, 12" (305mm) recommended for service
- C/E/25CR400A/W, C/E/25HR400A/W – 12" (305mm) at top recommended for service

See Dispenser Detail Sheet, form# 2075 for important installation information.

Ice Production

Air-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		510	464	397	335	273	lbs.
10		232	211	180	152	124	kg
60		482	435	389	329	270	lbs.
16		219	198	177	149	122	kg
70		454	417	380	323	266	lbs.
21		206	190	172	147	121	kg
80		424	385	347	297	247	lbs.
27		193	175	158	135	112	kg
90		394	354	313	270	227	lbs.
32		179	161	142	123	103	kg

Water-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		451	447	442	437	426	lbs.
10		205	203	201	198	193	kg
60		423	413	409	399	394	lbs.
16		192	187	186	181	179	kg
70		394	390	380	371	361	lbs.
21		179	177	172	168	164	kg
80		371	361	353	342	333	lbs.
27		168	164	160	155	151	kg
90		352	342	333	323	309	lbs.
32		160	155	151	146	140	kg

Specifications Ice and water dispenser to be Follett countertop, automatic load, in (choose one) _____ countertop, _____ wall mount configuration with 25 lbs (11kg) of storage. Water station standard. Environmentally-friendly R404A icemaker to be (choose one) _____ air- or _____ water-cooled and to be removable for cleaning and maintenance. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispensers with satellite-fill icemakers to be equipped with 10' (3m) of insulated ice transport tube, 2" (51mm) air duct for icemaker (air-cooled models only) and lightweight plastic top that allows full access to the ice storage area for easy cleaning and manual loading of back-up ice. Storage area to be insulated with high density, non-CFC foam polyurethane. 7' (2.1m) cord and NEMA 5-20 hospital-grade plug provided (220V/230V models, cord only). Dispenser to be NSF, UL and cUL listed, 230V models also CE compliant.

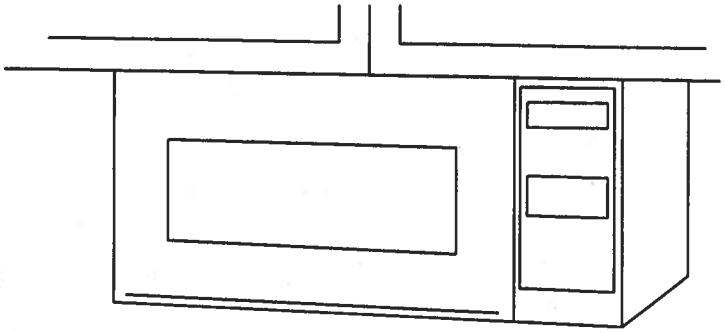
Follett reserves the right to change specifications at any time without obligation. Certifications may vary depending on country of origin.

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END OF SPECIFICATION

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Not to be used over a thermal oven.

Undercabinet mounting kit Pub. No. 4-A019 for Spacemaker II microwave oven models available at additional cost.

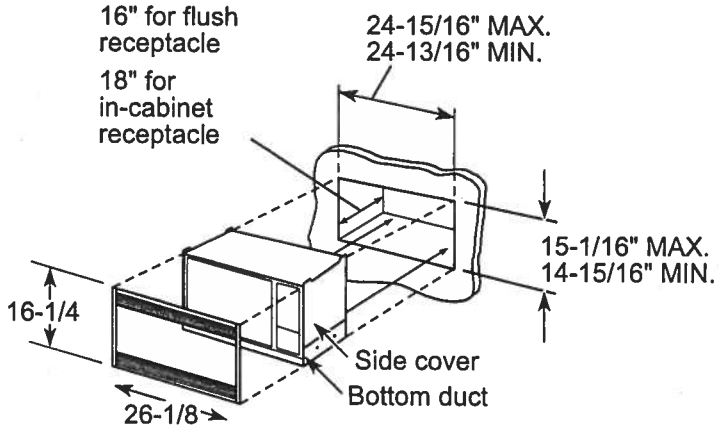
Exterior Dimensions* (in inches)	
W x H x D	23-25/32 x 11-11/64 x 12-55/64

*Height includes feet. Depth does not include handle.

Note: Undercabinet installation
Install Spacemaker II microwave ovens in just a few easy steps with the mounting template, which provides all the necessary measurements. Installation may vary depending on cabinets. These microwave ovens can be installed on practically any wood or metal cabinets.

Note: 120V, 60-cycle, grounded power receptacle location optional on back within cabinet opening.

Cutout Dimensions (in inches)

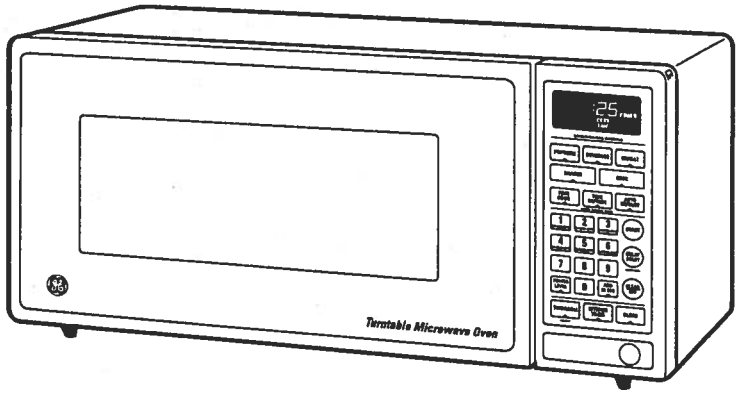


Built-In trim kit For 1.0 cu. ft. microwave ovens
For a custom built-in appearance, this kit allows built-in installation of the Spacemaker II microwave oven into a wall or cabinet alone, and is U.L.-approved for installation over a GE single electric wall oven. This kit should not be installed over a gas wall oven.

Trim kits for model JEM25
JX827SS – Stainless Steel, JX827WN – White, JX827CD – Bisque, JX827BN – Black

Installation Information: This information is not intended to be used for installing unit described. Before installing, consult installation instructions packed with product for current dimensional data.

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Features and Benefits

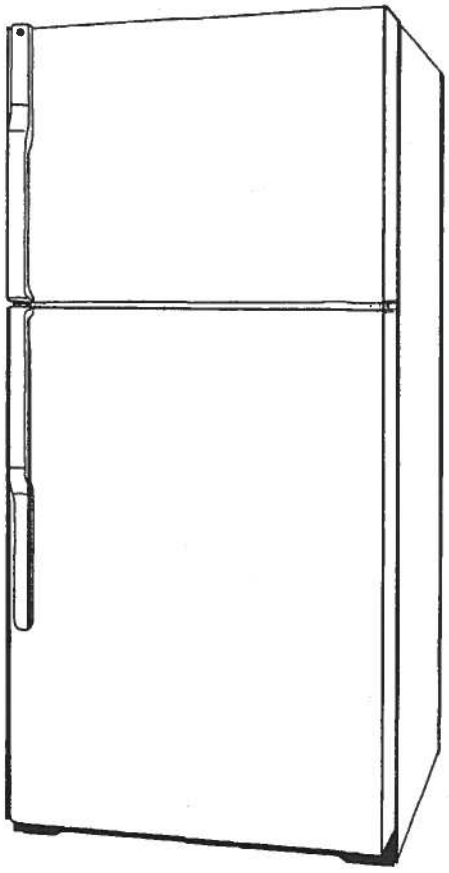
- 1.0 cu. ft. Oven cavity
- 800 Watts*
- Electronic touch controls
- Convenience cooking controls
- Electronic digital display with clock
- Time Cook I & II
- Express Cook with Instant On controls
- Auto Defrost/Time Defrost
- Add 30 Seconds
- Delay Start/Reminder
- Child Lockout
- Kitchen timer
- 10 Power levels
- Under the cabinetry mounting with optional kit
- Model JEM25WF – White
- Model JEM25BF – Black

*IEC-705 Test Procedure

APPROXIMATE DIMENSIONS(HxDxW)	
11.17 in x 12.86 in x 23 25/32 in	
CAPACITY	
Capacity	Mid-Size
Total Capacity (cubic feet)	1.00
FEATURES	
Electronic Digital Display with Clock	Yes
Electronic Touch Controls	Yes
Wattage (IEC-705)	800
Cooking System	Turntable
Power Levels	10
Delay Start	Yes
Beverage (Convenience)	Instant-On
Cook (Convenience)	9 Codes
Popcorn (Convenience)	Instant-On
Reheat (Convenience)	6 codes
Snacks (Convenience)	6 codes
Turntable	Glass
Turntable On / Off	Yes
Turntable Size (in.)	11-21/64
Add 30 Seconds	Instant-On
Cooking Complete Reminder	Yes
Defrost Type	Auto & Time
Express Cook	Instant-On; 1-5 Minutes
Instant On Controls	Yes
Kitchen Timer / Timer (On/Off)	Yes / No
Time Cook	I & II
Time Preference	Control Enhancement (1/9)
Child Lock	Yes
APPEARANCE	
Case Color	White
Color Appearance	White
Door Color	White
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	34 lb
Cavity (W x H x D)	16-23/32 X 8-1/16 X 12-15/32
Overall Depth	12.86 in
Overall Height	11.17 in
Overall Width	23 25/32 in
Net Weight (lbs.)	30 lb
POWER / RATINGS	
Electrical Input - 120V Amperage	11.5
Electrical Input - 120V Watts	1300
Frequency (MHz)	2450

END OF SPECIFICATION

GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker



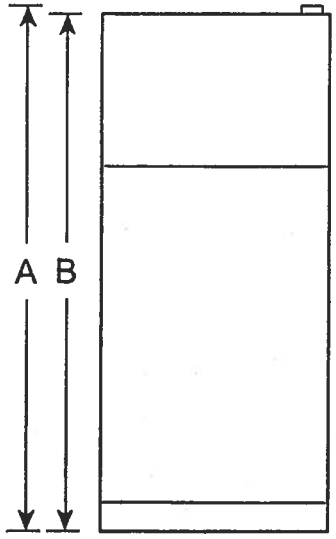
Features and Benefits

- Slide-Out, Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- Electronic Icemaker – Makes ice automatically, ensuring a ready supply.
- Model GTS18WCPWW – White on white
- Model GTS18WCPCC – Bisque on bisque

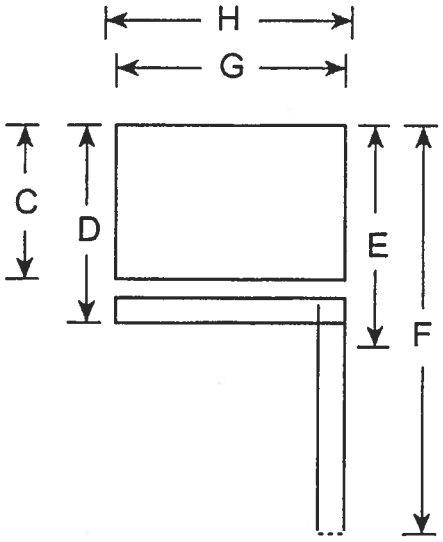
GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	32
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Total volume and shelf area are calculated by the Association of Home Appliance Manufacturers' standards

Listed by Underwriters Laboratories

APPROXIMATE DIMENSIONS(HxDxW)	
66 5/8 in x 32 1/8 in x 29 1/2 in	
CAPACITY	
Total (cubic feet)	17.9
Fresh Food (cubic feet)	12.87
Freezer (cubic feet)	4.98
Shelf Area (sq. ft.)	22.0
APPEARANCE	
Color Appearance	White on White
Customer Installed Handles	Yes
Exterior Design	Rounded Doors
Handle	Color-Matched
Door Swing	Shipped w/ Right Hand Door Opening (Hinges on Right)
Reversible Doors	Yes
Textured Steel Case & Door	Galvenized Door
Adjustable Rollers	Front
Door Stops	Yes

WEIGHTS & DIMENSIONS

Approximate Shipping Weight	233 lb
Overall Depth	32 1/8 in
Overall Height	66 5/8 in
Overall Width	29 1/2 in
Case Depth Without Door (in.)	27-1/2
Depth with Door Open 90° (in.)	58-1/8
Depth Without Handle (in.)	30-1/4
Height to Mid-Freezer	53-15/16
Height to Top of Case (in.)	66-1/8
Width w/Door Open 90 Degrees Inc. Handle (in.)	32
Back Air Clearances (in.)	1
Side Air Clearances (in.)	1/8
Top Air Clearances (in.)	1

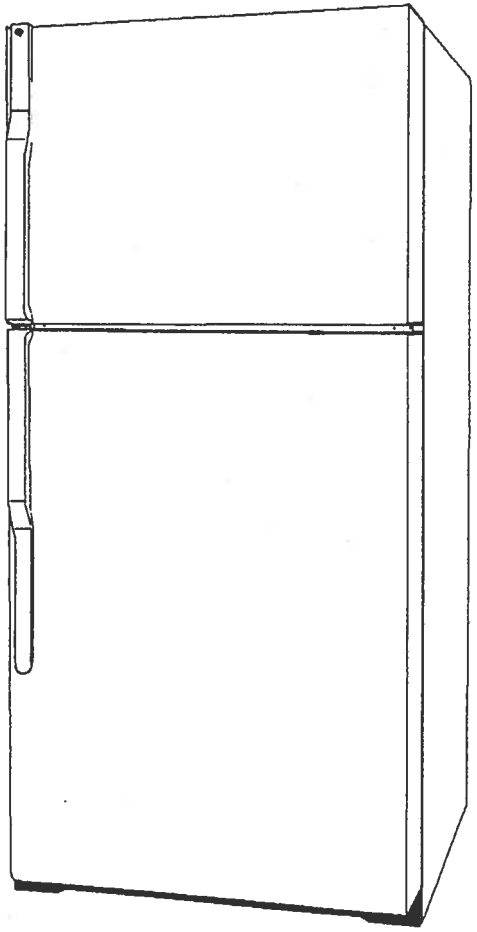
POWER / RATINGS

Volts / Hertz / Amps	120V; 60Hz ; 15A

END OF SPECIFICATION

GE Appliances

GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator



Specification Revised 5/03

Features and Benefits

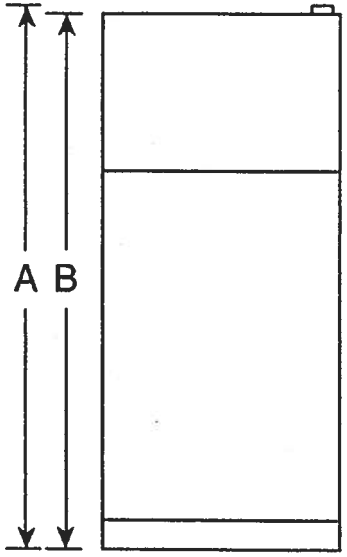
- Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- NeverClean™ Condenser – Condenser coils are encased, so they don't require cleaning in normal operating environments.
- Model GTS18KBPWW – White on white
- Model GTS18KBPBB – Black on black
- Model GTS18KBPCC – Bisque on bisque

GE Appliances

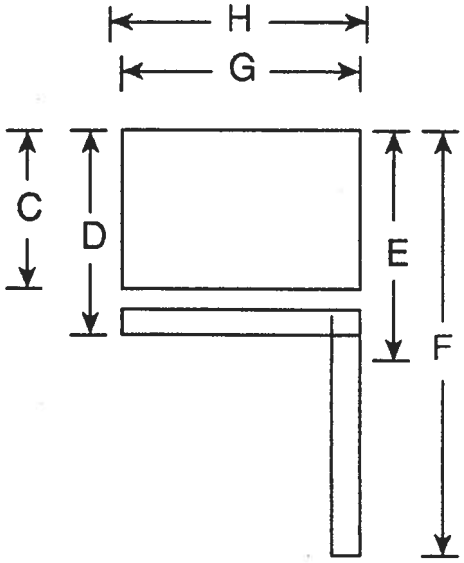
GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	30
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Specification Revised 5/03

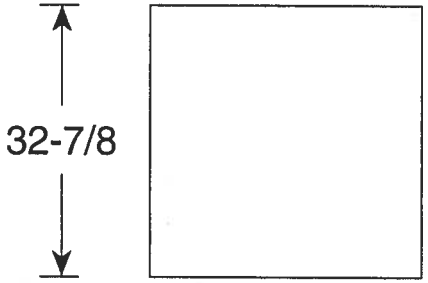
END OF SPECIFICATION

GE Appliances

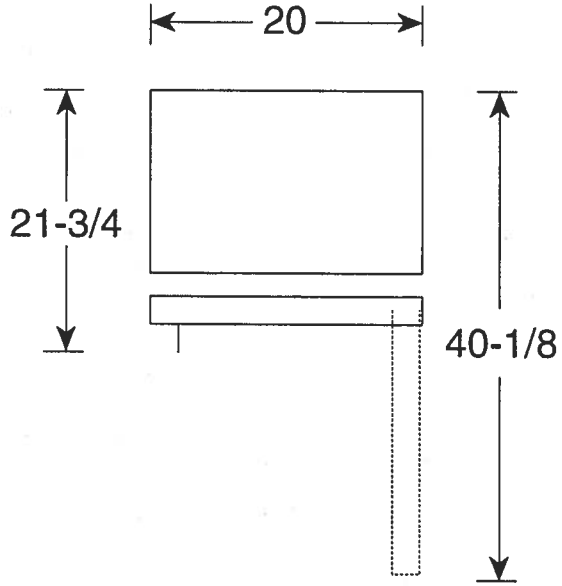
GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator

Dimensions (in inches)

Front View



Top View



Air Clearances	
Each side (in.)	1/2
Top (in.)	2
Back (in.)	2

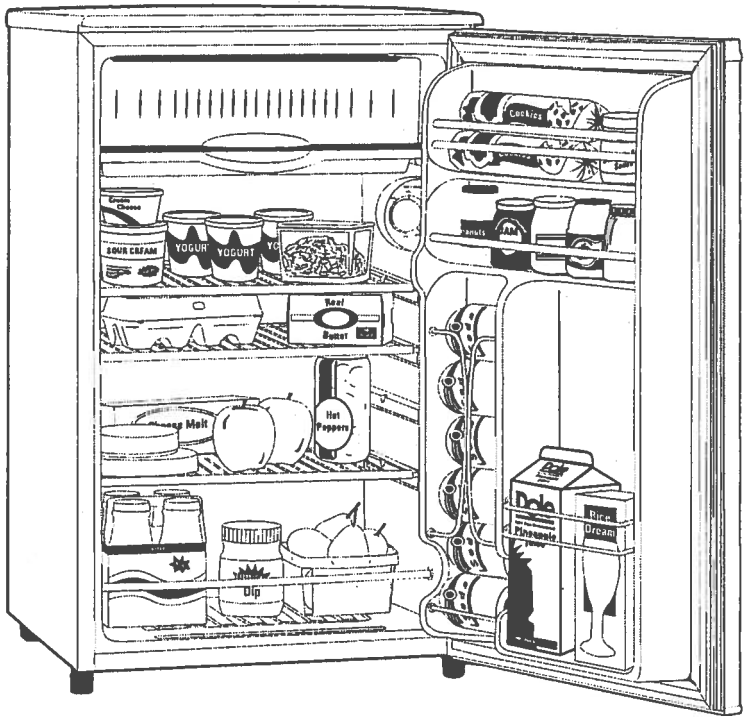
Note: Freezer compartment is for short-term storage of frozen food. The frozen food compartment of this refrigerator will make ice, and pre-frozen foods can be stored for about **two weeks.** It will not effectively freeze fresh foods or provide long-term storage for meats, poultry, or fish.

For answers to your Monogram,® GE Profile™ or GE® appliance questions, visit our website at GEAppliances.com or call GE Answer Center® service, 800.626.2000.

Specification Revised 7/04
310934

GE Appliances

GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator



Features and Benefits

- 4.3 cu. ft. Capacity (Fresh Food 3.81 cu. ft./Freezer .49 cu. ft.)
- 2-1/2 Fresh Food Door Shelves
- 2 Adjustable Wire Cabinet Shelves
- Can Rack
- 2 Mini Ice 'N Easy Trays
- Manual Defrost
- Color-Matched Recessed Door Handles
- Model GMR04AAMWW – White on white
- Model GMR04AAMBB – Black on black

Specification Revised 7/04
310934

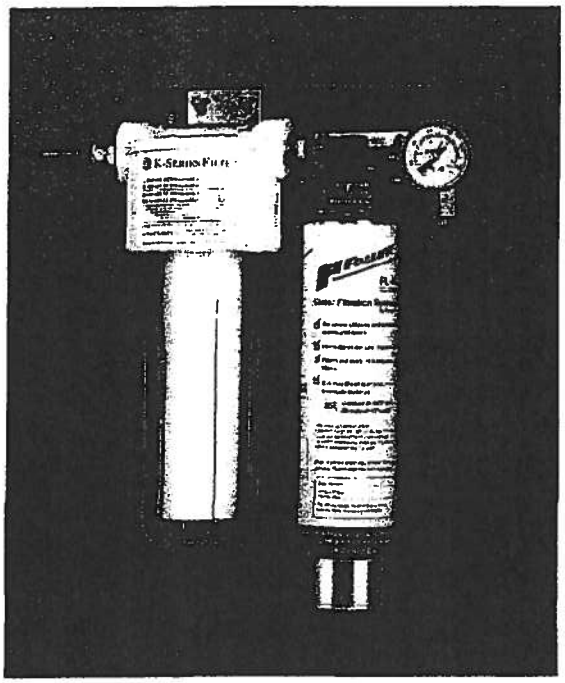
APPROXIMATE DIMENSIONS(HxDxW)	
32 7/8 in x 21 3/4 in x 20 in	
CAPACITY	
Total Capacity (cubic feet)	4.4
Fresh Food (cubic feet)	3.99
Freezer (cubic feet)	.39
Shelf Area (sq. ft.)	5.6
FEATURES	
Defrost Type	Manual
Fresh Food Cabinet Shelves - Adjustable	2
Fresh Food Cabinet Shelves - Total # of Shelves	2 Wire
Fresh Food Door Shelves	2 Full-Width; 1 Half-Width
Ice N' Easy Trays	1 Mini
APPEARANCE	
Color Appearance	White on White
Door Swing	Hinges on Right
Handle	Color-Matched Recessed
Rounded Doors	Yes
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	77 lb
Overall Depth	21 3/4 in
Overall Height	32 7/8 in
Overall Width	20 in
Depth with Door Open 90° (in.)	40-1/8
Back Air Clearances (in.)	2
Side Air Clearances (in.)	1/2
Top Air Clearances (in.)	2



END OF SPECIFICATION

QC4-FL4S Walter Filter System

SPECIFICATIONS



Water filter system for use with Follett icemakers and ice and water dispensers. System includes pre-filter, primary filter, pressure gauge and wall mounting bracket.

Important: Not for use with carbonated water — separate system required.

Ensures better tasting, cleaner, safer ice
- *Traps dirt as small as 1/2 micron in size*
- Removes chlorine, off-tastes and odors
- Filters out asbestos fibers and parasitic cysts such as *Cryptosporidium* and *Giardia*
- Certified to ANSI/NSF standards 42 and 53

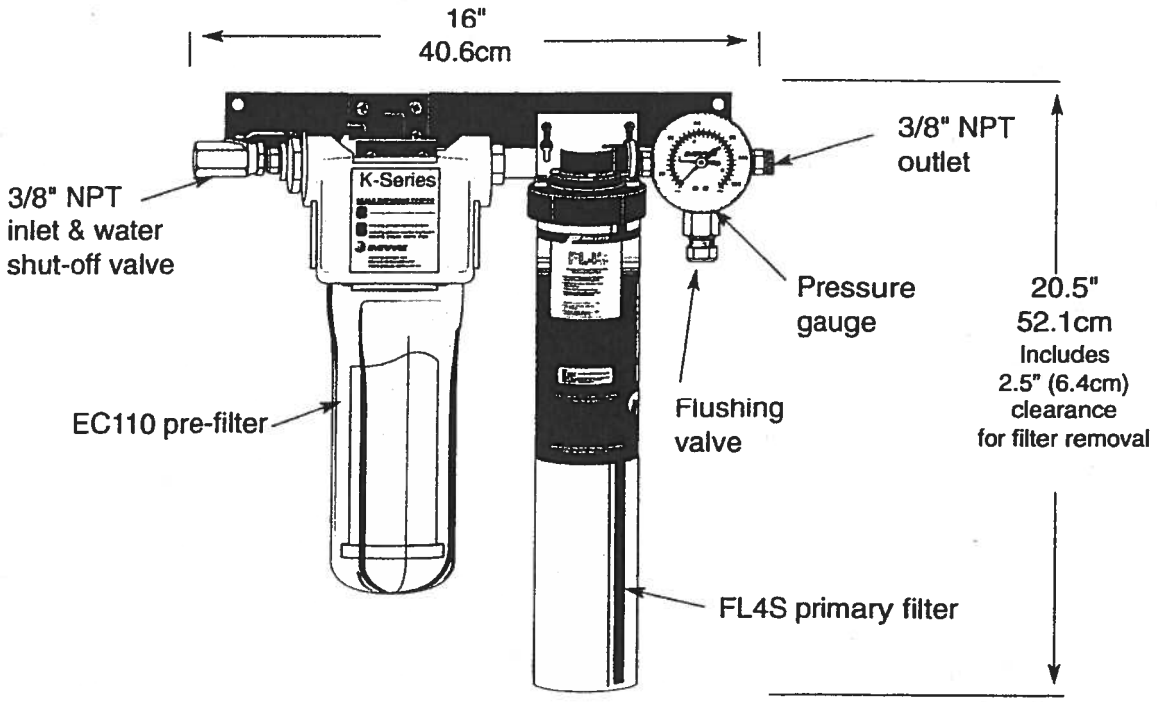
Improves icemaker performance
- Keeps icemakers functioning at full capacity
- Reduces scale build-up from dirt and minerals in the water by up to 70%
- Removes dirt and abrasive particles that can damage internal workings of icemaker
- Saves energy and reduces downtime

Space-saving design
- 20.5" (52.1cm) total height and 16" (40.6cm) width requires minimal space
- Entire system can be mounted out of the way below standard 34" - 36" (86.4cm - 91.4cm) counters

Dual filter system saves money
- *Economical EC110 pre-filter filters out* large particles and extends life of FL4S primary filter

Item # 714519

REV: tlg 8/21/2003



- Clearance required: 2.5" (6.4cm) at bottom of filter for cartridge removal
- Flow rate: 0.5 gpm (1.9 lpm)
- Pressure range 10 - 125 psi, non-shock
- Capacity: Certified for chlorine and taste and odor reduction for 3,000 gallons (11,400 liters)
- Water temperature: 35° - 100°F (2° - 38°C)

NSF International Standards

Tested and certified to ANSI/NSF Standard 42 & 53

Standard No. 42: Aesthetic Effects

Chemical Unit Taste & Odor and Chlorine Reduction, Class 1

Mechanical Filtration Unit Particulate Reduction, Class 1: 99.9% reduction of particles 1/2 micron and larger in size

Standard No. 53: Health Effects

Mechanical Filtration Unit

Turbidity Reduction, Cyst Reduction, Asbestos Reduction

The QC4-FL4S filter and 4S cartridge (by Everpure, Inc.) have been tested and Certified by NSF only for the functions listed above. Check for compliance with state and local laws and regulations. Do not use where the water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit. Can be used with water disinfected that may contain filterable cysts.

Item # 714519

END OF SPECIFICATION

Model 8573



Model 8573



8573 Koffee King Three Warmer Stepped Right Automatic Coffee Brewer *(without Hot Water Faucet)*

How do you get more for less? Use the Bloomfield Lo Profile® brewing system. At less than 17" tall, the Lo Profile is small in stature but big on capacity. Like all Bloomfield products, this proven, efficient brewing system is designed to take advantage of the finest electrical components and has the lowest service cost in the industry for this type of brewer.

Features

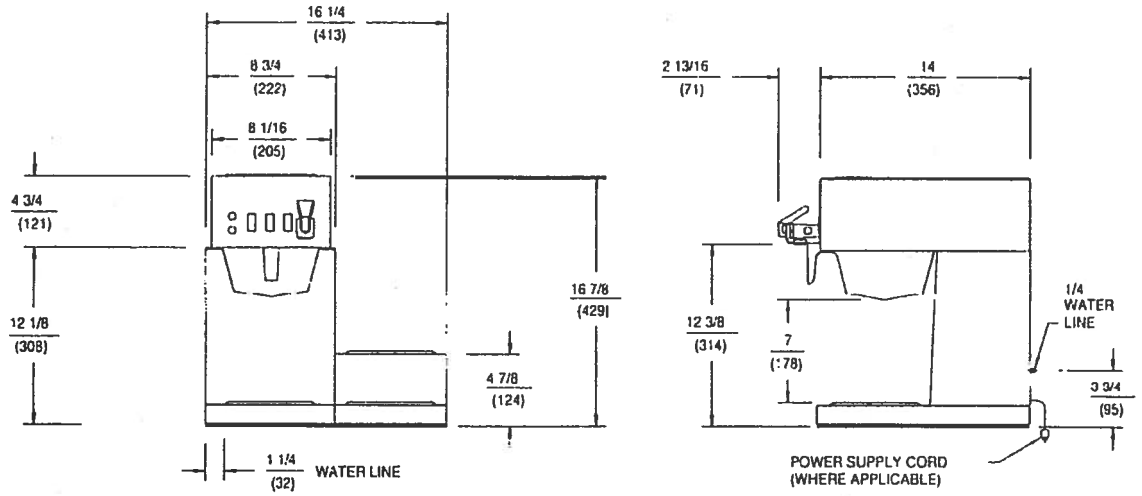
- **A high level of commonality of parts** with other Bloomfield models will significantly reduce the inventory of spare parts required to service many body styles.
- Exclusive design provides **easy access to components** for quick service.
- **Water volume adjustments** can be made with ease, no panels to remove or tools required.
- **Ready-to-Brew light** indicates the proper water temperature to help eliminate the guesswork in brewing.
- Built-in **pour over feature** provides flexibility.
- **Independent front-mounted hot water faucet** allows drawing of hot water without affecting coffee taste or brewing cycle.
- **Premium quality thermostat** has a full-length stainless steel sensing bulb that recognizes water temperature extremely accurately and cycles less frequently.
- **Superior sprayhead design** spreads water over the coffee grounds, creating agitation and a floating action that completely saturates the coffee to capture the full, rich essence of every bean.
- **Unique water valve with built-in flow control** assures consistent operation at 20-80 p.s.i.
- **One-piece drawn stainless steel water tank** has a superior design for extended life.
- **Three warming stations** with porcelain enameled warmer plates position decanters securely and, with no exposed screw heads, will not scratch or scrape decanters.
- High quality easy to clean **stainless steel construction.**

Item 715053

REV: 6/28/03

E9253 STD 4 LR 10836

DIMENSIONS: INCH / (MM)



SPECIFICATIONS:

MODELS	WATTS	VOLTS	AMPS	PHASE	POWER SUPPLY CORD
8573	1800	120	15	Single	NEMA 5-15P

Item # 715053

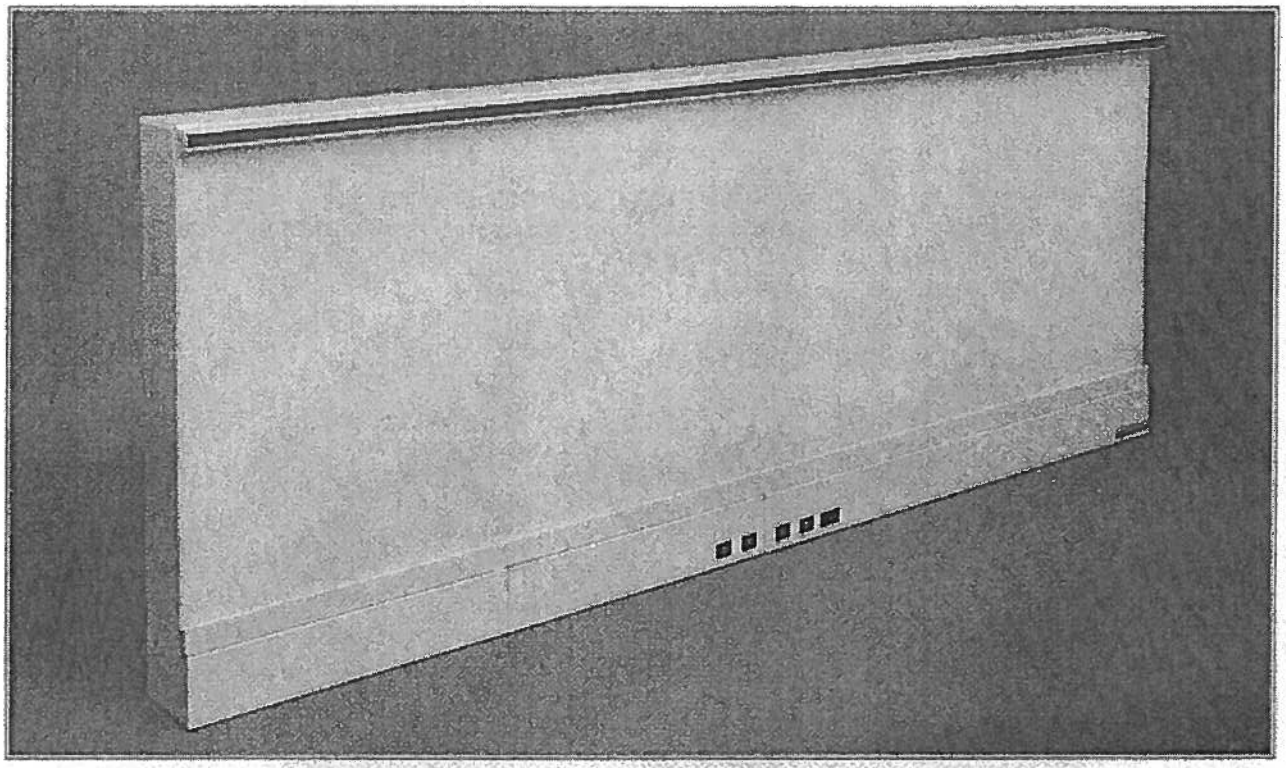
END OF SPECIFICATION

Item # 715152 1 of 3

800/347-XRAY
S&S X-RAY PRODUCTS
www.ssxray.com

CHAMELEON SERIES

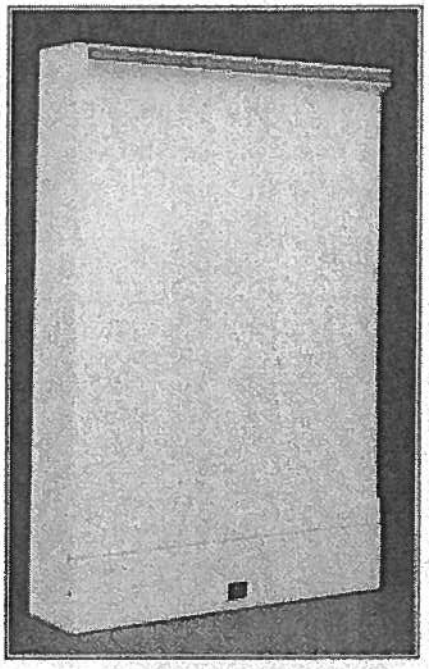
Blends With Any Décor



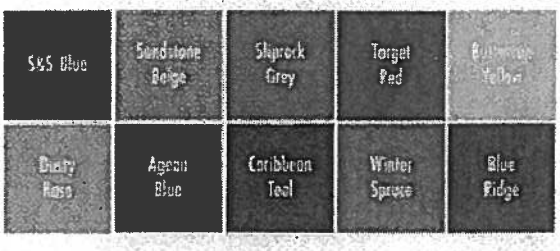
Four Bank Surface Mounted Model (101204)

The **Chameleon Illuminator Series** combines a slim, sleek appearance (3⅜" depth), with color-customizable trim. This cost efficient illuminator is designed to accentuate the warm, professional appearance of your reading room or consultation area. The units can be highlighted with *trim in a choice of ten colors*, polished stainless steel or primed strip (the latter can be easily painted to color coordinate within a facility). Constructed of durable steel with a white powder-coat finish, this series is available in 2 lamps, 3 lamps and 4 lamps per viewing area models.

Trigger start ballasts, separated viewing sections, centered cluster switches, one piece plexiglass fronts and continuous gravity film grips are standard with this series. A bottom ledge film support coupled with the continuous film grip guarantees maximum freedom for viewing small or large films. Each section is individually controlled by rocker switches mounted at the bottom center of the illuminator. Master switches are provided on units of three banks or more. The Chameleon Illuminator can also be incorporated into a corner module.



Trim Colors



Finish: White Baked Enamel

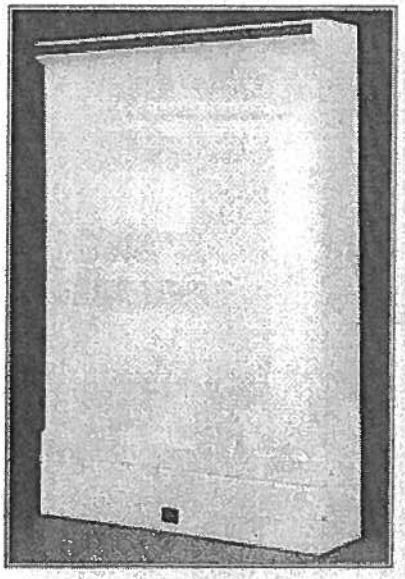
Electrical: Viewers operate on 120 volt, 60 Hz. **2 Lamp Series:** .47 amps per section, **3 Lamp series:** .61 amps per section, **4 Lamp series:** 1.0 amps per section. Surface mounting models are supplied with a 6' three conductor line cord (see diagram for wiring locations). Recessed models come with BX connectors. For special voltages consult factory.

* **Optional Items:** Modular Mobile system (pg B-23), mobile stand, console arms, angulated viewing system (pg B-25) corner modules (pg B-24), hospital grade plugs (pg B-30).

S&S X-RAY PRODUCTS
www.ssxray.com

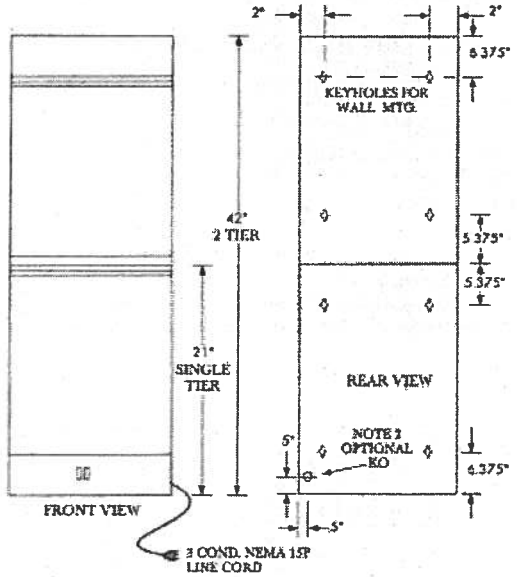
CHAMELEON SERIES

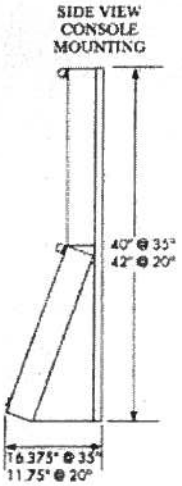
ILLUMINATORS



SURFACE MOUNTED MODELS

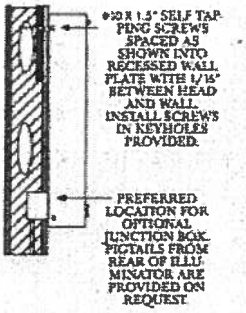
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	23 lbs	101401	101421
Two Bank 28"x17"	28"	21"	46 lbs	101402	101422
Three Bank 42"x17"	42"	21"	69 lbs	101403	101423
Four Bank 56"x17"	56"	21"	90 lbs	101404	101424
Five Bank 70"x17"	70"	21"	113 lbs	101405	101425
Six Bank 84"x17"	84"	21"	136 lbs	101406	101426
TWO TIER					
1 over 1 2 x 14"x17"	14"	42"	46 lbs	101411	101431
2 over 2 2 x 28"x17"	28"	42"	92 lbs	101412	101432
3 over 3 2 x 42"x17"	42"	42"	138 lbs	101413	101433
4 over 4 2 x 56"x17"	56"	42"	180 lbs	101414	101434
5 over 5 2 x 70"x17"	70"	42"	226 lbs	101415	101435
6 over 6 2 x 84"x17"	84"	42"	272 lbs	101416	101436

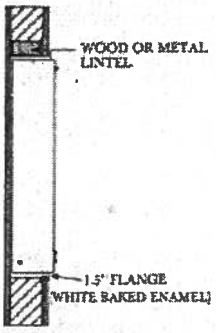






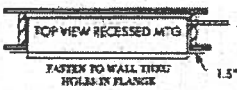
SIDE VIEW RIGHT SIDE





RECESSED MODELS

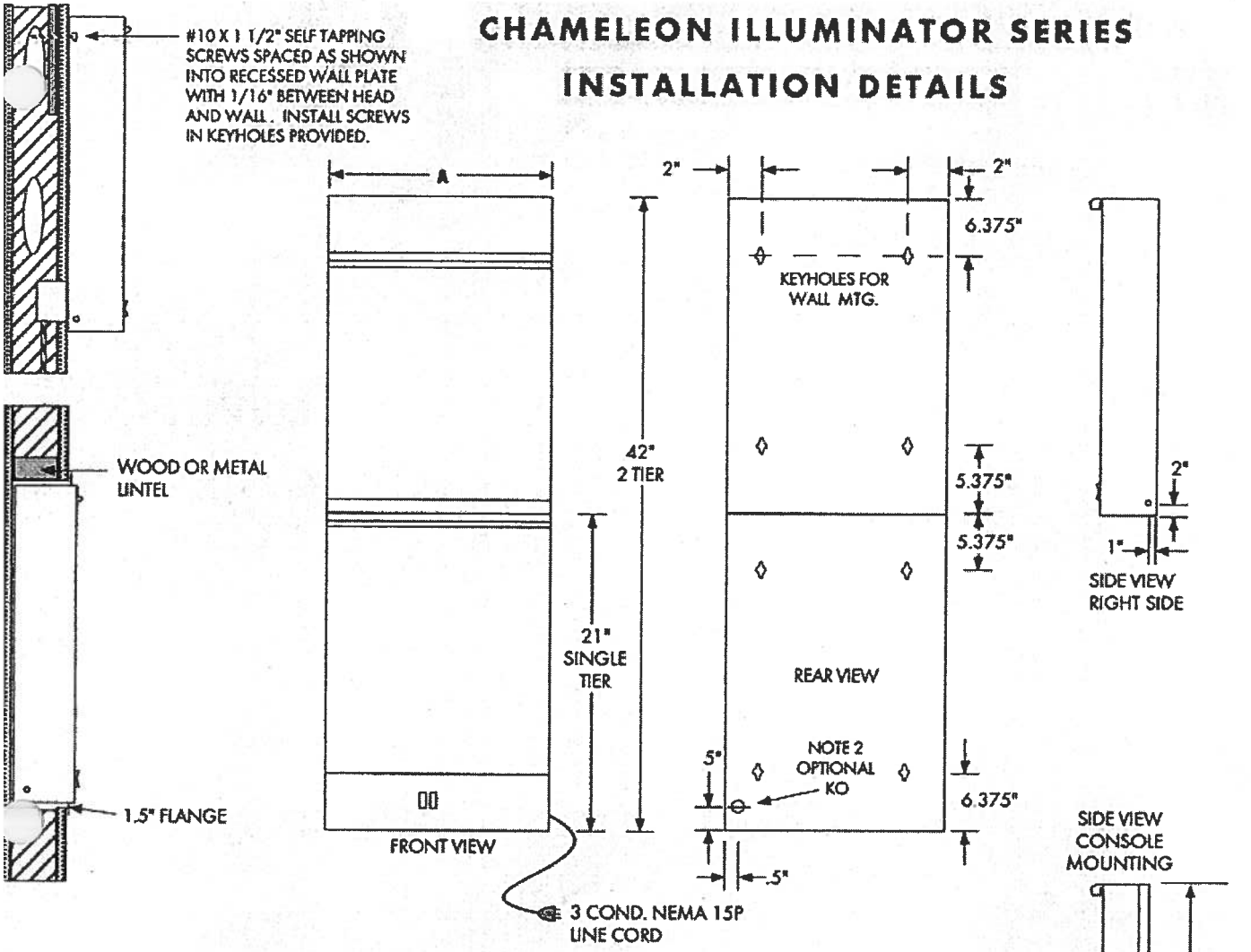
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	WALL OPENING WIDTH	WALL OPENING HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	14.25"	21.25"	23 lbs	101441	101461
Two Bank 28"x17"	28"	21"	28.25"	21.25"	46 lbs	101442	101462
Three Bank 42"x17"	42"	21"	42.25"	21.25"	69 lbs	101443	101463
Four Bank 56"x17"	56"	21"	56.25"	21.25"	90 lbs	101444	101464
Five Bank 70"x17"	70"	21"	70.25"	21.25"	113 lbs	101445	101465
Six Bank 84"x17"	84"	21"	84.25"	21.25"	136 lbs	101446	101466
TWO TIER							
1 over 1 2 x 14"x17"	14"	42"	14.25"	42.25"	46 lbs	101451	101471
2 over 2 2 x 28"x17"	28"	42"	28.25"	42.25"	92 lbs	101452	101472
3 over 3 2 x 42"x17"	42"	42"	42.25"	42.25"	138 lbs	101453	101473
4 over 4 2 x 56"x17"	56"	42"	56.25"	42.25"	180 lbs	101454	101474
5 over 5 2 x 70"x17"	70"	42"	70.25"	42.25"	226 lbs	101455	101475
6 over 6 2 x 84"x17"	84"	42"	84.25"	42.25"	272 lbs	101456	101476

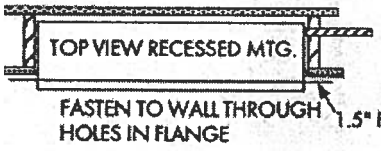


1/2" CONDUIT CONTAINING 3 NO. 14 WIRES TO 120 VOLT 60 HZ SERVICE.

ALL MEASUREMENTS ARE ± 1/16"

CHAMELEON ILLUMINATOR SERIES
INSTALLATION DETAILS





	NUMBER OF VIEWING AREAS						HEIGHT	
	1	2	3	4	5	6	1 TIER	2 TIER
CASE WIDTH "A"	14"	28"	42"	56"	70"	84"	21"	42"
WALL OPENING	14.25"	28.25"	42.25"	56.25"	70.25"	84.25"	21.25	42.25
WEIGHT 1 TIER	23	46	69	90	113	136		
WEIGHT 2 TIER	46	92	138	180	226	272		
DEPTH OF CASE	3.375"							

120 VOLT 60 HZ.
2 LAMP SERIES .47 AMPS PER VIEWING SECTION
3 LAMP SERIES .61 AMPS PER VIEWING SECTION
4 LAMP SERIES 1 AMPS PER VIEWING SECTION
UL LISTED FOR U.S.A. AND CANADA

NOTE:
1. FOR SAFETY AND PROPER OPERATION UNITS MUST BE ELECTRICALLY GROUNDED.

PREFERRED LOCATION FOR OPTIONAL JUNCTION BOX. PIGTAILS FROM REAR OF ILLUMINATOR PROVIDED ON

CALL OUR CUSTOM DESIGN ENGINEERING DEPT. FOR HELP WITH ROOM LAYOUTS AND CUSTOM CONFIGURATIONS.

The Industry Standard For 40 Years
800-347-XRAY 718-649-8500
FAX 718-257-0219
S&S X-RAY PRODUCTS INC
1165 LINWOOD STREET
BROOKLYN NY 11208

END OF SPECIFICATION

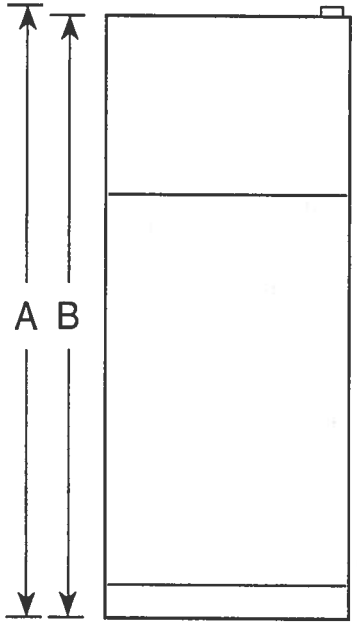
GTS17KBS
GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

Dimensions and Installation Information

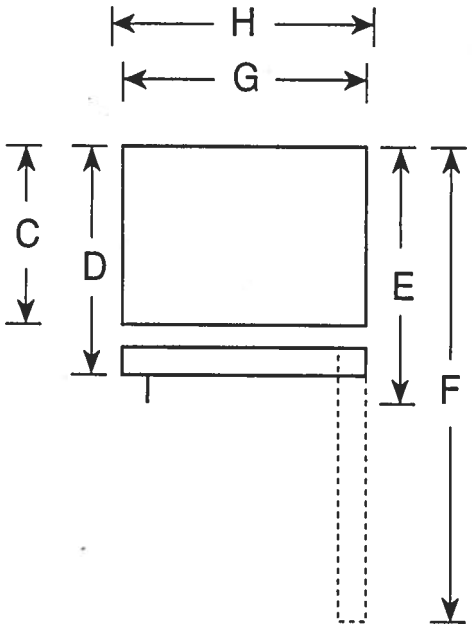
Overall Dimensions	Height to top of hinge (in.) **A**	64-3/4
	Height to top of case (in.) **B**	64-1/4*
	Case depth without door (in.) **C**†	25-7/8
	Case depth less door handle (in.) **D**†	29-1/8
	Case depth with door handle (in.) **E**†	31
	Depth with fresh food door open 90° (in.) **F**†	54-7/8
	Width (in.) **G**	28
	Width with door open 90° less door handle (in.) **H**	30-1/2
Air Clearances	Each side (in.)	3/4
	Top (in.)	1
	Back (in.)	1

*Height to mid-freezer (in.): 54-3/8

Front View



Top View



Dimension and installation information are shown in inches.

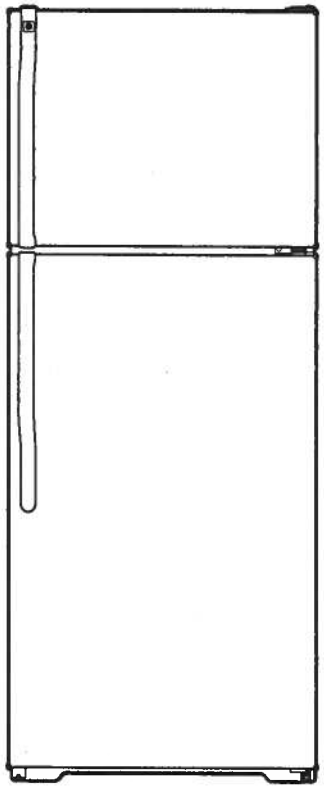
Listed by Underwriters Laboratories

GTS17KBS

GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

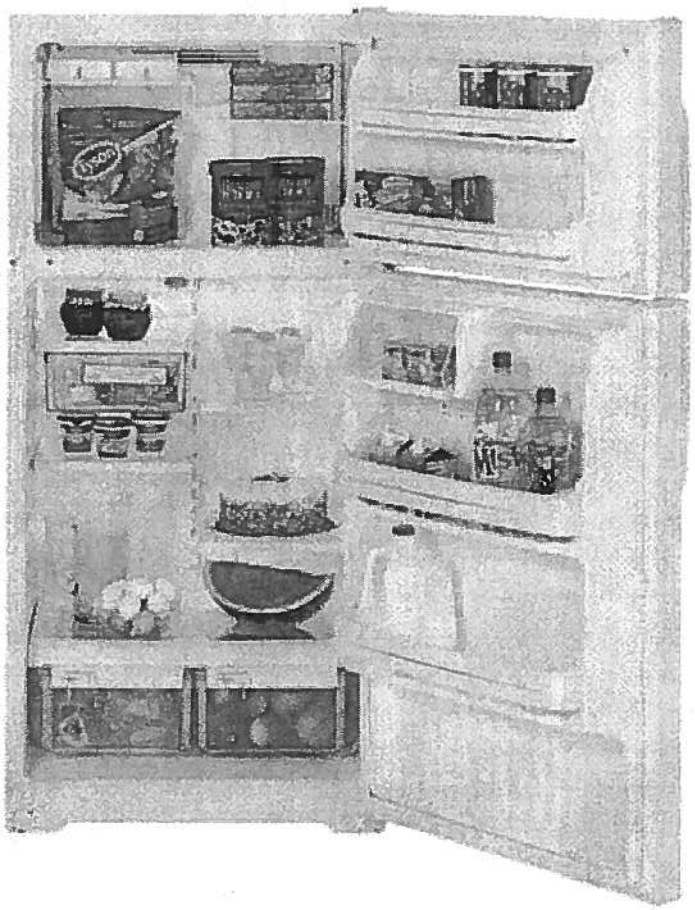
Features and Benefits

- Adjustable Spillproof Glass Shelves - Help contain spills for ease of cleaning
- Upfront Temperature Controls - Are positioned up front, close at hand, for maximum convenience and ease of use
- Adjustable Humidity Vegetable/Fruit Crispers - Provide the ideal storage environment for fruits and vegetables
- Gallon Door Storage - Makes room for milk and any other gallon size containers
- Snack Pan - Helps keep everyday foods like muffins and carrot sticks fresh
- NeverClean™ Condenser - Condenser coils are encased, so they don't require cleaning in normal operating environments
- Deluxe Quiet Design - Significantly reduces operating noise
- Square Doors - Classic design that's compatible with any kitchen décor
- Model GTS17KBSWW - White on white
- Model GTS17KBSCC - Bisque on bisque



APPROXIMATE DIMENSIONS(HxDxW)	
64 3/4 in x 31 in x 28 in	
CAPACITY	
Total Capacity (cubic feet)	16.60
Fresh Food (cubic feet)	12.54
Freezer (cubic feet)	4.10
Shelf Area (sq. ft.)	19.7
FEATURES	
Air Tower	Yes - Freezer
Defrost Type	Frost Free
Upfront Temperature Controls	Yes
Automatic Icemaker	Optional (IM4A)
Ice N' Easy Trays	2
Snack Drawer	Yes
Vegetable / Fruit Crisper(s)	2 Adjustable Humidity
Fresh Food Cabinet Shelves - Adjustable	4 Split
Fresh Food Cabinet Shelves - Spill Proof	Yes
Fresh Food Cabinet Shelves - Total Number of Shelves	4 Glass
Fresh Food Door Shelves	2 Fixed w/ Gal. Storage
Gallon Door Storage	Yes
Dairy Compartment	Yes
Interior Light	Yes
Freezer Cabinet Shelves (Wire)	Step Shelf
Freezer Door Shelves	2 Full-Width Fixed (1 Extra-Deep)
APPEARANCE	
Color Appearance	White on White
Handle	Color-Matched
Door Swing	Reversible Hinges
Textured Steel Case	Galvanized Door
Door Stops	Yes
Easy to Remove Door Gaskets	Yes
Leveling Legs	2 Front
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	185 lb
Net Weight (lbs.)	166 lb
Overall Depth	31 in
Overall Height	64 3/4 in
Overall Width	28 in
Case Depth Without Door (in.)	25-7/8
Depth with Door Open 90° (in.)	54-7/8
Depth Without Handle (in.)	29-1/8
Height to Mid-Freezer	54-3/8
Height to Top of Case (in.)	64-1/4
Width w/Door Open 90 Degrees Inc. Handle (in.)	30-1/2
Width w/Door Open 90 Degrees Less Handle (in.)	28-5/8
Back Air Clearances (in.)	1
Side Air Clearances (in.)	3/4
Top Air Clearances (in.)	1

POWER / RATINGS	
Volts / Hertz / Amps	120V; 60Hz ; 15A



END OF SPECIFICATION

AMSCO® WARMING CABINET

APPLICATION

The Amsco Warming Cabinet is designed to raise the temperature of surgical irrigation solutions and/or blankets to an acceptable level for hospital and surgical outpatient center applications.

FEATURES

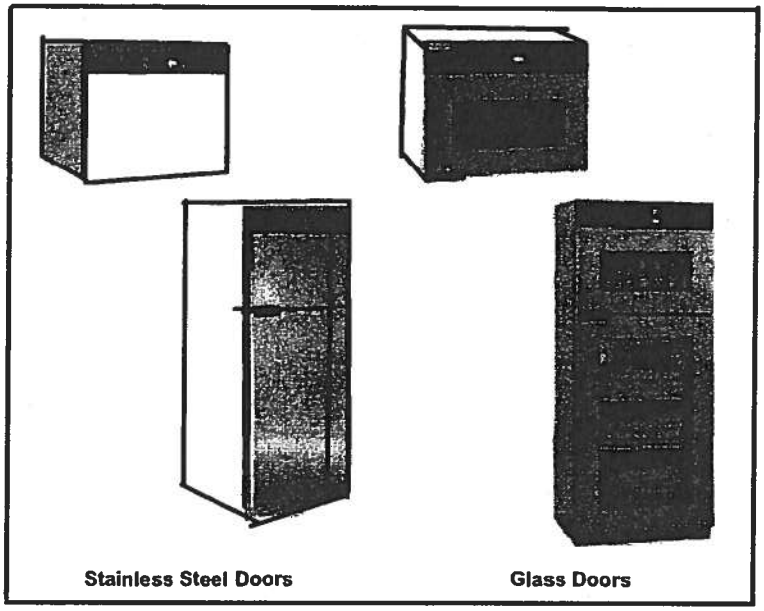
Single-compartment Model—Features a heating chamber available in two different depths: 18" (457 mm) or 24" (610 mm) deep.

Double-compartment Model—Features an upper and lower heating chamber with independent temperature controls, and a choice of two different depths: 18" (457 mm) or 24" (610 mm) deep.

Cabinet Storage Capabilities—The upper compartment of the 18" (457 mm) deep model holds up to 15 (2-liter) surgical flasks; the lower compartment holds up to 45 (2-liter) surgical flasks.

The upper compartment of the 24" (610 mm) deep model holds up to 20 (2-liter) surgical flasks; the lower compartment holds up to 60 (2-liter) surgical flasks.

All chambers can hold a combination of flasks and dry goods, or dry goods only.



Stainless Steel Doors **Glass Doors**

(Typical only - some details may vary.)

STANDARDS

Warming cabinet meets applicable requirements of the following standards, and carries the appropriate symbols.

- **Underwriters Laboratories (UL) Standard 2601-1, 1st Ed.,** as certified by ETL Testing Laboratories, Inc.
- **Standard CSA-C22.2 No. 601.1-M90,** Standard for Electro-Medical Equipment as certified by ETL Testing Laboratories, Inc.
- **EN 60601-1: 1993, Amendment 2, *1995,*** *Electrical Safety as certified by* ETL Testing Laboratories, Inc.
- **IEC 601-1-2: 1993,** EMC testing as certified by ETL Testing Laboratories, Inc.
- ***EN 55011: Group 1, Class B,*** *EMI* testing as certified by ETL Testing Laboratories, Inc.
- **Medical Device Directive (93/42 IEEC)**
- **California OSMPD Seismic Pre-Approval**
- **FDA Good Manufacturing Practices Regulations 21 CFR 820 for Medical Devices.**

The Selections Checked Below Apply To This Equipment

MODEL

- ☐ Single-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep
- ☐ Double-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep

Mounting

- ☐ Open-mounted
- ☐ For Recessing

DOOR OPTIONS

- ☐ Glass
- ☐ Stainless Steel

VOLTAGE

- ☐ 120 V
- ☐ 220-240 V

Door Hinge(LH/RH) interchangeable in field

ACCESSORY

*** Seismic Tie-down Kit

Item # 717197

REV: 6/19/03

CONSTRUCTION

Includes all components necessary to obtain a complete working unit. The open-mounted unit ships with a power condenser installed. The recessed unit requires a connection to building service, supplied by others. The unit contains a heating chamber, instrumentation and operating controls, and a lower heated chamber when double-compartment model is specified.

Cabinet controls are identical for both the single- and double-compartment configurations. The double compartment configuration has a temperature control knob, temperature display LCD, and overtemperature light for each compartment. The control panel (on either the single- or double-compartment configuration) can be conveniently serviced from the front of the unit.

Corners and intersections on the face of the cabinet and door are structurally formed for rigidity, cleanability and appearance. Both models are supported on a stainless steel integral subbase. The cabinet door(s) is (are) available in stainless steel, or stainless steel with a glass window. Interior of cabinet and shelves are stainless steel. If a freestanding model, the cabinet top and side panels are stainless steel.

Heating chamber compartment is insulated with 1" (25 mm) thick, fiberglass blanket. A fan circulates air within the chamber to provide even heat distribution. The door is of double-wall construction with 1-1/2" (38 mm) thick insulation between the walls. Right-hand door swing is provided; swing is reversible. Door closes against a heat-resistant, magnet imbedded, vinyl gasket. Pivot type hinges are stainless steel.

Chamber(s) is (are) heated by an electric rod heater operating on either *120 or 220 Volt, 50/60 Hz power.*

Lower chamber (double-compartment model) includes two stainless-steel shelves, adjustable in 1" (25 mm) increments by a clip and slot arrangement. Door structure mounting, gasket and hinges are the same as the door on the upper chamber. Chamber is heated by an electric rod heater.

CONTROLS

The control panel assembly features a temperature control knob, an overtemperature indicator light, a digital temperature indicator (if a double-compartment model, there will be duplicates of the previous items), and a power switch. The temperature control knob is used to regulate and turn off the heat to each chamber. 120 Volt units display temperature readings in Fahrenheit. 220 Volt units display temperature readings in Celsius scale. Temperature selection range is 90°-160°F (32.2°-71.1°C). An overtemperature alarm will visually and audibly alert operator should an overtemperature condition occur (chamber temperature greater than 10°F [5.5°C] above set temperature). In the event of an overtemperature condition, the overtemperature control automatically turns off the heater(s).

MOUNTING ARRANGEMENT

Double-compartment models may be specified as open-mounted or recessing into a partition wall. If model is specified for recessing, a synthetic rubber sealing gasket is provided to ensure close fit of cabinet front to the face of the wall partition. Recessed cabinet requires no supplementary supports behind the wall partition (except in seismic locations).

Single-compartment models may be specified for wall/counter mounting or for recessing into a partition wall.

PREVENTIVE MAINTENANCE

A global network of skilled service specialists can provide periodic inspections, and adjustments to assure *low-cost peak performance. STERIS* representatives can provide information regarding Annual Maintenance Agreements.

NOTE

1. Due to a variety of building constructions employed, fasteners for mounting cabinet to wall are not furnished by STERIS. Wall(s) must be adequately reinforced to *support operating weight of* cabinet.

ENGINEERING DATA

Unit	Approx. Unit Wt. lbs (kg)
Single-Compartment:*	
18" Wall/Counter Mounting	124 (56)
18" Recess Mounting	98 (45)
24" Wall/Counter Mounting	142 (65)
24" Recess Mounting	115 (52)
Double-Compartment:**	
18" Open-mounted	302 (137)
18" Recessed Mounting	266 (121)
24" Open-mounted	353 (160)
24" Recessed Mounting	306 (139)

** For 220/240 Volt units, add 8 lbs (3.6 kg). For glass door option, add 6 lbs (2.7 kg).*
*** For 220/240 Volt units, add 15 lbs (6.8 kg). For glass door option, add 6 lbs (2.7 kg).*

INTERNAL DIMENSIONS AND CAPACITY

Unit	Upper Chamber Single Chamber Unit (Height x Width x Depth)	Lower Chamber Double Chamber Unit (Height x Width x Depth)
18" Depth	15-1/2 x 23-3/4 x 16-7/8" – 3.6 cu. ft. (394 x 603 x 429 mm)	38-1/4 x 23-3/4 x 16-7/8" – 8.9 cu. ft. (972 x 603 x 429 mm)
24" Depth	15-1/2 x 23-3/4 x 22-7/8 – 4.9 cu. ft. (394 x 603 x 581 mm)	38-1/4 x 23-3/4 x 22-7/8 – 12 cu. ft. (972 x 603 x 581 mm)

UTILITY REQUIREMENTS - Single Compartment Model

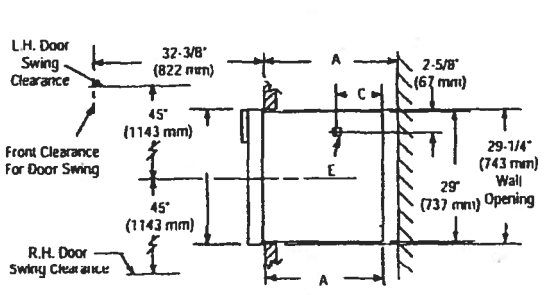
Electricity (E)

120 Volt, 50/60 Hz, 1-Phase, 6.8 A, 800 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 3.6 A, 869 Watts

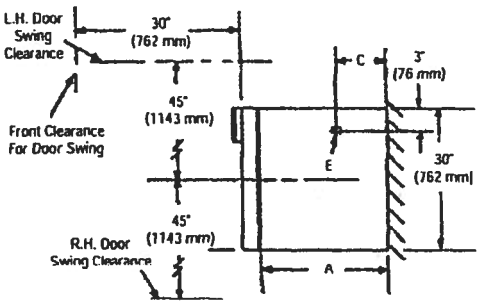
. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)

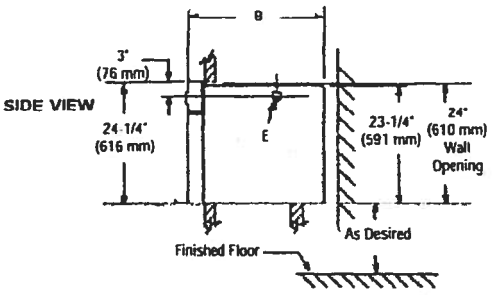
SINGLE-COMPARTMENT MODEL



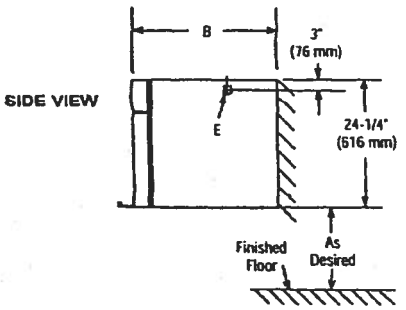
PLAN VIEW



PLAN VIEW



For Recessing



Wall/Counter Mounting

NOTE: Because of STERIS's continuing program of research and development, all specifications and descriptions are subject to change without notice. Obtain certified drawings for design, and installation.

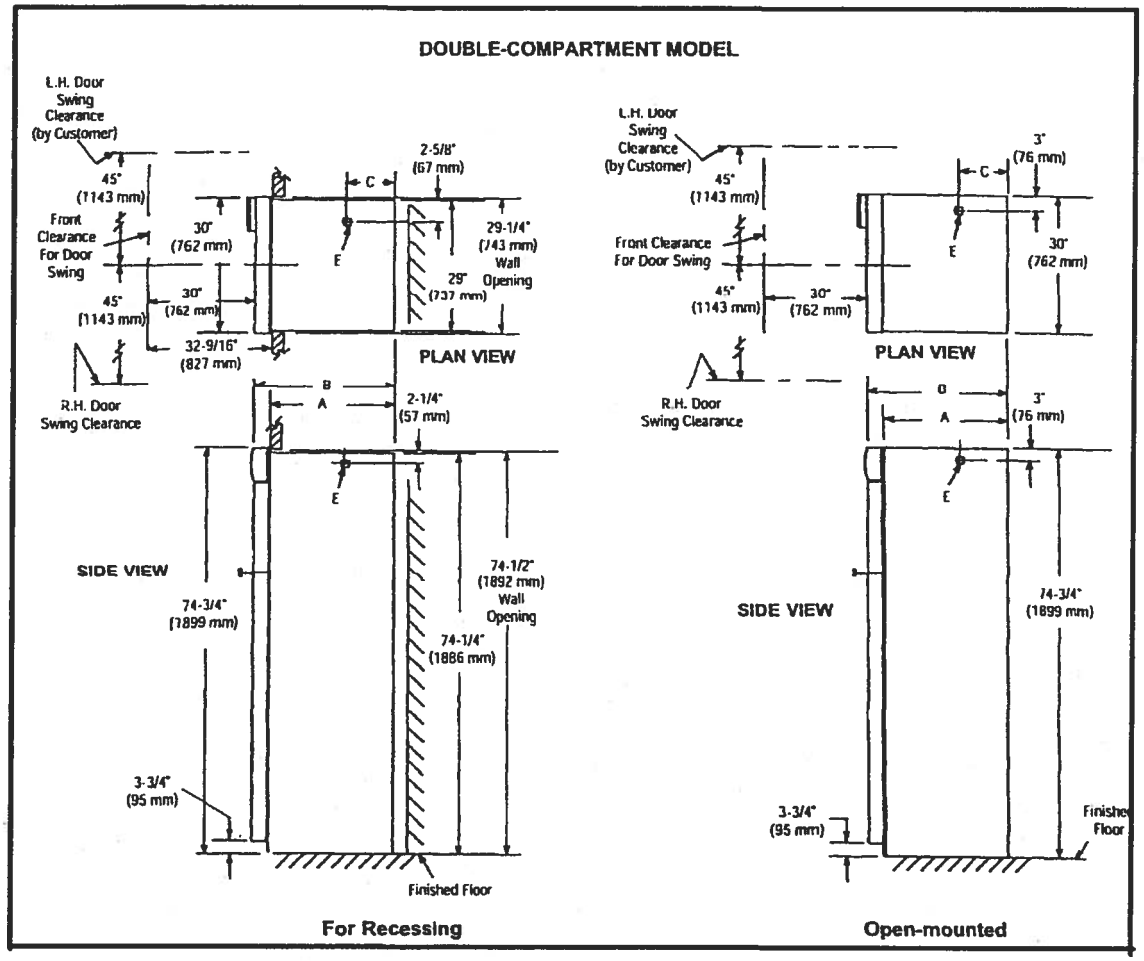
UTILITY REQUIREMENTS - Double Compartment Model

Electricity (E)

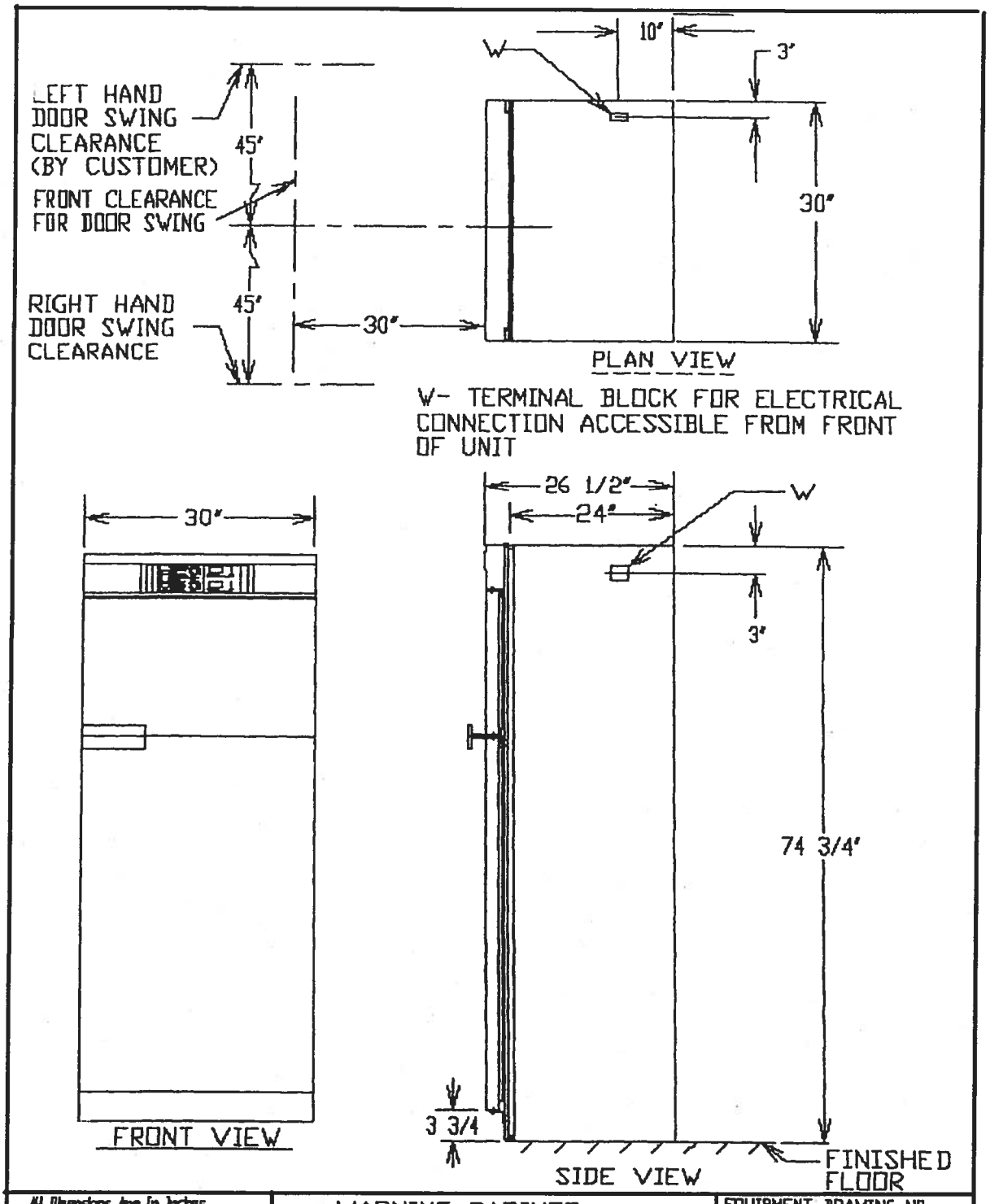
120 Volt, 50/60 Hz, 1-Phase, 13.7 A, 1600 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 6.8 A, 1625 Watts

. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)



Item # 717197



All Dimensions Are In Inches

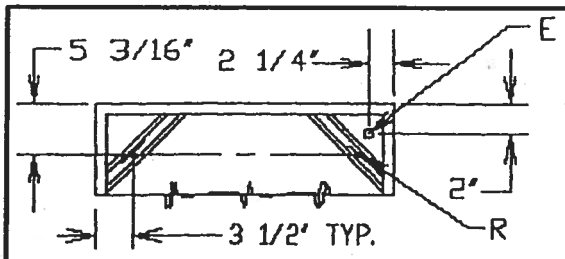
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET

24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214
SHT 1 OF 2

Item # 717197



REAR VIEW OF CABINET

E- 7/8" DIAMETER (22mm) HOLE FOR 1/2" (13mm) DIAMETER CONDUIT CONNECTION OR POWER CORD OPTION.

R- 3/8" (9.5mm) DIAMETER MOUNTING HOLES (2) FASTNERS NOT BY STERIS.

ELECETRICAL SPECIFICATIONS

VERSION	ELECTRICAL SUPPLY	POWER	CURRENT DRAW	UNIT BREAKER RATING
DOMESTIC	120V, 50/60 Hz, 1 PH	1644 WATTS	13.7 AMPS	15 AMPS
INTERNATIONAL	220-240V, 50/60 Hz, 1 PH	1625 WATTS	6.8 AMPS	10 AMPS

UNIT WEIGHT:

VERSION	UNIT WEIGHT		
	CRATED	BOXED	READY TO USE
DOMESTIC	542 LBS	410 LBS	353 LBS
INTERNATIONAL	557 LBS	425 LBS	368 LBS

UNIT CAPACITY:

	INTERNAL DIMENSIONS	VOLUME
TOP CHAMBER	22.875" DEEP X 23.75" WIDE X 15.5" HIGH 581.025mm DEEP X 603.25mm WIDE X 393.7mm HIGH	4.87 FT^3 .138 m^3
BOTTOM CHAMBER	22.875" DEEP X 23.75" WIDE X 38.25" HIGH 581.025mm DEEP X 603.25mm WIDE X 971.55mm HIGH	12.03 FT^3 .34 m^3

All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET
24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214 | SHT 2 OF 4

SEISMIC ANCHORAGE REPORT

for

74-INCH DUAL CHAMBER WARMING CABINETS

MODEL	ENGINEERING DWG. NO.	EQUIPMENT DWG. NO.
30"W X 18"D X 74"H OPEN MOUNTED	146655-541	129361-212
30"W X 18"D X 74"H RECESSED MOUNTED	146655-540	129361-213
30"W X 24"D X 74"H OPEN MOUNTED	146655-163	129361-214
30"W X 24"D X 74"H RECESSED MOUNTED	146655-162	129361-215

THE CALCULATIONS IN THIS REPORT SHOW COMPLIANCE WITH THE REQUIREMENTS OF TITLE 24 OF THE CALIFORNIA CODE OF REGULATIONS (CCR), PART 2 - CALIFORNIA BUILDING CODE (CBC) PUBLISHED AS THE 1988 EDITION OF THE UNIFORM BUILDING CODE (UBC) WITH STATE OF CALIFORNIA 1989. AMENDMENTS, SECTION 2312(g)

Prepared by: G. D. Hall — Date 8/21/91
Senior Engineer

Reviewed by: E. L. Thomas — Date 8/23/91
Project Engineer

Reviewed by: W. L. Sanders — Date
Project Manager

SEISMIC ANCHORAGE REPORT
74-INCH DUAL CHAMBER
WARMING CABINETS

AMSCO

PREPARED BY	CHECKED BY	APPROVED BY	APPROVED BY	APPROVED BY
G. Hall				
DATE 08/16/91	DATE	DATE	DATE	DATE

REVISION RECORD

REV.	DATE	APPROVED BY	PAGE	PARA.	CHANGE
0	8/16/91				Initial release PER # 24

EQUIPMENT WEIGHT & CENTER OF GRAVITY

	18"	24"	
Depth of Unit			
Weight of Cabinet (maximum)	220	260	pounds
Weight of Contents (maximum load)	360	480	pounds
Total Weight	580	740	pounds

The weight acts through the center of gravity as noted in Figures 1 and 2.

SEISMIC LOAD CALCULATIONS

Seismic load is calculated for the heavier unit from the formulae:

$F_p = Z\ I\ C_p\ W_p$ 1▸▸ 2▸▸

and:

$F_w = W_p \pm F_p/3$ 6▸▸

Where:

F_p = Lateral Seismic Force

Z = Zone Factor = 0.4 for Zone 4 locations 3▸▸

I = Importance Factor = 1.5 for essential facilities. 4▸▸

C_p = 0.75 Horizontal force factor - hospital equipment, rigid element 5▸▸

W_p = Dead weight of unit

F_w = Vertical Seismic Force

The forces then will be:

$F_p = Z\ I\ C_p\ W_p$

$= 0.4 \times 1.5 \times 0.75 \times W_p = 0.45\ W_p$

and:

$F_w = W_p \pm F_p/3 = W_p \pm (0.45\ W_p)/3 = W_p \pm 0.15\ W_p$

$F_w = 1.15\ W_p$ or $0.85\ W_p$

Seismic forces at the Warming Cabinet's C.G. are: (See Figures 1 & 2)

F_p - 0.45 X 740 = 333 lbs

F_w = 1.15 X 740 = 851 lbs

or

F_- = 0.85 X 740 = 629 lbs

EQUIPMENT ANCHORAGE INTERFACE

The equipment rest on the floor, but is anchored to the wall with three bolts as shown in Figures 1 and 2.

All the vertical seismic load is taken by the floor. The cabinet will not lift of the floor when the acceleration is upward. When the acceleration is downward, the stiffness of the cabinet is such that the load will be transmitted to the floor and not the bolts.

Friction on the floor is neglected, so all the horizontal load is taken by the bolts. It is assumed that the reaction of the floor is acting through the center of gravity producing no moment. The bolt reactions are determined by the laws of statics. When the seismic load is perpendicular to the wall, the bolts are in pure tension. When the seismic load is parallel to the wall, the bolts experience shear plus tension or compression to react the offset the center of gravity from the wall. The maximum tension any one bolt could experience is 210 pounds. The maximum shear any one bolt could experience is 180 pounds. A bolt can experience both maximum tension and maximum shear concurrently.

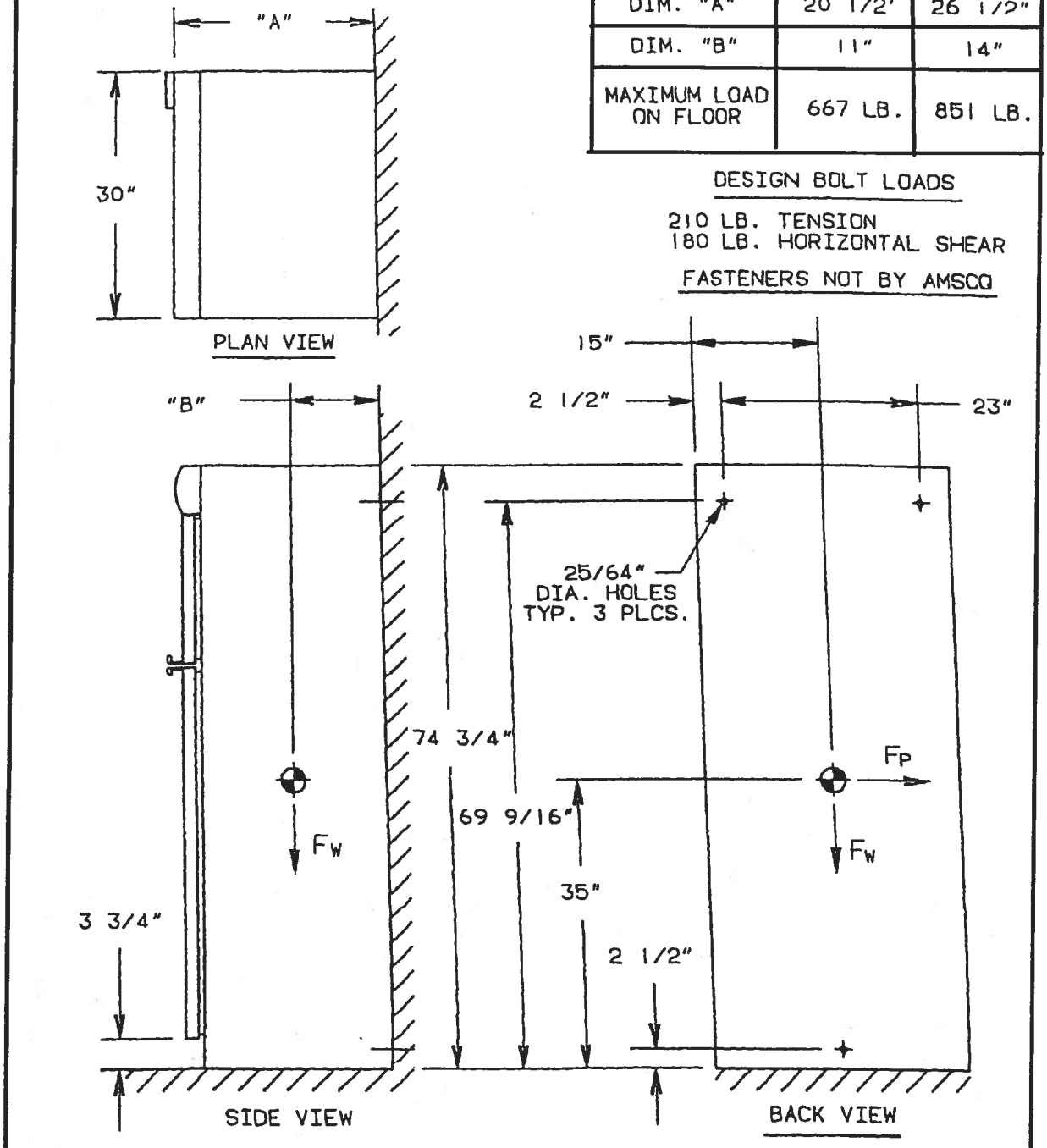
6▸▸ Reference 1▸▸ Table No. 23-P, Note 10, p. 179.54
5▸▸ Reference 1▸▸ Table No. 23-P, p. 179.53 plus notes on p. 179.26
4▸▸ Reference 1▸▸ Table Nos. 23-K and 23-L, pp 179.47 & 179.48
3▸▸ Reference 1▸▸ Table No. 23-I, p. 179.46
2▸▸ Reference 1▸▸ Section 2-312(g)2
1▸▸ Reference California Code of Regulations (CCR), Title 24, Part 2, Published as "State of California 1989 Amendments to the 1988 Edition of the Uniform Building Code".

	18" DEPTH	24" DEPTH
DIM. "A"	20 1/2'	26 1/2"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

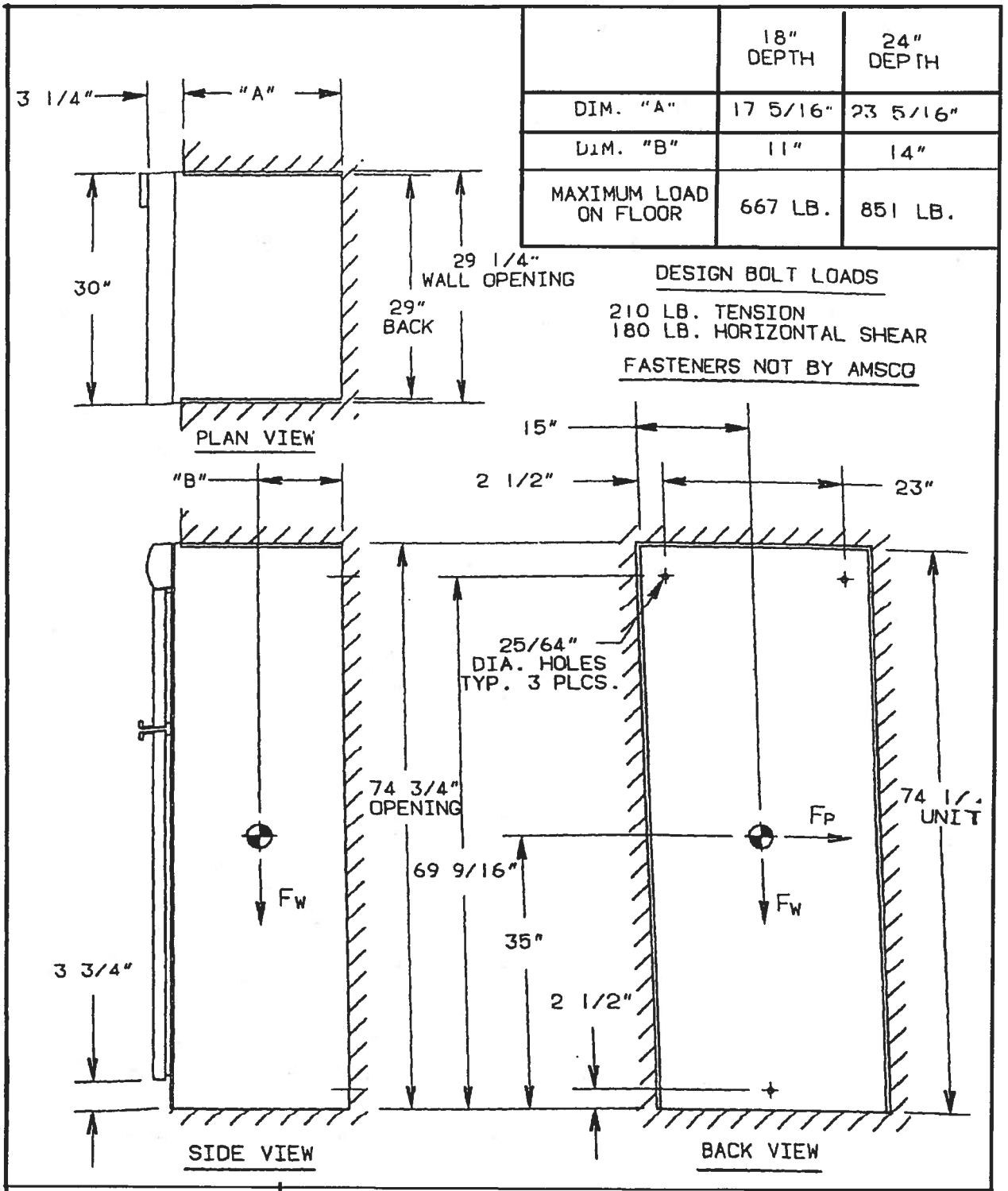
210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO



All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

Seismic Anchorage Report
Warming Cabinets, Open
30" Wide x 74" High



	18" DEPTH	24" DEPTH
DIM. "A"	17 5/16"	23 5/16"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO

All Dimensions Are In Inches
Also Refer To GENERAL NOTES
Applicable To Equipment Drawing

FIGURE 2
SEISMIC ANCHORAGE REPORT
WARMING CABINETS, RECESSED
30" WIDE × 74" HIGH

GENERAL NOTES – APPLICABLE TO SPECIALTY SURGICAL PRODUCT EQUIPMENT DRAWINGS

INTRODUCTION

Each equipment drawing (enclosed) pertains to the equipment as specified or purchased by you. These general notes and recommendations are intended to complement the equipment drawing(s), as necessary, and thereby further assist you in achieving satisfactory installation of the equipment. The information on this and the enclosed drawing(s) is based upon the design and construction of the equipment as of the date of the drawing.

SPACE CONSIDERATIONS

Clearances

The clearance dimensions shown on each drawing are the minimum considered necessary to allow space for servicing and operating the equipment.

Dimensions

Attention must be given to the *printed dimensions* shown on each drawing, since no attempt has been made to hold these drawings to any specific scale.

MOUNTING DETAILS

For Wall Mounting

It is important that walls be adequately reinforced to support the operating weight of the equipment as shown on the drawing. Materials and labor for such support are not furnished by STERIS.

Recessing Cubicle

Wooden bucks, where required to anchor equipment to the walls, are to be furnished by the Customer.

The recessing cubicle should be adequately ventilated to maintain temperature in the range of 80° to 90°F (27° to 32°C) when the equipment is in operation.

UTILITY SERVICE REQUIREMENTS

Roughing-in for Equipment Requiring Steam and/or Water Supply

All lines should be short-stubbed through the floor or wall, far enough to allow for pipe coupling. Provisions must be made for short-swing connections to equipment terminals.

Terminal Fittings

Unless otherwise specified in the contract or purchase order, piping and other appurtenances between terminal fittings on the equipment and wall or floor outlets (stubbing) are not furnished by STERIS.

Pipe Sizes

Pipe sizes shown on each equipment drawing indicate utility service terminals. To ensure adequate service, the lines leading to and from the equipment should be increased in size to conform with applicable plumbing codes.

Shutoff Valves

Separate shutoff valves should be installed in steam and water supply lines near each piece of equipment, so that the unit can be serviced without interruption of supply to other equipment.

Steam Return Lines

Steam return lines should be connected to a gravity system piped to a *vented receiver*. *Avoid any piping* arrangement that could cause back pressure in the return line.

Steam and Water Pressures

Steam and water pressures indicated on each drawing are to be dynamic at the equipment.

Equipment is adequately equipped to operate on the pressures listed on the equipment drawing. If supply line pressure exceeds those shown, provide reducing valves. These are not furnished by STERIS unless specifically called for in the contract or purchase order.

Wiring Terminals

Wiring on the equipment terminates at a junction box or boxes as shown on each drawing. Wiring and other appurtenances between junction box (or boxes) and building service lines are not furnished by STERIS.

Disconnect Switches

Disconnect switches with off position lockout only must be furnished and installed by the Customer in electric supply lines near each piece of equipment.

IMPORTANT

STERIS assumes no responsibility for changes made necessary through failure to explicitly observe these instructions and recommendations. In all instances, local, county, state, and national regulations should be observed.

STERIS SHIPPING INSTRUCTIONS AND SERVICE REQUIREMENTS

PREPARATION FOR SHIPMENT

Each unit of equipment shall be placed in a substantial shipping container or crate complying with applicable rules of the I.C.C. Uniform Freight Classification to ensure acceptance by the common or other carrier for safe transportation to final destination at the lowest rate. The shipping crate or container for heavy equipment (such as sterilizers and water stills) shall be of skid construction to facilitate handling by lift equipment.

The exterior of each container shall be clearly and legibly marked with the room, floor and item number (if available), shipping address, and brief description of the contents. A packing list and complete instructions for uncrating the equipment and setting it in place shall be fastened to the outside of the container or crate; such information shall be protected by a waterproof envelope. Packaging, packing, and marking differing from that above shall be provided, if specified.

INSTALLATION INSTRUCTIONS

Unless additional copies are specified, one set of complete installation instructions, including prints showing all utility service requirements, space requirements and wiring diagrams (if not affixed to the equipment) shall be furnished with each unit of equipment.

OPERATING AND MAINTENANCE INSTRUCTIONS

Instructions for operating and performing periodic preventive maintenance on each unit of equipment, including a list of the service parts and quantity of each required for this purpose, shall be furnished. Unless otherwise specified, one copy of this material shall be furnished.

SERVICE AFTER INSTALLATION*

After installation of each assembly, STERIS shall provide a factory-trained technician to perform repair service as required by the customer. This service shall be on a time and material basis unless the equipment is still within the manufacturer's warranty.

If specified, STERIS shall provide a factory-trained technician to perform preventive maintenance services on each assembly following its test and demonstration.

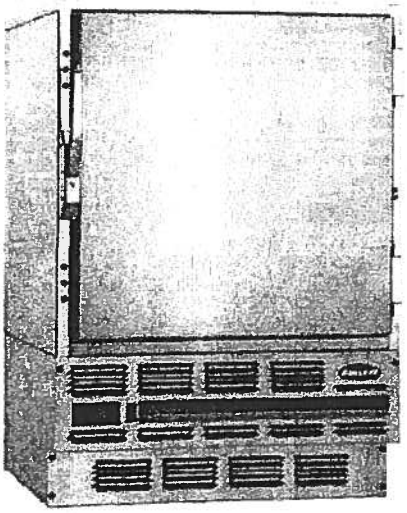
* *These services are available from the STERIS Corporation within the continental United States, Alaska, and Hawaii.*

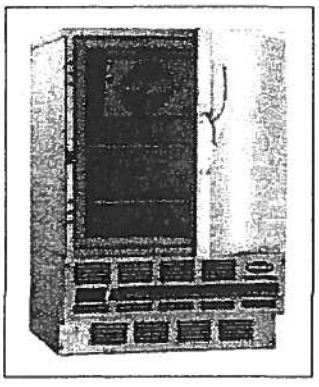
Item # 717197

Symphony REF Series Undercounter Refrigerators

Medical-grade undercounter refrigerator with external digital temperature display and stainless steel interior/exterior.

Model	
REF5	for standard 36" (915mm) counters, 4.8 cu ft capacity





Proper storage for expensive medications and patient supplies

- Heavy-duty compressor, forced air cooling and solid state controller maintain uniform cabinet temperatures with quick pull-down to temperature
- Adjustable set point meets temperature range requirements for different applications:
  36°F – 46°F (3°C – 8°C) for medications,
  33°F – 40°F (1°C – 5°C) for food and beverages
- Locking door handle provides medication security
- Supports JCAHO standards on medication storage
- NSF listing ensures temperature stability in adverse conditions and with frequent door openings

More features designed specifically for healthcare

- Easy-to-read external temperature display allows easy temperature logging
- Positive door latch and magnetic gasket provide secure closure
- Two, easy-to-clean, epoxy-coated shelves accept narcotic box hardware (supplied by others)
- Two models – for standard 36" (915mm) counter and 34" (864mm) ADA-compatible counters

Easy installation, cleaning and care

- Front-breathing design allows installation in standard 24" (610mm) casework opening with no side clearances
- Field-reversible door and handle for left or right opening
- Condensation evaporates automatically
- Automatic, off-cycle defrost eliminates manual defrosting
- Durable stainless steel interior and exterior for easy cleaning
- Slide-out compressor tray for easy access to condenser

Industry's best warranty

- 2-yr parts and labor on entire refrigerator
- 5-yr parts on compressor

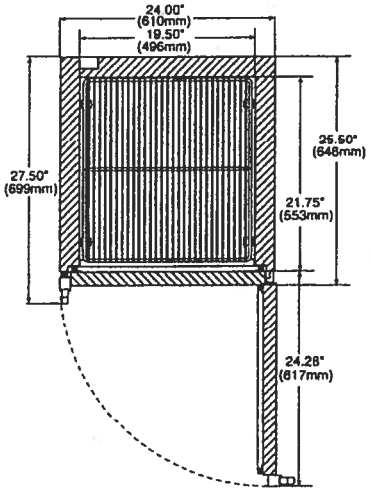
Accessories

- Temperature alarm with probe and °F/°C display
- Pyxis® compatible door bracket

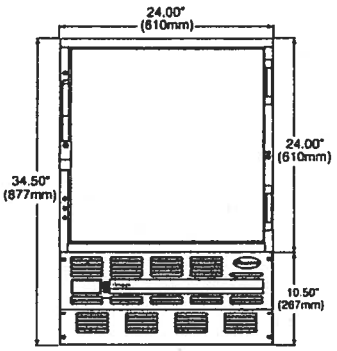
Item # 718171

REV: tlg 10/21/03

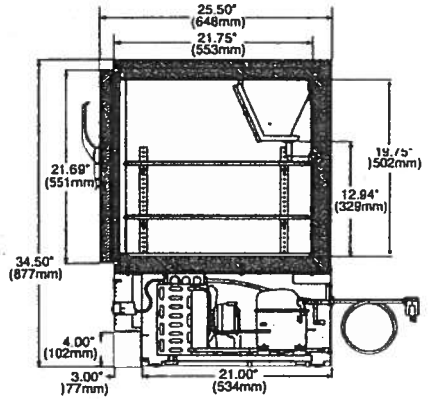
Top View
all models



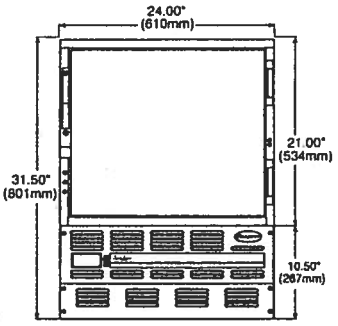
Front View
REF5



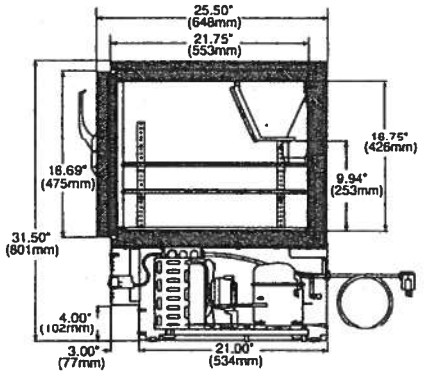
Side View
REF5



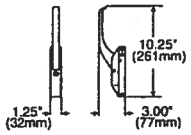
Front View
REF4-ADA



Side View
REF4-ADA



Handle Detail
all models



Plug Detail
all models
NEMA 5-15



Approximate Shipping Weight 175 lbs (79kg)

Standard Electrical 115V, 60Hz, 1 ph, 8.0 amps, max. fuse 15 amps
Hospital-grade cord and plug provided.

Specifications
Follett undercounter refrigerator to be model (choose one) _____ REF5 34.5" (877mm) high for use in standard counters or _____ REF4-ADA 31.5" (801mm) high for use in 34" (864mm) high ADA-compatible counters. REF5 to have 4.8 cu ft (136L) capacity. REF4-ADA to have 4.0 cu ft (113L) capacity. Environmentally-friendly R404A refrigeration system to include heavy-duty 1/4 HP compressor, blower, blower coil and automatic evaporative forced air cooling with off-cycle defrost. Refrigerator to be equipped with external temperature display in °F/°C and solid-state controller to maintain uniform cabinet temperatures. Controller to have programmable set points to meet temperature range requirements of different applications: 30°F – 40°F (2°C – 8°C) for medications, 33°F – 40°F (1°C – 5°C) for food and beverage. Refrigerator door to be field-reversible and equipped with replaceable gasket and chrome-plated handle with cylinder lock. Refrigerator interior and exterior to be stainless steel. Two epoxy-coated wire shelves adjust in 1/2" (13mm) increments. Storage area to be insulated with high-density, non-CFC foam polyurethane. Hospital-grade cord and plug provided. Refrigerator to be NSF, UL and cUL listed.

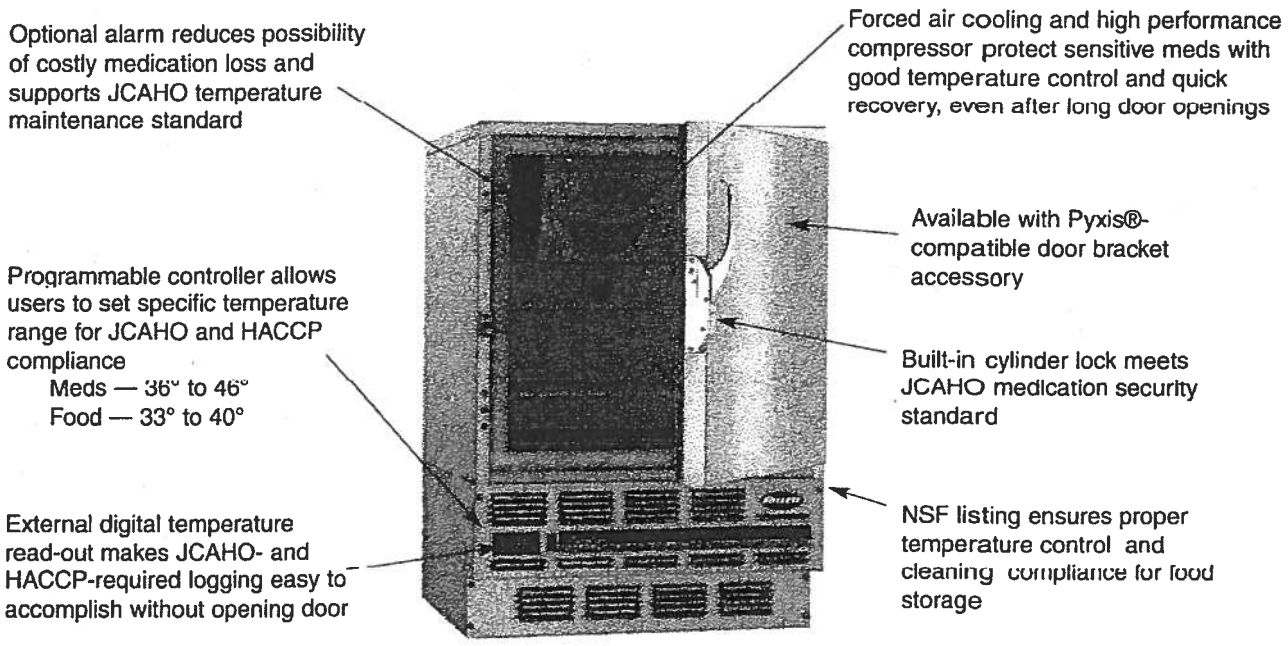
Item # 718171

Meets medication and food storage requirements

Follett's REF5 and REF4-ADA medical-grade undercounter refrigerators provide the features and performance to meet both JCAHO standards and local and state requirements for medication and food storage.

JCAHO's medication standard (TX 3.5/MM.2.20) addresses proper storage and control of medications, and at a minimum requires the logging of temperatures, lockable security for medications, and the maintenance of constant appropriate temperature.

State and local inspectors generally follow HACCP guidelines requiring temperature logging to ensure that perishable food is maintained below 40°F.



High-quality design and full stainless steel construction deliver outstanding performance and long-term reliability, backed with the industry's best warranty. Our component performance testing supports this claim:

- Compressor (1/4 hp, heavy-duty) — over 1.6 million on-off cycles without failure
- Fan, controller, and condenser — over 39,000 run hours without failure
- Door gasket — over 38,000 openings and closings with no measurable wear
- Door hinges — over 1 million cycles without measurable wear
- Door — tested open to 450 pounds of direct weight without failure

NSF - National Sanitation Foundation; JCAHO - Joint Commission on Accreditation of Healthcare Organizations; HCAAP - Hazardous Analysis of Critical Control Point Program

END OF SPECIFICATION

UNIT SPECIFICATIONS SHEET

LFGI-4USP LAMINAR FLOW GLOVEBOX / ISOLATOR

SECTION I. PERFORMANCE DATA

The Laminar Flow Glovebox/Isolator provides the ultimate in both product and operator protection. The LFGI functions as a Glovebox while operating under negative pressure to meet NIOSH recommendations and as an Isolator under positive pressure to meet USP <797> regulations. HEPA filtered unidirectional (laminar) air bathes the work area to protect the product from contamination and removes any particulate generated by sample manipulation. The operator is provided a complete barrier from materials being manipulated in the work area. The LFGI Series of barrier isolators meet or exceed ISO 14644-1 Class 5 air quality. Each LFGI, before shipping, undergoes rigorous physical testing to assure the unit meets performance requirements as validated. It is required that independent certification be performed before use.

SECTION II. EQUIPMENT SPECIFICATIONS

Construction-

-Overall Dimensions: 66 W (50" W at base) x 32" D x 80" H
-Work Area Dimensions: 46 ½" W x 24 ½" D x 29" H
-Designed to fit through standard door openings and elevators.
-All stainless steel construction both inside and out with a pharmaceutical grade finish.
-316L Stainless steel work trays slide over one another and are removable to facilitate easy clean up under the work deck.
-All viewing panels are stainless steel framed Acrylic
-Front viewing panel is top hinged and self supporting for easy access to the work area for cleaning and equipment ingress.
-All filter diffuser / guard panels are removable for easy cleaning.
-Straight sides and back maximize work area to accommodate the many types and shapes of pharmacy equipment and compounders.
-All corners in work area, antechamber and work surface are easily reached and cleaned.

Antechamber-

-Sealed two-door airlock (16" W x 13 ½" D x 14 ¼" H) maintains complete environmental separation between work area and ambient conditions.
-HEPA filtered purge of trapped airlock air eliminates cross contamination between the work area and the room during both material ingress and egress.

Waste Removal-

-Trash tube is a 4" diameter tube, flanged for waste bag/container connection and provided with an easily removable seal/stopper to maintain work area containment. (Stainless trash can is available)
-Sharps tube is a straight 2 ½" diameter tube to facilitate quick drop of the largest syringes and provided with an easily removable seal/stopper to maintain work area containment.
-Fully adjustable sharps container shelf accommodates most commercially available wide mouth or hinged top sharps collectors. (Examples BD Part # 305610 and 305491)

Safety-

-Lock-out handle requiring key for access to work area.
-Digital pressure readout with low pressure alarm for work area.
-Inward/Outward face velocity is 95-100 linear feet per minute at gloveport opening, to protect operator/product during massive breach of containment.
-Glove changes can be made without breaking containment.
-Locking casters are standard, seismic anchors are available.

Ergonomics-
-Hydraulic assist height adjusting stand offers a full 10" range variance allowing operators to sit or stand comfortably for extended time periods.
-Stainless steel sliding tray inside the airlock pulls into the work area eliminating reaching strains.
-Two part sleeve/glove system allows the use of most types and sizes of commercially available gloves for better dexterity and tactility.
-Extra large oval gloveports are placed with bottoms together to provide an athropometrically correct configuration that accommodates a wide range of body types and increases range of movement.
-Gloveports have a 3" arm rest to reduce operator fatigue.
-Large viewing panel is at an angle to reduce glare and operator strain.
-Integrated foot rest.

Configuration Options-
-Overall work area pressure can be either positive or negative and can be altered in-place by a certifier.
-Antechamber can be left or right handed or can be installed on both sides.
-Waste and sharps removal tubes can be left or right handed or can be installed on both sides.
-Three available exhaust options that can be factory set or changed by a certifier in-place.

Filtration-
-Full framed standard size minipleat HEPAs filter 100% of inlet and exhaust air from both the work area and the antechamber to provide a fully contained environment.
-HEPA filters are full coverage and front loading for easy replacement by a certifier.
-A Prefilter extends the life of the work area supply HEPA filter and can be replaced without tools.

Electrical-
-High capacity motor/blower systems with speed control to extend HEPA filters life.
-Ten foot hospital grade power cord with molded grounded plug.
-Sealed outlet in work area.
-Separate lighted power ON/OFF indicator switches for blower and lighting.
-High efficiency, standard sized fluorescent lights are externally mounted to minimize heat build-up.
-Voltage = 115 Volt, 60 Hz (220/50-60 Hz also available).
-Amperage Rating = 15, Running Amperage = 6

Exhaust-
-Clean air plenum is external to the work area.
-Constructed to allow for optional outside venting of exhaust air.
-Constructed to allow for 3 exhaust options that can be factory set or changed by a certifier in-place
-Venting is not required for operation but is optional.

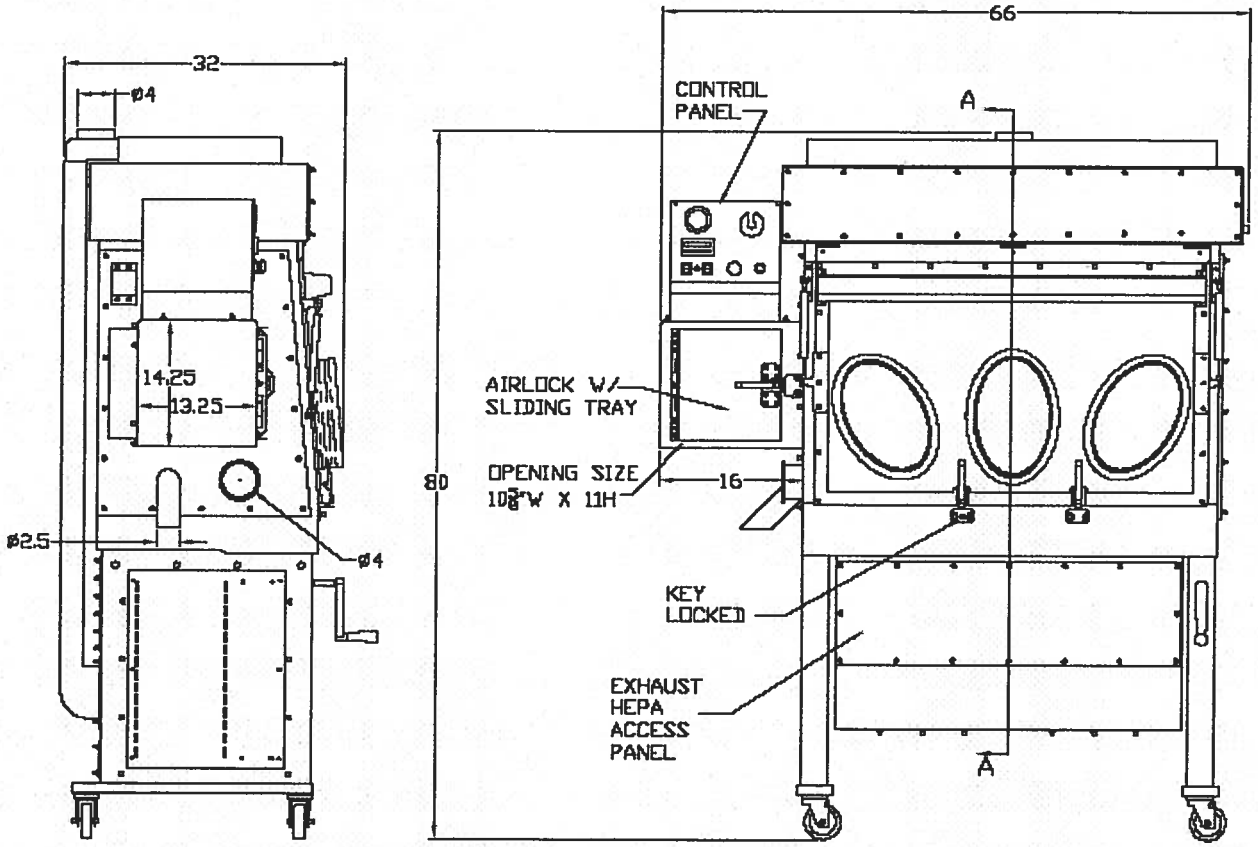
	No Exhaust- ~100% recycling of air	Controlled Exhaust- 80% recycling of air	Total Exhaust- no recycling of air.
Exhaust Connection	N/A	4" OD flexible hose	8" OD flexible duct
Exhaust CFM	20	80	400
Exhaust Static	N/A	<1 inch w.c.	Up to 2 inches w.c. (depending upon configuration)

Weight-
Net Weight- 625 lbs
Shipping Weight- 755 lbs

SECTION III. OPTIONAL EQUIPMENT AND ACCESSORIES-

LFGI-A80 Ergonomic task chair with anti-bacterial and anti-microbial vinyl covering, various colors
LFGI-A85S Stainless steel cleaning handle with pivot head. Accepts lint- free mop heads (LFGI-A85M)
LFGI-A8E Electrical Height Adjustment (requires additional plug-in)
LFGI-A83 Stainless steel garbage can (hangs on side to contain waste bags)
LFGI-A12 Exhaust ventilation kits

SECTION IV. UNIT DIAGRAM



END OF SPECIFICATION

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

Legend

D/R = Contractor De-Install & Relocate
CR = Contractor Rough-in Only
IR = Installation & Assembly Responsibility
F = Facility
C = Contractor
V = Vendor
N = New
E = Existing

Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	2-2099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	3-3073	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	4-4099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	5-5099	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1085	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1112	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	2-2082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	4-4082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1040	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1085	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1112	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3042	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3073	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4071	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5099	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1040	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1112	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	2-2071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	3-3042	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	4-4071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	5-5071	C				
475604	(Model: GTS18KBP) #GTS18KBP; REFRIGERATOR, TOP FREEZER,	3-3054	C				
477300	(Model: GMR04AAM) #GMR04AAM; REFRIGERATOR, UNDERCOUNTER	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1112	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	3-3073	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

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Equip. Manager:	CAGLE, JIMMY
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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1070	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1085	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1112	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3017	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3027B	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3042	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3073	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4082	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5099	C				
15152	(Model: 101461) # 101461; ILLUMINATOR, 1 PANEL	3-3066	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	3-3073	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5099	C				
717197	(Model: DJ04112033-01) #DJ04112033-01; WARMING CABINET	3-3055	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	3-3072	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5097	C				
JC2725	(Model: QUOTE) LAMINAR FLOW GLOVEBOX	3-3054	C				
C2859	(Model: QUOTE) DISPLAY CASE & REFRIGERATOR	1-1002	C				

COID PROJECT NUMBER: _____

OWNER FURNISHED EQUIPMENT DELIVERY SCHEDULE

NOTE: Per the Contractor Guideline Book this OFE Delivery Schedule MUST be completed and returned BEFORE the first invoice is paid!

PROJECT NAME: _____

Project Phase Description (if applicable): _____

Project Location: _____

Project Completion Date: _____ **Completion Date This Phase:** _____

Owner Equipment Mgr. _____ **Phone:** _____

Owner Construction Mgr. _____ **Phone:** _____

Hospital Material Mgr. _____ **Phone:** _____

Contractor's Supt.: _____ **Phone:** _____

Contractor's Project Mgr. _____ **Phone:** _____

OWNER FURNISHED/CONTRACTOR INSTALLED EQUIPMENT

NOTE: Include date for special backboxes (such as OR Lights, Illuminators, etc.) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor will coordinate with HCA Equipment Manager for safe storage.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:

HCA Equipment Manager:
HCA Construction Manager:
Hospital Construction Contact:
Hospital Materials Manager:

ENGINEERED SYSTEMS EQUIPMENT DELIVERY SCHEDULE

(Sample on Following Page)

EXPLANATION / INSTRUCTIONS: HCA requires that the enclosed Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule Form to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed. This information enables owner vendors to ship cable and backboxes and equipment, as well as, schedule installation to meet the construction schedule. It is critically important that one schedule document be provided for each separate occupancy phase of the project.

Please see "Team Construction: Routine / Repetitive Phase" for general contractor's responsibilities for management of the owner furnished systems process and installation of all raceway and cable installation on some systems. It is the contractor's responsibility to update and redistribute this document if the construction schedule changes.

NOTE: **No Payments can be made until receipt of this schedule(s) by the HCA Construction Manager.**

OWNER PROJECT#_____

ENGINEERED/SYSTEMS INFORMATION & TELEPHONE SYSTEMS
EQUIPMENT DELIVERY SCHEDULE

Project Name: _____ Date: _____
Project Location: _____ Revision Date: _____
Description of this phase (if applicable) _____
Completion Date of this phase: _____
Project Completion Date: _____ Revised: _____
Owner's Construction Manager: _____
Owner's Equipment Manager: _____ Phone #: _____
Information & Telephone Systems Cabling Installation Project Manager: _____
Information and Telephone Systems Project Manager: Bob Stewart Phone #: 615-344-8010
General Contractor Superintendent: _____ Phone #: _____
Electrical Contractor Project Manager: _____ Phone #: _____

Installation or Need Equipment Delivered

ITEM/DESCRIPTION	OWNER FURNISHED OWNER INSTALLED	OWNER FURNISHED CONTRACTOR
INSTALLED	DATE:	DATE:
1. Wiring Schematics/Cut Sheet		_____
2. Engineered Systems Cable		
Cable & Special Backboxes		_____
3. T.V. Brackets		_____
4. Radio Tower	_____	
5. Information Systems:		
Cable:	_____	
Telephone Equipment:	_____	
Data Equipment:	_____	
6. Nurse Call System/Sound System:	_____	
7. Intercom System	_____	
8. Dictation System	_____	
9. MATV System	_____	
10. TV Set Installation	_____	
11. Systems Inspection	_____	_____
12. State Inspection	_____	_____
13. Demobilize Job site	_____	_____

DISTRIBUTION BY HCA CONSTRUCTION MANAGER:
Information & Telephone Systems: Bob Stewart
HCA Construction Manager:
HCA Equipment Manager:
Hospital Construction Contact:
General Contractor's Project Manager:

Owner/ Vendor Installed Equipment Delivery Schedule

ITEM	Date Building Will Be Ready For Installation
Kitchen Equipment	
Walk-In Cooler & Freezer	
Radiology Equipment	
Shelving/Lockers	
Patient Room Furniture	
Office/Waiting Furniture	
Drapes/Cubicle Curtains/Shower Curtains	
Artwork	
Others (as may be applicable)	

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
1. ANESTHESIA ADMINISTRATION		X	X	X	X									
2. AUDIO / VISUAL / PERSONNEL TRAINING AIDS										X	X	X	X	To be coordinated via DD session. Information Systems will budget.
a. Portable										X	X	X	X	
b. Systems										X	X	X	X	
3. AUTOMATED TRANSPORT SYSTEMS (Pneumatic Tube)						X	X	X	X					Check with Bulk Purchasing
4. CARTS														
a. Anesthesia		X	X	X	X									
b. Case, Surgical		X	X	X	X									
c. Cast		X	X	X	X									
d. Crash		X	X	X	X									
e. Endoscopy		X	X	X	X									
f. E.N.T		X	X	X	X									
g. Environmental Svcs		X	X	X	X									
h. Food Service		X	X	X	X									
i. Fracture		X	X	X	X									
j. Gift Shop (Hospitality)		X	X	X	X									
k. Isolation		X	X	X	X									
l. Linen		X	X	X	X									
m. Medication		X	X	X	X									
n. Miscellaneous		X	X	X	X									
o. Supply		X	X	X	X									
p. Tool		X	X	X	X									
q. Trash		X	X	X	X									
r. Utility		X	X	X	X									
s. Wrap		X	X	X	X									
5. CASEWORK														
a. Focal						X	X	X	X					Check with Bulk Purchasing
b. Standard						X	X	X	X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Volce (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
c. Special (Modular)						X	X	X	X					Check with Bulk Purchasing Typically Vendor Installed
d. Keyboards (Duplicate under furniture)						X	X	X	X					
6. CHAIRS, EXAM/TREATMENT														
a. Contour (Donor, I.V.)		X	X	X	X									
b. Dental		X	X	X	X									
c. Eye / ENT		X	X	X	X									
d. Miscellaneous		X	X	X	X									
e. Phlebotomy		X	X	X	X									
7. CHARTING SYSTEMS, PATIENT														
a. Manual		X	X	X	X									
b. Computerized										X	X	X	X	
c. Wall-hung chart station						X	X	X	X					
8. CLOCKS														
a. Discrete (Battery / Plug-in)						X	X	X	X					
b. Interval Timers / Recorders						X	X	X	X					
c. Systems, Cenralized						X	X	X	X					
d. Kronos Time & Attendance										X	X	X	X	
9. COMMODES														
a. Fixed						X	X	X	X					
b. Portable		X	X	X	X									
10. COMMUNICATIONS EQUIP/SYSTEMS														
a. Dictation														
1. Portable										X	X	X	X	
2. Systems, Hardwired										X	X	X	X	
b. Doctors' Registry						X	X	X	X					
c. Emergency Radio		X	X	X	X									Contractor to pull cable
d. Intercom		X	X	X	X									Contractor to pull cable
e. Nurse Call		X	X	X	X									Contractor to pull cable

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
f. Side Com Receptacle		X	X					X	X					
g. Radio / Pocket Paging		X	X	X	X									Contractor to pull cable
h. Two Way Radio		X	X	X	X									Contractor to pull cable
i. Telephone										X	X	X	X	
j. Overhead Page / Music		X	X	X	X									Contractor to pull cable
k. Transcription										X	X	X	X	
l. Public Address		X	X	X	X									Contractor to pull cable
m. Fax Machines										X	X	X	X	
n. Picture Archive and Communication Systems (PACS)										X	X	X	X	
11. COMPACTORS														
a. External						X	X	X	X					
b. Departmental						X	X	X	X					
12. DARKROOM EQUIPMENT														
a. Cabinet, Film Storage		X	X					X	X					
b. Miscellaneous		X	X	X	X									
c. Safelights						X	X	X	X					
d. Transfer Boxes, Cassette						X	X	X	X					
e. Revolving X-Ray Door						X	X	X	X					
13. DATA / WORD PROCESSING EQUIPMENT														
a. Desktop Computer										X	X	X	X	
b. Mainframe										X	X	X	X	
c. Network Equipment										X	X	X	X	
d. Backbone and/or Station Wiring										X	X	X	X	
14. DIALYSIS EQUIPMENT														
a. Peritoneal		X	X	X	X									
b. Renal		X	X	X	X									
15. EQUIPMENT MANAGEMENT SYSTEMS (Equipment Boom)		X	X	X					X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
16. ELECTROCARDIOGRAPH EQUIPMENT		X	X	X										
17. ELECTROSURGICAL EQUIPMENT		X	X	X	X									
18. ENVIRONMENTAL ROOMS						X	X	X	X					
(Prefabricated)														
19. ENVIRONMENTAL SERVICES EQUIP		X	X	X	X									
20. FIRE PREVENTION EQUIPMENT														
a. Blankets		X	X					X	X					
b. Cabinets, Extinguisher						X	X	X	X					
c. Extinguishers						X	X	X	X					
d. Systems						X	X	X	X					
21. FOOD SERVICE EQUIPMENT														
a. Grp. I (Hoods, Walk-Ins)		X	X	X	X									Elec. contractor makes actual connection
b. Grp. II (Moveable: Ovens, Dishwasher)		X	X	X	X									
c. Grp. II (Smallwares: Pots, Trays, Carts)		X	X	X	X									
d. Final Equipment Placement Set in place; caulking; touchup														Work to be completed by food service vendor
e. Garbage Disposals						X	X	X	X					
f. Cash register										X	X	X	X	
22. FREEZERS (excluding Food Svc Equip)														
a. Chest		X	X					X	X					
b. Miscellaneous		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in/Prefabricated		X	X	X	X									Elec. contractor make actual connection
23. FURNISHINGS, DESIGN														

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Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Accessories, Design	X													
b. Artwork / Graphics		X	X	X	X									
c. Bulletin Boards/Tack Boards/Chalkboards/Marker Boards						X	X	X	X					
d. Carpet						X	X	X	X					Check with Bulk Purchasing
e. Curtains, Cubicle						X	X	X	X					
f. Curtains, Shower			X	X	X	X								
g. Furniture, General - Existing			X	X	X	X								Interior Designer to spec fabric
h. Furniture, General			X	X	X	X								
i. Signs, Exterior						X	X	X	X					Check with Bulk Purchasing
j. Signs, Interior						X	X	X	X					Check with Bulk Purchasing
k. Waste Receptacles														
Clinical		X	X	X	X									
Non-Clinical			X	X	X	X								
l. Window Treatment / Blinds/ Cornice Boards			X	X	X	X								Except Blinds that are internal with window units
m. Wall Protector (ie: bumper / bed / handrail/corner guards)						X	X	X	X					
n. Keyboards - in workstations, duplicate in casework						X	X	X	X					
o. Planters			X	X	X	X								
p. Plants	X													
24. FURNITURE, PATIENT ROOM														
a. Beds		X	X	X	X									
b. Cribs		X	X	X	X									
c. Mattresses		X	X	X	X									
d. Table, Overbed		X	X	X	X									
e. Cabinets, Bedside		X	X	X	X									Interior Designer Specification Responsibility Per Equipment Managers Direction
f. Chairs, Lounge		X	X	X	X									
g. Chairs, Side		X	X	X	X									
h. Chests		X	X	X	X									
i. Desks		X	X	X	X									
j. Dressers		X	X	X	X									
k. Wardrobes (except built-ins)		X	X	X	X									
25. HAMPERS, LINEN		X	X	X	X									
26. HEART-LUNG MACHINES		X	X	X	X									

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
27. HOODS														
a. Biohazard		X	X					X	X					
b. ETO						X	X	X	X					
c. Fume		X	X					X	X					
d. Laminar Flow		X	X					X	X					
e. Radioisotope		X	X					X	X					
28. HOT LAB EQUIPMENT														
a. Nuclear Medicine		X	X	X	X									
b. Radiation Therapy		X	X	X	X									
29. HYPO-HYPERTHERMIA EQUIPMENT		X	X	X	X									
30. ICE MACHINES		X	X					X	X					
31. ILLUMINATORS, X-RAY FILM														
a. Motorized		X	X					X	X					
b. Recessed		X	X					X	X					
c. Surface Mounted		X	X					X	X					
32. IMAGING EQUIPMENT														
a. Computerized Axial Tomography (CT)		X	X	X	X									
b. Dental Radiography		X	X	X	X									
c. Digital Radiography		X	X	X	X									
d. Image Intensifier, Portable		X	X	X	X									
e. Magnetic Resonance Imaging		X	X	X	X									
f. Magnetic Resonance Imaging Rigging							X	X						Contractor responsible
g. Mammography Equipment		X	X	X	X									
h. Nuclear Camera		X	X	X	X									
I. Nuclear Medicine Accessories		X	X	X	X									
j. Radiation Therapy Equipment		X	X	X	X									
k. Radiation Therapy Accessories		X	X	X	X									
l. Radiographic Equipment		X	X	X	X									
m. Radiographic Equipment Accessories		X	X	X	X									
n. Single Photon Emission		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
Computed Tomography														
o. Ultrasound Equipment		X	X	X	X									
p. Shielding (Lead, Magnetic, RF)						X	X	X	X					
q. Vibration Testing (MRI)														Contractor responsible
r. Picture Archive and Communication Systems (PACS)										X	X	X	X	
1. Cardiology and Radiology										X	X	X	X	
s. Cath Lab		X	X	X	X									
33. IMPRINTERS AND EMBOSSERS										X	X	X	X	
34. INCINERATOR														
a. Pathological						X	X	X	X					
b. Waste - Autoclave/Shredder						X	X	X	X					
35. INFANT CARE EQUIPMENT														
a. Bassinets		X	X	X	X									
b. Incubators		X	X	X	X									
c. Neonatal Care Systems		X	X	X	X									
d. Phototherapy Equipment		X	X	X	X									
e. Warmers		X	X	X	X									
36. INSTRUMENTS, EXAM														
a. Portable		X	X	X	X									
b. Wall Mounted	X	X	X	X	X									
(BP units, Oto/Ophth Sets)														
c. Diagnostic Board - Wallmount		X	X						X					
37. INSTRUMENTS, SURGICAL		X	X	X	X									
38. INTRAVENOUS PUMPS / CONTROLLERS		X	X	X	X									
39. LAB ANALYZERS / INSTRUMENTATION		X	X	X	X									
40. LASER DEVICES														

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Ophthalmic		X	X	X	X									
b. Surgical		X	X	X	X									
41. LAUNDRY SERVICE EQUIPMENT														
a. Washer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
b. Dryer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
42. LIGHTS														
a. Exam														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
b. Patient Headwall Lights						X	X	X	X					
c. Surgical														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
43. LOCKERS:														
NON PUBLIC AREAS						X	X	X	X					
PUBLIC AREAS						X	X	X	X					
BENCHES IN LOCKER ROOMS						X	X	X	X					
44. MAIL ROOM EQUIPMENT		X	X	X	X									
45. MAINTENANCE TOOLS & EQUIPMENT		X	X	X	X									
46. MATERIALS HANDLING / CONTROL EQUIPMENT		X	X	X	X									
47. MEDICAL GAS / VACUUM SYSTEM														
a. Primary System (Piping)						X	X	X	X					Check with Bulk Purchasing
b. Secondary Equipment		X	X	X	X									

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
(Regulators & Flowmeters)														
48. MEDICINE CENTERS						X	X	X	X					
a. Prefabricated						X	X	X	X					
b. Automated	X									X				
49. WEATHER GOOSE										X	X	X	X	
50. MISCELLANEOUS GROUPS II & III EQUIPMENT		X	X	X	X									
51. MONITORING EQUIPMENT, PHYSIOLOGICAL														
a. Ambulatory Systems														
1. ECG		X	X	X	X									
2. EEG		X	X	X	X									
b. Discrete Monitors														
1. Bedside		X	X	X	X									
2. Fetal		X	X	X	X									
c. Hardwired Systems		X	X	X	X									Contractor to pull cable
d. Miscellaneous Monitors		X	X	X	X									
e. Telemetry Systems		X	X	X	X									Contractor to pull cable
52. NARCOTICS LOCKERS						X	X	X	X					
53. NEUROLOGICAL EQUIPMENT														
a. Electroconvulsive Therapy Device		X	X	X	X									
b. Electroencephalographs		X	X	X	X									
c. Electromyographs		X	X	X	X									
d. Evoked Response Devices		X	X	X	X									
e. Misc. Equipment & Accessories		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
54. NOURISHMENT CENTERS (Prefabricated)						X	X	X	X					
55. OCCUPATIONAL THERAPY EQUIPMENT		X	X	X	X									
56. OFFICE MACHINES														
a. Calculators	X													Facility Operational Expense
b. Cash Registers										X	X	X	X	
c. Miscellaneous Equipment	X													Facility Operational Expense
d. Mobile Storage Equipment (Rotary)		X	X	X	X									
e. Photocopiers ie, Xerox	X													Facility Operational Expense
f. Typewriters	X													Facility Operational Expense
57. OPHTHALMIC EQUIPMENT														
a. Control Systems		X	X	X	X									
b. Portable		X	X	X	X									
58. ORTHOPEDIC APPARATUS		X	X	X	X									
59. OVENS / RANGES / MICROWAVES (Other than Food Service)														
a. Fixed		X	X					X	X					
b. Portable		X	X	X	X									
60. PATIENT SERVICE SYSTEMS (Prefabricated Headwall)														
a. Column - ICU / OR / RR / ER						X	X	X	X					
b. Headwall - LDRP						X	X	X	X					Check with Bulk Purchasing
c. Flatwall - ICU / ER / RR / Patient Room						X	X	X	X					
d. Headwall Accessories						X	X	X	X					
e. Anesthesia Gas Delivery Systems - Column Drops or Gas Boom Format						X	X	X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
61. PHYSICAL MEDICINE / REHAB EQUIP.														
a. Fixed (ie swimming pools)						X	X	X	X					
b. Hydrotherapy		X	X					X	X					
c. Portable		X	X	X	X									
62. PRINTING EQUIPMENT										X	X	X	X	
63. PROCEDURE SUPPORT EQUIPMENT (Portable, Stainless Steel)		X	X	X	X									
64. PROCESSORS, X-RAY FILM														
a. Processor		X	X					X	X					
1. Cine		X	X					X	X					
2. Darkroom		X	X					X	X					
b. Replenishment Systems, Chemical		X	X	X	X									
c. Silver Recovery Devices		X	X	X	X									
d. Laser Imager		X	X	X	X									
65. PROJECTION SCREENS						X	X	X	X					
SMART BOARDS		X	X	X	X									
66. PULMONARY FUNCTION EQUIPMENT		X	X	X	X									
67. REFRIGERATORS (exclude Food Service)														
a. Countertop		X	X	X	X									
b. Mortuary		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in / Prefabricated		X	X	X	X									Elec. contractor makes actual connection
68. RELIGIOUS ARTIFACTS		X	X	X	X									
69. RESPIRATORY THERAPY EQUIPMENT		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
70. RESUSCITATION EQUIPMENT		X	X	X	X									
71. RODS, CURTAIN (shower)						X	X	X	X					
72. SAFES		X	X	X	X									
73. SCALES														
a. Autopsy		X	X					X	X					
b. Bed		X	X	X	X									
c. Chair		X	X	X	X									
d. Clinical Exam		X	X	X	X									
e. Platform		X	X					X	X					
74. SCHEDULING SYSTEMS (automated)										X	X	X	X	
75. SCRUB SINKS						X	X	X	X					
76. SECURITY SYSTEMS														
a. Infant Abduction		X	X	X	X									Contractor to pull cable
b. CCTV - Campus Security		X	X	X	X									Contractor to pull cable
c. Door Access (ie: readers & locks)						X	X	X	X					With Equipment input
77. SHELVING / STORAGE EQUIPMENT														
a. High Density Systems		X	X	X	X									
b. Standard / Flat Steel - New		X	X	X	X									
c. Standard / Flat Steel - Existing		X	X	X	X									
d. Wire		X	X	X	X									
e. Miscellaneous (except built-in)		X	X	X	X									
f. Built-in						X	X	X	X					
78. STERILE PROCESSING EQUIPMENT														
a. Aerators		X	X					X	X					
b. Generator, Steam		X	X					X	X					
c. Loading / Processing Accessories		X	X	X	X									
d. Sonic Cleaners		X	X					X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
e. Steam Gun		X	X					X	X					
f. Sterilziers, Countertop		X	X					X	X					
g. Sterilizers, ETO Gas		X	X					X	X					
h. Sterilizers, ETO Gas / Aerator		X	X					X	X					
i. Sterilziers, ETO Gas / Steam		X	X					X	X					
j. Sterilizers, Electric / Steam		X	X					X	X					
k. Washers, Cart		X	X					X	X					
l. Washer, Fiberoptics		X	X					X	X					
m. Washers / Decontaminators / Sanitizers		X	X					X	X					Requires minimum of 9' ceiling
79. STRESS TEST EQUIPMENT		X	X	X	X									
80. STRETCHERS		X	X	X	X									
81. TABLES														
a. Autopsy		X	X					X	X					
b. Cysto		X	X	X	X									
c. Exam / Treatment		X	X	X	X									
d. Processing		X	X	X	X									
e. Surgical		X	X	X	X									
82. TELEVISION SYSTEMS														
a. Television Sets		X	X	X	X									Contractor to pull cable & install blocking
b. CCTV - Patient Monitoring		X	X	X	X				X					Contractor to pull cable & install blocking
c. Mounting Brackets		X	X					X	X					Contractor to install blocking & wall brackets
d. Antenna Systems		X	X	X	X									Contractor to pull cable
e. Cable TV (entrance cable to H-END location)	X													Equip. Mgr. notifies facility, contractor & TV vendor to coordinate installation w/local cable TV vendor for entrance cable.
83. TEMPERATURE ALARMS / RECORDERS		X	X					X	X					Blood Bank / Morgue Only

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
84. TOILET ROOM DEVICES														
a. Grab Bar						X	X	X	X					Check with Bulk Purchasing
b. Paper Towel Dispensers						X	X	X	X					Check with Bulk Purchasing
c. Sanitary Napkin Dispensers						X	X	X	X					Check with Bulk Purchasing
d. Soap Dispensers						X	X	X	X					Check with Bulk Purchasing
e. Toilet Paper Holder						X	X	X	X					Check with Bulk Purchasing
85. TRACK														
a. Curtain (Cubicle)						X	X	X	X					
b. Intravenous (including carriers & pendants)						X	X	X	X					
86. WATER CONDITIONING SYSTEMS														
a. Deionized						X	X	X	X					
b. Distilled						X	X	X	X					
c. Reverse Osmosis						X	X	X	X					
87. WATER COOLERS						X	X	X	X					
88. WHEELCHAIRS		X	X	X	X									

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VENDOR CONTACT MASTER

VENDOR	NAME/ADDRESS	CONTACT	PHONE	FAX	Web Address
902100	Abbott 100 Abbott Park Rd Dept 2FC-AP6C 5th Floor Abbott Park, IL 60064-6083	Rick Gooch	(708) 937-6161	(847) 937-0871	www.abbottdiagnostics.com
10517	Advanced Sterilization 33 Technology Drive Irvine, CA 92718	Customer Service	(800) 755-5900	(949) 450-6800	www.cidex.com
25360	AGFA Medical & Sterling Diag. 8170 Habersham Waters Rd. Dunwoody, GA 30350	Tom Koch	(800) 581-2432 Ext. #1238	(201) 288-3367	www.agfa.com
10451	Aladdin 250 East Main Street Hendersonville, TN 37075	Eric Roebuck	(800) 888-8018	(615) 748-3659	www.aladdintemprite.com
10240	Alimed 297 High Sttreet Dedham, MA 02026-9135	Robert Fralick	(800) 225-2610 Ext. #157	(800) 437-2966	www.alimed.com
10055	American Art Resources 3262 Sul Ross Houston, TX 77098	Kathy Hathorn	(800)282-0204	(713)527-9676	www.americanartresources.com
915200	ARJO 50 North Gary Ave Unit A Roselle, IL 60172	Terry Capp	(800) 323-1245 Ext. #6159		www.arjo.com
12599	Art Resource Team (A.R.T.) 2526 Homestead Place Cincinnati, OH 45211	Tony Baird	(513) 662-1998	(513) 662-6977	www.artresourceteam.com

VENDOR CONTACT MASTER

15000	Baker Company PO Drawer E Sanford Airport Sanford, ME 04073	Customer Service	(207) 324-8773	(207) 324-3869	www.bakerco.com
15012	Baring Industries 1808 West End Ave, Suite 814 Nashvill, TN 37203	Tom Esberger	(615) 321-0272	(615) 321-5667	www.baring.com
15026	Berchtold 1950 Hanahan Road Charleston, SC 29406	Jeff Dunkley	(800) 243-5135 ext. 334	(843) 569-6133	www.berchtoldusa.com
15382	Biodex Medical Brookhaven R&D Plaza 20 Ramsey Rd, Box 702 Shirley, NY 11967-0702	Marie Springman	(631) 924-9000 Ext. #234	(681) 924-9338	www.biodex.com
15206	Boehringer Laboratories, Inc. 500 E. Washington Street Norristown, PA 19401	Eileen Welty	(610) 278-0900	(610) 278-0907	www.boehringerlabs.com
20633	Camtronics Ltd. Medical System 900 Walnut Ridge Drive Hartland, WI 53029	Steve Crandall	(866) 694-2510		www.camtronics.com
933800	Cardinal Health & Medical Prod. 1750 Stoneridge Dr. Stone Mountain, GA 30083	Renee Hensley	(800) 889-1065 Ext. #3307	(770) 270-9645	www.cardinal.com/mps or www.cardinalhealth.com
901500	Cardinal Health & Medical Services 1750 Stoneridge Dr. Stone Mountain, GA 30083	Paula Watkins	(800) 633-0333	(800) 488-3987	www.cardinal.com/mps or www.cardinalhealth.com
21879	Cardinal Respiratory Care 1500 Waukegan Rd McGaw Park, IL 60085	Shelly Lancaster	(800) 637-1500 Ext. #1521	(630) 369-9302	www.cardinal.com/mps or www.cardinalhealth.com

VENDOR CONTACT MASTER

21433	Common Cents Solutions PO Box 5454 Jackson, MS 39288-5454	Tom Bunting	(888) 932-3687 Ext. #36	(601) 932-9414	www.commoncents.net
25350	Data Cash Register 942 Woodland Street Nashville, TN 37206		(615) 227-6978	(615) 227-7589	www.dcrpos.com
960400	Datascope 4117 Hillsboro Rd 103-303 Nashville, TN 37215	Kevin Wampler	(800) 288-2121	(800) 266-9624	www.datascope.com
25160-4	Diagnostic Imaging 199 Foster Brothers Drive West Columbia, SC 29172	Larry Myers	(803) 796-7038	(803) 796-9749	
920100	Dictaphone 147 Country Club Drive Hendersonville, TN 37075	Mike Collier	(888) 471-3463 Ext. # 4277	(203) 683-2169	www.dictaphone.com
956200	Dukane 27545 Diehl Rd., Suite 200 Warrenville, IL 60555	Angelo Lopez	(630) 836-3745	(630) 836-3805	www.dukane.com
944800	Follett 801 Church Lane PO Box D Easton, PA 18044	Gary Gutman	(800) 523-9361	(610) 250-0696	www.follettice.com
35570	Food Systems 318 Seaboard Lane, Bldg 100 Suite 114 Franklin,TN 37067	Beverly LeBlanc	(866) 662-4279 (615) 261-0400	(615) 261-0401	www.foodsystemsul.com
967600	GE Appliances (Acct #FMD30) 307 N. Hurstborne Pkwy Louisville, KY 40222	Skip Alcorn Jason Cropper	(615) 264-8994 (800) 782-8031 x4	(800) 772-6704	www.geappliances.com

VENDOR CONTACT MASTER

904100	GE Healthcare Datex-Ohmeda PO Box 7550 Madison, WI 53707-7550	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.datex-ohmeda.com
902900	GE Healthcare Technologies 830 Crescent Centre Dr. Suite 460 Franklin, TN 37067	Milton Mueller	(615) 472-2409 Cell: (615) 519-3357	(414) 918-8200	www.gehealthcare.com
40006-4	GE Medical System (Dia) PO Box 414, WT895 Milwaukee, WI 53201	Terri	(800) 232-2599	(800) 558-5102	www.gehealthcare.com
953600	GE Healthcare I.T. (Marquette) 8200 West Tower Ave Milwaukee, WI 53223	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.gehealthcare.com
968700	GE - OEC Medical Systems 3724 National Drive, Suite 100 Raleigh, NC 27612	Hurley Raynor	(800) 728-6596	(919) 881-8367	www.gemedicalsystems.com
912700	Getinge USA PO Box 3208 Augusta, GA 30914-3208	Carlton Colcough	(800) 475-9040	(716) 272-5283	www.getingeusa.com
921000	Grainger 1021Charlotte Avenue Nashville, TN 37203	Kevin Kolff	(615)480-7783 (800)994-2336	(615)331-0485	www.grainger.com
914300	Hill-Rom 1069 State Road, 46 East Batesville, IN 47006-9164	Doug Weigel	(800) 445-3730	(812) 934-1442	www.hill-rom.com/products
934300	Drager/ Air Shields 1069 State Road, 46 East Batesville, IN 47006-9164	Lisa Aiello	(800) 437-2437 x2358	(812) 934-1442	
920700	Interior Design Services 209 Powell Place Brentwood, TN 37027	Daryl Dunn	(615) 376-1222	(615) 376-3510	www.ids-tn.com

VENDOR CONTACT MASTER

51073	Thermo Electron 308 Ridgefield Ct. Asheville, NC 28806	Josh Camp	(800) 252-7100 828-658-2882	(828) 658-0363	www.thermo.com or www.kendro.com
914700	Medquist/ Lanier Healthcare 5930 Metric Place, Suite 200 Norcross, GA 30092	James Thomas	(251) 945-3412 (866) 856-3000	(943) 337-5752	www.medquist.com or www.lanier.com
929400	Medline Industries, Inc. 105 Continental Drive Brentwood, TN 37027	Jeff Fair	(615)373-2142 (888)897-7557	(615)373-2486	www.medline.com
916400	Medtronic Emergency Response System PO Box 97023 Redmond, WA 98073	Tammy Lombardi	(800) 442-1142 Ext. #4162	(800) 732-0956	www.medtronicphysiocontrol.com
70583	Nicolet 5225-2 Verona Rd Madison, WI 53711-4495	Kathy Hart	(800) 356-0007	(608) 441-2007	www.thermo.com
954400	Nihon Kohden 202 Kensington Place Nashville, TN 37215	Jim Fagan	(615) 292-5082	(615) 292-0584	www.nkusa.com
72016	Olympus 2 Corporate Ctr. Drive Melville, NY 11747	Betty Shaffer	(631) 844-5437 (800) 645-8100	(631) 844-5110	www.olympus-global.com
958320	Pharmed 3075 NW 107th Ave Pharmed Way Miami, FL 33172-2134	Carolyn Thomas	(800) 683-7342 Ext 342 (305) 592-2324	(800) 621-9511	www.pharmed.com
11331	Philips - ATL Ultrasound Ste 540 501 Corporate Centr Dr., Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com

VENDOR CONTACT MASTER

74031-1	Philips Medical Imaging 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com
914200	Philips Medical (Monitoring) 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Roger Duffy	(615) 472-2207	(615) 472-2273	www.philips.com
944500	Quinton 3303 Monte Villa Pkwy Bothell, WA 98021	Bob Atkins	(800) 426-0347	(425) 402-2001	www.quinton.com
76007	Radiology Specialty PO Box 406 Hermitage, TN 37076	Bob Webb	(615) 885-5326	(615) 885-4691	
924800	Rauland Borg Corporation 3450 West Oakton Street Skokie, IL 60076-2951	Alex Veytsel	(847) 324-8380 Ext. #380	(847) 679-4106	www.rauland.com
81742	Sara Lee Coffee & Tea 990 Supreme Dr. Bensonville, IL 60106	Kory Mickelsom	(800) 621-4100	(773) 489-7323	www.saraleecoffee.com
956000	Simplex Grinnell 9855 Carroll Canyon Rd San Diego, CA 92131	Randy Wilkins	(858) 279-8010	(858) 740-0157	www.tycoin.com
904600	Standard Textile PO Box 371805 Cincinnati, OH 45222	Tricia Partin	(800) 888-5000 Ext. #270	(800) 926-0043	www.standardtextile.com
912000	Steris/ Amsco Products 2448 Shiland Dr. Rock Hill, SC 29732	Randy Marks Dave Piver Lara Stark	(800) 989-7575 Randy #23117 Dave #21152	(440) 392-8902	www.steris.com
55026	Storage Systems, Inc. 318 Seaboard Lane Bldg. 100, Suite 115 Franklin,TN 37065	Bill Kreager	(888) 614-0004 (615) 261-6900	(615) 261-6906	www.storagesystemsul.com

VENDOR CONTACT MASTER

901100	Stryker Medical 4100 East Milham Ave. Kalamazoo, MI 49001-6197	Gloria Phillips	(800) 800-4236 ext. 1456	(800) 610-4408	www.stryker.com
929900	Telehealth/Telerent 4205 Hillsboro Rd Suite 303 Nashville, TN 37215	Darrell Leftwich	(615) 383-7836	(615) 383-4226	www.telehealth.com
85060-1	Toshiba 2150 F Northmont Pkwy Duluth, GA 30136	Craig Hamilton	(770)476-9992	(770) 476-1511	www.tobshiba.com/tams/newtams
921500	US Surgical 5920 Longbow Dr. Boulder, CO 80301	Customer Service	(800) 722-8772	(800) 544-8772	www.ussurg.com
91734	Wireless Solutions, Inc. 720 Fesslers Lane Nashville, TN 37210	Marie Gilland	(615) 255-5670	(615) 255-9967	
925500	Zenitel 6119 Connecticut Kansas Ctiy, MO 64120	Jeanne Gramman (816) 231-7201	(816) 231-7202	(816) 231-7203	www.zenitel.com

OWNER FURNISHED EQUIPMENT BROCHURE

Revision: August 9, 2006

The Medical Center Aurora

A02429 – Bed Tower Expansion

Aurora, CO

PROJECT # 306660001

Jimmy Cagle
MANAGER, MEDICAL EQUIPMENT
(615) 344-2179
Jimmy.Cagle@HCAHealthcare.com

Trisha Gutierrez
ASSISTANT, MEDICAL EQUIPMENT
(615) 344-2223
Trisha.Gutierrez@HCAHealthcare.com

HCA
The Healthcare Company.

