THE MEDICAL CENTER OF AURORA
TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St, Aurora, CO 80012

City of Aurora Building Division
Project: *HYBRID LAB RENOVATION*
Address: *1501 S POTOMAC ST*
Occupancy Group: *UBC I2*
Construction Type: *IBC 1A-SPK*
RSN: *1156136*
Permit: *2016 1191012*

ISSUE DATE: 08/19/16
PROJECT #: 16-003

FOR CONSTRUCTION

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Code violations that are found during inspection are required to be corrected. Permit issuance does not grant approval of a code violation.

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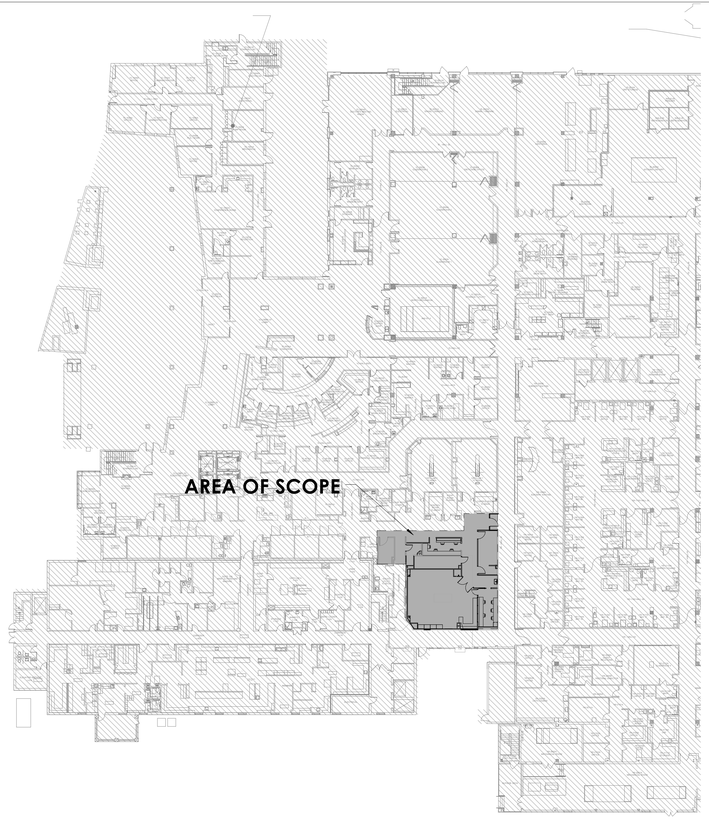
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* VENDOR DRAWINGS WILL NOT BE STAMPED BY A LICENSED ENGINEER

SEPARATE FIRE ALARM PERMIT REQUIRED: Due to the proposed work the general contractor is required to obtain the services of a fire alarm contractor to determine if a separate alarm permit is required. If it is determined that the spacing of the fire alarm devices is not in compliance, then a separate fire alarm permit is required. Approval of the documents is required prior to system installation or any request for inspection. A certificate of occupancy or final approval cannot be issued by the Building Division without this fire protection system. **2015 IFC, Section 105.7.6.**

SEPARATE FIRE SPRINKLER PERMIT REQUIRED: Due to the proposed work the general contractor is required to obtain the services of a fire sprinkler contractor to determine if a separate sprinkler permit is required. If it is determined that the spacing of the fire sprinkler heads is not in compliance, then a separate fire sprinkler permit is required. Approval of the documents is required prior to system installation or any request for inspection. A certificate of occupancy or final approval cannot be issued by the Building Division without this fire protection system. **2015 IFC, Section 105.7.1.**

KEY PLAN



GENERAL PROJECT NOTES

1. CONTRACTOR IS RESPONSIBLE FOR **COMPLETE** SET OF ISSUED CONTRACT DOCUMENTS.
2. DO NOT SCALE THE DRAWING. IF DIMENSIONS ARE IN QUESTION, OBTAIN CLARIFICATION FROM THE ARCHITECT BEFORE CONTINUING.
3. DIMENSIONS SHOWN ON THE FLOOR PLANS FOR NEW CONSTRUCTION ARE TO THE FACE OF FINISH OF INTERIOR WALLS, TO CENTER LINE OF COLUMNS, AND TO FACE OF CONCRETE OR MASONRY WALLS, UNLESS OTHERWISE INDICATED. DIMENSIONS IN RENOVATED AREAS ARE FROM FINISH FACE OF EXISTING WALLS AND TO FINISH FACE OF NEW STUD WALLS, UNLESS OTHERWISE INDICATED.
4. FIELD MEASURE AND CONFIRM DIMENSIONS FOR OWNER PROVIDED EQUIPMENT AND FURNISHINGS. COORDINATE WITH THE OWNER ON DELIVERY AND INSTALLATION OR OF/CI EQUIPMENT. MINIMUM REQUIRED OPENINGS AND ACCESSIBLE ROUTES TO THE INSTALLATION AREA SHALL BE COORDINATED WITH THE SUPPLIER.
5. FINISH FLOOR ELEVATIONS ARE TO TOP OF FINISHED FLOORING PRODUCT, OFTEN NOTED BY AFF (ABOVE FINISH FLOOR) UNLESS OTHERWISE NOTED.
6. COORDINATE EXACT SIZE AND PLACEMENT OF EQUIPMENT BASE AND HOUSEKEEPING PADS WITH EQUIPMENT TO BE PROVIDED.
7. WHERE NEW GYPSUM BOARD PARTITIONS ARE A CONTINUATION OF AN EXISTING PARTITION OR COLUMN ENCASEMENT, THE FACE OF THE NEW GYPSUM BOARD SHALL BE ALIGNED WITH THE FACE OF THE EXISTING SURFACE, WHERE A ONE HOUR PARTITION IS SHOWN AS A CONTINUATION OF A TWO-HOUR PARTITION OR COLUMN ENCASEMENT, THE FACE OF THE GYPSUM BOARD SHALL BE OFFSET AS REQUIRED TO PROVIDE FACE ALIGNMENT OF GYPSUM BOARD ON BOTH SIDES.
8. LEVEL FLOORS SO THAT THEY DO NOT EXCEED A 1/4" VARIANCE IN A 10'-0" RADIUS.
9. PIPING LOCATED ABOVE GRADE AND INSIDE THE BUILDING SHALL BE CONCEALED IN FURRED SPACES WITH THE EXCEPTION OF PIPING IN STAIRWAYS, EQUIPMENT ROOMS, AND POWERHOUSE. COORDINATE WITH OTHER TRADES TO PROVIDE FURRING FOR PIPING INSTALLED IN FINISHED AREAS.
10. PARTITION TYPES AND FIRE RESISTIVE RATINGS INDICATED ON A WALL ARE TO BE CONTINUOUS FOR THE LENGTH AND HEIGHT OF A PARTITION.
11. OPENINGS IN A RATED WALL, FLOOR, CEILING, AND ROOF ASSEMBLIES SHALL BE SEALED WITH A FIRE RESISTANT JOINT SYSTEM OR PROTECTED WITH A FIRE RATED CHASE.
12. EXIT SIGNS AND SMOKE DETECTORS LOCATED IN CEILINGS SHALL BE POSITIONED AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION.
13. WHERE MATERIALS ARE APPLIED TO, OR ARE IN DIRECT CONTACT WITH WORK INSTALLED BY ANOTHER SUBCONTRACTOR, COMMENCEMENT OF WORK IMPLIES ACCEPTANCE OF THE SUBSTRATE AS SUITABLE FOR THE APPLICATION INTENDED.
14. ISOLATE DISSIMILAR METALS TO PREVENT GALVANIC CORROSION.
15. SEALANTS EXPOSED TO VIEW SHALL BE CUSTOM COLOR AS SELECTED BY THE ARCHITECT AND LABLED.
16. COORDINATE LOCATION OF SEALANT AND COMPATIBILITY OF SEALANTS WITH ADJACENT WORK, INCLUDING MATERIALS AND OTHER CONTIGUOUS SEALANTS
17. CAULK AT JUNCTURE OF INTERIOR FACES OF DOOR FRAMES, VIEW WINDOW FRAMES, EXTERIOR WINDOW FRAMES, AND CABINET WORK WITH ADJACENT MATERIALS, MAINTAIN THE FIRE RATING OF CONSTRUCTION AROUND CABINETS, PANELS, AND BOXES RECESSED IN FIRE RATED WALL, FLOOR, AND CEILING ASSEMBLIES.
18. ACCESSORIES SUCH AS GRAB BARS, TOWEL BARS, PAPER DISPENSERS AND SOAP DISHES INSTALLED WITHIN 2' OF A URINAL, WATER CLOSET, SINK OR LAVATORY SHALL BE MOISTURE SEALED.
19. DO NOT HANG (SUPPORT) ANY ITEMS FROM METAL ROOF DECK. IT IS ACCEPTABLE TO ATTACH, I.E. CEILING SYSTEM WIRE HANGERS FROM JOISTS AND/OR BEAMS. IF NO JOIST OR BEAM, PROVIDE A STEEL STRIP.

ALTERNATES

1 DEDUCTIVE ALTERNATE: PROVIDE SOLID CORE WOOD VENEER DOORS IN LIEU OF ACROVYN DOORS WHERE ACROVYN DOORS ARE SCHEDULED. WOOD VENEER TO BE QUARTER CUT, CHERRY, SATIN FINISH, STAIN COLOR TO MATCH EXISTING DOORS IN THE AREA WHICH ARE A COLOR MATCH TO WILSON ART 7935-07 SHAKER CHERRY.

2 ADDITIVE ALTERNATE: REPLACE ADDITIONAL FLOORING IN THE CATH LAB DEPARTMENT THROUGHOUT INDICATED ON I.201.

DRAWING NUMBER KEY

DISCIPLINE
- A ARCHITECTURAL
- C CIVIL
- L LANDSCAPE
- M MECHANICAL
- E ELECTRICAL
- P PLUMBING
- S STRUCTURAL
- K KITCHEN
- R RADIOLOGY

XX/A.XXX
- NUMBER OF PLAN, DETAIL, ETC. ON SHEET
- DRAWING SERIES

PROJECT DATA

- **PROJECT INFORMATION**

RENOVATION WORK: RENOVATION AND DEPARTMENTAL EXPANSION WITHIN THE EXISTING SQUARE FOOTAGE OF THE FACILITY. REMOVAL OF EXISTING RECOVERY AREA FOLLOWING RELOCATION BY OTHER PROJECT. CONSTRUCTION OF NEW CATHETERIZATION LAB AND SUPPORT SPACES INCLUDING SUPPLY ROOM, COMPUTER ROOM, CHARTING AND CONTROL. SCOPE INCLUDES REMOVAL OF EXISTING AIR HANDLING UNITS AND REPLACEMENT WITH NEW SYSTEM TO SERVE RENOVATED SPACE. SQUARE FOOTAGE OF PROCEDURE SPACE AND RENOVATION AREA IS 2850 SQUARE FEET.

- **ADOPTED CODES / LAWS**

CITY OF AURORA:
2015 INTERNATIONAL BUILDING CODE
2015 INTERNATIONAL FUEL GAS CODE
2015 INTERNATIONAL EXISTING BUILDING CODE
2015 INTERNATIONAL MECHANICAL CODE
2015 INTERNATIONAL PLUMBING CODE
2015 INTERNATIONAL ENERGY CONSERVATION CODE
2015 INTERNATIONAL FIRE CODE
2014 NATIONAL ELECTRICAL CODE

STATE OF COLORADO:
2012 NFPA 101 - LIFE SAFETY CODE
2009 COLORADO DEPARTMENT OF HEALTH AND ENVIRONMENT - HOSPITAL LICENSING RULES

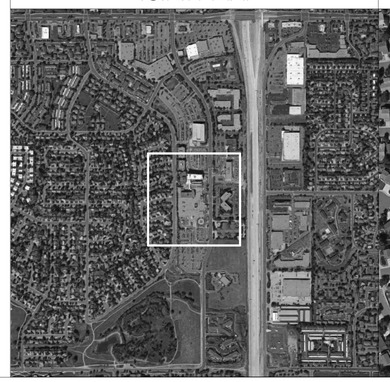
FEDERAL:
2010 AMERICANS WITH DISABILITIES ACT GUIDELINES
2009 ICC/ANSI A117.1 ACCESSIBLE USEABLE BUILDINGS AND FACILITIES

- **OCCUPANCY CLASSIFICATION:** 2015 IBC - GROUP I-2 (SECTION 308.4.1.2)
CMS - 2012 NFPA 101 - NEW HEALTHCARE OCCUPANCY (CHAPTER 18)
STATE OF COLORADO - 2012 NFPA 101 - NEW HEALTHCARE OCCUPANCY CHAPTER 18
- **PRINCIPAL OCCUPANCY TYPE:** HEALTHCARE
- **CONSTRUCTION TYPE:**
EXISTING: SBC - TYPE 1A, UNRESTRAINED, FULLY SPRINKLERED
NEW: 2015 IBC - TYPE 1A, FULLY SPRINKLERED
- **ALLOWABLE HEIGHT AND FLOOR AREAS:** (IBC TABLE 503)
- **FIRE RESISTANCE:** (FOR TYPE 1A CONSTRUCTION)

BUILDING ELEMENT	FIRE RATING	U.L. ASSEMBLY
STRUCTURAL FRAME (INCLUDING COLUMNS AND GIRDERS)		
SUPPORTING ROOF ONLY	2-HR	COLUMNS X-772 (W-BEAM) COLUMNS X-771 (TUBES) GIRDERS S-735 (W/ P936) GIRDERS S-734 (W/ P732)
SUPPORTING ONE OR MORE FLOORS	3-HR	COLUMNS X-771 (TUBE) COLUMNS X-772 (W-BEAM) GIRDERS N-782
BEARING WALLS		
EXTERIOR	3-HR	NA
INTERIOR (SUPPORTING ROOF ONLY)	2-HR	NA
NON-BEARING WALLS		
EXTERIOR	0-HR	
INTERIOR	0-HR	
FLOOR CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS)	2-HR	D-925 (COMPOSITE DECK) (USING NORMAL BEAMS AND JOISTS WEIGHT CONCRETE)
ROOF CONSTRUCTION (INCLUDING SUPPORTING BEAMS AND JOISTS (SECONDARY MEMBERS))	1-HR	U-732 (FULLY ADHERED SINGLE PLY TPO ROOFING MEMBRANE ON 3" RIGID INSULATION BOARD MECHANICALLY FASTENED TO STEEL ROOF DECK)

NOTES:
1. ALL FIRE RESISTIVE DESIGN TO BE CONSIDERED THERMALLY RESTRAINED.
2. ALL BEAM AND COLUMN FIRE PROOFING TO BE ADJUSTED USING W/ D RATIO

VICINITY MAP



SITE MAP



City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2015 INTERNATIONAL CODES & 2014 NEC

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No.	Description	Date
1	ASI 01	10/10/16
2	ASI 02	10/18/16

STATE OF COLORADO
JOHN MENNO MAY
401729
LICENSED ARCHITECT
10/18/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
COVER & DRAWING INDEX

Sheet Number
G.101

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10/18/16 4:58:08 PM

SECTION 011000 - SUMMARY

1.1 PROJECT INFORMATION
A. Project Identification: Cath Lab Renovation, The Medical Center of Aurora, Aurora, Colorado, Architect's Project No. 16-003 TMCA Cath Lab Renovation.
1. 1501 S. Potomac St, Aurora, CO, 80012.
B. Owner: The Medical Center of Aurora.
C. Architect: PATH21 Architecture, 2245 Curtis Street, Suite 100, Denver, Colorado 80205.

1.2 WORK COVERED BY CONTRACT DOCUMENTS
A. The work in this project consists of approximately 2000sf. of renovation on the first floor of the facility. Existing space will be renovated to include eight prep and recovery rooms, nurse station, patient toilets, and clean and soiled supply rooms. Work will include demolition of interior partitions and construction of new partitions, installation of updated casework and finishes. Modifications to the existing MPE systems serving the space are included as well.
B. Project will be constructed under a single prime contract.
C. Owner Furnished Products: Refer to Drawings.

1.3 ACCESS TO SITE
A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Limits: Confine construction operations to areas indicated.
2. Driveways, Walkways and Entrances: Keep driveways, loading areas, 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 by construction operations.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.4 COORDINATION WITH OCCUPANTS
A. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.5 WORK RESTRICTIONS
A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
1. Patient Areas of Medical Care Facilities: 24 hours per day, seven days a week.
2. Weekend Hours: 8:00 a.m. to 5:00 p.m.
3. Early Morning or Late Night Hours: Coordinate with Owner.
4. Hours for Utility Shutdowns: Coordinate with Owner.
5. Hours for Noisy Activities: Coordinate with Owner.
C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify Owner not less than three days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.
D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than three days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.
E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.
F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
H. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
1. Maintain list of approved screened personnel with Owner's representative.
I. Refer to Owner's "Requirements for Contractors Performing Construction" attached to this section.

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

1.1 SUMMARY
A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
1. General project coordination procedures.
2. Administrative and supervisory personnel.
3. Coordination drawings.
4. Requests for Information (RFIs).
5. Project meetings.
B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

1.1 COORDINATION
A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work.
1. Schedule construction operations in sequence required where installation of one part of the Work depends on installation of other components.
B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work.
1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-Installation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.
10. Structural Penetrations: Indicate penetrations and openings required for all disciplines.

1.2 REQUESTS FOR INFORMATION (RFIs)
A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI. All RFIs should be sent directly to the Architect via email.
B. RFI Forms: Software-generated form acceptable to Architect. Sketches or other necessary documents should be attached to email in PDF format.
C. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow 7 business days for Architect's response for each RFI.
D. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties.

1.3 PROJECT MEETINGS
A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
B. Pre-construction Conference: Schedule and conduct a pre-construction conference before starting construction but no later than 15 days after execution of the Agreement.
C. Pre-Installation Conferences: Conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
D. Progress Meetings: Conduct progress meetings at agreed upon intervals.
E. Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

SECTION 013300 - SUBMITTAL PROCEDURES

1.1 SUBMITTAL ADMINISTRATIVE REQUIREMENTS
A. Architect's Digital Data Files: Electronic copies of CAD Drawings will be provided by Architect for Contractor's use in preparing coordination submittals.
B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals. Submittals received after 1:00 pm will be considered to have been received the following day.
1. Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
D. Identification and Information: Identify and incorporate information in each electronic submittal file.
1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
E. Options: Identify options requiring selection by the Architect.
F. Deviations: Identify deviations from the Contract Documents on submittals.
G. Use for Construction: Use only final submittals that are marked with 'Reviewed' , 'Furnish as Corrected' notation from Architect's action stamp. , or with approval notation from alternate reviewer.

1.2 SUBMITTAL PROCEDURES
A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Email or upload electronic submittals as PDF electronic files directly to Architect.
H. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
I. Shop Drawings: Prepare Project-specific information, drawn accurately to scale.
J. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
K. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
L. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
M. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

1.3. CONTRACTOR'S REVIEW
B. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
N. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1.4 ARCHITECT'S ACTION
C. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
O. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
1. Reviewed
2. Revise and Resubmit
3. Rejected
4. Furnish As Corrected
5. No Action Taken.
P. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
Q. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
R. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
S. Submittals not required by the Contract Documents may not be reviewed and may be discarded.
T. Material safety data sheets shall not be submitted to the architect for review.

SECTION 017300 – EXECUTION

1.1 SECTION INCLUDES
A. Installation of the Work.
B. Cutting and patching.
C. Progress cleaning.
D. Protection of installed construction.

1.1 DEFINITIONS
A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.2 QUALITY ASSURANCE
A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
2. 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.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.3 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, 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.
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. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
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.

1.4 CUTTING AND PATCHING
A. Cutting and Patching, 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 in-place 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.
B. Temporary Support: Provide temporary support of work to be cut.
C. Protection: Protect in-place 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.
D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."
E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.
G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
b. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather-tight condition.
H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

1.5 PROGRESS CLEANING
A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
4. Utilize containers intended for holding waste materials of type to be stored.
5. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
B. Site: Maintain Project site free of waste materials and debris.
C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls." Division 01 Section "Construction Waste Management and Disposal."
H. 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.
I. 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.
J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

1.6 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.

1.7 CORRECTION OF THE WORK
A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
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.
D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

SECTION 017700 – CLOSEOUT PROCEDURES

1.1 SUBSTANTIAL COMPLETION
A. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.1 FINAL COMPLETION
A. 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. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected. Include cost for re-inspection based on incomplete work of the Contractor.

1.2 LIST OF INCOMPLETE ITEMS (PUNCHLIST)
A. Organization 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 CSI Form 14.1A attached or form provide by Contractor and approved by Architect.

1.3 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. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1.4 FINAL CLEANING
A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

SECTION 017823 – OPERATION AND MAINTENANCE DATA

1.1 CLOSEOUT SUBMITTALS
A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1.1 MANUALS
A. Emergency manuals.
B. Operation Manuals.
C. Product maintenance manuals.
D. Systems and equipment maintenance manuals.

SECTION 017839 – PROJECT RECORD DOCUMENTS

1.1 CLOSEOUT SUBMITTALS
A. Record drawings.
B. Record specifications.
C. Record product data.
D. Miscellaneous record submittals.

1.1 SUBMITTALS
A. Provide product record documents in electronic format.

SECTION 024129 – SELECTIVE DEMOLITION

1.1 SECTION INCLUDES
A. Demolition and removal of selected portions of building or structure.
B. Salvage of existing items to be reused or recycled.

1.1 MATERIALS OWNERSHIP
A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.2 FIELD CONDITIONS
A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
B. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
C. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.

1.3 PERFORMANCE REQUIREMENTS
A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

1.4 EXAMINATION
A. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
B. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
2. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
C. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs or preconstruction videos.
1. Comply with requirements specified in Section 01 32 33 "Photographic Documentation."
2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

1.5 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS
A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

1.6 PREPARATION
A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1.7 SELECTIVE DEMOLITION
A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations.
B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.

1.8 DISPOSAL OF DEMOLISHED MATERIALS
A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1.9 CLEANING
A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

SECTION 054523 – HEALTHCARE METAL SUPPORTS

1.1 SUMMARY
A. Section Includes: Metal support systems for medical equipment.
B. Requirements: Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
C. Interface with Adjacent Systems: Integrate design and connections with adjacent construction.
1. Accommodate allowable tolerances and deflections for structural members in installation.
2. Coordinate with reflected ceiling plan and other items indicated to be placed in or above ceiling to ensure medical support system does not interfere with or dislocate other items.

1.2 PERFORMANCE REQUIREMENTS
A. Manufacturer: Responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
B. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of medical support system.
C. 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.
D. Make modifications only to meet field conditioned and ensure fitting of system components.
1. Obtain Architect's approval of modifications and for connections to building elements at locations other than indicated on Drawings.
E. 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.
F. Ceiling Anchorage: Attach to ceiling by means of embedded concrete inserts, through-bolts, or direct attachment to structural framing.
G. Rigidly fix and brace support structure against sway.
H. 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.
1. 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).
I. 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 when maximum loading conditions of equipment operation are applied on either rail.

1.3 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: Indicate plan layout, typical elevations, details and anchoring methods.
C. Delegated Design Data: For installed dimension support systems indicated to comply with certain design loads and deflection limits, include structural analysis data signed and sealed by the qualified professional structural engineer responsible for their preparation.
D. Certificates verifying AWS qualifications within previous 12 months for each welder employed for Work.
E. Certifications specified in Quality Assurance article.
F. Qualification Data: For professional Engineer.

1.4 QUALITY ASSURANCE
A. 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 medical support systems.
B. Manufacturer Qualifications: Company specializing in manufacturing, fabricating, and installing Products specified in this Section with minimum five years experience.
C. Welder Qualifications: AWS certified within past 12 months for each type of weld required.
D. Certifications: Submit following:
1. Manufacturer's certification that products furnished for Project meet or exceed specified requirements.
2. Engineering certifications.

1.5 MANUFACTURER
A. Medical Support Systems: Subject to compliance with requirements, provide products by one of the following:
1. MHED, LLC, Modular Support System, Orlando, FL.
2. No Substitutions.

1.6 METALS, GENERAL
A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

1.7 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.

1.8 INSTALLATION
A. Medical Support Systems: Install in accordance with approved Shop Drawings and manufacturer's installation instructions.
B. Structural Assembly: Install supporting framework plumb and true.
C. Installation 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.

END OF SECTION

SECTION 061053 – MISCELLANEOUS ROUGH CARPENTRY

1.1 WOOD PRODUCTS, GENERAL
A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
2. Provide dressed lumber, S4S, unless otherwise indicated.

1.1 WOOD-PRESERVATIVE-TREATED MATERIALS
A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground.
B. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
C. Application: Treat miscellaneous carpentry unless otherwise indicated.

1.2 FIRE-RETARDANT-TREATED MATERIALS
A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
C. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
D. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
E. Application: Treat items indicated on Drawings, and the following:
1. Framing for raised platforms.
2. Concealed blocking.
3. Roof framing and blocking.
4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
5. Plywood backing panels.

1.1 MISCELLANEOUS LUMBER
A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
B. For items of dimension lumber size, provide No. 2 grade lumber and any of the following species:
1. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
C. For blocking not used for attachment of other construction, Utility, Stud, or No. 2 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

1.3 PLYWOOD BACKING PANELS
A. Equipment Backing Panels: DOC PS 1, Exterior, AC, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

1.4 INSTALLATION
A. 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.
B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.]
E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
F. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
G. Securely attach carpentry work to substrate by anchoring and fastening

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

1.1 SUMMARY
A. This Section includes the following:
1. Plastic-laminate cabinets.
2. Plastic-laminate countertops.
3. Shop finishing of interior woodwork.
4. Cabinet hardware.
5. Interior finish carpentry including standing and running trim.
B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.1 QUALITY ASSURANCE
A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.
C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.2 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.

1.3 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.

1.4 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.

1.5 MATERIALS
A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
B. Wood Products: Comply with the following:
1. Hardboard: Tempered, AHA A135.4.
2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
a. Type A (standard): MDF, MR10 – ANSI A208.2, Grade 130.
b. Type B (where additional moisture resistance is needed): MDF, MR30 – ANSI A208.2, Grade 155.
c. Type C (near sinks, splashes, and other high humidity locations): MDF, MR50 – ANSI A208.2, Grade 150
3. Softwood Plywood: DOC PS 1, Medium Density Overlay.
C. Thermoset Decorative Laminate (melamine): Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
1. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semi-exposed edges. Color to match face material.
D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1.6 CABINET HARDWARE AND ACCESSORIES
A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening, self-closing.
C. Back-Mounted Pulls: BHMA A156.9, B02011.
1. Subject to compliance with requirements, provide "DP3 series, 3-inch" by Doug Mockett & Company, Inc.
D. Wire Pulls: Back mounted, solid metal, 5 inches 127 mm long, 2-1/2 inches 63.5 mm deep, and 5/16 inch 8 mm in diameter.
E. Elbox Latches: BHMA A156.9, B02023.
F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
G. Shelf Rests: BHMA A156.9, B04013; metal, equal to Hafele 282.04.711.
H. Drawer Slides: BHMA A156.9, B05091.
1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
2. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches 150 mm high or 24 inches 600 mm wide.
3. Pencil Drawer Slides: Grade 2; for drawers not more than 3 inches 75 mm high and 24 inches 600 mm wide.
I. Door Locks: BHMA A156.11, E07121.
1. Basis of Design
a. National CAM door lock #C8053-14A w/elbow catch at 2-door cabinet.
J. Drawer Locks: BHMA A156.11, E07041.
K. Grommets for Cable Passage through Countertops: 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
1. Product: Subject to compliance with requirements, provide "EDP series" by Doug Mockett & Company, Inc.
L. Grommets for High Finish Areas: 2 inch OD, grommets and match caps with slot for wire passage.
1. Subject to compliance with requirements, provide "MM3 series" by Doug Mockett & Company, Inc
M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated, unless noted otherwise.
1. Satin Stainless Steel: BHMA 630.
N. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

1.7 MISCELLANEOUS MATERIALS
A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Wood Glues: 30 g/L.
2. Contact Adhesive: 250 g/L.
E. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

1.8 FABRICATION, GENERAL
A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom -grade interior woodwork complying with referenced quality standard.
B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch 19 mm Thick or Less: 1/16 inch1.5 mm.
2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.
C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
D. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
1. Seal edges of openings in countertops with a coat of varnish.

1.9 PLASTIC-LAMINATE CABINETS
A. Grade: Custom.
B. AWI Type of Cabinet Construction: Flush overlay.
C. Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Post-formed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade VGS.
4. Edges: Grade HGS.
D. Materials for Semi-exposed Surfaces:
1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade CLS.
a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.
b. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade CLS.
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood, ¼ inch thick.
E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.
F. Colors, Patterns, and Finishes: As scheduled.
G. Provide dust panels of 1/4-inch 6.4-mm plywood or tempered hardboard above compartments and drawers, unless located directly under tops.
H. Edgebanding for Plastic Laminate Clad Cabinets: Rigid PVC extrusions, through color with satin finish, 3 mm thick at counter tops, doors, drawer fronts, and exposed shelving on front and back edges (front edge only for fixed shelving); and 1 mm thick elsewhere, including edges of shelving within cabinets.
I. Edges exposed at glazed openings in cabinet shall receive laminate edges.

1.10 PLASTIC-LAMINATE COUNTERTOPS
A. Grade: Custom.
B. High-Pressure Decorative Laminate Grade: HGS.
C. Grain Direction: Parallel to cabinet fronts.
D. Edge Treatment: Same as laminate cladding on horizontal surfaces.
E. Core Material: Medium density fiberboard.
F. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.
G. Paper Backing: Provide paper backing on underside of countertop substrate.

1.11 CLOSET AND UTILITY SHELVING
A. Grade: Custom.
B. Shelf Material:
1. For spans up to 30 inches: ¾ inch medium-density fiberboard with solid lumber edge.
2. For spans up to 42 inches: 1 inch medium-density fiberboard with solid-lumber edge.
C. Cleats: 3/4-inch solid lumber.

1.12 PREPARATION
A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

1.13 INSTALLATION
A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
C. 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.
D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
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. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
2. Install wall railings on indicated metal brackets securely fastened to wall framing.
3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
G. Paneling: Anchor paneling to supporting substrate with splined connection strips. Do not use face fastening, unless otherwise indicated.
1. Install flush paneling with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
H. 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.
1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.
3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
I. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
3. Secure backsplashes to walls with adhesive.
4. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
J. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

SECTION 071326 – SELF-ADHERING SHEET WATERPROOFING

1.1 SECTION INCLUDES
A. Modified bituminous sheet waterproofing.

1.2 SUBMITTALS
A. Product Data and Shop Drawings: Manufacturer's written instructions for evaluating, preparing, and treating substrate, installation procedures, typical details, technical data, and tested physical and performance properties of waterproofing. Show locations and extent of waterproofing, details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions. Submit only project specific details that have been reviewed and approved by the membrane manufacturer.

1.3 QUALITY ASSURANCE
A. Preinstallation Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS
A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate. Do not apply waterproofing in snow, rain, fog, or mist.

1.5 WARRANTY
A. Special Manufacturer's Warranty: Manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of

08/19/16

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Structural
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3400 East Bayaud Ave., #300
Denver CO, 80209
ph: 303.399.5154

No.	Description	Date

STATE OF COLORADO
JOHN MENNO [illegible]
401729
LICENSED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
PROJECT SPECIFICATIONS

Sheet Number
G.201

RSN: 1156136
Permit #: 2016 1191012

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2015 INTERNATIONAL CODES & 2014 NEC
AURORA

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new joints and cracks in substrate exceeding 1/16 inch in width.
2. Warranty Period: Five years from date of Substantial Completion.
B. Installer warranty: Two year from date of Substantial Completion.

1.6 MODIFIED BITUMINOUS SHEET WATERPROOFING
A. Modified Bituminous Sheet: Not less than 60-mil-thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil- thick, polyethylene film with release liner on adhesive side.
B. Products: Subject to compliance with requirements, provide one of the following:
1. American Hydrotech, Inc.; VM 75.
2. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
3. Grace, W. R. & Co.; Bituthene 3000 with Hydroduct 220.
a. Basis of Design.
4. Henry Company; Blueskin WP 200.
5. Meadows, W. R., Inc.; SealTight Mel-Rol.
C. Physical Properties:
1. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified.
2. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
3. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
4. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
5. Puncture Resistance: 40 lbf minimum; ASTM E 154.
6. Hydrostatic-Head Resistance: 150 feet minimum; ASTM D 5385.
7. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
8. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.

1.7 AUXILIARY MATERIALS
A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.
C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
F. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.
G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
H. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 6-inch centers.
I. Molded-Sheet Drainage Panel and Protection Course: Prefabricated, composite drainage panels with a permeable geotextile facing laminated to a molded-plastic-sheet drainage core.
1. Drainage Core: Three-dimensional, non-biodegradable, molded-plastic-sheet material designed to effectively drain water under backfill pressure; complying with the following properties determined according to tests indicated:
a. Compressive Strength: 10,000 lbf/sf. ft., minimum; ASTM D 1621.
b. Flow Rate: 2.8 gpm per ft., minimum, at hydraulic gradient of 1.0 and compressive stress of 25 psi; ASTM D 4716.
2. Geotextile: Nonwoven needle-punched geotextile for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined according to AASHTO M 288:
a. Survivability: Class 2.
b. Apparent Opening Size: No. 40 sieve, maximum.
c. Permittivity: 0.5 per second, minimum.
d. Film Backing: Polymeric film bonded to drainage core surface.

1.8 EXAMINATION
A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance, and proceed with installation only after unsatisfactory conditions have been corrected.

1.9 SURFACE PREPARATION
A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
F. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/8 inch.
G. Bridge and cover expansion joints discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.
H. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
I. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
J. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
K. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
L. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

1.10 MODIFIED BITUMINOUS SHEET WATERPROOFING APPLICATION
A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.
B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
D. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
E. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.
F. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
G. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.
H. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
J. Install protection course with butted joints over waterproofing membrane immediately.
K. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

1.11 FIELD QUALITY CONTROL
A. Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions; surface preparation; membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.
B. Flood test all horizontal applications.

1.12 PROTECTION AND CLEANING
A. Protect waterproofing from damage and wear during remainder of construction period.

END OF SECTION

SECTION 072100 – THERMAL INSULATION

1.1 SECTION INCLUDES
A. Batt insulation in exterior wall and ceiling construction.

1.2 SUBMITTALS
A. Provide data on product characteristics, performance criteria, and product limitations.

1.3 BATT INSULATION MATERIALS
A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, ASTM C 665; friction fit.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E 84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
4. Formaldehyde Content: Zero.
5. Thermal Resistance: Refer Drawings.
6. Thickness: For exterior envelope: As indicated on Drawings, but not less than R-30 at attics, R-19 at ceilings over un-conditioned areas, R-13 at exterior walls.
7. Facing: FSK foil facing at metal or wood stud walls.
B. Manufacturers:
a. CertainTeed Corporation: www.certainteed.com.
b. Johns Manville Corporation: www.jm.com.
c. Knauf Insulation GmbH: www.knaufinsulation.us.
d. Owens Corning Corp: www.owenscorning.com.

1.4 BATT INSTALLATION
A. Install insulation and vapor retarder in accordance with manufacturer's instructions.
B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

END OF SECTION

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SECTION 074214 - MANUFACTURED EXTERIOR WALL PANELS

1.1 SECTION INCLUDES
A. Exterior metal wall panels.

1.2 SUBMITTALS
A. Product Data: Include manufacturer's product specifications, standard details, certified product test results, and general recommendations.
B. Shop Drawings: Show layouts of panels, details of corner conditions, joints, panel profiles, supports, anchorages, trim, flashings, closures, and special details.
C. Samples for Verification: Color samples for panel finish in manufacturer's standard size.

1.3 WARRANTY
A. Finish Warranty: Manufacturer's standard 20-year warranty.

1.4 MANUFACTURERS
A. Acceptable Manufacturers: Subject to compliance with requirements, provide products from one of the following:
1. Atas Aluminum Corp.
2. Berridge Manufacturing Co.
3. Centria.
4. Merchant & Evans, Inc.
5. Metal Building Components, Inc. (MBCI)
6. Petersen Aluminum Corp.
7. VicWest Steel.
B. Basis of Design: Berridge; FW-12 Panel.

1.5 WALL PANELS
A. Metallic-Coated Steel Sheet Pre-painted with Coil Coating: Steel sheet metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755 (ASTM A 755M) and the following requirements:
1. Galvanized Steel Sheet: ASTM A 653, G90 (ASTM A 653M, Z275); structural quality.
2. Thickness: 0.028-inch.
3. Surface: Smooth, flat, mill finish.
B. Finish: Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight with a total minimum dry film thickness of 0.9 mil (0.023 mm) and 30 percent reflective gloss when tested according to ASTM D 523.
1. Prime Coat for Concealed Surfaces: Apply pretreatment and white or light-colored, baked-on polyester primer coat; with a minimum dry film thickness of 0.2 mil.
C. Concealed Fastener Wall Panel: Interlocking flat profile.
1. Coverage: 12 inches.
2. Height: 1-1/2 inches.

1.6 ACCESSORIES
A. Fasteners: Apply pretreatment and white or light-colored, baked-on polyester primer coat; with a minimum dry film thickness of 0.2 mil.
1. Use stainless-steel fasteners for exterior applications.
2. Provide exposed fasteners with heads matching color of panel by means of plastic caps or factory-applied coating.
3. Provide metal-backed neoprene washers under heads of exposed fasteners located on weather side of panels.
B. Accessories: Unless otherwise specified, provide components required for a complete wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, seam covers, flashings, louvers, sealants, sealing tape, gaskets, fillers, closure strips, and similar items. Match materials and finishes of panels.

1.7 SECONDARY FRAMING
A. Panel Supports and Anchorage: Provide girts, furring channels, angles, plates, bracing, and other secondary framing members.
1. Girts: C- or Z-shaped sections fabricated from 0.0598-inch-thick, shop-painted, roll-formed steel.
2. Flange and Sag Bracing: 1-5/8-by-1-5/8-inch angles, fabricated from 0.0598-inch-thick, shop-painted, roll-formed steel.
3. Base or Sill Angles: Fabricate from 0.079-inch-thick, cold-formed, galvanized steel sections.
4. Secondary structural members, except columns and beams, shall be manufacturer's standard sections fabricated from 0.079-inch-thick, cold-formed galvanized steel.

1.8 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.

1.9 PANEL INSTALLATION
A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.
B. 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.
C. Accessories: Install components required for a complete wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, seam covers, flashings, louvers, sealants, gaskets, fillers, closure strips, and similar items.
D. 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.
E. 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.
F. 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.
G. Installation Tolerances: Shim and align panel units within installed tolerance of 1/4 inch in 20 feet on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
H. Cleaning and Protecting: Replace panels and components that have been damaged or deteriorated. Remove temporary protective coverings and strippable films.

END OF SECTION

SECTION 078413 - PENETRATION FIRESTOPPING

1.1 QUALITY ASSURANCE
A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. .
B. Fire-Test-Response Characteristics: Comply with the following requirements:
1. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
b. Classification markings on penetration firestopping correspond to designations listed by the following:
c. UL in its "Fire Resistance Directory."
d. Intertek ETL SEMKO in its "Directory of Listed Building Products."
C. Products shall be provided by one manufacturer only.

1.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by the following without substitution:
1. Hilti, Inc.

1.2 PENETRATION FIRESTOPPING
A. Provide penetration firestopping that is 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 construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. Fire-resistance-rated walls include fire walls smoke-barrier walls and fire partitions.
2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. Horizontal assemblies include floors floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.
E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
F. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.
G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

1.3 INSTALLATION
A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

1.4 PENETRATION FIRESTOPPING SCHEDULE
A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
B. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."
C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."
D. 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:
b. FA1016, FA1017, FA2053, FA2054 by Hilti.
c. CP 680 Cast-in Firestop Device by Hilti.
d. CP653 Speed Sleeve by Hilti.
E. 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
F. 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.
G. 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.
e. Firestop sleeve device.
f. Latex sealant.
H. Firestop Systems for Electrical Cables (FS-5): Comply with the following:
1. Acceptable UL-Classified Systems with CAJ, FC, or WL 3000 Series Systems, equivalent to, but not limited to, the following: CAJ3095, FC3012, WL3065, WL3112 by Hilti or CAJ3185, CAJ3199, CAJ3234, FC3018, FC3060, WL3179 by Grace.
2. Type of Fill Materials: One or more of the following:
a. Intumescent sealant.
b. Latex Sealant
c. Pillows/bags
d. Intumescent putty.
e. Silicone foam.
I. Firestop Systems for Cable Trays (FS-6): Comply with the following:
1. Acceptable UL-Classified Systems with CAJ or WL 4000 Series Systems equivalent to, but not limited to, the following: CAJ4035, CAJ4054, WL4011, WL4034 by Hilti or CAJ4035, CBJ4023, WL4025, WL4030 by Grace.
2. Type of Fill Materials: One or more of the following:
a. Intumescent sealant.
b. Intumescent putty.
c. Silicone foam.
d. Pillows/bags.
e. Foam blocks.
f. Firestop mortar.
g. Polyurethane firestop foam.
J. Firestop Systems for Insulated Pipes (FS-7): Comply with the following:
1. Acceptable UL-Classified Systems with CAJ or WL 5000 Series Systems, equivalent to, but not limited to, the following: CAJ5091, WL5029 by Hilti or CAJ5222, WL5171 by Grace.
2. Type of Fill Materials: One or more of the following:
a. Intumescent sealant.
b. Silicone foam.
c. Intumescent wrap strips.
d. Pre-formed intumescent blocks.
e. Latex sealant.
K. Firestop Systems for Miscellaneous Electrical Penetrants (FS-8): Comply with the following:
1. Acceptable UL-Classified Systems with CAJ 6000 Series Systems equivalent to, but not limited to, the following: CAJ6006, CAJ 6017 by Hilti or CAJ6012, CAJ6013, CAJ6027 by Grace.
2. Type of Fill Materials: One or more of the following:
a. Intumescent sealant.
b. Latex sealant
c. Intumescent putty.
d. Mortar.
L. 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.
M. 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.

SECTION 078446 – FIRE-RESISTIVE JOINT SYSTEMS

1.1 SECTION INCLUDES
A. Joints in or between fire-resistance-rated constructions.
B. Joints at exterior curtain-wall/floor intersections.
C. Joints in smoke barriers.

1.1 MANUFACTURERS
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following without substitution:
1. Hilti, Inc.

1.2 FIRE-RESISTIVE JOINT SYSTEMS
A. Where required, 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 assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:
1. Joints include those installed in or between fire-resistance-rated walls floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide fire-resistive joint systems with rating determined by ASTM E 119 based on testing at a positive pressure differential of 0.01-inch wg or ASTM E 2307.
1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
D. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.
1. L-Rating: Not exceeding 5.0 cfm/ft of joint at 0.30 inch wg at both ambient and elevated temperatures.
E. VOC Content: Provide fire-resistive joint systems that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.
F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

1.3 INSTALLATION
A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
C. Install fill materials for fire-resistive joint systems by proven techniques.

SECTION 079200 – JOINT SEALANTS

1.1 SECTION INCLUDES
A. Sealants and joint backing.
B. Pre-compressed foam sealers.

1.2 SUBMITTALS
A. Product Data: Provide data indicating sealant chemical characteristics.

1.3 WARRANTY
A. Correct defective workmanship within a five year period after Date of Substantial Completion.
B. Correct defective materials for 5 years for urethane sealants and 20 years for silicone sealants.
C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

1.4 MANUFACTURERS
A. Silicone Sealants:
1. Bostik Inc: www.bostik-us.com.
2. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com.
3. Pecora Corporation: www.pecora.com.
4. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
5. Tremco Global Sealants: www.tremcosealants.com.
B. Polyurethane Sealants:
1. Bostik Inc: www.bostik-us.com.
2. Pecora Corporation: www.pecora.com.
3. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
C. Acrylic Sealants (ASTM C920):
1. Tremco Global Sealants: www.tremcosealants.com.
D. Acrylic Emulsion Latex Sealants:
1. Bostik Inc: www.bostik-us.com.
2. Pecora Corporation: www.pecora.com.
3. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
4. Tremco Global Sealants: www.tremcosealants.com.
E. Preformed Compressible Foam Sealers:
1. EMSEAL Joint Systems, Ltd: www.emseal.com.
2. Sandell Manufacturing Company, Inc: www.sandellmfg.com.
3. Dayton Superior Corporation: www.daytonsuperior.com.
4. Tremco Global Sealants: www.tremcosealants.com.

1.5 SEALANTS
A. Type AL-A - Acoustical Sealant: Butyl or acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
1. Product: BA-98 manufactured by Pecora.
B. Type AL - Acrylic Sealant: ASTM C 920, Grade NS, Class 12-1/2, Uses NT, M, A, O; single component, solvent curing, non-staining, non-bleeding, non-sagging.
1. Color: Standard colors matching finished surfaces.
2. Product: Sonolac manufactured by Sonneborn.
3. Movement Capability: Plus and minus 12-1/2 percent.
4. Service Temperature Range: -13 to 180 degrees F.
5. Shore A Hardness Range: 25 to 50.
C. Type U-MC – Non-sag Polyurethane Sealant: ASTM C 920, Grade NS, Class 25, Uses NT, I, M, A, G, O; single component, chemical curing, non-staining, non bleeding, capable of continuous water immersion, non-sagging type.
1. Color: Standard colors matching finished surfaces.
2. Product: NP-2 manufactured by Sonneborn.
3. Movement Capability: Plus and minus 25 percent.
4. Service Temperature Range: -40 to 180 degrees F.
5. Shore A Hardness Range: 20 to 35.
D. Type U-SL - Self-Leveling Polyurethane Sealant: ASTM C 920, Grade P, Class 25, Uses T, I, M, A, O; single component, chemical curing, non staining, non bleeding, capable of continuous water immersion, self-leveling type.
1. Color: Color as selected.
2. Product: SL-2 manufactured by Sonneborn.
3. Movement Capability: Plus and minus 25 percent.
4. Service Temperature Range: -40 to 180 degrees F.
5. Shore A Hardness Range: 20 to 35.
E. Type S-GP - Silicone Sealant: ASTM C 920, Grade NS, Class 25, Uses NT, A, G, M, O; single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding.
1. Color: Standard colors matching finished surfaces.
2. Product: 795 manufactured by Dow Corning.
3. Movement Capability: Plus and minus 25 percent.
4. Service Temperature Range: -65 to 180 degrees F.
5. Shore A Hardness Range: 15 to 35.
F. Type S-S - Silicone Sealant: ASTM C 920, Grane NS, Class 25, Uses NG, A, G, M, O; single component, non-sagging, non-staining, sanitary.
1. Color: Standard colors matching finished surfaces.
2. Product: 786 manufactured by Dow Corning.
3. Service Temperature Range: -65 to 180 degrees F.
4. Shore A Hardness Range: 15 to 35.

1.6 ACCESSORIES
A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
B. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width .
C. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

1.7 PREPARATION
A. Remove loose materials and foreign matter that could impair adhesion of sealant.
B. Clean and prime joints in accordance with manufacturer's instructions.
C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
D. Protect elements surrounding the work of this section from damage or disfigurement.

1.8 INSTALLATION
A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
B. Perform installation in accordance with ASTM C1193.
C. Perform acoustical sealant application work in accordance with ASTM C919.
D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer , except where specific dimensions are indicated.
E. Install bond breaker where joint backing is not used.
F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
H. Tool joints concave.
I. Pre-compressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

1.9 SCHEDULE
A. Exterior Joints for Which No Other Sealant Type is Indicated: Type S-GP.
B. Control and Expansion Joints in Paving: Type U-SL.
C. Interior Wall Expansion Joints: Type U-NS.
D. Exterior Wall Expansion Joints: Type S-GP.
E. Control, Expansion, and Soft Joints in Masonry, and Between Masonry and Adjacent Work: Type S-GP.
F. Lap Joints in Exterior Sheet Metal Work: Type S-GP.
G. Joints Between Exterior Metal Frames and Adjacent Work: Type S-GP.
H. Interior Joints for Which No Other Sealant is Indicated: Type AL.
I. Control and Expansion Joints in Interior Concrete Slabs and Floors: Type U-SL.
J. Joints Between Plumbing Fixtures and Walls and Floors, and Between Countertops and Walls: Type S-S.
K. In STC-Rated Walls, Between Metal Stud Track/Runner and Adjacent Construction: Type AL-A.

END OF SECTION

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

1.1 SUMMARY
A. Section includes standard hollow metal doors and frames.

1.1 QUALITY ASSURANCE
A. Source Limitations: Obtain hollow metal doors and frames from single source manufacturer.
B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 and UL10C, embossed labels are acceptable on standard 3 sided door frames.
1. Temperature-Rise Limit At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
D. Smoke-Control Door Assemblies: Comply with NFPA 105.

1.2 MANUFACTURERS (MCR FACILITY SPECIFIC)
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Manufacturers of current SDI membership:
1. Curries co. (Preferred)
2. CECO Corp.
3. Steelcraft; an Ingersoll-Rand company.

1.3 STANDARD HOLLOW METAL DOORS
A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
b. Steel-stiffened door at interior and exterior shipping and receiving locations.
c. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 11.when tested to ASTM C518 calculated and 3.0 when tested to ASTM C1363 operable.
1) Locations: All exterior doors, and as indicated on Door Schedule..
3. Vertical Edges for Single-Acting Doors:
a. Beveled Edges: 1/8 inch in 2 inches.
1) At meeting edges of pairs of doors bevel edge at active leaf, square edge at inactive leaf.
2) Universal hinge preps for reverse swinging of doors are not acceptable.
4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
7. Provide hollow metal doors with at least 30 percent total recycled; 10 percent post-consumer content.
B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush)).
C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 3 and Physical Performance Level B (Heavy Duty), Model 2 (Full Flush).
D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

1.4 STANDARD HOLLOW METAL FRAMES
A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
B. Exterior Frames: Fabricated from metallic-coated steel sheet.
1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as face welded joints and back weld joints continuously, unless otherwise indicated.
3. Frames for Level 3 Steel Doors: (14 gage) thick steel sheet.
C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile and face welded unless otherwise indicated.
3. Frames for Level 3 Steel Doors: (16 gage) - thick steel sheet.
4. Frames 48-inches and wider in opening width are required to me min. 14 gage thick steel sheet.
5. Frames for Wood Doors: (16 gage) thick steel sheet.
6. Frames for Borrowed Lights: (16 gage) thick steel sheet.
D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
E. Knock down frames are acceptable only where indicated or scheduled.

1.5 FRAME ANCHORS
A. Jamb Anchors:
1. Stud Anchors: Welded frames for installation in stud partitions shall be provided with welded in steel anchors of suitable design, not less than 18 gage thickness, secured inside each jamb as follows:
a. Frames up to 60-inch height: 2 anchors.
b. Frames greater than 60 inches up to 90 inches 4 anchors.
c. Frames greater than 90 inches up to 96 inches: 5 anchors.
d. Frames greater than 96 inches: 5 anchors plus one for each 24 inches or fraction thereof over 96 inches spaced at 24 inches maximum between anchors.
B. Floor Anchors: Formed from same material as frames, not less than 0.067 inch thick, and as follows:
1. Monolithic Concrete Slabs: Floor anchors shall be provided with two holes for fasteners and shall be fastened inside jambs with at least four spot welds per anchor.

1.6 STOPS AND MOLDINGS
A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.
B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed. Field cuts are not acceptable.
D. Cut-off (Sanitary) Stops (for healthcare environments only): Where indicated on door schedule/frame type, terminate stops 6 inches above finish floor with a 45 degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

1.7 FABRICATION
A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
C. Hollow Metal Doors:
1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (beyond edge of door on which astragal is mounted.
4. Continuous Hinge Reinforcement: Provide continuous 12 gage strap tack welded to door edge for continuous hinges specified in hardware sets in Div. 8 Door hardware, unless door has continuous steel channel for hinge reinforcement.
5. Electrical Raceways: Provide raceways to accommodate up to twelve (12) wires as required for electrified door hardware specified in hardware sets in Div. 8 Door Hardware.
6. Seamless Edge (Model 2): Provide seamless edge on hollow metal doors by intermittently tack welding seam, grinding smooth and finishing edge free from defects and blemishes.
D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops require wider dimension on glass side of frame.
4. Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 42-inch and wider with mortise/butt type hinges at top hinge location to deter against hinge reinforcement sag; required at all openings with automatic openers.
5. Continuous Hinge Reinforcement: Provide continuous 12 gage strap tack welded to frame stop for continuous hinges specified in hardware sets in Div. 8 Door hardware.
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
7. Provide A60 Galvannealed coating at frames in restrooms with showers/ Jacuzzi, clean areas such as surgery rooms and surgical suites, clean rooms, and soil rooms.
8. Electrical Knock Out Boxes: Factory weld 18 gage electrical knock out boxes to frame for electrical hardware preps; included to electrical thru wire hinges, electrical raceways, door position switches, electric strikes, jamb mount card readers, and magnet locks as noted in door hardware sets in Division 8 Door Hardware and security prints.
9. Electrical knock out boxes are required at door position switches, electric strikes, card readers, and middle hinge locations for all exterior locations regardless of electrical hardware specified in Division 8 Door Hardware and security prints.
a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
b. Conduit to be factory installed for electric hardware preps. Frames with factory installed conduit to have weld in place anchors.
c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 8 Door Hardware and security prints.
d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb, coordinate with hardware supplier
e. Provide conduit for standardized plug connectors to accommodate up to (12) wires for electrified door hardware specified in hardware sets in Division 8 Door Hardware and security prints.
10. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers as follows. Keep holes clear during construction. Silencers to be supplied by frame manufacturer regardless if specified in Div. 8 Door Hardware.
a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.
G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
6. Gap for butted or mitered joints in glass stop should not exceed .0625-inch.

1.8 STEEL FINISHES
A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

1.9 INSTALLATION
A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.

SECTION 081416 - FLUSH WOOD DOORS

1.1 SECTION INCLUDES
A. Solid-core doors with wood-veneer and plastic-laminate faces.
B. Factory finishing flush wood doors.
C. Factory fitting flush wood doors to frames and factory machining for hardware.

1.1 QUALITY ASSURANCE
A. Source Limitations: Obtain flush wood doors and wood paneling from single manufacturer.
B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated" for veneers faces and WDMA I.S.1-A, "Architectural Wood Flush Doors" for performance of the door. along with "WI's "Manual of Millwork."
C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
2. Indicate rating and listing agent with permanently attached label on edge of door, if continuous hinge is used adhere label on top of door.

1.2 WARRANTY
A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
c. Telegraphing of core construction and delamination of face in decorative laminated faced doors.
2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

1.3 DOOR CONSTRUCTION, GENERAL
A. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
B. Particleboard-Core Doors:
1. Particleboard: ANSI A208.1, Grade LD-1.
2. Agrifiber board: Straw-based particleboard complying with ANSI A208.1, Grade LD-2 or M-2, except for density.
3. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
a. 8-inch top-rail blocking, in doors indicated to have closers.
b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
c. 5-inch midrail blocking, in doors indicated to have exit devices.
4. Provide doors with structural-composite-lumber (SCL) cores instead of particleboard cores for the following door types:
a. Indicated to receive exit devices.
b. Doors with more than 40 percent of core removed.
c. Lock and Light cutout stiles less than 5 1/2 inches between cutouts.
d. Shipping and receiving doors.
C. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
D. Mineral-Core Doors:
1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
a. 8-inch top-rail blocking.
b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
c. 5-inch midrail blocking, in doors indicated to have armor plates.
d. 4-1/2-by-10-inch lock blocks, in doors indicated to have exit devices.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges exceeding WDMA.

1.4 PLASTIC-LAMINATE-FACED DOORS
A. Interior Solid-Core Doors:
1. Grade: Custom.
2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
3. Finishes: Refer to Master Schedule.
4. Exposed Vertical and Top Edges plastic laminate Plastic laminate edge before face.
5. Core: Particleboard and comply with section 2.2.
6. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before faces and crossbands are applied. Faces are bonded to core using a hot press.
7. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

1.5 LOUVERS AND LIGHT FRAMES
A. Metal Louvers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Air Louvers Inc.
b. Anemostat; a Mestek company.
c. Hiawatha Incorporated.
d. McGill Architectural Products.
e. Pemko Manufacturing Company, Inc.
2. Blade Type: Vision-proof, inverted V or inverted Y.
3. Metal and Finish: Galvanized steel, 0.040 inch thick, factory primed for paint finish with baked-enamel- or powder-coated finish.
B. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.
1. Manufacturers: Subject to compliance with requirements, provide door manufacturers standard louver meeting rating indicated.
2. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, factory primed for paint finish with baked-enamel- or powder-coated finish.
C. Metal Frames for Light Openings in Fire-Rated Doors over 20-minute rating: Manufacturer's standard frame formed of 0.048-inch- thick, cold-rolled steel sheet; with factory baked-enamel or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

1.6 FABRICATION
A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
1. Comply with requirements in NFPA 80 for fire-rated doors.
B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
C. Openings: Cut and trim openings through doors in factory.

1.7 FACTORY FINISHING
A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
B. Finish doors at factory.
C. Transparent Finish:
1. Grade: Premium.
2. Finish: Meets or exceeds TR6 finish performance requirements as per WDMA I.S. 1A
3. Staining: As selected by Architect from manufacturer's full range of custom colors.
4. Effect: Semi-filled finish, produced by applying an additional finish coat to partially fill the wood pores.
5. Sheen: Satin

1.8 INSTALLATION
A. Hardware: For installation, see Division 08 Section "Door Hardware."
B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

1.9 ADJUSTING
A. Operation: Rehang or replace doors that do not swing or operate freely.
B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2015 INTERNATIONAL CODES & 2014 NEC

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No.	Description	Date

STATE OF COLORADO
JOHN MENNO NAP
401729
LICENSED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
PROJECT SPECIFICATIONS

Sheet Number
G.202

RSN: *1156136*
Permit #: *2016 1191012*

SECTION 081420 – HIGH-IMPACT-RESISTANT WOOD DOORS

1.1 SUMMARY
A. This Section includes the following: High-impact-resistant wood doors.

1.2 SUBMITTALS
A. Product data, schedule indicating location, size, hardware sets, swing, elevation and construction details not included in product data.

1.3 QUALITY ASSURANCE
A. Comply with WDMA Industry Standard (I.S. 1A-04 "Architectural Wood Flush Doors").
1. Meet performance attributes for the following performance duty level: Extra Heavy Duty.
2. Tolerances for warp, telegraphing, squareness and prefitting dimensions as per the latest edition of WDMA I.S.1A-04.
B. Where fire rated doors are required, provide doors labeled by Intertek/Warnock Hersey. Construction details and hardware application shall be as approved by the labeling agency.

1.4 WARRANTY
A. Solid-Core Interior Doors: Provide manufacturer's limited lifetime written warranty guarantee against warpage, delamination and defects in materials and workmanship.
1. Life of installation.

1.5 MANUFACTURER AND PRODUCT
A. Construction Specialties, Inc.; Acrovyn Door Systems.

1.6 MATERIALS
A. Door Construction
1. Non Fire Rated Doors and 20-minute interior flush wood doors conforming to WDMA I.S.1A-04 and the following:
a. Thickness: 1-3/4 inch, plus or minus 1/16 inch.
b. Core: Solid, bonded core.
c. Crossbanding: FSC certified 0.125-inch tempered hardboard.
d. Fixed Vertical Door Stiles: 1-3/8 inch, before trimming, fixed hardwood interior stile bonded to core.
e. Replaceable Vertical Door Stiles: 3/4-inch replaceable custom hardwood stiles; field removable for easy replacement if damaged.
f. Replaceable Vertical Edges: Fully wrapped door edge; replaceable, exclusive of fasteners to improve appearance.
g. Horizontal Edges: Hardwood rails bonded to core.
h. WDMA I.S.1A-04 Performance Duty Level: Extra Heavy Duty.
i. Durability Performance: Cycle Slam WDMA TM-7, 1990 Extra Heavy Duty - 2,000,000 cycles to ensure durability of entire door construction.
2. Fire-Rated, 45 and 60-minute: Interior flush fire-rated doors conforming to WDMA I.A. 1-A and the following:
a. Thickness: 1-3/4 inch, plus or minus 1/16 inch.
b. Cores: Solid, bonded, non-combustible mineral composite
c. Crossbanding: FSC certified 0.125-inch tempered hardboard.
d. Fixed Vertical Door Stiles: 1-1/2 inch, before trimming, fixed mineral composite, fixed interior stile bonded to core.
e. Replaceable Vertical Door Stiles: ¾-inch replaceable custom stiles; field removable for easy replacement if damaged.
f. Replaceable Vertical Edges: Fully wrapped door edge; replaceable, exclusive of fasteners to improve appearance.
g. Horizontal Edges: Hardwood/mineral composite bonded to core.
h. WDMA I.S.1A-04 Performance Duty Level: Extra Heavy Duty
i. Durability performance: Cycle Slam WDMA TM-7, 1990 - 1,000,000 cycles to insure durability of entire door construction.
B. Door Faces:
1. Door faces to be high impact resistant Acrovyn finish:
a. Acrovyn base color integral throughout to eliminate discoloration caused by scratching.
2. Face Veneer Wear Index - Abrasion Resistance Testing - ASTM D4060-90: 28,000 cycles to prove out resistant to scuffing and scratching.
3. Face Veneer Impact Resistance – ASTM D 4226: 86 in/lb. to confirm impact resistance of face finish.
C. Door stiles to meet or exceed the following performance testing to ensure hardware fastener holding strength:
1. WDMA TM-8 "Hinge Loading Resistance" Extra Heavy Duty.
2. WDMA TM-10 Screw Holding Capacity" Extra Heavy Duty.
D. Door Edges:
1. Finish: Same as door faces.
2. Edges are to fully wrap the door vertical stiles to eliminate banded edges thus improving durability and impact resistance.
3. Door edges shall be exclusive of fasteners to improve appearance.
4. Edges must be flush with face of door thus eliminating raised edges that could be torn off.
5. Edges to include 1/4-inch radius edges to improve impact deflection. Square edges shall not be permitted.
6. Edges to be provided as part of the construction of the door from single source manufacturer.
E. Adhesives
1. Crossbanding to core adhesives shall be urea formaldehyde free Type II to improve structural integrity of door.
2. Door faces are to be applied to the crossbanded core using Type I urea formaldehyde free adhesives to eliminate delamination.
F. Cores
1. Non Rated Doors: Particleboard grade LD-2, 32 lb/ft3 density, CARB Phase I compliant.
2. 20-minute Doors: Particleboard grade LD-2, 32 lb/ft3 density, CARB Phase I compliant.
3. Fire-Rated Doors: Non-combustible mineral core construction 25-32 lb/ft3 density - no added urea formaldehyde content.

1.7 FABRICATION, GENERAL
A. Doors shall be prefit and beveled at the factory to fit the openings to reduce handling an onsite labor costs. Prefit tolerances shall be in accordance with the requirements of WDMA I.S.1A-04, latest edition.
B. For fire rated doors comply with clearance requirements of referenced quality standard for fitting in accordance with requirements listed in NFPA 80.
C. Coordinate measurements of hardware mortises in metal frames. Contractor or door distributor to verify dimensions and alignment before factory machining.
D. Factory machine doors for hardware that is not surface applied. Comply with final hardware schedules, door frame shop drawings, and hardware templates.
E. Light openings must be cut by the manufacturer or by a certified machining distributor.
F. To ensure proper fit of the doors bevel on both strike and hinge edges to be 1/8 inch in 2 inches.
G. Top and bottom rails shall be factory sealed with an approved wood sealer to eliminate moisture from entering into core thus eliminating warpage.
H. Blocking: provide blocking approved for use in doors of fire ratings indicated as needed to eliminate through-bolting for surface applied hardware.

1.8 ACCESSORIES
A. Glazing Stops
1. Non Rated: Metal vision frames.
2. Fire Rated: Metal vision frames.
B. Glass: Refer to Division 08 Section "Glazing" for glass types.

1.9 INSTALLATION
A. Adjust frames to plumb condition before door installation. Tolerances for warp, squareness, and pre-fitting dimensions shall be as per latest edition of WDMA I.S.1A-04.
B. Handle doors in accordance with recommendations of WDMA I.S.1A-04 "Care and Installation at Job Site."
C. Condition doors to average temperature and humidity in area of installation for not less than 48 hours prior to installation.
D. Install doors to comply with manufacturer's written instructions, referenced quality standard and as indicated.
1. Install fire rated doors in corresponding fire-rated frames according to NFPA-80 and ITS/WH requirements.
E. Factory fitted doors: Align in frames for uniform clearance at each edge.
F. Set doors plumb, level, square and true.
G. In the field trimming:
H. Trim door height by cutting door bottom edges to a maximum of 3/4 inch per NFPA 80.
I. Trimming of fire rated doors in width can only be done by the manufacturer or a certified machining distributor under special guidance of the manufacturer.
J. Drill pilot holes for screws and bolts using templates provided by hardware manufacturer.
K. Exercise caution when drilling pilot holes and installing hinges so that pilot holes are not over drilled and screws are not over torqued. Follow manufacturer's installation instructions.
L. Reseal exposed tops and bottom rails of any doors that required site alteration with an approved wood sealer.
M. Hardware installation: See Division 08 Section "Door Hardware."
N. Clean prefinished doors with a rag in concert with water or a household cleaner such as Fantastik, Formula 409, or a comparable product approved by door manufacturer. Following use of the cleaner, the cleaned surface should be "rinse wiped" with clean water and wiped dry to remove any remaining residue.
O. ADJUSTING
P. Operating: Re-hang or replace doors that do not swing or operate freely.
Q. Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
R.

END OF SECTION

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2015 INTERNATIONAL CODES & 2014 NEC

08/19/16

SECTION 087100 - DOOR HARDWARE

1.1 QUALITY ASSURANCE
A. Door Hardware Installer Qualifications: An experienced and factory trained Installer who has completed both standard and electrified builders hardware and integrated access control installations 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.
B. Door Hardware Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity which is not more then a half day of travel from the jobsite and who employs a qualified Architectural Hardware Consultant or equivalent experience available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
C. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant (AHC) and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
D. Source Limitations: Obtain each type and variety of aluminum, steel and wood door hardware from the same single source manufacturer and supplier, unless otherwise indicated.
E. Fire-Rated Door Assemblies: Furnish door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.
1. Test Pressure: Positive pressure labeling.

1.1 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. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of standard, electrified hardware and access control hardware that fails in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
C. Warranty Period: Two year from date of Substantial Completion, unless otherwise indicated.
D. Special Warranty Periods:
1. Five years for mortise locksets.
2. Five years for exit devices.
3. Ten years for manual door closers.
4. One year for electromechanical door hardware.
5. Five years for Thresholds, Door Sweeps, Gasketing, Perimeter Weatherstripping.
E. Extended Warranty: As requested by either the Owner furnish a separate optional extended warranty and maintenance contract for access control system and power assist operated openings. Version upgrades and "fix" releases to the software, beyond the general warranty time period, are available at no extra charge only if the end user is under a valid extended warranty and maintenance contract.

1.2 MAINTENANCE SERVICE
A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools to Owner and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
B. Maintenance Service: Beginning at Substantial Completion, furnish six months' full maintenance by skilled employees of door hardware suppliers and installers. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Furnish parts and supplies as used in the manufacture and installation of original products.

1.3 HINGES AND PIVOTS
A. Standards: BHMA Certified products complying with the following:
1. Butts and Hinges: BHMA A156.1.
2. Continuous Geared Hinges: BHMA A156.26.
3. Pivots: BHMA A156.4.
4. Template Hinge Dimensions: BHMA A156.7.
5. Self-Closing Hinges: BHMA A156.17.
6. Floor Hinges: BHMA A156.4.
B. Quantity: Furnish the following, unless otherwise indicated:
1. Two Hinges: For doors with heights up to 60 inches
2. Three Hinges: For doors with heights 61 to 90 inches
3. Four Hinges: For doors with heights 91 to 120 inches
4. For doors with heights more than 120 inches, furnish 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
C. Pivot Hinges: Furnish 3/4" offset, single acting pivots with one intermediate pivot for doors less than 91 inches high and two intermediate pivots for doors between 91 inches and 121 inches in height. Space intermediate pivots equally not less than 25 inches on center apart or not more than 35 inches on center for doors over 121 inches high.
D. Floor Pivots: Furnish 3/4" offset, single acting floor closer complete with top and intermediate pivots according to manufacturer's recommendation. Options include availability for use on fire labeled; lead lined and extra heavy weight doors. Furnish independent and adjustable valves for closing speed, latch speed, and backcheck with built in dead stop and hold open features as specified.
1. Flush Floor Plates and Thresholds: Furnish finish cover plates or thresholds as indicated in door hardware sets for floor hinges. Match door hardware finish, unless otherwise indicated.
E. Hinge Size: Furnish the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
F. Hinge Weight and Base Material: Unless otherwise indicated, furnish the following:
1. Exterior Doors: Heavy weight, non-ferrous, ball bearing hinges.
2. Interior Doors: Heavy weight, ball bearing hinges unless Hardware Sets indicate standard weight.
a. Standard weight hinges can be used at Mechanical, Electrical, IDF, Data, and Offices with out closers openings, regardless of specified hinge weight in hardware sets.
G. Hinge Height Clarifications: Where uneven door leafs occur, the widest door leaf in the pair determines the height and weight of the hinges on the inactive and active door leafs; to ensure equal size hinges on opening.
H. Hinge Weight Clarification: If heavy weight hinges are specified in hardware sets for interior aluminum frames then standard weight hinges can be used. If aluminum frame opening has a door 42 inches or greater then provide an additional hinge in lieu of heavy weight or 5 inch hinges.
I. Hinge Options: Comply with the following where indicated in the Door Hardware Schedule or on Drawings:
1. Non-removable Pins: Furnish set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
a. Out-swinging exterior doors.
b. Out-swinging access controlled doors.
2. Electric Hinges: Furnish electric transfer hinges with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Furnish sufficient number of concealed wires to accommodate electric function of specified hardware.
J. Continuous-Geared Hinges (Aluminum): Minimum 0.120-inch thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame. Fabricate hinges non-handed and to template screw locations. Continuous hinges guaranteed for the life of the opening.
K. Continuous Barrel Hinges (Stainless Steel): Hinges to be made of 14 GA. type 304 Stainless Steel with concealed Teflon-coated stainless steel pin, and twin self-lubricated nylon bearings at each 2 inch knuckle. Fabricate hinges non-handed and to template screw locations.
L. Accessible Electrical Transfer Continuous Hinges: Furnish electric transfer continuous hinges with a 12" removable hinge modification accessible without de-mounting door from the frame and standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Furnish sufficient number of concealed wires to accommodate electric function of specified hardware.
M. Electrical Power Transfer: Furnish EPT where it is required per exit device manufactures requirements and warranty for more then 1 amp of inrush for latch retraction of exit device bolt. Furnish prep in door, frame, and continuous hinge. Furnish a secure and unobtrusive means of channeling electrical wiring from the door frame into the door itself by concealing internal wires for low voltage electrified door hardware. Furnish an Electrical Power Transfer fully manufactured with metal.
1. Acceptable Manufacturers:
a. Securitron Door Controls (SN) – EL-CEPT-12/22 series
b. Von Duprin (VO) – EPT-10 Series
N. Furnish mortar guard enclosure on frames at each electrical hinge location specified.

1.4 DOOR BOLTS
A. Standards: Comply with the following:
1. Surface Bolts: BHMA A156.16.
2. Automatic and Self-Latching Flush Bolts: BHMA A156.3.
3. Manual Flush Bolts: BHMA A156.16.
B. Surface Bolts and Flush Bolts: BHMA Certified Grade 1.
C. Furnish bolts with top rod of sufficient length to allow bolt location approximately six feet from the floor regardless if detailed as such in hardware sets. Furnish dust proof strikes for bottom bolts. Surface bolts to be 8" in length, unless otherwise noted and U.L. listed for labeled fire doors.
D. Furnish Self-Latching flush bolts as follows:
1. Access control inactive door leaf.
2. Uneven inactive door leaf.
E. Bolt Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:
1. Mortise Flush Bolts: Minimum 3/4-inch throw.

1.5 LOCKS AND LATCHES
A. Standards: Comply with the following:
1. Mortise Locks and Latches: BHMA A156.13.
2. Bored Locks and Latches: BHMA A156.2.
3. Interconnected Locks and Latches: BHMA A156.12.
4. Auxiliary Locks: BHMA A156.5.
B. Mortise Locks: BHMA Certified Grade 1, Series 1000.
C. Bored Locks: BHMA Certified Grade 1, Series 4000.
D. Interconnected Locks: BHMA Certified Grade 2, Series 5000.
E. Auxiliary Locks: BHMA Certified Grade 1.
F. Lock Trim: Match the following design style:
1. Levers:
a. Best Access System (BE) – 15H/15D
b. Corbin Russwin Hardware (CR) - NSA/NZD
c. Sargent Manufacturing (SA) – LNL/LL
d. Schlage (SC) – 06A/RHO
G. Lock Functions: Function numbers and descriptions indicated in the Door Hardware Schedule comply with the following:
1. Mortise Locks: BHMA A156.13.
2. Bored Locks: BHMA A156.2.
3. Interconnected Locks: BHMA A156.12.
H. Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:
1. Mortise Locks: Minimum 3/4-inchlatchbolt throw, with stainless steel bolt.
2. Bored Locks: Minimum 1/2-inchlatchbolt throw, 3/4" latchbolt throw at fire rated pairs.
3. Deadbolts: Minimum 1-inch bolt throw.
I. Backset: 2-3/4 inchesunless otherwise indicated.

1.6 ELECTRIFIED LOCKS
A. Electromagnetic Locks: Electromagnetic locks shall be heavy duty, surface mounted type conforming to ANSI A156.23, Grade 1 with a minimum holding force of 1,200 lbs.. Locks shall be capable of either 12 or 24 voltage and be UL listed for use on fire rated door assemblies. Electronics are to be fully sealed against tampering and allow exterior weatherproof applications. As indicated in hardware sets, furnish specified mounting brackets and housings. Power supply to be by the same manufacturer as the lock with combined products having unlimited lifetime warranty.
1. Surface Mount Electromagnetic Locks (Fail Safe):
a. Folger Adam EDC (FO) - FAM60 Series.
b. Securitron Door Controls (SE) - M62 Series.
c. Security Door Controls
2. Concealed Mount Electromagnetic Locks (Fail Safe):
a. Folger Adam EDC (FO) - FASAM Series.
b. Securitron Door Controls (SE) - SAM Series.
c. Security Door Controls

1.7 CYLINDERS AND KEYING
A. Furnish Patented, High, Security cylinders utilizing a unique factory code pattern that is both geographically and time zoned protected. A letter of authorization under the letterhead of the End User must accompany purchases of any products which involve patented cylinders, keys and accessories. Manufacturers of patented security cylinders to allow the ability for both security and conventional cylinders to be used together under the same facility master or grandmaster key system. The End User is required to have the ability for on-site cylinder pinning and original key cutting.
B. Standards: Comply with the following:
1. Cylinders: BHMA A156.5.
2. Key Control System: BHMA A156.5.
C. Cylinder Grade: BHMA Certified Grade 1.
D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
1. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware.
E. Construction Keying: Comply with the following:
1. Construction Master keying: Furnish temporary construction master keyed cores that are replaceable by permanent cores. Furnish construction master keys in quantity as required by project Contractor.
F. Keying System: Unless otherwise indicated, furnish for a keying system complying with the following requirements:
1. New Grand Master Key System: Cylinders are factory keyed operated by a change key, master key, and a grand master key. Conduct keying meeting with End User to define and document keying system instructions and requirements.
G. Keys: Furnish nickel-silver keys complying with the following:
1. Stamping: Permanently inscribe each key with a visual key control number and as directed by Owner.
2. Quantity: Furnish the following:
a. Cylinder Change Keys (Per Key Set): Four.
b. Master Keys (Per Level): Five.
c. Grand Master Keys: Two.
d. Construction Control Keys: Two.
e. Permanent Control Keys: Two.
f. Extra Keyed Permanent Cores: Ten.
g. Extra Blank Keys: Fifty.
H. Key Registration List: Furnish keying transcript list to Owner's representative for lock cylinders.
I. Key Control System: Furnish one lockable cabinet for key control and storage for up to 150 percent capacity, type and model to be determined in the keying meeting with the owner. Furnish End User with one copy of "Key Wizard" key management software program.

1.8 STRIKES
A. Standards: Comply with the following:
1. Strikes for Bored Locks and Latches: BHMA A156.2.
2. Strikes for Mortise Locks and Latches: BHMA A156.13.
3. Strikes for Interconnected Locks and Latches: BHMA A156.12.
4. Strikes for Auxiliary Deadlocks: BHMA A156.5.
5. Dustproof Strikes: BHMA A156.16.
6. Electric Strikes: BHMA A156.5.
B. Strikes: Furnish manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Furnish manufacturer's special strike box fabricated for aluminum framing.
C. Furnish electrified products with an in-line power controller that enables the hardware to operate from 12 to 32 volts. On board safety features shall include an in-line fuse to protect the hardware and host system from any possible reverse current surges. The controller shall regulate current to furnish continuous duty operation without the typical head build up. Adding the in-line power controller with electrified products furnishes unlimited lifetime warranty of electrified products.

1.9 MULTI-POINT DEVICES
A. Standard: BHMA A156.3.
B. Multi-Point (Exit) Devices: BHMA Certified Grade 1.

1.10 ACCESSORIES FOR PAIRS OF DOORS
A. Standards: Comply with the following:
1. Coordinators: BHMA A156.3.

1.11 CLOSERS and POWER OPERATORS
A. Standards: Comply with the following:
1. Closers: BHMA A156.4.
2. Power Operators: BHMA A156.19.
B. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Furnish non-handed, factory-sized closers adjustable to meet field conditions and requirements for opening force.
C. Closer Options: As indicated in hardware sets, furnish door closer options including: delayed action, hold open arms, extra duty parallel arms, positive stop/hold open arms, compression stop/hold open arms, special mounting brackets, spacers and drop plates. Through bolt type mounting is required as indicated in the door hardware sets. Where through bolts are used, coordinate the color of bolt on opposite of device with BHMA finish color similar to the color of door finish surface.
1. Furnish Delayed Action (DA) feature in closers at Laboratories, Shipping and Receiving doors and where cart traffic is active.
2. Furnish shock absorbing arm such as Spring or Rubber Cushion at exterior outswing openings.
D. Power assist operators as surface mounted, electric low energy type conforming to ANSI A156.19 requirements and capable of meeting ANSI A117.1 guidelines. Outputs and relays required to be on board in the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.
1. Outputs and relays on board the operator allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.
2. Electronic Controls to be microprocessor controlled unit shall control the operation and switching of the swing power operator. The electronic control furnished with low voltage power supply for all means of actuation. Electronic encoder to determine absolute open and close position.

1.12 OPERATING and PROTECTIVE TRIM UNITS
A. Standard: Comply with BHMA A156.6.
B. Materials: Fabricate protection plates from the following:
1. Brass/Bronze and Stainless Steel: .050 inchesthick, beveled four sides (B4E) with countersunk screw holes.
C. Push-Pull Design: 1" Round with 10" Centers. Furnish 90 degree offset pulls at exterior openings.
D. Fasteners: Furnish manufacturer's designated fastener type as indicated in door hardware sets.
E. Furnish protection plates sized 2 inchesless than door width (LDW) on push side and 1 inch less door width on pull side by height specified in door hardware sets.
F. Coordinate stainless steel hinges, door edges, kickplates and armor plates with less then .09375 inches between meeting edges, regardless of specified sizes in hardware sets.

1.13 STOPS AND HOLDERS
A. Standards: Comply with the following:
1. Stops and Bumpers: BHMA A156.16.
2. Electromagnetic Door Holders: BHMA A156.15.
3. Combination Overhead Holders and Stops: BHMA A156.8.
4. Door Silencers: BHMA A156.16.
B. Stops and Bumpers: BHMA Certified Grade 1.
C. Electromagnetic Door Holders for Labeled Fire Door Assemblies: Coordinate with fire detectors and interface with fire alarm system. Magnetic door holders shall meet or exceed ANSI A156.15 and be UL listed 228 for Door Closer and Holders, with or without integral smoke detectors. Holding force shall be 25 to 40 pounds and shall be fail-safe. Pushpin release that eliminates residual magnetism shall be standard. Furnish magnetic hold-opens with triple-voltage coil that can receive 12 VDC, 24 VAC/DC, or 120VAC; or coordinate required voltage with electrical. Subject to compliance with requirements, furnish products by one of the following:
1. Rixson Hardware (RX) - 980 Series.
2. LCN (LC) – SEM7800 Series.
D. Combination Overhead Stops and Holders: Certified BHMA Grade 1.
1. Rixson Hardware (RX) – 1 Concealed and 9 Surface Series.
E. Provide Overhead Concealed stops at public spaces such as conference, corridors, and office spaces where wall or floor stops are not applicable condition.
F. Provide Overhead Surface stops at non-public spaces such as mechanical, electrical, storage spaces.
G. Floor Stops: For doors, unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic.
1. Where floor or wall stops are not appropriate, furnish overhead stops.
H. Silencers for Metal Door Frames: BHMA Grade 1; neoprene or rubber, minimum diameter 1/2 inchfabricated for drilled-in application to frame. Furnish (3) per single door and (2) per paired door frame if applied gasketing is not specified in Hardware Sets.