Table of Contents

- Owner Furnished Equipment Index
- Specifications
- Project Information Sheet
- Owner Furnished/ Contractor Installed Equipment Delivery Schedule
- Owner/ Vendor Installed Equipment Delivery Schedule
- Engineered Systems Information and Telephone Systems Equipment Delivery Schedule
- Responsibility Matrix
- Vendor Contact Matrix

Owner Furnished/ Contractor Installed Equipment Notes

NOTE: Include date for special backboxes (such as OR Lights, Illuminators) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment, nurse call, ect.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor is required to store in secure environmentally controlled space and confirm with HCA Medical Equipment Manager.

NOTE: HCA required that the enclosed Owner Furnished/ Contractor Installed Equipment Delivery Schedule (excel), Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule form (word) to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed.

NOTE: No payments can be made, until receipt of the schedule(s) by the HCA Construction Manager.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:
HCA Equipment Manager
HCA Construction Manager
Hospital Construction Contact
Hospital Materials Manger

PROJECT INFORMATION SHEET

Project Title:_____ **Date of Issue:**_____
Owner Project:_____ **Revision Date:**_____
HOSPITAL:_____
ADDRESS:_____
TELEPHONE:_____ FAX:_____
ADMINISTRATOR:_____ CONTACT:_____
MATERIAL MGR:_____ PLANT MGR:_____
CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____
PROJECT MAILING ADDRESS:_____
E-MAIL ADDRESS:_____
ARCHITECT:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
INTERIOR DESIGN FIRM:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
M.P.E. ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
STRUCTURAL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
CIVIL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
MECHANICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
ELECTRICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
HCA
ONE PARK PLAZA, BLDG. 2 – 3E, NASHVILLE, TN 37203
P.O. BOX 550 (37202-0550)
TELEPHONE: 615-327-9551
DIRECTOR CONSTRUCTION:_____ PH:_____
CONSTRUCTION MANAGER:_____ PH:_____
EQUIPMENT ENG. SYS. MGR:_____ PH:_____
IS/TELECOM:_____ PH:_____

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

203200	FOLLETT CORPORATION	4	#110FB400A; ICE MAKER DISP.115/1 12.2A , SENSORSAFE DISPENSING PKG (#SENSORSAFE; $98.00), FR STANDING STG 24 1/2"W X 28.25"D X 68.125"H, 90 LBS STG, 400 LBS/DAY ICE PRODUCTION AIR COOLED. INCLUDES WATER STATION, WATER FILTER(NOT INCLUDED) **FLOOR DRAIN REQUIRED** 2--2099/1, 3--3073/1, 4--4099/1, 5--5099/1
203210	FOLLETT CORPORATION	5	#25CT400A; ICEMAKER DISPENSER, ($2,892.00) 21"W X 47.125"H X 23"D- COUNTERTOP, AIR COOLED, 25LB STORAGE CAPACITY, 400LB PER 24HR ICE PROD. TO INCL WATER STATION, SENSORSAFE DISPENSING (#SENSORSAFE; $98.00) 1--1085/1, 1--1112/1, 2--2082/1, 4--4082/1, 5--5082/1
430279	GENERAL ELECTRIC CO	14	#JEM25; MICROWAVE OVEN DIMENSIONS: 11 11/64"H X 23 25/32"W X 12 55/64"D. 120V - 60-CYCLE. CONTRACTOR TO SHELF MOUNT SELECT COLOR: BLACK - JEM25BF OR WHITE JEM25WF. 1--1040/1, 1--1085/1, 1--1112/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3042/1, 3--3073/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5071/1, 5--5082/1, 5--5099/1
475603	GENERAL ELECTRIC CO	6	#GTS18WCP, REFRIGERATOR, 17.9 CU. FT. NO FROST, W/FACTORY INSTALLED ICEMAKER; 66 5/8" H X 32 1/8"D X 29 1/2 "W. 120V/60 HZ/15AMPS. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT. 1--1040/1, 1--1112/1, 2--2071/1, 3--3042/1, 4--4071/1, 5--5071/1
475604	GENERAL ELECTRIC CO	1	#GTS18KBP; REFRIGERATOR, TOP FREEZER, 17.9 CU. FT. CAP. NO FROST. 66 5/8"H X 32 1/8"D X 29 1/2"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: BLACK, WHITE, BISQUE. HINGE: LEFT OR RIGHT. 3--3054/1
477300	GENERAL ELECTRIC CO	2	#GMR04AAM; REFRIGERATOR, UNDERCOUNTER 4.3 CU FT CAPACITY. 32 7/8"H X 21 3/4"D X 20"W, 110V. RIGHT HINGED. SELECT COLOR: BB/BLACK OR WW/WHITE 1--1085/2

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

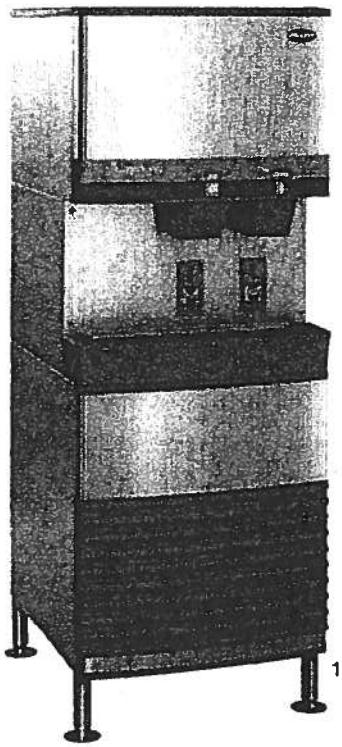
714519	FOLLETT CORPORATION	9	#QC4-FL4S; WATER FILTER SYSTEM (ACCESSORY FOR ICEMAKER DISPENSERS). #QC4-FL4S 1--1085/1, 1--1112/1, 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
715053	SARA LEE COFFEE & TEA	19	COFFEE MAKER, LO-PROFILE MODEL #8573, 3-STATION, AUTOMATIC COFFEE BREWER, FROM SUPERIOR COFFEE FOR REFERENCE ONLY, HOSPITAL TO LEASE (MFG. - BLOOMFIELD) PLUMBING REQUIREMENT: 1/4" OR 3/8" WATER CONNECTION 1--1070/1, 1--1085/1, 1--1112/1, 2--2030/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3017/1, 3--3027B/1, 3--3042/1, 3--3073/1, 4--4030/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5030/1, 5--5071/1, 5--5082/1, 5--5099/1
715152	RADIOLOGY SPECIALTY	1	# 101461; ILLUMINATOR, 1 PANEL RECESSED MT 4 BULB 3--3066/1
715344	GENERAL ELECTRIC CO	7	#GTS17KBR, REFRIGERATOR: TOP MOUNT. NO FROST, 4 SPILT SPILL PROOF ADJ. GLASS SHELVES. 16.6 CU. FT. CAP. 64 3/4"H X 31"D X 28"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
717197	STERIS/AMSCO PRODUCTS	1	#DJ04112033-01; WARMING CABINET 24" DIGITAL; SEISMIC 3--3055/1
718171	FOLLETT CORPORATION	7	#REF5; REFRIGERATOR, UNDERCOUNTER, WITH LOCK AND KEY, STAINLESS STEEL INTERIOR/EXTERIOR, 4.8 CU. FT., 115 V, 60HZ, 1PH, 8.0 AMPS, MAX.FUSE 15 AMPS, HOSPITAL GRADE CORD & PLUG - NEMA 5-15, 33 DEGREES F - 40 DEGREES F (1 DEGREE C - 5 DEGREES C) REVERSIBLE DOOR SWING/HANDLE, 34HX23.75WX25.5D, NSF, UL & CUL LISTED. 2--2076/1, 2--2097/1, 3--3072/1, 4--4076/1, 4--4097/1, 5--5076/1, 5--5097/1

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

JC2725	GERMFREE LABORATORIES INC.	1	LAMINAR FLOW GLOVEBOX ISOLATOR - 4 FOOT QUOTE # 200605929 58" W X 32"D X 87"H STANDARD 115V 3--3054/1
JC2859	BARING INDUSTRIES, INC.	1	DISPLAY CASE & REFRIGERATOR *****SPEC SHEET NOT INCLUDED WITH THIS DOCUMENT******* GALA SOURCE -12 CU FT REFRIGERATOR - TUR - 48SD ZESCO - COMBINATION NON-REFRIGERATED ABOVE/REFRIGERATED SERVICE CASE BELOW - 40" WIDE ENCORE 699-A-021 ********ARCHITECT TO SPEC SPACE & ELECTRICAL******** 1--1002/1

Symphony™

110FB400A air-cooled integral icemaker
110FB400W water-cooled integral icemaker



110FB400A/W shown with SensorSAFE accessory



Freestanding, automatic load, ice and water dispensers with air- or water-cooled icemaker located in the base of unit. Stainless steel frame and exterior with plastic trim. Water station standard. Up to 90 lbs (41kg) storage. Produces approximately 400 lbs (181kg) of compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet™ compressed nugget ice is slow melting, easy to chew

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone
- Clear chute directs ice cleanly into cups, pitchers, carafes, ice bags

Space-saving, attractive design

- 24.5" (623mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally friendly Maestro™ icemakers

- New, state-of-the-art R404A icemakers automatically load dispensers with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high wastewater
- Quiet production, no noisy harvest cycles

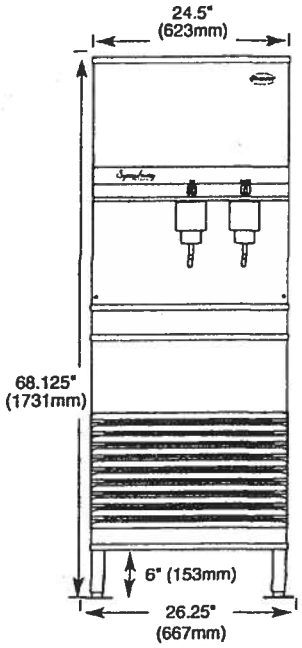
Accessories

- SensorSAFE actuation package
- Chilled water option
- Water filter kit
- Casters
- Up to 6 beverage valves (no beverage cooling)

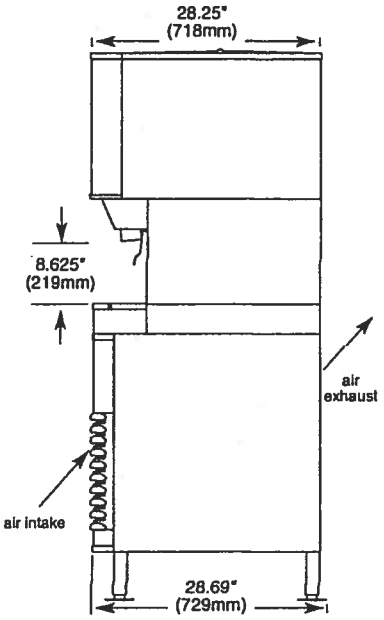
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Item # 203200

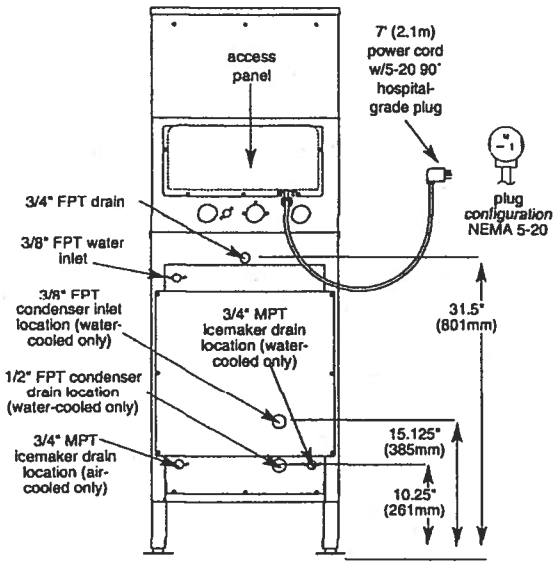
Front View



Side View



Rear View



Ice Production per 24 hours

Air-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	510 / 232	454 / 206	397 / 180	335 / 152	273 / 124	lbs. / kg.
60 / 16	482 / 219	435 / 198	389 / 177	329 / 150	270 / 123	lbs. / kg.
70 / 21	454 / 206	417 / 190	380 / 173	323 / 147	266 / 121	lbs. / kg.
80 / 27	424 / 193	385 / 175	347 / 158	297 / 135	247 / 112	lbs. / kg.
90 / 32	394 / 179	354 / 161	313 / 142	270 / 123	227 / 103	lbs. / kg.

Water-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	451 / 204	447 / 203	442 / 200	437 / 198	428 / 194	lbs. / kg.
60 / 16	423 / 192	413 / 187	409 / 185	399 / 181	394 / 179	lbs. / kg.
70 / 21	394 / 179	390 / 177	380 / 172	371 / 168	361 / 163	lbs. / kg.
80 / 27	371 / 168	361 / 164	352 / 160	342 / 155	333 / 151	lbs. / kg.
90 / 32	352 / 160	342 / 155	333 / 151	323 / 146	309 / 140	lbs. / kg.

Required clearances
12" (305mm) at top recommended for service, 4" (102mm) at rear for cleaning and ventilation

Connections
Cord and plug provided with dispenser. Wire in accordance with all local codes.

Approximate Shipping Weight 265 lbs (120kg)

Electrical Data
Standard electrical – 115V, 60Hz, 1 phase, 13.0 amps, max. fuse 20 amps

Specifications
Ice and water dispenser to be Follett freestanding, automatic load, in the following configuration with water station and _____ (air- or water-) cooled icemaker in base. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Environmentally friendly R404A icemaker to be mounted in base and to be removable as one unit for cleaning and maintenance. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispenser to have automatic bin level control to start and stop icemaker and separate circuitry to allow dispensing to continue with icemaker removed. Dispenser to be equipped with 6" (153mm) adjustable legs, flanged feet and lightweight plastic top that allows full access to the ice storage area for manual loading of back-up ice. Storage area to be insulated with high-density, non-CFC foam polyurethane. 7' cord and NEMA 5-20 hospital-grade plug provided. Dispenser to be NSF, UL and cUL listed.

Item # 203200

END OF SPECIFICATION

Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

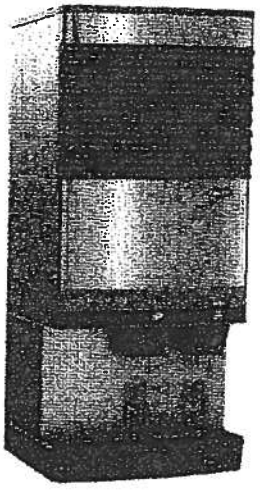
25 Series

Countertop models with (A) air- or (W) water-cooled icemaker

→ **25CT400A/W** – 115V, 60Hz, integral icemaker
25CR400A/W – 115V, 60Hz, satellite-fill icemaker
C25CT400A/W – 220V, 60Hz, integral icemaker
C25CR400A/W – 220V, 60Hz, satellite-fill icemaker
E25CT400A/W – 230V, 50Hz, integral icemaker
E25CR400A/W – 230V, 50Hz, satellite-fill icemaker

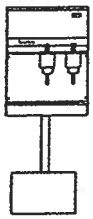
Wall mount models with (A) air- or (W) water-cooled icemaker

25HT400A/W – 115V, 60Hz, integral icemaker
25HR400A/W – 115V, 60Hz, satellite-fill icemaker
C25HT400A/W – 220V, 60Hz, integral icemaker
C25HR400A/W – 220V, 60Hz, satellite-fill icemaker
E25HT400A/W – 230V, 50Hz, integral icemaker
E25HR400A/W – 230V, 50Hz, satellite-fill icemaker

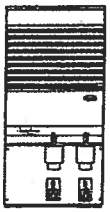


Countertop model shown with SensorSAFE accessory

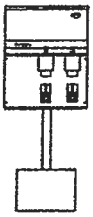
Symphony.



Countertop model with satellite-fill icemaker



Wall mount model with integral icemaker



Wall mount model with satellite-fill icemaker

Countertop and wall mount ice and water dispensers with air- or water-cooled icemaker. Stainless steel frame and exterior with plastic trim. Up to 25 lbs (11kg) storage. Produces approximately 400 lbs (181kg) of Chewblet compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever dispensing standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet compressed nugget ice is slow melting, easy to chew
- Clear chute ensures sanitary delivery and focuses ice cleanly into cups, pitchers, carafes, ice bags

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone

Space-saving, attractive design

- 21" (534mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally-friendly Maestro icemakers

- State-of-the-art R404A icemaker automatically loads dispenser with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high waste water
- Quiet production, no noisy harvest cycles
- Satellite-fill icemakers can be located up to 20 feet (6m) from dispenser; remove heat, noise and bulk from customer area

Accessories

- SensorSAFE actuation package (standard on wall mount models)
- Chilled water option (item# AFH20CHIL2550)
- Water filter kit (item# 00130229)
- Base stand (for models 25CT400A/W, C/E25CT400A/W) (item# AF50BASESTD)
- Slide-out track for satellite-fill icemakers (item# AFGSLIDER400A (air-cooled icemakers) and item# AFGSLIDER400W (water-cooled icemakers))
- Drain pan assembly for wall mount models (item# AFH25WBASE)

Job: _____

Item: 203210 Page 1 of 2

FOLLETT
Innovative solutions, inspired by ice

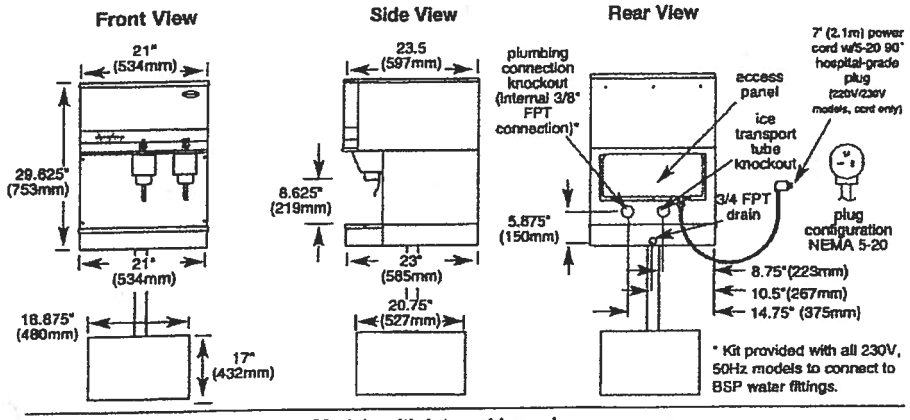
801 Church Lane • PO Box D, Easton, PA 18044, USA
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Form #2065

25 Series

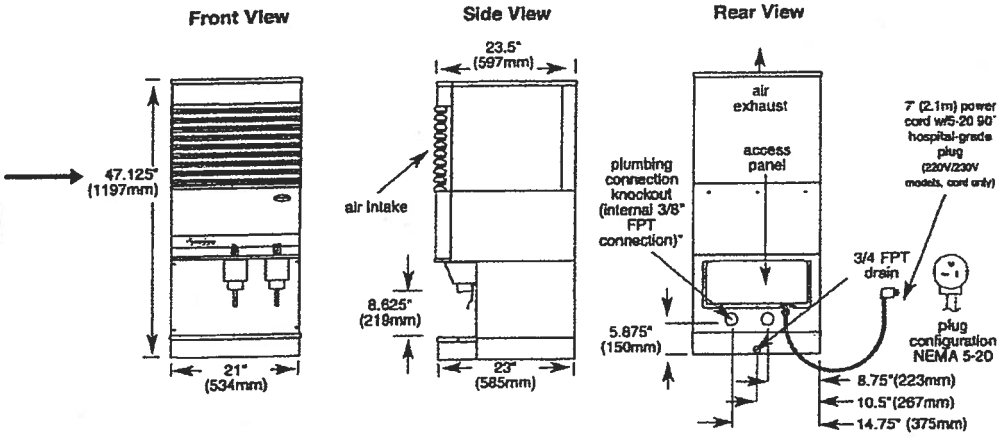
Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

Models with satellite-fill icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Models with integral icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Approximate Shipping Weights

C/E/25CT400A/W	295 lbs (134kg)	C/E/25HT400A/W	310 lbs (141kg)
C/E/25CR400A/W	250 lbs (113kg)	C/E/25HR400A/W	295 lbs (134kg)

Electrical

Standard electrical – 115V, 60Hz, 1 ph. Icemaker 11 amps, dispenser 4 amps. Cord and plug provided with each icemaker and dispensers. If local code requires hard-wiring, separate disconnects also required. Satellite-fill icemaker models require separate circuits for dispenser and icemaker.

Alternate electrical – 220V, 60Hz, 1 ph, 6.5 amps (icemaker 5 amps). 230V, 50Hz, 1 ph, 6.5 amps (icemaker 5 amps). Cord only provided with each icemaker and dispenser. Wire in accordance with all local codes.

Wall Mount Models

- Deduct 3.625" (92mm) from height shown
- Add .5" (13mm) to depth shown
- Standard with wall mounting bracket
- Standard without drain pan (drain pan available – contact factory)

Connections Utilities connect through back or bottom. Back entry shown. Supplied 2" (51mm) duct and louver must be installed for undercounter satellite-fill icemaker installations.

7 ft (2.1m) cord and NEMA 5-20 hospital-grade plug provided with each dispenser. 220V/230V models, cord only.

Required clearances

- C/E/25CT400A/W, C/E/25HT400A/W – 6" (153mm) at top for ventilation, 12" (305mm) recommended for service
- C/E/25CR400A/W, C/E/25HR400A/W – 12" (305mm) at top recommended for service

See Dispenser Detail Sheet, form# 2075 for important installation information.

Ice Production

Air-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		510	464	397	335	273	lbs.
10		232	211	180	152	124	kg
60		482	435	389	329	270	lbs.
16		219	198	177	149	122	kg
70		454	417	380	323	266	lbs.
21		206	190	172	147	121	kg
80		424	385	347	297	247	lbs.
27		193	175	158	135	112	kg
90		394	354	313	270	227	lbs.
32		179	161	142	123	103	kg

Water-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		451	447	442	437	426	lbs.
10		205	203	201	198	193	kg
60		423	413	409	399	394	lbs.
16		192	187	186	181	179	kg
70		394	390	380	371	361	lbs.
21		179	177	172	168	164	kg
80		371	361	353	342	333	lbs.
27		168	164	160	155	151	kg
90		352	342	333	323	309	lbs.
32		160	155	151	146	140	kg

Specifications Ice and water dispenser to be Follett countertop, automatic load, in (choose one) _____ countertop, _____ wall mount configuration with 25 lbs (11kg) of storage. Water station standard. Environmentally-friendly R404A icemaker to be (choose one) _____ air- or _____ water-cooled and to be removable for cleaning and maintenance. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispensers with satellite-fill icemakers to be equipped with 10' (3m) of insulated ice transport tube, 2" (51mm) air duct for icemaker (air-cooled models only) and lightweight plastic top that allows full access to the ice storage area for easy cleaning and manual loading of back-up ice. Storage area to be insulated with high density, non-CFC foam polyurethane. 7' (2.1m) cord and NEMA 5-20 hospital-grade plug provided (220V/230V models, cord only). Dispenser to be NSF, UL and cUL listed, 230V models also CE compliant.

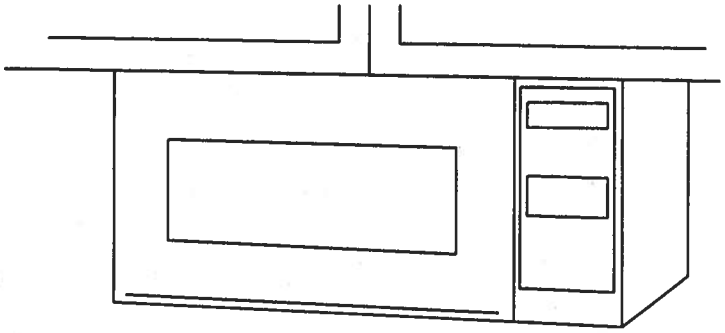
Follett reserves the right to change specifications at any time without obligation. Certifications may vary depending on country of origin.

FOLLETT
Innovative solutions, inspired by ice

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END OF SPECIFICATION

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Not to be used over a thermal oven.

Undercabinet mounting kit Pub. No. 4-A019 for Spacemaker II microwave oven models available at additional cost.

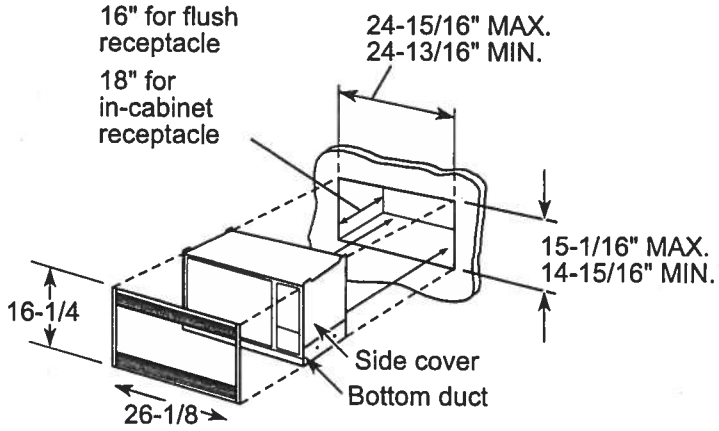
Exterior Dimensions* (in inches)	
W x H x D	23-25/32 x 11-11/64 x 12-55/64

*Height includes feet. Depth does not include handle.

Note: Undercabinet installation
Install Spacemaker II microwave ovens in just a few easy steps with the mounting template, which provides all the necessary measurements. Installation may vary depending on cabinets. These microwave ovens can be installed on practically any wood or metal cabinets.

Note: 120V, 60-cycle, grounded power receptacle location optional on back within cabinet opening.

Cutout Dimensions (in inches)

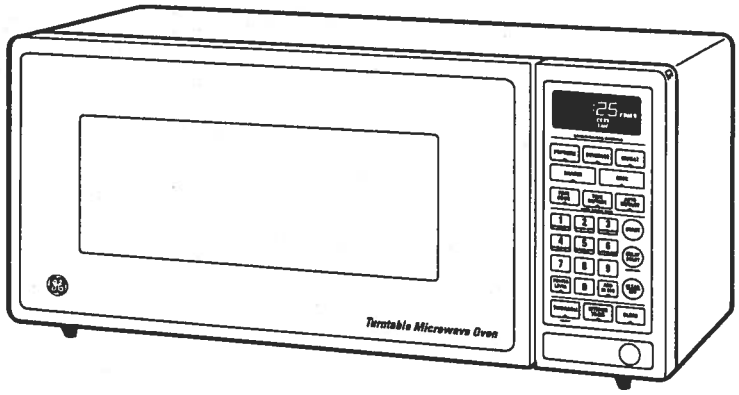


Built-In trim kit For 1.0 cu. ft. microwave ovens
For a custom built-in appearance, this kit allows built-in installation of the Spacemaker II microwave oven into a wall or cabinet alone, and is U.L.-approved for installation over a GE single electric wall oven. This kit should not be installed over a gas wall oven.

Trim kits for model JEM25
JX827SS – Stainless Steel, JX827WN – White, JX827CD – Bisque, JX827BN – Black

Installation Information: This information is not intended to be used for installing unit described. Before installing, consult installation instructions packed with product for current dimensional data.

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Features and Benefits

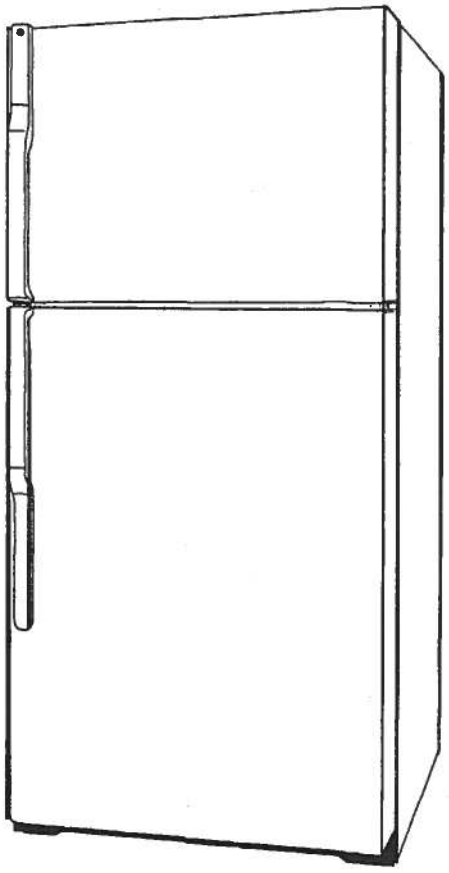
- 1.0 cu. ft. Oven cavity
- 800 Watts*
- Electronic touch controls
- Convenience cooking controls
- Electronic digital display with clock
- Time Cook I & II
- Express Cook with Instant On controls
- Auto Defrost/Time Defrost
- Add 30 Seconds
- Delay Start/Reminder
- Child Lockout
- Kitchen timer
- 10 Power levels
- Under the cabinetry mounting with optional kit
- Model JEM25WF – White
- Model JEM25BF – Black

*IEC-705 Test Procedure

APPROXIMATE DIMENSIONS(HxDxW)	
11.17 in x 12.86 in x 23 25/32 in	
CAPACITY	
Capacity	Mid-Size
Total Capacity (cubic feet)	1.00
FEATURES	
Electronic Digital Display with Clock	Yes
Electronic Touch Controls	Yes
Wattage (IEC-705)	800
Cooking System	Turntable
Power Levels	10
Delay Start	Yes
Beverage (Convenience)	Instant-On
Cook (Convenience)	9 Codes
Popcorn (Convenience)	Instant-On
Reheat (Convenience)	6 codes
Snacks (Convenience)	6 codes
Turntable	Glass
Turntable On / Off	Yes
Turntable Size (in.)	11-21/64
Add 30 Seconds	Instant-On
Cooking Complete Reminder	Yes
Defrost Type	Auto & Time
Express Cook	Instant-On; 1-5 Minutes
Instant On Controls	Yes
Kitchen Timer / Timer (On/Off)	Yes / No
Time Cook	I & II
Time Preference	Control Enhancement (1/9)
Child Lock	Yes
APPEARANCE	
Case Color	White
Color Appearance	White
Door Color	White
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	34 lb
Cavity (W x H x D)	16-23/32 X 8-1/16 X 12-15/32
Overall Depth	12.86 in
Overall Height	11.17 in
Overall Width	23 25/32 in
Net Weight (lbs.)	30 lb
POWER / RATINGS	
Electrical Input - 120V Amperage	11.5
Electrical Input - 120V Watts	1300
Frequency (MHz)	2450

END OF SPECIFICATION

GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker



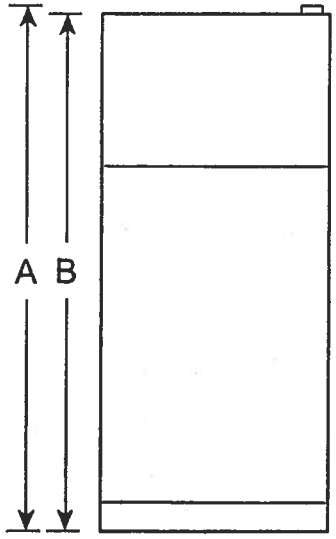
Features and Benefits

- Slide-Out, Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- Electronic Icemaker – Makes ice automatically, ensuring a ready supply.
- Model GTS18WCPWW – White on white
- Model GTS18WCPCC – Bisque on bisque

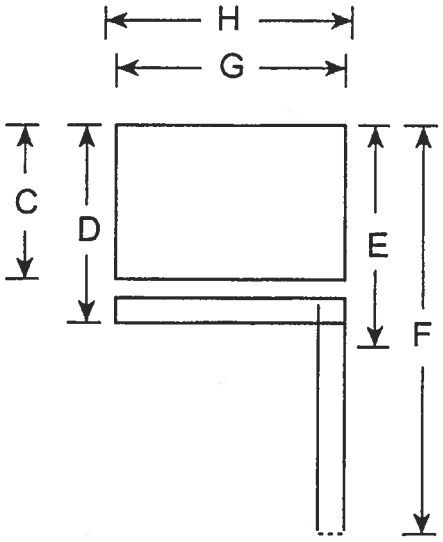
GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	32
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Total volume and shelf area are calculated by the Association of Home Appliance Manufacturers' standards

Listed by Underwriters Laboratories

APPROXIMATE DIMENSIONS(HxDxW)	
66 5/8 in x 32 1/8 in x 29 1/2 in	
CAPACITY	
Total (cubic feet)	17.9
Fresh Food (cubic feet)	12.87
Freezer (cubic feet)	4.98
Shelf Area (sq. ft.)	22.0
APPEARANCE	
Color Appearance	White on White
Customer Installed Handles	Yes
Exterior Design	Rounded Doors
Handle	Color-Matched
Door Swing	Shipped w/ Right Hand Door Opening (Hinges on Right)
Reversible Doors	Yes
Textured Steel Case & Door	Galvenized Door
Adjustable Rollers	Front
Door Stops	Yes

WEIGHTS & DIMENSIONS

Approximate Shipping Weight	233 lb
Overall Depth	32 1/8 in
Overall Height	66 5/8 in
Overall Width	29 1/2 in
Case Depth Without Door (in.)	27-1/2
Depth with Door Open 90° (in.)	58-1/8
Depth Without Handle (in.)	30-1/4
Height to Mid-Freezer	53-15/16
Height to Top of Case (in.)	66-1/8
Width w/Door Open 90 Degrees Inc. Handle (in.)	32
Back Air Clearances (in.)	1
Side Air Clearances (in.)	1/8
Top Air Clearances (in.)	1

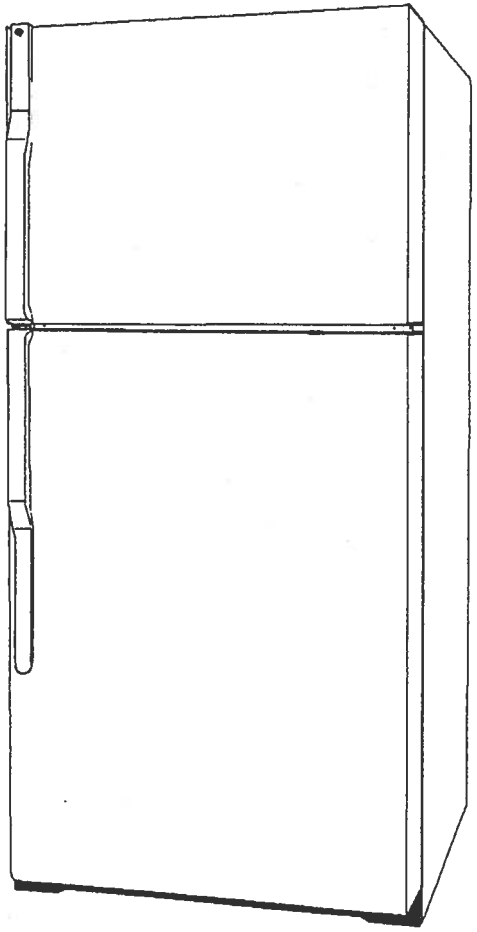
POWER / RATINGS

Volts / Hertz / Amps	120V; 60Hz ; 15A

END OF SPECIFICATION

GE Appliances

GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator



Specification Revised 5/03

Features and Benefits

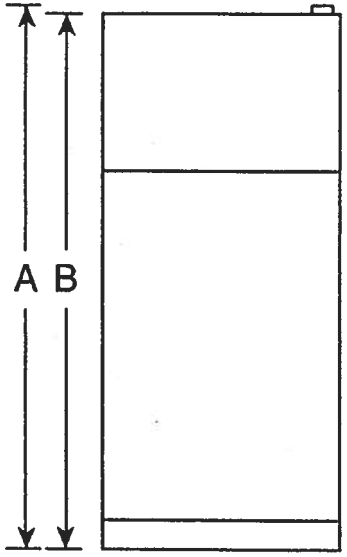
- Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- NeverClean™ Condenser – Condenser coils are encased, so they don't require cleaning in normal operating environments.
- Model GTS18KBPWW – White on white
- Model GTS18KBPBB – Black on black
- Model GTS18KBPCC – Bisque on bisque

GE Appliances

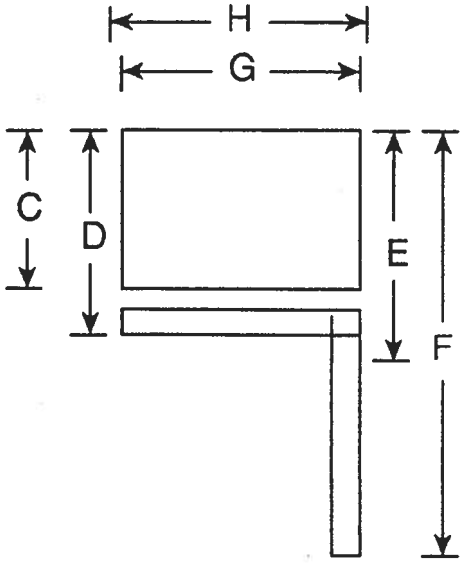
GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	30
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Specification Revised 5/03

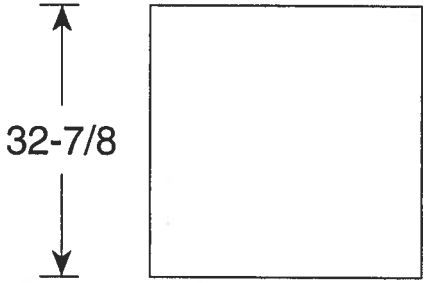
END OF SPECIFICATION

GE Appliances

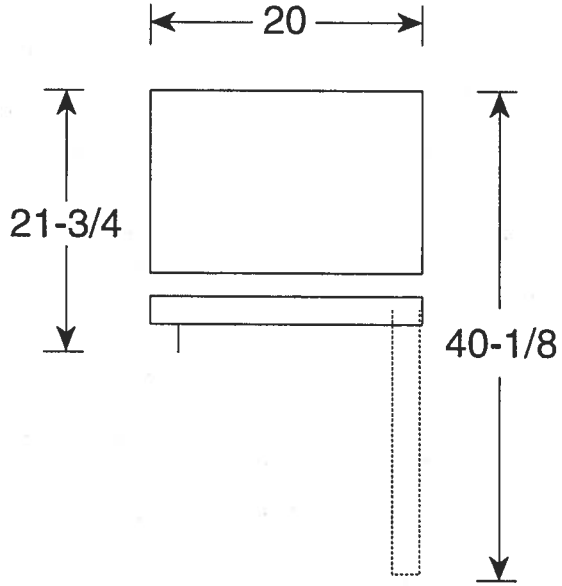
GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator

Dimensions (in inches)

Front View



Top View



Air Clearances	
Each side (in.)	1/2
Top (in.)	2
Back (in.)	2

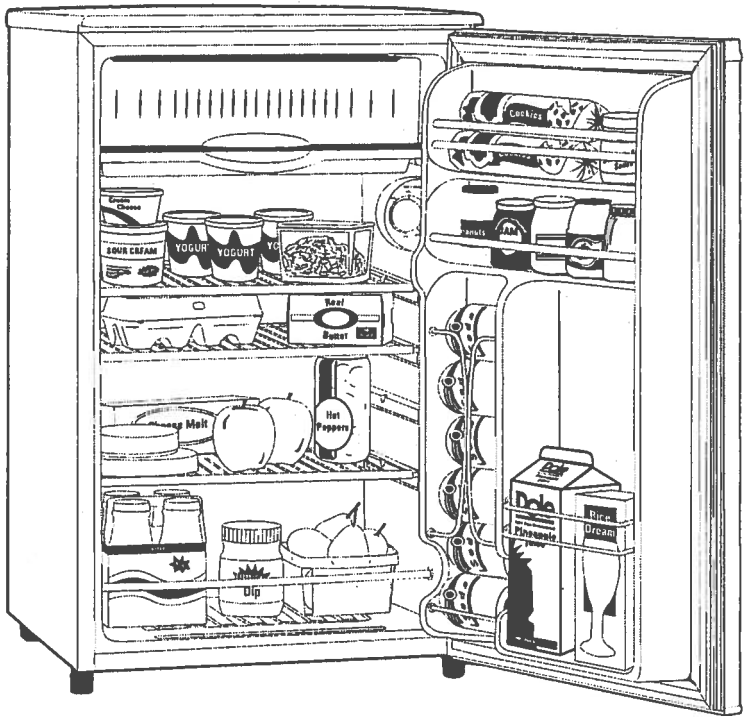
Note: Freezer compartment is for short-term storage of frozen food. The frozen food compartment of this refrigerator will make ice, and pre-frozen foods can be stored for about **two weeks.** It will not effectively freeze fresh foods or provide long-term storage for meats, poultry, or fish.

For answers to your Monogram,® GE Profile™ or GE® appliance questions, visit our website at GEAppliances.com or call GE Answer Center® service, 800.626.2000.

Specification Revised 7/04
310934

GE Appliances

GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator



Features and Benefits

- 4.3 cu. ft. Capacity (Fresh Food 3.81 cu. ft./Freezer .49 cu. ft.)
- 2-1/2 Fresh Food Door Shelves
- 2 Adjustable Wire Cabinet Shelves
- Can Rack
- 2 Mini Ice 'N Easy Trays
- Manual Defrost
- Color-Matched Recessed Door Handles
- Model GMR04AAMWW – White on white
- Model GMR04AAMBB – Black on black

Specification Revised 7/04
310934

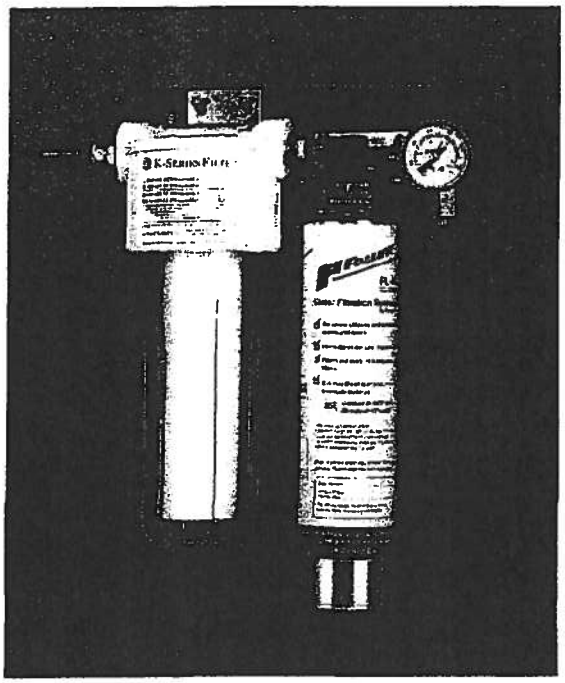
APPROXIMATE DIMENSIONS(HxDxW)	
32 7/8 in x 21 3/4 in x 20 in	
CAPACITY	
Total Capacity (cubic feet)	4.4
Fresh Food (cubic feet)	3.99
Freezer (cubic feet)	.39
Shelf Area (sq. ft.)	5.6
FEATURES	
Defrost Type	Manual
Fresh Food Cabinet Shelves - Adjustable	2
Fresh Food Cabinet Shelves - Total # of Shelves	2 Wire
Fresh Food Door Shelves	2 Full-Width; 1 Half-Width
Ice N' Easy Trays	1 Mini
APPEARANCE	
Color Appearance	White on White
Door Swing	Hinges on Right
Handle	Color-Matched Recessed
Rounded Doors	Yes
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	77 lb
Overall Depth	21 3/4 in
Overall Height	32 7/8 in
Overall Width	20 in
Depth with Door Open 90° (in.)	40-1/8
Back Air Clearances (in.)	2
Side Air Clearances (in.)	1/2
Top Air Clearances (in.)	2



END OF SPECIFICATION

QC4-FL4S Walter Filter System

SPECIFICATIONS



Water filter system for use with Follett icemakers and ice and water dispensers. System includes pre-filter, primary filter, pressure gauge and wall mounting bracket.

Important: Not for use with carbonated water — separate system required.

Ensures better tasting, cleaner, safer ice
- *Traps dirt as small as 1/2 micron in size*
- Removes chlorine, off-tastes and odors
- Filters out asbestos fibers and parasitic cysts such as *Cryptosporidium* and *Giardia*
- Certified to ANSI/NSF standards 42 and 53

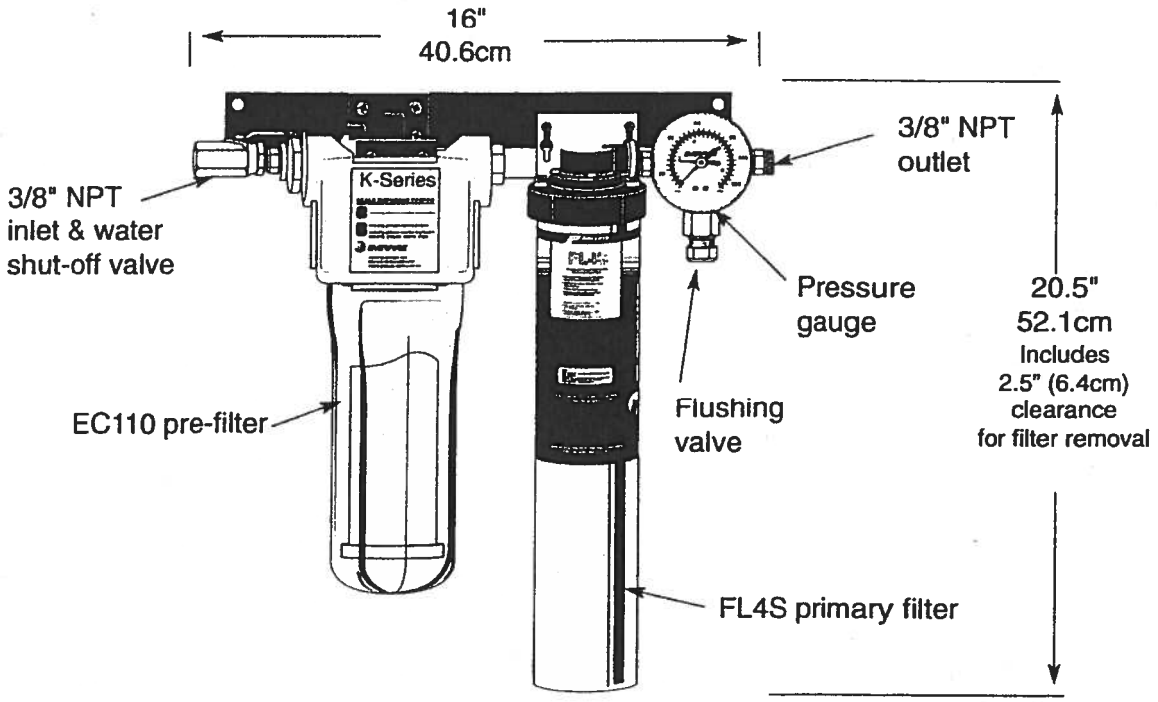
Improves icemaker performance
- Keeps icemakers functioning at full capacity
- Reduces scale build-up from dirt and minerals in the water by up to 70%
- Removes dirt and abrasive particles that can damage internal workings of icemaker
- Saves energy and reduces downtime

Space-saving design
- 20.5" (52.1cm) total height and 16" (40.6cm) width requires minimal space
- Entire system can be mounted out of the way below standard 34" - 36" (86.4cm - 91.4cm) counters

Dual filter system saves money
- *Economical EC110 pre-filter filters out* large particles and extends life of FL4S primary filter

Item # 714519

REV: tlg 8/21/2003



- Clearance required: 2.5" (6.4cm) at bottom of filter for cartridge removal
- Flow rate: 0.5 gpm (1.9 lpm)
- Pressure range 10 - 125 psi, non-shock
- Capacity: Certified for chlorine and taste and odor reduction for 3,000 gallons (11,400 liters)
- Water temperature: 35° - 100°F (2° - 38°C)

NSF International Standards

Tested and certified to ANSI/NSF Standard 42 & 53

Standard No. 42: Aesthetic Effects

Chemical Unit Taste & Odor and Chlorine Reduction, Class 1

Mechanical Filtration Unit Particulate Reduction, Class 1: 99.9% reduction of particles 1/2 micron and larger in size

Standard No. 53: Health Effects

Mechanical Filtration Unit

Turbidity Reduction, Cyst Reduction, Asbestos Reduction

The QC4-FL4S filter and 4S cartridge (by Everpure, Inc.) have been tested and Certified by NSF only for the functions listed above. Check for compliance with state and local laws and regulations. Do not use where the water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit. Can be used with water disinfected that may contain filterable cysts.

Item # 714519

END OF SPECIFICATION

Model 8573



Model 8573



8573 Koffee King Three Warmer Stepped Right Automatic Coffee Brewer *(without Hot Water Faucet)*

How do you get more for less? Use the Bloomfield Lo Profile® brewing system. At less than 17" tall, the Lo Profile is small in stature but big on capacity. Like all Bloomfield products, this proven, efficient brewing system is designed to take advantage of the finest electrical components and has the lowest service cost in the industry for this type of brewer.

Features

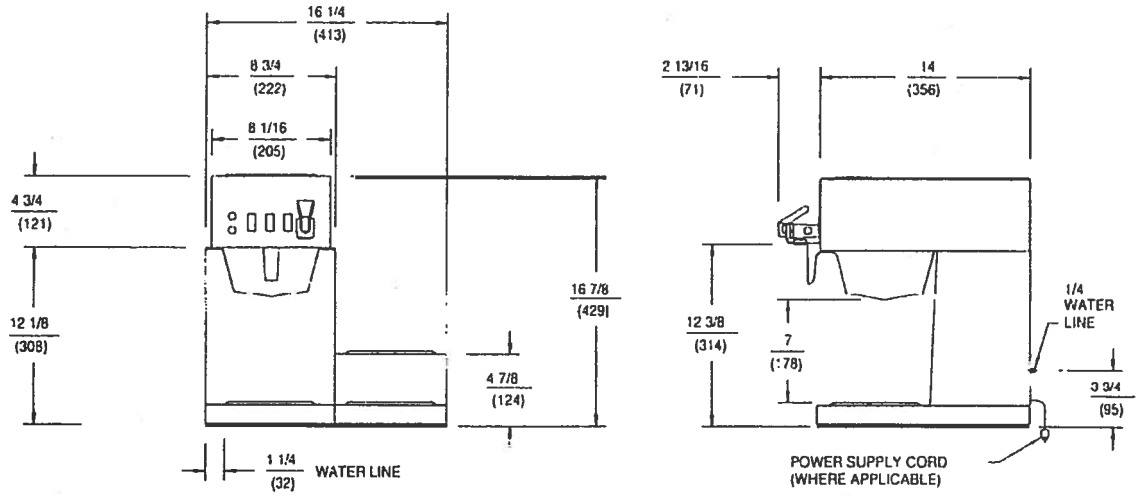
- **A high level of commonality of parts** with other Bloomfield models will significantly reduce the inventory of spare parts required to service many body styles.
- Exclusive design provides **easy access to components** for quick service.
- **Water volume adjustments** can be made with ease, no panels to remove or tools required.
- **Ready-to-Brew light** indicates the proper water temperature to help eliminate the guesswork in brewing.
- Built-in **pour over feature** provides flexibility.
- **Independent front-mounted hot water faucet** allows drawing of hot water without affecting coffee taste or brewing cycle.
- **Premium quality thermostat** has a full-length stainless steel sensing bulb that recognizes water temperature extremely accurately and cycles less frequently.
- **Superior sprayhead design** spreads water over the coffee grounds, creating agitation and a floating action that completely saturates the coffee to capture the full, rich essence of every bean.
- **Unique water valve with built-in flow control** assures consistent operation at 20-80 p.s.i.
- **One-piece drawn stainless steel water tank** has a superior design for extended life.
- **Three warming stations** with porcelain enameled warmer plates position decanters securely and, with no exposed screw heads, will not scratch or scrape decanters.
- High quality easy to clean **stainless steel construction.**

Item 715053

REV: 6/28/03

E9253 STD 4 LR 10836

DIMENSIONS: INCH / (MM)



SPECIFICATIONS:

MODELS	WATTS	VOLTS	AMPS	PHASE	POWER SUPPLY CORD
8573	1800	120	15	Single	NEMA 5-15P

Item # 715053

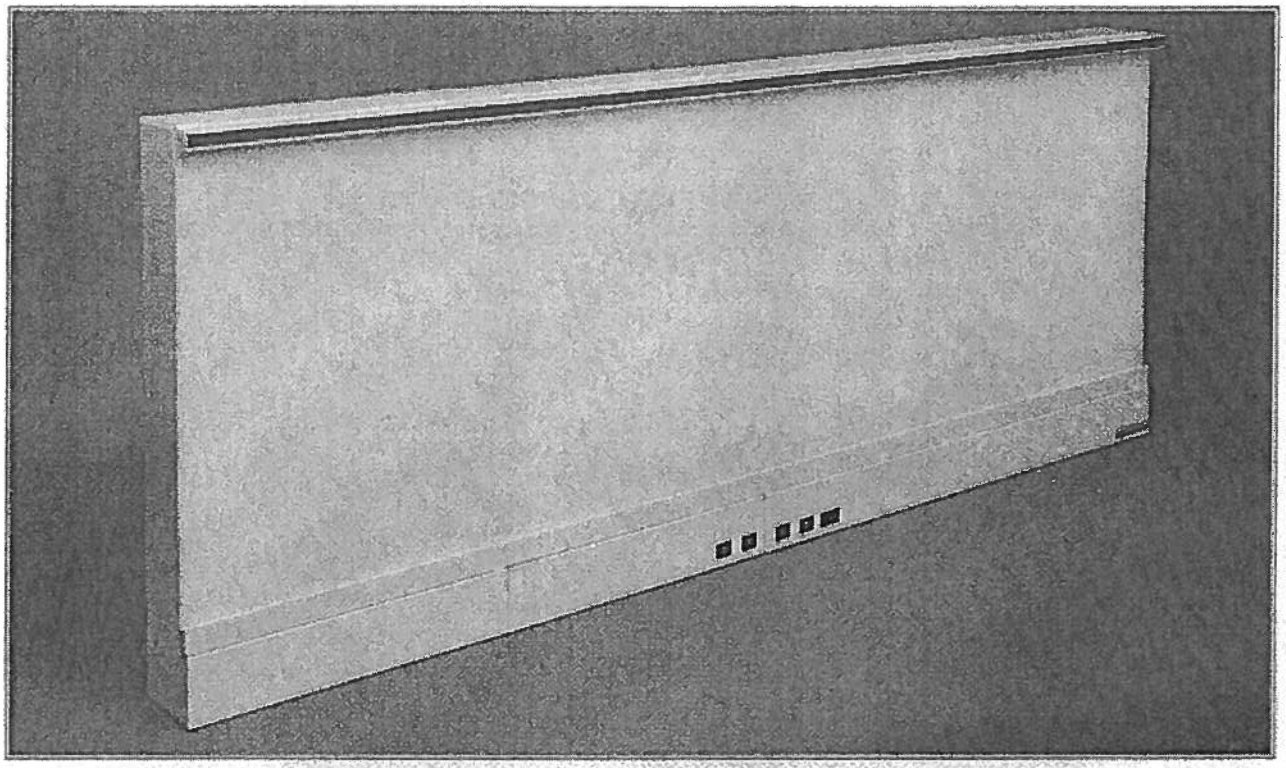
END OF SPECIFICATION

Item # 715152 1 of 3

800/347-XRAY
S&S X-RAY PRODUCTS
www.ssxray.com

CHAMELEON SERIES

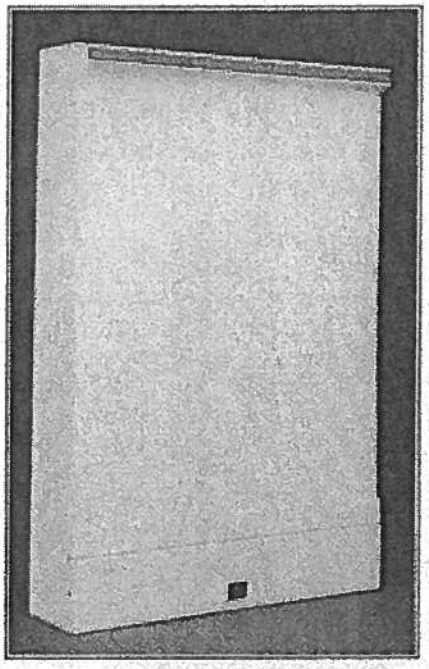
Blends With Any Décor



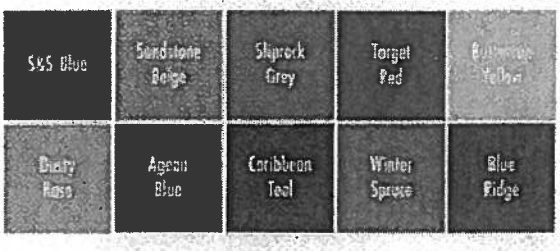
Four Bank Surface Mounted Model (101204)

The **Chameleon Illuminator Series** combines a slim, sleek appearance (3⅜" depth), with color-customizable trim. This cost efficient illuminator is designed to accentuate the warm, professional appearance of your reading room or consultation area. The units can be highlighted with *trim in a choice of ten colors*, polished stainless steel or primed strip (the latter can be easily painted to color coordinate within a facility). Constructed of durable steel with a white powder-coat finish, this series is available in 2 lamps, 3 lamps and 4 lamps per viewing area models.

Trigger start ballasts, separated viewing sections, centered cluster switches, one piece plexiglass fronts and continuous gravity film grips are standard with this series. A bottom ledge film support coupled with the continuous film grip guarantees maximum freedom for viewing small or large films. Each section is individually controlled by rocker switches mounted at the bottom center of the illuminator. Master switches are provided on units of three banks or more. The Chameleon Illuminator can also be incorporated into a corner module.



Trim Colors



Finish: White Baked Enamel

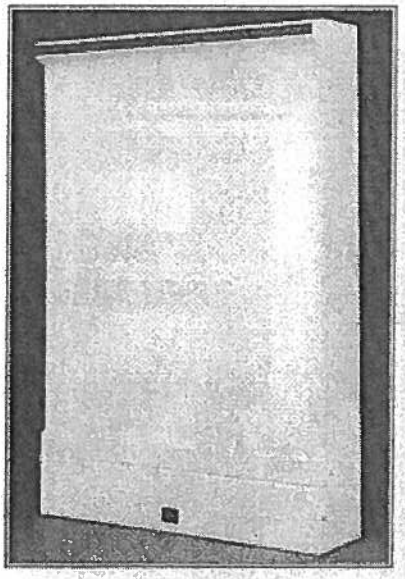
Electrical: Viewers operate on 120 volt, 60 Hz. **2 Lamp Series:** .47 amps per section, **3 Lamp series:** .61 amps per section, **4 Lamp series:** 1.0 amps per section. Surface mounting models are supplied with a 6' three conductor line cord (see diagram for wiring locations). Recessed models come with BX connectors. For special voltages consult factory.

* **Optional Items:** Modular Mobile system (pg B-23), mobile stand, console arms, angulated viewing system (pg B-25) corner modules (pg B-24), hospital grade plugs (pg B-30).

S&S X-RAY PRODUCTS
www.ssxray.com

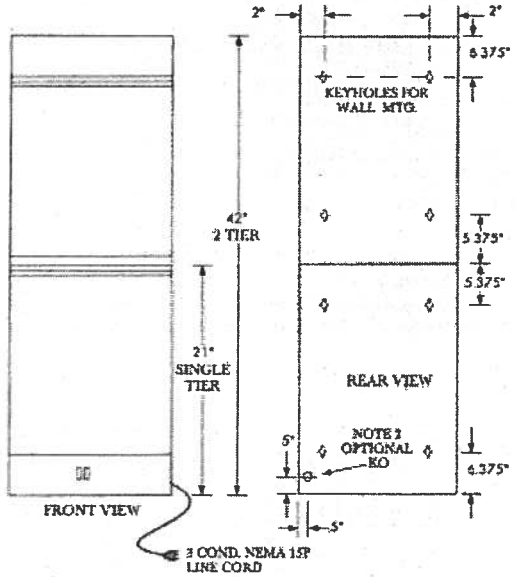
CHAMELEON SERIES

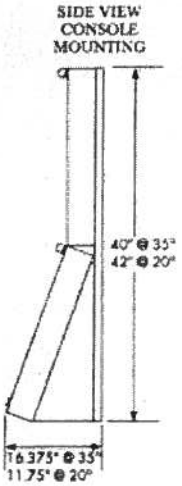
ILLUMINATORS



SURFACE MOUNTED MODELS

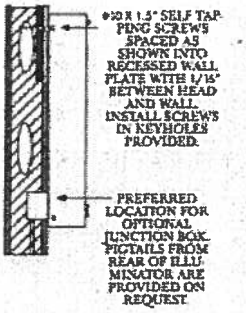
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	23 lbs	101401	101421
Two Bank 28"x17"	28"	21"	46 lbs	101402	101422
Three Bank 42"x17"	42"	21"	69 lbs	101403	101423
Four Bank 56"x17"	56"	21"	90 lbs	101404	101424
Five Bank 70"x17"	70"	21"	113 lbs	101405	101425
Six Bank 84"x17"	84"	21"	136 lbs	101406	101426
TWO TIER					
1 over 1 2 x 14"x17"	14"	42"	46 lbs	101411	101431
2 over 2 2 x 28"x17"	28"	42"	92 lbs	101412	101432
3 over 3 2 x 42"x17"	42"	42"	138 lbs	101413	101433
4 over 4 2 x 56"x17"	56"	42"	180 lbs	101414	101434
5 over 5 2 x 70"x17"	70"	42"	226 lbs	101415	101435
6 over 6 2 x 84"x17"	84"	42"	272 lbs	101416	101436

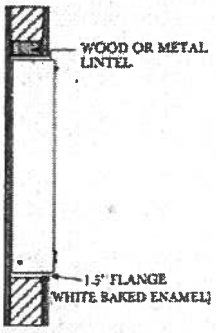






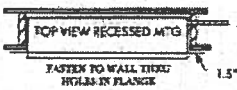
SIDE VIEW RIGHT SIDE





RECESSED MODELS

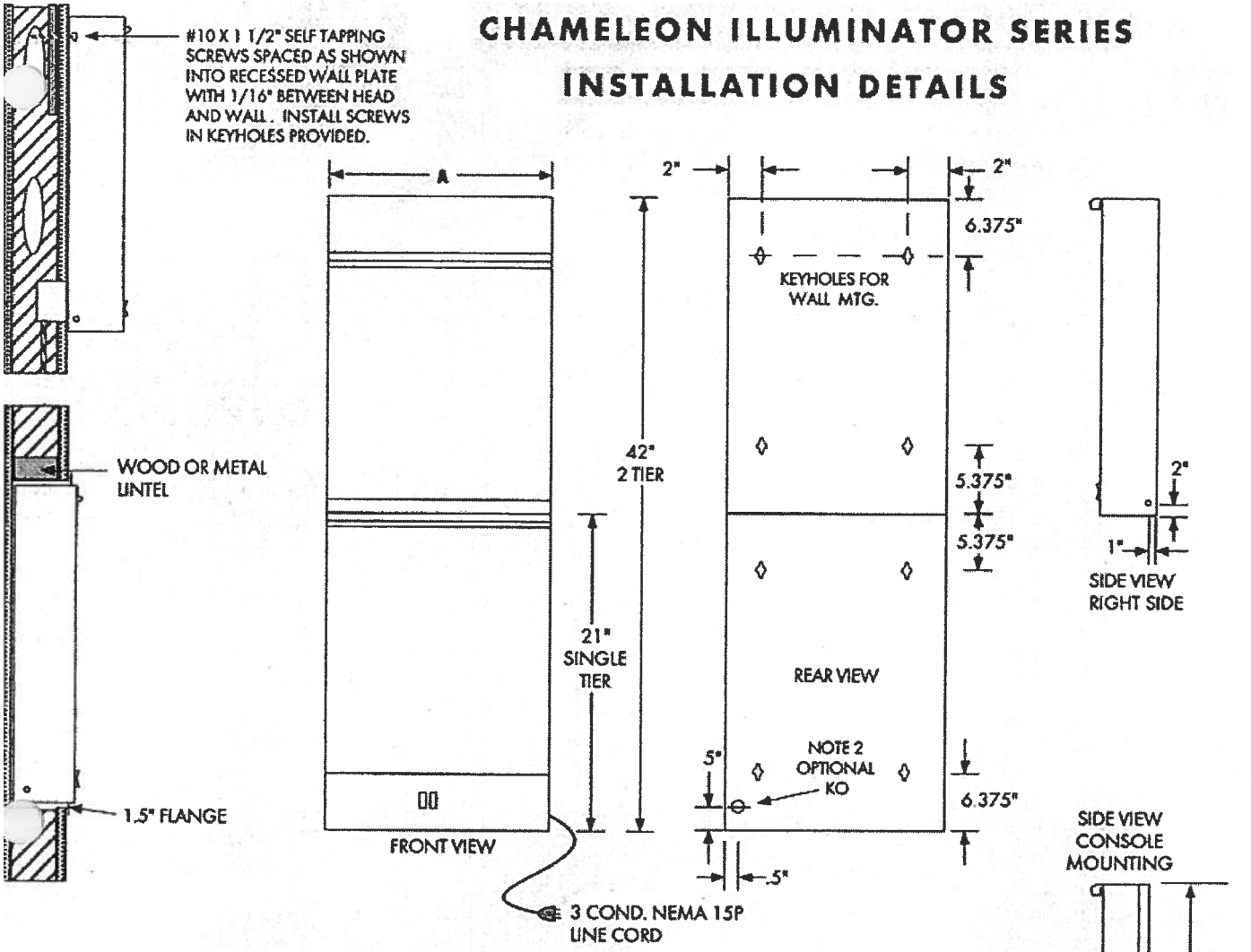
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	WALL OPENING WIDTH	WALL OPENING HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	14.25"	21.25"	23 lbs	101441	101461
Two Bank 28"x17"	28"	21"	28.25"	21.25"	46 lbs	101442	101462
Three Bank 42"x17"	42"	21"	42.25"	21.25"	69 lbs	101443	101463
Four Bank 56"x17"	56"	21"	56.25"	21.25"	90 lbs	101444	101464
Five Bank 70"x17"	70"	21"	70.25"	21.25"	113 lbs	101445	101465
Six Bank 84"x17"	84"	21"	84.25"	21.25"	136 lbs	101446	101466
TWO TIER							
1 over 1 2 x 14"x17"	14"	42"	14.25"	42.25"	46 lbs	101451	101471
2 over 2 2 x 28"x17"	28"	42"	28.25"	42.25"	92 lbs	101452	101472
3 over 3 2 x 42"x17"	42"	42"	42.25"	42.25"	138 lbs	101453	101473
4 over 4 2 x 56"x17"	56"	42"	56.25"	42.25"	180 lbs	101454	101474
5 over 5 2 x 70"x17"	70"	42"	70.25"	42.25"	226 lbs	101455	101475
6 over 6 2 x 84"x17"	84"	42"	84.25"	42.25"	272 lbs	101456	101476

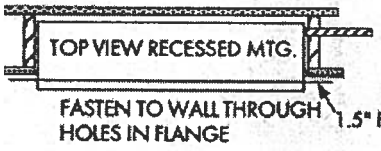


1/2" CONDUIT CONTAINING 3 NO. 14 WIRES TO 120 VOLT 60 HZ SERVICE.

ALL MEASUREMENTS ARE ± 1/16"

CHAMELEON ILLUMINATOR SERIES
INSTALLATION DETAILS





	NUMBER OF VIEWING AREAS						HEIGHT	
	1	2	3	4	5	6	1 TIER	2 TIER
CASE WIDTH "A"	14"	28"	42"	56"	70"	84"	21"	42"
WALL OPENING	14.25"	28.25"	42.25"	56.25"	70.25"	84.25"	21.25	42.25
WEIGHT 1 TIER	23	46	69	90	113	136		
WEIGHT 2 TIER	46	92	138	180	226	272		
DEPTH OF CASE	3.375"							

120 VOLT 60 HZ.
2 LAMP SERIES .47 AMPS PER VIEWING SECTION
3 LAMP SERIES .61 AMPS PER VIEWING SECTION
4 LAMP SERIES 1 AMPS PER VIEWING SECTION
UL LISTED FOR U.S.A. AND CANADA

NOTE:
1. FOR SAFETY AND PROPER OPERATION UNITS MUST BE ELECTRICALLY GROUNDED.

PREFERRED LOCATION FOR OPTIONAL JUNCTION BOX. PIGTAILS FROM REAR OF ILLUMINATOR PROVIDED ON

CALL OUR CUSTOM DESIGN ENGINEERING DEPT. FOR HELP WITH ROOM LAYOUTS AND CUSTOM CONFIGURATIONS.

The Industry Standard For 40 Years
800-347-XRAY 718-649-8500
FAX 718-257-0219
S&S X-RAY PRODUCTS INC
1165 LINWOOD STREET
BROOKLYN NY 11208

END OF SPECIFICATION

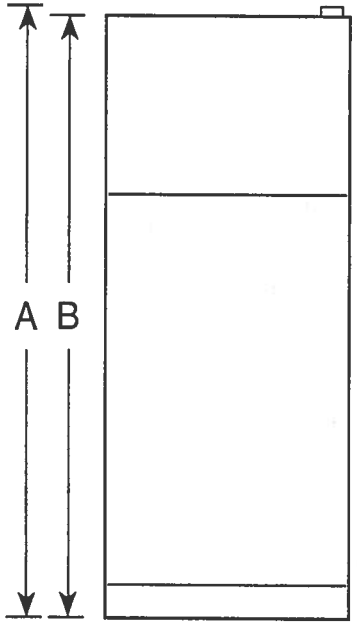
GTS17KBS
GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

Dimensions and Installation Information

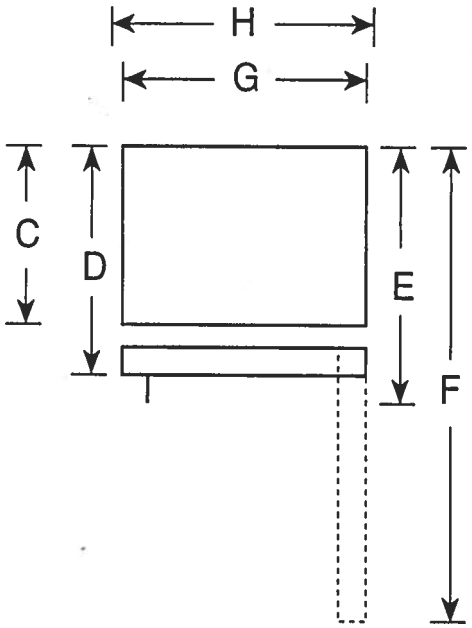
Overall Dimensions	Height to top of hinge (in.) **A**	64-3/4
	Height to top of case (in.) **B**	64-1/4*
	Case depth without door (in.) **C**†	25-7/8
	Case depth less door handle (in.) **D**†	29-1/8
	Case depth with door handle (in.) **E**†	31
	Depth with fresh food door open 90° (in.) **F**†	54-7/8
	Width (in.) **G**	28
	Width with door open 90° less door handle (in.) **H**	30-1/2
Air Clearances	Each side (in.)	3/4
	Top (in.)	1
	Back (in.)	1

*Height to mid-freezer (in.): 54-3/8

Front View



Top View



Dimension and installation information are shown in inches.

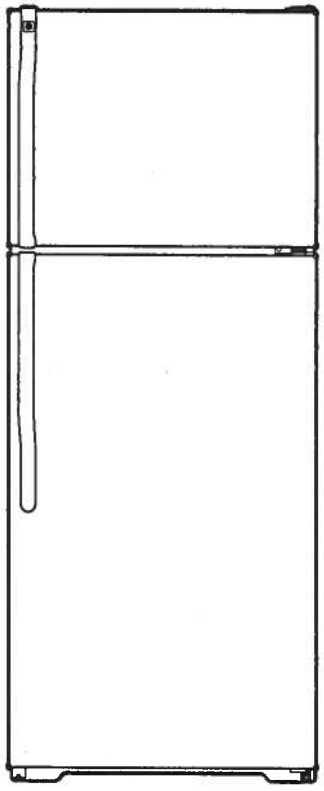
Listed by Underwriters Laboratories

GTS17KBS

GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

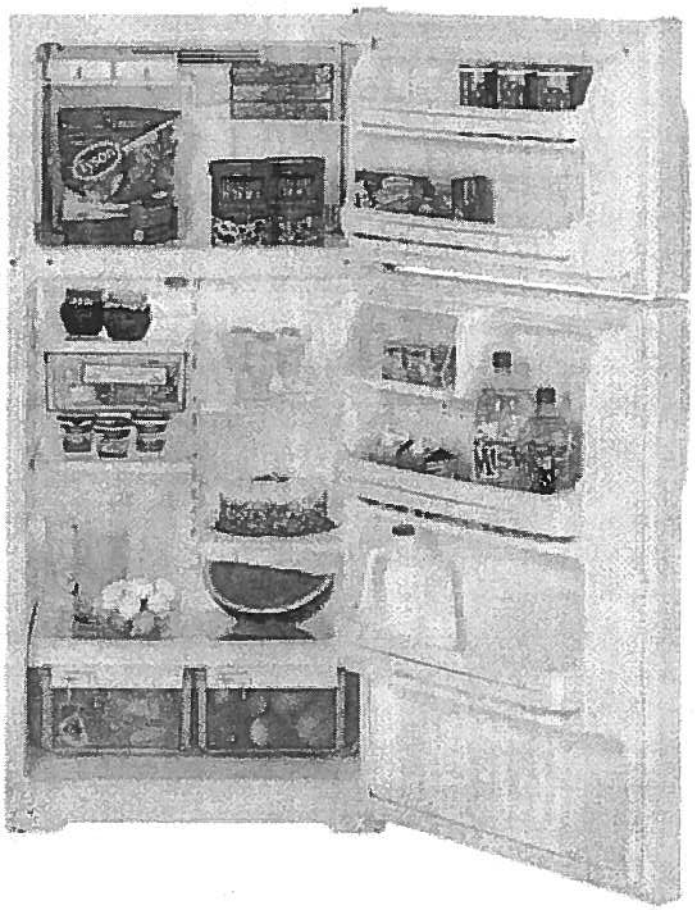
Features and Benefits

- Adjustable Spillproof Glass Shelves - Help contain spills for ease of cleaning
- Upfront Temperature Controls - Are positioned up front, close at hand, for maximum convenience and ease of use
- Adjustable Humidity Vegetable/Fruit Crispers - Provide the ideal storage environment for fruits and vegetables
- Gallon Door Storage - Makes room for milk and any other gallon size containers
- Snack Pan - Helps keep everyday foods like muffins and carrot sticks fresh
- NeverClean™ Condenser - Condenser coils are encased, so they don't require cleaning in normal operating environments
- Deluxe Quiet Design - Significantly reduces operating noise
- Square Doors - Classic design that's compatible with any kitchen décor
- Model GTS17KBSWW - White on white
- Model GTS17KBSCC - Bisque on bisque



APPROXIMATE DIMENSIONS(HxDxW)	
64 3/4 in x 31 in x 28 in	
CAPACITY	
Total Capacity (cubic feet)	16.60
Fresh Food (cubic feet)	12.54
Freezer (cubic feet)	4.10
Shelf Area (sq. ft.)	19.7
FEATURES	
Air Tower	Yes - Freezer
Defrost Type	Frost Free
Upfront Temperature Controls	Yes
Automatic Icemaker	Optional (IM4A)
Ice N' Easy Trays	2
Snack Drawer	Yes
Vegetable / Fruit Crisper(s)	2 Adjustable Humidity
Fresh Food Cabinet Shelves - Adjustable	4 Split
Fresh Food Cabinet Shelves - Spill Proof	Yes
Fresh Food Cabinet Shelves - Total Number of Shelves	4 Glass
Fresh Food Door Shelves	2 Fixed w/ Gal. Storage
Gallon Door Storage	Yes
Dairy Compartment	Yes
Interior Light	Yes
Freezer Cabinet Shelves (Wire)	Step Shelf
Freezer Door Shelves	2 Full-Width Fixed (1 Extra-Deep)
APPEARANCE	
Color Appearance	White on White
Handle	Color-Matched
Door Swing	Reversible Hinges
Textured Steel Case	Galvanized Door
Door Stops	Yes
Easy to Remove Door Gaskets	Yes
Leveling Legs	2 Front
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	185 lb
Net Weight (lbs.)	166 lb
Overall Depth	31 in
Overall Height	64 3/4 in
Overall Width	28 in
Case Depth Without Door (in.)	25-7/8
Depth with Door Open 90° (in.)	54-7/8
Depth Without Handle (in.)	29-1/8
Height to Mid-Freezer	54-3/8
Height to Top of Case (in.)	64-1/4
Width w/Door Open 90 Degrees Inc. Handle (in.)	30-1/2
Width w/Door Open 90 Degrees Less Handle (in.)	28-5/8
Back Air Clearances (in.)	1
Side Air Clearances (in.)	3/4
Top Air Clearances (in.)	1

POWER / RATINGS	
Volts / Hertz / Amps	120V; 60Hz ; 15A



END OF SPECIFICATION

AMSCO® WARMING CABINET

APPLICATION

The Amsco Warming Cabinet is designed to raise the temperature of surgical irrigation solutions and/or blankets to an acceptable level for hospital and surgical outpatient center applications.

FEATURES

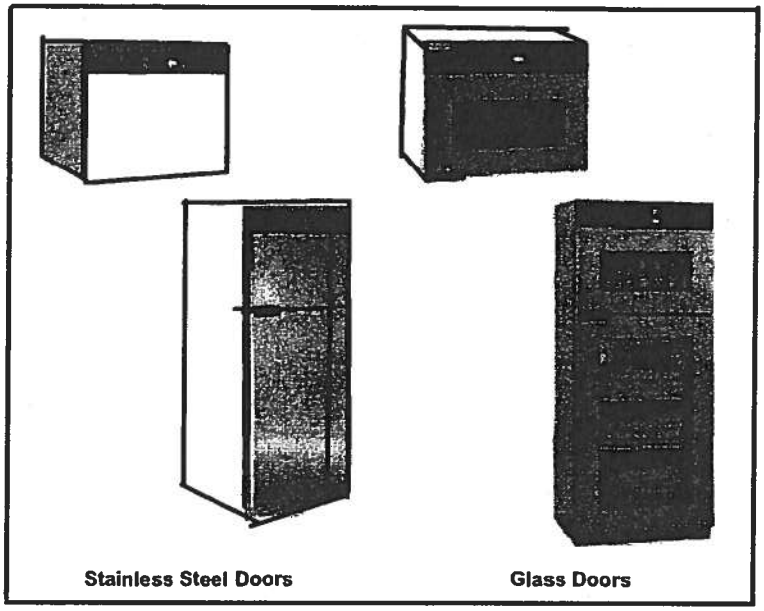
Single-compartment Model—Features a heating chamber available in two different depths: 18" (457 mm) or 24" (610 mm) deep.

Double-compartment Model—Features an upper and lower heating chamber with independent temperature controls, and a choice of two different depths: 18" (457 mm) or 24" (610 mm) deep.

Cabinet Storage Capabilities—The upper compartment of the 18" (457 mm) deep model holds up to 15 (2-liter) surgical flasks; the lower compartment holds up to 45 (2-liter) surgical flasks.

The upper compartment of the 24" (610 mm) deep model holds up to 20 (2-liter) surgical flasks; the lower compartment holds up to 60 (2-liter) surgical flasks.

All chambers can hold a combination of flasks and dry goods, or dry goods only.



Stainless Steel Doors **Glass Doors**

(Typical only - some details may vary.)

STANDARDS

Warming cabinet meets applicable requirements of the following standards, and carries the appropriate symbols.

- **Underwriters Laboratories (UL) Standard 2601-1, 1st Ed.,** as certified by ETL Testing Laboratories, Inc.
- **Standard CSA-C22.2 No. 601.1-M90,** Standard for Electro-Medical Equipment as certified by ETL Testing Laboratories, Inc.
- **EN 60601-1: 1993, Amendment 2, *1995,*** *Electrical Safety as certified by* ETL Testing Laboratories, Inc.
- **IEC 601-1-2: 1993,** EMC testing as certified by ETL Testing Laboratories, Inc.
- ***EN 55011: Group 1, Class B,*** *EMI* testing as certified by ETL Testing Laboratories, Inc.
- **Medical Device Directive (93/42 IEEC)**
- **California OSMPD Seismic Pre-Approval**
- **FDA Good Manufacturing Practices Regulations 21 CFR 820 for Medical Devices.**

The Selections Checked Below Apply To This Equipment

MODEL

- ☐ Single-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep
- ☐ Double-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep

Mounting

- ☐ Open-mounted
- ☐ For Recessing

DOOR OPTIONS

- ☐ Glass
- ☐ Stainless Steel

VOLTAGE

- ☐ 120 V
- ☐ 220-240 V

Door Hinge(LH/RH) interchangeable in field

ACCESSORY

*** Seismic Tie-down Kit

Item # 717197

REV: 6/19/03

CONSTRUCTION

Includes all components necessary to obtain a complete working unit. The open-mounted unit ships with a power condenser installed. The recessed unit requires a connection to building service, supplied by others. The unit contains a heating chamber, instrumentation and operating controls, and a lower heated chamber when double-compartment model is specified.

Cabinet controls are identical for both the single- and double-compartment configurations. The double compartment configuration has a temperature control knob, temperature display LCD, and overtemperature light for each compartment. The control panel (on either the single- or double-compartment configuration) can be conveniently serviced from the front of the unit.

Corners and intersections on the face of the cabinet and door are structurally formed for rigidity, cleanability and appearance. Both models are supported on a stainless steel integral subbase. The cabinet door(s) is (are) available in stainless steel, or stainless steel with a glass window. Interior of cabinet and shelves are stainless steel. If a freestanding model, the cabinet top and side panels are stainless steel.

Heating chamber compartment is insulated with 1" (25 mm) thick, fiberglass blanket. A fan circulates air within the chamber to provide even heat distribution. The door is of double-wall construction with 1-1/2" (38 mm) thick insulation between the walls. Right-hand door swing is provided; swing is reversible. Door closes against a heat-resistant, magnet imbedded, vinyl gasket. Pivot type hinges are stainless steel.

Chamber(s) is (are) heated by an electric rod heater operating on either *120 or 220 Volt, 50/60 Hz power.*

Lower chamber (double-compartment model) includes two stainless-steel shelves, adjustable in 1" (25 mm) increments by a clip and slot arrangement. Door structure mounting, gasket and hinges are the same as the door on the upper chamber. Chamber is heated by an electric rod heater.

CONTROLS

The control panel assembly features a temperature control knob, an overtemperature indicator light, a digital temperature indicator (if a double-compartment model, there will be duplicates of the previous items), and a power switch. The temperature control knob is used to regulate and turn off the heat to each chamber. 120 Volt units display temperature readings in Fahrenheit. 220 Volt units display temperature readings in Celsius scale. Temperature selection range is 90°-160°F (32.2°-71.1°C). An overtemperature alarm will visually and audibly alert operator should an overtemperature condition occur (chamber temperature greater than 10°F [5.5°C] above set temperature). In the event of an overtemperature condition, the overtemperature control automatically turns off the heater(s).

MOUNTING ARRANGEMENT

Double-compartment models may be specified as open-mounted or recessing into a partition wall. If model is specified for recessing, a synthetic rubber sealing gasket is provided to ensure close fit of cabinet front to the face of the wall partition. Recessed cabinet requires no supplementary supports behind the wall partition (except in seismic locations).

Single-compartment models may be specified for wall/counter mounting or for recessing into a partition wall.

PREVENTIVE MAINTENANCE

A global network of skilled service specialists can provide periodic inspections, and adjustments to assure *low-cost peak performance. STERIS* representatives can provide information regarding Annual Maintenance Agreements.

NOTE

1. Due to a variety of building constructions employed, fasteners for mounting cabinet to wall are not furnished by STERIS. Wall(s) must be adequately reinforced to *support operating weight of* cabinet.

ENGINEERING DATA

Unit	Approx. Unit Wt. lbs (kg)
Single-Compartment:*	
18" Wall/Counter Mounting	124 (56)
18" Recess Mounting	98 (45)
24" Wall/Counter Mounting	142 (65)
24" Recess Mounting	115 (52)
Double-Compartment:**	
18" Open-mounted	302 (137)
18" Recessed Mounting	266 (121)
24" Open-mounted	353 (160)
24" Recessed Mounting	306 (139)

** For 220/240 Volt units, add 8 lbs (3.6 kg). For glass door option, add 6 lbs (2.7 kg).*
*** For 220/240 Volt units, add 15 lbs (6.8 kg). For glass door option, add 6 lbs (2.7 kg).*

INTERNAL DIMENSIONS AND CAPACITY

Unit	Upper Chamber Single Chamber Unit (Height x Width x Depth)	Lower Chamber Double Chamber Unit (Height x Width x Depth)
18" Depth	15-1/2 x 23-3/4 x 16-7/8" – 3.6 cu. ft. (394 x 603 x 429 mm)	38-1/4 x 23-3/4 x 16-7/8" – 8.9 cu. ft. (972 x 603 x 429 mm)
24" Depth	15-1/2 x 23-3/4 x 22-7/8 – 4.9 cu. ft. (394 x 603 x 581 mm)	38-1/4 x 23-3/4 x 22-7/8 – 12 cu. ft. (972 x 603 x 581 mm)

UTILITY REQUIREMENTS - Single Compartment Model

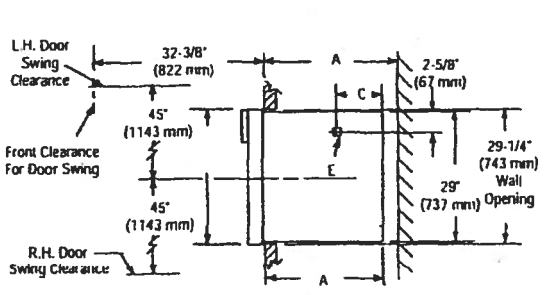
Electricity (E)

120 Volt, 50/60 Hz, 1-Phase, 6.8 A, 800 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 3.6 A, 869 Watts

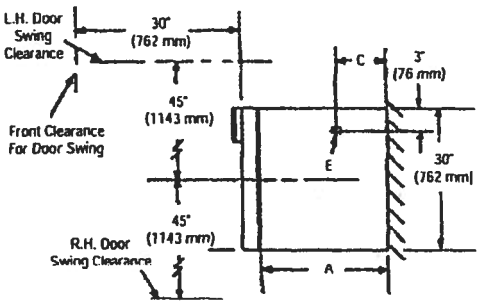
. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)

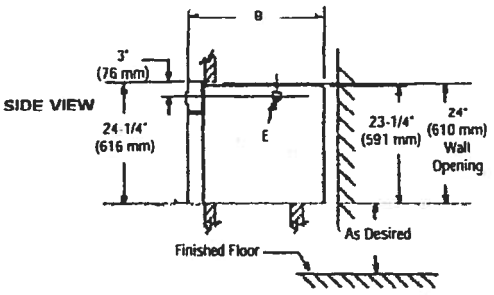
SINGLE-COMPARTMENT MODEL



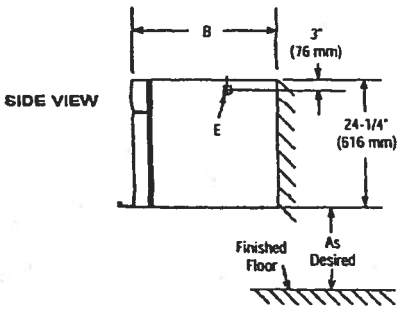
PLAN VIEW



PLAN VIEW



For Recessing



Wall/Counter Mounting

NOTE: Because of STERIS's continuing program of research and development, all specifications and descriptions are subject to change without notice. Obtain certified drawings for design, and installation.

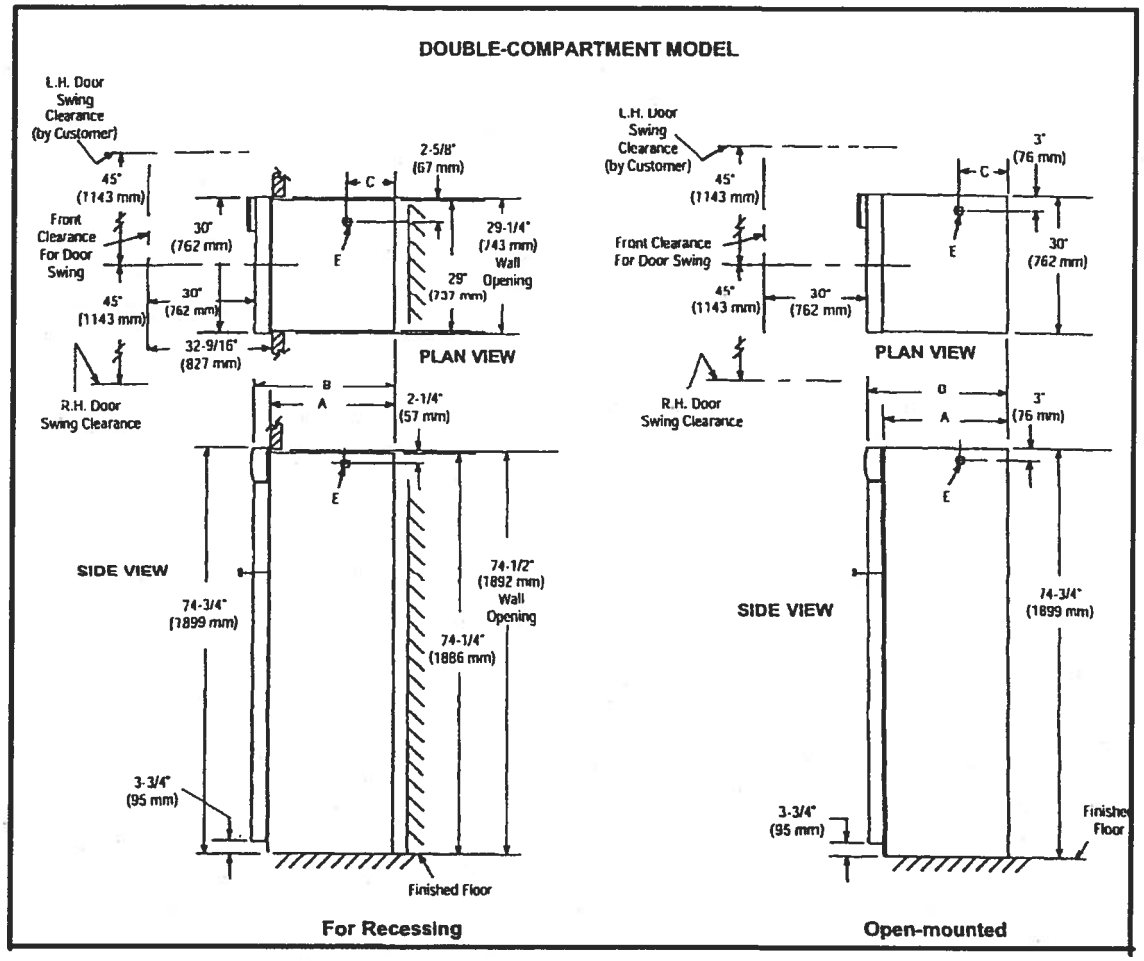
UTILITY REQUIREMENTS - Double Compartment Model

Electricity (E)

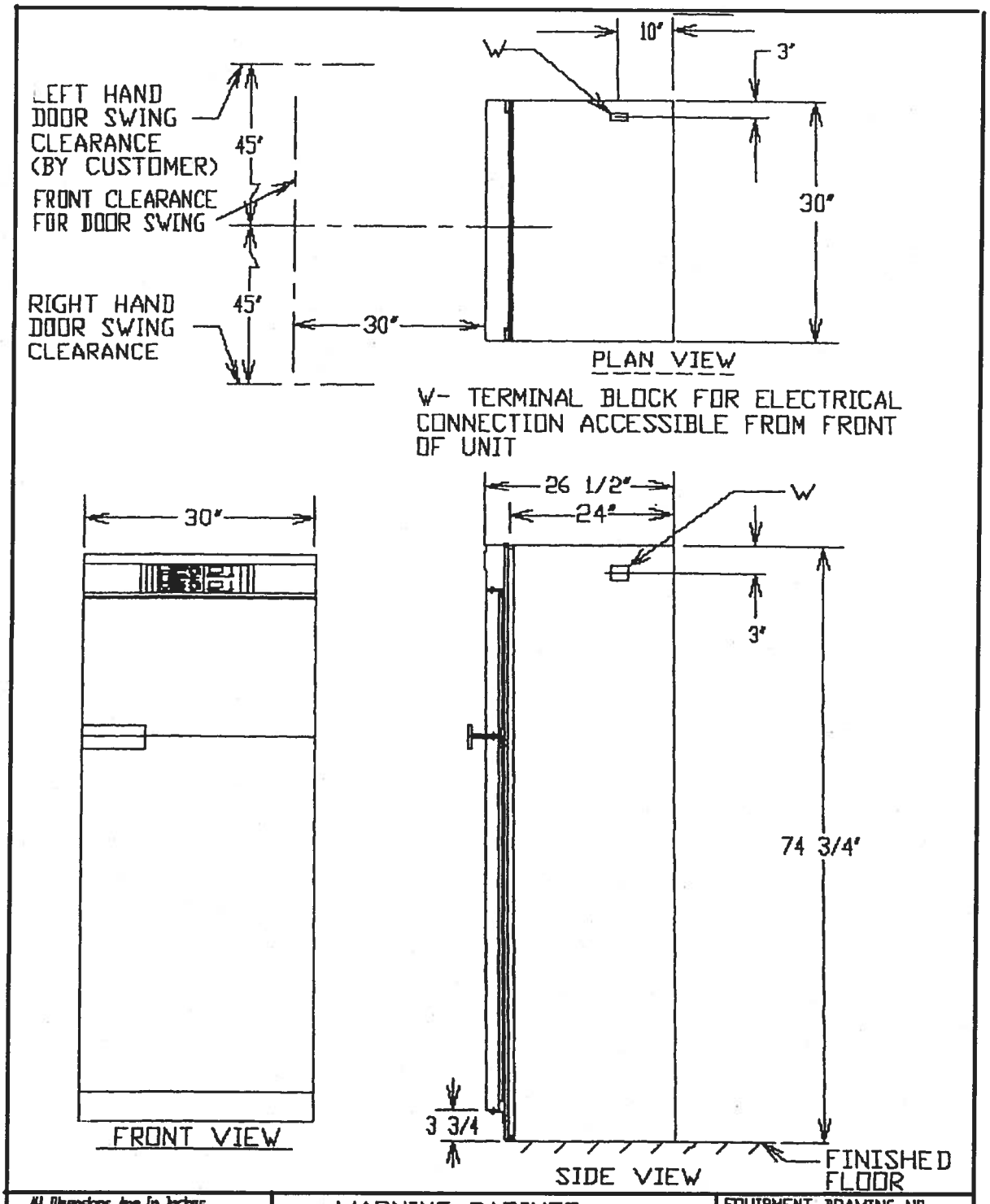
120 Volt, 50/60 Hz, 1-Phase, 13.7 A, 1600 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 6.8 A, 1625 Watts

. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)



Item # 717197



All Dimensions Are In Inches

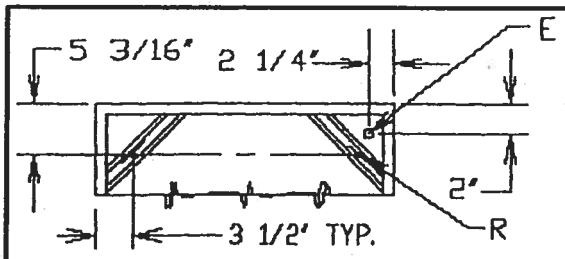
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET

24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214
SHT 1 OF 2

Item # 717197



REAR VIEW OF CABINET

E- 7/8" DIAMETER (22mm) HOLE FOR 1/2" (13mm) DIAMETER CONDUIT CONNECTION OR POWER CORD OPTION.

R- 3/8" (9.5mm) DIAMETER MOUNTING HOLES (2) FASTNERS NOT BY STERIS.

ELECETRICAL SPECIFICATIONS

VERSION	ELECTRICAL SUPPLY	POWER	CURRENT DRAW	UNIT BREAKER RATING
DOMESTIC	120V, 50/60 Hz, 1 PH	1644 WATTS	13.7 AMPS	15 AMPS
INTERNATIONAL	220-240V, 50/60 Hz, 1 PH	1625 WATTS	6.8 AMPS	10 AMPS

UNIT WEIGHT:

VERSION	UNIT WEIGHT		
	CRATED	BOXED	READY TO USE
DOMESTIC	542 LBS	410 LBS	353 LBS
INTERNATIONAL	557 LBS	425 LBS	368 LBS

UNIT CAPACITY:

	INTERNAL DIMENSIONS	VOLUME
TOP CHAMBER	22.875" DEEP X 23.75" WIDE X 15.5" HIGH 581.025mm DEEP X 603.25mm WIDE X 393.7mm HIGH	4.87 FT^3 .138 m^3
BOTTOM CHAMBER	22.875" DEEP X 23.75" WIDE X 38.25" HIGH 581.025mm DEEP X 603.25mm WIDE X 971.55mm HIGH	12.03 FT^3 .34 m^3

All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET
24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214 | SHT 2 OF 4

SEISMIC ANCHORAGE REPORT

for

74-INCH DUAL CHAMBER WARMING CABINETS

MODEL	ENGINEERING DWG. NO.	EQUIPMENT DWG. NO.
30"W X 18"D X 74"H OPEN MOUNTED	146655-541	129361-212
30"W X 18"D X 74"H RECESSED MOUNTED	146655-540	129361-213
30"W X 24"D X 74"H OPEN MOUNTED	146655-163	129361-214
30"W X 24"D X 74"H RECESSED MOUNTED	146655-162	129361-215

THE CALCULATIONS IN THIS REPORT SHOW COMPLIANCE WITH THE REQUIREMENTS OF TITLE 24 OF THE CALIFORNIA CODE OF REGULATIONS (CCR), PART 2 - CALIFORNIA BUILDING CODE (CBC) PUBLISHED AS THE 1988 EDITION OF THE UNIFORM BUILDING CODE (UBC) WITH STATE OF CALIFORNIA 1989. AMENDMENTS, SECTION 2312(g)

Prepared by: G. D. Hall — Date 8/21/91
Senior Engineer

Reviewed by: E. L. Thomas — Date 8/23/91
Project Engineer

Reviewed by: W. L. Sanders — Date
Project Manager

SEISMIC ANCHORAGE REPORT
74-INCH DUAL CHAMBER
WARMING CABINETS

AMSCO

PREPARED BY	CHECKED BY	APPROVED BY	APPROVED BY	APPROVED BY
G. Hall				
DATE 08/16/91	DATE	DATE	DATE	DATE

REVISION RECORD

REV.	DATE	APPROVED BY	PAGE	PARA.	CHANGE
0	8/16/91				Initial release PER # 24

EQUIPMENT WEIGHT & CENTER OF GRAVITY

	18"	24"	
Depth of Unit			
Weight of Cabinet (maximum)	220	260	pounds
Weight of Contents (maximum load)	360	480	pounds
Total Weight	580	740	pounds

The weight acts through the center of gravity as noted in Figures 1 and 2.

SEISMIC LOAD CALCULATIONS

Seismic load is calculated for the heavier unit from the formulae:

$F_p = Z\ I\ C_p\ W_p$ 1▸▸ 2▸▸

and:

$F_w = W_p \pm F_p/3$ 6▸▸

Where:

F_p = Lateral Seismic Force

Z = Zone Factor = 0.4 for Zone 4 locations 3▸▸

I = Importance Factor = 1.5 for essential facilities. 4▸▸

C_p = 0.75 Horizontal force factor - hospital equipment, rigid element 5▸▸

W_p = Dead weight of unit

F_w = Vertical Seismic Force

The forces then will be:

$F_p = Z\ I\ C_p\ W_p$

$= 0.4 \times 1.5 \times 0.75 \times W_p = 0.45\ W_p$

and:

$F_w = W_p \pm F_p/3 = W_p \pm (0.45\ W_p)/3 = W_p \pm 0.15\ W_p$

$F_w = 1.15\ W_p$ or $0.85\ W_p$

Seismic forces at the Warming Cabinet's C.G. are: (See Figures 1 & 2)

F_p - 0.45 X 740 = 333 lbs

F_w = 1.15 X 740 = 851 lbs

or

F_- = 0.85 X 740 = 629 lbs

EQUIPMENT ANCHORAGE INTERFACE

The equipment rest on the floor, but is anchored to the wall with three bolts as shown in Figures 1 and 2.

All the vertical seismic load is taken by the floor. The cabinet will not lift of the floor when the acceleration is upward. When the acceleration is downward, the stiffness of the cabinet is such that the load will be transmitted to the floor and not the bolts.

Friction on the floor is neglected, so all the horizontal load is taken by the bolts. It is assumed that the reaction of the floor is acting through the center of gravity producing no moment. The bolt reactions are determined by the laws of statics. When the seismic load is perpendicular to the wall, the bolts are in pure tension. When the seismic load is parallel to the wall, the bolts experience shear plus tension or compression to react the offset the center of gravity from the wall. The maximum tension any one bolt could experience is 210 pounds. The maximum shear any one bolt could experience is 180 pounds. A bolt can experience both maximum tension and maximum shear concurrently.

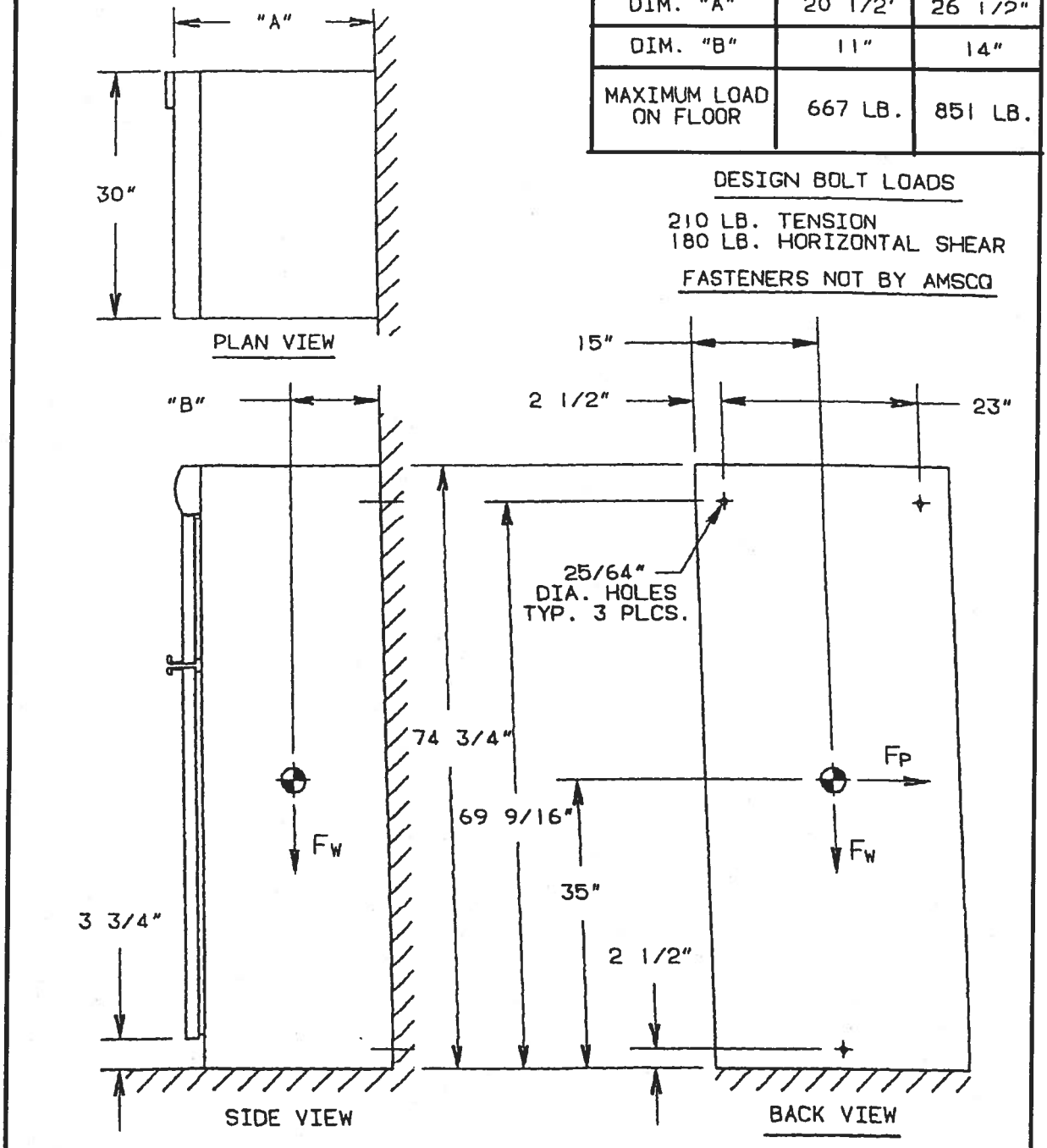
6▸▸ Reference 1▸▸ Table No. 23-P, Note 10, p. 179.54
5▸▸ Reference 1▸▸ Table No. 23-P, p. 179.53 plus notes on p. 179.26
4▸▸ Reference 1▸▸ Table Nos. 23-K and 23-L, pp 179.47 & 179.48
3▸▸ Reference 1▸▸ Table No. 23-I, p. 179.46
2▸▸ Reference 1▸▸ Section 2-312(g)2
1▸▸ Reference California Code of Regulations (CCR), Title 24, Part 2, Published as "State of California 1989 Amendments to the 1988 Edition of the Uniform Building Code".

	18" DEPTH	24" DEPTH
DIM. "A"	20 1/2'	26 1/2"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

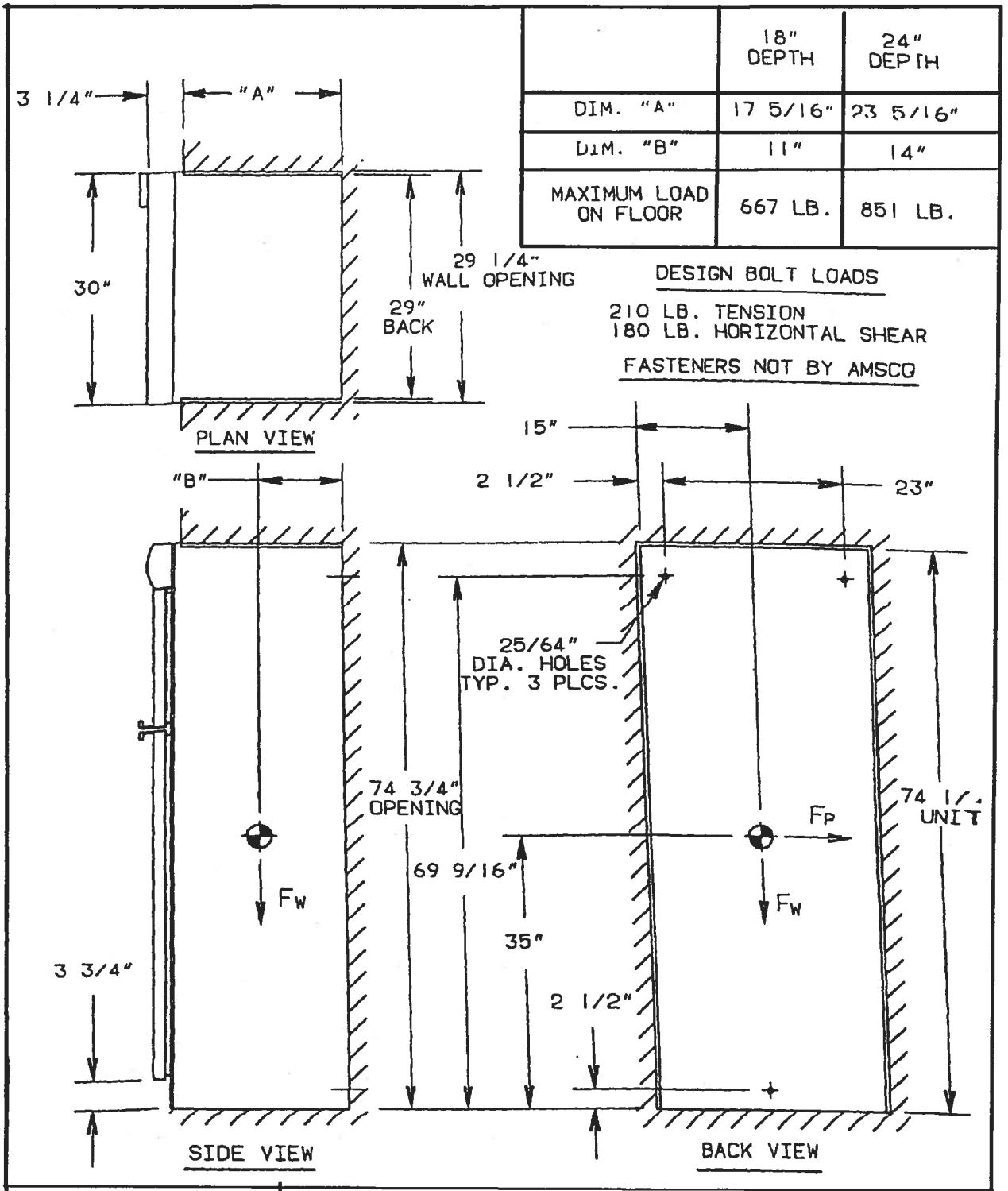
210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO



All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

Seismic Anchorage Report
Warming Cabinets, Open
30" Wide x 74" High



	18" DEPTH	24" DEPTH
DIM. "A"	17 5/16"	23 5/16"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO

All Dimensions Are In Inches
Also Refer To GENERAL NOTES
Applicable To Equipment Drawing

FIGURE 2
SEISMIC ANCHORAGE REPORT
WARMING CABINETS, RECESSED
30" WIDE × 74" HIGH

GENERAL NOTES – APPLICABLE TO SPECIALTY SURGICAL PRODUCT EQUIPMENT DRAWINGS

INTRODUCTION

Each equipment drawing (enclosed) pertains to the equipment as specified or purchased by you. These general notes and recommendations are intended to complement the equipment drawing(s), as necessary, and thereby further assist you in achieving satisfactory installation of the equipment. The information on this and the enclosed drawing(s) is based upon the design and construction of the equipment as of the date of the drawing.

SPACE CONSIDERATIONS

Clearances

The clearance dimensions shown on each drawing are the minimum considered necessary to allow space for servicing and operating the equipment.

Dimensions

Attention must be given to the *printed dimensions* shown on each drawing, since no attempt has been made to hold these drawings to any specific scale.

MOUNTING DETAILS

For Wall Mounting

It is important that walls be adequately reinforced to support the operating weight of the equipment as shown on the drawing. Materials and labor for such support are not furnished by STERIS.

Recessing Cubicle

Wooden bucks, where required to anchor equipment to the walls, are to be furnished by the Customer.

The recessing cubicle should be adequately ventilated to maintain temperature in the range of 80° to 90°F (27° to 32°C) when the equipment is in operation.

UTILITY SERVICE REQUIREMENTS

Roughing-in for Equipment Requiring Steam and/or Water Supply

All lines should be short-stubbed through the floor or wall, far enough to allow for pipe coupling. Provisions must be made for short-swing connections to equipment terminals.

Terminal Fittings

Unless otherwise specified in the contract or purchase order, piping and other appurtenances between terminal fittings on the equipment and wall or floor outlets (stubbing) are not furnished by STERIS.

Pipe Sizes

Pipe sizes shown on each equipment drawing indicate utility service terminals. To ensure adequate service, the lines leading to and from the equipment should be increased in size to conform with applicable plumbing codes.

Shutoff Valves

Separate shutoff valves should be installed in steam and water supply lines near each piece of equipment, so that the unit can be serviced without interruption of supply to other equipment.

Steam Return Lines

Steam return lines should be connected to a gravity system piped to a *vented receiver*. *Avoid any piping* arrangement that could cause back pressure in the return line.

Steam and Water Pressures

Steam and water pressures indicated on each drawing are to be dynamic at the equipment.

Equipment is adequately equipped to operate on the pressures listed on the equipment drawing. If supply line pressure exceeds those shown, provide reducing valves. These are not furnished by STERIS unless specifically called for in the contract or purchase order.

Wiring Terminals

Wiring on the equipment terminates at a junction box or boxes as shown on each drawing. Wiring and other appurtenances between junction box (or boxes) and building service lines are not furnished by STERIS.

Disconnect Switches

Disconnect switches with off position lockout only must be furnished and installed by the Customer in electric supply lines near each piece of equipment.

IMPORTANT

STERIS assumes no responsibility for changes made necessary through failure to explicitly observe these instructions and recommendations. In all instances, local, county, state, and national regulations should be observed.

STERIS SHIPPING INSTRUCTIONS AND SERVICE REQUIREMENTS

PREPARATION FOR SHIPMENT

Each unit of equipment shall be placed in a substantial shipping container or crate complying with applicable rules of the I.C.C. Uniform Freight Classification to ensure acceptance by the common or other carrier for safe transportation to final destination at the lowest rate. The shipping crate or container for heavy equipment (such as sterilizers and water stills) shall be of skid construction to facilitate handling by lift equipment.

The exterior of each container shall be clearly and legibly marked with the room, floor and item number (if available), shipping address, and brief description of the contents. A packing list and complete instructions for uncrating the equipment and setting it in place shall be fastened to the outside of the container or crate; such information shall be protected by a waterproof envelope. Packaging, packing, and marking differing from that above shall be provided, if specified.

INSTALLATION INSTRUCTIONS

Unless additional copies are specified, one set of complete installation instructions, including prints showing all utility service requirements, space requirements and wiring diagrams (if not affixed to the equipment) shall be furnished with each unit of equipment.

OPERATING AND MAINTENANCE INSTRUCTIONS

Instructions for operating and performing periodic preventive maintenance on each unit of equipment, including a list of the service parts and quantity of each required for this purpose, shall be furnished. Unless otherwise specified, one copy of this material shall be furnished.

SERVICE AFTER INSTALLATION*

After installation of each assembly, STERIS shall provide a factory-trained technician to perform repair service as required by the customer. This service shall be on a time and material basis unless the equipment is still within the manufacturer's warranty.

If specified, STERIS shall provide a factory-trained technician to perform preventive maintenance services on each assembly following its test and demonstration.

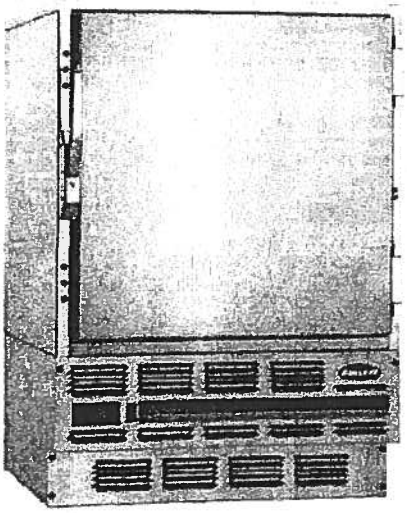
* *These services are available from the STERIS Corporation within the continental United States, Alaska, and Hawaii.*

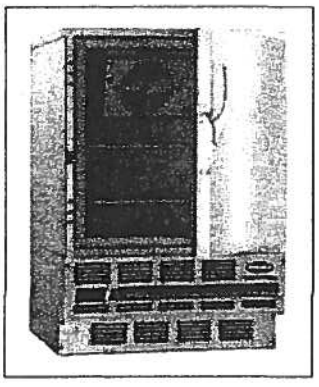
Item # 717197

Symphony REF Series Undercounter Refrigerators

Medical-grade undercounter refrigerator with external digital temperature display and stainless steel interior/exterior.

Model	
REF5	for standard 36" (915mm) counters, 4.8 cu ft capacity





Proper storage for expensive medications and patient supplies

- Heavy-duty compressor, forced air cooling and solid state controller maintain uniform cabinet temperatures with quick pull-down to temperature
- Adjustable set point meets temperature range requirements for different applications:
  36°F – 46°F (3°C – 8°C) for medications,
  33°F – 40°F (1°C – 5°C) for food and beverages
- Locking door handle provides medication security
- Supports JCAHO standards on medication storage
- NSF listing ensures temperature stability in adverse conditions and with frequent door openings

More features designed specifically for healthcare

- Easy-to-read external temperature display allows easy temperature logging
- Positive door latch and magnetic gasket provide secure closure
- Two, easy-to-clean, epoxy-coated shelves accept narcotic box hardware (supplied by others)
- Two models – for standard 36" (915mm) counter and 34" (864mm) ADA-compatible counters

Easy installation, cleaning and care

- Front-breathing design allows installation in standard 24" (610mm) casework opening with no side clearances
- Field-reversible door and handle for left or right opening
- Condensation evaporates automatically
- Automatic, off-cycle defrost eliminates manual defrosting
- Durable stainless steel interior and exterior for easy cleaning
- Slide-out compressor tray for easy access to condenser

Industry's best warranty

- 2-yr parts and labor on entire refrigerator
- 5-yr parts on compressor

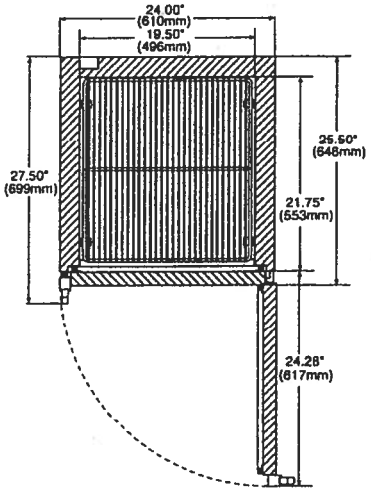
Accessories

- Temperature alarm with probe and °F/°C display
- Pyxis® compatible door bracket

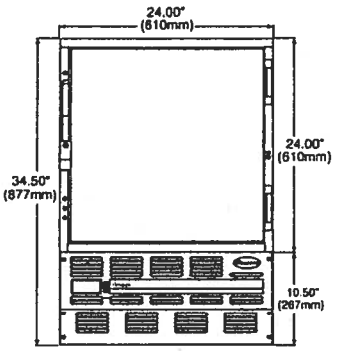
Item # 718171

REV: tlg 10/21/03

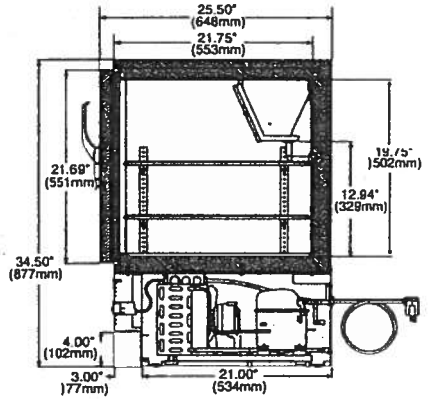
Top View
all models



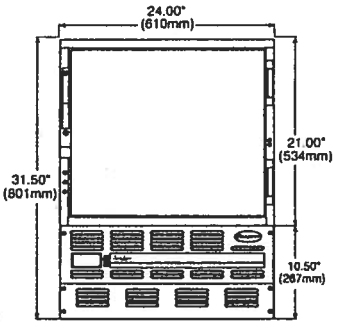
Front View
REF5



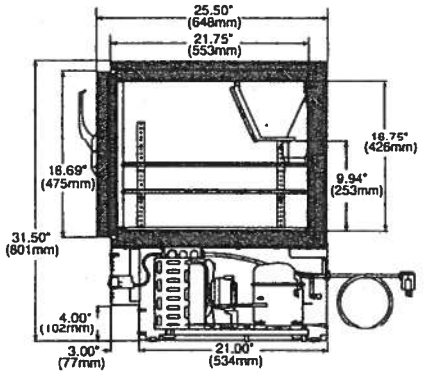
Side View
REF5



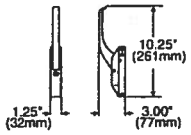
Front View
REF4-ADA



Side View
REF4-ADA



Handle Detail
all models



Plug Detail
all models
NEMA 5-15



Approximate Shipping Weight 175 lbs (79kg)

Standard Electrical 115V, 60Hz, 1 ph, 8.0 amps, max. fuse 15 amps
Hospital-grade cord and plug provided.

Specifications
Follett undercounter refrigerator to be model (choose one) _____ REF5 34.5" (877mm) high for use in standard counters or _____ REF4-ADA 31.5" (801mm) high for use in 34" (864mm) high ADA-compatible counters. REF5 to have 4.8 cu ft (136L) capacity. REF4-ADA to have 4.0 cu ft (113L) capacity. Environmentally-friendly R404A refrigeration system to include heavy-duty 1/4 HP compressor, blower, blower coil and automatic evaporative forced air cooling with off-cycle defrost. Refrigerator to be equipped with external temperature display in °F/°C and solid-state controller to maintain uniform cabinet temperatures. Controller to have programmable set points to meet temperature range requirements of different applications: 30°F – 40°F (2°C – 8°C) for medications, 33°F – 40°F (1°C – 5°C) for food and beverage. Refrigerator door to be field-reversible and equipped with replaceable gasket and chrome-plated handle with cylinder lock. Refrigerator interior and exterior to be stainless steel. Two epoxy-coated wire shelves adjust in 1/2" (13mm) increments. Storage area to be insulated with high-density, non-CFC foam polyurethane. Hospital-grade cord and plug provided. Refrigerator to be NSF, UL and cUL listed.

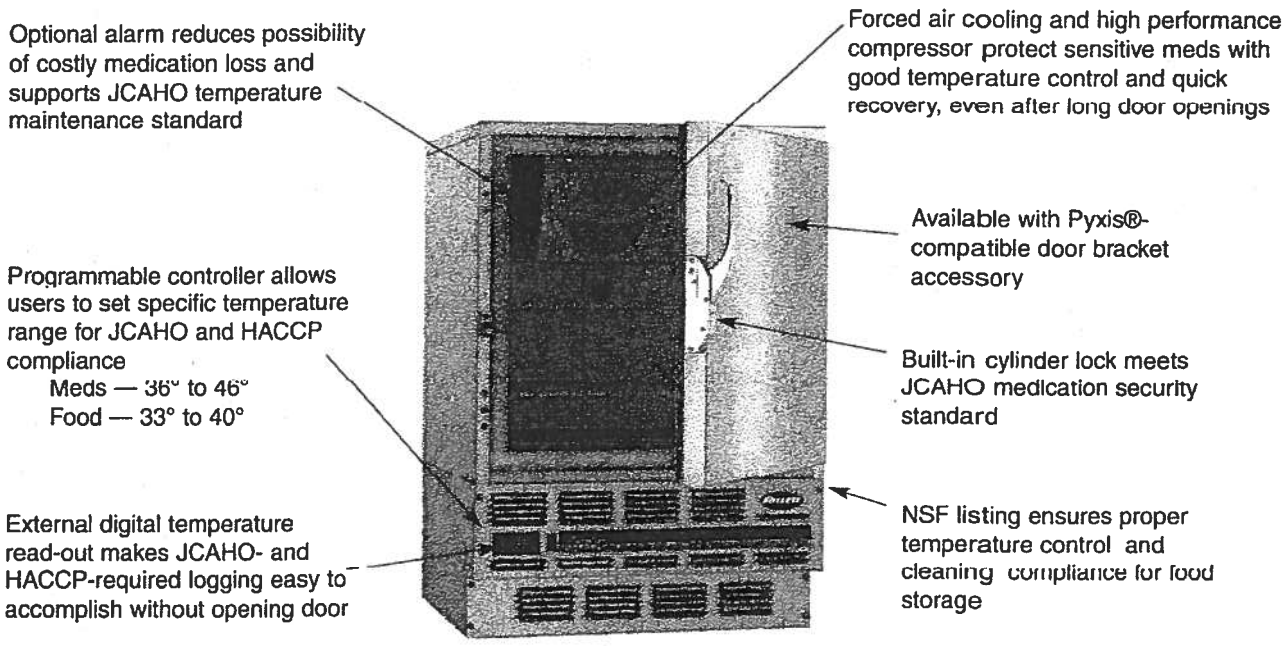
Item # 718171

Meets medication and food storage requirements

Follett's REF5 and REF4-ADA medical-grade undercounter refrigerators provide the features and performance to meet both JCAHO standards and local and state requirements for medication and food storage.

JCAHO's medication standard (TX 3.5/MM.2.20) addresses proper storage and control of medications, and at a minimum requires the logging of temperatures, lockable security for medications, and the maintenance of constant appropriate temperature.

State and local inspectors generally follow HACCP guidelines requiring temperature logging to ensure that perishable food is maintained below 40°F.



High-quality design and full stainless steel construction deliver outstanding performance and long-term reliability, backed with the industry's best warranty. Our component performance testing supports this claim:

- Compressor (1/4 hp, heavy-duty) — over 1.6 million on-off cycles without failure
- Fan, controller, and condenser — over 39,000 run hours without failure
- Door gasket — over 38,000 openings and closings with no measurable wear
- Door hinges — over 1 million cycles without measurable wear
- Door — tested open to 450 pounds of direct weight without failure

NSF - National Sanitation Foundation; JCAHO - Joint Commission on Accreditation of Healthcare Organizations; HCAAP - Hazardous Analysis of Critical Control Point Program

END OF SPECIFICATION

UNIT SPECIFICATIONS SHEET

LFGI-4USP LAMINAR FLOW GLOVEBOX / ISOLATOR

SECTION I. PERFORMANCE DATA

The Laminar Flow Glovebox/Isolator provides the ultimate in both product and operator protection. The LFGI functions as a Glovebox while operating under negative pressure to meet NIOSH recommendations and as an Isolator under positive pressure to meet USP <797> regulations. HEPA filtered unidirectional (laminar) air bathes the work area to protect the product from contamination and removes any particulate generated by sample manipulation. The operator is provided a complete barrier from materials being manipulated in the work area. The LFGI Series of barrier isolators meet or exceed ISO 14644-1 Class 5 air quality. Each LFGI, before shipping, undergoes rigorous physical testing to assure the unit meets performance requirements as validated. It is required that independent certification be performed before use.

SECTION II. EQUIPMENT SPECIFICATIONS

Construction-

-Overall Dimensions: 66 W (50" W at base) x 32" D x 80" H
-Work Area Dimensions: 46 ½" W x 24 ½" D x 29" H
-Designed to fit through standard door openings and elevators.
-All stainless steel construction both inside and out with a pharmaceutical grade finish.
-316L Stainless steel work trays slide over one another and are removable to facilitate easy clean up under the work deck.
-All viewing panels are stainless steel framed Acrylic
-Front viewing panel is top hinged and self supporting for easy access to the work area for cleaning and equipment ingress.
-All filter diffuser / guard panels are removable for easy cleaning.
-Straight sides and back maximize work area to accommodate the many types and shapes of pharmacy equipment and compounders.
-All corners in work area, antechamber and work surface are easily reached and cleaned.

Antechamber-

-Sealed two-door airlock (16" W x 13 ½" D x 14 ¼" H) maintains complete environmental separation between work area and ambient conditions.
-HEPA filtered purge of trapped airlock air eliminates cross contamination between the work area and the room during both material ingress and egress.

Waste Removal-

-Trash tube is a 4" diameter tube, flanged for waste bag/container connection and provided with an easily removable seal/stopper to maintain work area containment. (Stainless trash can is available)
-Sharps tube is a straight 2 ½" diameter tube to facilitate quick drop of the largest syringes and provided with an easily removable seal/stopper to maintain work area containment.
-Fully adjustable sharps container shelf accommodates most commercially available wide mouth or hinged top sharps collectors. (Examples BD Part # 305610 and 305491)

Safety-

-Lock-out handle requiring key for access to work area.
-Digital pressure readout with low pressure alarm for work area.
-Inward/Outward face velocity is 95-100 linear feet per minute at gloveport opening, to protect operator/product during massive breach of containment.
-Glove changes can be made without breaking containment.
-Locking casters are standard, seismic anchors are available.

Ergonomics-
-Hydraulic assist height adjusting stand offers a full 10" range variance allowing operators to sit or stand comfortably for extended time periods.
-Stainless steel sliding tray inside the airlock pulls into the work area eliminating reaching strains.
-Two part sleeve/glove system allows the use of most types and sizes of commercially available gloves for better dexterity and tactility.
-Extra large oval gloveports are placed with bottoms together to provide an athropometrically correct configuration that accommodates a wide range of body types and increases range of movement.
-Gloveports have a 3" arm rest to reduce operator fatigue.
-Large viewing panel is at an angle to reduce glare and operator strain.
-Integrated foot rest.

Configuration Options-
-Overall work area pressure can be either positive or negative and can be altered in-place by a certifier.
-Antechamber can be left or right handed or can be installed on both sides.
-Waste and sharps removal tubes can be left or right handed or can be installed on both sides.
-Three available exhaust options that can be factory set or changed by a certifier in-place.

Filtration-
-Full framed standard size minipleat HEPAs filter 100% of inlet and exhaust air from both the work area and the antechamber to provide a fully contained environment.
-HEPA filters are full coverage and front loading for easy replacement by a certifier.
-A Prefilter extends the life of the work area supply HEPA filter and can be replaced without tools.

Electrical-
-High capacity motor/blower systems with speed control to extend HEPA filters life.
-Ten foot hospital grade power cord with molded grounded plug.
-Sealed outlet in work area.
-Separate lighted power ON/OFF indicator switches for blower and lighting.
-High efficiency, standard sized fluorescent lights are externally mounted to minimize heat build-up.
-Voltage = 115 Volt, 60 Hz (220/50-60 Hz also available).
-Amperage Rating = 15, Running Amperage = 6

Exhaust-
-Clean air plenum is external to the work area.
-Constructed to allow for optional outside venting of exhaust air.
-Constructed to allow for 3 exhaust options that can be factory set or changed by a certifier in-place
-Venting is not required for operation but is optional.

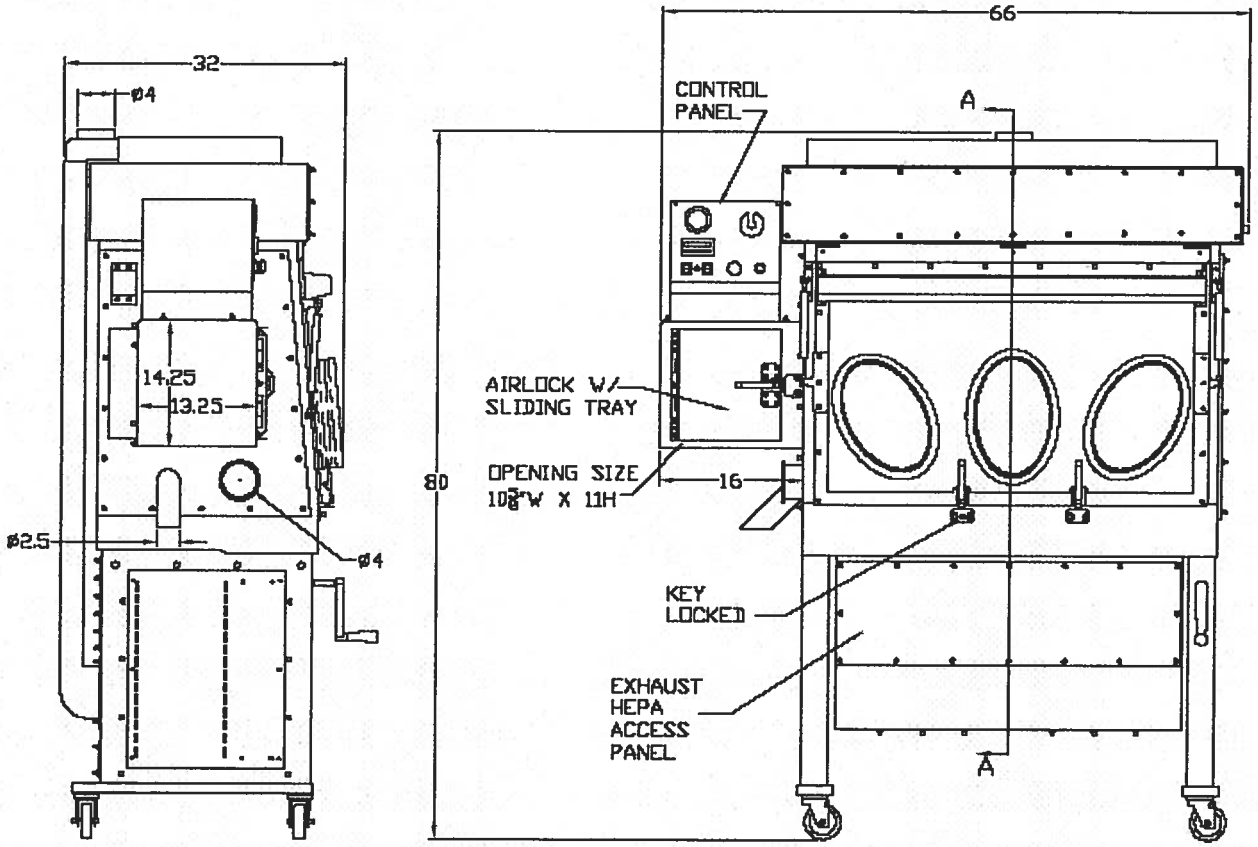
	No Exhaust- ~100% recycling of air	Controlled Exhaust- 80% recycling of air	Total Exhaust- no recycling of air.
Exhaust Connection	N/A	4" OD flexible hose	8" OD flexible duct
Exhaust CFM	20	80	400
Exhaust Static	N/A	<1 inch w.c.	Up to 2 inches w.c. (depending upon configuration)

Weight-
Net Weight- 625 lbs
Shipping Weight- 755 lbs

SECTION III. OPTIONAL EQUIPMENT AND ACCESSORIES-

LFGI-A80 Ergonomic task chair with anti-bacterial and anti-microbial vinyl covering, various colors
LFGI-A85S Stainless steel cleaning handle with pivot head. Accepts lint- free mop heads (LFGI-A85M)
LFGI-A8E Electrical Height Adjustment (requires additional plug-in)
LFGI-A83 Stainless steel garbage can (hangs on side to contain waste bags)
LFGI-A12 Exhaust ventilation kits

SECTION IV. UNIT DIAGRAM



END OF SPECIFICATION

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

Legend

D/R = Contractor De-Install & Relocate
CR = Contractor Rough-in Only
IR = Installation & Assembly Responsibility
F = Facility
C = Contractor
V = Vendor
N = New
E = Existing

Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	2-2099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	3-3073	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	4-4099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	5-5099	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1085	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1112	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	2-2082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	4-4082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1040	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1085	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1112	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3042	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3073	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4071	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

Legend

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5099	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1040	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1112	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	2-2071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	3-3042	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	4-4071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	5-5071	C				
475604	(Model: GTS18KBP) #GTS18KBP; REFRIGERATOR, TOP FREEZER,	3-3054	C				
477300	(Model: GMR04AAM) #GMR04AAM; REFRIGERATOR, UNDERCOUNTER	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1112	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	3-3073	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1070	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1085	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1112	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3017	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3027B	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3042	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3073	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4082	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5099	C				
15152	(Model: 101461) # 101461; ILLUMINATOR, 1 PANEL	3-3066	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	3-3073	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5099	C				
717197	(Model: DJ04112033-01) #DJ04112033-01; WARMING CABINET	3-3055	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	3-3072	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
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Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5097	C				
JC2725	(Model: QUOTE) LAMINAR FLOW GLOVEBOX	3-3054	C				
C2859	(Model: QUOTE) DISPLAY CASE & REFRIGERATOR	1-1002	C				

COID PROJECT NUMBER: _____

OWNER FURNISHED EQUIPMENT DELIVERY SCHEDULE

NOTE: Per the Contractor Guideline Book this OFE Delivery Schedule MUST be completed and returned BEFORE the first invoice is paid!

PROJECT NAME: _____

Project Phase Description (if applicable): _____

Project Location: _____

Project Completion Date: _____ **Completion Date This Phase:** _____

Owner Equipment Mgr. _____ **Phone:** _____

Owner Construction Mgr. _____ **Phone:** _____

Hospital Material Mgr. _____ **Phone:** _____

Contractor's Supt.: _____ **Phone:** _____

Contractor's Project Mgr. _____ **Phone:** _____

OWNER FURNISHED/CONTRACTOR INSTALLED EQUIPMENT

NOTE: Include date for special backboxes (such as OR Lights, Illuminators, etc.) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor will coordinate with HCA Equipment Manager for safe storage.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:

HCA Equipment Manager:
HCA Construction Manager:
Hospital Construction Contact:
Hospital Materials Manager:

ENGINEERED SYSTEMS EQUIPMENT DELIVERY SCHEDULE

(Sample on Following Page)

EXPLANATION / INSTRUCTIONS: HCA requires that the enclosed Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule Form to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed. This information enables owner vendors to ship cable and backboxes and equipment, as well as, schedule installation to meet the construction schedule. It is critically important that one schedule document be provided for each separate occupancy phase of the project.

Please see "Team Construction: Routine / Repetitive Phase" for general contractor's responsibilities for management of the owner furnished systems process and installation of all raceway and cable installation on some systems. It is the contractor's responsibility to update and redistribute this document if the construction schedule changes.