1.14 DOOR, GASKETING
A. Standard: Comply with BHMA A156.22.
B. General: Furnish continuous weatherstrip seal on exterior doors and smoke, light, or sound gasketing on interior doors where specified. Furnish non-corrosive fasteners for exterior applications.
1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame. Install header seal before mounting door closer arms.
2. Meeting Stile Astragals: Fasten to meeting stiles, forming seal when doors are closed.
3. Door Sweep: Apply to bottom of door, forming seal with threshold when door is closed.
C. Basic Sound Seal Requirement: Whether indicated on the drawings or not, furnish gasketing MCKS88BL at sound rated wall types and at the following areas for limiting of sound transmission: private offices, exams, conference, private toilets, corridor openings, rooms and similar sound sensitive area.
D. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
1. Furnish smoke labeled perimeter gasketing at all smoke labeled openings.
E. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
1. Intumescent Seals and Gasketing: Furnish concealed, Category A type gasketing systems on assemblies where an intumescent seal is required to meet IBC and UL-10C positive pressure labeling.
F. Provide Meeting Edges and Astragals at Pairs of Doors:
1. Meeting Edge Astragal Pair (Set) with Exit Devices and Cross Corridor Doors, and fire rated pairs:
a. Pemko Manufacturing (PE): 18041CNB
2. Meeting Edge Overlapping Astragal at with Doors with Bolts:
a. Pemko Manufacturing (PE): 355CPK

1.15 POWER SUPPLIES
A. Power Supplies: Furnish Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Modular unit in NEMA ICS 6, Type 4 enclosure. Furnish the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment. Third party listed and labeled for use with fire alarm systems. Power supply shall be furnished with a minimum of four (4) 4 Amp/hour batteries providing battery back up. An integral battery charging circuit shall be standard. Furnish key locking cover to prevent tampering. Furnish all control boards and relay panels to sufficiently operate the opening as described and intended per hardware sets. Subject to compliance with requirements, furnish products by one of the following:
1. Boxed Power Supplies:
a. Securitron Door Controls (SE) - BPS Series.

1.16 ELECTRIC DOOR CORDS
A. Electric Door Hardware Cords: Furnish electric transfer wiring with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Furnish sufficient number of concealed wires to accommodate electric function of specified hardware. Furnish a connector for through-door electronic locking devices and another one for hinge to junction box above the opening. Wire nut connections are not acceptable at low voltage electrified hardware. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified door:
1. McKinney: Inner Door Cord 3 inches: QC-C003P
2. McKinney: Inner Door Cord 3 foot door: QC-C206P
3. McKinney: Inner Door Cord 4 foot door: QC-C306P
4. McKinney: Inner Door Cord 15 feet: QC-C1500P
5. McKinney: Hinge to Junction Panel 15 feet: QC-C1500P
6. Furnish one each of the following tools as part of the base bid contract:
a. McKinney: Hand Tool for Connectors: QC-R003

1.17 ELECTRIC WALL MOUNT KEYSWITCHES
A. Key Switches shall be furnished on a stainless steel single gang face plate with a 12/24VDC bi-color LED and an integral backing bracket that shall permit integration with any 1.25" or 1.125" mortise cylinder. Key Switches shall be available for momentary or maintained action and in narrow stile designs. Subject to compliance with requirements, furnish products by one of the following:
1. Electric Wall Mount Key Switches
a. Securitron Door Controls (SE) – MK Series

1.18 FABRICATION
A. Fasteners: Furnish door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Furnish screws according to manufacturers recognized installation standards for application intended.
1. Furnish manufactures templated and approved stainless steel screws and fasteners for stainless steel hardware specified in the hardware sets.
B. Mounting Accessories: Furnish drop plates, filler brackets, extended length screws, through bolts, and accessories for complete mounting with door, frame, light kits, applied molding and special applications as part of the base bid with complete installation per manufactures recommendations.
1. In healthcare facilities install surface mount magnetic locks on the pull side of the doors when specified in hardware sets and located on openings in corridors. Furnish all mounting brackets with finish and beauty covers.

1.19 FINISHES
A. Standard: Comply with BHMA A156.18.
B. Furnish quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable and temporary protective covering before shipping to jobsite.
D. Finishes on locksets, latchsets and exit devices to incorporate an FDA recognized antimicrobial coating (MicroShield™) listed for use on medical and food preparation equipment that will suppress the growth and spread of a broad range of bacteria, algae, fungus, mold and mildew.
E. Furnish clear powder coat finish at exit devices located on exterior openings such as gates and at pool exit doors.

1.20 EXAMINATION
A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
B. Examine roughing-in for electrical source power to verify actual locations of wiring connections before electrified door hardware installation.
C. Proceed with installation only after unsatisfactory conditions have been corrected.
D. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

1.21 INSTALLATION
A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
C. Furnish and coordinate concealed wood blocking for wall mount stops as detailed in Door Hardware Schedule.
D. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

1.22 FIELD QUALITY CONTROL
A. The Contractor shall comply with AIA A201 1997 section 3.3.1 which reads as follows: "The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the contract Documents give other specific instructions concerning these matters."
B. Field Inspection: Supplier and Door Hardware Manufacturer will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

SECTION 088000 - GLAZING

1.1 PERFORMANCE REQUIREMENTS
A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

1.1 QUALITY ASSURANCE
A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
C. Source Limitations for Glass: Obtain insulating glass from single source from single manufacturer for each glass type.

1.2 WARRANTY
A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years from date of Substantial Completion.
B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
1. Warranty Period: 10 years from date of Substantial Completion.

1.3 GLASS PRODUCTS, GENERAL
A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

1.4 GLASS PRODUCTS
A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition 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. For uncoated glass, comply with requirements for Condition A.
3. For coated vision glass, comply with requirements for Condition C (other coated glass).

1.5 LAMINATED GLASS
A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

1.6 FIRE-PROTECTION-RATED GLAZING
A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies.

1.7 GLAZING GASKETS
A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1.8 GLAZING SEALANTS
A. General:
1. Compatibility: Provide 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. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Dow Corning Corporation; 790.
b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. Pecora Corporation; 890.
d. Tremco Incorporated; Spectrem 1.
C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Dow Corning Corporation; 795 .
b. GE Advanced Materials - Silicones; SilGlaze II SCS2800.
c. Pecora Corporation; 864 .
d. Tremco Incorporated; Spectrem 2.
D. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

1.9 GLAZING TAPES
A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

1.10 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.

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

1.1 PERFORMANCE REQUIREMENTS
A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.1 FRAMING SYSTEMS
A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.
B. Studs and Runners: Comply with ASTM C 645.
1. Steel Studs and Runners: Minimum base-metal thickness:
a. 25 gage unless indicated otherwise on Drawings or below.
b. Interior Metal Stud/Gypsum Board Assemblies, Typical Locations: Withstand lateral loading (air pressure) of 5 psf with deflection limit not more than L/240 of partition height.
c. Interior Metal Stud/Gypsum Board Assemblies at Atriums, Lobbies, Service Corridors, Exit Corridors, Elevator Lobbies, Vertical Shafts, and walls receiving plaster veneer: Withstand lateral loading (air pressure) of 7.5 psf with deflection limit not more than L/360 of partition height
d. Interior Metal Stud/Gypsum Board Assemblies at Locations with Ceramic Tile or Other Hard Surface Finishes: Withstand typical lateral loading (air pressure) with deflection limit not more than L/360 of partition height
e. Where wall mounted equipment, woodwork, and casework items are indicated or elsewhere as shown on Drawings, provide minimum 16 gage studs
f. At partitions scheduled to receive tile backing panels or ceramic tile finish, provide minimum 22 gage studs
g. At jambs of openings provide two minimum 20 gage studs
h. Refer to Division 5 for stud framing for studs carrying heavy vertical loads (manufactured stone masonry, stone tile thicker than ¾ inch, etc)
i. Depth: As indicated on Drawings.
C. Head Joints: Provide one of the following at all partitions that extend to underside of structure:
1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
a. Products: Subject to compliance with requirements, provide one of the following:
b. Manufacturer's standard deep leg track for non fire rated partitions.
c. Dietrich Metal Framing; SLP-TRK Slotted Deflection Track (for non-rated partitions)
d. Fas Track, CEMCO (for fire rated partitions only).
D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.012 inch.
E. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.
1. Depth: As indicated on Drawings.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.018 inch.
2. Depth: 7/8 inch
G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical.
H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 3/4 inch
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.0312 inch
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

1.2 SUSPENSION SYSTEMS
A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
B. Hanger Attachments to Concrete:
1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
a. Type: Post-installed, expansion anchor.
2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.1055 inch in diameter.
D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch- wide flanges, ASTM A653-A (653M), G40 hot dipped galvanized coating.
1. Depth: 2-1/2 inches
E. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
2. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep.
a. Minimum Base-Metal Thickness: 0.018 inch
3. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.
a. Configuration: Asymmetrical.
F. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Products: Subject to compliance with requirements, provide one of the following:
a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. Chicago Metallic Corporation; Drywall Grid System.
c. USG Corporation; Drywall Suspension System.

1.3 AUXILIARY MATERIALS
A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
B. Isolation Strip at Exterior Walls: Provide the following:
1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

1.4 INSTALLATION, GENERAL
A. Installation Standard: ASTM-C754.
1. Gypsum Board Assemblies: Also comply with requirements in ASTM-C840 that apply to framing installation.
B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
C. Install bracing at terminations in assemblies.
D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

1.5 INSTALLING FRAMED ASSEMBLIES
A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1.6 INSTALLING SUSPENSION SYSTEMS
A. Install suspension system components according to spacing indicated, but not greater than spacing required by referenced installation standards for assembly types.
1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 16 inches o.c.
B. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
C. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
D. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

SECTION 092900 - GYPSUM BOARD

1.1 PERFORMANCE REQUIREMENTS
A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119, UL, or by an independent testing agency as indicated on Drawings.
B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency as indicated on Drawings.

1.1 GYPSUM BOARD, GENERAL
A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

1.2 INTERIOR GYPSUM BOARD
A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. USG Corporation.
B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch.
2. Long Edges: Tapered.
C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces
1. Core: 5/8 inch, Type X or as otherwise indicated on partition type Drawings.
2. Long edges tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274

1.3 TILE BACKING PANELS
A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
1. Products: Subject to compliance with requirements, provide one of the following:
a. USG Fiberrock Aqua-Tough Tile Backer Board.
2. Core: 5/8 inch, Type X.
3. Mold Resistance: ASTM D 3273, score of 10.

1.4 TRIM ACCESSORIES
A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
B. Specialty Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
1. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.

1.5 JOINT TREATMENT MATERIALS
A. General: Comply with ASTM C 475/C 475M.

1.6 AUXILIARY MATERIALS
A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inchthick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
D. Acoustical Joint Sealant: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products: Subject to compliance with requirements, provide one of the following:
a. USG Corporation; SHEETROCK Acoustical Sealant.
2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1.7 APPLYING AND FINISHING PANELS, GENERAL
A. Comply with ASTM C840, GA-216-2007

1.8 APPLYING INTERIOR GYPSUM BOARD
A. Install interior gypsum board in the following locations (unless noted otherwise):
1. Type X: Vertical surfaces unless otherwise indicated.
2. Flexible Type: Apply in double layer as required by project conditions at curved assemblies.
3. Abuse-Resistant Type: As indicated on Drawings.
4. Moisture- and Mold-Resistant Type: Within 36" of and surrounding damp locations where tile backer board is not used.
5. Glass-Mat Interior Type: at damp locations such as tub, individual shower, kitchens and utility rooms. Cement Backer Board: At critical areas of high humidity, including hot tubs, steam rooms, indoor pools, saunas, and gang showers.

1.9 APPLYING TILE BACKING PANELS
A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions. Install with 1/4-inch gap where panels abut other construction or penetrations.

1.10 INSTALLING TRIM ACCESSORIES
A. Control Joints: Install control joints at locations indicated on Drawings, and according to ASTM C 840 and in specific locations approved by Architect for visual effect, and as follows:
B. Wall: Control joints shall be installed where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet, or 900 ft2
C. Ceiling with Perimeter relief: Control joints in interior ceilings with perimeter relief shall be installed so that linear dimensions between control joints do not exceed 50 ft or 2500 sq. ft
D. Ceiling, without perimeter relief: Control joints in interior ceilings without perimeter relief shall be installed so that linear dimensions between control joints do not exceed 30 ft
E. At acoustical or fire rated walls: Where a control joint occurs in an acoustical or fire rated system, blocking shall be provided behind the control joint by using a backing material such as 5/8 in. type X gypsum panel products, mineral fiber, or other tested equivalent
F. Interior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. Curved-Edge Cornerbead: Use at curved openings.
G. Aluminum Trim: Install in locations indicated on Drawings.

1.11 FINISHING GYPSUM BOARD
A. Prefill open joints, rounded or beveled edges, and damaged surface areas.
B. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
C. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Warehouse storage areas.
3. Level 3: Beneath wall covering.
4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
a. Primer and its application to surfaces are specified in other Division 09 Sections.
5. Level 5: Where indicated on Drawings.
a. Primer and its application to surfaces are specified in other Division 09 Sections.

END OF SECTION

SECTION 095113 – ACOUSTICAL PANEL CEILINGS

1.1 QUALITY ASSURANCE
A. Source Limitations:
1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
2. Suspension System: Obtain each type through one source from a single manufacturer.
B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
a. Smoke-Developed Index: 450 or less.

1.1 ACOUSTICAL PANELS, GENERAL
A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

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Structural
Structural Consultants Inc

No.	Description	Date

State of Colorado — Licensed Architect — 401729
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
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Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
PROJECT SPECIFICATIONS

Sheet Number
G.203

RSN: 1156136
Permit #: 2016 1191012

B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.
C. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

1.2 METAL SUSPENSION SYSTEMS, GENERAL
A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.
E. Hold-Down Clips: Where indicated, and at exterior locations, and with 10 feet of an exterior door, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.
F. Clean-Room Gasket System: Where indicated in schedule, provide manufacturer's standard system, including manufacturer's standard gasket and related adhesives, tapes, seals, and retention clips, designed to seal out foreign material from and maintain positive pressure in clean room.

1.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING
A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Armstrong World Industries, Inc.
2. Certainteed.
3. Chicago Metallic Corporation.
4. USG Interiors, Inc.
B. Unless noted otherwise in schedule, provide Wide-Face, Double-Web,Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation, with prefinished 15/16-inch- wide metal caps on flanges.
1. Structural Classification: Intermediate -duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
3. Face Design: Flat, flush.
C. Aluminum Grid: For use in MRI rooms.

1.4 ACOUSTICAL SEALANT
A. Products: Subject to compliance with requirements, provide one of the following:
1. Acoustical Sealant for Exposed and Concealed Joints:
a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
b. USG Corporation; SHEETROCK Acoustical Sealant.
B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, non-staining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
C. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

1.5 INSTALLATION
A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

1.1 RESILIENT BASE
A. Resilient Base Standard: ASTM F 1861.
1. Material Requirement: Type TS (rubber, vulcanized thermoset).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe) at hard surfaces; straight (flat or toeless) at carpet.
B. Minimum Thickness: 0.125 inch.
C. Lengths: Coils in manufacturer's standard length.
D. Outside Corners: Job formed.
E. Inside Corners: Job formed.
F. Finish: Satin.

1.1 RESILIENT MOLDING ACCESSORY
A. Description: Cap for cove resilient floor covering, Carpet edge for glue-down applications, Reducer strip for resilient floor covering, Joiner for tile and carpet, Transition strips.
B. Material: Rubber.

1.2 INSTALLATION MATERIALS
A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
a. Cove Base Adhesives: Not more than 50 g/L.
b. Rubber Floor Adhesives: Not more than 60 g/L.
C. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

1.3 RESILIENT BASE INSTALLATION
A. Comply with manufacturer's written instructions for installing resilient base.
B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

1.4 RESILIENT ACCESSORY INSTALLATION
A. Comply with manufacturer's written instructions for installing resilient accessories.

1.5 CLEANING AND PROTECTION
A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
B. Perform the following operations immediately after completing resilient product installation:
1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.
C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
1. Apply two coat(s).
E. Cover resilient products until Substantial Completion.

SECTION 096516 - RESILIENT SHEET FLOORING

1.1 QUALITY ASSURANCE
A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.
1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.

1.1 VINYL SHEET FLOOR COVERING
A. Unbacked Vinyl Sheet Floor Covering: ASTM F 1913, 0.080 inchthick, as indicated by product designations.
B. Vinyl Sheet Floor Covering with Backing: ASTM F 1303, as indicated by product designations.
1. Type (Binder Content): Type I, minimum binder content of 90 percent.
2. Wear-Layer Thickness: Grade 1.
3. Overall Thickness: As standard with manufacturer.
C. Wearing Surface: Smooth.
D. Sheet Width: As standard with manufacturer.
E. Seaming Method: Heat welded.

1.2 INSTALLATION MATERIALS
A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
1. Use adhesives that have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
C. Seamless-Installation Accessories:
1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
1) Color: Match floor covering.
D. Integral-Flash-Cove-Base Accessories: As indicated in Master Schedule.
1. Cove Strip: 1-inch radius provided or approved by manufacturer.
2. Cap Strip: Square metal, vinyl, or rubber cap provided or approved by manufacturer.
3. Corners: Metal inside and outside corners and end stops provided or approved by manufacturer.
E. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

1.3 PREPARATION
A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
B. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft.in 24 hours.
b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
D. Do not install floor coverings until they are same temperature as space where they are to be installed.
1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

1.4 FLOOR COVERING INSTALLATION
A. Comply with manufacturer's written instructions for installing floor coverings.
B. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
C. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.
D. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
E. Seamless Installation:
1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.
F. Integral-Flash-Cove Base: Cove floor coverings up vertical surfaces a dimension as indicated. Support floor coverings at horizontal and vertical junction by cove strip. Butt at top against cap strip.
1. Install metal corners at inside and outside corners.

1.5 CLEANING AND PROTECTION
A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.
B. Perform the following operations immediately after completing floor covering installation:
1. Remove adhesive and other blemishes from floor covering surfaces.
2. Sweep and vacuum floor coverings thoroughly.
3. Damp-mop floor coverings to remove marks and soil.
C. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish. Apply two coats.

SECTION 096519 - RESILIENT TILE FLOORING

1.1 SOLID VINYL FLOOR TILE
A. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
B. Wearing Surface: Smooth.
C. Thickness: 0.125 inch.
D. Size: 12 by 12 inches.

1.1 VINYL PLANKS
A. Vinyl Plank Flooring: Meeting ASTM F 1700.
1. Class: As indicated by product designations.
2. Type: Type B, embossed surface.
3. Thickness: 0.080 inch minimum.
4. Size: 3 by 36 inches.

1.2 INSTALLATION MATERIALS
A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
b. Rubber Floor Adhesives: Not more than 60 g/L.
C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

1.3 PREPARATION
A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
B. Concrete Substrates: Prepare according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft.in 24 hours.
b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
D. Do not install floor tiles until they are same temperature as space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

1.4 FLOOR TILE INSTALLATION
A. Comply with manufacturer's written instructions for installing floor tile.
B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
1. Lay tiles in pattern indicated on Drawings..
C. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
D. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

1.5 CLEANING AND PROTECTION
A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
B. Perform the following operations immediately after completing floor tile installation:
1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.
C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
1. Apply per manufacturer's recommendation.
E. Cover floor tile until Substantial Completion.

SECTION 098116 – ACOUSTICAL BLANKET INSULATION

1.1 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.

1.1 ACOUSTICAL INSULATION
A. Unfaced Mineral-Fiber Blanket Insulation (in walls): ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
B. Unfaced, Flexible Glass-Fiber Board Insulation (above ceilings): ASTM C 612, Type IA; ASTM C 553, Types I, II, and III; or ASTM C 665, Type I; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; and of the following properties:
1. Nominal density of 1.0 lb/cu. ft., thermal resistivity of 3.7 deg F x h x sq. ft./Btu x in. at 75 deg F.
2. Nominal density of not less than 1.5 lb/cu. ft. nor more than 1.7 lb/cu. ft., thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F.
3. Combustion Characteristics: Passes ASTM E 136.

1.2 INSTALLATION
A. 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, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.

SECTION 099100 - PAINTING

1.1 QUALITY ASSURANCE
A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with 3 years experience.
B. Applicator: Company specializing in commercial painting and finishing with 2 years experience.
C. Product Labels: Include manufacturer's name, type of paint, stock number, color and label analysis on label of containers.

1.1 REGULATORY REQUIREMENTS
A. Conform to applicable building code for flame spread/fuel contribution/smoke development rating requirements for finishes.
B. Comply with applicable city, county, state, and federal requirements and ordinances regarding maximum VOC (Volatile Organic Compound) content of all coatings.

1.2 TESTS
A. Provide periodic testing with Wet Film Thickness gage to verify that proper thickness of finish coatings are being applied.

1.3 FIELD SAMPLES
A. Provide field sample panel, 96 inches long by 96 inches wide, illustrating each coating color, texture, and finish intended for use.
B. Locate where directed.
C. Accepted sample may remain as part of the Work.

1.4 MANUFACTURERS
A. Acceptable Manufacturers: Subject to compliance with requirements indicated, provide products of one of the following:
1. Basis of Design: Sherwin-Williams.
B. Materials selected for coating systems for each type surface shall be product of a single manufacturer unless otherwise specified. Secondary products such as linseed oil, turpentine and shellacs shall be first quality products of a reputable manufacturer.

1.5 MATERIALS
A. Coatings: Ready mixed. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating with good flow and brushing properties; capable of drying or curing free of streaks or sags.
B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.
C. Patching Materials: Latex filler.

1.6 INTERIOR PAINT SCHEDULE
A. Drywall (Gypsum):
1. Latex: 1 coat Sherwin Williams ProMar 400 Zero VOC Interior Latex Primer, 2 coats Sherwin Williams ProMar 400 Zero VOC Interior Latex Paint.
B. Galvanized Metal:
1. N/A
C. Shop Primed Ferrous Metal:
1. Acrylic Latex: 1 coat Sherwin Williams Pro Industrial Pro-Cryl Universal Acrylic Primer, 2 coats Sherwin Williams ProMar 400 Zero VOC Interior Latex Paint.

1.7 PREPARATION
A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces or finishing.
B. Correct minor defects and clean surfaces which affect work of this Section. Remove existing coatings which exhibit loose surface defects.
C. Shellac and seal marks which may bleed through surface finishes.
D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
F. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
G. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid- alkali balance is achieved. Allow to dry.
H. Gypsum Board Surfaces: Latex fill minor defects. Spot prime defects after repair.
I. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
J. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
K. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
L. Uncoated Steel and Iron Surfaces: Remove grease, scale, dirt, and rust. Where heavy coatings of scale are evident, remove by wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
M. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.
N. Aluminum with Alodine Finish: Clean by lightly scuff with sandpaper. Remove all dust.
O. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
P. Interior Wood Items Schedule to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
Q. Shop Finished Items: Finish in accordance with AWI standards and guide lines.
R. Wood and Metal Doors Scheduled for Painting: Seal top and bottom edges with primer.

1.8 SURFACE PREPARATION OF PREVIOUSLY COATED SURFACES
A. General:
1. Remove cracked and deteriorated sealants and calking.
2. Remove chalk deposits and loose, blistered, peeling, scaling, or crazed finish to bare base material or sound substrate by scraping and sanding.
3. Wash surfaces with solution of TSP to remove wax, oil, grease, and other foreign material; rinse, and allow to dry. Exercise caution that TSP solution does not soften existing coating.
4. Abrade glossy surfaces by sanding or wiping with liquid de-glosser.
5. Remove mildew as specified above.
6. Test compatibility of existing coatings by applying new coating to small, inconspicuous area. If new coatings lift or blister existing coatings, request recommendation from Architect.
7. Apply specified primer to surfaces scheduled to receive coatings.
B. Gypsum Wallboard:
1. Fill cracks and voids with spackling compound.
2. Apply primer over bare surfaces and newly applied texture coatings.
C. Metal:
1. Remove rust from surfaces to bare metal in accordance with SP3 "Power Tool Cleaning".
2. Exercise care not to remove galvanizing.
3. Complete preparation as specified for new work.

1.9 APPLICATION
A. The intent of these Specifications is to produce the highest quality appearance of paint and finish surfaces. Employ skilled mechanics only. The proper preparation of all surfaces will be strictly enforced and wherever finished surfaces show any defects due to improper preparation, workmanship, etc., the defects shall be removed and the work refinished at the expense of the Contractor.
B. Apply products in accordance with manufacturer's instructions. Final finish coats shall have visual evidence of solid hiding and uniform appearance, and shall be free and smooth of brush marks, streaks, sags, runs, laps, or skipped areas.

1.10 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT
A. Paint shop primed equipment. Paint shop prefinished items where exposed to view in finished spaces. In mechanical rooms, repair shop pre-finished coatings which have been scratched or otherwise damaged with identical touch-up paint. Sand prior to touching up as required.
B. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
C. Paint grilles, registers, diffusers, and speaker grilles to match adjacent wall and ceiling surfaces, except that factory pre-finished items need not be painted if installed in a suspended acoustical ceiling system where the acoustical panels match the mechanical or electrical item color.
D. In finished spaces, prime and paint exposed pipes, conduit, boxes, ducts, hangers, brackets, collars and supports. Paint to match adjacent surfaces.
E. Repair or replace identification markings on mechanical or electrical equipment when painted accidentally.
F. Paint interior surfaces of air ducts and convectors that are visible through grilles and louvers with one coat of flat black paint, to limit of sight line. Paint dampers exposed behind louvers, grilles, and convector to match face panels.
G. Paint surfaces of plywood backboards for electrical and telephone equipment before installing equipment.
H. Replace electrical plates, hardware, light fixture trim, and fittings removed prior to finishing.
I. Paint exposed air handlers, roof ventilators, goose necks, exhaust fans and other items on the roof with 2 coats exterior enamel. Prepare surfaces in accordance with the base metal or primer as specified herein.
J. Paint concrete support bases with gray floor deck enamel.
K. Pipe hangers and other supports need not be painted except where installed in crawl spaces, where they shall be painted with a thick coat of asphaltic paint.

SECTION 102600 - WALL AND DOOR PROTECTION

PART 1 - GENERAL
1.1 SUMMARY
A. Section Includes:
1. Corner guards.
2. Protective wall coverings.
1.2 QUALITY ASSURANCE
A. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.

PART 2 - PRODUCTS
2.1 MATERIALS
A. PVC Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout; extruded and sheet material, thickness as indicated.
1. Impact Resistance: Minimum 25.4 ft-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
2. Chemical and Stain Resistance: Tested according to ASTM D 543.
3. Self-extinguishing when tested according to ASTM D 635.
4. Flame-Spread Index: 25 or less.
5. Smoke-Developed Index: 450 or less.
B. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft-lbf/in. of notch when tested according to ASTM D 256, Test Method A.
C. Fasteners: Aluminum, nonmagnetic stainless-steel, or other non-corrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
D. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2.2 CORNER GUARDS
A. Surface-Mounted, Resilient, Plastic Corner Guards [Insert drawing designation]: Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
1. Cover: Extruded rigid plastic, minimum 0.100-inch wall thickness; as follows:
a. Profile, Color, Texture, Height: As scheduled.
b. Basis of Design: As scheduled.
2. Retainer: Minimum 0.060-inch- thick, one-piece, extruded aluminum.
3. Retainer Clips: Manufacturer's standard impact-absorbing clips.
4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
B. Surface-Mounted, Metal Corner Guards: Fabricated from one-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.
1. Material: Stainless steel, Type 304.
a. Thickness: Minimum 0.0500 inch.
b. Finish: Directional satin, No. 4.
2. Wing Size: Refer to Finish Legend.
3. Corner Radius: 1/8 inch.
4. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes.
2.3 IMPACT-RESISTANT WALL COVERINGS
A. Impact-Resistant Sheet Wall Covering: Fabricated from plastic sheet wall-covering material.
1. Size: 48 by 120 inches for roll.
2. Sheet Thickness: 0.060 inch.
3. Color, Texture, Height: As scheduled.
4. Trim and Joint Moldings: Extruded rigid plastic that matches sheet wall covering color.
5. Mounting: Adhesive.
2.4 FABRICATION
A. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 - EXECUTION
3.1 INSTALLATION
A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
1. Install impact-resistant wall protection units in locations and at mounting heights indicated on Drawings.
B. Impact-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

END OF SECTION

SECTION 104400 – FIRE PROTECTION SPECIALTIES

1.1 SECTION INCLUDES
A. Fire protection cabinets for portable fire extinguishers.
B. Portable fire extinguishers.

1.2 QUALITY ASSURANCE
A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
B. 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.
C. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
D. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.3 MATERIALS
A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
C. Sheet: ASTM B 209.
D. Stainless-Steel Sheet: ASTM A 666, Type 304.
E. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

1.4 FIRE EXTINGUISHER CABINET
A. Cabinet Type: Suitable for fire extinguisher.
1. Manufacturer: Subject to compliance with requirements, provide products by one of the following:
a. J. L. Industries, Inc., a division of Activar Construction Products Group.
b. Larsen's Manufacturing Company.
c. Potter Roemer LLC.
B. Cabinet Construction: Non-rated in non-rated walls; 1-or- 2-hour fire rated in rated walls to match rating of wall..
1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch- thick, cold-rolled steel sheet lined with minimum 5/8-inch-thick, fire-barrier material. Provide factory-drilled mounting holes.
C. Cabinet Material: Steel sheet.
1. Shelf: Same metal and finish as cabinet.
D. Semi-recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
E. Cabinet Trim Material: Stainless steel sheet.
F. Door Material: Stainless-steel sheet.
G. Door Style: Vertical duo panel with frame.
H. Door Glazing: Tempered float glass (clear).
I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
1. Provide projecting lever handle with cam-action latch.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
J. Accessories:
1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locateas directed by Architect.
a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
b. Location: Applied to cabinet door.
c. Application Process: Decals.
d. Lettering Color: Black.
e. Orientation: Vertical.
K. Finishes:
1. Exterior of cabinet , door, and trim except for those surfaces indicated to receive another finish:
a. No. 4 stainless steel.
2. Interior of cabinet and door: Baked enamel.

1.5 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS
A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
b. Larsen's Manufacturing Company.
c. Potter Roemer LLC.
2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
B. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1.6 INSTALLATION
A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
1. Fire Protection Cabinets: Mount such that top of fire extinguisher inside is not more than 48 inches above finished floor.
B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
C. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
D. Identification: Apply vinyl lettering at locations indicated.

END OF SECTION

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2015 INTERNATIONAL CODES & 2014 NEC

SECTION 123661 – SIMULATED STONE COUNTERTOPS

1.1 SECTION INCLUDES
A. Countertops

1.2 QUALITY ASSURANCE
B. Fabricator Qualifications: Company specializing in fabricating engineered stone surfacing material with minimum 5 years experience.
C. 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 1 per ASTM E 84 including:
a. Flame Spread: 25 or less.

1.3 WARRANTY
D. Manufacturer's 10 year warranty for materials and labor to repair or replace defective materials.

1.4 MATERIALS
E. Solid Surfacing: Nonporous surfacing material composed of a unique blend of natural minerals and high-performance acrylic meeting the following criteria:
1. Wear and Cleanability: Passes per ASI Z124.3.
2. Abrasion Resistance: No loss of pattern per NEMA LD3-3.01 and ANSI Z 124.3; weight loss, 1,000 cycles, 0.2 gm; wear, 10,000 cycles, 0.008 inches.
3. Boiling Water Surface Resistance: No change per NEMA LD3-3.05.
4. High Temperature Resistance: No change per NEMA LD3-3.06.
5. Conductive Heat Resistance: No change per NEMA LD3-3.08.
6. Impact Resistance, Notched Izod: 0.28 ft-lbs/in of notch per ASTM D 256, Method A.
7. Impact Resistance, Ball Drop: 3/4 inch thick sheet, 36 inches with 1/2 pound ball, no failure per NEMA LD3-3.03.
8. Stain Resistance: Passes, Rating-41, modified with additional stains used, per ANSI Z124.3.
9. Weatherability: No change, 1000 hours, per ASTM D 1499.
10. Fungi and Bacteria: No attack per ASTM G 21, G 22.
11. Water Absorption: 3/4 inch sheet, 0.04 percent after 24 hours, 0.94 percent long term, per ASTM D 570.
12. Flammability: Solid colors per ASTM E 84.
a. Flame Spread: Less than 5.
b. Smoke Developed: Less than 15.
c. Class Rating: 1.
13. Thickness: 1/2 inch unless noted or scheduled otherwise.
14. Colors, Sheen, and Basis of Design: As scheduled.

1.5 MISCELLANEOUS MATERIALS
F. Adhesives and Cements: Non-staining, type as recommended by engineered stone manufacturer.
1. Waterproof, permanent material which will not induce mildew and fungus growth.
G. Joint Sealants: Two part color matched polyester knife grade adhesive.

1.6 FABRICATIONS
H. Assemble work at shop and deliver to job ready for installation. Manufacture in largest practical lengths with seams in least conspicuous locations.
I. Fabricate work square and to required lines.
J. Recess and conceal fasteners, connections, and reinforcing.
K. Design construction and installation details to allow for expansion and contraction of materials. Properly frame material with tight, hairline joints held rigidly in place.
L. Comply with adhesive manufacturer's recommendations for adhesive shelf life, pot life, working life, mixing, spreading, assembly time, time under pressure and ambient temperatures.
M. Fabricate countertops with backsplash and side splashes to profiles indicated or detailed.
N. Fabricate items to profiles shown with connections and supports as detailed or as required for proper installation per manufacturer's recommendations.
O. 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.
P. Do not exceed manufacturer's recommended unsupported overhang distances.
Q. Finish exposed surfaces smooth and polish to a sheen indicated.
R. Radius corners and edges.

1.7 INSTALLATION
S. Install in accordance with manufacturer's printed instructions and approved shop drawings. Provide templates and rough in measurements.
T. Install surfacing true in line and plane, level, rigid and solidly adhered to substrate.
U. Pre-fit items: Adjust supports to make fit. Align joints over support framing.
1. Provide intermediate supports to that material will not span more than 3 feet in any direction.
2. Cantilevers shall not exceed 12 inches without supplementary support.
V. Apply dabs of mastic on supports; place items on supports and attach.
W. Install with minimum number of joints practical, using full-length pieces from maximum lengths available. Cope at returns and square at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Radius cutouts with minimum 3/8 inch corner radius.
X. Install splashes using adhesive. Apply adhesive to back surface only. Place thin bead of seam adhesive along edge where splashes seat.

1.8 TOLERANCES
Y. Variation in Component Size: Plus or minus 1/8 inch over 10'-0" length.
Z. Location of Openings: Plus or minus 1/8 inch from indicated location.
AA. Install countertops level to within 1/8 inch in 10 feet.
AB. Allow minimum 1/16 inch clearance between edges of countertops and adjacent walls.
AC. Maximum Offset From True Position: 1/8 inch.

SECTION 134900 – RADIATION PROTECTION

1.1 SUMMARY
A. Section Includes: Lead sheet, strip and plate, lead glass, lead-lined gypsum board, hollow frames, **wood doors**, observation windows.
1.2 PERFORMANCE REQUIREMENTS
A. Provide materials and workmanship, including joints and fasteners, which maintain continuity of radiation protection at all points and in all directions equivalent to materials specified in thicknesses and locations indicated.
1. Materials, thicknesses, and configurations indicated are based on radiation protection design prepared by Owner's radiation health physicist. This design is available to Contractor on request.
B. Lead-Lined Assemblies: Unless otherwise indicated, provide lead thickness in doors, door frames, window frames, penetration shielding, joint strips, film transfer cabinets, and other items located in lead-lined assemblies not less than that indicated for assemblies in which they are installed.
C. Lead Glazing: Unless otherwise indicated, provide lead equivalence not less than that indicated for assembly in which glazing is installed.
1.3 SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: Show layout of radiation-protected areas. Indicate lead thickness or lead equivalence of components. Show components and installation conditions not fully dimensioned or detailed in product data.
1. Show ducts, pipes, conduit, and other objects that penetrate radiation protection; include details of penetrations.
1.4 QUALITY ASSURANCE
A. Installer Qualifications: Fabricator of products.
B. Fire-Rated and Smoke-Control Door and Frame Assemblies: Comply with Division 08 Section "Hollow Metal Frames".
C. Glazing: Comply with requirements in Division 08 Section "Glazing."
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. Preinstallation Conference: Conduct conference at Project site.
1.5 MATERIALS
A. Lead Sheet, Strip, and Plate: ASTM B 749, alloy UNS No. L51121 (chemical-copper lead).
B. Lead Glass: Lead-barium, polished float glass containing not less than 60 percent heavy metal oxides, including not less than 48 percent lead oxide by weight.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Amerope Enterprises, Inc.
b. McGrory Glass, Inc.
c. Schott North America, Inc.
2. Safety Glass: Fully tempered float glass.
a. Outer Lite: Clear float glass; not less than 1/8 inch thickness.
b. Interlayer: Clear polyvinyl butyral or cured resin of manufacturer's standard thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
c. Inner Lite: Lead-barium, polished float glass; not less than 1/8 inch thickness.
C. Lead-Lined Gypsum Board: 5/8-inch- thick gypsum board complying with Division 09 Section "Gypsum Board," of width and length required for support spacing and to prevent cracking during handling, and with a single sheet of lead laminated to the back of the board.
1. Provide 3-inch- wide lead strips for wrapping metal stud flanges.
2. Provide 2-inch- wide lead strips for backing joints.
3. Provide 5/8-inch lead disks for covering screw heads.
D. Accessories and Fasteners: Provide manufacturer's standard fasteners and accessories as required for installation, maintaining same lead equivalence as rest of system.
E. Asphalt Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
F. Asphalt Felt: ASTM D 226.
1.6 LEAD-LINED STEEL HOLLOW-METAL DOOR FRAMES
A. General: Steel door frames complying with ANSI/NAAMM-HMMA 861, except 0.0667 inch thick, and lined with lead sheet of thickness not less than that required for doors and walls where frames are used.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Accurate Radiation Shielding, Inc.
b. A & L Shielding Inc.
c. El Dorado Metals, Inc.
d. Fluke Biomedical; Radiation Management Services.
e. Mayco Industries; a Metalico company.
f. NELCO, Inc.
g. New Shield.
h. Radiation Protection Products, Inc.
i. Ray-Bar Engineering Corp.
2. Provide additional reinforcements and internal supports to adequately carry the weight of lead-lined doors. Install reinforcements and supports before installing lead lining.
3. 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. Fabricate lead lining wide enough to maintain an effective lap with lead of adjacent shielding.
4. Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
a. Color and Gloss: As selected by Architect from manufacturer's full range.
1.7 LEAD-LINED WOOD DOORS
A. General: Flush solid-core wood doors with lead lining, thickness not less than that required for partition in which door is installed.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Algoma Hardwoods, Inc.
b. Ampco, Inc.
c. Eggers Industries; Architectural Door Div.
d. Marshfield DoorSystems, Inc.
e. V-T Industries Inc.
f. A & L Shielding Inc.
g. NELCO, Inc.
h. New Shield.
i. Radiation Protection Products, Inc.
2. Door Construction: Veneer face, five ply, bonded particleboard core.
3. Door Construction: Plastic-laminate face, three ply, bonded particleboard core.
4. Lead Lining: One or more continuous sheets of lead extending from top to bottom and edge to edge, constructed either in the core or between the core and faces, at manufacturer's option.
5. Comply with Division 08 Section "Flush Wood Doors" for grade, faces, veneer matching, fabrication, finishing, and other requirements unless otherwise indicated.
6. Faces: Plastic laminate complying with NEMA LD 3, Grade HGS.
a. Color, Patterns, and Finishes: To match other surrounding doors.
7. Shield cutouts for locksets with lead sheet of same thickness used in door. Lap lining of cutouts with door lining.
8. Prepare doors to receive observation windows louvers; cut and trim openings through doors in factory. Provide removable wood stops for glazed openings.
9. Provide lead-lined astragals for pairs of doors.
10. Factory fit doors to suit frame openings indicated with 1/16-inch clearance at heads and jambs and minimum clearance at bottom. Factory machine doors for hardware not surface applied.
1.8 LEAD-LINED OBSERVATION-WINDOW FRAMES
A. General: Fabricate from 0.043-inch- thick, formed-steel sheet or 0.064-inch- 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 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.
1.9 INFORMATIONAL SIGNS
A. Informational Signs, General: Fabricate signs by engraving lettering in high-pressure-laminate engraving stock with contrasting face and core. Machine engrave copy using high-speed cutters mechanically positioned by master templates for accurately formed letters, numbers, and symbols.
1. Color: As selected by Architect from manufacturer's full range of colors.
2. Provide copy or as directed. Provide signs of sufficient size to contain required information.
3. Indicate lead equivalence in millimeters and heights of radiation protection in inches.
1.10 DOOR AND DOOR FRAME FABRICATION
A. Hardware Preparation: Factory prepare doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1.11 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.
B. Proceed with installation only after unsatisfactory conditions have been corrected.
1.12 INSTALLATION OF LEAD-LINED GYPSUM BOARD
A. Install with long edge parallel to supports and lead lining facing supports. Provide blocking at end joints. Install using construction adhesive and supplementary fasteners.
B. Fastening to Metal Supports: Use steel drill screws spaced as recommended in writing by gypsum board manufacturer. Install lead strips covering face of framing and wrap around flange to cover points of screws.
1. Where possible, install lead-lined gypsum board before installing gypsum board on other side of partition, and do not fold lead strips back over inside of flange until after lead-lined gypsum board is applied.
C. Fastening to Metal Supports: Use steel drill screws spaced as recommended in writing by gypsum board manufacturer. Apply lead disks over screw heads and recess flush with surface of board.
1. Install lead strips, 1-1/2 inches wide minimum and same thickness as lead lining, to face of supports and blocking where joints occur. Secure lead strips with construction adhesive. Provide shims at intermediate supports.
2. Apply lead disks recessed flush with surface of board over heads of screws securing trim.
D. Two-Layer System: Apply a facing sheet of gypsum board vertically over base sheet using laminating adhesive recommended in writing by gypsum board manufacturer. Offset joints in finish layer from joints in base layer and fasten at top and bottom of sheet to support finish panel until adhesive has set.
1. Locate fasteners above ceiling or behind wall base and cover fasteners with lead disks recessed flush with surface of board.
E. Openings: Extend lead-lined gypsum board into frames of openings, lapping lead lining with lead frames or frame linings at least 1 inch. Arrange board around openings so neither horizontal nor vertical joints occur at corners of openings.
F. 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.
1.13 INSTALLATION OF LEAD-LINED DOORS AND DOOR FRAMES
A. Install lead-lined steel doors door frames according to Division 08 Section "Hollow Metal Frames."
1. Apply a coat of asphalt mastic or paint to lead lining in door frames where lead will come in contact with masonry or grout.
B. Install lead-lined wood doors according to Division 08 Section "Flush Wood Doors."
C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with door manufacturer's written instructions.
D. Frames: Comply with HMMA 840 unless otherwise indicated. Except for frames located in existing walls or partitions, place frames before constructing walls. Set frames accurately in position, plumb, and brace securely until permanent anchors are set.
1. Provide three anchors per jamb, located adjacent to hinge on hinge jamb and at corresponding heights on strike jamb.
2. In masonry construction, use wire or T-strap anchors and apply a coat of asphalt mastic or paint to lead lining where lead will come in contact with masonry or grout.
3. In metal stud construction, use wall anchors attached to studs with screws.
E. Lap lead lining of frames over lining in walls at least 1 inch.
F. Lead Lining of Frames: Line inside of frames with lead of thickness not less than that required in doors and walls where frames are used. Form lead 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.
G. Install doors in frames level and plumb, aligned with frames and with uniform clearance at each edge.
H. Line astragals with lead sheet.
I. Hardware: Line covers, escutcheons, and plates to provide effective shielding at cutouts and penetrations of frames and doors. See Division 08 Section "Door Hardware" for other installation requirements.
J. Touch up damaged finishes with compatible coating after sanding smooth.
K. Operation: Rehang or replace doors that do not swing or operate freely. Check and readjust operating hardware items, leaving doors and frames undamaged and in proper operating condition.
1.14 INSTALLATION OF LEAD-LINED OBSERVATION WINDOWS
A. Install observation windows according to manufacturer's written installation instructions.
1. Apply a coat of asphalt mastic or paint to lead lining in frames where lead will come in contact with masonry or grout.
B. Install windows level, plumb, square, true to line, and anchored securely in place to structural support.
C. Install leaded side of frame on radiation side of wall. Lap lead lining of frames over lining in walls at least 1 inch.
D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with manufacturer's written instructions.
1.15 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.
D. Outlet Boxes and Conduit: Cover or line with lead sheet lapped over adjacent lead lining at least 1 inch. Wrap conduit with lead sheet for a distance of not less than 10 inches from box.
E. Duct Openings: Unless otherwise indicated, line or wrap ducts with lead sheet for distance from partition/ceiling equal to three times the largest opening dimension. Lap lead sheet with adjacent lead lining at least 1 inch.
F. Piping: Unless otherwise indicated, wrap piping with lead sheet for a distance of not less than 10 inches from point of penetration.
1.16 FIELD QUALITY CONTROL
A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections after radiology equipment has been installed and placed in operating condition.
B. Correct deficiencies in or remove and replace radiation protection that inspection reports indicate does not comply with specified requirements.

END OF SECTION

RSN: 1156136
Permit #: 2016 1191012

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Structural
Structural Consultants Inc
3400 East Bayaud Ave., #300
Denver CO, 80209
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No.	Description	Date

STATE OF COLORADO
JOHN MENNO
401729
LICENSED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION
1501 S Potamac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
PROJECT SPECIFICATIONS

Sheet Number
G.204

08/19/16

X-RAY SHIELDING DESIGN CALCULATIONS

AND RECOMMENDATIONS

PROJECT:
Philips Allura FD20 Biplane
New Cardiac Catheterization Lab 3
The Medical Center of Aurora
1501 S Potomac Ave
Aurora, CO 80012

CONTACT:

Thomas Hecker
The Medical Center of Aurora
Thomas.hecker@healthonecares.com

Nathan Busse, M.S., DABR, QE #238
Medical Radiation Physicist

July 21, 2016
Date

All required shielding is identified on attached layout. Calculations and assumptions are outlined in the report. For further information, please call Nathan Busse at (502) 758-1093 or email at busse.nathan@gmail.com

RADIOGRAPHIC SHIELDING

PREFACE

These calculations are done according to, and consistent with recommendations contained in the National Council on Radiation Protection and Measurements (NCRP) Report No. 49 entitled, "Structural Shielding Design and Evaluation for Medical Use of X-rays and Gamma Rays of Energies up to 10 MeV" and Report No. 147 "Structural Shielding Design for Medical Imaging Facilities". The calculations herein are based on a design limit of 20 µGy/week to members of the general public and 100 µGy/week to occupationally exposed workers whose dose is monitored. This is consistent with 10 CFR Part 20, State of Colorado Regulations 6 CCR 1007, and with the International Commission on Radiological Protection Publication No. 26 to keep exposures "As Low As Reasonably Achievable" (ALARA).

FACILITY ASSUMPTIONS

1. Walls are assumed to include two 5/8 inch gypsum sheets, with a 3 inch interspace. Doors are assumed to be 2 inch thick and of solid core construction. Windows are assumed to be glass or acrylic. Windows are assumed to have zero lead equivalence.

2. This portion of the building is slab on grade. The area above the CCL room is a mechanical penthouse with 5-6" concrete slab floor.

3. The occupancy factor (T) is often assumed to be greater than it actually is. This conservative estimate will allow for the occupancy to be upgraded without the need for shielding modifications.

4. Patient workload is assumed to be 20 exams per 40-hour work week times two (to account for the biplane system).

SHIELDING SPECIFICATIONS

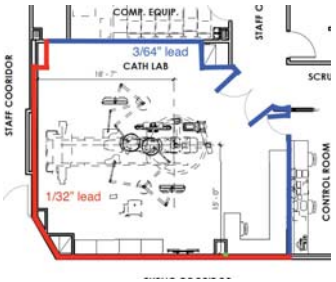
1. Window thickness shall be specified in millimeter lead equivalence (mm Pb e.q.), and for the control area will be at least that of the surrounding wall, 1.19 mm lead (3/64"). For the nursing desk window thickness will be at least 1.58 mm (1/16"). Door thicknesses shall be specified in millimeter lead equivalence (mm Pb e.g.), and will be at least that of the surrounding wall. For the double-door entry to the room and the door to the control area, this is 1.19 mm lead (3/64").

2. The lead shielding shall extend to a height of seven feet. All joints between lead shall be overlapped. All cutouts and openings in the lead will be backed and baffled with lead of at least equivalent thickness.

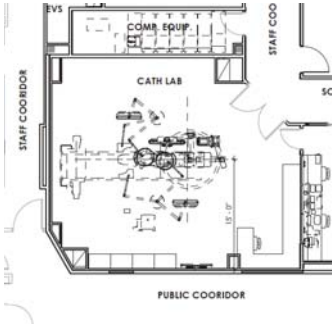
3. It is important to note that the recommended shielding is the minimum thickness required. However, it may turn out that a thicker lead is less expensive or more easily available. In that case, it is advisable to use the thicker lead as a cost-effective alternative.

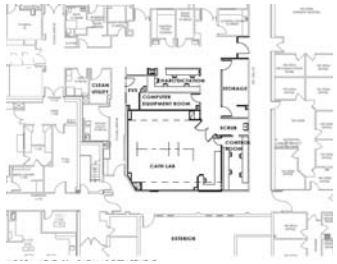
4. See attached color diagram for required lead thicknesses.

5. No additional shielding is required in the floor or ceiling.



Floorplan





Number of patients per week 40

	Location	Units	Chart / Dictate	Hallway / Door	Control	Nursing	Public Hallway	Office past Pub	Staff Hallway	CCL 4 Control	Above - Mech Penthouse	
	Design Goal	mGy/wk	0.02	0.02	0.1	0.02	0.02	0.02	0.02	0.02	0.02	
	Occupany		1	0.2	1	1	0.2	1	0.2	1	0.05	
	Usage Factor		0	0	0	0	0	0	0	0	0	
Inputs	Primary/Leakage Distance	m	6.4	4.2	5	3.8	4.9	9.2	6.2	12	4	
	Secondary Distance	m	6.4	4.2	5	3.8	4.9	9.2	6.2	12	4	
	Primary Source		RR(floor or other)	RR(floor or other)	RR(chest bucky)	RR(chest bucky)	RR(floor or other)	RR(floor or other)	RR(floor or other)	RR(floor or other)	RR(floor or other)	
	Secondary Source		Cardiac Angio	Cardiac Angio	Cardiac Angio	Cardiac Angio	Cardiac Angio	Cardiac Angio	Cardiac Angio	Cardiac Angio	Cardiac Angio	
	Side or Forward/Backscatter?		Sidescatter	Sidescatter	Sidescatter	Sidescatter	Sidescatter	Sidescatter	Sidescatter	Sidescatter	Sidescatter	
	Select Preshielding		Grid/cassette only	Grid/cassette only	Grid/cassette only	Grid/cassette only	Grid/cassette only	Grid/cassette only	Grid/cassette only	Grid/cassette only	Table or wall bucky	
	Lead Thickness	mm	1.19	0.79	1.19	1.58	0.79	0.79	0.79	0.79	0.4	0.39
	Concrete Thickness											
	Expected Weekly Dose	mGy/wk	0.013	0.018	0.021	0.014	0.013	0.019	0.008	0.011	0.019	#VALUE!
	Fraction of Design Goal		0.644	0.912	0.211	0.676	0.670	0.951	0.419	0.559	0.960	#VALUE!

RSN: *1156136*
Permit #: *2016 1191012*

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2015 INTERNATIONAL CODES & 2014 NEC

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Project Team
MEF
CCRD Partners
Structural
Structural Consultants Inc

No.	Description	Date

STATE OF COLORADO JOHN MENNO HOEK 401720 LICENSED ARCHITECT 08/19/16

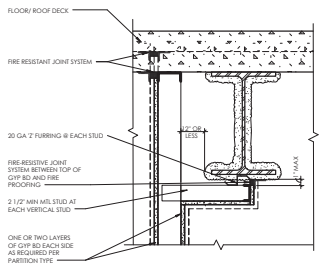
TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

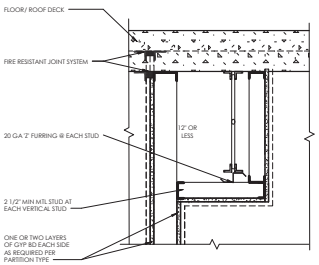
Issue	FOR CONSTRUCTION
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Drawn by	KL
Checked by	JMN

Sheet Title:
PROJECT SPECIFICATIONS

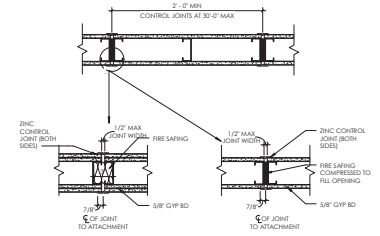
Sheet Number
G.205



12 - HEAD OF WALL AT BEAM - WALL WITHIN 12" OF A BEAM
1 1/2" = 1'-0"

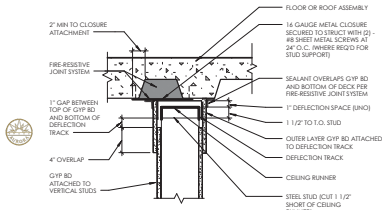


08 - HEAD OF WALL AT OPEN WEB TRUSS - WALL WITHIN 12" OF A BEAM
1 1/2" = 1'-0"



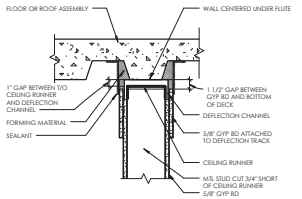
DETAILS OF JOINTS IN RATED GYP BD

04 - PARTITIONS
1 1/2" = 1'-0"



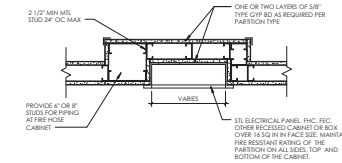
NOTES:
1. UL SYSTEM NO: HW-D-0118 (HW-D-0107 CAN ALSO BE USED).
2. SIMILAR AT NON-RATED WALL EXCEPT USE ACOUSTICAL SEALANT AND BATTS IN LIEU OF FIRE-RESISTIVE JOINT SYSTEM.
3. CONTRACTOR TO COMPLY WITH DETAIL SHOWN OR USE PROPRIETARY SYSTEM AS DESCRIBED IN THE SPECIFICATIONS.

11 - HEAD OF WALL @ RATED PARTITION PARALLEL TO METAL DECK
1 1/2" = 1'-0"



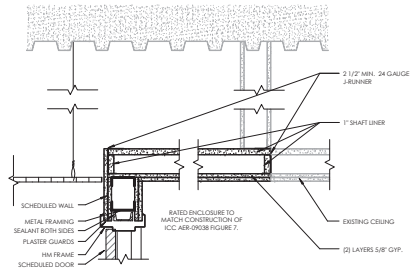
NOTES:
1. UL SYSTEM NO. HW-D-0107.
2. CONTRACTOR TO COMPLY WITH DEFLECTION DETAIL SHOWN OR COMPLY WITH PROPRIETARY SYSTEM AS SPECIFIED.

07 - HEAD OF WALL @ RATED PARTITION CENTERED UNDER FLUTE
1 1/2" = 1'-0"

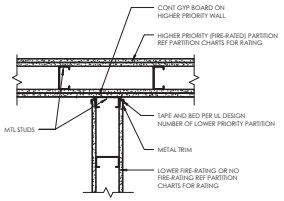


NOTES: PER 2015 IBC: 714.3.2
1. MAINTAINING FIRE RATING AROUND A GREATER THAN 16 SQ IN CABINET IS NOT NECESSARY IF THE BOX HAS BEEN TESTED FOR USE IN A FIRE-RESISTANT RATED ASSEMBLY.
2. REFER TO THE A.500 SERIES FOR SOUND ATTENUATION DETAIL.

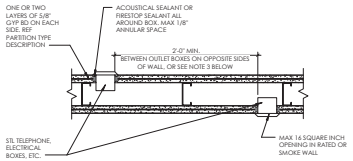
03 - RECESSED CABINETS IN RATED WALL
1 1/2" = 1'-0"



14 - DETAIL AT 2 HR RATED CORRIDOR
1 1/2" = 1'-0"

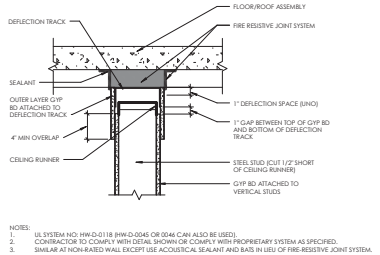


10 - INTERSECTION OF RATED WALL
1 1/2" = 1'-0"



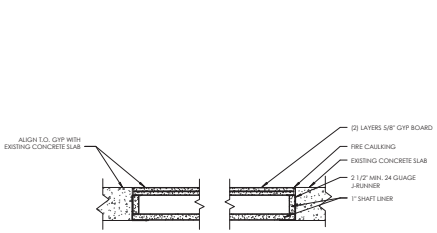
NOTES: PER 2015 IBC 713.3.2.
1. FOR ALL ONE HOUR RATED PARTITIONS, TWO HOUR RATED PARTITIONS AND SMOKE PARTITIONS, SURFACE AREA OF INDIVIDUAL METALLIC OUTLET OR SWITCH BOXES SHALL NOT EXCEED 16 SQUARE INCHES. THE AGGREGATED SURFACE OF ALL BOXES SHALL NOT EXCEED 100 SQUARE INCHES PER 100 SQUARE FEET OF WALL AREA. BOXES WHICH EXCEED THESE STANDARDS SHALL BE RECESSED AS SHOWN IN "RECESSED WALL CABINET DETAIL". BOXES < 16 SQ IN AND LOCATED ON OPPOSITE SIDES OF RATED FIRE SMOKE PARTITIONS SHALL BE SEPARATED BY A HORIZONTAL DISTANCE OF 24 INCHES MINIMUM.
2. REFER TO THE A.500 SERIES FOR SOUND ATTENUATION DETAIL.
3. WHERE WALL CAVITY IS FILLED WITH MINERAL FIBER INSULATION, BOXES SHALL BE OF ANY MATERIAL AND SEPARATED BY NOT LESS THAN THE DEPTH OF THE WALL CAVITY.
4. MEMBRANE PENETRATIONS FOR LISTED ELECTRICAL OUTLETS ARE PERMITTED PROVIDED THEY HAVE BEEN TESTED FOR USE IN FIRE-RESISTANT RATED ASSEMBLIES.
5. UL DESIGN TESTED MOLDABLE PUTTY PADS MAY BE USED IN LIEU OF SEPARATING THE BOXES BY 24" AND TO PROJECT > 16" SQ BOXES.

06 - BACK TO BACK ELECTRICAL OUTLETS
1 1/2" = 1'-0"



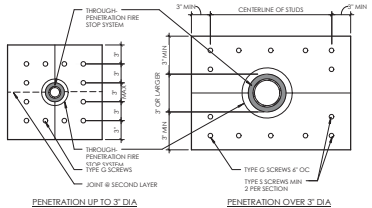
NOTES:
1. UL SYSTEM NO: HW-D-0118 (HW-D-0045 OR 0046 CAN ALSO BE USED).
2. CONTRACTOR TO COMPLY WITH DETAIL SHOWN OR COMPLY WITH PROPRIETARY SYSTEM AS SPECIFIED.
3. SIMILAR AT NON-RATED WALL EXCEPT USE ACOUSTICAL SEALANT AND BATTS IN LIEU OF FIRE-RESISTIVE JOINT SYSTEM.

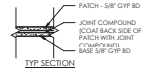
02 - HEAD OF WALL @ RATED PARTITION PERPENDICULAR TO METAL DECK
1 1/2" = 1'-0"



NOTES:
1) STENCIL PERIMETER OF INFILL WITH RED STRIPE.
2) STENCIL "NO STANDING OR STORAGE" ON TOP LAYER OF GYP INFILL.

13 - 2 HR LARGE PENETRATION INFILL AT PENETRATION
1 1/2" = 1'-0"

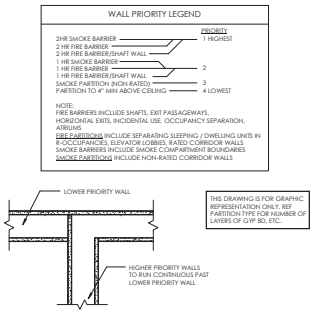




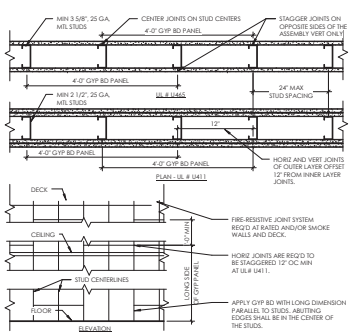
TYP SECTION

NOTES:
1. APPLY PATCH TO BOTH SIDES OF PARTITION.
2. FOR ABOVE CEILING AND "BACK OF HOUSE" LOCATIONS.

09 - OVERSIZED HOLES IN RATED PARTITION
1 1/2" = 1'-0"



05 - PARTITION PRIORITY LEGEND
1 1/2" = 1'-0"



LOCATION OF JOINTS IN RATED GYP BD

01 - PARTITION
1 1/2" = 1'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC

RSN: 1156136

Permit #: 2016 1191012

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No.	Description	Date

STATE OF COLORADO JOHN MENKO No. 401729 LICENSED ARCHITECT
08/19/16

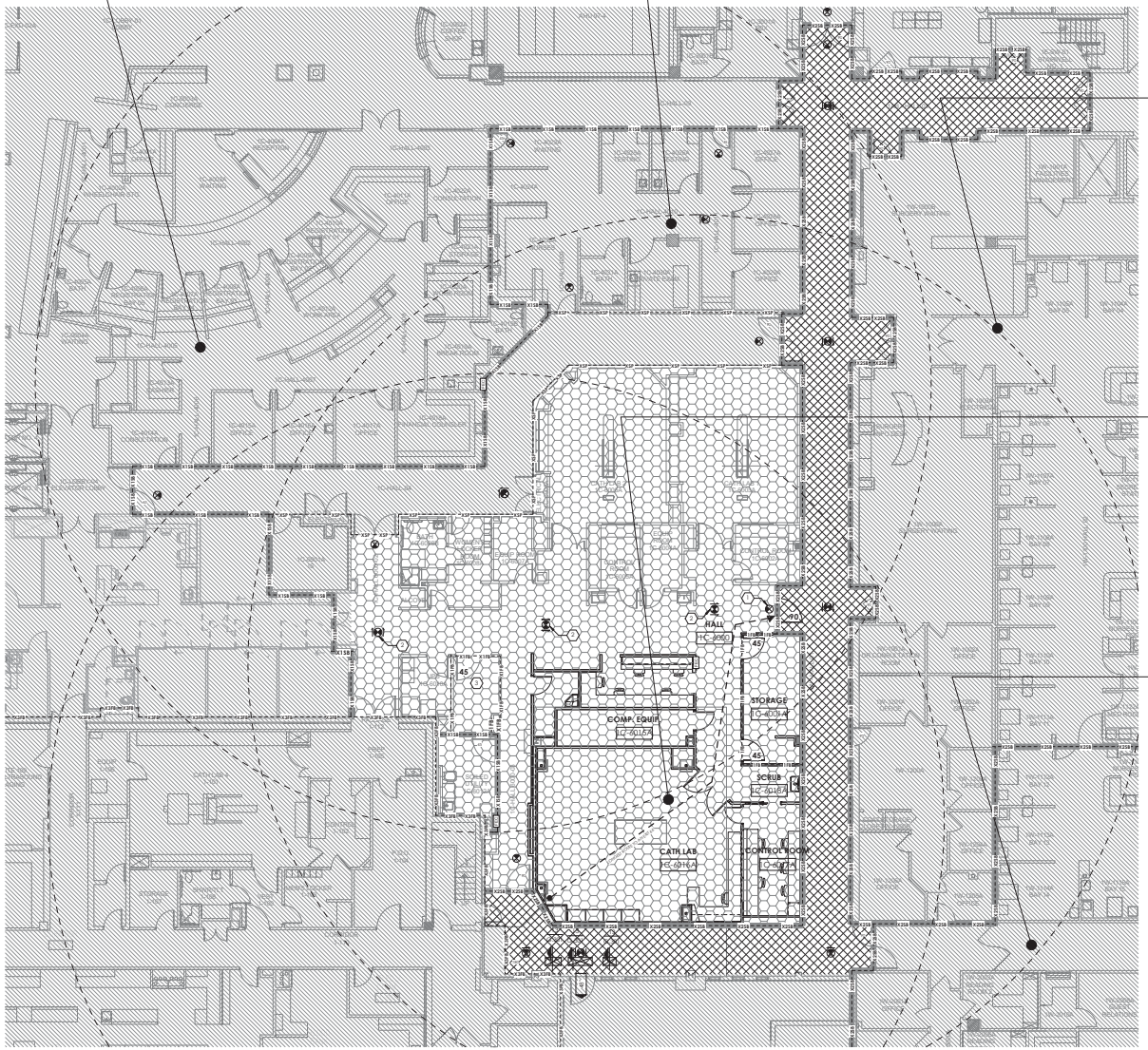
TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
CODE COMPLIANCE DETAILS

Sheet Number
G.301



01 - CODE COMPLIANCE PLAN - CATH LAB RENOVATION - LEVEL 01
1/8" = 1'-0"

SMOKE BARRIER COMPARTMENT DATA sc 1C

EXISTING SMOKE COMPARTMENT TO REMAIN.

TOTAL SMOKE COMPARTMENT SQUARE FOOTAGE: UNCHANGED

SMOKE BARRIER COMPARTMENT DATA sc 1D

EXISTING SMOKE COMPARTMENT TO REMAIN.

TOTAL SMOKE COMPARTMENT SQUARE FOOTAGE: UNCHANGED

SMOKE BARRIER COMPARTMENT DATA sc E-1J

EXISTING SMOKE COMPARTMENT TO REMAIN.

TOTAL SMOKE COMPARTMENT SQUARE FOOTAGE: UNCHANGED

SUITE DATA suite 2

1. 5,459 SQ. FT. SHOWN - 10,000 SQ. FT. ALLOWED.
2. 66 LINEAR FT. SHOWN TO EXIT ACCESS DOOR - 100' ALLOWED.
3. MAXIMUM NUMBER OF EXITS REQUIRED - 2.
   3 PROVIDED

SMOKE BARRIER COMPARTMENT DATA sc E-1B

EXISTING SMOKE COMPARTMENT TO REMAIN.

TOTAL SMOKE COMPARTMENT SQUARE FOOTAGE: UNCHANGED

Provide a sign stating "EXIT" in raised, visual characters and braille adjacent to each door in an area of refuge, an exterior area for assisted rescue, an exit stairway or ramp, an exit passageway and the exit discharge.
2015 IBC 1013.4

CODE COMPLIANCE PLAN GENERAL NOTES

1. EXISTING WALLS SHOWN WITH NEW LIFE SAFETY RATINGS ARE TO BE UPGRADED TO THE NEW RATING. THE UPGRADING INCLUDES PROTECTING ALL OPENINGS IN THE PARTITION.
2. REFER TO ELECTRICAL DRAWINGS FOR LOCATION AND QUANTITY OF SMOKE DETECTORS.
3. DOORS IN CORRIDOR PARTITIONS SHALL BE INSTALLED TO RESIST THE PASSAGE OF SMOKE UNLESS NOTED OTHERWISE.
4. REFER TO THE G.300 SERIES FOR FIRE EXTINGUISHER CABINET DETAIL.
5. VERIFY THAT ALL EXISTING DOORS IN RATED WALLS ARE LABELED WITH THE APPROPRIATE MARK WITHIN THE SMOKE COMPARTMENTS THAT ARE IN THE SCOPE OF THIS WORK.
6. VERIFY THAT ALL EXISTING WALLS WITHIN MODIFIED SMOKE COMPARTMENTS THAT ARE LABELED AS FIRE RATED OR SMOKE TIGHT MEET THE REQUIREMENTS OF THE LABELING.
7. SMOKE COMPARTMENTS IN AREAS OUTSIDE OF THIS PROJECT SCOPE OF WORK ARE SHOWN FOR REFERENCE ONLY.

CODE COMPLIANCE LEGEND

- SMOKE PARTITION
- SMOKE BARRIER FOR COMPARTMENTATION. 1-HOUR FIRE RATING
- SMOKE BARRIER FOR COMPARTMENTATION. 2-HOUR FIRE RATING
- 1-HOUR FIRE BARRIER
- 2-HOUR FIRE BARRIER
- 3-HOUR FIRE BARRIER
- 2-HOUR FIRE BARRIER REQUIRED TO HAVE SMOKE DAMPERS
  * THE LETTER "X" IN FRONT OF THE FIRE TAPE LABELS ABOVE DENOTES EXISTING RATED WALL (E.G. **X1FP**)
- NEW PARTITION
- EXISTING PARTITION
- EXIT SIGN W/ DIRECTION
- FIRE EXTINGUISHER & CABINET RECESSED (SCREENED IF EXISTING)
- FIRE EXTINGUISHER SURFACE MOUNTED (SCREENED IF EXISTING)
- EXIT LOCATION AND WIDTH (IN INCHES)(SCREENED IF EXISTING)
- 45 FIRE RATING OF DOOR IN MINUTES (SCREENED IF EXISTING)
- EXTENT OF SUITE
- EXIT PASSAGEWAY
- OUT OF SCOPE
- LONGEST ROUTE TO AN EXIT
- REQUIRED ACCESSIBLE PATH
- MAGNETIC HOLD OPEN

CODE COMPLIANCE KEYNOTES

1. ADD NEW EXIT LIGHT HERE
2. ADD TWO SIDED EXIT LIGHT
3. CONTRACTOR TO VERIFY EXISTING 1 HOUR RATING. IF NOT CURRENTLY RATED, CONTRACTOR TO BRING ROOM TO 1 HOUR FIRE RATING.

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC

RSN: 1156136
Permit #: 2016 1191012

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Greenwood Village, CO 80111
ph: 214.221.1661

Structural
Structural Consultants Inc
3600 East Bayaud Ave., #300
Denver, CO, 80209
ph: 303.399.0104

No.	Description	Date

STATE OF COLORADO
JOHN MENKO
14
401729
LICENSED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

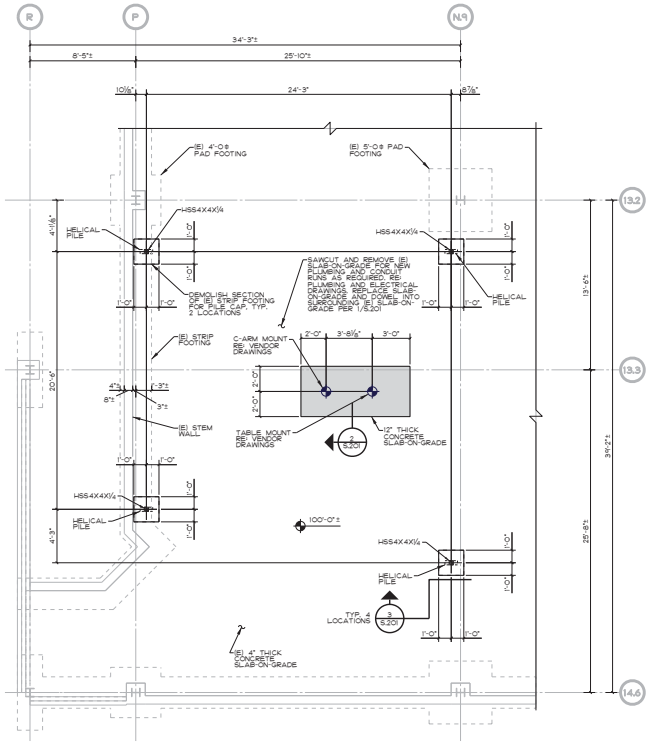
Sheet Title:
CODE COMPLIANCE PLANS

Sheet Number
G.401

GENERAL NOTES

1. Design Standards:
   A. International Building Code 2015 Edition
   B. ASCE 7-10 Minimum Design Loads for Buildings and Other Structures
   C. ACI 318-14 Building Code Requirements for Structural Concrete
   D. AISC 360-10 Specification for Structural Steel Buildings (LRFD)
2. Gravity Loads Used in Design:
   A. Equipment weights: Re: Plan
3. Seismic Load Design Criteria (For Reference):
   A. Seismic Design Category C
   B. Building Risk Category IV
   C. Soil Site Class D
   D. Site Spectral Response Accelerations:
      1. Ss = 0.173g
      2. S1 = 0.057g
      3. SDs = 0.184g
      4. SD1 = 0.091g
   E. Seismic Importance Factor, IE = 1.5
4. Concrete:
   A. All concrete shall be made with stone aggregate and shall develop the following 28 day compressive strength:
      Interior slabs-on-grade ..... 3000 psi
   B. All reinforcing bars shall be ASTM A615, Grade 60, unless otherwise noted. Welded wire fabric shall conform to ASTM A185 or ASTM A497.
   C. Concrete Protection for Reinforcement (unless otherwise noted):
      1. Concrete poured against earth..... 3"
      2. Concrete poured in forms but exposed to weather or earth:
         a. #5 bars or smaller..... 1-1/2"
         b. Bars larger than #5..... 2"
   D. No splices of reinforcement shall be made except as detailed or authorized by the Engineer. Reinforcing lap splices are to be a minimum of 48 bar diameters unless noted otherwise on drawings. Wire fabric reinforcement must lap one full mesh plus 2" at side and end laps, but not less than 6", and shall be wired together. Make all bars continuous at corners or provide corner bars of equal size and spacing.
   E. Detail bars in accordance with the ACI Detailing Manual and ACI Building Code Requirements for Structural Concrete.
   F. Provide all accessories necessary to support reinforcing at positions shown on the plans.
   G. Place 2-#5 bars (1 ea. face) with 2'-0" projection around all openings and re-entrant corners in concrete slabs unless noted otherwise.
   H. Slabs shall not have joints in a horizontal plane. All construction joints shall be as detailed or as approved by the Engineer.
   I. Slab-on-grade control joints are to be spaced at a maximum of 15 feet on-center and are to coincide with column center lines and re-entrant corners unless noted otherwise on the drawings.
5. Steel:
   A. Structural steel shall be detailed, fabricated and erected in accordance with the AISC "Steel Construction Manual."
   B. All structural steel shall conform to ASTM A992 (fy=50 ksi), except HSS sections which shall conform to ASTM A500 Grade C (fy=50 ksi) or ASTM 1085 (fy=50 ksi) and plates/bars which shall conform to ASTM A529 (fy=50 ksi) or ASTM A572 (fy=50 ksi).
   C. The steel connections have been designed. Provide connections as detailed. Alternate connection details of equal capacity may be considered, provided they are submitted along with calculations. Alternate connection detail drawings and calculations which are submitted must be sealed and signed by a Colorado Registered Professional Engineer.
   D. All welders shall have evidence of passing the AWS standard qualification tests, and have a current certification.
   E. Minimum weld size shall not be less than 3/16" continuous fillet weld, unless noted otherwise on the plans. Indicated welding is based upon E70XX electrodes.
   F. Anchor rods are to be ASTM F3554 36 ksi, unless noted otherwise.
6. All dimensions on structural drawings shall be checked against architectural.
7. Engineer's approval must be secured for all substitutions.
8. Verify all openings through floor with mechanical and electrical contractors.
9. All dimensions and existing conditions shown shall be field verified by the Contractor. It is the Contractor's responsibility to immediately notify the Engineer should any existing condition not be shown, or if any existing condition differs from those shown on the drawings.
10. During erection of the building, the Contractor shall be responsible for temporary bracing to withstand all loads to which the structure may be subjected. Such bracing shall be left in place as long as may be required for safety and until all structural framing is in place with connections completed.
11. The Engineer does not provide inspections of construction. The Engineer may make periodic observations of the construction. Such observations shall not replace required inspections by the governing authorities or serve as "Special Inspections" as may be required by the Building Code.
12. Special Inspections shall be performed by the Owner's Agent in accordance with Chapter 17 of the Building Code for the following:
    A. Structural steel construction, Section 1705.2 and AISC 360-10 Chapter N.
    B. Structural concrete construction, Section 1705.3 and Table 1705.3.
    C. Helical Pile Foundations, Section 1705.9.
13. Significant permanent equipment sizes, weights, and locations are indicated on the drawings as provided to the Engineer during design. Changes in sizes, weights, or locations must be submitted in writing for review by the Engineer. Required supports or braces not shown on the drawings are the responsibility of the equipment supplier.
14. All epoxy anchors indicated in the drawings shall be HILTI HIT-HY200 adhesive for concrete anchor system with standard embedment or approved equal, unless noted otherwise. Anchors are to be installed and inspected in accordance with the suppliers' recommendations and specifications.
15. The following is a list of performance-specified items to be designed by others and presented as a deferred submittal in accordance with IBC Section 107.3.4.1. All deferred submittals be sealed and signed by a Colorado Registered Professional Engineer.
    A. Helical pile foundations.
    B. Intermediate modular framing system.
16. Explanation of section designation used:

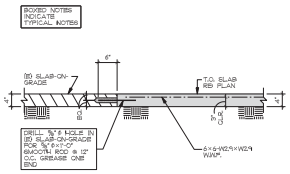
SECTION IDENTIFICATION — X / 6-X — SHEET LOCATION OF DETAILS



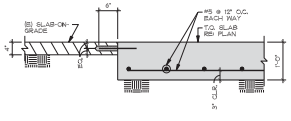
PARTIAL FOUNDATION PLAN

¼" = 1'-0"

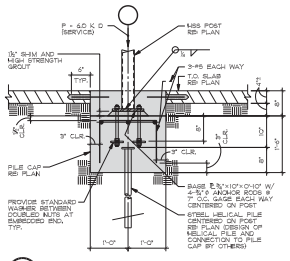
NOTES:
1. BOXED NOTES ☐ INDICATE A TYPICAL CONDITION UNLESS NOTED OTHERWISE.
2. TOP OF SLAB-ON-GRADE SLAB ELEVATION NOTED THUS 100'-0" MATCH TOP OF EXISTING CONCRETE SLAB.
3. (E) INDICATES EXISTING CONSTRUCTION TO BE FIELD-VERIFIED PRIOR TO START OF NEW CONSTRUCTION.
4. RTD CONSTRUCTION DOCUMENTS DATED 9-19-1966 AS PREPARED BY KITTRELL GARLOCK AND ASSOCIATES ARCHITECTS FOR INFORMATION ABOUT THE EXISTING STRUCTURES.



1 — ¾"=1'-0"



2 — ¾"=1'-0"



3 — ¾"=1'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC

RSN: 1156136
Permit #: 2016 1191012

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No.	Description	Date

COLORADO LICENSED 37385 PROFESSIONAL ENGINEER
09/01/2016

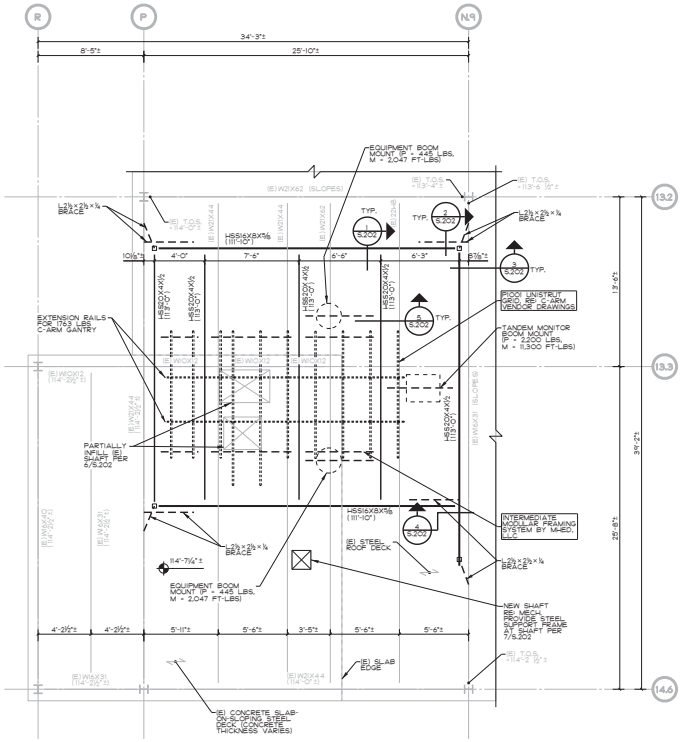
TMCA CATH LAB
HYBRID LAB
RENOVATION

1501 S Potamac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	APC
Checked by	CDT

Sheet Title:
GENERAL NOTES, FOUNDATION PLAN AND FOUNDATION DETAILS

Sheet Number
S.201

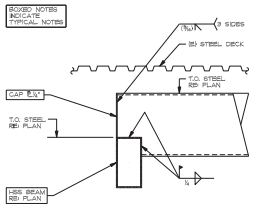


PARTIAL ROOF FRAMING PLAN

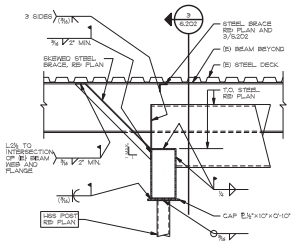
1/4" = 1'-0"

NOTES

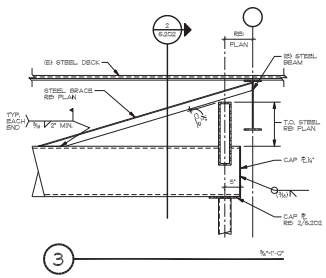
1. BOXED NOTES ▭ INDICATE A TYPICAL CONDITION UNLESS NOTED OTHERWISE.
2. TOP OF SLAB -ON-DECK ELEVATION NOTED THUS 000'00" .
3. TOP OF STEEL BEAM ELEVATION NOTED THUS (XXX'-XX") OR TOS XXX'-XX" . SLOPE TOP OF STEEL BETWEEN ELEVATIONS NOTED ON PLAN.
4. (E) INDICATES EXISTING CONSTRUCTION TO BE FIELD-VERIFIED PRIOR TO START OF NEW CONSTRUCTION.
5. RB: CONSTRUCTION DOCUMENTS DATED 4/19/1986 AS PREPARED BY KITTRELL GARLOCK AND ASSOCIATES ARCHITECTS FOR INFORMATION ABOUT THE EXISTING STRUCTURES.
6. THE INTERMEDIATE MODULAR FRAMING SYSTEM SHOWN SCHEMATICALLY ON THESE DRAWINGS SHALL BE DESIGNED BY MHED TO SUPPORT THE EQUIPMENT LOADS AND MEET THE DEFLECTION CRITERIA SPECIFIED BY THE EQUIPMENT VENDORS.



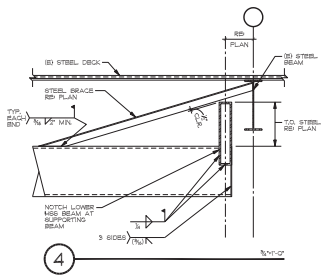
1 ¾"=1'-0"



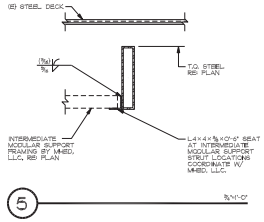
2 ¾"=1'-0"



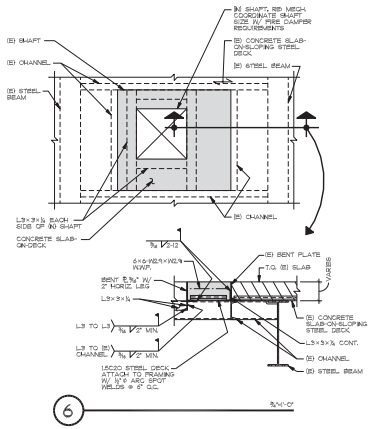
3 ¾"=1'-0"



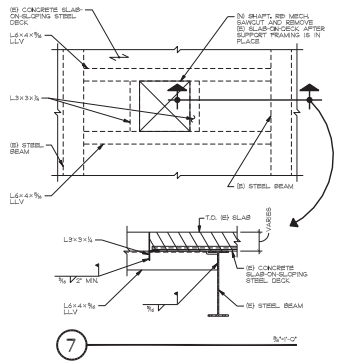
4 ¾"=1'-0"



5 ¾"=1'-0"



6 ¾"=1'-0"



7 ¾"=1'-0"

RSN: 1156136

Permit #: 2016 1191012

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COLORADO LICENSED 37385 PROFESSIONAL ENGINEER
09/01/2016

City of Aurora Building Division Reviewed for Code Compliance Approved as Noted: John Eckert Date: Oct 25, 2016 2009 INTERNATIONAL CODES & 2011 NEC

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St, Aurora, CO 80012

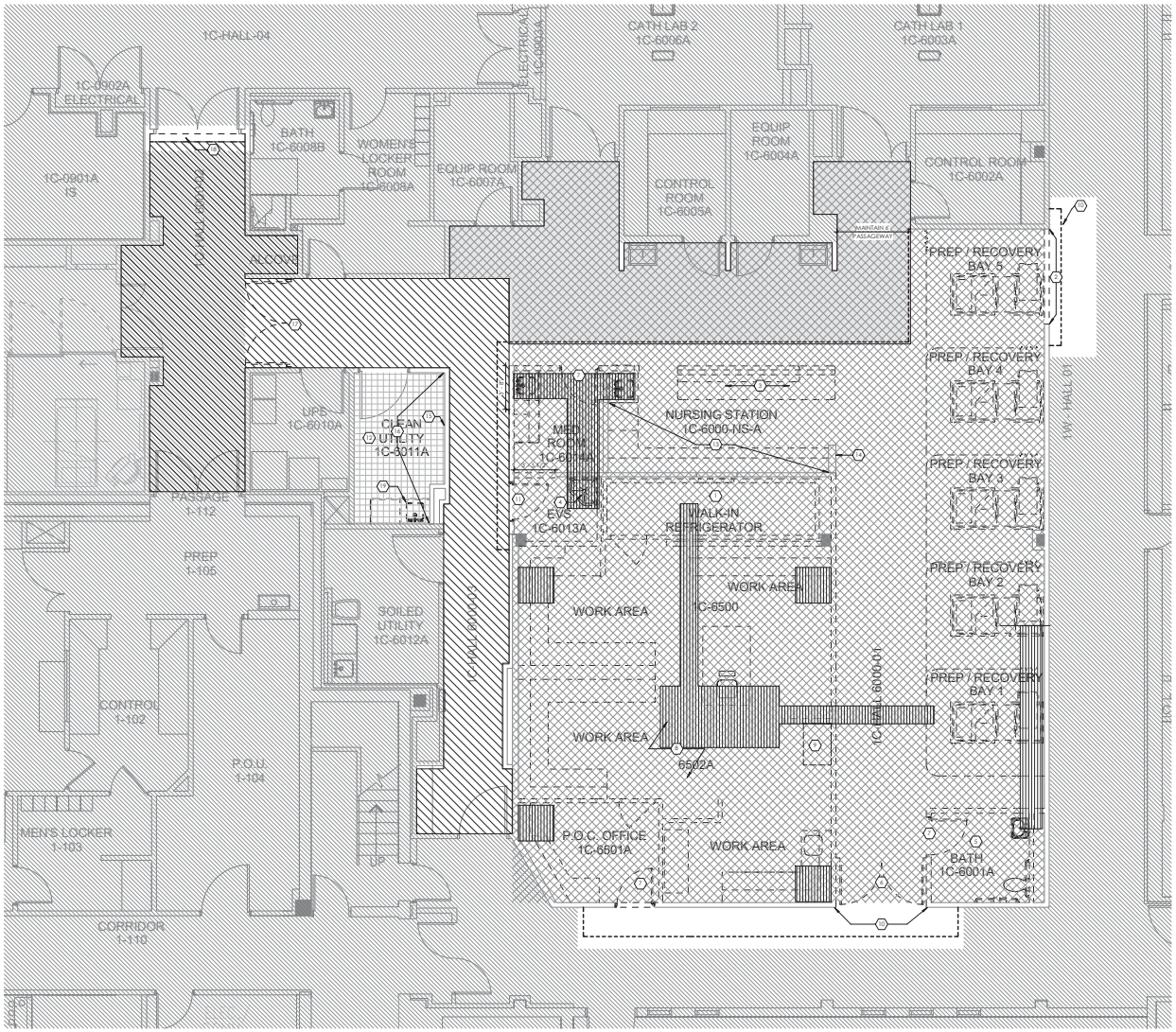
Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	APC
Checked by	CDT

Sheet Title: ROOF FRAMING PLAN AND FRAMING DETAILS

Sheet Number

S.202

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC



D.201 - DEMOLITION PLAN - LEVEL 01 - CATH LAB
1/4" = 1'-0"

DEMOLITION GENERAL NOTES

1. REFER TO SPECIFICATIONS FOR INTERIM LIFE SAFETY MEASURES.
2. CONSTRUCT TEMPORARY PARTITIONS AS REQUIRED BY PHASING TO MINIMIZE THE SPREAD OF DUST AND NOISE.
3. THESE DRAWINGS HAVE BEEN DEVELOPED FROM EXISTING DRAWINGS WHICH MAY NOT REFLECT ACTUAL FIELD CONDITIONS. VERIFY THESE DRAWINGS WITH EXISTING FIELD CONDITIONS AND NOTIFY THE ARCHITECT IMMEDIATELY OF INCONSISTENCIES BETWEEN THEM AND ACTUAL CONDITIONS BEFORE PROCEEDING WITH CONSTRUCTION.
4. CEILING TILE, CEILING GRID SYSTEM OR GYP. CEILING TO BE DEMOLISHED WITHIN DEMOLITION SCOPE OF WORK UNLESS OTHERWISE NOTED. SALVAGE LIGHTING AND RETURN TO FACILITY. REMOVE ALL EXISTING CEILING DEVICES IN PREPARATION FOR NEW.
5. REMOVE EXISTING CONSTRUCTION AS INDICATED. TYPICAL WALL REMOVAL INCLUDES FINISHES AND MECHANICAL PLUMBING AND ELECTRICAL SYSTEMS CONTAINED THEREIN. REMOVE DOORS, CASEWORK, WINDOWS, FRAMES, AND OTHER FIXTURES AS REQUIRED. AFTER REMOVAL OF PIPE CHASES, PATCH HOLES IN EXISTING FLOORS OR WALLS TO REMAIN TO MEET ORIGINAL FIRE PROTECTION AND STRUCTURAL REQUIREMENTS. PATCH ADJOINING WALLS.
6. WHERE NEW FINISHES ARE TO BE INSTALLED ON EXISTING SURFACES, REMOVE THE EXISTING FINISH AND PREPARE SURFACE TO RECEIVE THE NEW FINISH.
7. COORDINATE WITH THE OWNER ANY ITEMS TO BE STORED AND/OR RELOCATED.
8. SEE MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR DEMOLITION OF UTILITIES.
9. VERIFY THAT EXIT EGRESS IS MAINTAINED FOR ALL OCCUPIED AREAS OF THE BUILDING THROUGHOUT CONSTRUCTION.
10. DEMOLITION WORK SHALL BE EXECUTED IN CONFORMANCE WITH ALL CODES AND AS SET FORTH BY ALL GOVERNING AUTHORITIES.
11. BRACE ALL EXISTING STRUCTURES OR STRUCTURAL ELEMENTS AS NECESSARY DURING DEMOLITION.
12. DO NOT CUT ANY STRUCTURAL WORK WITHOUT PRIOR APPROVAL FROM THE STRUCTURAL ENGINEER.
13. THE EXISTING BUILDING ENVELOPE SHALL BE MAINTAINED IN A WATER TIGHT CONDITION AT ALL TIMES.
14. REPLACE OR REPAIR ANY EXISTING TO REMAIN FINISHES WHICH ARE DAMAGED DURING DEMOLITION (I.E.- CEILING GRID, CEILING TILE, WALL COVERING, FLOOR COVERING, ETC.

DEMOLITION LEGEND

- EXISTING PARTITION TO REMAIN
- EXISTING PARTITION TO BE REMOVED
- SUGGESTED TEMPORARY CONTAINMENT WALL.
- EXISTING FLOOR SLAB TO BE REMOVED WITHIN AREA INDICATED. COORDINATE EXACT EXTENTS WITH STRUCTURAL AND PLUMBING DRAWINGS.
- REMOVE ALL FLOORING, LIGHTS, GRILLS REGISTERS AND DIFFUSERS, CEILING GRID, AND ASSOCIATED CEILING SYSTEMS FROM THIS AREA. MAINTAIN DUCTWORK TO VAV BOXES, BUT REMOVE RUN OUTS AND PREPARE FOR FUTURE WORK. REFER ALSO TO MPE DRAWINGS.
- EXISTING FLOOR AND WALL FINISHES ONLY TO BE REMOVED WITHIN AREA INDICATED.
- EXISTING SHEET VINYL TO BE REMOVED WITHIN SCOPE. ACCESS TO CATH LABS 1 & 2, EQUIPMENT ROOMS AND CONTROL ROOMS MUST BE MAINTAINED DURING ALL BUSINESS HOURS.
- ADDITIVE ALTERNATE SCOPE: PREPARE FLOORING FOR ADDITIONAL REPLACEMENT THROUGHOUT AS INDICATED ON 1.201. ACCESS TO DEPARTMENT MUST BE MAINTAINED DURING ALL BUSINESS HOURS.
- AREA OUT OF SCOPE

DEMOLITION KEYNOTES

1. WALK IN REFRIGERATION UNIT. REMOVE ALL COMPONENTS. PREPARE RECESSED FLOOR FOR INFILL. REMOVE COMPRESSOR FROM ROOF AND DEMOLISH CONDUITS AND COOLANT LINES BACK TO SOURCE.
2. REMOVE TWO HOUR CONSTRUCTION INTO RATED EXIT PASSAGE. PROVIDE TEMPORARY 1.5M RATED WALL IN CORRIDOR DURING CONSTRUCTION.
3. REMOVE EXISTING ISLAND NURSE STATION FOR REFURBISHING.
4. SALVAGE ALL FIXTURES AND ACCESSORIES FOR REUSE.
5. REMOVE PLUMBING SUPPY AND VENT LINES TO ABOVE CEILING AND BELOW SLAB.
6. SALVAGE EXISTING 90 MINUTE RATED DOORS AND AUTOMATIC OPENER AND INVENTORY TO FACILITY.
7. SALVAGE EXISTING DOOR AND INVENTORY TO FACILITY.
8. REMOVE ALL CEILING SYSTEMS, LIGHTS AND MECHANICAL DEVICES AS WELL AS ALL DUCTWORK, CONDUIT, SANITARY AND VENT, EXHAUST DUCTWORK, AND DOMESTIC SUPPLY LINES PROVIDING SERVICE TO THIS SPACE WITHIN THE SCOPE OF THIS SPACE.
9. PNEUMATIC TUBE UNIT REMOVED AND RELOCATED DURING PREP RECOVERY SCOPE.
10. SUGGESTED CONSTRUCTION ENTRY POINT
11. SALVAGE DOOR AND HARDWARE FOR REUSE AT NEW JANITOR DOOR LOCATION.
12. REMOVE EXISTING FLOORING AND PREPARE FOR NEW. EXISTING CEILING TO REMAIN. PROTECT DURING DEMOLITION AND CONSTRUCTION.
13. REMOVE GYPSUM BOARD FROM WALL. RETAIN FRAMING FOR NEW SCOPE.
14. REMOVE EXISTING ZONE ALARM PANELS AND RELOCATE PER PLUMBING TO RECOVERY NURSE STATION.
15. SALVAGE WALL PHONE AND TURN OVER TO FACILITY FOR INSTALLATION IN NEW LOCATION.
16. REMOVE GYPSUM BOARD ONLY UP TO 8' AFF FOR THE INSTALLATION OF IN WALL BACKING.
17. SALVAGE EXISTING DOOR AND INVENTORY TO FACILITY. DEMOLISH DOOR PARTITION UP TO 6" BELOW CEILING AND PREPARE FOR NEW GYPSUM HEADER PER A.221.
18. CAREFULLY REMOVE EXISTING SHEET VINYL IN A RECTANGLE 8' WIDE BY THE WIDTH OF THE CORRIDOR. PREPARE FOR NEW SHEET VINYL PRODUCT.
19. REMOVE CASEWORK AND PLUMBING FIXTURE. CAP PLUMBING ABOVE CEILING AND IN WALL. RE: PLUMBING DRAWINGS.

RSN: 1156136
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No.	Description	Date

STATE OF COLORADO
JOHN MENKO
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REGISTERED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

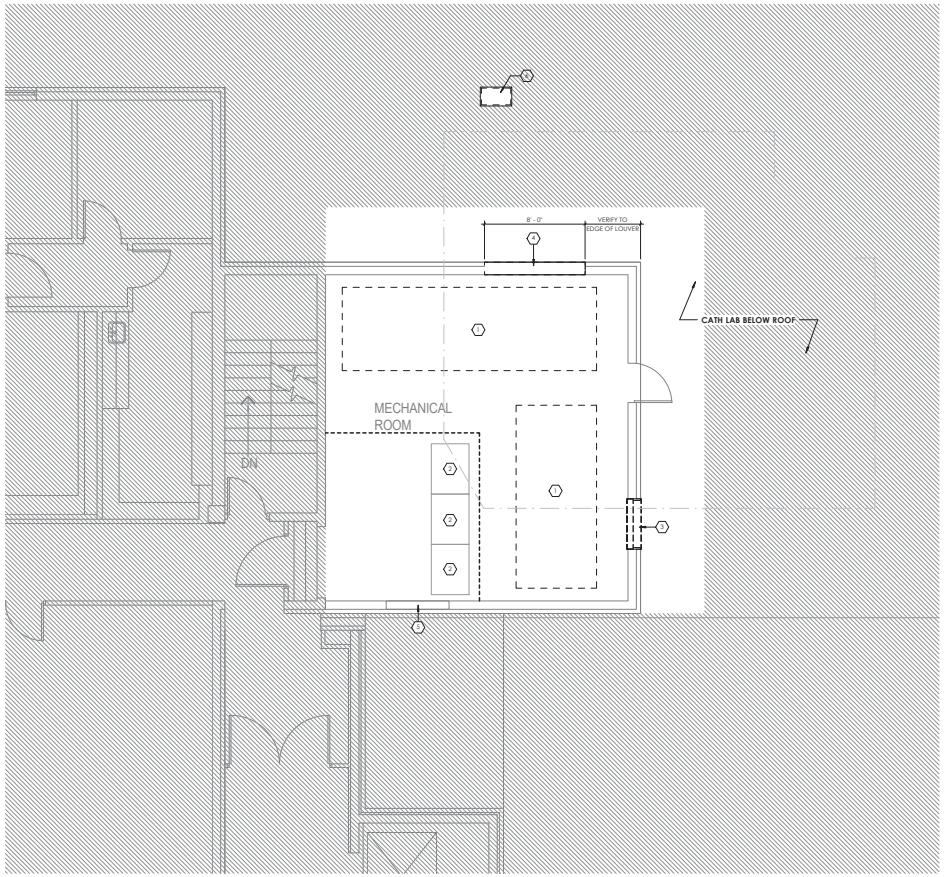
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Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
LEVEL 01 - DEMOLITION PLAN

Sheet Number
D.201

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC



01 - DEMOLITION ROOF PLAN - LEVEL 02 MECHANICAL ROOM
1/4" = 1'-0"

DEMOLITION GENERAL NOTES

1. REFER TO SPECIFICATIONS FOR INTERIM LIFE SAFETY MEASURES.
2. CONSTRUCT TEMPORARY PARTITIONS AS REQUIRED BY PHASING TO MINIMIZE THE SPREAD OF DUST AND NOISE.
3. THESE DRAWINGS HAVE BEEN DEVELOPED FROM EXISTING DRAWINGS WHICH MAY NOT REFLECT ACTUAL FIELD CONDITIONS. VERIFY THESE DRAWINGS WITH EXISTING FIELD CONDITIONS AND NOTIFY THE ARCHITECT IMMEDIATELY OF INCONSISTENCIES BETWEEN THEM AND ACTUAL CONDITIONS BEFORE PROCEEDING WITH CONSTRUCTION.
4. CEILING TILE, CEILING GRID SYSTEM OR GYP. CEILING TO BE DEMOLISHED WITHIN DEMOLITION SCOPE OF WORK UNLESS OTHERWISE NOTED. SALVAGE LIGHTING AND RETURN TO FACILITY. REMOVE ALL EXISTING CEILING DEVICES IN PREPARATION FOR NEW.
5. REMOVE EXISTING CONSTRUCTION AS INDICATED. TYPICAL WALL REMOVAL INCLUDES FINISHES AND MECHANICAL PLUMBING AND ELECTRICAL SYSTEMS CONTAINED THEREIN. REMOVE DOORS, CASEWORK, WINDOWS, FRAMES, AND OTHER FIXTURES AS REQUIRED. AFTER REMOVAL OF PIPE CHASES, PATCH HOLES IN EXISTING FLOORS OR WALLS TO REMAIN TO MEET ORIGINAL FIRE PROTECTION AND STRUCTURAL REQUIREMENTS. PATCH ADJOINING WALLS.
6. WHERE NEW FINISHES ARE TO BE INSTALLED ON EXISTING SURFACES, REMOVE THE EXISTING FINISH AND PREPARE SURFACE TO RECEIVE THE NEW FINISH.
7. COORDINATE WITH THE OWNER ANY ITEMS TO BE STORED AND/OR RELOCATED.
8. SEE MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR DEMOLITION OF UTILITIES.
9. VERIFY THAT EXIT EGRESS IS MAINTAINED FOR ALL OCCUPIED AREAS OF THE BUILDING THROUGHOUT CONSTRUCTION.
10. DEMOLITION WORK SHALL BE EXECUTED IN CONFORMANCE WITH ALL CODES AND AS SET FORTH BY ALL GOVERNING AUTHORITIES.
11. BRACE ALL EXISTING STRUCTURES OR STRUCTURAL ELEMENTS AS NECESSARY DURING DEMOLITION.
12. DO NOT CUT ANY STRUCTURAL WORK WITHOUT PRIOR APPROVAL FROM THE STRUCTURAL ENGINEER.
13. THE EXISTING BUILDING ENVELOPE SHALL BE MAINTAINED IN A WATER TIGHT CONDITION AT ALL TIMES.
14. REPLACE OR REPAIR ANY EXISTING TO REMAIN FINISHES WHICH ARE DAMAGED DURING DEMOLITION (I.E. - CEILING GRID, CEILING TILE, WALL COVERING, FLOOR COVERING, ETC.

DEMOLITION LEGEND

- EXISTING PARTITION TO REMAIN
- EXISTING PARTITION TO BE REMOVED
- EXPANSION JOINT
- SUGGESTED TEMPORARY CONTAINMENT WALL.
- EXISTING FLOOR SLAB TO BE REMOVED WITHIN AREA INDICATED
- EXISTING FLOOR, WALL, AND CEILING FINISHES ONLY, TO BE REMOVED WITHIN AREA INDICATED.
- EXISTING FLOOR AND WALL FINISHES ONLY, TO BE REMOVED WITHIN AREA INDICATED.
- AREA OUT OF SCOPE

DEMOLITION KEYNOTES

1. REMOVE EXISTING AHU AND ALL ASSOCIATED DUCTWORK AND PIPING.
2. PROTECT SERVER RACKS.
3. DEMOLISH EXISTING LOUVER AND BRICK BELOW AS NECESSARY TO PREPARE OPENING FOR NEW LOUVER.
4. REMOVE EXISTING LOUVER AND 8' SECTION OF WALL FOR REMOVAL AND REPLACEMENT OF AHU. PREPARE MASONRY FOR INFILL AS FUTURE KNOCK OUT WITH ALTERNATE MATERIAL. BRACE MASONRY ABOVE OPENING FOR DURATION OF PROJECT.
5. EXISTING BLANKED OFF LOUVER TO REMAIN.
6. SALVAGE EXISTING COMPRESSOR PAD FOR FUTURE CRAC UNIT. RE: MECHANICAL DRAWINGS. REMOVE EXISTING WALK IN REFRIGERATOR COMPRESSOR.

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Project Team

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No.	Description	Date

STATE OF COLORADO
JOHN MENNO HOY
401729
LICENSED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

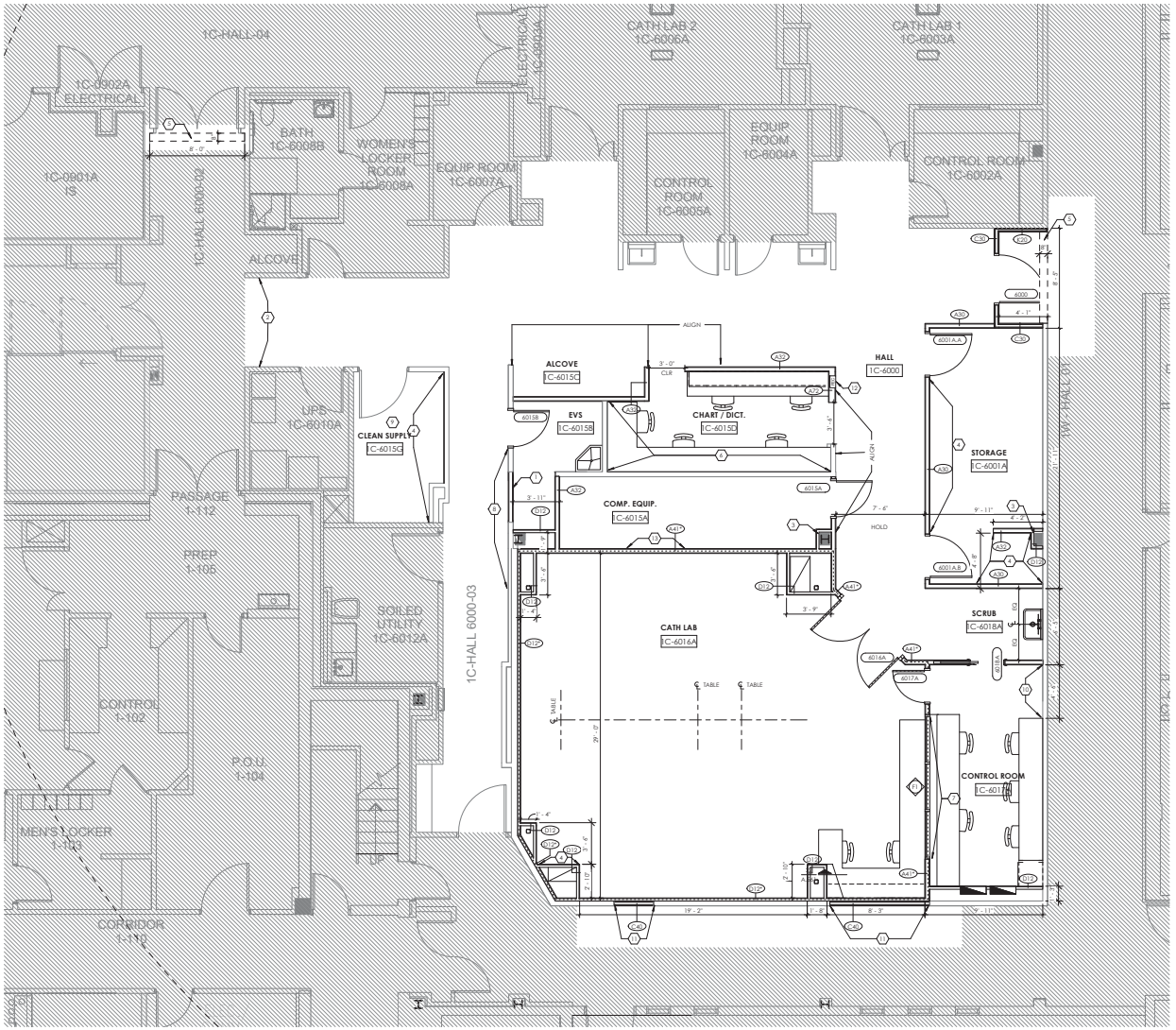
1501 S Potomac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
PENTHOUSE - DEMOLITION PLAN

Sheet Number
D.202

RSN: 1156136
Permit #: 2016 1191012



01 - MEDICAL CENTER OF AURORA - LEVEL 01 - CATH LAB
1/4" = 1'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC

FLOOR PLAN GENERAL NOTES

1. PARTITION TYPES ARE SCHEDULED IN THE A.500 SERIES. RE: G.300 SERIES "CODE COMPLIANCE PLANS" FOR GRAPHIC EXTENT OF FIRE RATED PARTITIONS. REFER TO PARTITION TYPE SCHEDULE FOR LOCATION OF SOUND ATTENUATION BLANKETS.
2. REFER TO SHEET G.101 FOR ADDITIONAL GENERAL NOTES.
3. ALL PARTITIONS ARE TYPE "A41" UNLESS OTHERWISE NOTED.
4. DIMENSIONS SHOWN ON THE FLOOR PLANS FOR NEW CONSTRUCTION ARE TO THE FACE OF FINISH OF INTERIOR WALLS, TO CENTER LINE OF COLUMNS AND TO THE FACE OF CONCRETE OR MASONRY WALLS, UNLESS OTHERWISE INDICATED. DIMENSIONS IN RENOVATED AREAS ARE FROM FINISH FACE OF EXISTING WALLS TO FINISH FACE OF NEW STUD WALL, UNLESS OTHERWISE INDICATED.
5. WHERE NEW GYPSUM BOARD PARTITIONS ARE A CONTINUATION OF AN EXISTING PARTITION OR COLUMN ENCASEMENT, THE FACE OF THE NEW GYPSUM BOARD SHALL BE ALIGNED WITH THE FACE OF THE EXISTING SURFACE. WHERE A ONE HOUR PARTITION IS SHOWN AS A CONTINUATION OF A TWO-HOUR PARTITION OR COLUMN ENCASEMENT, THE FACE OF THE GYPSUM BOARD SHALL BE ALIGNED. STUDS SHALL BE OFFSET AND ADDITIONAL LAYERS OF GYPSUM BOARD SHALL BE PROVIDED AS REQUIRED TO PROVIDE FACE ALIGNMENT OF GYPSUM BOARD.
7. CLINICAL SINKS SHALL BE MOUNTED SO THAT THE CENTERLINE OF THE SINK IS 1'-4" MINIMUM TO THE FACE OF THE ADJACENT FIXED EQUIPMENT, SIDEWALL, CASEWORK, ETC.
8. ALL PATIENT CORRIDORS AND PASSAGEWAYS SHALL BE 8'-0" MINIMUM CLEAR WIDTH UNLESS OTHERWISE NOTED
8. SEE ARCHITECTURAL ENLARGED PLANS FOR TYPICAL MOUNTING HEIGHTS OF PLUMBING FIXTURES AND TOILET ACCESSORIES.
9. REFER TO THE A.530 SERIES FOR MISCELLANEOUS DETAILS.
10. PROVIDE MINIMUM 1'-0" CLEAR FLOOR SPACE AT THE PUSH SIDE OF EVERY DOOR WITH A CLOSER. PROVIDE MINIMUM 1'-6" CLEAR AT THE PULL SIDE OF EVERY DOOR (EXCLUDING PATIENT BEDROOMS), UNLESS SPECIFICALLY DIMENSIONED, NOTED OR SHOWN OTHERWISE.
11. ALL LAVATORIES AND SINKS SHALL BE MOUNTED A MINIMUM OF 1'- 3" FROM THE CENTERLINE OF THE FIXTURE TO THE FINISHED FACE OF THE ADJACENT PARTITION.
12. SEE OWNER FURNISHED VENDOR DRAWINGS FOR CRITICAL DIMENSIONS IN THESE SPACES. REFERENCE INDEX SHEET FOR LOCATION OF VENDOR DRAWINGS IN SET.
13. REFER TO THE A.210 SERIES, "EQUIPMENT PLANS" FOR WALL PROTECTION LOCATIONS.
14. POUR BACK SLAB WHERE NECESSARY AFTER SLAB DEMOLITION FOR UNDERFLOOR PLUMBING.

FLOOR PLAN LEGEND

- NEW PARTITION
- EXISTING PARTITION TO REMAIN
- EXISTING COLUMN TO REMAIN
- EXPANSION JOINT
- INTERIOR WINDOW TAG REF: A.541 FOR SCHEDULE
- EXTERIOR LOUVER SYSTEM TAG
- XXX DOOR TAG REF. A.541 FOR DOOR SCHEDULE
- A41 PARTITION TAG REF. A.501 FOR TYPE CHARTS
- LEAD LINED WALL. REFER TO PHYSICIST REPORT AND DIVISION 13 SPECIFICATIONS.
- OUT OF SCOPE
- CONTRACTOR FURNISHED EQUIPMENT/ITEM
- OWNER FURNISHED EQUIPMENT/ITEM

FLOOR PLAN KEYNOTES

1. INFILL WALL AT DEMOLISHED DOOR.
2. PATCH AND FINISH WALL WHERE DOOR WAS REMOVED.
3. FRAME TIGHT TO COLUMN FIREPROOFING.
4. PROVIDE FIRE TREATED BACKING IN WALL FOR BIN SYSTEM AND/OR POU STATION. PROVIDE NEW GYPSUM BOARD.
5. INSTALL FLOORING FOR NEW "RED LINE" PER SHEET L101 AND L201
6. PROVIDE FIRE TREATED BACKING IN WALL FOR MONITOR BRACKETS FROM 30" AFF TO 66" AFF. GC TO INSTALL FACILITY DUAL MONITOR BRACKETS.
7. PROVIDE FIRE TREATED BACKING IN WALL ABOVE WINDOW FOR MOUNTING OF MONITORS. GC TO INSTALL VENDOR PROVIDED MOUNTING BRACKETS.
8. PROVIDE FIRE TREATED BACKING IN WALL FOR LEAD APRON RACK.COORDINATE DIMENSIONS WITH EXISTING LEAD RACKS.
9. CONTRACTOR TO VERIFY EXISTING 1 HOUR RATING OF WALLS. IF NOT RATED TO 1 HOUR, CONTRACTOR TO BRING WALLS UP TO CORRECT 1 HOUR RATING.
10. PROVIDE FIRE TREATED BACKING IN WALL FOR LEAD APRON RACK.
11. PROVIDE UL SYSTEM PROVIDED LAPPING OF JOINTS AT WALL INFILL.
12. FIRE EXTINGUISHER CABINET. MATCH FACILITY EXISTING STANDARD AND PROVIDE EXTINGUISHER, 10BC TYPE.
13. PROVIDE FIRE TREATED BACKING IN WALL FOR SHELF FROM 36" TO 54" AFF.

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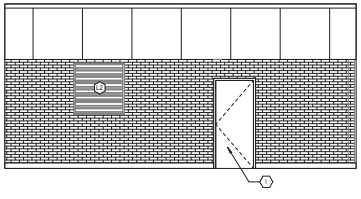
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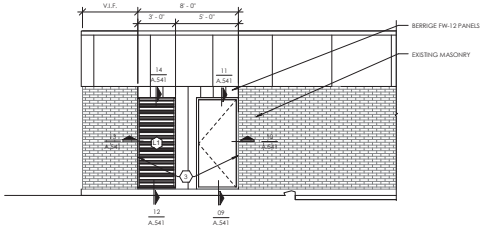
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Sheet Title:
LEVEL 01 - FLOOR PLAN

Sheet Number
A.201

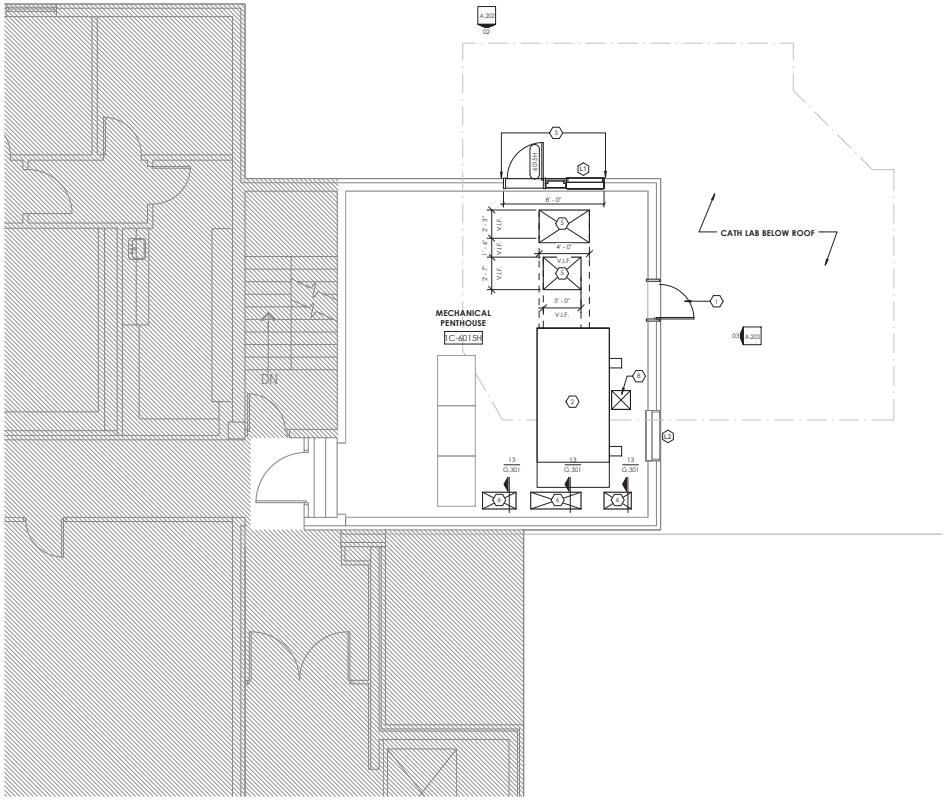


03- PENTHOUSE EXTERIOR ELEVATION - WEST
1/4" = 1'-0"



02- PENTHOUSE EXTERIOR ELEVATION - NORTH
1/4" = 1'-0"

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01- MEDICAL CENTER OF AURORA - LEVEL 2 - PENTHOUSE
1/4" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. PARTITION TYPES ARE SCHEDULED IN THE A.500 SERIES. RE: G.300 SERIES "CODE COMPLIANCE PLANS" FOR GRAPHIC EXTENT OF FIRE RATED PARTITIONS. REFER TO PARTITION TYPE SCHEDULE FOR LOCATION OF SOUND ATTENUATION BLANKETS.
2. REFER TO SHEET G.101 FOR ADDITIONAL GENERAL NOTES.
3. ALL PARTITIONS ARE TYPE "A41" UNLESS OTHERWISE NOTED.
4. DIMENSIONS SHOWN ON THE FLOOR PLANS FOR NEW CONSTRUCTION ARE TO THE FACE OF FINISH OF INTERIOR WALLS, TO CENTER LINE OF COLUMNS AND TO THE FACE OF CONCRETE OR MASONRY WALLS, UNLESS OTHERWISE INDICATED. DIMENSIONS IN RENOVATED AREAS ARE FROM FINISH FACE OF EXISTING WALLS TO FINISH FACE OF NEW STUD WALL, UNLESS OTHERWISE INDICATED.
5. WHERE NEW GYPSUM BOARD PARTITIONS ARE A CONTINUATION OF AN EXISTING PARTITION OR COLUMN ENCASEMENT, THE FACE OF THE NEW GYPSUM BOARD SHALL BE ALIGNED WITH THE FACE OF THE EXISTING SURFACE. WHERE A ONE HOUR PARTITION IS SHOWN AS A CONTINUATION OF A TWO-HOUR PARTITION OR COLUMN ENCASEMENT, THE FACE OF THE GYPSUM BOARD SHALL BE ALIGNED. STUDS SHALL BE OFFSET AND ADDITIONAL LAYERS OF GYPSUM BOARD SHALL BE PROVIDED AS REQUIRED TO PROVIDE FACE ALIGNMENT OF GYPSUM BOARD.
7. CLINICAL SINKS SHALL BE MOUNTED SO THAT THE CENTERLINE OF THE SINK IS 1'- 6" MINIMUM TO THE FACE OF THE ADJACENT FIXED EQUIPMENT, SIDEWALL, CASEWORK, ETC.
8. ALL PATIENT CORRIDORS AND PASSAGEWAYS SHALL BE 8'-0" MINIMUM CLEAR WIDTH UNLESS OTHERWISE NOTED
8. SEE ARCHITECTURAL ENLARGED PLANS FOR TYPICAL MOUNTING HEIGHTS OF PLUMBING FIXTURES AND TOILET ACCESSORIES.
9. REFER TO THE A.530 SERIES FOR MISCELLANEOUS DETAILS.
10. PROVIDE MINIMUM 1'-0" CLEAR FLOOR SPACE AT THE PUSH SIDE OF EVERY DOOR WITH A CLOSER. PROVIDE MINIMUM 1'-6" CLEAR AT THE PULL SIDE OF EVERY DOOR (EXCLUDING PATIENT BEDROOMS), UNLESS SPECIFICALLY DIMENSIONED, NOTED OR SHOWN OTHERWISE.
11. ALL LAVATORIES AND SINKS SHALL BE MOUNTED A MINIMUM OF 1'- 3" FROM THE CENTERLINE OF THE FIXTURE TO THE FINISHED FACE OF THE ADJACENT PARTITION.
12. SEE OWNER FURNISHED VENDOR DRAWINGS FOR CRITICAL DIMENSIONS IN THESE SPACES. REFERENCE INDEX SHEET FOR LOCATION OF VENDOR DRAWINGS IN SET.
13. REFER TO THE A.210 SERIES, "EQUIPMENT PLANS" FOR WALL PROTECTION LOCATIONS.
14. POUR BACK SLAB WHERE NECESSARY AFTER SLAB DEMOLITION FOR UNDERFLOOR PLUMBING.

FLOOR PLAN LEGEND

- NEW PARTITION
- EXISTING PARTITION TO REMAIN
- EXISTING COLUMN TO REMAIN
- EXPANSION JOINT
- INTERIOR WINDOW TAG REF: A.XXX FOR SCHEDULE
- EXTERIOR LOUVER SYSTEM TAG
- XXX DOOR TAG REF. A.XXX FOR DOOR SCHEDULE
- A41 PARTITION TAG REF. A.XXX FOR TYPE CHARTS
- LEAD LINED WALL
- OUT OF SCOPE
- CONTRACTOR FURNISHED EQUIPMENT/ITEM
- OWNER FURNISHED EQUIPMENT/ITEM

FLOOR PLAN KEYNOTES

1. EXISTING DOOR TO REMAIN.
2. NEW AHU, REFER TO MECHANICAL DRAWINGS. CONTRACTOR TO PROVIDE AND COORDINATE ENGINEERED SUPPORT SYSTEM TO ELEVATE NEW AHU ABOVE EXISTING LARGE ELECTRICAL CONDUIT TO REMAIN. ROUGHLY 18" AFF. BASIS OF DESIGN MHED SYSTEM.
3. INFILL CONSTRUCTION ENTRY WITH NEW LOUVER. NEW FOUR SIDED HM FRAME, HM DOOR AND METAL PANEL.
4. NOT USED
5. EXISTING PENETRATION. VERIFY DIMENSIONS IN THE FIELD AND COORDINATE WITH MECHANICAL AND STRUCTURAL DRAWINGS FOR NEW DUCTWORK AND CONCRETE INFILL.
6. INFILL EXISTING PENETRATION WITH 2 HOUR RATED ASSEMBLY AER-09038 FIGURE 7, RE DETAIL 14 ON G.301.
7. EXHAUST FAN FOR CO2 MANIFOLD CLOSET BELOW. RE: MECH. PROVIDE MECHANICAL CURB AND PATCH ROOFING TO CURB.
8. NEW MECHANICAL PENETRATION; RE: STRUCTURAL.

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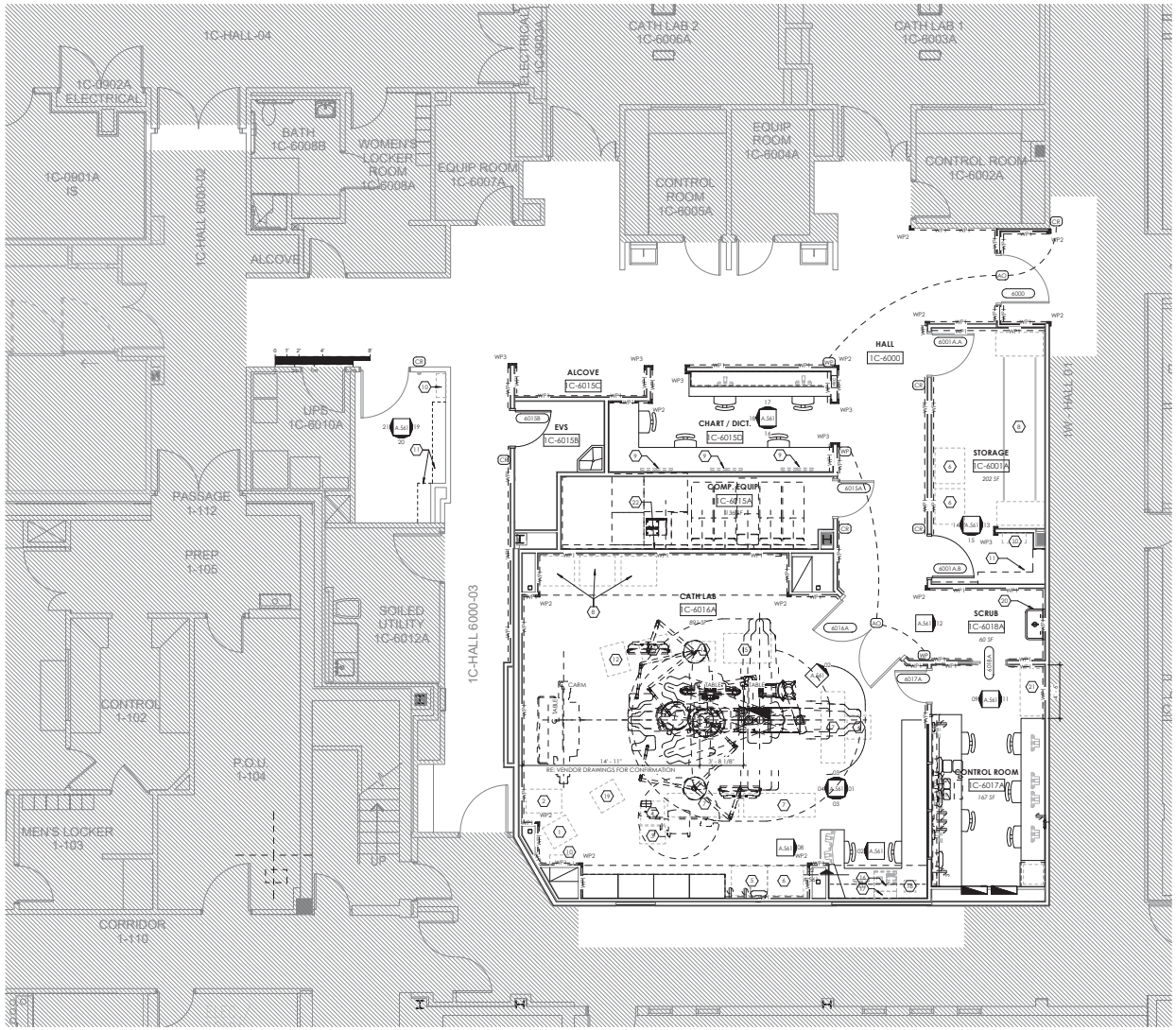
Issue	FOR CONSTRUCTION
Date	08/19/16
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Drawn by	KL
Checked by	JMN

Sheet Title:
PENTHOUSE - FLOOR PLAN & EXTERIOR ELEVATIONS

Sheet Number
A.202

RSN: 1156136
Permit #: 2016 1191012

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC



1 - EQUIPMENT PLAN - MEDICAL CENTER OF AURORA - LEVEL 01 - CATH LAB
1/4" = 1'-0"

RSN: 1156136
Permit #: 2016 1191012

EQUIPMENT PLAN GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY AND COORDINATE CLEAR DIMENSIONS REQUIRED FOR OWNER FURNISHED EQUIPMENT THAT IS LOCATED WITHIN OR ADJACENT TO BUILT IN CABINETS.
2. ALL GLOVE DISPENSERS ARE TO BE OWNER FURNISHED CONTRACTOR INSTALLED.
3. CONTRACTOR SHALL PROVIDE BLOCKING/STRAPPING FOR ALL MOUNTING BRACKETS OF WALL HUNG EQUIPMENT. COORDINATE FURNISHED EQUIPMENT REQUIREMENTS AND VENDOR DRAWINGS.
4. ALL SINKS ARE TO RECEIVE TAS PAPER TOWEL DISPENSER AND A TAS SOAP DISPENSER UNLESS NOTED OTHERWISE.
5. CONTRACTOR SHALL COORDINATE WITH THE OWNER ON THE DELIVERY AND INSTALLATION OF OWNER FURNISHED EQUIPMENT.

EQUIPMENT PLAN LEGEND

- OUT OF SCOPE
- CONTRACTOR FURNISHED EQUIPMENT/ITEM
- OWNER FURNISHED EQUIPMENT/ITEM
- WP1 — WP1 — SHEET/RAIL WALL PROTECTION RE: DETAILS ON SHEET A.531
- WP4 — WP4 — SHEET/RAIL WALL PROTECTION RE: DETAILS ON SHEET A.531
- WP2 — WALL PROTECTION CORNER GUARD RE: DETAILS ON SHEET A.531
- WP3 — WALL PROTECTION END GUARD RE: DETAILS ON SHEET A.531
- A.100 — INTERIOR ELEVATION TAG
- COMPUTER WORKSTATION
- CR — CARD READER
- WP — WAVE PLATE
- AO — AUTO OPENER
- FEC — FIRE EXTINGUISHER CABINET

EQUIPMENT PLAN KEYNOTES

1. ANESTHESIA PYXIS MAIN O.F.O.I.
2. ANESTHESIA SUPPLY, O.F.O.I.
3. ICE MAKER, O.F.O.I.
4. INSTRUMENT TABLE, O.F.O.I.
5. TAVR, O.F.O.I.
6. MOBILE SUPPLY CART, O.F.O.I.
7. SURGICAL TABLE, O.F.O.I.
8. METRO QUIKTRAK STORAGE SYSTEM - 4' LONG SUPER ADJUSTABLE SHELVES WITH STATIONARY END UNITS ON BOTH SIDES, O.F.C.I.
9. DOUBLE WALL MOUNTED MONITORS, BRACKET, O.F.C.I., MONITORS, O.F.O.I.
10. POU COMPUTER, O.F.C.I. WALL MTD BRACKET, O.F.C.I.
11. BIN SYSTEM O.F.O.I., METAL MOUNTIN PLATES, O.F.C.I.
12. ULTRA SOUND, O.F.O.I.
13. CRASH CART, O.F.O.I.
14. CELL SAVER, O.F.O.I.
15. PERFUSION UNIT, O.F.O.I.
16. PXYIS MED SUPPLY, 5-DRAWER, O.F.O.I.
17. UNDERCOUNTER REFRIGERATOR, O.F.O.I.
18. I-STAT, O.F.O.I.
19. ANESTHESIA CART, O.F.O.I.
20. MATCH EXISTING SCRUB SINKS IN SUITE, C.F.C.I. RE: PLUMBING DRAWINGS
21. MOBILE LEADS STORAGE CART, O.F.O.I.
22. SHELF FOR STRYKER EQUIPMENT, 30" X 2' X 1" THICK LAMINATE SHELF ON ADJUSTABLE STANDARDS, 5' LONG. COORDINATE SHELF HEIGHT WITH ALL VENDOR EQUIPMENT HEIGHTS AND REQUIRED CLEARANCES.

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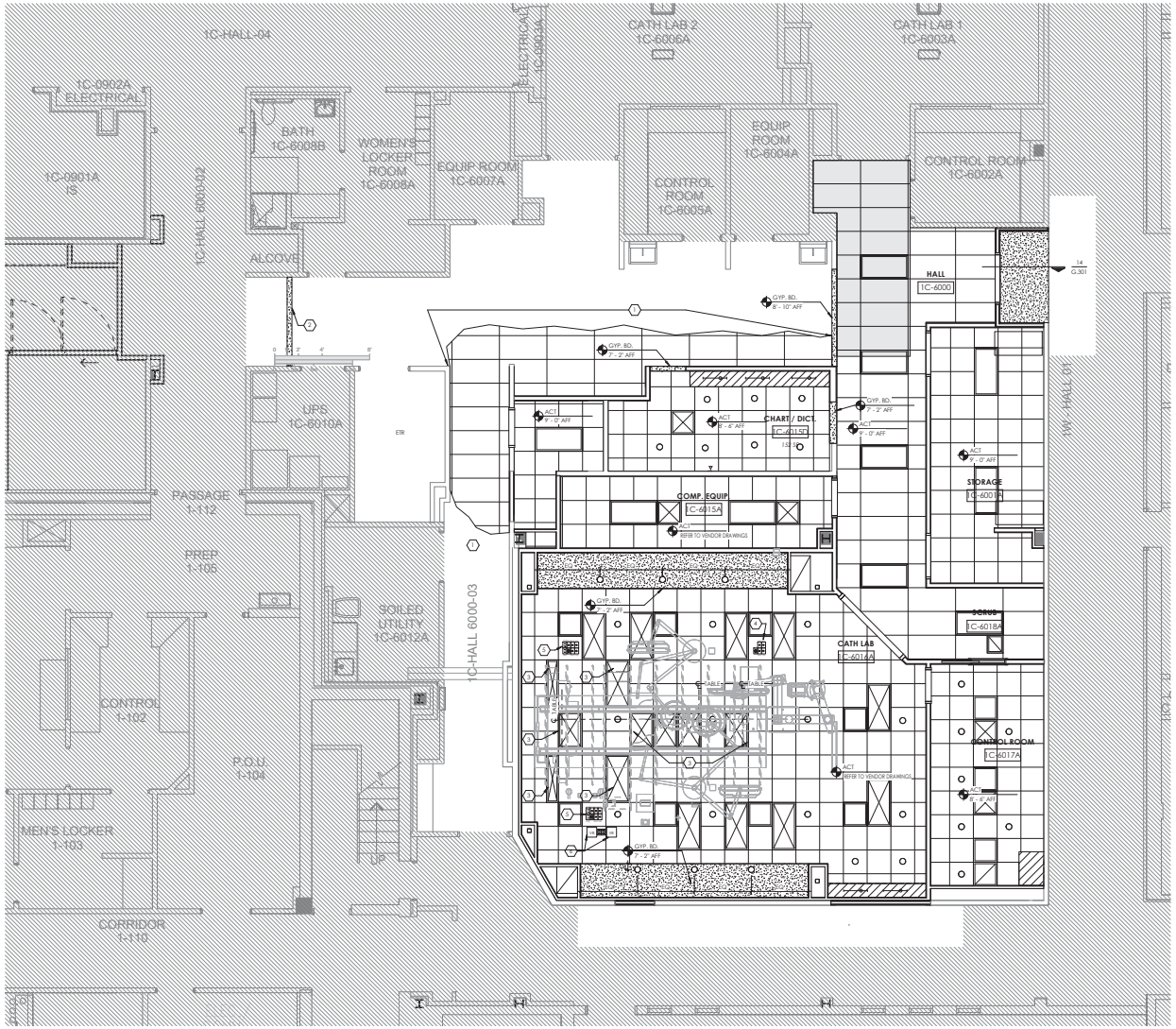
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Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
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Sheet Title:
LEVEL 01 - EQUIPMENT PLAN

Sheet Number
A.211

City of Aurora Building Division
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Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC



01 - LEVEL 01 - REFLECTED CEILING PLAN
1/4" = 1'-0"

REFLECTED CEILING PLAN GENERAL NOTES

1. THE CONTRACTOR SHALL COMPARE THIS REFLECTED CEILING PLAN WITH ELECTRICAL LIGHTING PLANS, MECHANICAL SUPPLY, RETURN, AND EXHAUST PLANS. THE CONTRACTOR SHALL REPORT ANY OMISSIONS OR INCONSISTENCIES TO THE ARCHITECT.
2. SEE ELECTRICAL DRAWINGS FOR THE LOCATIONS OF CEILING MOUNTED SMOKE DETECTORS, SPEAKERS, EXIT SIGNAGE, FIRE ALARM DEVICES, WALL MOUNTED EXIT LIGHTS, ETC.
3. FOR FURTHER DIMENSIONS SEE ENLARGED PLANS, SECTIONS, ELEVATIONS, AND DETAILS.
4. COORDINATE GYPSUM BOARD FURR DOWN HEIGHTS WITH FULL HEIGHT CABINETS AND INTERIOR ELEVATIONS.
5. SPRINKLER HEAD LOCATIONS ARE NOT SHOWN ON ARCHITECTURAL REFLECTED CEILING PLANS.
6. 18" MINIMUM VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN THE BOTTOM OF EXTENDED SPRINKLER HEADS AND THE TOP OF ANY FILES, SHELVING, LOCKERS, ETC.
7. THE CONTRACTOR SHALL VERIFY THAT ACCESS PANELS OF TYPE SPECIFIED ARE INSTALLED IN NON-ACCESSIBLE TYPE CEILINGS WHERE SERVICE OR ADJUSTMENT TO MECHANICAL, PLUMBING, OR ELECTRICAL ITEMS MAY BE REQUIRED. ACCESS PANELS SHALL BE THE FIRE RATED TYPE EQUAL TO THE RATING OF THE CEILING IN WHICH THEY OCCUR.
8. RELOCATE SUPPLY DRAIN AND VENT PIPES TO MAINTAIN SCHEDULED CEILING HEIGHTS. COORDINATE RELOCATIONS WITH MEP ENGINEERS.
9. WHERE EXISTING LAY-IN CEILINGS ARE TO REMAIN, THE CONTRACTOR SHALL REPLACE ANY TILE THAT HAS BEEN DAMAGED WITH MATERIALS THAT MATCH THE EXISTING FOR COLOR, TEXTURE, PATTERN, ETC. IF UNIFORMITY CANNOT BE ACHIEVED, THE CONTRACTOR SHALL REPLACE THE ENTIRE CEILING WITHIN THE SPACE WITH NEW MATERIAL.
10. WHERE LAY-IN CEILING TILES ARE CUT AND THE TILES ARE NOT HOMOGENEOUS, ALL EXPOSED EDGES ARE TO BE PAINTED WITH THE MANUFACTURERS COMPATIBLE EDGE PAINT TO MATCH TILE COLOR/TEXTURE. PAINTED EDGES ARE TO BE DRIED BEFORE BEING SET INTO THE GRID.

REFLECTED CEILING PLAN LEGEND

- SUSPENDED 2' x 2' ACOUSTICAL CEILING SYSTEM
- SUSPENDED 2' x 4' ACOUSTICAL CEILING SYSTEM
- GB#1 — GYPSUM WALL BOARD CEILING
- MS — MEDICAL EQUIPMENT SUPPORT SYSTEM. COORDINATE WITH VENDOR
- GYPSUM BOARD FURR DOWN OVER WALL CABINET OR LOCKER
- CEILING REPLACEMENT TO OCCUR AFTER CATH LAB HOURS
- CEILING TYPE / 9' - 0" AFF — CEILING HEIGHT DESIGNATION
- NEW RECESSED FLUORESCENT LIGHT FIXTURE
- RECESSED FLUORESCENT LIGHT FIXTURE TO BE RELOCATED
- EXISTING RECESSED FLUORESCENT LIGHT FIXTURE TO REMAIN
- FLUORESCENT STRIP COVE LIGHTING
- SUPPLY AIR GRILLE REF: MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION
- RETURN AIR GRILLE REF: MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION
- EXHAUST AIR GRILLE REF: MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION
- ACCESS PANEL
- RECESSED CAN LIGHT FIXTURE
- UNDER COUNTER TASK LIGHTING
- CEILING MOUNTED SECURITY CAMERA
- EXIT SIGN W/ DIRECTION
- OPEN TO STRUCTURE

REFLECTED CEILING PLAN KEYNOTES

1. TIE NEW GRID INTO EXISTING GRID PATTERN.
2. FINISH DEMOLISHED DOOR HEADER TO BE A GYPSUM FUR DOWN 2" BELOW EXISTING CEILING HEIGHT.
3. CONTRACTOR TO COORDIANTE DIFFUSER LOCATIONS MECHANICAL DRAWINGS AND MEDICAL EQUIPMENT SUPPORT SPACING.
4. MEDICAL GAS CEILING DROPS. (1) O2, (2) MV, (1) MA. CEILING TWIST LOCK DEDICATED POWER OUTLET. RE: MPE DRAWINGS.
5. MEDICAL GAS CEILING DROPS. (1) O2, (1) MV, (1) MA, (1) N2O, (1) WAG. CEILING TWIST LOCK DEDICATED POWER OUTLET. CEILING DATA OUTLETS. RE: MPE DRAWINGS.
6. PHILIPPS VIDEO BOX AND CEILING MOUNTED DUPLEX OUTLET. RE: VENDOR AND MPE DRAWINGS.

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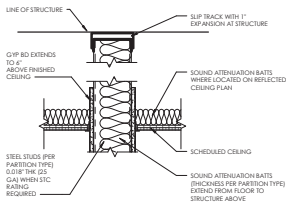
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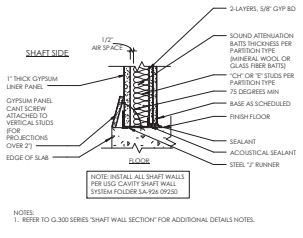
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LEVEL 01 - REFLECTED CEILING PLAN

Sheet Number
A.221

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Permit #: 2016 1191012

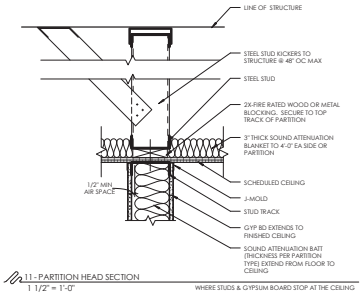


12 - PARTITION HEAD SECTION
1 1/2" = 1'-0" @ NON-RATED W/ GYP BD TO 6" ABOVE CEILING

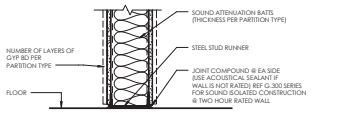


NOTES:
1. REFER TO G.300 SERIES "SHAFT WALL SECTION" FOR ADDITIONAL DETAILS NOTES.

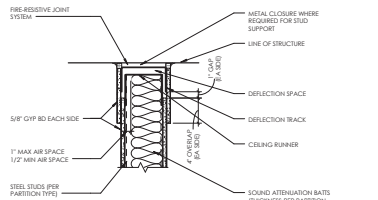
8 - PARTITION FLOOR SECTION
1 1/2" = 1'-0" @ 2 HR RATED SHAFT WALL



11 - PARTITION HEAD SECTION
1 1/2" = 1'-0" WHERE STUDS & GYPSUM BOARD STOP AT THE CEILING

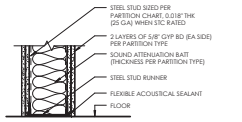


9 - PARTITION FLOOR SECTION
1 1/2" = 1'-0" WHERE STUDS & GYPSUM BOARD STOP AT THE CEILING

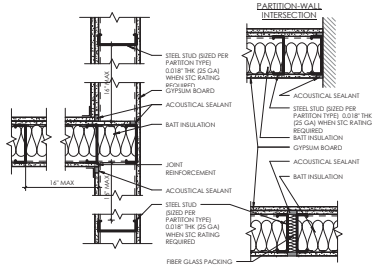


NOTES:
1. REFER TO G.300 SERIES FOR SIMILAR DETAIL AT RATED CONDITION.
2. CONTRACTOR TO COMPLY WITH DETAIL SHOWN OR USE PROPRIETARY SYSTEM AS DESCRIBED IN THE SPECIFICATIONS.
3. U419 - 1-HR RATED STUDS TO BE CUT 3/8" TO 3/4" LESS THAN ASSEMBLY HEIGHT.

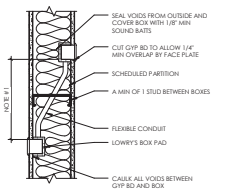
10 - PARTITION HEAD SECTION
1 1/2" = 1'-0" @ RATED WALL TO STRUCTURE U465 (1-HR), U411 (2-HR), U419 (1-HR)



3 - ACOUSTICAL PARTITION FLOOR SECTION
1 1/2" = 1'-0" @ FLOOR OF 2-HR RATED PARTITION OF NON-RATED PARTITION WITH AN STC REQUIREMENT

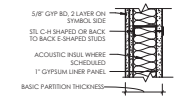


7 - ACOUSTICAL PARTITION PLAN DETAILS
1 1/2" = 1'-0"



NOTES:
1. 12" MINIMUM UNLESS NOTED OTHERWISE IN PARTITION CHART.
2. REFER TO G.300 SERIES FOR BACK TO BACK BOXES IN A RATED PARTITION.

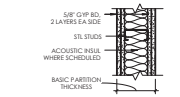
2 - ACOUSTICAL PARTITION PLAN DETAIL
1 1/2" = 1'-0" @ BACK BOX INSTALLATION DETAIL @ NON-FIRE RATED PARTITION



K

	K1_	STC	K2_	STC	K3_	STC
2-HR RATED SHAFT WALL	K16	41	K26	50	K36	43
STUD SIZE	2 1/2"		2 1/2"		4"	
BASIC PARTITION THICKNESS	3 3/4"		3 3/4"		5 1/4"	
ACOUSTICAL INSULATION THICKNESS	-		1"		-	
ACOUSTICAL TEST NUMBER	USG 750302 NOTE 3		USG 750302 NOTE 3		NOTE 2	
FIRE TEST NUMBER (WHERE APPLICABLE)	UL DES U415 (B)		UL DES U415 (B)		UL DES U415 (B)	

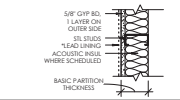
NOTE:
1. REFER TO A.500 SERIES FOR FLOOR DETAIL.
2. STC IS PREDICTED USING THE "INSUL" COMPUTER PROGRAM.
3. STC IS MODIFIED FROM REFERENCE.



C

	C1_	STC	C2_	STC	C3_	STC	C4_	STC
2-HR RATED WITH GYP BD TO STRUCTURE ABOVE	C16	49	C26	55	C36	48	C46	57
NON-RATED WITH GYP BD TO STRUCTURE ABOVE	C17	49	C27	55	C37	48	C47	57
STUD SIZE	2 1/2"		2 1/2"		3 5/8"		3 5/8"	
BASIC PARTITION THICKNESS	5"		5"		6 1/8"		6 1/8"	
ACOUSTICAL INSULATION THICKNESS	-		2"		-		3"	
ACOUSTICAL TEST NUMBER	SIM BBN 770408		SIM USG 840818 NOTE 2		SIM BBN 770408		SIM USG 840818	
FIRE TEST NUMBER (WHERE APPLICABLE)	UL DES U411		UL DES U411		UL DES U411		UL DES U411	

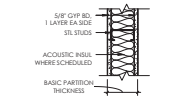
NOTE:
1. REFER TO G.300 FOR RATED CONDITIONS AND A.500 SERIES FOR NON-RATED CONDITIONS FOR PLACEMENT OF ACOUSTICAL SEALANT AT FLOOR IN A 4-LAYERED PARTITION.
2. STC IS MODIFIED FROM THE REFERENCE.
3. STC IS PREDICTED USING THE "INSUL" COMPUTER PROGRAM.
4. STC IS BASED ON 0.018" THICK (25 GA) STUDS.



D

	D1_	STC	D2_	STC	D3_	STC
NON-RATED WITH GYP BD TO STRUCTURE ABOVE	D11	27	D21	29	D31	27
NON-RATED WITH GYP BD TO 6" ABOVE CEILING	D13		D23		D33	
NON-RATED WITH STUDS & GYP BD TO FINISHED CEILING	D15		D25		D35	
STUD SIZE	2 1/2"		2 1/2"		3 5/8"	
BASIC PARTITION THICKNESS	3 1/8"		3 1/8"		4 1/4"	
ACOUSTICAL INSULATION THICKNESS	-		2"		-	
ACOUSTICAL TEST NUMBER	NOTE 1		NOTE 1		NOTE 1	
FIRE TEST NUMBER (WHERE APPLICABLE)						

NOTE:
1. STC'S ARE PREDICTED USING THE "INSUL" COMPUTER PROGRAM.
2. STC'S ARE BASED ON 0.018" THICK (25 GA) STUDS.
3. REFER TO A.500 SERIES FOR BRACING.
4. WHERE AN * NEXT TO THE PARTITION TAG, PROVIDE LEAD LINING PER THE PHYSICIST REPORT. LEAD LINING ALSO INDICATED ON SHEET A.203.



A

	A3_	STC	A4_	STC	A7_	STC	A8_	STC
1-HR RATED WITH GYP BD TO STRUCTURE ABOVE	A35	39	A45	41	A75	41	A85	48
NON-RATED WITH GYP BD TO STRUCTURE ABOVE (SMOKE RESIST)	A31	39	A41	41	A71	41	A81	48
NON-RATED WITH GYP BD TO 4" ABOVE CEILING	A32		A42		A72		A82	
NON-RATED WITH STUDS & GYP BD TO FINISHED CEILING	A33		A43		A73		A83	
PARTIAL HEIGHT PARTITION, SEE FLOOR PLANS FOR HEIGHTS...	A34		A44		A74		A84	
STUD SIZE	3 5/8"		3 5/8"		6"		6"	
BASIC PARTITION THICKNESS	4 7/8"		4 7/8"		7 1/4"		7 1/4"	
ACOUSTICAL INSULATION THICKNESS	-		3"		-		5 1/2"	
ACOUSTICAL TEST NUMBER	SIM USG 860808		SIM USG 870717		SIM USG 860808 NOTE 3		SIM USG 870717 NOTE 4	
FIRE TEST NUMBER (WHERE APPLICABLE)	UL DES U465		UL DES U465		UL DES U465		UL DES U465	

NOTE:
1. STC IS PREDICTED USING THE "INSUL" COMPUTER PROGRAM.
2. STC IS MODIFIED FROM THE REFERENCE.
3. STC IS BASED ON 0.018" THICK (25 GA) STUDS
4. WHERE AN * NEXT TO THE PARTITION TAG, PROVIDE 3/4" PLYWOOD BEHIND THE GYP BD ON THE STORE ROOM SIDE.

PARTITION TYPE GENERAL NOTES

1. REFER TO FLOOR PLAN SERIES A.200 FOR LOCATION OF PARTITION TYPES. ALL PARTITIONS ARE TYPE " A4 1 " UNLESS NOTED OTHERWISE. NOT ALL PARTITION TYPES SHOWN ARE UTILIZED.
2. REFER TO THE L200 SERIES FOR FINAL FINISHES ON PARTITIONS. PARTITION TYPES IN CHARTS REFER TO BASE WALL ONLY.
3. WHEN BLOCKING REQUIRED IN A PARTITION, USE A MINIMUM .033" (20 GA) STUD.
4. PROVIDE ONE LAYER OF 5/8" GLASS MATT INTERIOR AT WALLS BEHIND SINKS AND LAVATORIES WITHOUT TILE. GLASS MATT INTERIOR TYPE BOARD SHALL BE INSTALLED WITHIN 2' OF ALL URINALS AND WATER CLOSETS, TO A HEIGHT OF A 4' AFF (AT WALLS W/ CUT TILE).
5. PROVIDE TILE BACKER GLASS MATT AT ALL WALLS IN TOILET ROOMS WITH SHOWER AND AT TILED WALLS OR WALL PANELS IN SHOWERS AND BATHTUBS.
6. PENETRATIONS IN LEAD-LINED PARTITIONS SHALL BE SEALED TO MEET LEAD SHIELDING REQUIREMENTS.
7. ALL LOAD BEARING WALLS SHALL BE CONSTRUCTED PER STRUCTURAL DRAWINGS AND SPECIFICATIONS.
8. PROVIDE FIRE TREATED WOOD BLOCKING, SHEET METAL OR STEEL BACKING IN PARTITIONS TO SUPPORT WALL MOUNTED ITEMS AND EQUIPMENT. FOR EXAMPLE, AT CABINETS, HANDRAILS, GUARDRAILS, TOILET PARTITIONS AND ACCESSORIES, WALL-MOUNTED EQUIPMENT, ETC.
9. "LINE OF STRUCTURE" AS SHOWN AT THE HEAD CONDITIONS OF THE PARTITION DETAIL DOES NOT INDICATE THE EXACT CONSTRUCTION CONDITION. REFER TO THE G.300 SERIES "CODE COMPLIANCE DETAILS" FOR ADDITIONAL INFORMATION CONCERNING RATED PARTITIONS.
10. ISOLATE NON-LOAD BEARING FRAMING FROM STRUCTURAL ELEMENTS TO PREVENT THE TRANSFER OF LOAD TO PARTITION FRAMING. STOP STUD BELOW METAL RUNNER (TOP TRACK) TO ALLOW FOR VERTICAL EXPANSION. SET TOP TRACK 1" BELOW DEFLECTION TRACK. DO NOT ATTACH STUDS TO TOP TRACK. DO NOT ATTACH GYPSUM BOARD TO THE DEFLECTION TRACK. THIS MAY ALSO BE ACHIEVED. AT THE CONTRACTORS OPTION. BY UTILIZING THE PROPRIETARY SYSTEM DESCRIBED IN THE PROJECT MANUAL.
11. REFER TO DOOR AND WINDOW SCHEDULES FOR NOTES REGARDING STUDS AT OPENINGS.
12. REFER TO THE A.500 SERIES FOR HEAD OF WALL DETAILS FOR NON-RATED PARTITIONS.

ACOUSTICAL PARTITIONS

THE FOLLOWING NOTES APPLY TO ALL PARTITIONS DESIGNATED TO HAVE A SOUND TRASMISSION CLASS (STC) RATING ON THE PARTITION CHARTS. REFER TO DETAILS ON THE A.500 SERIES FOR PARTITION TYPES WITH A DESIGNATED STC RATING.

1. ALL ACOUSTICALLY CLASSED PARTITIONS SHALL BE CONSTRUCTED IN STRICT ACCORDANCE TO THE REFERENCED TEST.
2. STAGGER AND SEAL ALL JOINTS ON MULTIPLE GYPSUM BOARD LAYER PARTITIONS.
3. SEAL PARTITIONS AIR TIGHT AT FLOORS, SIDES, AND CEILINGS ON BOTH SIDES WITH NON-HARDENING ACOUSTICAL SEALANT.
4. ALL BATTS AND BLANKETS IN RATED PARTITIONS MUST BEAR THE REQUIRED UL CLASSIFICATION MARKING AS TO FIRE- RESISTANCE. REFER TO CODE COMPLIANCE DETAILS IN THE G.300 SERIES.
5. AT ACOUSTICALLY RATED PARTITIONS, DO NOT FILL THE STUD CAVITY (DEPTH) FULLY WITH SOUND BATTS. THE WIDTH OF THE SOUND BATTS SHOULD BE SLIGHTLY SMALLER THAN CAVITY TO AVOID BATT COMPRESSION; HOWEVER, THE ENTIRE LENGTH AND HEIGHT OF THE PARTITION SHOULD HAVE CONTINUOUS AND UNINTERRUPTED SOUND ATTENUATION BATTS.
6. SEAL ALL WALL INTERSECTIONS AND CONTROL JOINTS AT ACOUSTICALLY CLASSED PARTITIONS IN ACCORDANCE WITH DETAILS IN THE A.500 SERIES.
7. SEAL ALL CONDUIT, STRUCTURAL DUCT AND LARGE PIPE PENETRATIONS ACCORDING TO DETAILS IN THE A.500 SERIES TO MAINTAIN THE ACOUSTICAL RATING OF THE WALL. IF THE PARTITION IS FIRE RATED, REF THE CODE COMPLIANCE DETAILS ON THE G.300 SERIES.
8. OUTLETS ON OPPOSITE SIDES OF ACOUSTICALLY CLASSED PARTITIONS SHOULD BE SEPARATED BY A MINIMUM OF ONE STUD. SEAL OUTLETS IN ACCORDANCE WITH DETAILS IN THE A.500 SERIES TO MAINTAIN ACOUSTICAL RATING. IF THE PARTITION IS FIRE RATED REFER TO G.300 SERIES.
9. THE ARCHITECT SHALL OBSERVE THAT ALL BOXES REQUIRED TO BE ACOUSTICALLY SEALED ARE SEALED PRIOR TO CLOSING IN PARTITIONS AND INSTALLING DEVICES AND COVER PLATES.
10. "Z" FURRINGS OR RESILIENT CHANNELS ARE REQUIRED AT CMU WALLS TO MAINTAIN DESIGNATED STC.
11. HEAVIER GAGE STUDS, WITH THEIR ADDED THICKNESS HAVE A NEGATIVE IMPACT ON THE SOUND INSULATION OF A PARTITION.

FIRE RATED PARTITIONS

1. REFER TO THE G.300 SERIES "CODE COMPLIANCE DETAILS" FOR ADDITIONAL INFORMATION ON THRU PENETRATIONS AT RATED PARTITIONS, FIRE RESISTANT JOINT SYSTEMS, SLIP TRACKS AT NON-BEARING PARTITIONS CONNECTION TO STRUCTURE AND WALL PRIORITY.
2. UL DESIGN REFERS TO FIRE RESISTANCE DIRECTORY'S MOST RECENT ISSUE.
3. CONSTRUCT RATED PARTITIONS BEFORE NON-RATED.
4. REFER TO THE G.300 SERIES FOR HEAD OF WALL DETAILS FOR RATED PARTITIONS.

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No.	Description	Date

STATE OF COLORADO JOHN MENKO 401720 LICENSED ARCHITECT
08/19/16

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC

TMCA CATH LAB HYBRID LAB RENOVATION

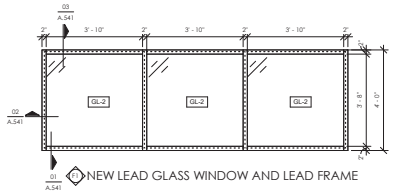
1501 S Potamac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
INTERIOR PARTITION TYPE CHARTS & DETAILS

Sheet Number
A.501

RSN: 1156136
Permit #: 2016 1191012



1.5-INTERIOR OPENINGS - CONTROL ROOM
1/2" = 1'-0"

DOOR SCHEDULE

DOOR NO	ROOM NAME	DOOR SIZE W	DOOR SIZE HT	DOOR SIZE THK	DOOR TYPE	DOOR MTL	DOOR FINISH	DOOR GLZ	FRAME TYPE	FRAME MTL	FRAME DETAILS HEAD	FRAME DETAILS JAMB	FIRE RATING	HARDWARE HDWR NO (REF SPEC'S)	REMARKS
601.5A	COMP. EQUIP.	3' - 0"	7' - 0"	1 3/4"	F	WD	ACR	-	A	HM	05/A541	04/A541	-	2.02	1, 3
601.6A	CATH LAB	7' - 0"	7' - 0"	1 3/4"	N	WD	ACR	GL-1	B	HM	07/A541	06/A541	-	4.01	1
601.7A	CONTROL ROOM	2' - 8"	7' - 0"	1 3/4"	F	WD	ACR	-	A	HM	07/A541	06/A541	-	4.02	
601.8A	SCRUB	3' - 0"	7' - 0"	1 3/4"	F	WD	ACR	-	A	HM	05/A541	08/A541	-	4.03	
600.1.A	STORAGE	3' - 6"	7' - 0"	1 3/4"	F	WD	ACR	-	A	HM	05/A541	04/A541	45	2.01	1
6000	HALL	4' - 0"	7' - 0"	1 3/4"	N	WD	ACR	GL-1	A	HM	05/A541	04/A541	90	7.01	1
601.5B	EVS	3' - 0"	7' - 0"	1 3/4"	F	WD	ACR	-	A	HM	05/A541	04/A541	-	2.02	1, 2
600.1.A.B	STORAGE	3' - 6"	7' - 0"	1 3/4"	F	WD	ACR	-	A	HM	05/A541	04/A541	45	2.01	1
601.5H	MECHANICAL PENTHOUSE	3' - 0"	7' - 0"	1 3/4"	F	HM		-	F	HM	11/A541	10/A541	-	2.03	1, 4
Grand total: 9															

REMARKS:

1) ACCESS CONTROL REQUIREMENTS TO BE COORDINATED WITH FACILITY SECURITY VENDOR. ROUGH IN TO BE PROVIDED BY CONTRACTOR.

2) RE-INSTALL SALVAGED DOOR AND HARDWARE. VERIFY EXISTING HARDWARE AGAINST THE REQUIRED HARDWARE IN HARDWARE SCHEDULE.

3) INSTALL IVES 180 DEGREE HINGE.

4) KEYSIDE TO INTERIOR.

5) HEAD OF FRAME AND SLIDING DOOR HARDWARE ASSEMBLY MUST BE DETAILED SO THAT THERE IS NO VISIBLE GAP BETWEEN TOP OF DOOR SLAB AND BOTTOM OF FRAME HEAD. TOP OF DOOR SLAB SHOULD BE CONCEALED INSIDE OF THE HEAD OF FRAME

WINDOW LEGEND

F1	RM 601A	GL-2	LEAD GLASS

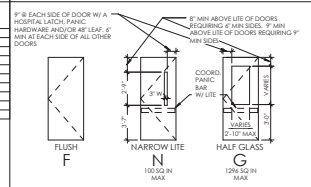
GLASS TO PROVIDE RADIATION PROTECTION EQUIVALENT TO REQUIREMENT FOR WALL IN PHYSICIST REPORT.

LOUVER LEGEND

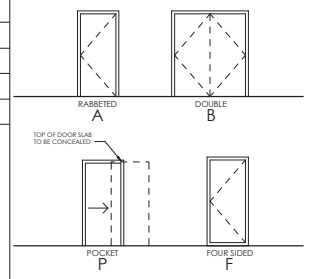
L1	RM 601SH	3' X 7'	C/S GROUP - STORM RESISTANT, WIND DRIVEN RAIN, BIRD SCREEN LOUVER. 50% FREE AREA.
L2	RM 601SH	4' X 4'	C/S GROUP - STORM RESISTANT, WIND DRIVEN RAIN, BIRD SCREEN LOUVER. 50% FREE AREA.

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2003 INTERNATIONAL CODES & 2011 NEC

DOOR TYPES



DOOR FRAME TYPES



DOOR SCHEDULE ABBREVIATIONS

MATERIAL:
HM - HOLLOW METAL
WD - (INSERT SPECIES) DOOR
SR - SMOKE RESISTANT
EXT - EXTERIOR
(E) - EXISTING
ME - MATCH EXISTING
NA - NOT APPLICABLE
GL-1 - GLAZING 1; REFER TO SPECIFICATIONS FOR MORE INFORMATION
GL-2 - LEAD LINED GLASS
FINISH:
*REFER TO FINISH LEGEND FOR MORE INFORMATION.
AL1 - ANODIZED ALUMINUM
AL2 - BRONZED ALUMINUM
PNT - PAINTED FINISH
SST - STAINLESS STEEL FINISH
PL - PLASTIC LAMINATE
ACR - ACROVYN CLAD (COLOR/PATTERN TO BE SELECTED BY ARCHITECT)

HARDWARE MANUFACTURERS:
IVE - IVES
SCH - SCHLAGE
LCN - LCN
NGP - NATIONAL GUARD PRODUCTS
MCK - MCKINNEY
GLY - GLYNN-JOHNSON
RIX - RIXSON
SU - SECURITRON
VON - VON DUPRIN
BEST - BEST
PEM - PEMKO
SAR - SARGENT
ME - MATCH EXISTING

DOOR HARDWARE

GENERAL HARDWARE NOTES:
1) FACILITY STANDARD KEYWAY: KABA PEAKS 250 (SFIC)*
2) CLOSERS TO BE MOUNTED ON THE INTERIOR SIDE OF DOORS SO THAT THEY ARE NOT VISIBLE FROM THE CORRIDOR.