NOTE: **No Payments can be made until receipt of this schedule(s) by the HCA Construction Manager.**

OWNER PROJECT#_____

ENGINEERED/SYSTEMS INFORMATION & TELEPHONE SYSTEMS
EQUIPMENT DELIVERY SCHEDULE

Project Name: _____ Date: _____
Project Location: _____ Revision Date: _____
Description of this phase (if applicable) _____
Completion Date of this phase: _____
Project Completion Date: _____ Revised: _____
Owner's Construction Manager: _____
Owner's Equipment Manager: _____ Phone #: _____
Information & Telephone Systems Cabling Installation Project Manager: _____
Information and Telephone Systems Project Manager: Bob Stewart Phone #: 615-344-8010
General Contractor Superintendent: _____ Phone #: _____
Electrical Contractor Project Manager: _____ Phone #: _____

Installation or Need Equipment Delivered

ITEM/DESCRIPTION	OWNER FURNISHED OWNER INSTALLED	OWNER FURNISHED CONTRACTOR
INSTALLED	DATE:	DATE:
1. Wiring Schematics/Cut Sheet		_____
2. Engineered Systems Cable		
Cable & Special Backboxes		_____
3. T.V. Brackets		_____
4. Radio Tower	_____	
5. Information Systems:		
Cable:	_____	
Telephone Equipment:	_____	
Data Equipment:	_____	
6. Nurse Call System/Sound System:	_____	
7. Intercom System	_____	
8. Dictation System	_____	
9. MATV System	_____	
10. TV Set Installation	_____	
11. Systems Inspection	_____	_____
12. State Inspection	_____	_____
13. Demobilize Job site	_____	_____

DISTRIBUTION BY HCA CONSTRUCTION MANAGER:
Information & Telephone Systems: Bob Stewart
HCA Construction Manager:
HCA Equipment Manager:
Hospital Construction Contact:
General Contractor's Project Manager:

Owner/ Vendor Installed Equipment Delivery Schedule

ITEM	Date Building Will Be Ready For Installation
Kitchen Equipment	
Walk-In Cooler & Freezer	
Radiology Equipment	
Shelving/Lockers	
Patient Room Furniture	
Office/Waiting Furniture	
Drapes/Cubicle Curtains/Shower Curtains	
Artwork	
Others (as may be applicable)	

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
1. ANESTHESIA ADMINISTRATION		X	X	X	X									
2. AUDIO / VISUAL / PERSONNEL TRAINING AIDS										X	X	X	X	To be coordinated via DD session. Information Systems will budget.
a. Portable										X	X	X	X	
b. Systems										X	X	X	X	
3. AUTOMATED TRANSPORT SYSTEMS (Pneumatic Tube)						X	X	X	X					Check with Bulk Purchasing
4. CARTS														
a. Anesthesia		X	X	X	X									
b. Case, Surgical		X	X	X	X									
c. Cast		X	X	X	X									
d. Crash		X	X	X	X									
e. Endoscopy		X	X	X	X									
f. E.N.T		X	X	X	X									
g. Environmental Svcs		X	X	X	X									
h. Food Service		X	X	X	X									
i. Fracture		X	X	X	X									
j. Gift Shop (Hospitality)		X	X	X	X									
k. Isolation		X	X	X	X									
l. Linen		X	X	X	X									
m. Medication		X	X	X	X									
n. Miscellaneous		X	X	X	X									
o. Supply		X	X	X	X									
p. Tool		X	X	X	X									
q. Trash		X	X	X	X									
r. Utility		X	X	X	X									
s. Wrap		X	X	X	X									
5. CASEWORK														
a. Focal						X	X	X	X					Check with Bulk Purchasing
b. Standard						X	X	X	X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Volce (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
c. Special (Modular)						X	X	X	X					Check with Bulk Purchasing Typically Vendor Installed
d. Keyboards (Duplicate under furniture)						X	X	X	X					
6. CHAIRS, EXAM/TREATMENT														
a. Contour (Donor, I.V.)		X	X	X	X									
b. Dental		X	X	X	X									
c. Eye / ENT		X	X	X	X									
d. Miscellaneous		X	X	X	X									
e. Phlebotomy		X	X	X	X									
7. CHARTING SYSTEMS, PATIENT														
a. Manual		X	X	X	X									
b. Computerized										X	X	X	X	
c. Wall-hung chart station						X	X	X	X					
8. CLOCKS														
a. Discrete (Battery / Plug-in)						X	X	X	X					
b. Interval Timers / Recorders						X	X	X	X					
c. Systems, Cenralized						X	X	X	X					
d. Kronos Time & Attendance										X	X	X	X	
9. COMMODES														
a. Fixed						X	X	X	X					
b. Portable		X	X	X	X									
10. COMMUNICATIONS EQUIP/SYSTEMS														
a. Dictation														
1. Portable										X	X	X	X	
2. Systems, Hardwired										X	X	X	X	
b. Doctors' Registry						X	X	X	X					
c. Emergency Radio		X	X	X	X									Contractor to pull cable
d. Intercom		X	X	X	X									Contractor to pull cable
e. Nurse Call		X	X	X	X									Contractor to pull cable

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
f. Side Com Receptacle		X	X					X	X					
g. Radio / Pocket Paging		X	X	X	X									Contractor to pull cable
h. Two Way Radio		X	X	X	X									Contractor to pull cable
i. Telephone										X	X	X	X	
j. Overhead Page / Music		X	X	X	X									Contractor to pull cable
k. Transcription										X	X	X	X	
l. Public Address		X	X	X	X									Contractor to pull cable
m. Fax Machines										X	X	X	X	
n. Picture Archive and Communication Systems (PACS)										X	X	X	X	
11. COMPACTORS														
a. External						X	X	X	X					
b. Departmental						X	X	X	X					
12. DARKROOM EQUIPMENT														
a. Cabinet, Film Storage		X	X					X	X					
b. Miscellaneous		X	X	X	X									
c. Safelights						X	X	X	X					
d. Transfer Boxes, Cassette						X	X	X	X					
e. Revolving X-Ray Door						X	X	X	X					
13. DATA / WORD PROCESSING EQUIPMENT														
a. Desktop Computer										X	X	X	X	
b. Mainframe										X	X	X	X	
c. Network Equipment										X	X	X	X	
d. Backbone and/or Station Wiring										X	X	X	X	
14. DIALYSIS EQUIPMENT														
a. Peritoneal		X	X	X	X									
b. Renal		X	X	X	X									
15. EQUIPMENT MANAGEMENT SYSTEMS (Equipment Boom)		X	X	X					X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
16. ELECTROCARDIOGRAPH EQUIPMENT		X	X	X										
17. ELECTROSURGICAL EQUIPMENT		X	X	X	X									
18. ENVIRONMENTAL ROOMS						X	X	X	X					
(Prefabricated)														
19. ENVIRONMENTAL SERVICES EQUIP		X	X	X	X									
20. FIRE PREVENTION EQUIPMENT														
a. Blankets		X	X					X	X					
b. Cabinets, Extinguisher						X	X	X	X					
c. Extinguishers						X	X	X	X					
d. Systems						X	X	X	X					
21. FOOD SERVICE EQUIPMENT														
a. Grp. I (Hoods, Walk-Ins)		X	X	X	X									Elec. contractor makes actual connection
b. Grp. II (Moveable: Ovens, Dishwasher)		X	X	X	X									
c. Grp. II (Smallwares: Pots, Trays, Carts)		X	X	X	X									
d. Final Equipment Placement Set in place; caulking; touchup														Work to be completed by food service vendor
e. Garbage Disposals						X	X	X	X					
f. Cash register										X	X	X	X	
22. FREEZERS (excluding Food Svc Equip)														
a. Chest		X	X					X	X					
b. Miscellaneous		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in/Prefabricated		X	X	X	X									Elec. contractor make actual connection
23. FURNISHINGS, DESIGN														

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

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EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Accessories, Design	X													
b. Artwork / Graphics		X	X	X	X									
c. Bulletin Boards/Tack Boards/Chalkboards/Marker Boards						X	X	X	X					
d. Carpet						X	X	X	X					Check with Bulk Purchasing
e. Curtains, Cubicle						X	X	X	X					
f. Curtains, Shower			X	X	X	X								
g. Furniture, General - Existing			X	X	X	X								Interior Designer to spec fabric
h. Furniture, General			X	X	X	X								
i. Signs, Exterior						X	X	X	X					Check with Bulk Purchasing
j. Signs, Interior						X	X	X	X					Check with Bulk Purchasing
k. Waste Receptacles														
Clinical		X	X	X	X									
Non-Clinical			X	X	X	X								
l. Window Treatment / Blinds/ Cornice Boards			X	X	X	X								Except Blinds that are internal with window units
m. Wall Protector (ie: bumper / bed / handrail/corner guards)						X	X	X	X					
n. Keyboards - in workstations, duplicate in casework						X	X	X	X					
o. Planters			X	X	X	X								
p. Plants	X													
24. FURNITURE, PATIENT ROOM														
a. Beds		X	X	X	X									
b. Cribs		X	X	X	X									
c. Mattresses		X	X	X	X									
d. Table, Overbed		X	X	X	X									
e. Cabinets, Bedside		X	X	X	X									Interior Designer Specification Responsibility Per Equipment Managers Direction
f. Chairs, Lounge		X	X	X	X									
g. Chairs, Side		X	X	X	X									
h. Chests		X	X	X	X									
i. Desks		X	X	X	X									
j. Dressers		X	X	X	X									
k. Wardrobes (except built-ins)		X	X	X	X									
25. HAMPERS, LINEN		X	X	X	X									
26. HEART-LUNG MACHINES		X	X	X	X									

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
27. HOODS														
a. Biohazard		X	X					X	X					
b. ETO						X	X	X	X					
c. Fume		X	X					X	X					
d. Laminar Flow		X	X					X	X					
e. Radioisotope		X	X					X	X					
28. HOT LAB EQUIPMENT														
a. Nuclear Medicine		X	X	X	X									
b. Radiation Therapy		X	X	X	X									
29. HYPO-HYPERTHERMIA EQUIPMENT		X	X	X	X									
30. ICE MACHINES		X	X					X	X					
31. ILLUMINATORS, X-RAY FILM														
a. Motorized		X	X					X	X					
b. Recessed		X	X					X	X					
c. Surface Mounted		X	X					X	X					
32. IMAGING EQUIPMENT														
a. Computerized Axial Tomography (CT)		X	X	X	X									
b. Dental Radiography		X	X	X	X									
c. Digital Radiography		X	X	X	X									
d. Image Intensifier, Portable		X	X	X	X									
e. Magnetic Resonance Imaging		X	X	X	X									
f. Magnetic Resonance Imaging Rigging							X	X						Contractor responsible
g. Mammography Equipment		X	X	X	X									
h. Nuclear Camera		X	X	X	X									
I. Nuclear Medicine Accessories		X	X	X	X									
j. Radiation Therapy Equipment		X	X	X	X									
k. Radiation Therapy Accessories		X	X	X	X									
l. Radiographic Equipment		X	X	X	X									
m. Radiographic Equipment Accessories		X	X	X	X									
n. Single Photon Emission		X	X	X	X									

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HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
Computed Tomography														
o. Ultrasound Equipment		X	X	X	X									
p. Shielding (Lead, Magnetic, RF)						X	X	X	X					
q. Vibration Testing (MRI)														Contractor responsible
r. Picture Archive and Communication Systems (PACS)										X	X	X	X	
1. Cardiology and Radiology										X	X	X	X	
s. Cath Lab		X	X	X	X									
33. IMPRINTERS AND EMBOSSERS										X	X	X	X	
34. INCINERATOR														
a. Pathological						X	X	X	X					
b. Waste - Autoclave/Shredder						X	X	X	X					
35. INFANT CARE EQUIPMENT														
a. Bassinets		X	X	X	X									
b. Incubators		X	X	X	X									
c. Neonatal Care Systems		X	X	X	X									
d. Phototherapy Equipment		X	X	X	X									
e. Warmers		X	X	X	X									
36. INSTRUMENTS, EXAM														
a. Portable		X	X	X	X									
b. Wall Mounted	X	X	X	X	X									
(BP units, Oto/Ophth Sets)														
c. Diagnostic Board - Wallmount		X	X						X					
37. INSTRUMENTS, SURGICAL		X	X	X	X									
38. INTRAVENOUS PUMPS / CONTROLLERS		X	X	X	X									
39. LAB ANALYZERS / INSTRUMENTATION		X	X	X	X									
40. LASER DEVICES														

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Ophthalmic		X	X	X	X									
b. Surgical		X	X	X	X									
41. LAUNDRY SERVICE EQUIPMENT														
a. Washer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
b. Dryer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
42. LIGHTS														
a. Exam														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
b. Patient Headwall Lights						X	X	X	X					
c. Surgical														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
43. LOCKERS:														
NON PUBLIC AREAS						X	X	X	X					
PUBLIC AREAS						X	X	X	X					
BENCHES IN LOCKER ROOMS						X	X	X	X					
44. MAIL ROOM EQUIPMENT		X	X	X	X									
45. MAINTENANCE TOOLS & EQUIPMENT		X	X	X	X									
46. MATERIALS HANDLING / CONTROL EQUIPMENT		X	X	X	X									
47. MEDICAL GAS / VACUUM SYSTEM														
a. Primary System (Piping)						X	X	X	X					Check with Bulk Purchasing
b. Secondary Equipment		X	X	X	X									

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
(Regulators & Flowmeters)														
48. MEDICINE CENTERS						X	X	X	X					
a. Prefabricated						X	X	X	X					
b. Automated	X									X				
49. WEATHER GOOSE										X	X	X	X	
50. MISCELLANEOUS GROUPS II & III EQUIPMENT		X	X	X	X									
51. MONITORING EQUIPMENT, PHYSIOLOGICAL														
a. Ambulatory Systems														
1. ECG		X	X	X	X									
2. EEG		X	X	X	X									
b. Discrete Monitors														
1. Bedside		X	X	X	X									
2. Fetal		X	X	X	X									
c. Hardwired Systems		X	X	X	X									Contractor to pull cable
d. Miscellaneous Monitors		X	X	X	X									
e. Telemetry Systems		X	X	X	X									Contractor to pull cable
52. NARCOTICS LOCKERS						X	X	X	X					
53. NEUROLOGICAL EQUIPMENT														
a. Electroconvulsive Therapy Device		X	X	X	X									
b. Electroencephalographs		X	X	X	X									
c. Electromyographs		X	X	X	X									
d. Evoked Response Devices		X	X	X	X									
e. Misc. Equipment & Accessories		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
54. NOURISHMENT CENTERS (Prefabricated)						X	X	X	X					
55. OCCUPATIONAL THERAPY EQUIPMENT		X	X	X	X									
56. OFFICE MACHINES														
a. Calculators	X													Facility Operational Expense
b. Cash Registers										X	X	X	X	
c. Miscellaneous Equipment	X													Facility Operational Expense
d. Mobile Storage Equipment (Rotary)		X	X	X	X									
e. Photocopiers ie, Xerox	X													Facility Operational Expense
f. Typewriters	X													Facility Operational Expense
57. OPHTHALMIC EQUIPMENT														
a. Control Systems		X	X	X	X									
b. Portable		X	X	X	X									
58. ORTHOPEDIC APPARATUS		X	X	X	X									
59. OVENS / RANGES / MICROWAVES (Other than Food Service)														
a. Fixed		X	X					X	X					
b. Portable		X	X	X	X									
60. PATIENT SERVICE SYSTEMS (Prefabricated Headwall)														
a. Column - ICU / OR / RR / ER						X	X	X	X					
b. Headwall - LDRP						X	X	X	X					Check with Bulk Purchasing
c. Flatwall - ICU / ER / RR / Patient Room						X	X	X	X					
d. Headwall Accessories						X	X	X	X					
e. Anesthesia Gas Delivery Systems - Column Drops or Gas Boom Format						X	X	X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
61. PHYSICAL MEDICINE / REHAB EQUIP.														
a. Fixed (ie swimming pools)						X	X	X	X					
b. Hydrotherapy		X	X					X	X					
c. Portable		X	X	X	X									
62. PRINTING EQUIPMENT										X	X	X	X	
63. PROCEDURE SUPPORT EQUIPMENT (Portable, Stainless Steel)		X	X	X	X									
64. PROCESSORS, X-RAY FILM														
a. Processor		X	X					X	X					
1. Cine		X	X					X	X					
2. Darkroom		X	X					X	X					
b. Replenishment Systems, Chemical		X	X	X	X									
c. Silver Recovery Devices		X	X	X	X									
d. Laser Imager		X	X	X	X									
65. PROJECTION SCREENS						X	X	X	X					
SMART BOARDS		X	X	X	X									
66. PULMONARY FUNCTION EQUIPMENT		X	X	X	X									
67. REFRIGERATORS (exclude Food Service)														
a. Countertop		X	X	X	X									
b. Mortuary		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in / Prefabricated		X	X	X	X									Elec. contractor makes actual connection
68. RELIGIOUS ARTIFACTS		X	X	X	X									
69. RESPIRATORY THERAPY EQUIPMENT		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
70. RESUSCITATION EQUIPMENT		X	X	X	X									
71. RODS, CURTAIN (shower)						X	X	X	X					
72. SAFES		X	X	X	X									
73. SCALES														
a. Autopsy		X	X					X	X					
b. Bed		X	X	X	X									
c. Chair		X	X	X	X									
d. Clinical Exam		X	X	X	X									
e. Platform		X	X					X	X					
74. SCHEDULING SYSTEMS (automated)										X	X	X	X	
75. SCRUB SINKS						X	X	X	X					
76. SECURITY SYSTEMS														
a. Infant Abduction		X	X	X	X									Contractor to pull cable
b. CCTV - Campus Security		X	X	X	X									Contractor to pull cable
c. Door Access (ie: readers & locks)						X	X	X	X					With Equipment input
77. SHELVING / STORAGE EQUIPMENT														
a. High Density Systems		X	X	X	X									
b. Standard / Flat Steel - New		X	X	X	X									
c. Standard / Flat Steel - Existing		X	X	X	X									
d. Wire		X	X	X	X									
e. Miscellaneous (except built-in)		X	X	X	X									
f. Built-in						X	X	X	X					
78. STERILE PROCESSING EQUIPMENT														
a. Aerators		X	X					X	X					
b. Generator, Steam		X	X					X	X					
c. Loading / Processing Accessories		X	X	X	X									
d. Sonic Cleaners		X	X					X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
e. Steam Gun		X	X					X	X					
f. Sterilziers, Countertop		X	X					X	X					
g. Sterilizers, ETO Gas		X	X					X	X					
h. Sterilizers, ETO Gas / Aerator		X	X					X	X					
i. Sterilziers, ETO Gas / Steam		X	X					X	X					
j. Sterilizers, Electric / Steam		X	X					X	X					
k. Washers, Cart		X	X					X	X					
l. Washer, Fiberoptics		X	X					X	X					
m. Washers / Decontaminators / Sanitizers		X	X					X	X					Requires minimum of 9' ceiling
79. STRESS TEST EQUIPMENT		X	X	X	X									
80. STRETCHERS		X	X	X	X									
81. TABLES														
a. Autopsy		X	X					X	X					
b. Cysto		X	X	X	X									
c. Exam / Treatment		X	X	X	X									
d. Processing		X	X	X	X									
e. Surgical		X	X	X	X									
82. TELEVISION SYSTEMS														
a. Television Sets		X	X	X	X									Contractor to pull cable & install blocking
b. CCTV - Patient Monitoring		X	X	X	X				X					Contractor to pull cable & install blocking
c. Mounting Brackets		X	X					X	X					Contractor to install blocking & wall brackets
d. Antenna Systems		X	X	X	X									Contractor to pull cable
e. Cable TV (entrance cable to H-END location)	X													Equip. Mgr. notifies facility, contractor & TV vendor to coordinate installation w/local cable TV vendor for entrance cable.
83. TEMPERATURE ALARMS / RECORDERS		X	X					X	X					Blood Bank / Morgue Only

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
84. TOILET ROOM DEVICES														
a. Grab Bar						X	X	X	X					Check with Bulk Purchasing
b. Paper Towel Dispensers						X	X	X	X					Check with Bulk Purchasing
c. Sanitary Napkin Dispensers						X	X	X	X					Check with Bulk Purchasing
d. Soap Dispensers						X	X	X	X					Check with Bulk Purchasing
e. Toilet Paper Holder						X	X	X	X					Check with Bulk Purchasing
85. TRACK														
a. Curtain (Cubicle)						X	X	X	X					
b. Intravenous (including carriers & pendants)						X	X	X	X					
86. WATER CONDITIONING SYSTEMS														
a. Deionized						X	X	X	X					
b. Distilled						X	X	X	X					
c. Reverse Osmosis						X	X	X	X					
87. WATER COOLERS						X	X	X	X					
88. WHEELCHAIRS		X	X	X	X									

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VENDOR CONTACT MASTER

VENDOR	NAME/ADDRESS	CONTACT	PHONE	FAX	Web Address
902100	Abbott 100 Abbott Park Rd Dept 2FC-AP6C 5th Floor Abbott Park, IL 60064-6083	Rick Gooch	(708) 937-6161	(847) 937-0871	www.abbottdiagnostics.com
10517	Advanced Sterilization 33 Technology Drive Irvine, CA 92718	Customer Service	(800) 755-5900	(949) 450-6800	www.cidex.com
25360	AGFA Medical & Sterling Diag. 8170 Habersham Waters Rd. Dunwoody, GA 30350	Tom Koch	(800) 581-2432 Ext. #1238	(201) 288-3367	www.agfa.com
10451	Aladdin 250 East Main Street Hendersonville, TN 37075	Eric Roebuck	(800) 888-8018	(615) 748-3659	www.aladdintemprite.com
10240	Alimed 297 High Sttreet Dedham, MA 02026-9135	Robert Fralick	(800) 225-2610 Ext. #157	(800) 437-2966	www.alimed.com
10055	American Art Resources 3262 Sul Ross Houston, TX 77098	Kathy Hathorn	(800)282-0204	(713)527-9676	www.americanartresources.com
915200	ARJO 50 North Gary Ave Unit A Roselle, IL 60172	Terry Capp	(800) 323-1245 Ext. #6159		www.arjo.com
12599	Art Resource Team (A.R.T.) 2526 Homestead Place Cincinnati, OH 45211	Tony Baird	(513) 662-1998	(513) 662-6977	www.artresourceteam.com

VENDOR CONTACT MASTER

15000	Baker Company PO Drawer E Sanford Airport Sanford, ME 04073	Customer Service	(207) 324-8773	(207) 324-3869	www.bakerco.com
15012	Baring Industries 1808 West End Ave, Suite 814 Nashvill, TN 37203	Tom Esberger	(615) 321-0272	(615) 321-5667	www.baring.com
15026	Berchtold 1950 Hanahan Road Charleston, SC 29406	Jeff Dunkley	(800) 243-5135 ext. 334	(843) 569-6133	www.berchtoldusa.com
15382	Biodex Medical Brookhaven R&D Plaza 20 Ramsey Rd, Box 702 Shirley, NY 11967-0702	Marie Springman	(631) 924-9000 Ext. #234	(681) 924-9338	www.biodex.com
15206	Boehringer Laboratories, Inc. 500 E. Washington Street Norristown, PA 19401	Eileen Welty	(610) 278-0900	(610) 278-0907	www.boehringerlabs.com
20633	Camtronics Ltd. Medical System 900 Walnut Ridge Drive Hartland, WI 53029	Steve Crandall	(866) 694-2510		www.camtronics.com
933800	Cardinal Health & Medical Prod. 1750 Stoneridge Dr. Stone Mountain, GA 30083	Renee Hensley	(800) 889-1065 Ext. #3307	(770) 270-9645	www.cardinal.com/mps or www.cardinalhealth.com
901500	Cardinal Health & Medical Services 1750 Stoneridge Dr. Stone Mountain, GA 30083	Paula Watkins	(800) 633-0333	(800) 488-3987	www.cardinal.com/mps or www.cardinalhealth.com
21879	Cardinal Respiratory Care 1500 Waukegan Rd McGaw Park, IL 60085	Shelly Lancaster	(800) 637-1500 Ext. #1521	(630) 369-9302	www.cardinal.com/mps or www.cardinalhealth.com

VENDOR CONTACT MASTER

21433	Common Cents Solutions PO Box 5454 Jackson, MS 39288-5454	Tom Bunting	(888) 932-3687 Ext. #36	(601) 932-9414	www.commoncents.net
25350	Data Cash Register 942 Woodland Street Nashville, TN 37206		(615) 227-6978	(615) 227-7589	www.dcrpos.com
960400	Datascope 4117 Hillsboro Rd 103-303 Nashville, TN 37215	Kevin Wampler	(800) 288-2121	(800) 266-9624	www.datascope.com
25160-4	Diagnostic Imaging 199 Foster Brothers Drive West Columbia, SC 29172	Larry Myers	(803) 796-7038	(803) 796-9749	
920100	Dictaphone 147 Country Club Drive Hendersonville, TN 37075	Mike Collier	(888) 471-3463 Ext. # 4277	(203) 683-2169	www.dictaphone.com
956200	Dukane 27545 Diehl Rd., Suite 200 Warrenville, IL 60555	Angelo Lopez	(630) 836-3745	(630) 836-3805	www.dukane.com
944800	Follett 801 Church Lane PO Box D Easton, PA 18044	Gary Gutman	(800) 523-9361	(610) 250-0696	www.follettice.com
35570	Food Systems 318 Seaboard Lane, Bldg 100 Suite 114 Franklin,TN 37067	Beverly LeBlanc	(866) 662-4279 (615) 261-0400	(615) 261-0401	www.foodsystemsul.com
967600	GE Appliances (Acct #FMD30) 307 N. Hurstborne Pkwy Louisville, KY 40222	Skip Alcorn Jason Cropper	(615) 264-8994 (800) 782-8031 x4	(800) 772-6704	www.geappliances.com

VENDOR CONTACT MASTER

904100	GE Healthcare Datex-Ohmeda PO Box 7550 Madison, WI 53707-7550	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.datex-ohmeda.com
902900	GE Healthcare Technologies 830 Crescent Centre Dr. Suite 460 Franklin, TN 37067	Milton Mueller	(615) 472-2409 Cell: (615) 519-3357	(414) 918-8200	www.gehealthcare.com
40006-4	GE Medical System (Dia) PO Box 414, WT895 Milwaukee, WI 53201	Terri	(800) 232-2599	(800) 558-5102	www.gehealthcare.com
953600	GE Healthcare I.T. (Marquette) 8200 West Tower Ave Milwaukee, WI 53223	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.gehealthcare.com
968700	GE - OEC Medical Systems 3724 National Drive, Suite 100 Raleigh, NC 27612	Hurley Raynor	(800) 728-6596	(919) 881-8367	www.gemedicalsystems.com
912700	Getinge USA PO Box 3208 Augusta, GA 30914-3208	Carlton Colcough	(800) 475-9040	(716) 272-5283	www.getingeusa.com
921000	Grainger 1021Charlotte Avenue Nashville, TN 37203	Kevin Kolff	(615)480-7783 (800)994-2336	(615)331-0485	www.grainger.com
914300	Hill-Rom 1069 State Road, 46 East Batesville, IN 47006-9164	Doug Weigel	(800) 445-3730	(812) 934-1442	www.hill-rom.com/products
934300	Drager/ Air Shields 1069 State Road, 46 East Batesville, IN 47006-9164	Lisa Aiello	(800) 437-2437 x2358	(812) 934-1442	
920700	Interior Design Services 209 Powell Place Brentwood, TN 37027	Daryl Dunn	(615) 376-1222	(615) 376-3510	www.ids-tn.com

VENDOR CONTACT MASTER

51073	Thermo Electron 308 Ridgefield Ct. Asheville, NC 28806	Josh Camp	(800) 252-7100 828-658-2882	(828) 658-0363	www.thermo.com or www.kendro.com
914700	Medquist/ Lanier Healthcare 5930 Metric Place, Suite 200 Norcross, GA 30092	James Thomas	(251) 945-3412 (866) 856-3000	(943) 337-5752	www.medquist.com or www.lanier.com
929400	Medline Industries, Inc. 105 Continental Drive Brentwood, TN 37027	Jeff Fair	(615)373-2142 (888)897-7557	(615)373-2486	www.medline.com
916400	Medtronic Emergency Response System PO Box 97023 Redmond, WA 98073	Tammy Lombardi	(800) 442-1142 Ext. #4162	(800) 732-0956	www.medtronicphysiocontrol.com
70583	Nicolet 5225-2 Verona Rd Madison, WI 53711-4495	Kathy Hart	(800) 356-0007	(608) 441-2007	www.thermo.com
954400	Nihon Kohden 202 Kensington Place Nashville, TN 37215	Jim Fagan	(615) 292-5082	(615) 292-0584	www.nkusa.com
72016	Olympus 2 Corporate Ctr. Drive Melville, NY 11747	Betty Shaffer	(631) 844-5437 (800) 645-8100	(631) 844-5110	www.olympus-global.com
958320	Pharmed 3075 NW 107th Ave Pharmed Way Miami, FL 33172-2134	Carolyn Thomas	(800) 683-7342 Ext 342 (305) 592-2324	(800) 621-9511	www.pharmed.com
11331	Philips - ATL Ultrasound Ste 540 501 Corporate Centr Dr., Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com

VENDOR CONTACT MASTER

74031-1	Philips Medical Imaging 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com
914200	Philips Medical (Monitoring) 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Roger Duffy	(615) 472-2207	(615) 472-2273	www.philips.com
944500	Quinton 3303 Monte Villa Pkwy Bothell, WA 98021	Bob Atkins	(800) 426-0347	(425) 402-2001	www.quinton.com
76007	Radiology Specialty PO Box 406 Hermitage, TN 37076	Bob Webb	(615) 885-5326	(615) 885-4691	
924800	Rauland Borg Corporation 3450 West Oakton Street Skokie, IL 60076-2951	Alex Veytsel	(847) 324-8380 Ext. #380	(847) 679-4106	www.rauland.com
81742	Sara Lee Coffee & Tea 990 Supreme Dr. Bensonville, IL 60106	Kory Mickelsom	(800) 621-4100	(773) 489-7323	www.saraleecoffee.com
956000	Simplex Grinnell 9855 Carroll Canyon Rd San Diego, CA 92131	Randy Wilkins	(858) 279-8010	(858) 740-0157	www.tycoin.com
904600	Standard Textile PO Box 371805 Cincinnati, OH 45222	Tricia Partin	(800) 888-5000 Ext. #270	(800) 926-0043	www.standardtextile.com
912000	Steris/ Amsco Products 2448 Shiland Dr. Rock Hill, SC 29732	Randy Marks Dave Piver Lara Stark	(800) 989-7575 Randy #23117 Dave #21152	(440) 392-8902	www.steris.com
55026	Storage Systems, Inc. 318 Seaboard Lane Bldg. 100, Suite 115 Franklin,TN 37065	Bill Kreager	(888) 614-0004 (615) 261-6900	(615) 261-6906	www.storagesystemsul.com

VENDOR CONTACT MASTER

901100	Stryker Medical 4100 East Milham Ave. Kalamazoo, MI 49001-6197	Gloria Phillips	(800) 800-4236 ext. 1456	(800) 610-4408	www.stryker.com
929900	Telehealth/Telerent 4205 Hillsboro Rd Suite 303 Nashville, TN 37215	Darrell Leftwich	(615) 383-7836	(615) 383-4226	www.telehealth.com
85060-1	Toshiba 2150 F Northmont Pkwy Duluth, GA 30136	Craig Hamilton	(770)476-9992	(770) 476-1511	www.tobshiba.com/tams/newtams
921500	US Surgical 5920 Longbow Dr. Boulder, CO 80301	Customer Service	(800) 722-8772	(800) 544-8772	www.ussurg.com
91734	Wireless Solutions, Inc. 720 Fesslers Lane Nashville, TN 37210	Marie Gilland	(615) 255-5670	(615) 255-9967	
925500	Zenitel 6119 Connecticut Kansas Ctiy, MO 64120	Jeanne Gramman (816) 231-7201	(816) 231-7202	(816) 231-7203	www.zenitel.com

OWNER FURNISHED EQUIPMENT BROCHURE

Revision: August 9, 2006

The Medical Center Aurora

A02429 – Bed Tower Expansion

Aurora, CO

PROJECT # 306660001

Jimmy Cagle
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(615) 344-2179
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HCA
The Healthcare Company.

Table of Contents

- Owner Furnished Equipment Index
- Specifications
- Project Information Sheet
- Owner Furnished/ Contractor Installed Equipment Delivery Schedule
- Owner/ Vendor Installed Equipment Delivery Schedule
- Engineered Systems Information and Telephone Systems Equipment Delivery Schedule
- Responsibility Matrix
- Vendor Contact Matrix

Owner Furnished/ Contractor Installed Equipment Notes

NOTE: Include date for special backboxes (such as OR Lights, Illuminators) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment, nurse call, ect.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor is required to store in secure environmentally controlled space and confirm with HCA Medical Equipment Manager.

NOTE: HCA required that the enclosed Owner Furnished/ Contractor Installed Equipment Delivery Schedule (excel), Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule form (word) to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed.

NOTE: No payments can be made, until receipt of the schedule(s) by the HCA Construction Manager.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:
HCA Equipment Manager
HCA Construction Manager
Hospital Construction Contact
Hospital Materials Manger

PROJECT INFORMATION SHEET

Project Title:_____ **Date of Issue:**_____
Owner Project:_____ **Revision Date:**_____
HOSPITAL:_____
ADDRESS:_____
TELEPHONE:_____ FAX:_____
ADMINISTRATOR:_____ CONTACT:_____
MATERIAL MGR:_____ PLANT MGR:_____
CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____
PROJECT MAILING ADDRESS:_____
E-MAIL ADDRESS:_____
ARCHITECT:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
INTERIOR DESIGN FIRM:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
M.P.E. ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
STRUCTURAL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
CIVIL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
MECHANICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
ELECTRICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
HCA
ONE PARK PLAZA, BLDG. 2 – 3E, NASHVILLE, TN 37203
P.O. BOX 550 (37202-0550)
TELEPHONE: 615-327-9551
DIRECTOR CONSTRUCTION:_____ PH:_____
CONSTRUCTION MANAGER:_____ PH:_____
EQUIPMENT ENG. SYS. MGR:_____ PH:_____
IS/TELECOM:_____ PH:_____

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

203200	FOLLETT CORPORATION	4	#110FB400A; ICE MAKER DISP.115/1 12.2A , SENSORSAFE DISPENSING PKG (#SENSORSAFE; $98.00), FR STANDING STG 24 1/2"W X 28.25"D X 68.125"H, 90 LBS STG, 400 LBS/DAY ICE PRODUCTION AIR COOLED. INCLUDES WATER STATION, WATER FILTER(NOT INCLUDED) **FLOOR DRAIN REQUIRED** 2--2099/1, 3--3073/1, 4--4099/1, 5--5099/1
203210	FOLLETT CORPORATION	5	#25CT400A; ICEMAKER DISPENSER, ($2,892.00) 21"W X 47.125"H X 23"D- COUNTERTOP, AIR COOLED, 25LB STORAGE CAPACITY, 400LB PER 24HR ICE PROD. TO INCL WATER STATION, SENSORSAFE DISPENSING (#SENSORSAFE; $98.00) 1--1085/1, 1--1112/1, 2--2082/1, 4--4082/1, 5--5082/1
430279	GENERAL ELECTRIC CO	14	#JEM25; MICROWAVE OVEN DIMENSIONS: 11 11/64"H X 23 25/32"W X 12 55/64"D. 120V - 60-CYCLE. CONTRACTOR TO SHELF MOUNT SELECT COLOR: BLACK - JEM25BF OR WHITE JEM25WF. 1--1040/1, 1--1085/1, 1--1112/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3042/1, 3--3073/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5071/1, 5--5082/1, 5--5099/1
475603	GENERAL ELECTRIC CO	6	#GTS18WCP, REFRIGERATOR, 17.9 CU. FT. NO FROST, W/FACTORY INSTALLED ICEMAKER; 66 5/8" H X 32 1/8"D X 29 1/2 "W. 120V/60 HZ/15AMPS. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT. 1--1040/1, 1--1112/1, 2--2071/1, 3--3042/1, 4--4071/1, 5--5071/1
475604	GENERAL ELECTRIC CO	1	#GTS18KBP; REFRIGERATOR, TOP FREEZER, 17.9 CU. FT. CAP. NO FROST. 66 5/8"H X 32 1/8"D X 29 1/2"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: BLACK, WHITE, BISQUE. HINGE: LEFT OR RIGHT. 3--3054/1
477300	GENERAL ELECTRIC CO	2	#GMR04AAM; REFRIGERATOR, UNDERCOUNTER 4.3 CU FT CAPACITY. 32 7/8"H X 21 3/4"D X 20"W, 110V. RIGHT HINGED. SELECT COLOR: BB/BLACK OR WW/WHITE 1--1085/2

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

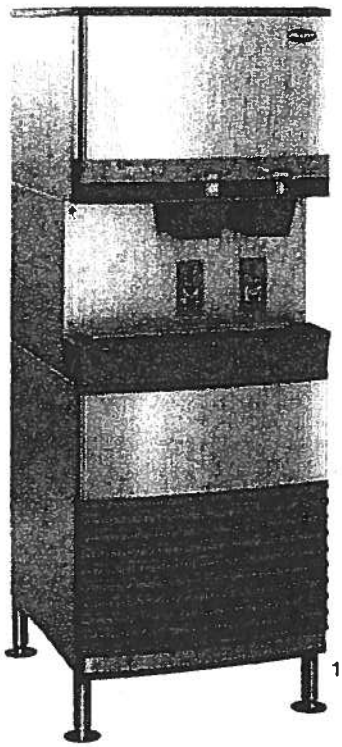
714519	FOLLETT CORPORATION	9	#QC4-FL4S; WATER FILTER SYSTEM (ACCESSORY FOR ICEMAKER DISPENSERS). #QC4-FL4S 1--1085/1, 1--1112/1, 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
715053	SARA LEE COFFEE & TEA	19	COFFEE MAKER, LO-PROFILE MODEL #8573, 3-STATION, AUTOMATIC COFFEE BREWER, FROM SUPERIOR COFFEE FOR REFERENCE ONLY, HOSPITAL TO LEASE (MFG. - BLOOMFIELD) PLUMBING REQUIREMENT: 1/4" OR 3/8" WATER CONNECTION 1--1070/1, 1--1085/1, 1--1112/1, 2--2030/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3017/1, 3--3027B/1, 3--3042/1, 3--3073/1, 4--4030/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5030/1, 5--5071/1, 5--5082/1, 5--5099/1
715152	RADIOLOGY SPECIALTY	1	# 101461; ILLUMINATOR, 1 PANEL RECESSED MT 4 BULB 3--3066/1
715344	GENERAL ELECTRIC CO	7	#GTS17KBR, REFRIGERATOR: TOP MOUNT. NO FROST, 4 SPILT SPILL PROOF ADJ. GLASS SHELVES. 16.6 CU. FT. CAP. 64 3/4"H X 31"D X 28"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
717197	STERIS/AMSCO PRODUCTS	1	#DJ04112033-01; WARMING CABINET 24" DIGITAL; SEISMIC 3--3055/1
718171	FOLLETT CORPORATION	7	#REF5; REFRIGERATOR, UNDERCOUNTER, WITH LOCK AND KEY, STAINLESS STEEL INTERIOR/EXTERIOR, 4.8 CU. FT., 115 V, 60HZ, 1PH, 8.0 AMPS, MAX.FUSE 15 AMPS, HOSPITAL GRADE CORD & PLUG - NEMA 5-15, 33 DEGREES F - 40 DEGREES F (1 DEGREE C - 5 DEGREES C) REVERSIBLE DOOR SWING/HANDLE, 34HX23.75WX25.5D, NSF, UL & CUL LISTED. 2--2076/1, 2--2097/1, 3--3072/1, 4--4076/1, 4--4097/1, 5--5076/1, 5--5097/1

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

JC2725	GERMFREE LABORATORIES INC.	1	LAMINAR FLOW GLOVEBOX ISOLATOR - 4 FOOT QUOTE # 200605929 58" W X 32"D X 87"H STANDARD 115V 3--3054/1
JC2859	BARING INDUSTRIES, INC.	1	DISPLAY CASE & REFRIGERATOR *****SPEC SHEET NOT INCLUDED WITH THIS DOCUMENT******* GALA SOURCE -12 CU FT REFRIGERATOR - TUR - 48SD ZESCO - COMBINATION NON-REFRIGERATED ABOVE/REFRIGERATED SERVICE CASE BELOW - 40" WIDE ENCORE 699-A-021 ********ARCHITECT TO SPEC SPACE & ELECTRICAL******** 1--1002/1

Symphony™

110FB400A air-cooled integral icemaker
110FB400W water-cooled integral icemaker



110FB400A/W shown with SensorSAFE accessory



Freestanding, automatic load, ice and water dispensers with air- or water-cooled icemaker located in the base of unit. Stainless steel frame and exterior with plastic trim. Water station standard. Up to 90 lbs (41kg) storage. Produces approximately 400 lbs (181kg) of compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet™ compressed nugget ice is slow melting, easy to chew

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone
- Clear chute directs ice cleanly into cups, pitchers, carafes, ice bags

Space-saving, attractive design

- 24.5" (623mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally friendly Maestro™ icemakers

- New, state-of-the-art R404A icemakers automatically load dispensers with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high wastewater
- Quiet production, no noisy harvest cycles

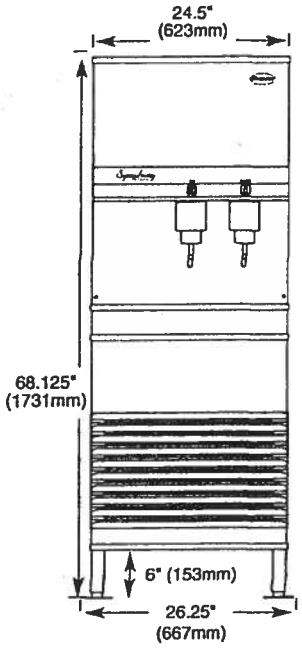
Accessories

- SensorSAFE actuation package
- Chilled water option
- Water filter kit
- Casters
- Up to 6 beverage valves (no beverage cooling)

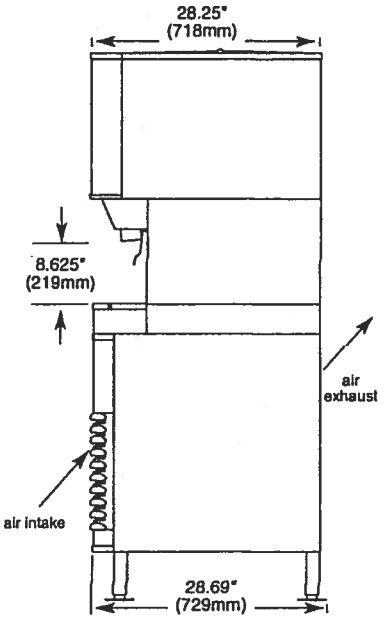
REV: tlg 7/31/03

Item # 203200

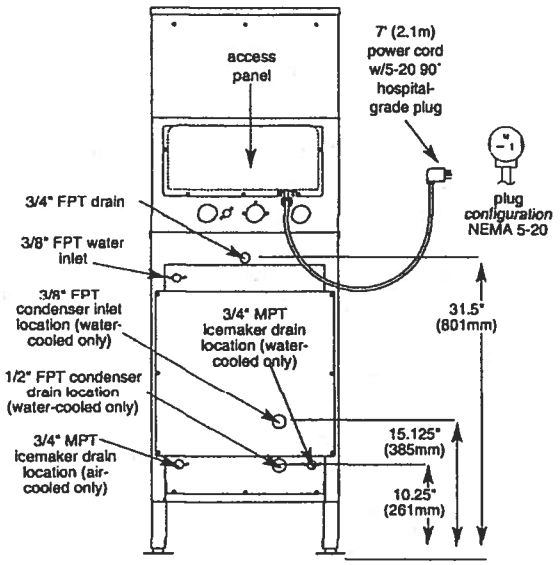
Front View



Side View



Rear View



Ice Production per 24 hours

Air-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	510 / 232	454 / 206	397 / 180	335 / 152	273 / 124	lbs. / kg.
60 / 16	482 / 219	435 / 198	389 / 177	329 / 150	270 / 123	lbs. / kg.
70 / 21	454 / 206	417 / 190	380 / 173	323 / 147	266 / 121	lbs. / kg.
80 / 27	424 / 193	385 / 175	347 / 158	297 / 135	247 / 112	lbs. / kg.
90 / 32	394 / 179	354 / 161	313 / 142	270 / 123	227 / 103	lbs. / kg.

Water-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	451 / 204	447 / 203	442 / 200	437 / 198	428 / 194	lbs. / kg.
60 / 16	423 / 192	413 / 187	409 / 185	399 / 181	394 / 179	lbs. / kg.
70 / 21	394 / 179	390 / 177	380 / 172	371 / 168	361 / 163	lbs. / kg.
80 / 27	371 / 168	361 / 164	352 / 160	342 / 155	333 / 151	lbs. / kg.
90 / 32	352 / 160	342 / 155	333 / 151	323 / 146	309 / 140	lbs. / kg.

Required clearances
12" (305mm) at top recommended for service, 4" (102mm) at rear for cleaning and ventilation

Connections
Cord and plug provided with dispenser. Wire in accordance with all local codes.

Approximate Shipping Weight 265 lbs (120kg)

Electrical Data
Standard electrical – 115V, 60Hz, 1 phase, 13.0 amps, max. fuse 20 amps

Specifications
Ice and water dispenser to be Follett freestanding, automatic load, in the following configuration with water station and _____ (air- or water-) cooled icemaker in base. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Environmentally friendly R404A icemaker to be mounted in base and to be removable as one unit for cleaning and maintenance. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispenser to have automatic bin level control to start and stop icemaker and separate circuitry to allow dispensing to continue with icemaker removed. Dispenser to be equipped with 6" (153mm) adjustable legs, flanged feet and lightweight plastic top that allows full access to the ice storage area for manual loading of back-up ice. Storage area to be insulated with high-density, non-CFC foam polyurethane. 7' cord and NEMA 5-20 hospital-grade plug provided. Dispenser to be NSF, UL and cUL listed.

Item # 203200

END OF SPECIFICATION

Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

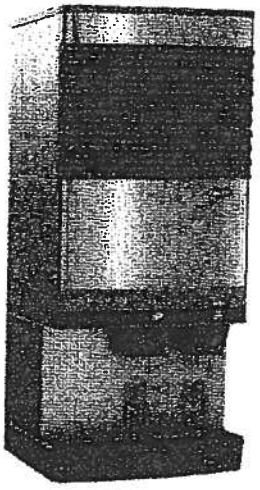
25 Series

Countertop models with (A) air- or (W) water-cooled icemaker

→ **25CT400A/W** – 115V, 60Hz, integral icemaker
25CR400A/W – 115V, 60Hz, satellite-fill icemaker
C25CT400A/W – 220V, 60Hz, integral icemaker
C25CR400A/W – 220V, 60Hz, satellite-fill icemaker
E25CT400A/W – 230V, 50Hz, integral icemaker
E25CR400A/W – 230V, 50Hz, satellite-fill icemaker

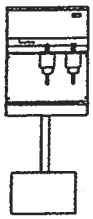
Wall mount models with (A) air- or (W) water-cooled icemaker

25HT400A/W – 115V, 60Hz, integral icemaker
25HR400A/W – 115V, 60Hz, satellite-fill icemaker
C25HT400A/W – 220V, 60Hz, integral icemaker
C25HR400A/W – 220V, 60Hz, satellite-fill icemaker
E25HT400A/W – 230V, 50Hz, integral icemaker
E25HR400A/W – 230V, 50Hz, satellite-fill icemaker

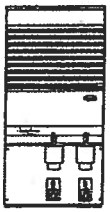


Countertop model shown with SensorSAFE accessory

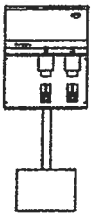
Symphony.



Countertop model with satellite-fill icemaker



Wall mount model with integral icemaker



Wall mount model with satellite-fill icemaker

Countertop and wall mount ice and water dispensers with air- or water-cooled icemaker. Stainless steel frame and exterior with plastic trim. Up to 25 lbs (11kg) storage. Produces approximately 400 lbs (181kg) of Chewblet compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever dispensing standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet compressed nugget ice is slow melting, easy to chew
- Clear chute ensures sanitary delivery and focuses ice cleanly into cups, pitchers, carafes, ice bags

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone

Space-saving, attractive design

- 21" (534mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally-friendly Maestro icemakers

- State-of-the-art R404A icemaker automatically loads dispenser with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high waste water
- Quiet production, no noisy harvest cycles
- Satellite-fill icemakers can be located up to 20 feet (6m) from dispenser; remove heat, noise and bulk from customer area

Accessories

- SensorSAFE actuation package (standard on wall mount models)
- Chilled water option (item# AFH20CHIL2550)
- Water filter kit (item# 00130229)
- Base stand (for models 25CT400A/W, C/E25CT400A/W) (item# AF50BASESTD)
- Slide-out track for satellite-fill icemakers (item# AFGSLIDER400A (air-cooled icemakers) and item# AFGSLIDER400W (water-cooled icemakers))
- Drain pan assembly for wall mount models (item# AFH25WBASE)

Job: _____

Item: 203210 Page 1 of 2

FOLLETT
Innovative solutions, inspired by ice

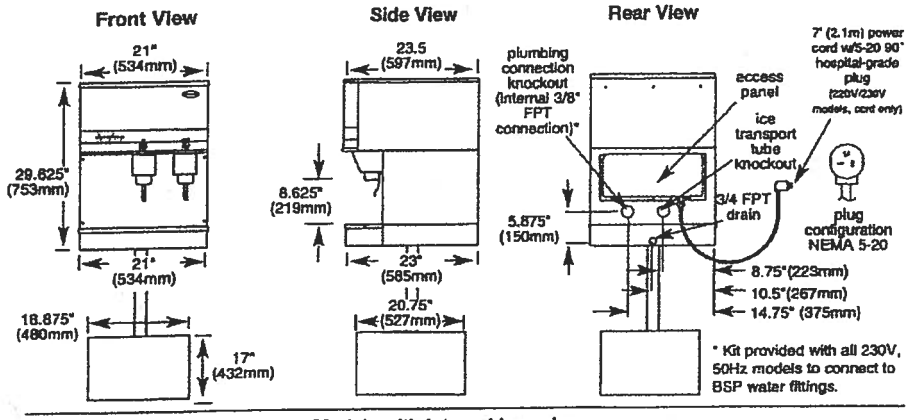
801 Church Lane • PO Box D, Easton, PA 18044, USA
Toll free (800) 523-9361 • (888) 2-FOLLETT
(810) 252-7301 • Fax (610) 250-0696 • www.follettice.com

© Follett Corporation
Form #2065

25 Series

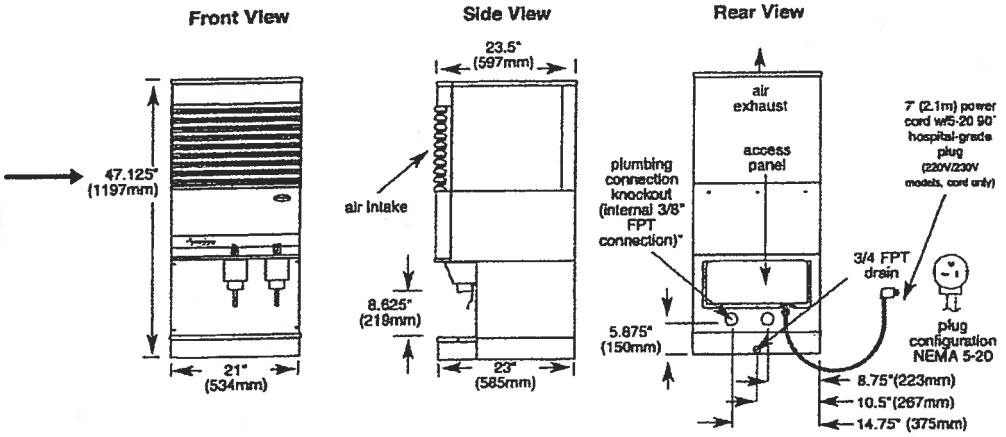
Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

Models with satellite-fill icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Models with integral icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Approximate Shipping Weights

C/E/25CT400A/W	295 lbs (134kg)	C/E/25HT400A/W	310 lbs (141kg)
C/E/25CR400A/W	250 lbs (113kg)	C/E/25HR400A/W	295 lbs (134kg)

Electrical

Standard electrical – 115V, 60Hz, 1 ph. Icemaker 11 amps, dispenser 4 amps. Cord and plug provided with each icemaker and dispensers. If local code requires hard-wiring, separate disconnects also required. Satellite-fill icemaker models require separate circuits for dispenser and icemaker.

Alternate electrical – 220V, 60Hz, 1 ph, 6.5 amps (icemaker 5 amps). 230V, 50Hz, 1 ph, 6.5 amps (icemaker 5 amps). Cord only provided with each icemaker and dispenser. Wire in accordance with all local codes.

Wall Mount Models

- Deduct 3.625" (92mm) from height shown
- Add .5" (13mm) to depth shown
- Standard with wall mounting bracket
- Standard without drain pan (drain pan available – contact factory)

Connections Utilities connect through back or bottom. Back entry shown. Supplied 2" (51mm) duct and louver must be installed for undercounter satellite-fill icemaker installations.

7 ft (2.1m) cord and NEMA 5-20 hospital-grade plug provided with each dispenser. 220V/230V models, cord only.

Required clearances

- C/E/25CT400A/W, C/E/25HT400A/W – 6" (153mm) at top for ventilation, 12" (305mm) recommended for service
- C/E/25CR400A/W, C/E/25HR400A/W – 12" (305mm) at top recommended for service

See Dispenser Detail Sheet, form# 2075 for important installation information.

Ice Production

Air-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		510	464	397	335	273	lbs.
10		232	211	180	152	124	kg
60		482	435	389	329	270	lbs.
16		219	198	177	149	122	kg
70		454	417	380	323	266	lbs.
21		206	190	172	147	121	kg
80		424	385	347	297	247	lbs.
27		193	175	158	135	112	kg
90		394	354	313	270	227	lbs.
32		179	161	142	123	103	kg

Water-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		451	447	442	437	426	lbs.
10		205	203	201	198	193	kg
60		423	413	409	399	394	lbs.
16		192	187	186	181	179	kg
70		394	390	380	371	361	lbs.
21		179	177	172	168	164	kg
80		371	361	353	342	333	lbs.
27		168	164	160	155	151	kg
90		352	342	333	323	309	lbs.
32		160	155	151	146	140	kg

Specifications Ice and water dispenser to be Follett countertop, automatic load, in (choose one) _____ countertop, _____ wall mount configuration with 25 lbs (11kg) of storage. Water station standard. Environmentally-friendly R404A icemaker to be (choose one) _____ air- or _____ water-cooled and to be removable for cleaning and maintenance. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispensers with satellite-fill icemakers to be equipped with 10' (3m) of insulated ice transport tube, 2" (51mm) air duct for icemaker (air-cooled models only) and lightweight plastic top that allows full access to the ice storage area for easy cleaning and manual loading of back-up ice. Storage area to be insulated with high density, non-CFC foam polyurethane. 7' (2.1m) cord and NEMA 5-20 hospital-grade plug provided (220V/230V models, cord only). Dispenser to be NSF, UL and cUL listed, 230V models also CE compliant.

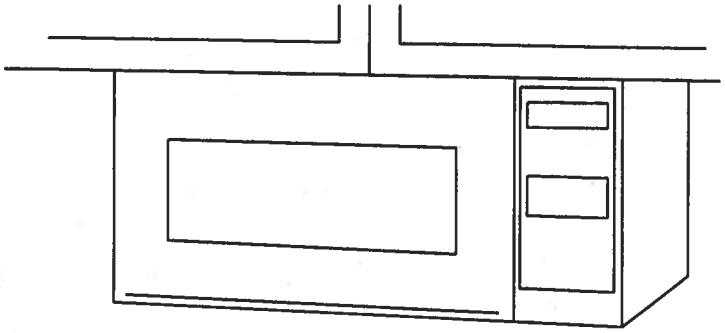
Follett reserves the right to change specifications at any time without obligation. Certifications may vary depending on country of origin.

FOLLETT
Innovative solutions, inspired by ice

801 Church Lane • PO Box D, Easton, PA 18044, USA
Toll free (800) 523-9361 • (888) 2-FOLLETT
(610) 252-7301 • Fax (610) 250-0696 • www.follettice.com

END OF SPECIFICATION

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Not to be used over a thermal oven.

Undercabinet mounting kit Pub. No. 4-A019 for Spacemaker II microwave oven models available at additional cost.

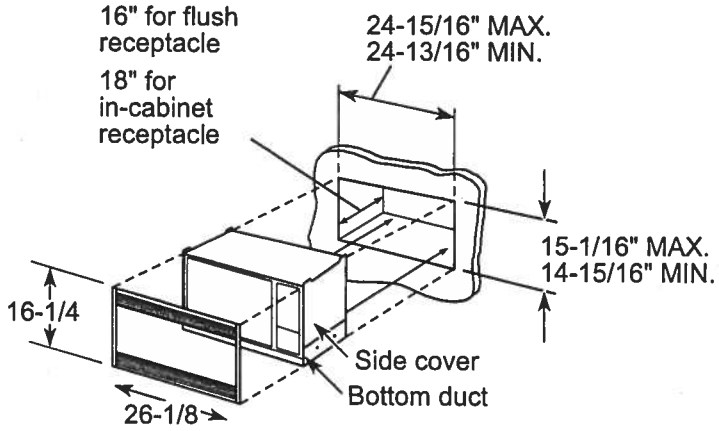
Exterior Dimensions* (in inches)	
W x H x D	23-25/32 x 11-11/64 x 12-55/64

*Height includes feet. Depth does not include handle.

Note: Undercabinet installation
Install Spacemaker II microwave ovens in just a few easy steps with the mounting template, which provides all the necessary measurements. Installation may vary depending on cabinets. These microwave ovens can be installed on practically any wood or metal cabinets.

Note: 120V, 60-cycle, grounded power receptacle location optional on back within cabinet opening.

Cutout Dimensions (in inches)

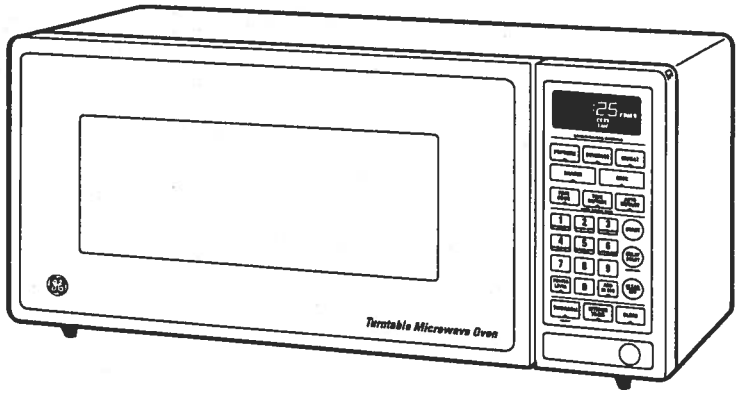


Built-In trim kit For 1.0 cu. ft. microwave ovens
For a custom built-in appearance, this kit allows built-in installation of the Spacemaker II microwave oven into a wall or cabinet alone, and is U.L.-approved for installation over a GE single electric wall oven. This kit should not be installed over a gas wall oven.

Trim kits for model JEM25
JX827SS – Stainless Steel, JX827WN – White, JX827CD – Bisque, JX827BN – Black

Installation Information: This information is not intended to be used for installing unit described. Before installing, consult installation instructions packed with product for current dimensional data.

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Features and Benefits

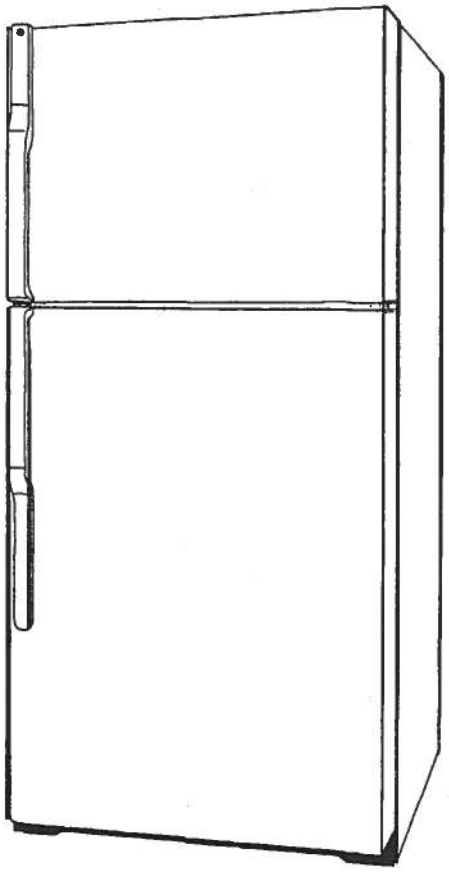
- 1.0 cu. ft. Oven cavity
- 800 Watts*
- Electronic touch controls
- Convenience cooking controls
- Electronic digital display with clock
- Time Cook I & II
- Express Cook with Instant On controls
- Auto Defrost/Time Defrost
- Add 30 Seconds
- Delay Start/Reminder
- Child Lockout
- Kitchen timer
- 10 Power levels
- Under the cabinetry mounting with optional kit
- Model JEM25WF – White
- Model JEM25BF – Black

*IEC-705 Test Procedure

APPROXIMATE DIMENSIONS(HxDxW)	
11.17 in x 12.86 in x 23 25/32 in	
CAPACITY	
Capacity	Mid-Size
Total Capacity (cubic feet)	1.00
FEATURES	
Electronic Digital Display with Clock	Yes
Electronic Touch Controls	Yes
Wattage (IEC-705)	800
Cooking System	Turntable
Power Levels	10
Delay Start	Yes
Beverage (Convenience)	Instant-On
Cook (Convenience)	9 Codes
Popcorn (Convenience)	Instant-On
Reheat (Convenience)	6 codes
Snacks (Convenience)	6 codes
Turntable	Glass
Turntable On / Off	Yes
Turntable Size (in.)	11-21/64
Add 30 Seconds	Instant-On
Cooking Complete Reminder	Yes
Defrost Type	Auto & Time
Express Cook	Instant-On; 1-5 Minutes
Instant On Controls	Yes
Kitchen Timer / Timer (On/Off)	Yes / No
Time Cook	I & II
Time Preference	Control Enhancement (1/9)
Child Lock	Yes
APPEARANCE	
Case Color	White
Color Appearance	White
Door Color	White
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	34 lb
Cavity (W x H x D)	16-23/32 X 8-1/16 X 12-15/32
Overall Depth	12.86 in
Overall Height	11.17 in
Overall Width	23 25/32 in
Net Weight (lbs.)	30 lb
POWER / RATINGS	
Electrical Input - 120V Amperage	11.5
Electrical Input - 120V Watts	1300
Frequency (MHz)	2450

END OF SPECIFICATION

GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker



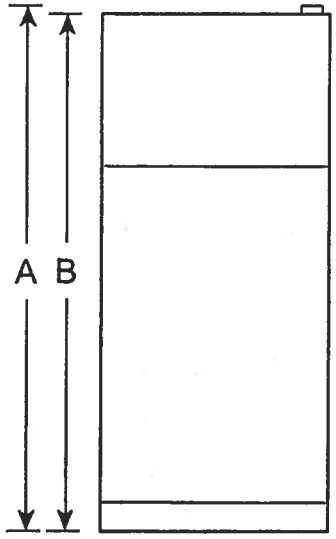
Features and Benefits

- Slide-Out, Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- Electronic Icemaker – Makes ice automatically, ensuring a ready supply.
- Model GTS18WCPWW – White on white
- Model GTS18WCPCC – Bisque on bisque

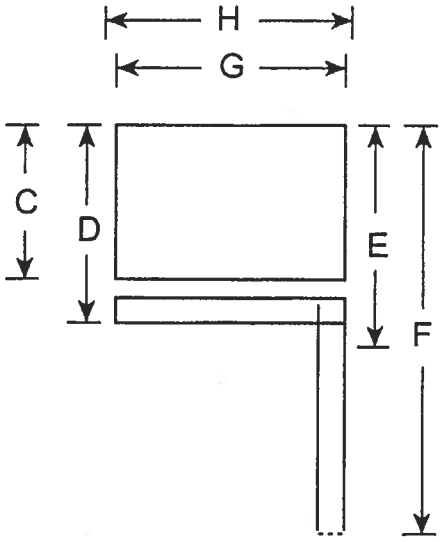
GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	32
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Total volume and shelf area are calculated by the Association of Home Appliance Manufacturers' standards

Listed by Underwriters Laboratories

APPROXIMATE DIMENSIONS(HxDxW)	
66 5/8 in x 32 1/8 in x 29 1/2 in	
CAPACITY	
Total (cubic feet)	17.9
Fresh Food (cubic feet)	12.87
Freezer (cubic feet)	4.98
Shelf Area (sq. ft.)	22.0
APPEARANCE	
Color Appearance	White on White
Customer Installed Handles	Yes
Exterior Design	Rounded Doors
Handle	Color-Matched
Door Swing	Shipped w/ Right Hand Door Opening (Hinges on Right)
Reversible Doors	Yes
Textured Steel Case & Door	Galvenized Door
Adjustable Rollers	Front
Door Stops	Yes

WEIGHTS & DIMENSIONS

Approximate Shipping Weight	233 lb
Overall Depth	32 1/8 in
Overall Height	66 5/8 in
Overall Width	29 1/2 in
Case Depth Without Door (in.)	27-1/2
Depth with Door Open 90° (in.)	58-1/8
Depth Without Handle (in.)	30-1/4
Height to Mid-Freezer	53-15/16
Height to Top of Case (in.)	66-1/8
Width w/Door Open 90 Degrees Inc. Handle (in.)	32
Back Air Clearances (in.)	1
Side Air Clearances (in.)	1/8
Top Air Clearances (in.)	1

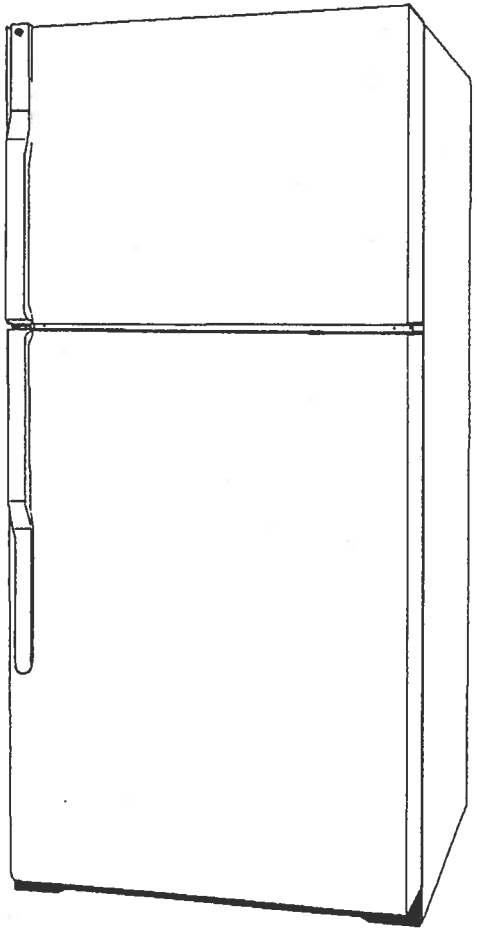
POWER / RATINGS

Volts / Hertz / Amps	120V; 60Hz ; 15A

END OF SPECIFICATION

GE Appliances

GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator



Specification Revised 5/03

Features and Benefits

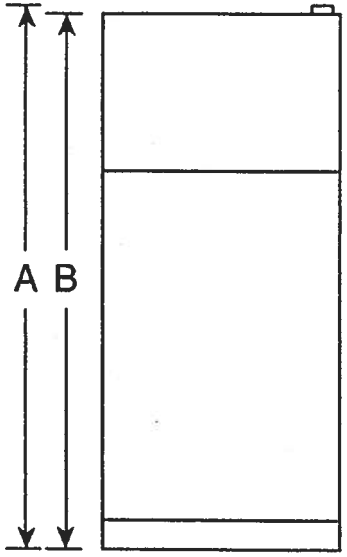
- Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- NeverClean™ Condenser – Condenser coils are encased, so they don't require cleaning in normal operating environments.
- Model GTS18KBPWW – White on white
- Model GTS18KBPBB – Black on black
- Model GTS18KBPCC – Bisque on bisque

GE Appliances

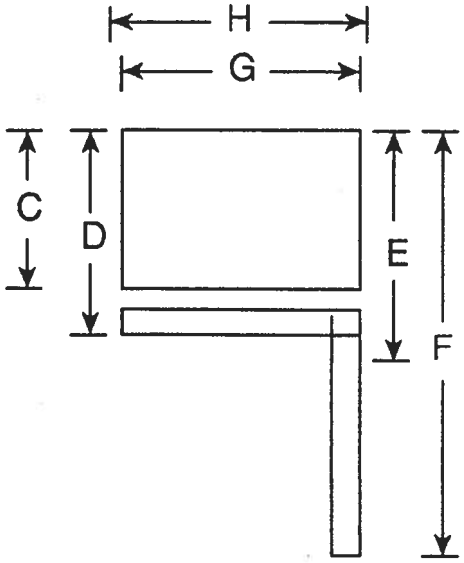
GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	30
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Specification Revised 5/03

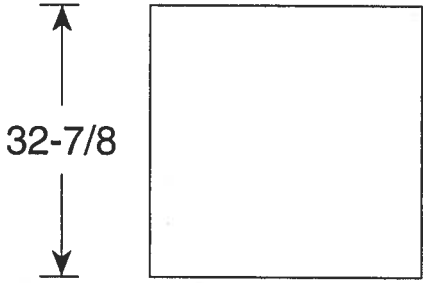
END OF SPECIFICATION

GE Appliances

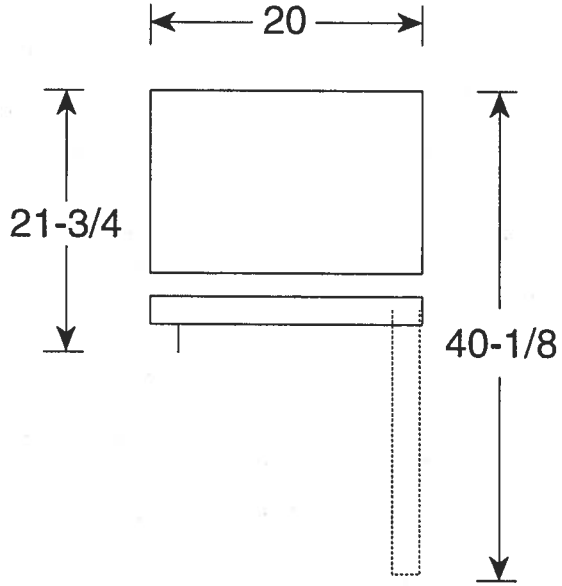
GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator

Dimensions (in inches)

Front View



Top View



Air Clearances	
Each side (in.)	1/2
Top (in.)	2
Back (in.)	2

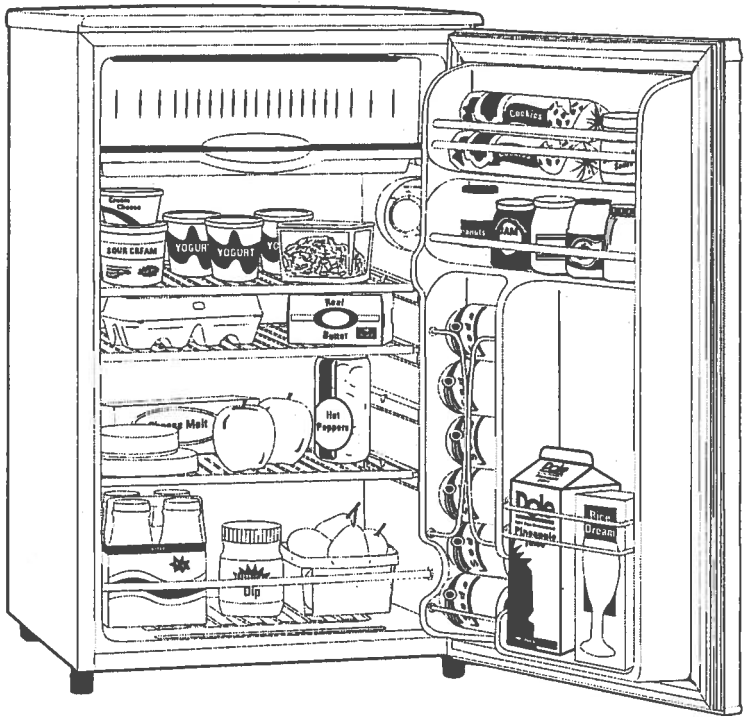
Note: Freezer compartment is for short-term storage of frozen food. The frozen food compartment of this refrigerator will make ice, and pre-frozen foods can be stored for about **two weeks.** It will not effectively freeze fresh foods or provide long-term storage for meats, poultry, or fish.

For answers to your Monogram,® GE Profile™ or GE® appliance questions, visit our website at GEAppliances.com or call GE Answer Center® service, 800.626.2000.

Specification Revised 7/04
310934

GE Appliances

GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator



Features and Benefits

- 4.3 cu. ft. Capacity (Fresh Food 3.81 cu. ft./Freezer .49 cu. ft.)
- 2-1/2 Fresh Food Door Shelves
- 2 Adjustable Wire Cabinet Shelves
- Can Rack
- 2 Mini Ice 'N Easy Trays
- Manual Defrost
- Color-Matched Recessed Door Handles
- Model GMR04AAMWW – White on white
- Model GMR04AAMBB – Black on black

Specification Revised 7/04
310934

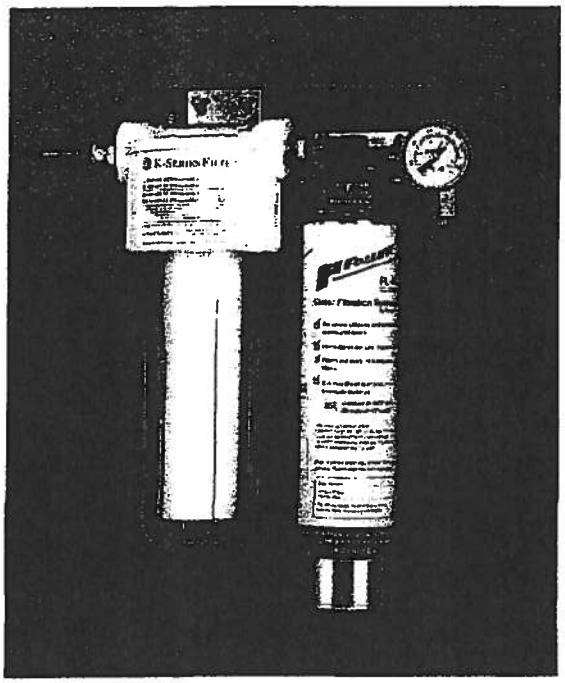
APPROXIMATE DIMENSIONS(HxDxW)	
32 7/8 in x 21 3/4 in x 20 in	
CAPACITY	
Total Capacity (cubic feet)	4.4
Fresh Food (cubic feet)	3.99
Freezer (cubic feet)	.39
Shelf Area (sq. ft.)	5.6
FEATURES	
Defrost Type	Manual
Fresh Food Cabinet Shelves - Adjustable	2
Fresh Food Cabinet Shelves - Total # of Shelves	2 Wire
Fresh Food Door Shelves	2 Full-Width; 1 Half-Width
Ice N' Easy Trays	1 Mini
APPEARANCE	
Color Appearance	White on White
Door Swing	Hinges on Right
Handle	Color-Matched Recessed
Rounded Doors	Yes
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	77 lb
Overall Depth	21 3/4 in
Overall Height	32 7/8 in
Overall Width	20 in
Depth with Door Open 90° (in.)	40-1/8
Back Air Clearances (in.)	2
Side Air Clearances (in.)	1/2
Top Air Clearances (in.)	2



END OF SPECIFICATION

QC4-FL4S Walter Filter System

SPECIFICATIONS



Water filter system for use with Follett icemakers and ice and water dispensers. System includes pre-filter, primary filter, pressure gauge and wall mounting bracket.

Important: Not for use with carbonated water — separate system required.

Ensures better tasting, cleaner, safer ice
- *Traps dirt as small as 1/2 micron in size*
- Removes chlorine, off-tastes and odors
- Filters out asbestos fibers and parasitic cysts such as *Cryptosporidium* and *Giardia*
- Certified to ANSI/NSF standards 42 and 53

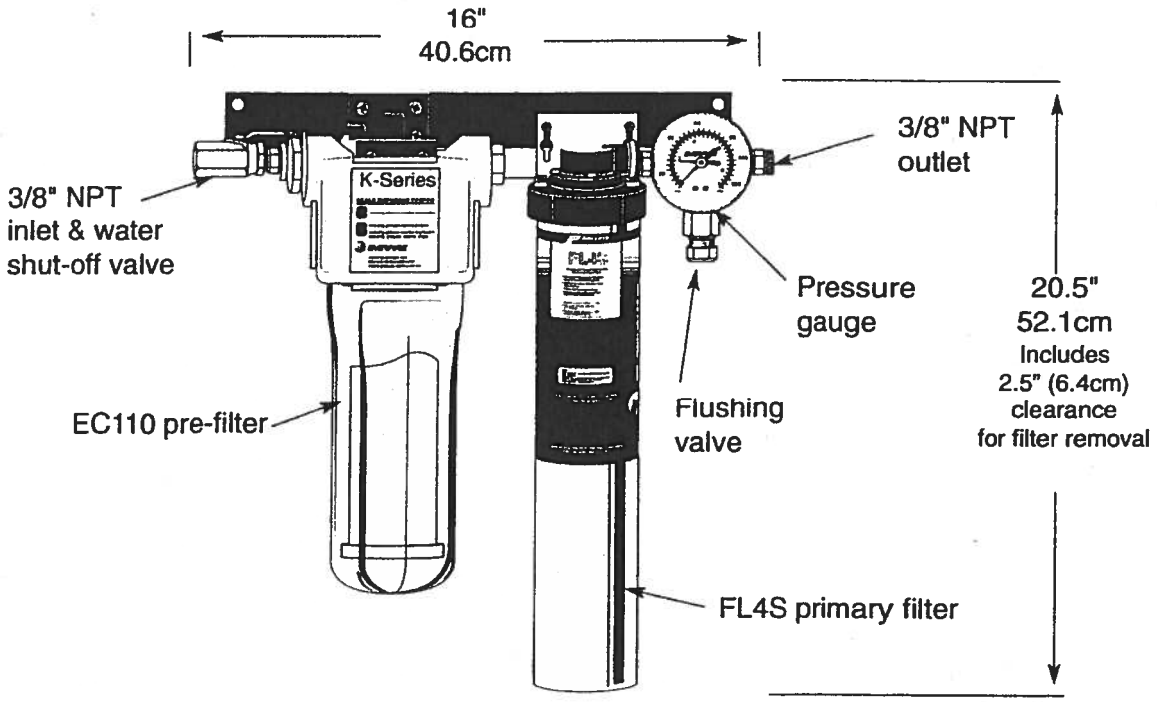
Improves icemaker performance
- Keeps icemakers functioning at full capacity
- Reduces scale build-up from dirt and minerals in the water by up to 70%
- Removes dirt and abrasive particles that can damage internal workings of icemaker
- Saves energy and reduces downtime

Space-saving design
- 20.5" (52.1cm) total height and 16" (40.6cm) width requires minimal space
- Entire system can be mounted out of the way below standard 34" - 36" (86.4cm - 91.4cm) counters

Dual filter system saves money
- *Economical EC110 pre-filter filters out* large particles and extends life of FL4S primary filter

Item # 714519

REV: tlg 8/21/2003



- Clearance required: 2.5" (6.4cm) at bottom of filter for cartridge removal
- Flow rate: 0.5 gpm (1.9 lpm)
- Pressure range 10 - 125 psi, non-shock
- Capacity: Certified for chlorine and taste and odor reduction for 3,000 gallons (11,400 liters)
- Water temperature: 35° - 100°F (2° - 38°C)

NSF International Standards

Tested and certified to ANSI/NSF Standard 42 & 53

Standard No. 42: Aesthetic Effects

Chemical Unit Taste & Odor and Chlorine Reduction, Class 1

Mechanical Filtration Unit Particulate Reduction, Class 1: 99.9% reduction of particles 1/2 micron and larger in size

Standard No. 53: Health Effects

Mechanical Filtration Unit

Turbidity Reduction, Cyst Reduction, Asbestos Reduction

The QC4-FL4S filter and 4S cartridge (by Everpure, Inc.) have been tested and Certified by NSF only for the functions listed above. Check for compliance with state and local laws and regulations. Do not use where the water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit. Can be used with water disinfected that may contain filterable cysts.

Item # 714519

END OF SPECIFICATION

Model 8573



Model 8573



8573 Koffee King Three Warmer Stepped Right Automatic Coffee Brewer *(without Hot Water Faucet)*

How do you get more for less? Use the Bloomfield Lo Profile® brewing system. At less than 17" tall, the Lo Profile is small in stature but big on capacity. Like all Bloomfield products, this proven, efficient brewing system is designed to take advantage of the finest electrical components and has the lowest service cost in the industry for this type of brewer.

Features

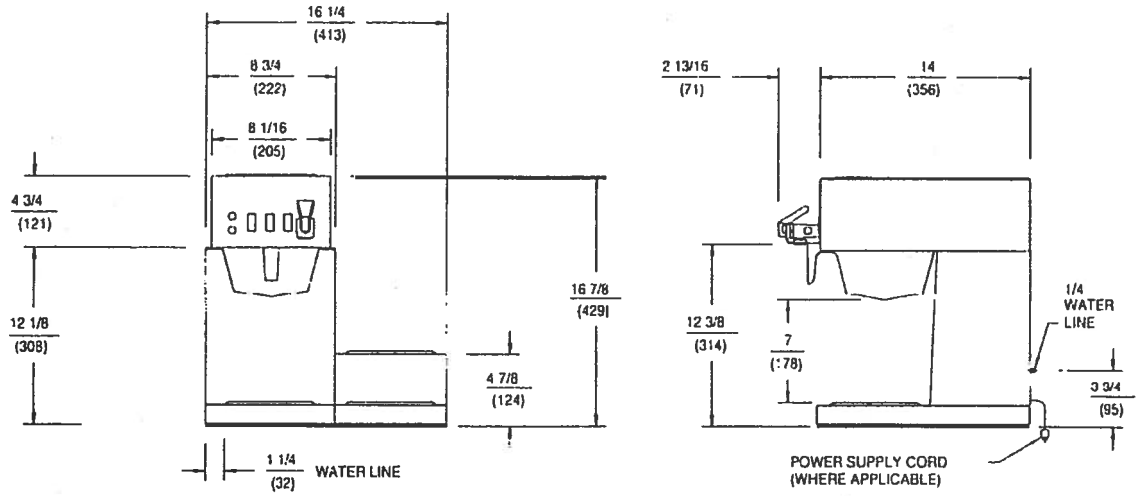
- **A high level of commonality of parts** with other Bloomfield models will significantly reduce the inventory of spare parts required to service many body styles.
- Exclusive design provides **easy access to components** for quick service.
- **Water volume adjustments** can be made with ease, no panels to remove or tools required.
- **Ready-to-Brew light** indicates the proper water temperature to help eliminate the guesswork in brewing.
- Built-in **pour over feature** provides flexibility.
- **Independent front-mounted hot water faucet** allows drawing of hot water without affecting coffee taste or brewing cycle.
- **Premium quality thermostat** has a full-length stainless steel sensing bulb that recognizes water temperature extremely accurately and cycles less frequently.
- **Superior sprayhead design** spreads water over the coffee grounds, creating agitation and a floating action that completely saturates the coffee to capture the full, rich essence of every bean.
- **Unique water valve with built-in flow control** assures consistent operation at 20-80 p.s.i.
- **One-piece drawn stainless steel water tank** has a superior design for extended life.
- **Three warming stations** with porcelain enameled warmer plates position decanters securely and, with no exposed screw heads, will not scratch or scrape decanters.
- High quality easy to clean **stainless steel construction.**

Item 715053

REV: 6/28/03

E9253 STD 4 LR 10836

DIMENSIONS: INCH / (MM)



SPECIFICATIONS:

MODELS	WATTS	VOLTS	AMPS	PHASE	POWER SUPPLY CORD
8573	1800	120	15	Single	NEMA 5-15P

Item # 715053

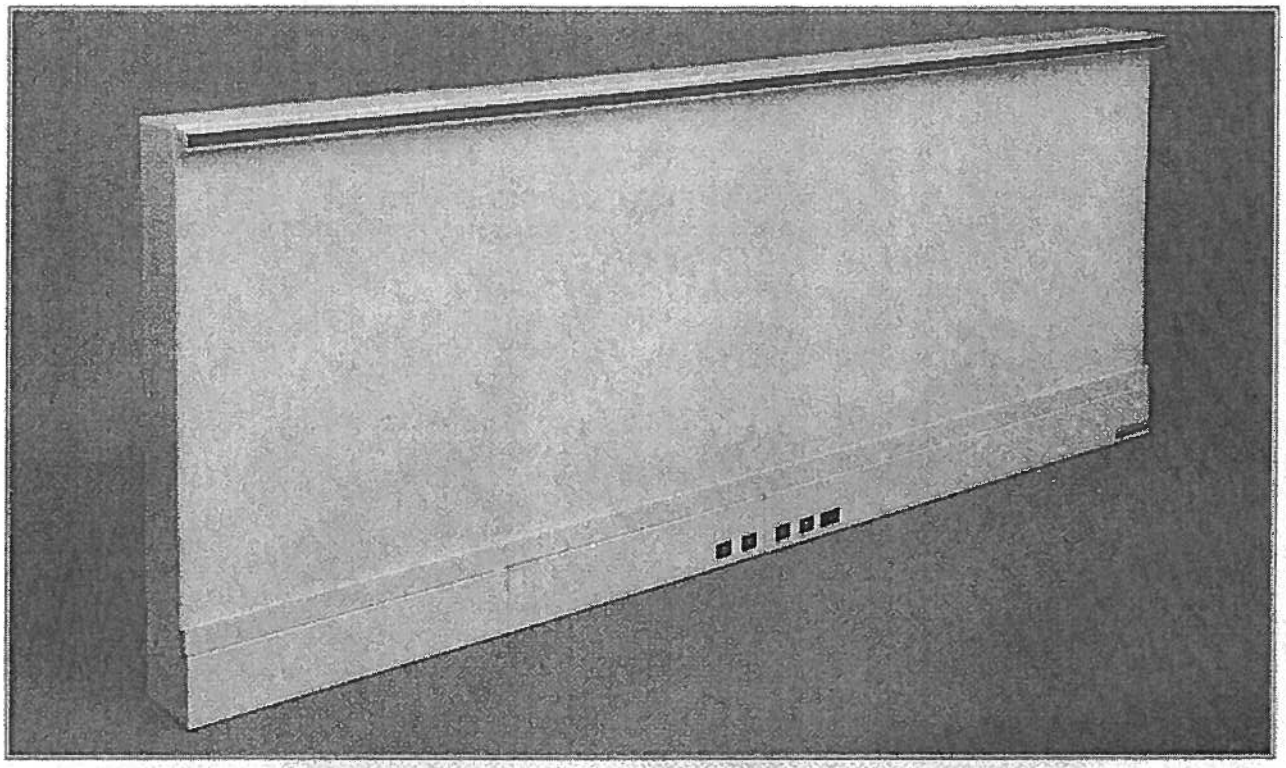
END OF SPECIFICATION

Item # 715152 1 of 3

800/347-XRAY
S&S X-RAY PRODUCTS
www.ssxray.com

CHAMELEON SERIES

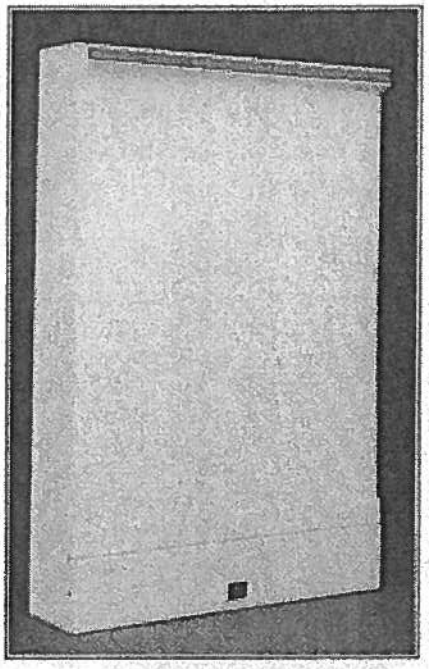
Blends With Any Décor



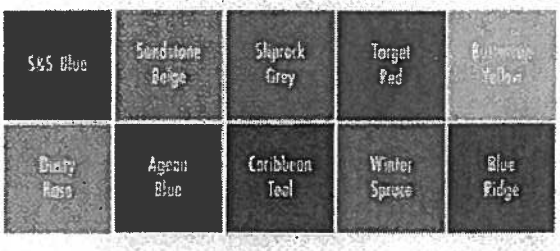
Four Bank Surface Mounted Model (101204)

The **Chameleon Illuminator Series** combines a slim, sleek appearance (3⅜" depth), with color-customizable trim. This cost efficient illuminator is designed to accentuate the warm, professional appearance of your reading room or consultation area. The units can be highlighted with *trim in a choice of ten colors*, polished stainless steel or primed strip (the latter can be easily painted to color coordinate within a facility). Constructed of durable steel with a white powder-coat finish, this series is available in 2 lamps, 3 lamps and 4 lamps per viewing area models.

Trigger start ballasts, separated viewing sections, centered cluster switches, one piece plexiglass fronts and continuous gravity film grips are standard with this series. A bottom ledge film support coupled with the continuous film grip guarantees maximum freedom for viewing small or large films. Each section is individually controlled by rocker switches mounted at the bottom center of the illuminator. Master switches are provided on units of three banks or more. The Chameleon Illuminator can also be incorporated into a corner module.



Trim Colors



Finish: White Baked Enamel

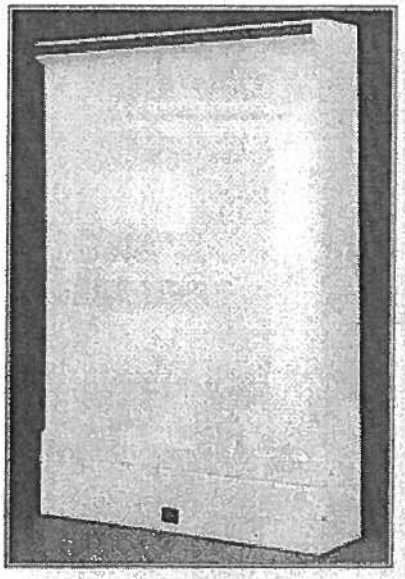
Electrical: Viewers operate on 120 volt, 60 Hz. **2 Lamp Series:** .47 amps per section, **3 Lamp series:** .61 amps per section, **4 Lamp series:** 1.0 amps per section. Surface mounting models are supplied with a 6' three conductor line cord (see diagram for wiring locations). Recessed models come with BX connectors. For special voltages consult factory.

* **Optional Items:** Modular Mobile system (pg B-23), mobile stand, console arms, angulated viewing system (pg B-25) corner modules (pg B-24), hospital grade plugs (pg B-30).

S&S X-RAY PRODUCTS
www.ssxray.com

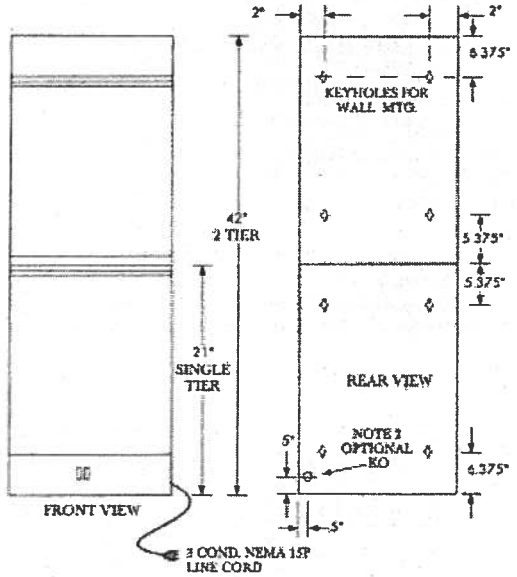
CHAMELEON SERIES

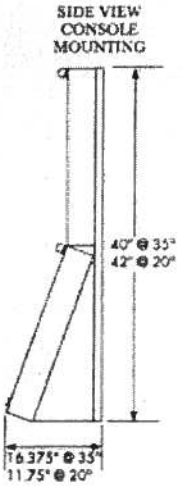
ILLUMINATORS



SURFACE MOUNTED MODELS

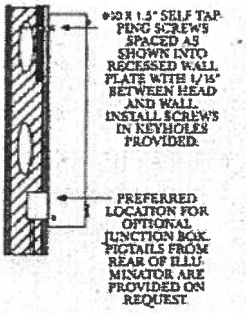
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	23 lbs	101401	101421
Two Bank 28"x17"	28"	21"	46 lbs	101402	101422
Three Bank 42"x17"	42"	21"	69 lbs	101403	101423
Four Bank 56"x17"	56"	21"	90 lbs	101404	101424
Five Bank 70"x17"	70"	21"	113 lbs	101405	101425
Six Bank 84"x17"	84"	21"	136 lbs	101406	101426
TWO TIER					
1 over 1 2 x 14"x17"	14"	42"	46 lbs	101411	101431
2 over 2 2 x 28"x17"	28"	42"	92 lbs	101412	101432
3 over 3 2 x 42"x17"	42"	42"	138 lbs	101413	101433
4 over 4 2 x 56"x17"	56"	42"	180 lbs	101414	101434
5 over 5 2 x 70"x17"	70"	42"	226 lbs	101415	101435
6 over 6 2 x 84"x17"	84"	42"	272 lbs	101416	101436

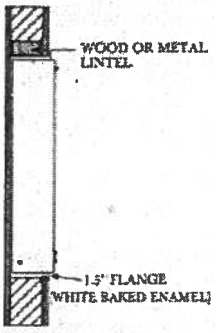






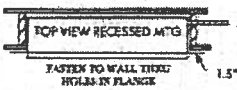
SIDE VIEW RIGHT SIDE





RECESSED MODELS

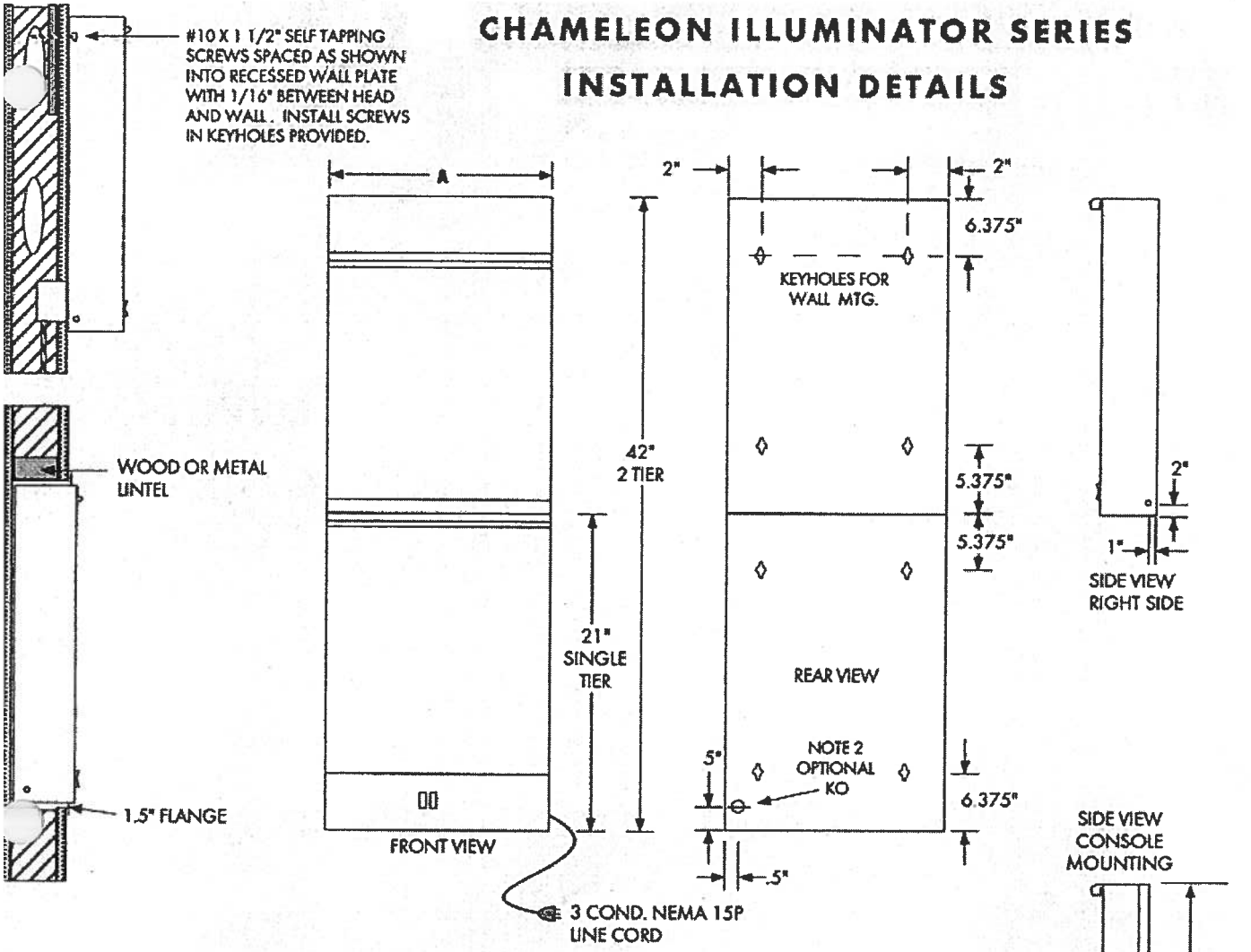
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	WALL OPENING WIDTH	WALL OPENING HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	14.25"	21.25"	23 lbs	101441	101461
Two Bank 28"x17"	28"	21"	28.25"	21.25"	46 lbs	101442	101462
Three Bank 42"x17"	42"	21"	42.25"	21.25"	69 lbs	101443	101463
Four Bank 56"x17"	56"	21"	56.25"	21.25"	90 lbs	101444	101464
Five Bank 70"x17"	70"	21"	70.25"	21.25"	113 lbs	101445	101465
Six Bank 84"x17"	84"	21"	84.25"	21.25"	136 lbs	101446	101466
TWO TIER							
1 over 1 2 x 14"x17"	14"	42"	14.25"	42.25"	46 lbs	101451	101471
2 over 2 2 x 28"x17"	28"	42"	28.25"	42.25"	92 lbs	101452	101472
3 over 3 2 x 42"x17"	42"	42"	42.25"	42.25"	138 lbs	101453	101473
4 over 4 2 x 56"x17"	56"	42"	56.25"	42.25"	180 lbs	101454	101474
5 over 5 2 x 70"x17"	70"	42"	70.25"	42.25"	226 lbs	101455	101475
6 over 6 2 x 84"x17"	84"	42"	84.25"	42.25"	272 lbs	101456	101476

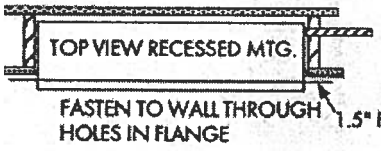


1/2" CONDUIT CONTAINING 3 NO. 14 WIRES TO 120 VOLT 60 HZ SERVICE.

ALL MEASUREMENTS ARE ± 1/16"

CHAMELEON ILLUMINATOR SERIES
INSTALLATION DETAILS





	NUMBER OF VIEWING AREAS						HEIGHT	
	1	2	3	4	5	6	1 TIER	2 TIER
CASE WIDTH "A"	14"	28"	42"	56"	70"	84"	21"	42"
WALL OPENING	14.25"	28.25"	42.25"	56.25"	70.25"	84.25"	21.25	42.25
WEIGHT 1 TIER	23	46	69	90	113	136		
WEIGHT 2 TIER	46	92	138	180	226	272		
DEPTH OF CASE	3.375"							

120 VOLT 60 HZ.
2 LAMP SERIES .47 AMPS PER VIEWING SECTION
3 LAMP SERIES .61 AMPS PER VIEWING SECTION
4 LAMP SERIES 1 AMPS PER VIEWING SECTION
UL LISTED FOR U.S.A. AND CANADA

NOTE:
1. FOR SAFETY AND PROPER OPERATION UNITS MUST BE ELECTRICALLY GROUNDED.

PREFERRED LOCATION FOR OPTIONAL JUNCTION BOX. PIGTAILS FROM REAR OF ILLUMINATOR PROVIDED ON

CALL OUR CUSTOM DESIGN ENGINEERING DEPT. FOR HELP WITH ROOM LAYOUTS AND CUSTOM CONFIGURATIONS.

The Industry Standard For 40 Years
800-347-XRAY 718-649-8500
FAX 718-257-0219
S&S X-RAY PRODUCTS INC
1165 LINWOOD STREET
BROOKLYN NY 11208

END OF SPECIFICATION

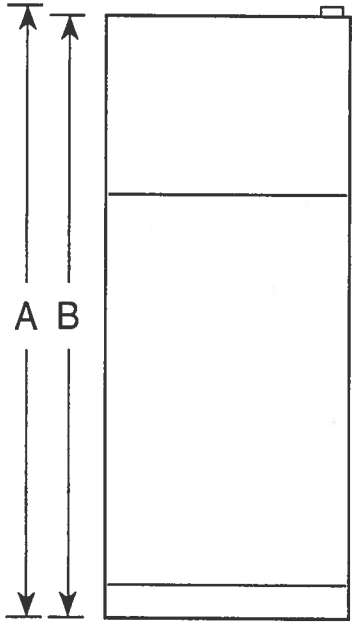
GTS17KBS
GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

Dimensions and Installation Information

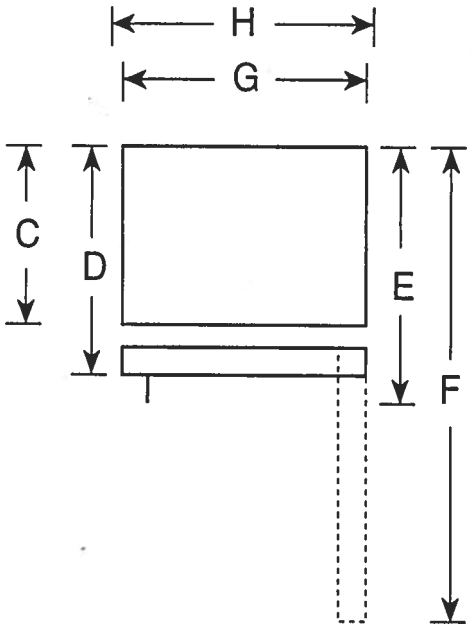
Overall Dimensions	Height to top of hinge (in.) **A**	64-3/4
	Height to top of case (in.) **B**	64-1/4*
	Case depth without door (in.) **C**†	25-7/8
	Case depth less door handle (in.) **D**†	29-1/8
	Case depth with door handle (in.) **E**†	31
	Depth with fresh food door open 90° (in.) **F**†	54-7/8
	Width (in.) **G**	28
	Width with door open 90° less door handle (in.) **H**	30-1/2
Air Clearances	Each side (in.)	3/4
	Top (in.)	1
	Back (in.)	1

*Height to mid-freezer (in.): 54-3/8

Front View



Top View



Dimension and installation information are shown in inches.

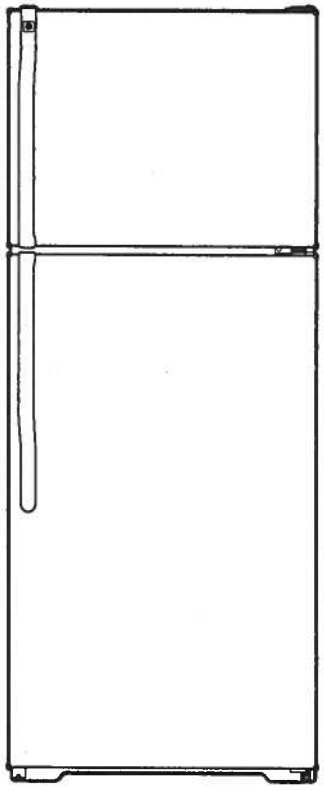
Listed by Underwriters Laboratories

GTS17KBS

GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

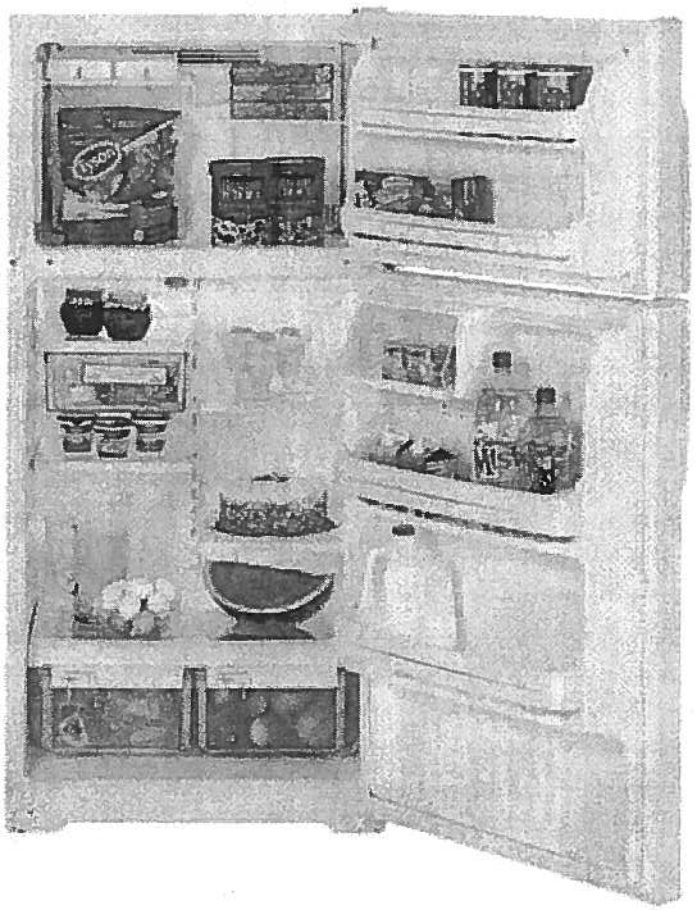
Features and Benefits

- Adjustable Spillproof Glass Shelves - Help contain spills for ease of cleaning
- Upfront Temperature Controls - Are positioned up front, close at hand, for maximum convenience and ease of use
- Adjustable Humidity Vegetable/Fruit Crispers - Provide the ideal storage environment for fruits and vegetables
- Gallon Door Storage - Makes room for milk and any other gallon size containers
- Snack Pan - Helps keep everyday foods like muffins and carrot sticks fresh
- NeverClean™ Condenser - Condenser coils are encased, so they don't require cleaning in normal operating environments
- Deluxe Quiet Design - Significantly reduces operating noise
- Square Doors - Classic design that's compatible with any kitchen décor
- Model GTS17KBSWW - White on white
- Model GTS17KBSCC - Bisque on bisque



APPROXIMATE DIMENSIONS(HxDxW)	
64 3/4 in x 31 in x 28 in	
CAPACITY	
Total Capacity (cubic feet)	16.60
Fresh Food (cubic feet)	12.54
Freezer (cubic feet)	4.10
Shelf Area (sq. ft.)	19.7
FEATURES	
Air Tower	Yes - Freezer
Defrost Type	Frost Free
Upfront Temperature Controls	Yes
Automatic Icemaker	Optional (IM4A)
Ice N' Easy Trays	2
Snack Drawer	Yes
Vegetable / Fruit Crisper(s)	2 Adjustable Humidity
Fresh Food Cabinet Shelves - Adjustable	4 Split
Fresh Food Cabinet Shelves - Spill Proof	Yes
Fresh Food Cabinet Shelves - Total Number of Shelves	4 Glass
Fresh Food Door Shelves	2 Fixed w/ Gal. Storage
Gallon Door Storage	Yes
Dairy Compartment	Yes
Interior Light	Yes
Freezer Cabinet Shelves (Wire)	Step Shelf
Freezer Door Shelves	2 Full-Width Fixed (1 Extra-Deep)
APPEARANCE	
Color Appearance	White on White
Handle	Color-Matched
Door Swing	Reversible Hinges
Textured Steel Case	Galvanized Door
Door Stops	Yes
Easy to Remove Door Gaskets	Yes
Leveling Legs	2 Front
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	185 lb
Net Weight (lbs.)	166 lb
Overall Depth	31 in
Overall Height	64 3/4 in
Overall Width	28 in
Case Depth Without Door (in.)	25-7/8
Depth with Door Open 90° (in.)	54-7/8
Depth Without Handle (in.)	29-1/8
Height to Mid-Freezer	54-3/8
Height to Top of Case (in.)	64-1/4
Width w/Door Open 90 Degrees Inc. Handle (in.)	30-1/2
Width w/Door Open 90 Degrees Less Handle (in.)	28-5/8
Back Air Clearances (in.)	1
Side Air Clearances (in.)	3/4
Top Air Clearances (in.)	1

POWER / RATINGS	
Volts / Hertz / Amps	120V; 60Hz ; 15A



END OF SPECIFICATION

AMSCO® WARMING CABINET

APPLICATION

The Amsco Warming Cabinet is designed to raise the temperature of surgical irrigation solutions and/or blankets to an acceptable level for hospital and surgical outpatient center applications.

FEATURES

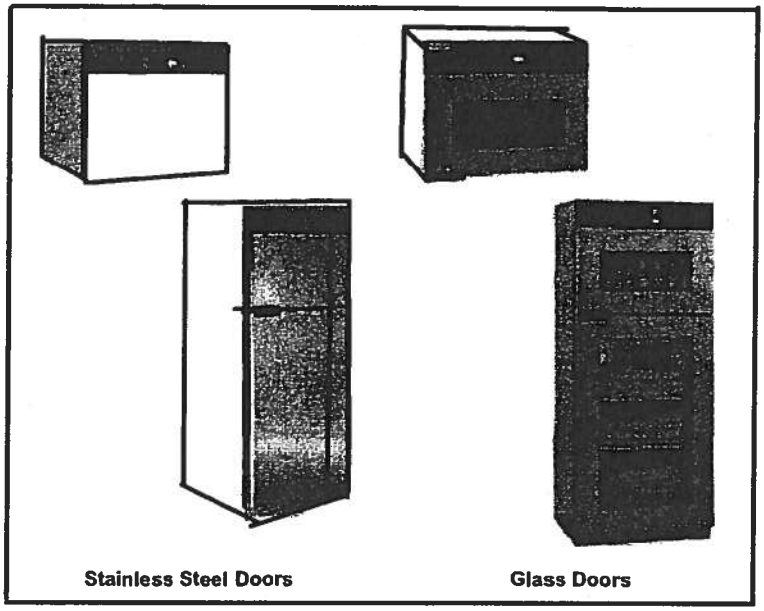
Single-compartment Model—Features a heating chamber available in two different depths: 18" (457 mm) or 24" (610 mm) deep.

Double-compartment Model—Features an upper and lower heating chamber with independent temperature controls, and a choice of two different depths: 18" (457 mm) or 24" (610 mm) deep.

Cabinet Storage Capabilities—The upper compartment of the 18" (457 mm) deep model holds up to 15 (2-liter) surgical flasks; the lower compartment holds up to 45 (2-liter) surgical flasks.

The upper compartment of the 24" (610 mm) deep model holds up to 20 (2-liter) surgical flasks; the lower compartment holds up to 60 (2-liter) surgical flasks.

All chambers can hold a combination of flasks and dry goods, or dry goods only.



Stainless Steel Doors **Glass Doors**

(Typical only - some details may vary.)

STANDARDS

Warming cabinet meets applicable requirements of the following standards, and carries the appropriate symbols.

- **Underwriters Laboratories (UL) Standard 2601-1, 1st Ed.,** as certified by ETL Testing Laboratories, Inc.
- **Standard CSA-C22.2 No. 601.1-M90,** Standard for Electro-Medical Equipment as certified by ETL Testing Laboratories, Inc.
- **EN 60601-1: 1993, Amendment 2, *1995,*** *Electrical Safety as certified by* ETL Testing Laboratories, Inc.
- **IEC 601-1-2: 1993,** EMC testing as certified by ETL Testing Laboratories, Inc.
- ***EN 55011: Group 1, Class B,*** *EMI* testing as certified by ETL Testing Laboratories, Inc.
- **Medical Device Directive (93/42 IEEC)**
- **California OSMPD Seismic Pre-Approval**
- **FDA Good Manufacturing Practices Regulations 21 CFR 820 for Medical Devices.**

The Selections Checked Below Apply To This Equipment

MODEL

- ☐ Single-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep
- ☐ Double-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep

Mounting

- ☐ Open-mounted
- ☐ For Recessing

DOOR OPTIONS

- ☐ Glass
- ☐ Stainless Steel

VOLTAGE

- ☐ 120 V
- ☐ 220-240 V

Door Hinge(LH/RH) interchangeable in field

ACCESSORY

*** Seismic Tie-down Kit

Item # 717197

REV: 6/19/03

CONSTRUCTION

Includes all components necessary to obtain a complete working unit. The open-mounted unit ships with a power condenser installed. The recessed unit requires a connection to building service, supplied by others. The unit contains a heating chamber, instrumentation and operating controls, and a lower heated chamber when double-compartment model is specified.

Cabinet controls are identical for both the single- and double-compartment configurations. The double compartment configuration has a temperature control knob, temperature display LCD, and overtemperature light for each compartment. The control panel (on either the single- or double-compartment configuration) can be conveniently serviced from the front of the unit.

Corners and intersections on the face of the cabinet and door are structurally formed for rigidity, cleanability and appearance. Both models are supported on a stainless steel integral subbase. The cabinet door(s) is (are) available in stainless steel, or stainless steel with a glass window. Interior of cabinet and shelves are stainless steel. If a freestanding model, the cabinet top and side panels are stainless steel.

Heating chamber compartment is insulated with 1" (25 mm) thick, fiberglass blanket. A fan circulates air within the chamber to provide even heat distribution. The door is of double-wall construction with 1-1/2" (38 mm) thick insulation between the walls. Right-hand door swing is provided; swing is reversible. Door closes against a heat-resistant, magnet imbedded, vinyl gasket. Pivot type hinges are stainless steel.

Chamber(s) is (are) heated by an electric rod heater operating on either *120 or 220 Volt, 50/60 Hz power.*

Lower chamber (double-compartment model) includes two stainless-steel shelves, adjustable in 1" (25 mm) increments by a clip and slot arrangement. Door structure mounting, gasket and hinges are the same as the door on the upper chamber. Chamber is heated by an electric rod heater.

CONTROLS

The control panel assembly features a temperature control knob, an overtemperature indicator light, a digital temperature indicator (if a double-compartment model, there will be duplicates of the previous items), and a power switch. The temperature control knob is used to regulate and turn off the heat to each chamber. 120 Volt units display temperature readings in Fahrenheit. 220 Volt units display temperature readings in Celsius scale. Temperature selection range is 90°-160°F (32.2°-71.1°C). An overtemperature alarm will visually and audibly alert operator should an overtemperature condition occur (chamber temperature greater than 10°F [5.5°C] above set temperature). In the event of an overtemperature condition, the overtemperature control automatically turns off the heater(s).

MOUNTING ARRANGEMENT

Double-compartment models may be specified as open-mounted or recessing into a partition wall. If model is specified for recessing, a synthetic rubber sealing gasket is provided to ensure close fit of cabinet front to the face of the wall partition. Recessed cabinet requires no supplementary supports behind the wall partition (except in seismic locations).

Single-compartment models may be specified for wall/counter mounting or for recessing into a partition wall.

PREVENTIVE MAINTENANCE

A global network of skilled service specialists can provide periodic inspections, and adjustments to assure *low-cost peak performance. STERIS* representatives can provide information regarding Annual Maintenance Agreements.

NOTE

1. Due to a variety of building constructions employed, fasteners for mounting cabinet to wall are not furnished by STERIS. Wall(s) must be adequately reinforced to *support operating weight of* cabinet.

ENGINEERING DATA

Unit	Approx. Unit Wt. lbs (kg)
Single-Compartment:*	
18" Wall/Counter Mounting	124 (56)
18" Recess Mounting	98 (45)
24" Wall/Counter Mounting	142 (65)
24" Recess Mounting	115 (52)
Double-Compartment:**	
18" Open-mounted	302 (137)
18" Recessed Mounting	266 (121)
24" Open-mounted	353 (160)
24" Recessed Mounting	306 (139)

** For 220/240 Volt units, add 8 lbs (3.6 kg). For glass door option, add 6 lbs (2.7 kg).*
*** For 220/240 Volt units, add 15 lbs (6.8 kg). For glass door option, add 6 lbs (2.7 kg).*

INTERNAL DIMENSIONS AND CAPACITY

Unit	Upper Chamber Single Chamber Unit (Height x Width x Depth)	Lower Chamber Double Chamber Unit (Height x Width x Depth)
18" Depth	15-1/2 x 23-3/4 x 16-7/8" – 3.6 cu. ft. (394 x 603 x 429 mm)	38-1/4 x 23-3/4 x 16-7/8" – 8.9 cu. ft. (972 x 603 x 429 mm)
24" Depth	15-1/2 x 23-3/4 x 22-7/8 – 4.9 cu. ft. (394 x 603 x 581 mm)	38-1/4 x 23-3/4 x 22-7/8 – 12 cu. ft. (972 x 603 x 581 mm)

UTILITY REQUIREMENTS - Single Compartment Model

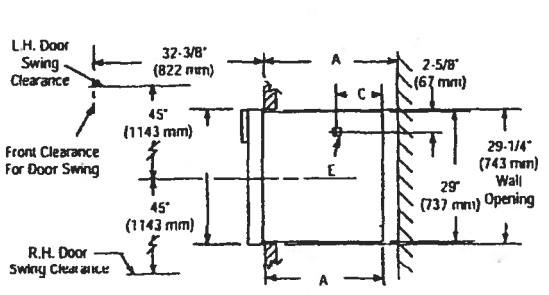
Electricity (E)

120 Volt, 50/60 Hz, 1-Phase, 6.8 A, 800 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 3.6 A, 869 Watts

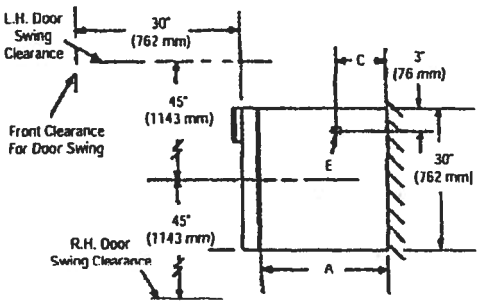
. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)

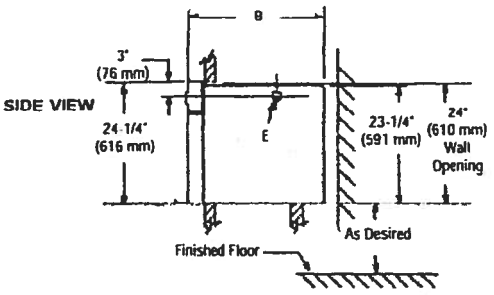
SINGLE-COMPARTMENT MODEL



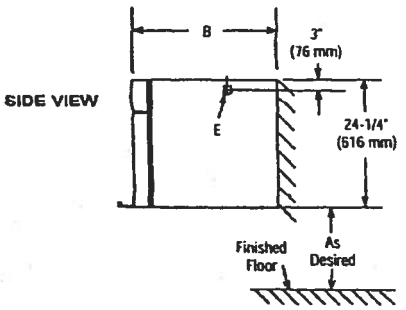
PLAN VIEW



PLAN VIEW



For Recessing



Wall/Counter Mounting

NOTE: Because of STERIS's continuing program of research and development, all specifications and descriptions are subject to change without notice. Obtain certified drawings for design, and installation.

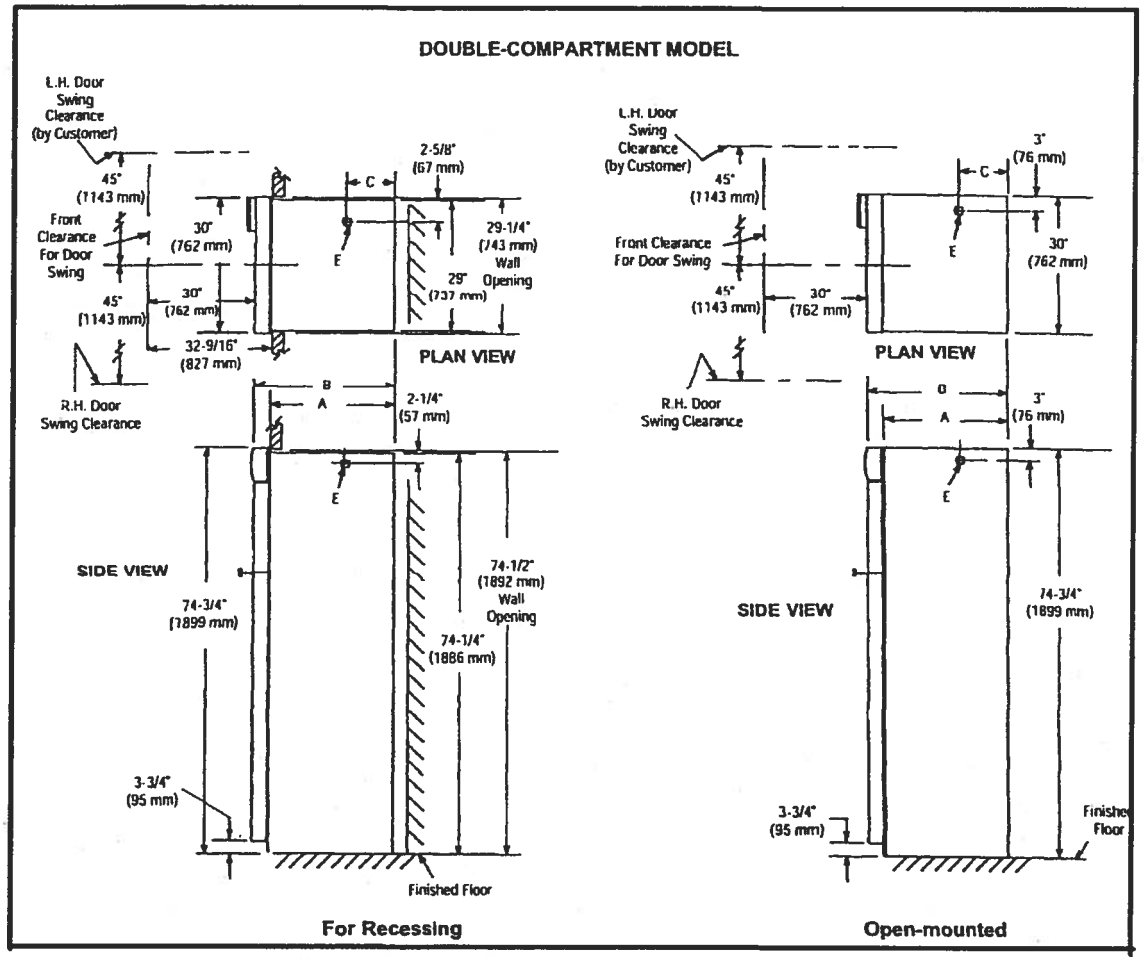
UTILITY REQUIREMENTS - Double Compartment Model

Electricity (E)

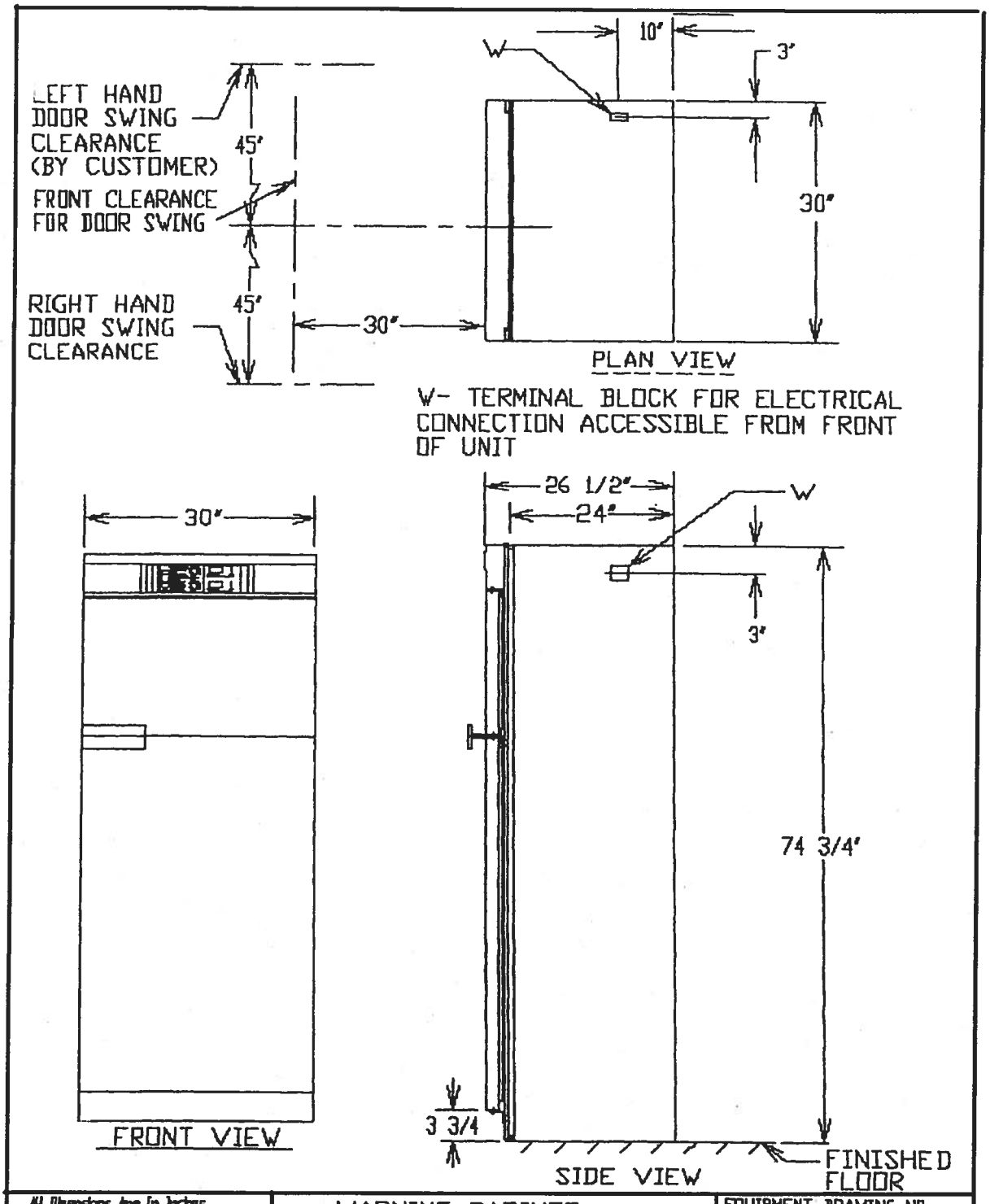
120 Volt, 50/60 Hz, 1-Phase, 13.7 A, 1600 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 6.8 A, 1625 Watts

. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)



Item # 717197



All Dimensions Are In Inches

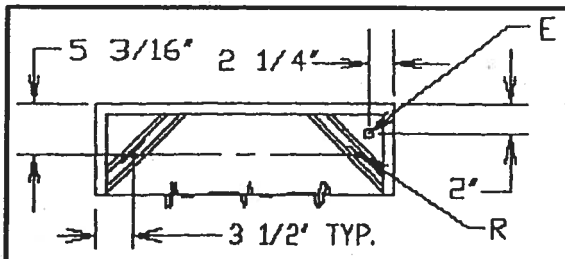
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET

24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214
SHT 1 OF 2

Item # 717197



REAR VIEW OF CABINET

E- 7/8" DIAMETER (22mm) HOLE FOR 1/2" (13mm) DIAMETER CONDUIT CONNECTION OR POWER CORD OPTION.

R- 3/8" (9.5mm) DIAMETER MOUNTING HOLES (2) FASTNERS NOT BY STERIS.

ELECETRICAL SPECIFICATIONS

VERSION	ELECTRICAL SUPPLY	POWER	CURRENT DRAW	UNIT BREAKER RATING
DOMESTIC	120V, 50/60 Hz, 1 PH	1644 WATTS	13.7 AMPS	15 AMPS
INTERNATIONAL	220-240V, 50/60 Hz, 1 PH	1625 WATTS	6.8 AMPS	10 AMPS

UNIT WEIGHT:

VERSION	UNIT WEIGHT		
	CRATED	BOXED	READY TO USE
DOMESTIC	542 LBS	410 LBS	353 LBS
INTERNATIONAL	557 LBS	425 LBS	368 LBS

UNIT CAPACITY:

	INTERNAL DIMENSIONS	VOLUME
TOP CHAMBER	22.875" DEEP X 23.75" WIDE X 15.5" HIGH 581.025mm DEEP X 603.25mm WIDE X 393.7mm HIGH	4.87 FT^3 .138 m^3
BOTTOM CHAMBER	22.875" DEEP X 23.75" WIDE X 38.25" HIGH 581.025mm DEEP X 603.25mm WIDE X 971.55mm HIGH	12.03 FT^3 .34 m^3

All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET
24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214 | SHT 2 OF 4

SEISMIC ANCHORAGE REPORT

for

74-INCH DUAL CHAMBER WARMING CABINETS

MODEL	ENGINEERING DWG. NO.	EQUIPMENT DWG. NO.
30"W X 18"D X 74"H OPEN MOUNTED	146655-541	129361-212
30"W X 18"D X 74"H RECESSED MOUNTED	146655-540	129361-213
30"W X 24"D X 74"H OPEN MOUNTED	146655-163	129361-214
30"W X 24"D X 74"H RECESSED MOUNTED	146655-162	129361-215

THE CALCULATIONS IN THIS REPORT SHOW COMPLIANCE WITH THE REQUIREMENTS OF TITLE 24 OF THE CALIFORNIA CODE OF REGULATIONS (CCR), PART 2 - CALIFORNIA BUILDING CODE (CBC) PUBLISHED AS THE 1988 EDITION OF THE UNIFORM BUILDING CODE (UBC) WITH STATE OF CALIFORNIA 1989. AMENDMENTS, SECTION 2312(g)

Prepared by: G. D. Hall — Date 8/21/91
Senior Engineer

Reviewed by: E. L. Thomas — Date 8/23/91
Project Engineer

Reviewed by: W. L. Sanders — Date
Project Manager

SEISMIC ANCHORAGE REPORT
74-INCH DUAL CHAMBER
WARMING CABINETS

AMSCO

PREPARED BY	CHECKED BY	APPROVED BY	APPROVED BY	APPROVED BY
G. Hall				
DATE 08/16/91	DATE	DATE	DATE	DATE

REVISION RECORD

REV.	DATE	APPROVED BY	PAGE	PARA.	CHANGE
0	8/16/91				Initial release PER # 24

EQUIPMENT WEIGHT & CENTER OF GRAVITY

	18"	24"	
Depth of Unit			
Weight of Cabinet (maximum)	220	260	pounds
Weight of Contents (maximum load)	360	480	pounds
Total Weight	580	740	pounds

The weight acts through the center of gravity as noted in Figures 1 and 2.

SEISMIC LOAD CALCULATIONS

Seismic load is calculated for the heavier unit from the formulae:

$F_p = Z\ I\ C_p\ W_p$ 1▸▸ 2▸▸

and:

$F_w = W_p \pm F_p/3$ 6▸▸

Where:

F_p = Lateral Seismic Force

Z = Zone Factor = 0.4 for Zone 4 locations 3▸▸

I = Importance Factor = 1.5 for essential facilities. 4▸▸

C_p = 0.75 Horizontal force factor - hospital equipment, rigid element 5▸▸

W_p = Dead weight of unit

F_w = Vertical Seismic Force

The forces then will be:

$F_p = Z\ I\ C_p\ W_p$

$= 0.4 \times 1.5 \times 0.75 \times W_p = 0.45\ W_p$

and:

$F_w = W_p \pm F_p/3 = W_p \pm (0.45\ W_p)/3 = W_p \pm 0.15\ W_p$

$F_w = 1.15\ W_p$ or $0.85\ W_p$

Seismic forces at the Warming Cabinet's C.G. are: (See Figures 1 & 2)

F_p - 0.45 X 740 = 333 lbs

F_w = 1.15 X 740 = 851 lbs

or

F_- = 0.85 X 740 = 629 lbs

EQUIPMENT ANCHORAGE INTERFACE

The equipment rest on the floor, but is anchored to the wall with three bolts as shown in Figures 1 and 2.

All the vertical seismic load is taken by the floor. The cabinet will not lift of the floor when the acceleration is upward. When the acceleration is downward, the stiffness of the cabinet is such that the load will be transmitted to the floor and not the bolts.

Friction on the floor is neglected, so all the horizontal load is taken by the bolts. It is assumed that the reaction of the floor is acting through the center of gravity producing no moment. The bolt reactions are determined by the laws of statics. When the seismic load is perpendicular to the wall, the bolts are in pure tension. When the seismic load is parallel to the wall, the bolts experience shear plus tension or compression to react the offset the center of gravity from the wall. The maximum tension any one bolt could experience is 210 pounds. The maximum shear any one bolt could experience is 180 pounds. A bolt can experience both maximum tension and maximum shear concurrently.

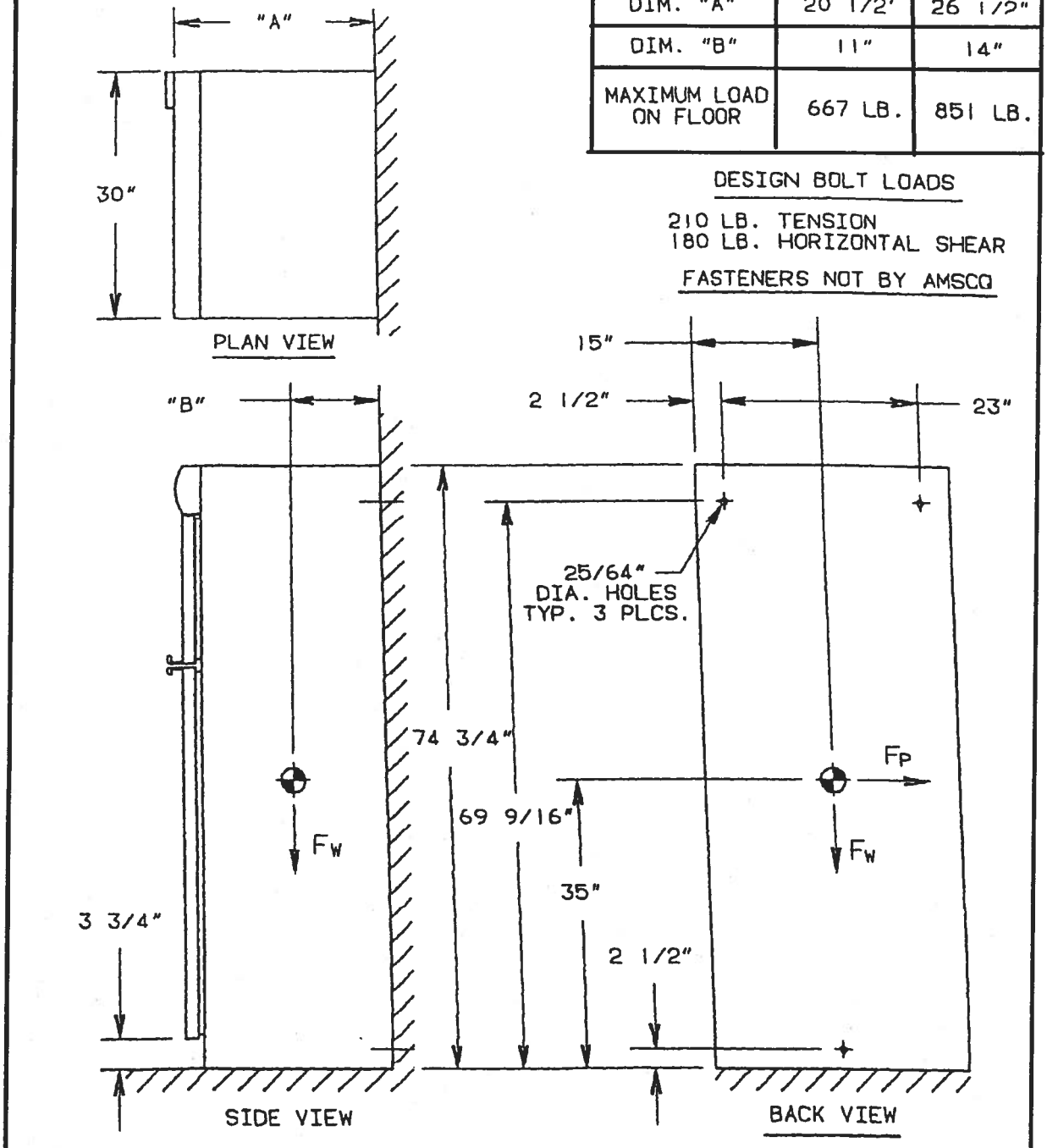
6▸▸ Reference 1▸▸ Table No. 23-P, Note 10, p. 179.54
5▸▸ Reference 1▸▸ Table No. 23-P, p. 179.53 plus notes on p. 179.26
4▸▸ Reference 1▸▸ Table Nos. 23-K and 23-L, pp 179.47 & 179.48
3▸▸ Reference 1▸▸ Table No. 23-I, p. 179.46
2▸▸ Reference 1▸▸ Section 2-312(g)2
1▸▸ Reference California Code of Regulations (CCR), Title 24, Part 2, Published as "State of California 1989 Amendments to the 1988 Edition of the Uniform Building Code".

	18" DEPTH	24" DEPTH
DIM. "A"	20 1/2'	26 1/2"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

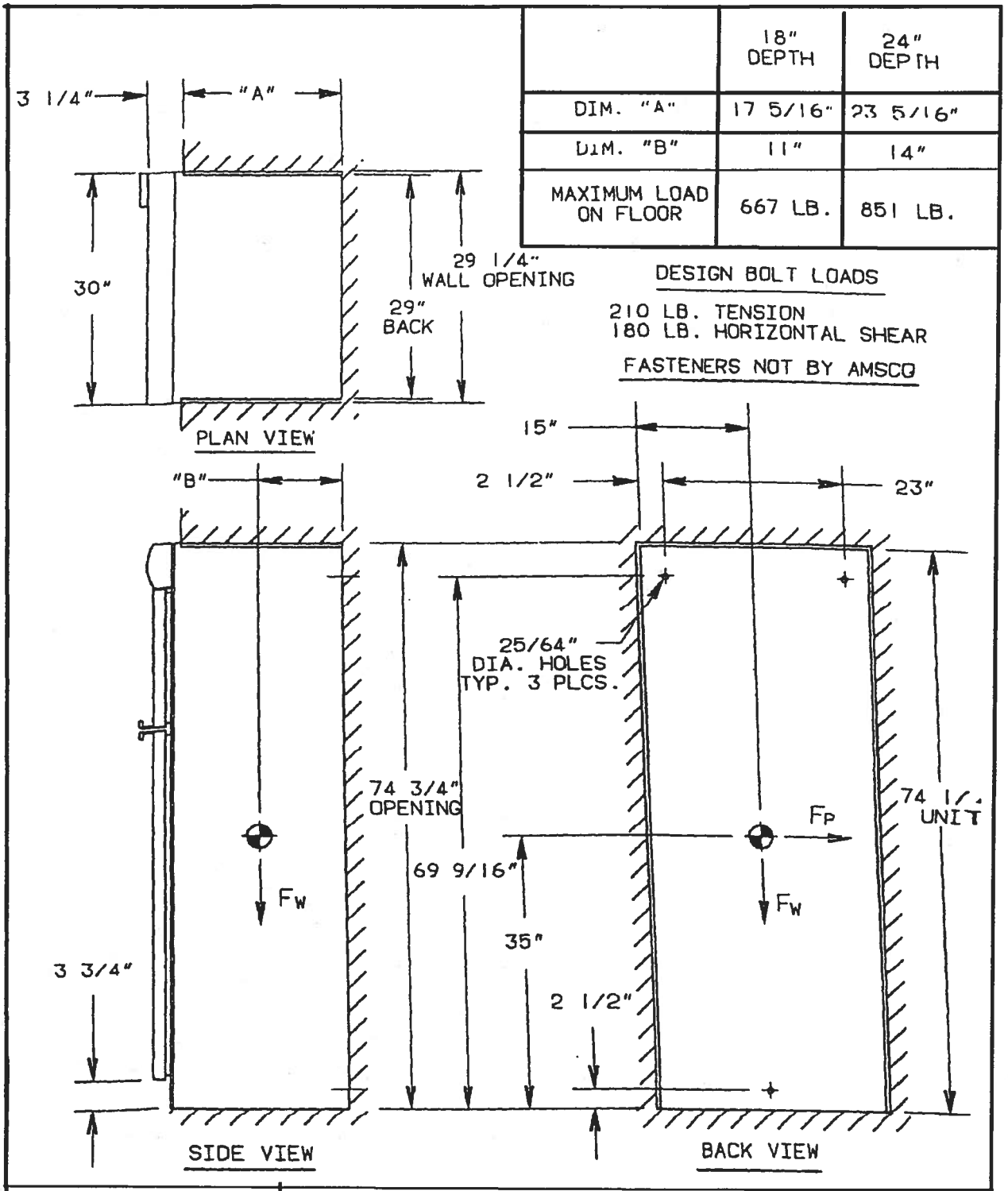
210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO



All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

Seismic Anchorage Report
Warming Cabinets, Open
30" Wide x 74" High



	18" DEPTH	24" DEPTH
DIM. "A"	17 5/16"	23 5/16"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO

All Dimensions Are In Inches
Also Refer To GENERAL NOTES
Applicable To Equipment Drawing

FIGURE 2
SEISMIC ANCHORAGE REPORT
WARMING CABINETS, RECESSED
30" WIDE × 74" HIGH

GENERAL NOTES – APPLICABLE TO SPECIALTY SURGICAL PRODUCT EQUIPMENT DRAWINGS

INTRODUCTION

Each equipment drawing (enclosed) pertains to the equipment as specified or purchased by you. These general notes and recommendations are intended to complement the equipment drawing(s), as necessary, and thereby further assist you in achieving satisfactory installation of the equipment. The information on this and the enclosed drawing(s) is based upon the design and construction of the equipment as of the date of the drawing.

SPACE CONSIDERATIONS

Clearances

The clearance dimensions shown on each drawing are the minimum considered necessary to allow space for servicing and operating the equipment.

Dimensions

Attention must be given to the *printed dimensions* shown on each drawing, since no attempt has been made to hold these drawings to any specific scale.

MOUNTING DETAILS

For Wall Mounting

It is important that walls be adequately reinforced to support the operating weight of the equipment as shown on the drawing. Materials and labor for such support are not furnished by STERIS.

Recessing Cubicle

Wooden bucks, where required to anchor equipment to the walls, are to be furnished by the Customer.

The recessing cubicle should be adequately ventilated to maintain temperature in the range of 80° to 90°F (27° to 32°C) when the equipment is in operation.

UTILITY SERVICE REQUIREMENTS

Roughing-in for Equipment Requiring Steam and/or Water Supply

All lines should be short-stubbed through the floor or wall, far enough to allow for pipe coupling. Provisions must be made for short-swing connections to equipment terminals.

Terminal Fittings

Unless otherwise specified in the contract or purchase order, piping and other appurtenances between terminal fittings on the equipment and wall or floor outlets (stubbing) are not furnished by STERIS.

Pipe Sizes

Pipe sizes shown on each equipment drawing indicate utility service terminals. To ensure adequate service, the lines leading to and from the equipment should be increased in size to conform with applicable plumbing codes.

Shutoff Valves

Separate shutoff valves should be installed in steam and water supply lines near each piece of equipment, so that the unit can be serviced without interruption of supply to other equipment.

Steam Return Lines

Steam return lines should be connected to a gravity system piped to a *vented receiver*. *Avoid any piping* arrangement that could cause back pressure in the return line.

Steam and Water Pressures

Steam and water pressures indicated on each drawing are to be dynamic at the equipment.

Equipment is adequately equipped to operate on the pressures listed on the equipment drawing. If supply line pressure exceeds those shown, provide reducing valves. These are not furnished by STERIS unless specifically called for in the contract or purchase order.

Wiring Terminals

Wiring on the equipment terminates at a junction box or boxes as shown on each drawing. Wiring and other appurtenances between junction box (or boxes) and building service lines are not furnished by STERIS.

Disconnect Switches

Disconnect switches with off position lockout only must be furnished and installed by the Customer in electric supply lines near each piece of equipment.

IMPORTANT

STERIS assumes no responsibility for changes made necessary through failure to explicitly observe these instructions and recommendations. In all instances, local, county, state, and national regulations should be observed.

STERIS SHIPPING INSTRUCTIONS AND SERVICE REQUIREMENTS

PREPARATION FOR SHIPMENT

Each unit of equipment shall be placed in a substantial shipping container or crate complying with applicable rules of the I.C.C. Uniform Freight Classification to ensure acceptance by the common or other carrier for safe transportation to final destination at the lowest rate. The shipping crate or container for heavy equipment (such as sterilizers and water stills) shall be of skid construction to facilitate handling by lift equipment.

The exterior of each container shall be clearly and legibly marked with the room, floor and item number (if available), shipping address, and brief description of the contents. A packing list and complete instructions for uncrating the equipment and setting it in place shall be fastened to the outside of the container or crate; such information shall be protected by a waterproof envelope. Packaging, packing, and marking differing from that above shall be provided, if specified.

INSTALLATION INSTRUCTIONS

Unless additional copies are specified, one set of complete installation instructions, including prints showing all utility service requirements, space requirements and wiring diagrams (if not affixed to the equipment) shall be furnished with each unit of equipment.

OPERATING AND MAINTENANCE INSTRUCTIONS

Instructions for operating and performing periodic preventive maintenance on each unit of equipment, including a list of the service parts and quantity of each required for this purpose, shall be furnished. Unless otherwise specified, one copy of this material shall be furnished.