HARDWARE GROUP: 2.01 - STOREROOM — 45 MIN.
NOTES: 45 MIN., FIRE RATED DOOR & FRAME

3 EA	HINGE	HD SB81 4.5 X 4.5	619	IVE
1 EA	STORE ROOM LOCK SET	10GD44-L*	619	SAR
1 EA	ELECTRIC STRIKE	1006	619	HES
1 EA	CLOSER	4041R	619	LCN
1 EA	WALL STOP	WS407/CVX	619	IVE
1 SET	SMOKE GASKET	5068	BLK	PEM
1 EA	CARD READER	BY OWNER VENDOR	--	--
1 EA	POWER SUPPLY	BY OWNER VENDOR	--	--

HARDWARE GROUP: 2.02 - STOREROOM
NOTES:

3 EA	HINGE	HD SB81 4.5 X 4.5	619	IVE
1 EA	STORE ROOM LOCK SET	10GD44-L*	619	SAR1 EA
1 EA	ELECTRIC STRIKE	1006	619	HES
1 EA	CLOSER	4041R	619	LCN
1 EA	WALL STOP	WS407/CVX	619	IVE
1 SET	DOOR SILENCERS	SR64	GRY	IVE
1 EA	CARD READER	BY OWNER VENDOR	--	--
1 EA	POWER SUPPLY	BY OWNER VENDOR	--	--

HARDWARE GROUP: 2.03 - STOREROOM
NOTES:

3 EA	HINGE	HD SB81 4.5 X 4.5	619	IVE
1 EA	STORE ROOM LOCK SET	10GD44-L*	619	SAR
1 EA	FLUSH BOLT	FB3358	619	IVE
2 EA	WALL STOP	WS407/CVX	619	IVE
1 EA	WEATHER STRIP	1552 (HEAD & JAMBS)	BLK	NGP
1 EA	DRIP CAP	16A	619	NGP
1 EA	DOOR SWEEP	200NSS	619	NGP

HARDWARE GROUP: 4.01 - PASSAGE SET
NOTES:

2 EA	S.C. CONT. GEARED HINGE	210HD	619	IVE
1 EA	AUTO FLUSH BOLT	FB51T	619	IVE
1 EA	CLOSER 30"	4041R	619	LCN
1 EA	COORDINATOR	COR42	619	IVE
1 EA	ASTRAGAL	375CR	619	PEM
1 EA	AUTO OPENER	BESAM SW2000-2	619	BES
1 EA	POWER SUPPLY	BY OWNER VENDOR	--	--
3 EA	WAVE PLATE	MATCH STANDARD	--	--

HARDWARE GROUP: 4.02 - PASSAGE SET
NOTES:

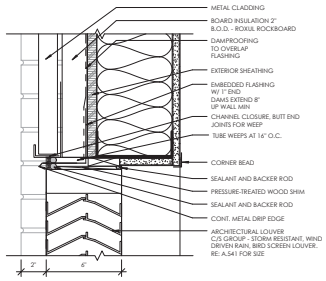
3 EA	HINGES	SB81 4.5X4.5	619	IVE
1 EA	PASSAGE SET	10GJ3-L-L	619	SAR
1 EA	CLOSER W/ HOLD OPEN	4041HO	619	LCN
3 EA	DOOR SILENCERS	SR64	GRY	IVE

HARDWARE GROUP: 4.03 - PASSAGE SET
NOTES:

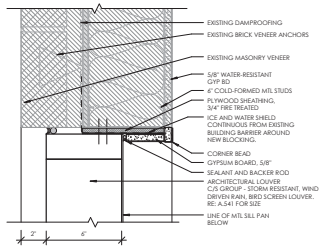
1 EA	POCKET DOOR ASSEMBLY	9628	HAG	ACC
1 EA	DUMMY PULL	7200L-D	619	HAG

HARDWARE GROUP: 7.01 - ENTRY/EGRESS SET — 90 MIN.
NOTES: 90 MIN. FIRE RATED DOOR AND FRAME

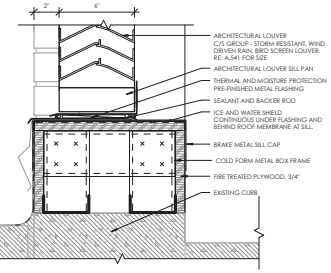
2 EA	S.C. CONT. GEARED HINGE	210HD	619	IVE
2 EA	EXIT DEVICE	QEL9927-TL-06-F-LBR	619	VON
1 EA	AUTO FLUSH BOLT	FB51T	619	IVE
1 EA	CLOSER 40"	4041R	619	LCN
1 EA	COORDINATOR	COR42	619	IVE
1SET	SMOKE GASKET	5068	BLK	PEM
1 EA	AUTO OPENER	BESAM SW2000-2	619	BES
1 EA	POWER SUPPLY	BY OWNER VENDOR	--	--
3 EA	WAVE PLATE	MATCH STANDARD	--	--



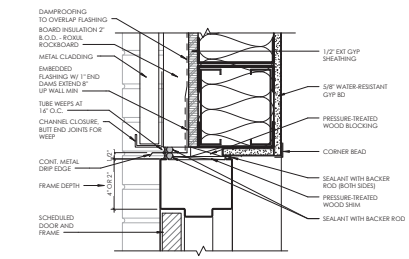
1.4-LOUVER HEAD @ BRICK WALL
3" = 1'-0"



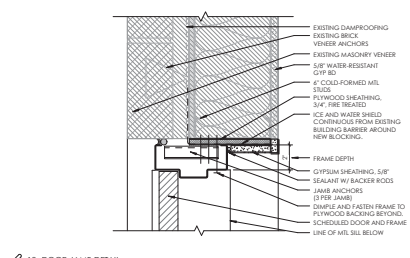
1.3-LOUVER JAMB DETAIL
3" = 1'-0"



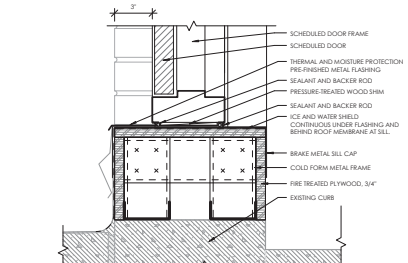
1.2-LOUVER SILL @ BRICK WALL
3" = 1'-0"



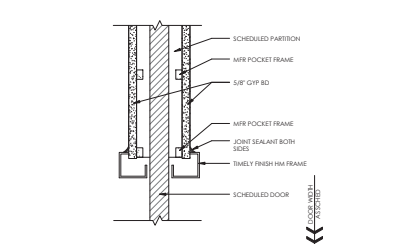
1.11-DOOR HEAD DETAIL
3" = 1'-0"
@ TYP EXT SWINGING DOOR



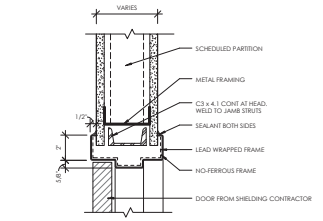
1.10-DOOR JAMB DETAIL
3" = 1'-0"
@ TYP EXT SWINGING DOOR



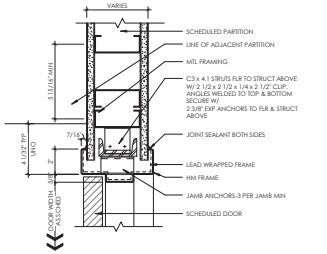
1.9-THRESHOLD DETAIL
3" = 1'-0"
@ EXTERIOR SWINGING DOORS



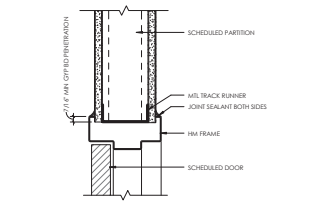
1.8-JAMB DETAIL
3" = 1'-0"
@ POCKET DOOR



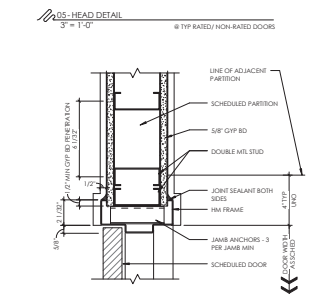
1.7-HEAD DETAIL
3" = 1'-0"
@ SHIELDED DOOR



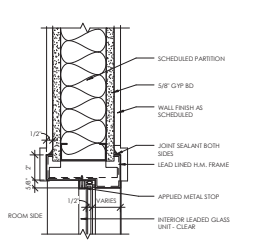
1.6-JAMB DETAIL
3" = 1'-0"
@ SHIELDED DOORS



1.3-HEAD DETAIL AT LEAD WINDOW
3" = 1'-0"

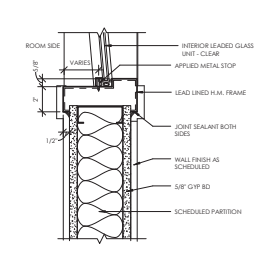


1.5-HEAD DETAIL
3" = 1'-0"
@ TYP RATED/ NON-RATED DOORS



1.2-JAMB DETAIL AT LEAD WINDOW
3" = 1'-0"

1.4-JAMB DETAIL
3" = 1'-0"
@ TYP RATED/ NON-RATED DOOR



1.1-SILL DETAIL AT LEAD WINDOW
3" = 1'-0"

RSN: 1156136

Permit #: 2016 1191012

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Denver, CO 80205
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Fax: 303.534.5215
Email: info@path21arch.com
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Structural
Structural Consultants Inc
3600 East Bayaud Ave., #300
Denver, CO, 80209
ph: 303.399.0104

No.	Description	Date

STATE OF COLORADO
JOHN MENKO
401720
REGISTERED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

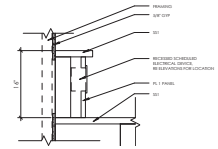
1501 S Potomac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

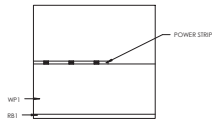
Sheet Title:
DOOR & WINDOW SCHEDULE, HARDWEAR, & DETAILS

Sheet Number
A.541

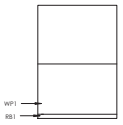
City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC



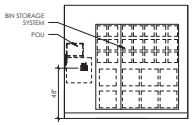
22- DETAIL AT SWITCH COUNTER
1" = 1'-0"



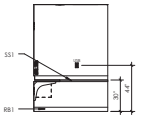
21 - CLEAN SUPPLY - WEST
1/4" = 1'-0"



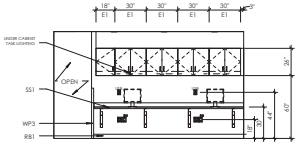
20- CLEAN SUPPLY - SOUTH
1/4" = 1'-0"



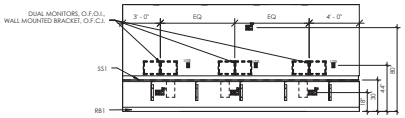
19 - CLEAN SUPPLY - EAST
1/4" = 1'-0"



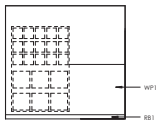
18 - CHART / DICT. WEST
1/4" = 1'-0"



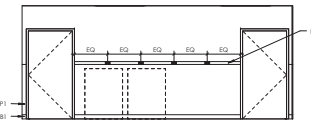
17 - CHART / DICT. NORTH
1/4" = 1'-0"



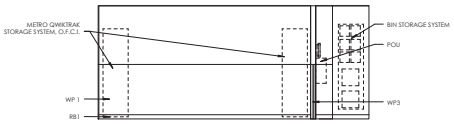
16 - CHART / DICT. SOUTH
1/4" = 1'-0"



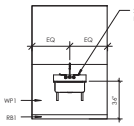
15- STORAGE ROOM ALCOVE - SOUTH
1/4" = 1'-0"



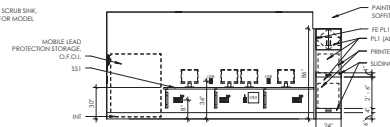
14- STORAGE WEST
1/4" = 1'-0"



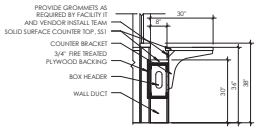
13 - STORAGE - EAST
1/4" = 1'-0"



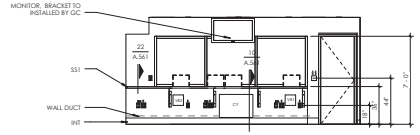
12 - SCRUB SINK - EAST
1/4" = 1'-0"



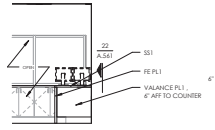
11 - CONTROL ROOM - EAST
1/4" = 1'-0"



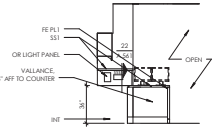
10 - SECTION THROUGH CONTROL DESK
1/2" = 1'-0"



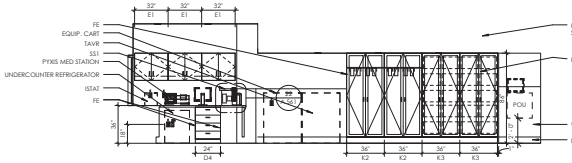
09 - CONTROL ROOM - WEST
1/4" = 1'-0"



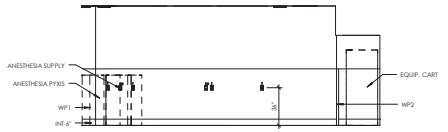
08 - RADIATION DESK EAST
1/4" = 1'-0"



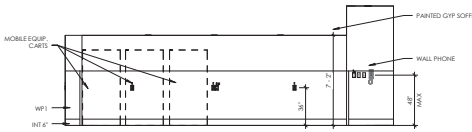
07 - RADIATION DESK - WEST
1/4" = 1'-0"



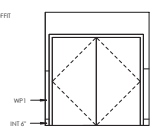
06 - CATH LAB - SOUTH
1/4" = 1'-0"



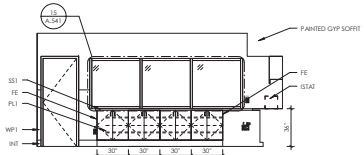
04 - CATH LAB - WEST
1/4" = 1'-0"



03 - CATH LAB - NORTH
1/4" = 1'-0"



02 - CATH LAB - NORTH EAST
1/4" = 1'-0"



01 - CATH LAB - EAST
1/4" = 1'-0"

RSN: 1156136
Permit #: 2016 1191012

path 21 architecture
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Email: info@path21arch.com
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ph: 214.551.1661

Structural
Structural Consultants Inc
3600 East Bayaud Ave., #300
Denver CO, 80209
ph: 303.399.0166

No.	Description	Date

STATE OF COLORADO
JOHN MENNO HOY
14
401729
LICENSED ARCHITECT
08/19/16

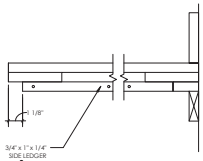
TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

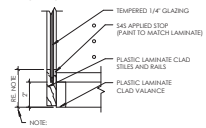
Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
INTERIOR ELEVATIONS

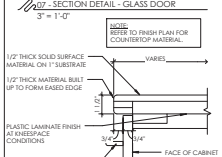
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A.561



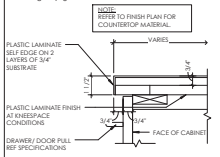
08 - SECTION DETAIL - LEDGER AT COUNTER
3" = 1'-0"



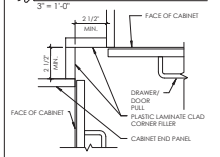
07 - SECTION DETAIL - GLASS DOOR
3" = 1'-0"



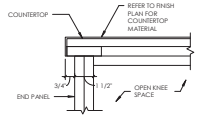
06 - SECTION DETAIL - SOLID SURFACE MAT.
3" = 1'-0"



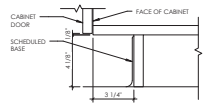
05 - SECTION DETAIL - PLASTIC LAMINATE
3" = 1'-0"



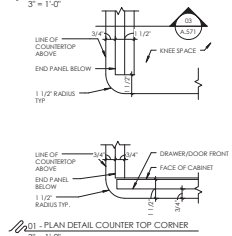
04 - PLAN DETAIL - INSIDE CORNER
3" = 1'-0"



03 - SECTION DETAIL - FINISHED END PANEL
3" = 1'-0"

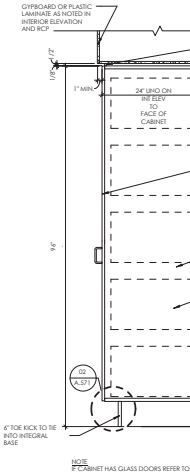


02 - SECTION DETAIL - TOEKICK
3" = 1'-0"



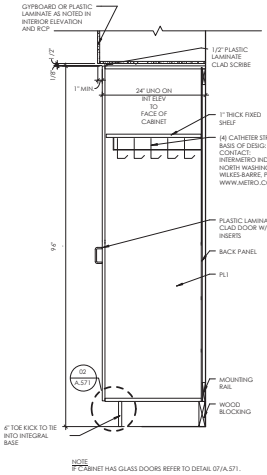
01 - PLAN DETAIL COUNTER TOP CORNER
3" = 1'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC



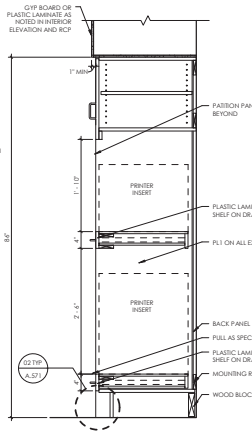
NOTE
IF CABINET HAS GLASS DOORS REFER TO DETAIL 07/A.571.

K3 - FULL HEIGHT CABINET
1" = 1'-0"
PLEXIGLASS DOORS & CATHETER HOOKS

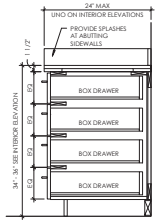


NOTE
IF CABINET HAS GLASS DOORS REFER TO DETAIL 07/A.571.

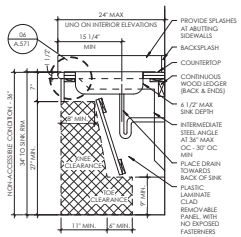
K2 - FULL HEIGHT CABINET
1" = 1'-0"
PLEXIGLASS DOORS & CATHETER HOOKS



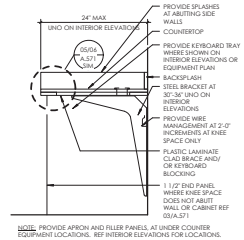
K1 - TALL CABINET
1" = 1'-0"
WITH SLIDING PRINTER SHELVES



P4 - BASE CABINET
1" = 1'-0"
4 BOX DRAWERS

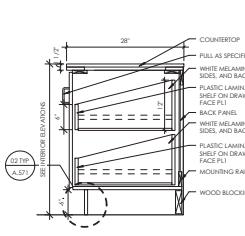


K2 - ACCESSIBLE SINK
1" = 1'-0"

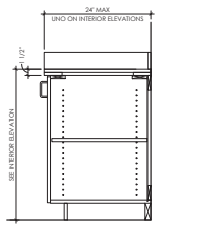


NOTE: PROVIDE APRON AND FILLER PANELS, AT UNDER COUNTER EQUIPMENT LOCATIONS. REF INTERIOR ELEVATIONS FOR LOCATIONS. REF TO INTERIOR FINISH PLAN FOR COUNTERTOP MATERIAL. IF PLASTIC LAMINATE COUNTERTOP REF 05/A.571, IF S3M4 REF S6/ A.571.

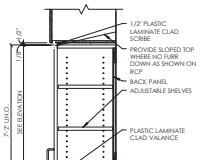
B1 - KNEE SPACE W/O DRAWER
1" = 1'-0"
KNEE SPACE OR U/C EQUIPMENT CONDITION



A6 - BASE CABINET
1" = 1'-0"
WITH DRAWERS AND DOOR



A2 - BASE CABINET
1" = 1'-0"
WITH DOOR



NOTE REFER TO THIS TYPICAL DETAIL E1 FOR MATERIALS AND DIMENSIONS OF TYPE "E" UPPER CABINETS.

IF CABINET HAS GLASS DOORS REFER TO DETAIL 07/A.571

E1 - UPPER CABINET
1" = 1'-0"
WITH DOORS

ARCHITECTURAL CASEWORK GENERAL NOTES

ALL CASEWORK:

1. ALL SECTION DETAILS ON THIS SHEET MAY NOT APPLY TO THIS PROJECT.
2. ARCHITECTURAL WOODWORK TYPES, WIDTHS, AND HEIGHTS ARE INDICATED ON THE A.560 SERIES SHEETS.
3. FIELD VERIFY EXISTING DIMENSIONS PRIOR TO FABRICATION. NOTIFY ARCHITECT OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO FABRICATION.
4. VERIFY AND COORDINATE CLEAR DIMENSIONS REQUIRED FOR OWNER-FURNISHED EQUIPMENT LOCATED WITHIN OR ADJACENT TO ANY CABINETS.
5. COORDINATE INSTALLATION OF SINKS WITH ASSOCIATED PIPING AND FITTINGS PLUS WITH INSTALLATION OF ACCESSIBLE COVER PANELS.
6. REQUIRED SCRIBES AND FILLER PIECES SHALL BE INSTALLED TO ALLOW PROPER OPERATION OF DRAWERS/DOORS. THEY SHALL BE EVENLY DISTRIBUTED AND OF EQUAL WIDTH ALONG A SINGLE RUN OF CABINETS. THEY SHALL BE 3" WIDE, MAXIMUM EXCEPT INSIDE CORNER FILLERS SHALL BE 2 1/2" WIDE MINIMUM. REF TO TYP. CASEWORK DETAILS ON SHEET A.571, INSIDE CORNER DETAIL.
7. WHERE BASE CABINETS INTERSECT AT INSIDE CORNER CONDITION PROVIDE WALL MOUNTED LEDGERS TO SUPPORT COUNTERTOP AT CORNERS. WHERE UPPER CABINETS INTERSECT AT INSIDE CORNER CONDITIONS PROVIDE HORIZONTAL FILLER PANEL FLUSH WITH BOTTOM OF CABINETS.
8. PROVIDE PLASTIC SCREW COVERS TO CONCEAL SCREW HEADS AT ALL SEMI-EXPOSED CABINET SURFACES. ALL EXPOSED SCREWS SHALL BE COUNTERSUNK.
9. CORE MATERIAL FOR SHELVING GREATER THAN 30" WIDE SHALL BE 1" THICK.
10. REFERENCE TOILET ACCESSORY LEGEND AND MOUNTING HEIGHTS IN A.500 SERIES.
11. PROVIDE KEYBOARD TRAYS & CPU HOLDERS AT ALL COMPUTER WORK STATION LOCATIONS UNLESS NOTED OTHERWISE.
12. PROVIDE FILLER PANELS AS NEEDED BETWEEN BUILT-IN APPLIANCES AND ADJACENT CABINETS OR WALLS.
13. ALL VERTICAL JOINTS BETWEEN CABINETS SHALL BE BUTT JOINTS. THEY SHALL LOOK "SEAMLESS" AND BE COVERED IN PLASTIC LAMINATE.
14. ALL EXPOSED SURFACES ON CABINETS WITHOUT DOORS SHALL BE CLAD IN PLASTIC LAMINATE UNO. NO EXPOSED MELAMINE UNO ON INTERIOR ELEVATIONS.

BASE CABINETS:

1. PROVIDE PLASTIC LAMINATE CLADDING ON ALL SURFACES OF BUILT IN DESKS AT KNEE SPACES AND EXPOSED ENDS OF DESK UNLESS NOTED OTHERWISE ON INTERIOR ELEVATIONS.
2. PROVIDE SCHEDULED BASE ALONG BOTTOM OF EXPOSED FRONTS, BACKS, SIDES, AND ENDS OF ALL FIXED CABINETS, PEDESTALS, VERTICAL SUPPORT PANELS, AND KNEE SPACES, ETC. UNLESS NOTED OTHERWISE ON THE INTERIOR ELEVATIONS.
3. ALL DRAWER LENGTHS SHALL BE 20" UNLESS NOTED OTHERWISE. ALL DRAWERS GREATER THAN 30" WIDE SHALL HAVE TWO PULLS.
4. ALL HORIZONTAL AND VERTICAL REVEALS SHALL BE 1/8".
5. ALL TOEKICK SPACES SHALL BE 4 1/8" TALL X 3 1/4" DEEP UNLESS NOTED OTHERWISE. REF TO TYP. CASEWORK DETAILS ON SHEET A.571.

COUNTERTOPS:

1. ALL COUNTERTOPS ARE TO BE 24" DEEP UNO ON INTERIOR ELEVATIONS.
2. ALL OUTSIDE COUNTERTOP CORNERS TO BE 1 1/2" RADIUS (IN PLAN) UNLESS NOTED OTHERWISE REF TO TYP. CASEWORK DETAILS ON SHEET A.571, COUNTERTOP CORNER DETAIL.
3. PROVIDE WALL MOUNTED BRACKETS (FIELD PAINTED) FOR SUPPORT OF COUNTERTOPS AT KNEE SPACES. COUNTERTOPS SHALL BE SUPPORTED 30" MINIMUM - 36" MAXIMUM OC COORDINATE LOCATION WITH KEYBOARD TRAYS AND CPU HOLDERS. REF. INTERIOR ELEVATIONS FOR LOCATIONS OF COUNTERTOP BRACKETS.
4. LOCATE GROMMETS AT BACK OF COUNTERTOPS EVERY 36" OC WITH A MINIMUM OF 1 PER KNEE SPACE UNLESS NOTED OTHERWISE ON THE EQUIPMENT PLAN. COORDINATE FINAL GROMMET LOCATIONS WITH OWNER. EXCEPTION: DO NOT PROVIDE GROMMETS AT ACCESSIBLE PORTION OF COUNTER, AS INDICATED ON THE EQUIPMENT PLANS.
5. REFER TO INTERIOR ELEVATIONS AND FINISH LEGEND FOR COUNTERTOP MATERIAL. ALL COUNTERTOPS AT SINKS TO BE SOLID SURFACE MATERIAL UNLESS NOTED OTHERWISE ON INTERIOR ELEVATIONS. REF TO TYP. CASEWORK DETAILS ON SHEET A.571 FOR SOLID SURFACE MATERIAL COUNTERTOP EDGE DETAIL AND FOR PLASTIC LAMINATE COUNTEREDGE DETAIL.
6. ALL BACK AND SIDE SPLASHES SHALL BE 4" TALL X 3/4" THICK IF PLASTIC LAMINATE, 1/2" THICK IF SOLID SURFACE MATERIAL UNO ON THE INTERIOR ELEVATIONS. ALL SPLASHES SHALL BE SCRIBED TO CONFORM TO THE SURFACE OF ABUTTING WALLS. ALL SPLASHES SHALL BE SEALED TO THE WALL WITH CLEAR SILICONE SEALANT. IF SOLID SURFACE, PROVIDE SPLASHES ON ALL REAR AND SIDE WALLS AT BASE CABINETS.

UPPER CABINETS:

1. TOP OF UPPER AND FULL HEIGHT CABINETS SHALL BE 7'-2" AFF UNLESS NOTED OTHERWISE ON INTERIOR ELEVATIONS. REF A.560 SERIES SHEETS.
2. REFERENCE SERIES A.220 AND A.560 FOR FURDOWN LOCATIONS. WALL CABINETS WITHOUT A FURR DOWN ABOVE SHALL RECEIVE A CONTINUOUS 6" HIGH SLOPED PANEL, FINISHED TO MATCH CABINETS UNLESS NOTED OTHERWISE.
3. WALL MOUNTED UPPER CABINETS SHALL INCLUDE ADJUSTABLE SHELVES UNLESS NOTED OTHERWISE.

CABINET HEIGHT	NUMBER OF SHELVES
UP TO 24"	1
25" THROUGH 42"	2
43" THROUGH 48"	3

4. TOPS AND BOTTOMS OF WALL HUNG CABINETS SHALL BE 3/4" THICK W/ PLASTIC LAMINATE ON ALL EXPOSED SURFACES.
5. BACKS OF WALL HUNG CABINETS SHALL BE 1/4" THICK UNLESS NOTED OTHERWISE. BACKS OF BASE CABINETS SHALL BE 1/4" THICK UNLESS NOTED OTHERWISE.

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No.	Description	Date

STATE OF COLORADO
JOHN MENKO
14
401729
LICENSED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	KL
Checked by	JMN

Sheet Title:
TYPICAL CASEWORK SECTIONS & DETAILS

Sheet Number
A.571

RSN: 1156136
Permit #: 2016 1191012

FINISH LEGEND

FLOORING

VCT1
Manuf: Mannington
Style: Progressions
Color: Almond Bluff # 167
Size: 12" x 12" x 0.125" thick
Contact: Gail Montresor @ 303-945-1843

SV1
Manuf: Mannington
Style: Biospec
Color: Cool Beige # 15240
Size: 6' x 30-68 sq. yards x 0.08" thick
Contact: Gail Montresor @ 303-945-1843

SV3
Manuf: Mannington
Style: Biospec
Color: Deep Fern #15399
Size: 6' x 30-68 sq. yards x 0.08" thick
Contact: Gail Montresor @ 303-945-1843

SV4
Manuf: Mannington
Style: Biospec
Color: Hot Sauce #15392
Size: 6' x 30-68 sq. yards x 0.08" thick
Contact: Gail Montresor @ 303-945-1843

BASE

INT
6" H Integral Base

RB1
Manuf: Johnsonite
Style: 4" h Traditional Cove Base x 120' roll
Color: #49 Beige
NOTE: Miter inside corners. Do not use premolded outside corners

WALLS

P1
Manuf: Sherwin Williams
Color: Kilim Beige # SW6106
Finish: Semigloss

P3
Manuf: Sherwin Williams
Color: At Ease Soldier # SW9127
Finish: Semigloss

P4
Manuf: Sherwin Williams
Color: Divine White # SW6105
Finish: Semigloss

CEILING

ACT1
Manuf: Armstrong
Tile Style: Optima Healthzone
Tile Model: #3114
Tile Size: 24" x 24" x 1" "
Tile Color: White
Grid Style: 15/16" Square Lay-in
Grid Color: White
*NOTE: Refer to A.220 series for size location

ACT2
Manuf: Armstrong
Tile Style: Clean Room ULTIMA, Square Lay-in
Tile Model: #1935
Tile Size: 24" x 24" x 3/4" "
Tile Color: White
Grid Style: 15/16" Square Lay-in Clean Room Gasketed
Grid Color: White
*NOTE: Refer to A.220 series for size location

GYP
Gypsum Board ceiling, painted as noted on finish plan

MILLWORK

PL1
Manuf: Wilsonart
Color: Shaker Cherry #7935K-07
Finish: Textured Gloss

SS1
Manuf: DuPont Corian
Collection: Private Collection
Color: Tumbleweed
Size: 1-1/2" Thick
Price Group: D
Edge Detail: Eased Edge

WALL PROTECTION

WP1 Sheet
Manuf: Inpro Corp.
Style: Rigid Sheet
Size: 4' x 10' x 0.060" Thick
Color: Chamois
*Include manuf trim pieces as required.

WP2 Single Corner Guard
Manuf:
Style:
Size: (1) 2 x 2 x refer to detail height
Color:

WP3 Double Corner Guard
Manuf:
Style:
Size: (2) 2 x 2 x refer to detail height
Color:

MISC.

(ME) Match Existing

(E) Existing to Remain

GENERAL NOTES

FLOOR FINISH:
A. ALL FLOOR TRANSITIONS ARE TO OCCUR AT THE CENTERLINE OF DOOR WHEN DOOR IS IN CLOSED POSITION.

B. REFER TO I.101 SERIES FOR TRANSITION AND THRESHOLD DETAILS.

C. REFER TO INTERIOR FLOOR FINISH PLANS FOR ALL FLOOR PATTERNS.

D. INSTALL ALL LUXURY VINYL TILE IN ONE DIRECTION ONLY, TO MATCH THROUGHOUT, UNLESS NOTED OTHERWISE.

WALL BASE:
A. ALL RUBBER BASE SHALL BE SEALED TIGHT TO FINISHED FLOOR.

WALL FINISH:
A. WALL TEXTURE SHALL MATCH FACILITY STANDARD, UNLESS NOTED OTHERWISE.

B. PAINT ALL WALLS LATEX SEMIGLOSS, UNLESS NOTED OTHERWISE. SEE FINISH LEGEND FOR DEFINITION.

C. PAINT ALL ELECTRICAL AND ACCESS WALL PANELS TO MATCH ADJACENT WALL FINISH.

CEILING FINISH:
A. FURR-DOWN FINISH: VERTICAL AND HORIZONTAL SURFACES OF FURR-DOWN TO MATCH ADJACENT WALLS, UNLESS NOTED OTHERWISE.

B. REFER TO REFLECTED CEILING PLAN FOR ALL CEILING HEIGHTS.

C. PAINT ALL GYP. BD. CEILINGS LATEX SEMIGLOSS, UNLESS NOTED OTHERWISE. SEE FINISH LEGEND FOR DEFINITION.

D. PAINT ALL ACCESS PANELS IN CEILING TO MATCH ADJACENT CEILING FINISH.

E. PAINT ALL SIDES OF SOFFIT FOR GYP. CEILING ABOVE COLOR LISTED ON REFLECTED CEILING PLAN.

F. ALL CEILING GRID WALL ANGLES TO BE SEALED AT WALL WHERE PAINT OCCURS.

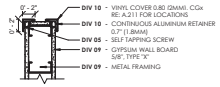
DOORS/WINDOWS:
A. NEW DOORS TO BE WOOD LOOK ACROVYN CLAD TO MATCH EXISTING DOOR FINISH IN SURROUNDING AREAS WHICH IS A COLOR MATCH TO WILSONART 7935-07 SHAKER CHERRY. RE: SPECIFICATIONS FOR MORE DETAIL. (ALTERNATE #1 NEW DOORS TO BE WOOD VENEER TO MATCH EXISTING DOOR FINISH IN THE SURROUDNING AREA. EXISTING DOORS ARE WOOD VENEER DOORS STAINED TO MATCH WILSONART 7935-07 SHAKER CHERRY)

B. EXISTING WOOD DOORS TO BE RESURFACED AND DAMAGED LAMINATE DOORS TO BE REPAIRED. SLABS ARE TO BE TAKEN OFF SITE FOR THIS SCOPE OF WORK AND NOT REFINISHED IN PLACE.

C. INTERIOR HOLLOW METAL DOOR & FRAME, AND INTERIOR SURFACE OF EXTERIOR HOLLOW METAL DOOR & FRAME TO BE PAINTED WITH P2. UNLESS OTHERWISE NOTED.

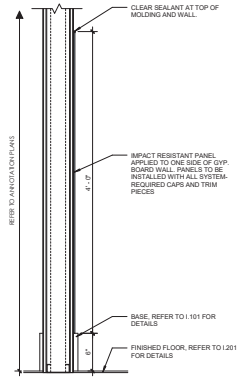
ACCESSORIES:
A. REFER TO EQUIPMENT PLAN AND DETAILS FOR WALL PROTECTION (WP) LOCATIONS. REFER TO INTERIOR FINISH LEGEND FOR SPECIFIC PROFILES AND COLORS.

B. PROVIDE AND INSTALL ADA COMPLAINT SIGNAGE, AS REQUIRED BY CODE FOR ALL ADA TOILET ROOMS, STAIR LEVELS AND SERVICE ROOMS.

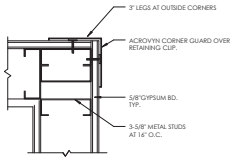


*NOTE: CORNER GUARD TO BE MOUNTED ABOVE SCHEDULED BASE TO 4'-6" A.F.F.

06 - WP3 - TYPICAL DOUBLE CORNER GUARD
1 1/2" = 1'-0"

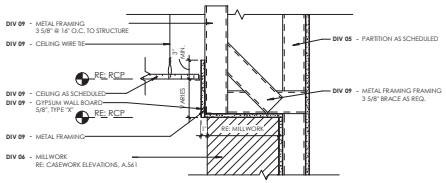


03 - WP1 - TYPICAL WALL PROTECTION SECTION
1 1/2" = 1'-0"

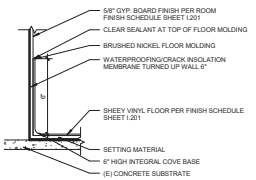


*NOTE: CORNER GUARD TO BE MOUNTED ABOVE SCHEDULE BASE

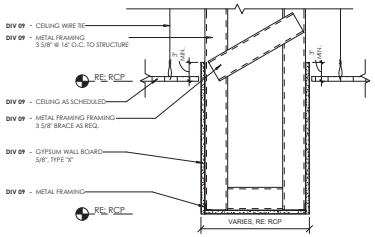
05 - WP2 - TYPICAL SINGLE CORNER GUARD DETAIL
1 1/2" = 1'-0"



02 - DETAIL @FURR DOWN
1 1/2" = 1'-0"



04 - TYPICAL INTEGRAL BASE DETAIL
3" = 1'-0"



01 - DETAIL @ FURR DOWN
1 1/2" = 1'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1156136*
Permit #: *2016 1191012*

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No.	Description	Date

STATE OF COLORADO
JOHN MENKO
401720
LICENSED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

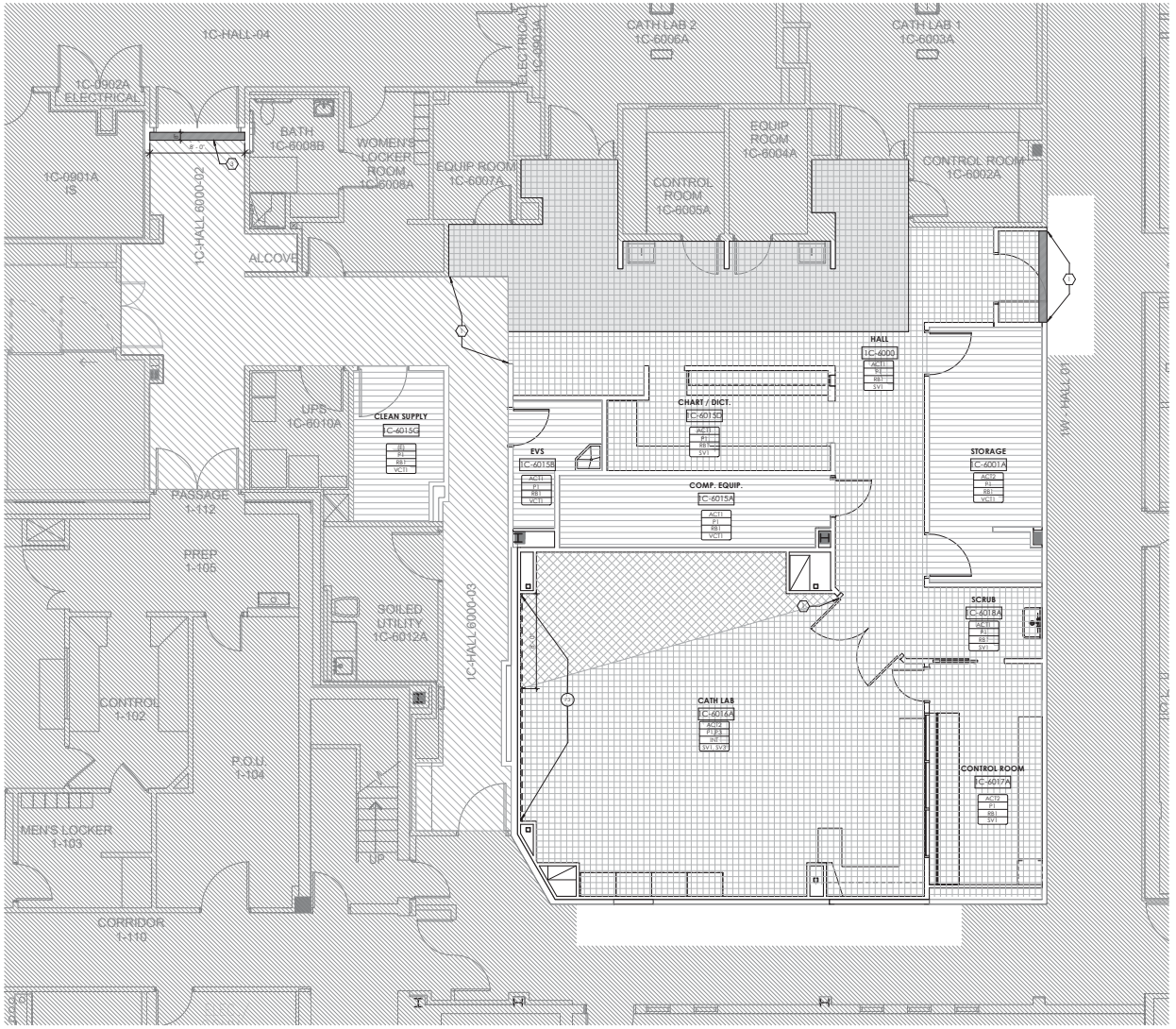
Issue	FOR CONSTRUCTION
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Project Number	16-003
Drawn by	Author
Checked by	Checker

Sheet Title:
FINISH LEGEND

Sheet Number
I.101

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City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
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1 A.01 - FINISH PLAN - MEDICAL CENTER OF AURORA - LEVEL 01 - CATH LAB
1/4" = 1'-0"

FINISH PLAN GENERAL NOTES

1. REFER TO INTERIOR FINISH LEGEND I.101 FOR FINISH MANUFACTURER AND COLOR INFORMATION.
2. REFER TO A.531 SERIES FOR FLOOR TRANSITION DETAILS.
3. REFER TO A.220 SERIES REFLECTED CEILING PLANS FOR LOCATION OF CEILING FINISHES AND CEILING HEIGHTS.

FINISH PLAN LEGEND

ROOM FINISH TAG (REFERENCE I.101 SHEET)

ACT	CEILING FINISH
P	WALL FINISH
RB	WALL BASE FINISH
SV	FLOOR FINISH

* DENOTES MULTIPLE FINISHES. PLEASE REFER TO ENLARGED PLANS, DETAILS AND/OR ELEVATIONS FOR MORE INFORMATION.

- (X) KEYNOTE
- NOT IN SCOPE OF WORK
- (X) PAINT ACCENT
- (XP1) FINISH TAG

FINISH PATTERN LEGEND

FLOOR FINISH

- SV1
- SV3
- SV4
- VCT1
- FLOOR REPLACEMENT TO OCCUR AFTER CATH LAB HOURS
- ALTERNATE ADDITIONAL FLOORING REPLACEMENT SCOPE, SV1.

FINISH PATTERN LEGEND

1. ALIGN FLOORING INTERSECTION WITH FACE OF FINISH WALL.
2. BEGIN ACCENT BAND AT INSIDE CORNER OF DOOR FRAME.
3. 8" WIDE STRIP ACCENT FLOORING, SV4.

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No.	Description	Date

STATE OF COLORADO
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LICENSED ARCHITECT
08/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	FOR CONSTRUCTION
Date	08/19/16
Project Number	16-003
Drawn by	Author
Checked by	Checker

Sheet Title:
FINISH PLANS

Sheet Number
I.201

RSN: 1156136
Permit #: 2016 1191012

GENERAL NOTES - ALL HVAC SHEETS:

A. ANY DISCREPANCY THAT PREVENTS THE CONTRACTOR FROM MEETING THE DESIGN INTENT OF THE DRAWINGS SHALL BE DOCUMENTED ON THE PROJECT RECORD DOCUMENTS AND BE REPORTED TO THE ARCHITECT/ENGINEER IMMEDIATELY.

B. ALL DEVIATIONS FROM SCHEDULED EQUIPMENT THAT RESULTS IN ADDITIONAL COST DUE TO LACK OF COORDINATION WITH DIMENSIONS, WEIGHTS, AND CONNECTION POINTS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

C. CONTRACTOR SHALL VISIT JOBSITE AND VERIFY SIZE AND LOCATION OF ALL EXISTING ITEMS AND CONDITIONS. CONTRACTOR SHALL COORDINATE ALL WORK CLOSELY WITH EXISTING CONDITIONS AND WITH ALL OTHER TRADES.

D. ALL MECHANICAL, ELECTRICAL, AND PLUMBING WORK SHALL COMPLY WITH ALL APPLICABLE STATE AND LOCAL BUILDING CODES. REFER TO SPECIFICATIONS FOR MATERIALS AND METHODS FOR MECHANICAL AND PLUMBING CONSTRUCTION.

E. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS, PAY ALL FEES, AND COMPLY WITH ALL NATIONAL, STATE, AND MUNICIPAL LAWS, CODES, AND ORDINANCES RELATING TO BUILDING AND PUBLIC SAFETY.

F. THE CONTRACTOR SHALL PREPARE A FULL SET OF COORDINATION DRAWINGS, SHOWING THE RELATIONSHIP OF ALL SYSTEMS TO BE INSTALLED. THESE DRAWINGS SHALL INDICATE SIZES, ELEVATIONS, AND EXACT LOCATIONS OF ALL STRUCTURAL, ARCHITECTURAL, MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS. THESE DRAWINGS SHALL BE COMPLETED PRIOR TO BEGINNING ANY WORK AND SUBMITTED TO THE ARCHITECT/ENGINEER FOR REVIEW. CONTRACTOR SHALL NOTE ANY ITEMS THAT PREVENT HIM FROM MEETING THE DESIGN INTENT OF THE CONSTRUCTION DOCUMENTS ON THESE DRAWINGS.

G. CONTRACTOR SHALL FURNISH ALL MATERIALS, EQUIPMENT, AND LABOR REQUIRED FOR A COMPLETE WORKING AND COORDINATED SYSTEM.

H. COORDINATE THE EXACT LOCATION OF MECHANICAL AND PLUMBING EQUIPMENT AND DEVICES WITH THE LOCATIONS OF LIGHT FIXTURES, PIPING, CONDUIT, AND OTHER CONSTRUCTION, TO ALLOW FOR PROPER ACCESS TO SERVICE EQUIPMENT.

I. COORDINATE THE LOCATION OF DUCTWORK AND PIPING WITH ALL OTHER TRADES AND PROVIDE OFFSETS IN DUCTWORK AND PIPING AS REQUIRED.

J. IT IS THE INTENT OF THESE DOCUMENTS TO ALLOW ALL CEILING CONSTRUCTION AND HEIGHTS TO BE AS SHOWN ON THE ARCHITECTURAL DRAWINGS. COORDINATE THE LOCATION OF DUCTWORK AND PIPING AND PROVIDE OFFSETS IN DUCTWORK AND PIPING AS REQUIRED TO MEET THIS INTENT.

K. CONDUIT, PIPING, AND DUCTWORK SHALL BE INDEPENDENTLY SUPPORTED, AND EACH SUPPORT SHALL BE INDEPENDENT OF PARTITION AND CEILING SYSTEM SUPPORTS. WHERE INDEPENDENT SUPPORT IS NOT POSSIBLE AN ENGINEERED SUPPORT SYSTEM SHALL BE UTILIZED.

L. INSTALL ALL FLOOR MOUNTED EQUIPMENT ON PADS AS SPECIFIED. PAD BY GENERAL CONTRACTOR. COORDINATE REQUIREMENTS WITH GENERAL CONTRACTOR.

M. ALL WORK SHALL BE SCHEDULED AND PERFORMED IN STRICT COORDINATION WITH ARCHITECTURAL PHASING PLANS AND WITH BUILDING SCHEDULES, OCCUPANCIES, AND WORK.

N. PROTECT EQUIPMENT AND WORK FROM DAMAGE DURING HANDLING AND INSTALLATION UNTIL COMPLETION OF CONSTRUCTION.

O. REMOVE ALL EXCESS MATERIAL AND DEBRIS AND CLEAN ALL EQUIPMENT UPON COMPLETION OF WORK. TOUCH UP WITH PAINT WHERE REQUIRED.

P. CONTRACTOR SHALL COORDINATE ALL WORK CLOSELY WITH ALL OTHER TRADES.

Q. CLIENT/ARCHITECT SHALL HAVE FINAL APPROVAL OF ALL GRILLE, DIFFUSER, AND THERMOSTAT LOCATIONS.

R. COORDINATE ALL AIR DEVICE LOCATIONS AND MOUNTING FRAME STYLES WITH LIGHTING PLANS AND ARCHITECTURAL REFLECTED CEILING PLANS.

S. COORDINATE ALL WALL MOUNTED DEVICE LOCATIONS WITH ARCHITECTURAL INTERIOR ELEVATIONS.

T. PROVIDE ADDITIONAL VALVES, TAPS, TEMPORARY DUCTWORK, ETC. AS NECESSARY TO PROVIDE UNINTERRUPTED SERVICE TO AREAS OUTSIDE OF THE PHASE IN WHICH WORK IS BEING PERFORMED.

U. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS OF WALLS THAT EXTEND TO STRUCTURE. EACH HVAC DUCT OR PIPE PENETRATION THROUGH THESE WALLS SHALL BE INSTALLED AS SPECIFIED OR DETAILED. WHERE FLEXIBLE DUCT WOULD PENETRATE A WALL WHICH EXTENDS TO STRUCTURE, PROVIDE INSULATED RIGID DUCT EXTENDING 12" ON EITHER SIDE OF THE PARTITION.

V. ALL DEVIATIONS FROM SCHEDULED EQUIPMENT THAT RESULTS IN ADDITIONAL COST DUE TO LACK OF COORDINATION WITH DIMENSIONS, WEIGHTS, AND CONNECTION POINTS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

W. DUCT SIZES ARE NET FREE AREA.

X. PROVIDE ROUND DUCTS TO ALL AIR DEVICES UNLESS NOTED OTHERWISE. DUCT SIZE SHALL MATCH AIR DEVICE NECK SIZE OR THE TABLE IN AIR DEVICE SCHEDULE, WHICHEVER IS LARGER. FLEXIBLE DUCTS SHALL BE SIZED SIMILARLY. DO NOT USE FLEXIBLE DUCTS ABOVE NON-LAYIN CEILINGS.

Y. PROVIDE FRAMED 0.5" BY 0.5" BIRD SCREEN (GALVANIZED STEEL ASSEMBLY) AT ALL DUCTS TERMINATING WITHOUT AN AIR DEVICE, AT INDOOR FACE OF LOUVERS, AND AT UNDUCTED AIR FLOW OPENINGS AT EQUIPMENT.

Z. PROVIDE MANUAL VOLUME DAMPER IN EACH AIR DEVICE RUNOUT DUCT AS FAR FROM AIR DEVICE AS POSSIBLE.

AA. INSTALL TURNING VANES IN ALL 90 DEGREE SQUARE ELLS IN SUPPLY, RETURN, AND EXHAUST DUCTS. (NONE ALLOWED IN COMBUSTION AIR DUCTS).

AB. MULTI-BLADE DAMPERS OF ANY TYPE INSTALLED WITHIN 36" OF AN ELL OR OTHER FITTING SHALL BE INSTALLED WITH THE DAMPER BLADE SHAFTS PARALLEL TO THE AIRSTREAM FLOW DIRECTION UPSTREAM OF THE FITTING.

AC. ALL FIRE AND COMBINATION FIRE/SMOKE DAMPERS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS INSTALLATION DETAILS AND BE U.L. TESTED AND LISTED.

AD. SLOPE & ARRANGE CONDENSATE PIPING TO ESTABLISH HIGH POINTS FOR AIR ELIMINATION AND LOW POINTS TO PERMIT PROPER DRAINING OF EACH LINE. PROVIDE MANUAL AIR VENTS AT HIGH POINTS AND DRAIN VALVES AT LOW POINTS.

AE. COORDINATE LOCATION OF ALL DUCT AND PIPING FLOOR SLEVE/CORE PENETRATIONS WITH STRUCTURAL DRAWINGS.

AB. INSTALL SPACE THERMOSTAT ADJACENT TO LATCH SIDE OF DOOR IN SPACE INDICATED. INDICATED LOCATIONS ARE APPROXIMATE. AVOID HEAT PRODUCING EQUIPMENT. FINAL SPACE THERMOSTAT/SENSOR LOCATIONS SHALL BE AS DIRECTED BY THE ARCHITECT.

AE. COORDINATE LOCATION OF ALL DISCONNECTS, CONTROL PANELS AND ELECTRICAL CONNECTIONS FOR MECHANICAL AND PLUMBING EQUIPMENT TO MAINTAIN NEC REQUIRED CLEARANCES OF 42" DEEP AND 30" WIDE IN FRONT OF EQUIPMENT.

GENERAL PIPING NOTES:

A. REFER TO THE ARCHITECTURAL PHASING PLAN FOR THE AREAS SHOWN ON THIS SET OF PLANS. WORK SHALL BE SCHEDULED AND PERFORMED IN SEQUENCE WITH THE PHASING PLAN.

B. ARCHITECT SHALL HAVE FINAL APPROVAL OF ALL THERMOSTAT LOCATIONS. COORDINATE ALL WALL MOUNTED DEVICE LOCATIONS WITH ARCHITECTURAL INTERIOR ELEVATIONS.

N. ALL CONNECTION BETWEEN PIPES OF DISSIMILAR MATERIALS SHALL BE MADE WITH DIELECTRIC UNIONS.

O. G.C. TO PROVIDE ACCESS DOORS IF REQUIRED FOR ACCESS TO VAV'S AND ANY VALVES THAT ARE NOT ACCESSIBLE. VERIFY SIZE AND LOCATIONS WITH MECHANICAL CONTRACTOR.

P. PROVIDE DRAIN PAN UNDER PIPES INSIDE ELECTRICAL AND COMMUNICATION ROOMS.

Q. PROVIDE CONDENSATE DRAIN PIPING FROM ALL COOLING COILS TO DRAIN.

R. LOCATE ISOLATION VALVES FOR EQUIPMENT AS CLOSE TO THE MAIN AS POSSIBLE.

GENERAL DEMOLITION NOTES:

A. ALL CAPPED DUCT TAPS AND CONNECTING DUCTS THAT ARE NOT BEING USED ARE TO BE REMOVED BACK TO THE MAIN DUCT AND PATCHED AS PER ITEM B BELOW.

B. PATCH OPENINGS IN EXISTING DUCTWORK THAT IS TO REMAIN INCLUDING OPENINGS. WHERE TAPS OR DUCTWORK ARE TO BE REMOVED, THE FOLLOWING SHALL OCCUR:

- OPENINGS IN THE MAIN DUCTS ARE TO BE COVERED WITH A SHEET METAL PATCH. THE PATCH IS TO BE LARGER THAN THE EXISTING OPENING AND IS TO BE SECURED WITH SHEET METAL SCREWS FOUR INCHES ON CENTERS.
- A LIBERAL QUANTITY OF FIRE RESISTANT ADHESIVE IS TO BE APPLIED TO THE EDGES OF THE METAL PATCH AND THE ASSEMBLY SCREWED IN PLACE.

C. REFER TO THE ARCHITECTURAL PHASING PLAN FOR THE AREAS SHOWN ON THIS PLAN. WORK SHALL BE SCHEDULED AND PERFORMED IN SEQUENCE WITH THE PHASING PLAN.

D. DEMOLITION OF EACH PHASE SHALL OCCUR AS PART OF THE WORK FOR THAT PHASE. REMOVE ONLY THE WORK THAT SERVES THE AREA OF DEMOLITION.

E. PROVISIONS SHALL BE MADE BY THE CONTRACTOR TO PREVENT DISRUPTING ADJACENT AREAS OF THE PHASE IN WHICH WORK IS BEING PERFORMED.

F. PROVIDE ADDITIONAL VALVES, TAPS, TEMPORARY DUCTWORK AND/OR PIPING AS NECESSARY TO PROVIDE UNINTERRUPTED SERVICE TO AREAS OUTSIDE OF THE PHASE IN WHICH WORK IS BEING PERFORMED.

G. ALL WORK SHALL BE PERFORMED IN STRICT COORDINATION WITH HOSPITAL SCHEDULES, OCCUPANCIES AND WORK. CONTRACTOR SHALL COORDINATE WITH HOSPITAL REPRESENTATIVE.

H. ALL NECESSARY SHUTDOWNS OR OUT OF PHASE WORK SHALL BE SCHEDULED WITH THE HOSPITAL REPRESENTATIVE.

MECHANICAL SYMBOLS

ALL SYMBOLS SHOWN MAY NOT APPEAR IN ALL DRAWINGS.
SYMBOLS ARE SHOWN SCHEMATIC AND MAY NOT BE TO SCALE.

SYMBOL	DESCRIPTION
	NEW EQUIPMENT DESIGNATION (TOP - EQUIP. ABBREV., BOTTOM - MARK)
	NEW DIFFUSER DESIGNATION (TOP - SCHEDULE DESIG., BOTTOM - CFM)
	NEW EQUIPMENT
	EXISTING EQUIPMENT
	NEW DUCT
	EXISTING DUCT
	EXISTING DUCT TO BE REMOVED OR RELOCATED
	NEW SUPPLY DIFFUSER
	EXISTING SUPPLY DIFFUSER
	EXISTING SUPPLY DIFFUSER TO BE REMOVED OR RELOCATED
	NEW R/A OR EXHAUST GRILLE
	EXISTING R/A OR EXHAUST GRILLE
	EXISTING R/A OR EXHAUST GRILLE TO BE REMOVED OR RELOCATED
	NEW SLOT DIFFUSER
	FLEXIBLE DUCT
	EXISTING SLOT DIFFUSER
	EXISTING SLOT DIFFUSER TO BE REMOVED OR RELOCATED
T	THERMOSTAT
T	EXISTING THERMOSTAT TO BE REMOVED OR RELOCATED
	45° PRESSURE TAP W/ VOLUME DAMPER
	CONICAL TAP WITH VOLUME DAMPER
	CONICAL TAP W/O VOLUME DAMPER
	MANUAL VOLUME DAMPER
	FIRE DAMPER
	SMOKE DAMPER
	FIRE/SMOKE DAMPER
M	MOTORIZED DAMPER
B	BAROMETRIC DAMPER
CHS	CHILLED WATER SUPPLY PIPE
CHR	CHILLED WATER RETURN PIPE
CS	CONDENSER WATER SUPPLY PIPE
CR	CONDENSER WATER RETURN PIPE
RL	REFRIGERANT LIQUID PIPE
RG	REFRIGERANT GAS PIPE
HS	HEATING WATER SUPPLY
HR	HEATING WATER RETURN
HPS	HIGH PRESSURE STEAM
HPR	HIGH PRESSURE CONDENSATE RETURN
LPS	LOW PRESSURE STEAM
LPR	LOW PRESSURE CONDENSATE RETURN
PCR	PUMPED CONDENSATE RETURN
	DOMESTIC COLD WATER
	DOMESTIC HOT WATER
	DOMESTIC HOT WATER RETURN
	SANITARY WASTE LINE
CD	CONDENSATE DRAIN
P	PUMPED SANITARY LINE
	VENT LINE
	DIRECTION OF SLOPE
	DIRECTION OF FLOW
	EXPANSION LOOP
	GATE VALVE
	BUTTERFLY VALVE
	BALL VALVE
	GLOBE VALVE
	TEMPERATURE AND PRESSURE RELIEF VALVE
	AUTOMATIC 2-WAY CONTROL VALVE
	AUTOMATIC 3-WAY CONTROL VALVE
	PLUG VALVE/BALANCING COCK
	SOLENOID VALVE
	CHECK VALVE
	HYDRAULIC SHOCK ARRESTOR
	VALVE IN VERTICAL
	UNION
	VACCUUM BREAKER
	P-TRAP
	FLOOR DRAIN W/ P-TRAP
	HUB DRAIN
	FLOOR CLEANOUT OR GRADE CLEANOUT
	CLEANOUT OR WALL CLEANOUT
	PETE'S PLUG
	GAUGE COCK
	THERMOMETER
	THERMOMETER WELL
	STRAINER WITH BLOW-OFF VALVE
	F & T STEAM TRAP
	STEAM BUCKET TRAP
	CONNECT TO EXISTING
EP	ELECTRIC PNEUMATIC SWITCH

CONTROL DIAGRAM SYMBOLS

SYMBOL	DESCRIPTION
AI	ANALOG INPUT
AO	ANALOG OUTPUT
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
TT-X	TEMPERATURE TRANSMITTER #X
HT-X	RELATIVE HUMIDITY TRANSMITTER #X
V-X	CONTROL VALVE #X
SPT-X	STATIC PRESSURE TRANSMITTER #X
ESC-X	END SWITCH, NORMALLY CLOSED #X
ESO-X	END SWITCH, NORMALLY OPEN #X
TE-X	TEMPERATURE SENSOR #X
SD-X	SMOKE DETECTOR #X
OL	OVERLOAD RELAY #X
DPS-X	DIFFERENTIAL PRESSURE SENSOR #X
CSR-X	CURRENT SENSING RELAY #X
FM-X	FLOW METER #X
FS-X	FLOW SWITCH #X
EAS-X	EMERGENCY AIR HANDLER SHUTDOWN BUTTON - AHU-#X

PROJECT DESIGN CRITERIA

LOCATION:	
CITY/STATE	AURORA, COLORADO
APPLICABLE CODES:	
BUILDING	2015 IBC
MECHANICAL	2015 IMC
PLUMBING	2015 IPC
ENERGY	2015 IECC
ELECTRICAL	2014 NEC
LATITUDE:	
DEG. N. LAT.	39.61
ELEVATION:	
FT. ABOVE SEA LEVEL	5470

MECHANICAL ABBREVIATIONS

AC	ABOVE CEILING	RLA	RELIEF AIR
AFF	ABOVE FINISHED FLOOR	SLA	SUPPLY LOW PRESSURE AIR
AI	ANALOG INPUT	SMA	SUPPLY MEDIUM PRESSURE AIR
AO	ANALOG OUTPUT	UH	UNIT HEATER
BFC	BELOW FINISHED CEILING	VAV	VARIABLE AIR VOLUME
BF	BELOW FLOOR, BLIND FLANGE	WH	WATER HEATER
BG	BELOW GRADE	WHP	WATER-SOURCE HEAT PUMP
BV	BUTTERFLY VALVE	FMB	FILTER MIXING BOX
CA	COMBUSTION AIR	IN HG	INCHES MERCURY (PRESSSURE)
CRU	COMPUTER ROOM UNIT	IN WC	INCHES WATER COLUMN (PRESSURE)
CRU	CONDENSATE RETURN UNIT	IBT	INVERTED BUCKET TRAP
CU	CONDENSING UNIT	TAV	THERMOSTATIC AIR VENT (STEAM SYSTEM)
DI	DIGITAL INPUT	MA	MIXED AIR
DO	DIGITAL OUTPUT	LE	LAUNDRY EQUIPMENT
DS	DISCONNECT SWITCH	CLPR	C LOW PRESSURE RETURN (CONDENSATE)
E	EXISTING	CLPS	C LOW PRESSURE STEAM
EDH	ELECTRIC DUCT HEATER	CHWR	CHILLED WATER RETURN
EUH	ELECTRIC UNIT HEATER	CHWS	CHILLED WATER SUPPLY
EF	EXHAUST FAN	CR	CONDENSER RETURN
EOMD	END OF MAIN DRIP (STEAM)	CS	CONDENSER SUPPLY
SF	SUPPLY FAN	GWR	GLYCOL WATER RETURN
EX	EXHAUST AIR	GWS	GLYCOL WATER SUPPLY
OSA	OUTSIDE AIR	HWR	HEATING WATER RETURN
TA	TRNASFER AIR	HWS	HEATING WATER SUPPLY
UNO	UNLESS NOTED OTHERWISE	HPR	HIGH PRESSURE RETURN (CONDENSATE)
PRV	PRESSURE RELIEF VALVE	HPS	HIGH PRESSURE STEAM
SV	SAFETY VALVE	LCA	LAB COMP. AIR
GD	GREASE DUCT	LHWC	LAB HEATING WATER
SS	STAINLESS STEEL	LPR	LOWER PRESSURE RETURN (CONDENSATE)
FCU	FAN COIL UNIT	LPS	LOW PRESSURE STEAM
FPB	FAN POWERED BOX	LTCWR	LOW TEMP. CHILLED WATER RETURN
FPI	FINS PER INCH	LTCWS	LOW TEMP. CHILLED WATER SUPPLY
GC	GENERAL CONTRACTOR	LTHWS	LOW TEMP. HEATING WATER SUPPLY
GEF	GENERAL EXHAUST FAN	PCWWR	PROCESS CHILLED WATER RETURN
GSF	GENERAL SUPPLY FAN	PCWS	PROCESS CHILLED WATER SUPPLY
MVD	MANUAL VOLUME DAMPER	SCWR	SECONDARY CHILLED WATER RETURN
N	NEW	SCWS	SECONDARY CHILLED WATER SUPPLY
OBD	OPPOSED BLADE DAMPER		
R	RELOCATED		
RA	RETURN AIR		
RCA	RECIRCULATED (RETURN) AIR		

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1156136*
Permit #: *2016 1191012*

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No.	Description	Date

TMCA CATH LAB HYBRID LAB RENOVATION
1501 S Potomac St,
Aurora, CO 80012

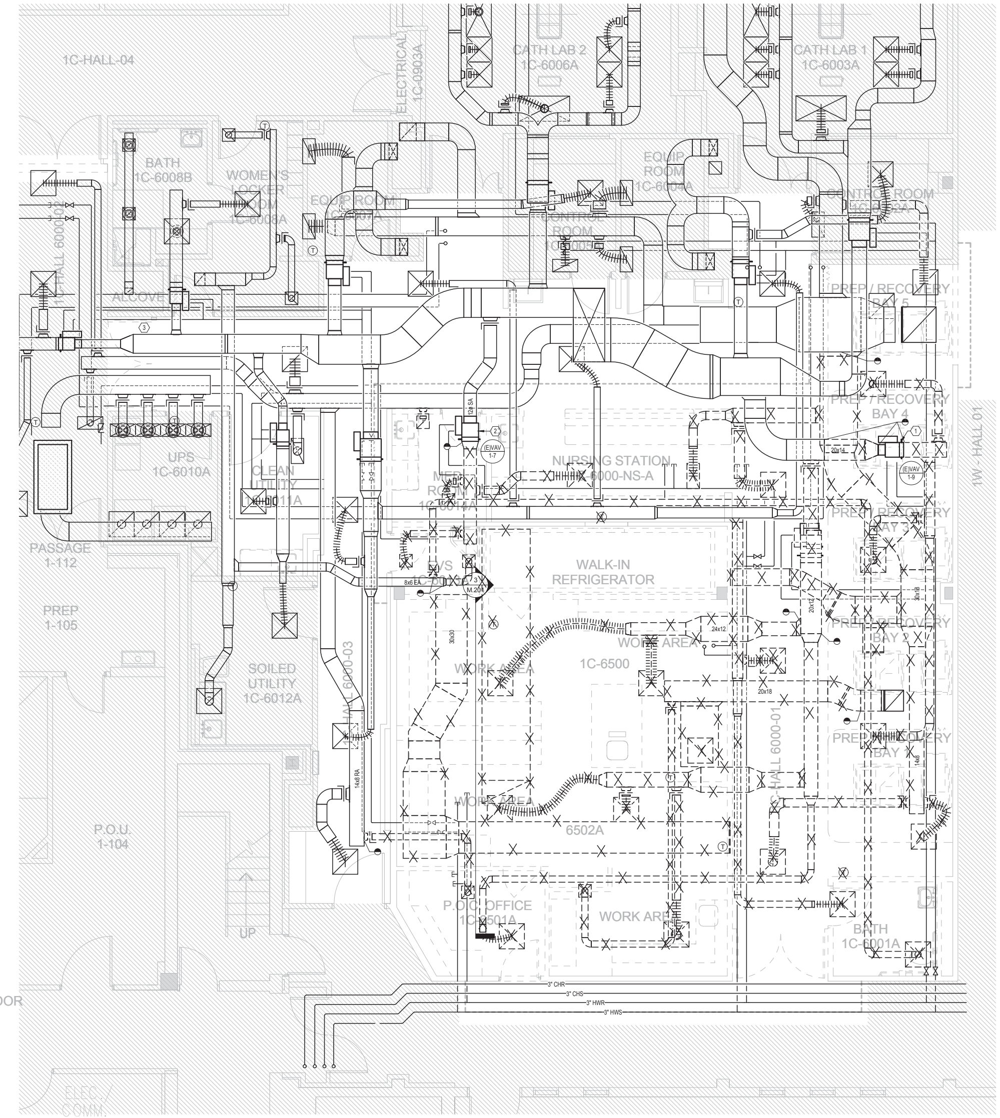
Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	BS
Checked by	WS

Sheet Title:
MECHANICAL LEGENDS, GENERAL NOTES, AND ABBREVIATIONS

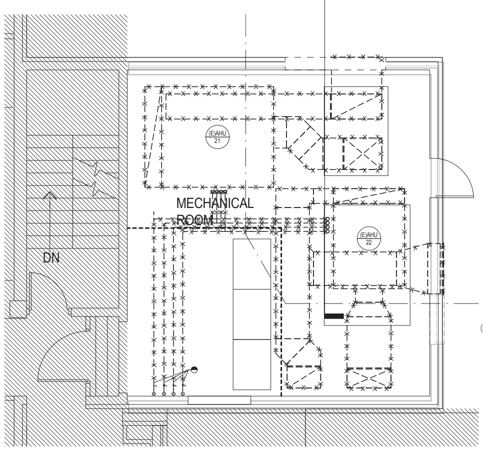
Sheet Number
M.001

Heating system shall be capable of maintaining 68 degrees F a 3'0" above the floor.
2015 IMC 309, IRC 303.9 and IBC 1204.1

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
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1 LEVEL 01 CATH LAB - HVAC DEMOLITION PLAN
1/4" = 1'-0"



2 LEVEL 02 PENTHOUSE - MECHANICAL DEMOLITION PLAN
1/4" = 1'-0"

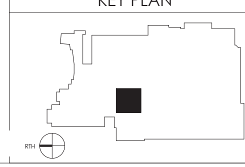
GENERAL NOTES:

A. REFER TO SHEET M.001 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1 EXISTING VAV TO BE RELOCATED IN NEW CONSTRUCTION. CAP AND SEAL EXISTING PIPING. SEE SHEET M.301 FOR DETAILS.
2 EXISTING VAV TO BE USED IN NEW CONSTRUCTION. SEE SHEET M.201 FOR DETAILS.
3 EXISTING DOORS TO BE DEMOLISHED. REMOVE EXISTING FIRE DAMPERS. PATCH, SEAL, AND INSULATE EXISTING DUCTWORK.

KEY PLAN



RSN: *1156136*
Permit #: *2016 1191012*

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No.	Description	Date

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	BS
Checked by	WS

Sheet Title:
FLOOR PLAN - MECHANICAL DEMOLITION

Sheet Number
MD.201

MECHANICAL SPECIFICATIONS

I GENERAL CONDITIONS:

A. THE SCOPE OF THE WORK SHALL INCLUDE THE FURNISHING AND INSTALLATION OF THE NECESSARY MATERIAL AND LABOR TO ACCOMPLISH THE WORK INDICATED BY THE DRAWINGS AND HEREIN SPECIFIED. ALL WORK BY THIS CONTRACTOR SHALL CONFORM TO ALL APPLICABLE FEDERAL, STATE AND LOCAL BUILDING CODES.

B. CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING THE EXISTING CONDITIONS AT THE JOB SITE BEFORE SUBMITTING PROPOSALS. SUBMISSION OF PROPOSALS SHALL BE TAKEN AS EVIDENCE THAT SUCH INSPECTION HAS TAKEN PLACE. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE COMPLETE SET OF CONSTRUCTION DOCUMENTS, AND THE LACK OF SPECIFIC INFORMATION ON THE DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR OF ANY RESPONSIBILITY.

C. MATERIALS AND EQUIPMENT FURNISHED UNDER THIS CONTRACT SHALL BE NEW AND SHALL BEAR THE UL. LABEL WHERE APPLICABLE, UNLESS NOTED OTHERWISE. ALL WORK SHALL BE GUARANTEED AGAINST DEFECTIVE MATERIALS AND WORKMANSHIP FOR A PERIOD OF NOT LESS THAN ONE (1) YEAR AFTER COMPLETION AND ACCEPTANCE BY THE OWNER.

D. CONTRACTOR SHALL INSTALL MECHANICAL SYSTEMS WITHOUT INTERFERENCE AND IN STRICT COORDINATION WITH OTHER TRADES.

E. MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE CONTRACT DOCUMENTS AND APPLICABLE CODES AND STANDARDS. IN CASE OF DIFFERENCE BETWEEN APPLICABLE CODES AND STANDARDS AND THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ARCHITECT/ENGINEER AND THE OWNER IN WRITING OF SUCH DIFFERENCE. SHOULD THE CONTRACTOR PERFORM ANY WORK THAT DOES NOT COMPLY WITH THE REQUIREMENTS OF APPLICABLE CODES AND STANDARDS, HE SHALL BEAR ALL COSTS ARISING IN CORRECTING SUCH DEFECTS. APPLICABLE CODES AND STANDARDS SHALL INCLUDE ALL ORDINANCES, UTILITY COMPANY REGULATIONS, AND APPLICABLE REQUIREMENTS OF NATIONALLY ACCEPTED CODES AND STANDARDS. SHOULD THE CONTRACTOR SUPPLY EQUIPMENT DIFFERING FROM THE SPECIFIED ITEMS IN THE CONTRACT DOCUMENTS WITHOUT NOTIFICATION TO THE ENGINEER, HE SHALL BEAR ALL COSTS TO UPGRADE DEFICIENCIES ARISING FROM SUCH.

F. WHERE ONLY ONE MANUFACTURER'S NAME IS LISTED IN THE EQUIPMENT SPECIFICATION, OTHER MANUFACTURERS OF SIMILAR CHARACTERISTICS AND OF EQUAL OR BETTER PERFORMANCE CAPACITIES MAY BE CONSIDERED FOR "OR EQUAL" APPROVAL BY THE ENGINEER. WHERE MORE THAN ONE MANUFACTURER IS LISTED IN THE NOTES AND EQUIPMENT SPECIFICATIONS, ONLY THOSE NAMED MANUFACTURERS WILL BE CONSIDERED FOR APPROVAL.

G. SHOULD A SUBSTITUTION BE ACCEPTED, AND SHOULD THE SUBSTITUTE MATERIAL PROVE DEFECTIVE, OR OTHERWISE UNSATISFACTORY FOR THE SERVICE INTENDED WITHIN THE GUARANTEE PERIOD, THIS MATERIAL OR EQUIPMENT SHALL BE REPLACED WITH THE MATERIAL OR EQUIPMENT SPECIFIED AT NO COST TO THE OWNER.

H. PROVIDE ACCESS, INCLUDING NECESSARY ACCESS DOORS, FOR NEW AND EXISTING EQUIPMENT REQUIRING OPERATION AND/OR MAINTENANCE. RELOCATE EXISTING AND LOCATE ALL NEW EQUIPMENT SUCH THAT OPERATION OR MAINTENANCE IS NOT RESTRICTED.

I. DO NOT RUN PIPING OR DUCTWORK, OR LOCATE EQUIPMENT, WITH RESPECT TO SWITCHBOARDS, PANELBOARDS, POWER PANELS, MOTOR CONTROL CENTERS OR DRY TYPE TRANSFORMERS, WITHIN 42 INCHES IN FRONT OF EQUIPMENT, OVER EQUIPMENT, OR WITHIN 36 INCHES HORIZONTALLY OF SAME SPACE.

J. PROVIDE SNAP-ON OR ADHESIVES LABELS INDICATING CHILLED OR HOT WATER SUPPLY AND RETURN, CONDENSATE DRAINAGE, DOMESTIC HOT AND COLD WATER, MEDICAL GASES, ETC.

II MECHANICAL DEMOLITION

A. UNLESS NOTED OTHERWISE, THE MECHANICAL DEMOLITION SHALL BE CARRIED OUT TO THE EXTENT AS SHOWN ON THE PLANS. CONTRACTOR SHALL VERIFY ALL EXISTING FIELD CONDITIONS IN ORDER TO ACCURATELY DETERMINE THE EXTENT OF THE WORK UNDER THIS SECTION.

B. UNLESS NOTED OTHERWISE, REMOVE EXISTING DIFFUSERS, GRILLES, AND DUCTWORK AS INDICATED PLANS. EXISTING DIFFUSERS AND GRILLES MAY BE REUSED IF THEY MEET THE SCHEDULED SPECIFICATIONS.

C. EXISTING THERMOSTATS AND/OR TEMPERATURE SENSORS ARE TO BE RELOCATED AND REUSED IF IN GOOD WORKING CONDITION.

D. EXISTING DUCTWORK SHOWN ON PLANS MAY NOT EXACTLY MATCH THE ACTUAL FIELD CONDITIONS. IT IS NOT NECESSARY TO REWORK THE DUCTWORK IN ORDER TO MATCH WHAT IS DEPICTED ON THE PLANS. CONTRACTOR SHALL VERIFY EXISTING DUCTWORK ROUTING AND LOCATIONS AND MAKE ADJUSTMENTS AS REQUIRED TO AVOID CONFLICTS WITH NEW DUCTWORK, EQUIPMENT, LIGHT FIXTURES, ETC.

III PRODUCTS, EQUIPMENT AND EXECUTION:

A. CHILLED AND HOT WATER PIPING SHALL BE AMERICAN MANUFACTURED SCHEDULE 40 BLACK STEEL OR TYPE "L" COPPER PIPE IN ACCORDANCE WITH THE FOLLOWING:

1. 2-1/2" AND SMALLER: STANDARD WEIGHT, BLACK STEEL (AMERICAN MANUFACTURED) PIPE WITH BLACK MALLEABLE IRON SCREWED FITTINGS OR TYPE "L" COPPER WITH WROUGHT COPPER FITTINGS ASSEMBLED WITH 95/5 SOLDER.

2. 3" AND LARGER: STANDARD WEIGHT, BLACK STEEL (AMERICAN MANUFACTURED) PIPE ASSEMBLED WITH FLANGED COUPLINGS/FITTINGS OR FACTORY FABRICATED WELDED FITTINGS.

B. REFRIGERANT PIPING SHALL BE AMERICAN MANUFACTURED TYPE "ACR" COPPER PIPE MANUFACTURED IN ACCORDANCE WITH ASTM B88 AND ANSI BP.1 REFRIGERATION INDUSTRY STANDARDS. FITTINGS SHALL BE WROUGHT COPPER PRESSURE TYPE AND ELBOWS SHALL BE LONG RADIUS TYPE. PIPE AND FITTINGS SHALL BE ASSEMBLED WITH SILVER BRAZING AND PURGED WITH NITROGEN DURING BRAZING. PIPING SHALL BE INSTALLED TO ALLOW FOR EXPANSION AND CONTRACTION; USING OFFSETS, SWING JOINTS, ETC. AS SHOWN AND/OR REQUIRED TO PREVENT UNDUE STRAIN ON THE PIPING.

1. SOLENOID AND HOT GAS BYPASS VALVES SHALL BE R/S FLO-CON SPORLAN.

2. FILTER-DRIERS SHALL BE SPORLAN REPLACEABLE CORE "CATCH-ALLS".

3. SIGHT GLASS SHALL BE SPORLAN "SEE-ALL".

4. AUXILIARY SIDE CONNECTIONS SHALL BE REQUIRED FOR HOT GAS BY-PASS AND SHALL BE SPORLAN, AND INSTALLED BETWEEN THE ORIFICE AND THE DISTRIBUTOR.

5. THERMOSTATIC EXPANSION VALVES WITH 10 DEGREES SUPERHEAT SHALL BE SPORLAN AND SIZED AND SELECTED FOR USE WITH THE EVAPORATOR SERVED AT THE DESIGN OPERATING PRESSURE.

6. SUCTION LINE ACCUMULATORS SHALL BE EQUAL TO MODEL S-7400 AS MANUFACTURED BY AC&R COMPONENTS, INC.

7. SHUT-OFF, CHECK, SOLENOID AND RELIEF VALVES SHALL BE AS MANUFACTURED BY THE HENRY VALVE COMPANY.

C. PIPE, EQUIPMENT, ETC., SHALL BE PROPERLY SUPPORTED FROM STRUCTURE WITH THE USE OF APPROVED TYPE CLEVIS, TRAPEZE HANGERS OR FLOOR STANDS WITH SPACING AS FOLLOWS:

1. STEEL PIPE OR COPPER TUBING - 1-1/2" OR LESS, 6 FOOT INTERVALS.

2. CAST IRON - ONE (1) HANGER PER LENGTH OF PIPE AND NOT EXCEEDING 10'-0" O.C.

3. FITTINGS - WITHIN 2'-0" OF EACH CHANGE OF DIRECTION.

D. INSULATION SHALL BE PROTECTED AT HANGERS BY A SECTION OF CALCIUM SILICATE PIPE INSULATION AND A 12" LONG HALF-ROUND SHEET METAL SHIELD ON THE OUTSIDE OF THE INSULATION. EXTEND PIPING INSULATION FULL THICKNESS WITHOUT INTERRUPTION THROUGH WALLS, FLOORS AND SIMILAR PENETRATIONS.