SERVICE AFTER INSTALLATION*

After installation of each assembly, STERIS shall provide a factory-trained technician to perform repair service as required by the customer. This service shall be on a time and material basis unless the equipment is still within the manufacturer's warranty.

If specified, STERIS shall provide a factory-trained technician to perform preventive maintenance services on each assembly following its test and demonstration.

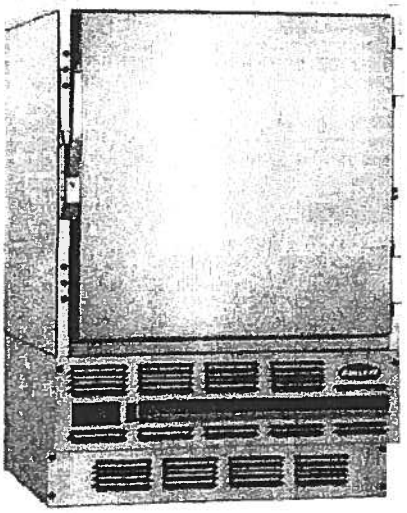
* *These services are available from the STERIS Corporation within the continental United States, Alaska, and Hawaii.*

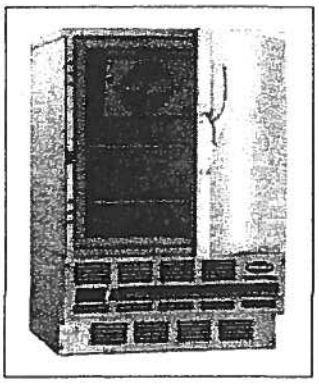
Item # 717197

Symphony REF Series Undercounter Refrigerators

Medical-grade undercounter refrigerator with external digital temperature display and stainless steel interior/exterior.

Model	
REF5	for standard 36" (915mm) counters, 4.8 cu ft capacity





Proper storage for expensive medications and patient supplies

- Heavy-duty compressor, forced air cooling and solid state controller maintain uniform cabinet temperatures with quick pull-down to temperature
- Adjustable set point meets temperature range requirements for different applications:
  36°F – 46°F (3°C – 8°C) for medications,
  33°F – 40°F (1°C – 5°C) for food and beverages
- Locking door handle provides medication security
- Supports JCAHO standards on medication storage
- NSF listing ensures temperature stability in adverse conditions and with frequent door openings

More features designed specifically for healthcare

- Easy-to-read external temperature display allows easy temperature logging
- Positive door latch and magnetic gasket provide secure closure
- Two, easy-to-clean, epoxy-coated shelves accept narcotic box hardware (supplied by others)
- Two models – for standard 36" (915mm) counter and 34" (864mm) ADA-compatible counters

Easy installation, cleaning and care

- Front-breathing design allows installation in standard 24" (610mm) casework opening with no side clearances
- Field-reversible door and handle for left or right opening
- Condensation evaporates automatically
- Automatic, off-cycle defrost eliminates manual defrosting
- Durable stainless steel interior and exterior for easy cleaning
- Slide-out compressor tray for easy access to condenser

Industry's best warranty

- 2-yr parts and labor on entire refrigerator
- 5-yr parts on compressor

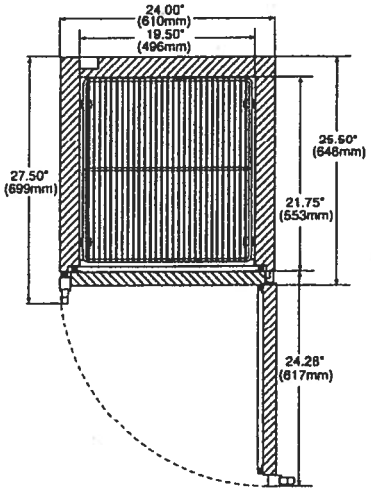
Accessories

- Temperature alarm with probe and °F/°C display
- Pyxis® compatible door bracket

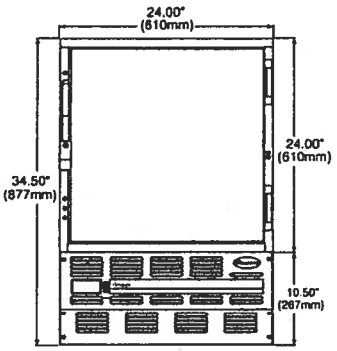
Item # 718171

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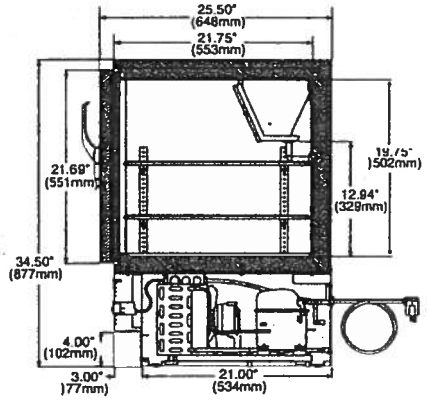
Top View
all models



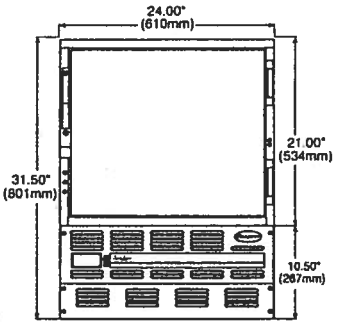
Front View
REF5



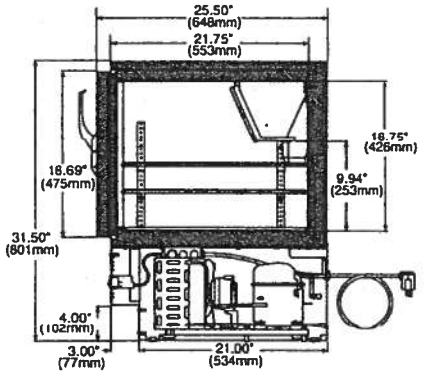
Side View
REF5



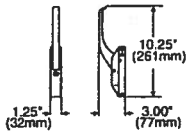
Front View
REF4-ADA



Side View
REF4-ADA



Handle Detail
all models



Plug Detail
all models
NEMA 5-15



Approximate Shipping Weight 175 lbs (79kg)

Standard Electrical 115V, 60Hz, 1 ph, 8.0 amps, max. fuse 15 amps
Hospital-grade cord and plug provided.

Specifications
Follett undercounter refrigerator to be model (choose one) _____ REF5 34.5" (877mm) high for use in standard counters or _____ REF4-ADA 31.5" (801mm) high for use in 34" (864mm) high ADA-compatible counters. REF5 to have 4.8 cu ft (136L) capacity. REF4-ADA to have 4.0 cu ft (113L) capacity. Environmentally-friendly R404A refrigeration system to include heavy-duty 1/4 HP compressor, blower, blower coil and automatic evaporative forced air cooling with off-cycle defrost. Refrigerator to be equipped with external temperature display in °F/°C and solid-state controller to maintain uniform cabinet temperatures. Controller to have programmable set points to meet temperature range requirements of different applications: 30°F – 40°F (2°C – 8°C) for medications, 33°F – 40°F (1°C – 5°C) for food and beverage. Refrigerator door to be field-reversible and equipped with replaceable gasket and chrome-plated handle with cylinder lock. Refrigerator interior and exterior to be stainless steel. Two epoxy-coated wire shelves adjust in 1/2" (13mm) increments. Storage area to be insulated with high-density, non-CFC foam polyurethane. Hospital-grade cord and plug provided. Refrigerator to be NSF, UL and cUL listed.

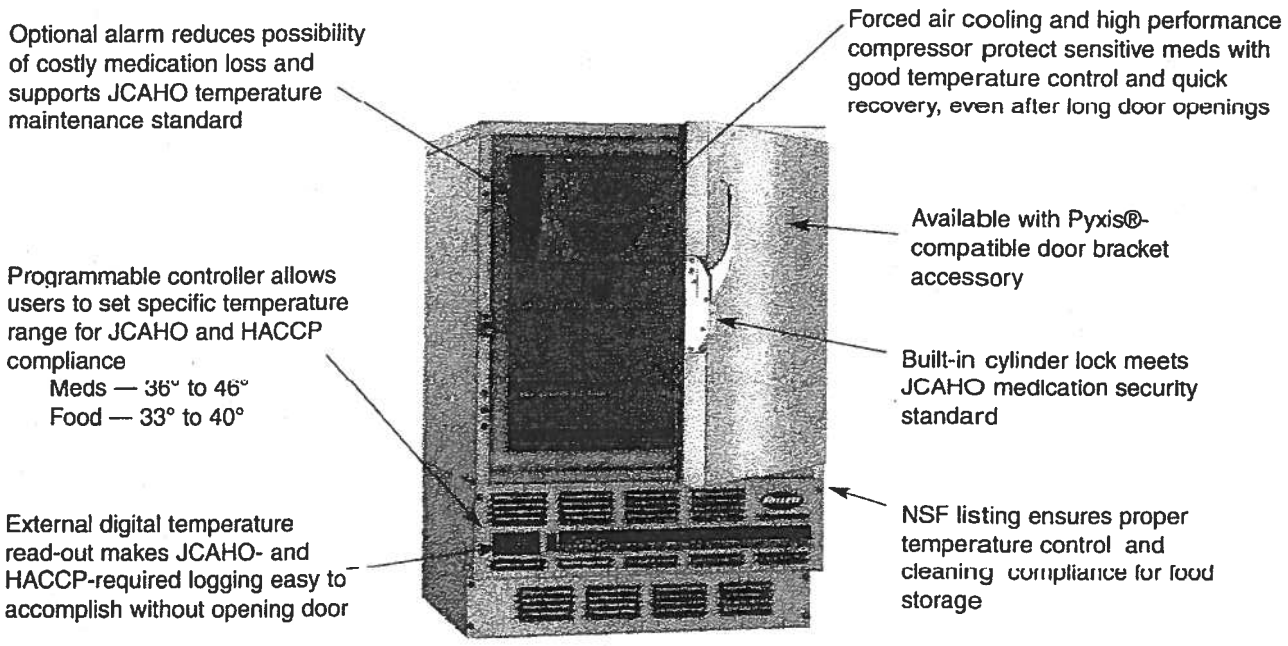
Item # 718171

Meets medication and food storage requirements

Follett's REF5 and REF4-ADA medical-grade undercounter refrigerators provide the features and performance to meet both JCAHO standards and local and state requirements for medication and food storage.

JCAHO's medication standard (TX 3.5/MM.2.20) addresses proper storage and control of medications, and at a minimum requires the logging of temperatures, lockable security for medications, and the maintenance of constant appropriate temperature.

State and local inspectors generally follow HACCP guidelines requiring temperature logging to ensure that perishable food is maintained below 40°F.



High-quality design and full stainless steel construction deliver outstanding performance and long-term reliability, backed with the industry's best warranty. Our component performance testing supports this claim:

- Compressor (1/4 hp, heavy-duty) — over 1.6 million on-off cycles without failure
- Fan, controller, and condenser — over 39,000 run hours without failure
- Door gasket — over 38,000 openings and closings with no measurable wear
- Door hinges — over 1 million cycles without measurable wear
- Door — tested open to 450 pounds of direct weight without failure

NSF - National Sanitation Foundation; JCAHO - Joint Commission on Accreditation of Healthcare Organizations; HCAAP - Hazardous Analysis of Critical Control Point Program

END OF SPECIFICATION

UNIT SPECIFICATIONS SHEET

LFGI-4USP LAMINAR FLOW GLOVEBOX / ISOLATOR

SECTION I. PERFORMANCE DATA

The Laminar Flow Glovebox/Isolator provides the ultimate in both product and operator protection. The LFGI functions as a Glovebox while operating under negative pressure to meet NIOSH recommendations and as an Isolator under positive pressure to meet USP <797> regulations. HEPA filtered unidirectional (laminar) air bathes the work area to protect the product from contamination and removes any particulate generated by sample manipulation. The operator is provided a complete barrier from materials being manipulated in the work area. The LFGI Series of barrier isolators meet or exceed ISO 14644-1 Class 5 air quality. Each LFGI, before shipping, undergoes rigorous physical testing to assure the unit meets performance requirements as validated. It is required that independent certification be performed before use.

SECTION II. EQUIPMENT SPECIFICATIONS

Construction-

-Overall Dimensions: 66 W (50" W at base) x 32" D x 80" H
-Work Area Dimensions: 46 ½" W x 24 ½" D x 29" H
-Designed to fit through standard door openings and elevators.
-All stainless steel construction both inside and out with a pharmaceutical grade finish.
-316L Stainless steel work trays slide over one another and are removable to facilitate easy clean up under the work deck.
-All viewing panels are stainless steel framed Acrylic
-Front viewing panel is top hinged and self supporting for easy access to the work area for cleaning and equipment ingress.
-All filter diffuser / guard panels are removable for easy cleaning.
-Straight sides and back maximize work area to accommodate the many types and shapes of pharmacy equipment and compounders.
-All corners in work area, antechamber and work surface are easily reached and cleaned.

Antechamber-

-Sealed two-door airlock (16" W x 13 ½" D x 14 ¼" H) maintains complete environmental separation between work area and ambient conditions.
-HEPA filtered purge of trapped airlock air eliminates cross contamination between the work area and the room during both material ingress and egress.

Waste Removal-

-Trash tube is a 4" diameter tube, flanged for waste bag/container connection and provided with an easily removable seal/stopper to maintain work area containment. (Stainless trash can is available)
-Sharps tube is a straight 2 ½" diameter tube to facilitate quick drop of the largest syringes and provided with an easily removable seal/stopper to maintain work area containment.
-Fully adjustable sharps container shelf accommodates most commercially available wide mouth or hinged top sharps collectors. (Examples BD Part # 305610 and 305491)

Safety-

-Lock-out handle requiring key for access to work area.
-Digital pressure readout with low pressure alarm for work area.
-Inward/Outward face velocity is 95-100 linear feet per minute at gloveport opening, to protect operator/product during massive breach of containment.
-Glove changes can be made without breaking containment.
-Locking casters are standard, seismic anchors are available.

Ergonomics-
-Hydraulic assist height adjusting stand offers a full 10" range variance allowing operators to sit or stand comfortably for extended time periods.
-Stainless steel sliding tray inside the airlock pulls into the work area eliminating reaching strains.
-Two part sleeve/glove system allows the use of most types and sizes of commercially available gloves for better dexterity and tactility.
-Extra large oval gloveports are placed with bottoms together to provide an athropometrically correct configuration that accommodates a wide range of body types and increases range of movement.
-Gloveports have a 3" arm rest to reduce operator fatigue.
-Large viewing panel is at an angle to reduce glare and operator strain.
-Integrated foot rest.

Configuration Options-
-Overall work area pressure can be either positive or negative and can be altered in-place by a certifier.
-Antechamber can be left or right handed or can be installed on both sides.
-Waste and sharps removal tubes can be left or right handed or can be installed on both sides.
-Three available exhaust options that can be factory set or changed by a certifier in-place.

Filtration-
-Full framed standard size minipleat HEPAs filter 100% of inlet and exhaust air from both the work area and the antechamber to provide a fully contained environment.
-HEPA filters are full coverage and front loading for easy replacement by a certifier.
-A Prefilter extends the life of the work area supply HEPA filter and can be replaced without tools.

Electrical-
-High capacity motor/blower systems with speed control to extend HEPA filters life.
-Ten foot hospital grade power cord with molded grounded plug.
-Sealed outlet in work area.
-Separate lighted power ON/OFF indicator switches for blower and lighting.
-High efficiency, standard sized fluorescent lights are externally mounted to minimize heat build-up.
-Voltage = 115 Volt, 60 Hz (220/50-60 Hz also available).
-Amperage Rating = 15, Running Amperage = 6

Exhaust-
-Clean air plenum is external to the work area.
-Constructed to allow for optional outside venting of exhaust air.
-Constructed to allow for 3 exhaust options that can be factory set or changed by a certifier in-place
-Venting is not required for operation but is optional.

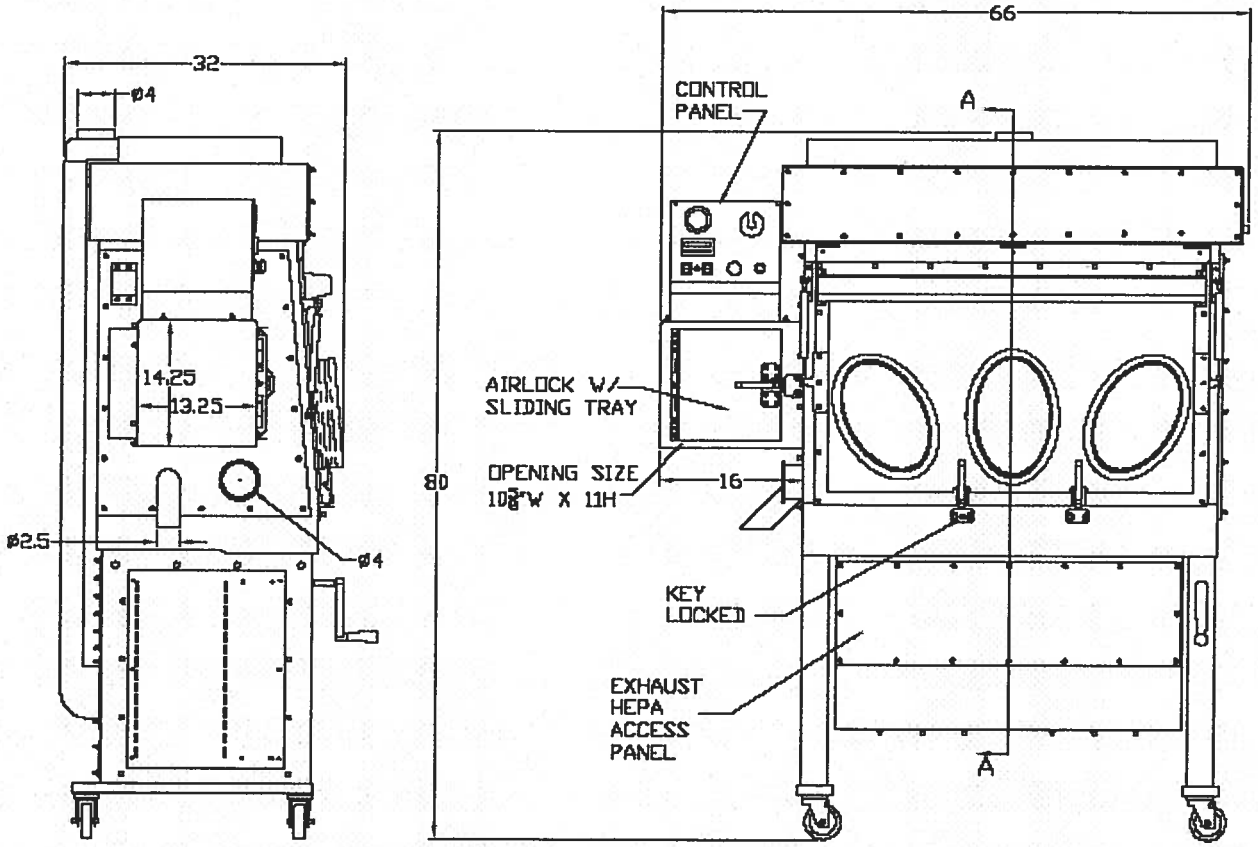
	No Exhaust- ~100% recycling of air	Controlled Exhaust- 80% recycling of air	Total Exhaust- no recycling of air.
Exhaust Connection	N/A	4" OD flexible hose	8" OD flexible duct
Exhaust CFM	20	80	400
Exhaust Static	N/A	<1 inch w.c.	Up to 2 inches w.c. (depending upon configuration)

Weight-
Net Weight- 625 lbs
Shipping Weight- 755 lbs

SECTION III. OPTIONAL EQUIPMENT AND ACCESSORIES-

LFGI-A80 Ergonomic task chair with anti-bacterial and anti-microbial vinyl covering, various colors
LFGI-A85S Stainless steel cleaning handle with pivot head. Accepts lint- free mop heads (LFGI-A85M)
LFGI-A8E Electrical Height Adjustment (requires additional plug-in)
LFGI-A83 Stainless steel garbage can (hangs on side to contain waste bags)
LFGI-A12 Exhaust ventilation kits

SECTION IV. UNIT DIAGRAM



END OF SPECIFICATION

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

Legend

D/R = Contractor De-Install & Relocate
CR = Contractor Rough-in Only
IR = Installation & Assembly Responsibility
F = Facility
C = Contractor
V = Vendor
N = New
E = Existing

Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	2-2099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	3-3073	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	4-4099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	5-5099	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1085	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1112	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	2-2082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	4-4082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1040	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1085	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1112	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3042	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3073	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4071	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
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N = New
E = Existing

Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5099	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1040	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1112	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	2-2071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	3-3042	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	4-4071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	5-5071	C				
475604	(Model: GTS18KBP) #GTS18KBP; REFRIGERATOR, TOP FREEZER,	3-3054	C				
477300	(Model: GMR04AAM) #GMR04AAM; REFRIGERATOR, UNDERCOUNTER	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1112	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	3-3073	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

Legend

D/R = Contractor De-Install & Relocate
CR = Contractor Rough-in Only
IR = Installation & Assembly Responsibility
F = Facility
C = Contractor
V = Vendor
N = New
E = Existing

Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1070	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1085	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1112	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3017	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3027B	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3042	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3073	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4082	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5099	C				
15152	(Model: 101461) # 101461; ILLUMINATOR, 1 PANEL	3-3066	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	3-3073	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5099	C				
717197	(Model: DJ04112033-01) #DJ04112033-01; WARMING CABINET	3-3055	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	3-3072	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

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IR = Installation & Assembly Responsibility
F = Facility
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N = New
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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5097	C				
JC2725	(Model: QUOTE) LAMINAR FLOW GLOVEBOX	3-3054	C				
C2859	(Model: QUOTE) DISPLAY CASE & REFRIGERATOR	1-1002	C				

COID PROJECT NUMBER: _____

OWNER FURNISHED EQUIPMENT DELIVERY SCHEDULE

NOTE: Per the Contractor Guideline Book this OFE Delivery Schedule MUST be completed and returned BEFORE the first invoice is paid!

PROJECT NAME: _____

Project Phase Description (if applicable): _____

Project Location: _____

Project Completion Date: _____ **Completion Date This Phase:** _____

Owner Equipment Mgr. _____ **Phone:** _____

Owner Construction Mgr. _____ **Phone:** _____

Hospital Material Mgr. _____ **Phone:** _____

Contractor's Supt.: _____ **Phone:** _____

Contractor's Project Mgr. _____ **Phone:** _____

OWNER FURNISHED/CONTRACTOR INSTALLED EQUIPMENT

NOTE: Include date for special backboxes (such as OR Lights, Illuminators, etc.) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor will coordinate with HCA Equipment Manager for safe storage.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:

HCA Equipment Manager:
HCA Construction Manager:
Hospital Construction Contact:
Hospital Materials Manager:

ENGINEERED SYSTEMS EQUIPMENT DELIVERY SCHEDULE

(Sample on Following Page)

EXPLANATION / INSTRUCTIONS: HCA requires that the enclosed Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule Form to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed. This information enables owner vendors to ship cable and backboxes and equipment, as well as, schedule installation to meet the construction schedule. It is critically important that one schedule document be provided for each separate occupancy phase of the project.

Please see "Team Construction: Routine / Repetitive Phase" for general contractor's responsibilities for management of the owner furnished systems process and installation of all raceway and cable installation on some systems. It is the contractor's responsibility to update and redistribute this document if the construction schedule changes.

NOTE: **No Payments can be made until receipt of this schedule(s) by the HCA Construction Manager.**

OWNER PROJECT#_____

ENGINEERED/SYSTEMS INFORMATION & TELEPHONE SYSTEMS
EQUIPMENT DELIVERY SCHEDULE

Project Name: _____ Date: _____
Project Location: _____ Revision Date: _____
Description of this phase (if applicable) _____
Completion Date of this phase: _____
Project Completion Date: _____ Revised: _____
Owner's Construction Manager: _____
Owner's Equipment Manager: _____ Phone #: _____
Information & Telephone Systems Cabling Installation Project Manager: _____
Information and Telephone Systems Project Manager: Bob Stewart Phone #: 615-344-8010
General Contractor Superintendent: _____ Phone #: _____
Electrical Contractor Project Manager: _____ Phone #: _____

Installation or Need Equipment Delivered

ITEM/DESCRIPTION	OWNER FURNISHED OWNER INSTALLED	OWNER FURNISHED CONTRACTOR
INSTALLED	DATE:	DATE:
1. Wiring Schematics/Cut Sheet		_____
2. Engineered Systems Cable		
Cable & Special Backboxes		_____
3. T.V. Brackets		_____
4. Radio Tower	_____	
5. Information Systems:		
Cable:	_____	
Telephone Equipment:	_____	
Data Equipment:	_____	
6. Nurse Call System/Sound System:	_____	
7. Intercom System	_____	
8. Dictation System	_____	
9. MATV System	_____	
10. TV Set Installation	_____	
11. Systems Inspection	_____	_____
12. State Inspection	_____	_____
13. Demobilize Job site	_____	_____

DISTRIBUTION BY HCA CONSTRUCTION MANAGER:
Information & Telephone Systems: Bob Stewart
HCA Construction Manager:
HCA Equipment Manager:
Hospital Construction Contact:
General Contractor's Project Manager:

Owner/ Vendor Installed Equipment Delivery Schedule

ITEM	Date Building Will Be Ready For Installation
Kitchen Equipment	
Walk-In Cooler & Freezer	
Radiology Equipment	
Shelving/Lockers	
Patient Room Furniture	
Office/Waiting Furniture	
Drapes/Cubicle Curtains/Shower Curtains	
Artwork	
Others (as may be applicable)	

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
1. ANESTHESIA ADMINISTRATION		X	X	X	X									
2. AUDIO / VISUAL / PERSONNEL TRAINING AIDS										X	X	X	X	To be coordinated via DD session. Information Systems will budget.
a. Portable										X	X	X	X	
b. Systems										X	X	X	X	
3. AUTOMATED TRANSPORT SYSTEMS (Pneumatic Tube)						X	X	X	X					Check with Bulk Purchasing
4. CARTS														
a. Anesthesia		X	X	X	X									
b. Case, Surgical		X	X	X	X									
c. Cast		X	X	X	X									
d. Crash		X	X	X	X									
e. Endoscopy		X	X	X	X									
f. E.N.T		X	X	X	X									
g. Environmental Svcs		X	X	X	X									
h. Food Service		X	X	X	X									
i. Fracture		X	X	X	X									
j. Gift Shop (Hospitality)		X	X	X	X									
k. Isolation		X	X	X	X									
l. Linen		X	X	X	X									
m. Medication		X	X	X	X									
n. Miscellaneous		X	X	X	X									
o. Supply		X	X	X	X									
p. Tool		X	X	X	X									
q. Trash		X	X	X	X									
r. Utility		X	X	X	X									
s. Wrap		X	X	X	X									
5. CASEWORK														
a. Focal						X	X	X	X					Check with Bulk Purchasing
b. Standard						X	X	X	X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Volce (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
c. Special (Modular)						X	X	X	X					Check with Bulk Purchasing Typically Vendor Installed
d. Keyboards (Duplicate under furniture)						X	X	X	X					
6. CHAIRS, EXAM/TREATMENT														
a. Contour (Donor, I.V.)		X	X	X	X									
b. Dental		X	X	X	X									
c. Eye / ENT		X	X	X	X									
d. Miscellaneous		X	X	X	X									
e. Phlebotomy		X	X	X	X									
7. CHARTING SYSTEMS, PATIENT														
a. Manual		X	X	X	X									
b. Computerized										X	X	X	X	
c. Wall-hung chart station						X	X	X	X					
8. CLOCKS														
a. Discrete (Battery / Plug-in)						X	X	X	X					
b. Interval Timers / Recorders						X	X	X	X					
c. Systems, Cenralized						X	X	X	X					
d. Kronos Time & Attendance										X	X	X	X	
9. COMMODES														
a. Fixed						X	X	X	X					
b. Portable		X	X	X	X									
10. COMMUNICATIONS EQUIP/SYSTEMS														
a. Dictation														
1. Portable										X	X	X	X	
2. Systems, Hardwired										X	X	X	X	
b. Doctors' Registry						X	X	X	X					
c. Emergency Radio		X	X	X	X									Contractor to pull cable
d. Intercom		X	X	X	X									Contractor to pull cable
e. Nurse Call		X	X	X	X									Contractor to pull cable

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
f. Side Com Receptacle		X	X					X	X					
g. Radio / Pocket Paging		X	X	X	X									Contractor to pull cable
h. Two Way Radio		X	X	X	X									Contractor to pull cable
i. Telephone										X	X	X	X	
j. Overhead Page / Music		X	X	X	X									Contractor to pull cable
k. Transcription										X	X	X	X	
l. Public Address		X	X	X	X									Contractor to pull cable
m. Fax Machines										X	X	X	X	
n. Picture Archive and Communication Systems (PACS)										X	X	X	X	
11. COMPACTORS														
a. External						X	X	X	X					
b. Departmental						X	X	X	X					
12. DARKROOM EQUIPMENT														
a. Cabinet, Film Storage		X	X					X	X					
b. Miscellaneous		X	X	X	X									
c. Safelights						X	X	X	X					
d. Transfer Boxes, Cassette						X	X	X	X					
e. Revolving X-Ray Door						X	X	X	X					
13. DATA / WORD PROCESSING EQUIPMENT														
a. Desktop Computer										X	X	X	X	
b. Mainframe										X	X	X	X	
c. Network Equipment										X	X	X	X	
d. Backbone and/or Station Wiring										X	X	X	X	
14. DIALYSIS EQUIPMENT														
a. Peritoneal		X	X	X	X									
b. Renal		X	X	X	X									
15. EQUIPMENT MANAGEMENT SYSTEMS (Equipment Boom)		X	X	X					X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
16. ELECTROCARDIOGRAPH EQUIPMENT		X	X	X										
17. ELECTROSURGICAL EQUIPMENT		X	X	X	X									
18. ENVIRONMENTAL ROOMS						X	X	X	X					
(Prefabricated)														
19. ENVIRONMENTAL SERVICES EQUIP		X	X	X	X									
20. FIRE PREVENTION EQUIPMENT														
a. Blankets		X	X					X	X					
b. Cabinets, Extinguisher						X	X	X	X					
c. Extinguishers						X	X	X	X					
d. Systems						X	X	X	X					
21. FOOD SERVICE EQUIPMENT														
a. Grp. I (Hoods, Walk-Ins)		X	X	X	X									Elec. contractor makes actual connection
b. Grp. II (Moveable: Ovens, Dishwasher)		X	X	X	X									
c. Grp. II (Smallwares: Pots, Trays, Carts)		X	X	X	X									
d. Final Equipment Placement Set in place; caulking; touchup														Work to be completed by food service vendor
e. Garbage Disposals						X	X	X	X					
f. Cash register										X	X	X	X	
22. FREEZERS (excluding Food Svc Equip)														
a. Chest		X	X					X	X					
b. Miscellaneous		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in/Prefabricated		X	X	X	X									Elec. contractor make actual connection
23. FURNISHINGS, DESIGN														

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Accessories, Design	X													
b. Artwork / Graphics		X	X	X	X									
c. Bulletin Boards/Tack Boards/Chalkboards/Marker Boards						X	X	X	X					
d. Carpet						X	X	X	X					Check with Bulk Purchasing
e. Curtains, Cubicle						X	X	X	X					
f. Curtains, Shower			X	X	X	X								
g. Furniture, General - Existing			X	X	X	X								Interior Designer to spec fabric
h. Furniture, General			X	X	X	X								
i. Signs, Exterior						X	X	X	X					Check with Bulk Purchasing
j. Signs, Interior						X	X	X	X					Check with Bulk Purchasing
k. Waste Receptacles														
Clinical		X	X	X	X									
Non-Clinical			X	X	X	X								
l. Window Treatment / Blinds/ Cornice Boards			X	X	X	X								Except Blinds that are internal with window units
m. Wall Protector (ie: bumper / bed / handrail/corner guards)						X	X	X	X					
n. Keyboards - in workstations, duplicate in casework						X	X	X	X					
o. Planters			X	X	X	X								
p. Plants	X													
24. FURNITURE, PATIENT ROOM														
a. Beds		X	X	X	X									
b. Cribs		X	X	X	X									
c. Mattresses		X	X	X	X									
d. Table, Overbed		X	X	X	X									
e. Cabinets, Bedside		X	X	X	X									Interior Designer Specification Responsibility Per Equipment Managers Direction
f. Chairs, Lounge		X	X	X	X									
g. Chairs, Side		X	X	X	X									
h. Chests		X	X	X	X									
i. Desks		X	X	X	X									
j. Dressers		X	X	X	X									
k. Wardrobes (except built-ins)		X	X	X	X									
25. HAMPERS, LINEN		X	X	X	X									
26. HEART-LUNG MACHINES		X	X	X	X									

Revised: 2-06-06

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Major / Minor Equipment Responsibilities

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
27. HOODS														
a. Biohazard		X	X					X	X					
b. ETO						X	X	X	X					
c. Fume		X	X					X	X					
d. Laminar Flow		X	X					X	X					
e. Radioisotope		X	X					X	X					
28. HOT LAB EQUIPMENT														
a. Nuclear Medicine		X	X	X	X									
b. Radiation Therapy		X	X	X	X									
29. HYPO-HYPERTHERMIA EQUIPMENT		X	X	X	X									
30. ICE MACHINES		X	X					X	X					
31. ILLUMINATORS, X-RAY FILM														
a. Motorized		X	X					X	X					
b. Recessed		X	X					X	X					
c. Surface Mounted		X	X					X	X					
32. IMAGING EQUIPMENT														
a. Computerized Axial Tomography (CT)		X	X	X	X									
b. Dental Radiography		X	X	X	X									
c. Digital Radiography		X	X	X	X									
d. Image Intensifier, Portable		X	X	X	X									
e. Magnetic Resonance Imaging		X	X	X	X									
f. Magnetic Resonance Imaging Rigging							X	X						Contractor responsible
g. Mammography Equipment		X	X	X	X									
h. Nuclear Camera		X	X	X	X									
I. Nuclear Medicine Accessories		X	X	X	X									
j. Radiation Therapy Equipment		X	X	X	X									
k. Radiation Therapy Accessories		X	X	X	X									
l. Radiographic Equipment		X	X	X	X									
m. Radiographic Equipment Accessories		X	X	X	X									
n. Single Photon Emission		X	X	X	X									

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
Computed Tomography														
o. Ultrasound Equipment		X	X	X	X									
p. Shielding (Lead, Magnetic, RF)						X	X	X	X					
q. Vibration Testing (MRI)														Contractor responsible
r. Picture Archive and Communication Systems (PACS)										X	X	X	X	
1. Cardiology and Radiology										X	X	X	X	
s. Cath Lab		X	X	X	X									
33. IMPRINTERS AND EMBOSSERS										X	X	X	X	
34. INCINERATOR														
a. Pathological						X	X	X	X					
b. Waste - Autoclave/Shredder						X	X	X	X					
35. INFANT CARE EQUIPMENT														
a. Bassinets		X	X	X	X									
b. Incubators		X	X	X	X									
c. Neonatal Care Systems		X	X	X	X									
d. Phototherapy Equipment		X	X	X	X									
e. Warmers		X	X	X	X									
36. INSTRUMENTS, EXAM														
a. Portable		X	X	X	X									
b. Wall Mounted	X	X	X	X	X									
(BP units, Oto/Ophth Sets)														
c. Diagnostic Board - Wallmount		X	X						X					
37. INSTRUMENTS, SURGICAL		X	X	X	X									
38. INTRAVENOUS PUMPS / CONTROLLERS		X	X	X	X									
39. LAB ANALYZERS / INSTRUMENTATION		X	X	X	X									
40. LASER DEVICES														

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Ophthalmic		X	X	X	X									
b. Surgical		X	X	X	X									
41. LAUNDRY SERVICE EQUIPMENT														
a. Washer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
b. Dryer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
42. LIGHTS														
a. Exam														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
b. Patient Headwall Lights						X	X	X	X					
c. Surgical														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
43. LOCKERS:														
NON PUBLIC AREAS						X	X	X	X					
PUBLIC AREAS						X	X	X	X					
BENCHES IN LOCKER ROOMS						X	X	X	X					
44. MAIL ROOM EQUIPMENT		X	X	X	X									
45. MAINTENANCE TOOLS & EQUIPMENT		X	X	X	X									
46. MATERIALS HANDLING / CONTROL EQUIPMENT		X	X	X	X									
47. MEDICAL GAS / VACUUM SYSTEM														
a. Primary System (Piping)						X	X	X	X					Check with Bulk Purchasing
b. Secondary Equipment		X	X	X	X									

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HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
(Regulators & Flowmeters)														
48. MEDICINE CENTERS						X	X	X	X					
a. Prefabricated						X	X	X	X					
b. Automated	X									X				
49. WEATHER GOOSE										X	X	X	X	
50. MISCELLANEOUS GROUPS II & III EQUIPMENT		X	X	X	X									
51. MONITORING EQUIPMENT, PHYSIOLOGICAL														
a. Ambulatory Systems														
1. ECG		X	X	X	X									
2. EEG		X	X	X	X									
b. Discrete Monitors														
1. Bedside		X	X	X	X									
2. Fetal		X	X	X	X									
c. Hardwired Systems		X	X	X	X									Contractor to pull cable
d. Miscellaneous Monitors		X	X	X	X									
e. Telemetry Systems		X	X	X	X									Contractor to pull cable
52. NARCOTICS LOCKERS						X	X	X	X					
53. NEUROLOGICAL EQUIPMENT														
a. Electroconvulsive Therapy Device		X	X	X	X									
b. Electroencephalographs		X	X	X	X									
c. Electromyographs		X	X	X	X									
d. Evoked Response Devices		X	X	X	X									
e. Misc. Equipment & Accessories		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
54. NOURISHMENT CENTERS (Prefabricated)						X	X	X	X					
55. OCCUPATIONAL THERAPY EQUIPMENT		X	X	X	X									
56. OFFICE MACHINES														
a. Calculators	X													Facility Operational Expense
b. Cash Registers										X	X	X	X	
c. Miscellaneous Equipment	X													Facility Operational Expense
d. Mobile Storage Equipment (Rotary)		X	X	X	X									
e. Photocopiers ie, Xerox	X													Facility Operational Expense
f. Typewriters	X													Facility Operational Expense
57. OPHTHALMIC EQUIPMENT														
a. Control Systems		X	X	X	X									
b. Portable		X	X	X	X									
58. ORTHOPEDIC APPARATUS		X	X	X	X									
59. OVENS / RANGES / MICROWAVES (Other than Food Service)														
a. Fixed		X	X					X	X					
b. Portable		X	X	X	X									
60. PATIENT SERVICE SYSTEMS (Prefabricated Headwall)														
a. Column - ICU / OR / RR / ER						X	X	X	X					
b. Headwall - LDRP						X	X	X	X					Check with Bulk Purchasing
c. Flatwall - ICU / ER / RR / Patient Room						X	X	X	X					
d. Headwall Accessories						X	X	X	X					
e. Anesthesia Gas Delivery Systems - Column Drops or Gas Boom Format						X	X	X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
61. PHYSICAL MEDICINE / REHAB EQUIP.														
a. Fixed (ie swimming pools)						X	X	X	X					
b. Hydrotherapy		X	X					X	X					
c. Portable		X	X	X	X									
62. PRINTING EQUIPMENT										X	X	X	X	
63. PROCEDURE SUPPORT EQUIPMENT (Portable, Stainless Steel)		X	X	X	X									
64. PROCESSORS, X-RAY FILM														
a. Processor		X	X					X	X					
1. Cine		X	X					X	X					
2. Darkroom		X	X					X	X					
b. Replenishment Systems, Chemical		X	X	X	X									
c. Silver Recovery Devices		X	X	X	X									
d. Laser Imager		X	X	X	X									
65. PROJECTION SCREENS						X	X	X	X					
SMART BOARDS		X	X	X	X									
66. PULMONARY FUNCTION EQUIPMENT		X	X	X	X									
67. REFRIGERATORS (exclude Food Service)														
a. Countertop		X	X	X	X									
b. Mortuary		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in / Prefabricated		X	X	X	X									Elec. contractor makes actual connection
68. RELIGIOUS ARTIFACTS		X	X	X	X									
69. RESPIRATORY THERAPY EQUIPMENT		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
70. RESUSCITATION EQUIPMENT		X	X	X	X									
71. RODS, CURTAIN (shower)						X	X	X	X					
72. SAFES		X	X	X	X									
73. SCALES														
a. Autopsy		X	X					X	X					
b. Bed		X	X	X	X									
c. Chair		X	X	X	X									
d. Clinical Exam		X	X	X	X									
e. Platform		X	X					X	X					
74. SCHEDULING SYSTEMS (automated)										X	X	X	X	
75. SCRUB SINKS						X	X	X	X					
76. SECURITY SYSTEMS														
a. Infant Abduction		X	X	X	X									Contractor to pull cable
b. CCTV - Campus Security		X	X	X	X									Contractor to pull cable
c. Door Access (ie: readers & locks)						X	X	X	X					With Equipment input
77. SHELVING / STORAGE EQUIPMENT														
a. High Density Systems		X	X	X	X									
b. Standard / Flat Steel - New		X	X	X	X									
c. Standard / Flat Steel - Existing		X	X	X	X									
d. Wire		X	X	X	X									
e. Miscellaneous (except built-in)		X	X	X	X									
f. Built-in						X	X	X	X					
78. STERILE PROCESSING EQUIPMENT														
a. Aerators		X	X					X	X					
b. Generator, Steam		X	X					X	X					
c. Loading / Processing Accessories		X	X	X	X									
d. Sonic Cleaners		X	X					X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
e. Steam Gun		X	X					X	X					
f. Sterilziers, Countertop		X	X					X	X					
g. Sterilizers, ETO Gas		X	X					X	X					
h. Sterilizers, ETO Gas / Aerator		X	X					X	X					
i. Sterilziers, ETO Gas / Steam		X	X					X	X					
j. Sterilizers, Electric / Steam		X	X					X	X					
k. Washers, Cart		X	X					X	X					
l. Washer, Fiberoptics		X	X					X	X					
m. Washers / Decontaminators / Sanitizers		X	X					X	X					Requires minimum of 9' ceiling
79. STRESS TEST EQUIPMENT		X	X	X	X									
80. STRETCHERS		X	X	X	X									
81. TABLES														
a. Autopsy		X	X					X	X					
b. Cysto		X	X	X	X									
c. Exam / Treatment		X	X	X	X									
d. Processing		X	X	X	X									
e. Surgical		X	X	X	X									
82. TELEVISION SYSTEMS														
a. Television Sets		X	X	X	X									Contractor to pull cable & install blocking
b. CCTV - Patient Monitoring		X	X	X	X				X					Contractor to pull cable & install blocking
c. Mounting Brackets		X	X					X	X					Contractor to install blocking & wall brackets
d. Antenna Systems		X	X	X	X									Contractor to pull cable
e. Cable TV (entrance cable to H-END location)	X													Equip. Mgr. notifies facility, contractor & TV vendor to coordinate installation w/local cable TV vendor for entrance cable.
83. TEMPERATURE ALARMS / RECORDERS		X	X					X	X					Blood Bank / Morgue Only

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
84. TOILET ROOM DEVICES														
a. Grab Bar						X	X	X	X					Check with Bulk Purchasing
b. Paper Towel Dispensers						X	X	X	X					Check with Bulk Purchasing
c. Sanitary Napkin Dispensers						X	X	X	X					Check with Bulk Purchasing
d. Soap Dispensers						X	X	X	X					Check with Bulk Purchasing
e. Toilet Paper Holder						X	X	X	X					Check with Bulk Purchasing
85. TRACK														
a. Curtain (Cubicle)						X	X	X	X					
b. Intravenous (including carriers & pendants)						X	X	X	X					
86. WATER CONDITIONING SYSTEMS														
a. Deionized						X	X	X	X					
b. Distilled						X	X	X	X					
c. Reverse Osmosis						X	X	X	X					
87. WATER COOLERS						X	X	X	X					
88. WHEELCHAIRS		X	X	X	X									

Revised: 2-06-06

VENDOR CONTACT MASTER

VENDOR	NAME/ADDRESS	CONTACT	PHONE	FAX	Web Address
902100	Abbott 100 Abbott Park Rd Dept 2FC-AP6C 5th Floor Abbott Park, IL 60064-6083	Rick Gooch	(708) 937-6161	(847) 937-0871	www.abbottdiagnostics.com
10517	Advanced Sterilization 33 Technology Drive Irvine, CA 92718	Customer Service	(800) 755-5900	(949) 450-6800	www.cidex.com
25360	AGFA Medical & Sterling Diag. 8170 Habersham Waters Rd. Dunwoody, GA 30350	Tom Koch	(800) 581-2432 Ext. #1238	(201) 288-3367	www.agfa.com
10451	Aladdin 250 East Main Street Hendersonville, TN 37075	Eric Roebuck	(800) 888-8018	(615) 748-3659	www.aladdintemprite.com
10240	Alimed 297 High Sttreet Dedham, MA 02026-9135	Robert Fralick	(800) 225-2610 Ext. #157	(800) 437-2966	www.alimed.com
10055	American Art Resources 3262 Sul Ross Houston, TX 77098	Kathy Hathorn	(800)282-0204	(713)527-9676	www.americanartresources.com
915200	ARJO 50 North Gary Ave Unit A Roselle, IL 60172	Terry Capp	(800) 323-1245 Ext. #6159		www.arjo.com
12599	Art Resource Team (A.R.T.) 2526 Homestead Place Cincinnati, OH 45211	Tony Baird	(513) 662-1998	(513) 662-6977	www.artresourceteam.com

VENDOR CONTACT MASTER

15000	Baker Company PO Drawer E Sanford Airport Sanford, ME 04073	Customer Service	(207) 324-8773	(207) 324-3869	www.bakerco.com
15012	Baring Industries 1808 West End Ave, Suite 814 Nashvill, TN 37203	Tom Esberger	(615) 321-0272	(615) 321-5667	www.baring.com
15026	Berchtold 1950 Hanahan Road Charleston, SC 29406	Jeff Dunkley	(800) 243-5135 ext. 334	(843) 569-6133	www.berchtoldusa.com
15382	Biodex Medical Brookhaven R&D Plaza 20 Ramsey Rd, Box 702 Shirley, NY 11967-0702	Marie Springman	(631) 924-9000 Ext. #234	(681) 924-9338	www.biodex.com
15206	Boehringer Laboratories, Inc. 500 E. Washington Street Norristown, PA 19401	Eileen Welty	(610) 278-0900	(610) 278-0907	www.boehringerlabs.com
20633	Camtronics Ltd. Medical System 900 Walnut Ridge Drive Hartland, WI 53029	Steve Crandall	(866) 694-2510		www.camtronics.com
933800	Cardinal Health & Medical Prod. 1750 Stoneridge Dr. Stone Mountain, GA 30083	Renee Hensley	(800) 889-1065 Ext. #3307	(770) 270-9645	www.cardinal.com/mps or www.cardinalhealth.com
901500	Cardinal Health & Medical Services 1750 Stoneridge Dr. Stone Mountain, GA 30083	Paula Watkins	(800) 633-0333	(800) 488-3987	www.cardinal.com/mps or www.cardinalhealth.com
21879	Cardinal Respiratory Care 1500 Waukegan Rd McGaw Park, IL 60085	Shelly Lancaster	(800) 637-1500 Ext. #1521	(630) 369-9302	www.cardinal.com/mps or www.cardinalhealth.com

VENDOR CONTACT MASTER

21433	Common Cents Solutions PO Box 5454 Jackson, MS 39288-5454	Tom Bunting	(888) 932-3687 Ext. #36	(601) 932-9414	www.commoncents.net
25350	Data Cash Register 942 Woodland Street Nashville, TN 37206		(615) 227-6978	(615) 227-7589	www.dcrpos.com
960400	Datascope 4117 Hillsboro Rd 103-303 Nashville, TN 37215	Kevin Wampler	(800) 288-2121	(800) 266-9624	www.datascope.com
25160-4	Diagnostic Imaging 199 Foster Brothers Drive West Columbia, SC 29172	Larry Myers	(803) 796-7038	(803) 796-9749	
920100	Dictaphone 147 Country Club Drive Hendersonville, TN 37075	Mike Collier	(888) 471-3463 Ext. # 4277	(203) 683-2169	www.dictaphone.com
956200	Dukane 27545 Diehl Rd., Suite 200 Warrenville, IL 60555	Angelo Lopez	(630) 836-3745	(630) 836-3805	www.dukane.com
944800	Follett 801 Church Lane PO Box D Easton, PA 18044	Gary Gutman	(800) 523-9361	(610) 250-0696	www.follettice.com
35570	Food Systems 318 Seaboard Lane, Bldg 100 Suite 114 Franklin,TN 37067	Beverly LeBlanc	(866) 662-4279 (615) 261-0400	(615) 261-0401	www.foodsystemsul.com
967600	GE Appliances (Acct #FMD30) 307 N. Hurstborne Pkwy Louisville, KY 40222	Skip Alcorn Jason Cropper	(615) 264-8994 (800) 782-8031 x4	(800) 772-6704	www.geappliances.com

VENDOR CONTACT MASTER

904100	GE Healthcare Datex-Ohmeda PO Box 7550 Madison, WI 53707-7550	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.datex-ohmeda.com
902900	GE Healthcare Technologies 830 Crescent Centre Dr. Suite 460 Franklin, TN 37067	Milton Mueller	(615) 472-2409 Cell: (615) 519-3357	(414) 918-8200	www.gehealthcare.com
40006-4	GE Medical System (Dia) PO Box 414, WT895 Milwaukee, WI 53201	Terri	(800) 232-2599	(800) 558-5102	www.gehealthcare.com
953600	GE Healthcare I.T. (Marquette) 8200 West Tower Ave Milwaukee, WI 53223	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.gehealthcare.com
968700	GE - OEC Medical Systems 3724 National Drive, Suite 100 Raleigh, NC 27612	Hurley Raynor	(800) 728-6596	(919) 881-8367	www.gemedicalsystems.com
912700	Getinge USA PO Box 3208 Augusta, GA 30914-3208	Carlton Colcough	(800) 475-9040	(716) 272-5283	www.getingeusa.com
921000	Grainger 1021Charlotte Avenue Nashville, TN 37203	Kevin Kolff	(615)480-7783 (800)994-2336	(615)331-0485	www.grainger.com
914300	Hill-Rom 1069 State Road, 46 East Batesville, IN 47006-9164	Doug Weigel	(800) 445-3730	(812) 934-1442	www.hill-rom.com/products
934300	Drager/ Air Shields 1069 State Road, 46 East Batesville, IN 47006-9164	Lisa Aiello	(800) 437-2437 x2358	(812) 934-1442	
920700	Interior Design Services 209 Powell Place Brentwood, TN 37027	Daryl Dunn	(615) 376-1222	(615) 376-3510	www.ids-tn.com

VENDOR CONTACT MASTER

51073	Thermo Electron 308 Ridgefield Ct. Asheville, NC 28806	Josh Camp	(800) 252-7100 828-658-2882	(828) 658-0363	www.thermo.com or www.kendro.com
914700	Medquist/ Lanier Healthcare 5930 Metric Place, Suite 200 Norcross, GA 30092	James Thomas	(251) 945-3412 (866) 856-3000	(943) 337-5752	www.medquist.com or www.lanier.com
929400	Medline Industries, Inc. 105 Continental Drive Brentwood, TN 37027	Jeff Fair	(615)373-2142 (888)897-7557	(615)373-2486	www.medline.com
916400	Medtronic Emergency Response System PO Box 97023 Redmond, WA 98073	Tammy Lombardi	(800) 442-1142 Ext. #4162	(800) 732-0956	www.medtronicphysiocontrol.com
70583	Nicolet 5225-2 Verona Rd Madison, WI 53711-4495	Kathy Hart	(800) 356-0007	(608) 441-2007	www.thermo.com
954400	Nihon Kohden 202 Kensington Place Nashville, TN 37215	Jim Fagan	(615) 292-5082	(615) 292-0584	www.nkusa.com
72016	Olympus 2 Corporate Ctr. Drive Melville, NY 11747	Betty Shaffer	(631) 844-5437 (800) 645-8100	(631) 844-5110	www.olympus-global.com
958320	Pharmed 3075 NW 107th Ave Pharmed Way Miami, FL 33172-2134	Carolyn Thomas	(800) 683-7342 Ext 342 (305) 592-2324	(800) 621-9511	www.pharmed.com
11331	Philips - ATL Ultrasound Ste 540 501 Corporate Centr Dr., Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com

VENDOR CONTACT MASTER

74031-1	Philips Medical Imaging 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com
914200	Philips Medical (Monitoring) 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Roger Duffy	(615) 472-2207	(615) 472-2273	www.philips.com
944500	Quinton 3303 Monte Villa Pkwy Bothell, WA 98021	Bob Atkins	(800) 426-0347	(425) 402-2001	www.quinton.com
76007	Radiology Specialty PO Box 406 Hermitage, TN 37076	Bob Webb	(615) 885-5326	(615) 885-4691	
924800	Rauland Borg Corporation 3450 West Oakton Street Skokie, IL 60076-2951	Alex Veytsel	(847) 324-8380 Ext. #380	(847) 679-4106	www.rauland.com
81742	Sara Lee Coffee & Tea 990 Supreme Dr. Bensonville, IL 60106	Kory Mickelsom	(800) 621-4100	(773) 489-7323	www.saraleecoffee.com
956000	Simplex Grinnell 9855 Carroll Canyon Rd San Diego, CA 92131	Randy Wilkins	(858) 279-8010	(858) 740-0157	www.tycoin.com
904600	Standard Textile PO Box 371805 Cincinnati, OH 45222	Tricia Partin	(800) 888-5000 Ext. #270	(800) 926-0043	www.standardtextile.com
912000	Steris/ Amsco Products 2448 Shiland Dr. Rock Hill, SC 29732	Randy Marks Dave Piver Lara Stark	(800) 989-7575 Randy #23117 Dave #21152	(440) 392-8902	www.steris.com
55026	Storage Systems, Inc. 318 Seaboard Lane Bldg. 100, Suite 115 Franklin,TN 37065	Bill Kreager	(888) 614-0004 (615) 261-6900	(615) 261-6906	www.storagesystemsul.com

VENDOR CONTACT MASTER

901100	Stryker Medical 4100 East Milham Ave. Kalamazoo, MI 49001-6197	Gloria Phillips	(800) 800-4236 ext. 1456	(800) 610-4408	www.stryker.com
929900	Telehealth/Telerent 4205 Hillsboro Rd Suite 303 Nashville, TN 37215	Darrell Leftwich	(615) 383-7836	(615) 383-4226	www.telehealth.com
85060-1	Toshiba 2150 F Northmont Pkwy Duluth, GA 30136	Craig Hamilton	(770)476-9992	(770) 476-1511	www.tobshiba.com/tams/newtams
921500	US Surgical 5920 Longbow Dr. Boulder, CO 80301	Customer Service	(800) 722-8772	(800) 544-8772	www.ussurg.com
91734	Wireless Solutions, Inc. 720 Fesslers Lane Nashville, TN 37210	Marie Gilland	(615) 255-5670	(615) 255-9967	
925500	Zenitel 6119 Connecticut Kansas Ctiy, MO 64120	Jeanne Gramman (816) 231-7201	(816) 231-7202	(816) 231-7203	www.zenitel.com

PROJECT MANUAL

RSN251428

VOLUME 1

ISSUED FOR PERMIT & CONSTRUCTION
Date: 24 AUGUST 2006

2007172604

MEDICAL CENTER OF AURORA
SOUTH CAMPUS

PRIVATE ROOM EXPANSION

AURORA, COLORADO

P+W Project Number: 142228.00

PERKINS +WILL

10100 N. Central Expressway
Suite 300
Dallas, TX 75231

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PROJECT MANUAL

Private Room Expansion, Medical Center of Aurora – South Campus
Aurora, Colorado

24 August 2006 **Issued for Permit and Construction**

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Facsimile: 214.722.6552
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ccrd partners inc.
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Facsimile: 214-521-1664
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Electronic Mail: Jeffb@ccrd.com, alexgray@ccrd.com, shaung@ccrd.com

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Denver, Colorado 80205-2108
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Electronic Mail: emoore@davispartner.com

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Project Numbers
P+W Project Number: **142228.000**
HCA Project No. 306660001

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DOCUMENT 00 01 07

PROFESSIONAL SEALS PAGE

The following Documents and Specifications have been furnished by the Owner for this Project, and were not prepared by or under the direct supervision of the Architect or any of the Architect's consultants:

OWNER

HCA
One Park Plaza
Nashville, TN 73203

BIDDING REQUIREMENTS

00 31 32 Geotechnical Data

CONTRACTING REQUIREMENTS

00 52 34 HCA Owner-Contractor Agreement

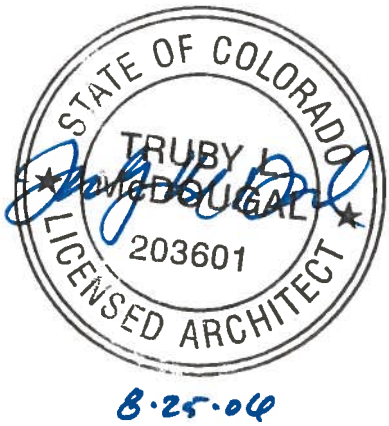
DIVISION 1 - GENERAL REQUIREMENTS

HCA Bulk Purchasing Vendor List
HCA Vendor List for Interior Finishes
HCA Interim Life Safety Program
HCA/Georgia-Pacific Job Profile Form

The following Documents and Specification Sections have been prepared by or under the direct supervision of the Architect:

ARCHITECT

Perkins + Will
10100 North Central Expressway, Suite 300
Dallas, Texas 75231



8.25.06

DOCUMENTS & SPECIFICATIONS

BIDDING REQUIREMENTS

00 26 00 Procurement Substitution Request

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01 14 00 Work Restrictions
01 22 00 Unit Prices
01 23 00 Alternates
01 25 00 Substitution Procedures
- Substitution Request Form

01 26 00 Contract Modification Procedures
01 26 13 Requests for Interpretation
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01 29 00 Payment Procedures
01 31 00 Project Management and Coordination
01 31 06 Coordination Drawings
01 32 00 Construction Progress Documentation
01 32 33 Photographic Documentation
01 33 00 Submittal Procedures
- Electronic Drawing File Transfer And Indemnification Agreement
- Subcontractors and Major Material Suppliers List Form
- Submittal Transmittal Form

01 35 13 Hospital Project Procedures
01 35 16 Alteration Project Procedures
01 42 00 References
01 43 00 Quality Assurance Requirements
01 50 00 Temporary Facilities and Controls
01 56 39 Temporary Tree Protection and Trimmings
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01 73 29 Cutting and Patching
01 77 00 Closeout Procedures
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01 78 23 Operation and Maintenance Data
01 78 39 Progress Documents
01 79 00 Demonstration and Training

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03 49 00 Glass Fiber Reinforced Precast Concrete
03 52 00 Lightweight Concrete Roof Insulation
03 54 16 Cement-Based Underlayment

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04 72 00 Cast Stone

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05 45 23 Medical Supports
05 58 00 Formed Metal Fabrications

DIVISION 6 - WOOD AND PLASTICS

06 20 00 Finish Carpentry
06 61 16 Solid Surfacing
06 61 19 Quartz Surfacing Fabrications
06 64 00 Thermoplastic (Solid Polymer) Material
06 82 56 Ballistic Resistant Fiberglass Panels

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07 16 13 Modified Cement Waterproofing
07 26 35 Water Vapor Emission Control Systems
07 42 14 Louvered Equipment Screens
07 42 43 Aluminum Composite Panel System
07 54 00 TPO Single-Ply Membrane Roofing
07 61 13 Standing Seam Sheet Metal Roofing
07 81 00 Sprayed Fire-Resistive Materials
07 81 60 Grease Duct Fire Protection
07 87 00 Elevator Door Smoke Containment System
07 95 13 Architectural Joint Systems

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08 33 24 Overhead Coiling Doors
08 42 30 Sliding Automatic Entrance Doors
08 42 43 ICU/CCU Entrance Doors
08 44 13 Glazed Aluminum Curtain Walls
08 50 00 Between Glass Venetian Blinds
08 51 13 Fixed Aluminum Windows
08 63 00 Metal Framed Skylights
08 71 13 Automatic Door Controls
08 81 13 Decorative Glass
08 83 13 Mirrored Glass
08 91 00 Storm-Resistant Aluminum Louvers

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09 27 13 Glass Reinforced Gypsum Fabrications
09 30 13 Ceramic Tile
09 31 33 Dimension Stone Tile
09 51 13 Acoustical Panel Ceilings
09 67 14 Concrete Sealing

09 67 23 Resinous Flooring System
09 68 10 Carpet Tile
09 68 16 Carpet
09 96 56 High Performance Coatings

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10 21 26 Cubicle Curtain Tracks, I.V. Tracks, & Shower Curtain Carriers
10 28 13.02 Toilet and Bath Accessories
10 44 00 Fire Protection Specialties
10 51 13 Metal Lockers
10 99 00 Miscellaneous Specialties

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11 24 23 Window Washing Systems
11 52 23 TV Hanger Assemblies
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12 32 16 Plastic Laminate Faced Manufactured Casework
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13 49 00 Radiation Protection Physicist's Report

DIVISION 14 - CONVEYING SYSTEMS
14 21 13 Electric Traction Elevators
14 92 00 Pneumatic Tube Systems

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31 31 16 Termite Control

DIVISION 32 - EXTERIOR IMPROVEMENTS
32 17 14 Concrete Parking Bumpers

DIVISION 33 – UTILITIES
33 46 13 Subdrainage

The following Specification Sections have been prepared by or under the direct supervision of the Civil Engineer:

CIVIL ENGINEER

MARTIN/MARTIN INC.
12499 West Colfax Avenue
Lakewood, Colorado 80215

SPECIFICATIONS

DIVISION 03 - CONCRETE

03 30 53 Miscellaneous Cast-In-Place Concrete (Other Than Pavement)

DIVISION 31 - EARTHWORK

31 10 00 Site Clearing
31 20 00 Earth Moving
31 23 33 Trenching and Backfilling
31 25 00 Temporary Erosion and Sedimentation Control

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32 12 16 Asphalt Paving
32 13 13 Concrete Paving
32 13 63 Pavement Markings
32 13 73 Concrete Paving Joint Sealants

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33 31 00 Sanitary Utility Sewerage Piping
33 41 00 Storm Utility Drainage Piping



The following Specification Sections have been prepared by or under the direct supervision of the Structural Engineer:

STRUCTURAL ENGINEER

TRC International, Ltd.
5050 Quorum Drive, Suite 700
Dallas, TX 75254

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DIVISION 01 – GENERAL REQUIREMENTS
01 40 00 Quality Requirements

DIVISION 3 - CONCRETE
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03 20 00 Concrete Reinforcing
03 30 00 Cast-In-Place Concrete

DIVISION 4 – MASONRY
04 27 31 Reinforced Unit Masonry

DIVISION 5 - METALS
05 12 00 Structural Steel Framing
05 31 00 Steel Decking
05 40 00 Cold-Formed Metal Framing
05 50 00 Metal Fabrications
05 51 00 Metal Stairs

DIVISION 31 – EARTHWORK
31 23 16 Excavation
31 63 29 Drilled Concrete Piers and Shafts



The following Specification Sections have been prepared by or under the direct supervision of the Mechanical / Electrical Engineer:

MECHANICAL / ELECTRICAL ENGINEERS
ccrd partners
3625 N. Hall Street
Suite 1300
Dallas, Texas 75219



SPECIFICATIONS

DIVISION 21 - FIRE SUPPRESSION
21 05 00 Common Work Results For Fire Suppression
21 10 00 Fire Protection Systems

DIVISION 22 - PLUMBING
22 05 00 Common Work Results For Plumbing
22 05 23 General-Duty Valves For Plumbing Piping
22 05 29 Hangers And Supports For Plumbing Piping And Equipment
22 05 53 Identification For Plumbing Piping And Equipment
22 07 00 Plumbing Insulation
22 11 13 Facility Water Distribution Piping
22 11 16 Domestic Water Piping
22 11 19 Domestic Water Piping Specialties
22 11 23 Domestic Water Pumps
22 11 23.13 Domestic Water Packaged Booster Pumps
22 13 16 Sanitary Waste And Vent Piping
22 13 19 Sanitary Waste Piping Specialties
22 13 23 Sanitary Waste Interceptors
22 14 13 Facility Storm Drainage Piping
22 14 23 Storm Drainage Piping Specialties
22 14 29 Sump Pumps
22 31 00 Domestic Water Softeners
22 35 00 Domestic Water Heat Exchangers
22 40 00 Plumbing Fixtures
22 61 13 Compressed-Air Piping For Healthcare Facilities
22 61 19 Compressed-Air Equipment for Healthcare Facilities
22 62 13 Vacuum Piping for Healthcare Facilities
22 62 19 Vacuum Equipment for Laboratory and Healthcare Facilities
22 63 13 Gas Piping for Healthcare Facilities
22 67 00 Processed Water Systems for Laboratory and Healthcare Facilities

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23 11 13 Facility Fuel-Oil Piping
23 11 23 Facility Natural-Gas Piping
23 21 23 Hydronic Pumps
23 22 23 Steam Condensate Pumps
23 25 00 HVAC Water Treatment
23 52 39 Fire-Tube Boilers
23 53 13 Boiler Feedwater Pumps
23 53 16 Deaerators

23 57 00 Heat Exchangers for HVAC
23 64 16 Centrifugal Water Chillers
23 65 00 Cooling Towers
23 73 13 Variable Aspect Indoor Central-Station Air-Handling Units
23 82 39 Unit Heaters

DIVISION 26 - ELECTRICAL
26 05 43 Underground Ducts and Raceways for Electrical Systems
26 09 43 Network Lighting Controls
26 24 13 Switchboards
26 28 13 Fuses
26 36 00 Transfer Switches
26 43 13 Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits

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27 11 00 Communications Equipment Room Fittings
27 13 00 Communications Backbone Cabling
27 52 13 Patient Monitoring System
27 52 23 Nurse Call and Code Blue System
27 60 00 In-Building Radio Coverage System

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY
28 05 00 Common Work Results for Electronic Safety and Security
28 13 00 Access Control System
28 35 00 Refrigerant Detection and Alarm

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00 01 07	Professional Seals Page	01 Jun 06	24 Aug 06
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00 52 34	HCA Owner-Contractor Agreement	13 Jul 06	
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01 11 00	Summary of Work	13 Jul 06	
01 14 00	Work Restrictions	13 Jul 06	
01 22 00	Unit Prices	13 Jul 06	
01 23 00	Alternates	13 Jul 06	24 Aug 06
01 25 00	Substitution Procedures	13 Jul 06	
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01 26 00	Contract Modification Procedures	13 Jul 06	
01 26 13	Requests for Interpretation	13 Jul 06	
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01 29 00	Payment Procedures	13 Jul 06	
01 31 00	Project Management and Coordination	13 Jul 06	
01 31 06	Coordination Drawings	13 Jul 06	
01 32 00	Construction Progress Documentation	13 Jul 06	
01 32 33	Photographic Documentation	13 Jul 06	
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	Submittal Transmittal Form		
01 35 13	Hospital Project Procedures	13 Jul 06	
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01 35 16	Alteration Project Procedures	13 Jul 06	
01 40 00	Quality Requirements	01 Jun 06	
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01 43 00	Quality Assurance Requirements	13 Jul 06	
01 50 00	Temporary Facilities and Controls	13 Jul 06	
01 56 39	Temporary Tree Protection and Trimming	13 Jul 06	24 Aug 06
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01 61 00	Common Product Requirements	13 Jul 06	
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03 20 00	Concrete Reinforcing	01 Jun 06	
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03 30 35	Sheet Vapor Barrier	01 Jun 06	
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03 49 00	Glass Fiber Reinforced Precast Concrete	24 Aug 06	
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03 54 16	Cement-Based Underlayment	24 Aug 06	
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05 40 00	Cold-Formed Metal Framing	01 Jun 06	
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05 50 00	Metal Fabrications (Structural)	01 Jun 06	
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05 51 00	Metal Stairs	01 Jun 06	
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06 64 00 Thermoplastic (Solid Polymer) Material .....24 Aug 06
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07 21 00 Building Insulation .....13 Jul 06
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07 27 19 Plastic Sheet Air Barrier .....31 Oct 06
07 42 14 Louvered Equipment Screens .....24 Aug 06
07 42 43 Aluminum Composite Panel System .....24 Aug 06
07 54 00 TPO Single-Ply Membrane Roofing .....24 Aug 06
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07 62 00 Sheet Metal Flashing and Trim .....13 Jul 06
07 81 00 Sprayed Fire-Resistive Materials .....24 Aug 06
07 81 60 Grease Duct Fire Protection .....24 Aug 06
07 84 13 Through-Penetration Firestop Systems .....13 Jul 06
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08 14 16 Flush Wood Doors - Transparent Finish .....13 Jul 06
08 31 16 Access Doors and Frames .....13 Jul 06
08 33 13 Overhead Coiling Counter Doors - Fire Rated .....24 Aug 06
08 33 24 Overhead Coiling Doors .....24 Aug 06
08 41 13 Aluminum Entrances and Storefronts .....13 Jul 06 31 Oct 06
08 42 30 Sliding Automatic Entrance Doors .....24 Aug 06
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08 44 13 Glazed Aluminum Curtain Walls .....24 Aug 06
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08 51 13 Fixed Aluminum Windows .....24 Aug 06
08 63 00 Metal Framed Skylights .....24 Aug 06
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09 51 13	Acoustical Panel Ceilings	24 Aug 06	
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10 26 23	Impact-Resistant Wall Protection	13 Jul 06	24 Aug 06
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10 44 00	Fire Protection Specialties	24 Aug 06	
10 51 13	Metal Lockers	24 Aug 06	
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11 24 23	Window Washing Systems	24 Aug 06	
11 52 23	TV Hanger Assemblies	24 Aug 06	
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22 05 29	Hangers And Supports For Plumbing Piping And Equipment	13 Jul 06	24 Aug 06
22 05 53	Identification For Plumbing Piping And Equipment	13 Jul 06	24 Aug 06
22 07 00	Plumbing Insulation	13 Jul 06	24 Aug 06
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22 11 19	Domestic Water Piping Specialties	13 Jul 06	24 Aug 06
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22 13 16	Sanitary Waste And Vent Piping	13 Jul 06	24 Aug 06
22 13 19	Sanitary Waste Piping Specialties	13 Jul 06	24 Aug 06
22 13 23	Sanitary Waste Interceptors	03 Aug 06	24 Aug 06
22 14 13	Facility Storm Drainage Piping	03 Aug 06	24 Aug 06
22 14 23	Storm Drainage Piping Specialties	03 Aug 06	24 Aug 06
22 14 29	Sump Pumps	03 Aug 06	24 Aug 06
22 31 00	Domestic Water Softeners	03 Aug 06	24 Aug 06
22 35 00	Domestic Water Heat Exchangers	03 Aug 06	24 Aug 06
22 40 00	Plumbing Fixtures	13 Jul 06	24 Aug 06
22 61 13	Compressed-Air Piping For Healthcare Facilities	13 Jul 06	24 Aug 06
22 61 19	Compressed-Air Equipment for Healthcare Facilities	03 Aug 06	24 Aug 06
22 62 13	Vacuum Piping for Healthcare Facilities	03 Aug 06	24 Aug 06
22 62 19	Vacuum Equipment for Laboratory and Healthcare Facilities	03 Aug 06	24 Aug 06
22 63 13	Gas Piping for Healthcare Facilities	03 Aug 06	24 Aug 06
22 67 00	Processed Water Systems for Laboratory and Healthcare Facilities	03 Aug 06	24 Aug 06

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23 21 23	Hydronic Pumps	03 Aug 06	24 Aug 06
23 22 23	Steam Condensate Pumps	03 Aug 06	24 Aug 06
23 25 00	HVAC Water Treatment	03 Aug 06	24 Aug 06

23 33 00	**Air Duct Accessories**	**13 Jul 06**	**31 Oct 06**
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23 53 13	Boiler Feedwater Pumps	03 Aug 06	24 Aug 06
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23 57 00	Heat Exchangers for HVAC	03 Aug 06	24 Aug 06
23 64 16	**Centrifugal Water Chillers**	**01 Jun 06**	**31 Oct 06**
23 65 00	**Cooling Towers**	**01 Jun 06**	**31 Oct 06**
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26 36 00	Transfer Switches	03 Aug 06	24 Aug 06
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27 60 00	In-Building Radio Coverage System	03 Aug 06	24 Aug 06

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31 23 16	Excavation	01 Jun 06	
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Division 00

Procurement and Contracting Requirements

23H05

DOCUMENT 00 26 00

PROCUREMENT SUBSTITUTION REQUEST

1.1 SUBSTITUTIONS DURING BIDDING PERIOD

A. Bids shall be submitted only on the basis of materials, products, and equipment specified in the Specifications, indicated on the Drawings, or as named by Addenda pursuant to approval of Requests for Substitution.

B. Materials, products, and equipment included in the Bidding Documents are specified for the purpose of establishing a minimum standard of quality, cost, appearance, design, and function. It is not the intent to limit the acceptance of materials, products or equipment specified, but rather to name or describe a material, product or piece of equipment as the absolute minimum standard that is desired and acceptable. Where proprietary names are used, whether or not followed by the words "or acceptable substitution," requests for substitution will nevertheless be considered if properly submitted to and received by the Architect prior to the designated date.

C. If any Bidder wishes to substitute equipment or materials, which is believed to be equal to those specified, the Bidder shall make a request in writing to the Architect for approval of such substitute equipment or materials at least seven (7) calendar days prior to the date for receipt of Bids, following the rules stated herein. If the Architect should approve of such substitute equipment or materials, an Addendum evidencing such approval will be promulgated by the Architect and issued to all prospective Prime Bidders of whom the Architect has a record.

D. All requests for substitutions shall be accompanied by manufacturer's product data, specifications, drawings, catalog cuts, samples, installation instructions, performance data, list of projects completed of similar size and scope, and other references and information necessary to completely describe the item, and to facilitate a thorough and complete review by the Architect. Requests not meeting all these requirements may be rejected without evaluation.

E. The Substitution Request Form included as an attachment to this Document shall be used for all Substitution requests. Failure to use the attached Substitution Request form, or the failure of the Bidder to fully execute the form as required, will result in rejection of the proposed substitution request without review.

F. Manufacturers, manufacturer's representatives, dealers, distributors, suppliers, and subcontractors shall not direct or make requests to substitute equipment or materials. All requests shall originate from a Prime Bidder.

G. Substitutions shall be submitted to the Architect only; no substitutions shall be submitted directly to any consultant, the Owner, or any of the Owner's consultants.

1.2 SUBSTITUTIONS AFTER AWARD OF CONTRACT

A. Comply with provisions of Section 01 25 00. Contractor shall execute the Substitution Request Form attached thereto.

SUBSTITUTION REQUEST FORM

PROJECT: _____ **(Procurement Period)**

TO: Perkins+Will
10100 North Central Expressway, Suite 300
Dallas, TX 75231

FROM: _____

_____

NO. P+W _____

DATE: _____

Bidder hereby requests acceptance of the following product or system as a substitution in accordance with provisions of the Document 00 21 13 - Instructions to Bidders, and Section 01 25 00:

1. SPECIFIED PRODUCT OR SYSTEM

Substitution request for: _____

Specification Section No.: _____ Article: _____

2. SUPPORTING DATA

☐ Product data for proposed substitution is attached (description of product, reference standards, performance and test data).

☐ Sample is attached. ☐ Sample will be sent if requested.

3. QUALITY COMPARISON

	SPECIFIED PRODUCT	SUBSTITUTION
Name, Brand:	_____	_____
Catalog No.:	_____	_____
Manufacturer:	_____	_____
Vendor:	_____	_____
Variations:	_____	_____
	_____	_____
	_____	_____

(Add Additional Sheets If Necessary)

Maintenance Service Available: ☐ Yes ☐ No

Spare Parts Source: _____

Warranty: ☐ Yes ☐ No _____ Years

4. PREVIOUS INSTALLATIONS

Identification of similar projects on which proposed substitution was used:

Project:: _____ Project: _____

Address: _____ Address: _____

_____ _____

Architect: _____ Architect: _____

Owner: _____ Owner: _____

Date Installed: _____ Date Installed: _____

5. REASON FOR NOT GIVING PRIORITY TO SPECIFIED ITEM

_____

_____

6. EFFECT OF SUBSTITUTION

Proposed substitution affects other work or trades: ☐ No ☐ Yes (if yes, explain)

_____

_____

_____

Substitution requires dimensional revisions or redesign of structural, M/E/P, or other work:

☐ No ☐ Yes (if yes, attach data explaining revisions)

7. BIDDER'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS

I/we have investigated the proposed substitution. I/we:

A. believe that it is equal or superior in all respects to specified product, except as stated above;
B. will provide same warranty as specified for specified product;
C. have included complete cost data and implications of the substitution:
D. will pay redesign and special inspection costs caused by the use of this product;
E. will coordinate the incorporation of the proposed substitution into the Work;
F. waive future claims for added cost to Contract caused by the substitution.

Bidder: _____
(Name of prime bidding contractor)

Date: _____ By: _____

All questions must be answered and all blanks filled in. Enter "NA" if not applicable. Unresponsive or incomplete requests will be rejected and returned without review.

8. ARCHITECT'S REVIEW AND ACTION

☐ Resubmit substitution request:

☐ Provide more information in the following areas: _____

_____

_____

☐ Prime Bidder must sign Bidder's Statement of Conformance

☐ Substitution is accepted.

☐ Substitution is accepted, with the following comments: _____

_____

_____

☐ Substitution is not accepted.

☐ Substitution Request received too late.

Perkins+Will

By:_____ Date:_____

Perkins+Will has relied upon the information provided by the Bidder, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Bidding Documents or Contract Documents, Bidder / Contractor shall provide the specified product at no additional cost to Owner.

END OF DOCUMENT

23H05

DOCUMENT 00 31 32

GEOTECHNICAL DATA

1.1 SUMMARY

A. This document includes information pertaining to geotechnical data.

1.2 INVESTIGATION

A. Investigations of subsurface soil conditions at the building site were authorized by the Owner, and were subsequently performed by Kleinfelder, Inc. Reports are as follows:
   1. Geotechnical Investigation Report for Tower: "Final Geotechnical Investigation, Bed Tower Addition, Medical Center of Aurora, Aurora, Colorado," File No. 66295-1, dated April 17, 2006.
   2. Geotechnical Investigation Report for Paving: "Pavement Thickness Design, Parking Renovation, and Fire Lane/Access Drive, Medical Center of Aurora, Aurora, Colorado," File No. 66295-1, dated May 19, 2006.

B. The Geotechnical Investigation Reports bound herein are for Bidder's convenience and information only, and are not a warranty of subsurface conditions.

C. The complete text of the Reports may also be examined by qualified Bidders at the office of the Architect, and where documents are on file for bidding purposes.

D. The Reports are made available for Bidder's information only, and are not Contract Documents.

E. The information contained in the Reports represents design criteria, recommendations, and guidelines that were utilized as the basis of design for the engineering of the earthwork operations, paving design, and foundation design indicated in the Contract Documents. No changes in this design criteria will be considered or permitted.

1.3 RESPONSIBILITY

A. Bidders are expected to examine the site and subsurface investigation reports and then decide for themselves the character of the materials to be encountered.

B. The Architect and Owner assume no responsibility for variations in subsoil conditions, quality, or stability, or for the presence, level, and extent of underground water.

C. The Architect and Owner assume no responsibility for Bidder's interpretation of data contained in the Reports.

END OF DOCUMENT

KLEINFELDER

FINAL GEOTECHNICAL INVESTIGATION
BED TOWER ADDITION
MEDICAL CENTER OF AURORA
AURORA, COLORADO

April 17, 2006

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KLEINFELDER
An employee owned company

April 17, 2006
File 66295-1

Mr. Rodney Allen
HCA Management Services, L.P.
P.O. Box 550 (37202-0550)
Nashville, TN 37203

Subject: **Final Geotechnical Investigation**
Bed Tower Addition
Medical Center of Aurora
Aurora, Colorado

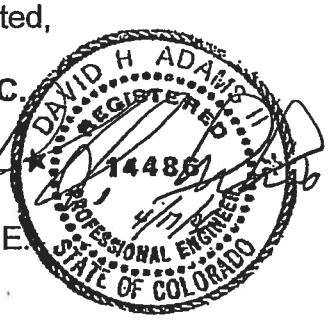
Dear Mr. Allen:

Kleinfelder is pleased to present the results of our geotechnical investigation for the proposed Bed Tower addition for the Medical Center of Aurora in Aurora, Colorado. Our work consisted of subsurface exploration, laboratory testing, engineering analyses and preparation of this report.

We appreciate this opportunity to be of service to you, and look forward to future endeavors. If you have any questions regarding this report or need additional information or services, please feel free to contact the undersigned in our office.

Respectfully submitted,

KLEINFELDER, INC.



David H. Adams, P.E.
Senior Professional

Rev. By: DLH

DHA/xr
Enclosures

Cc: Perkins + Will (3 copies)

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KLEINFELDER 611 Corporate Circle, Suite C, Golden, CO 80401 (303) 237-6601 (303) 237-6602 fax

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A Vicinity Map and Boring Location Plan
B Logs of Exploration Borings
C Laboratory Test Results

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1 INTRODUCTION

1.1 GENERAL

This report presents the results of a geotechnical investigation performed for a Bed Tower addition to the Medical Center of Aurora located at 1501 S. Potomac Street in Aurora, Colorado. An attached Vicinity Map (Figure A-1) shows the location of the project. Our investigation was performed for HCA Management Services, L.P., and was authorized by Mr. Rodney Allen.

The report includes our recommendations relating to the geotechnical aspects of project design and construction. The conclusions and recommendations stated in this report are based on the subsurface conditions found at the locations of our exploratory borings at the time our exploration was performed. They also are subject to the provisions stated in the report sections titled **Additional Services** and **Limitations**. Our findings, conclusions, and recommendations should not be extrapolated to other areas or used for other projects without our prior review. Furthermore, they should not be used if the site has been altered, or if a prolonged period has elapsed since the date of the report, without Kleinfelder's prior review to determine if these recommendations remain valid.

1.2 PROJECT DESCRIPTION

The Bed Tower addition includes a 27,000 square foot addition footprint on the ground level and four to six additional levels consisting of 21,000 square feet each for patient unit floors. The addition will be constructed on the north side of the existing hospital building in an area currently occupied by a parking lot and access drive. It will connect to the existing hospital with a four-level connector wing. We understand the building will be steel frame. Column loads in the tower will vary from approximately 500 to 750 kips and the connector will be about 200 kips. The one-story portion of the addition will have maximum column loads of 50 kips. The building will have a ground floor elevation near the existing grade.

The four-level connector will extend over a portion of the existing hospital. Column foundations will penetrate the existing structure. Construction access and working

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2 FIELD EXPLORATION AND LABORATORY TESTING

2.1 FIELD EXPLORATION

A field exploration performed on February 27, 2006 included drilling six exploratory borings at the locations indicated on the Boring Location Plan (Figure A-2) to the maximum depth drilled, 60 feet. The borings were advanced using a truck-mounted Boart-66 drill rig equipped with 4-inch diameter continuous-flight, solid-stem auger. Relatively undisturbed drive samples were obtained during exploration using a modified California sampler (2.5-inch I.D.) driven into the strata with blows from a 140-pound hammer falling through a 30-inch drop in accordance with local practice. The blows required to drive the sampler six inches were recorded. This blow count is an indication of the relative density or consistency of the strata.

Appendix B to this report includes logs describing the subsurface conditions. A legend to the boring logs and summary of the Unified Soil Classification System used to describe the soils is presented at the front of the appendix. The lines defining boundaries between soil and bedrock types on the logs are based on drill behavior and interpolation between samples, and are therefore approximate. Transition between soil types and bedrock may be abrupt or may be gradual.

2.2 LABORATORY TESTING

Laboratory tests were performed on selected soil samples to estimate their relative engineering properties. Tests performed included:

Description and Identification of Soils (Visual-Manual Procedure)
Classification of Soils for Engineering Purposes
Moisture Determination and Unit Weight
Particle Size Gradation Analysis
Unconfined Compressive Strength
One-Dimensional Swell-Settlement
Water Soluble Sulfate Concentration

Results of the laboratory tests are included in Appendix C of this report. Selected test results are also shown on the boring logs.

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3.3.2 Sand

Clean to silty sand was encountered beneath the pavement section or fill in each of the borings extending to depths of 35 to 40 feet. The sands were fine grained and had a loose to medium dense relative density based on sampler penetration resistance tests. Particle size gradation characteristics of the sands are presented in Appendix C in Figures C-2 and C-3.

3.3.3 Clay

A clay layer about 13 to 14 feet thick was found below the sand in the three deeper borings at depths of 35 to 40 feet. The clay had a stiff consistency based on penetration resistance tests. An unconfined compression test indicated a strength of 5,190 psf.

3.3.4 Bedrock

Bedrock was encountered in Borings TB-1, TB-4, and TB-5 at depths varying from 48 to 53 feet below the existing ground surface. The bedrock was comprised of sandstone and claystone of the Denver formation. Sandstone was identified in the upper 5 to 9 feet of bedrock overlying claystone in two of the borings. Boring TB-4 did not encounter sandstone. The bedrock hardness was classified as hard using local designations. Penetration resistance blow counts varied from 50 blows to drive the sampler 5 or 6 inches.

3.3.5 Groundwater

Groundwater was found in five of the six borings at depths of about 30 feet during drilling. Due to the high traffic areas the borings were backfilled and patched upon completion and additional groundwater monitoring was not possible. It appears the groundwater level will be within the lower granular soils perched above the clay layer.

Soil moisture levels and groundwater levels commonly vary over time depending upon seasonal precipitation, irrigation practices, land use, and runoff conditions. Accordingly, the soil moisture and groundwater data in this report pertain only to the locations and times at which exploration was performed.

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safety, is the sole responsibility of the Contractor as part of its overall responsibility for the means, methods, and sequencing of construction operations. Kleinfelder's recommendations for excavation support are intended for the Client's use in planning the project, and in no way relieve the Contractor of its responsibility to construct, support, and maintain safe slopes. Under no circumstances should the following recommendations be interpreted to mean that Kleinfelder is assuming responsibility for either construction site safety or the Contractor's activities.

We believe that the fill and clean to silty sand soils on this site will classify as Type C material using OSHA criteria. OSHA requires that temporary, unsupported cuts be laid back to ratios no steeper than 1½:1 (horizontal to vertical) for Type C material. In general, we believe that these slope ratios will be temporarily stable under unsaturated conditions. If groundwater seepage was to occur, flatter slopes may be appropriate. Please note that an OSHA-qualified "competent person" must make the actual determination of soil and rock type and allowable sloping in the field.

4.2.2 Site Preparation

All site preparation and earthwork operations should be performed in accordance with applicable codes, safety regulations and other Local, State or Federal guidelines. All references to maximum dry density values are referencing ASTM D698 standard Proctor.

Initial site work should consist of removal of the existing asphalt pavement and any loose existing fill. The asphalt pavement varied from 4 to 6 inches thick and aggregate base course was found in some of the borings as shown on the boring logs in Appendix B.

4.2.3 Compacted Fill

The native granular soils and existing fill materials are suitable for use as compacted fill anywhere on the site. Compacted fill should be placed in horizontal lifts compatible with the type of compaction equipment being used, moisture conditioned to within 2 percent of optimum moisture content and compacted to at least 95 percent of maximum standard Proctor dry density. Imported material, if necessary, should be granular, non-expansive material having less than 40 percent passing the No. 200 sieve and a liquid limit less

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throughout the project to evaluate such differing conditions as they appear, and to modify or add to the geotechnical recommendations as necessary.

4.2.7 Drainage and Landscaping

Grade the ground surface around the structure so that surface water will quickly flow away from the building and any adjacent buildings. Paved areas such as sidewalks and approach slabs within 5 feet of the building should have minimum gradients of 2 percent away from the building, while landscaped areas should have minimum gradients of 5 percent. Carry the downspouts from roof drains across all backfilled areas so that they discharge well clear of the backfill zone and structure. Water should drain away from structure as rapidly as possible and not be allowed to stand or pond near the building.

4.3 FOUNDATIONS

4.3.1 Foundation Type

After evaluation of the subsoil conditions and consideration of the proposed construction, we recommend the multi-story portions of the addition be founded with straight-shaft piers drilled into the underlying bedrock. Our evaluation is based on the low strength of the overburden soils, the type of structure, building loads, construction costs and our experience with similar projects in the Denver area.

The one-story portion of the addition may be founded with spread footings bearing on the native sands or compacted fill. Generally, it is preferred that a common foundation system be used for the entire addition; however, the upper sands are capable of supporting one-story building loads and we believe foundation costs could be reduced by using spread footings for this portion of the addition. Settlement may be differential between the two foundation types and a structural joint in recommended.

Two options appear feasible for the bridge that connects the upper floors. Spread footings may be considered. In order to maximize the allowable bearing capacity and minimize the excavation, the supporting soils would require improvement. This could be accomplished with chemical grouting of the supporting sands to allow use of 3,500 psf allowable bearing pressure. Footings would be about 7.5 feet square under this pressure. Chemical grouting can be performed in confined space and while facilities remain open. The grouted area should extend about 10 feet below the footings and 10

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similar properly constructed pier foundations, we estimate that pier settlement under the above design pressures may be on the order of ½-inch. Actual settlements measured both in pier load tests and on existing buildings suggest that settlements will be small.

4.3.2.3 Lateral Load

Seismic and wind induced loadings will be a consideration for a building of this size. Lateral loads will be resisted by the drilled pier foundation system and any foundation walls. The stiffness of the pier and the stress-strain properties of the surrounding soils determine the lateral resistance of the pier system. For beam on elastic foundation analysis, we recommend a modulus of horizontal subgrade reaction of 30 tcf for the overburden soils and 300 tcf for the bedrock be used. This modulus value is for a long one-foot diameter drilled pier and must be corrected for pier size. For example, a 24-inch diameter pier would use a modulus of 15 tcf for design in the overburden soils and 150 tcf in the bedrock. For L-Pile analysis the following parameters may be used.

PARAMETER	SAND (Above Water)	SAND (below water)	CLAY	BEDROCK
Unit Weight (pcf)	115	53	120	120
Cohesion (psf)	0	0	2,000	4,000
Friction Angle	30	30	0	0
k_s (pci)	60	40	500	2,000
k_c (pci)	60	40	200	800
E50	-	-	0.007	0.004

4.3.2.4 Pier Construction

We recommend the pier-drilling contractor be familiar and experienced with pier drilling operations in this area, especially large diameter piers requiring casing. A high capacity drill rig will be required to reach the design bedrock penetration and pier lengths. The construction criteria presented below should be observed for a straight-shaft drilled pier foundation system. The construction details should be considered when preparing project documents.

- Bedrock penetration in all pier holes should be provided with horizontal shear rings to assist the development of peripheral shear stress between the drilled pier and the bedrock. Shear rings should be installed with a grooving tool on

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4.3.3 Spread Footings

The one-story portion of the addition may also be founded on drilled piers; however, spread footings bearing on the native sands or compacted fill may be considered as an alternative. The existing fill encountered along the west end of the addition footprint should be removed and replaced compacted as outlined in Section 4.2.3. The design and construction criteria presented below should be observed for a spread footing foundation system. The construction details should be considered when preparing project documents.

- Footings bearing on native soils or compacted fill may be designed for a maximum allowable bearing pressure of 2,000 psf. The allowable bearing pressure may be increased by one-third for transient loading.
- Added option for 2,500 on 3-foot fill.
- If a higher allowable bearing capacity is desirable, the bearing capacity may be increased to 2,500 psf by placing footings on 3 feet of fill compacted to at least 100 percent of the standard Proctor density. The existing soils should be removed and replaced compacted.
- Any compacted fill placed below footings should extend beyond the horizontal limits of the footings 1 foot for each foot in depth of compacted fill.
- Continuous footings should have a width of at least 16 inches and isolated footing pads should be at least 24 inches in width.
- Lateral loads may be resisted using a coefficient of friction for sliding of 0.35 and a passive earth pressure of 300 pcf.
- We estimate total settlement for footings will be less than one-inch and differential settlement across the one-story portion of the addition should be less than ¾-inch; however, any settlement will be differential with respect to connections to the existing structure and a structural joint is recommended. In addition, a structural joint is recommended between the portions of the structure founded on drilled piers since the settlement between foundation types may be differential.
- Continuous foundation walls should be reinforced to span an unsupported length of at least 10 feet.
- Exterior footings or footings in unheated areas should have at least 36 inches of cover above the bearing elevation for frost protection.

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5 ADDITIONAL SERVICES

5.1 REQUIREMENTS FOR ADDITIONAL SERVICES

In most cases, other services beyond completion of a geotechnical report are necessary or desirable to complete a project satisfactorily. It also sometimes happens that, while performing our services, we discover conditions or circumstances that require the performance of additional work that was not anticipated when the geotechnical report was written. Kleinfelder offers a range of environmental, geological, geotechnical, and construction services to suit the varying needs of our clients. This section outlines some of those services that may pertain to this project. Kleinfelder will be happy to submit a proposal for performing any such services upon request.

5.2 REVIEW OF PLANS AND SPECIFICATIONS

We strongly recommend that Kleinfelder be given an opportunity to review the plans and specifications for this project before they are finalized. Such a review allows us to verify that our recommendations and concerns have been adequately incorporated in the design. It also gives us an opportunity to discuss those recommendations and concerns with other members of the design team so that we can clear up misunderstandings or ambiguities before the project reaches the construction stage.

5.3 PREBID AND PRECONSTRUCTION MEETINGS

Subcontractors often contact us during the bidding process to discuss the geotechnical aspects of projects. Informal contacts between Kleinfelder and individual subcontractors can result in incorrect or incomplete information being provided to the subcontractor. Therefore, we recommend that a prebid meeting be held to answer any questions about the report prior to submittal of bids. If this is not possible, questions or requests for clarifications regarding this report should be directed to the Owner or his designated representative. After consultation with Kleinfelder, the Owner (or his representative) should provide clarifications or additional information to all subcontractors bidding the job.

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6 LIMITATIONS

The recommendations in this report are based on our field observations, laboratory testing, and our present understanding of the proposed construction. It is possible that subsurface conditions can vary between or beyond the points explored. If the conditions found during construction differ from those described in this report, please notify us immediately so that we can review our report in light of those conditions and provide supplemental recommendations as necessary. We should also review the report if the scope of the proposed construction, including the proposed loads or structure locations, changes from that described in this report.

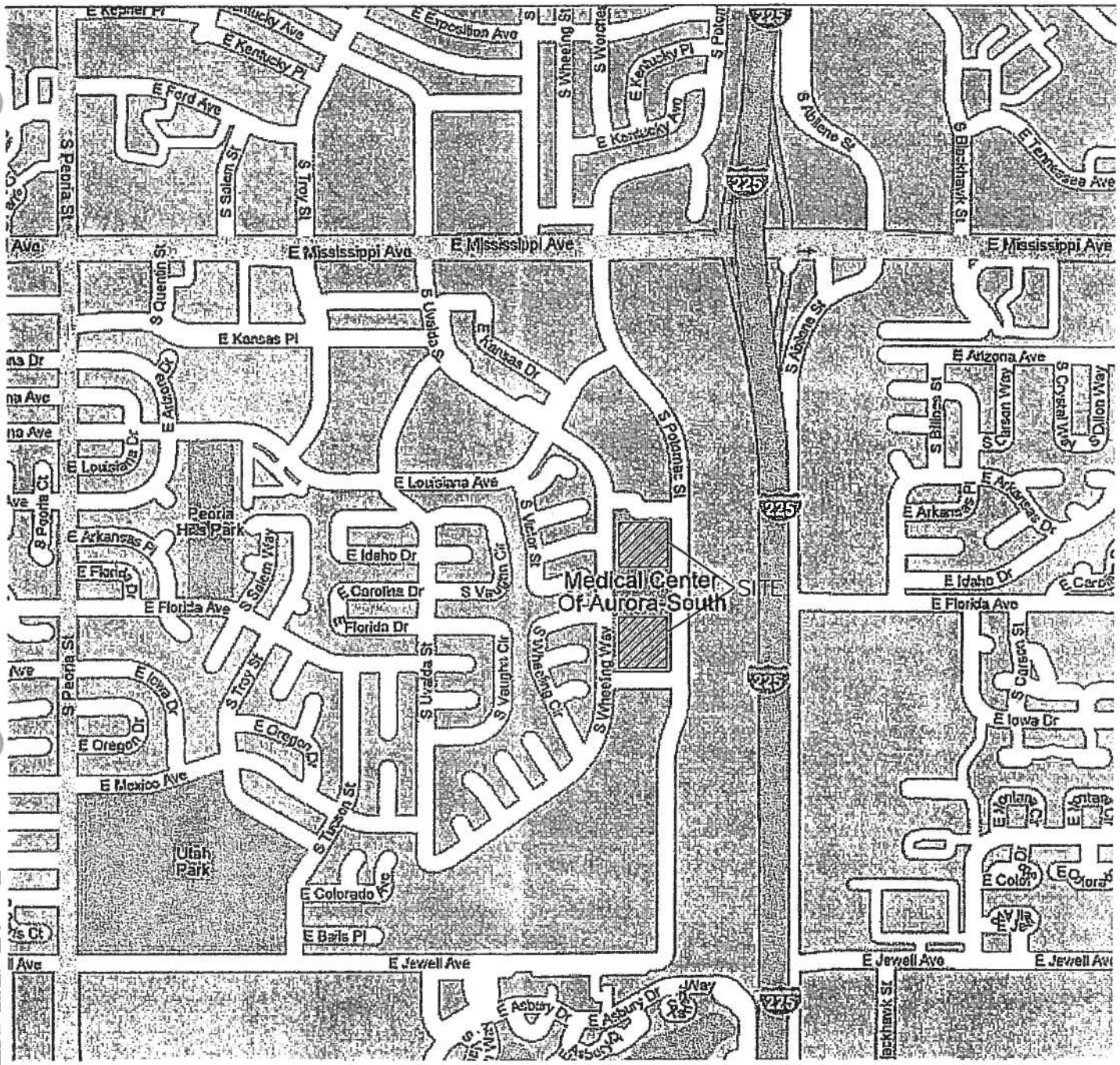
Kleinfelder has prepared this report for the exclusive use of HCA Management Services, L.P. for the Bed Tower addition at the Medical Center of Aurora in Aurora, Colorado. The report was prepared in substantial accordance with the generally accepted standards of practice for geotechnical engineering as exist in the site area at the time of our investigation. No warranty is expressed or implied. The recommendations in this report are based on the assumption that Kleinfelder will conduct an adequate program of construction testing and observation to evaluate compliance with our recommendations.

This report may be used only by the Client, and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on- and off-site), or other factors may change over time, so that additional investigation or revision of our recommendations may be required with the passage of time. It is the Client's responsibility to see that all parties to the project including the designer, contractor, and subcontractors, are made aware of this report in its entirety. The use of information contained in this report for bidding purposes shall be at the Contractor's option and risk. Any party other than the Client who wishes to use this report must notify Kleinfelder of such intended use. Based on that intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Noncompliance with these requirements by the Client or anyone else will release Kleinfelder from any liability resulting from the use of this report by an unauthorized party.

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APPENDIX A

Vicinity Map and Boring Location Plan



MAP REPRODUCED FROM GOOGLE - MAP DATA ©2006

NOT TO SCALE

KLEINFELDER
An employee owned company

Checked By: D. Adams	Drafted By: J. Edwards
Project Number: 66295	Date: March 20, 2006

VICINITY MAP

MEDICAL CENTER OF AURORA
AURORA, COLORADO

Figure
A-1

APPENDIX B

Logs of Exploratory Borings

LEGEND OF SYMBOLS USED ON BORING LOGS

LOG SYMBOLS

- BULK / GRAB SAMPLE
- MODIFIED CALIFORNIA SAMPLER (2.5 inch inside diameter)
- STANDARD PENETRATION SPLIT SPOON SAMPLER (2.0-inch O.D. X 1.4-inch I.D.)
- SHELBY TUBE (3 inch outside diameter)
- BDBGM SIZE CORE BARREL (1.65-inch I.D.)
- BW44 SIZE CORE BARREL (1.875-inch I.D.)
- HQ-3 SIZE CORE BARREL (2.4-inch I.D.)
- WATER LEVEL (level where first encountered)
- WATER LEVEL (level after completion)

GENERAL NOTES

1. Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.
2. No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
3. Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
4. In general, Unified Soil Classification designations presented on the logs were based on visual classification in the field and were modified where appropriate by visual classifications in the office, and/or laboratory gradation and index property testing.
5. NV = No Value; NA = Not Analyzed; NP = No Plasticity
6. Exp = percent expansion under defined surcharge pressure.
7. Com = Percent compression under defined surcharge pressure.
8. 50/X indicates number of blows required to drive the indentified sampler X inches with a 140 lb hammer falling 30 inches.

USCS SYMBOL	SOIL DESCRIPTIONS
GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
ML	INORGANIC SILTS & VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
---	CLAYSTONE
--	INTERBEDDED SANDSTONE/CLAYSTONE
---	SANDSTONE
--	SILTSTONE
---	FILL

Note: Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.

KLEINFELDER

Drafted By: *	Project Number: *
Date: *	

BORING LOG LEGEND

*

*

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▽): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	60.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Asphaltic Concrete											
			6" Asphalt 4" Road Base SAND (SP-SM): clean to silty, loose to medium dense, moist to wet, light brown, fine to medium grained		7 9	MCAL		106	4.9			100	8	
	10				8 8	MCAL								
	20				16 11	MCAL		118	10.5					
	30		▽											
	35		CLAY (CL): sandy, stiff, wet, brown											
	40				8 10	MCAL		96	27.5					Unc = 5190 psf
	50		SANDSTONE: hard, moist, brown, weakly cemented											
	55				50/5	MCAL		99	23.9					
	60		CLAYSTONE: hard, moist, olive-brown		50/5	MCAL		97	26.2					Exp = 0.6%
	65													

KLEINFELDER

Drafted By: R. Reyes
Date: March, 2006
Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING
TB 1
Page 1 of 1

ENVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▽): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	30.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Asphaltic Concrete											
	0		4" Asphalt 2" Road Base SAND (SP-SM): clean to silty, loose to medium dense, moist, light brown											
	5				5 8	MCAL								
	10				5 8	MCAL		100	8.1				11	
	15													
	20				10 11	MCAL								
	25													
	30				10 11	MCAL		109	17.0					
	35													
	40													
	45													
	50													
	55													
	60													
	65													

KLEINFELDER

Drafted By: R. Reyes
Date: March, 2006
Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING
TB 2

ORA MEDICAL CENTER.GPJ 3/20/2006
ENVER_GEO 66295

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▽): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	30.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Asphaltic Concrete											
			5" Asphalt 3" Road Base SAND (SP-SM): clean to silty, loose to medium dense, moist to wet, light brown		7 9	MCAL		100	2.4				5	
	10				10 13	MCAL								
	15				13 16	MCAL		107	8.8				7	
	30				17 19	MCAL								

KLEINFELDER

Drafted By: R. Reyes | Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING TB 3

Page 1 of 1

...NVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▼): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	61.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Asphaltic Concrete											
	0		5.5" Asphalt											
			SAND (SP-SM): clean to silty, loose to medium dense, moist to wet, light brown		8 9	MCAL		103	4.0					
	10				8 10	MCAL								
	15				7 8	MCAL								
	20													
	25				18 22	MCAL		106	5.4			100	12	
	30		▼											
	35													
			CLAY (CL): sandy, stiff, moist to wet, brown		7 8	MCAL								
	45													
	50		CLAYSTONE: hard, moist, olive-brown											
	55													
	60				50/5	MCAL								
	65													

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Drafted By: R. Reyes
Date: March 2006
Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING
TB 4
Page 1 of 1

ENVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▼): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	60.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Grass											
	0		FILL: sand, clean to silty, medium dense, moist, brown to dark brown											
	5				50/11	MCAL								
			SAND (SP-SM): clean to silty, medium dense, moist to wet, light brown											
	10													
	15				9 11	MCAL		106	7.5					
	20													
	25				21 21	MCAL			8.4				6	
	30		▼											
	35													
	40		CLAY (CL): sandy, stiff, moist to wet, brown											
	45													
	50													
	55		SANDSTONE: hard, very moist, brown, weakly cemented		50/5	MCAL								
			CLAYSTONE: hard, moist, brown-grey		50/6	MCAL		94	26.3					
	60													
	65													

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Drafted By: R. Reyes
Date: March, 2006
Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING
TB 5
Page 1 of 1

ENVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	No Free Groundwater Encountered			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	30.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Grass											
	5		FILL: sand, silty, dense, moist, dark brown to grey		30/6	MCAL		110	8.4				8	
	10		SAND (SP-SM): clean to silty, loose to medium dense, moist, brown to light brown		18 18	MCAL		105	5.2					
	20				8 8	MCAL								
	30				7 11	MCAL								
	35													
	40													
	45													
	50													
	55													
	60													
	65													

KLEINFELDER

Drafted By: R. Reyes | Project Number: 66295

Date: March 2006

BORING LOG

Medical Center of Aurora
Aurora, Colorado

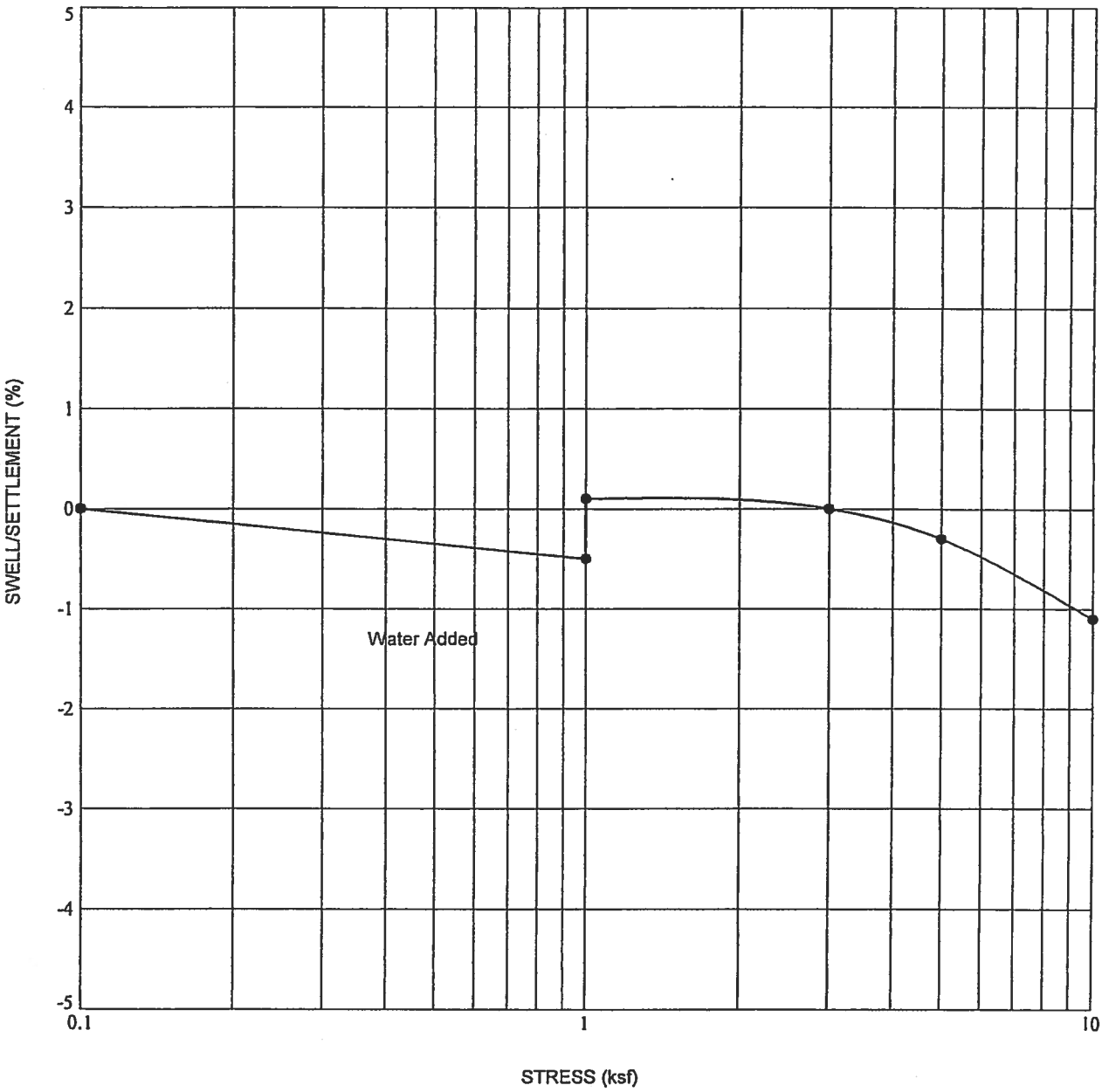
BORING

TB 6

ENVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

APPENDIX C

Laboratory Test Results



	Before	After
SOURCE: TB 1	Total Unit Weight (pcf) =	122.2
At a depth of approximately 59.0 feet	Moisture Content (%) =	26.2
Exp = 0.6%	Dry Unit Weight (pcf) =	96.8
claystone		

KLEINFELDER

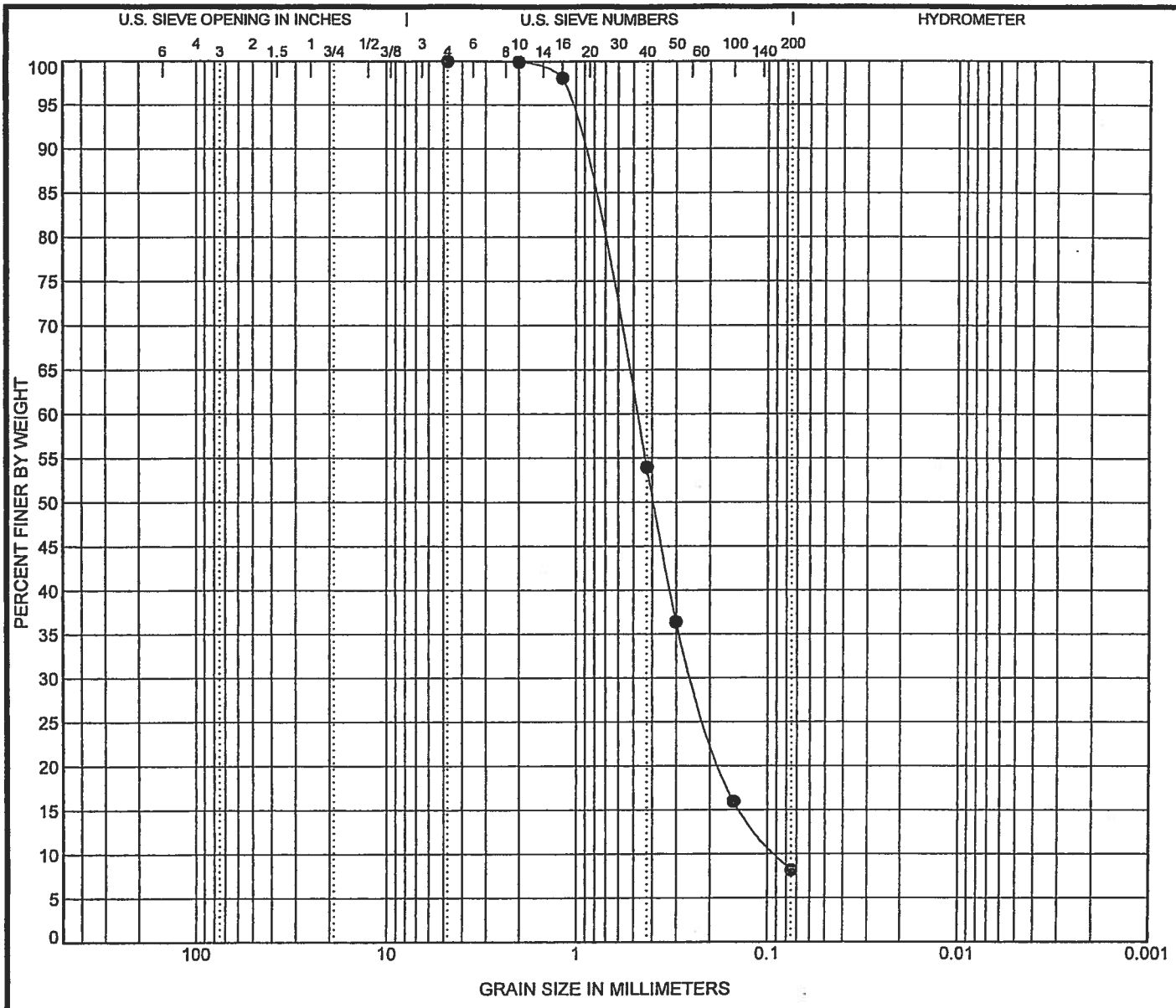
Drafted By: R. Reyes | Project Number:

SWELL/SETTLEMENT TEST

Medical Center of Aurora
Aurora, Colorado

Figure C-1

CONSOLID 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
TB 1	**4**					**1.35**	**5.52**

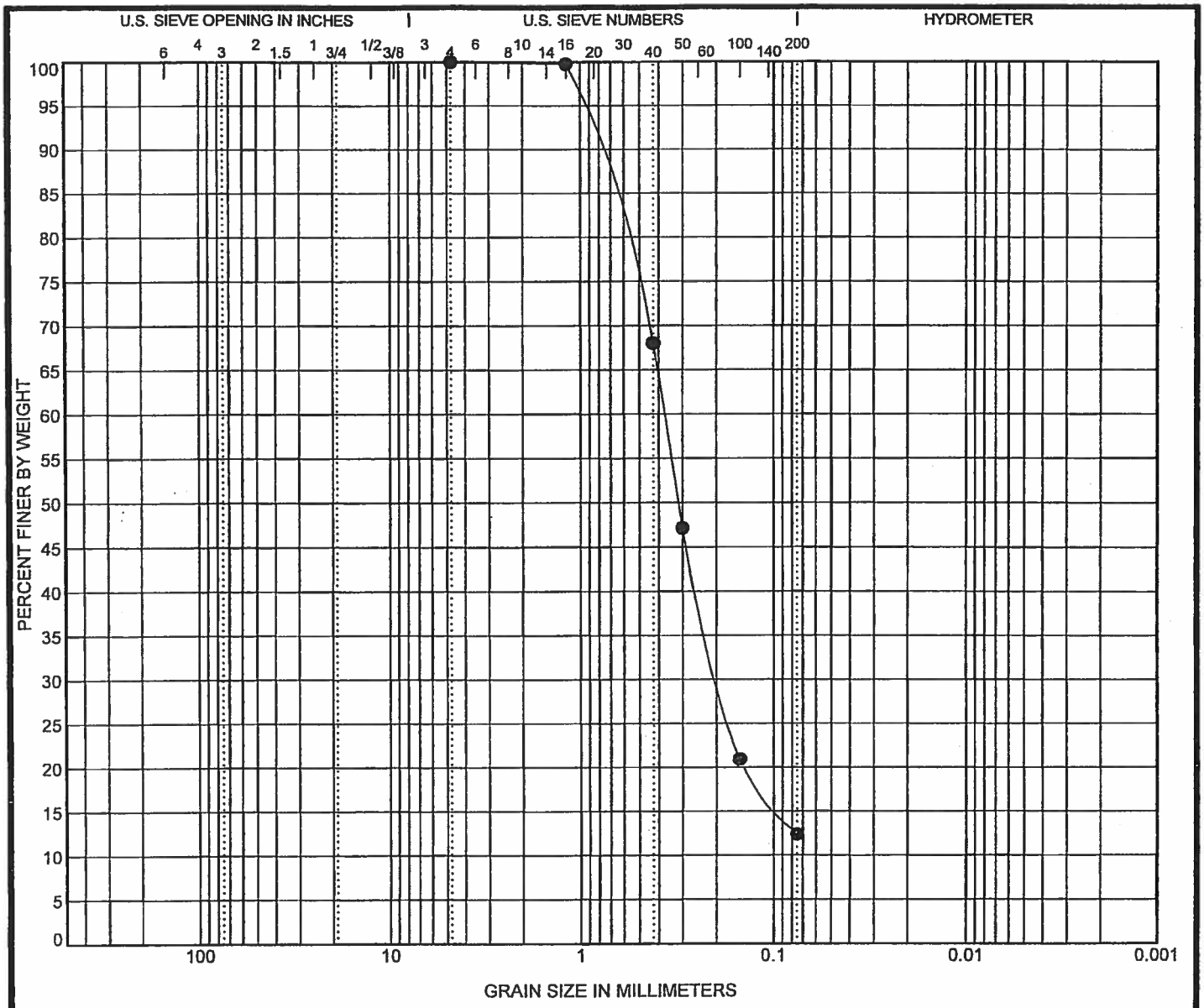
	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75	**0.489**	**0.242**	**0.089**	**0.0**	**91.9**	**8.1**	

Kleinfelder, Inc
611 Corporate Circle Suite C
Golden, CO 80401
Telephone: (303) 237-6601
Fax: (303) 237-6602

GRAIN SIZE DISTRIBUTION

Project: Medical Center of Aurora
Location: Aurora, Colorado
Number: 66295

Figure C-2



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
TB 4	24					1.58	6.01

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75	0.372	0.191		0.0	87.6	12.4	

Kleinfelder, Inc
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Golden, CO 80401
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GRAIN SIZE DISTRIBUTION

Project: Medical Center of Aurora
Location: Aurora, Colorado
Number: 66295

Figure C-3

Consultant: Kleinfelder, Inc.
611 Corporate Circle, Suite C
Golden, Colorado 80401
Phone No. 303-237-6601
Fax No. 303-237-6602
Contact: David Adams, P.E.

PAVEMENT THICKNESS DESIGN
PARKING RENOVATION
AND FIRE LANE/ACCESS DRIVE
MEDICAL CENTER OF AURORA
AURORA, COLORADO
AURORA FILE NO. _____

Owner: HCA-HealthONE, LLC
DBA The Medical Center of Aurora
2515 Park Plaza, Bldg II-3E
Nashville, TN 37203
Phone No. 615-344-5084
Fax No. 615-344-2770
Contact: Mr. Rodney Allen

Approved One Year From This Date

_____

_____ _____
City Engineer Date

May 19, 2006

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KLEINFELDER
An employee owned company

May 19, 2006
File: 66295-1

Mr. Rodney Allen
HCA Management Services, L.P.
P.O. Box 550 (37202-0550)
Nashville, TN 37203

Subject: **Pavement Thickness Design**
Parking Renovation and Fire Lane/Access Drive
Bed Tower Addition
Medical Center of Aurora
Aurora, Colorado
Aurora File No. _____

Dear Mr. Allen:

This report presents the results of a geotechnical investigation to provide recommendations for pavement thickness at the subject site. The site vicinity is shown on Figure A-1. The investigation was performed in accordance with the verbal authorization by Perkins + Will to proceed. Our work consisted of site reconnaissance, subsurface exploration, laboratory testing, engineering analyses, and preparation of this report.

It is planned to demolish an existing parking garage and construct an at grade parking lot as shown on Figure A-2. In addition, the fire lane/access drive at the front of the new bed tower addition and hospital entrance will be reconfigured. The preferred pavement section is flexible asphalt concrete. The City of Aurora pavement design procedures were followed for pavement design.

SITE CONDITIONS AND SUBGRADE MATERIAL

The area to be renovated and reconfigured is at or near the planned subgrade elevation. The ground surface was fairly level and the majority covered with asphalt or concrete pavement. Landscaping borders the existing parking garage.

Five exploratory borings were drilled within the expansion area to depths of between 5 and 10 feet at the locations shown on Figure A-2. Logs of the exploratory borings are presented in Appendix B and a legend of symbols and notes is shown at the beginning of the appendix. The subgrade materials encountered in our borings beneath about 6 inches of asphalt or 4 inches of concrete were slightly silty sand that extended to the full boring depth.

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the asphalt concrete, in the automobile parking and fire lane/access drive areas, respectively.

Alternatively, a composite section consisting of aggregate base course and asphalt may be used. For the parking area, the section should consist of 3 inches asphalt over 6 inches aggregate base course and the section for the fire lane/access drive should be 3.5 inches asphalt over 7 inches base course.

The design nomograph for flexible pavements and thickness calculations are attached in Appendix D. All pavement materials should conform to the City of Aurora specifications for construction.

Subgrade Preparation: Prior to placing the pavement section, the subgrade should be scarified to a depth of 12 inches, adjusted to moisture content within 2 percent of optimum moisture content, and compacted to 95 percent of the maximum modified Proctor density.

The entire pavement subgrade should be proofrolled with a heavily loaded pneumatic-tired vehicle after preparation. Pavement design procedures assume a stable subgrade. Areas that deform under heavy wheel loads are not stable and should be removed and replaced to achieve a stable subgrade prior to paving.

Drainage: Collection of surface drainage is extremely important for satisfactory performance of the pavement. City of Aurora design specifications provide for positive collection of surface drainage on the roadways, however, the adjoining parcels must also provide for positive drainage and collection of surface waters. Areas which pond or collect water outside of the intended drainage ways, such as gutters or swales, must be regraded to reduce wetting of the subgrade soils.

LIMITATIONS

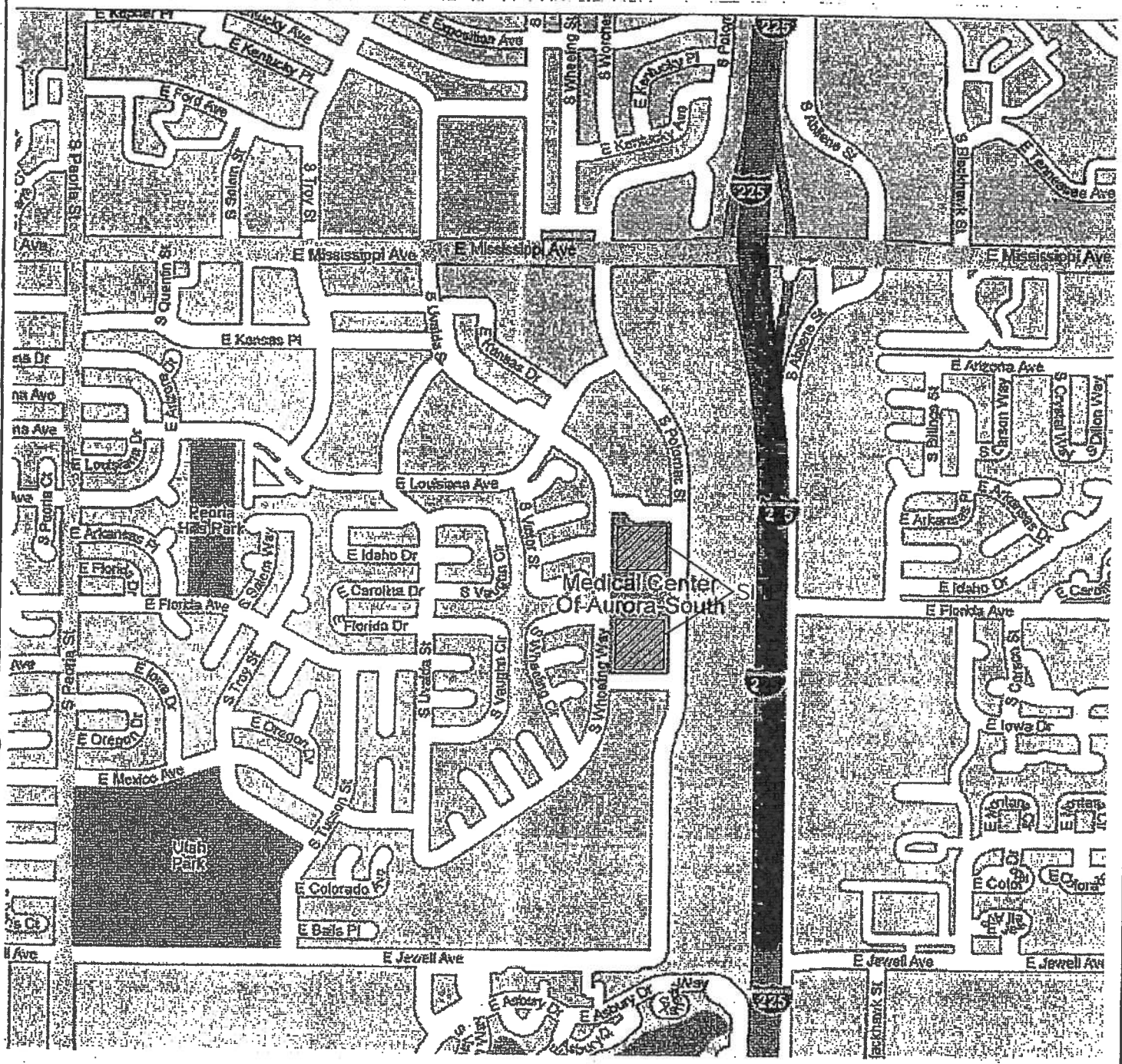
This report has been prepared in accordance with generally accepted geotechnical engineering principles and practices in this area at this time. We make no warranty either express or implied. The conclusions and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on Figure A-2 and our site observations.

This report has been prepared for the exclusive use by our client for pavement thickness design purposes. We are not responsible for technical interpretations by others of our exploratory information that has not been described or documented in this report. As the project evolves, we should be retained to provide continued consultation and field services to review and monitor the implementation of our recommendations and to verify that the recommendations have been appropriately interpreted. We recommend on-site observation of pavement subgrade and testing of pavement materials by a representative of the geotechnical engineer.

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APPENDIX A

Vicinity Map and Boring Location Plan



MAP REPRODUCED FROM GOOGLE - MAP DATA ©2006

N

NOT TO SCALE

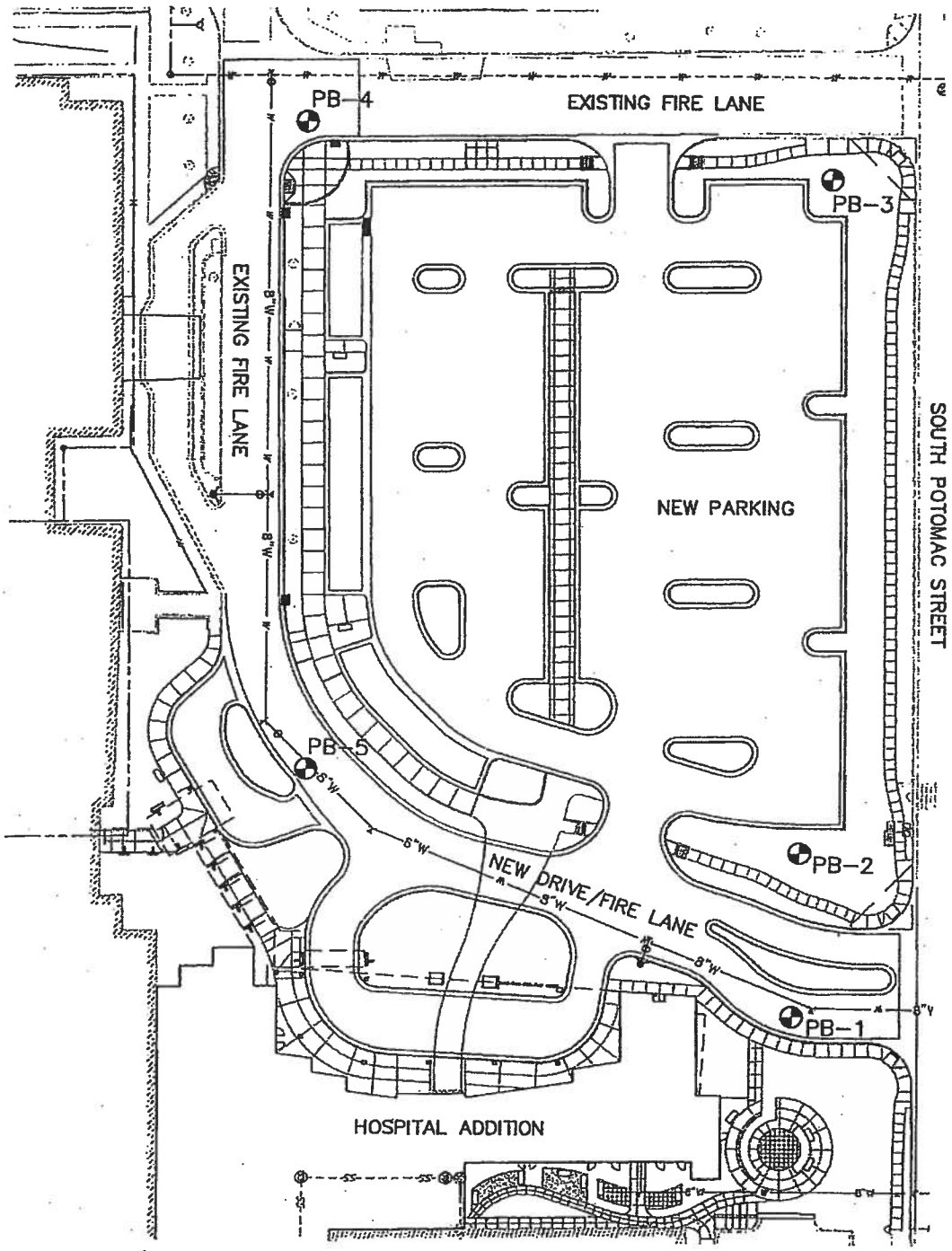
KLEINFELDER
An employee owned company

Checked By: D. Adams	Drafted By: J. Edwards
Project Number: 66295	Date: March 20, 2006

VICINITY MAP

MEDICAL CENTER OF AURORA
AURORA, COLORADO

Figure
A-1



PB–1 = PAVEMENT BORING

80 0 40 80

APPROXIMATE SCALE IN FEET

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An employee owned company

Checked By: D. Adams	Drafted By: J. Edwards
Project Number: 66295.1	Date: May 23, 2006

BORING LOCATION PLAN

MEDICAL CENTER OF AURORA
BED TOWER PARKING LOT EXPANSION
AURORA, COLORADO

Figure 2-A

APPENDIX B

Logs of Exploratory Borings

PROJECT MANUAL

RSN251428

VOLUME 1

ISSUED FOR PERMIT & CONSTRUCTION
Date: 24 AUGUST 2006

2007172604

MEDICAL CENTER OF AURORA
SOUTH CAMPUS

PRIVATE ROOM EXPANSION

AURORA, COLORADO

P+W Project Number: 142228.00

PERKINS +WILL

10100 N. Central Expressway
Suite 300
Dallas, TX 75231

t: 214.283.8700
f: 214.283.8701
www.perkinswill.com

NORTH AMERICA | ASIA | MIDDLE EAST | AFRICA | EUROPE

PROJECT MANUAL

Private Room Expansion, Medical Center of Aurora – South Campus
Aurora, Colorado

24 August 2006 **Issued for Permit and Construction**

Owner
HCA
One Park Plaza
Nashville, TN 73203
Telephone: 615-344-9551
Facsimile: 877-462-3396
Contact: Rodney Allen, Project manager
Electronic Mail: Rodney.Allen@hcahealthcare.com

Facility
The Medical Center of Aurora
South Campus
1501 South Potomac Street
Aurora, Colorado, 80012
Telephone: 303.873.5675
Facsimile: 303.337.9773
Contact: Sylvia Young, Chief Executive Officer
Electronic Mail: sylvia.young@healthonecares.com

Architect
Perkins + Will
10100 North Central Expressway, Suite 300
Dallas, Texas 75231
Telephone: 214-283-8700
Facsimile: 214-283-8701
Contact: Dimitri Englert, Project Architect
Electronic Mail: dimitri.englert@perkinswill.com

Interior Designer
Perkins + Will
10100 North Central Expressway, Suite 300
Dallas, Texas 75231
Telephone: 214-283-8700
Facsimile: 214-283-8701
Contact: Shannon Hopkins, Coordinator – Interiors
Electronic Mail: shannnon.hopkins@perkinswill.com

Structural Engineer
TRC International, Ltd.
5050 Quorum Drive, Suite 700
Dallas, TX 75254
Telephone: 214.722.6452
Facsimile: 214.722.6552
Contact: Andy Hammer, R.A.
Electronic Mail: ahammer@trcintl.com

Mechanical / Electrical Engineers
ccrd partners inc.
4311 Oak Lawn Avenue, Suite 400, LB 11
Dallas, Texas 75219
Telephone: 214-521-1661
Facsimile: 214-521-1664
Contact: Jeff Black, Alex Gray, Shaun Grimm
Electronic Mail: Jeffb@ccrd.com, alexgray@ccrd.com, shaung@ccrd.com

Civil Engineer
MARTIN/MARTIN INC.
12499 West Colfax Avenue
Lakewood, Colorado 80215
Telephone: 303-431-6100
Facsimile:
Contact: Duane Jansen
Electronic Mail: djansen@martinmartin.com

Landscape Engineer
Davis Partnership Architects
2301 Blake Street, Suite 100
Denver, Colorado 80205-2108
Telephone: 303-861-8555
Facsimile: 303-861-3027
Contact: Lynn Moore
Electronic Mail: emoore@davispartner.com

Contractor
J E Dunn
929 Holmes
Kansas City, KS 64106
Telephone: 816-474-8600
Facsimile: 816-448-2897
Contact: Mike Dennis, Project Manager
Electronic Mail: mike.dennis@jedunn.com

Project Numbers
P+W Project Number: **142228.000**
HCA Project No. 306660001

END OF DOCUMENT

DOCUMENT 00 01 07

PROFESSIONAL SEALS PAGE

The following Documents and Specifications have been furnished by the Owner for this Project, and were not prepared by or under the direct supervision of the Architect or any of the Architect's consultants:

OWNER

HCA
One Park Plaza
Nashville, TN 73203

BIDDING REQUIREMENTS

00 31 32 Geotechnical Data

CONTRACTING REQUIREMENTS

00 52 34 HCA Owner-Contractor Agreement

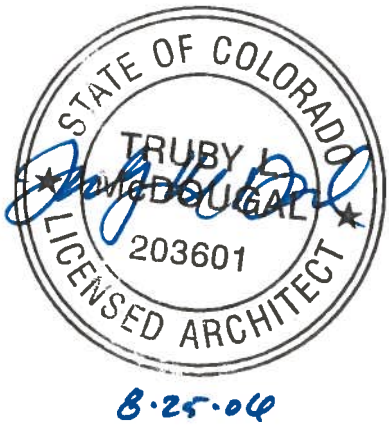
DIVISION 1 - GENERAL REQUIREMENTS

HCA Bulk Purchasing Vendor List
HCA Vendor List for Interior Finishes
HCA Interim Life Safety Program
HCA/Georgia-Pacific Job Profile Form

The following Documents and Specification Sections have been prepared by or under the direct supervision of the Architect:

ARCHITECT

Perkins + Will
10100 North Central Expressway, Suite 300
Dallas, Texas 75231



8.25.06

DOCUMENTS & SPECIFICATIONS

BIDDING REQUIREMENTS

00 26 00 Procurement Substitution Request

DIVISION 1 - GENERAL REQUIREMENTS

01 11 00 Summary of Work
01 14 00 Work Restrictions
01 22 00 Unit Prices
01 23 00 Alternates
01 25 00 Substitution Procedures
- Substitution Request Form

01 26 00 Contract Modification Procedures
01 26 13 Requests for Interpretation
- Request for Interpretation Form

01 29 00 Payment Procedures
01 31 00 Project Management and Coordination
01 31 06 Coordination Drawings
01 32 00 Construction Progress Documentation
01 32 33 Photographic Documentation
01 33 00 Submittal Procedures
- Electronic Drawing File Transfer And Indemnification Agreement
- Subcontractors and Major Material Suppliers List Form
- Submittal Transmittal Form

01 35 13 Hospital Project Procedures
01 35 16 Alteration Project Procedures
01 42 00 References
01 43 00 Quality Assurance Requirements
01 50 00 Temporary Facilities and Controls
01 56 39 Temporary Tree Protection and Trimmings
01 57 19 Airborne Contaminants Control
01 61 00 Common Product Requirements
01 62 05 HCA Product Requirements
01 72 00 Common Execution Requirements
01 73 29 Cutting and Patching
01 77 00 Closeout Procedures
- Completion/Correction Form

01 78 23 Operation and Maintenance Data
01 78 39 Progress Documents
01 79 00 Demonstration and Training

DIVISION 3 - CONCRETE

03 35 33 Stamped Cement Concrete Pavement
03 49 00 Glass Fiber Reinforced Precast Concrete
03 52 00 Lightweight Concrete Roof Insulation
03 54 16 Cement-Based Underlayment

DIVISION 4 - MASONRY

04 43 00 Stone Masonry Veneer
04 72 00 Cast Stone

DIVISION 5 - METALS

05 45 23 Medical Supports
05 58 00 Formed Metal Fabrications

DIVISION 6 - WOOD AND PLASTICS

06 20 00 Finish Carpentry
06 61 16 Solid Surfacing
06 61 19 Quartz Surfacing Fabrications
06 64 00 Thermoplastic (Solid Polymer) Material
06 82 56 Ballistic Resistant Fiberglass Panels

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07 16 13 Modified Cement Waterproofing
07 26 35 Water Vapor Emission Control Systems
07 42 14 Louvered Equipment Screens
07 42 43 Aluminum Composite Panel System
07 54 00 TPO Single-Ply Membrane Roofing
07 61 13 Standing Seam Sheet Metal Roofing
07 81 00 Sprayed Fire-Resistive Materials
07 81 60 Grease Duct Fire Protection
07 87 00 Elevator Door Smoke Containment System
07 95 13 Architectural Joint Systems

DIVISION 8 - OPENINGS

08 33 24 Overhead Coiling Doors
08 42 30 Sliding Automatic Entrance Doors
08 42 43 ICU/CCU Entrance Doors
08 44 13 Glazed Aluminum Curtain Walls
08 50 00 Between Glass Venetian Blinds
08 51 13 Fixed Aluminum Windows
08 63 00 Metal Framed Skylights
08 71 13 Automatic Door Controls
08 81 13 Decorative Glass
08 83 13 Mirrored Glass
08 91 00 Storm-Resistant Aluminum Louvers

DIVISION 9 - FINISHES

09 27 13 Glass Reinforced Gypsum Fabrications
09 30 13 Ceramic Tile
09 31 33 Dimension Stone Tile
09 51 13 Acoustical Panel Ceilings
09 67 14 Concrete Sealing

09 67 23 Resinous Flooring System
09 68 10 Carpet Tile
09 68 16 Carpet
09 96 56 High Performance Coatings

DIVISION 10 – SPECIALTIES
10 21 26 Cubicle Curtain Tracks, I.V. Tracks, & Shower Curtain Carriers
10 28 13.02 Toilet and Bath Accessories
10 44 00 Fire Protection Specialties
10 51 13 Metal Lockers
10 99 00 Miscellaneous Specialties

DIVISION 11 – EQUIPMENT
11 24 23 Window Washing Systems
11 52 23 TV Hanger Assemblies
11 70 00 Medical Equipment
11 73 13 Patient Care Fixtures

DIVISION 12 – FURNISHINGS
12 32 16 Plastic Laminate Faced Manufactured Casework
12 46 19 Clocks
12 93 53 Prefinished Pipe Bollards

DIVISION 13 - SPECIAL CONSTRUCTION
13 49 00 Radiation Protection Physicist's Report

DIVISION 14 - CONVEYING SYSTEMS
14 21 13 Electric Traction Elevators
14 92 00 Pneumatic Tube Systems

DIVISION 31 - EARTHWORK
31 31 16 Termite Control

DIVISION 32 - EXTERIOR IMPROVEMENTS
32 17 14 Concrete Parking Bumpers

DIVISION 33 – UTILITIES
33 46 13 Subdrainage

The following Specification Sections have been prepared by or under the direct supervision of the Civil Engineer:

CIVIL ENGINEER

MARTIN/MARTIN INC.
12499 West Colfax Avenue
Lakewood, Colorado 80215

SPECIFICATIONS

DIVISION 03 - CONCRETE

03 30 53 Miscellaneous Cast-In-Place Concrete (Other Than Pavement)

DIVISION 31 - EARTHWORK

31 10 00 Site Clearing
31 20 00 Earth Moving
31 23 33 Trenching and Backfilling
31 25 00 Temporary Erosion and Sedimentation Control

DIVISION 32 – EXTERIOR IMPROVEMENTS

32 12 16 Asphalt Paving
32 13 13 Concrete Paving
32 13 63 Pavement Markings
32 13 73 Concrete Paving Joint Sealants

DIVISION 33 – UTILITIES

33 11 00 Water Utility Distribution Piping
33 31 00 Sanitary Utility Sewerage Piping
33 41 00 Storm Utility Drainage Piping



The following Specification Sections have been prepared by or under the direct supervision of the Structural Engineer:

STRUCTURAL ENGINEER

TRC International, Ltd.
5050 Quorum Drive, Suite 700
Dallas, TX 75254

SPECIFICATIONS

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DIVISION 3 - CONCRETE
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03 20 00 Concrete Reinforcing
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DIVISION 4 – MASONRY
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DIVISION 5 - METALS
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05 31 00 Steel Decking
05 40 00 Cold-Formed Metal Framing
05 50 00 Metal Fabrications
05 51 00 Metal Stairs

DIVISION 31 – EARTHWORK
31 23 16 Excavation
31 63 29 Drilled Concrete Piers and Shafts



The following Specification Sections have been prepared by or under the direct supervision of the Mechanical / Electrical Engineer:

MECHANICAL / ELECTRICAL ENGINEERS
ccrd partners
3625 N. Hall Street
Suite 1300
Dallas, Texas 75219



SPECIFICATIONS

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DIVISION 22 - PLUMBING
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22 05 23 General-Duty Valves For Plumbing Piping
22 05 29 Hangers And Supports For Plumbing Piping And Equipment
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22 07 00 Plumbing Insulation
22 11 13 Facility Water Distribution Piping
22 11 16 Domestic Water Piping
22 11 19 Domestic Water Piping Specialties
22 11 23 Domestic Water Pumps
22 11 23.13 Domestic Water Packaged Booster Pumps
22 13 16 Sanitary Waste And Vent Piping
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22 31 00 Domestic Water Softeners
22 35 00 Domestic Water Heat Exchangers
22 40 00 Plumbing Fixtures
22 61 13 Compressed-Air Piping For Healthcare Facilities
22 61 19 Compressed-Air Equipment for Healthcare Facilities
22 62 13 Vacuum Piping for Healthcare Facilities
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23 53 13 Boiler Feedwater Pumps
23 53 16 Deaerators

23 57 00 Heat Exchangers for HVAC
23 64 16 Centrifugal Water Chillers
23 65 00 Cooling Towers
23 73 13 Variable Aspect Indoor Central-Station Air-Handling Units
23 82 39 Unit Heaters

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27 52 23 Nurse Call and Code Blue System
27 60 00 In-Building Radio Coverage System

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Division 00

Procurement and Contracting Requirements

23H05

DOCUMENT 00 26 00

PROCUREMENT SUBSTITUTION REQUEST

1.1 SUBSTITUTIONS DURING BIDDING PERIOD

A. Bids shall be submitted only on the basis of materials, products, and equipment specified in the Specifications, indicated on the Drawings, or as named by Addenda pursuant to approval of Requests for Substitution.

B. Materials, products, and equipment included in the Bidding Documents are specified for the purpose of establishing a minimum standard of quality, cost, appearance, design, and function. It is not the intent to limit the acceptance of materials, products or equipment specified, but rather to name or describe a material, product or piece of equipment as the absolute minimum standard that is desired and acceptable. Where proprietary names are used, whether or not followed by the words "or acceptable substitution," requests for substitution will nevertheless be considered if properly submitted to and received by the Architect prior to the designated date.

C. If any Bidder wishes to substitute equipment or materials, which is believed to be equal to those specified, the Bidder shall make a request in writing to the Architect for approval of such substitute equipment or materials at least seven (7) calendar days prior to the date for receipt of Bids, following the rules stated herein. If the Architect should approve of such substitute equipment or materials, an Addendum evidencing such approval will be promulgated by the Architect and issued to all prospective Prime Bidders of whom the Architect has a record.

D. All requests for substitutions shall be accompanied by manufacturer's product data, specifications, drawings, catalog cuts, samples, installation instructions, performance data, list of projects completed of similar size and scope, and other references and information necessary to completely describe the item, and to facilitate a thorough and complete review by the Architect. Requests not meeting all these requirements may be rejected without evaluation.

E. The Substitution Request Form included as an attachment to this Document shall be used for all Substitution requests. Failure to use the attached Substitution Request form, or the failure of the Bidder to fully execute the form as required, will result in rejection of the proposed substitution request without review.

F. Manufacturers, manufacturer's representatives, dealers, distributors, suppliers, and subcontractors shall not direct or make requests to substitute equipment or materials. All requests shall originate from a Prime Bidder.

G. Substitutions shall be submitted to the Architect only; no substitutions shall be submitted directly to any consultant, the Owner, or any of the Owner's consultants.

1.2 SUBSTITUTIONS AFTER AWARD OF CONTRACT

A. Comply with provisions of Section 01 25 00. Contractor shall execute the Substitution Request Form attached thereto.

SUBSTITUTION REQUEST FORM

PROJECT: _____ **(Procurement Period)**

TO: Perkins+Will
10100 North Central Expressway, Suite 300
Dallas, TX 75231

FROM: _____

_____

NO. P+W _____

DATE: _____

Bidder hereby requests acceptance of the following product or system as a substitution in accordance with provisions of the Document 00 21 13 - Instructions to Bidders, and Section 01 25 00:

1. SPECIFIED PRODUCT OR SYSTEM

Substitution request for: _____

Specification Section No.: _____ Article: _____

2. SUPPORTING DATA

☐ Product data for proposed substitution is attached (description of product, reference standards, performance and test data).

☐ Sample is attached. ☐ Sample will be sent if requested.

3. QUALITY COMPARISON

	SPECIFIED PRODUCT	SUBSTITUTION
Name, Brand:	_____	_____
Catalog No.:	_____	_____
Manufacturer:	_____	_____
Vendor:	_____	_____
Variations:	_____	_____
	_____	_____
	_____	_____

(Add Additional Sheets If Necessary)

Maintenance Service Available: ☐ Yes ☐ No

Spare Parts Source: _____

Warranty: ☐ Yes ☐ No _____ Years

4. PREVIOUS INSTALLATIONS

Identification of similar projects on which proposed substitution was used:

Project:: _____ Project: _____

Address: _____ Address: _____

_____ _____

Architect: _____ Architect: _____

Owner: _____ Owner: _____

Date Installed: _____ Date Installed: _____

5. REASON FOR NOT GIVING PRIORITY TO SPECIFIED ITEM

_____

_____

6. EFFECT OF SUBSTITUTION

Proposed substitution affects other work or trades: ☐ No ☐ Yes (if yes, explain)

_____

_____

_____

Substitution requires dimensional revisions or redesign of structural, M/E/P, or other work:

☐ No ☐ Yes (if yes, attach data explaining revisions)

7. BIDDER'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS

I/we have investigated the proposed substitution. I/we:

A. believe that it is equal or superior in all respects to specified product, except as stated above;
B. will provide same warranty as specified for specified product;
C. have included complete cost data and implications of the substitution:
D. will pay redesign and special inspection costs caused by the use of this product;
E. will coordinate the incorporation of the proposed substitution into the Work;
F. waive future claims for added cost to Contract caused by the substitution.

Bidder: _____
(Name of prime bidding contractor)

Date: _____ By: _____

All questions must be answered and all blanks filled in. Enter "NA" if not applicable. Unresponsive or incomplete requests will be rejected and returned without review.

8. ARCHITECT'S REVIEW AND ACTION

☐ Resubmit substitution request:

☐ Provide more information in the following areas: _____

_____

_____

☐ Prime Bidder must sign Bidder's Statement of Conformance

☐ Substitution is accepted.

☐ Substitution is accepted, with the following comments: _____

_____

_____

☐ Substitution is not accepted.

☐ Substitution Request received too late.

Perkins+Will

By:_____ Date:_____

Perkins+Will has relied upon the information provided by the Bidder, and makes no claim as to the accuracy, completeness, or validity of such information. If an accepted substitution is later found to be not in compliance with the Bidding Documents or Contract Documents, Bidder / Contractor shall provide the specified product at no additional cost to Owner.

END OF DOCUMENT

23H05

DOCUMENT 00 31 32

GEOTECHNICAL DATA

1.1 SUMMARY

A. This document includes information pertaining to geotechnical data.

1.2 INVESTIGATION

A. Investigations of subsurface soil conditions at the building site were authorized by the Owner, and were subsequently performed by Kleinfelder, Inc. Reports are as follows:
   1. Geotechnical Investigation Report for Tower: "Final Geotechnical Investigation, Bed Tower Addition, Medical Center of Aurora, Aurora, Colorado," File No. 66295-1, dated April 17, 2006.
   2. Geotechnical Investigation Report for Paving: "Pavement Thickness Design, Parking Renovation, and Fire Lane/Access Drive, Medical Center of Aurora, Aurora, Colorado," File No. 66295-1, dated May 19, 2006.

B. The Geotechnical Investigation Reports bound herein are for Bidder's convenience and information only, and are not a warranty of subsurface conditions.

C. The complete text of the Reports may also be examined by qualified Bidders at the office of the Architect, and where documents are on file for bidding purposes.

D. The Reports are made available for Bidder's information only, and are not Contract Documents.

E. The information contained in the Reports represents design criteria, recommendations, and guidelines that were utilized as the basis of design for the engineering of the earthwork operations, paving design, and foundation design indicated in the Contract Documents. No changes in this design criteria will be considered or permitted.

1.3 RESPONSIBILITY

A. Bidders are expected to examine the site and subsurface investigation reports and then decide for themselves the character of the materials to be encountered.

B. The Architect and Owner assume no responsibility for variations in subsoil conditions, quality, or stability, or for the presence, level, and extent of underground water.

C. The Architect and Owner assume no responsibility for Bidder's interpretation of data contained in the Reports.

END OF DOCUMENT

KLEINFELDER

FINAL GEOTECHNICAL INVESTIGATION
BED TOWER ADDITION
MEDICAL CENTER OF AURORA
AURORA, COLORADO

April 17, 2006

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KLEINFELDER
An employee owned company

April 17, 2006
File 66295-1

Mr. Rodney Allen
HCA Management Services, L.P.
P.O. Box 550 (37202-0550)
Nashville, TN 37203

Subject: **Final Geotechnical Investigation**
Bed Tower Addition
Medical Center of Aurora
Aurora, Colorado

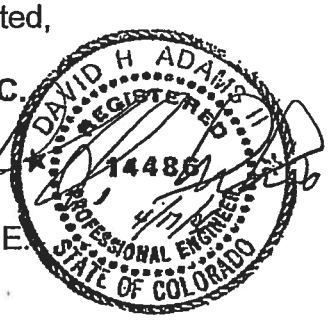
Dear Mr. Allen:

Kleinfelder is pleased to present the results of our geotechnical investigation for the proposed Bed Tower addition for the Medical Center of Aurora in Aurora, Colorado. Our work consisted of subsurface exploration, laboratory testing, engineering analyses and preparation of this report.

We appreciate this opportunity to be of service to you, and look forward to future endeavors. If you have any questions regarding this report or need additional information or services, please feel free to contact the undersigned in our office.

Respectfully submitted,

KLEINFELDER, INC.



David H. Adams, P.E.
Senior Professional

Rev. By: DLH

DHA/xr
Enclosures

Cc: Perkins + Will (3 copies)

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KLEINFELDER 611 Corporate Circle, Suite C, Golden, CO 80401 (303) 237-6601 (303) 237-6602 fax

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APPENDICES
A Vicinity Map and Boring Location Plan
B Logs of Exploration Borings
C Laboratory Test Results

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1 INTRODUCTION

1.1 GENERAL

This report presents the results of a geotechnical investigation performed for a Bed Tower addition to the Medical Center of Aurora located at 1501 S. Potomac Street in Aurora, Colorado. An attached Vicinity Map (Figure A-1) shows the location of the project. Our investigation was performed for HCA Management Services, L.P., and was authorized by Mr. Rodney Allen.

The report includes our recommendations relating to the geotechnical aspects of project design and construction. The conclusions and recommendations stated in this report are based on the subsurface conditions found at the locations of our exploratory borings at the time our exploration was performed. They also are subject to the provisions stated in the report sections titled **Additional Services** and **Limitations**. Our findings, conclusions, and recommendations should not be extrapolated to other areas or used for other projects without our prior review. Furthermore, they should not be used if the site has been altered, or if a prolonged period has elapsed since the date of the report, without Kleinfelder's prior review to determine if these recommendations remain valid.

1.2 PROJECT DESCRIPTION

The Bed Tower addition includes a 27,000 square foot addition footprint on the ground level and four to six additional levels consisting of 21,000 square feet each for patient unit floors. The addition will be constructed on the north side of the existing hospital building in an area currently occupied by a parking lot and access drive. It will connect to the existing hospital with a four-level connector wing. We understand the building will be steel frame. Column loads in the tower will vary from approximately 500 to 750 kips and the connector will be about 200 kips. The one-story portion of the addition will have maximum column loads of 50 kips. The building will have a ground floor elevation near the existing grade.

The four-level connector will extend over a portion of the existing hospital. Column foundations will penetrate the existing structure. Construction access and working

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2 FIELD EXPLORATION AND LABORATORY TESTING

2.1 FIELD EXPLORATION

A field exploration performed on February 27, 2006 included drilling six exploratory borings at the locations indicated on the Boring Location Plan (Figure A-2) to the maximum depth drilled, 60 feet. The borings were advanced using a truck-mounted Boart-66 drill rig equipped with 4-inch diameter continuous-flight, solid-stem auger. Relatively undisturbed drive samples were obtained during exploration using a modified California sampler (2.5-inch I.D.) driven into the strata with blows from a 140-pound hammer falling through a 30-inch drop in accordance with local practice. The blows required to drive the sampler six inches were recorded. This blow count is an indication of the relative density or consistency of the strata.

Appendix B to this report includes logs describing the subsurface conditions. A legend to the boring logs and summary of the Unified Soil Classification System used to describe the soils is presented at the front of the appendix. The lines defining boundaries between soil and bedrock types on the logs are based on drill behavior and interpolation between samples, and are therefore approximate. Transition between soil types and bedrock may be abrupt or may be gradual.

2.2 LABORATORY TESTING

Laboratory tests were performed on selected soil samples to estimate their relative engineering properties. Tests performed included:

Description and Identification of Soils (Visual-Manual Procedure)
Classification of Soils for Engineering Purposes
Moisture Determination and Unit Weight
Particle Size Gradation Analysis
Unconfined Compressive Strength
One-Dimensional Swell-Settlement
Water Soluble Sulfate Concentration

Results of the laboratory tests are included in Appendix C of this report. Selected test results are also shown on the boring logs.

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3.3.2 Sand

Clean to silty sand was encountered beneath the pavement section or fill in each of the borings extending to depths of 35 to 40 feet. The sands were fine grained and had a loose to medium dense relative density based on sampler penetration resistance tests. Particle size gradation characteristics of the sands are presented in Appendix C in Figures C-2 and C-3.

3.3.3 Clay

A clay layer about 13 to 14 feet thick was found below the sand in the three deeper borings at depths of 35 to 40 feet. The clay had a stiff consistency based on penetration resistance tests. An unconfined compression test indicated a strength of 5,190 psf.

3.3.4 Bedrock

Bedrock was encountered in Borings TB-1, TB-4, and TB-5 at depths varying from 48 to 53 feet below the existing ground surface. The bedrock was comprised of sandstone and claystone of the Denver formation. Sandstone was identified in the upper 5 to 9 feet of bedrock overlying claystone in two of the borings. Boring TB-4 did not encounter sandstone. The bedrock hardness was classified as hard using local designations. Penetration resistance blow counts varied from 50 blows to drive the sampler 5 or 6 inches.

3.3.5 Groundwater

Groundwater was found in five of the six borings at depths of about 30 feet during drilling. Due to the high traffic areas the borings were backfilled and patched upon completion and additional groundwater monitoring was not possible. It appears the groundwater level will be within the lower granular soils perched above the clay layer.

Soil moisture levels and groundwater levels commonly vary over time depending upon seasonal precipitation, irrigation practices, land use, and runoff conditions. Accordingly, the soil moisture and groundwater data in this report pertain only to the locations and times at which exploration was performed.

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safety, is the sole responsibility of the Contractor as part of its overall responsibility for the means, methods, and sequencing of construction operations. Kleinfelder's recommendations for excavation support are intended for the Client's use in planning the project, and in no way relieve the Contractor of its responsibility to construct, support, and maintain safe slopes. Under no circumstances should the following recommendations be interpreted to mean that Kleinfelder is assuming responsibility for either construction site safety or the Contractor's activities.

We believe that the fill and clean to silty sand soils on this site will classify as Type C material using OSHA criteria. OSHA requires that temporary, unsupported cuts be laid back to ratios no steeper than 1½:1 (horizontal to vertical) for Type C material. In general, we believe that these slope ratios will be temporarily stable under unsaturated conditions. If groundwater seepage was to occur, flatter slopes may be appropriate. Please note that an OSHA-qualified "competent person" must make the actual determination of soil and rock type and allowable sloping in the field.

4.2.2 Site Preparation

All site preparation and earthwork operations should be performed in accordance with applicable codes, safety regulations and other Local, State or Federal guidelines. All references to maximum dry density values are referencing ASTM D698 standard Proctor.

Initial site work should consist of removal of the existing asphalt pavement and any loose existing fill. The asphalt pavement varied from 4 to 6 inches thick and aggregate base course was found in some of the borings as shown on the boring logs in Appendix B.

4.2.3 Compacted Fill

The native granular soils and existing fill materials are suitable for use as compacted fill anywhere on the site. Compacted fill should be placed in horizontal lifts compatible with the type of compaction equipment being used, moisture conditioned to within 2 percent of optimum moisture content and compacted to at least 95 percent of maximum standard Proctor dry density. Imported material, if necessary, should be granular, non-expansive material having less than 40 percent passing the No. 200 sieve and a liquid limit less

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throughout the project to evaluate such differing conditions as they appear, and to modify or add to the geotechnical recommendations as necessary.

4.2.7 Drainage and Landscaping

Grade the ground surface around the structure so that surface water will quickly flow away from the building and any adjacent buildings. Paved areas such as sidewalks and approach slabs within 5 feet of the building should have minimum gradients of 2 percent away from the building, while landscaped areas should have minimum gradients of 5 percent. Carry the downspouts from roof drains across all backfilled areas so that they discharge well clear of the backfill zone and structure. Water should drain away from structure as rapidly as possible and not be allowed to stand or pond near the building.

4.3 FOUNDATIONS

4.3.1 Foundation Type

After evaluation of the subsoil conditions and consideration of the proposed construction, we recommend the multi-story portions of the addition be founded with straight-shaft piers drilled into the underlying bedrock. Our evaluation is based on the low strength of the overburden soils, the type of structure, building loads, construction costs and our experience with similar projects in the Denver area.

The one-story portion of the addition may be founded with spread footings bearing on the native sands or compacted fill. Generally, it is preferred that a common foundation system be used for the entire addition; however, the upper sands are capable of supporting one-story building loads and we believe foundation costs could be reduced by using spread footings for this portion of the addition. Settlement may be differential between the two foundation types and a structural joint in recommended.

Two options appear feasible for the bridge that connects the upper floors. Spread footings may be considered. In order to maximize the allowable bearing capacity and minimize the excavation, the supporting soils would require improvement. This could be accomplished with chemical grouting of the supporting sands to allow use of 3,500 psf allowable bearing pressure. Footings would be about 7.5 feet square under this pressure. Chemical grouting can be performed in confined space and while facilities remain open. The grouted area should extend about 10 feet below the footings and 10

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similar properly constructed pier foundations, we estimate that pier settlement under the above design pressures may be on the order of ½-inch. Actual settlements measured both in pier load tests and on existing buildings suggest that settlements will be small.

4.3.2.3 Lateral Load

Seismic and wind induced loadings will be a consideration for a building of this size. Lateral loads will be resisted by the drilled pier foundation system and any foundation walls. The stiffness of the pier and the stress-strain properties of the surrounding soils determine the lateral resistance of the pier system. For beam on elastic foundation analysis, we recommend a modulus of horizontal subgrade reaction of 30 tcf for the overburden soils and 300 tcf for the bedrock be used. This modulus value is for a long one-foot diameter drilled pier and must be corrected for pier size. For example, a 24-inch diameter pier would use a modulus of 15 tcf for design in the overburden soils and 150 tcf in the bedrock. For L-Pile analysis the following parameters may be used.

PARAMETER	SAND (Above Water)	SAND (below water)	CLAY	BEDROCK
Unit Weight (pcf)	115	53	120	120
Cohesion (psf)	0	0	2,000	4,000
Friction Angle	30	30	0	0
k_s (pci)	60	40	500	2,000
k_c (pci)	60	40	200	800
E50	-	-	0.007	0.004

4.3.2.4 Pier Construction

We recommend the pier-drilling contractor be familiar and experienced with pier drilling operations in this area, especially large diameter piers requiring casing. A high capacity drill rig will be required to reach the design bedrock penetration and pier lengths. The construction criteria presented below should be observed for a straight-shaft drilled pier foundation system. The construction details should be considered when preparing project documents.

- Bedrock penetration in all pier holes should be provided with horizontal shear rings to assist the development of peripheral shear stress between the drilled pier and the bedrock. Shear rings should be installed with a grooving tool on

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4.3.3 Spread Footings

The one-story portion of the addition may also be founded on drilled piers; however, spread footings bearing on the native sands or compacted fill may be considered as an alternative. The existing fill encountered along the west end of the addition footprint should be removed and replaced compacted as outlined in Section 4.2.3. The design and construction criteria presented below should be observed for a spread footing foundation system. The construction details should be considered when preparing project documents.

- Footings bearing on native soils or compacted fill may be designed for a maximum allowable bearing pressure of 2,000 psf. The allowable bearing pressure may be increased by one-third for transient loading.
- Added option for 2,500 on 3-foot fill.
- If a higher allowable bearing capacity is desirable, the bearing capacity may be increased to 2,500 psf by placing footings on 3 feet of fill compacted to at least 100 percent of the standard Proctor density. The existing soils should be removed and replaced compacted.
- Any compacted fill placed below footings should extend beyond the horizontal limits of the footings 1 foot for each foot in depth of compacted fill.
- Continuous footings should have a width of at least 16 inches and isolated footing pads should be at least 24 inches in width.
- Lateral loads may be resisted using a coefficient of friction for sliding of 0.35 and a passive earth pressure of 300 pcf.
- We estimate total settlement for footings will be less than one-inch and differential settlement across the one-story portion of the addition should be less than ¾-inch; however, any settlement will be differential with respect to connections to the existing structure and a structural joint is recommended. In addition, a structural joint is recommended between the portions of the structure founded on drilled piers since the settlement between foundation types may be differential.
- Continuous foundation walls should be reinforced to span an unsupported length of at least 10 feet.
- Exterior footings or footings in unheated areas should have at least 36 inches of cover above the bearing elevation for frost protection.

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5 ADDITIONAL SERVICES

5.1 REQUIREMENTS FOR ADDITIONAL SERVICES

In most cases, other services beyond completion of a geotechnical report are necessary or desirable to complete a project satisfactorily. It also sometimes happens that, while performing our services, we discover conditions or circumstances that require the performance of additional work that was not anticipated when the geotechnical report was written. Kleinfelder offers a range of environmental, geological, geotechnical, and construction services to suit the varying needs of our clients. This section outlines some of those services that may pertain to this project. Kleinfelder will be happy to submit a proposal for performing any such services upon request.

5.2 REVIEW OF PLANS AND SPECIFICATIONS

We strongly recommend that Kleinfelder be given an opportunity to review the plans and specifications for this project before they are finalized. Such a review allows us to verify that our recommendations and concerns have been adequately incorporated in the design. It also gives us an opportunity to discuss those recommendations and concerns with other members of the design team so that we can clear up misunderstandings or ambiguities before the project reaches the construction stage.

5.3 PREBID AND PRECONSTRUCTION MEETINGS

Subcontractors often contact us during the bidding process to discuss the geotechnical aspects of projects. Informal contacts between Kleinfelder and individual subcontractors can result in incorrect or incomplete information being provided to the subcontractor. Therefore, we recommend that a prebid meeting be held to answer any questions about the report prior to submittal of bids. If this is not possible, questions or requests for clarifications regarding this report should be directed to the Owner or his designated representative. After consultation with Kleinfelder, the Owner (or his representative) should provide clarifications or additional information to all subcontractors bidding the job.

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6 LIMITATIONS

The recommendations in this report are based on our field observations, laboratory testing, and our present understanding of the proposed construction. It is possible that subsurface conditions can vary between or beyond the points explored. If the conditions found during construction differ from those described in this report, please notify us immediately so that we can review our report in light of those conditions and provide supplemental recommendations as necessary. We should also review the report if the scope of the proposed construction, including the proposed loads or structure locations, changes from that described in this report.

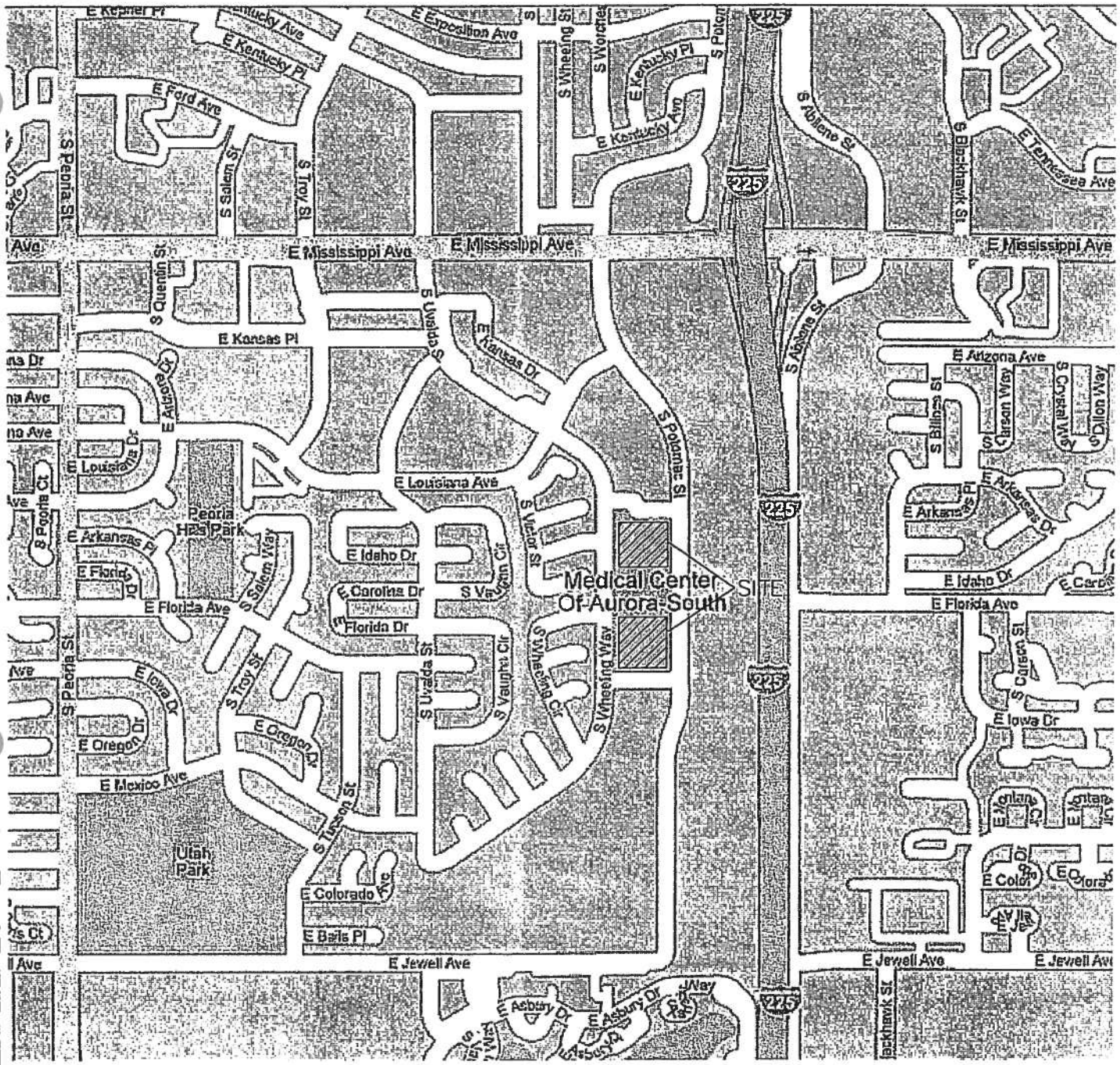
Kleinfelder has prepared this report for the exclusive use of HCA Management Services, L.P. for the Bed Tower addition at the Medical Center of Aurora in Aurora, Colorado. The report was prepared in substantial accordance with the generally accepted standards of practice for geotechnical engineering as exist in the site area at the time of our investigation. No warranty is expressed or implied. The recommendations in this report are based on the assumption that Kleinfelder will conduct an adequate program of construction testing and observation to evaluate compliance with our recommendations.

This report may be used only by the Client, and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on- and off-site), or other factors may change over time, so that additional investigation or revision of our recommendations may be required with the passage of time. It is the Client's responsibility to see that all parties to the project including the designer, contractor, and subcontractors, are made aware of this report in its entirety. The use of information contained in this report for bidding purposes shall be at the Contractor's option and risk. Any party other than the Client who wishes to use this report must notify Kleinfelder of such intended use. Based on that intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Noncompliance with these requirements by the Client or anyone else will release Kleinfelder from any liability resulting from the use of this report by an unauthorized party.

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APPENDIX A

Vicinity Map and Boring Location Plan



MAP REPRODUCED FROM GOOGLE - MAP DATA ©2006

NOT TO SCALE

KLEINFELDER
An employee owned company

Checked By: D. Adams	Drafted By: J. Edwards
Project Number: 66295	Date: March 20, 2006

VICINITY MAP

MEDICAL CENTER OF AURORA
AURORA, COLORADO

Figure
A-1

APPENDIX B

Logs of Exploratory Borings

LEGEND OF SYMBOLS USED ON BORING LOGS

LOG SYMBOLS

- BULK / GRAB SAMPLE
- MODIFIED CALIFORNIA SAMPLER (2.5 inch inside diameter)
- STANDARD PENETRATION SPLIT SPOON SAMPLER (2.0-inch O.D. X 1.4-inch I.D.)
- SHELBY TUBE (3 inch outside diameter)
- BDBGM SIZE CORE BARREL (1.65-inch I.D.)
- BW44 SIZE CORE BARREL (1.875-inch I.D.)
- HQ-3 SIZE CORE BARREL (2.4-inch I.D.)
- WATER LEVEL (level where first encountered)
- WATER LEVEL (level after completion)

GENERAL NOTES

1. Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.
2. No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
3. Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
4. In general, Unified Soil Classification designations presented on the logs were based on visual classification in the field and were modified where appropriate by visual classifications in the office, and/or laboratory gradation and index property testing.
5. NV = No Value; NA = Not Analyzed; NP = No Plasticity
6. Exp = percent expansion under defined surcharge pressure.
7. Com = Percent compression under defined surcharge pressure.
8. 50/X indicates number of blows required to drive the indentified sampler X inches with a 140 lb hammer falling 30 inches.

USCS SYMBOL	SOIL DESCRIPTIONS
GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
ML	INORGANIC SILTS & VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
---	CLAYSTONE
--	INTERBEDDED SANDSTONE/CLAYSTONE
---	SANDSTONE
--	SILTSTONE
---	FILL

Note: Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.

KLEINFELDER

Drafted By: *	Project Number: *
Date: *	

BORING LOG LEGEND

*

*

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▽): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	60.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Asphaltic Concrete											
			6" Asphalt 4" Road Base SAND (SP-SM): clean to silty, loose to medium dense, moist to wet, light brown, fine to medium grained		7 9	MCAL		106	4.9			100	8	
	10				8 8	MCAL								
	20				16 11	MCAL		118	10.5					
	30		▽											
	35		CLAY (CL): sandy, stiff, wet, brown											
	40				8 10	MCAL		96	27.5					Unc = 5190 psf
	50		SANDSTONE: hard, moist, brown, weakly cemented											
	55				50/5	MCAL		99	23.9					
	60		CLAYSTONE: hard, moist, olive-brown		50/5	MCAL		97	26.2					Exp = 0.6%
	65													

KLEINFELDER

Drafted By: R. Reyes
Date: March, 2006
Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING
TB 1
Page 1 of 1

ENVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▽): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	30.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Asphaltic Concrete											
	0		4" Asphalt 2" Road Base SAND (SP-SM): clean to silty, loose to medium dense, moist, light brown											
	5				5 8	MCAL								
	10				5 8	MCAL		100	8.1				11	
	15													
	20				10 11	MCAL								
	25													
	30				10 11	MCAL		109	17.0					
	35													
	40													
	45													
	50													
	55													
	60													
	65													

KLEINFELDER

Drafted By: R. Reyes
Date: March, 2006
Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING
TB 2

ORA MEDICAL CENTER.GPJ 3/20/2006
ENVER_GEO 66295

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▽): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	30.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Asphaltic Concrete											
			5" Asphalt 3" Road Base SAND (SP-SM): clean to silty, loose to medium dense, moist to wet, light brown		7 9	MCAL		100	2.4				5	
	10				10 13	MCAL								
	15				13 16	MCAL		107	8.8				7	
	30				17 19	MCAL								

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Drafted By: R. Reyes | Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING TB 3

Page 1 of 1

...NVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▼): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	61.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Asphaltic Concrete											
	0		5.5" Asphalt											
			SAND (SP-SM): clean to silty, loose to medium dense, moist to wet, light brown		8 9	MCAL		103	4.0					
	10				8 10	MCAL								
	15				7 8	MCAL								
	20													
	25				18 22	MCAL		106	5.4			100	12	
	30		▼											
	35													
			CLAY (CL): sandy, stiff, moist to wet, brown		7 8	MCAL								
	45													
	50		CLAYSTONE: hard, moist, olive-brown											
	55													
	60				50/5	MCAL								
	65													

KLEINFELDER

Drafted By: R. Reyes
Date: March 2006
Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING
TB 4
Page 1 of 1

ENVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	Initial (▼): 30.0 feet while drilling.			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	60.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Grass											
	0		FILL: sand, clean to silty, medium dense, moist, brown to dark brown											
	5				50/11	MCAL								
			SAND (SP-SM): clean to silty, medium dense, moist to wet, light brown											
	10													
	15				9 11	MCAL		106	7.5					
	20													
	25				21 21	MCAL			8.4				6	
	30		▼											
	35													
	40		CLAY (CL): sandy, stiff, moist to wet, brown											
	45													
	50													
	55		SANDSTONE: hard, very moist, brown, weakly cemented		50/5	MCAL								
			CLAYSTONE: hard, moist, brown-grey		50/6	MCAL		94	26.3					
	60													
	65													

KLEINFELDER

Drafted By: R. Reyes
Date: March, 2006
Project Number: 66295

BORING LOG

Medical Center of Aurora
Aurora, Colorado

BORING
TB 5
Page 1 of 1

ENVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

Location:	See boring location plan			Date Started:	2/27/2006
Groundwater (ft):	No Free Groundwater Encountered			Date Completed:	2/27/2006
Drilling Company:	Dakota Drilling	Equipment:	CME-55	Logged By:	J. Edwards
Hole Diameter (in):	4	Drilling Method:	Solid Flight Auger		
Hammer Type:	Cathead			Total Depth (ft):	30.0

Elevation (feet)	Depth (feet)	Graphical Log	DESCRIPTION	FIELD: Sample Interval	FIELD: Blow Counts per 6" Interval	FIELD: Sample Type	FIELD: Continuous Penetration Resistance	LABORATORY: Dry Density (pcf)	LABORATORY: Moisture Content (%)	LABORATORY: Liquid Limit	LABORATORY: Plasticity Index	LABORATORY: Passing #4 Sieve (%)	LABORATORY: Passing #200 Sieve (%)	LABORATORY: Other Tests
			Surface Condition: Grass											
	5		FILL: sand, silty, dense, moist, dark brown to grey		30/6	MCAL		110	8.4				8	
	10		SAND (SP-SM): clean to silty, loose to medium dense, moist, brown to light brown		18 18	MCAL		105	5.2					
	20				8 8	MCAL								
	30				7 11	MCAL								
	35													
	40													
	45													
	50													
	55													
	60													
	65													

KLEINFELDER

Drafted By: R. Reyes | Project Number: 66295

Date: March 2006

BORING LOG

Medical Center of Aurora
Aurora, Colorado

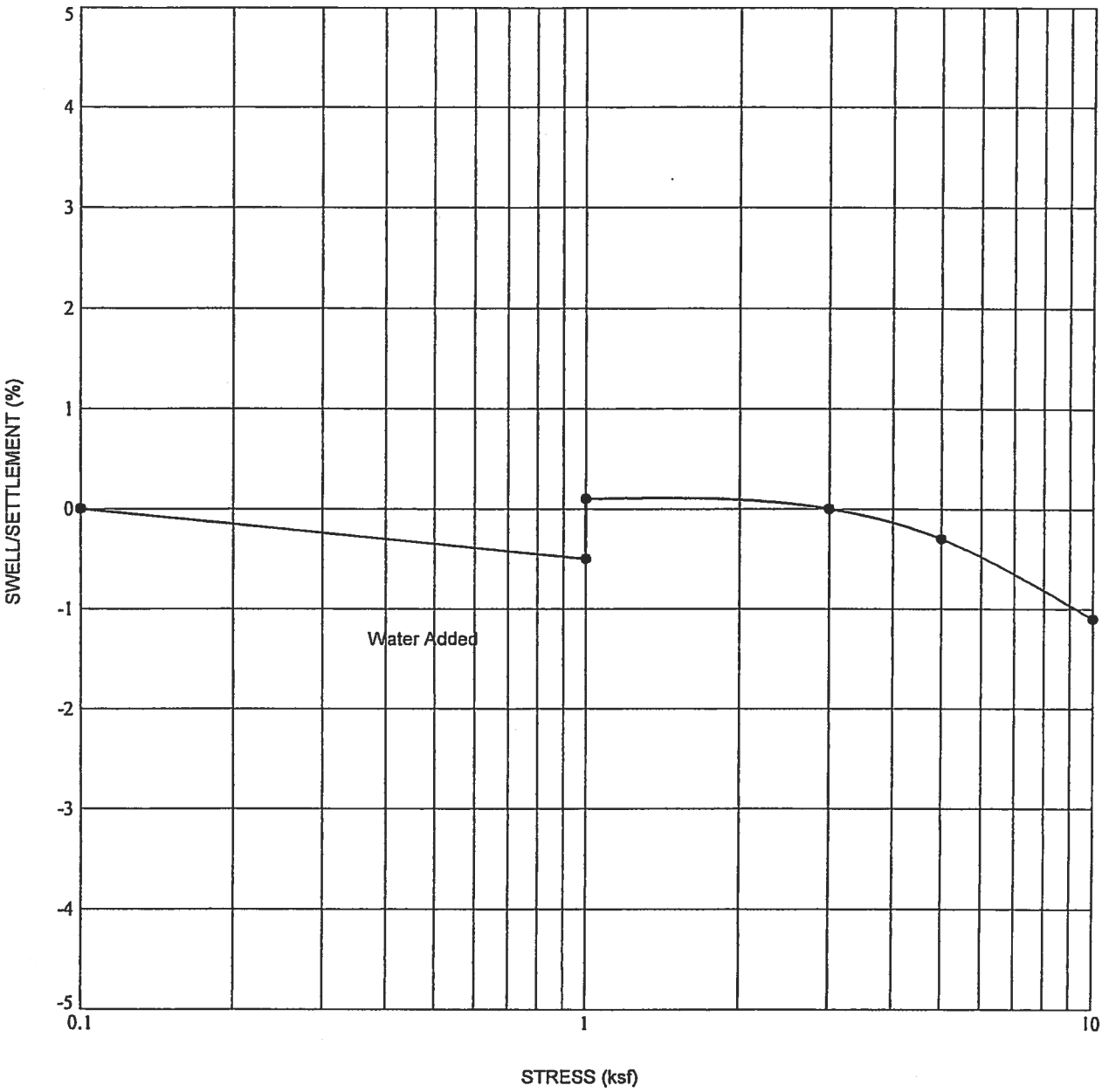
BORING

TB 6

ENVER_GEO 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006

APPENDIX C

Laboratory Test Results



	Before	After
SOURCE: TB 1	Total Unit Weight (pcf) =	122.2
At a depth of approximately 59.0 feet	Moisture Content (%) =	26.2
Exp = 0.6%	Dry Unit Weight (pcf) =	96.8
claystone		

KLEINFELDER

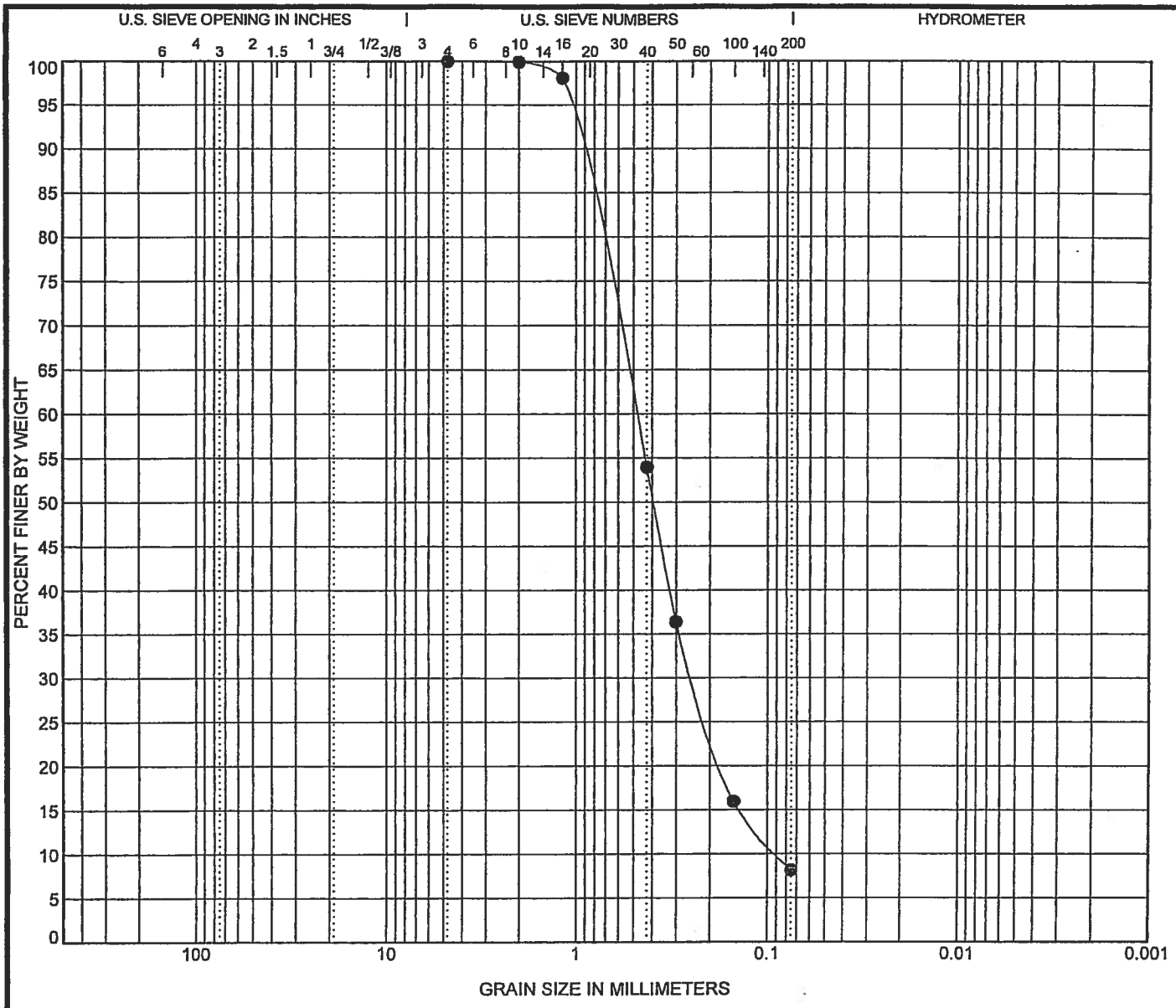
Drafted By: R. Reyes | Project Number:

SWELL/SETTLEMENT TEST

Medical Center of Aurora
Aurora, Colorado

Figure C-1

CONSOLID 66295 AURORA MEDICAL CENTER.GPJ 3/20/2006



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
TB 1	**4**					**1.35**	**5.52**

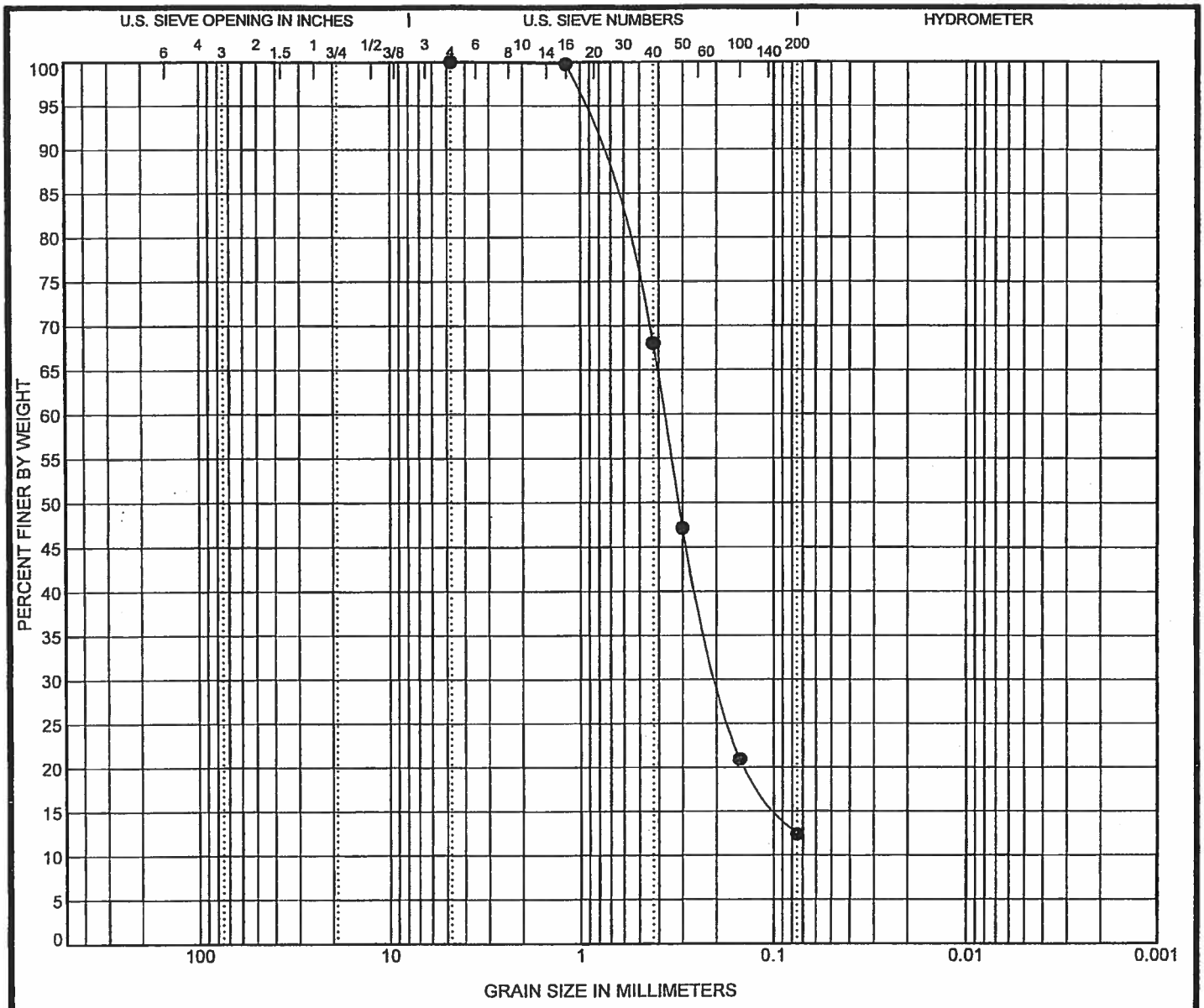
	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75	**0.489**	**0.242**	**0.089**	**0.0**	**91.9**	**8.1**	

Kleinfelder, Inc
611 Corporate Circle Suite C
Golden, CO 80401
Telephone: (303) 237-6601
Fax: (303) 237-6602

GRAIN SIZE DISTRIBUTION

Project: Medical Center of Aurora
Location: Aurora, Colorado
Number: 66295

Figure C-2



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	LL	PL	PI	Cc	Cu
TB 4	24					1.58	6.01

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75	0.372	0.191		0.0	87.6	12.4	

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GRAIN SIZE DISTRIBUTION

Project: Medical Center of Aurora
Location: Aurora, Colorado
Number: 66295

Figure C-3

Consultant: Kleinfelder, Inc.
611 Corporate Circle, Suite C
Golden, Colorado 80401
Phone No. 303-237-6601
Fax No. 303-237-6602
Contact: David Adams, P.E.

PAVEMENT THICKNESS DESIGN
PARKING RENOVATION
AND FIRE LANE/ACCESS DRIVE
MEDICAL CENTER OF AURORA
AURORA, COLORADO
AURORA FILE NO. _____

Owner: HCA-HealthONE, LLC
DBA The Medical Center of Aurora
2515 Park Plaza, Bldg II-3E
Nashville, TN 37203
Phone No. 615-344-5084
Fax No. 615-344-2770
Contact: Mr. Rodney Allen

Approved One Year From This Date

_____

_____ _____
City Engineer Date

May 19, 2006

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KLEINFELDER
An employee owned company

May 19, 2006
File: 66295-1

Mr. Rodney Allen
HCA Management Services, L.P.
P.O. Box 550 (37202-0550)
Nashville, TN 37203

Subject: **Pavement Thickness Design**
Parking Renovation and Fire Lane/Access Drive
Bed Tower Addition
Medical Center of Aurora
Aurora, Colorado
Aurora File No. _____

Dear Mr. Allen:

This report presents the results of a geotechnical investigation to provide recommendations for pavement thickness at the subject site. The site vicinity is shown on Figure A-1. The investigation was performed in accordance with the verbal authorization by Perkins + Will to proceed. Our work consisted of site reconnaissance, subsurface exploration, laboratory testing, engineering analyses, and preparation of this report.

It is planned to demolish an existing parking garage and construct an at grade parking lot as shown on Figure A-2. In addition, the fire lane/access drive at the front of the new bed tower addition and hospital entrance will be reconfigured. The preferred pavement section is flexible asphalt concrete. The City of Aurora pavement design procedures were followed for pavement design.

SITE CONDITIONS AND SUBGRADE MATERIAL

The area to be renovated and reconfigured is at or near the planned subgrade elevation. The ground surface was fairly level and the majority covered with asphalt or concrete pavement. Landscaping borders the existing parking garage.

Five exploratory borings were drilled within the expansion area to depths of between 5 and 10 feet at the locations shown on Figure A-2. Logs of the exploratory borings are presented in Appendix B and a legend of symbols and notes is shown at the beginning of the appendix. The subgrade materials encountered in our borings beneath about 6 inches of asphalt or 4 inches of concrete were slightly silty sand that extended to the full boring depth.

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KLEINFELDER 611 Corporate Circle, Suite C, Golden, CO 80401 (303) 237-6601 (303) 237-6602 fax

the asphalt concrete, in the automobile parking and fire lane/access drive areas, respectively.

Alternatively, a composite section consisting of aggregate base course and asphalt may be used. For the parking area, the section should consist of 3 inches asphalt over 6 inches aggregate base course and the section for the fire lane/access drive should be 3.5 inches asphalt over 7 inches base course.

The design nomograph for flexible pavements and thickness calculations are attached in Appendix D. All pavement materials should conform to the City of Aurora specifications for construction.

Subgrade Preparation: Prior to placing the pavement section, the subgrade should be scarified to a depth of 12 inches, adjusted to moisture content within 2 percent of optimum moisture content, and compacted to 95 percent of the maximum modified Proctor density.

The entire pavement subgrade should be proofrolled with a heavily loaded pneumatic-tired vehicle after preparation. Pavement design procedures assume a stable subgrade. Areas that deform under heavy wheel loads are not stable and should be removed and replaced to achieve a stable subgrade prior to paving.

Drainage: Collection of surface drainage is extremely important for satisfactory performance of the pavement. City of Aurora design specifications provide for positive collection of surface drainage on the roadways, however, the adjoining parcels must also provide for positive drainage and collection of surface waters. Areas which pond or collect water outside of the intended drainage ways, such as gutters or swales, must be regraded to reduce wetting of the subgrade soils.

LIMITATIONS

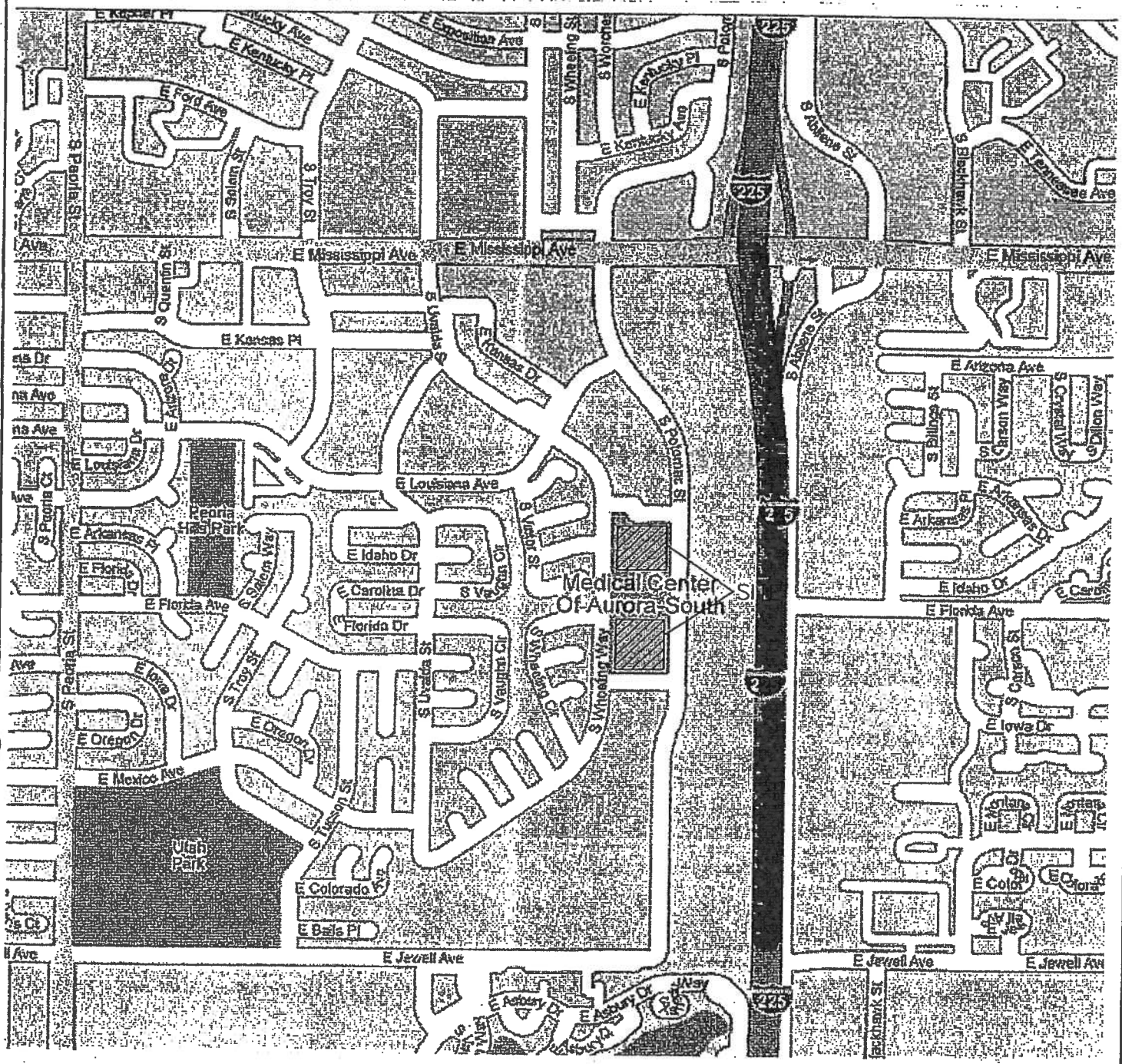
This report has been prepared in accordance with generally accepted geotechnical engineering principles and practices in this area at this time. We make no warranty either express or implied. The conclusions and recommendations submitted in this report are based upon the data obtained from the borings drilled at the locations shown on Figure A-2 and our site observations.

This report has been prepared for the exclusive use by our client for pavement thickness design purposes. We are not responsible for technical interpretations by others of our exploratory information that has not been described or documented in this report. As the project evolves, we should be retained to provide continued consultation and field services to review and monitor the implementation of our recommendations and to verify that the recommendations have been appropriately interpreted. We recommend on-site observation of pavement subgrade and testing of pavement materials by a representative of the geotechnical engineer.

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APPENDIX A

Vicinity Map and Boring Location Plan



MAP REPRODUCED FROM GOOGLE - MAP DATA ©2006

N

NOT TO SCALE

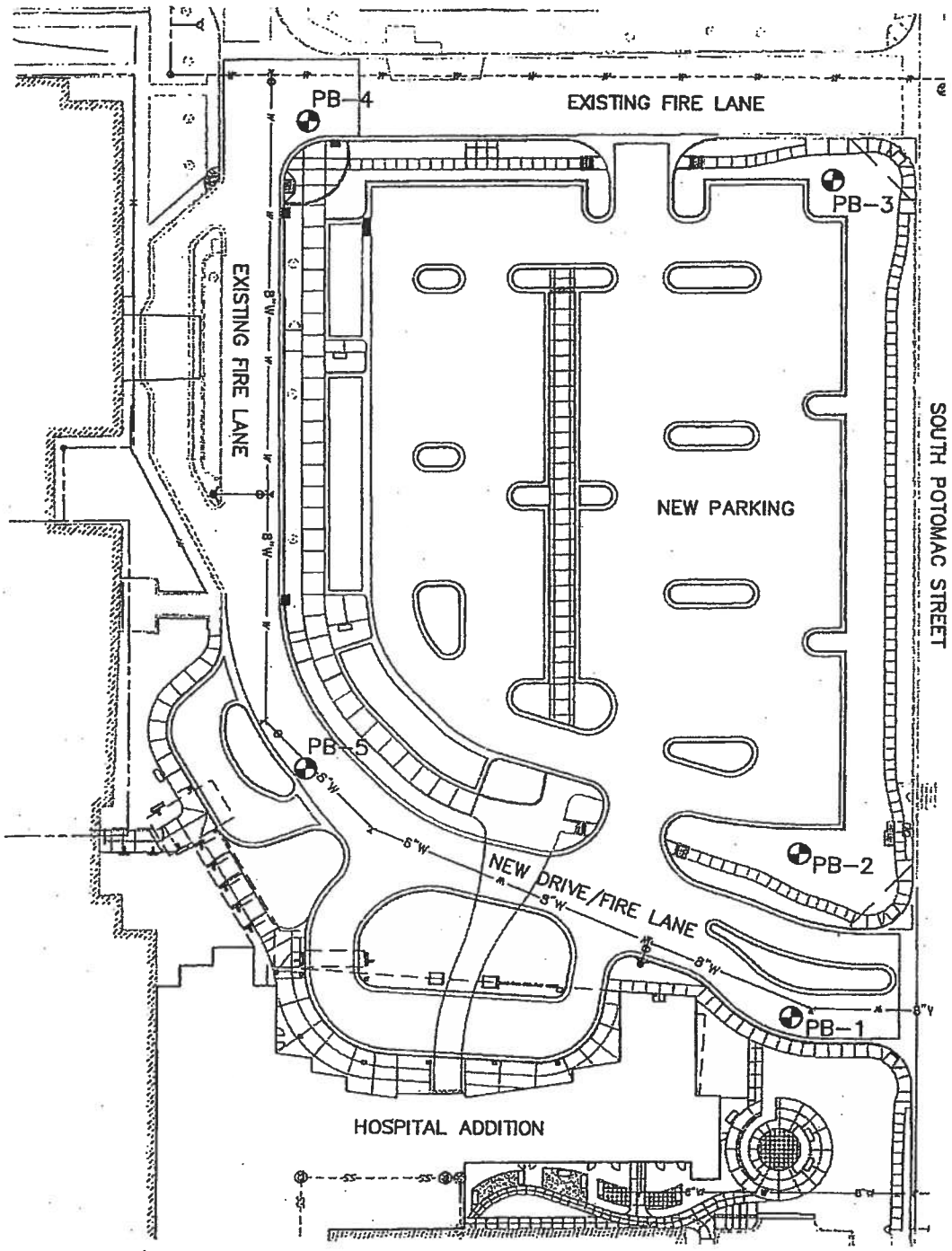
KLEINFELDER
An employee owned company

Checked By: D. Adams	Drafted By: J. Edwards
Project Number: 66295	Date: March 20, 2006

VICINITY MAP

MEDICAL CENTER OF AURORA
AURORA, COLORADO

Figure
A-1



PB–1 = PAVEMENT BORING

80 0 40 80

APPROXIMATE SCALE IN FEET

KLEINFELDER
An employee owned company

Checked By: D. Adams	Drafted By: J. Edwards
Project Number: 66295.1	Date: May 23, 2006

BORING LOCATION PLAN

MEDICAL CENTER OF AURORA
BED TOWER PARKING LOT EXPANSION
AURORA, COLORADO

Figure 2-A

APPENDIX B

Logs of Exploratory Borings

OWNER FURNISHED EQUIPMENT BROCHURE

Revision: August 9, 2006

The Medical Center Aurora

A02429 – Bed Tower Expansion

Aurora, CO

PROJECT # 306660001

Jimmy Cagle
MANAGER, MEDICAL EQUIPMENT
(615) 344-2179
Jimmy.Cagle@HCAHealthcare.com

Trisha Gutierrez
ASSISTANT, MEDICAL EQUIPMENT
(615) 344-2223
Trisha.Gutierrez@HCAHealthcare.com

HCA
The Healthcare Company.

Table of Contents

- Owner Furnished Equipment Index
- Specifications
- Project Information Sheet
- Owner Furnished/ Contractor Installed Equipment Delivery Schedule
- Owner/ Vendor Installed Equipment Delivery Schedule
- Engineered Systems Information and Telephone Systems Equipment Delivery Schedule
- Responsibility Matrix
- Vendor Contact Matrix

Owner Furnished/ Contractor Installed Equipment Notes

NOTE: Include date for special backboxes (such as OR Lights, Illuminators) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment, nurse call, ect.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor is required to store in secure environmentally controlled space and confirm with HCA Medical Equipment Manager.

NOTE: HCA required that the enclosed Owner Furnished/ Contractor Installed Equipment Delivery Schedule (excel), Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule form (word) to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed.

NOTE: No payments can be made, until receipt of the schedule(s) by the HCA Construction Manager.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:
HCA Equipment Manager
HCA Construction Manager
Hospital Construction Contact
Hospital Materials Manger

PROJECT INFORMATION SHEET

Project Title:_____ **Date of Issue:**_____
Owner Project:_____ **Revision Date:**_____
HOSPITAL:_____
ADDRESS:_____
TELEPHONE:_____ FAX:_____
ADMINISTRATOR:_____ CONTACT:_____
MATERIAL MGR:_____ PLANT MGR:_____
CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____
PROJECT MAILING ADDRESS:_____
E-MAIL ADDRESS:_____
ARCHITECT:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
INTERIOR DESIGN FIRM:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
M.P.E. ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
STRUCTURAL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
CIVIL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
MECHANICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
ELECTRICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
HCA
ONE PARK PLAZA, BLDG. 2 – 3E, NASHVILLE, TN 37203
P.O. BOX 550 (37202-0550)
TELEPHONE: 615-327-9551
DIRECTOR CONSTRUCTION:_____ PH:_____
CONSTRUCTION MANAGER:_____ PH:_____
EQUIPMENT ENG. SYS. MGR:_____ PH:_____
IS/TELECOM:_____ PH:_____

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

203200	FOLLETT CORPORATION	4	#110FB400A; ICE MAKER DISP.115/1 12.2A , SENSORSAFE DISPENSING PKG (#SENSORSAFE; $98.00), FR STANDING STG 24 1/2"W X 28.25"D X 68.125"H, 90 LBS STG, 400 LBS/DAY ICE PRODUCTION AIR COOLED. INCLUDES WATER STATION, WATER FILTER(NOT INCLUDED) **FLOOR DRAIN REQUIRED** 2--2099/1, 3--3073/1, 4--4099/1, 5--5099/1
203210	FOLLETT CORPORATION	5	#25CT400A; ICEMAKER DISPENSER, ($2,892.00) 21"W X 47.125"H X 23"D- COUNTERTOP, AIR COOLED, 25LB STORAGE CAPACITY, 400LB PER 24HR ICE PROD. TO INCL WATER STATION, SENSORSAFE DISPENSING (#SENSORSAFE; $98.00) 1--1085/1, 1--1112/1, 2--2082/1, 4--4082/1, 5--5082/1
430279	GENERAL ELECTRIC CO	14	#JEM25; MICROWAVE OVEN DIMENSIONS: 11 11/64"H X 23 25/32"W X 12 55/64"D. 120V - 60-CYCLE. CONTRACTOR TO SHELF MOUNT SELECT COLOR: BLACK - JEM25BF OR WHITE JEM25WF. 1--1040/1, 1--1085/1, 1--1112/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3042/1, 3--3073/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5071/1, 5--5082/1, 5--5099/1
475603	GENERAL ELECTRIC CO	6	#GTS18WCP, REFRIGERATOR, 17.9 CU. FT. NO FROST, W/FACTORY INSTALLED ICEMAKER; 66 5/8" H X 32 1/8"D X 29 1/2 "W. 120V/60 HZ/15AMPS. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT. 1--1040/1, 1--1112/1, 2--2071/1, 3--3042/1, 4--4071/1, 5--5071/1
475604	GENERAL ELECTRIC CO	1	#GTS18KBP; REFRIGERATOR, TOP FREEZER, 17.9 CU. FT. CAP. NO FROST. 66 5/8"H X 32 1/8"D X 29 1/2"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: BLACK, WHITE, BISQUE. HINGE: LEFT OR RIGHT. 3--3054/1
477300	GENERAL ELECTRIC CO	2	#GMR04AAM; REFRIGERATOR, UNDERCOUNTER 4.3 CU FT CAPACITY. 32 7/8"H X 21 3/4"D X 20"W, 110V. RIGHT HINGED. SELECT COLOR: BB/BLACK OR WW/WHITE 1--1085/2

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

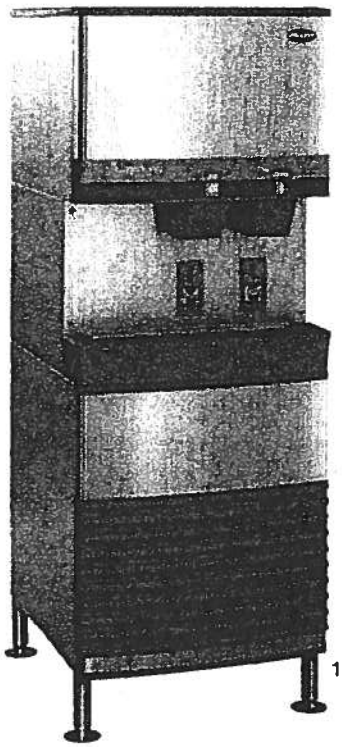
714519	FOLLETT CORPORATION	9	#QC4-FL4S; WATER FILTER SYSTEM (ACCESSORY FOR ICEMAKER DISPENSERS). #QC4-FL4S 1--1085/1, 1--1112/1, 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
715053	SARA LEE COFFEE & TEA	19	COFFEE MAKER, LO-PROFILE MODEL #8573, 3-STATION, AUTOMATIC COFFEE BREWER, FROM SUPERIOR COFFEE FOR REFERENCE ONLY, HOSPITAL TO LEASE (MFG. - BLOOMFIELD) PLUMBING REQUIREMENT: 1/4" OR 3/8" WATER CONNECTION 1--1070/1, 1--1085/1, 1--1112/1, 2--2030/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3017/1, 3--3027B/1, 3--3042/1, 3--3073/1, 4--4030/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5030/1, 5--5071/1, 5--5082/1, 5--5099/1
715152	RADIOLOGY SPECIALTY	1	# 101461; ILLUMINATOR, 1 PANEL RECESSED MT 4 BULB 3--3066/1
715344	GENERAL ELECTRIC CO	7	#GTS17KBR, REFRIGERATOR: TOP MOUNT. NO FROST, 4 SPILT SPILL PROOF ADJ. GLASS SHELVES. 16.6 CU. FT. CAP. 64 3/4"H X 31"D X 28"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
717197	STERIS/AMSCO PRODUCTS	1	#DJ04112033-01; WARMING CABINET 24" DIGITAL; SEISMIC 3--3055/1
718171	FOLLETT CORPORATION	7	#REF5; REFRIGERATOR, UNDERCOUNTER, WITH LOCK AND KEY, STAINLESS STEEL INTERIOR/EXTERIOR, 4.8 CU. FT., 115 V, 60HZ, 1PH, 8.0 AMPS, MAX.FUSE 15 AMPS, HOSPITAL GRADE CORD & PLUG - NEMA 5-15, 33 DEGREES F - 40 DEGREES F (1 DEGREE C - 5 DEGREES C) REVERSIBLE DOOR SWING/HANDLE, 34HX23.75WX25.5D, NSF, UL & CUL LISTED. 2--2076/1, 2--2097/1, 3--3072/1, 4--4076/1, 4--4097/1, 5--5076/1, 5--5097/1

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

JC2725	GERMFREE LABORATORIES INC.	1	LAMINAR FLOW GLOVEBOX ISOLATOR - 4 FOOT QUOTE # 200605929 58" W X 32"D X 87"H STANDARD 115V 3--3054/1
JC2859	BARING INDUSTRIES, INC.	1	DISPLAY CASE & REFRIGERATOR *****SPEC SHEET NOT INCLUDED WITH THIS DOCUMENT******* GALA SOURCE -12 CU FT REFRIGERATOR - TUR - 48SD ZESCO - COMBINATION NON-REFRIGERATED ABOVE/REFRIGERATED SERVICE CASE BELOW - 40" WIDE ENCORE 699-A-021 ********ARCHITECT TO SPEC SPACE & ELECTRICAL******** 1--1002/1

Symphony™

110FB400A air-cooled integral icemaker
110FB400W water-cooled integral icemaker



110FB400A/W shown with SensorSAFE accessory



Freestanding, automatic load, ice and water dispensers with air- or water-cooled icemaker located in the base of unit. Stainless steel frame and exterior with plastic trim. Water station standard. Up to 90 lbs (41kg) storage. Produces approximately 400 lbs (181kg) of compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet™ compressed nugget ice is slow melting, easy to chew

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone
- Clear chute directs ice cleanly into cups, pitchers, carafes, ice bags

Space-saving, attractive design

- 24.5" (623mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally friendly Maestro™ icemakers

- New, state-of-the-art R404A icemakers automatically load dispensers with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high wastewater
- Quiet production, no noisy harvest cycles

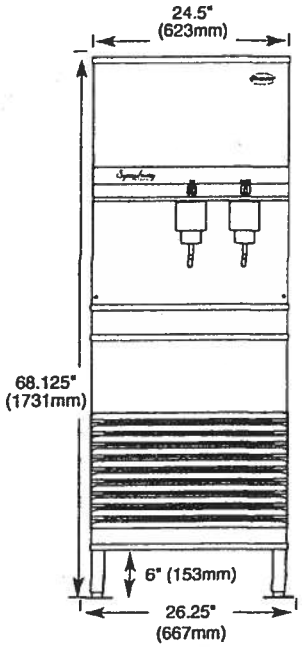
Accessories

- SensorSAFE actuation package
- Chilled water option
- Water filter kit
- Casters
- Up to 6 beverage valves (no beverage cooling)

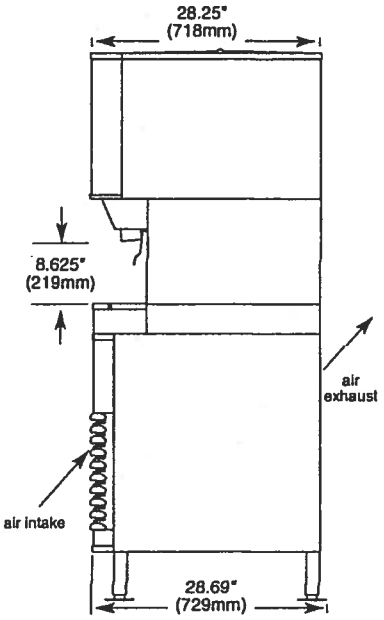
REV: tlg 7/31/03

Item # 203200

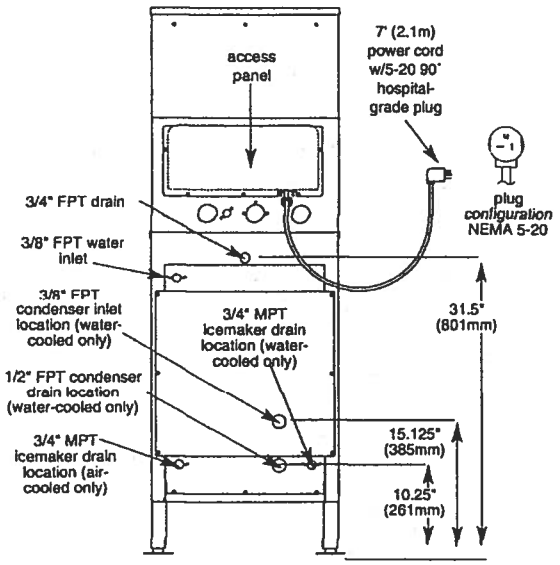
Front View



Side View



Rear View



Ice Production per 24 hours

Air-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	510 / 232	454 / 206	397 / 180	335 / 152	273 / 124	lbs. / kg.
60 / 16	482 / 219	435 / 198	389 / 177	329 / 150	270 / 123	lbs. / kg.
70 / 21	454 / 206	417 / 190	380 / 173	323 / 147	266 / 121	lbs. / kg.
80 / 27	424 / 193	385 / 175	347 / 158	297 / 135	247 / 112	lbs. / kg.
90 / 32	394 / 179	354 / 161	313 / 142	270 / 123	227 / 103	lbs. / kg.

Water-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	451 / 204	447 / 203	442 / 200	437 / 198	428 / 194	lbs. / kg.
60 / 16	423 / 192	413 / 187	409 / 185	399 / 181	394 / 179	lbs. / kg.
70 / 21	394 / 179	390 / 177	380 / 172	371 / 168	361 / 163	lbs. / kg.
80 / 27	371 / 168	361 / 164	352 / 160	342 / 155	333 / 151	lbs. / kg.
90 / 32	352 / 160	342 / 155	333 / 151	323 / 146	309 / 140	lbs. / kg.

Required clearances
12" (305mm) at top recommended for service, 4" (102mm) at rear for cleaning and ventilation

Connections
Cord and plug provided with dispenser. Wire in accordance with all local codes.

Approximate Shipping Weight 265 lbs (120kg)

Electrical Data
Standard electrical – 115V, 60Hz, 1 phase, 13.0 amps, max. fuse 20 amps

Specifications
Ice and water dispenser to be Follett freestanding, automatic load, in the following configuration with water station and _____ (air- or water-) cooled icemaker in base. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Environmentally friendly R404A icemaker to be mounted in base and to be removable as one unit for cleaning and maintenance. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispenser to have automatic bin level control to start and stop icemaker and separate circuitry to allow dispensing to continue with icemaker removed. Dispenser to be equipped with 6" (153mm) adjustable legs, flanged feet and lightweight plastic top that allows full access to the ice storage area for manual loading of back-up ice. Storage area to be insulated with high-density, non-CFC foam polyurethane. 7' cord and NEMA 5-20 hospital-grade plug provided. Dispenser to be NSF, UL and cUL listed.

Item # 203200

END OF SPECIFICATION

Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

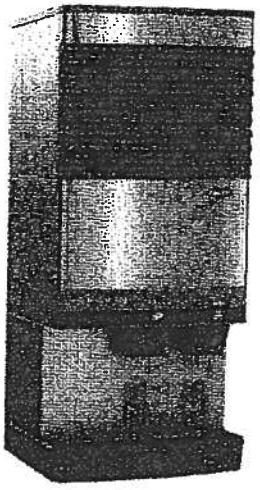
25 Series

Countertop models with (A) air- or (W) water-cooled icemaker

→ **25CT400A/W** – 115V, 60Hz, integral icemaker
25CR400A/W – 115V, 60Hz, satellite-fill icemaker
C25CT400A/W – 220V, 60Hz, integral icemaker
C25CR400A/W – 220V, 60Hz, satellite-fill icemaker
E25CT400A/W – 230V, 50Hz, integral icemaker
E25CR400A/W – 230V, 50Hz, satellite-fill icemaker

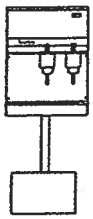
Wall mount models with (A) air- or (W) water-cooled icemaker

25HT400A/W – 115V, 60Hz, integral icemaker
25HR400A/W – 115V, 60Hz, satellite-fill icemaker
C25HT400A/W – 220V, 60Hz, integral icemaker
C25HR400A/W – 220V, 60Hz, satellite-fill icemaker
E25HT400A/W – 230V, 50Hz, integral icemaker
E25HR400A/W – 230V, 50Hz, satellite-fill icemaker

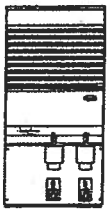


Countertop model shown with SensorSAFE accessory

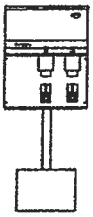
Symphony.



Countertop model with satellite-fill icemaker



Wall mount model with integral icemaker



Wall mount model with satellite-fill icemaker

Countertop and wall mount ice and water dispensers with air- or water-cooled icemaker. Stainless steel frame and exterior with plastic trim. Up to 25 lbs (11kg) storage. Produces approximately 400 lbs (181kg) of Chewblet compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever dispensing standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet compressed nugget ice is slow melting, easy to chew
- Clear chute ensures sanitary delivery and focuses ice cleanly into cups, pitchers, carafes, ice bags

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone

Space-saving, attractive design

- 21" (534mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally-friendly Maestro icemakers

- State-of-the-art R404A icemaker automatically loads dispenser with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high waste water
- Quiet production, no noisy harvest cycles
- Satellite-fill icemakers can be located up to 20 feet (6m) from dispenser; remove heat, noise and bulk from customer area

Accessories

- SensorSAFE actuation package (standard on wall mount models)
- Chilled water option (item# AFH20CHIL2550)
- Water filter kit (item# 00130229)
- Base stand (for models 25CT400A/W, C/E25CT400A/W) (item# AF50BASESTD)
- Slide-out track for satellite-fill icemakers (item# AFGSLIDER400A (air-cooled icemakers) and item# AFGSLIDER400W (water-cooled icemakers))
- Drain pan assembly for wall mount models (item# AFH25WBASE)

Job: _____

Item: 203210 Page 1 of 2

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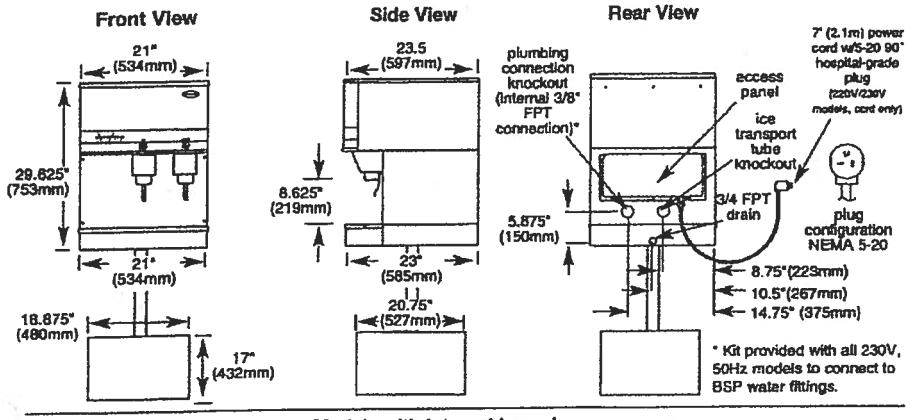
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Form #2065

25 Series

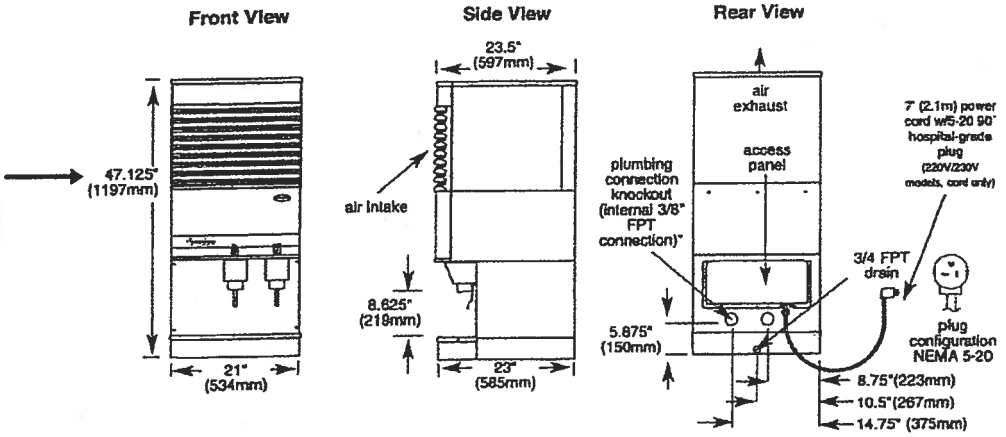
Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

Models with satellite-fill icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Models with integral icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Approximate Shipping Weights

C/E/25CT400A/W	295 lbs (134kg)	C/E/25HT400A/W	310 lbs (141kg)
C/E/25CR400A/W	250 lbs (113kg)	C/E/25HR400A/W	295 lbs (134kg)

Electrical

Standard electrical – 115V, 60Hz, 1 ph. Icemaker 11 amps, dispenser 4 amps. Cord and plug provided with each icemaker and dispensers. If local code requires hard-wiring, separate disconnects also required. Satellite-fill icemaker models require separate circuits for dispenser and icemaker.

Alternate electrical – 220V, 60Hz, 1 ph, 6.5 amps (icemaker 5 amps). 230V, 50Hz, 1 ph, 6.5 amps (icemaker 5 amps). Cord only provided with each icemaker and dispenser. Wire in accordance with all local codes.

Wall Mount Models

- Deduct 3.625" (92mm) from height shown
- Add .5" (13mm) to depth shown
- Standard with wall mounting bracket
- Standard without drain pan (drain pan available – contact factory)

Connections Utilities connect through back or bottom. Back entry shown. Supplied 2" (51mm) duct and louver must be installed for undercounter satellite-fill icemaker installations.

7 ft (2.1m) cord and NEMA 5-20 hospital-grade plug provided with each dispenser. 220V/230V models, cord only.

Required clearances

- C/E/25CT400A/W, C/E/25HT400A/W – 6" (153mm) at top for ventilation, 12" (305mm) recommended for service
- C/E/25CR400A/W, C/E/25HR400A/W – 12" (305mm) at top recommended for service

See Dispenser Detail Sheet, form# 2075 for important installation information.

Ice Production

Air-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		510	464	397	335	273	lbs.
10		232	211	180	152	124	kg
60		482	435	389	329	270	lbs.
16		219	198	177	149	122	kg
70		454	417	380	323	266	lbs.
21		206	190	172	147	121	kg
80		424	385	347	297	247	lbs.
27		193	175	158	135	112	kg
90		394	354	313	270	227	lbs.
32		179	161	142	123	103	kg

Water-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		451	447	442	437	426	lbs.
10		205	203	201	198	193	kg
60		423	413	409	399	394	lbs.
16		192	187	186	181	179	kg
70		394	390	380	371	361	lbs.
21		179	177	172	168	164	kg
80		371	361	353	342	333	lbs.
27		168	164	160	155	151	kg
90		352	342	333	323	309	lbs.
32		160	155	151	146	140	kg

Specifications Ice and water dispenser to be Follett countertop, automatic load, in (choose one) _____ countertop, _____ wall mount configuration with 25 lbs (11kg) of storage. Water station standard. Environmentally-friendly R404A icemaker to be (choose one) _____ air- or _____ water-cooled and to be removable for cleaning and maintenance. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispensers with satellite-fill icemakers to be equipped with 10' (3m) of insulated ice transport tube, 2" (51mm) air duct for icemaker (air-cooled models only) and lightweight plastic top that allows full access to the ice storage area for easy cleaning and manual loading of back-up ice. Storage area to be insulated with high density, non-CFC foam polyurethane. 7' (2.1m) cord and NEMA 5-20 hospital-grade plug provided (220V/230V models, cord only). Dispenser to be NSF, UL and cUL listed, 230V models also CE compliant.

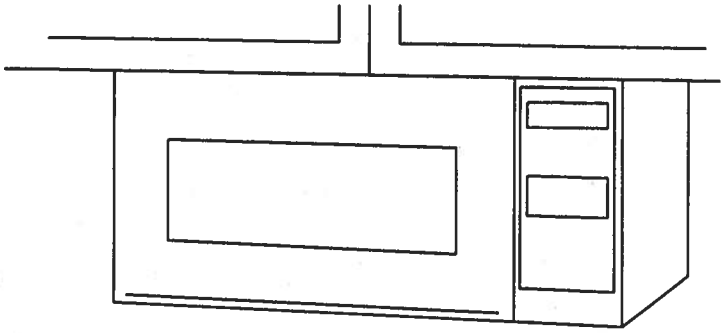
Follett reserves the right to change specifications at any time without obligation. Certifications may vary depending on country of origin.

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END OF SPECIFICATION

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Not to be used over a thermal oven.

Undercabinet mounting kit Pub. No. 4-A019 for Spacemaker II microwave oven models available at additional cost.

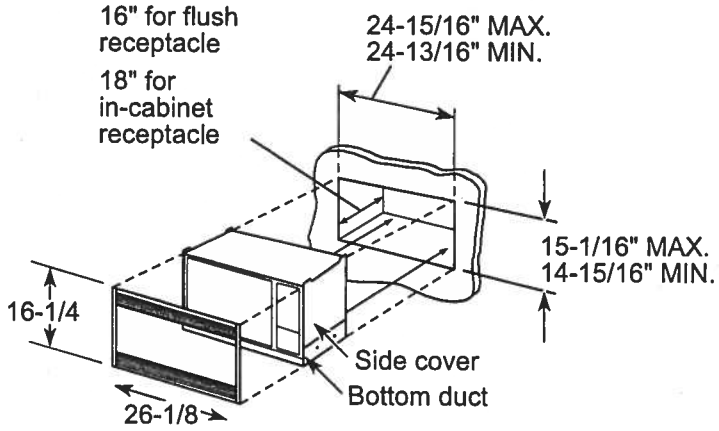
Exterior Dimensions* (in inches)	
W x H x D	23-25/32 x 11-11/64 x 12-55/64

*Height includes feet. Depth does not include handle.

Note: Undercabinet installation
Install Spacemaker II microwave ovens in just a few easy steps with the mounting template, which provides all the necessary measurements. Installation may vary depending on cabinets. These microwave ovens can be installed on practically any wood or metal cabinets.

Note: 120V, 60-cycle, grounded power receptacle location optional on back within cabinet opening.

Cutout Dimensions (in inches)

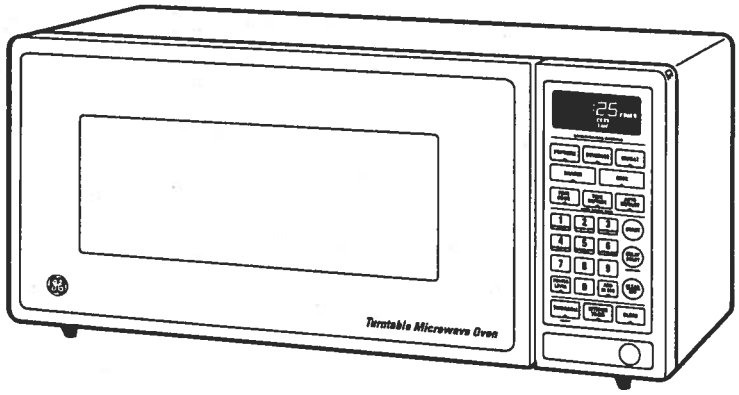


Built-In trim kit For 1.0 cu. ft. microwave ovens
For a custom built-in appearance, this kit allows built-in installation of the Spacemaker II microwave oven into a wall or cabinet alone, and is U.L.-approved for installation over a GE single electric wall oven. This kit should not be installed over a gas wall oven.

Trim kits for model JEM25
JX827SS – Stainless Steel, JX827WN – White, JX827CD – Bisque, JX827BN – Black

Installation Information: This information is not intended to be used for installing unit described. Before installing, consult installation instructions packed with product for current dimensional data.

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Features and Benefits

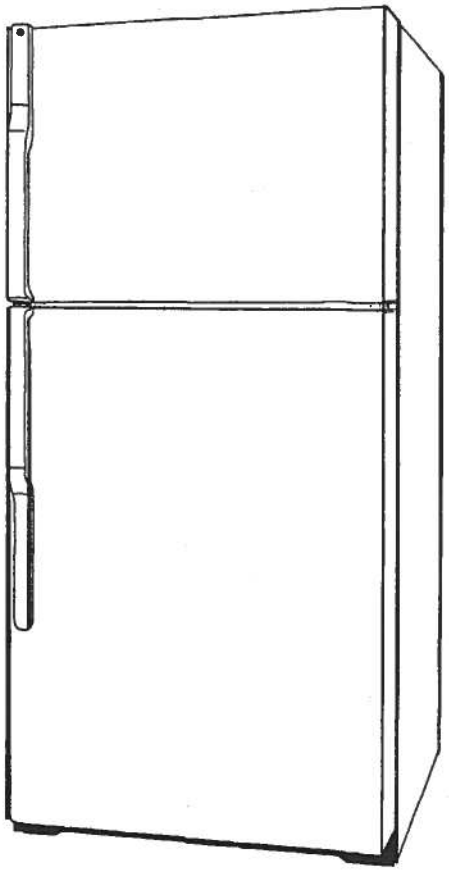
- 1.0 cu. ft. Oven cavity
- 800 Watts*
- Electronic touch controls
- Convenience cooking controls
- Electronic digital display with clock
- Time Cook I & II
- Express Cook with Instant On controls
- Auto Defrost/Time Defrost
- Add 30 Seconds
- Delay Start/Reminder
- Child Lockout
- Kitchen timer
- 10 Power levels
- Under the cabinetry mounting with optional kit
- Model JEM25WF – White
- Model JEM25BF – Black

*IEC-705 Test Procedure

APPROXIMATE DIMENSIONS(HxDxW)	
11.17 in x 12.86 in x 23 25/32 in	
CAPACITY	
Capacity	Mid-Size
Total Capacity (cubic feet)	1.00
FEATURES	
Electronic Digital Display with Clock	Yes
Electronic Touch Controls	Yes
Wattage (IEC-705)	800
Cooking System	Turntable
Power Levels	10
Delay Start	Yes
Beverage (Convenience)	Instant-On
Cook (Convenience)	9 Codes
Popcorn (Convenience)	Instant-On
Reheat (Convenience)	6 codes
Snacks (Convenience)	6 codes
Turntable	Glass
Turntable On / Off	Yes
Turntable Size (in.)	11-21/64
Add 30 Seconds	Instant-On
Cooking Complete Reminder	Yes
Defrost Type	Auto & Time
Express Cook	Instant-On; 1-5 Minutes
Instant On Controls	Yes
Kitchen Timer / Timer (On/Off)	Yes / No
Time Cook	I & II
Time Preference	Control Enhancement (1/9)
Child Lock	Yes
APPEARANCE	
Case Color	White
Color Appearance	White
Door Color	White
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	34 lb
Cavity (W x H x D)	16-23/32 X 8-1/16 X 12-15/32
Overall Depth	12.86 in
Overall Height	11.17 in
Overall Width	23 25/32 in
Net Weight (lbs.)	30 lb
POWER / RATINGS	
Electrical Input - 120V Amperage	11.5
Electrical Input - 120V Watts	1300
Frequency (MHz)	2450

END OF SPECIFICATION

GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker



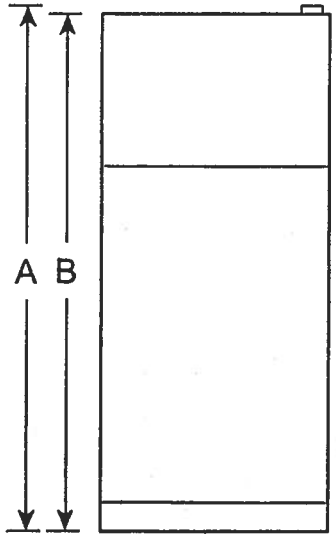
Features and Benefits

- Slide-Out, Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- Electronic Icemaker – Makes ice automatically, ensuring a ready supply.
- Model GTS18WCPWW – White on white
- Model GTS18WCPCC – Bisque on bisque

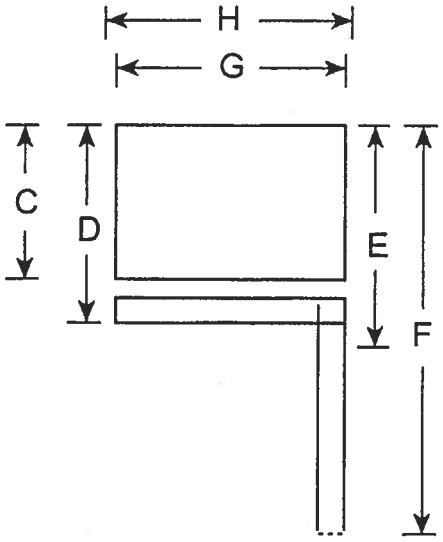
GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	32
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Total volume and shelf area are calculated by the Association of Home Appliance Manufacturers' standards

Listed by Underwriters Laboratories

APPROXIMATE DIMENSIONS(HxDxW)	
66 5/8 in x 32 1/8 in x 29 1/2 in	
CAPACITY	
Total (cubic feet)	17.9
Fresh Food (cubic feet)	12.87
Freezer (cubic feet)	4.98
Shelf Area (sq. ft.)	22.0
APPEARANCE	
Color Appearance	White on White
Customer Installed Handles	Yes
Exterior Design	Rounded Doors
Handle	Color-Matched
Door Swing	Shipped w/ Right Hand Door Opening (Hinges on Right)
Reversible Doors	Yes
Textured Steel Case & Door	Galvenized Door
Adjustable Rollers	Front
Door Stops	Yes

WEIGHTS & DIMENSIONS

Approximate Shipping Weight	233 lb
Overall Depth	32 1/8 in
Overall Height	66 5/8 in
Overall Width	29 1/2 in
Case Depth Without Door (in.)	27-1/2
Depth with Door Open 90° (in.)	58-1/8
Depth Without Handle (in.)	30-1/4
Height to Mid-Freezer	53-15/16
Height to Top of Case (in.)	66-1/8
Width w/Door Open 90 Degrees Inc. Handle (in.)	32
Back Air Clearances (in.)	1
Side Air Clearances (in.)	1/8
Top Air Clearances (in.)	1

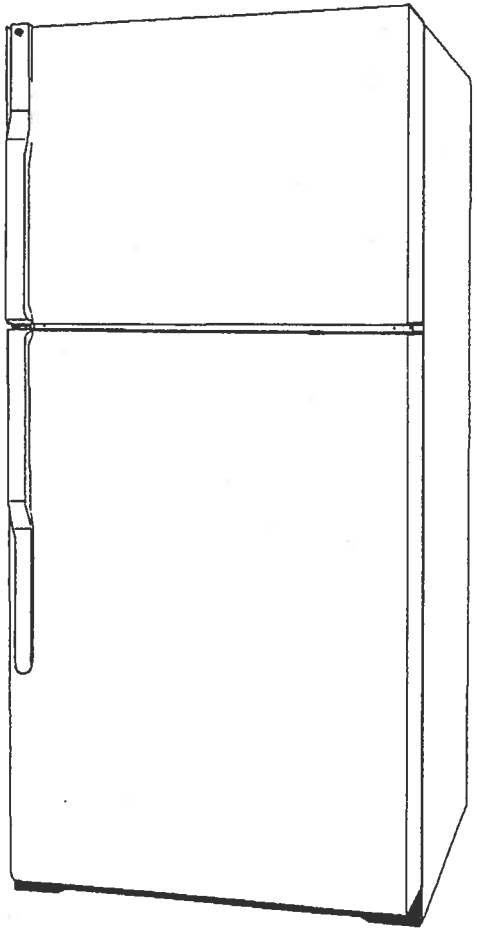
POWER / RATINGS

Volts / Hertz / Amps	120V; 60Hz ; 15A

END OF SPECIFICATION

GE Appliances

GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator



Specification Revised 5/03

Features and Benefits

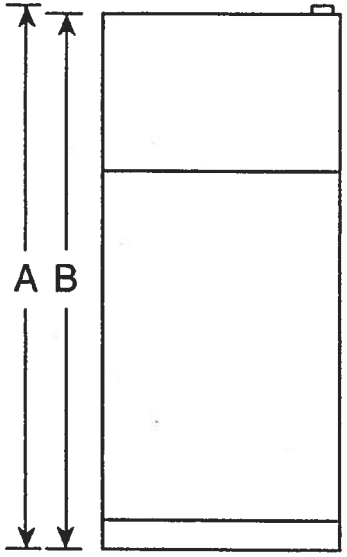
- Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- NeverClean™ Condenser – Condenser coils are encased, so they don't require cleaning in normal operating environments.
- Model GTS18KBPWW – White on white
- Model GTS18KBPBB – Black on black
- Model GTS18KBPCC – Bisque on bisque

GE Appliances

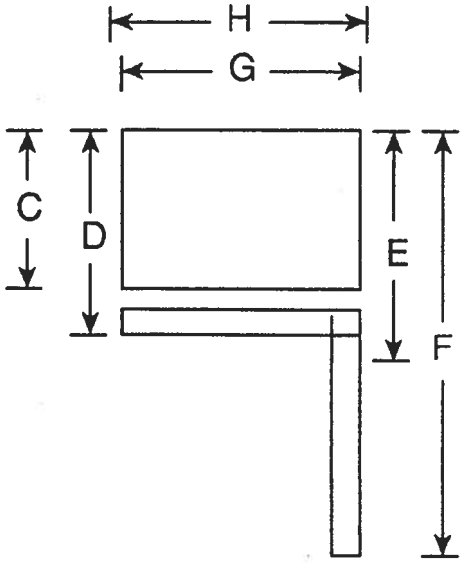
GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	30
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Specification Revised 5/03

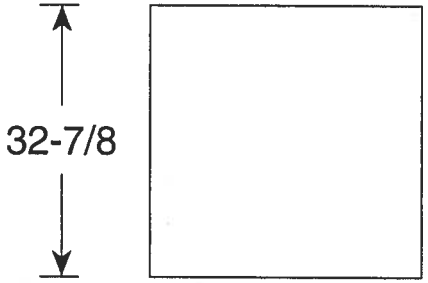
END OF SPECIFICATION

GE Appliances

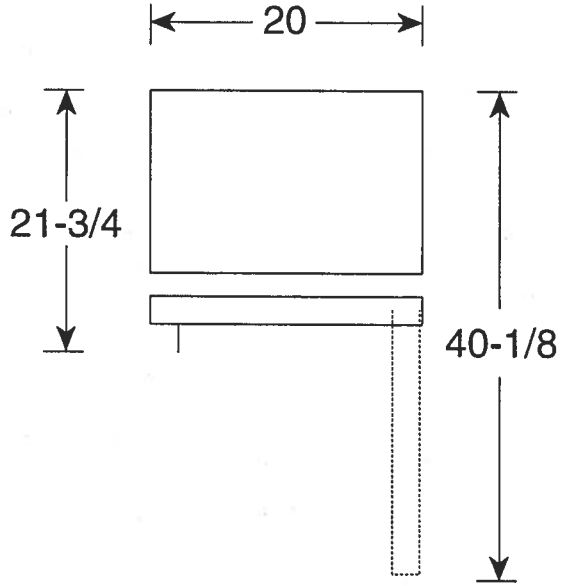
GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator

Dimensions (in inches)

Front View



Top View



Air Clearances	
Each side (in.)	1/2
Top (in.)	2
Back (in.)	2

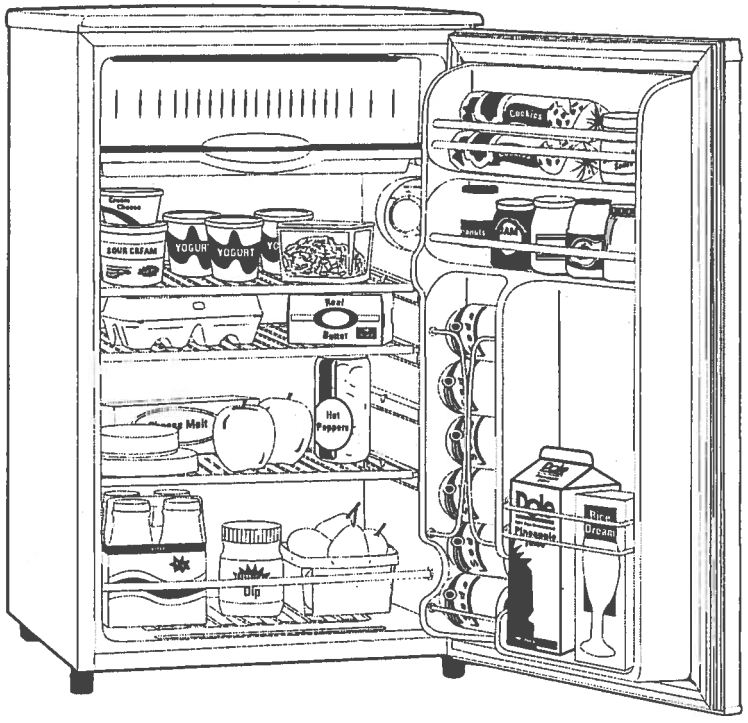
Note: Freezer compartment is for short-term storage of frozen food. The frozen food compartment of this refrigerator will make ice, and pre-frozen foods can be stored for about **two weeks.** It will not effectively freeze fresh foods or provide long-term storage for meats, poultry, or fish.

For answers to your Monogram,® GE Profile™ or GE® appliance questions, visit our website at GEAppliances.com or call GE Answer Center® service, 800.626.2000.

Specification Revised 7/04
310934

GE Appliances

GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator



Features and Benefits

- 4.3 cu. ft. Capacity (Fresh Food 3.81 cu. ft./Freezer .49 cu. ft.)
- 2-1/2 Fresh Food Door Shelves
- 2 Adjustable Wire Cabinet Shelves
- Can Rack
- 2 Mini Ice 'N Easy Trays
- Manual Defrost
- Color-Matched Recessed Door Handles
- Model GMR04AAMWW – White on white
- Model GMR04AAMBB – Black on black

Specification Revised 7/04
310934

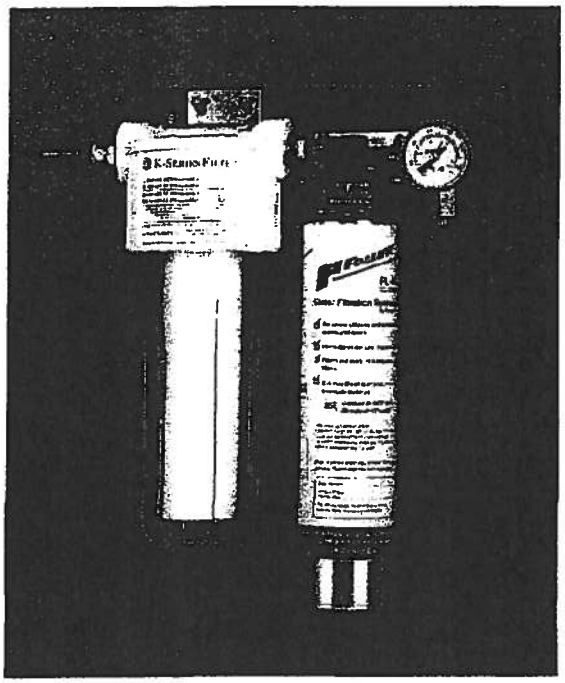
APPROXIMATE DIMENSIONS(HxDxW)	
32 7/8 in x 21 3/4 in x 20 in	
CAPACITY	
Total Capacity (cubic feet)	4.4
Fresh Food (cubic feet)	3.99
Freezer (cubic feet)	.39
Shelf Area (sq. ft.)	5.6
FEATURES	
Defrost Type	Manual
Fresh Food Cabinet Shelves - Adjustable	2
Fresh Food Cabinet Shelves - Total # of Shelves	2 Wire
Fresh Food Door Shelves	2 Full-Width; 1 Half-Width
Ice N' Easy Trays	1 Mini
APPEARANCE	
Color Appearance	White on White
Door Swing	Hinges on Right
Handle	Color-Matched Recessed
Rounded Doors	Yes
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	77 lb
Overall Depth	21 3/4 in
Overall Height	32 7/8 in
Overall Width	20 in
Depth with Door Open 90° (in.)	40-1/8
Back Air Clearances (in.)	2
Side Air Clearances (in.)	1/2
Top Air Clearances (in.)	2



END OF SPECIFICATION

QC4-FL4S Walter Filter System

SPECIFICATIONS



Water filter system for use with Follett icemakers and ice and water dispensers. System includes pre-filter, primary filter, pressure gauge and wall mounting bracket.

Important: Not for use with carbonated water — separate system required.

Ensures better tasting, cleaner, safer ice
- *Traps dirt as small as 1/2 micron in size*
- Removes chlorine, off-tastes and odors
- Filters out asbestos fibers and parasitic cysts such as *Cryptosporidium* and *Giardia*
- Certified to ANSI/NSF standards 42 and 53

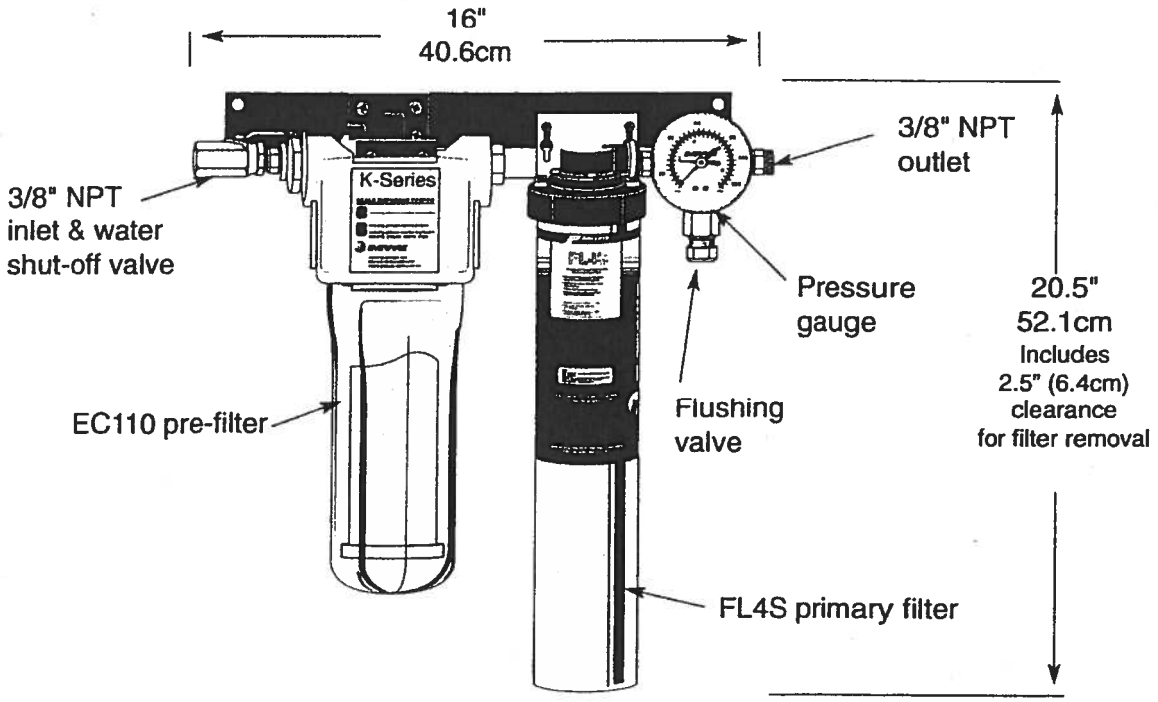
Improves icemaker performance
- Keeps icemakers functioning at full capacity
- Reduces scale build-up from dirt and minerals in the water by up to 70%
- Removes dirt and abrasive particles that can damage internal workings of icemaker
- Saves energy and reduces downtime

Space-saving design
- 20.5" (52.1cm) total height and 16" (40.6cm) width requires minimal space
- Entire system can be mounted out of the way below standard 34" - 36" (86.4cm - 91.4cm) counters

Dual filter system saves money
- *Economical EC110 pre-filter filters out* large particles and extends life of FL4S primary filter

Item # 714519

REV: tlg 8/21/2003



- Clearance required: 2.5" (6.4cm) at bottom of filter for cartridge removal
- Flow rate: 0.5 gpm (1.9 lpm)
- Pressure range 10 - 125 psi, non-shock
- Capacity: Certified for chlorine and taste and odor reduction for 3,000 gallons (11,400 liters)
- Water temperature: 35° - 100°F (2° - 38°C)

NSF International Standards

Tested and certified to ANSI/NSF Standard 42 & 53

Standard No. 42: Aesthetic Effects

Chemical Unit Taste & Odor and Chlorine Reduction, Class 1

Mechanical Filtration Unit Particulate Reduction, Class 1: 99.9% reduction of particles 1/2 micron and larger in size

Standard No. 53: Health Effects

Mechanical Filtration Unit

Turbidity Reduction, Cyst Reduction, Asbestos Reduction

The QC4-FL4S filter and 4S cartridge (by Everpure, Inc.) have been tested and Certified by NSF only for the functions listed above. Check for compliance with state and local laws and regulations. Do not use where the water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit. Can be used with water disinfected that may contain filterable cysts.

Item # 714519

END OF SPECIFICATION

Model 8573



Model 8573



8573 Koffee King Three Warmer Stepped Right Automatic Coffee Brewer *(without Hot Water Faucet)*

How do you get more for less? Use the Bloomfield Lo Profile® brewing system. At less than 17" tall, the Lo Profile is small in stature but big on capacity. Like all Bloomfield products, this proven, efficient brewing system is designed to take advantage of the finest electrical components and has the lowest service cost in the industry for this type of brewer.

Features

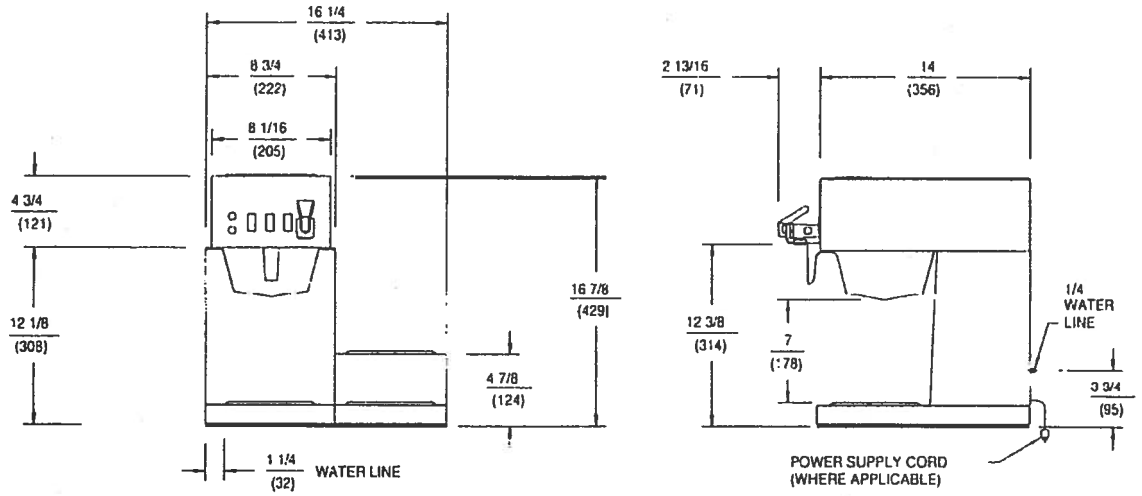
- **A high level of commonality of parts** with other Bloomfield models will significantly reduce the inventory of spare parts required to service many body styles.
- Exclusive design provides **easy access to components** for quick service.
- **Water volume adjustments** can be made with ease, no panels to remove or tools required.
- **Ready-to-Brew light** indicates the proper water temperature to help eliminate the guesswork in brewing.
- Built-in **pour over feature** provides flexibility.
- **Independent front-mounted hot water faucet** allows drawing of hot water without affecting coffee taste or brewing cycle.
- **Premium quality thermostat** has a full-length stainless steel sensing bulb that recognizes water temperature extremely accurately and cycles less frequently.
- **Superior sprayhead design** spreads water over the coffee grounds, creating agitation and a floating action that completely saturates the coffee to capture the full, rich essence of every bean.
- **Unique water valve with built-in flow control** assures consistent operation at 20-80 p.s.i.
- **One-piece drawn stainless steel water tank** has a superior design for extended life.
- **Three warming stations** with porcelain enameled warmer plates position decanters securely and, with no exposed screw heads, will not scratch or scrape decanters.
- High quality easy to clean **stainless steel construction.**

Item 715053

REV: 6/28/03

E9253 STD 4 LR 10836

DIMENSIONS: INCH / (MM)



SPECIFICATIONS:

MODELS	WATTS	VOLTS	AMPS	PHASE	POWER SUPPLY CORD
8573	1800	120	15	Single	NEMA 5-15P

Item # 715053

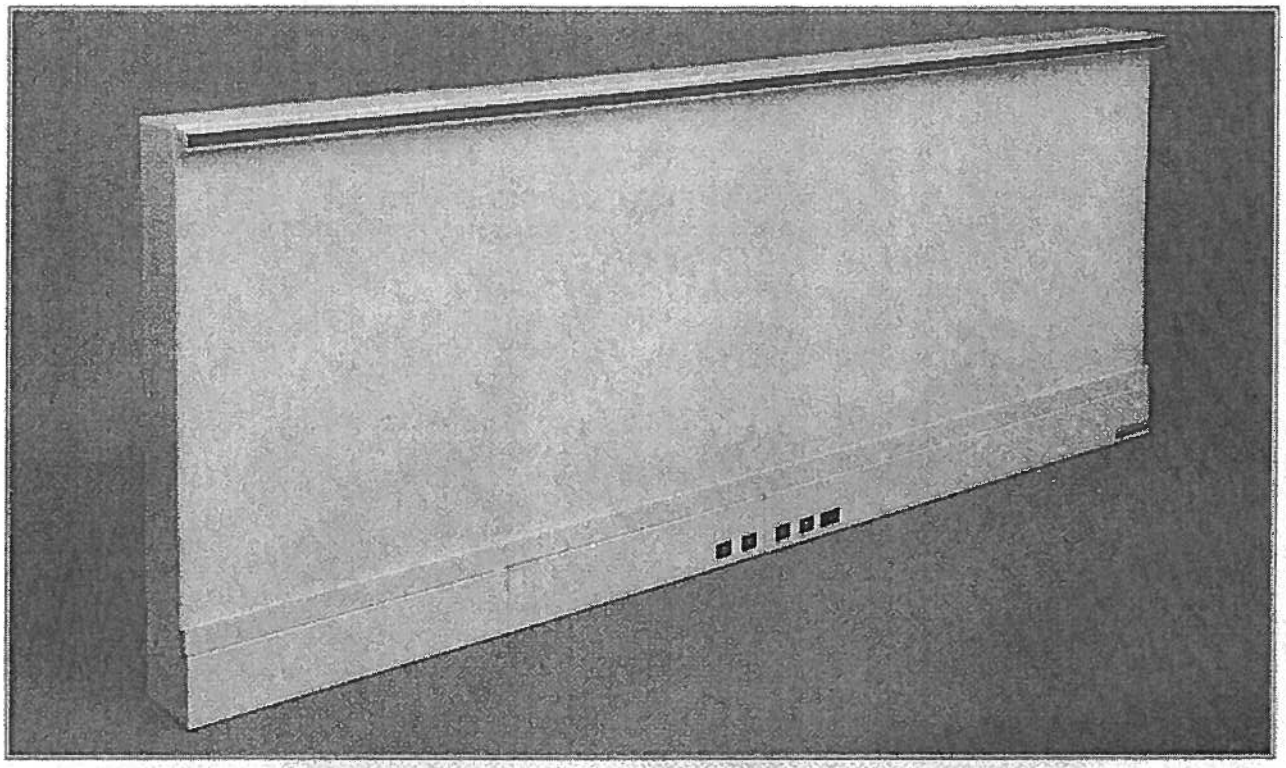
END OF SPECIFICATION

Item # 715152 1 of 3

800/347-XRAY
S&S X-RAY PRODUCTS
www.ssxray.com

CHAMELEON SERIES

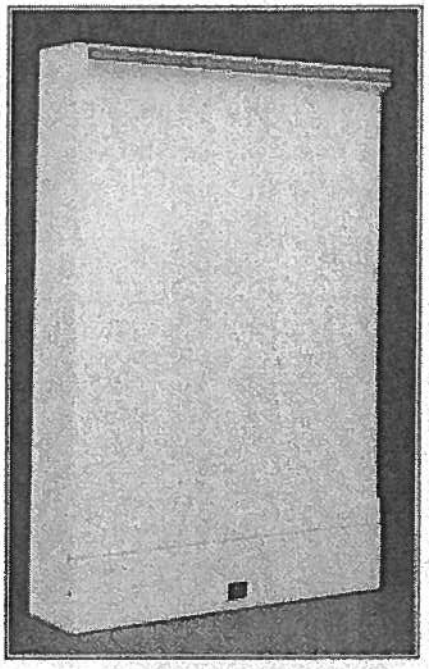
Blends With Any Décor



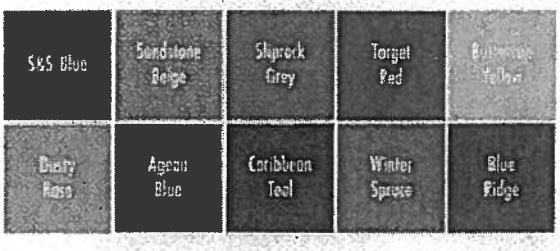
Four Bank Surface Mounted Model (101204)

The **Chameleon Illuminator Series** combines a slim, sleek appearance (3⅜" depth), with color-customizable trim. This cost efficient illuminator is designed to accentuate the warm, professional appearance of your reading room or consultation area. The units can be highlighted with *trim in a choice of ten colors*, polished stainless steel or primed strip (the latter can be easily painted to color coordinate within a facility). Constructed of durable steel with a white powder-coat finish, this series is available in 2 lamps, 3 lamps and 4 lamps per viewing area models.

Trigger start ballasts, separated viewing sections, centered cluster switches, one piece plexiglass fronts and continuous gravity film grips are standard with this series. A bottom ledge film support coupled with the continuous film grip guarantees maximum freedom for viewing small or large films. Each section is individually controlled by rocker switches mounted at the bottom center of the illuminator. Master switches are provided on units of three banks or more. The Chameleon Illuminator can also be incorporated into a corner module.



Trim Colors



Finish: White Baked Enamel

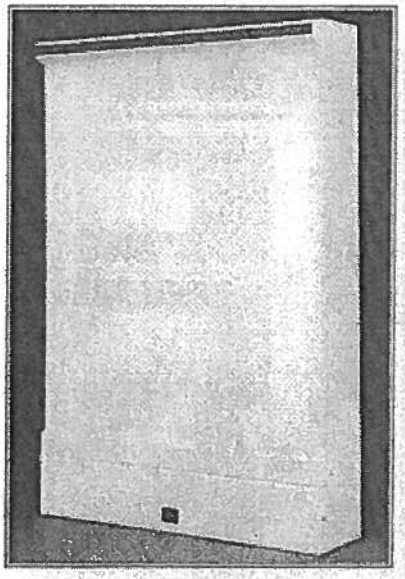
Electrical: Viewers operate on 120 volt, 60 Hz. **2 Lamp Series:** .47 amps per section, **3 Lamp series:** .61 amps per section, **4 Lamp series:** 1.0 amps per section. Surface mounting models are supplied with a 6' three conductor line cord (see diagram for wiring locations). Recessed models come with BX connectors. For special voltages consult factory.

* **Optional Items:** Modular Mobile system (pg B-23), mobile stand, console arms, angulated viewing system (pg B-25) corner modules (pg B-24), hospital grade plugs (pg B-30).

S&S X-RAY PRODUCTS
www.ssxray.com

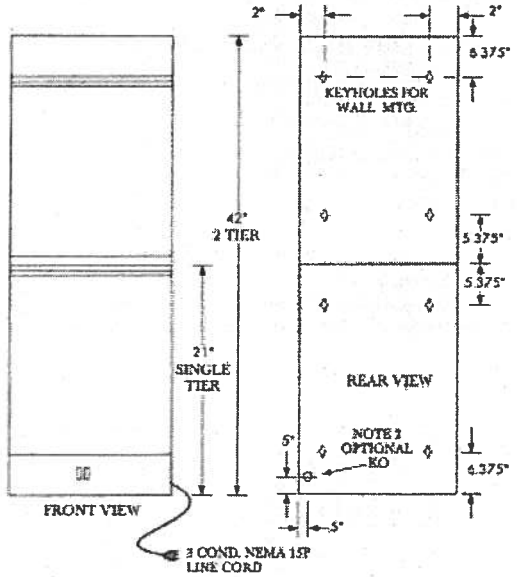
CHAMELEON SERIES

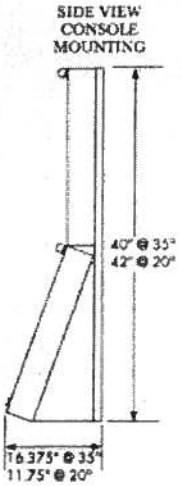
ILLUMINATORS



SURFACE MOUNTED MODELS

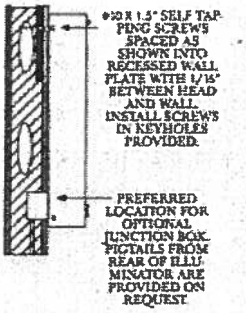
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	23 lbs	101401	101421
Two Bank 28"x17"	28"	21"	46 lbs	101402	101422
Three Bank 42"x17"	42"	21"	69 lbs	101403	101423
Four Bank 56"x17"	56"	21"	90 lbs	101404	101424
Five Bank 70"x17"	70"	21"	113 lbs	101405	101425
Six Bank 84"x17"	84"	21"	136 lbs	101406	101426
TWO TIER					
1 over 1 2 x 14"x17"	14"	42"	46 lbs	101411	101431
2 over 2 2 x 28"x17"	28"	42"	92 lbs	101412	101432
3 over 3 2 x 42"x17"	42"	42"	138 lbs	101413	101433
4 over 4 2 x 56"x17"	56"	42"	180 lbs	101414	101434
5 over 5 2 x 70"x17"	70"	42"	226 lbs	101415	101435
6 over 6 2 x 84"x17"	84"	42"	272 lbs	101416	101436

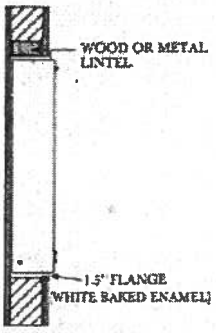






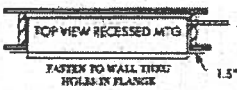
SIDE VIEW RIGHT SIDE





RECESSED MODELS

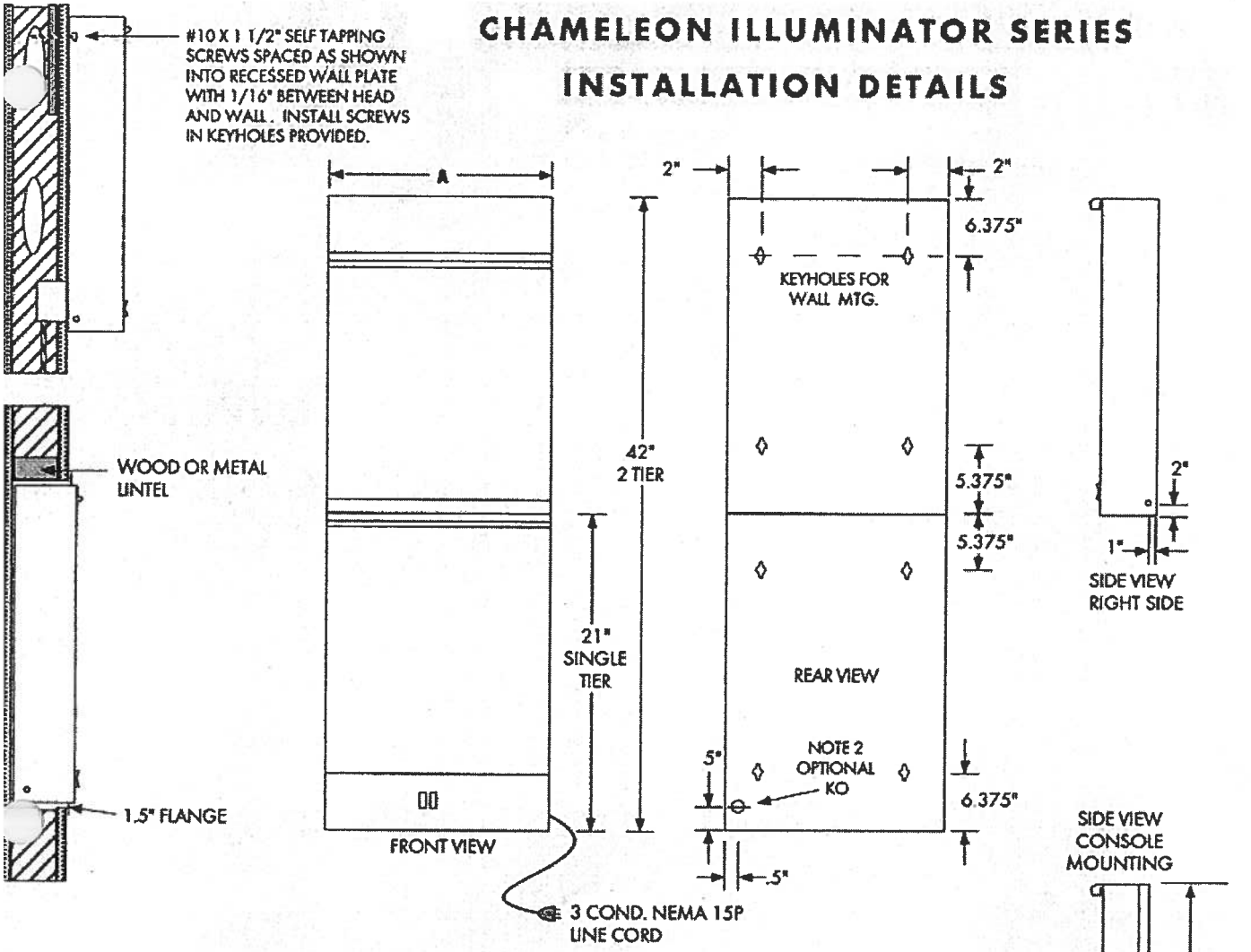
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	WALL OPENING WIDTH	WALL OPENING HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	14.25"	21.25"	23 lbs	101441	101461
Two Bank 28"x17"	28"	21"	28.25"	21.25"	46 lbs	101442	101462
Three Bank 42"x17"	42"	21"	42.25"	21.25"	69 lbs	101443	101463
Four Bank 56"x17"	56"	21"	56.25"	21.25"	90 lbs	101444	101464
Five Bank 70"x17"	70"	21"	70.25"	21.25"	113 lbs	101445	101465
Six Bank 84"x17"	84"	21"	84.25"	21.25"	136 lbs	101446	101466
TWO TIER							
1 over 1 2 x 14"x17"	14"	42"	14.25"	42.25"	46 lbs	101451	101471
2 over 2 2 x 28"x17"	28"	42"	28.25"	42.25"	92 lbs	101452	101472
3 over 3 2 x 42"x17"	42"	42"	42.25"	42.25"	138 lbs	101453	101473
4 over 4 2 x 56"x17"	56"	42"	56.25"	42.25"	180 lbs	101454	101474
5 over 5 2 x 70"x17"	70"	42"	70.25"	42.25"	226 lbs	101455	101475
6 over 6 2 x 84"x17"	84"	42"	84.25"	42.25"	272 lbs	101456	101476

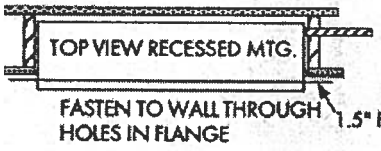


1/2" CONDUIT CONTAINING 3 NO. 14 WIRES TO 120 VOLT 60 HZ SERVICE.

ALL MEASUREMENTS ARE ± 1/16"

CHAMELEON ILLUMINATOR SERIES
INSTALLATION DETAILS





	NUMBER OF VIEWING AREAS						HEIGHT	
	1	2	3	4	5	6	1 TIER	2 TIER
CASE WIDTH "A"	14"	28"	42"	56"	70"	84"	21"	42"
WALL OPENING	14.25"	28.25"	42.25"	56.25"	70.25"	84.25"	21.25	42.25
WEIGHT 1 TIER	23	46	69	90	113	136		
WEIGHT 2 TIER	46	92	138	180	226	272		
DEPTH OF CASE	3.375"							

120 VOLT 60 HZ.
2 LAMP SERIES .47 AMPS PER VIEWING SECTION
3 LAMP SERIES .61 AMPS PER VIEWING SECTION
4 LAMP SERIES 1 AMPS PER VIEWING SECTION
UL LISTED FOR U.S.A. AND CANADA

NOTE:
1. FOR SAFETY AND PROPER OPERATION UNITS MUST BE ELECTRICALLY GROUNDED.

PREFERRED LOCATION FOR OPTIONAL JUNCTION BOX. PIGTAILS FROM REAR OF ILLUMINATOR PROVIDED ON

CALL OUR CUSTOM DESIGN ENGINEERING DEPT. FOR HELP WITH ROOM LAYOUTS AND CUSTOM CONFIGURATIONS.

The Industry Standard For 40 Years
800-347-XRAY 718-649-8500
FAX 718-257-0219
S&S X-RAY PRODUCTS INC
1165 LINWOOD STREET
BROOKLYN NY 11208

END OF SPECIFICATION

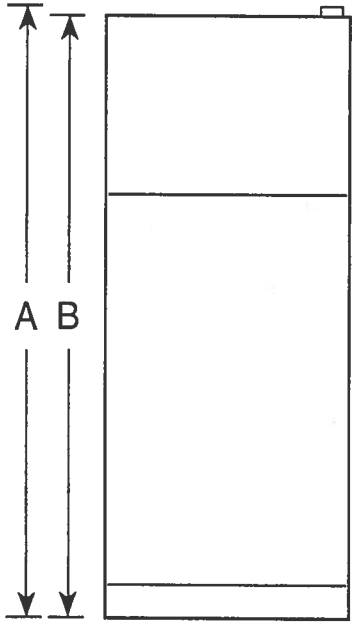
GTS17KBS
GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

Dimensions and Installation Information

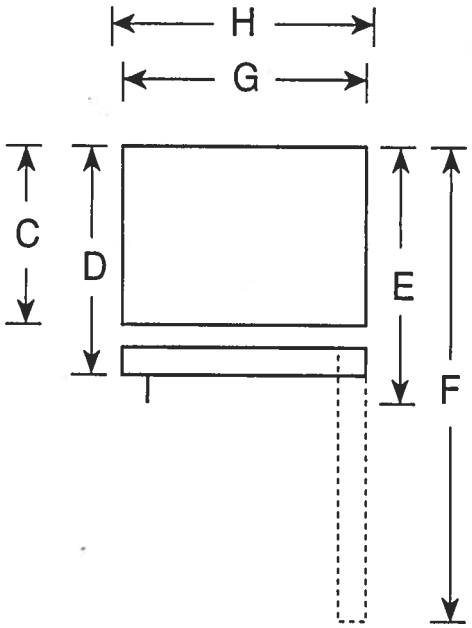
Overall Dimensions	Height to top of hinge (in.) **A**	64-3/4
	Height to top of case (in.) **B**	64-1/4*
	Case depth without door (in.) **C**†	25-7/8
	Case depth less door handle (in.) **D**†	29-1/8
	Case depth with door handle (in.) **E**†	31
	Depth with fresh food door open 90° (in.) **F**†	54-7/8
	Width (in.) **G**	28
	Width with door open 90° less door handle (in.) **H**	30-1/2
Air Clearances	Each side (in.)	3/4
	Top (in.)	1
	Back (in.)	1

*Height to mid-freezer (in.): 54-3/8

Front View



Top View



Dimension and installation information are shown in inches.

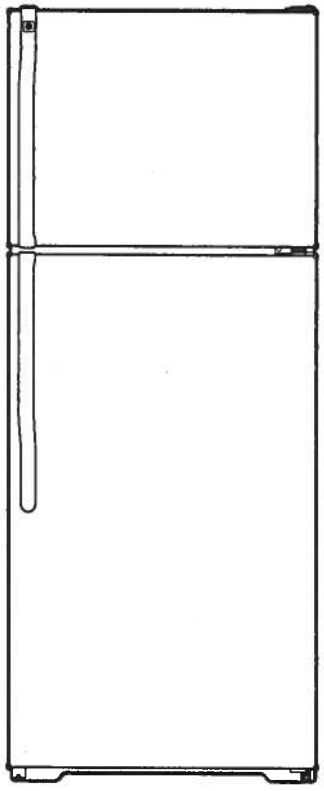
Listed by Underwriters Laboratories

GTS17KBS

GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

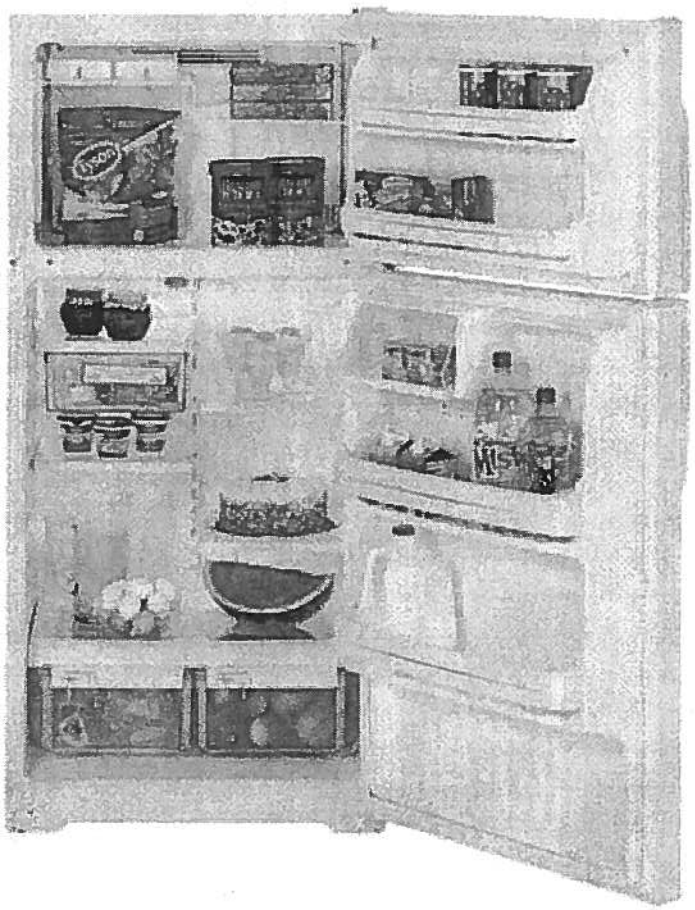
Features and Benefits

- Adjustable Spillproof Glass Shelves - Help contain spills for ease of cleaning
- Upfront Temperature Controls - Are positioned up front, close at hand, for maximum convenience and ease of use
- Adjustable Humidity Vegetable/Fruit Crispers - Provide the ideal storage environment for fruits and vegetables
- Gallon Door Storage - Makes room for milk and any other gallon size containers
- Snack Pan - Helps keep everyday foods like muffins and carrot sticks fresh
- NeverClean™ Condenser - Condenser coils are encased, so they don't require cleaning in normal operating environments
- Deluxe Quiet Design - Significantly reduces operating noise
- Square Doors - Classic design that's compatible with any kitchen décor
- Model GTS17KBSWW - White on white
- Model GTS17KBSCC - Bisque on bisque



APPROXIMATE DIMENSIONS(HxDxW)	
64 3/4 in x 31 in x 28 in	
CAPACITY	
Total Capacity (cubic feet)	16.60
Fresh Food (cubic feet)	12.54
Freezer (cubic feet)	4.10
Shelf Area (sq. ft.)	19.7
FEATURES	
Air Tower	Yes - Freezer
Defrost Type	Frost Free
Upfront Temperature Controls	Yes
Automatic Icemaker	Optional (IM4A)
Ice N' Easy Trays	2
Snack Drawer	Yes
Vegetable / Fruit Crisper(s)	2 Adjustable Humidity
Fresh Food Cabinet Shelves - Adjustable	4 Split
Fresh Food Cabinet Shelves - Spill Proof	Yes
Fresh Food Cabinet Shelves - Total Number of Shelves	4 Glass
Fresh Food Door Shelves	2 Fixed w/ Gal. Storage
Gallon Door Storage	Yes
Dairy Compartment	Yes
Interior Light	Yes
Freezer Cabinet Shelves (Wire)	Step Shelf
Freezer Door Shelves	2 Full-Width Fixed (1 Extra-Deep)
APPEARANCE	
Color Appearance	White on White
Handle	Color-Matched
Door Swing	Reversible Hinges
Textured Steel Case	Galvanized Door
Door Stops	Yes
Easy to Remove Door Gaskets	Yes
Leveling Legs	2 Front
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	185 lb
Net Weight (lbs.)	166 lb
Overall Depth	31 in
Overall Height	64 3/4 in
Overall Width	28 in
Case Depth Without Door (in.)	25-7/8
Depth with Door Open 90° (in.)	54-7/8
Depth Without Handle (in.)	29-1/8
Height to Mid-Freezer	54-3/8
Height to Top of Case (in.)	64-1/4
Width w/Door Open 90 Degrees Inc. Handle (in.)	30-1/2
Width w/Door Open 90 Degrees Less Handle (in.)	28-5/8
Back Air Clearances (in.)	1
Side Air Clearances (in.)	3/4
Top Air Clearances (in.)	1

POWER / RATINGS	
Volts / Hertz / Amps	120V; 60Hz ; 15A



END OF SPECIFICATION

AMSCO® WARMING CABINET

APPLICATION

The Amsco Warming Cabinet is designed to raise the temperature of surgical irrigation solutions and/or blankets to an acceptable level for hospital and surgical outpatient center applications.

FEATURES

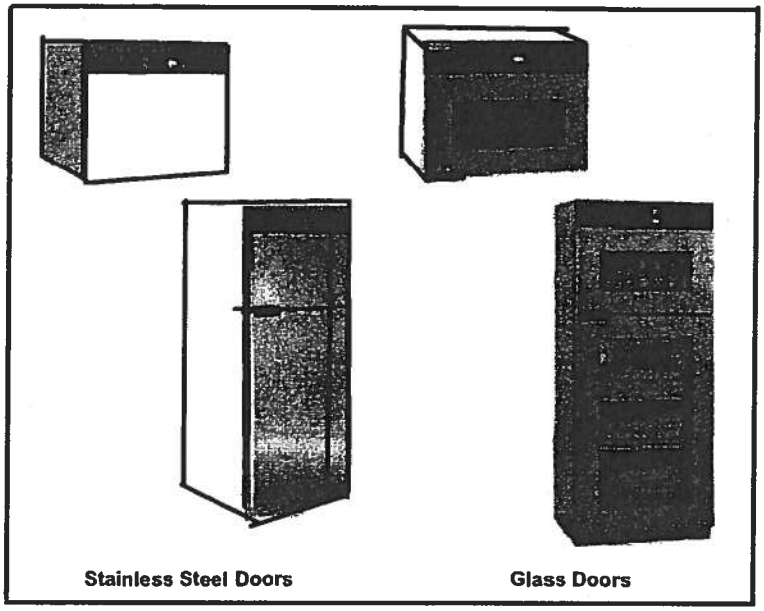
Single-compartment Model—Features a heating chamber available in two different depths: 18" (457 mm) or 24" (610 mm) deep.

Double-compartment Model—Features an upper and lower heating chamber with independent temperature controls, and a choice of two different depths: 18" (457 mm) or 24" (610 mm) deep.

Cabinet Storage Capabilities—The upper compartment of the 18" (457 mm) deep model holds up to 15 (2-liter) surgical flasks; the lower compartment holds up to 45 (2-liter) surgical flasks.

The upper compartment of the 24" (610 mm) deep model holds up to 20 (2-liter) surgical flasks; the lower compartment holds up to 60 (2-liter) surgical flasks.

All chambers can hold a combination of flasks and dry goods, or dry goods only.



Stainless Steel Doors **Glass Doors**

(Typical only - some details may vary.)

STANDARDS

Warming cabinet meets applicable requirements of the following standards, and carries the appropriate symbols.

- **Underwriters Laboratories (UL) Standard 2601-1, 1st Ed.,** as certified by ETL Testing Laboratories, Inc.
- **Standard CSA-C22.2 No. 601.1-M90,** Standard for Electro-Medical Equipment as certified by ETL Testing Laboratories, Inc.
- **EN 60601-1: 1993, Amendment 2, *1995,*** *Electrical Safety as certified by* ETL Testing Laboratories, Inc.
- **IEC 601-1-2: 1993,** EMC testing as certified by ETL Testing Laboratories, Inc.
- ***EN 55011: Group 1, Class B,*** *EMI* testing as certified by ETL Testing Laboratories, Inc.
- **Medical Device Directive (93/42 IEEC)**
- **California OSMPD Seismic Pre-Approval**
- **FDA Good Manufacturing Practices Regulations 21 CFR 820 for Medical Devices.**

The Selections Checked Below Apply To This Equipment

MODEL

- ☐ Single-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep
- ☐ Double-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep

Mounting

- ☐ Open-mounted
- ☐ For Recessing

DOOR OPTIONS

- ☐ Glass
- ☐ Stainless Steel

VOLTAGE

- ☐ 120 V
- ☐ 220-240 V

Door Hinge(LH/RH) interchangeable in field

ACCESSORY

*** Seismic Tie-down Kit

Item # 717197

REV: 6/19/03

CONSTRUCTION

Includes all components necessary to obtain a complete working unit. The open-mounted unit ships with a power condenser installed. The recessed unit requires a connection to building service, supplied by others. The unit contains a heating chamber, instrumentation and operating controls, and a lower heated chamber when double-compartment model is specified.

Cabinet controls are identical for both the single- and double-compartment configurations. The double compartment configuration has a temperature control knob, temperature display LCD, and overtemperature light for each compartment. The control panel (on either the single- or double-compartment configuration) can be conveniently serviced from the front of the unit.

Corners and intersections on the face of the cabinet and door are structurally formed for rigidity, cleanability and appearance. Both models are supported on a stainless steel integral subbase. The cabinet door(s) is (are) available in stainless steel, or stainless steel with a glass window. Interior of cabinet and shelves are stainless steel. If a freestanding model, the cabinet top and side panels are stainless steel.

Heating chamber compartment is insulated with 1" (25 mm) thick, fiberglass blanket. A fan circulates air within the chamber to provide even heat distribution. The door is of double-wall construction with 1-1/2" (38 mm) thick insulation between the walls. Right-hand door swing is provided; swing is reversible. Door closes against a heat-resistant, magnet imbedded, vinyl gasket. Pivot type hinges are stainless steel.

Chamber(s) is (are) heated by an electric rod heater operating on either *120 or 220 Volt, 50/60 Hz power.*

Lower chamber (double-compartment model) includes two stainless-steel shelves, adjustable in 1" (25 mm) increments by a clip and slot arrangement. Door structure mounting, gasket and hinges are the same as the door on the upper chamber. Chamber is heated by an electric rod heater.

CONTROLS

The control panel assembly features a temperature control knob, an overtemperature indicator light, a digital temperature indicator (if a double-compartment model, there will be duplicates of the previous items), and a power switch. The temperature control knob is used to regulate and turn off the heat to each chamber. 120 Volt units display temperature readings in Fahrenheit. 220 Volt units display temperature readings in Celsius scale. Temperature selection range is 90°-160°F (32.2°-71.1°C). An overtemperature alarm will visually and audibly alert operator should an overtemperature condition occur (chamber temperature greater than 10°F [5.5°C] above set temperature). In the event of an overtemperature condition, the overtemperature control automatically turns off the heater(s).

MOUNTING ARRANGEMENT

Double-compartment models may be specified as open-mounted or recessing into a partition wall. If model is specified for recessing, a synthetic rubber sealing gasket is provided to ensure close fit of cabinet front to the face of the wall partition. Recessed cabinet requires no supplementary supports behind the wall partition (except in seismic locations).

Single-compartment models may be specified for wall/counter mounting or for recessing into a partition wall.

PREVENTIVE MAINTENANCE

A global network of skilled service specialists can provide periodic inspections, and adjustments to assure *low-cost peak performance. STERIS* representatives can provide information regarding Annual Maintenance Agreements.

NOTE

1. Due to a variety of building constructions employed, fasteners for mounting cabinet to wall are not furnished by STERIS. Wall(s) must be adequately reinforced to *support operating weight of* cabinet.