E. PROVIDE AND INSTALL UNIONS AT PROPER POINTS TO PERMIT REMOVAL OF A PIPE, EQUIPMENT, ETC., WITHOUT INJURY TO OTHER PARTS OF THE SYSTEM AND TO PREVENT CORROSION DUE TO ELECTROLYSIS. ALL EQUIPMENT SHALL BE INSTALLED IN A MANNER TO PERMIT ACCESS FOR SERVICE WITHOUT DISASSEMBLY. UNIONS SHALL BE DIELECTRIC WHERE DISSIMILAR MATERIALS OCCUR. PRESSURE RATINGS SAME AS FITTINGS.

F. CHILLED AND HOT WATER HEATING COOLING PIPES SHALL BE INSULATED WITH OWENS-CORNING ASJ-SSL-II OR APPROVED EQUAL 1" THICK FOR HOT WATER 1 ½ " THICK FOR CHILLED WATER PIPE INSULATION. FITTINGS AND VALVES SHALL BE FINISHED WITH WHITE 25/50 PVC COVERS OVER MOLDED INSULATION FITTINGS. ALL JOINTS AND LAPS SHALL BE VAPOR SEALED.

G. CONDENSATE DRAIN PIPING, AUXILIARY DRAIN PIPING AND ALL REFRIGERANT PIPING SHALL BE INSULATED WITH 1" THICK OWENS-CORNING FIBERGLASS 25 ASJ/SSL OR EQUAL. AUXILIARY DRAIN PAN SHALL BE INSULATED WITH 3/8" THICK ARMAFLEX SHEET INSULATION.

H. PROVIDE INSULATION PRODUCTS MANUFACTURED BY JOHNS-MANVILLE, OWENS-CORNING, ARMSTRONG AND CERTAINTEED. FIBERGLASS PIPE INSULATION SHALL BE ASTM C547-77, CLASS 1. PROVIDE BANDS, WIRES, AND CEMENT AS RECOMMENDED BY INSULATION MANUFACTURER FOR THE APPLICATIONS INDICATED. FLEXIBLE FIBERGLASS DUCTWORK INSULATION SHALL BE ASTM C553-70, TYPE I, CLASS B3.

1. PROVIDE COMPOSITE INSULATION (INSULATION JACKETS, COVERINGS, SEALERS, MASTICS AND ADHESIVE) WITH FLAME-SPREAD RATINGS OF 25 OR LESS AND A SMOKE-DEVELOPED RATING OF 50 OR LESS, AS TESTED BY ASTM K04 (HFFA 255) METHOD.

2. MAINTAIN INTEGRITY OF VAPOR BARRIER JACKETS ON PIPE AND DUCTWORK INSULATION, AND PROTECT TO PREVENT PUNCTURE OR OTHER DAMAGE. SEAL OPEN ENDS OF INSULATION WITH MASTIC. SECTIONALLY SEAL ALL BUTT ENDS OF CHILLED WATER INSULATION OF FITTINGS WITH WHITE VAPOR BARRIER COATING. EXTEND PIPING INSULATION WITHOUT INTERRUPTION THROUGH WALLS, FLOORS AND SIMILAR PIPING PENETRATIONS, EXCEPT WHERE OTHERWISE INDICATED. INSTALL PROTECTIVE METAL SHIELDS AND FOAM GLASS INSERTS WHERE PIPE HANGERS BEAR ON OUTSIDE OF INSULATION.

I. ISOLATION VALVES FOR HOT AND CHILLED WATER SYSTEM SHALL BE EQUAL TO MILWAUKEE "BUTTERBALL" OR NIBCO BALL VALVES AND PROVIDED AT EACH PIECE OF EQUIPMENT. PROVIDE AUTO AIR VENTS IN HEATING WATER PIPING WHERE HIGH POINTS OCCUR.

J. RECTANGULAR "LOW PRESSURE" SHEET METAL DUCT SHALL BE FABRICATED OF CONTINUOUS HOT DIP MILL GALVANIZED MINIMUM 26 GAUGE STEEL SHEETS AND INSTALLED IN ACCORDANCE WITH SMACNA STANDARDS FOR 2" W.C.

K. ROUND "LOW PRESSURE" DUCT FITTINGS SHALL BE FABRICATED OF CONTINUOUS HOT DIP MILL GALVANIZED MINIMUM 26 GAUGE STEEL SHEETS AND INSTALLED IN ACCORDANCE WITH SMACNA RECOMMENDATIONS FOR 1" W.C.

L. RECTANGULAR AND ROUND "PRIMARY AIR" SHEET METAL DUCT AND FITTINGS SHALL BE FABRICATED OF CONTINUOUS HOT DIP MILL GALVANIZED MINIMUM 26 GAUGE STEEL SHEETS AND INSTALLED IN ACCORDANCE WITH SMACNA STANDARDS FOR 3.0" W.C. (DUCTS FOR MEDICAL WORK SHALL NOT BE LINED, BUT WILL BE WRAPPED). CONSTRUCTION METHODS:

1. RECTANGULAR - DUCTMATE SYSTEM

2. ROUND - SPIRAL DUCT SYSTEM

M. ROUND AND RECTANGULAR DUCTS SHALL BE INSULATED WITH 3/4 POUND PER CUBIC FOOT MINIMUM DENSITY, 2" THICK, COMMERCIAL GRADE, OWENS-CORNING FIBERGLASS FOIL BACKED ALL SERVICE DUCT WRAP, OR EQUAL.

N. FLEXIBLE DUCTS SHALL BE FLEXMASTER TYPE 8M, THERMAFLEX MKE OR WIREMOLD WK. FLEXIBLE DUCTS SHALL BE LISTED AS U.L. 181 CLASS (1) AIR DUCT AND SHALL COMPLY WITH NFPA STANDARDS 90A AND 90B.

O. CONTRACTOR SHALL BALANCE THE HVAC SYSTEMS FOR DESIGNATED AIR AND WATER QUANTITIES AND SHALL BE N.E.B.B. OR A.A.B.C. APPROVED. SUBMIT REPORT ON NEBB, AABC, OR SMACNA FORMS FOR APPROVAL BY THE ENGINEER. EXTENT OF BALANCING WORK TO INCLUDE REBALANCING OF EXISTING SUPPLY AND EXHAUST SYSTEMS AS REQUIRED TO ACHIEVE DESIGN CFM ON SUBJECT PROJECT.

P. DUCT ACCESS DOORS: PROVIDE RIGID AND CLOSE FITTING DOORS OF GALVANIZED STEEL WITH SEALING GASKETS AND QUICK FASTENING LOCKING DEVICES. FOR INTERNALLY LINED OR INSTALLED DUCTWORK, INSTALL MINIMUM ONE INCH THICK INSULATION WITH SHEET METAL COVER. INSTALL AT EACH FIRE DAMPER. DOORS TO BE EQUAL TO FLEXMASTER "THE INSPECTOR SERIES."

Q. FURNISH AND INSTALL SMOKE, FIRE AND/OR FIRE/SMOKE DAMPERS WHERE SHOWN ON THE DRAWINGS, AND REQUIRED BY THE GOVERNING AUTHORITY. DAMPERS SHALL BE INSTALLED AS RECOMMENDED BY SMACNA AND COMPLY WITH U.L. AND LOCAL ORDINANCES AS REQUIRED BY THE GOVERNING AUTHORITY.

R. "VARIABLE-VOLUME" AND "CONSTANT-VOLUME" SINGLE DUCT TERMINAL BOX SHALL BE MEDIUM PRESSURE, VARIABLE AIR VOLUME, SINGLE DUCT, PRESSURE INDEPENDENT TERMINAL UNIT WITH 2 P.C.F. DENSITY MINIMUM INSULATED CASING AND FLOW CONTROLLER. VARIABLE VOLUME TERMINAL BOXES SHALL BE BY ENVIRO-TEC, TITUS, PRICE OR KRUEGER.

S. COMPUTER ROOM AIR CONDITIONING UNITS (DX/ELECTRIC):

1. DESCRIPTION: THE ENVIRONMENTAL CONTROL, COMPUTER ROOM AIR CONDITIONING UNITS SHALL BE PROVIDED WITH A HIGH SENSIBLE COOLING SYSTEM, SELF-CONTAINED, FACTORY ASSEMBLED, PIPED, WIRED, AND FACTORY TESTED PRIOR TO SHIPMENT. UNITS SHALL INCLUDE AN ENCLOSURE/CABINET ASSEMBLY, FAN SECTION, FILTER SECTION, COOLING COIL, CONTROLS, AND INTERCONNECTING PIPING INTERNAL TO UNIT.

2. THE FRAME SHALL BE CONSTRUCTED OF 18 GAUGE WELDED TUBULAR STEEL AND BE COATED WITH A HEAVY CORROSION INHIBITING FINISH FOR LONG LIFE. THE SIDE PANELS SHALL BE OF GALVANIZED STEEL. THE CABINET SHALL BE INSULATED WITH ONE-QUARTER INCH (1/4") THICK, CLOSED CELL INSULATION. THE UNIT SHALL BE SERVICEABLE THROUGH THE REMOVABLE SIDE PANELS.

3. AIR COOLED PACKAGED - THE REFRIGERATION SYSTEM SHALL BE SELF-CONTAINED, FACTORY ASSEMBLED, CHARGED AND TESTED PACKAGE. NO REFRIGERANT PIPING CONNECTIONS SHALL BE REQUIRED. THE UNIT SHALL CONTAIN AN INDOOR EVAPORATOR AND AIR-COOLED INDOOR CONDENSING SECTION. BOTH SECTIONS SHALL BE ASSEMBLED WITHIN ONE CABINET AND FRAME ASSEMBLY. THE UNITS SHALL BE MOUNTED IN THE CEILING SPACE WITH DUCTED SUPPLY AND RETURN AIR AS REQUIRED ON THE PROJECT DRAWINGS. THE INDOOR EVAPORATOR SHALL INCLUDE A COOLING COIL CONSTRUCTED WITH COPPER TUBES AND ALUMINUM FINS FOR MAXIMUM HEAT TRANSFER. A SINGLE REFRIGERATION CIRCUIT SHALL CONTAIN AN EXPANSION VALVE WITH EXTERNAL EQUALIZATION, FILTER DRIER AND SIGHT-GLASS. SEE BLOWER ASSEMBLY SECTION OF THIS DOCUMENT FOR EVAPORATOR BLOWER DETAILS.

4. THE EVAPORATOR BLOWER ASSEMBLY SHALL BE A DOUBLE WIDTH, DOUBLE INLET, BLOWER WITH BELT DRIVE AND VARIABLE PITCH SHEAVE AND SELF-ALIGNING BALL BEARINGS RATED FOR AN AVERAGE LIFE OF 100,000 HOURS.

5. A TWO (2") INCH, MERV 8 (BASED ON ASHRAE STD. 52.2) DISPOSABLE FILTER SHALL BE PROVIDED

6. ALL ELECTRICAL COMPONENTS, INCLUDING CAPACITORS, CONTACTORS, RELAYS AND CONTROL TRANSFORMERS SHALL BE PRE-WIRED AND CONTAINED IN A HINGED ELECTRICAL BOX THAT SHALL SWING OUT FOR EASY ACCESS AND SERVICING. A FACTORY INSTALLED MICRO-SWITCH WILL DISABLE THE UNIT PRIOR TO CONDENSATE PAN OVERFLOW SHOULD THE DRAIN BECOME PLUGGED WITH DEBRIS. A DISCONNECT SWITCH WITH 1/4 TURN LATCH SHALL BE FACTORY INSTALLED AND WIRED. THE SWITCH MUST BE IN THE "OFF" POSITION TO REMOVE PANEL AND ACCESS ELECTRICAL COMPARTMENT

7. PRECISE TEMPERATURE REGULATION SHALL BE PROVIDED BY A LOW PROFILE PROGRAMMABLE THERMOSTAT WHICH PROVIDES 5/2 DAY TEMPERATURE PROGRAMMING FOR COOLING ONLY (NO REHEAT).

8. THE STEAM HUMIDIFIER SHALL BE OF THE SELF-CONTAINED CYLINDER TYPE WITH ELECTRONIC CONTROLS. THE HUMIDIFIER SHALL DISCHARGE PURE STEAM WITH NO MATERIAL DUST CARRY-OVER, AND SHALL HAVE SELF-REGULATING FLUSH CYCLE. CYLINDERS SHALL BE DISPOSABLE NOT REQUIRING CLEANING OR MAINTENANCE. HUMIDIFIER RATE SHALL AUTOMATICALLY ADAPT, BOTH IN FREQUENCY AND DURATION, TO VARIATIONS IN THE INCOMING WATER. THE HUMIDIFIER CAPACITY SHALL BE 5 POUNDS PER HOUR WITH POWER CONSUMPTION OF 1.7 KW.

9. A CONDENSATE PUMP SHALL BE PROVIDED WITH THE UNIT AND SHALL HAVE A CAPACITY OF 60 GPH AT 8 FEET OF HEAD. THE PUMP SHALL BE SHIPPED LOOSE FOR FIELD MOUNTING AND INSTALLATION. IT IS ALSO AVAILABLE INSTALLED AND WIRED FROM THE FACTORY.

10. UNITS SHALL BE DATA AIRE, LIEBERT OR COMPU-AIRE.

T. CENTRIFUGAL PUMPS (VERTICAL IN-LINE):

1. PUMP SHALL BE VERTICAL IN-LINE, BRONZE FITTED, SINGLE STAGE, CLOSE COUPLED CENTRIFUGAL PUMP AS INDICATED BY THE DRAWINGS, WITH NEMA STANDARD VERTICAL MOTOR. MOTOR SHALL BE SELECTED TO OPERATE CONTINUOUSLY WITHIN THE HORSEPOWER RATING EXCLUSIVE OF THE SERVICE MOTOR, PUMP SHALL BE AS MANUFACTURED BY BELL & GOSSETT, TACO, AURORA OR PACO. PUMP SHALL BE BRONZE FITTED. IMPELLERS TO BE BRONZE. CASES TO BE EQUIPPED WITH BRONZE REPLACEABLE WEAR RINGS. PUMP SHALL BE BUILT TO STANDARDS OF HYDRAULIC INSTITUTE.

2. PUMP IS TO BE EQUIPPED WITH MECHANICAL SEALS DESIGNED FOR THE SERVICE, PRESSURE AND TEMPERATURE AND CHEMICAL TREATMENT INVOLVED. SEAL SHALL INCLUDE A BUILT-IN FLUSHING ARRANGEMENT TO ASSURE PROPER FLUSHING OF THE SEAT.

3. PERFORMANCE CAPACITY OF THE PUMPS SHALL BE AS SCHEDULED ON THE DRAWINGS.

4. PUMP SELECTION SHALL BE SUCH THAT VARIATION OF PLUS OR MINUS 15% OF HEAD ESTIMATED CAN BE ACCOMPLISHED BY "TRIMMING" IMPELLERS BY THE MANUFACTURER BEFORE SHIPMENT. PUMP IMPELLER FURNISHED SHALL NOT OVERLOAD MOTORS AT THEIR OPERATING CONDITIONS AND CURVES SHALL SHOW THAT MOTORS WILL NOT OVERLOAD AT ANY OTHER POINTS ON THE CURVE. THE IMPELLER IN THE RESPECTIVE PUMP.

U. MOTOR STARTER/DISCONNECT:

1. MOTOR STARTER/DISCONNECT SWITCH FOR 3/4 HP, 3 PHASE MOTORS AND LARGER SHALL BE ACROSS-THE-LINE NON-REVERSING COMBINATION STARTERS WITH FUSIBLE DISCONNECT SWITCH TYPE RATED IN ACCORDANCE WITH NEMA STANDARDS, SIZES AND HORSEPOWER RATINGS. UNITS SHALL BE MOUNTED IN NEMA 1 ENCLOSURES WHERE INSTALLED INDOORS, AND NEMA 4 ENCLOSURES WHERE INSTALLED OUTDOORS. MINIMUM SIZE SHALL BE NEMA SIZE 1.

   a. OVERLOAD RELAYS OF THE MELTING ALLOY TYPE SHALL BE PROVIDED IN ALL PHASES. THERMAL UNITS SHALL BE OF ONE-PIECE CONSTRUCTION AND INTERCHANGEABLE.
   b. STARTERS SHALL BE EQUIPPED WITH ONE SET OF AUXILIARY CONTACTS AND BE SUITABLE FOR THE ADDITION OF AT LEAST THREE EXTERNAL ELECTRICAL INTERLOCKS OF ANY ARRANGEMENT NORMALLY OPEN OR NORMALLY CLOSED.
   c. ALL MAGNETIC STARTERS WITH "HAND-OFF-AUTO" SELECTOR SWITCH AND PILOT LIGHT SHALL BE EQUAL TO SQUARE D CLASS 8538 OR SIEMENS CLASS SCF WITH MELTING ALLOY OVERLOAD RELAYS AND FOR EACH PHASE, AND RED PILOT LIGHT IN COVER OF GENERAL PURPOSE ENCLOSURE. COIL VOLTAGE SHALL BE 120 VOLT AND STARTER SHALL HAVE A CONTROL VOLTAGE TRANSFORMER.
   d. PUSH BUTTON STATIONS AND/OR HAND-OFF-AUTOMATIC SWITCHES SHALL BE REMOTE LOCATED AND WIRED UNDER THIS SECTION WHERE SO SHOWN OR SCHEDULED ON THE DRAWINGS.

2. MOTOR STARTER/DISCONNECT SWITCH FOR SINGLE PHASE MOTORS 1 H.P. AND SMALLER SHALL BE COMBINATION STARTER/TOGGLE SWITCH IN ACCORDANCE WITH NEMA STANDARDS. UNITS SHALL BE SUPPLIED WITH HEAVY DUTY POWER RELAYS. ALL UNITS MOUNTED INDOORS SHALL BE IN NEMA 1 ENCLOSURES, AND WHERE INSTALLED OUTDOORS SHALL BE IN NEMA 4 ENCLOSURES. MINIMUM SIZE SHALL BE NEMA SIZE 0.
   a. UNITS SHALL BE EQUAL TO SIEMENS CLASS MSF AND TYPE SRD POWER RELAYS WITH ENCLOSURES.

V. AIR HANDLING UNIT:

1. HCA HAS A SOLE-SOURCE PURCHASING AGREEMENT WITH YORK/JCI FOR CHILLED WATER AIR HANDLING UNITS. OBTAIN PRICING FROM JOHNSON CONTROLS: PAIGE PRECHTER, 954-734-0792, BE-HCA@JCI.COM OR THROUGH LOCAL JCI REPRESENTATIVES.
2. AIR-HANDLING UNITS SHALL BE FACTORY ASSEMBLED AND CONSIST OF FANS, MOTOR AND DRIVE ASSEMBLY, COILS, DAMPER, PLENUMS, FILTERS, CONDENSATE PANS, AIR BLENDERS, MIXING DAMPERS, CONTROL DEVICES, AND OTHER ACCESSORIES, SECTIONS, OR COMPONENTS.
3. PROVIDE PROTECTION FOR ALL OPENINGS AND COMPONENTS DURING EQUIPMENT TRANSPORT. EXTERNALLY MOUNTED COMPONENTS SHALL BE PROTECTED DURING ALL PHASES OF TRANSPORT FROM EXPOSURE, INCLUDING MOISTURE AND AMBIENT TEMPERATURES OUTSIDE OF ANY COMPONENT'S OPERATING RANGE. EXTERNALLY MOUNTED COMPONENTS INCLUDE, BUT ARE NOT LIMITED TO, VFD'S, ACTUATORS, SENSORS, AND WEATHER HOODS. AIR HANDLER SHALL BE SHIPPED IN SPLITS SMALL ENOUGH TO FIT THROUGH THE EXISTING DOOR FRAME. CONTRACTOR SHALL COORDINATE SIZE OF SHIPPING SPLITS WITH EXISTING BUILDING CONDITIONS.
4. UNIT CONSTRUCTION:
   a. UNIT LEAKAGE NOT TO EXCEED 1% OF DESIGN CFM AT 8" MAXIMIUM W.G. OPERATION. LEAKAGE TO BE CALCULATED BY TOTALING ALL LEAKAGE EITHER INTO OR OUT OF THE UNIT.
   b. MATERIALS: FORMED AND REINFORCED DOUBLE-WALL INSULATED PANELS, FABRICATED TO ALLOW REMOVAL FOR ACCESS TO INTERNAL PARTS AND COMPONENTS, WITH JOINTS BETWEEN SECTIONS SEALED.
      1) OUTSIDE CASING: STEEL, 0.0598 INCH (1.5 MM) THICK.
      2) INSIDE CASING: GALVANIZED STEEL, 0.0276 INCH (0.7 MM) THICK.
      3) FLOOR PLATE: GALVANIZED STEEL, 0.1382 INCH (3.5 MM) THICK.
   c. CABINET INSULATION: COMPLY WITH NFPA 90A OR NFPA 90B.
      1) MATERIALS: ASTM C 1071 WITH COATED SURFACE EXPOSED TO AIRSTREAM TO PREVENT EROSION OF GLASS FIBERS.
      2) THERMAL PERFORMANCE: MINIMUM EFFECTIVE INSULATING VALUE OF R-12.
      3) FIRE-HAZARD CLASSIFICATION: MAXIMUM FLAME-SPREAD INDEX OF 25 AND SMOKE-DEVELOPED INDEX OF 50, WHEN TESTED ACCORDING TO ASTM C 411.
      4) LINER ADHESIVE: COMPLY WITH NFPA 90A OR NFPA 90B AND ASTM C 916.
      5) MECHANICAL FASTENERS: GALVANIZED STEEL, SUITABLE FOR ADHESIVE ATTACHMENT, MECHANICAL ATTACHMENT, OR WELDING ATTACHMENT TO DUCT WITHOUT DAMAGING LINER WHEN APPLIED AS RECOMMENDED BY MANUFACTURER AND WITHOUT CAUSING LEAKAGE IN CABINET.
      6) LOCATION AND APPLICATION: FACTORY APPLIED WITH ADHESIVE AND MECHANICAL FASTENERS TO THE INTERNAL SURFACE OF SECTION PANELS DOWNSTREAM FROM AND INCLUDING THE COOLING COIL SECTION.
      7) LOCATION AND APPLICATION: ENCASED BETWEEN OUTSIDE AND INSIDE CASING.
   d. ACCESS PANELS AND DOORS: SAME MATERIALS AND FINISHES AS CABINET, COMPLETE WITH HINGES, LATCHES, HANDLES, AND GASKETS. INSPECTION AND ACCESS PANELS AND DOORS SHALL BE SIZED AND LOCATED TO ALLOW PERIODIC MAINTENANCE AND INSPECTIONS. PROVIDE ACCESS PANELS AND DOORS IN THE FOLLOWING LOCATIONS:
      1) FAN SECTION: INSPECTION AND ACCESS DOORS.
      2) ACCESS SECTION: INSPECTION AND ACCESS DOORS.
      3) COIL SECTION: INSPECTION PANEL.
      4) DAMPER SECTION: INSPECTION AND ACCESS DOORS.
      5) FILTER SECTION: INSPECTION AND ACCESS DOORS TO ALLOW PERIODIC REMOVAL AND INSTALLATION OF FILTERS.
   e. CONDENSATE DRAIN PANS: FORMED SECTIONS OF STAINLESS-STEEL SHEET COMPLYING WITH REQUIREMENTS IN ASHRAE 62 FOR ALL COOLING COILS. FABRICATE PANS WITH SLOPES IN TWO PLANES TO COLLECT CONDENSATE FROM COILS (INCLUDING COIL PIPING CONNECTIONS AND RETURN BENDS) AND HUMIDIFIERS WHEN UNITS ARE OPERATING AT MAXIMUM CATALOGUED FACE VELOCITY ACROSS COOLING COIL.
   f. DOUBLE-WALL CONSTRUCTION: FILL SPACE BETWEEN WALLS WITH FOAM INSULATION AND SEAL MOISTURE TIGHT.
   g. UNITS WITH STACKED COILS SHALL HAVE AN INTERMEDIATE DRAIN PAN OR DRAIN TROUGH TO COLLECT CONDENSATE FROM TOP COIL. DRAIN INTERMEDIATE PAN TO MAIN PAN VIA COPPER DOWNSPOUT.
5. FAN SECTION
   a. FAN-SECTION CONSTRUCTION: BELT OR DIRECT-DRIVE FANS CONSISTING OF HOUSING, WHEEL, FAN SHAFT, BEARINGS, MOTOR AND DISCONNECT SWITCH, DRIVE ASSEMBLY, AND 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 WELDED OR RIVETED TO FLANGE AND BACKPLATE; CAST-IRON OR CAST-STEEL HUB RIVETED TO BACKPLATE AND FASTENED TO SHAFT WITH SET SCREWS.
   e. 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.
   f. COATINGS: HOT-DIP GALVANIZED.
   g. 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.
   h. BEARINGS:
      1) BEARING TYPES:
         a) PRELUBRICATED AND SEALED SHAFT BEARINGS: SELF-ALIGNING, PILLOW-BLOCK-TYPE BALL BEARINGS.
         b) GREASE-LUBRICATED SHAFT BEARINGS: SELF-ALIGNING, PILLOW-BLOCK-TYPE, TAPERED ROLLER BEARINGS WITH DOUBLE-LOCKING COLLARS AND TWO-PIECE, CAST-IRON HOUSING.
         c) GREASE-LUBRICATED SHAFT BEARINGS: SELF-ALIGNING, PILLOW-BLOCK-TYPE, BALL OR ROLLER BEARINGS WITH ADAPTER MOUNT AND TWO-PIECE, CAST-IRON HOUSING.
      2) BEARING RATING LIFE:
         a) BALL-BEARINGS: ABMA 9, L10 AT 200,000.
         b) ROLLER-BEARINGS: ABMA 11, L10 AT 200,000.
   i. BELT DRIVES: FACTORY MOUNTED, WITH FINAL ALIGNMENT AND BELT ADJUSTMENT MADE AFTER INSTALLATION.
      1) SERVICE FACTOR BASED ON FAN MOTOR SIZE: 1.5.
      2) FAN PULLEYS: CAST IRON OR CAST STEEL WITH SPLIT, TAPERED BUSHING; DYNAMICALLY BALANCED AT FACTORY.
      3) MOTOR PULLEYS:
         a) FOR MOTORS THROUGH 10 HP, USE ADJUSTABLE PITCH. SELECT PULLEY SO PITCH ADJUSTMENT IS AT THE MIDDLE OF ADJUSTMENT RANGE AT FAN DESIGN CONDITIONS.
         b) FOR MOTORS LARGER THAN 10 HP AND FOR ALL MOTORS WITH A VFD, USE FIXED PITCH.
   j. BELTS: OIL RESISTANT, NONSPARKING, AND NONSTATIC; MATCHED SETS FOR MULTIPLE BELT DRIVES.
   k. BELT GUARDS: FABRICATE TO COMPLY WITH OSHA AND SMACNA REQUIREMENTS OF DIAMOND-MESH WIRE SCREEN WELDED TO STEEL ANGLE FRAME OR EQUIVALENT, PRIME COATED. SECURE TO FAN OR FAN SUPPORTS WITHOUT SHORT CIRCUITING VIBRATION ISOLATION. INCLUDE PROVISIONS FOR ADJUSTMENT OF BELT TENSION, LUBRICATION, AND USE OF TACHOMETER WITH GUARD IN PLACE.
   l. MOTOR MOUNT: ADJUSTABLE FOR BELT TENSIONING.
   m. VIBRATION CONTROL: INSTALL FANS ON OPEN-SPRING VIBRATION ISOLATORS HAVING A MINIMUM OF 1-INCH (25-MM) STATIC DEFLECTION AND SIDE SNUBBERS.
   n. FAN-SECTION SOURCE QUALITY CONTROL:
      1) SOUND POWER LEVEL RATINGS: COMPLY WITH AMCA 301, "METHODS FOR CALCULATING FAN SOUND RATINGS FROM LABORATORY TEST DATA." TEST FANS ACCORDING TO AMCA 300, "REVERBERANT ROOM METHOD FOR SOUND TESTING OF FANS." FANS SHALL BEAR AMCA-CERTIFIED SOUND RATINGS SEAL.
      2) FACTORY TEST FAN PERFORMANCE FOR FLOW RATE, PRESSURE, POWER, AIR DENSITY, ROTATION SPEED, AND EFFICIENCY. ESTABLISH RATINGS ACCORDING TO AMCA 210, "LABORATORY METHODS OF TESTING FANS FOR RATING."
      3) FANS INTEGRAL TO UNITS SHALL NOT EXCEED 85% OF CLASS RATING AT THE SELECTION POINT.
6. MOTORS AND DRIVES SHALL BE FACTORY MOUNTED WITH ENTIRE ASSEMBLY BALANCED BEFORE SHIPMENT. FANS SHALL BE EQUIPPED WITH THE PROPERLY SIZED, 1750 RPM MOTOR HAVING THE VOLTAGE REQUIREMENTS SCHEDULED ON THE DRAWINGS. MOTORS SHALL BE OF THE OPEN DRIP-PROOF TYPE AND SHALL BE MOUNTED ON ADJUSTABLE MOTOR BASE PROPERLY ATTACHED TO THE UNIT HOUSING. MOTORS SHALL BE EQUIPPED WITH ADJUSTABLE SHEAVES.
7. COILS
   a. COIL SECTIONS: COMMON OR INDIVIDUAL, INSULATED. DESIGN AND CONSTRUCT TO FACILITATE REMOVAL AND REPLACEMENT OF COIL FOR MAINTENANCE AND TO ENSURE FULL AIRFLOW THROUGH COILS. FOR MULTIZONE UNITS, PROVIDE AIR DEFLECTORS AND AIR BAFFLES TO BALANCE AIRFLOW ACROSS COILS.
   b. HYDRONIC COILS: CLEANABLE COIL FABRICATED ACCORDING TO ARI 410.
      1) PIPING CONNECTIONS: THREADED, ON SAME END.
      2) TUBES: COPPER.
      3) FINS: ALUMINUM WITH FIN SPACING AS SCHEDULED.
         a) MINIMUM SPACING: 8 FINS PER INCH.
         b) MAXIMUM SPACING: 12 FINS PER INCH.
         c) MAXIMUM FIN LENGTH OF 120".
         d) PROVIDE INTERMEDIATE TUBE SUPPORTS FOR COILS OVER 44" LONG, WITH AN ADDITIONAL SUPPORT EVERY MULTIPLE OF 42" THEREAFTER.
      4) FIN AND TUBE JOINT: MECHANICAL BOND.
      5) HEADERS: SEAMLESS COPPER TUBE WITH BRAZED JOINTS, PRIME COATED.
      6) FRAMES: MINIMUM THICKNESS 0.0625 INCH (1.58 MM).
         a) HEATING COILS: GALVANIZED-STEEL CHANNEL.
         b) COOLING COILS: STAINLESS STEEL CHANNEL.
      7) DRAIN PANS: PROVIDE
      8) RATINGS: DESIGN TESTED AND RATED ACCORDING TO ASHRAE 33 AND ARI 410.
         a) WORKING-PRESSURE RATINGS: 200 PSIG (1380 KPA), 325 DEG F (163 DEG C).
      9) SOURCE QUALITY CONTROL: TEST TO 300 PSIG (2070 KPA) AND TO 200 PSIG (1380 KPA) UNDERWATER.
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 (10-M/S) FACE VELOCITY THROUGH DAMPER AND 4-INCH WG (1000-PA) PRESSURE DIFFERENTIAL.
   b. DAMPER OPERATORS: PNEUMATIC OR 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 OPPOSED OR PARALLEL-BLADE ARRANGEMENT AS INDICATED IN THE CONTRACT DOCUMENTS WITH STEEL OPERATING RODS ROTATING IN A STAINLESS-STEEL SLEEVE OR SINTERED BRONZE OR NYLON 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. (0.22 L/S PER SQ. M) AT 1-INCH WG (250 PA) AND 9 CFM/SQ. FT. (0.4 L/S PER SQ. M) AT 4-INCH WG (1.0 MPA).
   d. MIXING BOXES: PARALLEL-BLADE GALVANIZED-STEEL DAMPERS MECHANICALLY FASTENED TO STEEL OPERATING ROD IN REINFORCED, GALVANIZED-STEEL CABINET. CONNECT OPERATING RODS WITH COMMON LINKAGE AND INTERCONNECT LINKAGES SO DAMPERS OPERATE SIMULTANEOUSLY.
9. FILTER SECTION
   a. 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 OR THE FACE.
   b. REFER TO AHU SCHEDULE IN CONTRACT DOCUMENTS FOR THE QUANTITY, PERFORMANCE, AND TYPE OF FILTER SECTIONS.
   c. QUALITY ASSURANCE: COMPLY WITH NFPA 90A OR 90B AS REQUIRED.
10. ELECTRICAL
   a. THE ELECTRICAL CONNECTIONS FOR ALL ELECTRICAL COMPONENTS IN EACH UNIT SHALL BE WIRED BY THE AHU MANUFACTURER TO THE EXTERIOR OF THE UNIT FOR FIELD CONNECTION.
   b. PROVIDE DISCONNECT AT EACH MOTOR INTERNAL TO THE UNIT.
   c. MARINE LIGHTS
      1) MARINE LIGHTS SHALL BE PROVIDED THROUGHOUT AHUS, BUT NO LESS THAN ONE PER SECTION WITH AN ACCESS DOOR.
      2) LIGHTS SHALL BE COMPACT FLUORESCENT TYPE TO MINIMIZE AMPERAGE DRAW AND SHALL PRODUCE LUMENS EQUIVALENT TO A MINIMUM 64 W, INSTANT-START BULB.
      3) LIGHTS SHALL BE CONSTRUCTED OF SAFETY GLASS AND SHALL BE SUITABLE FOR WET LOCATIONS.
   d. MARINE LIGHT SWITCHES
      1) ALL LIGHTS ON A UNIT SHALL BE WIRED IN THE FACTORY TO A SINGLE ON-OFF SWITCH WITH AN INTEGRAL TIMER ADJUSTABLE FOR UP TO FORTY FIVE MINUTES.
      2) LIGHTING CIRCUIT(S) SHALL BE WIRED BY THE AHU MANUFACTURER TO A COMMON JUNCTION BOX SEPARATE FROM THE VFD OR STARTER SO THE LIGHTS CAN REMAIN ON WHEN THE MAIN DISCONNECT TO THE UNIT IS ON OR OFF.
   e. CONVENIENCE OUTLET
      1) MANUFACTURER SHALL PROVIDE AT LEAST ONE DUPLEX 120-V CONVENIENCE OUTLET PER FAN SECTION.
      2) OUTLETS SHALL BE WIRED BY AHU MANUFACTURER TO A COMMON JUNCTION BOX SEPARATE FROM VFD OR STARTER SO THE OUTLET CAN REMAIN ON WHEN THE MAIN DISCONNECT TO THE UNIT IS ON OR OFF.
   f. RATINGS
      1) SHORT-CIRCUIT CURRENT: MATCH RATING OF OVERCURRENT PROTECTIVE DEVICE SERVING THE EQUIPMENT ASSEMBLY.
      2) AVAILABLE SHORT-CIRCUIT CURRENT: AS INDICATED ON THE DRAWINGS.
11. STARTUP SERVICE
   a. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO PERFORM STARTUP SERVICE.
   b. FINAL CHECKS BEFORE STARTUP: PERFORM THE FOLLOWING:
      1) VERIFY THAT SHIPPING, BLOCKING, AND BRACING ARE REMOVED.
      2) VERIFY THAT UNIT IS SECURE ON MOUNTINGS AND SUPPORTING DEVICES AND THAT CONNECTIONS TO PIPING, DUCTS, AND ELECTRICAL SYSTEMS ARE COMPLETE. VERIFY THAT PROPER THERMAL-OVERLOAD PROTECTION IS INSTALLED IN MOTORS, STARTERS, AND DISCONNECT SWITCHES.
      3) PERFORM CLEANING AND ADJUSTING SPECIFIED IN THIS SECTION.
      4) DISCONNECT FAN DRIVE FROM MOTOR, VERIFY PROPER MOTOR ROTATION DIRECTION, AND VERIFY FREE FAN WHEEL ROTATION AND SMOOTH BEARING OPERATIONS. RECONNECT FAN DRIVE SYSTEM, ALIGN BELTS, AND INSTALL BELT GUARDS.
      5) LUBRICATE BEARINGS, PULLEYS, BELTS, AND OTHER MOVING PARTS WITH FACTORY-RECOMMENDED LUBRICANTS.
      6) SET OUTSIDE- AND RETURN-AIR MIXING DAMPERS TO MINIMUM OUTSIDE-AIR SETTING.
      7) COMB COIL FINS FOR PARALLEL ORIENTATION.
      8) INSTALL CLEAN FILTERS.
      9) VERIFY THAT MANUAL AND AUTOMATIC VOLUME CONTROL AND FIRE AND SMOKE DAMPERS IN CONNECTED DUCT SYSTEMS ARE IN FULLY OPEN POSITION.
   c. STARTING PROCEDURES FOR MODULAR INDOOR AIR-HANDLING UNITS INCLUDE THE FOLLOWING:
      1) ENERGIZE MOTOR; VERIFY PROPER OPERATION OF MOTOR, DRIVE SYSTEM, AND FAN WHEEL. ADJUST FAN TO INDICATED RPM. REPLACE FAN AND MOTOR PULLEYS AS REQUIRED TO ACHIEVE DESIGN CONDITIONS.
      2) MEASURE AND RECORD MOTOR ELECTRICAL VALUES FOR VOLTAGE AND AMPERAGE.
      3) MANUALLY OPERATE DAMPERS FROM FULLY CLOSED TO FULLY OPEN POSITION AND RECORD FAN PERFORMANCE.
      4) ADJUST DAMPER LINKAGES FOR PROPER DAMPER OPERATION.

W. EXHAUST FANS - DOME STYLE CENTRIFUGAL ROOF VENTILATORS
1. PERFORMANCE REQUIREMENTS
   a. PROJECT ALTITUDE: BASE FAN PERFORMANCE RATINGS ON ACTUAL PROJECT SITE ELEVATIONS ABOVE SEA LEVEL.
   b. OPERATING LIMITS: CLASSIFY ACCORDING TO AMCA 99.
2. MANUFACTURERS: COOK, TWIN CITY FAN, GREENHECK
3. DESCRIPTION: DIRECT- OR BELT-DRIVEN CENTRIFUGAL FANS CONSISTING OF HOUSING, WHEEL, FAN SHAFT, BEARINGS, MOTOR AND DISCONNECT SWITCH, DRIVE ASSEMBLY, CURB BASE, AND ACCESSORIES.
4. HOUSING: REMOVABLE, SPUN-ALUMINUM, DOME TOP AND OUTLET BAFFLE; SQUARE, ONE-PIECE, ALUMINUM BASE WITH VENTURI INLET CONE.
   a. UPBLAST UNITS: PROVIDE SPUN-ALUMINUM DISCHARGE BAFFLE TO DIRECT DISCHARGE AIR UPWARD, WITH RAIN AND SNOW DRAINS.
   b. HINGED SUBBASE: GALVANIZED-STEEL HINGED ARRANGEMENT PERMITTING SERVICE AND MAINTENANCE.
5. FAN WHEELS:
   a. WHEELS SHALL BE STATICALLY AND DYNAMICALLY BALANCED TO GRADE G6.3 PER ANSI S2.19.
   b. ALUMINUM HUB AND WHEEL WITH BACKWARD-INCLINED BLADES.
6. BELT-DRIVEN DRIVE ASSEMBLY: RESILIENTLY MOUNTED TO HOUSING, WITH THE FOLLOWING FEATURES:
   a. FAN SHAFT: TURNED, GROUND, AND POLISHED STEEL; KEYED TO WHEEL HUB.
   b. SHAFT BEARINGS: PERMANENTLY LUBRICATED, PERMANENTLY SEALED, SELF-ALIGNING BALL BEARINGS.
   c. PULLEYS: CAST-IRON, ADJUSTABLE-PITCH MOTOR PULLEY. PROVIDE AUTOMATIC BELT TENSIONER FOR TOOL FREE BELT REPLACEMENT.
   d. FAN AND MOTOR ISOLATED FROM EXHAUST AIRSTREAM.
7. ACCESSORIES:
   a. VARIABLE-SPEED CONTROLLER: SOLID-STATE CONTROL TO REDUCE SPEED FROM 100 TO LESS THAN 50 PERCENT.
   b. DISCONNECT SWITCH: NONFUSIBLE TYPE, WITH THERMAL-OVERLOAD PROTECTION MOUNTED INSIDE FAN HOUSING, FACTORY WIRED THROUGH AN INTERNAL ALUMINUM CONDUIT.
   c. BIRD SCREENS: REMOVABLE, 1/2-INCH (13-MM) MESH, ALUMINUM OR BRASS WIRE.
   d. DAMPERS: COUNTERBALANCED, PARALLEL-BLADE, BACKDRAFT DAMPERS MOUNTED IN CURB BASE; FACTORY SET TO CLOSE WHEN FAN STOPS.
8. ROOF CURBS:
   a. FACTORY FABRICATED; GALVANIZED STEEL; MITERED AND WELDED CORNERS; 1-1/2-INCH- (40-MM-) THICK, RIGID, FIBERGLASS INSULATION ADHERED TO INSIDE WALLS; AND 1-1/2-INCH (40-MM) WOOD NAILER. SIZE AS REQUIRED TO SUIT ROOF OPENING AND FAN BASE.
   b. CONFIGURATION: SELF-FLASHING WITHOUT A CANT STRIP, WITH MOUNTING FLANGE.
   c. OVERALL HEIGHT: COORDINATE CURB HEIGHT WITH ROOFING SYSTEM FOR 12" MINIMUM CLEARANCE ABOVE FINISHED ROOF DECK.
   d. METAL LINER: GALVANIZED STEEL.
   e. MOUNTING PEDESTAL: GALVANIZED STEEL WITH REMOVABLE ACCESS PANEL.

X. SELF-CONTAINED HUMIDIFIERS
1. ELECTRIC SOURCE
   a. ELECTRIC-RESISTANCE HEATER CONTAINER: CLEANABLE, ASTM A 666, TYPE 316 STAINLESS STEEL. COMPLY WITH UL 499.
   b. ELECTRICAL RATINGS
      1) SHORT-CIRCUIT CURRENT: MATCH RATING OF OVERCURRENT PROTECTIVE DEVICE SERVING THE EQUIPMENT ASSEMBLY.
      2) AVAILABLE SHORT-CIRCUIT CURRENT: AS INDICATED ON THE DRAWINGS.
2. MANIFOLD: ASTM A 666, TYPE 316 STAINLESS-STEEL TUBE EXTENDING ACROSS ENTIRE WIDTH OF DUCT OR PLENUM AND EQUIPPED WITH MOUNTING BRACKETS ON ENDS.
3. CABINET: SHEET METAL ENCLOSURE FOR HOUSING HEATER CYLINDER, ELECTRICAL WIRING, COMPONENTS, CONTROLS, AND CONTROL PANEL. ENCLOSURE SHALL INCLUDE BAKED-ENAMEL FINISH, HINGED OR REMOVABLE ACCESS DOOR, AND THREADED OUTLET IN BOTTOM OF CABINET FOR DRAIN PIPING.
4. CONTROL PANEL:
   a. FACTORY-WIRED DISCONNECT SWITCH.
   b. ELECTRONIC DISPLAY.
   c. PROGRAMMABLE KEYBOARD.
   d. SET-POINT ADJUSTMENT.
   e. WARNING SIGNAL INDICATING END OF REPLACEABLE CYLINDER LIFE.
   f. LOW-VOLTAGE, CONTROL CIRCUIT.
   g. DIAGNOSTIC, MAINTENANCE, ALARM, AND STATUS FEATURES.
   h. HIGH-WATER SENSOR OR FLOAT TO PREVENT OVERFILLING.
5. CONTROLS:
   a. MICROPROCESSOR-BASED CONTROL SYSTEM FOR MODULATING OR CYCLING CONTROL, AND START/STOP AND STATUS MONITORING FOR INTERFACE TO CENTRAL HVAC INSTRUMENTATION AND CONTROLS.
   b. SOLENOID-FILL AND AUTOMATIC DRAIN VALVES TO MAINTAIN WATER LEVEL AND TEMPER HOT DRAIN WATER.
   c. FIELD-ADJUSTABLE TIMER TO CONTROL DRAIN CYCLE FOR FLUSH DURATION AND INTERVAL.
   d. CONTROLS SHALL DRAIN TANKS IF NO DEMAND FOR HUMIDIFICATION FOR MORE THAN 72 HOURS.
   e. CONDUCTIVITY OR FLOAT-TYPE LEVEL CONTROLS.
6. ACCESSORIES (PROVIDED BY CONTROLS CONTRACTOR):
   a. HUMIDISTAT: WALL OR RETURN-DUCT-MOUNTING, SOLID-STATE, ELECTRONIC-SENSOR CONTROLLER CAPABLE OF FULL MODULATION OR CYCLING CONTROL AS INDICATED IN DRAWINGS.
   b. DUCT-MOUNTING, HIGH-LIMIT HUMIDISTAT.
   c. AIRFLOW SWITCH FOR PREVENTING HUMIDIFIER OPERATION WITHOUT AIRFLOW.

Y. TEMPERATURE CONTROLS:

1. ALL TEMPERATURE CONTROLS NECESSARY FOR THE RENOVATION AND FINISH-OUT OF THE SPACE SHALL COMPLY WITH THE BASE BUILDING SYSTEM AND CONTROL SPECIFICATIONS. BUILDING STANDARD CONTROL SYSTEM COMPONENTS SHALL BE UTILIZED. RENOVATION WORK IN THE OCCUPIED SPACES SHALL TIE INTO THE EXISTING SIEMENS PNEUMATIC CONTROL SYSTEM. NEW CONTROLS IN THE MECHANICAL PENTHOUSE SHALL BE DDC CONTROLS BY JCI.

2. NEW THERMOSTATS OR SENSORS SHALL MATCH THE EXISTING THERMOSTATS OR SENSORS.

3. ALL CONTROL WIRING AND POWER WIRING FOR CONTROLS SHALL BE BY THE CONTROLS SUB-CONTRACTOR.

4. TERMINAL UNITS, FAN-COIL UNITS AND MOTORIZED SUPPLY AIR DAMPERS SHALL BE CONTROLLED BY ROOM THERMOSTATS PIPED WITH MAIN CONTROL PRESSURE AND BRANCH PRESSURE FROM THERMOSTAT OR SENSORS WITH TWISTED PAIR, PLENUM RATED CABLE FROM SENSORS TO OPERATORS, CONTROL VALVES, ETC.

5. THE AIR HANDLING AND CRAC UNITS SHALL BE CONNECTED TO THE BASE BUILDING ENERGY MANAGEMENT SYSTEM FOR START AND STOP SCHEDULES. THE AUXILIARY CONTACTS IN THE STARTER/DISCONNECTS SHALL BE USED TO AUTOMATE THE START AND STOP FUNCTIONS.

6. AT THE COMPLETION OF CONSTRUCTION, ALL NEW AND EXISTING THERMOSTATS AND SENSORS SHALL BE CALIBRATED.

7. AIR FLOW MEASURING DEVICES:
   a. GENERAL:
      1) AIRFLOW MEASURING SENSORS SHALL BE INSTALLED AT FAN INLET WHENEVER POSSIBLE AND SHALL BE CAPABLE OF CONTINUOUSLY MEASURING THE AIR HANDLING CAPACITY (AIR VOLUME) OF THE RESPECTIVE CENTRIFUGAL, PLUG, OR VANE-AXIAL FAN(S).
   b. MANUFACTURERS:
      1) PARAGON CONTROLS INCORPORATED (PCI), MICROTRANS EQ.
   c. FAN INLET TRAVERSE PROBES.
      1) THE FAN INLET AIRFLOW TRAVERSE PROBES SHALL CONTAIN MULTIPLE TOTAL AND STATIC PRESSURE SENSORS PLACED AT CONCENTRIC AREA CENTERS ALONG THE EXTERIOR SURFACE OF THE CYLINDRICAL PROBES AND INTERNALLY CONNECTED TO THEIR RESPECTIVE AVERAGING MANIFOLDS.
      2) SENSORS SHALL NOT PROTRUDE BEYOND THE SURFACE OF THE PROBE. THE FAN INLET AIRFLOW TRAVERSE PROBES SHALL HAVE SYMMETRICAL AVERAGING SIGNAL TAKEOFFS, AND SHALL BE OF ALUMINUM CONSTRUCTION WITH HARD ANODIZED FINISH WITH GALVANIZED STEEL MOUNTING HARDWARE.
      3) THE FAN INLET AIRFLOW TRAVERSE PROBES SHALL NOT SIGNIFICANTLY IMPACT FAN PERFORMANCE OR CONTRIBUTE TO FAN GENERATED NOISE LEVELS.
      4) THE PROBES SHALL BE CAPABLE OF PRODUCING STEADY, NON-PULSATING SIGNALS OF STANDARD TOTAL AND STATIC PRESSURE, WITHOUT NEED FOR FLOW CORRECTIONS OR FACTORS, WITH AN ACCURACY OF 3% OF ACTUAL FLOW OVER A FAN OPERATING RANGE OF 6 TO 1 CAPACITY TURNDOWN.
   d. FAN INLET PIEZOMETER RINGS
      1) FACTORY TAP FAN INLET WITH SENSOR PORTS.
      2) ACCURACY: +/-3% OF FULL SCALE.
   e. DUCT MOUNTED:
      1) MANUFACTURERS:
         a) EBTRON.
      2) DESCRIPTION: THERMAL DISPERSION TYPE. UNITS SHALL BE PROVIDED COMPLETE WITH DIFFERENTIAL PRESSURE TRANSDUCERS, TEMPERATURE COMPENSATION, SQUARE ROOT EXTRACTION. UNIT SHALL PERFORM ALL INTERNAL CALCULATIONS TO OUTPUT TO THE FMS THE CFM READINGS.
      3) LOCATION: PROVIDE STRAIGHT DUCT BEFORE AND AFTER DEVICE ACCORDING TO THE SENSOR MANUFACTURER'S RECOMMENDATIONS. PROVIDE ACCESS DOOR IN DUCTWORK ADJACENT TO SENSORS.
      4) ACCURACY: SENSOR ACCURACY SHALL BE +/- 2% OF THE AIRFLOW READING OVER THE ENTIRE RANGE OF AIRFLOW MEASURED.
   f. TRANSMITTER / TRANSDUCER
      1) EACH SENSOR SHALL BE PROVIDED COMPLETE WITH TRANSMITTER.
      2) MANUFACTURERS:
         a) PARAGON.
      3) FULL SCALE ACCURACY:
         a) ACCURACY: +/- 0.25% OF FULL SCALE.
         b) TERMINAL POINT NON-LINEARITY: +/- 0.2%.
         c) HYSTERESIS: +/- 0.2%.
         d) NON-REPEATABILITY: +/- 0.3%.
         e) TEMPERATURE EFFECT: +/- 0.15% FULL SCALE / °F.
      4) THE TRANSMITTER-CONTROLLER SHALL BE CAPABLE OF RECEIVING FLOW SIGNALS (TOTAL AND STATIC PRESSURE) FROM AN AIRFLOW STATION OR PROBE ARRAY AND PRODUCE AN OUTPUT LINEAR AND SCALED FOR AIR VOLUME, VELOCITY, DIFFERENTIAL PRESSURE, ETC. THE INTERNAL P, I, THREE-MODE CONTROLLER SHALL BE CAPABLE OF CONTROLLING AT A USER SELECTABLE INTERNAL OR EXTERNAL SETPOINT, AND OUTPUT A 0-5VDC, 0-10VDC, OR 4-20MADC CONTROL SIGNAL.
      5) THE TRANSMITTER-CONTROLLER SHALL CONTAIN AN INTEGRAL MULTI-LINE DIGITAL DISPLAY FOR USE DURING THE CONFIGURATION AND CALIBRATION PROCESS, AND TO DISPLAY ONE TRANSMITTER OUTPUT PLUS CONTROLLER SETPOINT DURING NORMAL OPERATING MODE. ALL TRANSMITTER CONFIGURATION, PARAMETER SETTING, ZERO AND SPAN CALIBRATION, PLUS DISPLAY FORMATTING AND SCALING WILL BE PERFORMED DIGITALLY IN THE ON-BOARD MICROPROCESSOR VIA INPUT PUSHBUTTONS.
      6) THE TRANSMITTER-CONTROLLER WILL BE AVAILABLE IN MULTIPLE NATURAL SPANS COVERING THE RANGE OF 0.05" W.C. TO 10.0" W.C. THE TRANSMITTER-CONTROLLER SHALL BE FURNISHED WITH A TRANSDUCER AUTOMATIC ZEROING CIRCUIT, AND BE CAPABLE OF MAINTAINING LINEAR OUTPUT SIGNALS ON APPLICATIONS REQUIRING 10 TO 1 VELOCITY OR PRESSURE TURNDOWN.
      7) THE TRANSMITTER-CONTROLLER SHALL BE CAPABLE OF HAVING ITS OPERATING SPAN ELECTRONICALLY SELECTED WITHOUT HAVING TO PERFORM RECALIBRATION INVOLVING AN EXTERNAL PRESSURE SOURCE. THE TRANSMITTER-CONTROLLER WILL PROVIDE THE MEANS OF MANAGING A SYSTEM FOR AUTOMATIC HIGH PRESSURE PURGE OF THE AIRFLOW STATION OR PROBE ARRAY, WITH USER SELECTABLE PURGE FREQUENCY AND DURATION, WHILE MAINTAINING THE LAST TRANSMITTER OUTPUT DURING THE PURGE CYCLE. USING A SECOND TRANSMITTER AS AN INPUT, THE INTERNAL MICROPROCESSOR CAN PERFORM A SUMMED FLOW, FLOW DIFFERENTIAL, LOW SIGNAL SELECT, HIGH SIGNAL SELECT OR PERCENT DEVIATION CALCULATION, WITH THE RESULT BEING DISPLAYED AND PROVIDED AS AN ANALOG OUTPUT SIGNAL

Z. TEST AND BALANCE:

1. THE GENERAL CONTRACTOR SHALL RETAIN THE SERVICES OF AN INDEPENDENT CERTIFIED AIR BALANCE FIRM TO PERFORM THE TESTING AND BALANCING AND PREPARE REPORTS TO THE GENERAL CONTRACTOR. IF THE MECHANICAL CONTRACTOR IS NEBB CERTIFIED, THEY CAN BALANCE THE SYSTEM.

2. TESTING AND BALANCING SHALL BE PERFORMED IN ACCORDANCE WITH THESE SPECIFICATIONS AND IN ACCORDANCE WITH THE ASSOCIATED AIR BALANCE COUNCIL NATIONAL STANDARDS FOR FIELD MEASUREMENT AND INSTRUMENTATION, SECOND EDITION, 1974, OR NATIONAL ENVIRONMENTAL BALANCING BUREAU STANDARDS.

3. THE CONTRACTOR SHALL CORRECT ALL DEFICIENCIES IN THE OPERATION OF FACTORY SET VAV UNITS.

4. READINGS AND TEST OF DIFFUSERS, GRILLES AND REGISTERS SHALL INCLUDE DESIGN, INITIAL TEST, AND FINAL ADJUSTED FPM VELOCITY AND CFM. ALL DIFFUSERS, GRILLES AND REGISTERS SHALL BE BALANCED BY A HOOD THAT HAS BEEN CALIBRATED, INCLUDING A MANOMETER, AND PILOT TUBE READINGS SHALL BE TAKEN TO ESTABLISH TOTAL CFM FLOW IN ALL MAIN DUCTS. DIRECT READING INSTRUMENTS SUCH AS VELOMETERS AND ANEMOMETERS MAY BE USED AT TERMINAL UNITS.

IV RECORDS FOR OWNER:

A. CONTRACTOR SHALL KEEP A CLEAN SET OF DRAWINGS ON THE JOB, NOTING DAILY ALL CHANGES MADE IN THESE DRAWINGS IN CONNECTION WITH THE FINAL INSTALLATION INCLUDING EXACT DIMENSIONED LOCATIONS OF ALL NEW AND UNCOVERED EXISTING UTILITIES AND SHALL, WITH HIS REQUEST FOR FINAL PAYMENT, TURN OVER A CLEAN, NEATLY MARKED SET OF DRAWINGS SHOWING "AS INSTALLED" WORK TO THE ARCHITECT FOR SUBSEQUENT REVIEW AND TRANSMITTAL TO THE OWNER. CONTRACTOR SHALL NOTE ALL CONSTRUCTION CHANGES, DATE EACH SHEET AND LABEL "AS-BUILTS" IN THE REVISION BLOCK ON THE DRAWINGS.

B. IN ADDITION TO THE ABOVE, CONTRACTOR SHALL ACCUMULATE DURING THE JOB'S PROGRESS, THE FOLLOWING DATA, IN TRIPLICATE, PREPARED IN A NEAT BROCHURE OR PACKET FOLDER AND TURNED OVER TO THE ARCHITECT FOR REVIEW AND SUBSEQUENT DELIVERY TO THE OWNER.

1. ALL WARRANTIES AND GUARANTEES AND MANUFACTURER'S DIRECTIONS ON EQUIPMENT AND MATERIAL COVERED BY THE CONTRACT INCLUDING THE NAMES, ADDRESSES AND TELEPHONE NUMBERS OF THE MANUFACTURER'S REPRESENTATIVE.

2. APPROVED FIXTURE BROCHURES, WIRING DIAGRAMS AND CONTROL DIAGRAMS (ORIGINAL DATA, NO COPIES).

3. COPIES OF APPROVED SHOP DRAWINGS.

4. OPERATING INSTRUCTIONS FOR HEATING AND COOLING AND OTHER MECHANICAL SYSTEM. OPERATING INSTRUCTIONS SHALL ALSO INCLUDE RECOMMENDED MAINTENANCE AND SEASONAL CHANGEOVER PROCEDURES.

5. TEST AND BALANCE REPORTS REQUIRED BY THESE SPECIFICATIONS.

6. ANY AND ALL OTHER DATA AND/OR DRAWINGS REQUIRED DURING CONSTRUCTION.

7. REPAIR PARTS LISTS OF ALL MAJOR ITEMS AND EQUIPMENT INCLUDING NAME, ADDRESS AND TELEPHONE NUMBERS OF LOCAL SUPPLIER OR AGENT.

8. VALVE TAG CHARTS AND DIAGRAMS.

C. ALL OF THE ABOVE DATA SHALL BE SUBMITTED TO THE ENGINEER FOR HIS REVIEW AT SUCH TIME AS THE CONTRACTOR SUBMITS HIS LAST ESTIMATE PRIOR TO HIS FINAL PAYMENT, BUT IN NO CASE, LESS THAN TWO WEEKS BEFORE FINAL INSPECTION.

GENERAL MECHANICAL NOTES

I LOCATIONS AND SIZES OF EXISTING SYSTEMS ARE APPROXIMATE. EXACT SIZES AND LOCATIONS OF ALL EXISTING PIPING, DUCTS, ETC. SHALL BE VERIFIED ON THE JOB BY THE CONTRACTOR.

II CONTRACTOR SHALL INSTALL MECHANICAL SYSTEMS WITHOUT INTERFERENCE AND IN STRICT COORDINATION WITH ALL OTHER TRADES. HOLD DUCTWORK TIGHT AGAINST UNDERSIDE OF STRUCTURE ABOVE.

III ALL DUCT SIZES ARE "AIR SIZE".

IV TAPE AND SEAL ALL ROUND DUCT CONNECTIONS TO BE PERMANENTLY AIR TIGHT.

V SPIN-IN COLLARS "ONLY" SHALL BE SUITABLE FOR CONNECTION TO RECTANGULAR DUCTWORK AND SHALL HAVE VOLUME DAMPERS. "DOVE-TAIL" TAPS WILL NOT BE ALLOWED.

VI RIGID SHEET METAL DUCT SHALL BE RUN WITHIN SIX FEET OF DIFFUSERS. FLEX DUCT SHALL BE SUPPORTED AS OFTEN AS NECESSARY TO PREVENT KINKS, FOLDS OR OTHER OBSTRUCTIONS TO AIR FLOW. CEILING GRID AND ASSOCIATED SUPPORTS MAY NOT BE USED TO SUPPORT DUCTWORK. PROVIDE RIGID 90 DEGREE ELBOWS ON DIFFUSER NECKS.

VII EQUIPMENT CAPACITIES AND CHARACTERISTICS SHALL BE AS SCHEDULED ON THE DRAWINGS.

VIII EXISTING CEILING DIFFUSERS MAY BE REUSED AND RELOCATED AS NECESSARY UNLESS NOTED OTHERWISE OR SIZE PROHIBITS USE.

IX NEW SUPPLY DIFFUSERS AND RETURN/EXHAUST REGISTERS SHALL BE TITUS, PRICE, METALAIRE OR KRUEGER. COORDINATE LOCATION WITH ARCHITECTURAL PLANS.

X THERMOSTATS FOR EXISTING TERMINAL BOXES ARE EXISTING AND SHALL BE INSTALLED WHERE SHOWN ON PLANS. (48" A.F.F. UNLESS NOTED OTHERWISE.) NEW THERMOSTATS SHALL BE EQUAL TO AND MATCH EXISTING THERMOSTATS. CALIBRATE ALL NEW AND EXISTING THERMOSTATS AT THE JOB COMPLETION.

XI ALL NEW FLOOR PENETRATIONS AND PENETRATIONS THROUGH RATED WALLS SHALL BE FIRE SAFED.

XII RE-POUR ALL ABANDONED FLOOR PENETRATIONS. EXISTING FLOOR PENETRATIONS WHICH ARE REUSED FOR NEW DUCTS SHALL HAVE THE REMAINING AREA AROUND THE NEW DUCT REPOURED AND FIRE SAFED. PROVIDE FIRE DAMPERS IN ALL DUCTS GOING THROUGH THE FLOOR.

XIII ALL DIFFUSERS SHALL BE FURNISHED WITH SPIN-IN COLLAR. VOLUME DAMPER AND MAXIMUM OF 6' OF FLEXIBLE DUCT.

XIV CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL BY THE ENGINEER ALL MAJOR ITEMS OF MATERIALS AND EQUIPMENT.

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1156136*
Permit #: *2016 1191012*

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No.	Description	Date

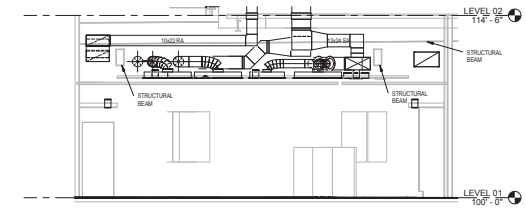
TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

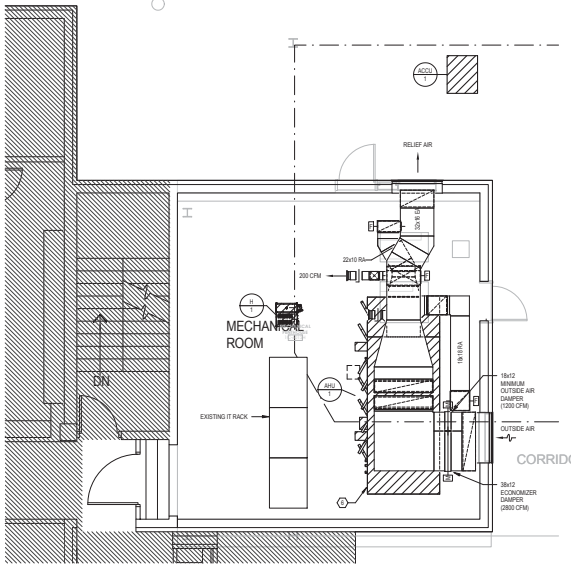
Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	WS
Checked by	WS

Sheet Title:
MECHANICAL SPECIFICATIONS

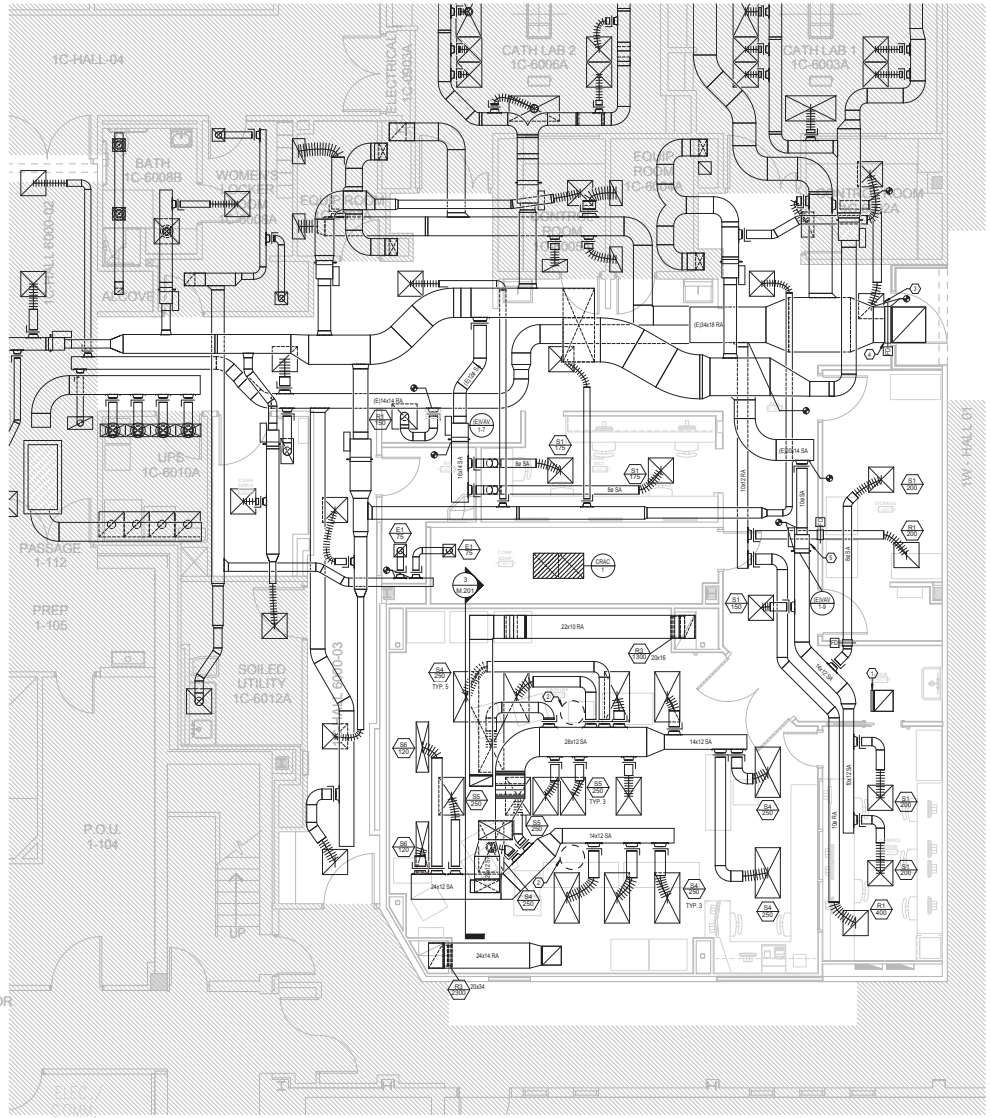
Sheet Number
M.002



3 Section 13
1/4" = 1'-0"



2 LEVEL 02 PENTHOUSE - HVAC PLAN
1/4" = 1'-0"



1 LEVEL 01 CATH LAB - HVAC PLAN
1/4" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET M.001 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

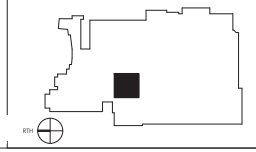
LEGEND NOTES:

1 EXISTING EXHAUST DUCTWORK. CONTRACTOR TO CAP AND SEAL. SEE SHEET MD.201 FOR DEMOLITION DETAILS.
2 OUTLINE OF BOOM SUPPORTS. SEE ARCHITECTURAL PLANS.
3 RELOCATED RETURN AIR DIFFUSER. SEE SHEET MD.201 FOR DETAILS.
4 CONTRACTOR TO INSTALL FIRE DAMPER ON EXISTING DUCTWORK.
5 RELOCATED VAV. CONTRACTOR TO RECONNECT VAV TO DUCTWORK AS SHOWN. SEE SHEET MD.201 FOR ADDITIONAL DETAILS.
6 AIR HANDLER IS TO BE SET ON STRUCTURAL FRAMING APPROXIMATELY 24" ABOVE THE FLOOR. FRAMING DESIGN SHALL BE BY STRUCTURAL SUB CONTRACTOR. AIR UNIT CONSTRUCTION SHALL BE COORDINATED WITH DELEGATED DESIGN SUB CONTRACTOR WITH INTERMEDIATE SUPPORTS PROVIDED AS REQUIRED DURING THE COORDINATION PROCESS.

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KEY PLAN



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No.	Description	Date

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
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Sheet Title:
FLOOR PLAN - HVAC

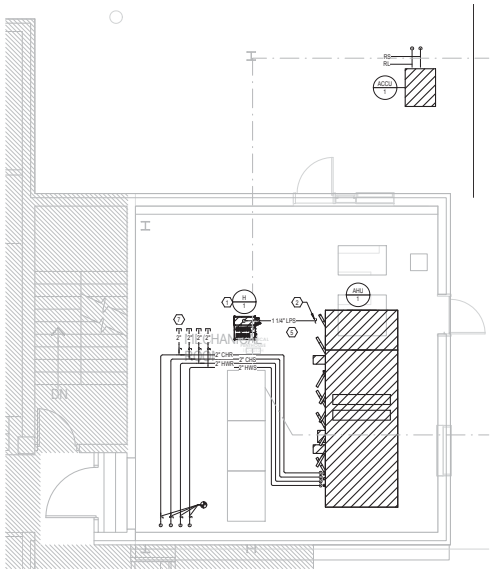
Sheet Number
M.201

GENERAL NOTES:

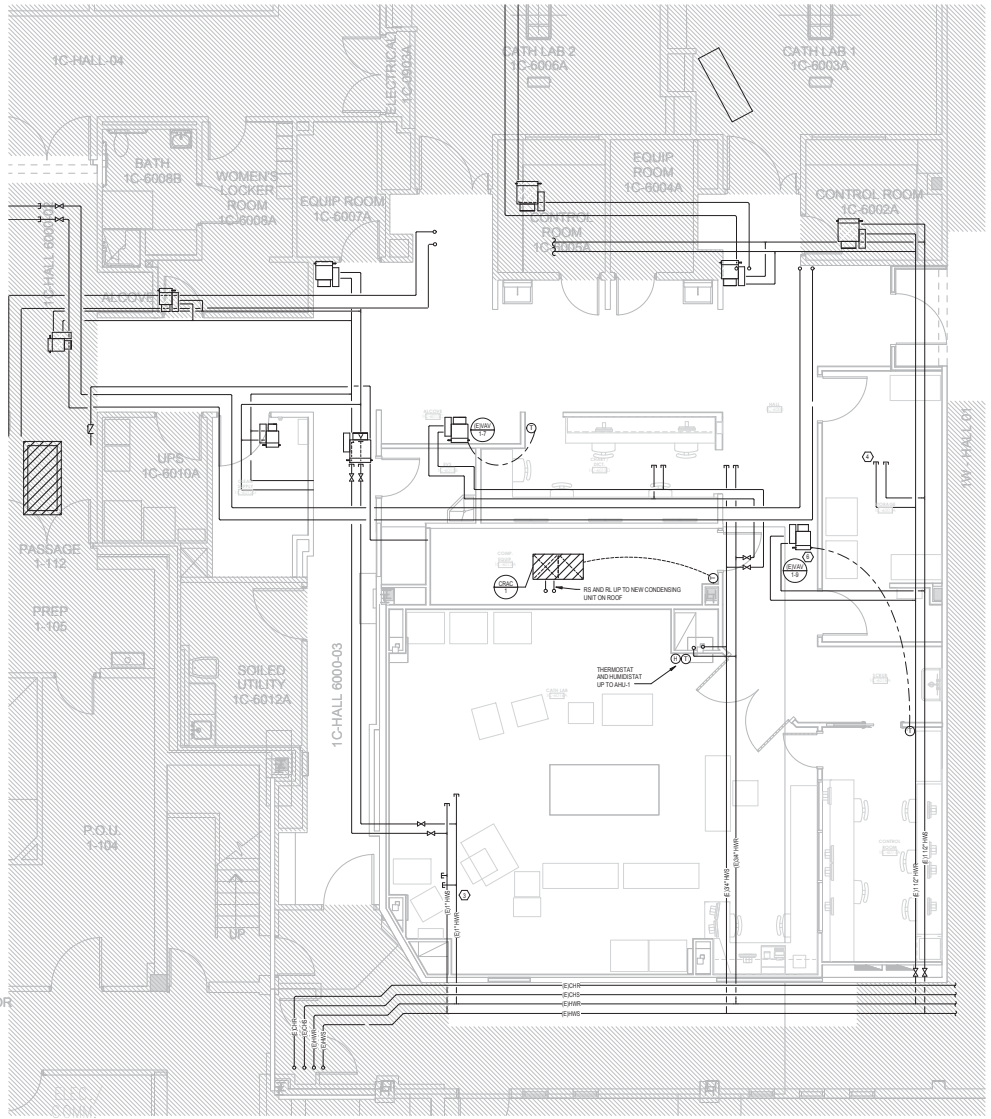
A. REFER TO SHEET M.001 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1. DRAIN CONDENSATE TO NEAREST FLOOR DRAIN.
2. STEAM TO AHU HUMIDIFICATION.
3. EXISTING HYDRONIC PIPE TO REMAIN; REMAINING PIPE TO BE COORDINATED WITH STRUCTURE.
4. EXISTING HYDRONIC PIPE TO BE CAPPED.
5. CONTRACTOR TO PROVIDE DRAIN COOLER FOR STEAM HUMIDIFICATION.
6. RELOCATED EXISTING VAV. SEE M.301 FOR DETAILS.
7. CONTRACTOR TO INSTALL BALL VALVES AND CAP PIPING FOR FUTURE USE.



2 LEVEL 02 PENTHOUSE - PIPING PLAN
1/4" = 1'-0"

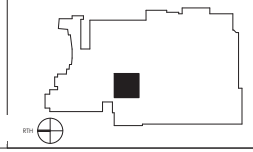


1 LEVEL 01 CATH LAB - PIPING PLAN
1/4" = 1'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1156136*
Permit #: *2016 1191012*

KEY PLAN



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No.	Description	Date

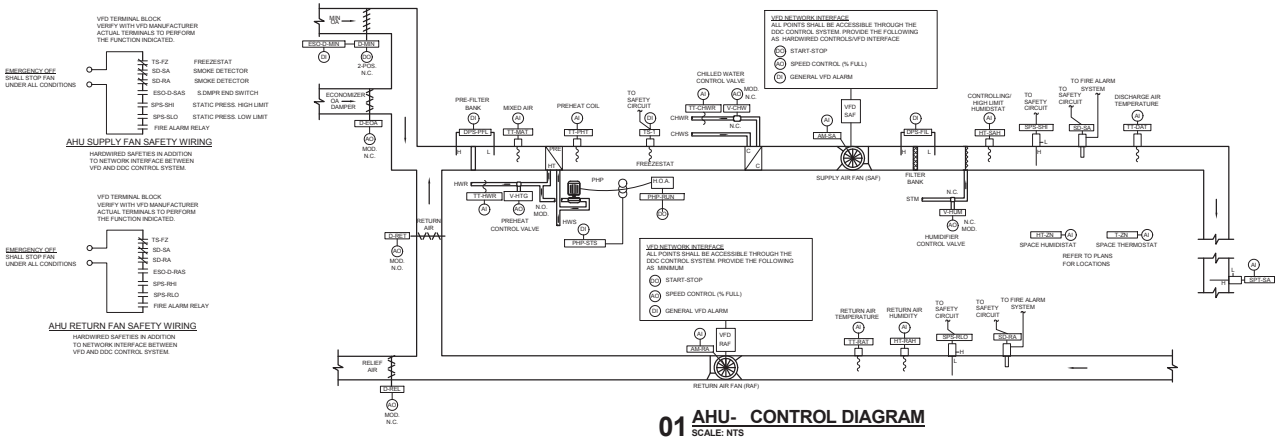
TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	BS
Checked by	WS

Sheet Title:
FLOOR PLAN - HVAC PIPING

Sheet Number
M.301



01 AHU- CONTROL DIAGRAM

SCALE: NTS

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

DDC INPUT / OUTPUT POINTS LIST

POINT DESCRIPTION	DESIGNATION	NOTES	QUANTITY	OUTPUT: DIGITAL: GRAPHIC DISPLAY	OUTPUT: DIGITAL: OVERRIDE INDICATION	OUTPUT: DIGITAL: EMER. STOP	OUTPUT: DIGITAL: FILTER DP	OUTPUT: DIGITAL: ENABLE CHANGE	OUTPUT: DIGITAL: OVERRIDE CONTROL	OUTPUT: DIGITAL: CONTROL	OUTPUT: ANALOG: SETPOINT	OUTPUT: ANALOG: CONTROL	INPUT: DIGITAL: FAULT	INPUT: DIGITAL: RELAY CONTROL	INPUT: DIGITAL: STATUS RELAY	INPUT: DIGITAL: PRESSURE SWITCH	INPUT: DIGITAL: DPS INITIAL FAILURE	INPUT: DIGITAL: AUXILIARY CONTACTS	INPUT: ANALOG: FLOW	INPUT: ANALOG: FAULT	INPUT: ANALOG: SPEED FEEDBACK	INPUT: ANALOG: FLOW METER	INPUT: ANALOG: PRESSURE	INPUT: ANALOG: TEMPERATURE	INPUT: ANALOG: HUMIDITY	INPUT: ANALOG: RESISTANCE	INPUT: ANALOG: VOLTAGE	INPUT: ANALOG: CURRENT	SOFTWARE: ALARMS: SENSOR FAILURE	SOFTWARE: ALARMS: LOW LIMIT	SOFTWARE: ALARMS: MAPE	SOFTWARE: ALARMS: AIR BALANCE	SOFTWARE: CALCULATED VALUE: BTUH	SOFTWARE: CALCULATED VALUE: CFM	SOFTWARE: CALCULATED VALUE: RUN TIME	SOFTWARE: CALCULATED VALUE: TOTALIZER	SOFTWARE: CALCULATED VALUE: AUTO RESTART	SOFTWARE: CALCULATED VALUE: SCHEDULE	SOFTWARE: CALCULATED VALUE: CHILLED WATER RESET	SOFTWARE: CALCULATED VALUE: DEMAND LIMITING	SOFTWARE: CALCULATED VALUE: PULL MOD. CONTROL	SOFTWARE: PROGRAMS: PULL MOD. EXPAN.	SOFTWARE: PROGRAMS: ALARM DELAY	SOFTWARE: PROGRAMS: SCHEDULES START / STOP	SOFTWARE: PROGRAMS: DUTY CYCLE	SOFTWARE: PROGRAMS: SUPPLY AIR RESET	SOFTWARE: PROGRAMS: TREND LOGGING
MISC POINTS																																																		
OUTSIDE AIR TEMP	TT-OA	3	1	X																																												X
OUTSIDE AIR HUMIDITY	HT-OA	3	1	X																																												X
SENSORS																																																	
TEMPERATURE TRANSMITTERS																																																	
SUPPLY TEMP	TT-DAT		1	X																																												X	X
RETURN TEMP	TT-RAT		1	X																																												X	
MIXED AIR TEMP	TT-MAT		1	X																																												X	
PREHEAT DISCH TEMP	TT-PHT		1	X																																											X	
CHILLED WATER RETURN TEMP	TT-CHWR		1	X																																											X	
HEATING WATER RETURN TEMP	TT-HWR		1	X																																											X	
TEMPERATURE SWITCHES																																																	
FREEZESTAT	TS-FZ		1	X										X																			X																
HUMIDISTATS																																																	
RETURN HUMID	HT-MAH		1	X																																												X	X
HUMIDIFIER DISCHRH LIMIT	HT-SAH		1	X																																											X	X
SPACE HUMIDITY	HT-ZN		1	X																																											X	X
SUP DUCT STATIC	SPT-SA		1	X																				X									X	X												X	X
SUP FAN HIGH STATIC	SPS-SHI		1												X																	X																
SUP FAN LOW STATIC	SPS-SLO		1												X																	X																
RET FAN HIGH STATIC	SPS-RHI		1												X																	X																
RET FAN LOW STATIC	SPS-RLO		1												X																	X																
PRE FILTER DP	DPS-PFIL		1	X																																														
POST FILTER DP	DPS-FFIL		1	X																																													
SUPPLY FAN AIRFLOW	AM-SA		1	X																																											X	X
RETURN FAN AIRFLOW	AM-RA		1	X																																											X	X
OUTSIDE AIR FLOW	OAF		1	X																																											X	X
SUP AIR SMOKE DET	SD-SA	1	1											X																			X													X	
RET AIR SMOKE DET	SD-RA	1	1											X																			X													X	
DAMPERS																																																	
MIN OA DPR	D-MIN		1	X	X									X																			X													X			X
MIN OA DPR	ESO-O-MIN		1	X										X																			X													X			
EA SMOKE DAMPER	ESO-D-EAS		1	X										X																			X													X			
RA SMOKE DAMPER	ESO-D-RAS		1	X										X																			X													X			
VALVES																																																	
CHW VLV COMMAND	V-CHW		1	X	X						X																																					X		X
PREHEAT VLV COMMAND	V-HTG		1	X	X						X																																				X		X
HUMIDIFIER VALVE	V-HUM		1	X	X						X																																				X		X
MOTOR DPTS																																																	
SUPPLY FAN VFD	VFD-SAF	2	1																																														
SUP FAN VFD S/S	SF-RUN		1	X	X		X																																					X	X				X
SUP FAN VFD SPEED	SF-SPD		1	X							X																																					X
SUP FAN SPEED MON	SF-SPD-MON		1	X																																												X
SUP FAN VFD GEN ALRM	SF-ALM		1																																													
SUP FAN VFD BYP STATUS	SF-BYP		1																																													
SUP FAN STATUS	SF-STS		1																																													
RETURN FAN VFD	VFD-RAF	2	1																																														
RET FAN VFD S/S	RF-RUN		1	X	X		X																																					X	X				X
RET FAN VFD SPEED	RF-SPD		1	X							X																																					X
RET FAN SPEED MON	RF-SPD-MT		1	X																																												X
RET FAN VFD GEN ALRM	RF-ALM		1																																													
RET FAN VFD BYP STATUS	RF-BYP		1																																													
RET FAN STATUS	RF-STS		1																																													
PREHEAT PUMP																																																	
PREHEAT PUMP S/S	PHP-RUN		1	X			X																																					X					
PREHEAT PUMP STATUS	PHP-STS		1																																											X			X

1 SMOKE DETECTORS SHALL BE FURNISHED BY FA CONTR.
2 VFD'S SHALL HAVE NETWORK INTERFACE. ALL POINTS SHALL BE AVAILABLE OVER THE CONTROL SYSTEM. THE FOLLOWING IS A LIST OF MINIMUM SOFTWARE POINTS TO BE SPECIFICALLY AVAILABLE FOR CONTROL AND ALARM.
3 DAMPERS FURNISHED WITH AHU. (NOT REQUIRED FOR AHU 49)
4 DAMPERS TO BE RATED SMOKE DAMPERS
5 REFERENCE FROM EXISTING BUILDING AUTOMATION SYSTEM

SEQUENCE OF OPERATION:

SUPPLY AIR AND RETURN AIR FAN
SUPPLY AIR AND RETURN AIR FANS SHALL BE ENERGIZED/DE-ENERGIZED FROM THE VFD IN HAND POSITION OR THE DDC SYSTEM WHEN IN AUTO MODE. THE DDC CONTROL SYSTEM SHALL SENSE WHEN THE FAN IS IN HAND POSITION BY THE FAN STATUS VERIFICATION AND INITIATE THE AHU CONTROL SEQUENCE.