ENGINEERING DATA

Unit	Approx. Unit Wt. lbs (kg)
Single-Compartment:*	
18" Wall/Counter Mounting	124 (56)
18" Recess Mounting	98 (45)
24" Wall/Counter Mounting	142 (65)
24" Recess Mounting	115 (52)
Double-Compartment:**	
18" Open-mounted	302 (137)
18" Recessed Mounting	266 (121)
24" Open-mounted	353 (160)
24" Recessed Mounting	306 (139)

** For 220/240 Volt units, add 8 lbs (3.6 kg). For glass door option, add 6 lbs (2.7 kg).*
*** For 220/240 Volt units, add 15 lbs (6.8 kg). For glass door option, add 6 lbs (2.7 kg).*

INTERNAL DIMENSIONS AND CAPACITY

Unit	Upper Chamber Single Chamber Unit (Height x Width x Depth)	Lower Chamber Double Chamber Unit (Height x Width x Depth)
18" Depth	15-1/2 x 23-3/4 x 16-7/8" – 3.6 cu. ft. (394 x 603 x 429 mm)	38-1/4 x 23-3/4 x 16-7/8" – 8.9 cu. ft. (972 x 603 x 429 mm)
24" Depth	15-1/2 x 23-3/4 x 22-7/8 – 4.9 cu. ft. (394 x 603 x 581 mm)	38-1/4 x 23-3/4 x 22-7/8 – 12 cu. ft. (972 x 603 x 581 mm)

UTILITY REQUIREMENTS - Single Compartment Model

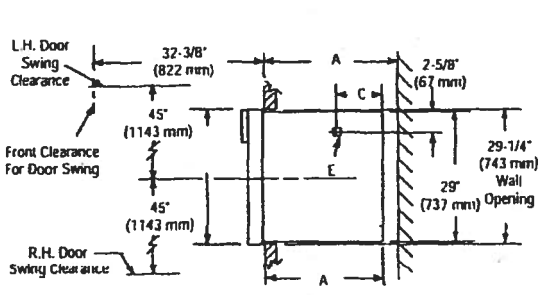
Electricity (E)

120 Volt, 50/60 Hz, 1-Phase, 6.8 A, 800 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 3.6 A, 869 Watts

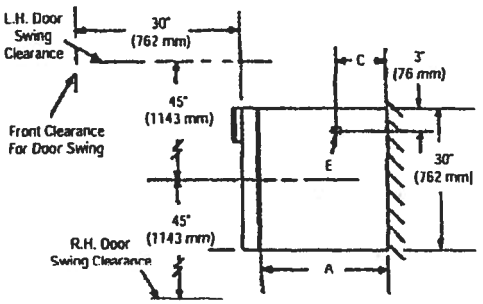
. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)

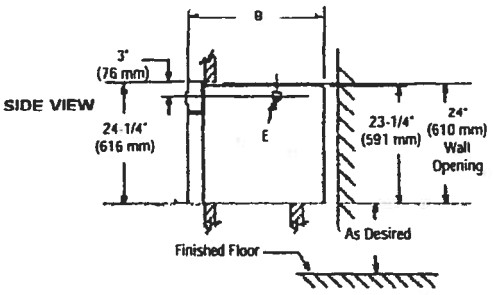
SINGLE-COMPARTMENT MODEL



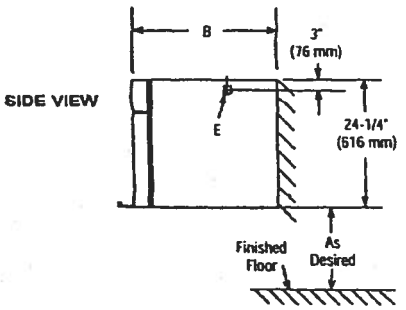
PLAN VIEW



PLAN VIEW



For Recessing



Wall/Counter Mounting

NOTE: Because of STERIS's continuing program of research and development, all specifications and descriptions are subject to change without notice. Obtain certified drawings for design, and installation.

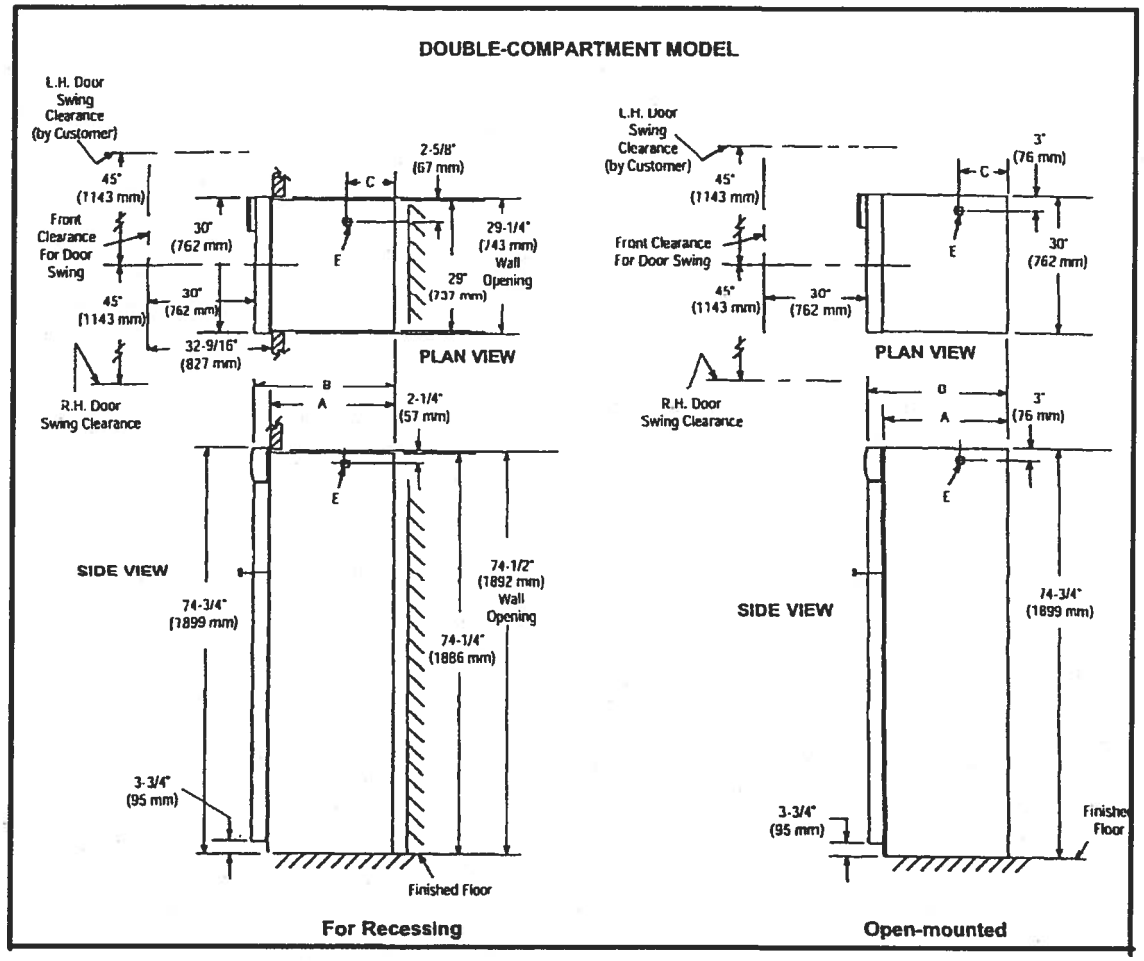
UTILITY REQUIREMENTS - Double Compartment Model

Electricity (E)

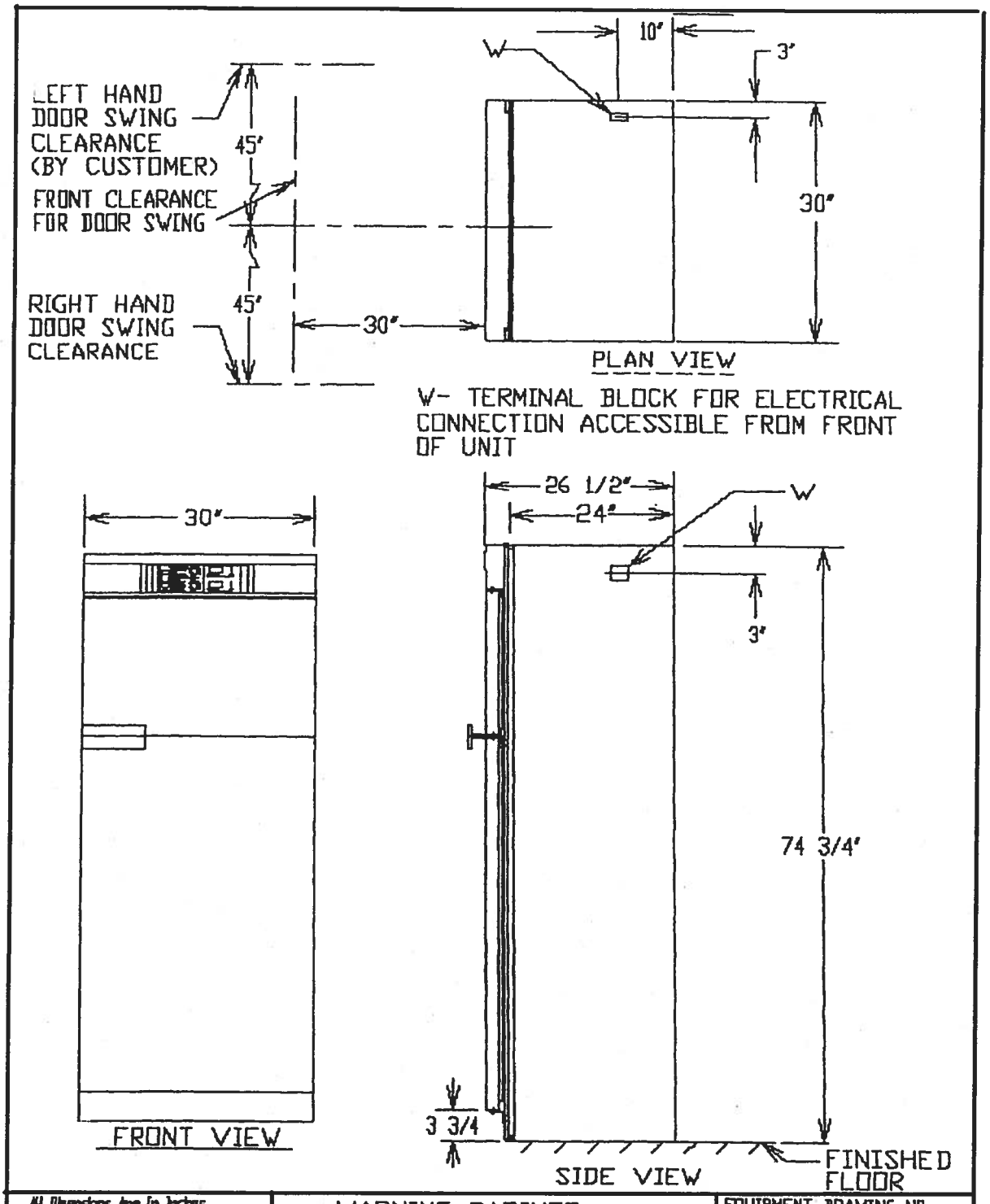
120 Volt, 50/60 Hz, 1-Phase, 13.7 A, 1600 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 6.8 A, 1625 Watts

. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)



Item # 717197



All Dimensions Are In Inches

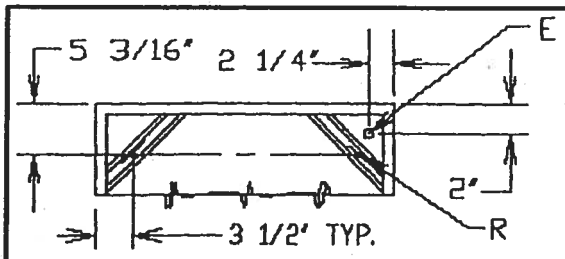
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET

24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214
SHT 1 OF 2

Item # 717197



REAR VIEW OF CABINET

E- 7/8" DIAMETER (22mm) HOLE FOR 1/2" (13mm) DIAMETER CONDUIT CONNECTION OR POWER CORD OPTION.

R- 3/8" (9.5mm) DIAMETER MOUNTING HOLES (2) FASTNERS NOT BY STERIS.

ELECETRICAL SPECIFICATIONS

VERSION	ELECTRICAL SUPPLY	POWER	CURRENT DRAW	UNIT BREAKER RATING
DOMESTIC	120V, 50/60 Hz, 1 PH	1644 WATTS	13.7 AMPS	15 AMPS
INTERNATIONAL	220-240V, 50/60 Hz, 1 PH	1625 WATTS	6.8 AMPS	10 AMPS

UNIT WEIGHT:

VERSION	UNIT WEIGHT		
	CRATED	BOXED	READY TO USE
DOMESTIC	542 LBS	410 LBS	353 LBS
INTERNATIONAL	557 LBS	425 LBS	368 LBS

UNIT CAPACITY:

	INTERNAL DIMENSIONS	VOLUME
TOP CHAMBER	22.875" DEEP X 23.75" WIDE X 15.5" HIGH 581.025mm DEEP X 603.25mm WIDE X 393.7mm HIGH	4.87 FT^3 .138 m^3
BOTTOM CHAMBER	22.875" DEEP X 23.75" WIDE X 38.25" HIGH 581.025mm DEEP X 603.25mm WIDE X 971.55mm HIGH	12.03 FT^3 .34 m^3

All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET
24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214 | SHT 2 OF 4

SEISMIC ANCHORAGE REPORT

for

74-INCH DUAL CHAMBER WARMING CABINETS

MODEL	ENGINEERING DWG. NO.	EQUIPMENT DWG. NO.
30"W X 18"D X 74"H OPEN MOUNTED	146655-541	129361-212
30"W X 18"D X 74"H RECESSED MOUNTED	146655-540	129361-213
30"W X 24"D X 74"H OPEN MOUNTED	146655-163	129361-214
30"W X 24"D X 74"H RECESSED MOUNTED	146655-162	129361-215

THE CALCULATIONS IN THIS REPORT SHOW COMPLIANCE WITH THE REQUIREMENTS OF TITLE 24 OF THE CALIFORNIA CODE OF REGULATIONS (CCR), PART 2 - CALIFORNIA BUILDING CODE (CBC) PUBLISHED AS THE 1988 EDITION OF THE UNIFORM BUILDING CODE (UBC) WITH STATE OF CALIFORNIA 1989. AMENDMENTS, SECTION 2312(g)

Prepared by: G. D. Hall — Date 8/21/91
Senior Engineer

Reviewed by: E. L. Thomas — Date 8/23/91
Project Engineer

Reviewed by: W. L. Sanders — Date
Project Manager

SEISMIC ANCHORAGE REPORT
74-INCH DUAL CHAMBER
WARMING CABINETS

AMSCO

PREPARED BY	CHECKED BY	APPROVED BY	APPROVED BY	APPROVED BY
G. Hall				
DATE 08/16/91	DATE	DATE	DATE	DATE

REVISION RECORD

REV.	DATE	APPROVED BY	PAGE	PARA.	CHANGE
0	8/16/91				Initial release PER # 24

EQUIPMENT WEIGHT & CENTER OF GRAVITY

	18"	24"	
Depth of Unit			
Weight of Cabinet (maximum)	220	260	pounds
Weight of Contents (maximum load)	360	480	pounds
Total Weight	580	740	pounds

The weight acts through the center of gravity as noted in Figures 1 and 2.

SEISMIC LOAD CALCULATIONS

Seismic load is calculated for the heavier unit from the formulae:

$F_p = Z\ I\ C_p\ W_p$ 1▸▸ 2▸▸

and:

$F_w = W_p \pm F_p/3$ 6▸▸

Where:

F_p = Lateral Seismic Force

Z = Zone Factor = 0.4 for Zone 4 locations 3▸▸

I = Importance Factor = 1.5 for essential facilities. 4▸▸

C_p = 0.75 Horizontal force factor - hospital equipment, rigid element 5▸▸

W_p = Dead weight of unit

F_w = Vertical Seismic Force

The forces then will be:

$F_p = Z\ I\ C_p\ W_p$

$= 0.4 \times 1.5 \times 0.75 \times W_p = 0.45\ W_p$

and:

$F_w = W_p \pm F_p/3 = W_p \pm (0.45\ W_p)/3 = W_p \pm 0.15\ W_p$

$F_w = 1.15\ W_p$ or $0.85\ W_p$

Seismic forces at the Warming Cabinet's C.G. are: (See Figures 1 & 2)

F_p - 0.45 X 740 = 333 lbs

F_w = 1.15 X 740 = 851 lbs

or

F_- = 0.85 X 740 = 629 lbs

EQUIPMENT ANCHORAGE INTERFACE

The equipment rest on the floor, but is anchored to the wall with three bolts as shown in Figures 1 and 2.

All the vertical seismic load is taken by the floor. The cabinet will not lift of the floor when the acceleration is upward. When the acceleration is downward, the stiffness of the cabinet is such that the load will be transmitted to the floor and not the bolts.

Friction on the floor is neglected, so all the horizontal load is taken by the bolts. It is assumed that the reaction of the floor is acting through the center of gravity producing no moment. The bolt reactions are determined by the laws of statics. When the seismic load is perpendicular to the wall, the bolts are in pure tension. When the seismic load is parallel to the wall, the bolts experience shear plus tension or compression to react the offset the center of gravity from the wall. The maximum tension any one bolt could experience is 210 pounds. The maximum shear any one bolt could experience is 180 pounds. A bolt can experience both maximum tension and maximum shear concurrently.

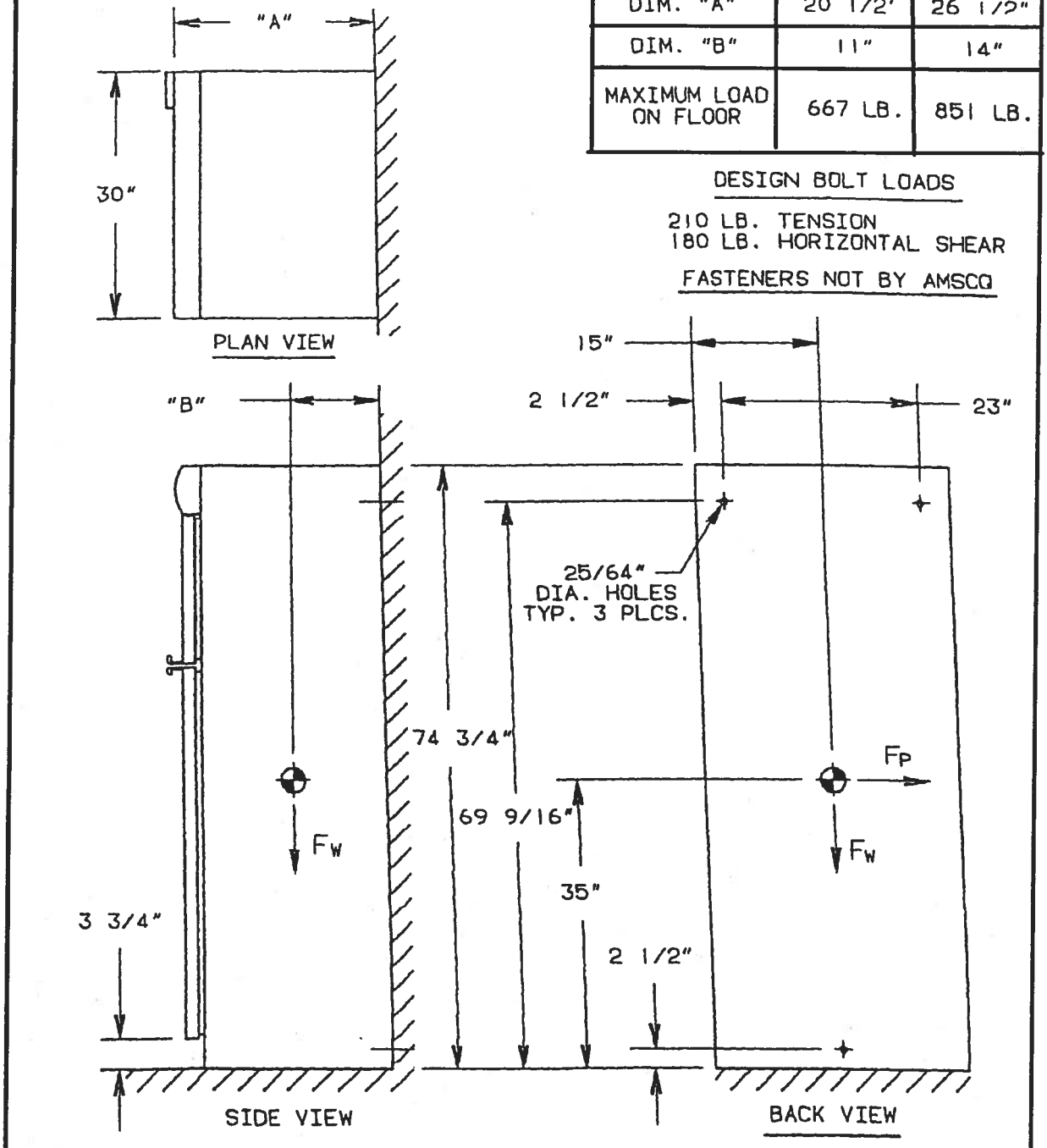
6▸▸ Reference 1▸▸ Table No. 23-P, Note 10, p. 179.54
5▸▸ Reference 1▸▸ Table No. 23-P, p. 179.53 plus notes on p. 179.26
4▸▸ Reference 1▸▸ Table Nos. 23-K and 23-L, pp 179.47 & 179.48
3▸▸ Reference 1▸▸ Table No. 23-I, p. 179.46
2▸▸ Reference 1▸▸ Section 2-312(g)2
1▸▸ Reference California Code of Regulations (CCR), Title 24, Part 2, Published as "State of California 1989 Amendments to the 1988 Edition of the Uniform Building Code".

	18" DEPTH	24" DEPTH
DIM. "A"	20 1/2'	26 1/2"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

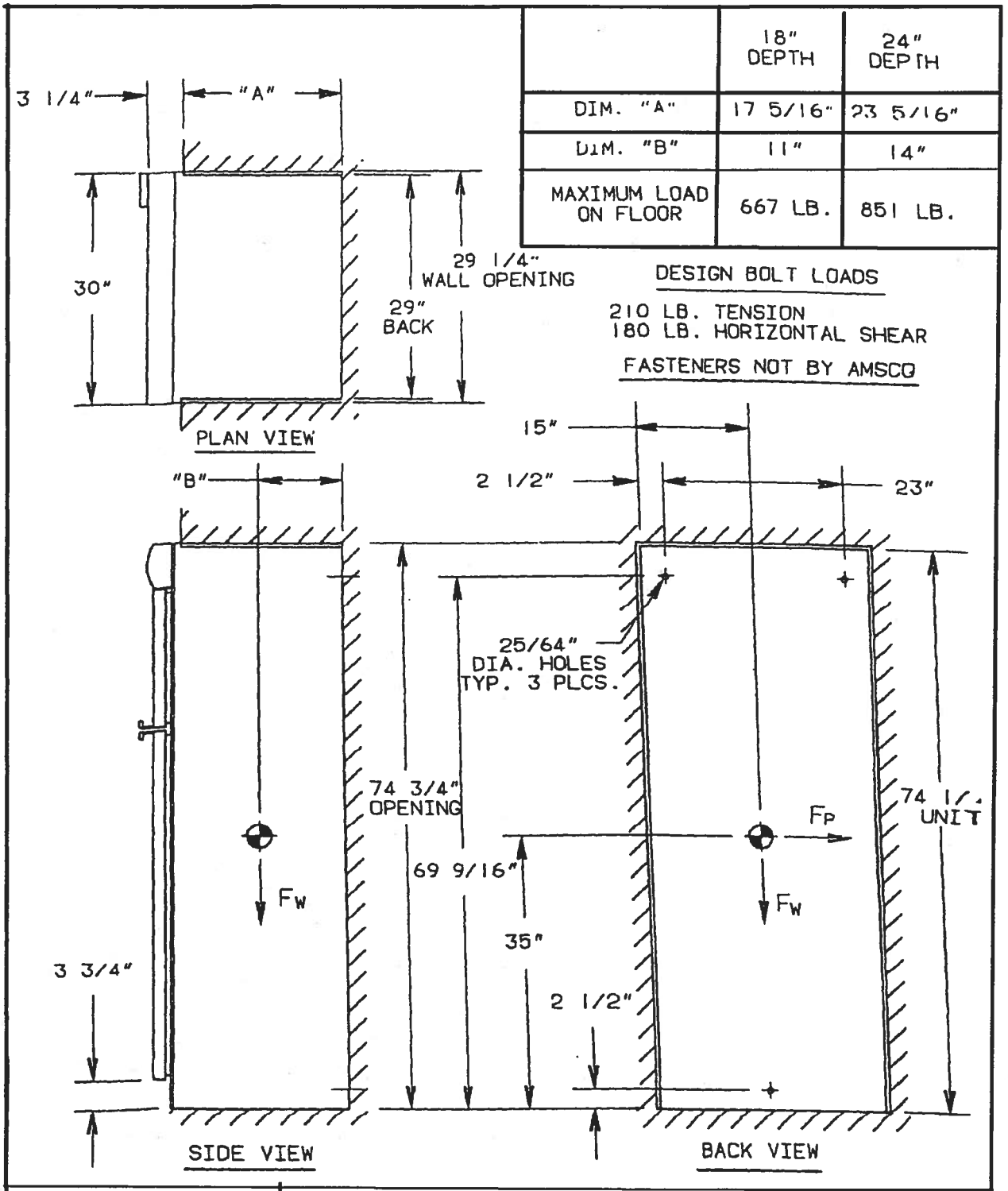
210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO



All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

Seismic Anchorage Report
Warming Cabinets, Open
30" Wide x 74" High



	18" DEPTH	24" DEPTH
DIM. "A"	17 5/16"	23 5/16"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO

All Dimensions Are In Inches
Also Refer To GENERAL NOTES
Applicable To Equipment Drawing

FIGURE 2
SEISMIC ANCHORAGE REPORT
WARMING CABINETS, RECESSED
30" WIDE × 74" HIGH

GENERAL NOTES – APPLICABLE TO SPECIALTY SURGICAL PRODUCT EQUIPMENT DRAWINGS

INTRODUCTION

Each equipment drawing (enclosed) pertains to the equipment as specified or purchased by you. These general notes and recommendations are intended to complement the equipment drawing(s), as necessary, and thereby further assist you in achieving satisfactory installation of the equipment. The information on this and the enclosed drawing(s) is based upon the design and construction of the equipment as of the date of the drawing.

SPACE CONSIDERATIONS

Clearances

The clearance dimensions shown on each drawing are the minimum considered necessary to allow space for servicing and operating the equipment.

Dimensions

Attention must be given to the *printed dimensions* shown on each drawing, since no attempt has been made to hold these drawings to any specific scale.

MOUNTING DETAILS

For Wall Mounting

It is important that walls be adequately reinforced to support the operating weight of the equipment as shown on the drawing. Materials and labor for such support are not furnished by STERIS.

Recessing Cubicle

Wooden bucks, where required to anchor equipment to the walls, are to be furnished by the Customer.

The recessing cubicle should be adequately ventilated to maintain temperature in the range of 80° to 90°F (27° to 32°C) when the equipment is in operation.

UTILITY SERVICE REQUIREMENTS

Roughing-in for Equipment Requiring Steam and/or Water Supply

All lines should be short-stubbed through the floor or wall, far enough to allow for pipe coupling. Provisions must be made for short-swing connections to equipment terminals.

Terminal Fittings

Unless otherwise specified in the contract or purchase order, piping and other appurtenances between terminal fittings on the equipment and wall or floor outlets (stubbing) are not furnished by STERIS.

Pipe Sizes

Pipe sizes shown on each equipment drawing indicate utility service terminals. To ensure adequate service, the lines leading to and from the equipment should be increased in size to conform with applicable plumbing codes.

Shutoff Valves

Separate shutoff valves should be installed in steam and water supply lines near each piece of equipment, so that the unit can be serviced without interruption of supply to other equipment.

Steam Return Lines

Steam return lines should be connected to a gravity system piped to a *vented receiver*. *Avoid any piping* arrangement that could cause back pressure in the return line.

Steam and Water Pressures

Steam and water pressures indicated on each drawing are to be dynamic at the equipment.

Equipment is adequately equipped to operate on the pressures listed on the equipment drawing. If supply line pressure exceeds those shown, provide reducing valves. These are not furnished by STERIS unless specifically called for in the contract or purchase order.

Wiring Terminals

Wiring on the equipment terminates at a junction box or boxes as shown on each drawing. Wiring and other appurtenances between junction box (or boxes) and building service lines are not furnished by STERIS.

Disconnect Switches

Disconnect switches with off position lockout only must be furnished and installed by the Customer in electric supply lines near each piece of equipment.

IMPORTANT

STERIS assumes no responsibility for changes made necessary through failure to explicitly observe these instructions and recommendations. In all instances, local, county, state, and national regulations should be observed.

STERIS SHIPPING INSTRUCTIONS AND SERVICE REQUIREMENTS

PREPARATION FOR SHIPMENT

Each unit of equipment shall be placed in a substantial shipping container or crate complying with applicable rules of the I.C.C. Uniform Freight Classification to ensure acceptance by the common or other carrier for safe transportation to final destination at the lowest rate. The shipping crate or container for heavy equipment (such as sterilizers and water stills) shall be of skid construction to facilitate handling by lift equipment.

The exterior of each container shall be clearly and legibly marked with the room, floor and item number (if available), shipping address, and brief description of the contents. A packing list and complete instructions for uncrating the equipment and setting it in place shall be fastened to the outside of the container or crate; such information shall be protected by a waterproof envelope. Packaging, packing, and marking differing from that above shall be provided, if specified.

INSTALLATION INSTRUCTIONS

Unless additional copies are specified, one set of complete installation instructions, including prints showing all utility service requirements, space requirements and wiring diagrams (if not affixed to the equipment) shall be furnished with each unit of equipment.

OPERATING AND MAINTENANCE INSTRUCTIONS

Instructions for operating and performing periodic preventive maintenance on each unit of equipment, including a list of the service parts and quantity of each required for this purpose, shall be furnished. Unless otherwise specified, one copy of this material shall be furnished.

SERVICE AFTER INSTALLATION*

After installation of each assembly, STERIS shall provide a factory-trained technician to perform repair service as required by the customer. This service shall be on a time and material basis unless the equipment is still within the manufacturer's warranty.

If specified, STERIS shall provide a factory-trained technician to perform preventive maintenance services on each assembly following its test and demonstration.

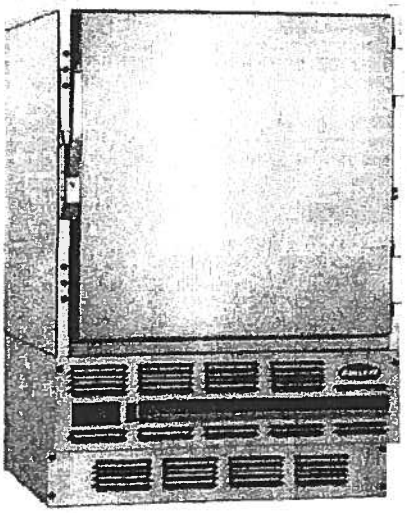
* *These services are available from the STERIS Corporation within the continental United States, Alaska, and Hawaii.*

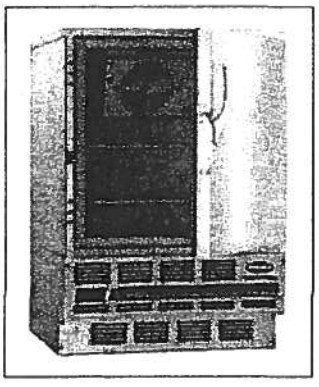
Item # 717197

Symphony REF Series Undercounter Refrigerators

Medical-grade undercounter refrigerator with external digital temperature display and stainless steel interior/exterior.

Model	
REF5	for standard 36" (915mm) counters, 4.8 cu ft capacity





Proper storage for expensive medications and patient supplies

- Heavy-duty compressor, forced air cooling and solid state controller maintain uniform cabinet temperatures with quick pull-down to temperature
- Adjustable set point meets temperature range requirements for different applications:
  36°F – 46°F (3°C – 8°C) for medications,
  33°F – 40°F (1°C – 5°C) for food and beverages
- Locking door handle provides medication security
- Supports JCAHO standards on medication storage
- NSF listing ensures temperature stability in adverse conditions and with frequent door openings

More features designed specifically for healthcare

- Easy-to-read external temperature display allows easy temperature logging
- Positive door latch and magnetic gasket provide secure closure
- Two, easy-to-clean, epoxy-coated shelves accept narcotic box hardware (supplied by others)
- Two models – for standard 36" (915mm) counter and 34" (864mm) ADA-compatible counters

Easy installation, cleaning and care

- Front-breathing design allows installation in standard 24" (610mm) casework opening with no side clearances
- Field-reversible door and handle for left or right opening
- Condensation evaporates automatically
- Automatic, off-cycle defrost eliminates manual defrosting
- Durable stainless steel interior and exterior for easy cleaning
- Slide-out compressor tray for easy access to condenser

Industry's best warranty

- 2-yr parts and labor on entire refrigerator
- 5-yr parts on compressor

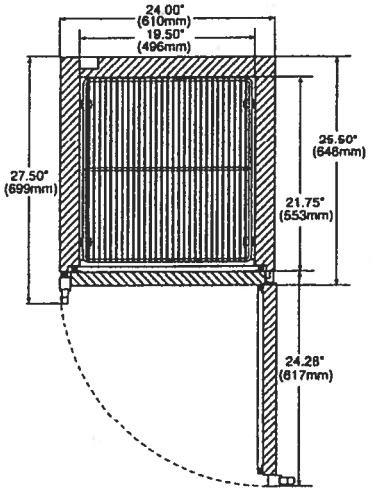
Accessories

- Temperature alarm with probe and °F/°C display
- Pyxis® compatible door bracket

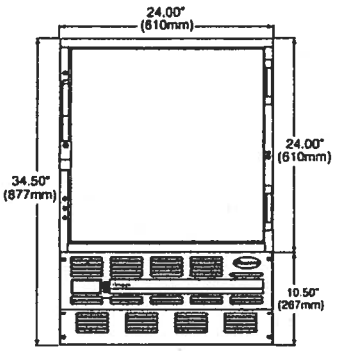
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REV: tlg 10/21/03

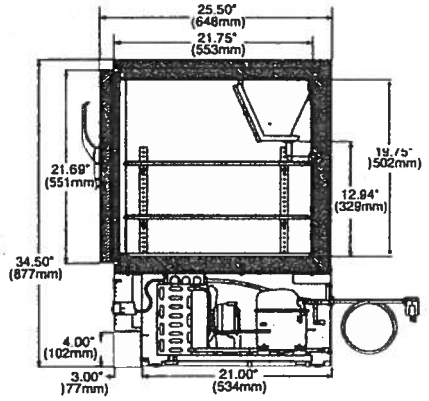
Top View
all models



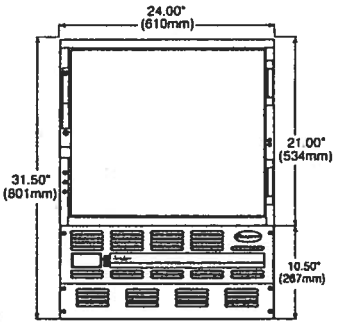
Front View
REF5



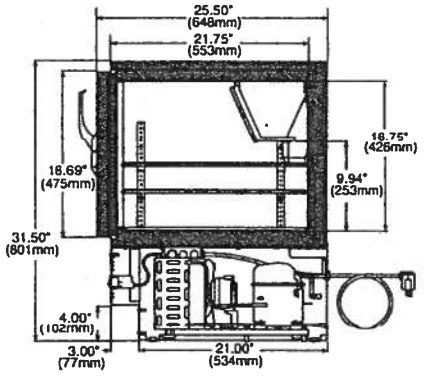
Side View
REF5



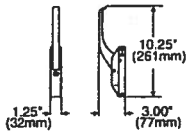
Front View
REF4-ADA



Side View
REF4-ADA



Handle Detail
all models



Plug Detail
all models
NEMA 5-15



Approximate Shipping Weight 175 lbs (79kg)

Standard Electrical 115V, 60Hz, 1 ph, 8.0 amps, max. fuse 15 amps
Hospital-grade cord and plug provided.

Specifications
Follett undercounter refrigerator to be model (choose one) _____ REF5 34.5" (877mm) high for use in standard counters or _____ REF4-ADA 31.5" (801mm) high for use in 34" (864mm) high ADA-compatible counters. REF5 to have 4.8 cu ft (136L) capacity. REF4-ADA to have 4.0 cu ft (113L) capacity. Environmentally-friendly R404A refrigeration system to include heavy-duty 1/4 HP compressor, blower, blower coil and automatic evaporative forced air cooling with off-cycle defrost. Refrigerator to be equipped with external temperature display in °F/°C and solid-state controller to maintain uniform cabinet temperatures. Controller to have programmable set points to meet temperature range requirements of different applications: 30°F – 40°F (2°C – 8°C) for medications, 33°F – 40°F (1°C – 5°C) for food and beverage. Refrigerator door to be field-reversible and equipped with replaceable gasket and chrome-plated handle with cylinder lock. Refrigerator interior and exterior to be stainless steel. Two epoxy-coated wire shelves adjust in 1/2" (13mm) increments. Storage area to be insulated with high-density, non-CFC foam polyurethane. Hospital-grade cord and plug provided. Refrigerator to be NSF, UL and cUL listed.

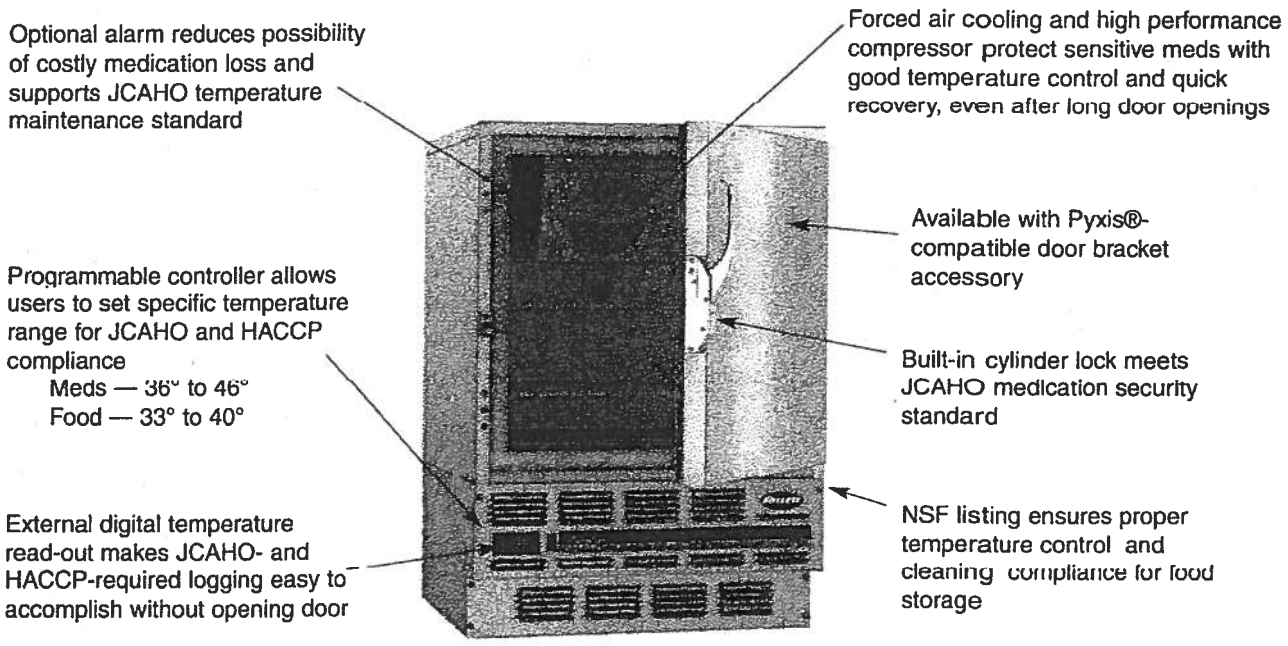
Item # 718171

Meets medication and food storage requirements

Follett's REF5 and REF4-ADA medical-grade undercounter refrigerators provide the features and performance to meet both JCAHO standards and local and state requirements for medication and food storage.

JCAHO's medication standard (TX 3.5/MM.2.20) addresses proper storage and control of medications, and at a minimum requires the logging of temperatures, lockable security for medications, and the maintenance of constant appropriate temperature.

State and local inspectors generally follow HACCP guidelines requiring temperature logging to ensure that perishable food is maintained below 40°F.



High-quality design and full stainless steel construction deliver outstanding performance and long-term reliability, backed with the industry's best warranty. Our component performance testing supports this claim:

- Compressor (1/4 hp, heavy-duty) — over 1.6 million on-off cycles without failure
- Fan, controller, and condenser — over 39,000 run hours without failure
- Door gasket — over 38,000 openings and closings with no measurable wear
- Door hinges — over 1 million cycles without measurable wear
- Door — tested open to 450 pounds of direct weight without failure

NSF - National Sanitation Foundation; JCAHO - Joint Commission on Accreditation of Healthcare Organizations; HCAAP - Hazardous Analysis of Critical Control Point Program

END OF SPECIFICATION

UNIT SPECIFICATIONS SHEET

LFGI-4USP LAMINAR FLOW GLOVEBOX / ISOLATOR

SECTION I. PERFORMANCE DATA

The Laminar Flow Glovebox/Isolator provides the ultimate in both product and operator protection. The LFGI functions as a Glovebox while operating under negative pressure to meet NIOSH recommendations and as an Isolator under positive pressure to meet USP <797> regulations. HEPA filtered unidirectional (laminar) air bathes the work area to protect the product from contamination and removes any particulate generated by sample manipulation. The operator is provided a complete barrier from materials being manipulated in the work area. The LFGI Series of barrier isolators meet or exceed ISO 14644-1 Class 5 air quality. Each LFGI, before shipping, undergoes rigorous physical testing to assure the unit meets performance requirements as validated. It is required that independent certification be performed before use.

SECTION II. EQUIPMENT SPECIFICATIONS

Construction-

-Overall Dimensions: 66 W (50" W at base) x 32" D x 80" H
-Work Area Dimensions: 46 ½" W x 24 ½" D x 29" H
-Designed to fit through standard door openings and elevators.
-All stainless steel construction both inside and out with a pharmaceutical grade finish.
-316L Stainless steel work trays slide over one another and are removable to facilitate easy clean up under the work deck.
-All viewing panels are stainless steel framed Acrylic
-Front viewing panel is top hinged and self supporting for easy access to the work area for cleaning and equipment ingress.
-All filter diffuser / guard panels are removable for easy cleaning.
-Straight sides and back maximize work area to accommodate the many types and shapes of pharmacy equipment and compounders.
-All corners in work area, antechamber and work surface are easily reached and cleaned.

Antechamber-

-Sealed two-door airlock (16" W x 13 ½" D x 14 ¼" H) maintains complete environmental separation between work area and ambient conditions.
-HEPA filtered purge of trapped airlock air eliminates cross contamination between the work area and the room during both material ingress and egress.

Waste Removal-

-Trash tube is a 4" diameter tube, flanged for waste bag/container connection and provided with an easily removable seal/stopper to maintain work area containment. (Stainless trash can is available)
-Sharps tube is a straight 2 ½" diameter tube to facilitate quick drop of the largest syringes and provided with an easily removable seal/stopper to maintain work area containment.
-Fully adjustable sharps container shelf accommodates most commercially available wide mouth or hinged top sharps collectors. (Examples BD Part # 305610 and 305491)

Safety-

-Lock-out handle requiring key for access to work area.
-Digital pressure readout with low pressure alarm for work area.
-Inward/Outward face velocity is 95-100 linear feet per minute at gloveport opening, to protect operator/product during massive breach of containment.
-Glove changes can be made without breaking containment.
-Locking casters are standard, seismic anchors are available.

Ergonomics-
-Hydraulic assist height adjusting stand offers a full 10" range variance allowing operators to sit or stand comfortably for extended time periods.
-Stainless steel sliding tray inside the airlock pulls into the work area eliminating reaching strains.
-Two part sleeve/glove system allows the use of most types and sizes of commercially available gloves for better dexterity and tactility.
-Extra large oval gloveports are placed with bottoms together to provide an athropometrically correct configuration that accommodates a wide range of body types and increases range of movement.
-Gloveports have a 3" arm rest to reduce operator fatigue.
-Large viewing panel is at an angle to reduce glare and operator strain.
-Integrated foot rest.

Configuration Options-
-Overall work area pressure can be either positive or negative and can be altered in-place by a certifier.
-Antechamber can be left or right handed or can be installed on both sides.
-Waste and sharps removal tubes can be left or right handed or can be installed on both sides.
-Three available exhaust options that can be factory set or changed by a certifier in-place.

Filtration-
-Full framed standard size minipleat HEPAs filter 100% of inlet and exhaust air from both the work area and the antechamber to provide a fully contained environment.
-HEPA filters are full coverage and front loading for easy replacement by a certifier.
-A Prefilter extends the life of the work area supply HEPA filter and can be replaced without tools.

Electrical-
-High capacity motor/blower systems with speed control to extend HEPA filters life.
-Ten foot hospital grade power cord with molded grounded plug.
-Sealed outlet in work area.
-Separate lighted power ON/OFF indicator switches for blower and lighting.
-High efficiency, standard sized fluorescent lights are externally mounted to minimize heat build-up.
-Voltage = 115 Volt, 60 Hz (220/50-60 Hz also available).
-Amperage Rating = 15, Running Amperage = 6

Exhaust-
-Clean air plenum is external to the work area.
-Constructed to allow for optional outside venting of exhaust air.
-Constructed to allow for 3 exhaust options that can be factory set or changed by a certifier in-place
-Venting is not required for operation but is optional.

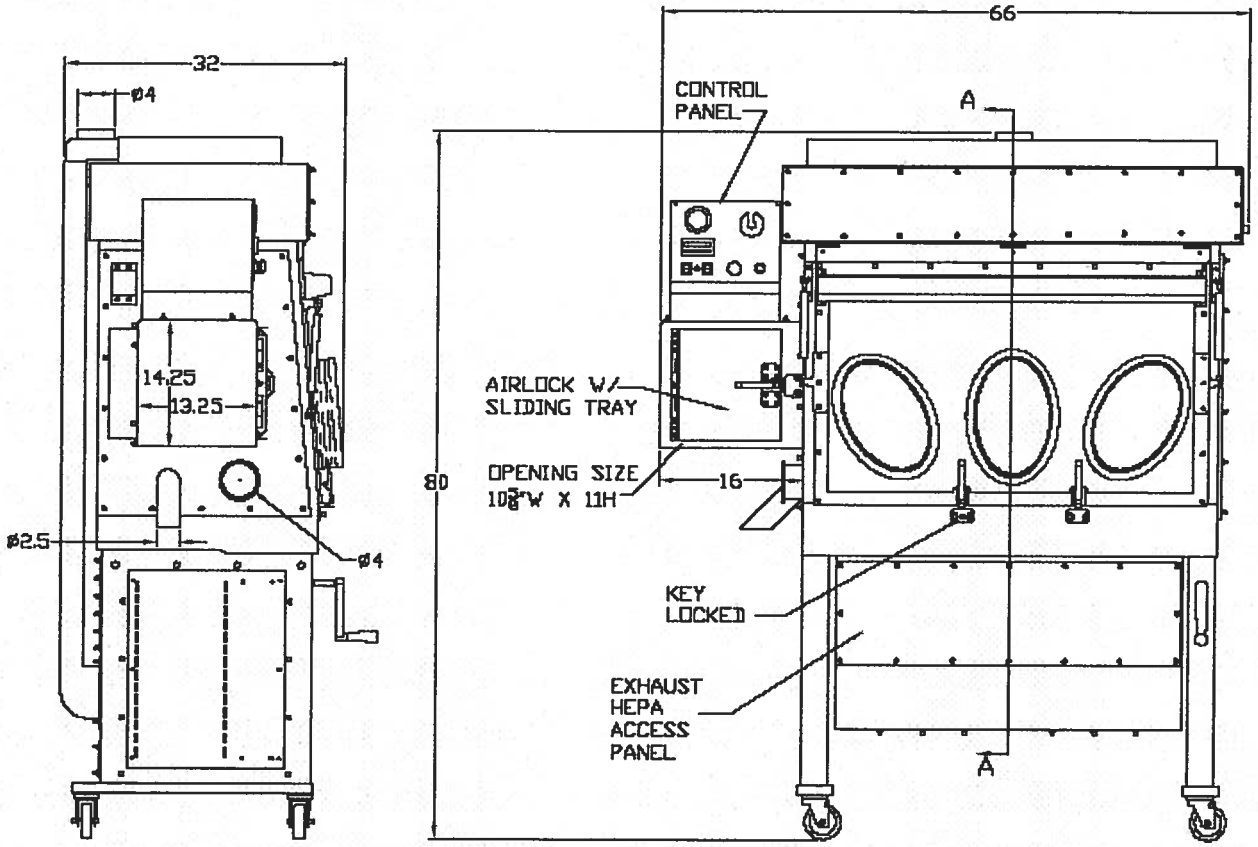
	No Exhaust- ~100% recycling of air	Controlled Exhaust- 80% recycling of air	Total Exhaust- no recycling of air.
Exhaust Connection	N/A	4" OD flexible hose	8" OD flexible duct
Exhaust CFM	20	80	400
Exhaust Static	N/A	<1 inch w.c.	Up to 2 inches w.c. (depending upon configuration)

Weight-
Net Weight- 625 lbs
Shipping Weight- 755 lbs

SECTION III. OPTIONAL EQUIPMENT AND ACCESSORIES-

LFGI-A80 Ergonomic task chair with anti-bacterial and anti-microbial vinyl covering, various colors
LFGI-A85S Stainless steel cleaning handle with pivot head. Accepts lint- free mop heads (LFGI-A85M)
LFGI-A8E Electrical Height Adjustment (requires additional plug-in)
LFGI-A83 Stainless steel garbage can (hangs on side to contain waste bags)
LFGI-A12 Exhaust ventilation kits

SECTION IV. UNIT DIAGRAM



END OF SPECIFICATION

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

Legend

D/R = Contractor De-Install & Relocate
CR = Contractor Rough-in Only
IR = Installation & Assembly Responsibility
F = Facility
C = Contractor
V = Vendor
N = New
E = Existing

Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	2-2099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	3-3073	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	4-4099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	5-5099	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1085	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1112	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	2-2082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	4-4082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1040	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1085	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1112	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3042	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3073	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4071	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5099	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1040	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1112	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	2-2071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	3-3042	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	4-4071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	5-5071	C				
475604	(Model: GTS18KBP) #GTS18KBP; REFRIGERATOR, TOP FREEZER,	3-3054	C				
477300	(Model: GMR04AAM) #GMR04AAM; REFRIGERATOR, UNDERCOUNTER	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1112	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	3-3073	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1070	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1085	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1112	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3017	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3027B	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3042	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3073	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4082	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5099	C				
15152	(Model: 101461) # 101461; ILLUMINATOR, 1 PANEL	3-3066	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	3-3073	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5099	C				
717197	(Model: DJ04112033-01) #DJ04112033-01; WARMING CABINET	3-3055	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	3-3072	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5097	C				
JC2725	(Model: QUOTE) LAMINAR FLOW GLOVEBOX	3-3054	C				
C2859	(Model: QUOTE) DISPLAY CASE & REFRIGERATOR	1-1002	C				

COID PROJECT NUMBER: _____

OWNER FURNISHED EQUIPMENT DELIVERY SCHEDULE

NOTE: Per the Contractor Guideline Book this OFE Delivery Schedule MUST be completed and returned BEFORE the first invoice is paid!

PROJECT NAME: _____

Project Phase Description (if applicable): _____

Project Location: _____

Project Completion Date: _____ **Completion Date This Phase:** _____

Owner Equipment Mgr. _____ **Phone:** _____

Owner Construction Mgr. _____ **Phone:** _____

Hospital Material Mgr. _____ **Phone:** _____

Contractor's Supt.: _____ **Phone:** _____

Contractor's Project Mgr. _____ **Phone:** _____

OWNER FURNISHED/CONTRACTOR INSTALLED EQUIPMENT

NOTE: Include date for special backboxes (such as OR Lights, Illuminators, etc.) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor will coordinate with HCA Equipment Manager for safe storage.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:

HCA Equipment Manager:
HCA Construction Manager:
Hospital Construction Contact:
Hospital Materials Manager:

ENGINEERED SYSTEMS EQUIPMENT DELIVERY SCHEDULE

(Sample on Following Page)

EXPLANATION / INSTRUCTIONS: HCA requires that the enclosed Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule Form to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed. This information enables owner vendors to ship cable and backboxes and equipment, as well as, schedule installation to meet the construction schedule. It is critically important that one schedule document be provided for each separate occupancy phase of the project.

Please see "Team Construction: Routine / Repetitive Phase" for general contractor's responsibilities for management of the owner furnished systems process and installation of all raceway and cable installation on some systems. It is the contractor's responsibility to update and redistribute this document if the construction schedule changes.

NOTE: **No Payments can be made until receipt of this schedule(s) by the HCA Construction Manager.**

OWNER PROJECT#_____

ENGINEERED/SYSTEMS INFORMATION & TELEPHONE SYSTEMS
EQUIPMENT DELIVERY SCHEDULE

Project Name: _____ Date: _____
Project Location: _____ Revision Date: _____
Description of this phase (if applicable) _____
Completion Date of this phase: _____
Project Completion Date: _____ Revised: _____
Owner's Construction Manager: _____
Owner's Equipment Manager: _____ Phone #: _____
Information & Telephone Systems Cabling Installation Project Manager: _____
Information and Telephone Systems Project Manager: Bob Stewart Phone #: 615-344-8010
General Contractor Superintendent: _____ Phone #: _____
Electrical Contractor Project Manager: _____ Phone #: _____

Installation or Need Equipment Delivered

ITEM/DESCRIPTION	OWNER FURNISHED OWNER INSTALLED	OWNER FURNISHED CONTRACTOR
INSTALLED	DATE:	DATE:
1. Wiring Schematics/Cut Sheet		_____
2. Engineered Systems Cable		
Cable & Special Backboxes		_____
3. T.V. Brackets		_____
4. Radio Tower	_____	
5. Information Systems:		
Cable:	_____	
Telephone Equipment:	_____	
Data Equipment:	_____	
6. Nurse Call System/Sound System:	_____	
7. Intercom System	_____	
8. Dictation System	_____	
9. MATV System	_____	
10. TV Set Installation	_____	
11. Systems Inspection	_____	_____
12. State Inspection	_____	_____
13. Demobilize Job site	_____	_____

DISTRIBUTION BY HCA CONSTRUCTION MANAGER:
Information & Telephone Systems: Bob Stewart
HCA Construction Manager:
HCA Equipment Manager:
Hospital Construction Contact:
General Contractor's Project Manager:

Owner/ Vendor Installed Equipment Delivery Schedule

ITEM	Date Building Will Be Ready For Installation
Kitchen Equipment	
Walk-In Cooler & Freezer	
Radiology Equipment	
Shelving/Lockers	
Patient Room Furniture	
Office/Waiting Furniture	
Drapes/Cubicle Curtains/Shower Curtains	
Artwork	
Others (as may be applicable)	

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
1. ANESTHESIA ADMINISTRATION		X	X	X	X									
2. AUDIO / VISUAL / PERSONNEL TRAINING AIDS										X	X	X	X	To be coordinated via DD session. Information Systems will budget.
a. Portable										X	X	X	X	
b. Systems										X	X	X	X	
3. AUTOMATED TRANSPORT SYSTEMS (Pneumatic Tube)						X	X	X	X					Check with Bulk Purchasing
4. CARTS														
a. Anesthesia		X	X	X	X									
b. Case, Surgical		X	X	X	X									
c. Cast		X	X	X	X									
d. Crash		X	X	X	X									
e. Endoscopy		X	X	X	X									
f. E.N.T		X	X	X	X									
g. Environmental Svcs		X	X	X	X									
h. Food Service		X	X	X	X									
i. Fracture		X	X	X	X									
j. Gift Shop (Hospitality)		X	X	X	X									
k. Isolation		X	X	X	X									
l. Linen		X	X	X	X									
m. Medication		X	X	X	X									
n. Miscellaneous		X	X	X	X									
o. Supply		X	X	X	X									
p. Tool		X	X	X	X									
q. Trash		X	X	X	X									
r. Utility		X	X	X	X									
s. Wrap		X	X	X	X									
5. CASEWORK														
a. Focal						X	X	X	X					Check with Bulk Purchasing
b. Standard						X	X	X	X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Volce (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
c. Special (Modular)						X	X	X	X					Check with Bulk Purchasing Typically Vendor Installed
d. Keyboards (Duplicate under furniture)						X	X	X	X					
6. CHAIRS, EXAM/TREATMENT														
a. Contour (Donor, I.V.)		X	X	X	X									
b. Dental		X	X	X	X									
c. Eye / ENT		X	X	X	X									
d. Miscellaneous		X	X	X	X									
e. Phlebotomy		X	X	X	X									
7. CHARTING SYSTEMS, PATIENT														
a. Manual		X	X	X	X									
b. Computerized										X	X	X	X	
c. Wall-hung chart station						X	X	X	X					
8. CLOCKS														
a. Discrete (Battery / Plug-in)						X	X	X	X					
b. Interval Timers / Recorders						X	X	X	X					
c. Systems, Cenralized						X	X	X	X					
d. Kronos Time & Attendance										X	X	X	X	
9. COMMODES														
a. Fixed						X	X	X	X					
b. Portable		X	X	X	X									
10. COMMUNICATIONS EQUIP/SYSTEMS														
a. Dictation														
1. Portable										X	X	X	X	
2. Systems, Hardwired										X	X	X	X	
b. Doctors' Registry						X	X	X	X					
c. Emergency Radio		X	X	X	X									Contractor to pull cable
d. Intercom		X	X	X	X									Contractor to pull cable
e. Nurse Call		X	X	X	X									Contractor to pull cable

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HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
f. Side Com Receptacle		X	X					X	X					
g. Radio / Pocket Paging		X	X	X	X									Contractor to pull cable
h. Two Way Radio		X	X	X	X									Contractor to pull cable
i. Telephone										X	X	X	X	
j. Overhead Page / Music		X	X	X	X									Contractor to pull cable
k. Transcription										X	X	X	X	
l. Public Address		X	X	X	X									Contractor to pull cable
m. Fax Machines										X	X	X	X	
n. Picture Archive and Communication Systems (PACS)										X	X	X	X	
11. COMPACTORS														
a. External						X	X	X	X					
b. Departmental						X	X	X	X					
12. DARKROOM EQUIPMENT														
a. Cabinet, Film Storage		X	X					X	X					
b. Miscellaneous		X	X	X	X									
c. Safelights						X	X	X	X					
d. Transfer Boxes, Cassette						X	X	X	X					
e. Revolving X-Ray Door						X	X	X	X					
13. DATA / WORD PROCESSING EQUIPMENT														
a. Desktop Computer										X	X	X	X	
b. Mainframe										X	X	X	X	
c. Network Equipment										X	X	X	X	
d. Backbone and/or Station Wiring										X	X	X	X	
14. DIALYSIS EQUIPMENT														
a. Peritoneal		X	X	X	X									
b. Renal		X	X	X	X									
15. EQUIPMENT MANAGEMENT SYSTEMS (Equipment Boom)		X	X	X					X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
16. ELECTROCARDIOGRAPH EQUIPMENT		X	X	X										
17. ELECTROSURGICAL EQUIPMENT		X	X	X	X									
18. ENVIRONMENTAL ROOMS						X	X	X	X					
(Prefabricated)														
19. ENVIRONMENTAL SERVICES EQUIP		X	X	X	X									
20. FIRE PREVENTION EQUIPMENT														
a. Blankets		X	X					X	X					
b. Cabinets, Extinguisher						X	X	X	X					
c. Extinguishers						X	X	X	X					
d. Systems						X	X	X	X					
21. FOOD SERVICE EQUIPMENT														
a. Grp. I (Hoods, Walk-Ins)		X	X	X	X									Elec. contractor makes actual connection
b. Grp. II (Moveable: Ovens, Dishwasher)		X	X	X	X									
c. Grp. II (Smallwares: Pots, Trays, Carts)		X	X	X	X									
d. Final Equipment Placement Set in place; caulking; touchup														Work to be completed by food service vendor
e. Garbage Disposals						X	X	X	X					
f. Cash register										X	X	X	X	
22. FREEZERS (excluding Food Svc Equip)														
a. Chest		X	X					X	X					
b. Miscellaneous		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in/Prefabricated		X	X	X	X									Elec. contractor make actual connection
23. FURNISHINGS, DESIGN														

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Accessories, Design	X													
b. Artwork / Graphics		X	X	X	X									
c. Bulletin Boards/Tack Boards/Chalkboards/Marker Boards						X	X	X	X					
d. Carpet						X	X	X	X					Check with Bulk Purchasing
e. Curtains, Cubicle						X	X	X	X					
f. Curtains, Shower			X	X	X	X								
g. Furniture, General - Existing			X	X	X	X								Interior Designer to spec fabric
h. Furniture, General			X	X	X	X								
i. Signs, Exterior						X	X	X	X					Check with Bulk Purchasing
j. Signs, Interior						X	X	X	X					Check with Bulk Purchasing
k. Waste Receptacles														
Clinical		X	X	X	X									
Non-Clinical			X	X	X	X								
l. Window Treatment / Blinds/ Cornice Boards			X	X	X	X								Except Blinds that are internal with window units
m. Wall Protector (ie: bumper / bed / handrail/corner guards)						X	X	X	X					
n. Keyboards - in workstations, duplicate in casework						X	X	X	X					
o. Planters			X	X	X	X								
p. Plants	X													
24. FURNITURE, PATIENT ROOM														
a. Beds		X	X	X	X									
b. Cribs		X	X	X	X									
c. Mattresses		X	X	X	X									
d. Table, Overbed		X	X	X	X									
e. Cabinets, Bedside		X	X	X	X									Interior Designer Specification Responsibility Per Equipment Managers Direction
f. Chairs, Lounge		X	X	X	X									
g. Chairs, Side		X	X	X	X									
h. Chests		X	X	X	X									
i. Desks		X	X	X	X									
j. Dressers		X	X	X	X									
k. Wardrobes (except built-ins)		X	X	X	X									
25. HAMPERS, LINEN		X	X	X	X									
26. HEART-LUNG MACHINES		X	X	X	X									

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
27. HOODS														
a. Biohazard		X	X					X	X					
b. ETO						X	X	X	X					
c. Fume		X	X					X	X					
d. Laminar Flow		X	X					X	X					
e. Radioisotope		X	X					X	X					
28. HOT LAB EQUIPMENT														
a. Nuclear Medicine		X	X	X	X									
b. Radiation Therapy		X	X	X	X									
29. HYPO-HYPERTHERMIA EQUIPMENT		X	X	X	X									
30. ICE MACHINES		X	X					X	X					
31. ILLUMINATORS, X-RAY FILM														
a. Motorized		X	X					X	X					
b. Recessed		X	X					X	X					
c. Surface Mounted		X	X					X	X					
32. IMAGING EQUIPMENT														
a. Computerized Axial Tomography (CT)		X	X	X	X									
b. Dental Radiography		X	X	X	X									
c. Digital Radiography		X	X	X	X									
d. Image Intensifier, Portable		X	X	X	X									
e. Magnetic Resonance Imaging		X	X	X	X									
f. Magnetic Resonance Imaging Rigging							X	X						Contractor responsible
g. Mammography Equipment		X	X	X	X									
h. Nuclear Camera		X	X	X	X									
I. Nuclear Medicine Accessories		X	X	X	X									
j. Radiation Therapy Equipment		X	X	X	X									
k. Radiation Therapy Accessories		X	X	X	X									
l. Radiographic Equipment		X	X	X	X									
m. Radiographic Equipment Accessories		X	X	X	X									
n. Single Photon Emission		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
Computed Tomography														
o. Ultrasound Equipment		X	X	X	X									
p. Shielding (Lead, Magnetic, RF)						X	X	X	X					
q. Vibration Testing (MRI)														Contractor responsible
r. Picture Archive and Communication Systems (PACS)										X	X	X	X	
1. Cardiology and Radiology										X	X	X	X	
s. Cath Lab		X	X	X	X									
33. IMPRINTERS AND EMBOSSERS										X	X	X	X	
34. INCINERATOR														
a. Pathological						X	X	X	X					
b. Waste - Autoclave/Shredder						X	X	X	X					
35. INFANT CARE EQUIPMENT														
a. Bassinets		X	X	X	X									
b. Incubators		X	X	X	X									
c. Neonatal Care Systems		X	X	X	X									
d. Phototherapy Equipment		X	X	X	X									
e. Warmers		X	X	X	X									
36. INSTRUMENTS, EXAM														
a. Portable		X	X	X	X									
b. Wall Mounted	X	X	X	X	X									
(BP units, Oto/Ophth Sets)														
c. Diagnostic Board - Wallmount		X	X						X					
37. INSTRUMENTS, SURGICAL		X	X	X	X									
38. INTRAVENOUS PUMPS / CONTROLLERS		X	X	X	X									
39. LAB ANALYZERS / INSTRUMENTATION		X	X	X	X									
40. LASER DEVICES														

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Ophthalmic		X	X	X	X									
b. Surgical		X	X	X	X									
41. LAUNDRY SERVICE EQUIPMENT														
a. Washer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
b. Dryer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
42. LIGHTS														
a. Exam														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
b. Patient Headwall Lights						X	X	X	X					
c. Surgical														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
43. LOCKERS:														
NON PUBLIC AREAS						X	X	X	X					
PUBLIC AREAS						X	X	X	X					
BENCHES IN LOCKER ROOMS						X	X	X	X					
44. MAIL ROOM EQUIPMENT		X	X	X	X									
45. MAINTENANCE TOOLS & EQUIPMENT		X	X	X	X									
46. MATERIALS HANDLING / CONTROL EQUIPMENT		X	X	X	X									
47. MEDICAL GAS / VACUUM SYSTEM														
a. Primary System (Piping)						X	X	X	X					Check with Bulk Purchasing
b. Secondary Equipment		X	X	X	X									

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
(Regulators & Flowmeters)														
48. MEDICINE CENTERS						X	X	X	X					
a. Prefabricated						X	X	X	X					
b. Automated	X									X				
49. WEATHER GOOSE										X	X	X	X	
50. MISCELLANEOUS GROUPS II & III EQUIPMENT		X	X	X	X									
51. MONITORING EQUIPMENT, PHYSIOLOGICAL														
a. Ambulatory Systems														
1. ECG		X	X	X	X									
2. EEG		X	X	X	X									
b. Discrete Monitors														
1. Bedside		X	X	X	X									
2. Fetal		X	X	X	X									
c. Hardwired Systems		X	X	X	X									Contractor to pull cable
d. Miscellaneous Monitors		X	X	X	X									
e. Telemetry Systems		X	X	X	X									Contractor to pull cable
52. NARCOTICS LOCKERS						X	X	X	X					
53. NEUROLOGICAL EQUIPMENT														
a. Electroconvulsive Therapy Device		X	X	X	X									
b. Electroencephalographs		X	X	X	X									
c. Electromyographs		X	X	X	X									
d. Evoked Response Devices		X	X	X	X									
e. Misc. Equipment & Accessories		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
54. NOURISHMENT CENTERS (Prefabricated)						X	X	X	X					
55. OCCUPATIONAL THERAPY EQUIPMENT		X	X	X	X									
56. OFFICE MACHINES														
a. Calculators	X													Facility Operational Expense
b. Cash Registers										X	X	X	X	
c. Miscellaneous Equipment	X													Facility Operational Expense
d. Mobile Storage Equipment (Rotary)		X	X	X	X									
e. Photocopiers ie, Xerox	X													Facility Operational Expense
f. Typewriters	X													Facility Operational Expense
57. OPHTHALMIC EQUIPMENT														
a. Control Systems		X	X	X	X									
b. Portable		X	X	X	X									
58. ORTHOPEDIC APPARATUS		X	X	X	X									
59. OVENS / RANGES / MICROWAVES (Other than Food Service)														
a. Fixed		X	X					X	X					
b. Portable		X	X	X	X									
60. PATIENT SERVICE SYSTEMS (Prefabricated Headwall)														
a. Column - ICU / OR / RR / ER						X	X	X	X					
b. Headwall - LDRP						X	X	X	X					Check with Bulk Purchasing
c. Flatwall - ICU / ER / RR / Patient Room						X	X	X	X					
d. Headwall Accessories						X	X	X	X					
e. Anesthesia Gas Delivery Systems - Column Drops or Gas Boom Format						X	X	X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
61. PHYSICAL MEDICINE / REHAB EQUIP.														
a. Fixed (ie swimming pools)						X	X	X	X					
b. Hydrotherapy		X	X					X	X					
c. Portable		X	X	X	X									
62. PRINTING EQUIPMENT										X	X	X	X	
63. PROCEDURE SUPPORT EQUIPMENT (Portable, Stainless Steel)		X	X	X	X									
64. PROCESSORS, X-RAY FILM														
a. Processor		X	X					X	X					
1. Cine		X	X					X	X					
2. Darkroom		X	X					X	X					
b. Replenishment Systems, Chemical		X	X	X	X									
c. Silver Recovery Devices		X	X	X	X									
d. Laser Imager		X	X	X	X									
65. PROJECTION SCREENS						X	X	X	X					
SMART BOARDS		X	X	X	X									
66. PULMONARY FUNCTION EQUIPMENT		X	X	X	X									
67. REFRIGERATORS (exclude Food Service)														
a. Countertop		X	X	X	X									
b. Mortuary		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in / Prefabricated		X	X	X	X									Elec. contractor makes actual connection
68. RELIGIOUS ARTIFACTS		X	X	X	X									
69. RESPIRATORY THERAPY EQUIPMENT		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
70. RESUSCITATION EQUIPMENT		X	X	X	X									
71. RODS, CURTAIN (shower)						X	X	X	X					
72. SAFES		X	X	X	X									
73. SCALES														
a. Autopsy		X	X					X	X					
b. Bed		X	X	X	X									
c. Chair		X	X	X	X									
d. Clinical Exam		X	X	X	X									
e. Platform		X	X					X	X					
74. SCHEDULING SYSTEMS (automated)										X	X	X	X	
75. SCRUB SINKS						X	X	X	X					
76. SECURITY SYSTEMS														
a. Infant Abduction		X	X	X	X									Contractor to pull cable
b. CCTV - Campus Security		X	X	X	X									Contractor to pull cable
c. Door Access (ie: readers & locks)						X	X	X	X					With Equipment input
77. SHELVING / STORAGE EQUIPMENT														
a. High Density Systems		X	X	X	X									
b. Standard / Flat Steel - New		X	X	X	X									
c. Standard / Flat Steel - Existing		X	X	X	X									
d. Wire		X	X	X	X									
e. Miscellaneous (except built-in)		X	X	X	X									
f. Built-in						X	X	X	X					
78. STERILE PROCESSING EQUIPMENT														
a. Aerators		X	X					X	X					
b. Generator, Steam		X	X					X	X					
c. Loading / Processing Accessories		X	X	X	X									
d. Sonic Cleaners		X	X					X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
e. Steam Gun		X	X					X	X					
f. Sterilziers, Countertop		X	X					X	X					
g. Sterilizers, ETO Gas		X	X					X	X					
h. Sterilizers, ETO Gas / Aerator		X	X					X	X					
i. Sterilziers, ETO Gas / Steam		X	X					X	X					
j. Sterilizers, Electric / Steam		X	X					X	X					
k. Washers, Cart		X	X					X	X					
l. Washer, Fiberoptics		X	X					X	X					
m. Washers / Decontaminators / Sanitizers		X	X					X	X					Requires minimum of 9' ceiling
79. STRESS TEST EQUIPMENT		X	X	X	X									
80. STRETCHERS		X	X	X	X									
81. TABLES														
a. Autopsy		X	X					X	X					
b. Cysto		X	X	X	X									
c. Exam / Treatment		X	X	X	X									
d. Processing		X	X	X	X									
e. Surgical		X	X	X	X									
82. TELEVISION SYSTEMS														
a. Television Sets		X	X	X	X									Contractor to pull cable & install blocking
b. CCTV - Patient Monitoring		X	X	X	X				X					Contractor to pull cable & install blocking
c. Mounting Brackets		X	X					X	X					Contractor to install blocking & wall brackets
d. Antenna Systems		X	X	X	X									Contractor to pull cable
e. Cable TV (entrance cable to H-END location)	X													Equip. Mgr. notifies facility, contractor & TV vendor to coordinate installation w/local cable TV vendor for entrance cable.
83. TEMPERATURE ALARMS / RECORDERS		X	X					X	X					Blood Bank / Morgue Only

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
84. TOILET ROOM DEVICES														
a. Grab Bar						X	X	X	X					Check with Bulk Purchasing
b. Paper Towel Dispensers						X	X	X	X					Check with Bulk Purchasing
c. Sanitary Napkin Dispensers						X	X	X	X					Check with Bulk Purchasing
d. Soap Dispensers						X	X	X	X					Check with Bulk Purchasing
e. Toilet Paper Holder						X	X	X	X					Check with Bulk Purchasing
85. TRACK														
a. Curtain (Cubicle)						X	X	X	X					
b. Intravenous (including carriers & pendants)						X	X	X	X					
86. WATER CONDITIONING SYSTEMS														
a. Deionized						X	X	X	X					
b. Distilled						X	X	X	X					
c. Reverse Osmosis						X	X	X	X					
87. WATER COOLERS						X	X	X	X					
88. WHEELCHAIRS		X	X	X	X									

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VENDOR CONTACT MASTER

VENDOR	NAME/ADDRESS	CONTACT	PHONE	FAX	Web Address
902100	Abbott 100 Abbott Park Rd Dept 2FC-AP6C 5th Floor Abbott Park, IL 60064-6083	Rick Gooch	(708) 937-6161	(847) 937-0871	www.abbottdiagnostics.com
10517	Advanced Sterilization 33 Technology Drive Irvine, CA 92718	Customer Service	(800) 755-5900	(949) 450-6800	www.cidex.com
25360	AGFA Medical & Sterling Diag. 8170 Habersham Waters Rd. Dunwoody, GA 30350	Tom Koch	(800) 581-2432 Ext. #1238	(201) 288-3367	www.agfa.com
10451	Aladdin 250 East Main Street Hendersonville, TN 37075	Eric Roebuck	(800) 888-8018	(615) 748-3659	www.aladdintemprite.com
10240	Alimed 297 High Sttreet Dedham, MA 02026-9135	Robert Fralick	(800) 225-2610 Ext. #157	(800) 437-2966	www.alimed.com
10055	American Art Resources 3262 Sul Ross Houston, TX 77098	Kathy Hathorn	(800)282-0204	(713)527-9676	www.americanartresources.com
915200	ARJO 50 North Gary Ave Unit A Roselle, IL 60172	Terry Capp	(800) 323-1245 Ext. #6159		www.arjo.com
12599	Art Resource Team (A.R.T.) 2526 Homestead Place Cincinnati, OH 45211	Tony Baird	(513) 662-1998	(513) 662-6977	www.artresourceteam.com

VENDOR CONTACT MASTER

15000	Baker Company PO Drawer E Sanford Airport Sanford, ME 04073	Customer Service	(207) 324-8773	(207) 324-3869	www.bakerco.com
15012	Baring Industries 1808 West End Ave, Suite 814 Nashvill, TN 37203	Tom Esberger	(615) 321-0272	(615) 321-5667	www.baring.com
15026	Berchtold 1950 Hanahan Road Charleston, SC 29406	Jeff Dunkley	(800) 243-5135 ext. 334	(843) 569-6133	www.berchtoldusa.com
15382	Biodex Medical Brookhaven R&D Plaza 20 Ramsey Rd, Box 702 Shirley, NY 11967-0702	Marie Springman	(631) 924-9000 Ext. #234	(681) 924-9338	www.biodex.com
15206	Boehringer Laboratories, Inc. 500 E. Washington Street Norristown, PA 19401	Eileen Welty	(610) 278-0900	(610) 278-0907	www.boehringerlabs.com
20633	Camtronics Ltd. Medical System 900 Walnut Ridge Drive Hartland, WI 53029	Steve Crandall	(866) 694-2510		www.camtronics.com
933800	Cardinal Health & Medical Prod. 1750 Stoneridge Dr. Stone Mountain, GA 30083	Renee Hensley	(800) 889-1065 Ext. #3307	(770) 270-9645	www.cardinal.com/mps or www.cardinalhealth.com
901500	Cardinal Health & Medical Services 1750 Stoneridge Dr. Stone Mountain, GA 30083	Paula Watkins	(800) 633-0333	(800) 488-3987	www.cardinal.com/mps or www.cardinalhealth.com
21879	Cardinal Respiratory Care 1500 Waukegan Rd McGaw Park, IL 60085	Shelly Lancaster	(800) 637-1500 Ext. #1521	(630) 369-9302	www.cardinal.com/mps or www.cardinalhealth.com

VENDOR CONTACT MASTER

21433	Common Cents Solutions PO Box 5454 Jackson, MS 39288-5454	Tom Bunting	(888) 932-3687 Ext. #36	(601) 932-9414	www.commoncents.net
25350	Data Cash Register 942 Woodland Street Nashville, TN 37206		(615) 227-6978	(615) 227-7589	www.dcrpos.com
960400	Datascope 4117 Hillsboro Rd 103-303 Nashville, TN 37215	Kevin Wampler	(800) 288-2121	(800) 266-9624	www.datascope.com
25160-4	Diagnostic Imaging 199 Foster Brothers Drive West Columbia, SC 29172	Larry Myers	(803) 796-7038	(803) 796-9749	
920100	Dictaphone 147 Country Club Drive Hendersonville, TN 37075	Mike Collier	(888) 471-3463 Ext. # 4277	(203) 683-2169	www.dictaphone.com
956200	Dukane 27545 Diehl Rd., Suite 200 Warrenville, IL 60555	Angelo Lopez	(630) 836-3745	(630) 836-3805	www.dukane.com
944800	Follett 801 Church Lane PO Box D Easton, PA 18044	Gary Gutman	(800) 523-9361	(610) 250-0696	www.follettice.com
35570	Food Systems 318 Seaboard Lane, Bldg 100 Suite 114 Franklin,TN 37067	Beverly LeBlanc	(866) 662-4279 (615) 261-0400	(615) 261-0401	www.foodsystemsul.com
967600	GE Appliances (Acct #FMD30) 307 N. Hurstborne Pkwy Louisville, KY 40222	Skip Alcorn Jason Cropper	(615) 264-8994 (800) 782-8031 x4	(800) 772-6704	www.geappliances.com

VENDOR CONTACT MASTER

904100	GE Healthcare Datex-Ohmeda PO Box 7550 Madison, WI 53707-7550	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.datex-ohmeda.com
902900	GE Healthcare Technologies 830 Crescent Centre Dr. Suite 460 Franklin, TN 37067	Milton Mueller	(615) 472-2409 Cell: (615) 519-3357	(414) 918-8200	www.gehealthcare.com
40006-4	GE Medical System (Dia) PO Box 414, WT895 Milwaukee, WI 53201	Terri	(800) 232-2599	(800) 558-5102	www.gehealthcare.com
953600	GE Healthcare I.T. (Marquette) 8200 West Tower Ave Milwaukee, WI 53223	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.gehealthcare.com
968700	GE - OEC Medical Systems 3724 National Drive, Suite 100 Raleigh, NC 27612	Hurley Raynor	(800) 728-6596	(919) 881-8367	www.gemedicalsystems.com
912700	Getinge USA PO Box 3208 Augusta, GA 30914-3208	Carlton Colcough	(800) 475-9040	(716) 272-5283	www.getingeusa.com
921000	Grainger 1021Charlotte Avenue Nashville, TN 37203	Kevin Kolff	(615)480-7783 (800)994-2336	(615)331-0485	www.grainger.com
914300	Hill-Rom 1069 State Road, 46 East Batesville, IN 47006-9164	Doug Weigel	(800) 445-3730	(812) 934-1442	www.hill-rom.com/products
934300	Drager/ Air Shields 1069 State Road, 46 East Batesville, IN 47006-9164	Lisa Aiello	(800) 437-2437 x2358	(812) 934-1442	
920700	Interior Design Services 209 Powell Place Brentwood, TN 37027	Daryl Dunn	(615) 376-1222	(615) 376-3510	www.ids-tn.com

VENDOR CONTACT MASTER

51073	Thermo Electron 308 Ridgefield Ct. Asheville, NC 28806	Josh Camp	(800) 252-7100 828-658-2882	(828) 658-0363	www.thermo.com or www.kendro.com
914700	Medquist/ Lanier Healthcare 5930 Metric Place, Suite 200 Norcross, GA 30092	James Thomas	(251) 945-3412 (866) 856-3000	(943) 337-5752	www.medquist.com or www.lanier.com
929400	Medline Industries, Inc. 105 Continental Drive Brentwood, TN 37027	Jeff Fair	(615)373-2142 (888)897-7557	(615)373-2486	www.medline.com
916400	Medtronic Emergency Response System PO Box 97023 Redmond, WA 98073	Tammy Lombardi	(800) 442-1142 Ext. #4162	(800) 732-0956	www.medtronicphysiocontrol.com
70583	Nicolet 5225-2 Verona Rd Madison, WI 53711-4495	Kathy Hart	(800) 356-0007	(608) 441-2007	www.thermo.com
954400	Nihon Kohden 202 Kensington Place Nashville, TN 37215	Jim Fagan	(615) 292-5082	(615) 292-0584	www.nkusa.com
72016	Olympus 2 Corporate Ctr. Drive Melville, NY 11747	Betty Shaffer	(631) 844-5437 (800) 645-8100	(631) 844-5110	www.olympus-global.com
958320	Pharmed 3075 NW 107th Ave Pharmed Way Miami, FL 33172-2134	Carolyn Thomas	(800) 683-7342 Ext 342 (305) 592-2324	(800) 621-9511	www.pharmed.com
11331	Philips - ATL Ultrasound Ste 540 501 Corporate Centr Dr., Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com

VENDOR CONTACT MASTER

74031-1	Philips Medical Imaging 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com
914200	Philips Medical (Monitoring) 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Roger Duffy	(615) 472-2207	(615) 472-2273	www.philips.com
944500	Quinton 3303 Monte Villa Pkwy Bothell, WA 98021	Bob Atkins	(800) 426-0347	(425) 402-2001	www.quinton.com
76007	Radiology Specialty PO Box 406 Hermitage, TN 37076	Bob Webb	(615) 885-5326	(615) 885-4691	
924800	Rauland Borg Corporation 3450 West Oakton Street Skokie, IL 60076-2951	Alex Veytsel	(847) 324-8380 Ext. #380	(847) 679-4106	www.rauland.com
81742	Sara Lee Coffee & Tea 990 Supreme Dr. Bensonville, IL 60106	Kory Mickelsom	(800) 621-4100	(773) 489-7323	www.saraleecoffee.com
956000	Simplex Grinnell 9855 Carroll Canyon Rd San Diego, CA 92131	Randy Wilkins	(858) 279-8010	(858) 740-0157	www.tycoin.com
904600	Standard Textile PO Box 371805 Cincinnati, OH 45222	Tricia Partin	(800) 888-5000 Ext. #270	(800) 926-0043	www.standardtextile.com
912000	Steris/ Amsco Products 2448 Shiland Dr. Rock Hill, SC 29732	Randy Marks Dave Piver Lara Stark	(800) 989-7575 Randy #23117 Dave #21152	(440) 392-8902	www.steris.com
55026	Storage Systems, Inc. 318 Seaboard Lane Bldg. 100, Suite 115 Franklin,TN 37065	Bill Kreager	(888) 614-0004 (615) 261-6900	(615) 261-6906	www.storagesystemsul.com

VENDOR CONTACT MASTER

901100	Stryker Medical 4100 East Milham Ave. Kalamazoo, MI 49001-6197	Gloria Phillips	(800) 800-4236 ext. 1456	(800) 610-4408	www.stryker.com
929900	Telehealth/Telerent 4205 Hillsboro Rd Suite 303 Nashville, TN 37215	Darrell Leftwich	(615) 383-7836	(615) 383-4226	www.telehealth.com
85060-1	Toshiba 2150 F Northmont Pkwy Duluth, GA 30136	Craig Hamilton	(770)476-9992	(770) 476-1511	www.tobshiba.com/tams/newtams
921500	US Surgical 5920 Longbow Dr. Boulder, CO 80301	Customer Service	(800) 722-8772	(800) 544-8772	www.ussurg.com
91734	Wireless Solutions, Inc. 720 Fesslers Lane Nashville, TN 37210	Marie Gilland	(615) 255-5670	(615) 255-9967	
925500	Zenitel 6119 Connecticut Kansas Ctiy, MO 64120	Jeanne Gramman (816) 231-7201	(816) 231-7202	(816) 231-7203	www.zenitel.com

OWNER FURNISHED EQUIPMENT BROCHURE

Revision: August 9, 2006

The Medical Center Aurora

A02429 – Bed Tower Expansion

Aurora, CO

PROJECT # 306660001

Jimmy Cagle
MANAGER, MEDICAL EQUIPMENT
(615) 344-2179
Jimmy.Cagle@HCAHealthcare.com

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ASSISTANT, MEDICAL EQUIPMENT
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HCA
The Healthcare Company.

Table of Contents

- Owner Furnished Equipment Index
- Specifications
- Project Information Sheet
- Owner Furnished/ Contractor Installed Equipment Delivery Schedule
- Owner/ Vendor Installed Equipment Delivery Schedule
- Engineered Systems Information and Telephone Systems Equipment Delivery Schedule
- Responsibility Matrix
- Vendor Contact Matrix

Owner Furnished/ Contractor Installed Equipment Notes

NOTE: Include date for special backboxes (such as OR Lights, Illuminators) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment, nurse call, ect.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor is required to store in secure environmentally controlled space and confirm with HCA Medical Equipment Manager.

NOTE: HCA required that the enclosed Owner Furnished/ Contractor Installed Equipment Delivery Schedule (excel), Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule form (word) to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed.

NOTE: No payments can be made, until receipt of the schedule(s) by the HCA Construction Manager.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:
HCA Equipment Manager
HCA Construction Manager
Hospital Construction Contact
Hospital Materials Manger

PROJECT INFORMATION SHEET

Project Title:_____ **Date of Issue:**_____
Owner Project:_____ **Revision Date:**_____
HOSPITAL:_____
ADDRESS:_____
TELEPHONE:_____ FAX:_____
ADMINISTRATOR:_____ CONTACT:_____
MATERIAL MGR:_____ PLANT MGR:_____
CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____
PROJECT MAILING ADDRESS:_____
E-MAIL ADDRESS:_____
ARCHITECT:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
INTERIOR DESIGN FIRM:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
M.P.E. ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
STRUCTURAL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
CIVIL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
MECHANICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
ELECTRICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
HCA
ONE PARK PLAZA, BLDG. 2 – 3E, NASHVILLE, TN 37203
P.O. BOX 550 (37202-0550)
TELEPHONE: 615-327-9551
DIRECTOR CONSTRUCTION:_____ PH:_____
CONSTRUCTION MANAGER:_____ PH:_____
EQUIPMENT ENG. SYS. MGR:_____ PH:_____
IS/TELECOM:_____ PH:_____

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

203200	FOLLETT CORPORATION	4	#110FB400A; ICE MAKER DISP.115/1 12.2A , SENSORSAFE DISPENSING PKG (#SENSORSAFE; $98.00), FR STANDING STG 24 1/2"W X 28.25"D X 68.125"H, 90 LBS STG, 400 LBS/DAY ICE PRODUCTION AIR COOLED. INCLUDES WATER STATION, WATER FILTER(NOT INCLUDED) **FLOOR DRAIN REQUIRED** 2--2099/1, 3--3073/1, 4--4099/1, 5--5099/1
203210	FOLLETT CORPORATION	5	#25CT400A; ICEMAKER DISPENSER, ($2,892.00) 21"W X 47.125"H X 23"D- COUNTERTOP, AIR COOLED, 25LB STORAGE CAPACITY, 400LB PER 24HR ICE PROD. TO INCL WATER STATION, SENSORSAFE DISPENSING (#SENSORSAFE; $98.00) 1--1085/1, 1--1112/1, 2--2082/1, 4--4082/1, 5--5082/1
430279	GENERAL ELECTRIC CO	14	#JEM25; MICROWAVE OVEN DIMENSIONS: 11 11/64"H X 23 25/32"W X 12 55/64"D. 120V - 60-CYCLE. CONTRACTOR TO SHELF MOUNT SELECT COLOR: BLACK - JEM25BF OR WHITE JEM25WF. 1--1040/1, 1--1085/1, 1--1112/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3042/1, 3--3073/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5071/1, 5--5082/1, 5--5099/1
475603	GENERAL ELECTRIC CO	6	#GTS18WCP, REFRIGERATOR, 17.9 CU. FT. NO FROST, W/FACTORY INSTALLED ICEMAKER; 66 5/8" H X 32 1/8"D X 29 1/2 "W. 120V/60 HZ/15AMPS. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT. 1--1040/1, 1--1112/1, 2--2071/1, 3--3042/1, 4--4071/1, 5--5071/1
475604	GENERAL ELECTRIC CO	1	#GTS18KBP; REFRIGERATOR, TOP FREEZER, 17.9 CU. FT. CAP. NO FROST. 66 5/8"H X 32 1/8"D X 29 1/2"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: BLACK, WHITE, BISQUE. HINGE: LEFT OR RIGHT. 3--3054/1
477300	GENERAL ELECTRIC CO	2	#GMR04AAM; REFRIGERATOR, UNDERCOUNTER 4.3 CU FT CAPACITY. 32 7/8"H X 21 3/4"D X 20"W, 110V. RIGHT HINGED. SELECT COLOR: BB/BLACK OR WW/WHITE 1--1085/2

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

714519	FOLLETT CORPORATION	9	#QC4-FL4S; WATER FILTER SYSTEM (ACCESSORY FOR ICEMAKER DISPENSERS). #QC4-FL4S 1--1085/1, 1--1112/1, 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
715053	SARA LEE COFFEE & TEA	19	COFFEE MAKER, LO-PROFILE MODEL #8573, 3-STATION, AUTOMATIC COFFEE BREWER, FROM SUPERIOR COFFEE FOR REFERENCE ONLY, HOSPITAL TO LEASE (MFG. - BLOOMFIELD) PLUMBING REQUIREMENT: 1/4" OR 3/8" WATER CONNECTION 1--1070/1, 1--1085/1, 1--1112/1, 2--2030/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3017/1, 3--3027B/1, 3--3042/1, 3--3073/1, 4--4030/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5030/1, 5--5071/1, 5--5082/1, 5--5099/1
715152	RADIOLOGY SPECIALTY	1	# 101461; ILLUMINATOR, 1 PANEL RECESSED MT 4 BULB 3--3066/1
715344	GENERAL ELECTRIC CO	7	#GTS17KBR, REFRIGERATOR: TOP MOUNT. NO FROST, 4 SPILT SPILL PROOF ADJ. GLASS SHELVES. 16.6 CU. FT. CAP. 64 3/4"H X 31"D X 28"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
717197	STERIS/AMSCO PRODUCTS	1	#DJ04112033-01; WARMING CABINET 24" DIGITAL; SEISMIC 3--3055/1
718171	FOLLETT CORPORATION	7	#REF5; REFRIGERATOR, UNDERCOUNTER, WITH LOCK AND KEY, STAINLESS STEEL INTERIOR/EXTERIOR, 4.8 CU. FT., 115 V, 60HZ, 1PH, 8.0 AMPS, MAX.FUSE 15 AMPS, HOSPITAL GRADE CORD & PLUG - NEMA 5-15, 33 DEGREES F - 40 DEGREES F (1 DEGREE C - 5 DEGREES C) REVERSIBLE DOOR SWING/HANDLE, 34HX23.75WX25.5D, NSF, UL & CUL LISTED. 2--2076/1, 2--2097/1, 3--3072/1, 4--4076/1, 4--4097/1, 5--5076/1, 5--5097/1

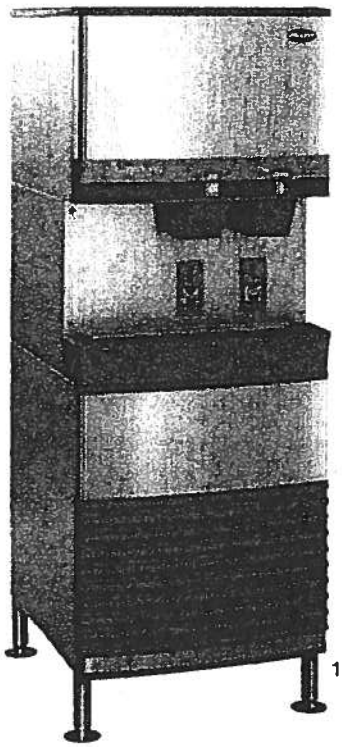
Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

JC2725	GERMFREE LABORATORIES INC.	1	LAMINAR FLOW GLOVEBOX ISOLATOR - 4 FOOT QUOTE # 200605929 58" W X 32"D X 87"H STANDARD 115V 3--3054/1
JC2859	BARING INDUSTRIES, INC.	1	DISPLAY CASE & REFRIGERATOR *****SPEC SHEET NOT INCLUDED WITH THIS DOCUMENT******* GALA SOURCE -12 CU FT REFRIGERATOR - TUR - 48SD ZESCO - COMBINATION NON-REFRIGERATED ABOVE/REFRIGERATED SERVICE CASE BELOW - 40" WIDE ENCORE 699-A-021 ********ARCHITECT TO SPEC SPACE & ELECTRICAL******** 1--1002/1

Symphony™

110FB400A air-cooled integral icemaker
110FB400W water-cooled integral icemaker

Freestanding, automatic load, ice and water dispensers with air- or water-cooled icemaker located in the base of unit. Stainless steel frame and exterior with plastic trim. Water station standard. Up to 90 lbs (41kg) storage. Produces approximately 400 lbs (181kg) of compressed nugget ice in a 24-hour period.



110FB400A/W shown with SensorSAFE accessory



Convenient, sanitary, user-friendly dispensing
- Labor-saving, sanitary automatic load
- Lever standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet™ compressed nugget ice is slow melting, easy to chew

SensorSAFE™ accessory offers even more sanitation and convenience
- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone
- Clear chute directs ice cleanly into cups, pitchers, carafes, ice bags

Space-saving, attractive design
- 24.5" (623mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

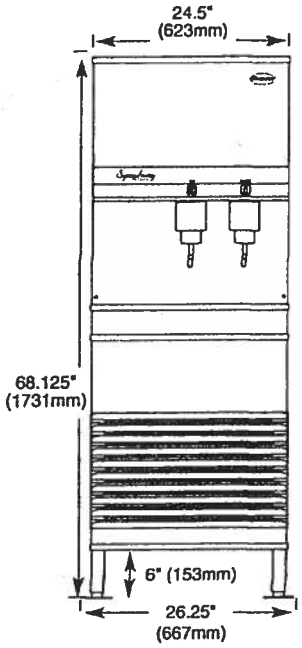
Environmentally friendly Maestro™ icemakers
- New, state-of-the-art R404A icemakers automatically load dispensers with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high wastewater
- Quiet production, no noisy harvest cycles

Accessories
- SensorSAFE actuation package
- Chilled water option
- Water filter kit
- Casters
- Up to 6 beverage valves (no beverage cooling)

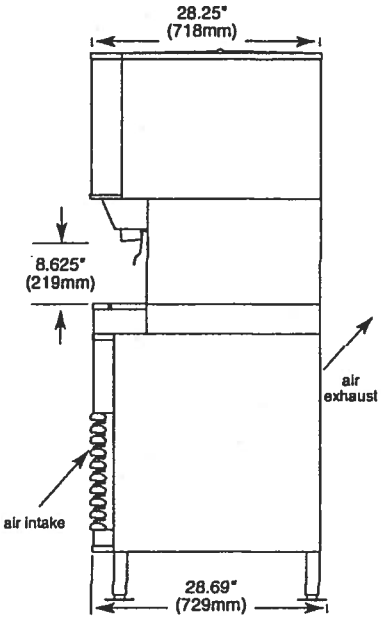
REV: tlg 7/31/03

Item # 203200

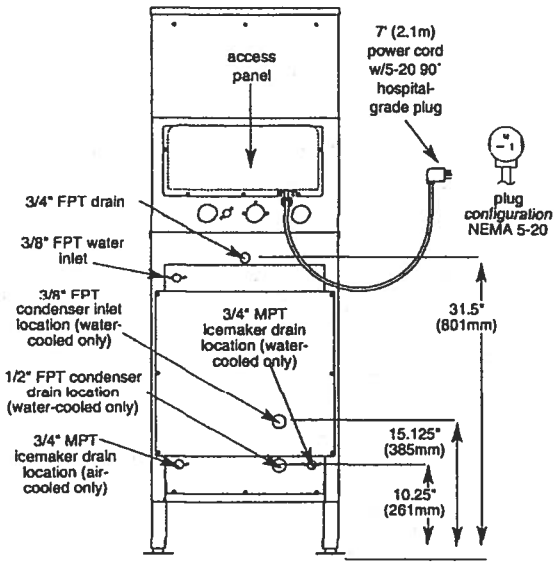
Front View



Side View



Rear View



Ice Production per 24 hours

Air-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	510 / 232	454 / 206	397 / 180	335 / 152	273 / 124	lbs. / kg.
60 / 16	482 / 219	435 / 198	389 / 177	329 / 150	270 / 123	lbs. / kg.
70 / 21	454 / 206	417 / 190	380 / 173	323 / 147	266 / 121	lbs. / kg.
80 / 27	424 / 193	385 / 175	347 / 158	297 / 135	247 / 112	lbs. / kg.
90 / 32	394 / 179	354 / 161	313 / 142	270 / 123	227 / 103	lbs. / kg.

Water-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	451 / 204	447 / 203	442 / 200	437 / 198	428 / 194	lbs. / kg.
60 / 16	423 / 192	413 / 187	409 / 185	399 / 181	394 / 179	lbs. / kg.
70 / 21	394 / 179	390 / 177	380 / 172	371 / 168	361 / 163	lbs. / kg.
80 / 27	371 / 168	361 / 164	352 / 160	342 / 155	333 / 151	lbs. / kg.
90 / 32	352 / 160	342 / 155	333 / 151	323 / 146	309 / 140	lbs. / kg.

Required clearances
12" (305mm) at top recommended for service, 4" (102mm) at rear for cleaning and ventilation

Connections
Cord and plug provided with dispenser. Wire in accordance with all local codes.

Approximate Shipping Weight 265 lbs (120kg)

Electrical Data
Standard electrical – 115V, 60Hz, 1 phase, 13.0 amps, max. fuse 20 amps

Specifications
Ice and water dispenser to be Follett freestanding, automatic load, in the following configuration with water station and _____ (air- or water-) cooled icemaker in base. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Environmentally friendly R404A icemaker to be mounted in base and to be removable as one unit for cleaning and maintenance. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispenser to have automatic bin level control to start and stop icemaker and separate circuitry to allow dispensing to continue with icemaker removed. Dispenser to be equipped with 6" (153mm) adjustable legs, flanged feet and lightweight plastic top that allows full access to the ice storage area for manual loading of back-up ice. Storage area to be insulated with high-density, non-CFC foam polyurethane. 7' cord and NEMA 5-20 hospital-grade plug provided. Dispenser to be NSF, UL and cUL listed.

Item # 203200

END OF SPECIFICATION

Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

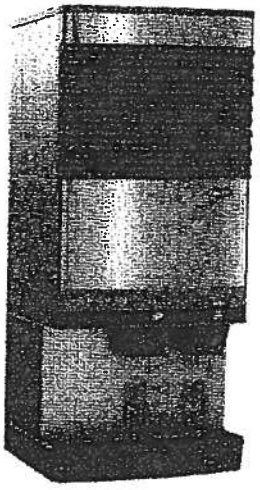
25 Series

Countertop models with (A) air- or (W) water-cooled icemaker

→ **25CT400A/W** – 115V, 60Hz, integral icemaker
25CR400A/W – 115V, 60Hz, satellite-fill icemaker
C25CT400A/W – 220V, 60Hz, integral icemaker
C25CR400A/W – 220V, 60Hz, satellite-fill icemaker
E25CT400A/W – 230V, 50Hz, integral icemaker
E25CR400A/W – 230V, 50Hz, satellite-fill icemaker

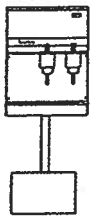
Wall mount models with (A) air- or (W) water-cooled icemaker

25HT400A/W – 115V, 60Hz, integral icemaker
25HR400A/W – 115V, 60Hz, satellite-fill icemaker
C25HT400A/W – 220V, 60Hz, integral icemaker
C25HR400A/W – 220V, 60Hz, satellite-fill icemaker
E25HT400A/W – 230V, 50Hz, integral icemaker
E25HR400A/W – 230V, 50Hz, satellite-fill icemaker

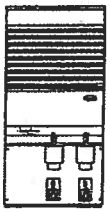


Countertop model shown with SensorSAFE accessory

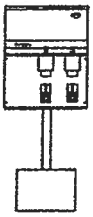
Symphony.



Countertop model with satellite-fill icemaker



Wall mount model with integral icemaker



Wall mount model with satellite-fill icemaker

Countertop and wall mount ice and water dispensers with air- or water-cooled icemaker. Stainless steel frame and exterior with plastic trim. Up to 25 lbs (11kg) storage. Produces approximately 400 lbs (181kg) of Chewblet compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever dispensing standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet compressed nugget ice is slow melting, easy to chew
- Clear chute ensures sanitary delivery and focuses ice cleanly into cups, pitchers, carafes, ice bags

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone

Space-saving, attractive design

- 21" (534mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally-friendly Maestro icemakers

- State-of-the-art R404A icemaker automatically loads dispenser with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high waste water
- Quiet production, no noisy harvest cycles
- Satellite-fill icemakers can be located up to 20 feet (6m) from dispenser; remove heat, noise and bulk from customer area

Accessories

- SensorSAFE actuation package (standard on wall mount models)
- Chilled water option (item# AFH20CHIL2550)
- Water filter kit (item# 00130229)
- Base stand (for models 25CT400A/W, C/E25CT400A/W) (item# AF50BASESTD)
- Slide-out track for satellite-fill icemakers (item# AFGSLIDER400A (air-cooled icemakers) and item# AFGSLIDER400W (water-cooled icemakers))
- Drain pan assembly for wall mount models (item# AFH25WBASE)

Job: _____

Item: 203210 Page 1 of 2

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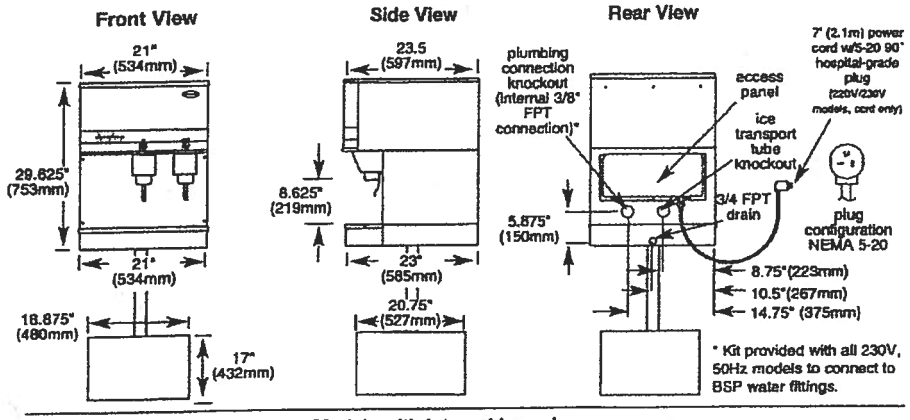
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Form #2065

25 Series

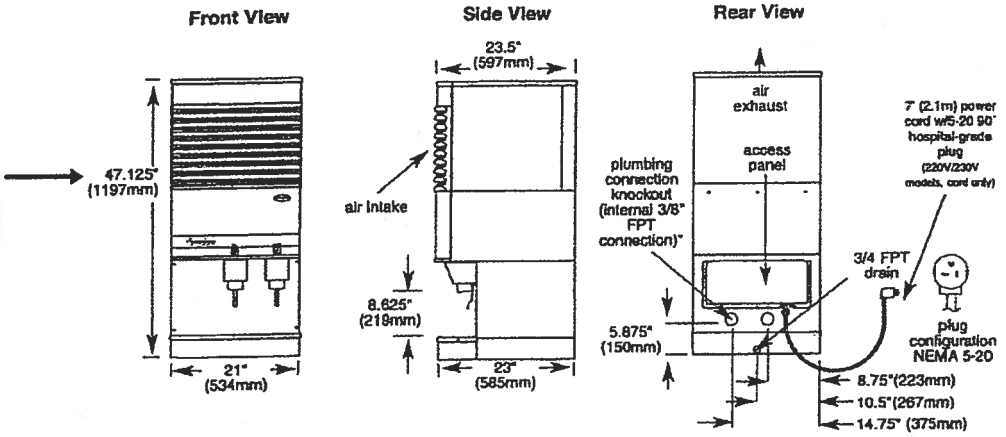
Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

Models with satellite-fill icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Models with integral icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Approximate Shipping Weights

C/E/25CT400A/W	295 lbs (134kg)	C/E/25HT400A/W	310 lbs (141kg)
C/E/25CR400A/W	250 lbs (113kg)	C/E/25HR400A/W	295 lbs (134kg)

Electrical

Standard electrical – 115V, 60Hz, 1 ph. Icemaker 11 amps, dispenser 4 amps. Cord and plug provided with each icemaker and dispensers. If local code requires hard-wiring, separate disconnects also required. Satellite-fill icemaker models require separate circuits for dispenser and icemaker.

Alternate electrical – 220V, 60Hz, 1 ph, 6.5 amps (icemaker 5 amps). 230V, 50Hz, 1 ph, 6.5 amps (icemaker 5 amps). Cord only provided with each icemaker and dispenser. Wire in accordance with all local codes.

Wall Mount Models

- Deduct 3.625" (92mm) from height shown
- Add .5" (13mm) to depth shown
- Standard with wall mounting bracket
- Standard without drain pan (drain pan available – contact factory)

Connections Utilities connect through back or bottom. Back entry shown. Supplied 2" (51mm) duct and louver must be installed for undercounter satellite-fill icemaker installations.

7 ft (2.1m) cord and NEMA 5-20 hospital-grade plug provided with each dispenser. 220V/230V models, cord only.

Required clearances

- C/E/25CT400A/W, C/E/25HT400A/W – 6" (153mm) at top for ventilation, 12" (305mm) recommended for service
- C/E/25CR400A/W, C/E/25HR400A/W – 12" (305mm) at top recommended for service

See Dispenser Detail Sheet, form# 2075 for important installation information.

Ice Production

Air-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		510	464	397	335	273	lbs.
10		232	211	180	152	124	kg
60		482	435	389	329	270	lbs.
16		219	198	177	149	122	kg
70		454	417	380	323	266	lbs.
21		206	190	172	147	121	kg
80		424	385	347	297	247	lbs.
27		193	175	158	135	112	kg
90		394	354	313	270	227	lbs.
32		179	161	142	123	103	kg

Water-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		451	447	442	437	426	lbs.
10		205	203	201	198	193	kg
60		423	413	409	399	394	lbs.
16		192	187	186	181	179	kg
70		394	390	380	371	361	lbs.
21		179	177	172	168	164	kg
80		371	361	353	342	333	lbs.
27		168	164	160	155	151	kg
90		352	342	333	323	309	lbs.
32		160	155	151	146	140	kg

Specifications Ice and water dispenser to be Follett countertop, automatic load, in (choose one) _____ countertop, _____ wall mount configuration with 25 lbs (11kg) of storage. Water station standard. Environmentally-friendly R404A icemaker to be (choose one) _____ air- or _____ water-cooled and to be removable for cleaning and maintenance. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispensers with satellite-fill icemakers to be equipped with 10' (3m) of insulated ice transport tube, 2" (51mm) air duct for icemaker (air-cooled models only) and lightweight plastic top that allows full access to the ice storage area for easy cleaning and manual loading of back-up ice. Storage area to be insulated with high density, non-CFC foam polyurethane. 7' (2.1m) cord and NEMA 5-20 hospital-grade plug provided (220V/230V models, cord only). Dispenser to be NSF, UL and cUL listed, 230V models also CE compliant.

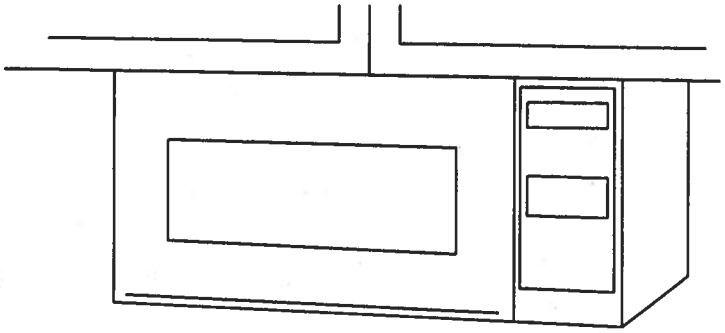
Follett reserves the right to change specifications at any time without obligation. Certifications may vary depending on country of origin.

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END OF SPECIFICATION

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Not to be used over a thermal oven.

Undercabinet mounting kit Pub. No. 4-A019 for Spacemaker II microwave oven models available at additional cost.

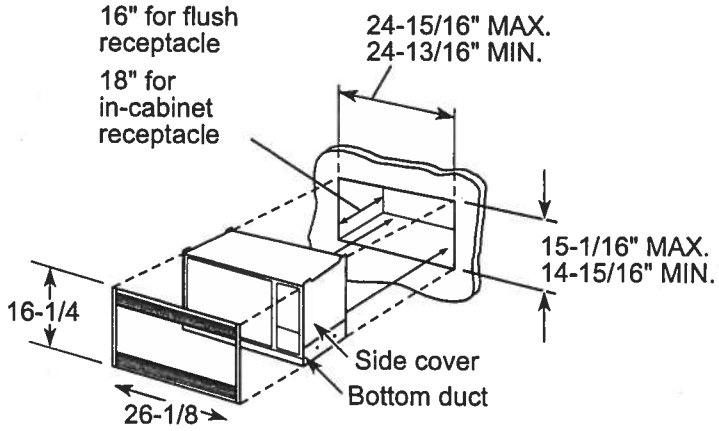
Exterior Dimensions* (in inches)	
W x H x D	23-25/32 x 11-11/64 x 12-55/64

*Height includes feet. Depth does not include handle.

Note: Undercabinet installation
Install Spacemaker II microwave ovens in just a few easy steps with the mounting template, which provides all the necessary measurements. Installation may vary depending on cabinets. These microwave ovens can be installed on practically any wood or metal cabinets.

Note: 120V, 60-cycle, grounded power receptacle location optional on back within cabinet opening.

Cutout Dimensions (in inches)

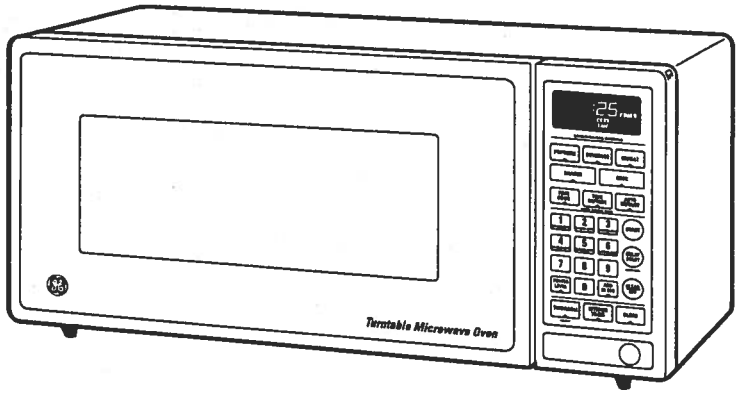


Built-In trim kit For 1.0 cu. ft. microwave ovens
For a custom built-in appearance, this kit allows built-in installation of the Spacemaker II microwave oven into a wall or cabinet alone, and is U.L.-approved for installation over a GE single electric wall oven. This kit should not be installed over a gas wall oven.

Trim kits for model JEM25
JX827SS – Stainless Steel, JX827WN – White, JX827CD – Bisque, JX827BN – Black

Installation Information: This information is not intended to be used for installing unit described. Before installing, consult installation instructions packed with product for current dimensional data.

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Features and Benefits

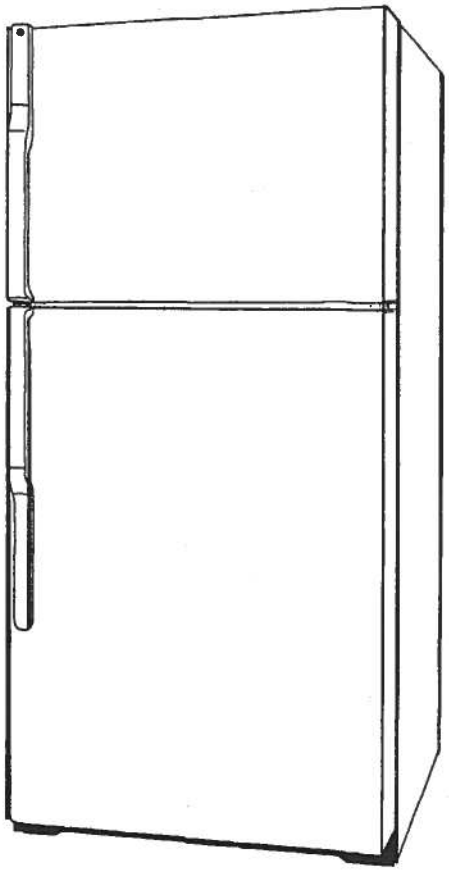
- 1.0 cu. ft. Oven cavity
- 800 Watts*
- Electronic touch controls
- Convenience cooking controls
- Electronic digital display with clock
- Time Cook I & II
- Express Cook with Instant On controls
- Auto Defrost/Time Defrost
- Add 30 Seconds
- Delay Start/Reminder
- Child Lockout
- Kitchen timer
- 10 Power levels
- Under the cabinetry mounting with optional kit
- Model JEM25WF – White
- Model JEM25BF – Black

*IEC-705 Test Procedure

APPROXIMATE DIMENSIONS(HxDxW)	
11.17 in x 12.86 in x 23 25/32 in	
CAPACITY	
Capacity	Mid-Size
Total Capacity (cubic feet)	1.00
FEATURES	
Electronic Digital Display with Clock	Yes
Electronic Touch Controls	Yes
Wattage (IEC-705)	800
Cooking System	Turntable
Power Levels	10
Delay Start	Yes
Beverage (Convenience)	Instant-On
Cook (Convenience)	9 Codes
Popcorn (Convenience)	Instant-On
Reheat (Convenience)	6 codes
Snacks (Convenience)	6 codes
Turntable	Glass
Turntable On / Off	Yes
Turntable Size (in.)	11-21/64
Add 30 Seconds	Instant-On
Cooking Complete Reminder	Yes
Defrost Type	Auto & Time
Express Cook	Instant-On; 1-5 Minutes
Instant On Controls	Yes
Kitchen Timer / Timer (On/Off)	Yes / No
Time Cook	I & II
Time Preference	Control Enhancement (1/9)
Child Lock	Yes
APPEARANCE	
Case Color	White
Color Appearance	White
Door Color	White
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	34 lb
Cavity (W x H x D)	16-23/32 X 8-1/16 X 12-15/32
Overall Depth	12.86 in
Overall Height	11.17 in
Overall Width	23 25/32 in
Net Weight (lbs.)	30 lb
POWER / RATINGS	
Electrical Input - 120V Amperage	11.5
Electrical Input - 120V Watts	1300
Frequency (MHz)	2450

END OF SPECIFICATION

GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker



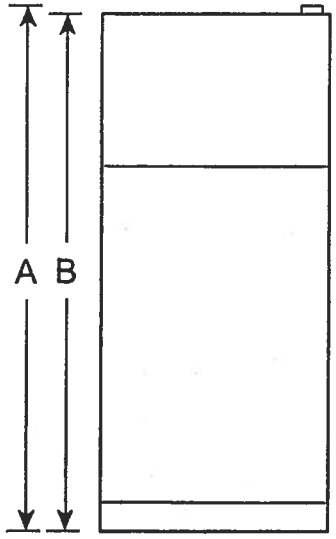
Features and Benefits

- Slide-Out, Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- Electronic Icemaker – Makes ice automatically, ensuring a ready supply.
- Model GTS18WCPWW – White on white
- Model GTS18WCPCC – Bisque on bisque

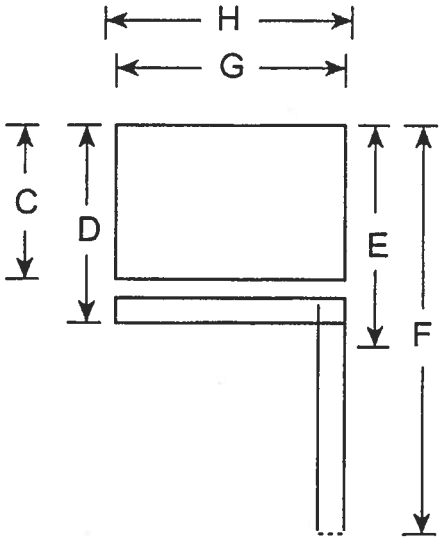
GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	32
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Total volume and shelf area are calculated by the Association of Home Appliance Manufacturers' standards

Listed by Underwriters Laboratories

APPROXIMATE DIMENSIONS(HxDxW)	
66 5/8 in x 32 1/8 in x 29 1/2 in	
CAPACITY	
Total (cubic feet)	17.9
Fresh Food (cubic feet)	12.87
Freezer (cubic feet)	4.98
Shelf Area (sq. ft.)	22.0
APPEARANCE	
Color Appearance	White on White
Customer Installed Handles	Yes
Exterior Design	Rounded Doors
Handle	Color-Matched
Door Swing	Shipped w/ Right Hand Door Opening (Hinges on Right)
Reversible Doors	Yes
Textured Steel Case & Door	Galvenized Door
Adjustable Rollers	Front
Door Stops	Yes

WEIGHTS & DIMENSIONS

Approximate Shipping Weight	233 lb
Overall Depth	32 1/8 in
Overall Height	66 5/8 in
Overall Width	29 1/2 in
Case Depth Without Door (in.)	27-1/2
Depth with Door Open 90° (in.)	58-1/8
Depth Without Handle (in.)	30-1/4
Height to Mid-Freezer	53-15/16
Height to Top of Case (in.)	66-1/8
Width w/Door Open 90 Degrees Inc. Handle (in.)	32
Back Air Clearances (in.)	1
Side Air Clearances (in.)	1/8
Top Air Clearances (in.)	1

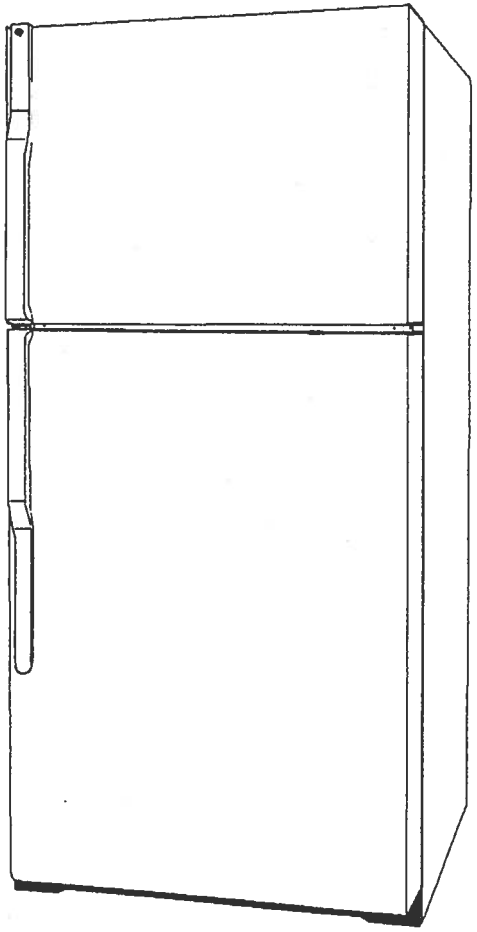
POWER / RATINGS

Volts / Hertz / Amps	120V; 60Hz ; 15A

END OF SPECIFICATION

GE Appliances

GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator



Specification Revised 5/03

Features and Benefits

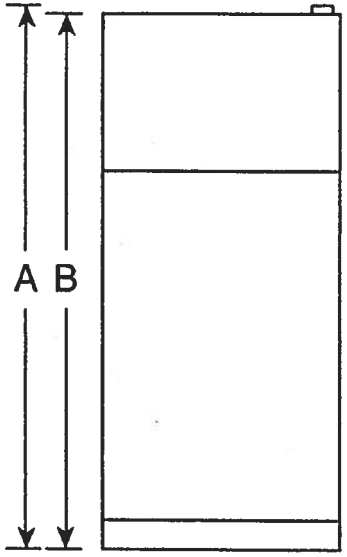
- Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- NeverClean™ Condenser – Condenser coils are encased, so they don't require cleaning in normal operating environments.
- Model GTS18KBPWW – White on white
- Model GTS18KBPBB – Black on black
- Model GTS18KBPCC – Bisque on bisque

GE Appliances

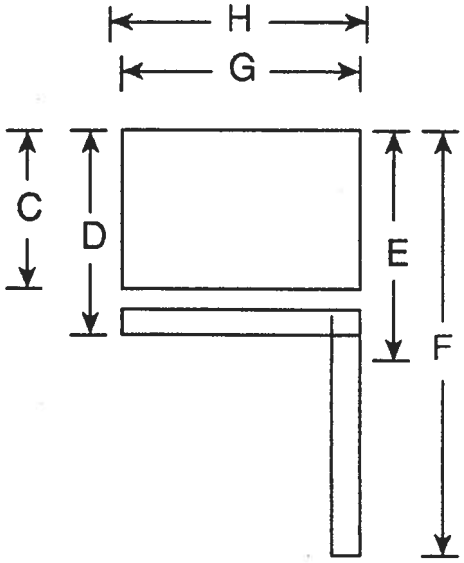
GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	30
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Specification Revised 5/03

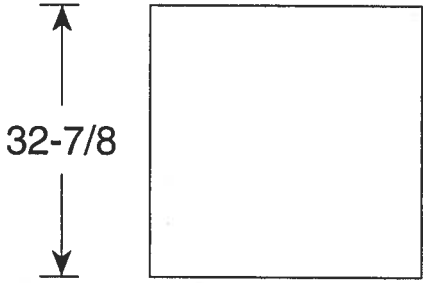
END OF SPECIFICATION

GE Appliances

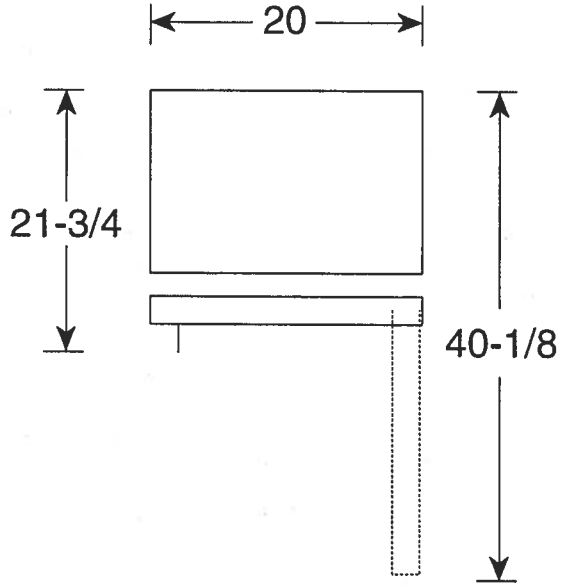
GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator

Dimensions (in inches)

Front View



Top View



Air Clearances	
Each side (in.)	1/2
Top (in.)	2
Back (in.)	2

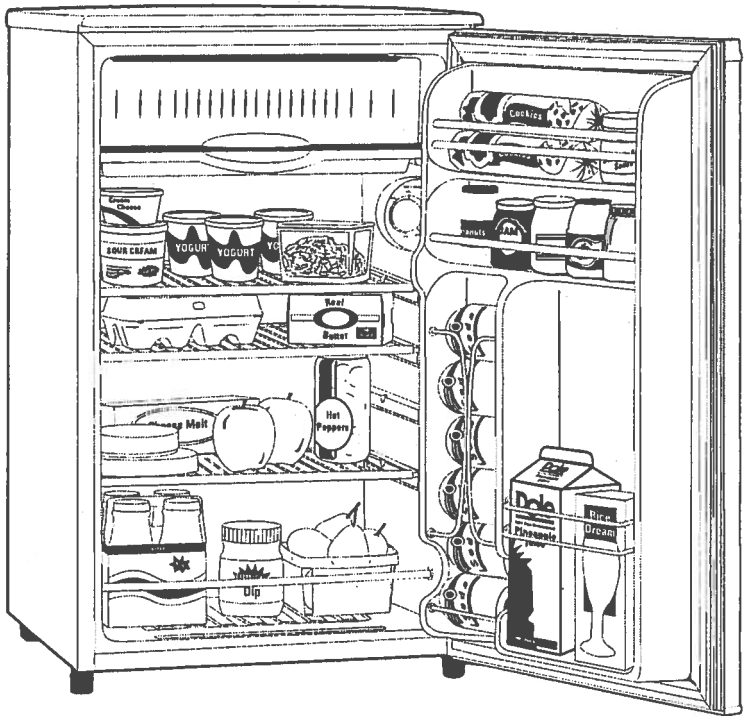
Note: Freezer compartment is for short-term storage of frozen food. The frozen food compartment of this refrigerator will make ice, and pre-frozen foods can be stored for about **two weeks.** It will not effectively freeze fresh foods or provide long-term storage for meats, poultry, or fish.

For answers to your Monogram,® GE Profile™ or GE® appliance questions, visit our website at GEAppliances.com or call GE Answer Center® service, 800.626.2000.

Specification Revised 7/04
310934

GE Appliances

GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator



Features and Benefits

- 4.3 cu. ft. Capacity (Fresh Food 3.81 cu. ft./Freezer .49 cu. ft.)
- 2-1/2 Fresh Food Door Shelves
- 2 Adjustable Wire Cabinet Shelves
- Can Rack
- 2 Mini Ice 'N Easy Trays
- Manual Defrost
- Color-Matched Recessed Door Handles
- Model GMR04AAMWW – White on white
- Model GMR04AAMBB – Black on black

Specification Revised 7/04
310934

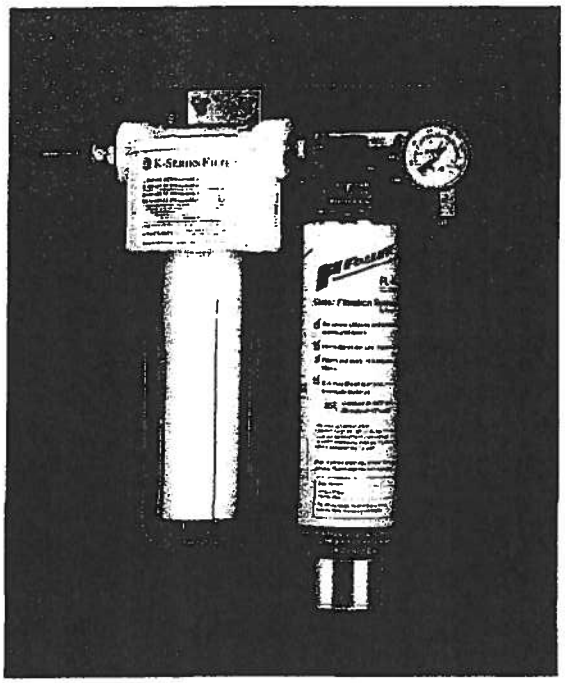
APPROXIMATE DIMENSIONS(HxDxW)	
32 7/8 in x 21 3/4 in x 20 in	
CAPACITY	
Total Capacity (cubic feet)	4.4
Fresh Food (cubic feet)	3.99
Freezer (cubic feet)	.39
Shelf Area (sq. ft.)	5.6
FEATURES	
Defrost Type	Manual
Fresh Food Cabinet Shelves - Adjustable	2
Fresh Food Cabinet Shelves - Total # of Shelves	2 Wire
Fresh Food Door Shelves	2 Full-Width; 1 Half-Width
Ice N' Easy Trays	1 Mini
APPEARANCE	
Color Appearance	White on White
Door Swing	Hinges on Right
Handle	Color-Matched Recessed
Rounded Doors	Yes
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	77 lb
Overall Depth	21 3/4 in
Overall Height	32 7/8 in
Overall Width	20 in
Depth with Door Open 90° (in.)	40-1/8
Back Air Clearances (in.)	2
Side Air Clearances (in.)	1/2
Top Air Clearances (in.)	2



END OF SPECIFICATION

QC4-FL4S Walter Filter System

SPECIFICATIONS



Water filter system for use with Follett icemakers and ice and water dispensers. System includes pre-filter, primary filter, pressure gauge and wall mounting bracket.

Important: Not for use with carbonated water — separate system required.

Ensures better tasting, cleaner, safer ice
- *Traps dirt as small as 1/2 micron in size*
- Removes chlorine, off-tastes and odors
- Filters out asbestos fibers and parasitic cysts such as *Cryptosporidium* and *Giardia*
- Certified to ANSI/NSF standards 42 and 53

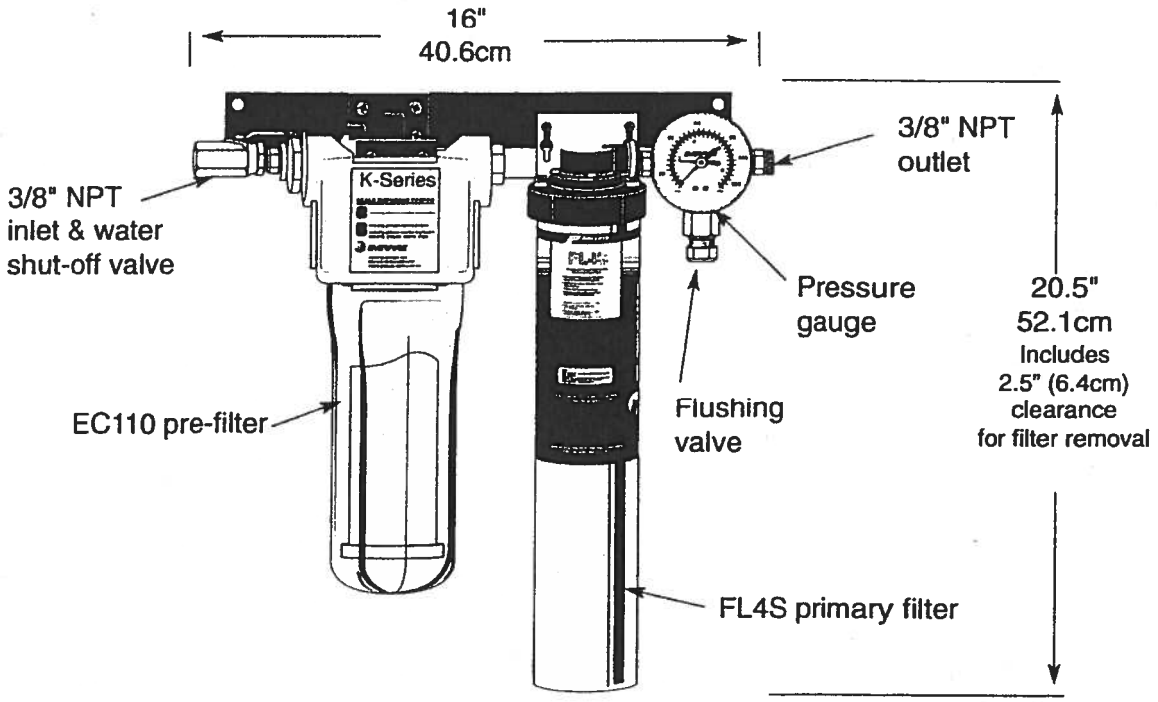
Improves icemaker performance
- Keeps icemakers functioning at full capacity
- Reduces scale build-up from dirt and minerals in the water by up to 70%
- Removes dirt and abrasive particles that can damage internal workings of icemaker
- Saves energy and reduces downtime

Space-saving design
- 20.5" (52.1cm) total height and 16" (40.6cm) width requires minimal space
- Entire system can be mounted out of the way below standard 34" - 36" (86.4cm - 91.4cm) counters

Dual filter system saves money
- *Economical EC110 pre-filter filters out* large particles and extends life of FL4S primary filter

Item # 714519

REV: tlg 8/21/2003



- Clearance required: 2.5" (6.4cm) at bottom of filter for cartridge removal
- Flow rate: 0.5 gpm (1.9 lpm)
- Pressure range 10 - 125 psi, non-shock
- Capacity: Certified for chlorine and taste and odor reduction for 3,000 gallons (11,400 liters)
- Water temperature: 35° - 100°F (2° - 38°C)

NSF International Standards

Tested and certified to ANSI/NSF Standard 42 & 53

Standard No. 42: Aesthetic Effects

Chemical Unit Taste & Odor and Chlorine Reduction, Class 1

Mechanical Filtration Unit Particulate Reduction, Class 1: 99.9% reduction of particles 1/2 micron and larger in size

Standard No. 53: Health Effects

Mechanical Filtration Unit

Turbidity Reduction, Cyst Reduction, Asbestos Reduction

The QC4-FL4S filter and 4S cartridge (by Everpure, Inc.) have been tested and Certified by NSF only for the functions listed above. Check for compliance with state and local laws and regulations. Do not use where the water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit. Can be used with water disinfected that may contain filterable cysts.

Item # 714519

END OF SPECIFICATION

Model 8573



Model 8573



8573 Koffee King Three Warmer Stepped Right Automatic Coffee Brewer *(without Hot Water Faucet)*

How do you get more for less? Use the Bloomfield Lo Profile® brewing system. At less than 17" tall, the Lo Profile is small in stature but big on capacity. Like all Bloomfield products, this proven, efficient brewing system is designed to take advantage of the finest electrical components and has the lowest service cost in the industry for this type of brewer.

Features

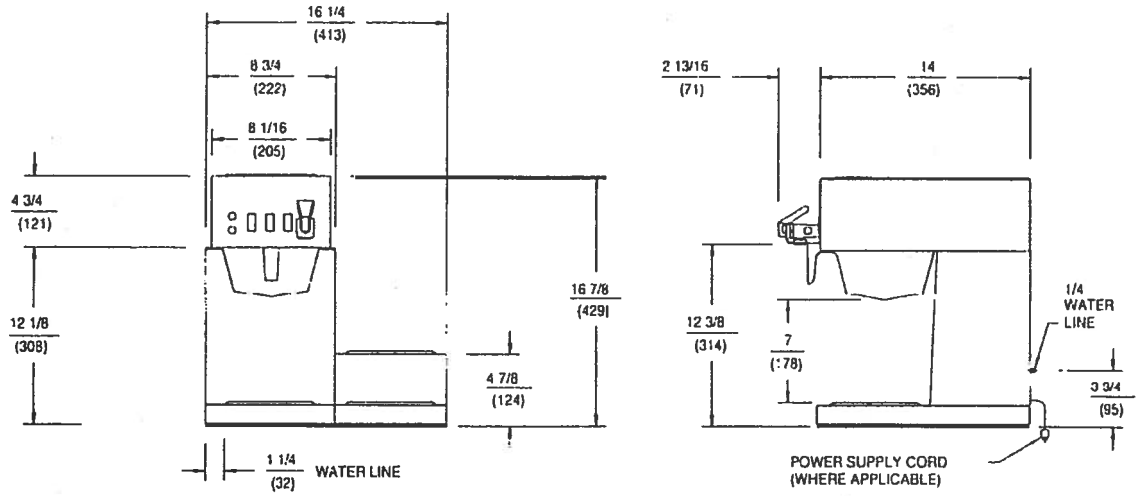
- **A high level of commonality of parts** with other Bloomfield models will significantly reduce the inventory of spare parts required to service many body styles.
- Exclusive design provides **easy access to components** for quick service.
- **Water volume adjustments** can be made with ease, no panels to remove or tools required.
- **Ready-to-Brew light** indicates the proper water temperature to help eliminate the guesswork in brewing.
- Built-in **pour over feature** provides flexibility.
- **Independent front-mounted hot water faucet** allows drawing of hot water without affecting coffee taste or brewing cycle.
- **Premium quality thermostat** has a full-length stainless steel sensing bulb that recognizes water temperature extremely accurately and cycles less frequently.
- **Superior sprayhead design** spreads water over the coffee grounds, creating agitation and a floating action that completely saturates the coffee to capture the full, rich essence of every bean.
- **Unique water valve with built-in flow control** assures consistent operation at 20-80 p.s.i.
- **One-piece drawn stainless steel water tank** has a superior design for extended life.
- **Three warming stations** with porcelain enameled warmer plates position decanters securely and, with no exposed screw heads, will not scratch or scrape decanters.
- High quality easy to clean **stainless steel construction.**

Item 715053

REV: 6/28/03

E9253 STD 4 LR 10836

DIMENSIONS: INCH / (MM)



SPECIFICATIONS:

MODELS	WATTS	VOLTS	AMPS	PHASE	POWER SUPPLY CORD
8573	1800	120	15	Single	NEMA 5-15P

Item # 715053

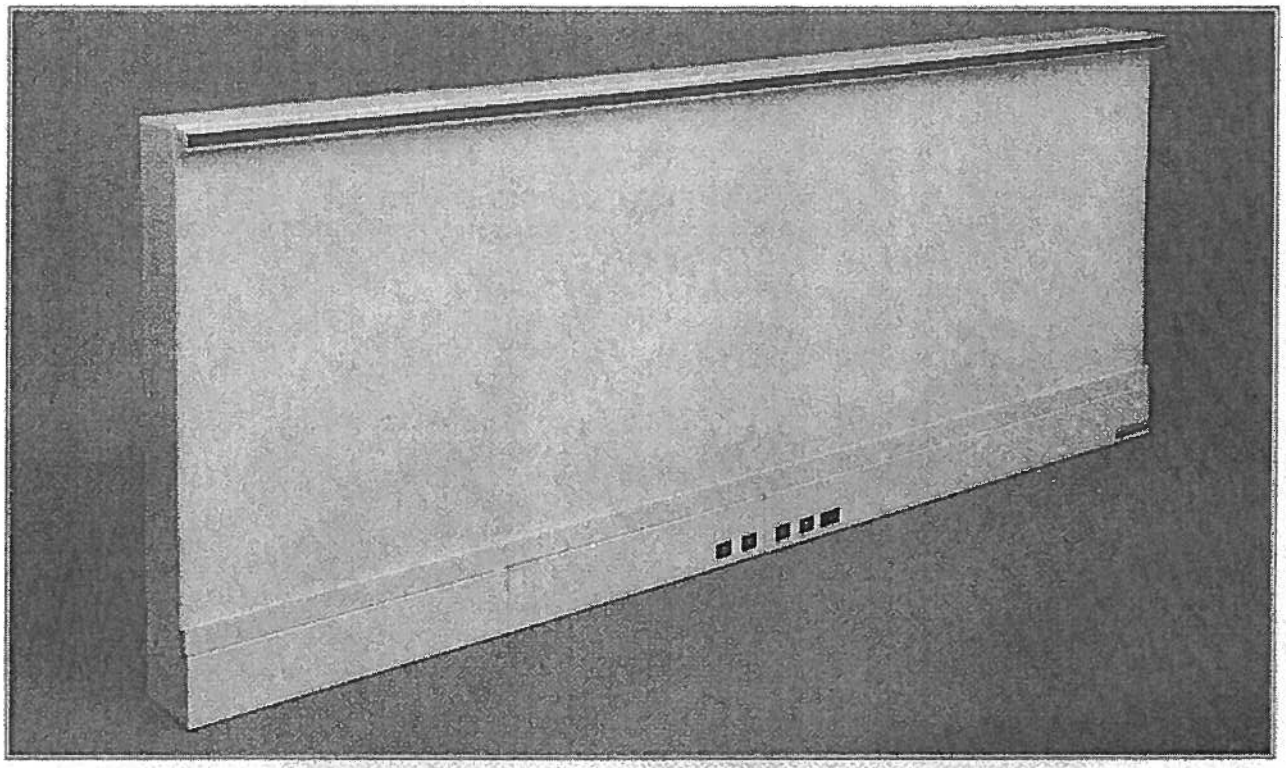
END OF SPECIFICATION

Item # 715152 1 of 3

800/347-XRAY
S&S X-RAY PRODUCTS
www.ssxray.com

CHAMELEON SERIES

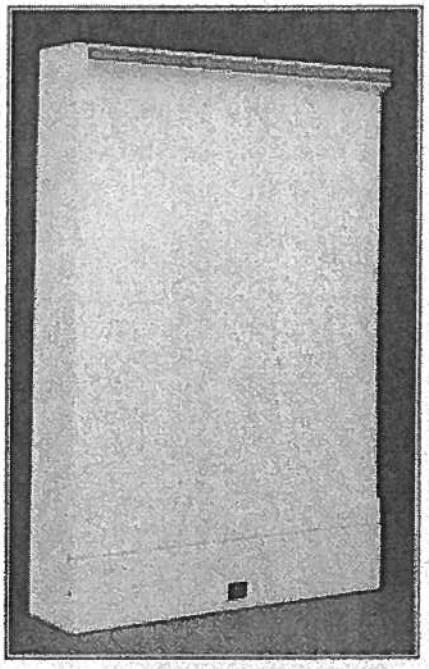
Blends With Any Décor



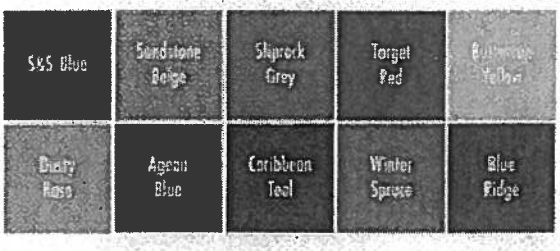
Four Bank Surface Mounted Model (101204)

The **Chameleon Illuminator Series** combines a slim, sleek appearance (3⅜" depth), with color-customizable trim. This cost efficient illuminator is designed to accentuate the warm, professional appearance of your reading room or consultation area. The units can be highlighted with *trim in a choice of ten colors*, polished stainless steel or primed strip (the latter can be easily painted to color coordinate within a facility). Constructed of durable steel with a white powder-coat finish, this series is available in 2 lamps, 3 lamps and 4 lamps per viewing area models.

Trigger start ballasts, separated viewing sections, centered cluster switches, one piece plexiglass fronts and continuous gravity film grips are standard with this series. A bottom ledge film support coupled with the continuous film grip guarantees maximum freedom for viewing small or large films. Each section is individually controlled by rocker switches mounted at the bottom center of the illuminator. Master switches are provided on units of three banks or more. The Chameleon Illuminator can also be incorporated into a corner module.



Trim Colors



Finish: White Baked Enamel

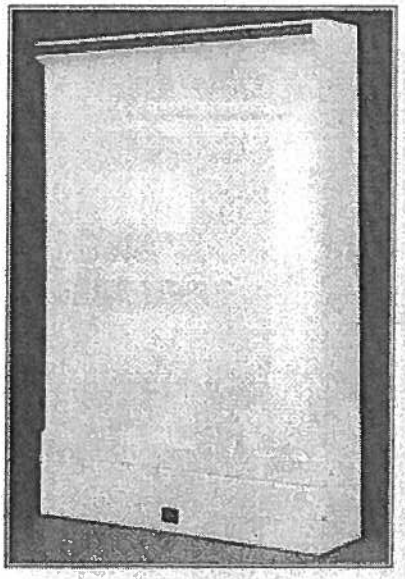
Electrical: Viewers operate on 120 volt, 60 Hz. **2 Lamp Series:** .47 amps per section, **3 Lamp series:** .61 amps per section, **4 Lamp series:** 1.0 amps per section. Surface mounting models are supplied with a 6' three conductor line cord (see diagram for wiring locations). Recessed models come with BX connectors. For special voltages consult factory.

* **Optional Items:** Modular Mobile system (pg B-23), mobile stand, console arms, angulated viewing system (pg B-25) corner modules (pg B-24), hospital grade plugs (pg B-30).