IN AUTO MODE THE TWO-POSITION MINIMUM OUTSIDE AIR DAMPER (D-MIN) SHALL OPEN. ONCE THE DAMPER IS OPEN, THE SUPPLY FAN SHALL START; THE DDC SYSTEM SHALL SIGNAL THE ASSOCIATED RETURN AND EXHAUST FANS TO START. IF FAN STARTED IN HAND THE TWO POSITION MINIMUM OUTSIDE AIR DAMPER SHALL OPEN IMMEDIATELY UPON SENSING FAN STATUS AS ON.

FANS SHALL SHUT DOWN FROM A SIGNAL FROM:
- THE FIRE ALARM PANEL THRU THE F/A RELAY.
- THE SUPPLY AIR SMOKE DETECTOR(S) (SD-SA)
- THE RETURN AIR SMOKE DETECTOR(S) (SD-RA)
- FREEZE STAT. (TS-FRZ).
- THE HIGH/LOW LIMIT STATIC PRESSURE SWITCHES (SPS-SHI & RLO).

WHEN THE SUPPLY FAN SHUTS DOWN THE FOLLOWING SHALL OCCUR:
- THE MINIMUM OUTSIDE AIR DAMPER (D-MIN) SHALL CLOSE.
- THE ECONOMIZER OUTSIDE AIR DAMPER (D-EOA) SHALL CLOSE.
- THE RELIEF DAMPER (D-REL) SHALL CLOSE.
- THE RETURN DAMPER (D-RET) SHALL OPEN
- THE CHILLED WATER VALVE (V-CHW) SHALL CLOSE
- THE PREHEAT COIL (V-HTG) SHALL REMAIN UNDER CONTROL OF THE PREHEAT DISCHARGE TEMPERATURE SENSOR (TT-PHT).
- THE RETURN FAN AND THE ASSOCIATED EXHAUST FANS SHALL SHUTDOWN.

SUPPLY FAN SPEED CONTROL
THE SUPPLY FAN SPEED SHALL BE CONTROLLED BY THE VARIABLE FREQUENCY DRIVE (VFD) TO MAINTAIN A CONSTANT VOLUME OF AIR (VFD SPEED TO BE VERIFIED BY THE T.A.B. CONTRACTOR). THE VFD SHALL OUTPUT THE % FULL SPEED TO THE DDC SYSTEM BY THE NETWORK INTERFACE.

SPS-SHI SHALL SHUTDOWN THE FANS WHENEVER IT SENSES A HIGH STATIC PRESSURE. ALARM THE DDC SYSTEM AND REQUIRE A LOCAL MANUAL RESET TO RESTART THE FAN. SPS-RLO SHALL SHUTDOWN THE FANS WHENEVER IT SENSES A LOW STATIC PRESSURE AND ALARM THE DDC SYSTEM AND REQUIRE A LOCAL MANUAL RESET TO RESTART THE FAN

VOLUMETRIC TRACKING
THE RETURN AIR FAN VFD SHALL BE CONTROLLED FROM AN OUTSIDE AIR QUANTITY SOFTWARE SETPOINT (SCHEDULED OUTSIDE AIR QUANTITY, ADJUSTABLE) USING AIRFLOW MEASURING DEVICES AND TRANSMITTERS AM-SA AND AM-RA INSTALLED AT THE INLET OF THE SUPPLY AND RETURN FANS. AM-SA SHALL MEASURE THE TOTAL AIRFLOW OF THE SUPPLY FAN AND AM-RA SHALL MEASURE THE TOTAL AIRFLOW OF THE RETURN FAN. THE AIRFLOW MEASURING TRANSMITTERS SHALL OUTPUT THE TOTAL CFM READING TO THE DDC SYSTEM. THE DDC SYSTEM SHALL CALCULATE THE DIFFERENCE OF THE TOTAL SUPPLY AIR AND THE TOTAL RETURN AIR TO MAKE AN OUTSIDE AIR QUANTITY SOFTWARE POINT. THE DDC SYSTEM SHALL MODULATE THE SPEED OF THE RETURN AIR FAN VFD TO MAINTAIN THE CALCULATED OUTSIDE AIR QUANTITY WITHIN 2% OF THE OUTSIDE AIR QUANTITY SETPOINT.

AIR HANDLER OPERATING STATES
THE AIR HANDLING UNIT SHALL OPERATE IN FOUR DISTINCT STATES. CRITERIA TO TRANSITION BETWEEN STATES ARE INDICATED BELOW. TO TRANSITION BETWEEN STATES THE CRITERIA SHALL BE MEET FOR AN ADJUSTABLE MINIMUM PERIOD OF TIME REFERRED TO AS "TRANSITION TIME".

THE DISCHARGE AIR TEMPERATURE SENSOR, TT-DAT, SET POINT SHALL BE SET BY SPACE THERMOSTAT, TT-ZN, AS NEEDED TO MAINTAIN THE SPACE TEMPERATURE (68°F, ADJ.)

STATE 1 - FULL COOLING COIL
ECONOMIZER OUTSIDE AIR DAMPERS SHALL BE CLOSED. THE COOLING COIL CONTROL VALVE, V-CHW, SHALL BE CONTROLLED BY A CONTROL LOOP WITH THE DISCHARGE TEMPERATURE TRANSMITTER, TT-DAT, AS THE INPUT, AND A SETPOINT EQUAL TO THE DISCHARGE AIR SETPOINT OF (55 F, ADJUSTABLE). ON A RISE IN TEMPERATURE ABOVE TT-DAT SETPOINT, THE VALVE SHALL MODULATE OPEN. ON A FALL IN TEMPERATURE BELOW TT-DAT SETPOINT, THE VALVE SHALL MODULATE CLOSED. TT-DAT SHALL ALARM THE DDC SYSTEM WHENEVER THE DISCHARGE TEMPERATURE IS TOO HIGH OR LOW. THE COOLING COIL CONTROL LOOP SHALL CONTROL THE LEAVING AIR TEMPERATURE WITHIN +/- 0.5 DEGREE F.

TRANSITION FROM STATE 1 TO STATE 2:
THERE SHALL BE AN ADJUSTABLE OUTSIDE AIR ECONOMIZER ENABLE TEMPERATURE (65 DEGREES F) AND AN ADJUSTABLE DEAD BAND (2 DEGREES F). THE UNIT SHALL TRANSITION FROM STATE 1 TO STATE 2 WHENEVER THE OUTSIDE AIR TEMPERATURE IS BELOW THE ECONOMIZER ENABLE TEMPERATURE LESS THE DEAD BAND (65-2=63) FOR AN ADJUSTABLE TRANSITION TIME (20 MINUTES).

TRANSITION FROM STATE 2 TO STATE 1:
THE UNIT SHALL TRANSITION FROM STATE 2 TO STATE 1 WHENEVER THE OUTSIDE AIR TEMPERATURE IS ABOVE THE ECONOMIZER ENABLE TEMPERATURE PLUS THE DEAD BAND (65+2=67) FOR AN ADJUSTABLE TRANSITION TIME (20 MINUTES).

STATE 2 - FULL ECONOMIZER WITH COOLING COIL
ECONOMIZER OUTSIDE AIR DAMPERS SHALL BE FULLY OPEN. THE COOLING COIL CONTROL VALVE, V-CHW, SHALL BE CONTROLLED BY A CONTROL LOOP WITH THE DISCHARGE TEMPERATURE TRANSMITTER, TT-DAT, AS THE INPUT, AND A SETPOINT EQUAL TO THE DISCHARGE AIR SETPOINT OF (55 F, ADJUSTABLE.).

TRANSITION FROM STATE 2 TO STATE 3:
THE UNIT SHALL TRANSITION FROM STATE 2 TO STATE 3 WHENEVER THE COOLING COIL CONTROL LOOP HAS AN OUTPUT OF 0% OPEN FOR AN ADJUSTABLE TRANSITION TIME (10 MINUTES).

TRANSITION FROM STATE 3 TO STATE 2:
THE UNIT SHALL TRANSITION FROM STATE 3 TO STATE 2 WHENEVER THE ECONOMIZER DAMPER CONTROL LOOP HAS AN OUTPUT OF 100% OPEN FOR AN ADJUSTABLE TRANSITION TIME (10 MINUTES).

STATE 3 - FREE COOLING:
THE COOLING COIL VALVE SHALL CLOSE AND THE ECONOMIZER AIR DAMPER (D-EOA), RELIEF AIR DAMPER (D-REL), AND THE RETURN AIR DAMPER (D-RET) SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT THE DISCHARGE AIR TEMPERATURE SETPOINT. THE DAMPERS SHALL BE CONTROLLED BY SELECTING THE MINIMUM OUTPUT OF A DISCHARGE TEMPERATURE CONTROL LOOP AND A LOW LIMIT CONTROL LOOP.

THE DISCHARGE AIR TEMPERATURE CONTROL LOOP SHALL HAVE THE UNIT DISCHARGE AIR TEMPERATURE TRANSMITTER (TT-DAT) AS THE INPUT AND A SETPOINT EQUAL TO THE COOLING COIL SETPOINT (55). ON A RISE IN DISCHARGE AIR TEMPERATURE THE ECONOMIZER OUTSIDE AIR AND RELIEF AIR DAMPERS SHALL MODULATE OPEN AND THE RETURN AIR DAMPER SHALL MODULATE CLOSED. ON A FALL IN DISCHARGE AIR TEMPERATURE THE ECONOMIZER OUTSIDE AIR DAMPER AND RELIEF AIR DAMPER SHALL MODULATE CLOSED AND THE RETURN AIR DAMPER SHALL MODULATE OPEN. DAMPERS SHALL MAINTAIN DAT TO WITHIN +/- ½ DF OF SETPOINT.

THE MIXED AIR LOW LIMIT CONTROL LOOP SHALL HAVE THE MIXED AIR TEMPERATURE AS SENSED BY TT-MAT AS INPUT AND A SETPOINT OF THE DISCHARGE AIR TEMPERATURE CONTROL LOOP MINUS 6 DEGREES (ADJ.) (55 - 6 = 49) ON A RISE IN MIXED AIR TEMPERATURE ABOVE TT-MAT SETPOINT, TT-MAT SHALL, THROUGH THE DDC SYSTEM, MODULATE OPEN THE ECONOMIZER AIR DAMPER (D-EOA) AND RELIEF AIR DAMPER (D-REL) AND MODULATE CLOSED THE RETURN AIR DAMPER (D-RET). ON A FALL IN MIXED AIR TEMPERATURE AS SENSED BY TT-MAT, TT-MAT SHALL, THROUGH THE DDC SYSTEM, MODULATE CLOSED THE ECONOMIZER OUTSIDE AIR DAMPER (D-EOA) AND RELIEF AIR DAMPER (D-REL) AND MODULATE OPEN THE RETURN AIR DAMPER (D-RET) TO MAINTAIN TT-MAT'S SETPOINT.

BOTH THE DISCHARGE AIR TEMPERATURE CONTROL LOOP AND LOW LIMIT CONTROL LOOP SHALL BE PROPORTIONAL INTEGRAL. (PROPORTIONAL ONLY OR LINEAR ONLY IS NOT ACCEPTABLE) TT-MAT SHALL OVERRIDE ALL OTHER CONTROLS EXCEPT HARDWIRED SAFETY DEVICES.

IF THE MIXED AIR TEMPERATURE TRANSMITTER, TT-MAT, FALLS MORE THAN 10 DEGREES (ADJ.) BELOW SUPPLY SETPOINT (55-10=45), THE FOLLOWING SHALL OCCUR:
- AN ALARM SHALL BE ISSUED TO THE OPERATOR.
- STATE 2 AND STATE 3 SHALL BE DE-ACTIVATED REQUIRING AN OPERATOR RESET AT THE WORK STATION.
- THE ECONOMIZER DAMPER (D-EOA) SHALL CLOSE
- THE MINIMUM OUTSIDE AIR DAMPER (D-MIN) SHALL REMAIN OPEN,
- THE RELIEF DAMPERS (D-REL) SHALL BE CLOSED
- THE RETURN DAMPERS (D-RET) SHALL BE OPEN
- THE CHILLED WATER VALVE (V-CHW) SHALL BE FULLY OPENED
- THE CHILLED WATER PUMPS SHALL BE COMMANDED "ON"

TRANSITION FROM STATE 3 TO STATE 4:
THE UNIT SHALL TRANSITION FROM STATE 3 TO STATE 4 WHENEVER THE ECONOMIZER DAMPER CONTROL LOOP HAS AN OUTPUT OF 0% OPEN FOR AN ADJUSTABLE TRANSITION TIME (10 MINUTES).

TRANSITION FROM STATE 4 TO STATE 3:
THE UNIT SHALL TRANSITION FROM STATE 3 TO STATE 2 WHENEVER THE PREHEAT VALVE CONTROL LOOP HAS AN OUTPUT OF 0% OPEN FOR AN ADJUSTABLE TRANSITION TIME (10 MINUTES).

STATE 4 - PREHEAT:
WHEN THE UNIT IS IN STATE 4 THE PREHEAT HOT WATER VALVE, V-HTG, SHALL BE CONTROLLED BY A SELECTING THE MAXIMUM OUTPUT OF THE PREHEAT MINIMUM TEMPERATURE CONTROL LOOP (AS DESCRIBED BELOW) AND THE DISCHARGE AIR TEMPERATURE CONTROL LOOP. THE DISCHARGE AIR TEMPERATURE CONTROL LOOP SHALL HAVE THE UNIT DISCHARGE AIR TEMPERATURE TRANSMITTER (TT-DAT) AS INPUT AND A SETPOINT OF THE DISCHARGE AIR SETPOINT (55 DEGREES F).

PRE-HEAT COIL MINIMUM DISCHARGE TEMP
PRE-HEAT COIL CONTROL VALVE, V-HTG, SHALL BE CONTROLLED AT ALL TIMES, INCLUDING WHEN THE UNIT IS DE-ENERGIZED, TO MAINTAIN A MINIMUM PREHEAT COIL DISCHARGE TEMPERATURE. A CONTROL LOOP WITH THE PREHEAT COIL DISCHARGE TEMPERATURE TRANSMITTER, TT-PHT, AS INPUT, AND A SETPOINT OF 40 F (ADJ.).

PRE-HEAT PUMP
THE PRE-HEAT PUMP SHALL BE ENERGIZED WHENEVER THE OUTSIDE AIR TEMPERATURE FALLS BELOW 40 DEGREES F (ADJ.) AND SHALL DE-ENERGIZE WHENEVER THE OUTSIDE TEMPERATURE RISES ABOVE 45 DEGREES F. (ADJ.)

FREEZESTAT
WHENEVER FREEZESTAT, TS-FZ, SENSES A TEMPERATURE BELOW 36 DEGREES F (ADJ.), IT SHALL PERFORM THE FOLLOWING:
- THE RETURN FAN AND THE ASSOCIATED EXHAUST FANS SHALL SHUTDOWN.
- START PRE-HEAT RE-CIRCULATING PUMP
- THE MINIMUM OUTSIDE AIR DAMPER (D-MIN) SHALL CLOSE.

RSN: *1156136*
Permit #: *2016 1191012*

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No.	Description	Date

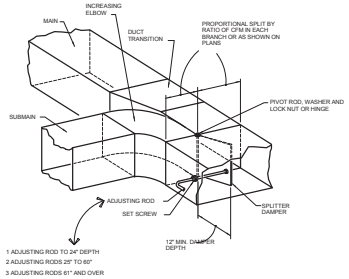
TMCA CATH LAB HYBRID LAB RENOVATION
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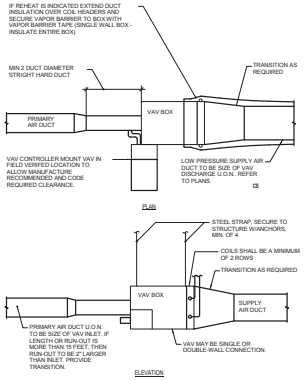
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MECHANICAL CONTROL DIAGRAMS

Sheet Number
M.401

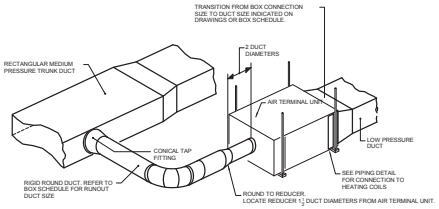
City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC



02 PROPORTIONAL SPLIT FOR LOW PRESSURE DUCTWORK
NO SCALE

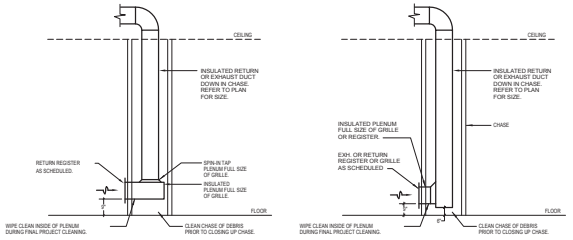


01 VAV BOX INSTALLATION DETAIL
NO SCALE

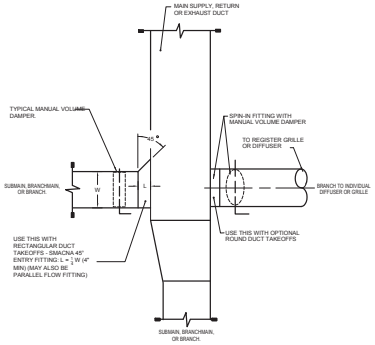


NOTE:
1. THIS DETAIL REFERS TO VAV AND CONSTANT VOLUME HOT WATER REHEAT AIR TERMINAL UNITS AND VAV AIR TERMINAL UNITS WITHOUT REHEAT.
2. PROVIDE 2" DUCT DIAMETERS OF STRAIGHT DUCT BETWEEN REDUCER AND AIR TERMINAL UNIT.
3. TAP FITTING TO RECTANGULAR MEDIUM PRESSURE DUCT MAY ALSO BE RECTANGULAR 45° ENTRY, SIZED PER SMACNA RECOMMENDATIONS, AND THEN TRANSITIONING TO ROUND.
4. MEDIUM PRESSURE ROUND TRUNK DUCT TO HAVE CONICAL TEE FITTING, WITH OTHER REQUIREMENTS AS SHOWN.
5. BOXES 1400 CFM OR LESS TO BE SUPPORT OF REINFORCING ANGLE WITH ¾" GALVANIZED ALL THREAD ROD HANGERS.
6. COORDINATE REQUIREMENT FOR CEILING ACCESS PANELS WITH DIVISION 8.

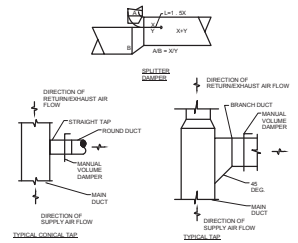
03 DUCT CONNECTION TO AIR TERMINAL UNIT
NO SCALE



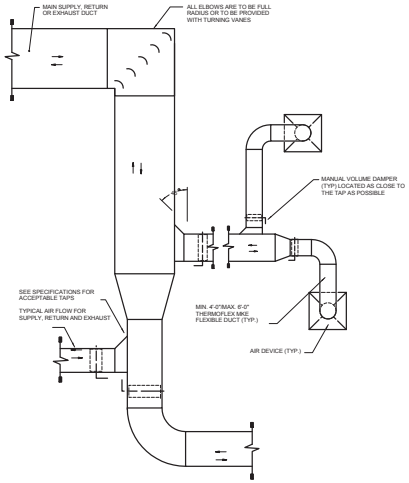
06 LOW RETURN OR EXAUST GRILLE OR REGISTER IN WALL DETAIL
NO SCALE



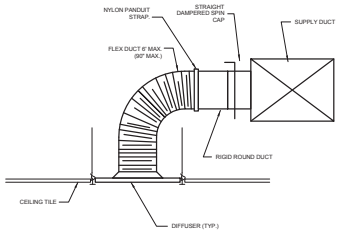
LOW PRESSURE DUCT VOLUME DAMPER REQUIREMENTS
05 NO SCALE



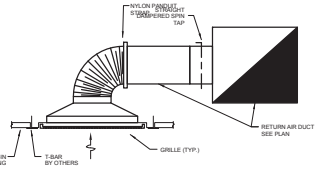
03 LOW PRESSURE DUCT DETAILS
NO SCALE



TYPICAL LOW PRESSURE SUPPLY RETURN AND EXHAUST DUCT DETAIL
04 NO SCALE



02 DIFFUSER CONNECTION DETAIL
NO SCALE



01 RETURN AIR GRILLE DUCT CONNECTION
NO SCALE

RSN: *1156136*
Permit #: *2016 1191012*

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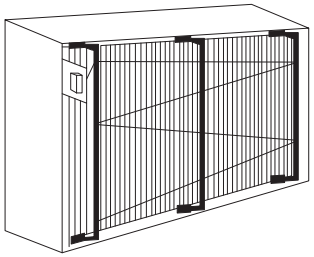
TMCA CATH LAB HYBRID LAB RENOVATION
1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	BS
Checked by	WS

Sheet Title:
MECHANICAL DETAILS

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City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC



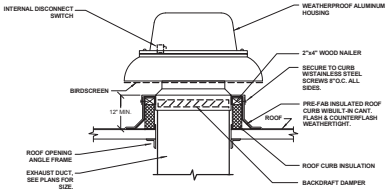
SECURE THE SENSOR ELEMENT BY PROVIDING AND ARAY TO SUPPORT THE CAPILARY TUBE ACROSS THE FACE OF THE COIL.

IF DISSIMILAR METALS ARE USED IN THIS PROCESS ENSURE THE ELEMENTS IS SECURED AND ISOLATED TO PREVENT DAMAGE TO THE CAPILARY AT ALL JUNCTIONS.

ENSURE THE COIL IS PROPERLY COVERED BY PROVIDING 1 LINEAL FOOT FOR EACH SQUARE FOOT OF COIL AREA I.E. IF THE COIL IS 2'x4' THE TOTAL AREA IS 8 SQUARE FEET WHICH WOULD RESULT IN AN 8' CAPILARY LENGTH PROPERLY SPACED TO PROVIDE COVERAGE.

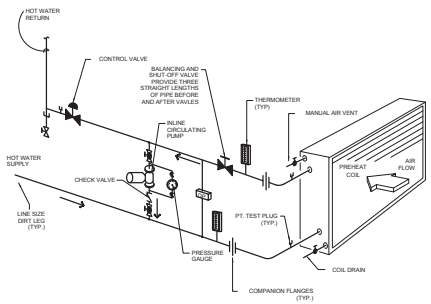
THERE SHOULD BE ADEQUATE SPACE BETWEEN THE COIL AND ELEMENT, TO ALLOW FOR COIL CLEANING WITHOUT REMOVING THE CAPILARY TUBE.

06 MIXED AIR SENSOR INSTALLATION
NO SCALE



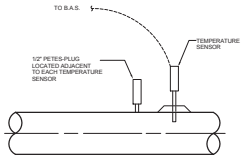
NOTE:
1. EXHAUST DUCT-SIZES AS SHOWN ON PLANS. DUCTS SHALL EXTEND UP TO ROOF EXHAUSTER OPENING. DUCTS SHALL NOT TERMINATE BELOW ROOF.
2. PROVIDE SPACE FOR ELECTRICAL CONDUIT BETWEEN DAMPER AND ROOF OPENING.

05 TYPICAL DOME TYPE EXHAUST
NO SCALE

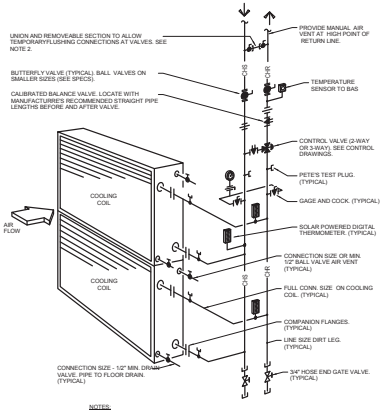


NOTES:
1. PROVIDE MANUAL AIR VENT AT HIGH POINT OF RETURN LINE.
2. WATER TO ENTER COIL ON AIR LEAVING SIDE OF COIL.

04 PIPING AT PREHEAT HOT WATER COIL
NO SCALE

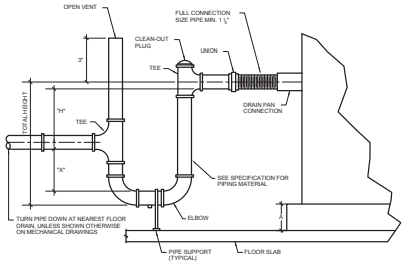


03 TEMPERATURE SENSOR INSTALLATION DETAIL
NO SCALE



NOTES:
1. WATER SHALL ENTER COIL ON THE AIR LEAVING SIDE. OFFSET PIPING AS SHOWN TO ALLOW COIL PULL ACCESS WITHOUT DISMANTLING VERTICAL RISERS.
2. PROVIDE MINIMUM 2" FLUSH CONNECTION WITH 2" BALL VALVES. CONNECT TO SUPPLY AND RETURN MAINS WITH TEMPORARY FLUSH PIPE. PIPE MAY BE CLEAR PLASTIC SECURED WITH RADIATOR CLAMPS. AFTER FLUSHING REMOVE TEMPORARY PIPING, CAP EACH END OF PIPE. CLOSE FLUSHING VALVES AND REMOVE HANDLES.

02 CHILLED WATER PIPING AT MULTIPLE COOLING COIL
NO SCALE



NOTE:
1. ELEVATED A/C UNIT SUFFICIENT DISTANCE ABOVE FLOOR OR ROOF TO ALLOW FOR INSTALLATION OF TRAP WITH ADEQUATE DIMENSIONS TO WITHSTAND SYSTEM OPERATING PRESSURE. COORDINATE WITH DETAIL FOR A/C UNIT MOUNTING.

TOTAL HEIGHT OF TRAP = X+H+(1 ½ x PIPE DIAMETER)

FOR DRAW THRU UNITS
X = MIN. 1H (PREFERRED 1 ½ H)
H = NEGATIVE STATIC PRESSURE + 1"

FOR BLOW THRU UNITS
X = FAN STATIC PRESSURE +1"
H = MIN. 1"

A= HOUSE KEEPING PAD MINIMUM 4", ACTUAL PAD DIMENSION IS SUBJECT TO CALCULATION OF PIPE TRAP DEPTH ON A UNIT BY UNIT BASIS.

01 COOLING COIL CONDENSATE DRAIN
NO SCALE

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M.502

AIR DEVICE SCHEDULE

DESIG.	FRAME SIZE	OBD	FINISH	THROW	NECK SIZE	MANUFACTURER/MODEL NO.	REMARKS/NOTES
S1	24x24	NO	WHITE	4-WAY (ADJUSTABLE)	NOTE 1	TITUS TMSA-AA	SQUARE CONE DIFFUSER
S2	12x12	NO	WHITE	4-WAY (ADJUSTABLE)	NOTE 1	TITUS TMSA	SQUARE CONE DIFFUSER
S3	SEE PLANS	NO	WHITE	2-WAY	SEE PLANS	TITUS 300FL	LOUVERED SUPPLY GRILLE (SURFACE MOUNT)
S4	24x48	YES	WHITE	LAMINAR	8" : OR 10" :	TITUS TLF-SS	LAMINAR FLOW DIFFUSER (OPERATING ROOM)
S5	24x36	YES	WHITE	LAMINAR	8" : OR 10" :	TITUS TLF-SS	LAMINAR FLOW DIFFUSER (OPERATING ROOM)
S6	12x48	YES	WHITE	LAMINAR	8" : OR 10" :	TITUS TLF-SS	LAMINAR FLOW DIFFUSER (OPERATING ROOM)
R1	24x24	NO	WHITE	N/A	NOTE 3	TITUS 350FL	LOUVERED RETURN (LAY IN)
R2	SEE PLANS	NO	WHITE	N/A	SEE PLANS	TITUS 350FL	LOUVERED RETURN (SURFACE MOUNT)
R3	SEE PLANS	NO	MILL	N/A	SEE PLANS	TITUS 350R-SS	STAINLESS STEEL LOUVERED RETURN
E1	12x12	NO	WHITE	N/A	NOTE 5	TITUS 355RL	LOUVERED EXHAUST (LAY IN)
E2	SEE PLANS	NO	WHITE	N/A	SEE PLANS	TITUS 355RL	LOUVERED EXHAUST (SURFACE MOUNT)

NOTES:

1.

NECK*	AIRFLOW
6" :	0-100 CFM
8" :	101-200 CFM
10" :	201-350 CFM
12" :	351-560 CFM
14" :	561-850 CFM

* AND/OR DUCT RUNOUT

2.

NECK*	AIRFLOW
6x6	0-100 CFM
8x8	101-230 CFM
10x10	231-360 CFM
12x12	361-450 CFM
16x16	451-800 CFM
22x22	801-1200 CFM

* AND/OR DUCT RUNOUT

3. ON ALL R1 DUCTED RETURN AIR GRILLES: PROVIDE 22"x22" NECK GRILLE AND INSTALL 22"x22"x6" TALL PLENUM BOX ON BACK OF GRILLE. SEE PLANS FOR DUCT RUN OUT SIZE TO PLENUM BOX. SEE NOTE 2 IF NO SIZE IS INDICATED.
4. PROVIDE AND INSTALL FACTORY LINEAR SLOT PLENUMS ON ALL LINEAR SLOT DIFFUSERS WITHOUT INTERNAL INSULATION. PLENUM SHALL HAVE EXTERNAL INSULATION ONLY. SEE NOTE 1 FOR NECK SIZE. MATCH PLENUM STYLE TO DIFFUSER STYLE FOR T-BAR OR SURFACE MOUNT APPLICATIONS.
5. SEE NOTE 1 FOR RUNOUT SIZE IF NOT INDICATED ON PLANS (NOTE 2 MAY BE USED AS AN ALTERNATE). PROVIDE SQUARE TO ROUND ADAPTER AS REQUIRED.

PUMP SCHEDULE

DESIG.	SERVES/ LOCATION	TYPE	GPM	TDH (FT)	MOTOR ELECTRICAL			MANUFACTURER/MODEL NO.	NOTES
					HP	RPM	VOLT/PHASE		
PHP-AHU	PRE-HEAT CIRC. PUMP	IN-LINE	20	30	1	1750	460/3/60	B&G 60 1-1/2x6-1/4	3,5

NOTES:
1. VARIABLE FREQUENCY DRIVE
2. 2-SPEED, H-0-A, STARTER
3. SINGLE SPEED, H-0-A, STARTER
4. ONE AS BACKUP
5. SERVES PRE-HEAT COIL.

ELECTRIC HUMIDIFIER SCHEDULE

DESIGNATION	CAPACITY LBS/HR	VOLTAGE/PHASE	AMPS	CFM	DUCT SIZE	SYSTEM SERVED	HUMIDISTAT LOCATION	ABSORPTION DISTANCE	MANUFACTURER/MODEL NUMBER	REMARKS/NOTES
H-1	119	480/3	50.5	4000	65x29	AHU-1	CATH LAB 4	8"	DRI-STEEM / VAPORSTREAM 42-2	ALL

NOTES:
1. PROVIDE DRAIN COOLER AT STEAM GENERATOR AND DISPERSION GRID. ALL CONDENSATE TO BE PIPED TO DRAIN COOLER.
2. PROVIDE BACNET INTERFACE FOR INTEGRATION INTO BUILDING AUTOMATION SYSTEM. COORDINATE WITH T.C. CONTRACTOR.
3. AIR PROVING SWITCH, HIGH LIMIT HUMIDISTAT, ROOM TEMPERATURE AND HUMIDITY SENSOR PROVIDED BY T.C. CONTRACTOR.
4. PROVIDE ULTRASORB MODEL LV STEAM DISPERSION GRID WITH INSULATED TUBES (OR EQUAL). COORDINATE DISPERSION GRID WITH AHU.
5. PIPING BETWEEN STEAM GENERATOR AND DISPERSION GRID SHALL BE SCHEDULE 40 STEEL WITH 2" FIBERGLASS INSULATION.

COMPUTER ROOM A/C UNIT SCHEDULE

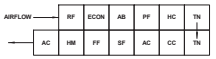
AIR HANDLER DESIGNATION		CRAC-1	-	-
SERVES		CATH EQUIP ROOM	-	-
OUTSIDE AIR CFM		0	-	-
FAN COIL UNIT DATA	SUPPLY CFM HIGH/LOW	1200	-	-
	EXT. S.P. ("WG)	0.3	-	-
	FAN MOTOR HP	3/4	-	-
	VOLTS/PH	208/1	-	-
	FLA	13	-	-
	MOCP	20	-	-
	WEIGHT LBS	425	-	-
COOLING DATA	EAT DB/WB (°F)	80/62	-	-
	SENS. HEAT (MBH)	25.9	-	-
	TOTAL HEAT (MBH)	27.8	-	-
CONDENSING UNIT DESIGNATION		CCU-1	-	-
CU DATA	VOLTS/PH	208/1	-	-
	FLA	18	-	-
	MOCP	30	-	-
	WEIGHT LBS	-	-	-
MANUFACTURER		DATA AIRE	-	-
MODEL NO'S	AIR HANDLING UNIT	DANA 2.5	-	-
	CONDENSING UNIT	DRCU-0712-2.5	-	-
REMARKS/NOTES		ALL	-	-

NOTES:
1. CAPACITY AT 95°F O.A.T.
2. 13.0 MIN. SEER RATING.
3. PROVIDE INTEGRAL CONDENSATE PUMP.
4. LOW AMBIENT TO 20°F.
5. PROVIDE DISCONNECT SWITCHES AND INTEGRAL 120V/24 V CONTROL TRANSFORMER WITH BOX.
6. BOTTOM SUPPLY AND RETURN OPENINGS.
7. 1.7 KW HUMIDIFIER, 5.0 LBS./HR.
8. MERV 8 FILTER.
9. R-410A REFRIGERANT.

AIR HANDLING UNIT SCHEDULE

DESIGNATION		AHU-	
LOCATION		PENTHOUSE	
SERVICE		CATH LAB	
SUPPLY FAN	CFM (MAX/MIN)	4,000	
	ESP / TSP ("WG)	2.0 / 3.72	
	FAN MOTOR HP (MIN)	5 HP	
	POWER (VOLTS / PH)	480/3	
	FAN WHEEL DIAMETER (IN)	14	
	FAN WHEEL TYPE	PLENUM	
	DRIVE (QTY)	DIRECT	
	FAN RPM	3286	
RETURN FAN	CFM	4,000	
	ESP / TSP ("WG)	0.5 / 0.78	
	FAN MOTOR HP (MIN)	3 HP	
	POWER (VOLTS / PH)	480/3	
	FAN WHEEL DIAMETER (IN)	14	
	FAN WHEEL TYPE	PLENUM	
	DRIVE	DIRECT	
	FAN RPM	2630	
COOLING COIL DATA	TYPE	CHILLED WATER	
	CFM	4,000	
	MAX FACE VEL (FPM)	400	
	MAX AIR P.D. ("WG)	0.4	
	TOTAL / SENS (MBTUH)	124 / 96	
	EAT °F DB/WB	80 / 62	
	LAT °F DB/WB	52.4 / 51	
	ROWS/FPI	6 / 10	
	FIN MATERIAL	ALUMINUM	
	FLUID EWT / LWT	45 / 55	
	GPM	25	
	FLUID PRESSURE DROP (FT WC)	7.3	
	FLUID VELOCITY (FT/SEC)	3.4	
HEATING COIL DATA	TYPE	HOT WATER	
	CFM	4,000	
	EAT °F DB	40	
	LAT °F DB	90	
	MAX FACE VEL (FPM)	450	
	MAX AIR P.D. ("WG)	0.08	
	TOTAL CAPACITY (MBH)	196	
	FLUID EWT / LWT	140/120	
	GPM	20	
	ROWS / FINS PER INCH	2 / 10	
	FLUID PRESSURE DROP (FT WC)	5.1	
	FLUID VELOCITY (FT/SEC)	3.9	
OUTSIDE AIR CFM (MIN) (AT FULL COOLING)		800	
FIRST FILTER DATA	CFM	4,000	
	TYPE	C	
	EFFICIENCY (%) (ASHRAE 52)	35%	
	MAX. VELOCITY (FPM)	500	
	P.D. (DIRTY / CLEAN)	0.3 / 0.5	
FINAL FILTER DATA	CFM	4,000	
	TYPE	E	
	EFFICIENCY (%) (ASHRAE 52)	90%	
	MAX. VELOCITY (FPM)	500	
	P.D. (DIRTY / CLEAN)	1.0 / 0.61	
BASED ON (MANUF.)		JCI	
BASED ON(MODEL NO.)		-	
WEIGHTS (INCLUDING PLENUMS, DOES NOT INCLUDE CURB)		4090	
REMARKS / NOTES		ALL	

NOTES:
1. CLEAN FILTERS. ISP EQUALS AHU SP LOSS WITH DIRTY FILTERS. TSP EQUALS ESP + ISP. TSP LISTED IS FOR REFERENCE ONLY.
2. FAN MOTOR NAMEPLATE HP SHALL NOT BE EXCEEDED AT SCHEDULED CFM AND TSP
3. PROVIDE PARAGON CONTROLS PIEZOMETER RINGS CERTIFIED TO MEASURE AIR FLOW WITHIN +/- 3.0% ACCURACY FOR SUPPLY AND RETURN FAN AIRFLOW MEASUREMENTS.
4. PROVIDE INTERNALLY ISOLATED FANS, DRIVES, MOTORS.
5. PROVIDE MANUFACTURER RETURN PLENUM.
6. PROVIDE BAS INTERFACE FOR ALL AIR HANDLING AND FAN COIL EQUIPMENT.
7. PROVIDE AHU WITH INTEGRAL DISCONNECTS.
8. REFER TO HVAC AIR FILTRATION SPECIFICATIONS FOR FILTER REQUIREMENTS AND TYPES.
9. PROVIDE A MANOMETER TO READ ACROSS EACH FILTER BED HAVING AN EFFICIENCY OF 75% OR GREATER. ACCESS SHALL BE PROVIDED FOR FIELD TESTING.
10. PROVIDE ALUMINUM AIR BLENDER SECTION.
11. LIGHTS SHALL HAVE TIMER SWITCH.
12. PROVIDE VIEW WINDOW AND LIGHT IN EACH FAN, COIL AND FILTER SECTION.
13. AIR HANDLER IS TO BE SET ON STRUCTURAL FRAMING APPROXIMATELY 24" ABOVE THE FLOOR. FRAMING DESIGN SHALL BE BY STRUCTURAL SUB CONTRACTOR. AIR UNIT CONSTRUCTION SHALL BE COORDINATED WITH DELEGATED DESIGN SUB CONTRACTOR WITH INTERMEDIATE SUPPORTS PROVIDED AS REQUIRED DURING THE COORDINATION PROCESS.
14. STACKED UNIT SHALL HAVE THE FOLLOWING COMPONENTS IN THE DIRECTION OF AIRFLOW: RETURN FAN, ECONOMIZER, AIR BLENDER, PREFILTER, HEATING COIL, TURNING SECTIONS, COOLING COIL, ACCESS, SUPPLY FAN, FINAL FILTER, HUMIDIFIER, ACCESS. SEE DIAGRAM BELOW.



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Sheet Title:
MECHANICAL SCHEDULES

Sheet Number
M.601

PLUMBING SPECIFICATIONS

I GENERAL CONDITIONS:

A. THE SCOPE OF THE WORK SHALL INCLUDE THE FURNISHING AND INSTALLATION OF THE NECESSARY MATERIAL AND LABOR TO ACCOMPLISH THE WORK INDICATED BY THE DRAWINGS AND HEREIN SPECIFIED. ALL WORK BY THIS CONTRACTOR SHALL CONFORM TO ALL APPLICABLE FEDERAL, STATE AND LOCAL BUILDING CODES.

B. CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING THE EXISTING CONDITIONS AT THE JOB SITE BEFORE SUBMITTING PROPOSALS. SUBMISSION OF PROPOSALS SHALL BE TAKEN AS EVIDENCE THAT SUCH INSPECTION HAS TAKEN PLACE. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE COMPLETE SET OF CONSTRUCTION DOCUMENTS, AND THE LACK OF SPECIFIC INFORMATION ON THE DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR OF ANY RESPONSIBILITY.

C. MATERIALS AND EQUIPMENT FURNISHED UNDER THIS CONTRACT SHALL BE NEW AND SHALL BEAR THE UL. LABEL WHERE APPLICABLE, UNLESS NOTED OTHERWISE. ALL WORK SHALL BE GUARANTEED AGAINST DEFECTIVE MATERIALS AND WORKMANSHIP FOR A PERIOD OF NOT LESS THAN ONE (1) YEAR AFTER COMPLETION AND ACCEPTANCE BY THE OWNER.

D. CONTRACTOR SHALL INSTALL PLUMBING SYSTEMS WITHOUT INTERFERENCE AND IN STRICT COORDINATION WITH OTHER TRADES.

E. MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE CONTRACT DOCUMENTS AND APPLICABLE CODES AND STANDARDS. IN CASE OF DIFFERENCE BETWEEN APPLICABLE CODES AND STANDARDS AND THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ARCHITECT/ENGINEER AND THE OWNER IN WRITING OF SUCH DIFFERENCE. SHOULD THE CONTRACTOR PERFORM ANY WORK THAT DOES NOT COMPLY WITH THE REQUIREMENTS OF APPLICABLE CODES AND STANDARDS, HE SHALL BEAR ALL COSTS ARISING IN CORRECTING SUCH DEFECTS. APPLICABLE CODES AND STANDARDS SHALL INCLUDE ALL ORDINANCES, UTILITY COMPANY REGULATIONS, AND APPLICABLE REQUIREMENTS OF NATIONALLY ACCEPTED CODES AND STANDARDS. SHOULD THE CONTRACTOR SUPPLY EQUIPMENT DIFFERING FROM THE SPECIFIED ITEMS IN THE CONTRACT DOCUMENTS WITHOUT NOTIFICATION TO THE ENGINEER, HE SHALL BEAR ALL COSTS TO UPGRADE DEFICIENCIES ARISING FROM SUCH.

F. WHERE ONLY ONE MANUFACTURER'S NAME IS LISTED IN THE EQUIPMENT SPECIFICATION, OTHER MANUFACTURERS OF SIMILAR CHARACTERISTICS AND OF EQUAL OR BETTER PERFORMANCE CAPACITIES MAY BE CONSIDERED FOR "OR EQUAL" APPROVAL BY THE ENGINEER. WHERE MORE THAN ONE MANUFACTURER IS LISTED IN THE NOTES AND EQUIPMENT SPECIFICATIONS, ONLY THOSE NAMED MANUFACTURERS WILL BE CONSIDERED FOR APPROVAL.

G. SHOULD A SUBSTITUTION BE ACCEPTED, AND SHOULD THE SUBSTITUTE MATERIAL PROVE DEFECTIVE, OR OTHERWISE UNSATISFACTORY FOR THE SERVICE INTENDED WITHIN THE GUARANTEE PERIOD, THIS MATERIAL OR EQUIPMENT SHALL BE REPLACED WITH THE MATERIAL OR EQUIPMENT SPECIFIED AT NO COST TO THE OWNER.

H. PROVIDE ACCESS, INCLUDING NECESSARY ACCESS DOORS, FOR NEW AND EXISTING EQUIPMENT REQUIRING OPERATION AND/OR MAINTENANCE. RELOCATE EXISTING AND LOCATE ALL NEW EQUIPMENT SUCH THAT OPERATION OR MAINTENANCE IS NOT RESTRICTED.

I. DO NOT RUN PIPING OR DUCTWORK, OR LOCATE EQUIPMENT, WITH RESPECT TO SWITCHBOARDS, PANELBOARDS, POWER PANELS, MOTOR CONTROL CENTERS OR DRY TYPE TRANSFORMERS, WITHIN 42 INCHES IN FRONT OF EQUIPMENT, OVER EQUIPMENT, OR WITHIN 36 INCHES HORIZONTALLY OF SAME SPACE.

J. PROVIDE SNAP-ON OR ADHESIVES LABELS INDICATING CHILLED OR HOT WATER SUPPLY AND RETURN, CONDENSATE DRAINAGE, DOMESTIC HOT AND COLD WATER, MEDICAL GASES, ETC.

II PLUMBING DEMOLITION

A. UNLESS NOTED OTHERWISE, THE PLUMBING DEMOLITION SHALL BE CARRIED OUT TO THE EXTENT THAT THE FLOORS ARE RETURNED TO THE ORIGINAL BASE BUILDING CONDITIONS. CONTRACTOR SHALL VERIFY ALL EXISTING FIELD CONDITIONS IN ORDER TO ACCURATELY DETERMINE THE EXTENT OF THE WORK UNDER THIS SECTION.

B. WASTE, DOMESTIC WATER, AND VENT PIPING SHALL BE REMOVED BACK TO RISER STACK CONNECTIONS AND CAPPED, UNLESS NOTED OTHERWISE.

III PRODUCTS, EQUIPMENT AND EXECUTION:

A. SANITARY DRAIN LINES (SOIL, WASTE AND VENT) SHALL BE AMERICAN MANUFACTURED SERVICE WEIGHT CAST IRON OR DWV COPPER PIPE. JOINTS SHALL BE FABRICATED BY THE USE OF COMPRESSION JOINTS SIMILAR TO TYLER PIPE AND FOUNDRY'S "TY-SEAL" FOR CAST IRON PIPE OR 95/5 SOLDER FOR DWV COPPER PIPE. NO-HUB CAST IRON PIPE ASSEMBLED WITH STAINLESS STEEL/NEOPRENE HUBLESS COUPLINGS SHALL BE LIMITED TO ABOVE GROUND INSTALLATIONS.

B. DOMESTIC WATER PIPING INSTALLED ABOVE GROUND SHALL BE AMERICAN MANUFACTURED TYPE "L" HARD DRAWN COPPER ASSEMBLED WITH 95/5 SOLDER AND WROUGHT COPPER JOINT FITTINGS.

C. RELIEF AND DRAIN PIPING SHALL BE AMERICAN MANUFACTURED TYPE "M" COPPER WITH 95/5 SOLDER JOINT FITTINGS OR SCHEDULE 40 BLACK STEEL PIPES WITH SCREWED FITTINGS.

D. MEDICAL GAS PIPING SHALL BE INSTALLED IN STRICT ACCORDANCE WITH CURRENT NFPA-99 AND HOSPITAL LICENSING CODE REQUIREMENTS, GCA P-2.1 RECOMMENDATIONS FOR MEDICAL-SURGICAL VACUUM SYSTEMS IN HEALTH CARE FACILITIES.

1. PIPING SHALL BE AMERICAN MANUFACTURED SEAMLESS TYPE 'K' HARD-DRAWN COPPER TUBING CLEANED AND SEALED FOR MEDICAL GAS USE. FITTINGS SHALL BE WROUGHT, BRASS OR BRONZE, MADE ONLY FOR BRAZED CONNECTIONS. ALL JOINTS IN THE PIPING, EXCEPT AT VALVES AND EQUIPMENT REQUIRING SCREW CONNECTIONS, SHALL BE ASSEMBLED WITH A SILVER BRAZING ALLOY. SCREWED JOINTS SHALL BE MADE-UP WITH GLYCERIN.
2. MEDICAL GAS WALL OUTLETS SHALL MATCH EXISTING MANUFACTURER, MODEL NUMBER AND FINISH OR MAY BE BEACON MEDICAL PRODUCTS TO MATCH EXISTING.
3. PROVIDE NECESSARY PIPING, FITTINGS, VALVES, ALARMS, SENSORS, WIRING, OUTLETS, ETC. AND LABOR FOR COMPLETE OPERATING SYSTEMS.
4. COLOR-CODED ADHESIVE PIPE MARKERS SHALL BE INSTALLED AT NO MORE THAN 20 FEET APART, OR ONE IN EACH ROOM, OR EACH FLOOR OF THE BUILDING. LABELS SHALL INCLUDE GAS CONTENTS, OPERATING PRESSURE AND THE DIRECTION OF FLOW ON ALL MEDICAL GASES, COMPRESSED AIR AND VACUUM PIPING.
5. THE MEDICAL AIR VACUUM PIPING SHALL ORIGINATE FROM THE EXISTING AIR AND VACUUM PIPING SYSTEMS LOCATED ABOVE THE CORRIDOR CEILING.
6. THE OXYGEN PIPING SHALL ORIGINATE FROM THE EXISTING OXYGEN DISTRIBUTION LINE ABOVE THE CORRIDOR CEILING.
7. THE MANUFACTURER OF MEDICAL GAS EQUIPMENT SHALL TEST ALL MEDICAL GAS PIPING SYSTEMS AFTER INSTALLATION TO INSURE THAT NO CROSSED LINES EXIST AND THAT THE PROPER SERVICE IS BROUGHT TO EACH OUTLET. THE TEST SHALL BE PERFORMED IN ACCORDANCE WITH NFPA 99 4-5 GAS SYSTEM PERFORMANCE CRITERIA AND TESTING. FURNISH THE OWNER, THROUGH THE ARCHITECT, A WRITTEN CERTIFICATION, SIGNED BY AN OFFICER OF THE COMPANY, THAT THE SYSTEM HAS BEEN CHECKED AND IS CONSTRUCTED AND TESTED IN ACCORDANCE WITH NFPA 99 AND IS SAFE FOR PATIENT USE. MANUFACTURER MUST SUBMIT A LETTER SIGNED BY AN OFFICER OF THE COMPANY TO THE ARCHITECT 10 DAYS PRIOR TO BID OPENING THAT THIS SERVICE WILL BE PERFORMED.
8. VALVES NOT IN BOXES SHALL BE BEACON BRONZE-BODY, DOUBLE-SEAL, FULL-FLOW UNION BALL TYPE, WITH TEFLON SEATS AND SEALS, DESIGNED FOR A WORKING PRESSURE OF 27" Hg VACUUM TO 400 PSI WITH CHROME-PLATED BRASS BALLS WHICH SEAL IN BOTH DIRECTIONS. EACH VALVE SHALL BE SO DESIGNED THAT ONLY A QUARTER TURN OF THE LEVER TYPE HANDLE IS NECESSARY BETWEEN THE OPEN AND CLOSED POSITIONS. VALVE DESIGN SHALL ELIMINATE THE NEED FOR UNIONS BY PERMITTING REMOVAL OR SWING-AWAY OF THE CENTER VALVE SECTION OUT-OF-LINE. VALVES SHALL CONFORM TO NFPA STANDARDS. VALVES SHALL BE SUPPLIED PROPERLY WASHED FOR OXYGEN SERVICE. GAS SERVICE LABELS SHALL BE PROVIDED FOR EACH SERVICE AS REQUIRED.
9. PROVIDE GAUGES ON SYSTEMS AS REQUIRED BY NFPA 99, CURRENT EDITION, AND WHERE INDICATED ON THE DRAWINGS.
10. GAUGES FOR PIPELINE INSTALLATION SHALL BE EQUAL TO OHMEDA MAIN LINE GAUGES AS FOLLOWS:

	SERVICE	CALIBRATION	STOCK NO.
a.	OXYGEN, N20, AIR	0-100 PSI	841-0014-300
b.	VACUUM	0-30" Hg.	395-7558-300
c.	NITROGEN	0-400 PSI	841-0007-300

11. WALL SERVICE OUTLETS SHALL BE INSTALLED WHERE INDICATED ON THE DRAWINGS AND SHOWN ON ARCHITECTURAL ELEVATIONS.
12. OUTLETS TO MATCH EXISTING OR SHALL BE BEACON RECESSED WALL OUTLET ASSEMBLY OF THE TYPE LISTED BELOW.

a.	OXYGEN	0221-7804-810	DIAMOND III
b.	VACUUM	0221-7804-812	DIAMOND III
c.	AIR	0221-7804-813	DIAMOND III
d.	NITROUS OXIDE	0221-7804-811	DIAMOND III
e.	NITROGEN	0221-7806-815	DIAMOND III

13. BEFORE ERECTION, ALL PIPE, TUBING, VALVES AND FITTINGS (EXCEPT THOSE SUPPLIED EXPRESSLY CLEANED FOR OXYGEN SERVICES BY MANUFACTURER) SHALL BE THOROUGHLY CLEANSED OF ALL GREASE, OIL OR OTHER READILY OXIDIZABLE MATERIALS BY WASHING IN A HOT SOLUTION OF SODIUM CARBONATE OR TRISODIUM PHOSPHATE MIXED IN EQUAL PROPORTIONS OF ONE POUND TO THREE GALLONS OF WATER. SCRUBBING AND CONTINUOUS AGITATION OF THE PARTS SHALL BE EMPLOYED WHERE NECESSARY TO REMOVE ALL DEPOSITS AND INSURE COMPLETE CLEANSING. AFTER WASHING, ALL MATERIALS SHALL BE RINSED THOROUGHLY IN CLEAN, HOT WATER. AFTER CLEANSING, GREAT CARE MUST BE EXERCISED IN THE STORAGE AND HANDLING OF ALL MATERIALS AND IN THE CONDITION OF TOOLS USED IN CUTTING AND REAMING TO PREVENT OIL OR GREASE BEING INTRODUCED INTO THE TUBING. WHERE SUCH CONTAMINATION IS KNOWN TO HAVE OCCURRED, THE MATERIALS AFFECTED MUST BE REWASHED AND THEN RINSED.
14. AFTER INSTALLATION OF THE PIPING, BUT BEFORE INSTALLATION OF THE STATION OUTLETS AND OTHER MEDICAL GAS SYSTEM COMPONENTS (e.g., PRESSURE-ACTUATING SWITCHES FOR ALARMS, MANIFOLDS, PRESSURE GAUGES OR PRESSURE RELIEF VALVES), THE LINE SHALL BE BLOWN CLEAR BY MEANS OF OIL-FREE, DRY AIR OR NITROGEN. THE SYSTEM SHALL BE TESTED IN ACCORDANCE WITH NFPA 99 4-5.1.3 "MEDICAL GAS SYSTEM TEST".
15. ALL PIPING SHALL BE SUPPORTED WITH COPPER-CLAD HANGERS WITH POLYSTYRENE OR NEOPRENE INSERTS OR PADS AT APPROPRIATE INTERVALS AND NOT SUPPORTED BY OTHER PIPING.

E. FITTINGS AND PIPING CONNECTED WITH PLUMBING FIXTURES SHALL BE BRASS AND, WHEREVER EXPOSED, SHALL BE POLISHED CHROME-PLATED.

F. FURNISH AND INSTALL ALL REQUIRED WATER, WASTE, SOIL, AND VENT CONNECTIONS TO ALL PLUMBING FIXTURES AND EQUIPMENT, TOGETHER WITH ALL FITTINGS, SUPPORTS, FASTENING DEVICES, COCKS, VALVES, TRAPS, ETC., LEAVING ALL IN COMPLETE WORKING ORDER.

G. PLUMBING FIXTURES SHALL BE PROVIDED AS SCHEDULED ON THE DRAWINGS. PLUMBING FIXTURES SHALL BE NEW, EXCEPT WHERE NOTED, AND SHALL BE APPROVED BY THE APPLICABLE WATER CONSERVATION AUTHORITY. THE PLUMBING CONTRACTOR SHALL PROVIDE NECESSARY CHROME PLATED P-TRAPS, SUPPLIES WITH STOPS, RISERS, INLET DRAINS, ETC.

H. SHOCK ARRESTORS SHALL BE SIMILAR TO JOSAM 75000 OR AS MANUFACTURED BY PPP AND SIOUX CHIEF SIZED AS PER THE PDI.

I. FIXTURE CARRIERS SHALL BE PROVIDED FOR WATER CLOSETS, URINALS AND LAVATORIES AS REQUIRED AND SHALL BE FLOOR SUPPORTED AS MANUFACTURED BY JOSAM.

J. TRAP PRIMERS SHALL BE AS REQUIRED BY LOCAL CODES AND SIMILAR TO J.R. SMITH FIR 2698 WATER SAVER TRAP PRIMER.

K. FLOOR DRAINS SHALL BE SIMILAR TO JOSAM SERIES 30000 CAST IRON FLOOR DRAIN WITH NICKALOY STRAINER.

L. CLEANOUTS SHALL BE PROVIDED IN SANITARY WASTE LINES AS SHOWN AND AT EACH CHANGE OF DIRECTION GREATER THAN 45 DEGREES. WALL CLEANOUTS SHALL BE SIMILAR TO JOSAM 5879 WITH BRONZE PLUG AND STAINLESS STEEL COVER. FLOOR CLEANOUTS SHALL BE SIMILAR TO JOSAM 56020 WITH CARPET MARKER FOR CARPETED FLOORS.

M. PIPE, EQUIPMENT, ETC., SHALL BE PROPERLY SUPPORTED FROM STRUCTURE WITH THE USE OF APPROVED TYPE CLEVIS, TRAPEZE HANGERS OR FLOOR STANDS WITH SPACING AS FOLLOWS:

1. STEEL PIPE OR COPPER TUBING - 1-1/2" OR LESS, 6 FOOT INTERVALS.
2. CAST IRON - ONE (1) HANGER PER LENGTH OF PIPE AND NOT EXCEEDING 10'-0" O.C.
3. FITTINGS - WITHIN 2'-0" OF EACH CHANGE OF DIRECTION.

N. INSULATION SHALL BE PROTECTED AT HANGERS BY A SECTION OF CALCIUM SILICATE PIPE INSULATION AND A 12" LONG HALF-ROUND SHEET METAL SHIELD ON THE OUTSIDE OF THE INSULATION. EXTEND PIPING INSULATION FULL THICKNESS WITHOUT INTERRUPTION THROUGH WALLS, FLOORS AND SIMILAR PENETRATIONS.

O. PROVIDE AND INSTALL UNIONS AT PROPER POINTS TO PERMIT REMOVAL OF A PIPE, EQUIPMENT, ETC., WITHOUT INJURY TO OTHER PARTS OF THE SYSTEM AND TO PREVENT CORROSION DUE TO ELECTROLYSIS. ALL EQUIPMENT SHALL BE INSTALLED IN A MANNER TO PERMIT ACCESS FOR SERVICE WITHOUT DISASSEMBLY. UNIONS SHALL BE DIELECTRIC WHERE DISSIMILAR MATERIALS OCCUR. PRESSURE RATINGS SAME AS FITTINGS.

P. ALL DOMESTIC COLD WATER AND HOT WATER PIPE AND FITTINGS SHALL BE INSULATED WITH ½" THICK OWENS-CORNING FIBERGLASS 25 ASJ/SSL OR APPROVED EQUAL.

Q. CONDENSATE DRAIN PIPING, AUXILIARY DRAIN PIPING AND ALL REFRIGERANT PIPING SHALL BE INSULATED WITH " THICK OWENS-CORNING FIBERGLASS 25 ASJ/SSL OR EQUAL. AUXILIARY DRAIN PAN SHALL BE INSULATED WITH 3/8" THICK ARMAFLEX SHEET INSULATION.

R. PROVIDE INSULATION PRODUCTS MANUFACTURED BY JOHNS-MANVILLE, OWENS-CORNING, ARMSTRONG AND CERTAINTEED. FIBERGLASS PIPE INSULATION SHALL BE ASTM C547-77, CLASS 1. PROVIDE BANDS, WIRES, AND CEMENT AS RECOMMENDED BY INSULATION MANUFACTURER FOR THE APPLICATIONS INDICATED. FLEXIBLE FIBERGLASS DUCTWORK INSULATION SHALL BE ASTM C553-70, TYPE I, CLASS B3.

1. PROVIDE COMPOSITE INSULATION (INSULATION JACKETS, COVERINGS, SEALERS, MASTICS AND ADHESIVE) WITH FLAME-SPREAD RATINGS OF 25 OR LESS AND A SMOKE-DEVELOPED RATING OF 50 OR LESS, AS TESTED BY ASTM K04 (HFFA 255) METHOD.
2. MAINTAIN INTEGRITY OF VAPOR BARRIER JACKETS ON PIPE AND DUCTWORK INSULATION, AND PROTECT TO PREVENT PUNCTURE OR OTHER DAMAGE. SEAL OPEN ENDS OF INSULATION WITH MASTIC. SECTIONALLY SEAL ALL BUTT ENDS OF CHILLED WATER INSULATION OF FITTINGS WITH WHITE VAPOR BARRIER COATING. EXTEND PIPING INSULATION WITHOUT INTERRUPTION THROUGH WALLS, FLOORS AND SIMILAR PIPING PENETRATIONS, EXCEPT WHERE OTHERWISE INDICATED. INSTALL PROTECTIVE METAL SHIELDS AND FOAM GLASS INSERTS WHERE PIPE HANGERS BEAR ON OUTSIDE OF INSULATION.

GENERAL FIRE PROTECTION NOTES

IV IT IS THE INTENT THAT THE FIRE PROTECTION SUB-CONTRACTOR BE RESPONSIBLE FOR THE DESIGN AND INSTALLATION OF THE FIRE SUPPRESSION SYSTEMS IN ACCORDANCE WITH APPLICABLE CODES.

V FIRE PROTECTION SUB-CONTRACTOR SHALL UTILIZE EXISTING PIPING SYSTEM AND SPRINKLER HEADS WHERE POSSIBLE, AND ADD PIPING AND HEADS AS REQUIRED TO PROVIDE CODE APPROVED COVERAGE OR MATCH EXISTING BUILDING SPRINKLER GRID COVERAGE.

VI SPRINKLER HEADS TO MATCH EXISTING HEADS WITHIN THE BUILDING.

VII COORDINATE HEAD LOCATIONS WITH LIGHT FIXTURES, DIFFUSERS, GRILLES, ETC.

GENERAL PLUMBING NOTES

VIII LOCATIONS AND SIZES OF EXISTING SYSTEMS ARE APPROXIMATE. EXACT SIZES AND LOCATIONS OF EXISTING SYSTEMS TO BE UTILIZED SHALL BE VERIFIED AT JOB SITE.

IX SEAL AROUND ALL PIPE PENETRATIONS THROUGH FLOORS WITH WATER PROOFING AND FIRE-SAFE MATERIALS.

X REMOVE ALL EXISTING ABANDONED PLUMBING PIPING, FITTINGS AND CAP AT STACKS.

XI RE-POUR ALL ABANDONED FLOOR PENETRATIONS.

XII CONTRACTOR SHALL PREPARE AND SUBMIT FOR APPROVAL BY THE ENGINEER ALL MAJOR ITEMS OF MATERIALS AND EQUIPMENT.

GENERAL NOTES - PLUMBING

A. ALL MECHANICAL, ELECTRICAL, AND PLUMBING WORK SHALL COMPLY WITH ALL APPLICABLE STATE AND LOCAL BUILDING CODES. REFER TO SPECIFICATIONS FOR MATERIALS AND METHODS FOR MECHANICAL AND PLUMBING CONSTRUCTION.
B. INDICATED LOCATIONS ARE APPROXIMATE.
C. COORDINATE WITH OWNER AND PERSONNEL THE SHUT-DOWN OF THE EXISTING SITE UTILITIES.
D. ROUTE ALL PLUMBING PIPING AS TIGHT AS POSSIBLE TO STRUCTURE. PIPING SHALL BE INSTALLED PARALLEL/PERPENDICULAR TO WALLS AND COLUMN LINES.
E. CONTRACTOR SHALL FURNISH ALL MATERIALS, EQUIPMENT, AND LABOR REQUIRED FOR A COMPLETE WORKING AND COORDINATED SYSTEM.
F. COORDINATE THE EXACT LOCATION OF MECHANICAL, PLUMBING, AND FIRE PROTECTION EQUIPMENT WITH THE LOCATIONS OF LIGHT FIXTURES, PIPING, CONDUIT, AND OTHER CONSTRUCTION, TO ALLOW FOR PROPER ACCESS TO SERVICE EQUIPMENT.
G. COORDINATE ALL NEW WORK WITH ALL TRADES. WORK SHOWN ON THESE DRAWINGS ARE INTENDED TO PROVIDE THE OVERALL ENGINEERING DESIGN CONCEPT AND DOES NOT PROVIDE FOR RELOCATIONS, OFFSETS, ETC., THAT ARE REQUIRED BY THE COORDINATION OF TRADES. THIS ADDITIONAL WORK SHALL BE PROVIDED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACT.
H. IT IS THE REQUIREMENT OF THESE DOCUMENTS TO ALLOW ALL CEILING CONSTRUCTION AND HEIGHTS TO BE AS SHOWN ON THE ARCHITECTURAL DRAWINGS. COORDINATE THE LOCATION OF PIPING AND PROVIDE OFFSETS IN PIPING AS REQUIRED TO MEET THIS REQUIREMENT.
I. CONDUIT, PIPING, AND DUCTWORK SHALL BE INDEPENDENTLY SUPPORTED, AND EACH SUPPORT SHALL BE INDEPENDENT OF PARTITION AND CEILING SYSTEM SUPPORTS. WHERE INDEPENDENT SUPPORT IS NOT POSSIBLE AN ENGINEERED SUPPORT SYSTEM SHALL BE UTILIZED.
J. ALL WORK SHALL BE SCHEDULED AND PERFORMED IN STRICT COORDINATION WITH ARCHITECTURAL PHASING PLANS. CONTRACTOR SHALL SCHEDULE AND PERFORM WORK IN SEQUENCE WITH THE PHASING PLAN.
K. PROTECT EQUIPMENT AND WORK FROM DAMAGE DURING HANDLING AND INSTALLATION UNTIL COMPLETION OF CONSTRUCTION.
L. REMOVE ALL EXCESS MATERIAL AND DEBRIS AND CLEAN ALL EQUIPMENT UPON COMPLETION OF WORK. TOUCH UP WITH PAINT WHERE REQUIRED.
M. ALL CONNECTIONS BETWEEN PIPES OF DISSIMILAR MATERIALS SHALL BE MADE WITH DIELECTRIC UNIONS.
N. LOCATE ISOLATION VALVES FOR EQUIPMENT AS CLOSE TO THE MAIN AS POSSIBLE.
O. PROVIDE CLEANOUTS AT THE BASE OF ALL STORM AND SANITARY STACKS.
P. ALL SANITARY SEWER AND STORM DRAIN SYSTEM WALL CLEANOUTS SHALL BE PLACED AT 18" AFF UNLESS OTHERWISE NOTED.
Q. COORDINATE ALL FIRE PROTECTION SPRINKLER LOCATIONS AND MOUNTING STYLES WITH LIGHTING PLANS AND ARCHITECTURAL REFLECTED CEILING PLANS.
R. DO NOT ROUTE PIPING INSIDE ELECTRICAL AND COMMUNICATION ROOMS, IN UNAVOIDABLE INSTANCES, ALL EQUIPMENT SHALL BE PROTECTED FROM OVERHEAD PIPING WITH DRAIN PANS. ROUTE DRAIN FROM DRAIN PANS TO NEAREST FLOOR DRAIN IN MECHANICAL AREAS. WHERE NO FLOOR DRAIN IS ACCESSIBLE ROUTE AS INDIRECT WASTE TO PLUMBING FIXTURE AS INDICATED ON CONTRACT DRAWINGS, OR NEAREST LAVATORY TAILPIECE. PROVIDE SENSOR IN DRAIN PAN TO SEND ALARM TO BAS IN CASE OF LEAKAGE INTO PAN.
S. EACH SUBCONTRACTOR SHALL PROVIDE ADEQUATELY SIZED ACCESS DOORS TO PROVIDE REQUIRED ACCESS THROUGH HARD SURFACES TO THEIR WORK REQUIRING ACCESS (ANY FLOW DEVICES, VALVES, ETC.). SUBCONTRACTOR IS ALSO REQUIRED TO PROVIDE ADEQUATE LOCATION INFORMATION SO ACCESS CAN BE INSTALLED BY INTERIORS SUBCONTRACTOR.
T. REFER TO ARCHITECTURAL DRAWINGS FOR RATED WALL TYPES.
U. ALL PLUMBING PIPING SHALL BE IDENTIFIED IN ACCORDANCE WITH THE SPECIFICATIONS.
V. SLOPE AND ARRANGE WATER PIPING SYSTEMS TO ESTABLISH HIGH POINTS FOR AIR ELIMINATION AND LOW POINTS TO PERMIT PROPER DRAINING OF EACH LINE.
W. COORDINATE ALL PIPING FLOOR PENETRATIONS WITH STRUCTURAL.
X. SPACE LOCATIONS FOR MATERIALS, EQUIPMENT AND FIXTURES HAVE BEEN MADE ON THE BASIS OF PRESENT AND KNOWN FUTURE REQUIREMENTS AND THE DIMENSIONS OF ITEMS OF EQUIPMENT OR FIXTURES OF A PARTICULAR MANUFACTURER WHETHER INDICATED OR NOT. THE CONTRACTOR SHALL VERIFY THAT ALL MATERIALS, EQUIPMENT AND FIXTURES PROPOSED FOR USE ON THIS PROJECT ARE WITHIN THE CONSTRAINTS OF THE ALLOCATED SPACE.
Y. PIPE PENETRATIONS THROUGH WALLS SHALL MAINTAIN THE CONSTRUCTION/FIRE RATING OF THE WALL.

DEMOLITION

A. ALL CAPPED SANITARY WASTE, VENTS AND DOMESTIC WATER PIPING THAT ARE NOT BEING USED, NEED TO BE REMOVED BACK TO THE MAINS AND CAPPED.
B. PROVIDE ADDITIONAL VALVES, FITTINGS AND/OR PIPING AS NECESSARY TO PROVIDE UNINTERRUPTED SERVICE TO AREAS OUTSIDE AND INSIDE OF THE AREA WORK.
C. ALL WORK SHALL BE PERFORMED IN STRICT COORDINATION WITH HOSPITAL SCHEDULES, OCCUPANCIES AND WORK. CONTRACTOR SHALL COORDINATE WITH HOSPITAL REPRESENTATIVE.
D. ALL NECESSARY SHUTDOWNS OR OUT OF PHASE WORK SHALL BE SCHEDULED WITH THE HOSPITAL REPRESENTATIVE.
E. INFORMATION PROVIDED ON THESE DRAWINGS HAVE BEEN TAKEN FROM DESIGN DRAWING AND FIELD OBSERVATIONS. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO PRICING AND COMMENCEMENT OF WORK.
F. WHERE EXISTING WALLS ARE DEMOLISHED, REMOVE ALL EXISTING PLUMBING FIXTURES AND THEIR ASSOCIATED PIPING BACK TO THE POINT OF ORIGINATION. ALL EXISTING PIPING THAT WAS SHUT DOWN DURING DEMOLITION SHALL BE TURNED ON AND CHECKED FOR LEAKS.
G. PROVIDE FOR ANY AND ALL DEMOLITION WORK NECESSARY TO ACCOMMODATE ALL NEW CONSTRUCTION, INCLUDING ARCHITECTURAL, MECHANICAL, PLUMBING OR ELECTRICAL WORK.
H. IF DEMOLITION IS REQUIRED TO INSTALL AN ITEM, THE CONTRACTOR SHALL RESTORE THE AREA TO PREVIOUS CONDITION, OR REPLACE DAMAGED ITEMS WITH NEW ITEMS TO MATCH EXISTING.
I. A DEVICE OR PIPING WITH AN 'X' INDICATES EXISTING TO BE REMOVED INCLUDING ALL ASSOCIATED VALVES AND FIXTURES. PIPING TO BE VALVED AND CAPPED AT POINT OF ORIGIN.
J. CONTRACTOR SHALL REMOVE ALL FIXTURES, ASSOCIATED PIPING AND EQUIPMENT INDICATED TO BE REMOVED AND/OR RELOCATED UNLESS NOTED OTHERWISE. PROVIDE AND INSTALL ALL NECESSARY FIXTURES, EQUIPMENT AND ACCESSORIES REQUIRED TO MAINTAIN SERVICE TO ALL "EXISTING TO REMAIN" FIXTURES AND EQUIPMENT THAT MAY BE INTERRUPTED DURING DEMOLITION.
K. WHERE EXISTING MECHANICAL EQUIPMENT IS DEMOLISHED, REMOVE ALL RELATED PLUMBING TO THE EQUIPMENT AND THEIR ASSOCIATED PIPING BACK TO THE POINT OF ORIGINATION AND VALVE & CAP.
L. ITEMS REMOVED AND NOT REINSTALLED OR RETURNED TO OWNER SHALL BE DISPOSED OF LEGALLY (COORDINATE WITH OWNER FOR THE DISPOSAL).
M. ALL EXISTING PLUMBING RISER(S) LOCATED IN THE DEMOLISHED WALLS/CHASES MUST BE RELOCATED TO AN APPROVED LOCATION BY THE ARCHITECT THEN RECONNECTED ON ADJACENT FLOORS.
N. ANY FLOOR DRAINS OR FLOOR SINKS NOT REQUIRED SHALL BE REMOVED COMPLETELY. DRAINS ON THE GROUND FLOOR SHALL BE PERMANENTLY PLUGGED WITH GROUT AND CUT BACK TO ACCEPT NEW FLOORING MATERIAL.

RENOVATION

A. COORDINATE ALL PIPING ROUTING WITH OTHER TRADES BEFORE INSTALLING PIPING. OFFSET PIPING WHERE POSSIBLE, TO COORDINATE WITH OTHER TRADES.
B. CONNECT VENT AND WATER FOR NEW FIXTURES TO NEAREST PIPING IN CEILING SPACE ON THIS FLOOR. CONNECT WASTE FOR NEW FIXTURES TO NEAREST PIPING IN CEILING SPACE OF FLOOR BELOW.
C. WHERE POSSIBLE, REUSE EXISTING FLOOR PENETRATIONS AFTER REVIEW AND APPROVAL BY ARCHITECT. LOCATIONS SHOWN ON THESE DRAWINGS REFLECT DESIGN INTENT AND ARE BASED ON AS-BUILT DRAWINGS MADE AVAILABLE TO THE ENGINEER. CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL LOCATIONS OF NEW FLOOR PENETRATIONS BASED ON FIELD INVESTIGATION AND VERIFICATION, PRIOR TO STARTING NEW WORK.
D. WHERE UNAVOIDABLE, PIPE ROUTING MAY REQUIRE BORING THROUGH STRUCTURAL GIRDERS. CONTRACTOR SHALL X-RAY GIRDER AND PREPARE A DRAWING AND SUPPORTING DOCUMENTS SHOWING THE PROPOSED BORE LOCATIONS FOR PIPING. SUBMIT THIS PROPOSED PIPING LAYOUT FOR ENGINEER/ARCHITECT/OWNER REVIEW AND APPROVAL PRIOR TO COMMENCING WORK. PROCEED WITH NEW WORK ONLY WITH WRITTEN STATEMENT TO PROCEED FROM ARCHITECT OR STRUCTURAL ENGINEER.
E. FOR ALL EXISTING FLOOR PENETRATIONS NOT USED, CUT PIPING JUST BELOW FLOOR LEVEL, PLUG PIPING WATER-TIGHT AND FILL WITH GROUT. REPAIR AND PATCH FLOOR TO MATCH EXISTING.
F. CONFIRM WITH ARCHITECTURAL DRAWINGS THE REQUIRED MOUNTING HEIGHTS PRIOR TO INSTALLATION/RE-INSTALLATION OF FIXTURES.
G. ALL CONNECTIONS TO EXISTING PIPING SHALL BE MADE TO SAME SIZE OR LARGER EXISTING PIPING. IF IT IS DETERMINED BY FIELD INVESTIGATION THAT THE EXISTING PIPE SIZE TO BE CONNECTED TO IS SMALLER THAN THE NEW PIPE SIZE, NOTIFY ARCH/ENGR BEFORE PROCEEDING WITH WORK.
H. CONNECTIONS TO EXISTING SANITARY PIPING IS BASED ON EXISTING DRAWINGS AND LIMITED FIELD INVESTIGATION DUE TO INACCESSIBLE AREAS. PIPING LESS THAN 4" SHALL HAVE A 1/4" SLOPE PER FOOT, PIPING 4" AND LARGER A 1/8" SLOPE PER FOOT. IF IT IS DETERMINED DURING CONSTRUCTION/FIELD SURVEY THAT THE PIPE ROUTING CAN NOT TIE-IN TO EXISTING SANITARY PIPING AS SHOWN ON THESE DRAWINGS BECAUSE OF ELEVATION DIFFERENCES, CONTRACTOR SHALL PREPARE AN ADJUSTED PIPING ROUTING AND CONNECTION TO EXISTING PIPING BASED ON ACTUAL FIELD CONDITIONS. SUBMIT THIS PROPOSED PIPING LAYOUT FOR ENGINEER/ARCHITECT/OWNER REVIEW PRIOR TO CONTINUING WITH CONSTRUCTION.

FIRE PROTECTION NOTES

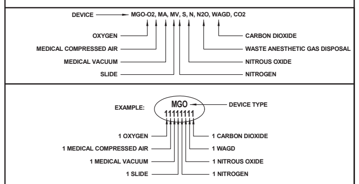
A. FIRE PROTECTION CONTRACTOR SHALL REFER TO THE PLUMBING DRAWINGS FOR SCOPE OF WORK INCLUDING THE GENERAL NOTES ON THIS SHEET.
B. THE BUILDING'S FIRE PROTECTION SYSTEM MUST REMAIN IN SERVICE DURING CONSTRUCTION. FIRE PROTECTION ENGINEER IS RESPONSIBLE FOR EXTENT OF DEMOLITION, RELOCATION, AND RENOVATION OF THE FIRE PROTECTION SYSTEM.
C. RENOVATION AND DEMOLITION SCOPE OF WORK FOR FIRE PROTECTION SYSTEM IS THE RESPONSIBILITY OF THE FIRE PROTECTION ENGINEER.
D. DESIGN OF THE SPRINKLER SYSTEM SHALL BE UNDER DIRECT SUPERVISION OF AN RME (RESPONSIBLE MANAGING EMPLOYEE) EXPERIENCED IN DESIGN OF THIS WORK AND LICENSED IN THE STATE OF COLORADO. ALL DESIGN SUBMITTAL DOCUMENTS SHALL BEAR THE RME's SIGNED AND DATED REGISTRATION NUMBER. THE SYSTEM SHALL BE INSTALLED BY A FIRM HAVING MINIMUM THREE YEARS EXPERIENCE REGULARLY ENGAGED IN THE DESIGN AND INSTALLATION OF AUTOMATIC FIRE PROTECTION SYSTEMS IN ACCORDANCE WITH REQUIREMENTS OF THE NATIONAL FIRE PROTECTION ASSOCIATION AND THE STATE OF COLORADO FIRE MARSHALL'S OFFICE. EVIDENCE TO SUPPORT THE ABOVE REQUIREMENTS SHALL BE SUBMITTED WITH SHOP DRAWINGS. WORKING PLANS SHALL BE SEALED BY AN ENGINEER REGISTERED BY THE COLORADO STATE BOARD FOR PROFESSIONAL ENGINEERS IN THE FIRE PROTECTION SPECIALTY.
E. DEMOLISH/RELOCATE/PROVIDE NEW SPRINKLER HEADS AS REQUIRED BY THE RENOVATION/EXPANSION SPACE FLOOR PLANS. FIRE PROTECTION SYSTEM FOR THE BUILDING MUST REMAIN IN SERVICE DURING CONSTRUCTION.
F. PROVIDE STANDARD QUICK RESPONSE SPRINKLER HEADS FOR ALL AREAS, UNLESS OTHERWISE NOTED.
G. COORDINATE SPRINKLER AND FIRE MAIN LOCATIONS WITH ALL TRADES.
H. COORDINATE ALL FIRE PROTECTION SPRINKLER LOCATIONS AND MOUNTING STYLES WITH LIGHTING PLANS AND ARCHITECTURAL REFLECTED CEILING PLANS.

MEDICAL GAS SYMBOLS

SYMBOL	DESCRIPTION
— O2 —	MEDICAL OXYGEN PIPING
— MA —	MEDICAL AIR PIPING
— MV —	MEDICAL VACUUM PIPING
—WAGD—	WASTE ANESTHETIC GAS DISPOSAL PIPING
— N —	MEDICAL NITROGEN PIPING
—N2O—	MEDICAL NITROUS OXIDE PIPING
—CO2—	CARBON DIOXIDE PIPING
	MEDICAL GAS PIPING DROPS IN WALL FULL SIZE
MGO	MEDICAL GAS OUTLETS
AA	AREA ALARM
MA	MASTER ALARM
ZVB	ZONE VALVE BOX
	MASTER ALARM SENSOR
	AREA ALARM SENSOR
L	LOCKABLE TYPE BALL VALVE

MEDICAL GAS LEGEND

MAP	= MASTER ALARM PANEL	MED AIR	= MEDICAL COMPRESSED AIR
MGB	= MEDICAL GAS CEILING BOOM	MV	= MEDICAL VACUUM
MGC	= MEDICAL GAS CEILING COLUMN	02	= OXYGEN
MGD	= MEDICAL GAS DROP	S	= SLIDE
MGH	= MEDICAL GAS HEADWALL	AAP	= AREA ALARM PANEL
MGO	= MEDICAL GAS WALL OUTLET	ZVB	= ZONE VALVE BOX
MGP	= MEDICAL GAS PEDESTAL	NCP	= NITROGEN CONTROL PANEL
MVE	= MEDICAL GAS VACUUM EXHAUST	N	= NITROGEN
ME	= MEDICAL EQUIPMENT COMPRESSED AIR (FOR BRAKES ON MEDICAL BOOMS)	N20	= NITROUS DIOXIDE GAS
		CO2	= CARBON DIOXIDE GAS
		WAGD	= WASTE ANESTHETIC GAS DISPOSAL



MEDICAL GAS NOTES:

A. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR EXACT LOCATION AND MOUNTING HEIGHTS OF MEDICAL GAS OUTLETS, ZONE VALVE BOXES AND ALARM PANELS.
B. NOT ALL GASES ARE TO BE USED AT EACH LOCATION. THE GAS ORDER SHOWN IN THE EXAMPLE IS TYPICAL FOR ALL OUTLETS.
C. COORDINATE MEDICAL GAS PIPE ROUTINGS WITH ALL OTHER TRADES BEFORE INSTALLATION.

TYPICAL MOUNTING HEIGHTS FOR MEDICAL GAS DEVICES*:

WALL OUTLETS:	5' (60 INCHES) TO THE CENTER OF THE OUTLET
ZONE VALVE BOX:	5'-6" (66 INCHES) TO THE TOP OF THE ZONE VALVE BOX
AREA ALARM:	5'-6" (66 INCHES) TO THE TOP OF THE ALARM
MASTER ALARM:	5'-6" (66 INCHES) TO THE TOP OF THE ALARM
NITROGEN CONTROL CABINET:	5'-2" (62 INCHES) TO THE BOTTOM OF THE PANEL
FIXED CEILING COLUMN:	5'-3" (63 INCHES) TO THE BOTTOM OF THE COLUMN
RETRACTABLE CEILING COLUMN:	5'-10" (70 INCHES) TO THE BOTTOM OF THE COLUMN
CEILING HOSE DROP:	6'-4" (76 INCHES) TO THE BOTTOM OF THE HOSE
ASSEMBLY CEILING ARMS/BOOMS:	CONSULT MANUFACTURERS RECOMMENDATIONS

* ALL DIMENSION HEIGHTS SHALL BE COORDINATED WITH ARCHITECTURAL ELEVATION.

PLUMBING SYMBOLS

ALL SYMBOLS SHOWN MAY NOT APPEAR IN ALL DRAWINGS. SYMBOLS ARE SHOWN SCHEMATICALLY AND MAY NOT BE TO SCALE.

SYMBOL	DESCRIPTION
	DOMESTIC COLD WATER
	DOMESTIC HOT WATER (TEMP. AS NOTED)
	DOMESTIC HOT WATER RETURN (TEMP. AS NOTED)
	EXISTING PIPING TO BE REMOVED
— SS —	SANITARY SEWER PIPING (SOIL OR WASTE)
	SANITARY VENT PIPING
— IW —	INDIRECT WASTE
— CD —	CONDENSATE DRAIN PIPING
— D —	DRAIN PIPING
	CONNECT NEW TO EXISTING
— F —	FIRE PROTECTION (STANDPIPE, SPRINKLER, SERVICE)
	GATE VALVE
	BUTTERFLY VALVE
	BALL VALVE
FD	FLOOR DRAIN
WCO	WALL CLEANOUT
CO CO	CLEANOUT PLUG
	DIRECTION OF SLOPE
	DIRECTION OF FLOW
	CAP OUTLET OR PLUGGED OUTLET
	CAP SANITARY SEWER OR STORM PIPING

PLUMBING ABBREVIATIONS

ABV	ABOVE	FLR	FLOOR
AFF	ABOVE FINISH FLOOR	FS	FIRE SPRINKLER
AFG	ABOVE FINISH GRADE	GC	GENERAL CONTRACTOR
A/C	ABOVE CEILING	GCO	GRADE CLEANOUT
AP	ACCESS PANEL OR DOOR	IE	INVERT ELEVATION
BFF	BELOW FINISH FLOOR	INV	INVERT
BF	BELOW FLOOR	LV	LAVATORY
BG	BELOW GRADE	MS	MOPSINK
BV	AUTOMATIC BALANCING VALVE	NC	NORMALLY CLOSED
CW	DOMESTIC COLD WATER	RPPBP	REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTER.
HW	DOMESTIC HOT WATER		
HWRC	DOMESTIC HOT WATER RETURN	RL	RELOCATED
DF	DRINKING FOUNTAIN	SK	SINK
E	EXISTING	SS	SANITARY SEWER
FCO	FLOOR CLEANOUT	SS	SANITARY WASTE
FD	FLOOR DRAIN	TP	TRAP PRIMER
FF	FINISH FLOOR	V	VENT
FFD	FUNNEL FLOOR DRAIN	VTR	VENT THROUGH ROOF
FFE	FINISH FLOOR ELEVATION	WCO	WALL CLEANOUT

PROJECT DESIGN CRITERIA

LOCATION:	
CITY/STATE	AURORA, CO
APPLICABLE CODES:	
BUILDING	2015 IBC
MECHANICAL	2015 IMC
PLUMBING	2015 IPC
ENERGY	2015 IECC
ELECTRICAL	2014 NEC
LATITUDE:	
DEG. N. LAT.	39°41 N
ELEVATION:	
FT. ABOVE SEA LEVEL	5470

PLUMBING FIXTURE SCHEDULE

DESIG.	FIXTURE TYPE	San. Sewer	Vent	Cold Water	Hot Water	DESCRIPTION
(RL)MS-1	MOP SINK	2"	2"	3/4"	3/4"	RELOCATE EXISTING FLOOR MOUNTED MOP SINK BASIN AND FAUCET TO NEW LOCATION. REFER TO FLOOR PLANS FOR NEW LOCATION AND CONNECTION LOCATIONS.
SK-1	STAINLESS STEEL COUNTER MOUNTED SINK	2"	2"	1/2"	1/2"	ELKAY LRAD2219 #18 GA, TYPE 304 STAINLESS STEEL DROP-IN SINK, 6.5" DEPTH, OFF-CENTERED REAR, 2 FAUCET HOLES. PROVIDE Z8824-XL-PC STOPS, Z8700-PC P-TRAP AND Z8946-1-NT ADA TRAP, STOP AND SUPPLY PROTECTORS (WHERE APPLICABLE). PROVIDE SINK WITH CHICAGO FAUCETS MODEL NO. 895-317GN2FCCP, DECK MOUNTED 4" CENTERS FAUCET, 5-1/4" GOOSENECK FAUCET, 1.6 GPM NON-AERATING LAMINAR OUTLET AND 4" WRISTBLADES.
SS-1	SCRUB SINK	2"	2"	1/2"	1/2"	STERIS/AMSCO FLEXMATIC SCRUB SINK STATION MODEL NO. CE12-130-0, 1 STATION, STAINLESS STEEL CONSTRUCTION WITH WELDED COMPARTMENTS AND COVERED CORNERS, KNEE ACTIVATED PANEL TO CONTROL WATER FLOW, ROSE SPRAY FAUCET, NON-AERATING WATER FLOW, INTEGRAL THERMOSTATIC MIXING VALVE, CARRIER SUPPORT.

GENERAL NOTES:
1. VERIFY ALL MOUNTING HEIGHTS WITH ARCHITECTURAL DRAWINGS.
2. ALL P-TRAPS SHALL HAVE INTEGRAL CLEANOUT PLUGS.
3. ALL PLUMBING FIXTURES MUST CONFORM TO CURRENT "ADA" REQUIREMENTS FOR PERFORMANCE AND ACCESSIBILITY AS REQUIRED.
4. ALL VITREOUS CHINA FIXTURES TO BE WHITE ENAMELED.
5. ALL EXPOSED PIPING TO BE CHROME PLATED.

ZONE VALVE BOX SCHEDULE

DESIGNATION	SIZE OF PIPING & VALVE: O	A	V	N	N_2O	CO2	WAGD	LOCATION	SERVING	AREA ALARM
ZVB-4	1/2"	1/2"	1"	1/2"	1/2"	1/2"	-	-	CATH LAB - 1C-6016A	1

NOTES:
1. VERIFY ALL MOUNTING HEIGHTS WITH ARCHITECTURAL DRAWINGS.

AREA ALARM SCHEDULE

DESIGNATION	LOCATION	DESCRIPTION	REMARKS
AAP-4	NURSE STATION - 1C-5006A	MONITORS ZVB-4	BASIS OF DESIGN: BEACON MEDAES MODEL # 6-TA2A32R LARGE AREA ALARM

City of Aurora Building Division
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2009 INTERNATIONAL CODES & 2011 NEC

RSN: 1156136
Permit #: 2016 1191012

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No.	Description	Date

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	AL
Checked by	WS

Sheet Title: PLUMBING LEGENDS, GENERAL NOTES, AND ABBREVIATIONS

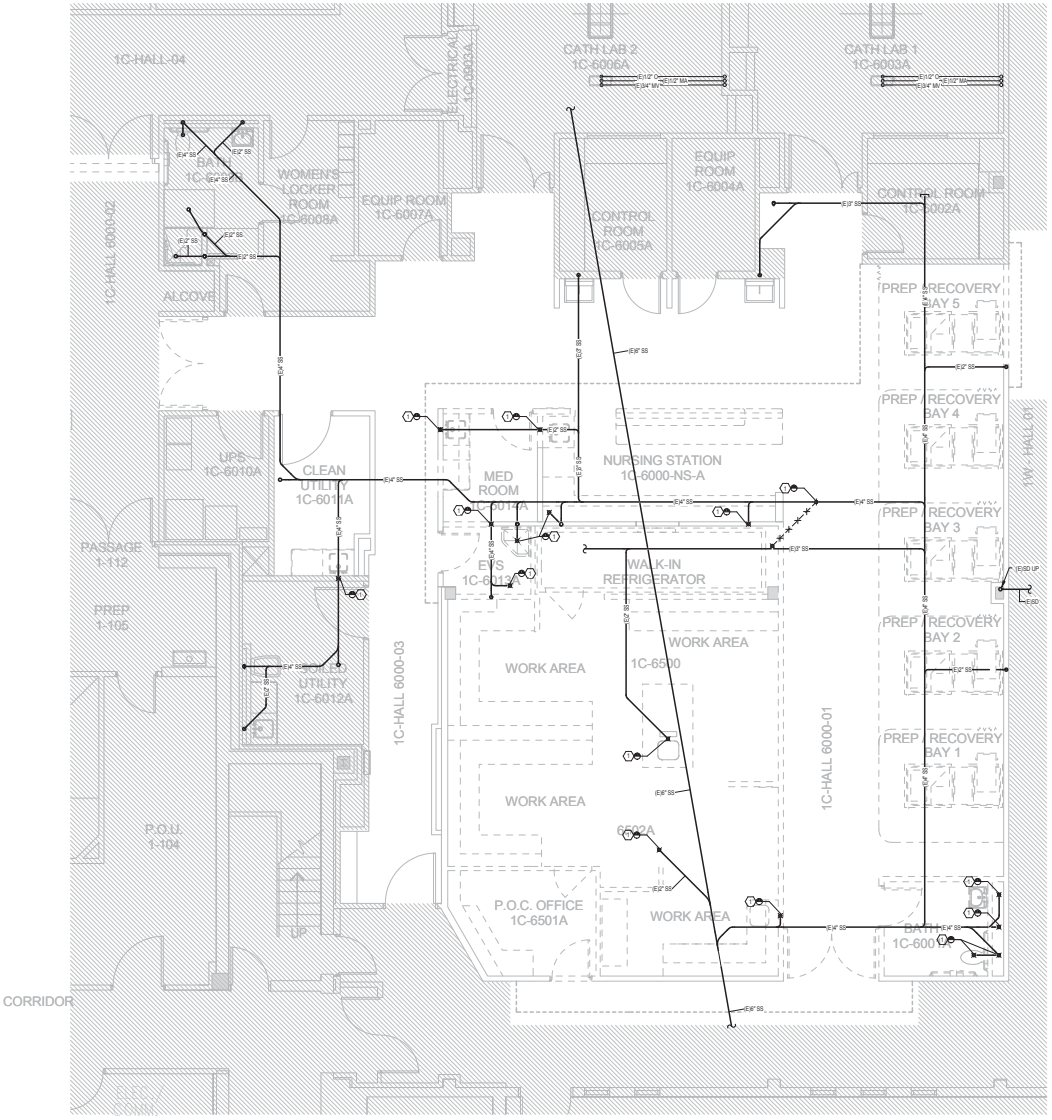
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GENERAL NOTES:

A. REFER TO SHEET P.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1 EXISTING SANITARY SEWER PIPING TO BE ABANDONED IN PLACE. CAP AND SEAL WATER/AIR TIGHT AT FLOOR.

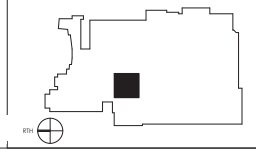


1 LEVEL 00 CATH LAB - UNDERFLOOR PLUMBING DEMOLTION
1/4" = 1'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
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2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1156136*
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KEY PLAN



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No.	Description	Date

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
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Sheet Title:
UNDERFLOOR PLAN - PLUMBING DEMOLITION

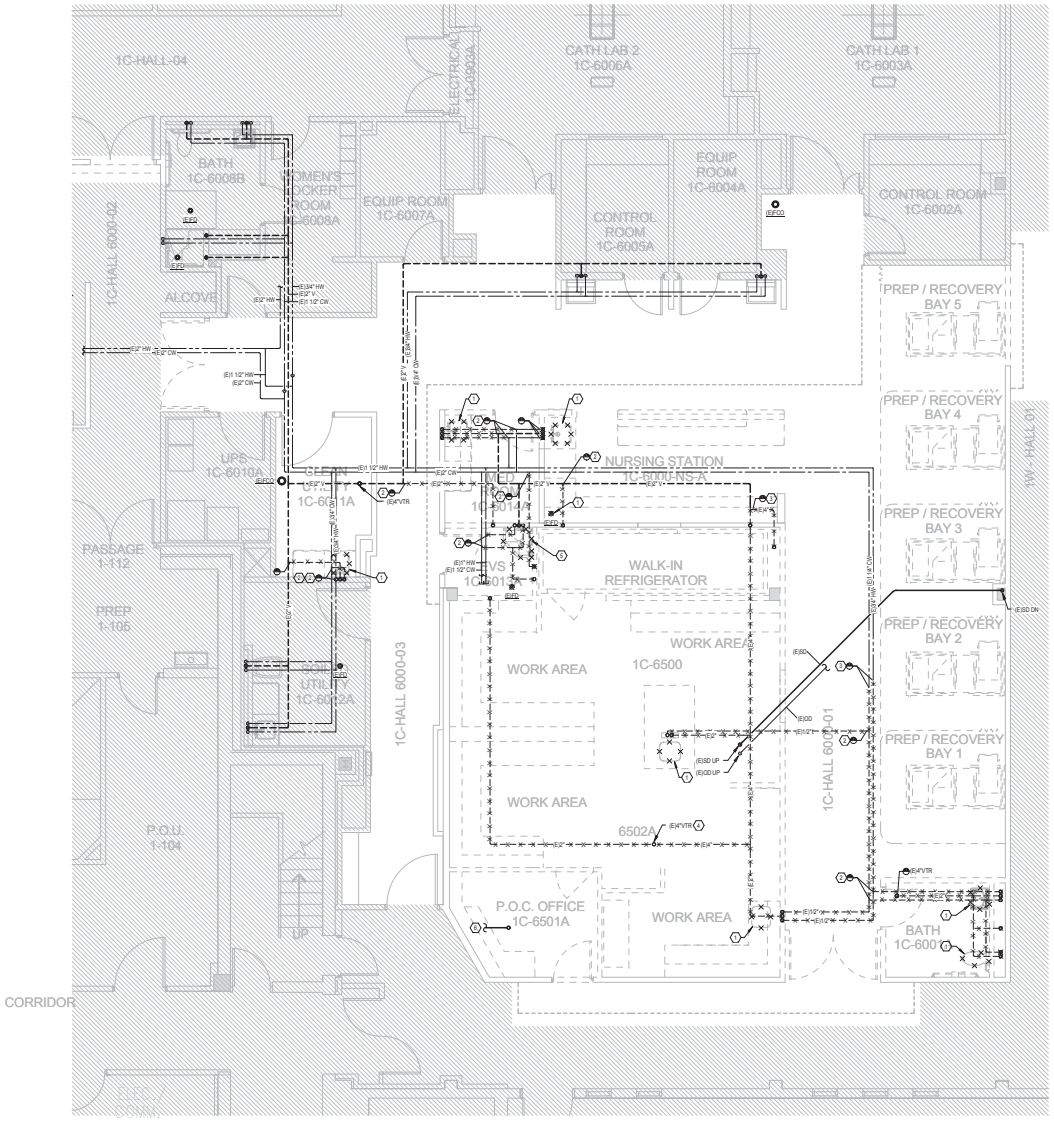
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PD.101

GENERAL NOTES:

A. REFER TO SHEET P.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1. DEMOLISH EXISTING PLUMBING FIXTURE
2. DEMOLISH EXISTING PIPING BACK TO EXISTING MAIN. CAP AND SEAL WATERMAIN TIGHT.
3. DEMOLISH EXISTING PIPING BACK TO POINT SHOWN. PREPARE FOR NEW CONNECTION.
4. DEMOLISH EXISTING 4"VTR. PATCH AND SEAL ROOF PENETRATION PER ARCHITECTURAL DRAWINGS.
5. DEMOLISH EXISTING PLUMBING FIXTURE AND PREPARE FOR RE-LOCATION.
6. DEMOLISH EXISTING SANITARY PIPING AND REROUTE TO NEW LOCATION.

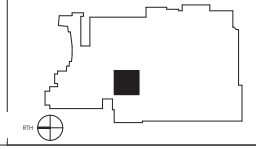


1 LEVEL 01 CATH LAB - PLUMBING DEMOLITION PLAN
1/4" = 1'-0"

City of Aurora Building Division
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Sheet Title:
FLOOR PLAN - PLUMBING DEMOLITION

Sheet Number
PD.201

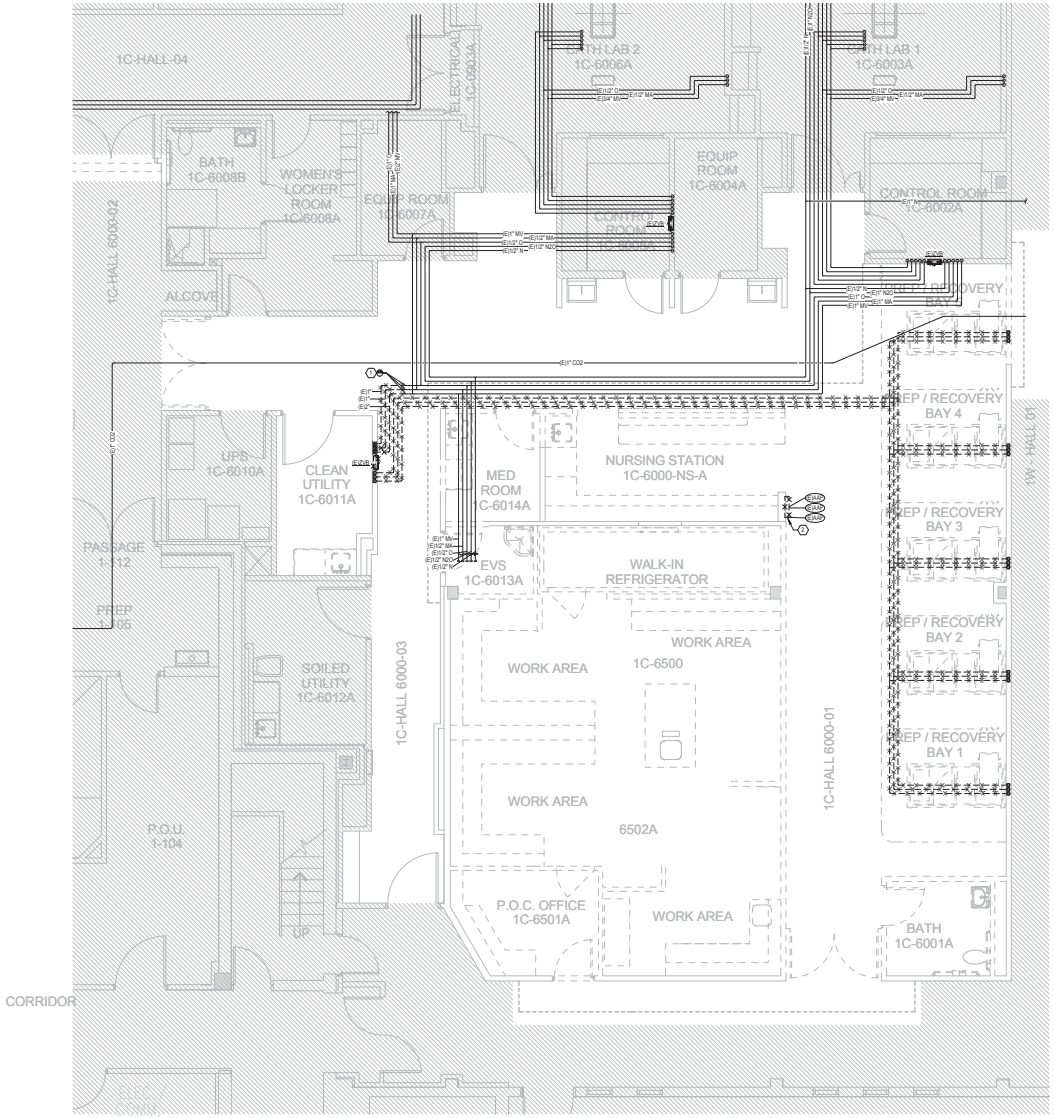
med gas to be inspected by a certified
Med Gas Inspector

GENERAL NOTES:

A. REFER TO SHEET P.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1. DEMOLISH EXISTING MEDICAL GAS PIPING. PROVIDE PROVISIONS FOR "SMART TAP" CONNECTION IN THE EVENT THAT ISOLATION VALVES DO NOT EXIST.
2. EXISTING AREA ALARM PANELS SHALL BE RELOCATED TO NEW PREP/RECOVERY NURSE STATION - 1C-6006A. REFER TO NEW FLOOR PLAN FOR EXACT LOCATIONS.

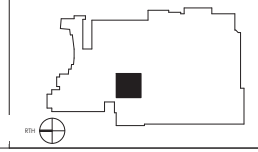


1 LEVEL 01 CATH LAB - MEDICAL GAS DEMOLITION PLAN
1/4" = 1'-0"

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TMCA CATH LAB
HYBRID LAB
RENOVATION

1501 S Potomac St,
Aurora, CO 80012

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Date	08/19/16
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Sheet Title:
FLOOR PLAN - MEDICAL GAS DEMOLITION

Sheet Number
PD.301

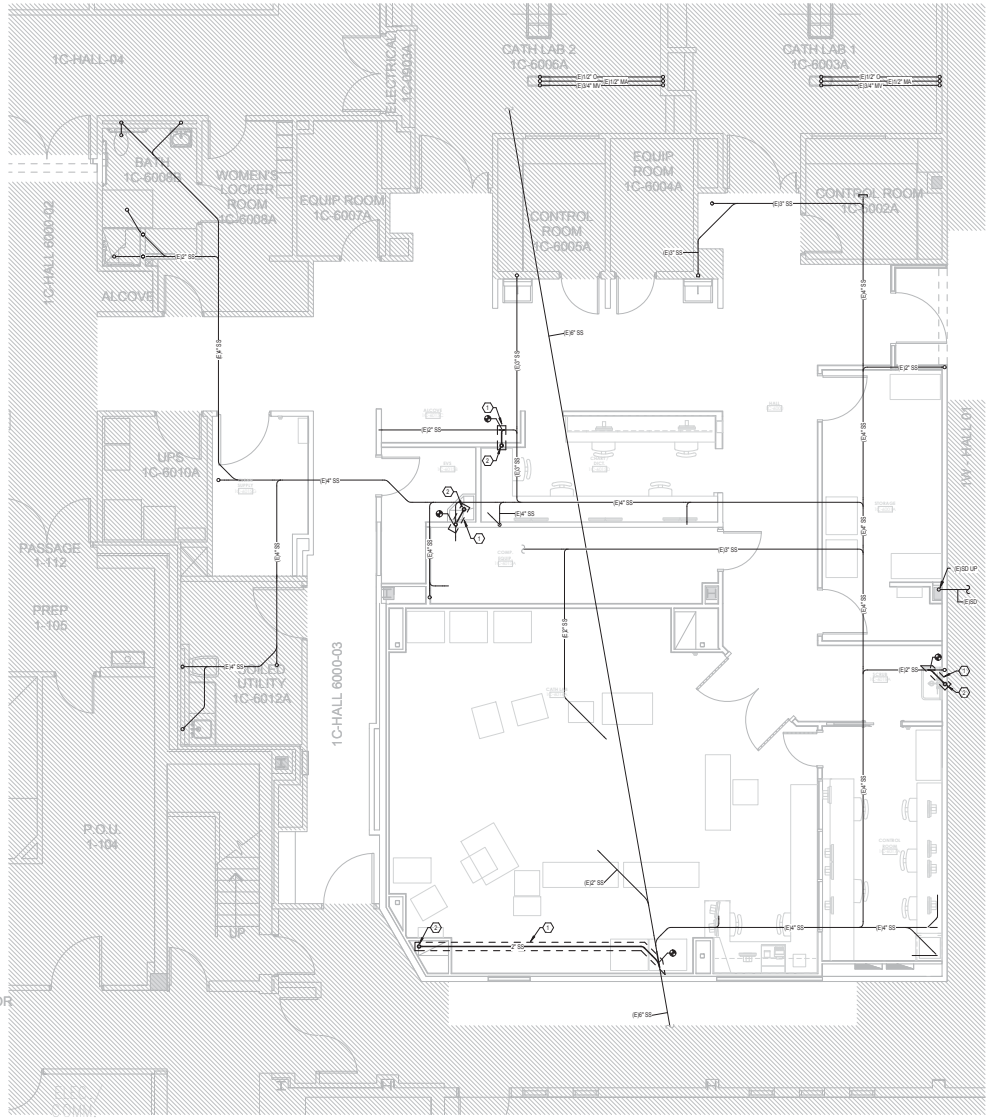
GENERAL NOTES:

A. REFER TO SHEET P.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1 SAWCUT & PROVIDE TRENCHING AS NECESSARY TO ROUTE NEW SANITARY SEWER PIPING TO EXISTING SANITARY SEWER.

2 (N)CTSS UP.

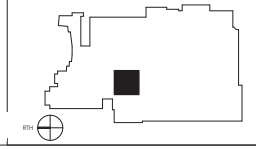


1 LEVEL 00 CATH LAB - UNDERFLOOR PLUMBING PLAN
1/4" = 1'-0"

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TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
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Sheet Title:
UNDERFLOOR PLAN - PLUMBING

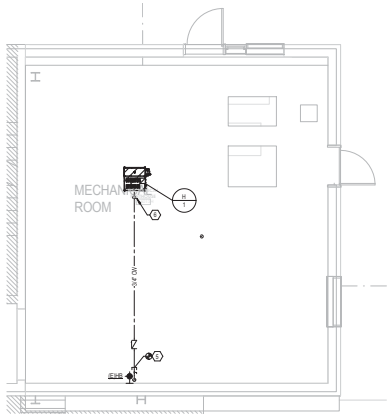
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GENERAL NOTES:

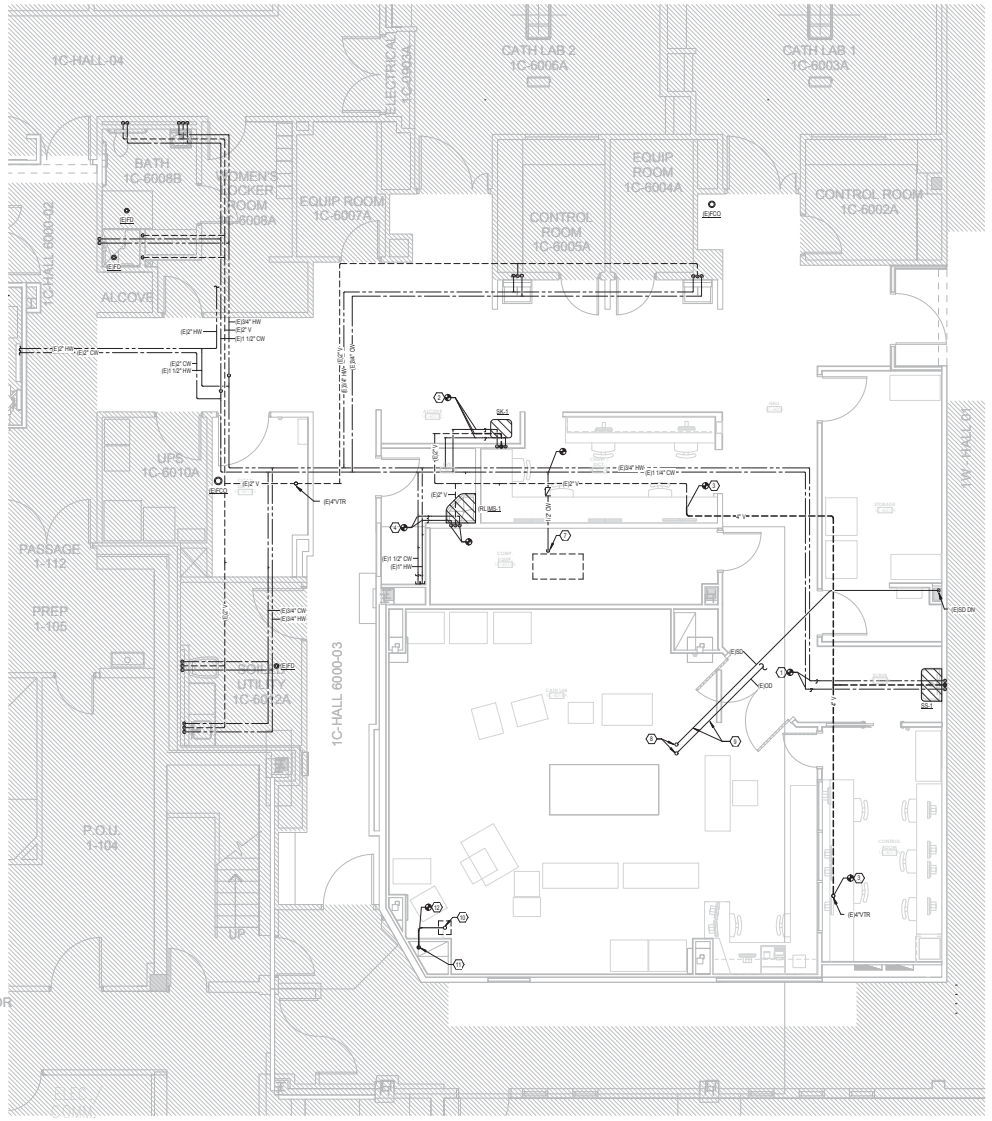
A. REFER TO SHEET P.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1. CONNECT NEW 1/2"CW AND 1/2"HW PIPING TO EXISTING MAINS.
2. CONNECT NEW 1/2"CW, 1/2"HW, AND 2"V PIPING TO EXISTING MAINS.
3. RE-ROUTE 4" VENT PIPING TO EXISTING 4" VTR.
4. PROVIDE NEW CW/HW PIPING TO RELOCATED MS-1. CONNECT NEW PIPING WITH BALL VALVES TO EXISTING CONNECTIONS.
5. CONNECT 3/4"CW TO EXISTING HOSE BIBB WITH CHECK VALVE.
6. ROUTE 3/4"CW TO STEAM GENERATOR H-1. COORDINATE FINAL CONNECTION AND LOCATION WITH ARCHITECTURAL AND MECHANICAL DRAWINGS.
7. ROUTE 1/2" CW TO CRAC UNIT HUMIDIFIER CONNECTION. PROVIDE IN LINE CHECK VALVE AND DRAIN PAN FOR ANY WET PIPE LOCATED ABOVE EQUIPMENT ROOM. ROUTE CONDENSATE DRAIN AND DRAIN PAN DRAIN TO RELOCATED MOP SINK.
8. EXISTING ROOF DRAIN PIPING UP TO ROOF DRAINS.
9. PROVIDE PROVISIONS TO RAISE EXISTING PIPING SO THAT IT IS TIGHT TO STRUCTURE. DRAIN PAN ALL ROOF DRAINAGE AND OVERFLOW ROOF DRAINAGE PIPING IN CATH LAB SPACE. ROUTE DRAIN PAN DRAINAGE TO NEAREST OPEN SITE DRAIN.
10. EXISTING SS UP TO EXISTING FLOOR SINK. DRAIN PAN ALL SS PIPING LOCATED ABOVE CATH LAB SPACE.
11. ROUTE SS PIPING DOWN AND RECONNECT TO EXISTING.
12. DRAIN PAN ALL SS PIPING IN CATH LAB SPACE. ROUTE DRAIN PAN DRAINAGE TO NEAREST OPEN SITE DRAIN.



2 LEVEL 02 PENTHOUSE - PLUMBING PLAN
1/4" = 1'-0"

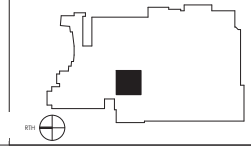


1 LEVEL 01 CATH LAB - PLUMBING PLAN
1/4" = 1'-0"

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Sheet Title:
FLOOR PLAN - PLUMBING

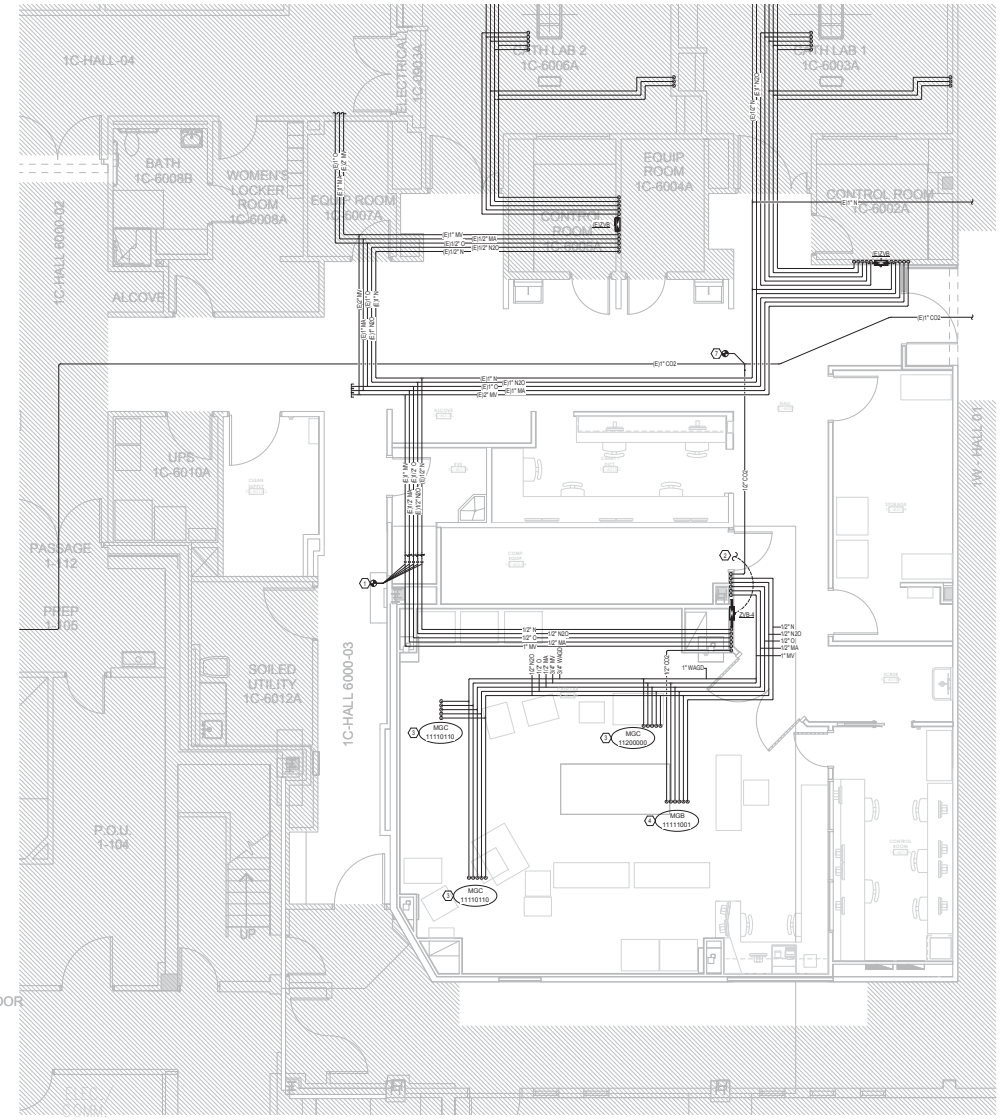
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P.201

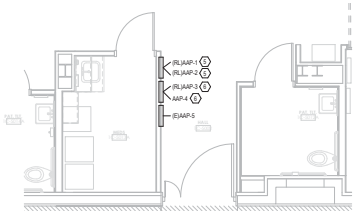
GENERAL NOTES:

A. REFER TO SHEET P.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1. CONNECT NEW MEDICAL GAS PIPING TO EXISTING CAPPED AND SEALED MAINS.
2. ZVB PRESSURE INDICATORS SHALL BE ROUTED TO AREA ALARM PANEL LOCATED IN PREP/RECOVERY NURSE'S STAION - 1C-6006A.
3. ROUTE MEDICAL GASES TO DISS CEILING OUTLETS WITH PIN INDEX CONNECTION HOSES. COORDINATE LOCATIONS WITH ARCHITECTURAL DRAWINGS.
4. ROUTE MEDICAL GASES TO EQUIPMENT BOOM PROVIDED BY OTHERS.
5. RELOCATE EXISTING AREA ALARM PANELS FOR CATH LAB #1 AND #2 TO EXISTING PANEL ROUGH-IN.
6. RELOCATE EXISTING AREA ALARM PANELS FOR CATH LAB #3 AND NEW ALARM PANEL FOR CATH LAB #4 TO EXISTING PANEL ROUGH-IN.
7. CONNECT NEW CO2 PIPING TO EXISTING MAIN. PROVIDE PROVISIONS FOR 'SMART TAP' IN THE EVENT THAT THERE ARE NO ISOLATION VALVES.



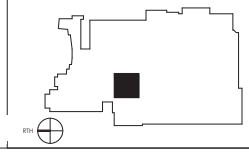


2 LEVEL 01 CATH LAB/PREP RECOVERY - MEDICAL GAS PLAN
1/4" = 1'-0"

1 LEVEL 01 CATH LAB - MEDICAL GAS PLAN
1/4" = 1'-0"

City of Aurora Building Division
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KEY PLAN



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TMCA CATH LAB HYBRID LAB RENOVATION

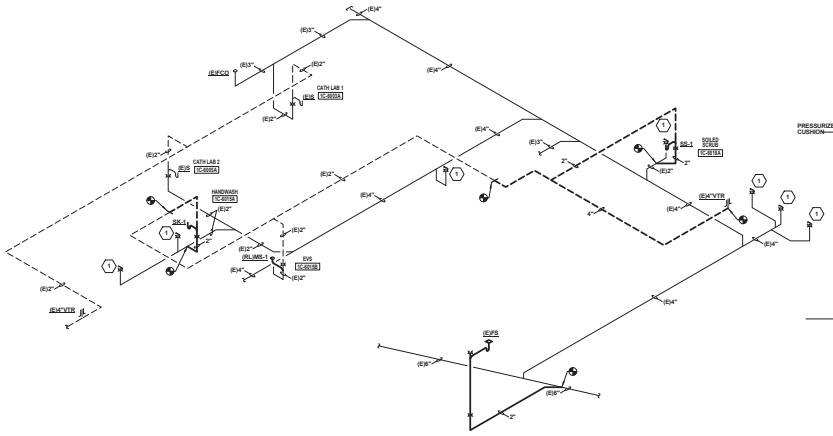
1501 S Potomac St,
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Sheet Title:
FLOOR PLAN - MEDICAL GAS

Sheet Number
P.301

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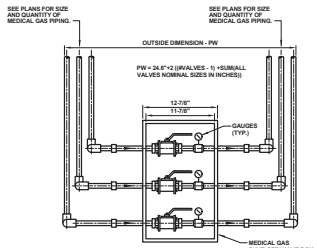


LEGEND NOTES

NOTE:
ALL FLOOR PENETRATIONS ARE AT LEVEL 01 UNLESS NOTED OTHERWISE.

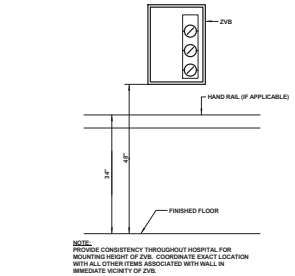
1 EXISTING SANITARY SEWER PIPING TO BE ABANDONED IN PLACE. CAP & SEAL WATER/AIR TIGHT AT FLOOR.

01 WASTE AND VENT RISER DIAGRAM
NO SCALE



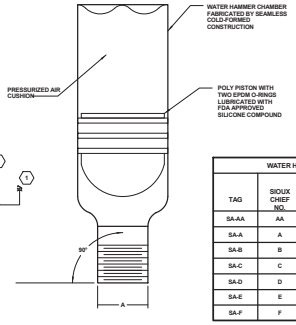
FRONT VIEW

09 ZONE VALVE BOX DETAIL
NO SCALE



NOTE:
PROVIDE CONSISTENCY THROUGHOUT HOSPITAL FOR MOUNTING HEIGHT OF ZVB. COORDINATE EXACT LOCATION WITH ALL OTHER ITEMS ASSOCIATED WITH WALL IN IMMEDIATE VICINITY OF ZVB.

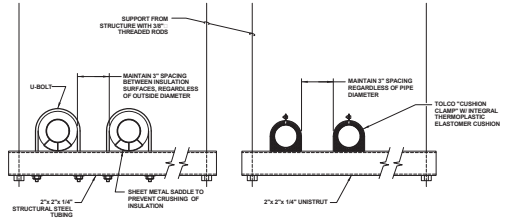
08 ZONE VALVE BOX MOUNTING DETAIL
NO SCALE



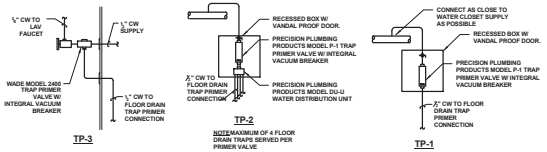
WATER HAMMER ARRESTOR SCHEDULE					
TAG	SIOUX CHIEF NO.	FIXTURE UNIT RATING	DIMENSIONS - FOR THREADED CONN.		
			OVERALL HEIGHT	CHAMBER WIDTH	CONN SIZE
SA-AA	AA	1-4	3-3/8"	7/8"	1/2"
SA-A	A	4-11	8-1/4"	1-3/8"	1/2"
SA-B	B	12-32	8-3/4"	1-3/8"	3/4"
SA-C	C	33-60	11"	1-3/8"	1"
SA-D	D	61-113	10-1/8"	2-1/8"	1"
SA-E	E	114-154	12-5/8"	2-1/8"	1"
SA-F	F	155-330	15-1/8"	2-1/8"	1"

NOTE:
1. ALWAYS INSTALL IN UPRIGHT POSITION. PROVIDE PANEL IN WALL FOR ACCESS.
2. SHOCK ARRESTORS SHALL BE PROVIDED AT ALL FIXTURES AND BATTERIES OF FIXTURES WHETHER OR NOT SHOWN ON DRAWINGS.

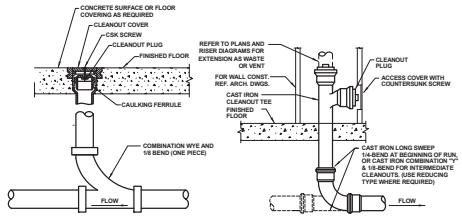
07 WATER HAMMER ARRESTOR
NO SCALE



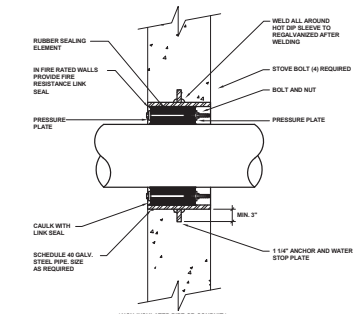
06 TRAPEZE PIPE HANGER DETAILS
NO SCALE



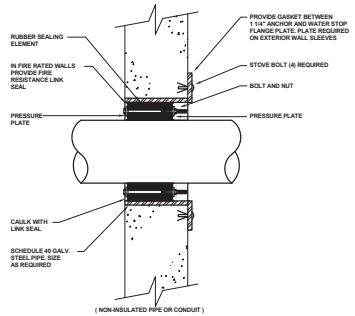
05 TRAP PRIMER DETAILS
NO SCALE



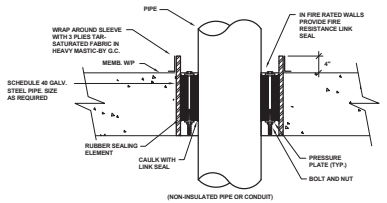
04 INTERIOR CLEANOUT DETAIL - FINISHED ROOMS
NO SCALE



03 PIPE SLEEVE THRU NEW WALL
NO SCALE



02 PIPE SLEEVE THRU EXISTING WALL
NO SCALE



01 PIPE SLEEVE THRU EXISTING FLOOR
NO SCALE

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No.	Description	Date

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	AL
Checked by	WS

Sheet Title:
PLUMBING ISOMETRIC AND DETAILS

Sheet Number
P.401

GENERAL NOTES

GENERAL CONDITIONS

A1 THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND IT IS THE INTENT AND MEANING OF THE CONTRACT DOCUMENTS THAT THE CONTRACTOR SHALL PROVIDE AN ELECTRICAL INSTALLATION THAT IS COMPLETE AND ALL ITEMS AND APPURTENANCES NECESSARY, REASONABLE INCIDENTAL, OR CUSTOMARILY INCLUDED, EVEN THOUGH EACH AND EVERY ITEM IS NOT SPECIFICALLY CALLED OUT OR SHOWN. THE CONTRACTOR SHALL PROVIDE ALL EQUIPMENT, MATERIALS, LABOR, SUPERVISION AND SERVICE NECESSARY SO AS TO PROVIDE A COMPLETE, FUNCTIONING ELECTRICAL SYSTEM IN SAFE WORKING ORDER.

A2 SYMBOLS FOR VARIOUS ELEMENTS AND SYSTEMS ARE SHOWN ON THE DRAWINGS. SHOULD THERE BE ANY DOUBT REGARDING THE MEANING OR INTENT OF THE SYMBOLS USED, AN INTERPRETATION SHALL BE OBTAINED FROM THE ARCHITECT IN WRITING. THE DECISION OF THE ARCHITECT SHALL BE FINAL.

A3 IT SHALL BE THE RESPONSIBILITY OF EACH CONTRACTOR TO EXAMINE THE CONTRACT DOCUMENTS CAREFULLY BEFORE SUBMITTING HIS BID, WITH PARTICULAR ATTENTION TO ERRORS, OMISSIONS, CONFLICTS WITH PROVISIONS OF LAWS AND CODES HAVING JURISDICTION, CONFLICTS BETWEEN DRAWINGS OR DRAWINGS AND SPECIFICATIONS, AND AMBIGUOUS DEFINITION OF THE EXTENT OF COVERAGE BETWEEN CONTRACTS. ANY SUCH DISCREPANCY SHALL BE BROUGHT IMMEDIATELY TO THE ATTENTION OF THE ARCHITECT FOR CORRECTION. SHOULD ANY OF THESE ERRORS, OMISSIONS, CONFLICTS, OR AMBIGUITIES EXIST, THE CONTRACTOR SHALL HAVE THEM EXPLAINED AND ADJUSTED IN WRITING BEFORE SIGNING THE CONTRACT OR PROCEEDING WITH THE WORK; OTHERWISE, HE SHALL, AT HIS OWN EXPENSE, SUPPLY THE PROPER MATERIALS AND LABOR TO MAKE GOOD ANY DAMAGE OR DEFECTS IN HIS WORK OR THE RESULTS OBTAINED THEREFROM, CAUSED BY SUCH DISCREPANCY.

A4 WHEREVER CONFLICTS OCCUR BETWEEN DIFFERENT PARTS OF THE CONTRACT DOCUMENTS, THE GREATER QUANTITY, THE BETTER QUALITY, OR LARGER SIZE SHALL PREVAIL UNLESS THE ARCHITECT INFORMS THE CONTRACTOR OTHERWISE IN WRITING.

A5 THE SCALE OF EACH DRAWING IS RELATIVELY ACCURATE; ANY DIMENSIONS SHOWN ARE APPROXIMATE TO CENTERLINE FROM ASSUMED BUILDING PERIMETER. THE CONTRACTOR SHALL OBTAIN THE NECESSARY DIMENSIONS FOR ANY EXACT TAKEOFFS FROM THE ARCHITECT. NO ADDITIONAL COST TO THE OWNER WILL BE CONSIDERED FOR FAILURE TO OBTAIN EXACT DIMENSIONS WHERE NOT CLEAR OR IN ERROR ON THE DRAWINGS. ANY DEVICE OR FIXTURE ROUGHED IN IMPROPERLY AND NOT POSITIONED ON IMPLIED CENTER-LINES OR AS REQUIRED BY GOOD PRACTICE MUST BE REPOSITIONED AT NO COST TO THE OWNER.

A6 ALL WORK AND MATERIALS SHALL BE GUARANTEED FREE FROM DEFECTS FOR A MINIMUM PERIOD OF ONE YEAR UNLESS NOTED OTHERWISE. THE WARRANTY PERIOD SHALL BEGIN AT THE DATE OF BENEFICIAL OCCUPANCY OF THE FACILITY.

A7 THE CONTRACTOR IS RESPONSIBLE FOR FILING AND PAYING ALL FEES AND OBTAINING NECESSARY PERMITS AND CERTIFICATES OF INSPECTION. THE CONTRACTOR SHALL DELIVER ALL CERTIFICATES OF INSPECTION TO OWNER/CONSTRUCTION MANAGER INCLUDING COPIES WITH MAINTENANCE MANUALS.

A8 ONLY EXPERIENCED CRAFTSMEN KNOWLEDGEABLE IN THEIR RESPECTIVE TRADE SHALL PERFORM THE WORK DESCRIBED IN THE CONSTRUCTION DOCUMENTS.

A9 ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST ADDITION OF NFPA STANDARD 70 (NATIONAL ELECTRICAL CODE). CONTRACTOR SHALL ALSO CONFORM TO ALL APPLICABLE LOCAL CODES AND AMENDMENTS.

A10 ALL ELECTRICAL EQUIPMENT, INCLUDING BUT NOT LIMITED TO SWITCHGEAR, CONDUIT, WIRE, BOXES AND FITTINGS SHALL BE NEW AND SHALL MEET NEMA AND ANSI STANDARDS AND SHALL BEAR THE UL LABEL.

A11 PROVIDE SHOP DRAWINGS FOR ENGINEER'S REVIEW FOR ALL ELECTRICAL EQUIPMENT, DEVICES, AND MATERIALS PROPOSED TO BE PROVIDED UNDER THIS CONTRACT. ANY DEVIATIONS FROM ITEMS SPECIFIED SHALL BE CLEARLY IDENTIFIED AND SEPARATELY SUBMITTED WITH A FORMAL SUBSTITUTION REQUEST. REFER TO SPECIFICATIONS (PROJECT MANUAL) FOR REQUIREMENTS.

ELECTRICAL EQUIPMENT

B1 PROVIDE AN IDENTIFICATION NAMEPLATE FOR EACH ELECTRICAL EQUIPMENT, APPURTENANCE DEPICTING THE DESIGNATION INDICATED ON THE DRAWINGS. REFER TO SPECIFICATIONS FOR EXACT REQUIREMENTS.

B2 WEATHERPROOF ENCLOSURES SHALL BE PROVIDED FOR ALL ELECTRICAL EQUIPMENT, DEVICES AND APPURTENANCES (ALL SYSTEMS) INSTALLED OUTDOORS.

B3 CONTRACTOR SHALL COORDINATE AND SCHEDULE ALL POWER OUTAGES WITH OWNER'S REPRESENTATIVE.

B4 CONTRACTOR SHALL NOT USE PERMANENT INK WHEN MAKING FIELD MARKINGS OR TEMPORARY CIRCUIT LABELS ON PANELS. CONTRACTOR SHALL USE REMOVABLE TAPE/TAGS FOR ALL TEMPORARY MARKINGS AND SHALL REMOVE THESE TEMPORARY MARKINGS AT THE CONCLUSION OF THIS PROJECT.

CONDUIT & RACEWAY

C1 ALL WORK SHALL BE COORDINATED SO THAT INTERFERENCES ARE AVOIDED. PROVIDE ALL NECESSARY OFFSETS IN CONDUITS, RACEWAYS, ETC., REQUIRED TO PROPERLY INSTALL THE WORK. EXPOSED WORK MUST BE KEPT AS CLOSE AS POSSIBLE TO WALLS, CEILINGS, COLUMNS, ETC., SO AS TO TAKE UP MINIMUM AMOUNT OF SPACE; ALL OFFSETS, FITTINGS, ETC., REQUIRED SHALL BE PROVIDED WITHOUT ADDITIONAL EXPENSE TO THE OWNER. WORK SHALL BE COORDINATED WITH OTHER TRADES.

C2 CONDUIT RUNS ARE DIAGRAMMATIC IN NATURE. CONTRACTOR IS RESPONSIBLE FOR SIZING AND LOCATING PULL BOXES PER N.E.C. AND FOR COORDINATION WITH OTHER DISCIPLINES.

C3 CONTRACTOR SHALL PROVIDE AND INSTALL ADEQUATE SUPPORTS NECESSARY FOR THE RACEWAY SYSTEM. THIS INCLUDES BUT IS NOT LIMITED TO BLOCKING FOR SURFACE AND FLUSH MOUNTED PANELS. CONTRACTOR SHALL REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SIZES AND QUANTITIES OF ALL SUPPORTING MEANS.

C4 PENETRATIONS OF WALLS, FLOORS, AND ROOFS FOR THE PASSAGE OF ELECTRICAL RACEWAYS SHALL BE APPROVED BY THE STRUCTURAL ENGINEER OF RECORD PRIOR TO THE COMMENCEMENT OF WORK. ALL SUCH PENETRATIONS SHALL BE PROPERLY SEALED OFF AFTER INSTALLATION OF RACEWAY SO AS TO MAINTAIN THE STRUCTURAL, WATER PROOF, AND FIRE PROOF INTEGRITY OF THE WALL, FLOOR, OR ROOF SYSTEM PENETRATED.

C5 THE CONTRACTOR SHALL SEAL ALL CONDUITS THAT PENETRATE THE FLOOR SLAB TO MAKE THEM WATER TIGHT. THE CONDUITS SHALL BE DRIED PRIOR TO INSTALLATION OF WIRE/CABLE AND SHALL BE SEALED AT TERMINATIONS.

C6 ALL PENETRATIONS THROUGH FIRE RATED WALLS OR PARTITIONS SHALL BE MADE IN ACCORDANCE WITH U.L. 483 "FIRE RESISTANCE DIRECTORY". PENETRATIONS SHALL BE SLEEVED AND SEALED WITH A UL APPROVED FIRE RATED SEALANT. REFER TO ARCHITECTURAL PLANS FOR FIRE RATED WALLS.

C7 ALL EMPTY CONDUIT SYSTEMS SHALL CONTAIN A PULL WIRE FOR FUTURE PULLING OF CONDUCTORS.

BRANCH CIRCUITS AND FEEDERS

D1 UNLESS NOTED OTHERWISE, ALL CIRCUITS 100' OR LESS SHALL BE MINIMUM #12 AWG WIRE SIZE. CIRCUITS OVER 100' BUT LESS THAN 200' SHALL BE MINIMUM #10 AWG WIRE SIZE. CIRCUITS OVER 200' SHALL BE MINIMUM #8 AWG WIRE SIZE.

D2 ALL POWER WIRING SHALL BE INSTALLED IN CONDUIT. CONDUCTOR SIZES #12 AWG AND SMALLER SHALL BE SOLID. CONDUCTOR SIZES #10 AWG AND LARGER MAY BE STRANDED.

D3 A SEPARATE INSULATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE PULLED WITH THE CIRCUIT CONDUCTORS FOR GROUNDING WHETHER OR NOT INDICATED ON THE DRAWINGS. METAL RACEWAY, OR A CABLE ARMOR OR SHEATH SHALL NOT BE USED AS AN EQUIPMENT GROUNDING CONDUCTOR.

D4 CONTRACTOR SHALL GROUND ALL EQUIPMENT AND ELECTRICAL SYSTEM PER N.E.C.

WIRING DEVICES

E1 REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR LOCATION AND MOUNTING HEIGHT OF ALL WALL AND FLOOR MOUNTED ELEMENTS (OUTLETS, LIGHT SWITCHES, CONTROLLERS, POKE-THRU, ETC). ALL WALL/FLOOR MOUNTED ITEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE ARCHITECTURAL DIMENSIONED DRAWINGS. IF LOCATION FOR AN ITEM IS NOT SHOWN ON THE ARCHITECTURAL DRAWINGS, VERIFY THE EXACT LOCATION OF THE ITEM WITH THE ARCHITECT PRIOR TO INSTALLATION. THESE REQUIREMENTS APPLY TO ALL WALL/FLOOR TYPES IN ALL AREAS. DO NOT SCALE OR DIMENSION LOCATIONS FROM THESE DRAWINGS.

E2 CONTRACTOR SHALL COORDINATE THE LOCATION AND INSTALLATION DETAIL OF OUTLETS IN MILLWORK WITH ARCHITECTURAL DRAWINGS (WALL ELEVATIONS, MILLWORK DETAILS, ETC.) AND WITH MILLWORK MANUFACTURER PRIOR TO ELECTRICAL ROUGH-IN.

E3 WALL AND FLOOR MOUNTED POWER RECEPTACLES SHOWN NEAR DATA OUTLETS SHALL BE LOCATED WITHIN SIX (6) INCHES OF THE DATA OUTLET. LOCATE AT SAME MOUNTING HEIGHT UNLESS NOTED OTHERWISE.

E4 PROVIDE METAL BACKBOX MOUNTING BRACKET (CADDY #RBS SERIES OR SIMILAR) TO MOUNT DEVICE BETWEEN METAL/WOOD STUDS AT SAME ELEVATION AND EQUAL SPACING.

E5 CONTRACTOR SHALL VERIFY THE EXACT POWER CONNECTION TYPE AND NEMA CONFIGURATION OF RECEPTACLES FOR EQUIPMENT FURNISHED BY THE OWNER, OTHER TRADES, OR UNDER A SEPARATE SECTION OF THIS CONTRACT PRIOR TO ELECTRICAL ROUGH-IN.

E6 MOUNT ALL RECEPTACLES THROUGHOUT THE PROJECT WITH THE GROUND POLE AT THE TOP OF THE CONFIGURATION WHEN MOUNTED VERTICALLY, AND ON THE RIGHT WHEN MOUNTED HORIZONTALLY.

E7 ALL RECEPTACLES WITHIN SIX FEET OF ANY PLUMBING FIXTURE AND/OR SINK SHALL BE EQUIPPED WITH GFCI FOR PERSONNEL PROTECTION.

E8 ALL RECEPTACLES LOCATED OUTSIDE THE BUILDING ENVELOPE SHALL BE HOUSED IN ENCLOSURES THAT ARE RATED 'WEATHER-PROOF-WHILE-IN-USE' AND SHALL BE EQUIPPED WITH GFCI FOR PERSONNEL PROTECTION.

E9 ALL GFCI RECEPTACLES SHALL BE CONNECTED SO THAT ALL DEVICES ON THE SAME CIRCUIT AS THE GFCI RECEPTACLE DO NOT DE-ENERGIZE UPON TRIPPING. ALL GFCI RECEPTACLES SHALL INCLUDE A LOCK-OUT FUNCTION TO PROTECT AGAINST THE USE OF MISWIRED DEVICES OR DEVICES THAT HAVE BEEN DAMAGED DUE TO DISABLING SURGES.

E10 FINISH COLORS OF DEVICES AND CORRESPONDING COVER PLATES SHALL BE SELECTED AND APPROVED BY THE ARCHITECT. SPECIALTY RECEPTACLES AND COVERPLATES (I.E. ISOLATED GROUND, EMERGENCY, CRITICAL BRANCH, SURGE SUPPRESSION, ETC.) SHALL BE THE COLOR NOTED IN ELECTRICAL CONSTRUCTION DOCUMENTS.

LIGHTING SYSTEM

G1 REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR LOCATION OF ALL CEILING ELEMENTS (LIGHTS, SPRINKLERS, DIFFUSERS, ETC). ALL CEILING MOUNTED ITEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE ARCHITECTURAL DIMENSIONED DRAWINGS. IF LOCATION FOR AN ITEM IS NOT SHOWN ON THE ARCHITECTURAL DRAWINGS, VERIFY THE EXACT LOCATION OF THE ITEM WITH THE ARCHITECT PRIOR TO INSTALLATION. THESE REQUIREMENTS APPLY TO ALL CEILING TYPES IN ALL AREAS. DO NOT SCALE OR DIMENSION LOCATIONS FROM THESE DRAWINGS.

G2 CONTRACTOR SHALL PROVIDE AND INSTALL ALL SUPPORTS FOR LIGHT FIXTURES. SUPPORTS SHALL BE INDEPENDENT OF THE CEILING GRID SUPPORT SYSTEM.

G3 LIGHT SWITCHES LOCATED IN A ROOM SHALL CONTROL ALL THE LIGHT FIXTURES IN THAT ROOM UNLESS NOTED OTHERWISE. CONTRACTOR SHALL GANG TOGETHER ALL SWITCHES/DIMMERS UNDER A SINGLE COVER PLATE IN ALL AREAS THAT REQUIRE MORE THAN ONE SWITCH TO CONTROL ELECTRICAL DEVICES.

G4 WALLBOX DIMMERS SHALL BE INSTALLED IN A MANNER SUCH THAT THEIR LISTED WATTAGE IS NOT DERATED DUE TO HEAT. SPACE ACCORDING TO DIMMER MANUFACTURER'S RECOMMENDATIONS AND PROVIDE 'WIDE-FIN' DESING DIMMERS WHERE REQUIRED.

G5 ALL LIGHT FIXTURES SHALL BE INSTALLED WITH APPROPRIATE LAMPS AS INDICATED. FIXTURES SHALL ALSO BE INSTALLED WITH BALLASTS WHERE NECESSARY.

OCCUPANCY SENSOR NOTES:

H1 ALL SENSOR LOCATIONS ARE APPROXIMATE. REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS PRIOR TO INSTALLATION.

H2 ULTRASONIC CEILING MOUNT SENSORS SHOULD BE LOCATED A MINIMUM OF SIX (6) FEET FROM HVAC SUPPLY/RETURN VENTS.

H3 CONTRACTOR IS RESPONSIBLE FOR PROPER SENSITIVITY AND TIME DELAY SETTINGS FOR NON-ADAPTIVE PRODUCTS, FOLLOWING THE MANUFACTURER'S RECOMMENDED PLACEMENT, AND FIELD VERIFICATION OF CIRCUITS WITH RESPECT TO POWER PACK PLACEMENT.

H4 CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF REQUIRED NUMBER OF POWER PACKS:
A. ONE POWER PACK IS REQUIRED FOR EACH CONTROLLED CIRCUIT;
B. SEVERAL SENSORS AND ADD-A-RELAYS CAN BE WIRED IN PARALLEL TO A SINGLE POWER PACK, NOT TO EXCEED 150mA TOTAL POWER CONSUMPTION;
C. IF MULTIPLE CIRCUITS ARE TO BE CONTROLLED BY A SINGLE SENSOR, AUXILIARY RELAYS MAY BE USED IN CONJUNCTION WITH A POWER PACK.

H5 SENSORS MOUNTED OVER DOORWAYS SHOULD BE PLACED ONE (1) FOOT INSIDE THRESHOLD.

MECHANICAL & PLUMBING COORDINATION

I1 CONTRACTOR SHALL REFERENCE THE MECHANICAL AND PLUMBING DRAWINGS FOR ALL EQUIPMENT NEEDING ELECTRICAL CONNECTIONS. MAKE ALL CONNECTIONS AND PROVIDE APPROPRIATE WIRE, CONDUIT, AND OVERCURRENT PROTECTION FOR ALL EQUIPMENT.

I2 DISCONNECTING MEANS FOR ALL MECHANICAL AND PLUMBING EQUIPMENT SHALL BE MOUNTED INDEPENDENTLY OF THE EQUIPMENT.

I3 ALL CIRCUIT BREAKERS SERVING MECHANICAL EQUIPMENT SHALL BEAR AN 'HACR' RATING.

I4 CONTRACTOR SHALL COORDINATE BETWEEN TRADES AND PROVIDE CONTROL POWER FOR ALL VAV BOXES/DAMPERS/ETC, AS REQUIRED TO ENSURE A COMPLETE, FULLY FUNCTIONAL HVAC SYSTEM. SHOULD AN EXACT CIRCUIT NUMBER NOT BE INDICATED ON ELECTRICAL DRAWINGS, CONTRACTOR SHALL UTILIZE AVAILABLE 20A/1P SPACE FROM THE NEAREST 208V/120V PANEL OR FROM BUILDING CONTROL POWER DISTRIBUTION SYSTEM.

I5 CONTRACTOR SHALL COORDINATE MOTOR DISCONNECT AND CONTROL WITH MECHANICAL DRAWINGS AND BETWEEN TRADES.

I6 COORDINATE ALL REQUIRED ENERGY MANAGEMENT SYSTEM POINTS AND CONTACT CONNECTIONS TO ENSURE THE COMPLETE AND PROPER OPERATION OF ALL SYSTEMS.

I7 ALL DISCONNECTS DOWN STREAM OF VFDs SHALL BE PROVIDED WITH AUXILIARY CONTACTS TO SHUT DOWN UPSTREAM VFD WHEN SWITCH IS OPENED.

EMERGENCY POWER SYSTEM

J1 ALL EMERGENCY SYSTEMS SHALL BE RUN IN A SEPARATE RACEWAY/CONDUIT SYSTEM AND SHALL BE CLEARLY LABELED AS SUCH.

LIGHTNING PROTECTION SYSTEM

K1 THE EXISTING FACILITY PROVECTRON SYSTEM SHALL BE EXTENDED AS REQUIRED TO SERVE THE NEW BUILDING. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ALL THE REQUIRED UPGRADES TO THE EXISTING PROVECTRON SYSTEM IN ORDER TO PROTECT THE NEW BUILDING.

DOOR HARDWARE COORDINATION

L1 CONTRACTOR SHALL PROVIDE 120V, 20A CIRCUIT CONNECTION TO ALL DOOR HEADERS WITH ELECTRONIC DEVICES. EACH DOOR CONNECTION SHOULD BE PROVIDED WITH LOCAL DISCONNECTING MEANS.

L1 COORDINATE ALL DOOR CONNECTIONS WITH FIRE ALARM SYSTEM. FIRE ALARM SYSTEM SHALL PROVIDE ALL RELAYS FOR CONNECTION TO ELECTRONICALLY OPERATED DOORS. FIRE ALARM SYSTEM SHALL PROVIDE ALL RELAYS WITH AN EXTERNAL TEST SWITCH FOR FACILITY TESTING.

ELECTRICAL DEMOLITION NOTES

A. PROVIDE UPDATED, TYPE-WRITTEN PANEL DIRECTORY OF ALL CORRECT CIRCUITS WITH LOAD DEFINITIONS FOR EACH PANEL BOARD. DIRECTORY SHALL BE LOCATED INSIDE PANEL DOOR.

B. INFORMATION PROVIDED ON THESE DRAWINGS HAS BEEN TAKEN FROM DESIGN DRAWINGS AND FIELD OBSERVATIONS. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS PRIOR TO PRICING AND COMMENCEMENT OF WORK.

C. WHERE EXISTING WALLS ARE DEMOLISHED, REMOVE ALL EXISTING ELECTRICAL DEVICES AND THEIR ASSOCIATED CONDUITS AND WIRING BACK TO THE POINT OF ORIGINATION. ENERGIZE ALL EXISTING DEVICES THAT WERE INTERRUPTED DURING DEMOLITION. WHERE ENTIRE CIRCUITS ARE REMOVED, TURN THE CIRCUIT BREAKER OFF AND LABEL AS "SPARE".

D. PROVIDE FOR ANY AND ALL DEMOLITION WORK NECESSARY TO ACCOMMODATE ALL NEW CONSTRUCTION, INCLUDING ARCHITECTURAL, MECHANICAL, PLUMBING OR ELECTRICAL WORK.

E. IF DEMOLITION IS REQUIRED TO INSTALL AN ITEM, THE CONTRACTOR SHALL RESTORE THE AREA TO PREVIOUS CONDITION, OR REPLACE DAMAGED ITEMS WITH NEW ITEMS TO MATCH EXISTING.

F. DESIGNATION 'EX' REPRESENTS EXISTING DEVICE OR LIGHT FIXTURE TO REMAIN AS CIRCUITED AND SWITCHED UNLESS NOTED OTHERWISE. EXISTING LIGHT FIXTURES SHALL BE CLEANED AND REPAIRED AS REQUIRED.

G. CONTRACTOR SHALL REMOVE ALL CONDUIT AND WIRING ASSOCIATED WITH DEVICES AND EQUIPMENT TO BE REMOVED AND/OR RELOCATED UNLESS NOTED OTHERWISE. PROVIDE AND INSTALL ALL NECESSARY DEVICES, EQUIPMENT AND ACCESSORIES REQUIRED TO MAINTAIN SERVICE TO ALL "EXISTING TO REMAIN" DEVICES AND EQUIPMENT THAT MAY BE INTERRUPTED DURING DEMOLITION.

H. WHERE EXISTING MECHANICAL/PLUMBING EQUIPMENT IS DEMOLISHED, REMOVE ALL RELATED ELECTRICAL FEEDS TO THE EQUIPMENT AND THEIR ASSOCIATED CONDUITS BACK TO THE POINT OF ORIGINATION.

I. SPACE ALLOCATIONS FOR MATERIALS, EQUIPMENT AND DEVICES 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. THE CONTRACTOR SHALL VERIFY THAT ALL MATERIALS, EQUIPMENT AND DEVICES PROPOSED FOR USE ON THIS PROJECT ARE WITHIN THE CONSTRAINTS OF THE ALLOCATED SPACE.

J. REFER TO ARCHITECTURAL PLANS FOR AREAS WHERE CEILING IS DEMOLISHED. REMOVE ALL LIGHTING FIXTURES AND ASSOCIATED CONDUIT AND WIRING FROM THESE LOCATIONS.

K. ALL RECEPTACLES WITHIN THE PROJECT SCOPE SHALL BE HOSPITAL GRADE TYPE. IF A DEVICE IS INDICATED AS EXISTING TO REMAIN AND IS NOT A HOSPITAL GRADE RECEPTACLE, REPLACE THE EXISTING DEVICE WITH A HOSPITAL GRADE RECEPTACLE AND RECONNECT TO EXISTING CIRCUIT.

L. ALL LIGHTING FIXTURES DEMOLISHED UNDER THESE DRAWINGS SHALL BE RETURNED TO THE OWNER.

M. CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE ALL SERVICE OUTAGES REQUIRED TO PROPERLY EXECUTE THIS PROJECT WITH OWNERS AUTHORIZED REPRESENTATIVE AND UTILITY COMPANY. PERFORM ALL WORK AS DIRECTED. INCLUDE SUITABLE ALLOWANCE IN BASE BID FOR ALL REQUIRED PREMIUM TIME, TEMPORARY EXTRA EQUIPMENT AND/OR MATERIALS FOR A COMPLETE AND OPERABLE INSTALLATION.

ELECTRCIAL ABBREVIATIONS

AAP	AREA ALARM PANEL
AFC	ABOVE FINISHED COUNTER
AFF	ABOVE FINISHED FLOOR
ATS	AUTOMATIC TRANSFER SWITCH
BFC	BELOW FINISHED CEILING
BOF	BOTTOM OF FIXTURE
C	CONDUIT
CB,C/B OR CKT BKR	CIRCUIT BREAKER
CKT	CIRCUIT
CCTV	CLOSED CIRCUIT T.V.
CLG	CEILING
CUH	CABINET HEATER
EC	EMPTY CONDUIT
ELEC	ELECTRIC
E	EMERGENCY
EMS	ENERGY MANAGEMENT SYSTEM
EP	EXPLOSION PROOF
EWC	ELECTRIC WATER COOLER
EX	EXISTING
F	FUSE
FA	FIRE ALARM
FACP, FAP	FIRE ALARM CONTROL PANEL
FCU	FAN COIL UNIT
FIXT	FIXTURE
FLR	FLOOR
FLUOR	FLUORESCENT
FTP, FTS	FAN TERMINAL UNIT
FTU	FAN TERMINAL UNIT
FUT	FUTURE
G, GND	GROUND (EQUIPMENT)
GEF	GENERAL EXHAUST FAN
GEN	GENERATOR
GFCI, GFI	GROUND FAULT CIRCUIT INTERRUPTER
HP	HORSE POWER
HV	HIGH VOLTAGE
HWAT	HEAT TRACE
IC	INTERRUPTING CAPACITY
ICAND	INCANDESCENT
IG	ISOLATED GROUND
JB	JUNCTION BOX
KEF	KITCHEN EXHAUST FAN
LTG	LIGHTING
LTS	LIGHTS
LV	LOW VOLTAGE
MATV	MASTER ANTENNA
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDP	MAIN DISTRIBUTION PANEL
MH	MANHOLE
MLO	MAIN LUGS ONLY
MTD	MOUNT OR MOUNTED
N	NEW DEVICE
NC (N.C.)	NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NF	NONFUSED
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO (N.O.)	NORMALLY OPEN
PB	PULL BOX
PNL	PANEL
PWR	POWER
R	REMOVE DEVICES
RL	RELOCATED DEVICE
RCPT(S) OR RECEPT	RECEPTACLE(S)
RF	RETURN AIR FAN
SEF	SMOKE EXHAUST FAN
SF	SUPPLY AIR FAN
SO (S.O.)	SPACE ONLY
SP	SPARE
ST (S.T.)	SHUNT TRIP
SW	SWITCH
TEL	TELEPHONE
TF	TRANSFER FAN
TP	TAMPER PROOF
TV	TELEVISION
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
UF	UNDERFLOOR
UG	UNDERGROUND
UH	UNIT HEATER
UNO (U.N.O.)	UNLESS NOTED OR INDICATED OTHERWISE
V	VOLTAGE
VFD	VARIABLE FREQUENCY DRIVE
VP	VAPOR PROOF
VV	VARIABLE VOLUME UNIT
W	WIRE
W/	WITH
WG	WIRE GUARD
WP	WEATHER PROOF
WT	WATER TIGHT
XFMR	TRANSFORMER
+xx	MOUNTING HEIGHT IN INCHES. AFF UNO.

KEY TO GENERAL NOTATIONS AND MOUNTING HEIGHTS

48" AFF INDICATES TO TOP OF DEVICE;
18" AFF INDICATES TO CENTER OF DEVICE;
60" AFF INDICATES TO BOTTOM OF DEVICE;
80" AFF INDICATES TO BOTTOM OF DEVICE;
ALL OTHER MOUNTING HEIGHTS REFER TO CENTERLINE OF DEVICE.

ARCHITECTURAL ELEVATIONS AND MOUNTING HEIGHTS SHALL TAKE PRECEDENCE OVER VALUES IN THIS SCHEDULE

2 - LEGEND NOTES: DENOTES "SEE LEGEND NOTE NO. 2"

7 - EQUIPMENT (ID) NUMBER FOR FOOD SERVICE EQUIPMENT. REFER TO FOOD SERVICE DOCUMENTS FOR DEFINITION AND REQUIREMENTS.

717629 OR 717629 - EQUIPMENT (ID) NUMBER FOR OWNER PROVIDED EQUIPMENT. REFER TO OWNER'S EQUIPMENT BOOK / FF&E DOCUMENTS FOR DEFINITION AND REQUIREMENTS.

02/E-202 - DENOTES: REFERENCE 2 IN DRAWING (SHEET) E-202

20.4 FEEDER TAG. FEEDER SIZES ARE DETERMINED BY THE FEEDER SCHEDULE ON E-6000.

PROJECT DESIGN CRITERIA

LOCATION:	
CITY/STATE	AURORA, CO
APPLICABLE CODES:	
BUILDING	2015 IBC
MECHANICAL	2015 IMC
PLUMBING	2015 IPC
ENERGY	2015 IECC
ELECTRICAL	2014 NEC
LATITUDE:	
DEG. N. LAT.	39°41 N
ELEVATION:	
FT. ABOVE SEA LEVEL	5470

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC

LIGHTING SYMBOLS LEGEND

ALL SYMBOLS SHOWN MAY NOT APPEAR IN ALL DRAWINGS. SYMBOLS ARE SHOWN SCHEMATIC AND MAY NOT BE TO SCALE.

SYMBOL	DESCRIPTION	MNTG. HT. UNO (SEE NOTE 1)
	2'x4' FLUORESCENT LIGHT FIXTURE ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	2'x4' FLUORESCENT LIGHT FIXTURE ON LIFE SAFETY CIRCUIT OR LEGALLY REQUIRED STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	2'x4' FLUORESCENT LIGHT FIXTURE ON CRITICAL CIRCUIT OR NON-ESSENTIAL STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	2'x4' FLUORESCENT LIGHT FIXTURE WITH INBOARD LAMPS ON NORMAL CIRCUIT AND OUTBOARD LAMPS ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	2'x4' FLUORESCENT LIGHT FIXTURE WITH INBOARD LAMPS ON LIFE SAFETY CIRCUIT AND OUTBOARD LAMPS ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	2'x4' FLUORESCENT LIGHT FIXTURE WITH INBOARD LAMPS ON CRITICAL CIRCUIT AND OUTBOARD LAMPS ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	2'x2' FLUORESCENT LIGHT FIXTURE ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	2'x2' FLUORESCENT LIGHT FIXTURE ON LIFE SAFETY CIRCUIT OR LEGALLY REQUIRED STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	2'x2' FLUORESCENT LIGHT FIXTURE ON CRITICAL CIRCUIT OR NON-ESSENTIAL STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	2'x2' FLUORESCENT LIGHT FIXTURE WITH INBOARD LAMPS ON NORMAL CIRCUIT AND OUTBOARD LAMPS ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	2'x2' FLUORESCENT LIGHT FIXTURE WITH INBOARD LAMPS ON LIFE SAFETY CIRCUIT AND OUTBOARD LAMPS ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	2'x2' FLUORESCENT LIGHT FIXTURE WITH INBOARD LAMPS ON CRITICAL CIRCUIT AND OUTBOARD LAMPS ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	WALL MOUNTED LINEAR FIXTURE ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	WALL MOUNTED LINEAR FIXTURE ON LIFE SAFETY CIRCUIT OR LEGALLY REQUIRED STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	WALL MOUNTED LINEAR FIXTURE ON CRITICAL CIRCUIT OR NON-ESSENTIAL STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	RECESSED/SURFACE MOUNTED LINEAR FIXTURE ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	RECESSED/SURFACE MOUNTED LINEAR FIXTURE ON LIFE SAFETY CIRCUIT OR LEGALLY REQUIRED STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	RECESSED/SURFACE MOUNTED LINEAR FIXTURE ON CRITICAL CIRCUIT OR NON-ESSENTIAL STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	RECESSED/SURFACE DOWNLIGHT FIXTURE ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	RECESSED/SURFACE DOWNLIGHT FIXTURE ON LIFE SAFETY CIRCUIT OR LEGALLY REQUIRED STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	RECESSED/SURFACE DOWNLIGHT FIXTURE ON CRITICAL CIRCUIT OR NON-ESSENTIAL STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	WALL MOUNTED FIXTURE ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	WALL MOUNTED FIXTURE ON LIFE SAFETY CIRCUIT OR LEGALLY REQUIRED STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	WALL MOUNTED FIXTURE ON CRITICAL CIRCUIT OR NON-ESSENTIAL STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	RECESSED DOWNLIGHT FIXTURE WITH WALL WASH ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	RECESSED DOWNLIGHT FIXTURE WITH WALL WASH ON LIFE SAFETY CIRCUIT OR LEGALLY REQUIRED STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	RECESSED DOWNLIGHT FIXTURE WITH WALL WASH ON CRITICAL CIRCUIT OR NON-ESSENTIAL STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	HANGING RECTANGULAR PENDANT FIXTURE ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	HANGING RECTANGULAR PENDANT FIXTURE ON LIFE SAFETY CIRCUIT OR LEGALLY REQUIRED STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	HANGING RECTANGULAR PENDANT FIXTURE ON CRITICAL CIRCUIT OR NON-ESSENTIAL STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	HANGING CIRCULAR PENDANT FIXTURE ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	HANGING CIRCULAR PENDANT FIXTURE ON LIFE SAFETY CIRCUIT OR LEGALLY REQUIRED STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	HANGING CIRCULAR PENDANT FIXTURE ON CRITICAL CIRCUIT OR NON-ESSENTIAL STANDBY SYSTEM.	SEE FIXTURE SCHEDULE
	WALL MOUNTED 90-MINUTE BATTERY-POWERED EGRESS LIGHTING ON NORMAL CIRCUIT.	SEE FIXTURE SCHEDULE
	CEILING MOUNTED EXIT SIGN. SHADING INDICATES DOUBLE OR SINGLE FACE. ARROW INDICATES CHEVRON DIRECTIONS.	SEE FIXTURE SCHEDULE
	END MOUNTED EXIT SIGN. SHADING INDICATES DOUBLE OR SINGLE FACE. ARROW INDICATES CHEVRON DIRECTIONS.	SEE FIXTURE SCHEDULE
	WALL MOUNTED EXIT SIGN. SHADING INDICATES DOUBLE OR SINGLE FACE. ARROW INDICATES CHEVRON DIRECTIONS.	SEE FIXTURE SCHEDULE
$\$_3$	3-WAY WALL SWITCH, 20A, 120/277V	48" AFF
$\$_4$	4-WAY WALL SWITCH, 20A, 120/277V	48" AFF
$\$_D$	WALL DIMMER SWITCH	48" AFF
$\$_{3D}$	3-WAY DIMMER WALL SWITCH, 20A, 120/277V	48" AFF
$\$_{LV}$	LOW VOLTAGE WALL SWITCH	48" AFF

LIGHTING NOTES:
1. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT MOUNTING HEIGHTS OF ALL DEVICES.