S&S X-RAY PRODUCTS
www.ssxray.com

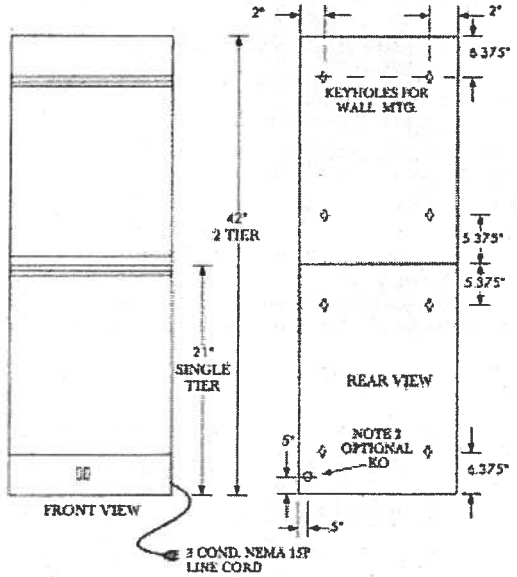
CHAMELEON SERIES

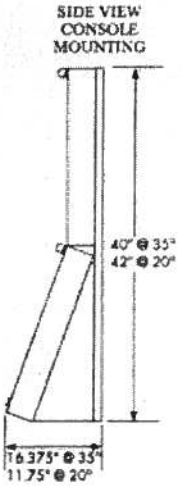
ILLUMINATORS



SURFACE MOUNTED MODELS

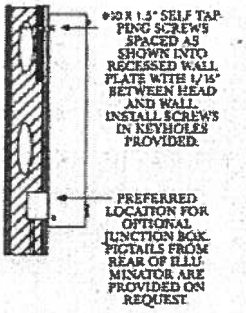
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	23 lbs	101401	101421
Two Bank 28"x17"	28"	21"	46 lbs	101402	101422
Three Bank 42"x17"	42"	21"	69 lbs	101403	101423
Four Bank 56"x17"	56"	21"	90 lbs	101404	101424
Five Bank 70"x17"	70"	21"	113 lbs	101405	101425
Six Bank 84"x17"	84"	21"	136 lbs	101406	101426
TWO TIER					
1 over 1 2 x 14"x17"	14"	42"	46 lbs	101411	101431
2 over 2 2 x 28"x17"	28"	42"	92 lbs	101412	101432
3 over 3 2 x 42"x17"	42"	42"	138 lbs	101413	101433
4 over 4 2 x 56"x17"	56"	42"	180 lbs	101414	101434
5 over 5 2 x 70"x17"	70"	42"	226 lbs	101415	101435
6 over 6 2 x 84"x17"	84"	42"	272 lbs	101416	101436

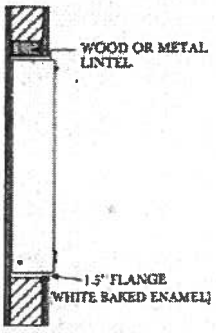






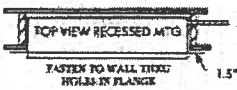
SIDE VIEW RIGHT SIDE





RECESSED MODELS

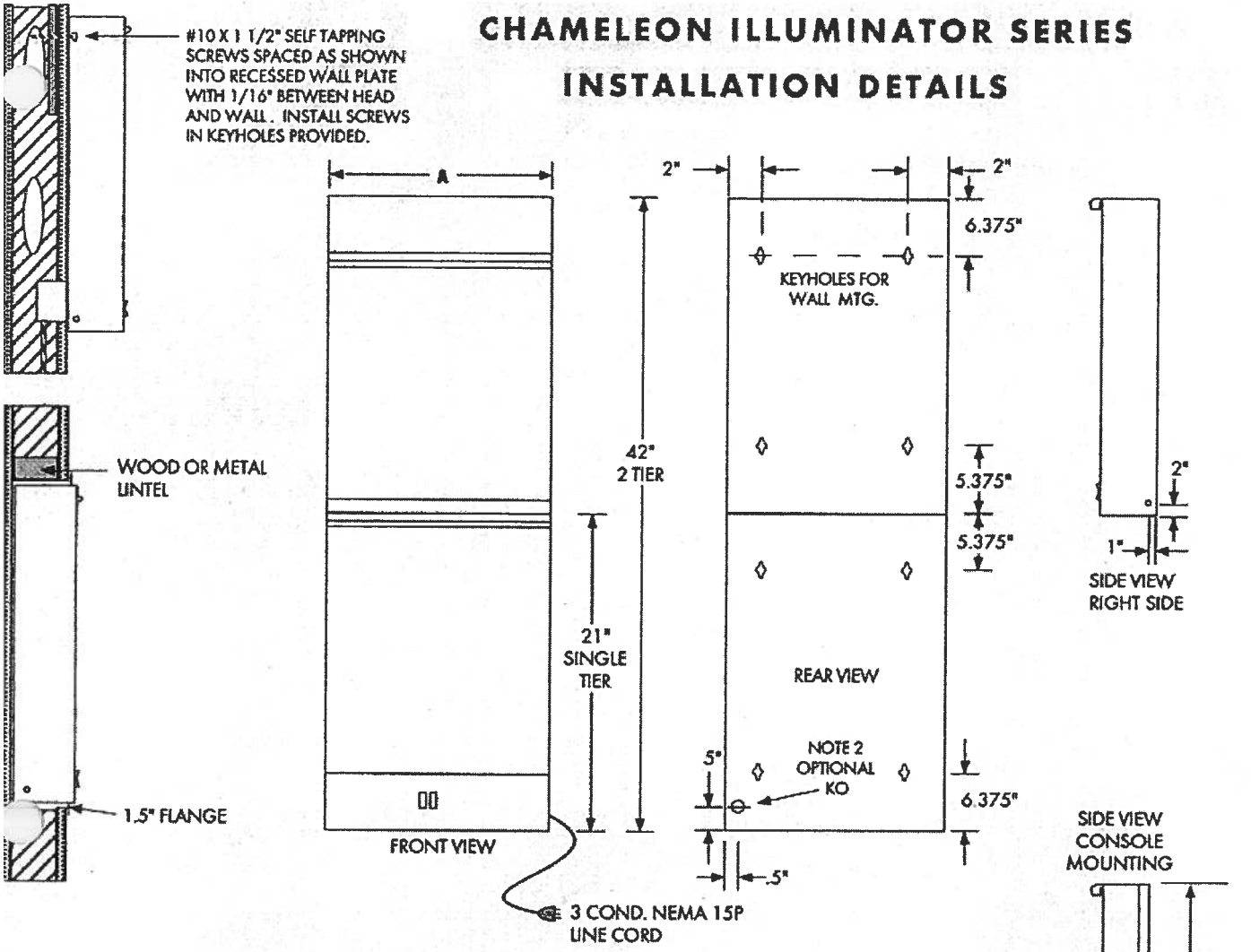
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	WALL OPENING WIDTH	WALL OPENING HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	14.25"	21.25"	23 lbs	101441	101461
Two Bank 28"x17"	28"	21"	28.25"	21.25"	46 lbs	101442	101462
Three Bank 42"x17"	42"	21"	42.25"	21.25"	69 lbs	101443	101463
Four Bank 56"x17"	56"	21"	56.25"	21.25"	90 lbs	101444	101464
Five Bank 70"x17"	70"	21"	70.25"	21.25"	113 lbs	101445	101465
Six Bank 84"x17"	84"	21"	84.25"	21.25"	136 lbs	101446	101466
TWO TIER							
1 over 1 2 x 14"x17"	14"	42"	14.25"	42.25"	46 lbs	101451	101471
2 over 2 2 x 28"x17"	28"	42"	28.25"	42.25"	92 lbs	101452	101472
3 over 3 2 x 42"x17"	42"	42"	42.25"	42.25"	138 lbs	101453	101473
4 over 4 2 x 56"x17"	56"	42"	56.25"	42.25"	180 lbs	101454	101474
5 over 5 2 x 70"x17"	70"	42"	70.25"	42.25"	226 lbs	101455	101475
6 over 6 2 x 84"x17"	84"	42"	84.25"	42.25"	272 lbs	101456	101476

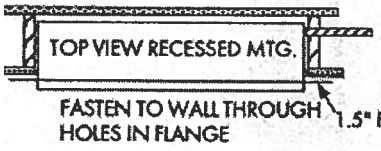


1/2" CONDUIT CONTAINING 3 NO. 14 WIRES TO 120 VOLT 60 HZ SERVICE.

ALL MEASUREMENTS ARE ± 1/16"

CHAMELEON ILLUMINATOR SERIES
INSTALLATION DETAILS





	NUMBER OF VIEWING AREAS						HEIGHT	
	1	2	3	4	5	6	1 TIER	2 TIER
CASE WIDTH "A"	14"	28"	42"	56"	70"	84"	21"	42"
WALL OPENING	14.25"	28.25"	42.25"	56.25"	70.25"	84.25"	21.25	42.25
WEIGHT 1 TIER	23	46	69	90	113	136		
WEIGHT 2 TIER	46	92	138	180	226	272		
DEPTH OF CASE	3.375"							

120 VOLT 60 HZ.
2 LAMP SERIES .47 AMPS PER VIEWING SECTION
3 LAMP SERIES .61 AMPS PER VIEWING SECTION
4 LAMP SERIES 1 AMPS PER VIEWING SECTION
UL LISTED FOR U.S.A. AND CANADA

NOTE:
1. FOR SAFETY AND PROPER OPERATION UNITS MUST BE ELECTRICALLY GROUNDED.

PREFERRED LOCATION FOR OPTIONAL JUNCTION BOX. PIGTAILS FROM REAR OF ILLUMINATOR PROVIDED ON

CALL OUR CUSTOM DESIGN ENGINEERING DEPT. FOR HELP WITH ROOM LAYOUTS AND CUSTOM CONFIGURATIONS.

The Industry Standard For 40 Years
800-347-XRAY 718-649-8500
FAX 718-257-0219
S&S X-RAY PRODUCTS INC
1165 LINWOOD STREET
BROOKLYN NY 11208

END OF SPECIFICATION

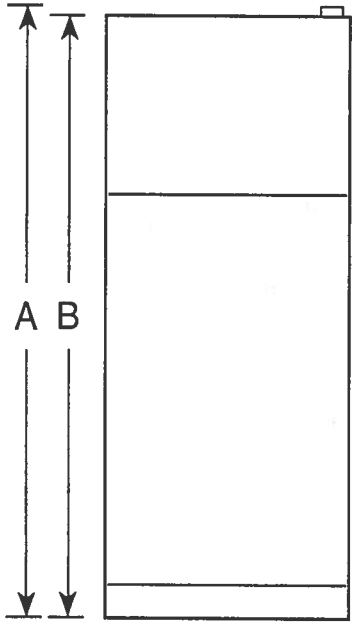
GTS17KBS
GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

Dimensions and Installation Information

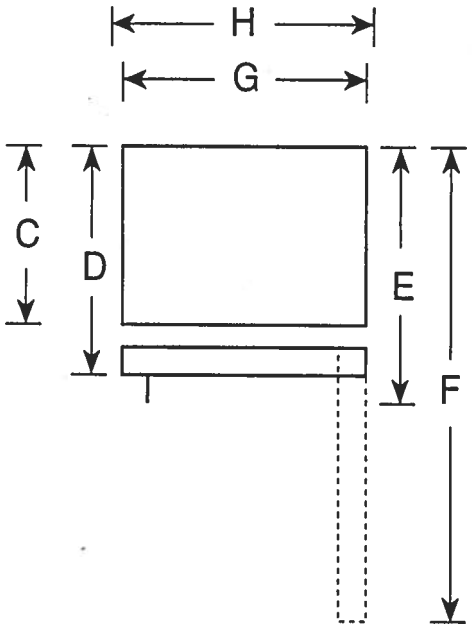
Overall Dimensions	Height to top of hinge (in.) **A**	64-3/4
	Height to top of case (in.) **B**	64-1/4*
	Case depth without door (in.) **C**†	25-7/8
	Case depth less door handle (in.) **D**†	29-1/8
	Case depth with door handle (in.) **E**†	31
	Depth with fresh food door open 90° (in.) **F**†	54-7/8
	Width (in.) **G**	28
	Width with door open 90° less door handle (in.) **H**	30-1/2
Air Clearances	Each side (in.)	3/4
	Top (in.)	1
	Back (in.)	1

*Height to mid-freezer (in.): 54-3/8

Front View



Top View



Dimension and installation information are shown in inches.

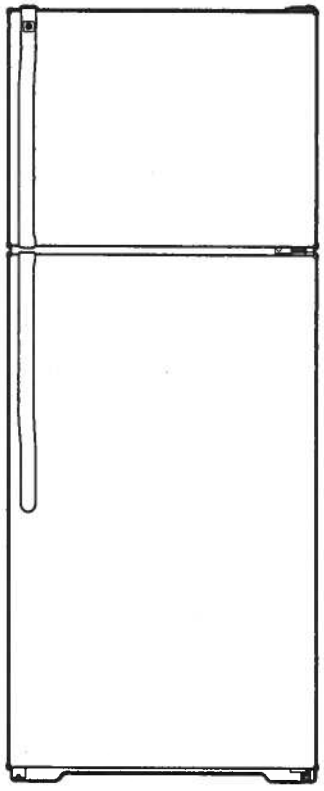
Listed by Underwriters Laboratories

GTS17KBS

GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

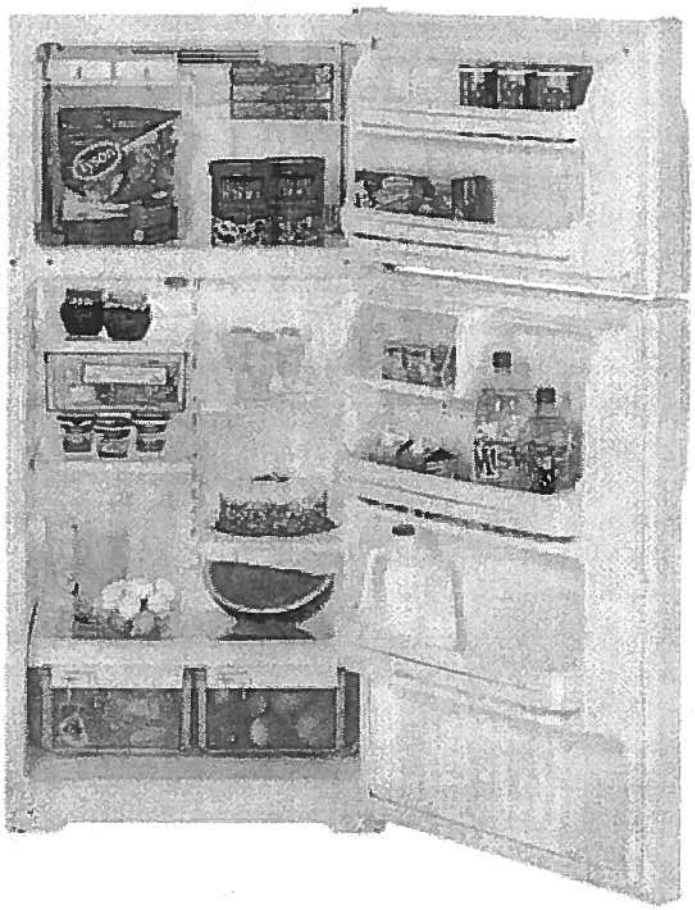
Features and Benefits

- Adjustable Spillproof Glass Shelves - Help contain spills for ease of cleaning
- Upfront Temperature Controls - Are positioned up front, close at hand, for maximum convenience and ease of use
- Adjustable Humidity Vegetable/Fruit Crispers - Provide the ideal storage environment for fruits and vegetables
- Gallon Door Storage - Makes room for milk and any other gallon size containers
- Snack Pan - Helps keep everyday foods like muffins and carrot sticks fresh
- NeverClean™ Condenser - Condenser coils are encased, so they don't require cleaning in normal operating environments
- Deluxe Quiet Design - Significantly reduces operating noise
- Square Doors - Classic design that's compatible with any kitchen décor
- Model GTS17KBSWW - White on white
- Model GTS17KBSCC - Bisque on bisque



APPROXIMATE DIMENSIONS(HxDxW)	
64 3/4 in x 31 in x 28 in	
CAPACITY	
Total Capacity (cubic feet)	16.60
Fresh Food (cubic feet)	12.54
Freezer (cubic feet)	4.10
Shelf Area (sq. ft.)	19.7
FEATURES	
Air Tower	Yes - Freezer
Defrost Type	Frost Free
Upfront Temperature Controls	Yes
Automatic Icemaker	Optional (IM4A)
Ice N' Easy Trays	2
Snack Drawer	Yes
Vegetable / Fruit Crisper(s)	2 Adjustable Humidity
Fresh Food Cabinet Shelves - Adjustable	4 Split
Fresh Food Cabinet Shelves - Spill Proof	Yes
Fresh Food Cabinet Shelves - Total Number of Shelves	4 Glass
Fresh Food Door Shelves	2 Fixed w/ Gal. Storage
Gallon Door Storage	Yes
Dairy Compartment	Yes
Interior Light	Yes
Freezer Cabinet Shelves (Wire)	Step Shelf
Freezer Door Shelves	2 Full-Width Fixed (1 Extra-Deep)
APPEARANCE	
Color Appearance	White on White
Handle	Color-Matched
Door Swing	Reversible Hinges
Textured Steel Case	Galvanized Door
Door Stops	Yes
Easy to Remove Door Gaskets	Yes
Leveling Legs	2 Front
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	185 lb
Net Weight (lbs.)	166 lb
Overall Depth	31 in
Overall Height	64 3/4 in
Overall Width	28 in
Case Depth Without Door (in.)	25-7/8
Depth with Door Open 90° (in.)	54-7/8
Depth Without Handle (in.)	29-1/8
Height to Mid-Freezer	54-3/8
Height to Top of Case (in.)	64-1/4
Width w/Door Open 90 Degrees Inc. Handle (in.)	30-1/2
Width w/Door Open 90 Degrees Less Handle (in.)	28-5/8
Back Air Clearances (in.)	1
Side Air Clearances (in.)	3/4
Top Air Clearances (in.)	1

POWER / RATINGS	
Volts / Hertz / Amps	120V; 60Hz ; 15A



END OF SPECIFICATION

AMSCO® WARMING CABINET

APPLICATION

The Amsco Warming Cabinet is designed to raise the temperature of surgical irrigation solutions and/or blankets to an acceptable level for hospital and surgical outpatient center applications.

FEATURES

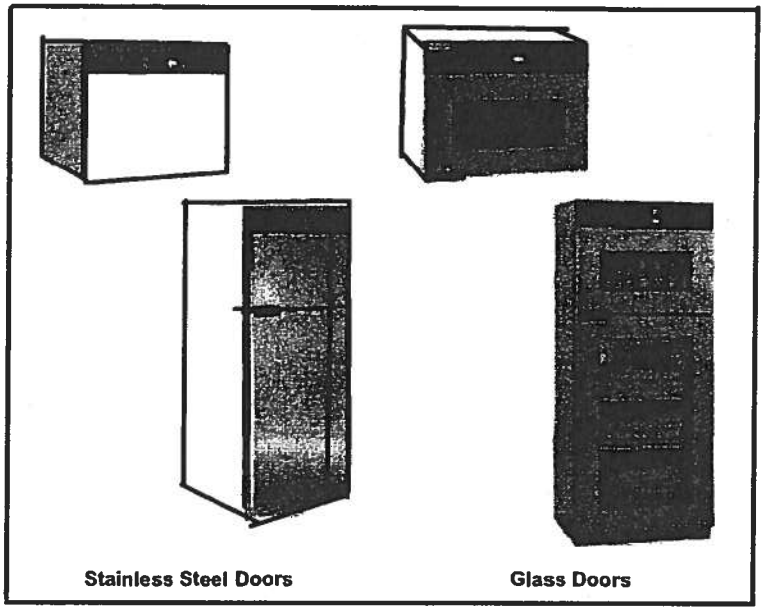
Single-compartment Model—Features a heating chamber available in two different depths: 18" (457 mm) or 24" (610 mm) deep.

Double-compartment Model—Features an upper and lower heating chamber with independent temperature controls, and a choice of two different depths: 18" (457 mm) or 24" (610 mm) deep.

Cabinet Storage Capabilities—The upper compartment of the 18" (457 mm) deep model holds up to 15 (2-liter) surgical flasks; the lower compartment holds up to 45 (2-liter) surgical flasks.

The upper compartment of the 24" (610 mm) deep model holds up to 20 (2-liter) surgical flasks; the lower compartment holds up to 60 (2-liter) surgical flasks.

All chambers can hold a combination of flasks and dry goods, or dry goods only.



Stainless Steel Doors **Glass Doors**

(Typical only - some details may vary.)

STANDARDS

Warming cabinet meets applicable requirements of the following standards, and carries the appropriate symbols.

- **Underwriters Laboratories (UL) Standard 2601-1, 1st Ed.,** as certified by ETL Testing Laboratories, Inc.
- **Standard CSA-C22.2 No. 601.1-M90,** Standard for Electro-Medical Equipment as certified by ETL Testing Laboratories, Inc.
- **EN 60601-1: 1993, Amendment 2, *1995,*** *Electrical Safety as certified by* ETL Testing Laboratories, Inc.
- **IEC 601-1-2: 1993,** EMC testing as certified by ETL Testing Laboratories, Inc.
- ***EN 55011: Group 1, Class B,*** *EMI* testing as certified by ETL Testing Laboratories, Inc.
- **Medical Device Directive (93/42 IEEC)**
- **California OSMPD Seismic Pre-Approval**
- **FDA Good Manufacturing Practices Regulations 21 CFR 820 for Medical Devices.**

The Selections Checked Below Apply To This Equipment

MODEL

- ☐ Single-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep
- ☐ Double-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep

Mounting

- ☐ Open-mounted
- ☐ For Recessing

DOOR OPTIONS

- ☐ Glass
- ☐ Stainless Steel

VOLTAGE

- ☐ 120 V
- ☐ 220-240 V

Door Hinge(LH/RH) interchangeable in field

ACCESSORY

*** Seismic Tie-down Kit

Item # 717197

REV: 6/19/03

CONSTRUCTION

Includes all components necessary to obtain a complete working unit. The open-mounted unit ships with a power condenser installed. The recessed unit requires a connection to building service, supplied by others. The unit contains a heating chamber, instrumentation and operating controls, and a lower heated chamber when double-compartment model is specified.

Cabinet controls are identical for both the single- and double-compartment configurations. The double compartment configuration has a temperature control knob, temperature display LCD, and overtemperature light for each compartment. The control panel (on either the single- or double-compartment configuration) can be conveniently serviced from the front of the unit.

Corners and intersections on the face of the cabinet and door are structurally formed for rigidity, cleanability and appearance. Both models are supported on a stainless steel integral subbase. The cabinet door(s) is (are) available in stainless steel, or stainless steel with a glass window. Interior of cabinet and shelves are stainless steel. If a freestanding model, the cabinet top and side panels are stainless steel.

Heating chamber compartment is insulated with 1" (25 mm) thick, fiberglass blanket. A fan circulates air within the chamber to provide even heat distribution. The door is of double-wall construction with 1-1/2" (38 mm) thick insulation between the walls. Right-hand door swing is provided; swing is reversible. Door closes against a heat-resistant, magnet imbedded, vinyl gasket. Pivot type hinges are stainless steel.

Chamber(s) is (are) heated by an electric rod heater operating on either *120 or 220 Volt, 50/60 Hz power.*

Lower chamber (double-compartment model) includes two stainless-steel shelves, adjustable in 1" (25 mm) increments by a clip and slot arrangement. Door structure mounting, gasket and hinges are the same as the door on the upper chamber. Chamber is heated by an electric rod heater.

CONTROLS

The control panel assembly features a temperature control knob, an overtemperature indicator light, a digital temperature indicator (if a double-compartment model, there will be duplicates of the previous items), and a power switch. The temperature control knob is used to regulate and turn off the heat to each chamber. 120 Volt units display temperature readings in Fahrenheit. 220 Volt units display temperature readings in Celsius scale. Temperature selection range is 90°-160°F (32.2°-71.1°C). An overtemperature alarm will visually and audibly alert operator should an overtemperature condition occur (chamber temperature greater than 10°F [5.5°C] above set temperature). In the event of an overtemperature condition, the overtemperature control automatically turns off the heater(s).

MOUNTING ARRANGEMENT

Double-compartment models may be specified as open-mounted or recessing into a partition wall. If model is specified for recessing, a synthetic rubber sealing gasket is provided to ensure close fit of cabinet front to the face of the wall partition. Recessed cabinet requires no supplementary supports behind the wall partition (except in seismic locations).

Single-compartment models may be specified for wall/counter mounting or for recessing into a partition wall.

PREVENTIVE MAINTENANCE

A global network of skilled service specialists can provide periodic inspections, and adjustments to assure *low-cost peak performance. STERIS* representatives can provide information regarding Annual Maintenance Agreements.

NOTE

1. Due to a variety of building constructions employed, fasteners for mounting cabinet to wall are not furnished by STERIS. Wall(s) must be adequately reinforced to *support operating weight of* cabinet.

ENGINEERING DATA

Unit	Approx. Unit Wt. lbs (kg)
Single-Compartment:*	
18" Wall/Counter Mounting	124 (56)
18" Recess Mounting	98 (45)
24" Wall/Counter Mounting	142 (65)
24" Recess Mounting	115 (52)
Double-Compartment:**	
18" Open-mounted	302 (137)
18" Recessed Mounting	266 (121)
24" Open-mounted	353 (160)
24" Recessed Mounting	306 (139)

** For 220/240 Volt units, add 8 lbs (3.6 kg). For glass door option, add 6 lbs (2.7 kg).*
*** For 220/240 Volt units, add 15 lbs (6.8 kg). For glass door option, add 6 lbs (2.7 kg).*

INTERNAL DIMENSIONS AND CAPACITY

Unit	Upper Chamber Single Chamber Unit (Height x Width x Depth)	Lower Chamber Double Chamber Unit (Height x Width x Depth)
18" Depth	15-1/2 x 23-3/4 x 16-7/8" – 3.6 cu. ft. (394 x 603 x 429 mm)	38-1/4 x 23-3/4 x 16-7/8" – 8.9 cu. ft. (972 x 603 x 429 mm)
24" Depth	15-1/2 x 23-3/4 x 22-7/8 – 4.9 cu. ft. (394 x 603 x 581 mm)	38-1/4 x 23-3/4 x 22-7/8 – 12 cu. ft. (972 x 603 x 581 mm)

UTILITY REQUIREMENTS - Single Compartment Model

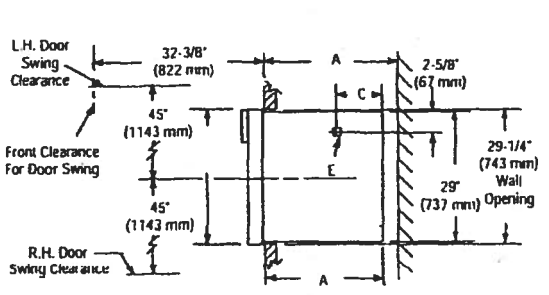
Electricity (E)

120 Volt, 50/60 Hz, 1-Phase, 6.8 A, 800 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 3.6 A, 869 Watts

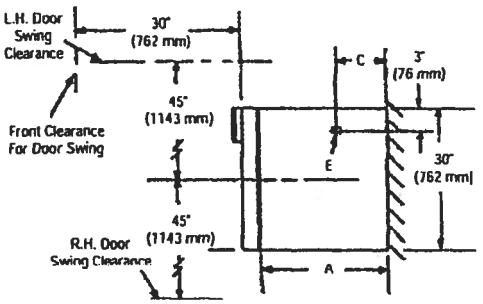
. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)

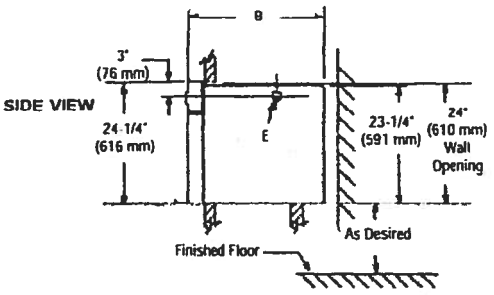
SINGLE-COMPARTMENT MODEL



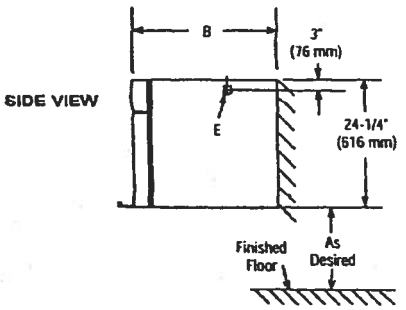
PLAN VIEW



PLAN VIEW



For Recessing



Wall/Counter Mounting

NOTE: Because of STERIS's continuing program of research and development, all specifications and descriptions are subject to change without notice. Obtain certified drawings for design, and installation.

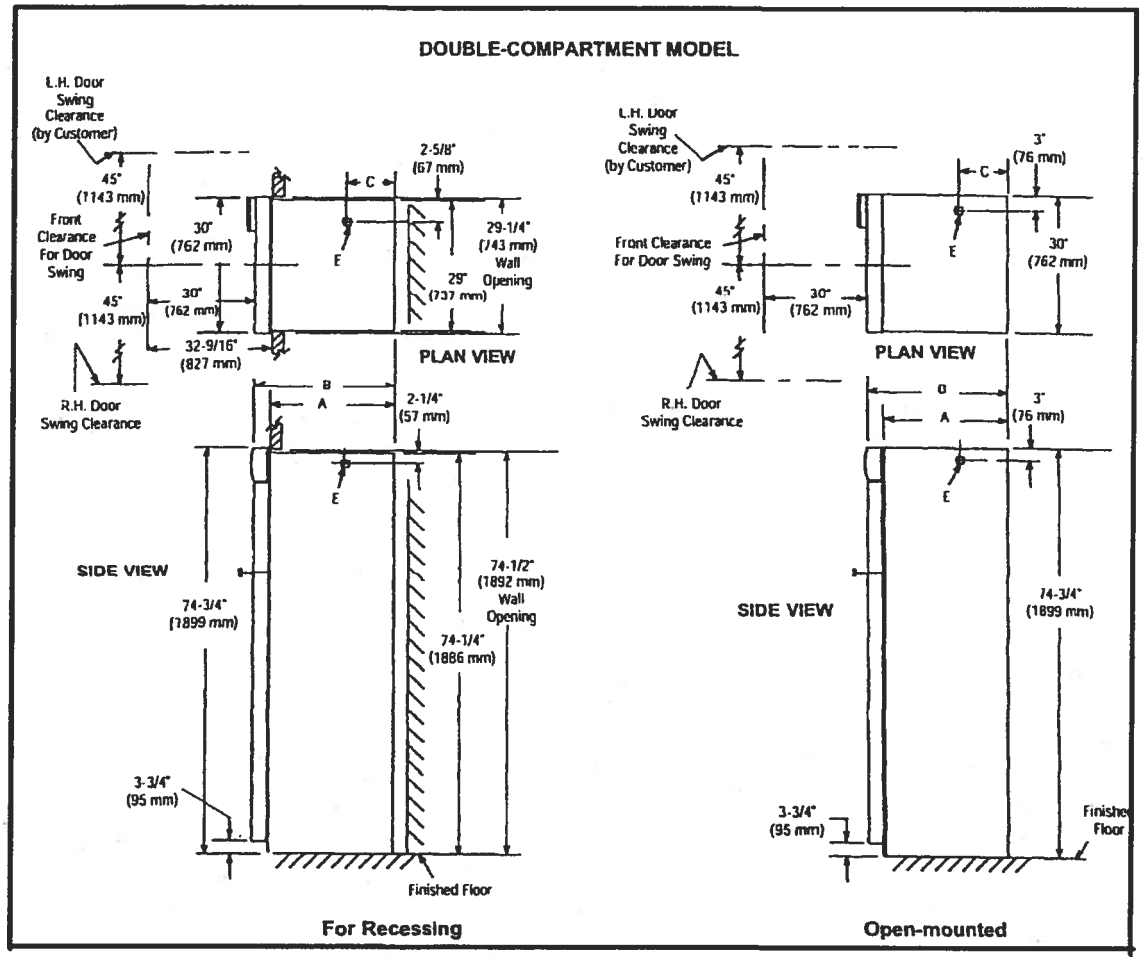
UTILITY REQUIREMENTS - Double Compartment Model

Electricity (E)

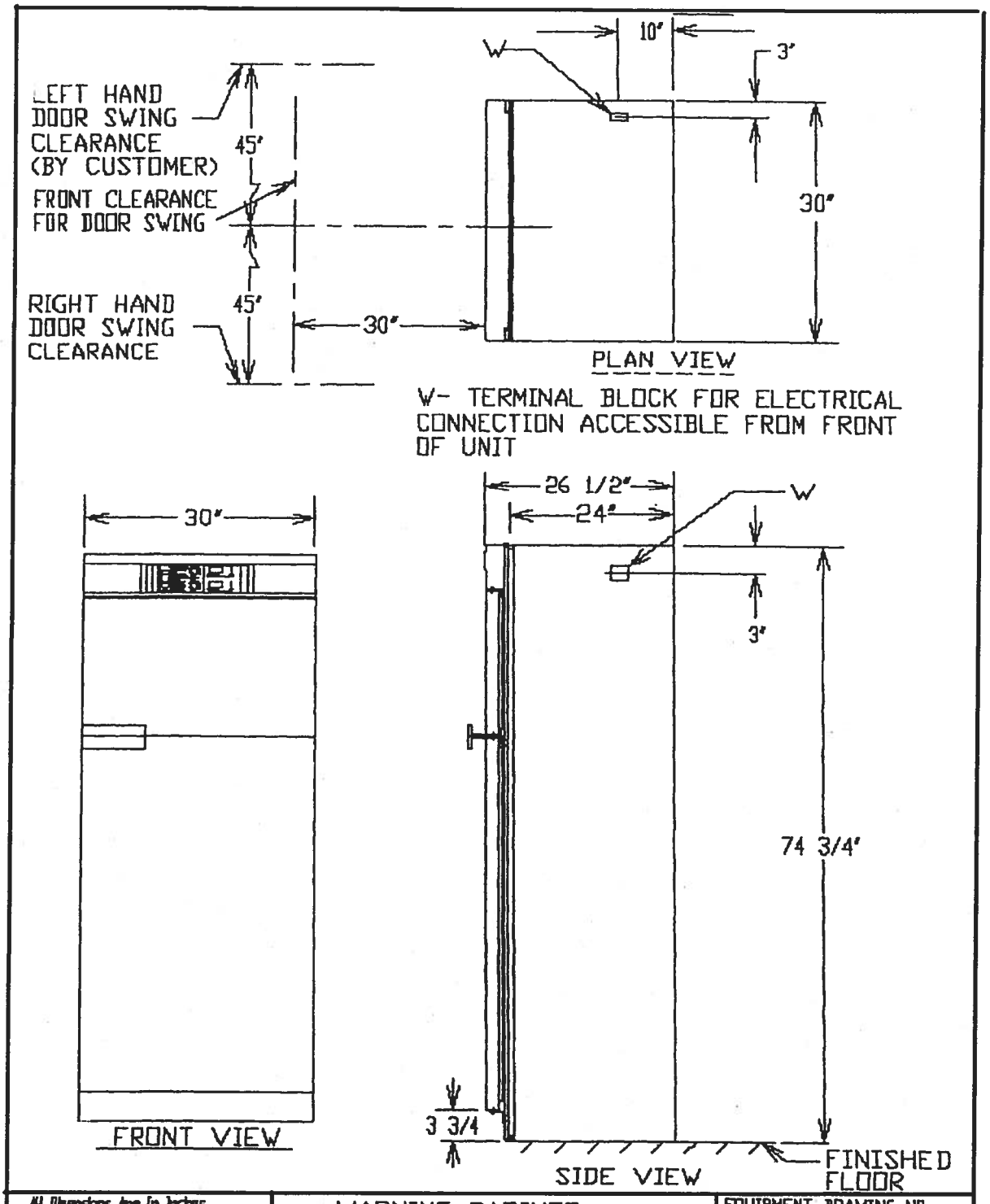
120 Volt, 50/60 Hz, 1-Phase, 13.7 A, 1600 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 6.8 A, 1625 Watts

. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)



Item # 717197



All Dimensions Are In Inches

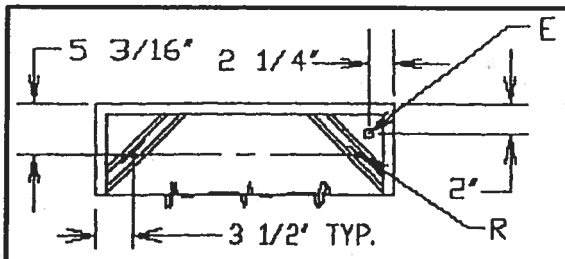
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET

24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214
SHT 1 OF 2

Item # 717197



REAR VIEW OF CABINET

E- 7/8" DIAMETER (22mm) HOLE FOR 1/2" (13mm) DIAMETER CONDUIT CONNECTION OR POWER CORD OPTION.

R- 3/8" (9.5mm) DIAMETER MOUNTING HOLES (2) FASTNERS NOT BY STERIS.

ELECETRICAL SPECIFICATIONS

VERSION	ELECTRICAL SUPPLY	POWER	CURRENT DRAW	UNIT BREAKER RATING
DOMESTIC	120V, 50/60 Hz, 1 PH	1644 WATTS	13.7 AMPS	15 AMPS
INTERNATIONAL	220-240V, 50/60 Hz, 1 PH	1625 WATTS	6.8 AMPS	10 AMPS

UNIT WEIGHT:

VERSION	UNIT WEIGHT		
	CRATED	BOXED	READY TO USE
DOMESTIC	542 LBS	410 LBS	353 LBS
INTERNATIONAL	557 LBS	425 LBS	368 LBS

UNIT CAPACITY:

	INTERNAL DIMENSIONS	VOLUME
TOP CHAMBER	22.875" DEEP X 23.75" WIDE X 15.5" HIGH 581.025mm DEEP X 603.25mm WIDE X 393.7mm HIGH	4.87 FT^3 .138 m^3
BOTTOM CHAMBER	22.875" DEEP X 23.75" WIDE X 38.25" HIGH 581.025mm DEEP X 603.25mm WIDE X 971.55mm HIGH	12.03 FT^3 .34 m^3

All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET
24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214 | SHT 2 OF 4

SEISMIC ANCHORAGE REPORT

for

74-INCH DUAL CHAMBER WARMING CABINETS

MODEL	ENGINEERING DWG. NO.	EQUIPMENT DWG. NO.
30"W X 18"D X 74"H OPEN MOUNTED	146655-541	129361-212
30"W X 18"D X 74"H RECESSED MOUNTED	146655-540	129361-213
30"W X 24"D X 74"H OPEN MOUNTED	146655-163	129361-214
30"W X 24"D X 74"H RECESSED MOUNTED	146655-162	129361-215

THE CALCULATIONS IN THIS REPORT SHOW COMPLIANCE WITH THE REQUIREMENTS OF TITLE 24 OF THE CALIFORNIA CODE OF REGULATIONS (CCR), PART 2 - CALIFORNIA BUILDING CODE (CBC) PUBLISHED AS THE 1988 EDITION OF THE UNIFORM BUILDING CODE (UBC) WITH STATE OF CALIFORNIA 1989. AMENDMENTS, SECTION 2312(g)

Prepared by: G. D. Hall — Date 8/21/91
Senior Engineer

Reviewed by: E. L. Thomas — Date 8/23/91
Project Engineer

Reviewed by: W. L. Sanders — Date
Project Manager

SEISMIC ANCHORAGE REPORT
74-INCH DUAL CHAMBER
WARMING CABINETS

AMSCO

PREPARED BY	CHECKED BY	APPROVED BY	APPROVED BY	APPROVED BY
G. Hall				
DATE 08/16/91	DATE	DATE	DATE	DATE

REVISION RECORD

REV.	DATE	APPROVED BY	PAGE	PARA.	CHANGE
0	8/16/91				Initial release PER # 24

EQUIPMENT WEIGHT & CENTER OF GRAVITY

	18"	24"	
Depth of Unit			
Weight of Cabinet (maximum)	220	260	pounds
Weight of Contents (maximum load)	360	480	pounds
Total Weight	580	740	pounds

The weight acts through the center of gravity as noted in Figures 1 and 2.

SEISMIC LOAD CALCULATIONS

Seismic load is calculated for the heavier unit from the formulae:

$F_p = Z\ I\ C_p\ W_p$ 1▸▸ 2▸▸

and:

$F_w = W_p \pm F_p/3$ 6▸▸

Where:

F_p = Lateral Seismic Force

Z = Zone Factor = 0.4 for Zone 4 locations 3▸▸

I = Importance Factor = 1.5 for essential facilities. 4▸▸

C_p = 0.75 Horizontal force factor - hospital equipment, rigid element 5▸▸

W_p = Dead weight of unit

F_w = Vertical Seismic Force

The forces then will be:

$F_p = Z\ I\ C_p\ W_p$

$= 0.4 \times 1.5 \times 0.75 \times W_p = 0.45\ W_p$

and:

$F_w = W_p \pm F_p/3 = W_p \pm (0.45\ W_p)/3 = W_p \pm 0.15\ W_p$

$F_w = 1.15\ W_p$ or $0.85\ W_p$

Seismic forces at the Warming Cabinet's C.G. are: (See Figures 1 & 2)

F_p - 0.45 X 740 = 333 lbs

F_w = 1.15 X 740 = 851 lbs

or

F_- = 0.85 X 740 = 629 lbs

EQUIPMENT ANCHORAGE INTERFACE

The equipment rest on the floor, but is anchored to the wall with three bolts as shown in Figures 1 and 2.

All the vertical seismic load is taken by the floor. The cabinet will not lift of the floor when the acceleration is upward. When the acceleration is downward, the stiffness of the cabinet is such that the load will be transmitted to the floor and not the bolts.

Friction on the floor is neglected, so all the horizontal load is taken by the bolts. It is assumed that the reaction of the floor is acting through the center of gravity producing no moment. The bolt reactions are determined by the laws of statics. When the seismic load is perpendicular to the wall, the bolts are in pure tension. When the seismic load is parallel to the wall, the bolts experience shear plus tension or compression to react the offset the center of gravity from the wall. The maximum tension any one bolt could experience is 210 pounds. The maximum shear any one bolt could experience is 180 pounds. A bolt can experience both maximum tension and maximum shear concurrently.

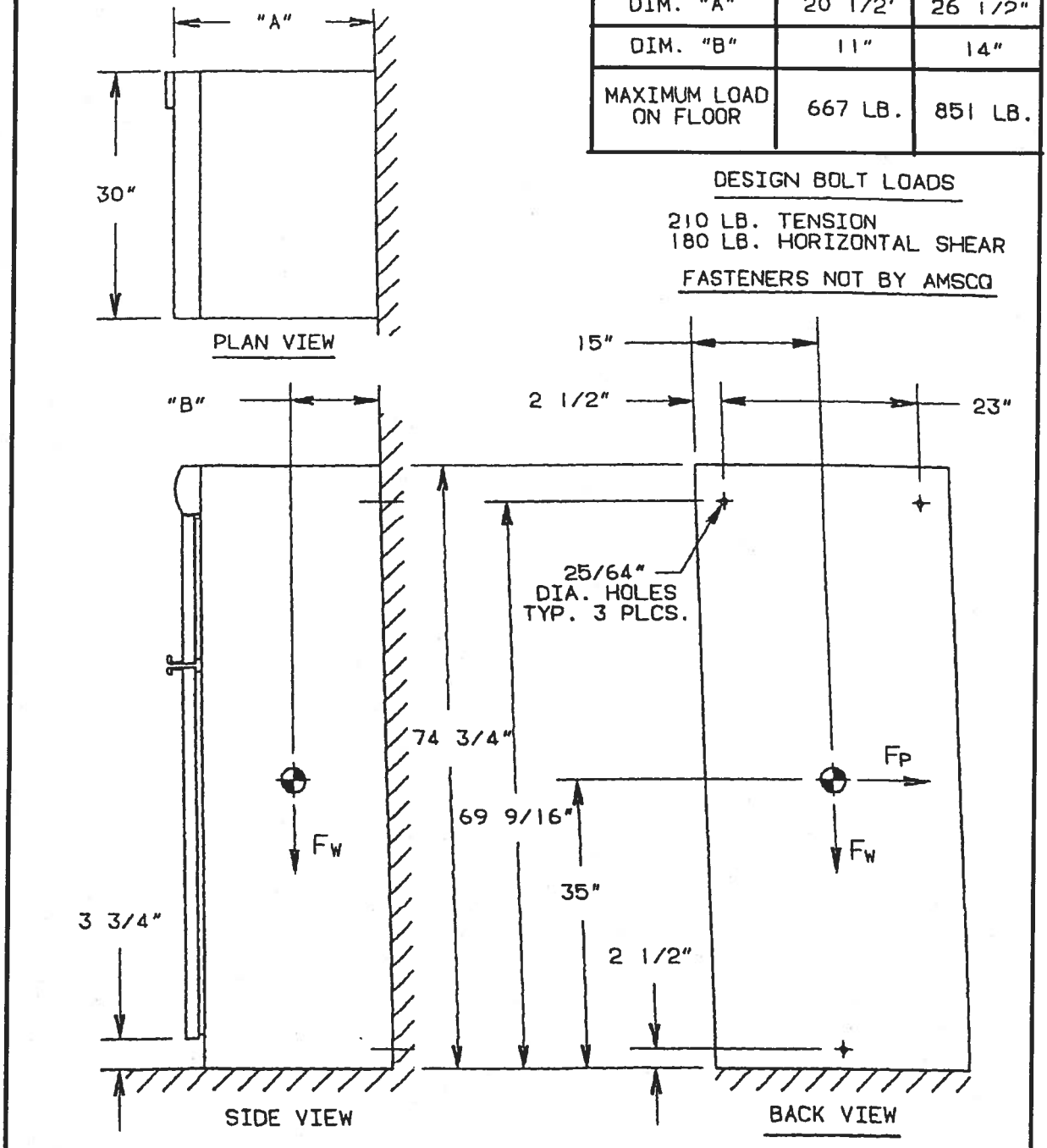
6▸▸ Reference 1▸▸ Table No. 23-P, Note 10, p. 179.54
5▸▸ Reference 1▸▸ Table No. 23-P, p. 179.53 plus notes on p. 179.26
4▸▸ Reference 1▸▸ Table Nos. 23-K and 23-L, pp 179.47 & 179.48
3▸▸ Reference 1▸▸ Table No. 23-I, p. 179.46
2▸▸ Reference 1▸▸ Section 2-312(g)2
1▸▸ Reference California Code of Regulations (CCR), Title 24, Part 2, Published as "State of California 1989 Amendments to the 1988 Edition of the Uniform Building Code".

	18" DEPTH	24" DEPTH
DIM. "A"	20 1/2'	26 1/2"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

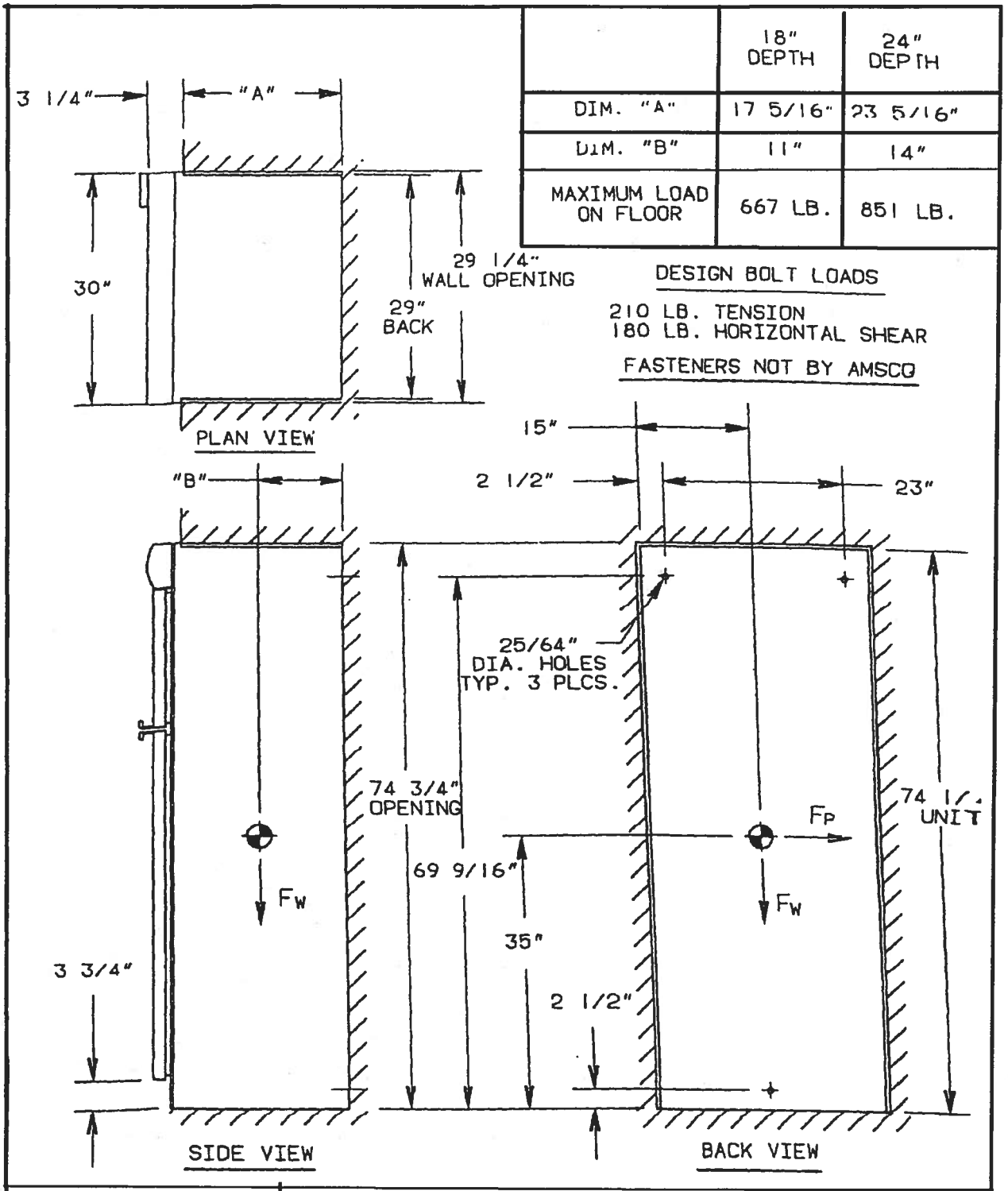
210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO



All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

Seismic Anchorage Report
Warming Cabinets, Open
30" Wide x 74" High



	18" DEPTH	24" DEPTH
DIM. "A"	17 5/16"	23 5/16"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO

All Dimensions Are In Inches
Also Refer To GENERAL NOTES
Applicable To Equipment Drawing

FIGURE 2
SEISMIC ANCHORAGE REPORT
WARMING CABINETS, RECESSED
30" WIDE × 74" HIGH

GENERAL NOTES – APPLICABLE TO SPECIALTY SURGICAL PRODUCT EQUIPMENT DRAWINGS

INTRODUCTION

Each equipment drawing (enclosed) pertains to the equipment as specified or purchased by you. These general notes and recommendations are intended to complement the equipment drawing(s), as necessary, and thereby further assist you in achieving satisfactory installation of the equipment. The information on this and the enclosed drawing(s) is based upon the design and construction of the equipment as of the date of the drawing.

SPACE CONSIDERATIONS

Clearances

The clearance dimensions shown on each drawing are the minimum considered necessary to allow space for servicing and operating the equipment.

Dimensions

Attention must be given to the *printed dimensions* shown on each drawing, since no attempt has been made to hold these drawings to any specific scale.

MOUNTING DETAILS

For Wall Mounting

It is important that walls be adequately reinforced to support the operating weight of the equipment as shown on the drawing. Materials and labor for such support are not furnished by STERIS.

Recessing Cubicle

Wooden bucks, where required to anchor equipment to the walls, are to be furnished by the Customer.

The recessing cubicle should be adequately ventilated to maintain temperature in the range of 80° to 90°F (27° to 32°C) when the equipment is in operation.

UTILITY SERVICE REQUIREMENTS

Roughing-in for Equipment Requiring Steam and/or Water Supply

All lines should be short-stubbed through the floor or wall, far enough to allow for pipe coupling. Provisions must be made for short-swing connections to equipment terminals.

Terminal Fittings

Unless otherwise specified in the contract or purchase order, piping and other appurtenances between terminal fittings on the equipment and wall or floor outlets (stubbing) are not furnished by STERIS.

Pipe Sizes

Pipe sizes shown on each equipment drawing indicate utility service terminals. To ensure adequate service, the lines leading to and from the equipment should be increased in size to conform with applicable plumbing codes.

Shutoff Valves

Separate shutoff valves should be installed in steam and water supply lines near each piece of equipment, so that the unit can be serviced without interruption of supply to other equipment.

Steam Return Lines

Steam return lines should be connected to a gravity system piped to a *vented receiver*. *Avoid any piping* arrangement that could cause back pressure in the return line.

Steam and Water Pressures

Steam and water pressures indicated on each drawing are to be dynamic at the equipment.

Equipment is adequately equipped to operate on the pressures listed on the equipment drawing. If supply line pressure exceeds those shown, provide reducing valves. These are not furnished by STERIS unless specifically called for in the contract or purchase order.

Wiring Terminals

Wiring on the equipment terminates at a junction box or boxes as shown on each drawing. Wiring and other appurtenances between junction box (or boxes) and building service lines are not furnished by STERIS.

Disconnect Switches

Disconnect switches with off position lockout only must be furnished and installed by the Customer in electric supply lines near each piece of equipment.

IMPORTANT

STERIS assumes no responsibility for changes made necessary through failure to explicitly observe these instructions and recommendations. In all instances, local, county, state, and national regulations should be observed.

STERIS SHIPPING INSTRUCTIONS AND SERVICE REQUIREMENTS

PREPARATION FOR SHIPMENT

Each unit of equipment shall be placed in a substantial shipping container or crate complying with applicable rules of the I.C.C. Uniform Freight Classification to ensure acceptance by the common or other carrier for safe transportation to final destination at the lowest rate. The shipping crate or container for heavy equipment (such as sterilizers and water stills) shall be of skid construction to facilitate handling by lift equipment.

The exterior of each container shall be clearly and legibly marked with the room, floor and item number (if available), shipping address, and brief description of the contents. A packing list and complete instructions for uncrating the equipment and setting it in place shall be fastened to the outside of the container or crate; such information shall be protected by a waterproof envelope. Packaging, packing, and marking differing from that above shall be provided, if specified.

INSTALLATION INSTRUCTIONS

Unless additional copies are specified, one set of complete installation instructions, including prints showing all utility service requirements, space requirements and wiring diagrams (if not affixed to the equipment) shall be furnished with each unit of equipment.

OPERATING AND MAINTENANCE INSTRUCTIONS

Instructions for operating and performing periodic preventive maintenance on each unit of equipment, including a list of the service parts and quantity of each required for this purpose, shall be furnished. Unless otherwise specified, one copy of this material shall be furnished.

SERVICE AFTER INSTALLATION*

After installation of each assembly, STERIS shall provide a factory-trained technician to perform repair service as required by the customer. This service shall be on a time and material basis unless the equipment is still within the manufacturer's warranty.

If specified, STERIS shall provide a factory-trained technician to perform preventive maintenance services on each assembly following its test and demonstration.

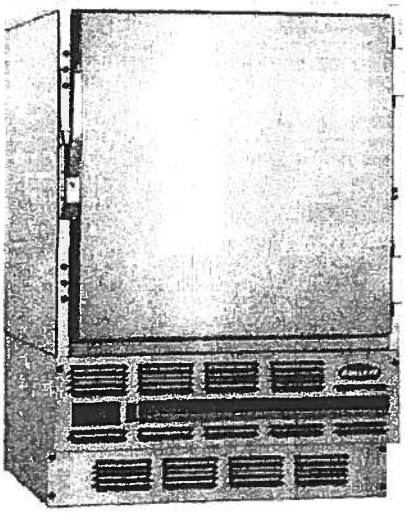
* *These services are available from the STERIS Corporation within the continental United States, Alaska, and Hawaii.*

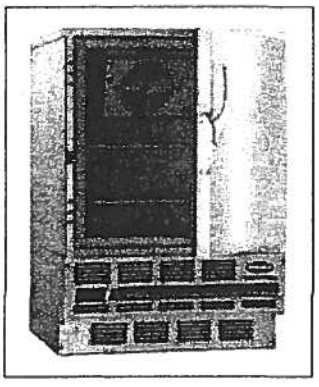
Item # 717197

Symphony REF Series Undercounter Refrigerators

Medical-grade undercounter refrigerator with external digital temperature display and stainless steel interior/exterior.

Model	
REF5	for standard 36" (915mm) counters, 4.8 cu ft capacity





Proper storage for expensive medications and patient supplies

- Heavy-duty compressor, forced air cooling and solid state controller maintain uniform cabinet temperatures with quick pull-down to temperature
- Adjustable set point meets temperature range requirements for different applications:
  36°F – 46°F (3°C – 8°C) for medications,
  33°F – 40°F (1°C – 5°C) for food and beverages
- Locking door handle provides medication security
- Supports JCAHO standards on medication storage
- NSF listing ensures temperature stability in adverse conditions and with frequent door openings

More features designed specifically for healthcare

- Easy-to-read external temperature display allows easy temperature logging
- Positive door latch and magnetic gasket provide secure closure
- Two, easy-to-clean, epoxy-coated shelves accept narcotic box hardware (supplied by others)
- Two models – for standard 36" (915mm) counter and 34" (864mm) ADA-compatible counters

Easy installation, cleaning and care

- Front-breathing design allows installation in standard 24" (610mm) casework opening with no side clearances
- Field-reversible door and handle for left or right opening
- Condensation evaporates automatically
- Automatic, off-cycle defrost eliminates manual defrosting
- Durable stainless steel interior and exterior for easy cleaning
- Slide-out compressor tray for easy access to condenser

Industry's best warranty

- 2-yr parts and labor on entire refrigerator
- 5-yr parts on compressor

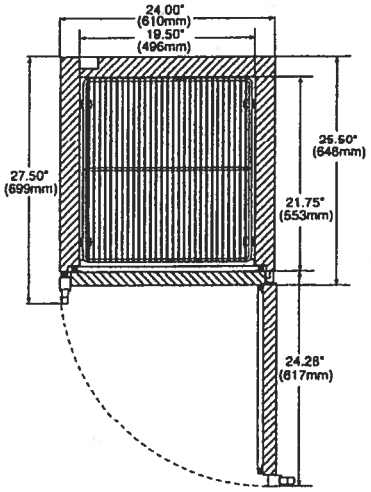
Accessories

- Temperature alarm with probe and °F/°C display
- Pyxis® compatible door bracket

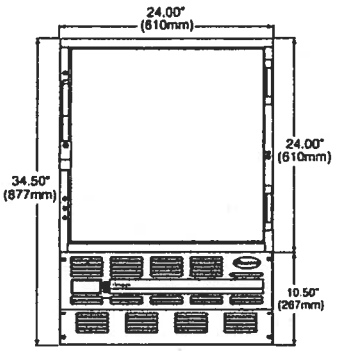
Item # 718171

REV: tlg 10/21/03

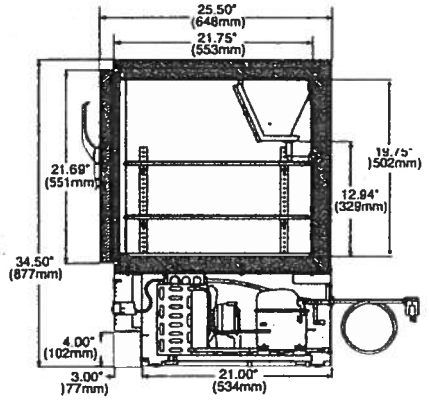
Top View
all models



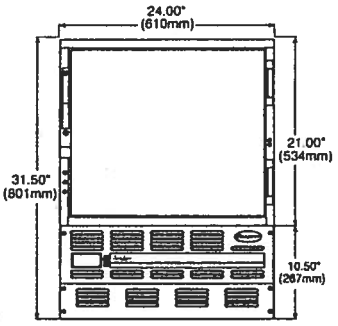
Front View
REF5



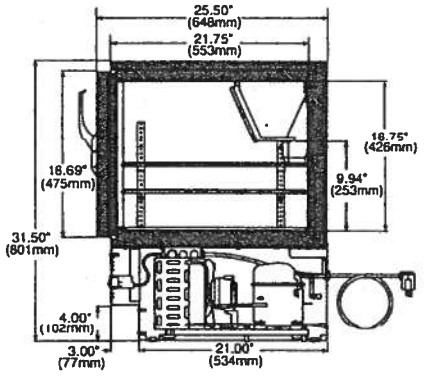
Side View
REF5



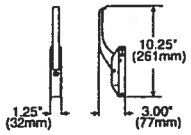
Front View
REF4-ADA



Side View
REF4-ADA



Handle Detail
all models



Plug Detail
all models
NEMA 5-15



Approximate Shipping Weight 175 lbs (79kg)

Standard Electrical 115V, 60Hz, 1 ph, 8.0 amps, max. fuse 15 amps
Hospital-grade cord and plug provided.

Specifications
Follett undercounter refrigerator to be model (choose one) _____ REF5 34.5" (877mm) high for use in standard counters or _____ REF4-ADA 31.5" (801mm) high for use in 34" (864mm) high ADA-compatible counters. REF5 to have 4.8 cu ft (136L) capacity. REF4-ADA to have 4.0 cu ft (113L) capacity. Environmentally-friendly R404A refrigeration system to include heavy-duty 1/4 HP compressor, blower, blower coil and automatic evaporative forced air cooling with off-cycle defrost. Refrigerator to be equipped with external temperature display in °F/°C and solid-state controller to maintain uniform cabinet temperatures. Controller to have programmable set points to meet temperature range requirements of different applications: 30°F – 40°F (2°C – 8°C) for medications, 33°F – 40°F (1°C – 5°C) for food and beverage. Refrigerator door to be field-reversible and equipped with replaceable gasket and chrome-plated handle with cylinder lock. Refrigerator interior and exterior to be stainless steel. Two epoxy-coated wire shelves adjust in 1/2" (13mm) increments. Storage area to be insulated with high-density, non-CFC foam polyurethane. Hospital-grade cord and plug provided. Refrigerator to be NSF, UL and cUL listed.

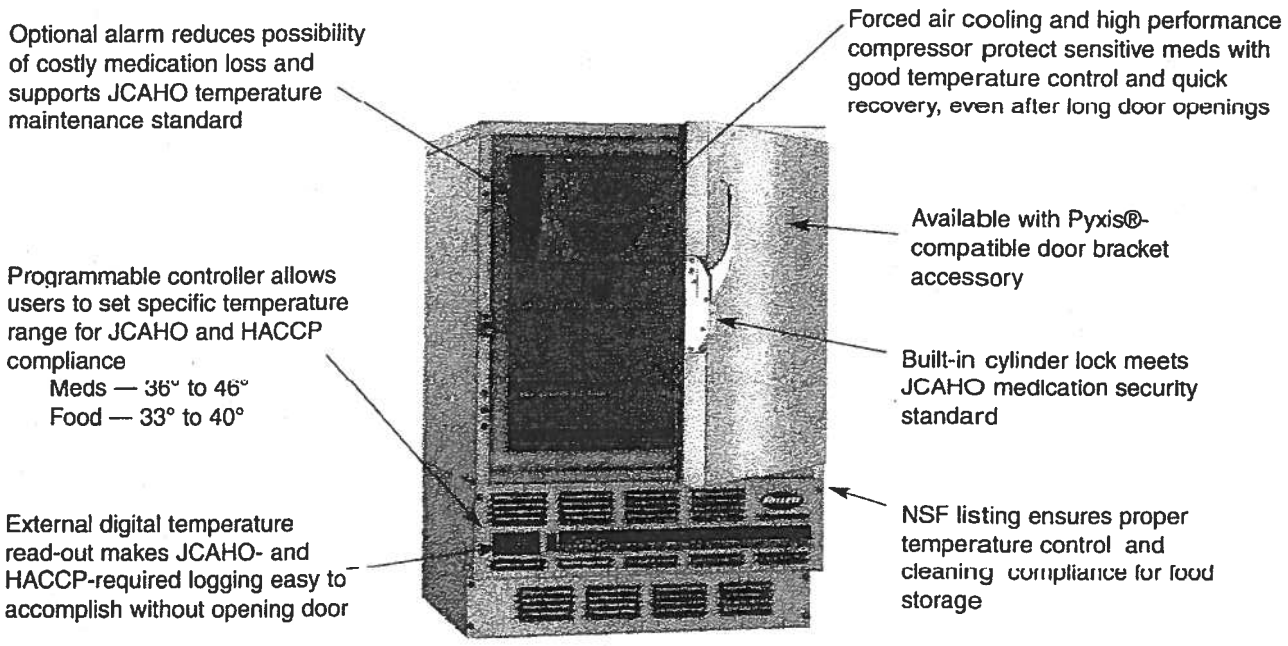
Item # 718171

Meets medication and food storage requirements

Follett's REF5 and REF4-ADA medical-grade undercounter refrigerators provide the features and performance to meet both JCAHO standards and local and state requirements for medication and food storage.

JCAHO's medication standard (TX 3.5/MM.2.20) addresses proper storage and control of medications, and at a minimum requires the logging of temperatures, lockable security for medications, and the maintenance of constant appropriate temperature.

State and local inspectors generally follow HACCP guidelines requiring temperature logging to ensure that perishable food is maintained below 40°F.



High-quality design and full stainless steel construction deliver outstanding performance and long-term reliability, backed with the industry's best warranty. Our component performance testing supports this claim:

- Compressor (1/4 hp, heavy-duty) — over 1.6 million on-off cycles without failure
- Fan, controller, and condenser — over 39,000 run hours without failure
- Door gasket — over 38,000 openings and closings with no measurable wear
- Door hinges — over 1 million cycles without measurable wear
- Door — tested open to 450 pounds of direct weight without failure

NSF - National Sanitation Foundation; JCAHO - Joint Commission on Accreditation of Healthcare Organizations; HCAAP - Hazardous Analysis of Critical Control Point Program

END OF SPECIFICATION

UNIT SPECIFICATIONS SHEET

LFGI-4USP LAMINAR FLOW GLOVEBOX / ISOLATOR

SECTION I. PERFORMANCE DATA

The Laminar Flow Glovebox/Isolator provides the ultimate in both product and operator protection. The LFGI functions as a Glovebox while operating under negative pressure to meet NIOSH recommendations and as an Isolator under positive pressure to meet USP <797> regulations. HEPA filtered unidirectional (laminar) air bathes the work area to protect the product from contamination and removes any particulate generated by sample manipulation. The operator is provided a complete barrier from materials being manipulated in the work area. The LFGI Series of barrier isolators meet or exceed ISO 14644-1 Class 5 air quality. Each LFGI, before shipping, undergoes rigorous physical testing to assure the unit meets performance requirements as validated. It is required that independent certification be performed before use.

SECTION II. EQUIPMENT SPECIFICATIONS

Construction-

-Overall Dimensions: 66 W (50" W at base) x 32" D x 80" H
-Work Area Dimensions: 46 ½" W x 24 ½" D x 29" H
-Designed to fit through standard door openings and elevators.
-All stainless steel construction both inside and out with a pharmaceutical grade finish.
-316L Stainless steel work trays slide over one another and are removable to facilitate easy clean up under the work deck.
-All viewing panels are stainless steel framed Acrylic
-Front viewing panel is top hinged and self supporting for easy access to the work area for cleaning and equipment ingress.
-All filter diffuser / guard panels are removable for easy cleaning.
-Straight sides and back maximize work area to accommodate the many types and shapes of pharmacy equipment and compounders.
-All corners in work area, antechamber and work surface are easily reached and cleaned.

Antechamber-

-Sealed two-door airlock (16" W x 13 ½" D x 14 ¼" H) maintains complete environmental separation between work area and ambient conditions.
-HEPA filtered purge of trapped airlock air eliminates cross contamination between the work area and the room during both material ingress and egress.

Waste Removal-

-Trash tube is a 4" diameter tube, flanged for waste bag/container connection and provided with an easily removable seal/stopper to maintain work area containment. (Stainless trash can is available)
-Sharps tube is a straight 2 ½" diameter tube to facilitate quick drop of the largest syringes and provided with an easily removable seal/stopper to maintain work area containment.
-Fully adjustable sharps container shelf accommodates most commercially available wide mouth or hinged top sharps collectors. (Examples BD Part # 305610 and 305491)

Safety-

-Lock-out handle requiring key for access to work area.
-Digital pressure readout with low pressure alarm for work area.
-Inward/Outward face velocity is 95-100 linear feet per minute at gloveport opening, to protect operator/product during massive breach of containment.
-Glove changes can be made without breaking containment.
-Locking casters are standard, seismic anchors are available.

Ergonomics-
-Hydraulic assist height adjusting stand offers a full 10" range variance allowing operators to sit or stand comfortably for extended time periods.
-Stainless steel sliding tray inside the airlock pulls into the work area eliminating reaching strains.
-Two part sleeve/glove system allows the use of most types and sizes of commercially available gloves for better dexterity and tactility.
-Extra large oval gloveports are placed with bottoms together to provide an athropometrically correct configuration that accommodates a wide range of body types and increases range of movement.
-Gloveports have a 3" arm rest to reduce operator fatigue.
-Large viewing panel is at an angle to reduce glare and operator strain.
-Integrated foot rest.

Configuration Options-
-Overall work area pressure can be either positive or negative and can be altered in-place by a certifier.
-Antechamber can be left or right handed or can be installed on both sides.
-Waste and sharps removal tubes can be left or right handed or can be installed on both sides.
-Three available exhaust options that can be factory set or changed by a certifier in-place.

Filtration-
-Full framed standard size minipleat HEPAs filter 100% of inlet and exhaust air from both the work area and the antechamber to provide a fully contained environment.
-HEPA filters are full coverage and front loading for easy replacement by a certifier.
-A Prefilter extends the life of the work area supply HEPA filter and can be replaced without tools.

Electrical-
-High capacity motor/blower systems with speed control to extend HEPA filters life.
-Ten foot hospital grade power cord with molded grounded plug.
-Sealed outlet in work area.
-Separate lighted power ON/OFF indicator switches for blower and lighting.
-High efficiency, standard sized fluorescent lights are externally mounted to minimize heat build-up.
-Voltage = 115 Volt, 60 Hz (220/50-60 Hz also available).
-Amperage Rating = 15, Running Amperage = 6

Exhaust-
-Clean air plenum is external to the work area.
-Constructed to allow for optional outside venting of exhaust air.
-Constructed to allow for 3 exhaust options that can be factory set or changed by a certifier in-place
-Venting is not required for operation but is optional.

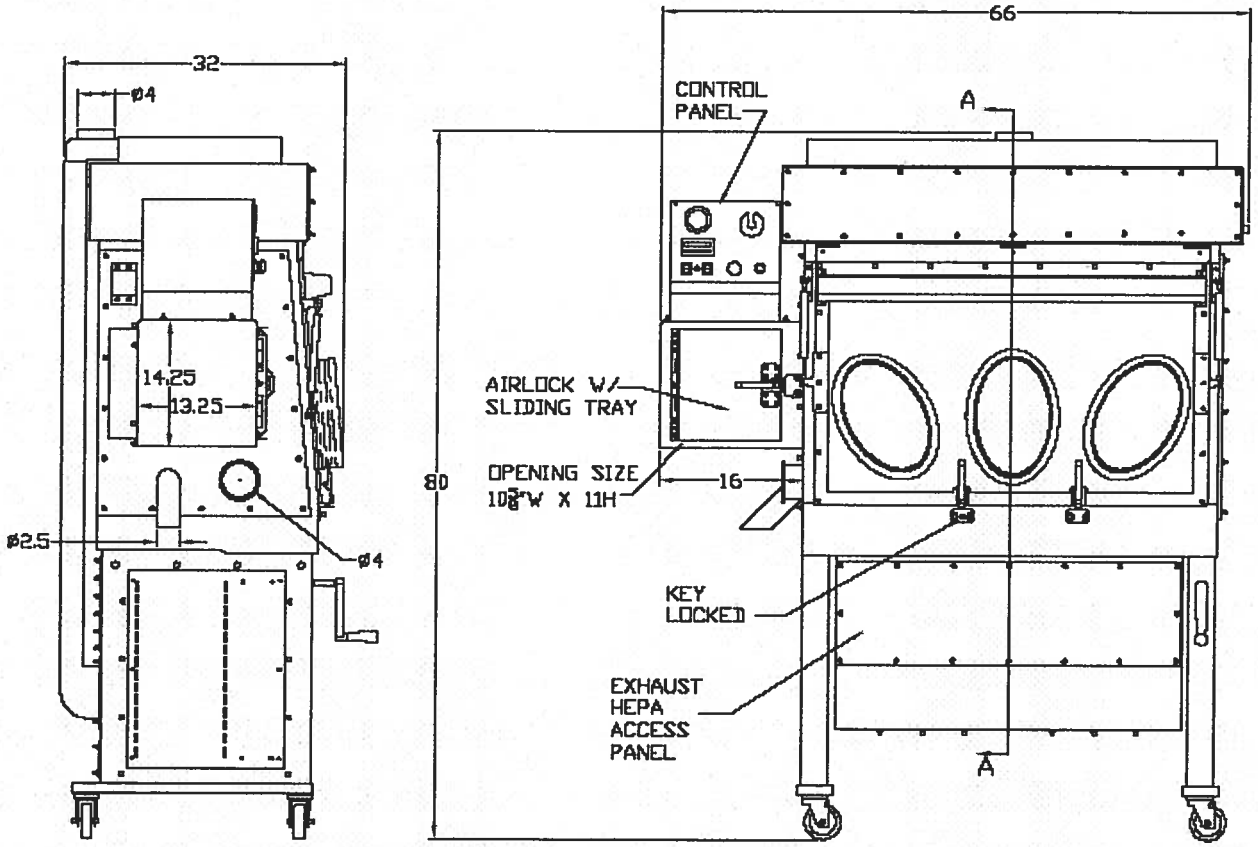
	No Exhaust- ~100% recycling of air	Controlled Exhaust- 80% recycling of air	Total Exhaust- no recycling of air.
Exhaust Connection	N/A	4" OD flexible hose	8" OD flexible duct
Exhaust CFM	20	80	400
Exhaust Static	N/A	<1 inch w.c.	Up to 2 inches w.c. (depending upon configuration)

Weight-
Net Weight- 625 lbs
Shipping Weight- 755 lbs

SECTION III. OPTIONAL EQUIPMENT AND ACCESSORIES-

LFGI-A80 Ergonomic task chair with anti-bacterial and anti-microbial vinyl covering, various colors
LFGI-A85S Stainless steel cleaning handle with pivot head. Accepts lint- free mop heads (LFGI-A85M)
LFGI-A8E Electrical Height Adjustment (requires additional plug-in)
LFGI-A83 Stainless steel garbage can (hangs on side to contain waste bags)
LFGI-A12 Exhaust ventilation kits

SECTION IV. UNIT DIAGRAM



END OF SPECIFICATION

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

Legend

D/R = Contractor De-Install & Relocate
CR = Contractor Rough-in Only
IR = Installation & Assembly Responsibility
F = Facility
C = Contractor
V = Vendor
N = New
E = Existing

Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	2-2099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	3-3073	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	4-4099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	5-5099	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1085	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1112	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	2-2082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	4-4082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1040	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1085	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1112	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3042	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3073	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4071	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5099	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1040	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1112	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	2-2071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	3-3042	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	4-4071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	5-5071	C				
475604	(Model: GTS18KBP) #GTS18KBP; REFRIGERATOR, TOP FREEZER,	3-3054	C				
477300	(Model: GMR04AAM) #GMR04AAM; REFRIGERATOR, UNDERCOUNTER	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1112	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	3-3073	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

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Equip. Manager:	CAGLE, JIMMY
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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1070	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1085	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1112	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3017	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3027B	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3042	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3073	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4082	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5099	C				
15152	(Model: 101461) # 101461; ILLUMINATOR, 1 PANEL	3-3066	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	3-3073	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5099	C				
717197	(Model: DJ04112033-01) #DJ04112033-01; WARMING CABINET	3-3055	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	3-3072	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5097	C				
JC2725	(Model: QUOTE) LAMINAR FLOW GLOVEBOX	3-3054	C				
C2859	(Model: QUOTE) DISPLAY CASE & REFRIGERATOR	1-1002	C				

COID PROJECT NUMBER: _____

OWNER FURNISHED EQUIPMENT DELIVERY SCHEDULE

NOTE: Per the Contractor Guideline Book this OFE Delivery Schedule MUST be completed and returned BEFORE the first invoice is paid!

PROJECT NAME: _____

Project Phase Description (if applicable): _____

Project Location: _____

Project Completion Date: _____ **Completion Date This Phase:** _____

Owner Equipment Mgr. _____ **Phone:** _____

Owner Construction Mgr. _____ **Phone:** _____

Hospital Material Mgr. _____ **Phone:** _____

Contractor's Supt.: _____ **Phone:** _____

Contractor's Project Mgr. _____ **Phone:** _____

OWNER FURNISHED/CONTRACTOR INSTALLED EQUIPMENT

NOTE: Include date for special backboxes (such as OR Lights, Illuminators, etc.) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor will coordinate with HCA Equipment Manager for safe storage.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:

HCA Equipment Manager:
HCA Construction Manager:
Hospital Construction Contact:
Hospital Materials Manager:

ENGINEERED SYSTEMS EQUIPMENT DELIVERY SCHEDULE

(Sample on Following Page)

EXPLANATION / INSTRUCTIONS: HCA requires that the enclosed Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule Form to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed. This information enables owner vendors to ship cable and backboxes and equipment, as well as, schedule installation to meet the construction schedule. It is critically important that one schedule document be provided for each separate occupancy phase of the project.

Please see "Team Construction: Routine / Repetitive Phase" for general contractor's responsibilities for management of the owner furnished systems process and installation of all raceway and cable installation on some systems. It is the contractor's responsibility to update and redistribute this document if the construction schedule changes.

NOTE: **No Payments can be made until receipt of this schedule(s) by the HCA Construction Manager.**

OWNER PROJECT#_____

ENGINEERED/SYSTEMS INFORMATION & TELEPHONE SYSTEMS
EQUIPMENT DELIVERY SCHEDULE

Project Name: _____ Date: _____
Project Location: _____ Revision Date: _____
Description of this phase (if applicable) _____
Completion Date of this phase: _____
Project Completion Date: _____ Revised: _____
Owner's Construction Manager: _____
Owner's Equipment Manager: _____ Phone #: _____
Information & Telephone Systems Cabling Installation Project Manager: _____
Information and Telephone Systems Project Manager: Bob Stewart Phone #: 615-344-8010
General Contractor Superintendent: _____ Phone #: _____
Electrical Contractor Project Manager: _____ Phone #: _____

Installation or Need Equipment Delivered

ITEM/DESCRIPTION	OWNER FURNISHED OWNER INSTALLED	OWNER FURNISHED CONTRACTOR
INSTALLED	DATE:	DATE:
1. Wiring Schematics/Cut Sheet		_____
2. Engineered Systems Cable		
Cable & Special Backboxes		_____
3. T.V. Brackets		_____
4. Radio Tower	_____	
5. Information Systems:		
Cable:	_____	
Telephone Equipment:	_____	
Data Equipment:	_____	
6. Nurse Call System/Sound System:	_____	
7. Intercom System	_____	
8. Dictation System	_____	
9. MATV System	_____	
10. TV Set Installation	_____	
11. Systems Inspection	_____	_____
12. State Inspection	_____	_____
13. Demobilize Job site	_____	_____

DISTRIBUTION BY HCA CONSTRUCTION MANAGER:
Information & Telephone Systems: Bob Stewart
HCA Construction Manager:
HCA Equipment Manager:
Hospital Construction Contact:
General Contractor's Project Manager:

Owner/ Vendor Installed Equipment Delivery Schedule

ITEM	Date Building Will Be Ready For Installation
Kitchen Equipment	
Walk-In Cooler & Freezer	
Radiology Equipment	
Shelving/Lockers	
Patient Room Furniture	
Office/Waiting Furniture	
Drapes/Cubicle Curtains/Shower Curtains	
Artwork	
Others (as may be applicable)	

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
1. ANESTHESIA ADMINISTRATION		X	X	X	X									
2. AUDIO / VISUAL / PERSONNEL TRAINING AIDS										X	X	X	X	To be coordinated via DD session. Information Systems will budget.
a. Portable										X	X	X	X	
b. Systems										X	X	X	X	
3. AUTOMATED TRANSPORT SYSTEMS (Pneumatic Tube)						X	X	X	X					Check with Bulk Purchasing
4. CARTS														
a. Anesthesia		X	X	X	X									
b. Case, Surgical		X	X	X	X									
c. Cast		X	X	X	X									
d. Crash		X	X	X	X									
e. Endoscopy		X	X	X	X									
f. E.N.T		X	X	X	X									
g. Environmental Svcs		X	X	X	X									
h. Food Service		X	X	X	X									
i. Fracture		X	X	X	X									
j. Gift Shop (Hospitality)		X	X	X	X									
k. Isolation		X	X	X	X									
l. Linen		X	X	X	X									
m. Medication		X	X	X	X									
n. Miscellaneous		X	X	X	X									
o. Supply		X	X	X	X									
p. Tool		X	X	X	X									
q. Trash		X	X	X	X									
r. Utility		X	X	X	X									
s. Wrap		X	X	X	X									
5. CASEWORK														
a. Focal						X	X	X	X					Check with Bulk Purchasing
b. Standard						X	X	X	X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Volce (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
c. Special (Modular)						X	X	X	X					Check with Bulk Purchasing Typically Vendor Installed
d. Keyboards (Duplicate under furniture)						X	X	X	X					
6. CHAIRS, EXAM/TREATMENT														
a. Contour (Donor, I.V.)		X	X	X	X									
b. Dental		X	X	X	X									
c. Eye / ENT		X	X	X	X									
d. Miscellaneous		X	X	X	X									
e. Phlebotomy		X	X	X	X									
7. CHARTING SYSTEMS, PATIENT														
a. Manual		X	X	X	X									
b. Computerized										X	X	X	X	
c. Wall-hung chart station						X	X	X	X					
8. CLOCKS														
a. Discrete (Battery / Plug-in)						X	X	X	X					
b. Interval Timers / Recorders						X	X	X	X					
c. Systems, Cenralized						X	X	X	X					
d. Kronos Time & Attendance										X	X	X	X	
9. COMMODES														
a. Fixed						X	X	X	X					
b. Portable		X	X	X	X									
10. COMMUNICATIONS EQUIP/SYSTEMS														
a. Dictation														
1. Portable										X	X	X	X	
2. Systems, Hardwired										X	X	X	X	
b. Doctors' Registry						X	X	X	X					
c. Emergency Radio		X	X	X	X									Contractor to pull cable
d. Intercom		X	X	X	X									Contractor to pull cable
e. Nurse Call		X	X	X	X									Contractor to pull cable

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
f. Side Com Receptacle		X	X					X	X					
g. Radio / Pocket Paging		X	X	X	X									Contractor to pull cable
h. Two Way Radio		X	X	X	X									Contractor to pull cable
i. Telephone										X	X	X	X	
j. Overhead Page / Music		X	X	X	X									Contractor to pull cable
k. Transcription										X	X	X	X	
l. Public Address		X	X	X	X									Contractor to pull cable
m. Fax Machines										X	X	X	X	
n. Picture Archive and Communication Systems (PACS)										X	X	X	X	
11. COMPACTORS														
a. External						X	X	X	X					
b. Departmental						X	X	X	X					
12. DARKROOM EQUIPMENT														
a. Cabinet, Film Storage		X	X					X	X					
b. Miscellaneous		X	X	X	X									
c. Safelights						X	X	X	X					
d. Transfer Boxes, Cassette						X	X	X	X					
e. Revolving X-Ray Door						X	X	X	X					
13. DATA / WORD PROCESSING EQUIPMENT														
a. Desktop Computer										X	X	X	X	
b. Mainframe										X	X	X	X	
c. Network Equipment										X	X	X	X	
d. Backbone and/or Station Wiring										X	X	X	X	
14. DIALYSIS EQUIPMENT														
a. Peritoneal		X	X	X	X									
b. Renal		X	X	X	X									
15. EQUIPMENT MANAGEMENT SYSTEMS (Equipment Boom)		X	X	X					X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
16. ELECTROCARDIOGRAPH EQUIPMENT		X	X	X										
17. ELECTROSURGICAL EQUIPMENT		X	X	X	X									
18. ENVIRONMENTAL ROOMS						X	X	X	X					
(Prefabricated)														
19. ENVIRONMENTAL SERVICES EQUIP		X	X	X	X									
20. FIRE PREVENTION EQUIPMENT														
a. Blankets		X	X					X	X					
b. Cabinets, Extinguisher						X	X	X	X					
c. Extinguishers						X	X	X	X					
d. Systems						X	X	X	X					
21. FOOD SERVICE EQUIPMENT														
a. Grp. I (Hoods, Walk-Ins)		X	X	X	X									Elec. contractor makes actual connection
b. Grp. II (Moveable: Ovens, Dishwasher)		X	X	X	X									
c. Grp. II (Smallwares: Pots, Trays, Carts)		X	X	X	X									
d. Final Equipment Placement Set in place; caulking; touchup														Work to be completed by food service vendor
e. Garbage Disposals						X	X	X	X					
f. Cash register										X	X	X	X	
22. FREEZERS (excluding Food Svc Equip)														
a. Chest		X	X					X	X					
b. Miscellaneous		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in/Prefabricated		X	X	X	X									Elec. contractor make actual connection
23. FURNISHINGS, DESIGN														

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Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Accessories, Design	X													
b. Artwork / Graphics		X	X	X	X									
c. Bulletin Boards/Tack Boards/Chalkboards/Marker Boards						X	X	X	X					
d. Carpet						X	X	X	X					Check with Bulk Purchasing
e. Curtains, Cubicle						X	X	X	X					
f. Curtains, Shower			X	X	X	X								
g. Furniture, General - Existing			X	X	X	X								Interior Designer to spec fabric
h. Furniture, General			X	X	X	X								
i. Signs, Exterior						X	X	X	X					Check with Bulk Purchasing
j. Signs, Interior						X	X	X	X					Check with Bulk Purchasing
k. Waste Receptacles														
Clinical		X	X	X	X									
Non-Clinical			X	X	X	X								
l. Window Treatment / Blinds/ Cornice Boards			X	X	X	X								Except Blinds that are internal with window units
m. Wall Protector (ie: bumper / bed / handrail/corner guards)						X	X	X	X					
n. Keyboards - in workstations, duplicate in casework						X	X	X	X					
o. Planters			X	X	X	X								
p. Plants	X													
24. FURNITURE, PATIENT ROOM														
a. Beds		X	X	X	X									
b. Cribs		X	X	X	X									
c. Mattresses		X	X	X	X									
d. Table, Overbed		X	X	X	X									
e. Cabinets, Bedside		X	X	X	X									Interior Designer Specification Responsibility Per Equipment Managers Direction
f. Chairs, Lounge		X	X	X	X									
g. Chairs, Side		X	X	X	X									
h. Chests		X	X	X	X									
i. Desks		X	X	X	X									
j. Dressers		X	X	X	X									
k. Wardrobes (except built-ins)		X	X	X	X									
25. HAMPERS, LINEN		X	X	X	X									
26. HEART-LUNG MACHINES		X	X	X	X									

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
27. HOODS														
a. Biohazard		X	X					X	X					
b. ETO						X	X	X	X					
c. Fume		X	X					X	X					
d. Laminar Flow		X	X					X	X					
e. Radioisotope		X	X					X	X					
28. HOT LAB EQUIPMENT														
a. Nuclear Medicine		X	X	X	X									
b. Radiation Therapy		X	X	X	X									
29. HYPO-HYPERTHERMIA EQUIPMENT		X	X	X	X									
30. ICE MACHINES		X	X					X	X					
31. ILLUMINATORS, X-RAY FILM														
a. Motorized		X	X					X	X					
b. Recessed		X	X					X	X					
c. Surface Mounted		X	X					X	X					
32. IMAGING EQUIPMENT														
a. Computerized Axial Tomography (CT)		X	X	X	X									
b. Dental Radiography		X	X	X	X									
c. Digital Radiography		X	X	X	X									
d. Image Intensifier, Portable		X	X	X	X									
e. Magnetic Resonance Imaging		X	X	X	X									
f. Magnetic Resonance Imaging Rigging							X	X						Contractor responsible
g. Mammography Equipment		X	X	X	X									
h. Nuclear Camera		X	X	X	X									
I. Nuclear Medicine Accessories		X	X	X	X									
j. Radiation Therapy Equipment		X	X	X	X									
k. Radiation Therapy Accessories		X	X	X	X									
l. Radiographic Equipment		X	X	X	X									
m. Radiographic Equipment Accessories		X	X	X	X									
n. Single Photon Emission		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
Computed Tomography														
o. Ultrasound Equipment		X	X	X	X									
p. Shielding (Lead, Magnetic, RF)						X	X	X	X					
q. Vibration Testing (MRI)														Contractor responsible
r. Picture Archive and Communication Systems (PACS)										X	X	X	X	
1. Cardiology and Radiology										X	X	X	X	
s. Cath Lab		X	X	X	X									
33. IMPRINTERS AND EMBOSSERS										X	X	X	X	
34. INCINERATOR														
a. Pathological						X	X	X	X					
b. Waste - Autoclave/Shredder						X	X	X	X					
35. INFANT CARE EQUIPMENT														
a. Bassinets		X	X	X	X									
b. Incubators		X	X	X	X									
c. Neonatal Care Systems		X	X	X	X									
d. Phototherapy Equipment		X	X	X	X									
e. Warmers		X	X	X	X									
36. INSTRUMENTS, EXAM														
a. Portable		X	X	X	X									
b. Wall Mounted	X	X	X	X	X									
(BP units, Oto/Ophth Sets)														
c. Diagnostic Board - Wallmount		X	X						X					
37. INSTRUMENTS, SURGICAL		X	X	X	X									
38. INTRAVENOUS PUMPS / CONTROLLERS		X	X	X	X									
39. LAB ANALYZERS / INSTRUMENTATION		X	X	X	X									
40. LASER DEVICES														

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Ophthalmic		X	X	X	X									
b. Surgical		X	X	X	X									
41. LAUNDRY SERVICE EQUIPMENT														
a. Washer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
b. Dryer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
42. LIGHTS														
a. Exam														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
b. Patient Headwall Lights						X	X	X	X					
c. Surgical														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
43. LOCKERS:														
NON PUBLIC AREAS						X	X	X	X					
PUBLIC AREAS						X	X	X	X					
BENCHES IN LOCKER ROOMS						X	X	X	X					
44. MAIL ROOM EQUIPMENT		X	X	X	X									
45. MAINTENANCE TOOLS & EQUIPMENT		X	X	X	X									
46. MATERIALS HANDLING / CONTROL EQUIPMENT		X	X	X	X									
47. MEDICAL GAS / VACUUM SYSTEM														
a. Primary System (Piping)						X	X	X	X					Check with Bulk Purchasing
b. Secondary Equipment		X	X	X	X									

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
(Regulators & Flowmeters)														
48. MEDICINE CENTERS						X	X	X	X					
a. Prefabricated						X	X	X	X					
b. Automated	X									X				
49. WEATHER GOOSE										X	X	X	X	
50. MISCELLANEOUS GROUPS II & III EQUIPMENT		X	X	X	X									
51. MONITORING EQUIPMENT, PHYSIOLOGICAL														
a. Ambulatory Systems														
1. ECG		X	X	X	X									
2. EEG		X	X	X	X									
b. Discrete Monitors														
1. Bedside		X	X	X	X									
2. Fetal		X	X	X	X									
c. Hardwired Systems		X	X	X	X									Contractor to pull cable
d. Miscellaneous Monitors		X	X	X	X									
e. Telemetry Systems		X	X	X	X									Contractor to pull cable
52. NARCOTICS LOCKERS						X	X	X	X					
53. NEUROLOGICAL EQUIPMENT														
a. Electroconvulsive Therapy Device		X	X	X	X									
b. Electroencephalographs		X	X	X	X									
c. Electromyographs		X	X	X	X									
d. Evoked Response Devices		X	X	X	X									
e. Misc. Equipment & Accessories		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
54. NOURISHMENT CENTERS (Prefabricated)						X	X	X	X					
55. OCCUPATIONAL THERAPY EQUIPMENT		X	X	X	X									
56. OFFICE MACHINES														
a. Calculators	X													Facility Operational Expense
b. Cash Registers										X	X	X	X	
c. Miscellaneous Equipment	X													Facility Operational Expense
d. Mobile Storage Equipment (Rotary)		X	X	X	X									
e. Photocopiers ie, Xerox	X													Facility Operational Expense
f. Typewriters	X													Facility Operational Expense
57. OPHTHALMIC EQUIPMENT														
a. Control Systems		X	X	X	X									
b. Portable		X	X	X	X									
58. ORTHOPEDIC APPARATUS		X	X	X	X									
59. OVENS / RANGES / MICROWAVES (Other than Food Service)														
a. Fixed		X	X					X	X					
b. Portable		X	X	X	X									
60. PATIENT SERVICE SYSTEMS (Prefabricated Headwall)														
a. Column - ICU / OR / RR / ER						X	X	X	X					
b. Headwall - LDRP						X	X	X	X					Check with Bulk Purchasing
c. Flatwall - ICU / ER / RR / Patient Room						X	X	X	X					
d. Headwall Accessories						X	X	X	X					
e. Anesthesia Gas Delivery Systems - Column Drops or Gas Boom Format						X	X	X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
61. PHYSICAL MEDICINE / REHAB EQUIP.														
a. Fixed (ie swimming pools)						X	X	X	X					
b. Hydrotherapy		X	X					X	X					
c. Portable		X	X	X	X									
62. PRINTING EQUIPMENT										X	X	X	X	
63. PROCEDURE SUPPORT EQUIPMENT (Portable, Stainless Steel)		X	X	X	X									
64. PROCESSORS, X-RAY FILM														
a. Processor		X	X					X	X					
1. Cine		X	X					X	X					
2. Darkroom		X	X					X	X					
b. Replenishment Systems, Chemical		X	X	X	X									
c. Silver Recovery Devices		X	X	X	X									
d. Laser Imager		X	X	X	X									
65. PROJECTION SCREENS						X	X	X	X					
SMART BOARDS		X	X	X	X									
66. PULMONARY FUNCTION EQUIPMENT		X	X	X	X									
67. REFRIGERATORS (exclude Food Service)														
a. Countertop		X	X	X	X									
b. Mortuary		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in / Prefabricated		X	X	X	X									Elec. contractor makes actual connection
68. RELIGIOUS ARTIFACTS		X	X	X	X									
69. RESPIRATORY THERAPY EQUIPMENT		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
70. RESUSCITATION EQUIPMENT		X	X	X	X									
71. RODS, CURTAIN (shower)						X	X	X	X					
72. SAFES		X	X	X	X									
73. SCALES														
a. Autopsy		X	X					X	X					
b. Bed		X	X	X	X									
c. Chair		X	X	X	X									
d. Clinical Exam		X	X	X	X									
e. Platform		X	X					X	X					
74. SCHEDULING SYSTEMS (automated)										X	X	X	X	
75. SCRUB SINKS						X	X	X	X					
76. SECURITY SYSTEMS														
a. Infant Abduction		X	X	X	X									Contractor to pull cable
b. CCTV - Campus Security		X	X	X	X									Contractor to pull cable
c. Door Access (ie: readers & locks)						X	X	X	X					With Equipment input
77. SHELVING / STORAGE EQUIPMENT														
a. High Density Systems		X	X	X	X									
b. Standard / Flat Steel - New		X	X	X	X									
c. Standard / Flat Steel - Existing		X	X	X	X									
d. Wire		X	X	X	X									
e. Miscellaneous (except built-in)		X	X	X	X									
f. Built-in						X	X	X	X					
78. STERILE PROCESSING EQUIPMENT														
a. Aerators		X	X					X	X					
b. Generator, Steam		X	X					X	X					
c. Loading / Processing Accessories		X	X	X	X									
d. Sonic Cleaners		X	X					X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
e. Steam Gun		X	X					X	X					
f. Sterilziers, Countertop		X	X					X	X					
g. Sterilizers, ETO Gas		X	X					X	X					
h. Sterilizers, ETO Gas / Aerator		X	X					X	X					
i. Sterilziers, ETO Gas / Steam		X	X					X	X					
j. Sterilizers, Electric / Steam		X	X					X	X					
k. Washers, Cart		X	X					X	X					
l. Washer, Fiberoptics		X	X					X	X					
m. Washers / Decontaminators / Sanitizers		X	X					X	X					Requires minimum of 9' ceiling
79. STRESS TEST EQUIPMENT		X	X	X	X									
80. STRETCHERS		X	X	X	X									
81. TABLES														
a. Autopsy		X	X					X	X					
b. Cysto		X	X	X	X									
c. Exam / Treatment		X	X	X	X									
d. Processing		X	X	X	X									
e. Surgical		X	X	X	X									
82. TELEVISION SYSTEMS														
a. Television Sets		X	X	X	X									Contractor to pull cable & install blocking
b. CCTV - Patient Monitoring		X	X	X	X				X					Contractor to pull cable & install blocking
c. Mounting Brackets		X	X					X	X					Contractor to install blocking & wall brackets
d. Antenna Systems		X	X	X	X									Contractor to pull cable
e. Cable TV (entrance cable to H-END location)	X													Equip. Mgr. notifies facility, contractor & TV vendor to coordinate installation w/local cable TV vendor for entrance cable.
83. TEMPERATURE ALARMS / RECORDERS		X	X					X	X					Blood Bank / Morgue Only

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
84. TOILET ROOM DEVICES														
a. Grab Bar						X	X	X	X					Check with Bulk Purchasing
b. Paper Towel Dispensers						X	X	X	X					Check with Bulk Purchasing
c. Sanitary Napkin Dispensers						X	X	X	X					Check with Bulk Purchasing
d. Soap Dispensers						X	X	X	X					Check with Bulk Purchasing
e. Toilet Paper Holder						X	X	X	X					Check with Bulk Purchasing
85. TRACK														
a. Curtain (Cubicle)						X	X	X	X					
b. Intravenous (including carriers & pendants)						X	X	X	X					
86. WATER CONDITIONING SYSTEMS														
a. Deionized						X	X	X	X					
b. Distilled						X	X	X	X					
c. Reverse Osmosis						X	X	X	X					
87. WATER COOLERS						X	X	X	X					
88. WHEELCHAIRS		X	X	X	X									

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VENDOR CONTACT MASTER

VENDOR	NAME/ADDRESS	CONTACT	PHONE	FAX	Web Address
902100	Abbott 100 Abbott Park Rd Dept 2FC-AP6C 5th Floor Abbott Park, IL 60064-6083	Rick Gooch	(708) 937-6161	(847) 937-0871	www.abbottdiagnostics.com
10517	Advanced Sterilization 33 Technology Drive Irvine, CA 92718	Customer Service	(800) 755-5900	(949) 450-6800	www.cidex.com
25360	AGFA Medical & Sterling Diag. 8170 Habersham Waters Rd. Dunwoody, GA 30350	Tom Koch	(800) 581-2432 Ext. #1238	(201) 288-3367	www.agfa.com
10451	Aladdin 250 East Main Street Hendersonville, TN 37075	Eric Roebuck	(800) 888-8018	(615) 748-3659	www.aladdintemprite.com
10240	Alimed 297 High Sttreet Dedham, MA 02026-9135	Robert Fralick	(800) 225-2610 Ext. #157	(800) 437-2966	www.alimed.com
10055	American Art Resources 3262 Sul Ross Houston, TX 77098	Kathy Hathorn	(800)282-0204	(713)527-9676	www.americanartresources.com
915200	ARJO 50 North Gary Ave Unit A Roselle, IL 60172	Terry Capp	(800) 323-1245 Ext. #6159		www.arjo.com
12599	Art Resource Team (A.R.T.) 2526 Homestead Place Cincinnati, OH 45211	Tony Baird	(513) 662-1998	(513) 662-6977	www.artresourceteam.com

VENDOR CONTACT MASTER

15000	Baker Company PO Drawer E Sanford Airport Sanford, ME 04073	Customer Service	(207) 324-8773	(207) 324-3869	www.bakerco.com
15012	Baring Industries 1808 West End Ave, Suite 814 Nashvill, TN 37203	Tom Esberger	(615) 321-0272	(615) 321-5667	www.baring.com
15026	Berchtold 1950 Hanahan Road Charleston, SC 29406	Jeff Dunkley	(800) 243-5135 ext. 334	(843) 569-6133	www.berchtoldusa.com
15382	Biodex Medical Brookhaven R&D Plaza 20 Ramsey Rd, Box 702 Shirley, NY 11967-0702	Marie Springman	(631) 924-9000 Ext. #234	(681) 924-9338	www.biodex.com
15206	Boehringer Laboratories, Inc. 500 E. Washington Street Norristown, PA 19401	Eileen Welty	(610) 278-0900	(610) 278-0907	www.boehringerlabs.com
20633	Camtronics Ltd. Medical System 900 Walnut Ridge Drive Hartland, WI 53029	Steve Crandall	(866) 694-2510		www.camtronics.com
933800	Cardinal Health & Medical Prod. 1750 Stoneridge Dr. Stone Mountain, GA 30083	Renee Hensley	(800) 889-1065 Ext. #3307	(770) 270-9645	www.cardinal.com/mps or www.cardinalhealth.com
901500	Cardinal Health & Medical Services 1750 Stoneridge Dr. Stone Mountain, GA 30083	Paula Watkins	(800) 633-0333	(800) 488-3987	www.cardinal.com/mps or www.cardinalhealth.com
21879	Cardinal Respiratory Care 1500 Waukegan Rd McGaw Park, IL 60085	Shelly Lancaster	(800) 637-1500 Ext. #1521	(630) 369-9302	www.cardinal.com/mps or www.cardinalhealth.com

VENDOR CONTACT MASTER

21433	Common Cents Solutions PO Box 5454 Jackson, MS 39288-5454	Tom Bunting	(888) 932-3687 Ext. #36	(601) 932-9414	www.commoncents.net
25350	Data Cash Register 942 Woodland Street Nashville, TN 37206		(615) 227-6978	(615) 227-7589	www.dcrpos.com
960400	Datascope 4117 Hillsboro Rd 103-303 Nashville, TN 37215	Kevin Wampler	(800) 288-2121	(800) 266-9624	www.datascope.com
25160-4	Diagnostic Imaging 199 Foster Brothers Drive West Columbia, SC 29172	Larry Myers	(803) 796-7038	(803) 796-9749	
920100	Dictaphone 147 Country Club Drive Hendersonville, TN 37075	Mike Collier	(888) 471-3463 Ext. # 4277	(203) 683-2169	www.dictaphone.com
956200	Dukane 27545 Diehl Rd., Suite 200 Warrenville, IL 60555	Angelo Lopez	(630) 836-3745	(630) 836-3805	www.dukane.com
944800	Follett 801 Church Lane PO Box D Easton, PA 18044	Gary Gutman	(800) 523-9361	(610) 250-0696	www.follettice.com
35570	Food Systems 318 Seaboard Lane, Bldg 100 Suite 114 Franklin,TN 37067	Beverly LeBlanc	(866) 662-4279 (615) 261-0400	(615) 261-0401	www.foodsystemsul.com
967600	GE Appliances (Acct #FMD30) 307 N. Hurstborne Pkwy Louisville, KY 40222	Skip Alcorn Jason Cropper	(615) 264-8994 (800) 782-8031 x4	(800) 772-6704	www.geappliances.com

VENDOR CONTACT MASTER

904100	GE Healthcare Datex-Ohmeda PO Box 7550 Madison, WI 53707-7550	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.datex-ohmeda.com
902900	GE Healthcare Technologies 830 Crescent Centre Dr. Suite 460 Franklin, TN 37067	Milton Mueller	(615) 472-2409 Cell: (615) 519-3357	(414) 918-8200	www.gehealthcare.com
40006-4	GE Medical System (Dia) PO Box 414, WT895 Milwaukee, WI 53201	Terri	(800) 232-2599	(800) 558-5102	www.gehealthcare.com
953600	GE Healthcare I.T. (Marquette) 8200 West Tower Ave Milwaukee, WI 53223	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.gehealthcare.com
968700	GE - OEC Medical Systems 3724 National Drive, Suite 100 Raleigh, NC 27612	Hurley Raynor	(800) 728-6596	(919) 881-8367	www.gemedicalsystems.com
912700	Getinge USA PO Box 3208 Augusta, GA 30914-3208	Carlton Colcough	(800) 475-9040	(716) 272-5283	www.getingeusa.com
921000	Grainger 1021Charlotte Avenue Nashville, TN 37203	Kevin Kolff	(615)480-7783 (800)994-2336	(615)331-0485	www.grainger.com
914300	Hill-Rom 1069 State Road, 46 East Batesville, IN 47006-9164	Doug Weigel	(800) 445-3730	(812) 934-1442	www.hill-rom.com/products
934300	Drager/ Air Shields 1069 State Road, 46 East Batesville, IN 47006-9164	Lisa Aiello	(800) 437-2437 x2358	(812) 934-1442	
920700	Interior Design Services 209 Powell Place Brentwood, TN 37027	Daryl Dunn	(615) 376-1222	(615) 376-3510	www.ids-tn.com

VENDOR CONTACT MASTER

51073	Thermo Electron 308 Ridgefield Ct. Asheville, NC 28806	Josh Camp	(800) 252-7100 828-658-2882	(828) 658-0363	www.thermo.com or www.kendro.com
914700	Medquist/ Lanier Healthcare 5930 Metric Place, Suite 200 Norcross, GA 30092	James Thomas	(251) 945-3412 (866) 856-3000	(943) 337-5752	www.medquist.com or www.lanier.com
929400	Medline Industries, Inc. 105 Continental Drive Brentwood, TN 37027	Jeff Fair	(615)373-2142 (888)897-7557	(615)373-2486	www.medline.com
916400	Medtronic Emergency Response System PO Box 97023 Redmond, WA 98073	Tammy Lombardi	(800) 442-1142 Ext. #4162	(800) 732-0956	www.medtronicphysiocontrol.com
70583	Nicolet 5225-2 Verona Rd Madison, WI 53711-4495	Kathy Hart	(800) 356-0007	(608) 441-2007	www.thermo.com
954400	Nihon Kohden 202 Kensington Place Nashville, TN 37215	Jim Fagan	(615) 292-5082	(615) 292-0584	www.nkusa.com
72016	Olympus 2 Corporate Ctr. Drive Melville, NY 11747	Betty Shaffer	(631) 844-5437 (800) 645-8100	(631) 844-5110	www.olympus-global.com
958320	Pharmed 3075 NW 107th Ave Pharmed Way Miami, FL 33172-2134	Carolyn Thomas	(800) 683-7342 Ext 342 (305) 592-2324	(800) 621-9511	www.pharmed.com
11331	Philips - ATL Ultrasound Ste 540 501 Corporate Centr Dr., Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com

VENDOR CONTACT MASTER

74031-1	Philips Medical Imaging 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com
914200	Philips Medical (Monitoring) 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Roger Duffy	(615) 472-2207	(615) 472-2273	www.philips.com
944500	Quinton 3303 Monte Villa Pkwy Bothell, WA 98021	Bob Atkins	(800) 426-0347	(425) 402-2001	www.quinton.com
76007	Radiology Specialty PO Box 406 Hermitage, TN 37076	Bob Webb	(615) 885-5326	(615) 885-4691	
924800	Rauland Borg Corporation 3450 West Oakton Street Skokie, IL 60076-2951	Alex Veytsel	(847) 324-8380 Ext. #380	(847) 679-4106	www.rauland.com
81742	Sara Lee Coffee & Tea 990 Supreme Dr. Bensonville, IL 60106	Kory Mickelsom	(800) 621-4100	(773) 489-7323	www.saraleecoffee.com
956000	Simplex Grinnell 9855 Carroll Canyon Rd San Diego, CA 92131	Randy Wilkins	(858) 279-8010	(858) 740-0157	www.tycoin.com
904600	Standard Textile PO Box 371805 Cincinnati, OH 45222	Tricia Partin	(800) 888-5000 Ext. #270	(800) 926-0043	www.standardtextile.com
912000	Steris/ Amsco Products 2448 Shiland Dr. Rock Hill, SC 29732	Randy Marks Dave Piver Lara Stark	(800) 989-7575 Randy #23117 Dave #21152	(440) 392-8902	www.steris.com
55026	Storage Systems, Inc. 318 Seaboard Lane Bldg. 100, Suite 115 Franklin,TN 37065	Bill Kreager	(888) 614-0004 (615) 261-6900	(615) 261-6906	www.storagesystemsul.com

VENDOR CONTACT MASTER

901100	Stryker Medical 4100 East Milham Ave. Kalamazoo, MI 49001-6197	Gloria Phillips	(800) 800-4236 ext. 1456	(800) 610-4408	www.stryker.com
929900	Telehealth/Telerent 4205 Hillsboro Rd Suite 303 Nashville, TN 37215	Darrell Leftwich	(615) 383-7836	(615) 383-4226	www.telehealth.com
85060-1	Toshiba 2150 F Northmont Pkwy Duluth, GA 30136	Craig Hamilton	(770)476-9992	(770) 476-1511	www.tobshiba.com/tams/newtams
921500	US Surgical 5920 Longbow Dr. Boulder, CO 80301	Customer Service	(800) 722-8772	(800) 544-8772	www.ussurg.com
91734	Wireless Solutions, Inc. 720 Fesslers Lane Nashville, TN 37210	Marie Gilland	(615) 255-5670	(615) 255-9967	
925500	Zenitel 6119 Connecticut Kansas Ctiy, MO 64120	Jeanne Gramman (816) 231-7201	(816) 231-7202	(816) 231-7203	www.zenitel.com

OWNER FURNISHED EQUIPMENT BROCHURE

Revision: August 9, 2006

The Medical Center Aurora

A02429 – Bed Tower Expansion

Aurora, CO

PROJECT # 306660001

Jimmy Cagle
MANAGER, MEDICAL EQUIPMENT
(615) 344-2179
Jimmy.Cagle@HCAHealthcare.com

Trisha Gutierrez
ASSISTANT, MEDICAL EQUIPMENT
(615) 344-2223
Trisha.Gutierrez@HCAHealthcare.com

HCA
The Healthcare Company.

Table of Contents

- Owner Furnished Equipment Index
- Specifications
- Project Information Sheet
- Owner Furnished/ Contractor Installed Equipment Delivery Schedule
- Owner/ Vendor Installed Equipment Delivery Schedule
- Engineered Systems Information and Telephone Systems Equipment Delivery Schedule
- Responsibility Matrix
- Vendor Contact Matrix

Owner Furnished/ Contractor Installed Equipment Notes

NOTE: Include date for special backboxes (such as OR Lights, Illuminators) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment, nurse call, ect.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor is required to store in secure environmentally controlled space and confirm with HCA Medical Equipment Manager.

NOTE: HCA required that the enclosed Owner Furnished/ Contractor Installed Equipment Delivery Schedule (excel), Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule form (word) to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed.

NOTE: No payments can be made, until receipt of the schedule(s) by the HCA Construction Manager.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:
HCA Equipment Manager
HCA Construction Manager
Hospital Construction Contact
Hospital Materials Manger

PROJECT INFORMATION SHEET

Project Title:_____ **Date of Issue:**_____
Owner Project:_____ **Revision Date:**_____
HOSPITAL:_____
ADDRESS:_____
TELEPHONE:_____ FAX:_____
ADMINISTRATOR:_____ CONTACT:_____
MATERIAL MGR:_____ PLANT MGR:_____
CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____
PROJECT MAILING ADDRESS:_____
E-MAIL ADDRESS:_____
ARCHITECT:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
INTERIOR DESIGN FIRM:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
E-MAIL ADDRESS:_____
M.P.E. ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
STRUCTURAL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
CIVIL ENGINEER:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
MECHANICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
ELECTRICAL CONTRACTOR:_____
TELEPHONE:_____ FAX:_____
PROJECT MANAGER:_____
SUPERINTENDENT:_____
SITE TELEPHONE:_____ SITE FAX:_____
HCA
ONE PARK PLAZA, BLDG. 2 – 3E, NASHVILLE, TN 37203
P.O. BOX 550 (37202-0550)
TELEPHONE: 615-327-9551
DIRECTOR CONSTRUCTION:_____ PH:_____
CONSTRUCTION MANAGER:_____ PH:_____
EQUIPMENT ENG. SYS. MGR:_____ PH:_____
IS/TELECOM:_____ PH:_____

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

203200	FOLLETT CORPORATION	4	#110FB400A; ICE MAKER DISP.115/1 12.2A , SENSORSAFE DISPENSING PKG (#SENSORSAFE; $98.00), FR STANDING STG 24 1/2"W X 28.25"D X 68.125"H, 90 LBS STG, 400 LBS/DAY ICE PRODUCTION AIR COOLED. INCLUDES WATER STATION, WATER FILTER(NOT INCLUDED) **FLOOR DRAIN REQUIRED** 2--2099/1, 3--3073/1, 4--4099/1, 5--5099/1
203210	FOLLETT CORPORATION	5	#25CT400A; ICEMAKER DISPENSER, ($2,892.00) 21"W X 47.125"H X 23"D- COUNTERTOP, AIR COOLED, 25LB STORAGE CAPACITY, 400LB PER 24HR ICE PROD. TO INCL WATER STATION, SENSORSAFE DISPENSING (#SENSORSAFE; $98.00) 1--1085/1, 1--1112/1, 2--2082/1, 4--4082/1, 5--5082/1
430279	GENERAL ELECTRIC CO	14	#JEM25; MICROWAVE OVEN DIMENSIONS: 11 11/64"H X 23 25/32"W X 12 55/64"D. 120V - 60-CYCLE. CONTRACTOR TO SHELF MOUNT SELECT COLOR: BLACK - JEM25BF OR WHITE JEM25WF. 1--1040/1, 1--1085/1, 1--1112/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3042/1, 3--3073/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5071/1, 5--5082/1, 5--5099/1
475603	GENERAL ELECTRIC CO	6	#GTS18WCP, REFRIGERATOR, 17.9 CU. FT. NO FROST, W/FACTORY INSTALLED ICEMAKER; 66 5/8" H X 32 1/8"D X 29 1/2 "W. 120V/60 HZ/15AMPS. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT. 1--1040/1, 1--1112/1, 2--2071/1, 3--3042/1, 4--4071/1, 5--5071/1
475604	GENERAL ELECTRIC CO	1	#GTS18KBP; REFRIGERATOR, TOP FREEZER, 17.9 CU. FT. CAP. NO FROST. 66 5/8"H X 32 1/8"D X 29 1/2"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: BLACK, WHITE, BISQUE. HINGE: LEFT OR RIGHT. 3--3054/1
477300	GENERAL ELECTRIC CO	2	#GMR04AAM; REFRIGERATOR, UNDERCOUNTER 4.3 CU FT CAPACITY. 32 7/8"H X 21 3/4"D X 20"W, 110V. RIGHT HINGED. SELECT COLOR: BB/BLACK OR WW/WHITE 1--1085/2

Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

714519	FOLLETT CORPORATION	9	#QC4-FL4S; WATER FILTER SYSTEM (ACCESSORY FOR ICEMAKER DISPENSERS). #QC4-FL4S 1--1085/1, 1--1112/1, 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
715053	SARA LEE COFFEE & TEA	19	COFFEE MAKER, LO-PROFILE MODEL #8573, 3-STATION, AUTOMATIC COFFEE BREWER, FROM SUPERIOR COFFEE FOR REFERENCE ONLY, HOSPITAL TO LEASE (MFG. - BLOOMFIELD) PLUMBING REQUIREMENT: 1/4" OR 3/8" WATER CONNECTION 1--1070/1, 1--1085/1, 1--1112/1, 2--2030/1, 2--2071/1, 2--2082/1, 2--2099/1, 3--3017/1, 3--3027B/1, 3--3042/1, 3--3073/1, 4--4030/1, 4--4071/1, 4--4082/1, 4--4099/1, 5--5030/1, 5--5071/1, 5--5082/1, 5--5099/1
715152	RADIOLOGY SPECIALTY	1	# 101461; ILLUMINATOR, 1 PANEL RECESSED MT 4 BULB 3--3066/1
715344	GENERAL ELECTRIC CO	7	#GTS17KBR, REFRIGERATOR: TOP MOUNT. NO FROST, 4 SPILT SPILL PROOF ADJ. GLASS SHELVES. 16.6 CU. FT. CAP. 64 3/4"H X 31"D X 28"W. 120V/ 60HZ/ 15AMP. SELECT COLOR: WHITE OR BISQUE. HINGE: LEFT OR RIGHT 2--2082/1, 2--2099/1, 3--3073/1, 4--4082/1, 4--4099/1, 5--5082/1, 5--5099/1
717197	STERIS/AMSCO PRODUCTS	1	#DJ04112033-01; WARMING CABINET 24" DIGITAL; SEISMIC 3--3055/1
718171	FOLLETT CORPORATION	7	#REF5; REFRIGERATOR, UNDERCOUNTER, WITH LOCK AND KEY, STAINLESS STEEL INTERIOR/EXTERIOR, 4.8 CU. FT., 115 V, 60HZ, 1PH, 8.0 AMPS, MAX.FUSE 15 AMPS, HOSPITAL GRADE CORD & PLUG - NEMA 5-15, 33 DEGREES F - 40 DEGREES F (1 DEGREE C - 5 DEGREES C) REVERSIBLE DOOR SWING/HANDLE, 34HX23.75WX25.5D, NSF, UL & CUL LISTED. 2--2076/1, 2--2097/1, 3--3072/1, 4--4076/1, 4--4097/1, 5--5076/1, 5--5097/1

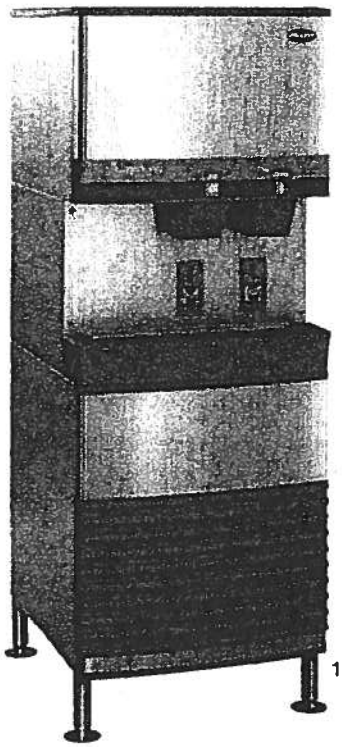
Owner Furnished - Contractor Installed Equipment Brochure For Working Equipment List
THE MEDICAL CENTER AURORA
A02429 - BED TOWER EXPANSION
306660001

JC2725	GERMFREE LABORATORIES INC.	1	LAMINAR FLOW GLOVEBOX ISOLATOR - 4 FOOT QUOTE # 200605929 58" W X 32"D X 87"H STANDARD 115V 3--3054/1
JC2859	BARING INDUSTRIES, INC.	1	DISPLAY CASE & REFRIGERATOR *****SPEC SHEET NOT INCLUDED WITH THIS DOCUMENT******* GALA SOURCE -12 CU FT REFRIGERATOR - TUR - 48SD ZESCO - COMBINATION NON-REFRIGERATED ABOVE/REFRIGERATED SERVICE CASE BELOW - 40" WIDE ENCORE 699-A-021 ********ARCHITECT TO SPEC SPACE & ELECTRICAL******** 1--1002/1

Symphony™

110FB400A air-cooled integral icemaker
110FB400W water-cooled integral icemaker

Freestanding, automatic load, ice and water dispensers with air- or water-cooled icemaker located in the base of unit. Stainless steel frame and exterior with plastic trim. Water station standard. Up to 90 lbs (41kg) storage. Produces approximately 400 lbs (181kg) of compressed nugget ice in a 24-hour period.



110FB400A/W shown with SensorSAFE accessory



Convenient, sanitary, user-friendly dispensing
- Labor-saving, sanitary automatic load
- Lever standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet™ compressed nugget ice is slow melting, easy to chew

SensorSAFE™ accessory offers even more sanitation and convenience
- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone
- Clear chute directs ice cleanly into cups, pitchers, carafes, ice bags

Space-saving, attractive design
- 24.5" (623mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

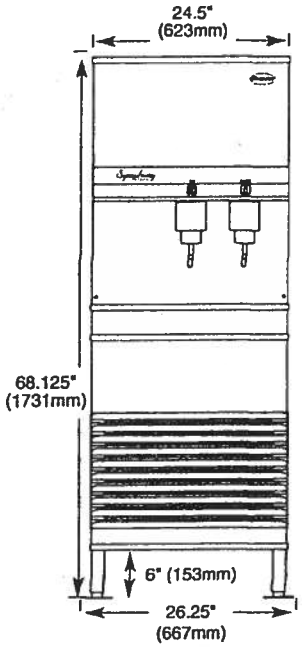
Environmentally friendly Maestro™ icemakers
- New, state-of-the-art R404A icemakers automatically load dispensers with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high wastewater
- Quiet production, no noisy harvest cycles

Accessories
- SensorSAFE actuation package
- Chilled water option
- Water filter kit
- Casters
- Up to 6 beverage valves (no beverage cooling)

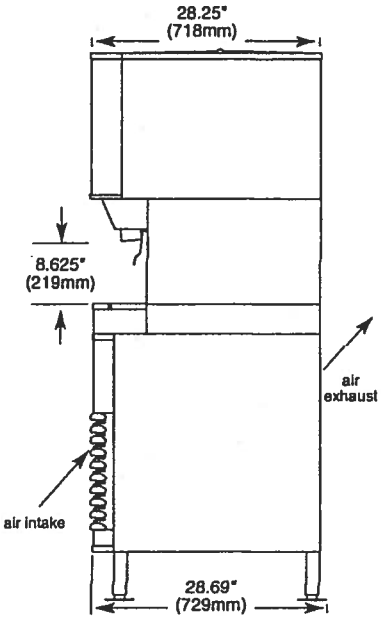
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Item # 203200

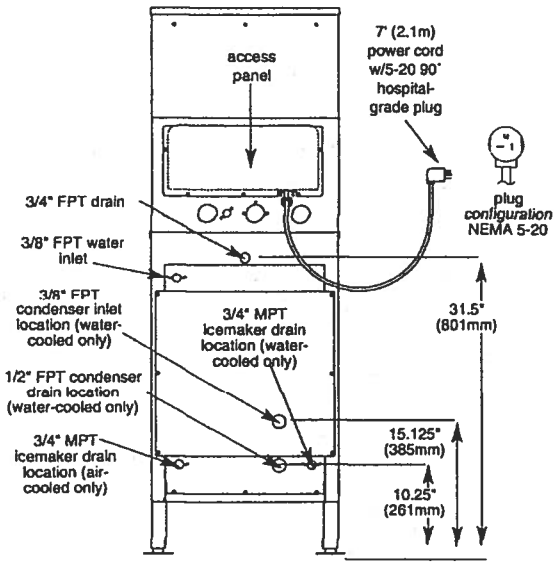
Front View



Side View



Rear View



Ice Production per 24 hours

Air-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	510 / 232	454 / 206	397 / 180	335 / 152	273 / 124	lbs. / kg.
60 / 16	482 / 219	435 / 198	389 / 177	329 / 150	270 / 123	lbs. / kg.
70 / 21	454 / 206	417 / 190	380 / 173	323 / 147	266 / 121	lbs. / kg.
80 / 27	424 / 193	385 / 175	347 / 158	297 / 135	247 / 112	lbs. / kg.
90 / 32	394 / 179	354 / 161	313 / 142	270 / 123	227 / 103	lbs. / kg.

Water-cooled icemaker capacity/24 hrs.
Ambient Air Temperature °F/°C

Inlet Water Temperature °F/°C	60 / 16	70 / 21	80 / 27	90 / 32	100 / 38	
50 / 10	451 / 204	447 / 203	442 / 200	437 / 198	428 / 194	lbs. / kg.
60 / 16	423 / 192	413 / 187	409 / 185	399 / 181	394 / 179	lbs. / kg.
70 / 21	394 / 179	390 / 177	380 / 172	371 / 168	361 / 163	lbs. / kg.
80 / 27	371 / 168	361 / 164	352 / 160	342 / 155	333 / 151	lbs. / kg.
90 / 32	352 / 160	342 / 155	333 / 151	323 / 146	309 / 140	lbs. / kg.

Required clearances
12" (305mm) at top recommended for service, 4" (102mm) at rear for cleaning and ventilation

Connections
Cord and plug provided with dispenser. Wire in accordance with all local codes.

Approximate Shipping Weight 265 lbs (120kg)

Electrical Data
Standard electrical – 115V, 60Hz, 1 phase, 13.0 amps, max. fuse 20 amps

Specifications
Ice and water dispenser to be Follett freestanding, automatic load, in the following configuration with water station and _____ (air- or water-) cooled icemaker in base. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Environmentally friendly R404A icemaker to be mounted in base and to be removable as one unit for cleaning and maintenance. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispenser to have automatic bin level control to start and stop icemaker and separate circuitry to allow dispensing to continue with icemaker removed. Dispenser to be equipped with 6" (153mm) adjustable legs, flanged feet and lightweight plastic top that allows full access to the ice storage area for manual loading of back-up ice. Storage area to be insulated with high-density, non-CFC foam polyurethane. 7' cord and NEMA 5-20 hospital-grade plug provided. Dispenser to be NSF, UL and cUL listed.

Item # 203200

END OF SPECIFICATION

Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

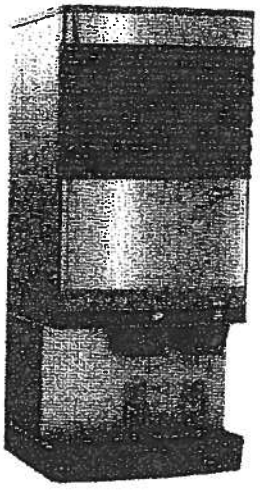
25 Series

Countertop models with (A) air- or (W) water-cooled icemaker

→ **25CT400A/W** – 115V, 60Hz, integral icemaker
25CR400A/W – 115V, 60Hz, satellite-fill icemaker
C25CT400A/W – 220V, 60Hz, integral icemaker
C25CR400A/W – 220V, 60Hz, satellite-fill icemaker
E25CT400A/W – 230V, 50Hz, integral icemaker
E25CR400A/W – 230V, 50Hz, satellite-fill icemaker

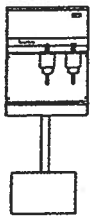
Wall mount models with (A) air- or (W) water-cooled icemaker

25HT400A/W – 115V, 60Hz, integral icemaker
25HR400A/W – 115V, 60Hz, satellite-fill icemaker
C25HT400A/W – 220V, 60Hz, integral icemaker
C25HR400A/W – 220V, 60Hz, satellite-fill icemaker
E25HT400A/W – 230V, 50Hz, integral icemaker
E25HR400A/W – 230V, 50Hz, satellite-fill icemaker

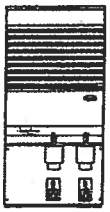


Countertop model shown with SensorSAFE accessory

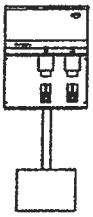
Symphony.



Countertop model with satellite-fill icemaker



Wall mount model with integral icemaker



Wall mount model with satellite-fill icemaker

Countertop and wall mount ice and water dispensers with air- or water-cooled icemaker. Stainless steel frame and exterior with plastic trim. Up to 25 lbs (11kg) storage. Produces approximately 400 lbs (181kg) of Chewblet compressed nugget ice in a 24-hour period.

Convenient, sanitary, user-friendly dispensing

- Labor-saving, sanitary automatic load
- Lever dispensing standard
- Quick shut-off reduces the amount of wasted ice
- High-quality Chewblet compressed nugget ice is slow melting, easy to chew
- Clear chute ensures sanitary delivery and focuses ice cleanly into cups, pitchers, carafes, ice bags

SensorSAFE™ accessory offers even more sanitation and convenience

- Infrared sensing eliminates container-dispenser contact, reduces chance of cross-contamination
- Easy, one-hand filling of containers
- Bright graphics direct users to actuation zone

Space-saving, attractive design

- 21" (534mm) width requires less space than competitive models of similar capacity
- Zero side clearance required for ventilation
- Softly-rounded European styling
- High-quality stainless steel exterior with plastic trim
- Attractive, user-friendly graphics

Environmentally-friendly Maestro icemakers

- State-of-the-art R404A icemaker automatically loads dispenser with 400 lbs (181kg) of ice each day
- Stainless steel evaporator and auger
- Energy-efficient, no costly defrost cycles or high waste water
- Quiet production, no noisy harvest cycles
- Satellite-fill icemakers can be located up to 20 feet (6m) from dispenser; remove heat, noise and bulk from customer area

Accessories

- SensorSAFE actuation package (standard on wall mount models)
- Chilled water option (item# AFH20CHIL2550)
- Water filter kit (item# 00130229)
- Base stand (for models 25CT400A/W, C/E25CT400A/W) (item# AF50BASESTD)
- Slide-out track for satellite-fill icemakers (item# AFGSLIDER400A (air-cooled icemakers) and item# AFGSLIDER400W (water-cooled icemakers))
- Drain pan assembly for wall mount models (item# AFH25WBASE)

Job: _____

Item: 203210 Page 1 of 2

FOLLETT
Innovative solutions, inspired by ice

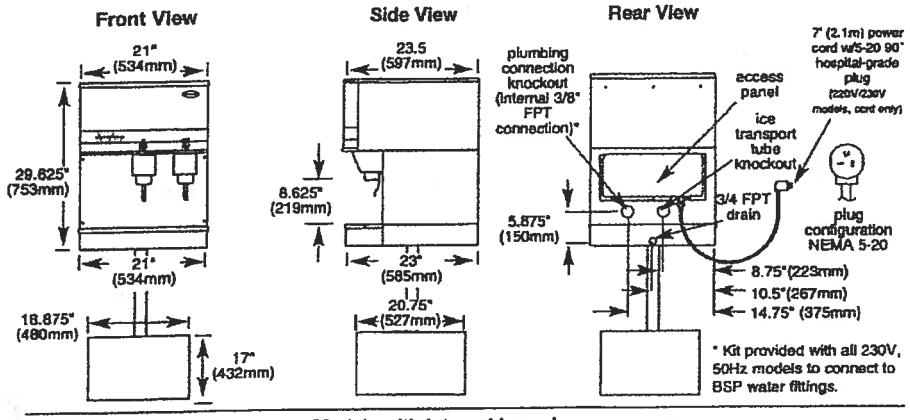
801 Church Lane • PO Box D, Easton, PA 18044, USA
Toll free (800) 523-9361 • (888) 2-FOLLETT
(810) 252-7301 • Fax (610) 250-0696 • www.follettice.com

© Follett Corporation
Form #2065

25 Series

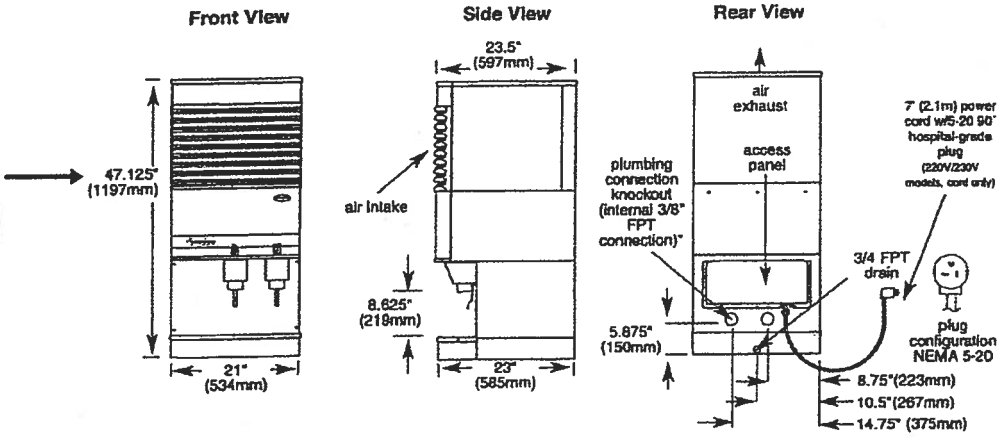
Symphony™ countertop and wall mount ice and water dispensers with Maestro™ Chewblet™ icemaker

Models with satellite-fill icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Models with integral icemakers



* Kit provided with all 230V, 50Hz models to connect to BSP water fittings.

Approximate Shipping Weights

C/E/25CT400A/W	295 lbs (134kg)	C/E/25HT400A/W	310 lbs (141kg)
C/E/25CR400A/W	250 lbs (113kg)	C/E/25HR400A/W	295 lbs (134kg)

Electrical

Standard electrical – 115V, 60Hz, 1 ph. Icemaker 11 amps, dispenser 4 amps. Cord and plug provided with each icemaker and dispensers. If local code requires hard-wiring, separate disconnects also required. Satellite-fill icemaker models require separate circuits for dispenser and icemaker.

Alternate electrical – 220V, 60Hz, 1 ph, 6.5 amps (icemaker 5 amps). 230V, 50Hz, 1 ph, 6.5 amps (icemaker 5 amps). Cord only provided with each icemaker and dispenser. Wire in accordance with all local codes.

Wall Mount Models

- Deduct 3.625" (92mm) from height shown
- Add .5" (13mm) to depth shown
- Standard with wall mounting bracket
- Standard without drain pan (drain pan available – contact factory)

Connections Utilities connect through back or bottom. Back entry shown. Supplied 2" (51mm) duct and louver must be installed for undercounter satellite-fill icemaker installations.

7 ft (2.1m) cord and NEMA 5-20 hospital-grade plug provided with each dispenser. 220V/230V models, cord only.

Required clearances

- C/E/25CT400A/W, C/E/25HT400A/W – 6" (153mm) at top for ventilation, 12" (305mm) recommended for service
- C/E/25CR400A/W, C/E/25HR400A/W – 12" (305mm) at top recommended for service

See Dispenser Detail Sheet, form# 2075 for important installation information.

Ice Production

Air-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		510	464	397	335	273	lbs.
10		232	211	180	152	124	kg
60		482	435	389	329	270	lbs.
16		219	198	177	149	122	kg
70		454	417	380	323	266	lbs.
21		206	190	172	147	121	kg
80		424	385	347	297	247	lbs.
27		193	175	158	135	112	kg
90		394	354	313	270	227	lbs.
32		179	161	142	123	103	kg

Water-cooled icemaker capacity/24 hrs.

Inlet Water Temperature °F/°C	Ambient Air Temperature °F/°C						
	F	50	70	80	90	100	
	C	10	21	27	32	38	
50		451	447	442	437	426	lbs.
10		205	203	201	198	193	kg
60		423	413	409	399	394	lbs.
16		192	187	186	181	179	kg
70		394	390	380	371	361	lbs.
21		179	177	172	168	164	kg
80		371	361	353	342	333	lbs.
27		168	164	160	155	151	kg
90		352	342	333	323	309	lbs.
32		160	155	151	146	140	kg

Specifications Ice and water dispenser to be Follett countertop, automatic load, in (choose one) _____ countertop, _____ wall mount configuration with 25 lbs (11kg) of storage. Water station standard. Environmentally-friendly R404A icemaker to be (choose one) _____ air- or _____ water-cooled and to be removable for cleaning and maintenance. Dispenser frame to be stainless steel. Dispenser cabinet to be of stainless steel with plastic trim. Icemaker to produce approximately 400 lbs (181kg) per day of compressed nugget ice at 70°F (21°C) water, 80°F (27°C) air and to be equipped with printed circuit board with diagnostics for servicing. Dispensers with satellite-fill icemakers to be equipped with 10' (3m) of insulated ice transport tube, 2" (51mm) air duct for icemaker (air-cooled models only) and lightweight plastic top that allows full access to the ice storage area for easy cleaning and manual loading of back-up ice. Storage area to be insulated with high density, non-CFC foam polyurethane. 7' (2.1m) cord and NEMA 5-20 hospital-grade plug provided (220V/230V models, cord only). Dispenser to be NSF, UL and cUL listed, 230V models also CE compliant.

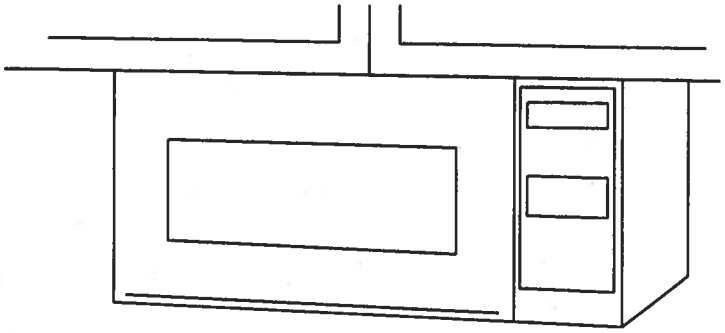
Follett reserves the right to change specifications at any time without obligation. Certifications may vary depending on country of origin.

FOLLETT
Innovative solutions, inspired by ice

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END OF SPECIFICATION

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Not to be used over a thermal oven.

Undercabinet mounting kit Pub. No. 4-A019 for Spacemaker II microwave oven models available at additional cost.

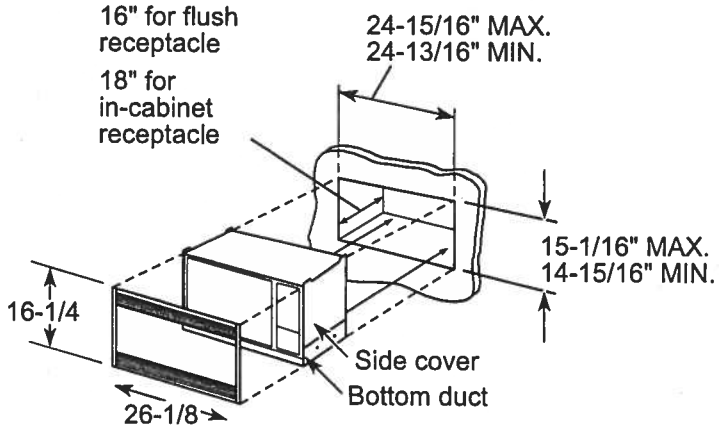
Exterior Dimensions* (in inches)	
W x H x D	23-25/32 x 11-11/64 x 12-55/64

*Height includes feet. Depth does not include handle.

Note: Undercabinet installation
Install Spacemaker II microwave ovens in just a few easy steps with the mounting template, which provides all the necessary measurements. Installation may vary depending on cabinets. These microwave ovens can be installed on practically any wood or metal cabinets.

Note: 120V, 60-cycle, grounded power receptacle location optional on back within cabinet opening.

Cutout Dimensions (in inches)

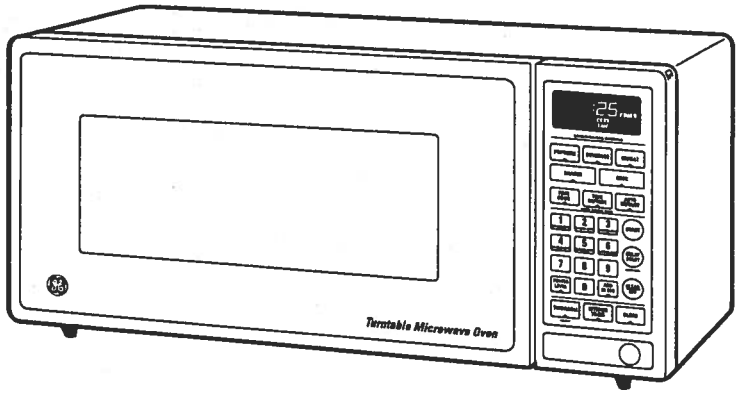


Built-In trim kit For 1.0 cu. ft. microwave ovens
For a custom built-in appearance, this kit allows built-in installation of the Spacemaker II microwave oven into a wall or cabinet alone, and is U.L.-approved for installation over a GE single electric wall oven. This kit should not be installed over a gas wall oven.

Trim kits for model JEM25
JX827SS – Stainless Steel, JX827WN – White, JX827CD – Bisque, JX827BN – Black

Installation Information: This information is not intended to be used for installing unit described. Before installing, consult installation instructions packed with product for current dimensional data.

JEM25BF/WF – GE Spacemaker II™ 1.0 cu. ft. capacity microwave oven



Features and Benefits

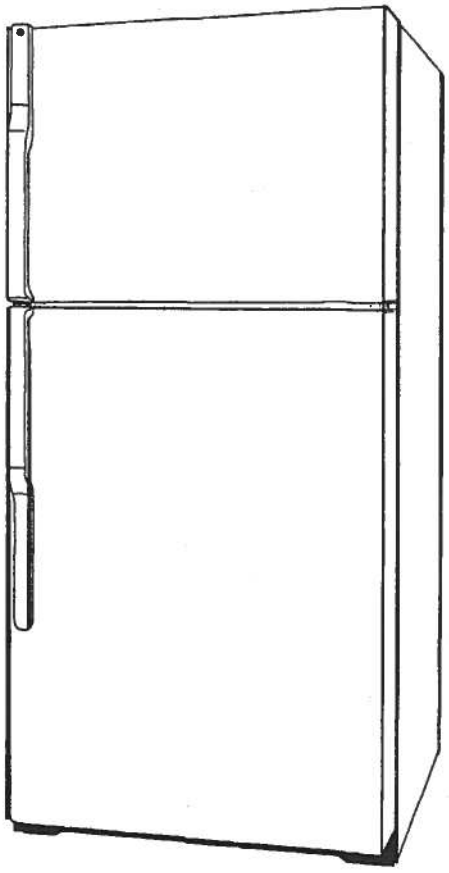
- 1.0 cu. ft. Oven cavity
- 800 Watts*
- Electronic touch controls
- Convenience cooking controls
- Electronic digital display with clock
- Time Cook I & II
- Express Cook with Instant On controls
- Auto Defrost/Time Defrost
- Add 30 Seconds
- Delay Start/Reminder
- Child Lockout
- Kitchen timer
- 10 Power levels
- Under the cabinetry mounting with optional kit
- Model JEM25WF – White
- Model JEM25BF – Black

*IEC-705 Test Procedure

APPROXIMATE DIMENSIONS(HxDxW)	
11.17 in x 12.86 in x 23 25/32 in	
CAPACITY	
Capacity	Mid-Size
Total Capacity (cubic feet)	1.00
FEATURES	
Electronic Digital Display with Clock	Yes
Electronic Touch Controls	Yes
Wattage (IEC-705)	800
Cooking System	Turntable
Power Levels	10
Delay Start	Yes
Beverage (Convenience)	Instant-On
Cook (Convenience)	9 Codes
Popcorn (Convenience)	Instant-On
Reheat (Convenience)	6 codes
Snacks (Convenience)	6 codes
Turntable	Glass
Turntable On / Off	Yes
Turntable Size (in.)	11-21/64
Add 30 Seconds	Instant-On
Cooking Complete Reminder	Yes
Defrost Type	Auto & Time
Express Cook	Instant-On; 1-5 Minutes
Instant On Controls	Yes
Kitchen Timer / Timer (On/Off)	Yes / No
Time Cook	I & II
Time Preference	Control Enhancement (1/9)
Child Lock	Yes
APPEARANCE	
Case Color	White
Color Appearance	White
Door Color	White
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	34 lb
Cavity (W x H x D)	16-23/32 X 8-1/16 X 12-15/32
Overall Depth	12.86 in
Overall Height	11.17 in
Overall Width	23 25/32 in
Net Weight (lbs.)	30 lb
POWER / RATINGS	
Electrical Input - 120V Amperage	11.5
Electrical Input - 120V Watts	1300
Frequency (MHz)	2450

END OF SPECIFICATION

GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker



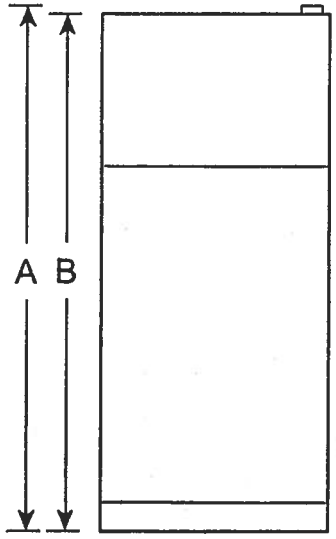
Features and Benefits

- Slide-Out, Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- Electronic Icemaker – Makes ice automatically, ensuring a ready supply.
- Model GTS18WCPWW – White on white
- Model GTS18WCPCC – Bisque on bisque

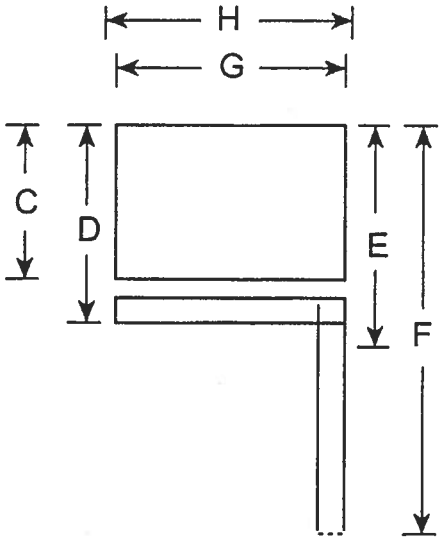
GTS18WCP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator with Icemaker

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	32
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Total volume and shelf area are calculated by the Association of Home Appliance Manufacturers' standards

Listed by Underwriters Laboratories

APPROXIMATE DIMENSIONS(HxDxW)	
66 5/8 in x 32 1/8 in x 29 1/2 in	
CAPACITY	
Total (cubic feet)	17.9
Fresh Food (cubic feet)	12.87
Freezer (cubic feet)	4.98
Shelf Area (sq. ft.)	22.0
APPEARANCE	
Color Appearance	White on White
Customer Installed Handles	Yes
Exterior Design	Rounded Doors
Handle	Color-Matched
Door Swing	Shipped w/ Right Hand Door Opening (Hinges on Right)
Reversible Doors	Yes
Textured Steel Case & Door	Galvenized Door
Adjustable Rollers	Front
Door Stops	Yes

WEIGHTS & DIMENSIONS

Approximate Shipping Weight	233 lb
Overall Depth	32 1/8 in
Overall Height	66 5/8 in
Overall Width	29 1/2 in
Case Depth Without Door (in.)	27-1/2
Depth with Door Open 90° (in.)	58-1/8
Depth Without Handle (in.)	30-1/4
Height to Mid-Freezer	53-15/16
Height to Top of Case (in.)	66-1/8
Width w/Door Open 90 Degrees Inc. Handle (in.)	32
Back Air Clearances (in.)	1
Side Air Clearances (in.)	1/8
Top Air Clearances (in.)	1

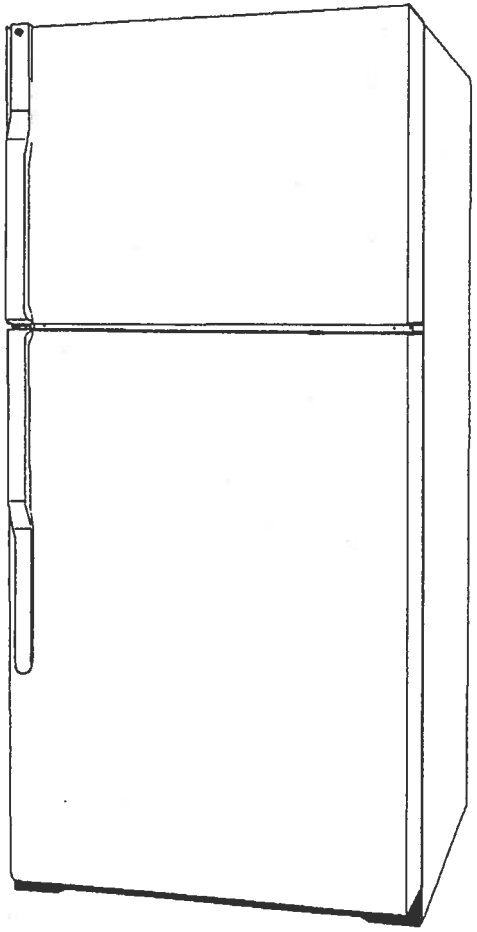
POWER / RATINGS

Volts / Hertz / Amps	120V; 60Hz ; 15A

END OF SPECIFICATION

GE Appliances

GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator



Specification Revised 5/03

Features and Benefits

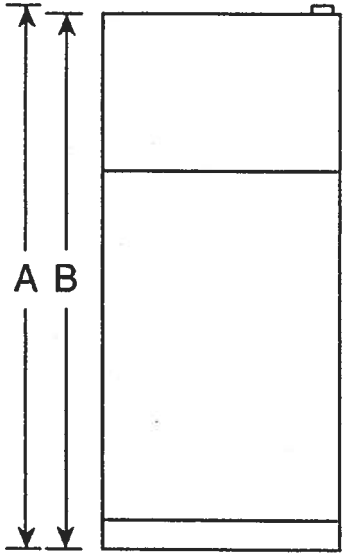
- Spill Proof Glass Shelves – Shelves slide out, and spills stay put.
- Illuminated Upfront Slimline Temperature Controls – Offer maximum style and convenience.
- Adjustable Humidity Vegetable/Fruit Crisper – Provides the ideal storage environment for fruits and vegetables.
- Automatic Moisture Control – Electronic sensors automatically control moisture, adjusting to room humidity changes.
- Spill Proof Freezer Floor – Seamless design offers easy cleanup.
- Adjustable Gallon Door Bins – Makes room for milk and other gallon-size containers.
- NeverClean™ Condenser – Condenser coils are encased, so they don't require cleaning in normal operating environments.
- Model GTS18KBPWW – White on white
- Model GTS18KBPBB – Black on black
- Model GTS18KBPCC – Bisque on bisque

GE Appliances

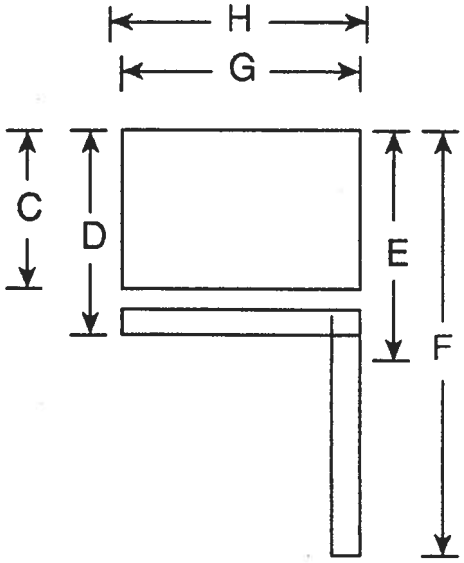
GTS18KBP – GE 17.9 Cu. Ft. Top-Freezer Refrigerator

Dimensions (in inches)

Front View



Top View



Overall Dimensions	Height to top of hinge (in.) **A**	66-5/8
	Height to top of case (in.) **B**	66-1/8
	Height to mid-freezer (in.)	53-15/16
	Case depth without door (in.) **C**	27-1/2
	Case depth less door handle (in.) **D**	30-1/4
	Case depth with door handle (in.) **E**	32-1/8
	Depth with fresh food door open 90° (in.) **F**	58-1/8
	Width (in.) **G**	29-1/2
	Width with door open 90° less door handle (in.) **H**	30
Air Clearances	Each side (in.)	1/8
	Top (in.)	1
	Back (in.)	1

Note: All Top-Freezer No-Frost Right-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your left and the hinges are on your right.
All Top-Freezer No-Frost Left-Hand Refrigerator Doors: As you face the front of the refrigerator, the handle is on your right and the hinges are on your left.

Specification Revised 5/03

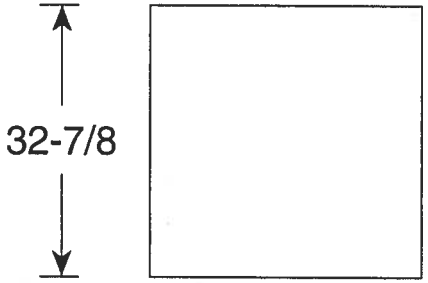
END OF SPECIFICATION

GE Appliances

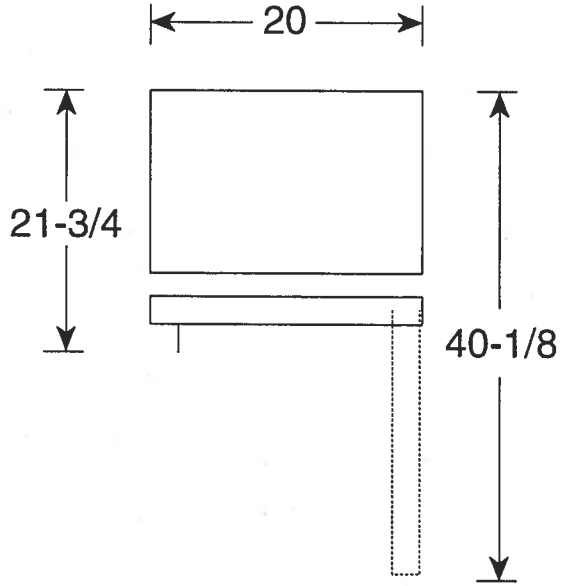
GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator

Dimensions (in inches)

Front View



Top View



Air Clearances	
Each side (in.)	1/2
Top (in.)	2
Back (in.)	2

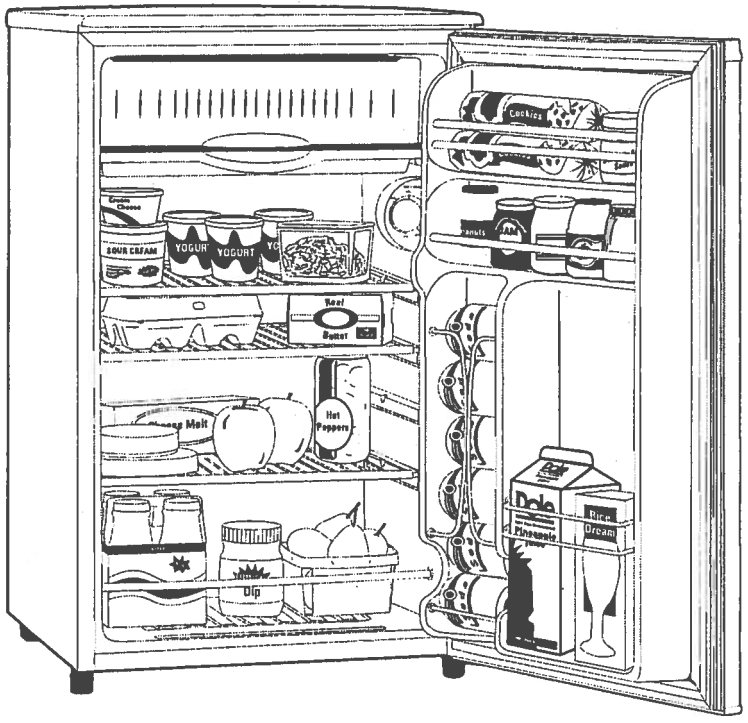
Note: Freezer compartment is for short-term storage of frozen food. The frozen food compartment of this refrigerator will make ice, and pre-frozen foods can be stored for about **two weeks.** It will not effectively freeze fresh foods or provide long-term storage for meats, poultry, or fish.

For answers to your Monogram,® GE Profile™ or GE® appliance questions, visit our website at GEAppliances.com or call GE Answer Center® service, 800.626.2000.

Specification Revised 7/04
310934

GE Appliances

GMR04AAMBB/WW – GE Spacemaker™ 4.3 Cu. Ft. Compact Refrigerator



Features and Benefits

- 4.3 cu. ft. Capacity (Fresh Food 3.81 cu. ft./Freezer .49 cu. ft.)
- 2-1/2 Fresh Food Door Shelves
- 2 Adjustable Wire Cabinet Shelves
- Can Rack
- 2 Mini Ice 'N Easy Trays
- Manual Defrost
- Color-Matched Recessed Door Handles
- Model GMR04AAMWW – White on white
- Model GMR04AAMBB – Black on black

Specification Revised 7/04
310934

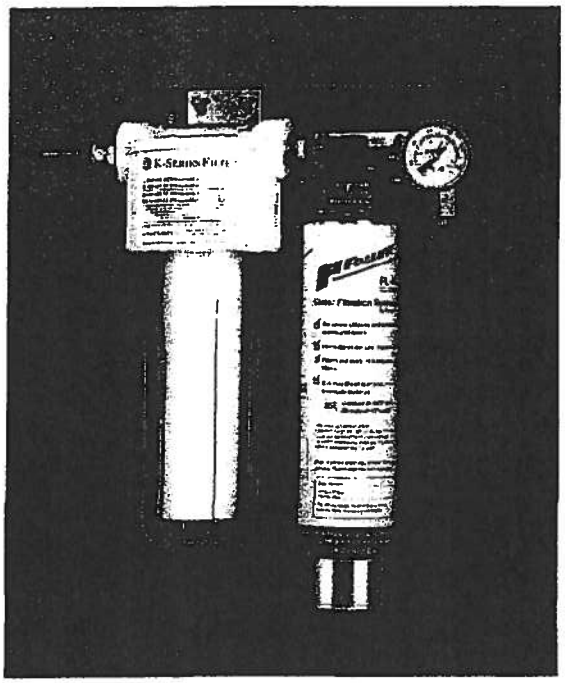
APPROXIMATE DIMENSIONS(HxDxW)	
32 7/8 in x 21 3/4 in x 20 in	
CAPACITY	
Total Capacity (cubic feet)	4.4
Fresh Food (cubic feet)	3.99
Freezer (cubic feet)	.39
Shelf Area (sq. ft.)	5.6
FEATURES	
Defrost Type	Manual
Fresh Food Cabinet Shelves - Adjustable	2
Fresh Food Cabinet Shelves - Total # of Shelves	2 Wire
Fresh Food Door Shelves	2 Full-Width; 1 Half-Width
Ice N' Easy Trays	1 Mini
APPEARANCE	
Color Appearance	White on White
Door Swing	Hinges on Right
Handle	Color-Matched Recessed
Rounded Doors	Yes
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	77 lb
Overall Depth	21 3/4 in
Overall Height	32 7/8 in
Overall Width	20 in
Depth with Door Open 90° (in.)	40-1/8
Back Air Clearances (in.)	2
Side Air Clearances (in.)	1/2
Top Air Clearances (in.)	2



END OF SPECIFICATION

QC4-FL4S Walter Filter System

SPECIFICATIONS



Water filter system for use with Follett icemakers and ice and water dispensers. System includes pre-filter, primary filter, pressure gauge and wall mounting bracket.

Important: Not for use with carbonated water — separate system required.

Ensures better tasting, cleaner, safer ice
- *Traps dirt as small as 1/2 micron in size*
- Removes chlorine, off-tastes and odors
- Filters out asbestos fibers and parasitic cysts such as *Cryptosporidium* and *Giardia*
- Certified to ANSI/NSF standards 42 and 53

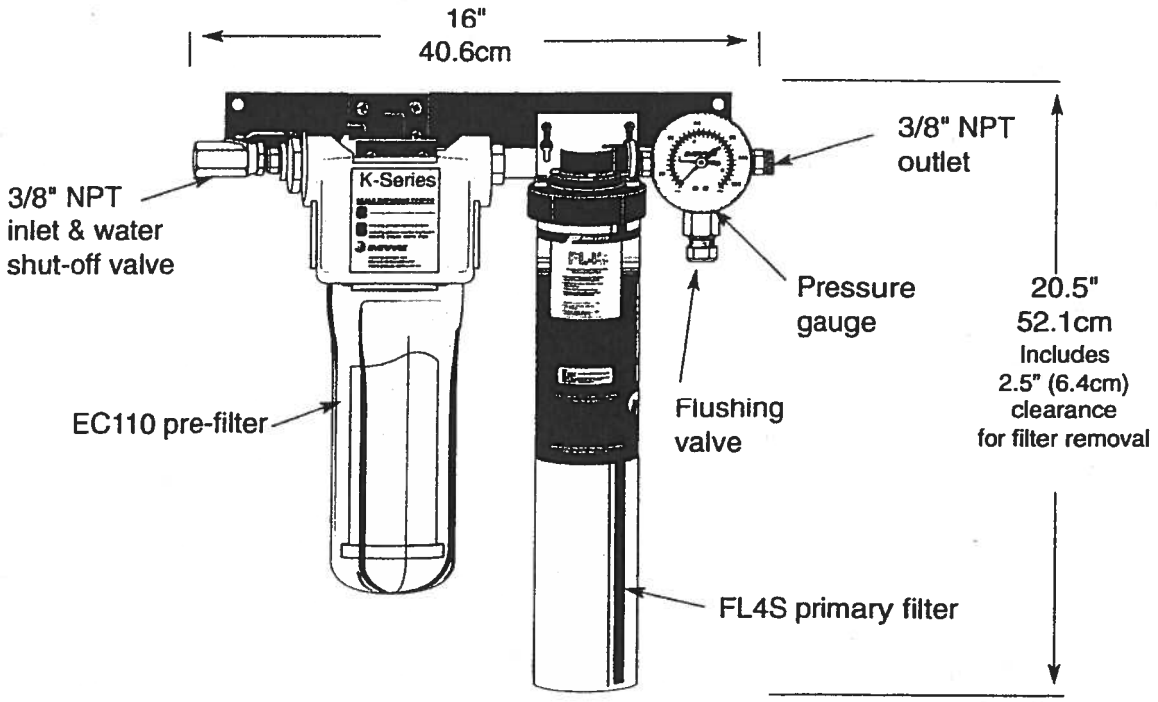
Improves icemaker performance
- Keeps icemakers functioning at full capacity
- Reduces scale build-up from dirt and minerals in the water by up to 70%
- Removes dirt and abrasive particles that can damage internal workings of icemaker
- Saves energy and reduces downtime

Space-saving design
- 20.5" (52.1cm) total height and 16" (40.6cm) width requires minimal space
- Entire system can be mounted out of the way below standard 34" - 36" (86.4cm - 91.4cm) counters

Dual filter system saves money
- *Economical EC110 pre-filter filters out* large particles and extends life of FL4S primary filter

Item # 714519

REV: tlg 8/21/2003



- Clearance required: 2.5" (6.4cm) at bottom of filter for cartridge removal
- Flow rate: 0.5 gpm (1.9 lpm)
- Pressure range 10 - 125 psi, non-shock
- Capacity: Certified for chlorine and taste and odor reduction for 3,000 gallons (11,400 liters)
- Water temperature: 35° - 100°F (2° - 38°C)

NSF International Standards

Tested and certified to ANSI/NSF Standard 42 & 53

Standard No. 42: Aesthetic Effects

Chemical Unit Taste & Odor and Chlorine Reduction, Class 1

Mechanical Filtration Unit Particulate Reduction, Class 1: 99.9% reduction of particles 1/2 micron and larger in size

Standard No. 53: Health Effects

Mechanical Filtration Unit

Turbidity Reduction, Cyst Reduction, Asbestos Reduction

The QC4-FL4S filter and 4S cartridge (by Everpure, Inc.) have been tested and Certified by NSF only for the functions listed above. Check for compliance with state and local laws and regulations. Do not use where the water is microbiologically unsafe or with water of unknown quality without adequate disinfection before or after the unit. Can be used with water disinfected that may contain filterable cysts.

Item # 714519

END OF SPECIFICATION

Model 8573



Model 8573



8573 Koffee King Three Warmer Stepped Right Automatic Coffee Brewer *(without Hot Water Faucet)*

How do you get more for less? Use the Bloomfield Lo Profile® brewing system. At less than 17" tall, the Lo Profile is small in stature but big on capacity. Like all Bloomfield products, this proven, efficient brewing system is designed to take advantage of the finest electrical components and has the lowest service cost in the industry for this type of brewer.

Features

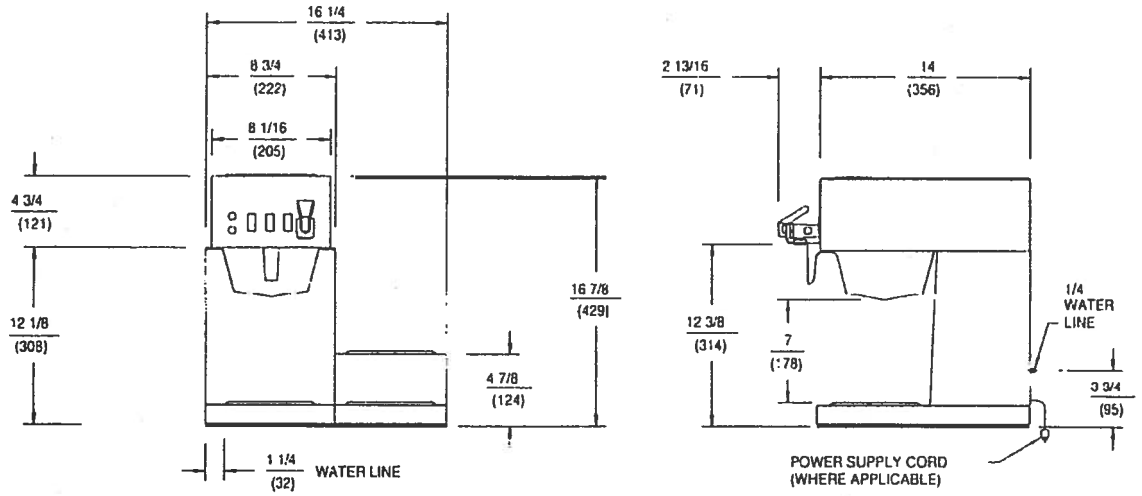
- **A high level of commonality of parts** with other Bloomfield models will significantly reduce the inventory of spare parts required to service many body styles.
- Exclusive design provides **easy access to components** for quick service.
- **Water volume adjustments** can be made with ease, no panels to remove or tools required.
- **Ready-to-Brew light** indicates the proper water temperature to help eliminate the guesswork in brewing.
- Built-in **pour over feature** provides flexibility.
- **Independent front-mounted hot water faucet** allows drawing of hot water without affecting coffee taste or brewing cycle.
- **Premium quality thermostat** has a full-length stainless steel sensing bulb that recognizes water temperature extremely accurately and cycles less frequently.
- **Superior sprayhead design** spreads water over the coffee grounds, creating agitation and a floating action that completely saturates the coffee to capture the full, rich essence of every bean.
- **Unique water valve with built-in flow control** assures consistent operation at 20-80 p.s.i.
- **One-piece drawn stainless steel water tank** has a superior design for extended life.
- **Three warming stations** with porcelain enameled warmer plates position decanters securely and, with no exposed screw heads, will not scratch or scrape decanters.
- High quality easy to clean **stainless steel construction.**

Item 715053

REV: 6/28/03

E9253 STD 4 LR 10836

DIMENSIONS: INCH / (MM)



SPECIFICATIONS:

MODELS	WATTS	VOLTS	AMPS	PHASE	POWER SUPPLY CORD
8573	1800	120	15	Single	NEMA 5-15P

Item # 715053

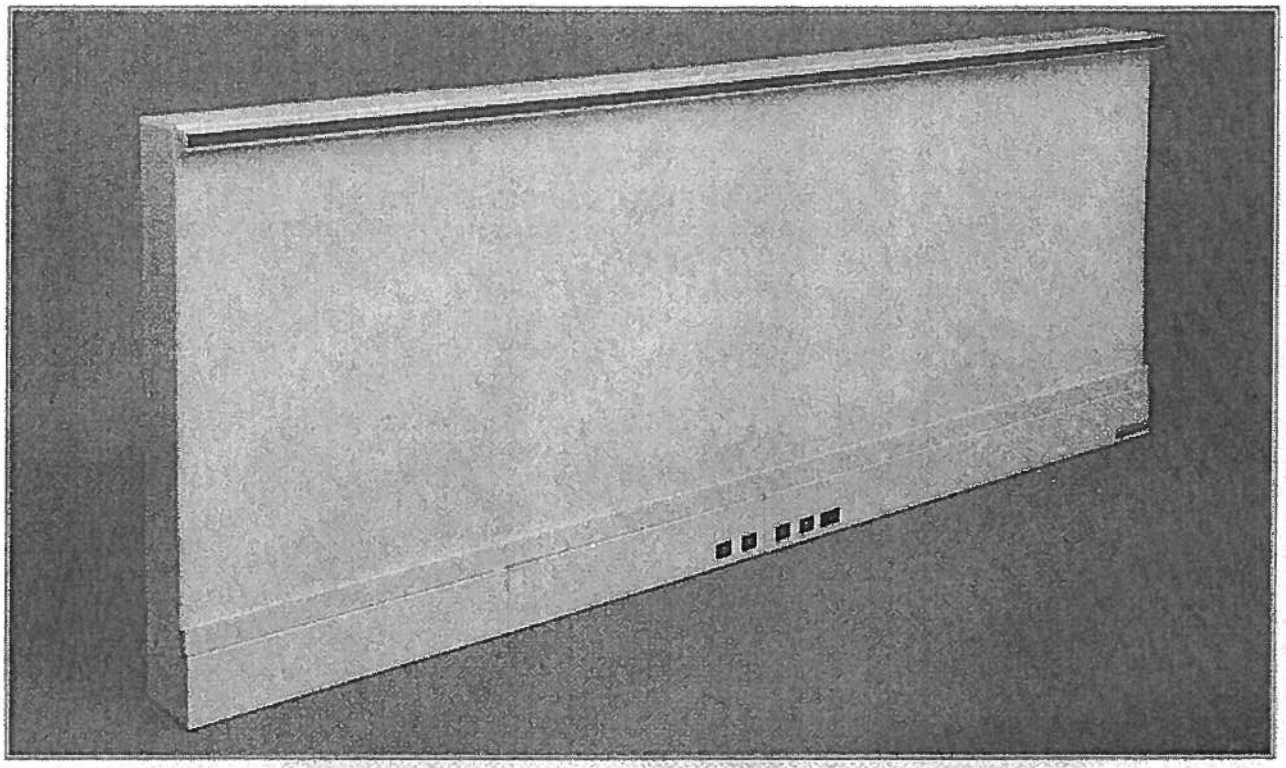
END OF SPECIFICATION

Item # 715152 1 of 3

800/347-XRAY
S&S X-RAY PRODUCTS
www.ssxray.com

CHAMELEON SERIES

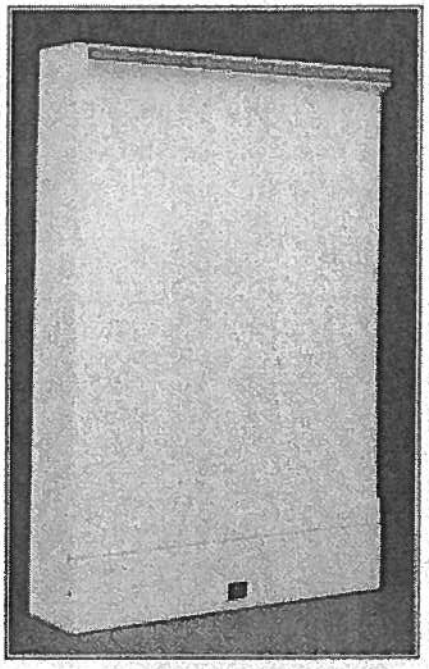
Blends With Any Décor



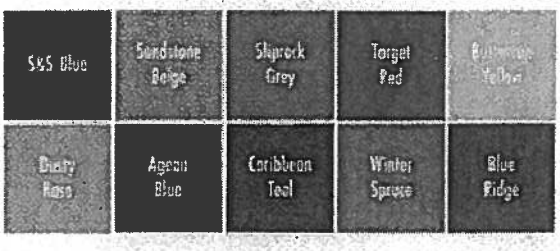
Four Bank Surface Mounted Model (101204)

The **Chameleon Illuminator Series** combines a slim, sleek appearance (3⅜" depth), with color-customizable trim. This cost efficient illuminator is designed to accentuate the warm, professional appearance of your reading room or consultation area. The units can be highlighted with *trim in a choice of ten colors*, polished stainless steel or primed strip (the latter can be easily painted to color coordinate within a facility). Constructed of durable steel with a white powder-coat finish, this series is available in 2 lamps, 3 lamps and 4 lamps per viewing area models.

Trigger start ballasts, separated viewing sections, centered cluster switches, one piece plexiglass fronts and continuous gravity film grips are standard with this series. A bottom ledge film support coupled with the continuous film grip guarantees maximum freedom for viewing small or large films. Each section is individually controlled by rocker switches mounted at the bottom center of the illuminator. Master switches are provided on units of three banks or more. The Chameleon Illuminator can also be incorporated into a corner module.



Trim Colors



Finish: White Baked Enamel

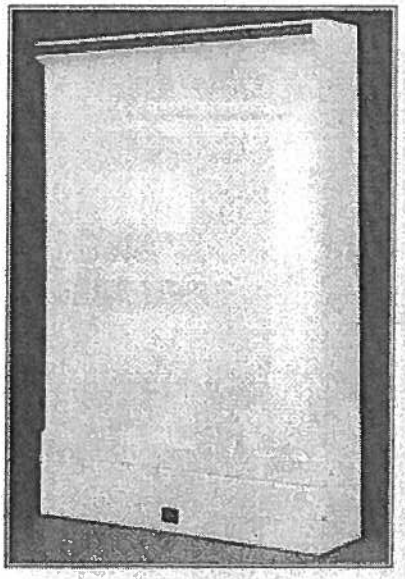
Electrical: Viewers operate on 120 volt, 60 Hz. **2 Lamp Series:** .47 amps per section, **3 Lamp series:** .61 amps per section, **4 Lamp series:** 1.0 amps per section. Surface mounting models are supplied with a 6' three conductor line cord (see diagram for wiring locations). Recessed models come with BX connectors. For special voltages consult factory.

* **Optional Items:** Modular Mobile system (pg B-23), mobile stand, console arms, angulated viewing system (pg B-25) corner modules (pg B-24), hospital grade plugs (pg B-30).

S&S X-RAY PRODUCTS
www.ssxray.com

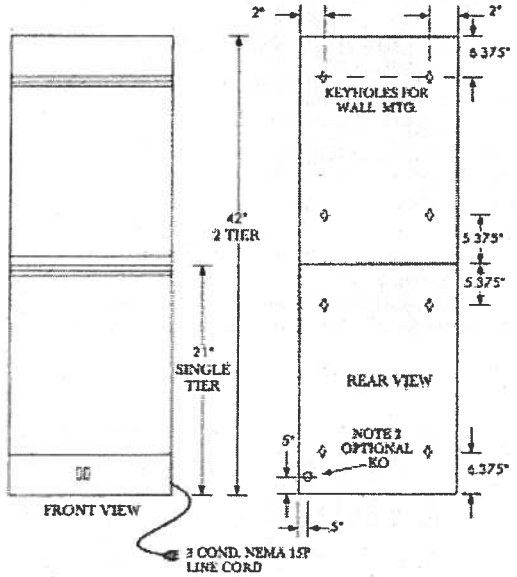
CHAMELEON SERIES

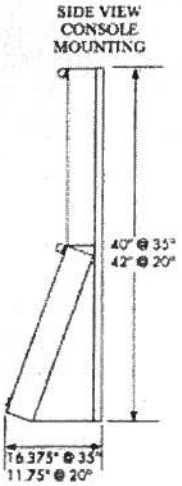
ILLUMINATORS



SURFACE MOUNTED MODELS

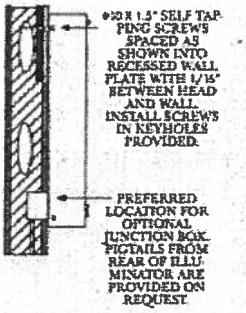
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	23 lbs	101401	101421
Two Bank 28"x17"	28"	21"	46 lbs	101402	101422
Three Bank 42"x17"	42"	21"	69 lbs	101403	101423
Four Bank 56"x17"	56"	21"	90 lbs	101404	101424
Five Bank 70"x17"	70"	21"	113 lbs	101405	101425
Six Bank 84"x17"	84"	21"	136 lbs	101406	101426
TWO TIER					
1 over 1 2 x 14"x17"	14"	42"	46 lbs	101411	101431
2 over 2 2 x 28"x17"	28"	42"	92 lbs	101412	101432
3 over 3 2 x 42"x17"	42"	42"	138 lbs	101413	101433
4 over 4 2 x 56"x17"	56"	42"	180 lbs	101414	101434
5 over 5 2 x 70"x17"	70"	42"	226 lbs	101415	101435
6 over 6 2 x 84"x17"	84"	42"	272 lbs	101416	101436

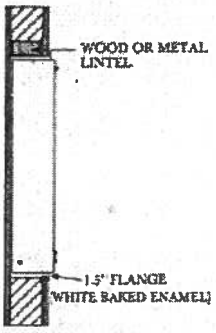






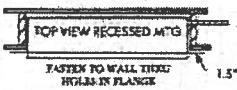
SIDE VIEW RIGHT SIDE





RECESSED MODELS

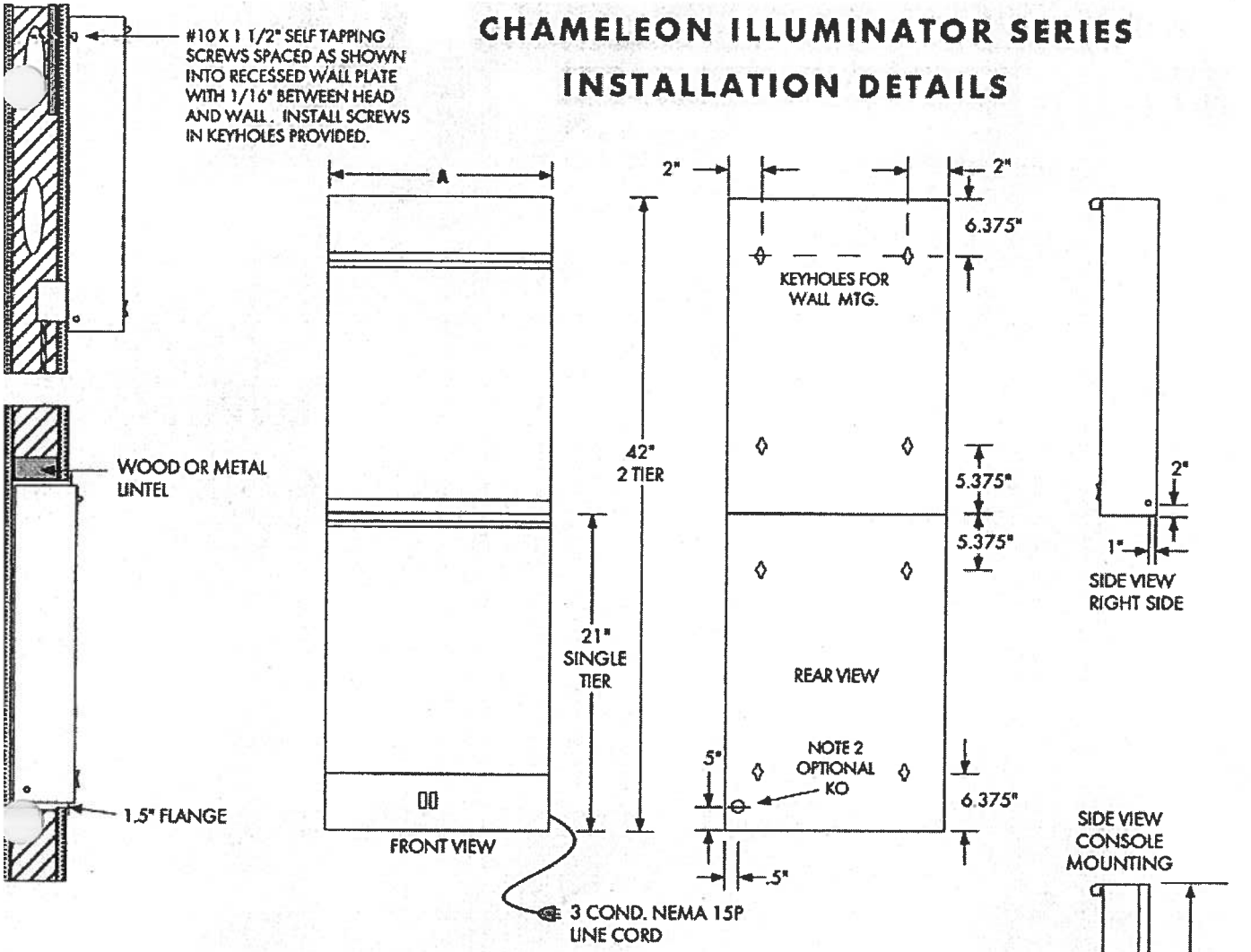
VIEWING AREA	EXTERIOR DIM WIDTH	EXTERIOR DIM HGT	WALL OPENING WIDTH	WALL OPENING HGT	APPROX SHIP WT	101 SERIES FOUR LAMP STANDARD SWITCHES	101 SERIES FOUR LAMP AUTO SWITCHES
Single Bank 14"x17"	14"	21"	14.25"	21.25"	23 lbs	101441	101461
Two Bank 28"x17"	28"	21"	28.25"	21.25"	46 lbs	101442	101462
Three Bank 42"x17"	42"	21"	42.25"	21.25"	69 lbs	101443	101463
Four Bank 56"x17"	56"	21"	56.25"	21.25"	90 lbs	101444	101464
Five Bank 70"x17"	70"	21"	70.25"	21.25"	113 lbs	101445	101465
Six Bank 84"x17"	84"	21"	84.25"	21.25"	136 lbs	101446	101466
TWO TIER							
1 over 1 2 x 14"x17"	14"	42"	14.25"	42.25"	46 lbs	101451	101471
2 over 2 2 x 28"x17"	28"	42"	28.25"	42.25"	92 lbs	101452	101472
3 over 3 2 x 42"x17"	42"	42"	42.25"	42.25"	138 lbs	101453	101473
4 over 4 2 x 56"x17"	56"	42"	56.25"	42.25"	180 lbs	101454	101474
5 over 5 2 x 70"x17"	70"	42"	70.25"	42.25"	226 lbs	101455	101475
6 over 6 2 x 84"x17"	84"	42"	84.25"	42.25"	272 lbs	101456	101476

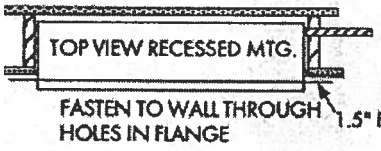


1/2" CONDUIT CONTAINING 3 NO. 14 WIRES TO 120 VOLT 60 HZ SERVICE.

ALL MEASUREMENTS ARE ± 1/16"

CHAMELEON ILLUMINATOR SERIES
INSTALLATION DETAILS





	NUMBER OF VIEWING AREAS						HEIGHT	
	1	2	3	4	5	6	1 TIER	2 TIER
CASE WIDTH "A"	14"	28"	42"	56"	70"	84"	21"	42"
WALL OPENING	14.25"	28.25"	42.25"	56.25"	70.25"	84.25"	21.25	42.25
WEIGHT 1 TIER	23	46	69	90	113	136		
WEIGHT 2 TIER	46	92	138	180	226	272		
DEPTH OF CASE	3.375"							

120 VOLT 60 HZ.
2 LAMP SERIES .47 AMPS PER VIEWING SECTION
3 LAMP SERIES .61 AMPS PER VIEWING SECTION
4 LAMP SERIES 1 AMPS PER VIEWING SECTION
UL LISTED FOR U.S.A. AND CANADA

NOTE:
1. FOR SAFETY AND PROPER OPERATION UNITS MUST BE ELECTRICALLY GROUNDED.

PREFERRED LOCATION FOR OPTIONAL JUNCTION BOX. PIGTAILS FROM REAR OF ILLUMINATOR PROVIDED ON

CALL OUR CUSTOM DESIGN ENGINEERING DEPT. FOR HELP WITH ROOM LAYOUTS AND CUSTOM CONFIGURATIONS.

The Industry Standard For 40 Years
800-347-XRAY 718-649-8500
FAX 718-257-0219
S&S X-RAY PRODUCTS INC
1165 LINWOOD STREET
BROOKLYN NY 11208

END OF SPECIFICATION

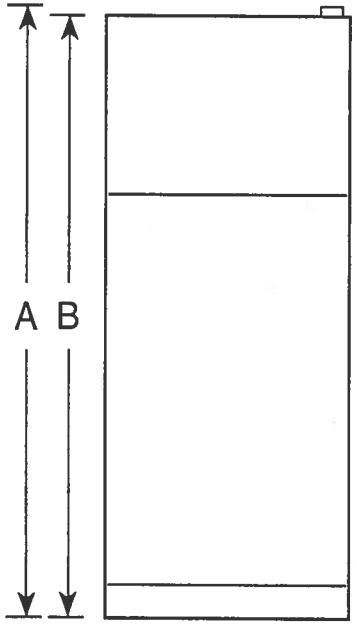
GTS17KBS
GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

Dimensions and Installation Information

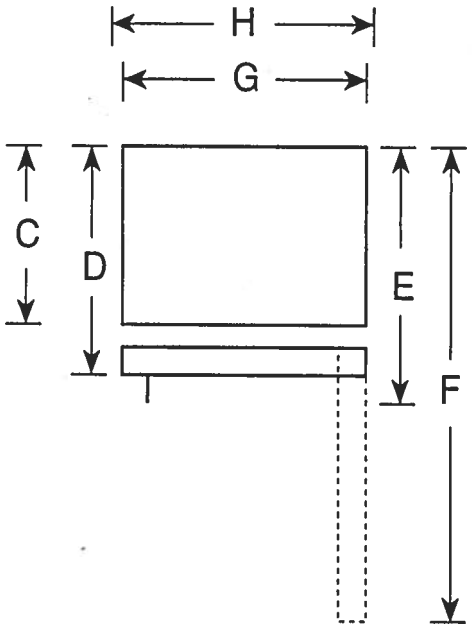
Overall Dimensions	Height to top of hinge (in.) **A**	64-3/4
	Height to top of case (in.) **B**	64-1/4*
	Case depth without door (in.) **C**†	25-7/8
	Case depth less door handle (in.) **D**†	29-1/8
	Case depth with door handle (in.) **E**†	31
	Depth with fresh food door open 90° (in.) **F**†	54-7/8
	Width (in.) **G**	28
	Width with door open 90° less door handle (in.) **H**	30-1/2
Air Clearances	Each side (in.)	3/4
	Top (in.)	1
	Back (in.)	1

*Height to mid-freezer (in.): 54-3/8

Front View



Top View



Dimension and installation information are shown in inches.

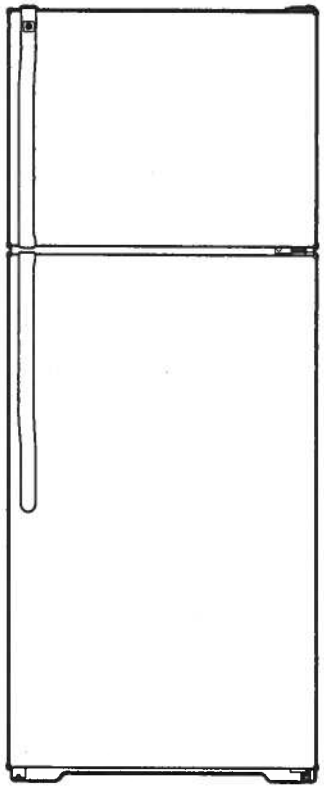
Listed by Underwriters Laboratories

GTS17KBS

GE® 16.6 Cu. Ft. Top-Freezer Refrigerator

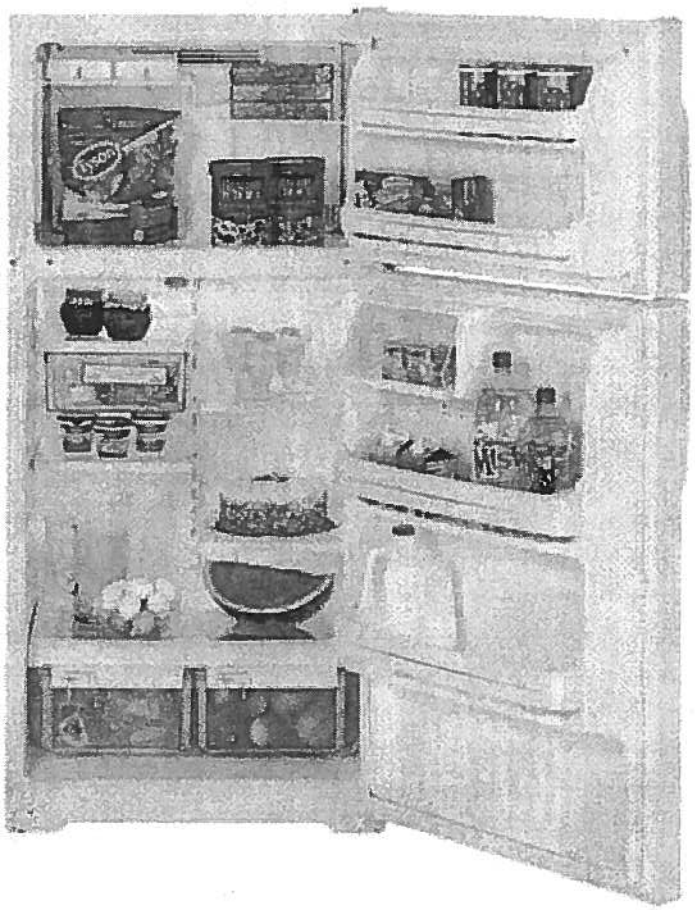
Features and Benefits

- Adjustable Spillproof Glass Shelves - Help contain spills for ease of cleaning
- Upfront Temperature Controls - Are positioned up front, close at hand, for maximum convenience and ease of use
- Adjustable Humidity Vegetable/Fruit Crispers - Provide the ideal storage environment for fruits and vegetables
- Gallon Door Storage - Makes room for milk and any other gallon size containers
- Snack Pan - Helps keep everyday foods like muffins and carrot sticks fresh
- NeverClean™ Condenser - Condenser coils are encased, so they don't require cleaning in normal operating environments
- Deluxe Quiet Design - Significantly reduces operating noise
- Square Doors - Classic design that's compatible with any kitchen décor
- Model GTS17KBSWW - White on white
- Model GTS17KBSCC - Bisque on bisque



APPROXIMATE DIMENSIONS(HxDxW)	
64 3/4 in x 31 in x 28 in	
CAPACITY	
Total Capacity (cubic feet)	16.60
Fresh Food (cubic feet)	12.54
Freezer (cubic feet)	4.10
Shelf Area (sq. ft.)	19.7
FEATURES	
Air Tower	Yes - Freezer
Defrost Type	Frost Free
Upfront Temperature Controls	Yes
Automatic Icemaker	Optional (IM4A)
Ice N' Easy Trays	2
Snack Drawer	Yes
Vegetable / Fruit Crisper(s)	2 Adjustable Humidity
Fresh Food Cabinet Shelves - Adjustable	4 Split
Fresh Food Cabinet Shelves - Spill Proof	Yes
Fresh Food Cabinet Shelves - Total Number of Shelves	4 Glass
Fresh Food Door Shelves	2 Fixed w/ Gal. Storage
Gallon Door Storage	Yes
Dairy Compartment	Yes
Interior Light	Yes
Freezer Cabinet Shelves (Wire)	Step Shelf
Freezer Door Shelves	2 Full-Width Fixed (1 Extra-Deep)
APPEARANCE	
Color Appearance	White on White
Handle	Color-Matched
Door Swing	Reversible Hinges
Textured Steel Case	Galvanized Door
Door Stops	Yes
Easy to Remove Door Gaskets	Yes
Leveling Legs	2 Front
WEIGHTS & DIMENSIONS	
Approximate Shipping Weight	185 lb
Net Weight (lbs.)	166 lb
Overall Depth	31 in
Overall Height	64 3/4 in
Overall Width	28 in
Case Depth Without Door (in.)	25-7/8
Depth with Door Open 90° (in.)	54-7/8
Depth Without Handle (in.)	29-1/8
Height to Mid-Freezer	54-3/8
Height to Top of Case (in.)	64-1/4
Width w/Door Open 90 Degrees Inc. Handle (in.)	30-1/2
Width w/Door Open 90 Degrees Less Handle (in.)	28-5/8
Back Air Clearances (in.)	1
Side Air Clearances (in.)	3/4
Top Air Clearances (in.)	1

POWER / RATINGS	
Volts / Hertz / Amps	120V; 60Hz ; 15A



END OF SPECIFICATION

AMSCO® WARMING CABINET

APPLICATION

The Amsco Warming Cabinet is designed to raise the temperature of surgical irrigation solutions and/or blankets to an acceptable level for hospital and surgical outpatient center applications.

FEATURES

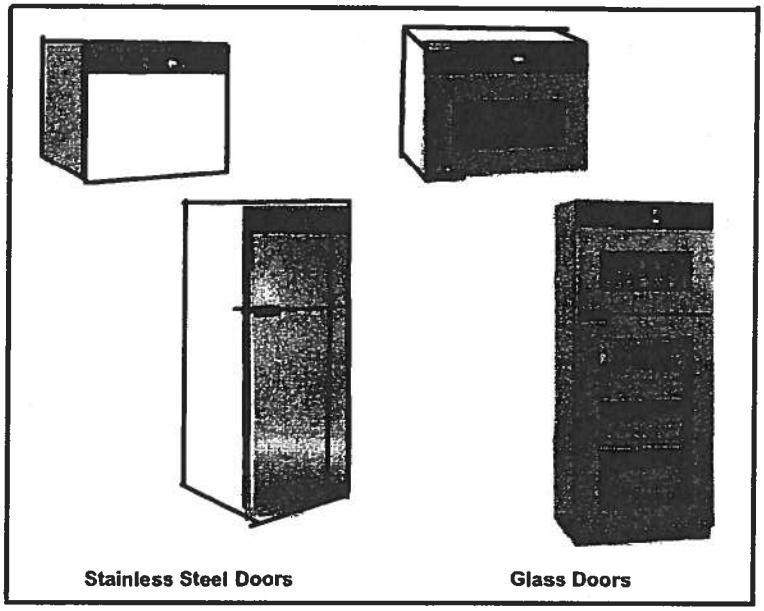
Single-compartment Model—Features a heating chamber available in two different depths: 18" (457 mm) or 24" (610 mm) deep.

Double-compartment Model—Features an upper and lower heating chamber with independent temperature controls, and a choice of two different depths: 18" (457 mm) or 24" (610 mm) deep.

Cabinet Storage Capabilities—The upper compartment of the 18" (457 mm) deep model holds up to 15 (2-liter) surgical flasks; the lower compartment holds up to 45 (2-liter) surgical flasks.

The upper compartment of the 24" (610 mm) deep model holds up to 20 (2-liter) surgical flasks; the lower compartment holds up to 60 (2-liter) surgical flasks.

All chambers can hold a combination of flasks and dry goods, or dry goods only.



Stainless Steel Doors **Glass Doors**

(Typical only - some details may vary.)

STANDARDS

Warming cabinet meets applicable requirements of the following standards, and carries the appropriate symbols.

- **Underwriters Laboratories (UL) Standard 2601-1, 1st Ed.,** as certified by ETL Testing Laboratories, Inc.
- **Standard CSA-C22.2 No. 601.1-M90,** Standard for Electro-Medical Equipment as certified by ETL Testing Laboratories, Inc.
- **EN 60601-1: 1993, Amendment 2, *1995,*** *Electrical Safety as certified by* ETL Testing Laboratories, Inc.
- **IEC 601-1-2: 1993,** EMC testing as certified by ETL Testing Laboratories, Inc.
- ***EN 55011: Group 1, Class B,*** *EMI* testing as certified by ETL Testing Laboratories, Inc.
- **Medical Device Directive (93/42 IEEC)**
- **California OSMPD Seismic Pre-Approval**
- **FDA Good Manufacturing Practices Regulations 21 CFR 820 for Medical Devices.**

The Selections Checked Below Apply To This Equipment

MODEL

- ☐ Single-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep
- ☐ Double-compartment
  - ☐ 18" (457 mm) deep
  - ☐ 24" (610 mm) deep

Mounting

- ☐ Open-mounted
- ☐ For Recessing

DOOR OPTIONS

- ☐ Glass
- ☐ Stainless Steel

VOLTAGE

- ☐ 120 V
- ☐ 220-240 V

Door Hinge(LH/RH) interchangeable in field

ACCESSORY

*** Seismic Tie-down Kit

Item # 717197

REV: 6/19/03

CONSTRUCTION

Includes all components necessary to obtain a complete working unit. The open-mounted unit ships with a power condenser installed. The recessed unit requires a connection to building service, supplied by others. The unit contains a heating chamber, instrumentation and operating controls, and a lower heated chamber when double-compartment model is specified.

Cabinet controls are identical for both the single- and double-compartment configurations. The double compartment configuration has a temperature control knob, temperature display LCD, and overtemperature light for each compartment. The control panel (on either the single- or double-compartment configuration) can be conveniently serviced from the front of the unit.

Corners and intersections on the face of the cabinet and door are structurally formed for rigidity, cleanability and appearance. Both models are supported on a stainless steel integral subbase. The cabinet door(s) is (are) available in stainless steel, or stainless steel with a glass window. Interior of cabinet and shelves are stainless steel. If a freestanding model, the cabinet top and side panels are stainless steel.

Heating chamber compartment is insulated with 1" (25 mm) thick, fiberglass blanket. A fan circulates air within the chamber to provide even heat distribution. The door is of double-wall construction with 1-1/2" (38 mm) thick insulation between the walls. Right-hand door swing is provided; swing is reversible. Door closes against a heat-resistant, magnet imbedded, vinyl gasket. Pivot type hinges are stainless steel.

Chamber(s) is (are) heated by an electric rod heater operating on either *120 or 220 Volt, 50/60 Hz power.*

Lower chamber (double-compartment model) includes two stainless-steel shelves, adjustable in 1" (25 mm) increments by a clip and slot arrangement. Door structure mounting, gasket and hinges are the same as the door on the upper chamber. Chamber is heated by an electric rod heater.

CONTROLS

The control panel assembly features a temperature control knob, an overtemperature indicator light, a digital temperature indicator (if a double-compartment model, there will be duplicates of the previous items), and a power switch. The temperature control knob is used to regulate and turn off the heat to each chamber. 120 Volt units display temperature readings in Fahrenheit. 220 Volt units display temperature readings in Celsius scale. Temperature selection range is 90°-160°F (32.2°-71.1°C). An overtemperature alarm will visually and audibly alert operator should an overtemperature condition occur (chamber temperature greater than 10°F [5.5°C] above set temperature). In the event of an overtemperature condition, the overtemperature control automatically turns off the heater(s).

MOUNTING ARRANGEMENT

Double-compartment models may be specified as open-mounted or recessing into a partition wall. If model is specified for recessing, a synthetic rubber sealing gasket is provided to ensure close fit of cabinet front to the face of the wall partition. Recessed cabinet requires no supplementary supports behind the wall partition (except in seismic locations).

Single-compartment models may be specified for wall/counter mounting or for recessing into a partition wall.

PREVENTIVE MAINTENANCE

A global network of skilled service specialists can provide periodic inspections, and adjustments to assure *low-cost peak performance. STERIS* representatives can provide information regarding Annual Maintenance Agreements.

NOTE

1. Due to a variety of building constructions employed, fasteners for mounting cabinet to wall are not furnished by STERIS. Wall(s) must be adequately reinforced to *support operating weight of* cabinet.

ENGINEERING DATA

Unit	Approx. Unit Wt. lbs (kg)
Single-Compartment:*	
18" Wall/Counter Mounting	124 (56)
18" Recess Mounting	98 (45)
24" Wall/Counter Mounting	142 (65)
24" Recess Mounting	115 (52)
Double-Compartment:**	
18" Open-mounted	302 (137)
18" Recessed Mounting	266 (121)
24" Open-mounted	353 (160)
24" Recessed Mounting	306 (139)

** For 220/240 Volt units, add 8 lbs (3.6 kg). For glass door option, add 6 lbs (2.7 kg).*
*** For 220/240 Volt units, add 15 lbs (6.8 kg). For glass door option, add 6 lbs (2.7 kg).*

INTERNAL DIMENSIONS AND CAPACITY

Unit	Upper Chamber Single Chamber Unit (Height x Width x Depth)	Lower Chamber Double Chamber Unit (Height x Width x Depth)
18" Depth	15-1/2 x 23-3/4 x 16-7/8" – 3.6 cu. ft. (394 x 603 x 429 mm)	38-1/4 x 23-3/4 x 16-7/8" – 8.9 cu. ft. (972 x 603 x 429 mm)
24" Depth	15-1/2 x 23-3/4 x 22-7/8 – 4.9 cu. ft. (394 x 603 x 581 mm)	38-1/4 x 23-3/4 x 22-7/8 – 12 cu. ft. (972 x 603 x 581 mm)

UTILITY REQUIREMENTS - Single Compartment Model

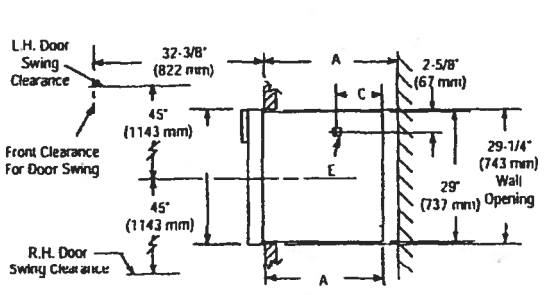
Electricity (E)

120 Volt, 50/60 Hz, 1-Phase, 6.8 A, 800 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 3.6 A, 869 Watts

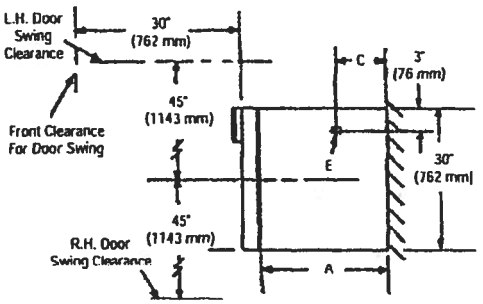
. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)

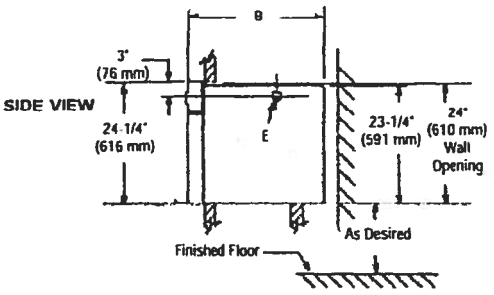
SINGLE-COMPARTMENT MODEL



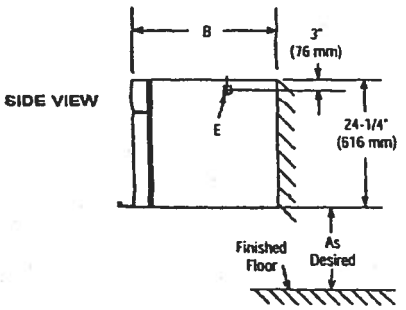
PLAN VIEW



PLAN VIEW



For Recessing



Wall/Counter Mounting

NOTE: Because of STERIS's continuing program of research and development, all specifications and descriptions are subject to change without notice. Obtain certified drawings for design, and installation.

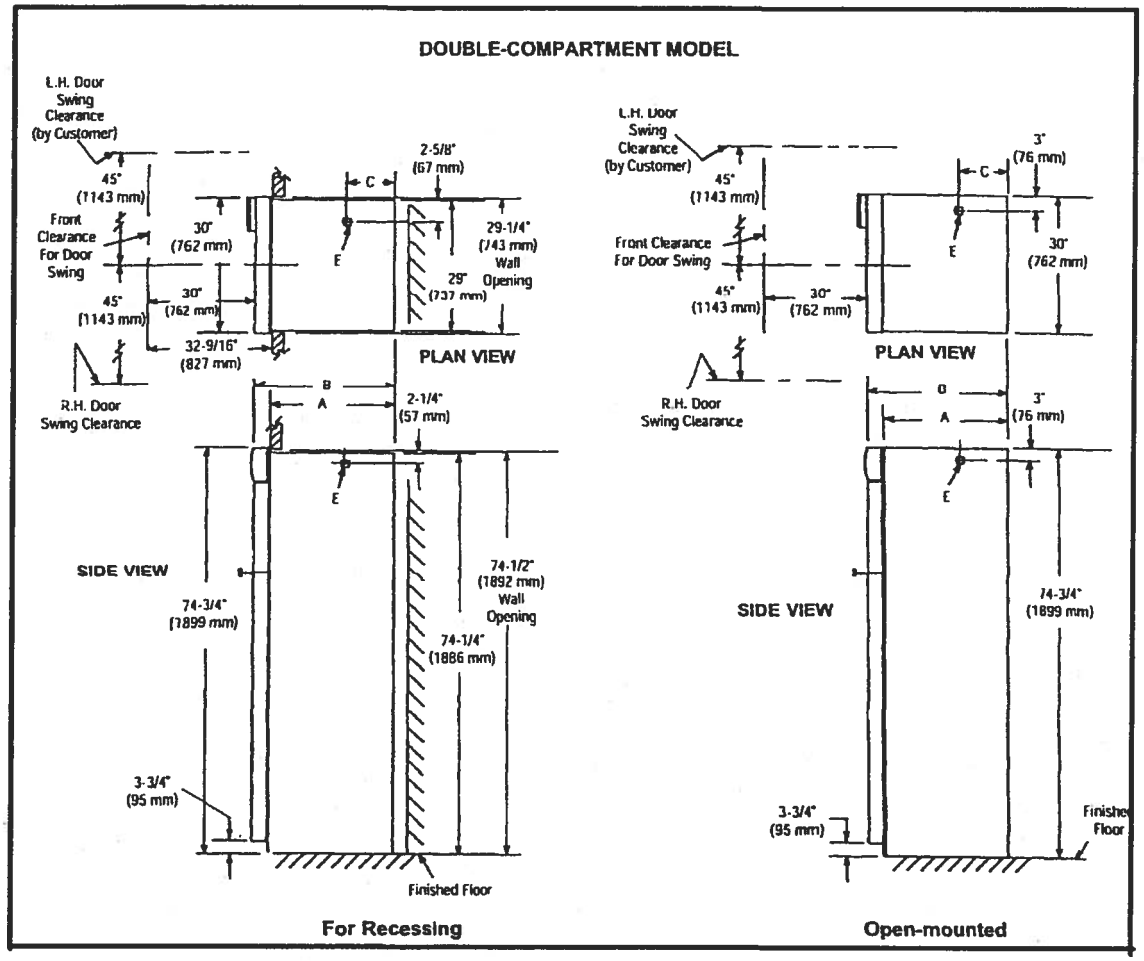
UTILITY REQUIREMENTS - Double Compartment Model

Electricity (E)

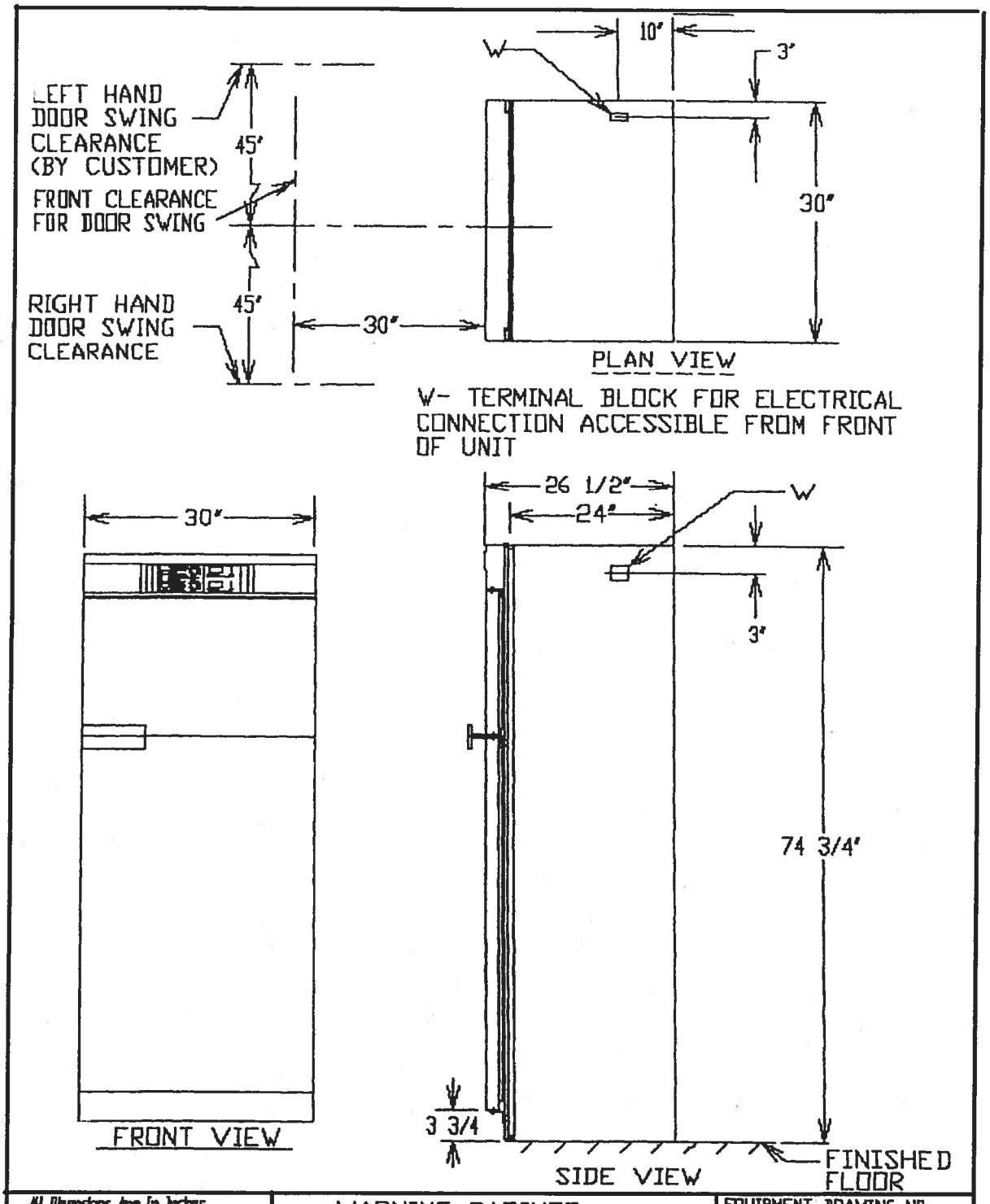
120 Volt, 50/60 Hz, 1-Phase, 13.7 A, 1600 Watts; or 220-240 Volts, 50/60 Hz, 1-Phase, 6.8 A, 1625 Watts

. . . CHECK LOCAL CODES . . .

MODEL	DIMENSIONS - INCHES (MM)		
	A	B	C
18" (457 mm)	18 (517)	20-1/2 (521)	7 (178)
24" (610 mm)	24 (610)	26-1/2 (673)	10 (254)



Item # 717197



All Dimensions Are In Inches

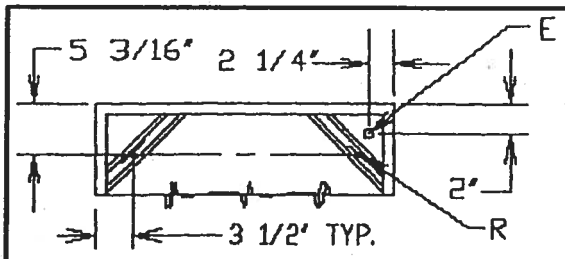
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET

24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214
SHT 1 OF 2

Item # 717197



REAR VIEW OF CABINET

E- 7/8" DIAMETER (22mm) HOLE FOR 1/2" (13mm) DIAMETER CONDUIT CONNECTION OR POWER CORD OPTION.

R- 3/8" (9.5mm) DIAMETER MOUNTING HOLES (2) FASTNERS NOT BY STERIS.

ELECETRICAL SPECIFICATIONS

VERSION	ELECTRICAL SUPPLY	POWER	CURRENT DRAW	UNIT BREAKER RATING
DOMESTIC	120V, 50/60 Hz, 1 PH	1644 WATTS	13.7 AMPS	15 AMPS
INTERNATIONAL	220-240V, 50/60 Hz, 1 PH	1625 WATTS	6.8 AMPS	10 AMPS

UNIT WEIGHT:

VERSION	UNIT WEIGHT		
	CRATED	BOXED	READY TO USE
DOMESTIC	542 LBS	410 LBS	353 LBS
INTERNATIONAL	557 LBS	425 LBS	368 LBS

UNIT CAPACITY:

	INTERNAL DIMENSIONS	VOLUME
TOP CHAMBER	22.875" DEEP X 23.75" WIDE X 15.5" HIGH 581.025mm DEEP X 603.25mm WIDE X 393.7mm HIGH	4.87 FT^3 .138 m^3
BOTTOM CHAMBER	22.875" DEEP X 23.75" WIDE X 38.25" HIGH 581.025mm DEEP X 603.25mm WIDE X 971.55mm HIGH	12.03 FT^3 .34 m^3

All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

WARMING CABINET
24" FREE STANDING
DUAL COMPARTMENT
ELECTRIC HEAT

EQUIPMENT DRAWING NO.
129361-214 | SHT 2 OF 4

SEISMIC ANCHORAGE REPORT

for

74-INCH DUAL CHAMBER WARMING CABINETS

MODEL	ENGINEERING DWG. NO.	EQUIPMENT DWG. NO.
30"W X 18"D X 74"H OPEN MOUNTED	146655-541	129361-212
30"W X 18"D X 74"H RECESSED MOUNTED	146655-540	129361-213
30"W X 24"D X 74"H OPEN MOUNTED	146655-163	129361-214
30"W X 24"D X 74"H RECESSED MOUNTED	146655-162	129361-215

THE CALCULATIONS IN THIS REPORT SHOW COMPLIANCE WITH THE REQUIREMENTS OF TITLE 24 OF THE CALIFORNIA CODE OF REGULATIONS (CCR), PART 2 - CALIFORNIA BUILDING CODE (CBC) PUBLISHED AS THE 1988 EDITION OF THE UNIFORM BUILDING CODE (UBC) WITH STATE OF CALIFORNIA 1989. AMENDMENTS, SECTION 2312(g)

Prepared by: G. D. Hall — Date 8/21/91
Senior Engineer

Reviewed by: E. L. Thomas — Date 8/23/91
Project Engineer

Reviewed by: W. L. Sanders — Date
Project Manager

SEISMIC ANCHORAGE REPORT
74-INCH DUAL CHAMBER
WARMING CABINETS

AMSCO

PREPARED BY	CHECKED BY	APPROVED BY	APPROVED BY	APPROVED BY
G. Hall				
DATE 08/16/91	DATE	DATE	DATE	DATE

REVISION RECORD

REV.	DATE	APPROVED BY	PAGE	PARA.	CHANGE
0	8/16/91				Initial release PER # 24

EQUIPMENT WEIGHT & CENTER OF GRAVITY

	18"	24"	
Depth of Unit			
Weight of Cabinet (maximum)	220	260	pounds
Weight of Contents (maximum load)	360	480	pounds
Total Weight	580	740	pounds

The weight acts through the center of gravity as noted in Figures 1 and 2.

SEISMIC LOAD CALCULATIONS

Seismic load is calculated for the heavier unit from the formulae:

$F_p = Z\ I\ C_p\ W_p$ 1▸▸ 2▸▸

and:

$F_w = W_p \pm F_p/3$ 6▸▸

Where:

F_p = Lateral Seismic Force

Z = Zone Factor = 0.4 for Zone 4 locations 3▸▸

I = Importance Factor = 1.5 for essential facilities. 4▸▸

C_p = 0.75 Horizontal force factor - hospital equipment, rigid element 5▸▸

W_p = Dead weight of unit

F_w = Vertical Seismic Force

The forces then will be:

$F_p = Z\ I\ C_p\ W_p$

$= 0.4 \times 1.5 \times 0.75 \times W_p = 0.45\ W_p$

and:

$F_w = W_p \pm F_p/3 = W_p \pm (0.45\ W_p)/3 = W_p \pm 0.15\ W_p$

$F_w = 1.15\ W_p$ or $0.85\ W_p$

Seismic forces at the Warming Cabinet's C.G. are: (See Figures 1 & 2)

F_p - 0.45 X 740 = 333 lbs

F_w = 1.15 X 740 = 851 lbs

or

F_- = 0.85 X 740 = 629 lbs

EQUIPMENT ANCHORAGE INTERFACE

The equipment rest on the floor, but is anchored to the wall with three bolts as shown in Figures 1 and 2.

All the vertical seismic load is taken by the floor. The cabinet will not lift of the floor when the acceleration is upward. When the acceleration is downward, the stiffness of the cabinet is such that the load will be transmitted to the floor and not the bolts.

Friction on the floor is neglected, so all the horizontal load is taken by the bolts. It is assumed that the reaction of the floor is acting through the center of gravity producing no moment. The bolt reactions are determined by the laws of statics. When the seismic load is perpendicular to the wall, the bolts are in pure tension. When the seismic load is parallel to the wall, the bolts experience shear plus tension or compression to react the offset the center of gravity from the wall. The maximum tension any one bolt could experience is 210 pounds. The maximum shear any one bolt could experience is 180 pounds. A bolt can experience both maximum tension and maximum shear concurrently.

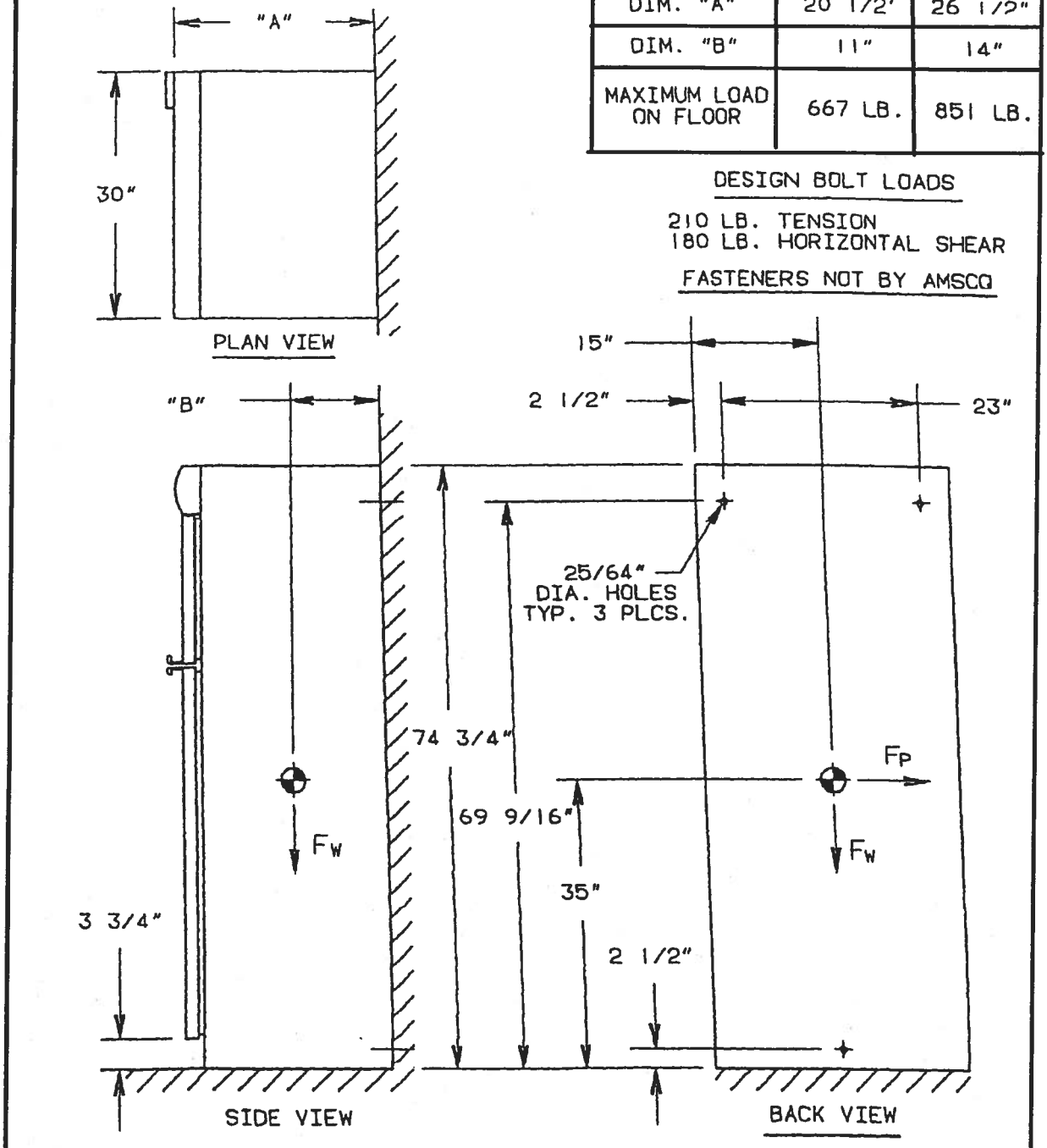
6▸▸ Reference 1▸▸ Table No. 23-P, Note 10, p. 179.54
5▸▸ Reference 1▸▸ Table No. 23-P, p. 179.53 plus notes on p. 179.26
4▸▸ Reference 1▸▸ Table Nos. 23-K and 23-L, pp 179.47 & 179.48
3▸▸ Reference 1▸▸ Table No. 23-I, p. 179.46
2▸▸ Reference 1▸▸ Section 2-312(g)2
1▸▸ Reference California Code of Regulations (CCR), Title 24, Part 2, Published as "State of California 1989 Amendments to the 1988 Edition of the Uniform Building Code".

	18" DEPTH	24" DEPTH
DIM. "A"	20 1/2'	26 1/2"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

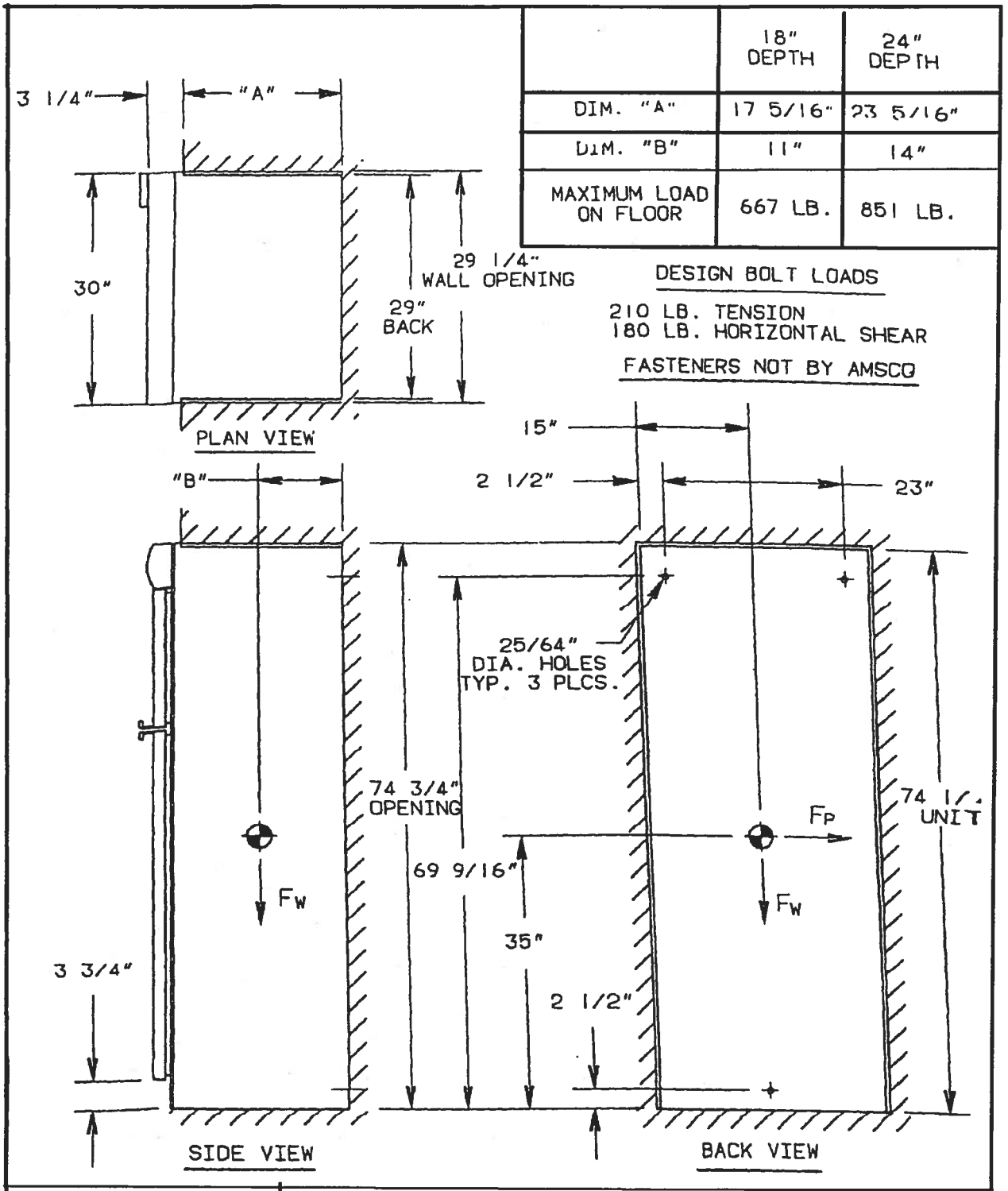
210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO



All Dimensions Are In Inches
Also Refer To GENERAL NOTES Applicable To Equipment Drawings

Seismic Anchorage Report
Warming Cabinets, Open
30" Wide x 74" High



	18" DEPTH	24" DEPTH
DIM. "A"	17 5/16"	23 5/16"
DIM. "B"	11"	14"
MAXIMUM LOAD ON FLOOR	667 LB.	851 LB.

DESIGN BOLT LOADS

210 LB. TENSION
180 LB. HORIZONTAL SHEAR

FASTENERS NOT BY AMSCO

All Dimensions Are In Inches
Also Refer To GENERAL NOTES
Applicable To Equipment Drawing

FIGURE 2
SEISMIC ANCHORAGE REPORT
WARMING CABINETS, RECESSED
30" WIDE × 74" HIGH

GENERAL NOTES – APPLICABLE TO SPECIALTY SURGICAL PRODUCT EQUIPMENT DRAWINGS

INTRODUCTION

Each equipment drawing (enclosed) pertains to the equipment as specified or purchased by you. These general notes and recommendations are intended to complement the equipment drawing(s), as necessary, and thereby further assist you in achieving satisfactory installation of the equipment. The information on this and the enclosed drawing(s) is based upon the design and construction of the equipment as of the date of the drawing.

SPACE CONSIDERATIONS

Clearances

The clearance dimensions shown on each drawing are the minimum considered necessary to allow space for servicing and operating the equipment.

Dimensions

Attention must be given to the *printed dimensions* shown on each drawing, since no attempt has been made to hold these drawings to any specific scale.

MOUNTING DETAILS

For Wall Mounting

It is important that walls be adequately reinforced to support the operating weight of the equipment as shown on the drawing. Materials and labor for such support are not furnished by STERIS.

Recessing Cubicle

Wooden bucks, where required to anchor equipment to the walls, are to be furnished by the Customer.

The recessing cubicle should be adequately ventilated to maintain temperature in the range of 80° to 90°F (27° to 32°C) when the equipment is in operation.

UTILITY SERVICE REQUIREMENTS

Roughing-in for Equipment Requiring Steam and/or Water Supply

All lines should be short-stubbed through the floor or wall, far enough to allow for pipe coupling. Provisions must be made for short-swing connections to equipment terminals.

Terminal Fittings

Unless otherwise specified in the contract or purchase order, piping and other appurtenances between terminal fittings on the equipment and wall or floor outlets (stubbing) are not furnished by STERIS.

Pipe Sizes

Pipe sizes shown on each equipment drawing indicate utility service terminals. To ensure adequate service, the lines leading to and from the equipment should be increased in size to conform with applicable plumbing codes.

Shutoff Valves

Separate shutoff valves should be installed in steam and water supply lines near each piece of equipment, so that the unit can be serviced without interruption of supply to other equipment.

Steam Return Lines

Steam return lines should be connected to a gravity system piped to a *vented receiver*. *Avoid any piping* arrangement that could cause back pressure in the return line.

Steam and Water Pressures

Steam and water pressures indicated on each drawing are to be dynamic at the equipment.

Equipment is adequately equipped to operate on the pressures listed on the equipment drawing. If supply line pressure exceeds those shown, provide reducing valves. These are not furnished by STERIS unless specifically called for in the contract or purchase order.

Wiring Terminals

Wiring on the equipment terminates at a junction box or boxes as shown on each drawing. Wiring and other appurtenances between junction box (or boxes) and building service lines are not furnished by STERIS.

Disconnect Switches

Disconnect switches with off position lockout only must be furnished and installed by the Customer in electric supply lines near each piece of equipment.

IMPORTANT

STERIS assumes no responsibility for changes made necessary through failure to explicitly observe these instructions and recommendations. In all instances, local, county, state, and national regulations should be observed.

STERIS SHIPPING INSTRUCTIONS AND SERVICE REQUIREMENTS

PREPARATION FOR SHIPMENT

Each unit of equipment shall be placed in a substantial shipping container or crate complying with applicable rules of the I.C.C. Uniform Freight Classification to ensure acceptance by the common or other carrier for safe transportation to final destination at the lowest rate. The shipping crate or container for heavy equipment (such as sterilizers and water stills) shall be of skid construction to facilitate handling by lift equipment.

The exterior of each container shall be clearly and legibly marked with the room, floor and item number (if available), shipping address, and brief description of the contents. A packing list and complete instructions for uncrating the equipment and setting it in place shall be fastened to the outside of the container or crate; such information shall be protected by a waterproof envelope. Packaging, packing, and marking differing from that above shall be provided, if specified.

INSTALLATION INSTRUCTIONS

Unless additional copies are specified, one set of complete installation instructions, including prints showing all utility service requirements, space requirements and wiring diagrams (if not affixed to the equipment) shall be furnished with each unit of equipment.

OPERATING AND MAINTENANCE INSTRUCTIONS

Instructions for operating and performing periodic preventive maintenance on each unit of equipment, including a list of the service parts and quantity of each required for this purpose, shall be furnished. Unless otherwise specified, one copy of this material shall be furnished.

SERVICE AFTER INSTALLATION*

After installation of each assembly, STERIS shall provide a factory-trained technician to perform repair service as required by the customer. This service shall be on a time and material basis unless the equipment is still within the manufacturer's warranty.

If specified, STERIS shall provide a factory-trained technician to perform preventive maintenance services on each assembly following its test and demonstration.

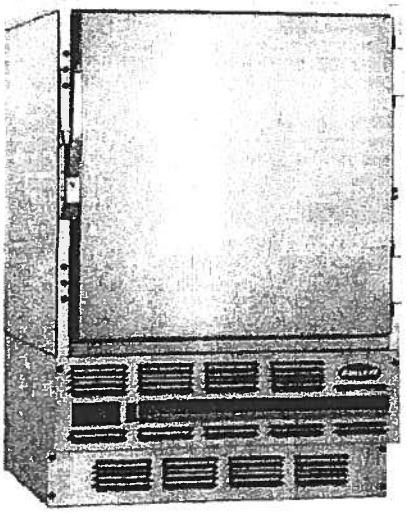
* *These services are available from the STERIS Corporation within the continental United States, Alaska, and Hawaii.*

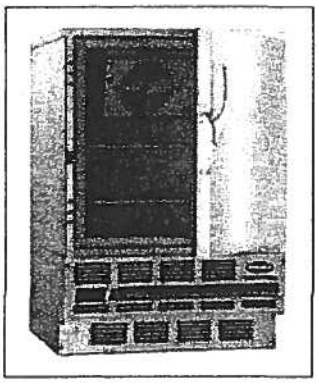
Item # 717197

Symphony REF Series Undercounter Refrigerators

Medical-grade undercounter refrigerator with external digital temperature display and stainless steel interior/exterior.

Model	
REF5	for standard 36" (915mm) counters, 4.8 cu ft capacity





Proper storage for expensive medications and patient supplies

- Heavy-duty compressor, forced air cooling and solid state controller maintain uniform cabinet temperatures with quick pull-down to temperature
- Adjustable set point meets temperature range requirements for different applications:
  36°F – 46°F (3°C – 8°C) for medications,
  33°F – 40°F (1°C – 5°C) for food and beverages
- Locking door handle provides medication security
- Supports JCAHO standards on medication storage
- NSF listing ensures temperature stability in adverse conditions and with frequent door openings

More features designed specifically for healthcare

- Easy-to-read external temperature display allows easy temperature logging
- Positive door latch and magnetic gasket provide secure closure
- Two, easy-to-clean, epoxy-coated shelves accept narcotic box hardware (supplied by others)
- Two models – for standard 36" (915mm) counter and 34" (864mm) ADA-compatible counters

Easy installation, cleaning and care

- Front-breathing design allows installation in standard 24" (610mm) casework opening with no side clearances
- Field-reversible door and handle for left or right opening
- Condensation evaporates automatically
- Automatic, off-cycle defrost eliminates manual defrosting
- Durable stainless steel interior and exterior for easy cleaning
- Slide-out compressor tray for easy access to condenser

Industry's best warranty

- 2-yr parts and labor on entire refrigerator
- 5-yr parts on compressor

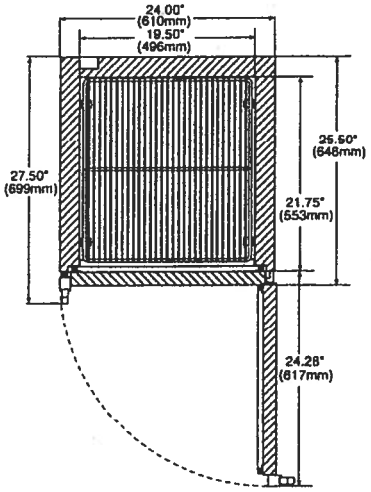
Accessories

- Temperature alarm with probe and °F/°C display
- Pyxis® compatible door bracket

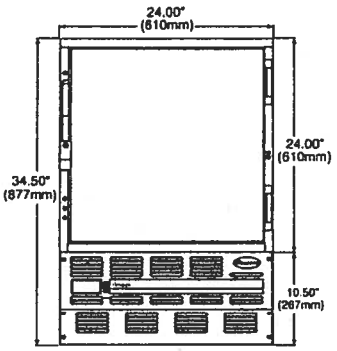
Item # 718171

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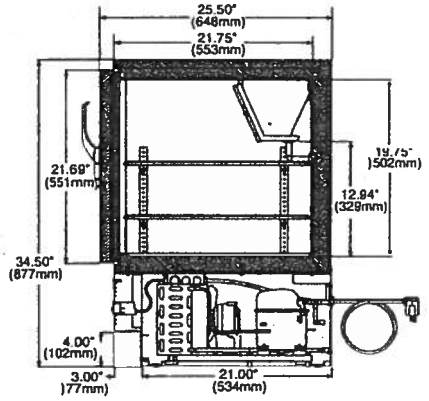
Top View
all models



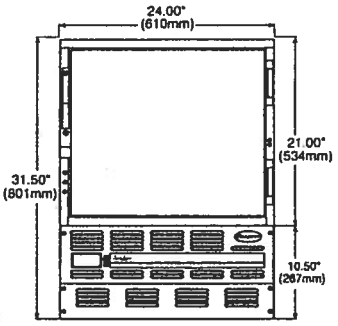
Front View
REF5



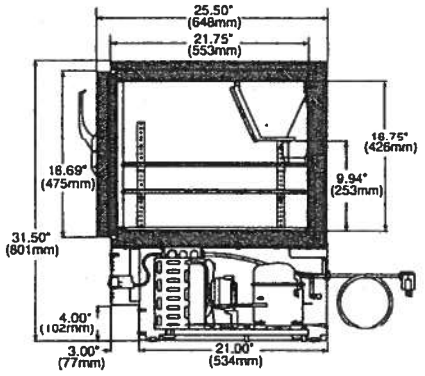
Side View
REF5



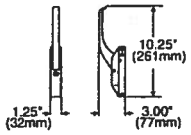
Front View
REF4-ADA



Side View
REF4-ADA



Handle Detail
all models



Plug Detail
all models
NEMA 5-15



Approximate Shipping Weight 175 lbs (79kg)

Standard Electrical 115V, 60Hz, 1 ph, 8.0 amps, max. fuse 15 amps
Hospital-grade cord and plug provided.

Specifications
Follett undercounter refrigerator to be model (choose one) _____ REF5 34.5" (877mm) high for use in standard counters or _____ REF4-ADA 31.5" (801mm) high for use in 34" (864mm) high ADA-compatible counters. REF5 to have 4.8 cu ft (136L) capacity. REF4-ADA to have 4.0 cu ft (113L) capacity. Environmentally-friendly R404A refrigeration system to include heavy-duty 1/4 HP compressor, blower, blower coil and automatic evaporative forced air cooling with off-cycle defrost. Refrigerator to be equipped with external temperature display in °F/°C and solid-state controller to maintain uniform cabinet temperatures. Controller to have programmable set points to meet temperature range requirements of different applications: 30°F – 40°F (2°C – 8°C) for medications, 33°F – 40°F (1°C – 5°C) for food and beverage. Refrigerator door to be field-reversible and equipped with replaceable gasket and chrome-plated handle with cylinder lock. Refrigerator interior and exterior to be stainless steel. Two epoxy-coated wire shelves adjust in 1/2" (13mm) increments. Storage area to be insulated with high-density, non-CFC foam polyurethane. Hospital-grade cord and plug provided. Refrigerator to be NSF, UL and cUL listed.

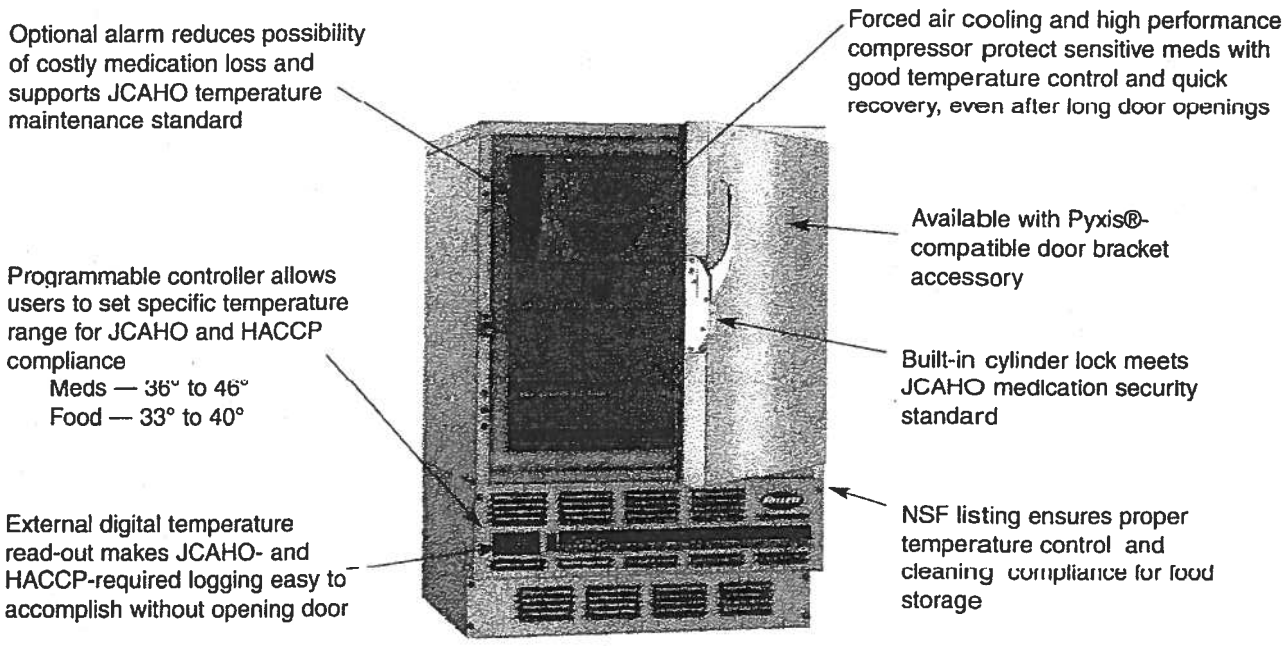
Item # 718171

Meets medication and food storage requirements

Follett's REF5 and REF4-ADA medical-grade undercounter refrigerators provide the features and performance to meet both JCAHO standards and local and state requirements for medication and food storage.

JCAHO's medication standard (TX 3.5/MM.2.20) addresses proper storage and control of medications, and at a minimum requires the logging of temperatures, lockable security for medications, and the maintenance of constant appropriate temperature.

State and local inspectors generally follow HACCP guidelines requiring temperature logging to ensure that perishable food is maintained below 40°F.



High-quality design and full stainless steel construction deliver outstanding performance and long-term reliability, backed with the industry's best warranty. Our component performance testing supports this claim:

- Compressor (1/4 hp, heavy-duty) — over 1.6 million on-off cycles without failure
- Fan, controller, and condenser — over 39,000 run hours without failure
- Door gasket — over 38,000 openings and closings with no measurable wear
- Door hinges — over 1 million cycles without measurable wear
- Door — tested open to 450 pounds of direct weight without failure

NSF - National Sanitation Foundation; JCAHO - Joint Commission on Accreditation of Healthcare Organizations; HCAAP - Hazardous Analysis of Critical Control Point Program

END OF SPECIFICATION

UNIT SPECIFICATIONS SHEET

LFGI-4USP LAMINAR FLOW GLOVEBOX / ISOLATOR

SECTION I. PERFORMANCE DATA

The Laminar Flow Glovebox/Isolator provides the ultimate in both product and operator protection. The LFGI functions as a Glovebox while operating under negative pressure to meet NIOSH recommendations and as an Isolator under positive pressure to meet USP <797> regulations. HEPA filtered unidirectional (laminar) air bathes the work area to protect the product from contamination and removes any particulate generated by sample manipulation. The operator is provided a complete barrier from materials being manipulated in the work area. The LFGI Series of barrier isolators meet or exceed ISO 14644-1 Class 5 air quality. Each LFGI, before shipping, undergoes rigorous physical testing to assure the unit meets performance requirements as validated. It is required that independent certification be performed before use.

SECTION II. EQUIPMENT SPECIFICATIONS

Construction-

-Overall Dimensions: 66 W (50" W at base) x 32" D x 80" H
-Work Area Dimensions: 46 ½" W x 24 ½" D x 29" H
-Designed to fit through standard door openings and elevators.
-All stainless steel construction both inside and out with a pharmaceutical grade finish.
-316L Stainless steel work trays slide over one another and are removable to facilitate easy clean up under the work deck.
-All viewing panels are stainless steel framed Acrylic
-Front viewing panel is top hinged and self supporting for easy access to the work area for cleaning and equipment ingress.
-All filter diffuser / guard panels are removable for easy cleaning.
-Straight sides and back maximize work area to accommodate the many types and shapes of pharmacy equipment and compounders.
-All corners in work area, antechamber and work surface are easily reached and cleaned.

Antechamber-

-Sealed two-door airlock (16" W x 13 ½" D x 14 ¼" H) maintains complete environmental separation between work area and ambient conditions.
-HEPA filtered purge of trapped airlock air eliminates cross contamination between the work area and the room during both material ingress and egress.

Waste Removal-

-Trash tube is a 4" diameter tube, flanged for waste bag/container connection and provided with an easily removable seal/stopper to maintain work area containment. (Stainless trash can is available)
-Sharps tube is a straight 2 ½" diameter tube to facilitate quick drop of the largest syringes and provided with an easily removable seal/stopper to maintain work area containment.
-Fully adjustable sharps container shelf accommodates most commercially available wide mouth or hinged top sharps collectors. (Examples BD Part # 305610 and 305491)

Safety-

-Lock-out handle requiring key for access to work area.
-Digital pressure readout with low pressure alarm for work area.
-Inward/Outward face velocity is 95-100 linear feet per minute at gloveport opening, to protect operator/product during massive breach of containment.
-Glove changes can be made without breaking containment.
-Locking casters are standard, seismic anchors are available.

Ergonomics-
-Hydraulic assist height adjusting stand offers a full 10" range variance allowing operators to sit or stand comfortably for extended time periods.
-Stainless steel sliding tray inside the airlock pulls into the work area eliminating reaching strains.
-Two part sleeve/glove system allows the use of most types and sizes of commercially available gloves for better dexterity and tactility.
-Extra large oval gloveports are placed with bottoms together to provide an athropometrically correct configuration that accommodates a wide range of body types and increases range of movement.
-Gloveports have a 3" arm rest to reduce operator fatigue.
-Large viewing panel is at an angle to reduce glare and operator strain.
-Integrated foot rest.

Configuration Options-
-Overall work area pressure can be either positive or negative and can be altered in-place by a certifier.
-Antechamber can be left or right handed or can be installed on both sides.
-Waste and sharps removal tubes can be left or right handed or can be installed on both sides.
-Three available exhaust options that can be factory set or changed by a certifier in-place.

Filtration-
-Full framed standard size minipleat HEPAs filter 100% of inlet and exhaust air from both the work area and the antechamber to provide a fully contained environment.
-HEPA filters are full coverage and front loading for easy replacement by a certifier.
-A Prefilter extends the life of the work area supply HEPA filter and can be replaced without tools.

Electrical-
-High capacity motor/blower systems with speed control to extend HEPA filters life.
-Ten foot hospital grade power cord with molded grounded plug.
-Sealed outlet in work area.
-Separate lighted power ON/OFF indicator switches for blower and lighting.
-High efficiency, standard sized fluorescent lights are externally mounted to minimize heat build-up.
-Voltage = 115 Volt, 60 Hz (220/50-60 Hz also available).
-Amperage Rating = 15, Running Amperage = 6

Exhaust-
-Clean air plenum is external to the work area.
-Constructed to allow for optional outside venting of exhaust air.
-Constructed to allow for 3 exhaust options that can be factory set or changed by a certifier in-place
-Venting is not required for operation but is optional.

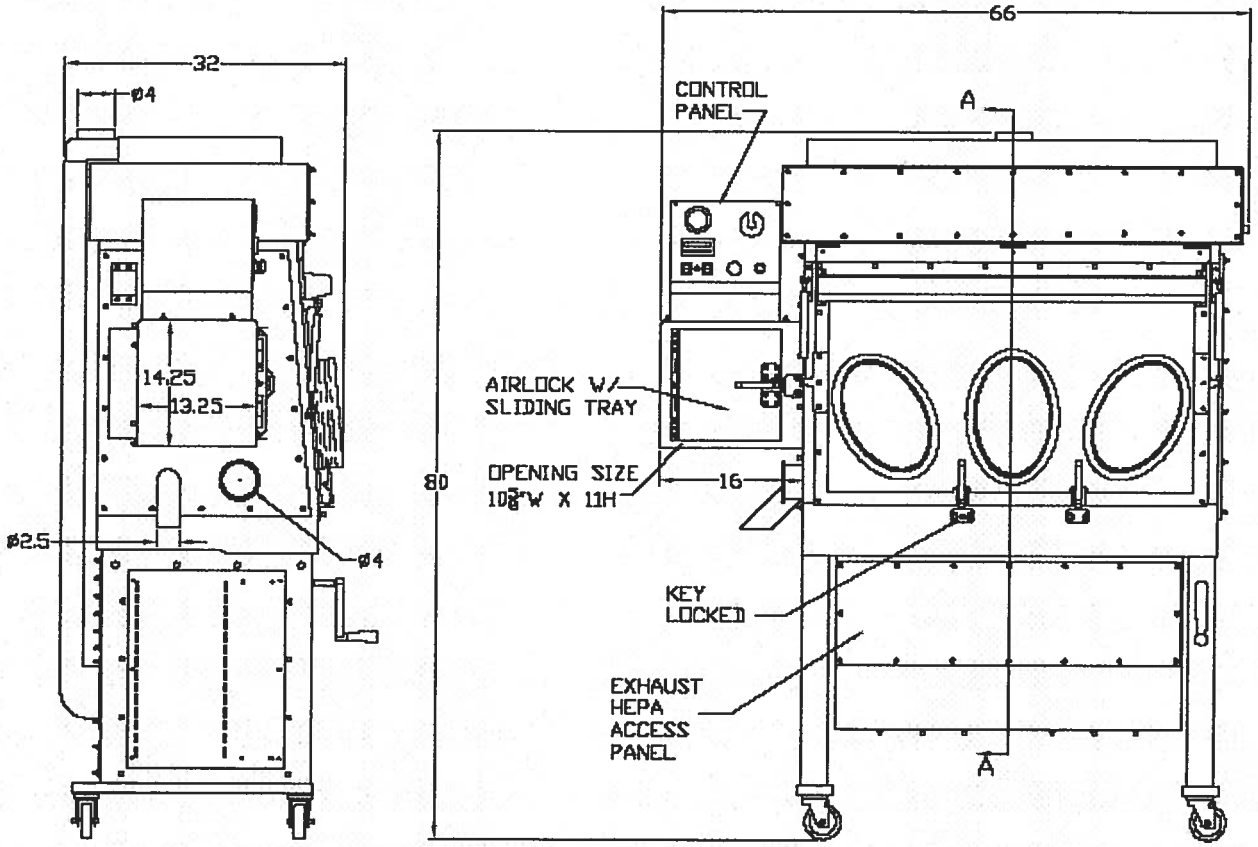
	No Exhaust- ~100% recycling of air	Controlled Exhaust- 80% recycling of air	Total Exhaust- no recycling of air.
Exhaust Connection	N/A	4" OD flexible hose	8" OD flexible duct
Exhaust CFM	20	80	400
Exhaust Static	N/A	<1 inch w.c.	Up to 2 inches w.c. (depending upon configuration)

Weight-
Net Weight- 625 lbs
Shipping Weight- 755 lbs

SECTION III. OPTIONAL EQUIPMENT AND ACCESSORIES-

LFGI-A80 Ergonomic task chair with anti-bacterial and anti-microbial vinyl covering, various colors
LFGI-A85S Stainless steel cleaning handle with pivot head. Accepts lint- free mop heads (LFGI-A85M)
LFGI-A8E Electrical Height Adjustment (requires additional plug-in)
LFGI-A83 Stainless steel garbage can (hangs on side to contain waste bags)
LFGI-A12 Exhaust ventilation kits

SECTION IV. UNIT DIAGRAM



END OF SPECIFICATION

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

Legend

D/R = Contractor De-Install & Relocate
CR = Contractor Rough-in Only
IR = Installation & Assembly Responsibility
F = Facility
C = Contractor
V = Vendor
N = New
E = Existing

Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	2-2099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	3-3073	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	4-4099	C				
203200	(Model: 110FB400A) #110FB400A; ICE MAKER DISP.115/1	5-5099	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1085	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	1-1112	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	2-2082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	4-4082	C				
203210	(Model: 25CT400A) #25CT400A; ICEMAKER DISPENSER,	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1040	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1085	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	1-1112	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	2-2099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3042	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	3-3073	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4071	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
Project:	South Campus Bed Tower Addition [Fac]
CAM's Project #:	306660001
Equip. Project #:	30666A02429
Architect:	PERKINS & WILL
Equip. Manager:	CAGLE, JIMMY
Issue Date:	
Revision Date:	

Legend

D/R = Contractor De-Install & Relocate
CR = Contractor Rough-in Only
IR = Installation & Assembly Responsibility
F = Facility
C = Contractor
V = Vendor
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E = Existing

Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	4-4099	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5071	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5082	C				
430279	(Model: JEM25) #JEM25; MICROWAVE OVEN	5-5099	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1040	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	1-1112	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	2-2071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	3-3042	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	4-4071	C				
475603	(Model: GTS18WCP) #GTS18WCP, REFRIGERATOR,	5-5071	C				
475604	(Model: GTS18KBP) #GTS18KBP; REFRIGERATOR, TOP FREEZER,	3-3054	C				
477300	(Model: GMR04AAM) #GMR04AAM; REFRIGERATOR, UNDERCOUNTER	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1085	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	1-1112	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	2-2099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	3-3073	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	4-4099	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5082	C				
714519	(Model: QC4-FL4S) #QC4-FL4S; WATER FILTER SYSTEM	5-5099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1070	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1085	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	1-1112	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	2-2099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3017	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3027B	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3042	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	3-3073	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4082	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

Print Date: 8/9/2006

Facility:	THE MEDICAL CENTER AURORA
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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	4-4099	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5030	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5071	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5082	C				
715053	(Model: 8573) COFFEE MAKER, LO-PROFILE MODEL	5-5099	C				
15152	(Model: 101461) # 101461; ILLUMINATOR, 1 PANEL	3-3066	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	2-2099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	3-3073	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	4-4099	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5082	C				
715344	(Model: GTS17KBR) #GTS17KBR, REFRIGERATOR: TOP MOUNT.	5-5099	C				
717197	(Model: DJ04112033-01) #DJ04112033-01; WARMING CABINET	3-3055	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	2-2097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	3-3072	C				

Owner Furnished/Contractor Installed Equipment Delivery Schedule

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Item #	Description	Space #	IR	Date Back Boxes Due	Date Cables Due	Date Eq. Required On Site	Comments
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	4-4097	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5076	C				
718171	(Model: REF5) #REF5; REFRIGERATOR,	5-5097	C				
JC2725	(Model: QUOTE) LAMINAR FLOW GLOVEBOX	3-3054	C				
C2859	(Model: QUOTE) DISPLAY CASE & REFRIGERATOR	1-1002	C				

COID PROJECT NUMBER: _____

OWNER FURNISHED EQUIPMENT DELIVERY SCHEDULE

NOTE: Per the Contractor Guideline Book this OFE Delivery Schedule MUST be completed and returned BEFORE the first invoice is paid!

PROJECT NAME: _____

Project Phase Description (if applicable): _____

Project Location: _____

Project Completion Date: _____ **Completion Date This Phase:** _____

Owner Equipment Mgr. _____ **Phone:** _____

Owner Construction Mgr. _____ **Phone:** _____

Hospital Material Mgr. _____ **Phone:** _____

Contractor's Supt.: _____ **Phone:** _____

Contractor's Project Mgr. _____ **Phone:** _____

OWNER FURNISHED/CONTRACTOR INSTALLED EQUIPMENT

NOTE: Include date for special backboxes (such as OR Lights, Illuminators, etc.) although no item number is assigned to this rough-in item. Include date(s) cable required on site for patient monitoring equipment.

NOTE: If the project is a renovation project that would involve several phases causing Owner Furnished Contractor Installed Equipment to be delivered by phase, it is the General Contractor's responsibility to submit a separate delivery schedule for each phase with a clear description of areas included in a particular phase, along with an anticipated completion date of this phase.

NOTE: If early delivery of equipment is required, contractor will coordinate with HCA Equipment Manager for safe storage.

DISTRIBUTION BY THE HCA CONSTRUCTION MANAGER:

HCA Equipment Manager:
HCA Construction Manager:
Hospital Construction Contact:
Hospital Materials Manager:

ENGINEERED SYSTEMS EQUIPMENT DELIVERY SCHEDULE

(Sample on Following Page)

EXPLANATION / INSTRUCTIONS: HCA requires that the enclosed Engineered Systems/ Information & Telephone Systems Equipment Delivery Schedule Form to be completed by the contractor and returned to the HCA Construction Manager within ten (10) working days of the written contractor's notice to proceed. This information enables owner vendors to ship cable and backboxes and equipment, as well as, schedule installation to meet the construction schedule. It is critically important that one schedule document be provided for each separate occupancy phase of the project.

Please see "Team Construction: Routine / Repetitive Phase" for general contractor's responsibilities for management of the owner furnished systems process and installation of all raceway and cable installation on some systems. It is the contractor's responsibility to update and redistribute this document if the construction schedule changes.

NOTE: **No Payments can be made until receipt of this schedule(s) by the HCA Construction Manager.**

OWNER PROJECT#_____

ENGINEERED/SYSTEMS INFORMATION & TELEPHONE SYSTEMS
EQUIPMENT DELIVERY SCHEDULE

Project Name: _____ Date: _____
Project Location: _____ Revision Date: _____
Description of this phase (if applicable) _____
Completion Date of this phase: _____
Project Completion Date: _____ Revised: _____
Owner's Construction Manager: _____
Owner's Equipment Manager: _____ Phone #: _____
Information & Telephone Systems Cabling Installation Project Manager: _____
Information and Telephone Systems Project Manager: Bob Stewart Phone #: 615-344-8010
General Contractor Superintendent: _____ Phone #: _____
Electrical Contractor Project Manager: _____ Phone #: _____

Installation or Need Equipment Delivered

ITEM/DESCRIPTION	OWNER FURNISHED OWNER INSTALLED	OWNER FURNISHED CONTRACTOR
INSTALLED	DATE:	DATE:
1. Wiring Schematics/Cut Sheet		_____
2. Engineered Systems Cable		
Cable & Special Backboxes		_____
3. T.V. Brackets		_____
4. Radio Tower	_____	
5. Information Systems:		
Cable:	_____	
Telephone Equipment:	_____	
Data Equipment:	_____	
6. Nurse Call System/Sound System:	_____	
7. Intercom System	_____	
8. Dictation System	_____	
9. MATV System	_____	
10. TV Set Installation	_____	
11. Systems Inspection	_____	_____
12. State Inspection	_____	_____
13. Demobilize Job site	_____	_____

DISTRIBUTION BY HCA CONSTRUCTION MANAGER:
Information & Telephone Systems: Bob Stewart
HCA Construction Manager:
HCA Equipment Manager:
Hospital Construction Contact:
General Contractor's Project Manager:

Owner/ Vendor Installed Equipment Delivery Schedule

ITEM	Date Building Will Be Ready For Installation
Kitchen Equipment	
Walk-In Cooler & Freezer	
Radiology Equipment	
Shelving/Lockers	
Patient Room Furniture	
Office/Waiting Furniture	
Drapes/Cubicle Curtains/Shower Curtains	
Artwork	
Others (as may be applicable)	

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
1. ANESTHESIA ADMINISTRATION		X	X	X	X									
2. AUDIO / VISUAL / PERSONNEL TRAINING AIDS										X	X	X	X	To be coordinated via DD session. Information Systems will budget.
a. Portable										X	X	X	X	
b. Systems										X	X	X	X	
3. AUTOMATED TRANSPORT SYSTEMS (Pneumatic Tube)						X	X	X	X					Check with Bulk Purchasing
4. CARTS														
a. Anesthesia		X	X	X	X									
b. Case, Surgical		X	X	X	X									
c. Cast		X	X	X	X									
d. Crash		X	X	X	X									
e. Endoscopy		X	X	X	X									
f. E.N.T		X	X	X	X									
g. Environmental Svcs		X	X	X	X									
h. Food Service		X	X	X	X									
i. Fracture		X	X	X	X									
j. Gift Shop (Hospitality)		X	X	X	X									
k. Isolation		X	X	X	X									
l. Linen		X	X	X	X									
m. Medication		X	X	X	X									
n. Miscellaneous		X	X	X	X									
o. Supply		X	X	X	X									
p. Tool		X	X	X	X									
q. Trash		X	X	X	X									
r. Utility		X	X	X	X									
s. Wrap		X	X	X	X									
5. CASEWORK														
a. Focal						X	X	X	X					Check with Bulk Purchasing
b. Standard						X	X	X	X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Volce (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
c. Special (Modular)						X	X	X	X					Check with Bulk Purchasing Typically Vendor Installed
d. Keyboards (Duplicate under furniture)						X	X	X	X					
6. CHAIRS, EXAM/TREATMENT														
a. Contour (Donor, I.V.)		X	X	X	X									
b. Dental		X	X	X	X									
c. Eye / ENT		X	X	X	X									
d. Miscellaneous		X	X	X	X									
e. Phlebotomy		X	X	X	X									
7. CHARTING SYSTEMS, PATIENT														
a. Manual		X	X	X	X									
b. Computerized										X	X	X	X	
c. Wall-hung chart station						X	X	X	X					
8. CLOCKS														
a. Discrete (Battery / Plug-in)						X	X	X	X					
b. Interval Timers / Recorders						X	X	X	X					
c. Systems, Cenralized						X	X	X	X					
d. Kronos Time & Attendance										X	X	X	X	
9. COMMODES														
a. Fixed						X	X	X	X					
b. Portable		X	X	X	X									
10. COMMUNICATIONS EQUIP/SYSTEMS														
a. Dictation														
1. Portable										X	X	X	X	
2. Systems, Hardwired										X	X	X	X	
b. Doctors' Registry						X	X	X	X					
c. Emergency Radio		X	X	X	X									Contractor to pull cable
d. Intercom		X	X	X	X									Contractor to pull cable
e. Nurse Call		X	X	X	X									Contractor to pull cable

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
f. Side Com Receptacle		X	X					X	X					
g. Radio / Pocket Paging		X	X	X	X									Contractor to pull cable
h. Two Way Radio		X	X	X	X									Contractor to pull cable
i. Telephone										X	X	X	X	
j. Overhead Page / Music		X	X	X	X									Contractor to pull cable
k. Transcription										X	X	X	X	
l. Public Address		X	X	X	X									Contractor to pull cable
m. Fax Machines										X	X	X	X	
n. Picture Archive and Communication Systems (PACS)										X	X	X	X	
11. COMPACTORS														
a. External						X	X	X	X					
b. Departmental						X	X	X	X					
12. DARKROOM EQUIPMENT														
a. Cabinet, Film Storage		X	X					X	X					
b. Miscellaneous		X	X	X	X									
c. Safelights						X	X	X	X					
d. Transfer Boxes, Cassette						X	X	X	X					
e. Revolving X-Ray Door						X	X	X	X					
13. DATA / WORD PROCESSING EQUIPMENT														
a. Desktop Computer										X	X	X	X	
b. Mainframe										X	X	X	X	
c. Network Equipment										X	X	X	X	
d. Backbone and/or Station Wiring										X	X	X	X	
14. DIALYSIS EQUIPMENT														
a. Peritoneal		X	X	X	X									
b. Renal		X	X	X	X									
15. EQUIPMENT MANAGEMENT SYSTEMS (Equipment Boom)		X	X	X					X					

Revised: 2-06-06

HCA The Healthcare Company
Major / Minor Equipment Responsibilities

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
16. ELECTROCARDIOGRAPH EQUIPMENT		X	X	X										
17. ELECTROSURGICAL EQUIPMENT		X	X	X	X									
18. ENVIRONMENTAL ROOMS						X	X	X	X					
(Prefabricated)														
19. ENVIRONMENTAL SERVICES EQUIP		X	X	X	X									
20. FIRE PREVENTION EQUIPMENT														
a. Blankets		X	X					X	X					
b. Cabinets, Extinguisher						X	X	X	X					
c. Extinguishers						X	X	X	X					
d. Systems						X	X	X	X					
21. FOOD SERVICE EQUIPMENT														
a. Grp. I (Hoods, Walk-Ins)		X	X	X	X									Elec. contractor makes actual connection
b. Grp. II (Moveable: Ovens, Dishwasher)		X	X	X	X									
c. Grp. II (Smallwares: Pots, Trays, Carts)		X	X	X	X									
d. Final Equipment Placement Set in place; caulking; touchup														Work to be completed by food service vendor
e. Garbage Disposals						X	X	X	X					
f. Cash register										X	X	X	X	
22. FREEZERS (excluding Food Svc Equip)														
a. Chest		X	X					X	X					
b. Miscellaneous		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in/Prefabricated		X	X	X	X									Elec. contractor make actual connection
23. FURNISHINGS, DESIGN														

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HCA The Healthcare Company
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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Accessories, Design	X													
b. Artwork / Graphics		X	X	X	X									
c. Bulletin Boards/Tack Boards/Chalkboards/Marker Boards						X	X	X	X					
d. Carpet						X	X	X	X					Check with Bulk Purchasing
e. Curtains, Cubicle						X	X	X	X					
f. Curtains, Shower			X	X	X	X								
g. Furniture, General - Existing			X	X	X	X								Interior Designer to spec fabric
h. Furniture, General			X	X	X	X								
i. Signs, Exterior						X	X	X	X					Check with Bulk Purchasing
j. Signs, Interior						X	X	X	X					Check with Bulk Purchasing
k. Waste Receptacles														
Clinical		X	X	X	X									
Non-Clinical			X	X	X	X								
l. Window Treatment / Blinds/ Cornice Boards			X	X	X	X								Except Blinds that are internal with window units
m. Wall Protector (ie: bumper / bed / handrail/corner guards)						X	X	X	X					
n. Keyboards - in workstations, duplicate in casework						X	X	X	X					
o. Planters			X	X	X	X								
p. Plants	X													
24. FURNITURE, PATIENT ROOM														
a. Beds		X	X	X	X									
b. Cribs		X	X	X	X									
c. Mattresses		X	X	X	X									
d. Table, Overbed		X	X	X	X									
e. Cabinets, Bedside		X	X	X	X									Interior Designer Specification Responsibility Per Equipment Managers Direction
f. Chairs, Lounge		X	X	X	X									
g. Chairs, Side		X	X	X	X									
h. Chests		X	X	X	X									
i. Desks		X	X	X	X									
j. Dressers		X	X	X	X									
k. Wardrobes (except built-ins)		X	X	X	X									
25. HAMPERS, LINEN		X	X	X	X									
26. HEART-LUNG MACHINES		X	X	X	X									

Revised: 2-06-06

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
27. HOODS														
a. Biohazard		X	X					X	X					
b. ETO						X	X	X	X					
c. Fume		X	X					X	X					
d. Laminar Flow		X	X					X	X					
e. Radioisotope		X	X					X	X					
28. HOT LAB EQUIPMENT														
a. Nuclear Medicine		X	X	X	X									
b. Radiation Therapy		X	X	X	X									
29. HYPO-HYPERTHERMIA EQUIPMENT		X	X	X	X									
30. ICE MACHINES		X	X					X	X					
31. ILLUMINATORS, X-RAY FILM														
a. Motorized		X	X					X	X					
b. Recessed		X	X					X	X					
c. Surface Mounted		X	X					X	X					
32. IMAGING EQUIPMENT														
a. Computerized Axial Tomography (CT)		X	X	X	X									
b. Dental Radiography		X	X	X	X									
c. Digital Radiography		X	X	X	X									
d. Image Intensifier, Portable		X	X	X	X									
e. Magnetic Resonance Imaging		X	X	X	X									
f. Magnetic Resonance Imaging Rigging							X	X						Contractor responsible
g. Mammography Equipment		X	X	X	X									
h. Nuclear Camera		X	X	X	X									
I. Nuclear Medicine Accessories		X	X	X	X									
j. Radiation Therapy Equipment		X	X	X	X									
k. Radiation Therapy Accessories		X	X	X	X									
l. Radiographic Equipment		X	X	X	X									
m. Radiographic Equipment Accessories		X	X	X	X									
n. Single Photon Emission		X	X	X	X									

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HCA The Healthcare Company
Major / Minor Equipment Responsibilities

Project:

EQUIPMENT CATEGORY	Facility	Owner				Architect Int. Designer	Contractor			Data (HIS) Voice (TELE)				Comments
	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
Computed Tomography														
o. Ultrasound Equipment		X	X	X	X									
p. Shielding (Lead, Magnetic, RF)						X	X	X	X					
q. Vibration Testing (MRI)														Contractor responsible
r. Picture Archive and Communication Systems (PACS)										X	X	X	X	
1. Cardiology and Radiology										X	X	X	X	
s. Cath Lab		X	X	X	X									
33. IMPRINTERS AND EMBOSSERS										X	X	X	X	
34. INCINERATOR														
a. Pathological						X	X	X	X					
b. Waste - Autoclave/Shredder						X	X	X	X					
35. INFANT CARE EQUIPMENT														
a. Bassinets		X	X	X	X									
b. Incubators		X	X	X	X									
c. Neonatal Care Systems		X	X	X	X									
d. Phototherapy Equipment		X	X	X	X									
e. Warmers		X	X	X	X									
36. INSTRUMENTS, EXAM														
a. Portable		X	X	X	X									
b. Wall Mounted	X	X	X	X	X									
(BP units, Oto/Ophth Sets)														
c. Diagnostic Board - Wallmount		X	X						X					
37. INSTRUMENTS, SURGICAL		X	X	X	X									
38. INTRAVENOUS PUMPS / CONTROLLERS		X	X	X	X									
39. LAB ANALYZERS / INSTRUMENTATION		X	X	X	X									
40. LASER DEVICES														

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HCA The Healthcare Company
Major / Minor Equipment Responsibilities

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
a. Ophthalmic		X	X	X	X									
b. Surgical		X	X	X	X									
41. LAUNDRY SERVICE EQUIPMENT														
a. Washer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
b. Dryer														
1. Commercial		X	X					X	X					
2. Residential		X	X					X	X					
42. LIGHTS														
a. Exam														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
b. Patient Headwall Lights						X	X	X	X					
c. Surgical														
1. Fixed		X	X					X	X					
2. Portable		X	X	X	X									
43. LOCKERS:														
NON PUBLIC AREAS						X	X	X	X					
PUBLIC AREAS						X	X	X	X					
BENCHES IN LOCKER ROOMS						X	X	X	X					
44. MAIL ROOM EQUIPMENT		X	X	X	X									
45. MAINTENANCE TOOLS & EQUIPMENT		X	X	X	X									
46. MATERIALS HANDLING / CONTROL EQUIPMENT		X	X	X	X									
47. MEDICAL GAS / VACUUM SYSTEM														
a. Primary System (Piping)						X	X	X	X					Check with Bulk Purchasing
b. Secondary Equipment		X	X	X	X									

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	respons	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
(Regulators & Flowmeters)														
48. MEDICINE CENTERS						X	X	X	X					
a. Prefabricated						X	X	X	X					
b. Automated	X									X				
49. WEATHER GOOSE										X	X	X	X	
50. MISCELLANEOUS GROUPS II & III EQUIPMENT		X	X	X	X									
51. MONITORING EQUIPMENT, PHYSIOLOGICAL														
a. Ambulatory Systems														
1. ECG		X	X	X	X									
2. EEG		X	X	X	X									
b. Discrete Monitors														
1. Bedside		X	X	X	X									
2. Fetal		X	X	X	X									
c. Hardwired Systems		X	X	X	X									Contractor to pull cable
d. Miscellaneous Monitors		X	X	X	X									
e. Telemetry Systems		X	X	X	X									Contractor to pull cable
52. NARCOTICS LOCKERS						X	X	X	X					
53. NEUROLOGICAL EQUIPMENT														
a. Electroconvulsive Therapy Device		X	X	X	X									
b. Electroencephalographs		X	X	X	X									
c. Electromyographs		X	X	X	X									
d. Evoked Response Devices		X	X	X	X									
e. Misc. Equipment & Accessories		X	X	X	X									

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Major / Minor Equipment Responsibilities

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
54. NOURISHMENT CENTERS (Prefabricated)						X	X	X	X					
55. OCCUPATIONAL THERAPY EQUIPMENT		X	X	X	X									
56. OFFICE MACHINES														
a. Calculators	X													Facility Operational Expense
b. Cash Registers										X	X	X	X	
c. Miscellaneous Equipment	X													Facility Operational Expense
d. Mobile Storage Equipment (Rotary)		X	X	X	X									
e. Photocopiers ie, Xerox	X													Facility Operational Expense
f. Typewriters	X													Facility Operational Expense
57. OPHTHALMIC EQUIPMENT														
a. Control Systems		X	X	X	X									
b. Portable		X	X	X	X									
58. ORTHOPEDIC APPARATUS		X	X	X	X									
59. OVENS / RANGES / MICROWAVES (Other than Food Service)														
a. Fixed		X	X					X	X					
b. Portable		X	X	X	X									
60. PATIENT SERVICE SYSTEMS (Prefabricated Headwall)														
a. Column - ICU / OR / RR / ER						X	X	X	X					
b. Headwall - LDRP						X	X	X	X					Check with Bulk Purchasing
c. Flatwall - ICU / ER / RR / Patient Room						X	X	X	X					
d. Headwall Accessories						X	X	X	X					
e. Anesthesia Gas Delivery Systems - Column Drops or Gas Boom Format						X	X	X	X					

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HCA The Healthcare Company
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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
61. PHYSICAL MEDICINE / REHAB EQUIP.														
a. Fixed (ie swimming pools)						X	X	X	X					
b. Hydrotherapy		X	X					X	X					
c. Portable		X	X	X	X									
62. PRINTING EQUIPMENT										X	X	X	X	
63. PROCEDURE SUPPORT EQUIPMENT (Portable, Stainless Steel)		X	X	X	X									
64. PROCESSORS, X-RAY FILM														
a. Processor		X	X					X	X					
1. Cine		X	X					X	X					
2. Darkroom		X	X					X	X					
b. Replenishment Systems, Chemical		X	X	X	X									
c. Silver Recovery Devices		X	X	X	X									
d. Laser Imager		X	X	X	X									
65. PROJECTION SCREENS						X	X	X	X					
SMART BOARDS		X	X	X	X									
66. PULMONARY FUNCTION EQUIPMENT		X	X	X	X									
67. REFRIGERATORS (exclude Food Service)														
a. Countertop		X	X	X	X									
b. Mortuary		X	X					X	X					
c. Undercounter		X	X					X	X					
d. Upright		X	X					X	X					
e. Walk-in / Prefabricated		X	X	X	X									Elec. contractor makes actual connection
68. RELIGIOUS ARTIFACTS		X	X	X	X									
69. RESPIRATORY THERAPY EQUIPMENT		X	X	X	X									

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
70. RESUSCITATION EQUIPMENT		X	X	X	X									
71. RODS, CURTAIN (shower)						X	X	X	X					
72. SAFES		X	X	X	X									
73. SCALES														
a. Autopsy		X	X					X	X					
b. Bed		X	X	X	X									
c. Chair		X	X	X	X									
d. Clinical Exam		X	X	X	X									
e. Platform		X	X					X	X					
74. SCHEDULING SYSTEMS (automated)										X	X	X	X	
75. SCRUB SINKS						X	X	X	X					
76. SECURITY SYSTEMS														
a. Infant Abduction		X	X	X	X									Contractor to pull cable
b. CCTV - Campus Security		X	X	X	X									Contractor to pull cable
c. Door Access (ie: readers & locks)						X	X	X	X					With Equipment input
77. SHELVING / STORAGE EQUIPMENT														
a. High Density Systems		X	X	X	X									
b. Standard / Flat Steel - New		X	X	X	X									
c. Standard / Flat Steel - Existing		X	X	X	X									
d. Wire		X	X	X	X									
e. Miscellaneous (except built-in)		X	X	X	X									
f. Built-in						X	X	X	X					
78. STERILE PROCESSING EQUIPMENT														
a. Aerators		X	X					X	X					
b. Generator, Steam		X	X					X	X					
c. Loading / Processing Accessories		X	X	X	X									
d. Sonic Cleaners		X	X					X	X					

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
e. Steam Gun		X	X					X	X					
f. Sterilziers, Countertop		X	X					X	X					
g. Sterilizers, ETO Gas		X	X					X	X					
h. Sterilizers, ETO Gas / Aerator		X	X					X	X					
i. Sterilziers, ETO Gas / Steam		X	X					X	X					
j. Sterilizers, Electric / Steam		X	X					X	X					
k. Washers, Cart		X	X					X	X					
l. Washer, Fiberoptics		X	X					X	X					
m. Washers / Decontaminators / Sanitizers		X	X					X	X					Requires minimum of 9' ceiling
79. STRESS TEST EQUIPMENT		X	X	X	X									
80. STRETCHERS		X	X	X	X									
81. TABLES														
a. Autopsy		X	X					X	X					
b. Cysto		X	X	X	X									
c. Exam / Treatment		X	X	X	X									
d. Processing		X	X	X	X									
e. Surgical		X	X	X	X									
82. TELEVISION SYSTEMS														
a. Television Sets		X	X	X	X									Contractor to pull cable & install blocking
b. CCTV - Patient Monitoring		X	X	X	X				X					Contractor to pull cable & install blocking
c. Mounting Brackets		X	X					X	X					Contractor to install blocking & wall brackets
d. Antenna Systems		X	X	X	X									Contractor to pull cable
e. Cable TV (entrance cable to H-END location)	X													Equip. Mgr. notifies facility, contractor & TV vendor to coordinate installation w/local cable TV vendor for entrance cable.
83. TEMPERATURE ALARMS / RECORDERS		X	X					X	X					Blood Bank / Morgue Only

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	respons.	spec	pur	place	instl	spec	pur	place	instl	spec	pur	place	instl	
84. TOILET ROOM DEVICES														
a. Grab Bar						X	X	X	X					Check with Bulk Purchasing
b. Paper Towel Dispensers						X	X	X	X					Check with Bulk Purchasing
c. Sanitary Napkin Dispensers						X	X	X	X					Check with Bulk Purchasing
d. Soap Dispensers						X	X	X	X					Check with Bulk Purchasing
e. Toilet Paper Holder						X	X	X	X					Check with Bulk Purchasing
85. TRACK														
a. Curtain (Cubicle)						X	X	X	X					
b. Intravenous (including carriers & pendants)						X	X	X	X					
86. WATER CONDITIONING SYSTEMS														
a. Deionized						X	X	X	X					
b. Distilled						X	X	X	X					
c. Reverse Osmosis						X	X	X	X					
87. WATER COOLERS						X	X	X	X					
88. WHEELCHAIRS		X	X	X	X									

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VENDOR CONTACT MASTER

VENDOR	NAME/ADDRESS	CONTACT	PHONE	FAX	Web Address
902100	Abbott 100 Abbott Park Rd Dept 2FC-AP6C 5th Floor Abbott Park, IL 60064-6083	Rick Gooch	(708) 937-6161	(847) 937-0871	www.abbottdiagnostics.com
10517	Advanced Sterilization 33 Technology Drive Irvine, CA 92718	Customer Service	(800) 755-5900	(949) 450-6800	www.cidex.com
25360	AGFA Medical & Sterling Diag. 8170 Habersham Waters Rd. Dunwoody, GA 30350	Tom Koch	(800) 581-2432 Ext. #1238	(201) 288-3367	www.agfa.com
10451	Aladdin 250 East Main Street Hendersonville, TN 37075	Eric Roebuck	(800) 888-8018	(615) 748-3659	www.aladdintemprite.com
10240	Alimed 297 High Sttreet Dedham, MA 02026-9135	Robert Fralick	(800) 225-2610 Ext. #157	(800) 437-2966	www.alimed.com
10055	American Art Resources 3262 Sul Ross Houston, TX 77098	Kathy Hathorn	(800)282-0204	(713)527-9676	www.americanartresources.com
915200	ARJO 50 North Gary Ave Unit A Roselle, IL 60172	Terry Capp	(800) 323-1245 Ext. #6159		www.arjo.com
12599	Art Resource Team (A.R.T.) 2526 Homestead Place Cincinnati, OH 45211	Tony Baird	(513) 662-1998	(513) 662-6977	www.artresourceteam.com

VENDOR CONTACT MASTER

15000	Baker Company PO Drawer E Sanford Airport Sanford, ME 04073	Customer Service	(207) 324-8773	(207) 324-3869	www.bakerco.com
15012	Baring Industries 1808 West End Ave, Suite 814 Nashvill, TN 37203	Tom Esberger	(615) 321-0272	(615) 321-5667	www.baring.com
15026	Berchtold 1950 Hanahan Road Charleston, SC 29406	Jeff Dunkley	(800) 243-5135 ext. 334	(843) 569-6133	www.berchtoldusa.com
15382	Biodex Medical Brookhaven R&D Plaza 20 Ramsey Rd, Box 702 Shirley, NY 11967-0702	Marie Springman	(631) 924-9000 Ext. #234	(681) 924-9338	www.biodex.com
15206	Boehringer Laboratories, Inc. 500 E. Washington Street Norristown, PA 19401	Eileen Welty	(610) 278-0900	(610) 278-0907	www.boehringerlabs.com
20633	Camtronics Ltd. Medical System 900 Walnut Ridge Drive Hartland, WI 53029	Steve Crandall	(866) 694-2510		www.camtronics.com
933800	Cardinal Health & Medical Prod. 1750 Stoneridge Dr. Stone Mountain, GA 30083	Renee Hensley	(800) 889-1065 Ext. #3307	(770) 270-9645	www.cardinal.com/mps or www.cardinalhealth.com
901500	Cardinal Health & Medical Services 1750 Stoneridge Dr. Stone Mountain, GA 30083	Paula Watkins	(800) 633-0333	(800) 488-3987	www.cardinal.com/mps or www.cardinalhealth.com
21879	Cardinal Respiratory Care 1500 Waukegan Rd McGaw Park, IL 60085	Shelly Lancaster	(800) 637-1500 Ext. #1521	(630) 369-9302	www.cardinal.com/mps or www.cardinalhealth.com

VENDOR CONTACT MASTER

21433	Common Cents Solutions PO Box 5454 Jackson, MS 39288-5454	Tom Bunting	(888) 932-3687 Ext. #36	(601) 932-9414	www.commoncents.net
25350	Data Cash Register 942 Woodland Street Nashville, TN 37206		(615) 227-6978	(615) 227-7589	www.dcrpos.com
960400	Datascope 4117 Hillsboro Rd 103-303 Nashville, TN 37215	Kevin Wampler	(800) 288-2121	(800) 266-9624	www.datascope.com
25160-4	Diagnostic Imaging 199 Foster Brothers Drive West Columbia, SC 29172	Larry Myers	(803) 796-7038	(803) 796-9749	
920100	Dictaphone 147 Country Club Drive Hendersonville, TN 37075	Mike Collier	(888) 471-3463 Ext. # 4277	(203) 683-2169	www.dictaphone.com
956200	Dukane 27545 Diehl Rd., Suite 200 Warrenville, IL 60555	Angelo Lopez	(630) 836-3745	(630) 836-3805	www.dukane.com
944800	Follett 801 Church Lane PO Box D Easton, PA 18044	Gary Gutman	(800) 523-9361	(610) 250-0696	www.follettice.com
35570	Food Systems 318 Seaboard Lane, Bldg 100 Suite 114 Franklin,TN 37067	Beverly LeBlanc	(866) 662-4279 (615) 261-0400	(615) 261-0401	www.foodsystemsul.com
967600	GE Appliances (Acct #FMD30) 307 N. Hurstborne Pkwy Louisville, KY 40222	Skip Alcorn Jason Cropper	(615) 264-8994 (800) 782-8031 x4	(800) 772-6704	www.geappliances.com

VENDOR CONTACT MASTER

904100	GE Healthcare Datex-Ohmeda PO Box 7550 Madison, WI 53707-7550	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.datex-ohmeda.com
902900	GE Healthcare Technologies 830 Crescent Centre Dr. Suite 460 Franklin, TN 37067	Milton Mueller	(615) 472-2409 Cell: (615) 519-3357	(414) 918-8200	www.gehealthcare.com
40006-4	GE Medical System (Dia) PO Box 414, WT895 Milwaukee, WI 53201	Terri	(800) 232-2599	(800) 558-5102	www.gehealthcare.com
953600	GE Healthcare I.T. (Marquette) 8200 West Tower Ave Milwaukee, WI 53223	Mary Fetsch	(615) 386-3001 Cell: (615) 604-1240	(615) 386-0082	www.gehealthcare.com
968700	GE - OEC Medical Systems 3724 National Drive, Suite 100 Raleigh, NC 27612	Hurley Raynor	(800) 728-6596	(919) 881-8367	www.gemedicalsystems.com
912700	Getinge USA PO Box 3208 Augusta, GA 30914-3208	Carlton Colcough	(800) 475-9040	(716) 272-5283	www.getingeusa.com
921000	Grainger 1021Charlotte Avenue Nashville, TN 37203	Kevin Kolff	(615)480-7783 (800)994-2336	(615)331-0485	www.grainger.com
914300	Hill-Rom 1069 State Road, 46 East Batesville, IN 47006-9164	Doug Weigel	(800) 445-3730	(812) 934-1442	www.hill-rom.com/products
934300	Drager/ Air Shields 1069 State Road, 46 East Batesville, IN 47006-9164	Lisa Aiello	(800) 437-2437 x2358	(812) 934-1442	
920700	Interior Design Services 209 Powell Place Brentwood, TN 37027	Daryl Dunn	(615) 376-1222	(615) 376-3510	www.ids-tn.com

VENDOR CONTACT MASTER

51073	Thermo Electron 308 Ridgefield Ct. Asheville, NC 28806	Josh Camp	(800) 252-7100 828-658-2882	(828) 658-0363	www.thermo.com or www.kendro.com
914700	Medquist/ Lanier Healthcare 5930 Metric Place, Suite 200 Norcross, GA 30092	James Thomas	(251) 945-3412 (866) 856-3000	(943) 337-5752	www.medquist.com or www.lanier.com
929400	Medline Industries, Inc. 105 Continental Drive Brentwood, TN 37027	Jeff Fair	(615)373-2142 (888)897-7557	(615)373-2486	www.medline.com
916400	Medtronic Emergency Response System PO Box 97023 Redmond, WA 98073	Tammy Lombardi	(800) 442-1142 Ext. #4162	(800) 732-0956	www.medtronicphysiocontrol.com
70583	Nicolet 5225-2 Verona Rd Madison, WI 53711-4495	Kathy Hart	(800) 356-0007	(608) 441-2007	www.thermo.com
954400	Nihon Kohden 202 Kensington Place Nashville, TN 37215	Jim Fagan	(615) 292-5082	(615) 292-0584	www.nkusa.com
72016	Olympus 2 Corporate Ctr. Drive Melville, NY 11747	Betty Shaffer	(631) 844-5437 (800) 645-8100	(631) 844-5110	www.olympus-global.com
958320	Pharmed 3075 NW 107th Ave Pharmed Way Miami, FL 33172-2134	Carolyn Thomas	(800) 683-7342 Ext 342 (305) 592-2324	(800) 621-9511	www.pharmed.com
11331	Philips - ATL Ultrasound Ste 540 501 Corporate Centr Dr., Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com

VENDOR CONTACT MASTER

74031-1	Philips Medical Imaging 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Paula Berzina	(615) 472-2207	(615) 472-2273	www.philips.com
914200	Philips Medical (Monitoring) 501 Corporate Centr Dr., Ste. 540 Franklin, TN 37067	Roger Duffy	(615) 472-2207	(615) 472-2273	www.philips.com
944500	Quinton 3303 Monte Villa Pkwy Bothell, WA 98021	Bob Atkins	(800) 426-0347	(425) 402-2001	www.quinton.com
76007	Radiology Specialty PO Box 406 Hermitage, TN 37076	Bob Webb	(615) 885-5326	(615) 885-4691	
924800	Rauland Borg Corporation 3450 West Oakton Street Skokie, IL 60076-2951	Alex Veytsel	(847) 324-8380 Ext. #380	(847) 679-4106	www.rauland.com
81742	Sara Lee Coffee & Tea 990 Supreme Dr. Bensonville, IL 60106	Kory Mickelsom	(800) 621-4100	(773) 489-7323	www.saraleecoffee.com
956000	Simplex Grinnell 9855 Carroll Canyon Rd San Diego, CA 92131	Randy Wilkins	(858) 279-8010	(858) 740-0157	www.tycoin.com
904600	Standard Textile PO Box 371805 Cincinnati, OH 45222	Tricia Partin	(800) 888-5000 Ext. #270	(800) 926-0043	www.standardtextile.com
912000	Steris/ Amsco Products 2448 Shiland Dr. Rock Hill, SC 29732	Randy Marks Dave Piver Lara Stark	(800) 989-7575 Randy #23117 Dave #21152	(440) 392-8902	www.steris.com
55026	Storage Systems, Inc. 318 Seaboard Lane Bldg. 100, Suite 115 Franklin,TN 37065	Bill Kreager	(888) 614-0004 (615) 261-6900	(615) 261-6906	www.storagesystemsul.com

VENDOR CONTACT MASTER

901100	Stryker Medical 4100 East Milham Ave. Kalamazoo, MI 49001-6197	Gloria Phillips	(800) 800-4236 ext. 1456	(800) 610-4408	www.stryker.com
929900	Telehealth/Telerent 4205 Hillsboro Rd Suite 303 Nashville, TN 37215	Darrell Leftwich	(615) 383-7836	(615) 383-4226	www.telehealth.com
85060-1	Toshiba 2150 F Northmont Pkwy Duluth, GA 30136	Craig Hamilton	(770)476-9992	(770) 476-1511	www.tobshiba.com/tams/newtams
921500	US Surgical 5920 Longbow Dr. Boulder, CO 80301	Customer Service	(800) 722-8772	(800) 544-8772	www.ussurg.com
91734	Wireless Solutions, Inc. 720 Fesslers Lane Nashville, TN 37210	Marie Gilland	(615) 255-5670	(615) 255-9967	
925500	Zenitel 6119 Connecticut Kansas Ctiy, MO 64120	Jeanne Gramman (816) 231-7201	(816) 231-7202	(816) 231-7203	www.zenitel.com