FIRE ALARM SYMBOLS LEGEND

ALL SYMBOLS SHOWN MAY NOT APPEAR IN ALL DRAWINGS. SYMBOLS ARE SHOWN SCHEMATIC AND MAY NOT BE TO SCALE.

SYMBOL	DESCRIPTION	MNTG. HT. UNO
F	FIRE ALARM PULL STATION WALL MOUNTED	48" AFF
	FIRE ALARM AUDIBLE VISUAL SIGNAL WALL MOUNTED	48" AFF
	FIRE ALARM AUDIBLE SIGNAL WALL MOUNTED	48" AFF
	FIRE ALARM VISUAL SIGNAL WALL MOUNTED	48" AFF
CLG	FIRE ALARM AUDIBLE VISUAL SIGNAL CEILING MOUNTED	--
CLG	FIRE ALARM AUDIBLE SIGNAL CEILING MOUNTED	--
CLG	FIRE ALARM VISUAL SIGNAL CEILING MOUNTED	--
	SMOKE DETECTOR CEILING MOUNTED	--
	DUCT SMOKE DETECTOR	--
M	ELECTRO-MAGNETIC SMOKE DOOR HOLDER (INTERFACED WITH FIRE ALARM SYSTEM. DC POWER PROVIDED BY FIRE ALARM WIRING	AS REQUIRED
FAAP	FIRE ALARM ANNUNCIATOR PANEL	__" AFF

POWER SYMBOLS LEGEND

ALL SYMBOLS SHOWN MAY NOT APPEAR IN ALL DRAWINGS. SYMBOLS ARE SHOWN SCHEMATIC AND MAY NOT BE TO SCALE.

SYMBOL	DESCRIPTION	MNTG. HT. UNO
	SINGLE RECEPTACLE - 20A/125V/2P/3W/G NEMA 5-20R	18" AFF
	DUPLEX RECEPTACLE - 20A/125V/2P/3W/G NEMA 5-20R	18" AFF
E	DUPLEX RECEPTACLE ON EMERGENCY CIRCUIT	18" AFF
GFI	DUPLEX RECEPTACLE GFCI - 20A/125V/2P/3W/G NEMA 5-20R	18" AFF
TP	DUPLEX RECEPTACLE, TAMPER PROOF - 20A/125V/2P/3W/G NEMA 5-20R	18" AFF
WP	DUPLEX RECEPTACLE, GFCI, TAMPER RESISTANT, WEATHER RESISTANT, HOUSED IN A "WEATHERPROOF-WHILE-IN-USE" ENCLOSURE - 20A/125V/2P/3W/G NEMA 5-20R	18" AFF
	DUPLEX RECEPTACLE MOUNTED ABOVE COUNTERTOP	8" AFC OR 42" AFF
E	DUPLEX RECEPTACLE MOUNTED ABOVE COUNTERTOP ON EMERGENCY CIRCUIT	8" AFC OR 42" AFF
	QUADRAPLEX RECEPTACLE (TWO DUPLEX RECEPTACLES UNDER ONE COVERPLATE)	18" AFF
E	QUADRAPLEX RECEPTACLE ON EMERGENCY CIRCUIT (TWO DUPLEX RECEPTACLES UNDER ONE COVERPLATE)	18" AFF
	QUADRAPLEX RECEPTACLE MOUNTED ABOVE COUNTERTOP (TWO DUPLEX RECEPTACLES UNDER ONE COVERPLATE)	8" AFC OR 42" AFF
E	QUADRAPLEX RECEPTACLE MOUNTED ABOVE COUNTERTOP ON EMERGENCY CIRCUIT (TWO DUPLEX RECEPTACLES UNDER ONE COVERPLATE)	8" AFC OR 42" AFF
	SPECIAL PURPOSE RECEPTACLE (NEMA NO. AS INDICATED)	18" AFF
	FLOOR MOUNTED RECEPTACLE IN FLOOR BOX OR POKE-THRU DEVICE - FLUSH MOUNTED, UNO	18" AFF
	CEILING MOUNTED RECEPTACLE - CONFIGURATION UNO	FLUSH W/ CLG SURFACE
J	JUNCTION BOX - SIZE & MOUNTING AS REQUIRED	AS REQUIRED
D/T	WALL MOUNTED JUNCTION BOX FOR DATA/TELEPHONE - SIZE & MOUNTING AS REQUIRED	AS REQUIRED
X/Y/Z	DISCONNECT SWITCH (X=FRAME SIZE, Y=FUSE SIZE, Z=NUMBER OF POLES)	AS REQUIRED
X/-/Z	DISCONNECT SWITCH NON-FUSED (X=FRAME SIZE, Z=NUMBER OF POLES)	AS REQUIRED
CB X/Z	ENCLOSED CIRCUIT BREAKER (X=TRIP RATING, Z=NUMBER OF POLES)	AS REQUIRED
#	MOTOR STARTER FVNR UNO (#=NEMA SIZE)	AS REQUIRED
CB	COMBINATION MOTOR CONTROLLER / DISCONNECT SWITCH	AS REQUIRED
$\$_M$	MANUAL MOTOR STARTER SWITCH WITH THERMAL OVERLOAD AND PILOT LIGHT	AS REQUIRED
	EMERGENCY POWER OFF BUTTON - WALL MOUNTED	AS REQUIRED
	CIRCUIT CONDUCTOR INDICATION (EQUIPMENT GROUND, NEUTRAL, PHASE)	--
	CIRCUIT HOMERUN TO PANELBOARD (2#12, 1#12G, 3/4"C. 20A/1P CB UNO)	--
	CONDUIT INSTALLED IN CEILING SPACE OF FLOOR BELOW.	--
X,X,X	THREE SINGLE POLE DEVICE CIRCUIT NUMBERS	--
X/X/X	MULTI-POLE DEVICE CIRCUIT NUMBERS	--
	208Y/120V PANELBOARD	--
	480Y/277V PANELBOARD	--
	208Y/120V DISTRIBUTION PANELBOARD	--
	480Y/277V DISTRIBUTION PANELBOARD	--

LOW VOLTAGE SYMBOLS LEGEND

ALL SYMBOLS SHOWN MAY NOT APPEAR IN ALL DRAWINGS. SYMBOLS ARE SHOWN SCHEMATIC AND MAY NOT BE TO SCALE.

SYMBOL	DESCRIPTION	MNTG. HT. UNO (SEE NOTE 1)
	TELEPHONE OUTLET. WALL MOUNTED - STUB 3/4" C. ABOVE ACCESSIBLE CEILING FROM OUTLET BOX	15" AFF
W	TELEPHONE OUTLET. WALL MOUNTED - STUB 3/4" C. ABOVE ACCESSIBLE CEILING FROM OUTLET BOX	48" AFF
P	PAY TELEPHONE OUTLET. WALL MOUNTED - STUB 3/4" C. ABOVE ACCESSIBLE CEILING FROM OUTLET BOX	48" AFF
	FLOOR MOUNTED TELEPHONE OUTLET - FLUSH MOUNTED UNO	-
	TELEPHONE AND DATA OUTLET - STUB 3/4" C. ABOVE ACCESSIBLE CEILING FROM OUTLET BOX	15" AFF
	DATA OUTLET. WALL MOUNTED - STUB 3/4" C. ABOVE CEILING FROM OUTLET BOX	15" AFF
AC	DATA OUTLET. WALL MOUNTED ABOVE COUNTER- STUB 3/4" C. ABOVE CEILING FROM OUTLET BOX	8" AFC OR 42" AFF
	FLOOR MOUNTED DATA OUTLET - FLUSH MOUNTED UNO	-
CR	CARD READER. WALL MOUNTED - STUB 1/2" C. ABOVE ACCESSIBLE CEILING FROM OUTLET BOX. REFER TO ELECTRONIC HARDWARE SCHEDULE, BY DIVISION 8, FOR EXACT EQUIPMENT SPECIFICATIONS.	48" AFF
PB	PUSH BUTTON FOR ACCESS CONTROL. WALL MOUNTED - STUB 1/2" C. ABOVE ACCESSIBLE CEILING FROM OUTLET BOX. REFER TO ELECTRONIC HARDWARE SCHEDULE, BY DIVISION 8, FOR EXACT EQUIPMENT SPECIFICATIONS.	48" AFF
C	CCTV SECURITY CAMERA. CEILING MOUNTED. PROVIDE SINGLE GANG OULET BOX U.N.O.	-
CP	CCTV SECURITY CAMERA - PAN/TILT/ZOOM. CEILING MOUNTED. PROVIDE SINGLE GANG OULET BOX U.N.O.	-
AV	TELEVISION SYSTEM OUTLET. WALL MOUNTED - STUB 1/2" C. ABOVE ACCESSIBLE CEILING FROM OUTLET BOX.	-

OCCUPANCY SENSOR/CONTROLS SYMBOLS LEGEND

ALL SYMBOLS SHOWN MAY NOT APPEAR IN ALL DRAWINGS. SYMBOLS ARE SHOWN SCHEMATIC AND MAY NOT BE TO SCALE.

SYMBOL	DESCRIPTION	MNTG. HT. UNO (SEE NOTE 1)
OS DT	OCCUPANCY SENSOR, DUAL TECHNOLOGY	CEILING MOUNTED
VS DT	VACANCY SENSOR, DUAL TECHNOLOGY	CEILING MOUNTED
$\$_O$	WALL SWITCH OCCUPANCY SENSOR CONTROL	48" AFF
$\$_V$	WALL SWITCH VACANCY SENSOR CONTROL	48" AFF

OCCUPANCY SENSOR/CONTROLS NOTES:
1. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT MOUNTING HEIGHTS OF ALL DEVICES.

LIGHTING CONTROL SYSTEM COMMISSIONING

LIGHTING CONTROL SYSTEM SHALL BE COMMISSIONED IN ACCORDANCE WITH 2015 INTERNATIONAL ENERGY CODE SECTION C408. A FUNCTIONAL TESTING REPORT PRODUCED BY A THIRD PARTY COMMISSIONING AGENT SHALL BE PROVIDED TO THE OWNER AND AUTHORITY HAVING JURISDICTION. IT IS THE RESPONSIBILITY OF THE COMMISSIONING AGENT TO PROVIDE COMMISSIONING SCOPE OF WORK AND DOCUMENTATION FOR THE LIGHTING CONTROL SYSTEM WHICH INCLUDES THE FOLLOWING:

1. FUNCTIONAL TESTING TO ENSURE THAT CONTROL HARDWARE AND SOFTWARE ARE CALIBRATED, ADJUSTED, PROGRAMMED AND IN PROPER WORKING CONDITION IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AND MANUFACTURER'S INSTALLATION INSTRUCTIONS.
2. WHERE OCCUPANT SENSORS, TIME SWITCHES, PROGRAMMABLE SCHEDULE CONTROLS, PHOTOSENSORS OR DAYLIGHITNG CONTROLS ARE INSTALLED, THE FOLLOWING PROCEDURES SHALL BE PERFORMED:
   A. CONFIRM THAT THE PLACEMENT, SENSITIVITY AND TIME-OUT ADJUSTMENTS FOR OCCUPANT SENSORS YIELD ACCEPTABLE PERFORMANCE.
   B. CONFIRM THAT THE TIME SWITCHES AND PROGRAMMABLE SCHEDULE CONTROLS ARE PROGRAMMED TO TURN THE LIGHTS OFF.
   C. CONFIRM THAT THE PLACEMENT AND SENSITIVITY ADJUSTMENTS FOR PHOTOSENSOR CONTROLS REDUCE ELECTRIC LIGHT BASED ON THE AMOUNT OF USABLE DAYLIGHT IN THE SPACE AS SPECIFIED.
3. FUNCTIONAL TESTING REPORT.

SEE 2012 IECC FOR COMPLETE LIST OF REQUIREMENTS.

RSN: 1156136
Permit #: 2016 1191012

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Consultant Team
MEP
WSP + CCRD

No.	Description	Date

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
ELECTRICAL LEGENDS, GENERAL NOTES, AND ABBREVIATIONS

Sheet Number
E.001

I GENERAL CONDITIONS

A. THE SCOPE OF THE WORK SHALL INCLUDE THE FURNISHING AND INSTALLATION OF THE NECESSARY MATERIAL AND LABOR TO ACCOMPLISH THE WORK INDICATED BY THE DRAWINGS AND HEREIN SPECIFIED. ALL WORK BY THIS CONTRACTOR SHALL CONFORM TO ALL APPLICABLE FEDERAL, STATE AND LOCAL BUILDING CODES.

B. THE CONTRACT DOCUMENTS DO NOT PROPOSE TO SHOW ALL EXISTING SYSTEMS, EQUIPMENT OR MATERIAL. CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING THE EXISTING CONDITIONS AT THE JOB SITE BEFORE SUBMITTING PROPOSALS. SUBMISSION OF PROPOSALS SHALL BE TAKEN AS EVIDENCE THAT SUCH INSPECTION HAS TAKEN PLACE. THE CONTRACTOR SHALL BECOME FAMILIAR WITH THE COMPLETE SET OF CONSTRUCTION DOCUMENTS, AND THE LACK OF SPECIFIC INFORMATION ON THE DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR OF ANY RESPONSIBILITY.

C. MATERIALS AND EQUIPMENT FURNISHED UNDER THIS CONTRACT SHALL BE NEW AND SHALL BEAR THE U.L. LABEL WHERE APPLICABLE, UNLESS NOTED OTHERWISE. ALL WORK SHALL BE GUARANTEED AGAINST DEFECTIVE MATERIALS AND WORKMANSHIP FOR A PERIOD OF NOT LESS THAN ONE (1) YEAR AFTER COMPLETION AND ACCEPTANCE BY THE OWNER.

D. CONTRACTOR SHALL INSTALL ELECTRICAL SYSTEMS WITHOUT INTERFERENCE AND IN STRICT COORDINATION WITH OTHER TRADES.

E. MATERIALS AND WORKMANSHIP SHALL COMPLY WITH THE CONTRACT DOCUMENTS AND APPLICABLE CODES AND STANDARDS. IN CASE OF DIFFERENCE BETWEEN APPLICABLE CODES AND STANDARDS AND THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL PROMPTLY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF SUCH DIFFERENCE. SHOULD THE CONTRACTOR PERFORM ANY WORK THAT DOES NOT COMPLY WITH THE REQUIREMENTS OF APPLICABLE CODES AND STANDARDS, HE SHALL BEAR ALL COSTS ARISING IN CORRECTING SUCH DEFECTS. APPLICABLE CODES AND STANDARDS SHALL INCLUDE ALL ORDINANCES, UTILITY COMPANY REGULATIONS, AND APPLICABLE REQUIREMENTS OF NATIONALLY ACCEPTED CODES AND STANDARDS. SHOULD THE CONTRACTOR SUPPLY EQUIPMENT DIFFERING FROM THE SPECIFIED ITEMS IN THE CONTRACT DOCUMENTS WITHOUT NOTIFICATION TO THE ENGINEER, HE SHALL BEAR ALL COSTS TO UPGRADE DEFICIENCIES ARISING FROM SUCH.

F. WHERE ONLY ONE MANUFACTURER'S NAME IS LISTED IN THE EQUIPMENT SPECIFICATION, OTHER MANUFACTURERS OF SIMILAR CHARACTERISTICS AND OF EQUAL OR BETTER PERFORMANCE CAPACITIES MAY BE CONSIDERED FOR "OR EQUAL" ACCEPTANCE BY THE ENGINEER. SUBSTITUTION REQUESTS SHALL BE SUBMITTED FOR REVIEW AND APPROVAL. WHERE MORE THAN ONE MANUFACTURER IS LISTED IN THE NOTES AND EQUIPMENT SPECIFICATIONS, ONLY THOSE NAMED MANUFACTURERS WILL BE CONSIDERED FOR ACCEPTANCE. SHOULD A SUBSTITUTION BE ACCEPTED, AND SHOULD THE SUBSTITUTE MATERIAL PROVE DEFECTIVE, OR OTHERWISE UNSATISFACTORY FOR THE SERVICE INTENDED WITHIN THE GUARANTEE PERIOD, THIS MATERIAL OR EQUIPMENT SHALL BE REPLACED WITH THE MATERIAL OR EQUIPMENT SPECIFIED AT NO COST TO THE OWNER.

G. PROVIDE ACCESS, INCLUDING NECESSARY ACCESS DOORS, FOR NEW AND EXISTING EQUIPMENT REQUIRING OPERATION AND/OR MAINTENANCE. RELOCATE EXISTING AND LOCATE ALL NEW EQUIPMENT SUCH THAT OPERATION OR MAINTENANCE IS NOT RESTRICTED.

H. INSTALL EQUIPMENT WITH WORKING CLEARANCES COMPLYING WITH NEC 110-16 AND 110-34.

II PRODUCTS

A. CONDUIT

1. RIGID STEEL CONDUIT (GRC - GALVANIZED RIGID CONDUIT): CONSTRUCTED OF MILD STEEL PIPING, GALVANIZED INSIDE AND OUTSIDE, CONFORMING WITH FED. SPEC. WW-C-581C, ANSI C80.1 AND APPLICABLE UL STANDARDS.

2. INTERMEDIATE METAL CONDUIT (IMC): CONSTRUCTED OF ZINC COATED STEEL TUBING MANUFACTURED IN ACCORDANCE WITH UL-1242 AND MEETING THE REQUIREMENTS OF THE NEC.

3. ELECTRIC METALLIC TUBING (EMT): OF HIGH GRADE STEEL MANUFACTURED SPECIFICALLY TO STANDARDS ASSURING MAXIMUM WELDING CHARACTERISTICS AND DUCTILITY, AND SHALL CONFORM TO FED. SPEC. WW-T-806b.

4. FLEXIBLE METAL CONDUIT: MANUFACTURED OF MILD STEEL STRIP MATERIAL HAVING A HOT-DIP GALVANIZED COATING AND MEETING REQUIREMENTS OF FED. SPEC. WW-C-566b.

5. LIQUIDTIGHT FLEXIBLE CONDUIT: FLEXIBLE METAL CONDUIT AS SPECIFIED HEREIN WITH A COPPER GROUNDING STRAND AND FACTORY-APPLIED NEOPRENE JACKET. LIQUID TIGHT FLEXIBLE CONDUIT SHALL BE UL LISTED, EQUIVALENT TO ANACONDA "SEALTITE", TYPE UA.

6. METAL-CLAD CABLE MAY BE USED. TYPE HCF-MC METAL CLAD CABLE SHALL CONSIST OF FACTORY ASSEMBLED INSULATED CONDUCTORS ENCLOSED IN A METALLIC SHEATH OF INTERLOCKED GALVANIZED STEEL STRIP MANUFACTURED IN ACCORDANCE WITH UL 5169. THE CONDUCTORS SHALL HAVE AN OPERATING TEMPERATURE OF 90 DEGREE C AND SHALL BE COVERED BY A HIGH DIELECTRIC STRENGTH ASSEMBLY TAPE. TYPE HCF-MC CABLE SHALL BE AS MANUFACTURED BY AFC OR EQUAL.

B. COUPLINGS AND TERMINATORS

1. FOR RIGID STEEL OR INTERMEDIATE METAL CONDUIT: FACTORY-MADE THREADED COUPLINGS OF SAME MATERIAL AS THE CONDUIT.

2. FOR ELECTRICAL METALLIC TUBING: STEEL SET SCREW COUPLINGS; STEEL SET SCREW BOX CONNECTORS WITH NYLON INSULATED THROAT AND LOCKNUTS AT ALL BOXES AND CABINET TERMINATIONS OR NON-INSULATED BOX CONNECTOR, LOCKNUT AND NYLON-INSULATED GROUNDING BUSHING ON ALL TUBING WHERE GROUNDING BUSHINGS ARE REQUIRED.

3. FOR FLEXIBLE METAL CONDUIT: COUPLINGS AT CONNECTIONS BETWEEN FLEXIBLE CONDUIT AND EMT, AND NYLON INSULATED THROAT STEEL CONNECTORS AT BOX OR CABINET TERMINATIONS.

C. JUNCTION AND PULL BOXES

1. SIZE BOXES IN ACCORDANCE WITH THE REQUIREMENTS OF THE NEC. BOXES SHALL BE NO SMALLER THAN 4 INCHES SQUARE BY 1-1/2 INCHES DEEP WITH COVERS ACCESSIBLE AT ALL TIMES. SET BOXES ON CONCEALED CONDUITS WITH COVERS FLUSH WITH THE FINISHED WALL OR CEILING LINE. PROVIDE JUNCTION AND PULL BOXES OF APPROPRIATE DIMENSIONS FOR CONDUITS AND CONDUCTORS NOTED, WHERE SHOWN AND WHERE NECESSARY FOR THE INSTALLATION AND PULLING OF CABLES AND WIRES. INSTALL COVERS ON JUNCTION BOXES AND CONDULETS AFTER WIRING AND CONNECTIONS ARE COMPLETED.

D. OUTLET BOXES

1. OUTLET BOXES SHALL BE UL LISTED, AND OF SIZES AND TYPES REQUIRED FOR THE APPLICATION. OUTLET BOXES SHALL BE SHEET STEEL, NO LIGHTER THAN 14 GAUGE, GALVANIZED AFTER FABRICATION. SET BOX SO FACE OF BOX WILL FINISH FLUSH WITH BUILDING SURFACE.

a. FOR LIGHTING FIXTURE OUTLETS: 4 INCH SQUARE BY 1-1/2 INCHES DEEP WITH RAISED FIXTURE RING.

b. FOR WALL SWITCHES, RECEPTACLES, AND COMMUNICATION USE: 4 INCH SQUARE, BY 1-1/2 INCHES DEEP. USE BOXES WITH PLASTER RINGS IN ALL PLASTERED WALLS WHERE WALL THICKNESS PERMITS. USE BOXES LESS THAN 1-1/2 INCH DEEP ONLY IN LOCATIONS WHERE DEEP BOXES CANNOT BE ACCOMMODATED BY CONSTRUCTION.

E. PULL CORDS

1. PROVIDE A NYLON POLYETHYLENE CORD, WITH A TENSILE STRENGTH OF NOT LESS THAN 200 POUNDS, IN EACH EMPTY CONDUIT TO FACILITATE THE FUTURE INSTALLATION OF CONDUCTORS. INCORPORATE PLASTIC TAGS FOR IDENTIFICATION.

F. CONDUCTORS

1. CONDUCTORS SHALL BE 98% CONDUCTIVITY SOFT DRAWN ANNEALED COPPER, 600 VOLT, THHN/THWN INSULATION, #10 AND SMALLER - SOLID, #8 AND LARGER - STRANDED.

2. NO CONDUCTORS SHALL BE SMALLER THAN NO. 12, EXCEPT FOR SIGNAL OR CONTROL CIRCUITS AND FOR INDIVIDUAL LIGHTING FIXTURE TAPS AS PERMITTED BY NEC.

3. FOR HOME RUNS ON 120-VOLT, 20-AMPERE BRANCH CIRCUITS, WHERE LENGTH OF RUN FROM PANELBOARD TO FIRST OUTLET EXCEEDS 100 LINEAR FEET, USE NO. 10 CONDUCTORS. WHERE LENGTH OF RUN IS 100 LINEAR FEET OR LESS, USE NO. 12 CONDUCTORS.

4. FOR HOME RUNS ON 277-VOLT, 20-AMPERE BRANCH CIRCUITS, WHERE LENGTH OF RUN FROM PANELBOARD TO FIRST OUTLET EXCEEDS 200 LINEAR FEET, USE NO. 10 CONDUCTORS. WHERE LENGTH OF RUN IS 100 LINEAR FEET OR LESS, USE NO. 12 CONDUCTORS.

G. WIRING DEVICES, COVER PLATES AND ACCESSORIES

1. PROVIDE WIRING DEVICES AND ASSOCIATED ACCESSORIES OF SPECIFICATION GRADE. DEVICES OF LEVITON, HUBBELL OR PASS & SEYMORE ARE ACCEPTABLE. SUBMIT FOR REVIEW A COMPLETE LIST OF ANY SUBSTITUTES OFFERED FROM THOSE SPECIFIED.

2. COLOR OF WALL SWITCHES, RECEPTACLES AND FACEPLATES: AS SPECIFIED OR SELECTED BY ARCHITECT.

3. WHERE LIGHTING CIRCUITS ARE SHOWN TO BE LINE VOLTAGE SWITCHED, PROVIDE WITH SPECIFICATION GRADE, HORSEPOWER RATED, UL LISTED, BACK- AND SIDE-WIRED, TOGGLE SWITCHES RATED 20-AMP, 120 VOLTS OR 277 VOLTS. SWITCHES SHALL BE SPST, DPST, 3-WAY OR 4-WAY, WITH OR WITHOUT PILOT LIGHT, AS INDICATED ON THE DRAWINGS.

4. RECEPTACLES

a. STANDARD WALL RECEPTACLES SHALL BE SPECIFICATION GRADE, RATED 20-AMP, 120-VOLT, 2 POLE, 3-WIRE, GROUNDING TYPE, SIDE-WIRED, NEMA 5-20R.

b. SPECIAL PURPOSE RECEPTACLES SHALL BE SPECIFICATION GRADE DEVICES FOR THE NEMA CONFIGURATIONS SCHEDULED OR INDICATED ON THE DRAWINGS.

c. GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES SHALL BE 20 AMP, 120 VOLT, 2 POLE, 3-WIRE, NEMA 5-20R.

5. MAINTAIN GROUNDING CONTINUITY BETWEEN DEVICES AND METALLIC RACEWAY SYSTEM IN ADDITION TO PROVIDING A GREEN EQUIPMENT GROUNDING CONDUCTOR RUN WITH ALL CIRCUIT CONDUCTORS AS INDICATED ON THE DRAWINGS, EXCEPT CARE SHALL BE TAKEN WHEN INSTALLING RECEPTACLES HAVING ISOLATED GROUND POLE SO AS TO NOT BOND THE EQUIPMENT GROUND CONDUCTOR TO THE CONDUIT SYSTEM.

H. ISOLATION PANELBOARDS
1. MANUFACTURERS:
a. PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES AND ACCESSORIES:
1) ISOTROL SYSTEMS
2) POST GLOVER LIFELINK, INC.
3) SQUARE D.
2. GENERAL REQUIREMENTS
a. DESCRIPTION: ISOLATION PANELBOARD SPECIFICALLY DESIGNED FOR THE PURPOSE OF SUPPLYING UNGROUNDED POWER.
b. ENCLOSURE:
1) FLUSH- AND SURFACE-MOUNTED CABINETS, AS INDICATED. NEMA 250, TYPE 1. NEMA PB 1.
2) NON-VENTILATED DESIGN WITH MAXIMUM FRONT PANEL TEMPERATURE NOT TO EXCEED 30°C RISE UNDER FULL LOAD CONTINUOUS OPERATION.
3) BACKBOX: 14-GAUGE STEEL, DEGREASED, PHOSPHATIZED, PRIMED, AND FINISH BAKED ENAMEL PAINTED.
4) TRIM AND FINISH: 12-GAUGE TYPE 304 STAINLESS STEEL TRIM WITH BRUSHED FINISH. STANDARD CONCEALED-HINGE DOOR WITH KEYED LOOK WITHIN TRIM COVER TO ACCESS DEVICE HANDLES AND LIM. TRIM SHALL NOT CONTAIN ANY VENTS, OPENINGS, OR STANDING HINGES THAT CAN IMPEDE INFECTION CONTROL EFFORTS.
5) BARRIERED COMPARTMENT: PROVIDE FOR SEPARATION OF INCOMING PRIMARY FEED, GROUNDED AND UNGROUNDED CONDUCTORS.
6) TERMINAL BLOCKS: PROVIDE FOR CONNECTION OF REMOTE SIGNAL CONDUCTORS
c. UNGROUNDED LOW-LEAKAGE TRANSFORMER:
1) TRANSFORMER WINDINGS: COPPER, RATING AS INDICATED.
2) ELECTROSTATIC SHIELD: ELECTROSTATIC SHIELD BETWEEN THE PRIMARY AND SECONDARY WINDINGS. SHIELD GROUNDED TO THE ENCLOSURE AND THE REFERENCE GROUND BAR IN THE ISOLATION PANEL. ELECTROSTATIC SHIELD DESIGNED TO PREVENT DIRECT SHORTING OF THE PRIMARY WINDING TO THE SECONDARY WINDING, AND TO REDUCE THE COUPLING OF HARMONIC DISTORTIONS BETWEEN THE PRIMARY AND SECONDARY CIRCUITS.
3) TRANSFORMER CORE DESIGN: STACKED CORE DESIGN, INTERNALLY ISOLATED FROM THE ENCLOSURE BY MEANS OF A SUITABLE VIBRATION DAMPENING SYSTEM, VARNISH IMPREGNATED, WITH A FINAL WRAP OF INSULATING MATERIAL TO PREVENT EXPOSURE OF BARE CONDUCTORS.
4) TOTAL LEAKAGE CURRENT TO GROUND: NOT TO EXCEED THE VALUES SHOWN IN TABLE 29.2 OF UL 1047.
5) VOLTAGE REGULATION: NOT TO EXCEED 2.5 PERCENT AT 0.8 POWER FACTOR (PF) AT 20°C ABOVE THE FULL LOAD CONTINUOUS OPERATING TEMPERATURE IN ACCORDANCE WITH NEMA AND ANSI STANDARDS.
6) INSULATION CLASS: CLASS H; MATERIALS IN ACCORDANCE WITH NEMA ST20 220 DEG C, UL-COMPONENT-RECOGNIZED INSULATION SYSTEM WITH A MAXIMUM OF 55 DEG C RISE ABOVE 40 DEG C AMBIENT TEMPERATURE.
7) LOW-SOUND-LEVEL REQUIREMENTS: MAXIMUM OF 27 DBA FOR 5KVA AND 35 DBA FOR 7.5 KVA AND GREATER, WHEN FACTORY TESTED ACCORDING TO IEEE C57.12.91.
d. CIRCUIT BREAKERS:
1) TYPE: THERMAL-MAGNETIC MOLDED-CASE CIRCUIT BREAKER. UL 489, NEMA AB 1, WITH INTERRUPTING CAPACITY TO MEET AVAILABLE FAULT CURRENTS WITH INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS.
2) PRIMARY MAIN CIRCUIT BREAKER: QUANTITY AND SIZE AS INDICATED.
3) SECONDARY MAIN CIRCUIT BREAKER: QUANTITY AND SIZE AS INDICATED.
4) BRANCH FEEDER BREAKERS: TWO-POLE BREAKERS, QUANTITY AND SIZED AS INDICATED.
e. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL.
f. LINE ISOLATION MONITOR (LIM):
1) PROVIDE UNIT WHICH MEETS THE FOLLOWING REQUIREMENTS:
a) MICROPROCESSOR-BASED DIGITAL SIGNAL PROCESSING THAT CONTINUALLY MONITOR THE IMPEDANCE FROM ALL SECONDARY CONDUCTORS OF THE ISOLATED POWER SYSTEMS TO GROUND.
b) CAPABLE OF MEASURING ALL COMBINATIONS OF CAPACITIVE AND RESISTIVE FAULTS INCLUDING BALANCED, UNBALANCED AND HYBRID FAULTS.
c) OPERATING VOLTAGE: 85 TO 265 VAC
d) OPERATING FREQUENCY:60 HZ
e) ACCURACY: 5 PERCENT OR BETTER
f) MONITOR HAZARD CURRENT: 25 MICROAMPERES (MA) OR LESS.
2) DISPLAYS, ALARM INDICATORS, AND FEATURES:
a) DIGITAL AMMETER INDICATING TOTAL HAZARD CURRENT OF SYSTEM IN AMPERES, MOUNTED BEHIND TRIM DOOR.
b) MOMENTARY TEST SWITCH: SWITCH FOR PERIODIC TESTING AND RECALIBRATION OF LIM CIRCUITRY, MOUNTED BEHIND TRIM DOOR.
c) DIGITAL OR ANALOG AMMETER ON THE FRONT FACE OF PANEL TO INDICATING TOTAL HAZARD CURRENT OF SYSTEM IN AMPERES.
d) GREEN SAFE LIGHT ON THE FRONT FACE OF PANEL TO INDICATE NORMAL OPERATING CONDITIONS.
e) RED HAZARD LIGHT ON THE FRONT FACE OF PANEL TO INDICATE ALARM CONDITION.
f) AUDIBLE ALARM TO OPERATE IN CONJUNCTION WITH THE RED HAZARD LIGHT.
g) PUSH-TO-SILENCE BUTTON ON THE FRONT FACE OF PANEL TO ACKNOWLEDGE ALARM CONDITION. LIGHT SHALL REMAIN ILLUMINATED UNTIL FAULT CONDITION HAS BEEN CORRECTED.
h) AUXILIARY CONTACTS: TWO SPST SWITCHES WITH ONE NORMALLY OPEN AND ONE NORMALLY CLOSED CONTACT FOR CONNECTION TO REMOTE ALARM SYSTEMS.
3) ALARM CONDITIONS:
a) HAZARD CURRENT LEVEL: 2 OR 5 MILLIAMPERES (SELECTABLE)
b) LOSS OF GROUND: ALARM TO INDICATE WHEN REFERENCE GROUND IS DISCONNECTED.
g. REMOTE INDICATING ALARM UNIT:
1) FLUSH-MOUNTED STAINLESS STEEL UNIT SEPARATE FROM PANELBOARD WITH THE FOLLOWING FEATURES TO MIMIC LIM STATUS AND ALARM CONDITIONS AT A REMOTE LOCATION:
a) DIGITAL OR ANALOG AMMETER INDICATING TOTAL HAZARD CURRENT OF SYSTEM IN AMPERES
b) GREEN SAFE LIGHT ON THE FRONT PANEL TO INDICATE NORMAL OPERATING CONDITIONS.
c) RED HAZARD LIGHT ON THE FRONT PANEL TO INDICATE ALARM CONDITION.
d) AUDIBLE ALARM TO OPERATE IN CONJUNCTION WITH THE RED HAZARD LIGHT.
e) PUSH-TO-SILENCE BUTTON ON THE FRONT PANEL TO ACKNOWLEDGE ALARM CONDITION. LIGHT SHALL REMAIN ILLUMINATED UNTIL FAULT CONDITION HAS BEEN CORRECTED.
2) LOCATION: PROVIDE REMOTE INDICATING ALARM UNITS IN THE FOLLOWING LOCATIONS:
a) WHERE PANELS ARE NOT INSTALLED WITHIN THE OPERATING ROOM, PROVIDE A SEPARATELY MOUNTED REMOTE INDICATING ALARM IN RECESSED BACK BOX WITHIN THE OPERATING ROOM.
3. PANELBOARD SHORT-CIRCUIT RATING
a. FULLY RATED TO INTERRUPT SYMMETRICAL SHORT-CIRCUIT CURRENT AVAILABLE AT TERMINALS. SERIES RATING IS NOT ACCEPTABLE.
4. SINGLE VOLTAGE ISOLATION PANELBOARDS
a. SINGLE VOLTAGE OUTPUT ISOLATION PANELBOARDS: ISOLATION PANELBOARDS INDICATED TO BE SINGLE VOLTAGE OUTPUT SHALL COMPLY WITH ALL REQUIREMENTS LISTED IN GENERAL ISOLATION PANELBOARD REQUIREMENTS PARAGRAPH ABOVE, UNLESS OTHERWISE INDICATED.
1) NUMBER OF SECONDARY TRANSFORMER WINDINGS:ONE
2) QUANTITY OF PRIMARY MAIN CIRCUIT BREAKER: ONE
3) QUANTITY OF SECONDARY MAIN CIRCUIT BREAKER: ONE
4) QUANTITY OF BRANCH FEEDER BREAKERS: (16) TWO-POLE BREAKERS, UNLESS OTHERWISE INDICATED ON THE DRAWINGS.
5) QUANTITY OF LIMS: ONE
5. ISOLATION PANELBOARD WIRING
a. CONDUCTOR TYPE: COPPER STRANDED LOW LEAKAGE TYPE XHHW CONDUCTOR WITH A DIELECTRIC CONSTANT OF 3.5 OR LESS.
b. COLOR CODING: COMPLY WITH APPLICABLE PARAGRAPHS OF THE CURRENT EDITIONS OF NFPA 70 AND NFPA 99.
c. TOTAL LEAKAGE CURRENT: NOT TO EXCEED THE VALUES SHOWN IN TABLE 29.1 OF UL 1047. TOTAL LEAKAGE CURRENT OF THE MANUFACTURED ISOLATION PANEL SHALL INCLUDE BUT NOT BE LIMITED TO THE FOLLOWING ITEMS:
1) LIM
2) ISOLATION TRANSFORMER
3) PANELBOARD
4) BRANCH CIRCUIT BREAKERS
5) PANEL MOUNTED ACCESSORIES
d.

I. OVERCURRENT PROTECTIVE DEVICES

1. MOLDED CASE CIRCUIT BREAKERS

a. AS MANUFACTURED BY THE MANUFACTURER OF THE PANELBOARD IN WHICH INSTALLED.

b. ONE, TWO OR THREE POLE WITH RATINGS INDICATED ON THE DRAWINGS; (STANDARD) OR (HIGH INTERRUPTING) CONSTRUCTION AS REQUIRED BY THE SHORT CIRCUIT RATINGS INDICATED ON THE DRAWINGS.

c. QUICK-MAKE, QUICK-BREAK, CALIBRATED FOR OPERATION IN AN AMBIENT TEMPERATURE OF 40°C. TRIP INDICATION BY HANDLE POSITION, TRIP-FREE. TWO AND THREE POLE BREAKERS: COMMON TRIP WITH SINGLE OPERATING HANDLE WITHOUT HANDLE TIES, PERMANENT TRIP UNIT CONTAINING INDIVIDUAL THERMAL AND MAGNETIC TRIP ELEMENTS IN EACH POLE. FRAME SIZES GREATER THAN 100 AMPERES: VARIABLE MAGNETIC TRIP ELEMENTS WHICH ARE SET BY A SINGLE ADJUSTMENT.

d. REMOVABLE LUGS, UL LISTED FOR COPPER AND ALUMINUM CONDUCTORS. LISTED FOR INSTALLATION OF MECHANICAL OR COMPRESSION TYPE LUGS.

J. GROUNDING

1. GROUNDING SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC.

2. GROUNDING CONDUCTORS SHALL BE ANNEALED COPPER CABLES OF THE SIZES INDICATED OR REQUIRED.

3. A "GREEN WIRE" EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED WITHIN EACH FEEDER AND BRANCH CIRCUIT RACEWAY, WHETHER METALLIC OR NON-METALLIC, TO FORM A COMPLETE AND CONTINUOUS GROUNDING PATH. CONNECT GROUNDING CONDUCTORS TO GROUND TERMINALS AT EACH END OF THE RUN.

K. LIGHTING FIXTURES

1. INSURE EACH LIGHTING FIXTURE HAS AN OPERATING SET OF LAMPS EQUAL TO EXISTING OR OF THE TYPES SHOWN ON THE DRAWINGS AND/OR SPECIFIED HEREIN. LAMPS SHALL BE MANUFACTURED BY GENERAL ELECTRIC, PHILIPS, OR OSRAM/SYLVANIA, EXCEPT WHERE SCHEDULED OTHERWISE.

2. PROVIDE A LIGHTING FIXTURE COMPLETE WITH LAMPS, BALLASTS, AND OTHER REQUIRED APPURTENANCES FOR EACH LIGHTING OUTLET SHOWN ON THE DRAWINGS. LIGHT FIXTURES SHALL BE AS DESCRIBED IN THE "LIGHTING FIXTURE SCHEDULE". EACH UNIT SHALL BE FURNISHED WITH ALL MOUNTING AND TRIM ACCESSORIES TO SUIT THE SPECIFIC SERVICES APPLIED. FINISHES SHALL BE FACTORY-STANDARD, EXCEPT WHERE SCHEDULED OTHERWISE.

3. PROVIDE LIGHTING FIXTURES IN ACCORDANCE WITH THE DESIGNATIONS AND DESCRIPTIONS ON THE DRAWINGS. WHERE A SINGLE MANUFACTURER AND ASSOCIATED CATALOG NUMBER IS SCHEDULED, IT IS TO ESTABLISH A DESIRED TYPE AND STANDARD OF QUALITY.

4. LIGHTING FIXTURES SHALL BE UL LABELED.

L. FIRE ALARM SYSTEM

1. FURNISH AND INSTALL FIRE ALARM AND DETECTION SYSTEM ADDITIONS AND RELOCATIONS AS INDICATED ON THE DRAWINGS, COMPATIBLE AND CONSISTENT WITH THE EXISTING SYSTEM.

2. THE EXISTING SYSTEM OPERATION SHALL REMAIN UNCHANGED PROVIDING CONTINUAL SERVICE DURING ALL PHASES OF THE RENOVATION AND EXPANSION.

M. TELEPHONE/DATA SYSTEM

1. AT ALL WALL DATA/VOICE OUTLET LOCATIONS, PROVIDE BACK BOXES AND 3/4" EMPTY CONDUIT WITH PULL CORD TO ABOVE CEILING.

III EXECUTION

A. INSTALLATION OF BUILDING CONDUIT

1. ALL INTERIOR RACEWAYS SHALL BE EMT. RACEWAYS IN DAMP OR WET LOCATIONS, OR IN HAZARDOUS LOCATIONS, SHALL BE GRC OR IMC.

2. CONDUITS SHALL BE OF SUCH SIZE AND SO INSTALLED THAT THE CONDUCTORS MAY BE DRAWN THROUGH WITHOUT INJURY OR EXCESSIVE STRAIN, SHALL BE SECURED AT CABINETS AND BOXES WITH GALVANIZED LOCKNUTS, BOTH INSIDE AND OUTSIDE, AND SHALL HAVE APPROPRIATE BUSHINGS INSIDE. BUSHINGS SHALL BE INSULATING TYPE WITH BOND GROUND CLAMPS.

3. USE LENGTHS OF FLEXIBLE METAL CONDUIT NOT LESS THAN 12 INCHES LONG AT FINAL CONNECTIONS TO ALL MOTORS, TRANSFORMERS AND SIMILAR DEVICES SUBJECT TO MOVEMENT BECAUSE OF VIBRATION OR MECHANICAL ADJUSTMENT. USE FLEXIBLE METAL CONDUITS TO EFFECT FINAL CONNECTIONS TO RECESSED LIGHTING FIXTURES. USE LIQUID TIGHT FLEXIBLE METAL CONDUIT, WITH APPROPRIATE CONNECTIONS, IN DAMP OR WET LOCATIONS, AT MOTOR OR EQUIPMENT LOCATIONS IN MECHANICAL EQUIPMENT ROOMS, AT OR NEAR PUMPS, AND WHEN INSTALLED OUTDOORS.

4. GROUND METALLIC CONDUITS AS REQUIRED BY NEC.

5. INSTALL RACEWAYS CONTINUOUS FROM OUTLET TO OUTLET BOX, OR CABINET, WITH A MAXIMUM OF 150 FEET BETWEEN PULLS. IN AREAS WHERE THERE ARE NO SUSPENDED CEILINGS, RUN ALL CONDUITS PARALLEL/PERPENDICULAR TO BUILDING SURFACE PLANES.

6. IN SYSTEMS OPERATING AT MORE THAN 300 VOLTS BETWEEN PHASE CONDUCTORS, AND WHERE DIFFERENT PHASE CONDUCTORS ARE TO BE RUN TO A COMMON GANG WALL SWITCH BOX, PROVIDE SUBSTANTIAL BARRIERS BETWEEN ADJACENT SWITCHES IN THE BOX SO THAT TWO DIFFERENT PHASE WIRES WILL NOT BE IN THE SAME COMPARTMENT.

7. WHEREVER RACEWAYS PASS THROUGH FLOORS, WALLS, PENETRATIONS, OR OTHER PARTITIONS, CAREFULLY FILL ANY SPACE BETWEEN THE OUTSIDE OF THE RACEWAY AND THE BUILDING MATERIAL TO PREVENT PASSAGE OF AIR, WATER, SMOKE, AND FUMES. FILLING MATERIAL SHALL BE A UL LISTED, INTUMESCENT SEALING HAVING FIRE/SMOKE RESISTIVE RATING EQUAL TO THE BUILDING MATERIAL PENETRATED.

8. TYPE HCF-MC METAL CLAD CABLES SHALL BE ACCEPTABLE TO BE INSTALLED IN WALLS AND CEILINGS IN CONFORMANCE WITH THE REQUIREMENTS OF NEC 334. TYPE MC CABLE SHALL BE USED ONLY FOR BRANCH CIRCUITS FOR LIGHTING AND SPECIFIC AND GENERAL PURPOSE RECEPTACLES. TYPE MC CABLE SHALL NOT BE USED FOR FEEDERS OR MULTIPLE BRANCH CIRCUIT HOMERUNS, AND MORE SPECIFICALLY, SHALL NOT BE USED FOR HVAC, AND KITCHEN EQUIPMENT BRANCH CIRCUITS. TYPE MC CABLE SHALL NOT BE UTILIZED WITHIN ELECTRICAL EQUIPMENT ROOMS. CABLE SHALL TRANSITION TO A RIGID TYPE CONDUIT PRIOR TO ENTERING ELECTRICAL EQUIPMENT ROOMS.

9. CONDUITS UTILIZED THROUGHOUT THE PROJECT SHALL NOT BE SMALLER THAN 3/4 INCH FOR FEEDERS, MULTIPLE BRANCH CIRCUIT HOMERUNS AND HOMERUNS OF CONDUCTORS LARGER THAN NO. 12. INDIVIDUAL BRANCH CIRCUIT WIRING FOR NO. 12 CONDUCTORS SHALL BE ACCEPTABLE IN 1/2" CONDUIT, I.E. 2#12, 1#12G, 1/2"C.

B. INSTALLATION OF PULL AND JUNCTION BOXES

1. FASTEN ALL BOXES SECURELY TO THE BUILDING CONSTRUCTION, INDEPENDENT OF CONDUIT SYSTEMS.

2. ON CONCEALED CONDUIT SYSTEMS WHERE BOXES ARE NOT OTHERWISE ACCESSIBLE, SET BOXES FLUSH WITH FINISHED SURFACES FOR ACCESS, AND PROVIDE OVERLAPPING COVERS.

C. INSTALLATION OF OUTLET BOXES

1. TERMINATE CONDUITS AT A METAL OUTLET BOX AT EACH OUTLET OR DEVICE. ALL BOXES SHALL CONFORM TO THE NEC.

2. OUTLET BOXES SHALL BE SUPPORTED INDEPENDENT OF THE CONDUIT SYSTEM.

D. INSTALLATION OF CONDUIT HANGERS AND SUPPORTS

1. FURNISH AND INSTALL ALL HANGERS AND SUPPORTS REQUIRED BY RACEWAY SYSTEMS.

2. SUPPORT ALL ABOVE-GROUND ELECTRICAL CONDUITS FROM THE BUILDING STRUCTURE/CONSTRUCTION. SUPPORT CONDUITS RUNNING VERTICALLY OR HORIZONTALLY ALONG WALLS WITH GALVANIZED MALLEABLE IRON ONE-HOLE CLAMPS. CARRY INDIVIDUALLY SUPPORTED HORIZONTAL CONDUITS 1-1/4 INCH AND LARGER ON SUITABLE HANGERS.

3. LOCATE HANGERS AND TRAPEZES TO SUPPORT HORIZONTAL RACEWAYS WITHOUT APPRECIABLE SAGGING. HANGER SPACING SHALL NOT EXCEED NEC REQUIREMENTS, OR RECOMMENDATIONS OF THE NECA "STANDARD OF INSTALLATION".

4. WHERE CONDUITS SMALLER THAN 1-1/4 INCH ARE INSTALLED ABOVE REMOVABLE TYPE DRY CEILINGS, SUPPORT THEM ON SUITABLE HANGER RODS WITH METAL CLIPS AT A DISTANCE ABOVE THE CEILING SUFFICIENT TO PERMIT REMOVAL OF CEILING PANELS AND LAY-IN LIGHT FIXTURES. LOCATE SUCH CONDUITS SO AS NOT TO HINDER ACCESS TO MECHANICAL EQUIPMENT THROUGH CEILING PANELS.

E. INSTALLATION OF CONDUCTORS

1. PULL NO CONDUCTORS INTO CONDUITS UNTIL ALL WORK OF A NATURE WHICH MAY CAUSE INJURY TO CONDUCTORS IS COMPLETED.

2. RUN FEEDERS IN CONTINUOUS PIECES, WITHOUT JOINTS OR SPLICES, INSOFAR AS PRACTICABLE.

3. RUN CONDUITS FOR EMERGENCY POWER CONDUCTORS SEPARATE FROM ALL OTHER WIRING.

F. INSTALLATION OF ISOLATION PANELBOARDS

1. INSTALL PANELBOARDS AND ACCESSORIES ACCORDING TO NEMA PB 1.1 AND MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.

2. MOUNT TOP OF TRIM 74 INCHES (1880 MM) ABOVE FINISHED FLOOR, UNLESS OTHERWISE INDICATED.

3. MOUNT PLUMB AND RIGID WITHOUT DISTORTION OF BOX. MOUNT RECESSED PANELBOARDS WITH FRONTS UNIFORMLY FLUSH WITH WALL FINISH.

4. INSTALL OVERCURRENT PROTECTIVE DEVICES AND CONTROLLERS.

5. INSTALL FILLER PLATES IN UNUSED SPACES.
6. FOR RECESSED PANELS: STUB FOUR 1-INCH (27-GRC) EMPTY CONDUITS FROM PANELBOARD INTO ACCESSIBLE CEILING SPACE.

7. ARRANGE CONDUCTORS IN GUTTERS INTO GROUPS AND BUNDLE AND WRAP WITH WIRE TIES.

8. DO NOT USE GUTTERS OF PANELBOARDS AS RACEWAYS FOR ROUTING FEEDER CONDUCTORS FROM BOTTOM ENTRA GUTTER OR CONDUIT SHALL BE USED FOR THIS PURPOSE.

9. CLOSE UNUSED CONDUIT OPENING OR OTHER UNUSED HOLES IN SIDES OF BOX WITH PROPER MATING BLANK-OFF PL

10. IDENTIFY FIELD-INSTALLED CONDUCTORS, INTERCONNECTING WIRING, AND COMPONENTS.

11. PANELBOARD NAMEPLATES: LABEL EACH PANELBOARD WITH NAMEPLATE.

12. PANELBOARD DIRECTORY: CREATE A DIRECTORY TO INDICATE NAME/DESCRIPTIONS OF INSTALLED CIRCUIT LOADS. OR TYPEWRITER TO CREATE DIRECTORY; HANDWRITTEN DIRECTORIES ARE NOT ACCEPTABLE.

13. GROUND PANELBOARD PER NEC REQUIREMENTS.
14. FIELD QUALITY CONTROL
a. PREPARE FOR ACCEPTANCE TESTS AS FOLLOWS:
1) TEST INSULATION RESISTANCE FOR EACH PANELBOARD BUS, COMPONENT, CONNECTING SUPPLY, FEEDER, F
2) TEST CONTINUITY OF EACH CIRCUIT.

Retain one of two paragraphs below. Keep subparagraphs regardless of which choice you make, the test are the same whether conducted technician. ccrd partners does not recommend testing only by the Contractor.

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. PREPARE TEST REPORTS AND SUBMIT REPORTS IN CONJUNCTION WITH FIELD QUALITY CONTROL REPORTS REQUIRED IN DIVISION 16 26 SECTION "GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS".
1) PERFORM EACH ELECTRICAL TEST AND VISUAL AND MECHANICAL INSPECTION STATED IN NETA ATS, SECTION 7.6 FOR MOLDED-CASE CIRCUIT BREAKERS. CERTIFY COMPLIANCE WITH TEST PARAMETERS.
2) PERFORM EACH ELECTRICAL TEST STATED IN NFPA 99, CHAPTER "ELECTRICAL SYSTEMS" FOR IMPEDANCE OF ISOLATED WIRING. CERTIFY COMPLIANCE WITH TEST PARAMETERS.
a) OBSERVE AND RECORD SYSTEM CURRENT LEAKAGES.
b) TEST AND RECORD THE RESISTANCE BETWEEN THE GROUND POINT OF EACH RECEPTACLE AND THE REFERENCE POINT. RESISTANCE LEVEL SHALL BE LESS THAN 0.1 OHM.
c) TEST AND RECORD THE VOLTAGE POTENTIAL DIFFERENCE BETWEEN EXPOSED CONDUCTIVE SURFACES IN THE PATIENT VICINITY. POTENTIAL DIFFERENCE TO BE NO MORE THAN 20 MILLIVOLTS (MV).
3) SIMULATE FAULTS ON THE ISOLATED SYSTEM OF A MAGNITUDE HIGH ENOUGH TO BRING THE TOTAL SYSTEM LEAKAGE ABOVE THE LIM CALIBRATED POINT. THE FAULTS SIMULATED SHALL BE COMBINATIONS OF RESISTIVE AND CAPACITIVE FAULTS. VERIFY AND RECORD THAT THE LIM OPERATES IN ACCORDANCE WITH REQUIREMENTS.
4) INFRARED SCANNING: PERFORM THERMOGRAPHIC SURVEY IN ACCORDANCE WITH NETA ATS, SECTION 9.0.
a) INITIAL INFRARED SCANNING: AFTER SUBSTANTIAL COMPLETION, BUT NOT MORE THAN 60 DAYS AFTER FINAL ACCEPTANCE, PERFORM AN INFRARED SCAN OF EACH PANELBOARD. OPEN OR REMOVE 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.

2 PREPARE A CERTIFIED REPORT THAT IDENTIFIES PANELBOARDS CHECKED AND DESCRIBES SCANNING RESULTS. INCLUDE NOTATION OF DEFICIENCIES DETECTED, REMEDIAL ACTION TAKEN, AND OBSERVATIONS AFTER REMEDIAL ACTION.
c. CORRECT DEFICIENCIES, RETEST AND REPORT:
1) CORRECT UNSATISFACTORY CONDITIONS, AND RETEST TO DEMONSTRATE COMPLIANCE; REPLACE 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.
d. TEST LABELING: ON COMPLETION OF SATISFACTORY TESTING OF EACH UNIT, ATTACH A DATED AND SIGNED "SATISFACTORY TEST" LABEL TO TESTED COMPONENT.

G. SEGREGATION OF WIRING SYSTEMS

1. SEGREGATION OF WIRING SYSTEMS SHALL NOT BE COMPROMISED BY THE USE OF COMMON PULLBOXES, WIREWAYS, CABINETS OR ANY OTHER TYPE OF ENCLOSURE.

2. THE RACEWAY SYSTEM FOR EACH FEEDER SHALL BE A SEPARATE SYSTEM COMPLETELY FAULT ISOLATED FROM ALL OTHER RACEWAY SYSTEMS.

3. THE RACEWAY SYSTEM FOR THE BRANCH CIRCUITS OF EACH PANELBOARD SHALL BE A SEPARATE SYSTEM COMPLETELY FAULT ISOLATED FROM ALL OTHER RACEWAY SYSTEMS.

H. EQUIPMENT CONNECTIONS AND CONTROL WIRING

1. THE FURNISHING AND INSTALLATION OF CONTROL POWER WIRING REQUIRED FOR EQUIPMENT FURNISHED UNDER DIVISION 15 AND NOT SHOWN ON THE ELECTRICAL DRAWINGS SHALL BE FURNISHED UNDER DIVISION 15. CONTROL POWER WIRING IS DEFINED AS THE LINE VOLTAGE (120V) POWER WIRING FOR EQUIPMENT CONTROL CABINETS, TEMPERATURE CONTROL, ENERGY MANAGEMENT, OR BUILDING AUTOMATION SYSTEM PANELS AND LINE VOLTAGE SMOKE/FIRE DAMPERS.

2. THE FURNISHING AND INSTALLATION OF THE TEMPERATURE CONTROL WIRING, ENERGY MANAGEMENT SYSTEM OR BUILDING AUTOMATION WIRING NOT SHOWN ON THE ELECTRICAL DRAWINGS SHALL BE FURNISHED UNDER DIVISION 15. TEMPERATURE CONTROL, ENERGY MANAGEMENT SYSTEM AND BUILDING AUTOMATION SYSTEM WIRING IS DEFINED AS THE INTERLOCK OR INTERCONNECTING WIRING REQUIRED BETWEEN SYSTEM CONTROL DEVICES, APPURTENANCES AND CONTROL PANELS TO ALLOW THE SYSTEM TO FUNCTION AUTOMATICALLY. THIS INCLUDES WIRING BETWEEN THE FIRE ALARM SYSTEM, SMOKE EXHAUST SYSTEMS, DOOR ENTRY SYSTEMS AND ANY OTHER SYSTEM REQUIRING INTERFACE WITH THE TEMPERATURE CONTROL, ENERGY MANAGEMENT AND BUILDING AUTOMATION SYSTEM.

3. PROVIDE POWER WIRING TO EACH MOTOR-DRIVEN AND/OR ELECTRICALLY-OPERATED SYSTEM OR UNIT OF EQUIPMENT. THE WIRING SHALL ALLOW THE MOTOR(S) OR EQUIPMENT TO OPERATE IN A MANUAL MODE.

4. CONTROL WIRING WILL, UNLESS SPECIFICALLY NOTED OTHERWISE, WILL BE FURNISHED AND INSTALLED UNDER OTHER DIVISIONS OF THE SPECIFICATIONS.

5. EXCEPT FOR ITEMS THAT ARE FURNISHED WITH FACTORY-INSTALLED, INTEGRAL MOTORS, AN ELECTRIC MOTOR OF REQUIRED SIZE AND ELECTRICAL CHARACTERISTICS WILL BE PROVIDED AND INSTALLED UNDER OTHER DIVISIONS FOR EACH ITEM OF MOTOR-DRIVEN EQUIPMENT. COMPLETE THE ELECTRICAL INSTALLATION OF THESE MOTORS IN ACCORDANCE WITH APPROVED WIRING DIAGRAMS AND INSTRUCTIONS.

6. WHERE DISCONNECT SWITCHES OR CIRCUIT BREAKERS ARE NOT PROVIDED INTEGRAL WITH CONTROL EQUIPMENT FOR MOTORS AND OTHER ELECTRICAL APPURTENANCES, PROVIDE AND INSTALL ALL DISCONNECT SWITCHES REQUIRED BY THE NATIONAL ELECTRICAL CODE AND/OR INDICATED.

7. WHERE POSSIBLE, TERMINATE CONDUITS IN CONDUIT BOXES ON MOTORS. WHERE MOTORS ARE NOT PROVIDED WITH CONDUIT BOXES, TERMINATE THE CONDUITS IN CONDUIT FITTINGS AT THE MOTORS.

I. EXISTING SYSTEMS TO REMAIN

1. THE CONTRACT DOCUMENTS DO NOT PROPOSE TO SHOW ALL EXISTING SYSTEMS, MATERIAL OR EQUIPMENT. OBTAIN DATA RELATED TO EXISTING CONDITIONS FROM EXISTING DOCUMENTS, MEASUREMENTS, NOTATIONS, PHOTOGRAPHS, SURVEYS AND OTHER OBSERVATIONS AT THE SITE.

2. REMOVE EXISTING WIRE, CONDUIT, EQUIPMENT, FIXTURES AND OTHER ITEMS TO PROVIDE ACCESS FOR WORK IN EXISTING FACILITIES. REINSTALL AND REFINISH ITEMS REMOVED, OR OTHERWISE DAMAGED, TO MATCH EXISTING ADJACENT SURFACED UPON COMPLETION OF THE WORK.

3. WHERE EXISTING FUNCTIONS TO REMAIN IN USE ARE DISRUPTED, THEY SHALL BE FULLY RESTORED AFTER DISRUPTION, IN FULL COMPLIANCE WITH THIS DIVISION OF THE SPECIFICATIONS FOR NEW WORK.

4. MODIFY, REMOVE OR RELOCATE MATERIALS AND ITEMS INDICATED ON THE DRAWINGS OR REQUIRED BY THE INSTALLATION OF NEW WORK.

5. WORKING JOINTLY WITH THE ARCHITECT, ESTABLISH AND MARK SALVAGE AND DEMOLITION ITEMS BEFORE COMMENCING WORK; REPORT ITEMS SCHEDULE FOR RELOCATION, REINSTALLATION OR REUSE, WHICH ARE FOUND TO BE IN DAMAGED CONDITION; AWAIT FURTHER INSTRUCTIONS FROM THE ARCHITECT BEFORE COMMENCING WITH WORK.

6. DEMOLITION EQUIPMENT, DEVICES AND MATERIAL SHALL BE REMOVED FROM THE SITE AND DISPOSED OF BY THE CONTRACTOR. SALVAGED EQUIPMENT AND DEVICES SHALL BE THE PROPERTY OF THE CONTRACTOR UNLESS NOTED OTHERWISE.

7. MAKE MINOR RELOCATIONS NECESSITATED BY THE CONDITIONS AT THE SITE OR AS DIRECTED BY THE ARCHITECT, WITHOUT ADDITIONAL COST TO THE OWNER. REPAIR AND RESTORE TO GOOD FUNCTIONAL CONDITION, EQUIPMENT, MATERIALS AND ITEMS SCHEDULED FOR RELOCATION, WHICH ARE DAMAGED DURING DISMANTLING OR REASSEMBLY OPERATIONS. NEW MATERIALS AND ITEMS OF SIMILAR DESIGN AND QUALITY MAY BE SUBSTITUTED FOR MATERIALS AND ITEMS INDICATED TO BE RELOCATED UPON APPROVAL OF SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. REMOVE CAREFULLY, IN REVERSE ORDER TO ORIGINAL ASSEMBLY OR PLACEMENT, ITEMS WHICH ARE TO BE RELOCATED. PROTECT ITEMS UNTIL RELOCATION IS COMPLETE. CLEAN AND REPAIR ITEMS TO BE RELOCATED, AND PROVIDE NEW MATERIALS, FITTINGS AND APPURTENANCES REQUIRED TO COMPLETE THE RELOCATIONS AND TO RESTORE TO GOOD OPERATING ORDER. PERFORM THE RELOCATION WORK IN ACCORDANCE WITH APPLICABLE PORTIONS OF THESE SPECIFICATIONS, UTILIZING SKILLED WORKERS.

8. RELOCATING DEVICES: REMOVE AND REINSTALL IN LOCATIONS DESIGNATED BY THE ARCHITECT TEMPERATURE CONTROL SYSTEM DEVICES, RELAYS, WIRE, CONDUIT, FIXTURES, EQUIPMENT AND OTHER DEVICES REQUIRED FOR THE OPERATION OF THE VARIOUS SYSTEMS THAT ARE INSTALLED IN EXISTING-TO-BE-REMOVED CONSTRUCTION.

J. CONTRACTOR SHALL KEEP A CLEAN SET OF DRAWINGS ON THE JOB, NOTING DAILY ALL CHANGES MADE IN THESE DRAWINGS IN CONNECTION WITH THE FINAL INSTALLATION INCLUDING EXACT DIMENSIONED LOCATIONS OF ALL NEW AND UNCOVERED EXISTING UTILITIES AND SHALL, WITH HIS REQUEST FOR FINAL PAYMENT, TURN OVER A CLEAN, NEATLY MARKED SET OF REPRODUCIBLE MYLARS SHOWING "AS INSTALLED" WORK TO THE ARCHITECT FOR SUBSEQUENT REVIEW AND TRANSMITTAL TO THE OWNER. CONTRACTOR SHALL NOTE ALL CONSTRUCTION CHANGES, DATE EACH SHEET AND LABEL "AS-BUILTS" IN THE REVISION BLOCK ON THE DRAWINGS. CONTRACTOR SHALL ALSO FURNISH ONE (1) SET OF AS-BUILT BLUELINE PRINTS.

K. IN ADDITION TO THE ABOVE, CONTRACTOR SHALL ACCUMULATE DURING THE JOB'S PROGRESS, THE FOLLOWING DATA, IN TRIPLICATE, PREPARED IN A NEAT BROCHURE OR PACKET FOLDER AND TURNED OVER TO THE ARCHITECT FOR REVIEW AND SUBSEQUENT DELIVERY TO THE OWNER.

1. ALL WARRANTIES AND GUARANTEES AND MANUFACTURER'S DIRECTIONS ON EQUIPMENT AND MATERIAL COVERED BY THE CONTRACT INCLUDING THE NAMES, ADDRESSES AND TELEPHONE NUMBERS OF THE MANUFACTURER'S REPRESENTATIVE.

2. APPROVED FIXTURE BROCHURES, WIRING DIAGRAMS AND CONTROL DIAGRAMS (ORIGINAL DATA, NO COPIES).

3. COPIES OF APPROVED SHOP DRAWINGS.

4. OPERATING INSTRUCTIONS FOR ALL ELECTRICAL SYSTEM EQUIPMENT. OPERATING INSTRUCTIONS SHALL ALSO INCLUDE RECOMMENDED MAINTENANCE PROCEDURES.

5. TEST REPORTS REQUIRED BY THESE SPECIFICATIONS.

6. ANY AND ALL OTHER DATA AND/OR DRAWINGS REQUIRED DURING CONSTRUCTION.

7. REPAIR PARTS LISTS OF ALL MAJOR ITEMS OF EQUIPMENT INCLUDING NAME, ADDRESS AND TELEPHONE NUMBERS OF LOCAL SUPPLIER OR AGENT.

L. ALL OF THE ABOVE DATA SHALL BE SUBMITTED TO THE ENGINEER FOR HIS REVIEW AT SUCH TIME AS THE CONTRACTOR SUBMITS HIS LAST ESTIMATE PRIOR TO HIS FINAL PAYMENT, BUT IN NO CASE, LESS THAN TWO WEEKS BEFORE FINAL INSPECTION.

END OF SECTION

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC
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No.	Description	Date

COLORADO LICENSED PROFESSIONAL ENGINEER 48502 8/19/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

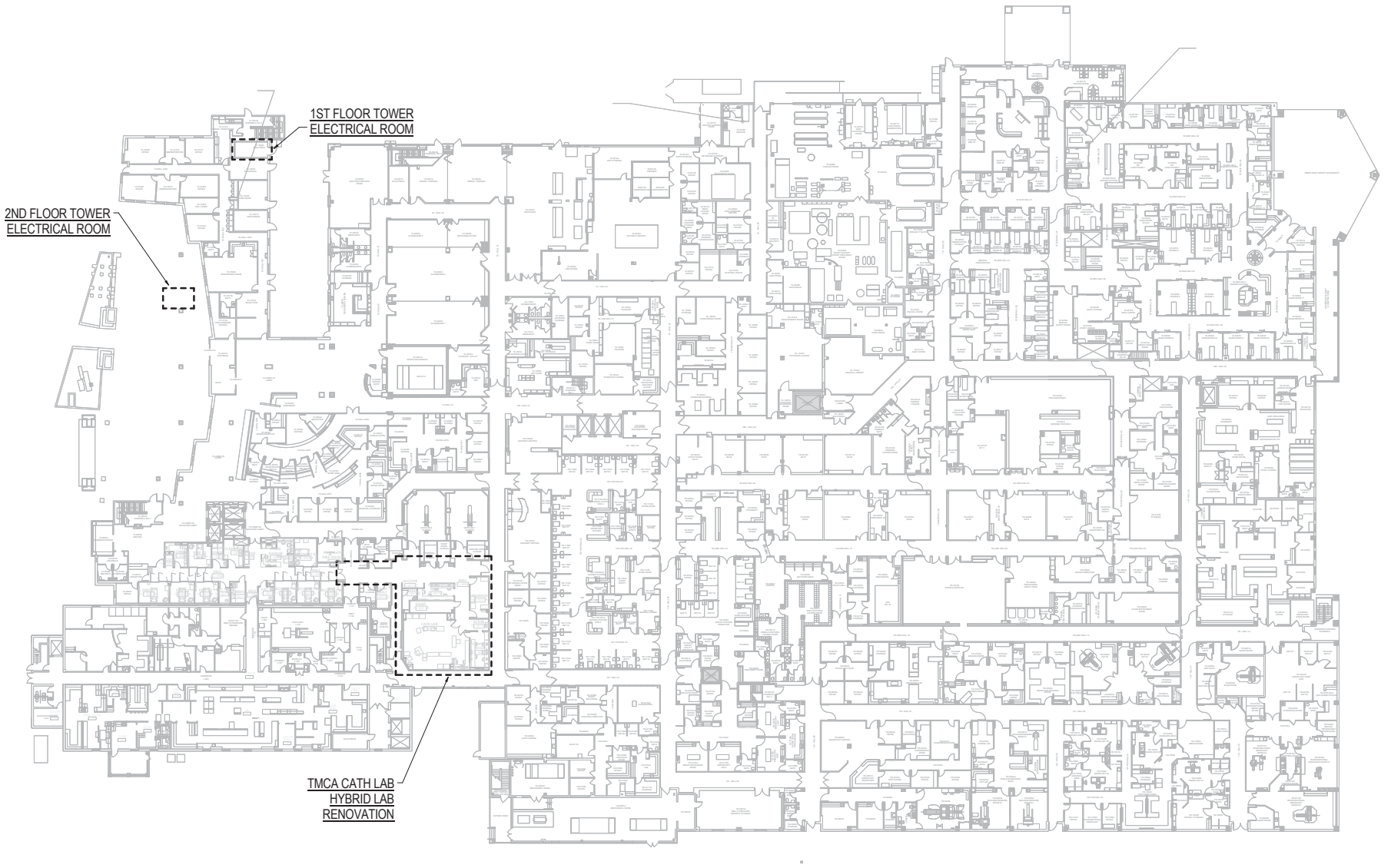
Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
ELEECTRICAL SPECIFICATIONS

Sheet Number
E.002

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1 LEVEL 01 - OVERALL PLAN
1" = 20'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1156136*
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No.	Description	Date

COLORADO LICENSED 46502 PROFESSIONAL ENGINEER

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
LEVEL 1 - ELECTRICAL OVERALL PLAN

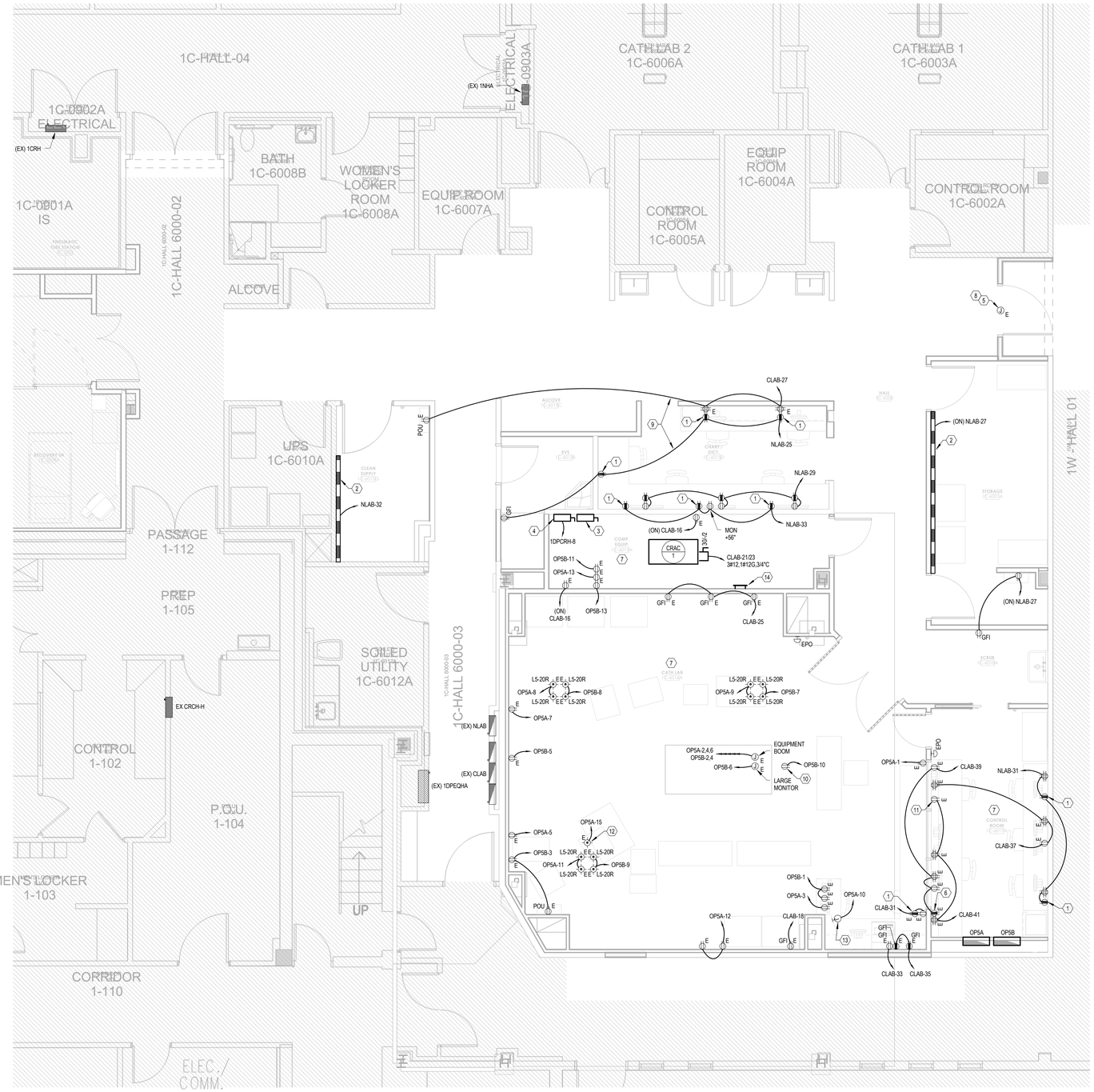
Sheet Number
E.100

GENERAL NOTES:

A. REFER TO SHEET E.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.
B. REFER TO ARCHITECTURAL FLOOR PLANS FOR ALL DOOR ELEVATIONS.
C. REFER TO DETAILS 5/E.601 FOR PATIENT HOIST GROUNDING REQUIREMENTS.

LEGEND NOTES:

#	
1	PROVIDE HOSPITAL GRADE DUPLEX RECEPTACLE WITH (2) USB OUTLETS, EQUAL TO LEGRAND TR8300HUSB.
2	PROVIDE SURFACE MOUNTED RACEWAY EQUAL TO LEGRAND 3000 SERIES MOUNTED AT 54" AFF. PROVIDE (1) HOSPITAL GRADE DUPLEX RECEPTACLE AT 24" OC.
3	PROVIDE 125A/3P ENCLOSED CIRCUIT BREAKER FOR UPS OUTPUT. COORDINATE ADDITIONAL REQUIREMENTS WITH VENDOR DRAWINGS.
4	PROVIDE 150A/3P ENCLOSED SHUNT TRIP CIRCUIT BREAKER DISCONNECT SWITCH TO SERVE AS CATH EQUIPMENT MAIN DISCONNECTING MEANS. COORDINATE ADDITIONAL REQUIREMENTS WITH VENDOR DRAWINGS.
5	120V CONNECTION FOR AUTO DOOR OPERATOR AND ACCESS CONTROLS. COORDINATE REQUIREMENTS WITH DOOR HARDWARE VENDOR AND SECURITY CONTRACTOR.
6	RECEPTACLE FOR CONNECTION TO OWNER FURNISHED SOUND SYSTEM COMPONENTS. REFER TO ARCHITECTURAL ELEVATIONS FOR MOUNTING HEIGHT.
7	REFER TO PHILIPS AND STRYKER DRAWINGS FOR ALL VENDOR RACEWAY, CONDUCTOR, AND ROUGH-IN REQUIREMENTS WITHIN THIS SPACE.
8	CONNECT NEW AUTO DOOR OPERATOR TO EXISTING LIFE SAFETY CIRCUIT SERVING DEMOLISHED AUTO DOOR, INDICATED TO BE 2LSL-4 ON RECORD DOCUMENTS. EXTEND CONDUIT AND CONDUCTORS AS REQUIRED TO REACH NEW DOOR LOCATION.
9	REUSE EXISTING CONDUITS SERVING DEMOLISHED NURSE STATION WHERE PRACTICABLE.
10	120V CONNECTION TO VENDOR EQUIPMENT LOCATED WITHIN MED GAS PEDESTAL. COORDINATE REQUIREMENTS WITH VENDOR.
11	RECEPTACLE MOUNTED ABOVE WINDOW FOR CONNECTION TO CEILING MOUNTED MONITORS.
12	DUPLEX 5-20R
13	BACK BOX FOR BOOM MOUNTED LIGHTING CONTROLLER. COORDINATE ROUGH-IN REQUIREMENTS WITH SYSTEM VENDOR. COORDINATE LOCATION WITH ARCHITECTURAL ELEVATIONS.
14	EQUI-POTENTIAL GROUND BAR FURNISHED AND INSTALLED BY CONTRACTOR. REFER TO VENDOR DRAWINGS FOR PURCHASING INFORMATION. PROVIDE (1) #1 AWG GROUND IN 3/4"C FROM 1DPCRH.

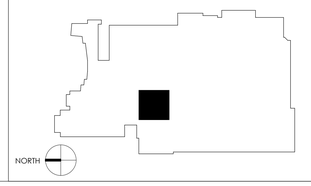


1 LEVEL 01 CATH LAB - POWER PLAN
1/4" = 1'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1156136*
Permit #: *2016 1191012*

KEY PLAN



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No.	Description	Date
2	AS1 02	10/18/2016

COLORADO LICENSED 45502 PROFESSIONAL ENGINEER 10-18-16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
FLOOR PLAN - POWER

Sheet Number
E.201

CONTRACT & 21st CENTURY ARCHITECTURE

10/19/2016 6:47:14 PM

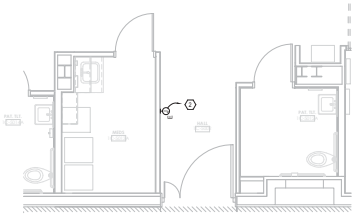
GENERAL NOTES:

A. REFER TO SHEET E.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.
B. REFER TO ARCHITECTURAL ELEVATIONS FOR ALL DEVICE ELEVATIONS.

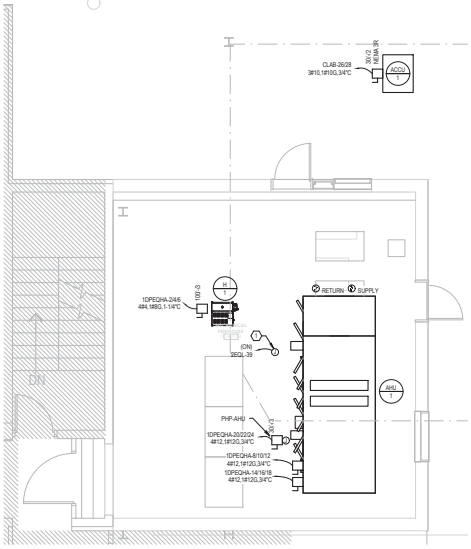
LEGEND NOTES:

1 PROVIDE 120V EQUIPMENT BRANCH CONNECTION TO TEMPERATURE CONTROLS. COORDINATE ADDITIONAL REQUIREMENTS WITH CONTROLS CONTRACTOR.

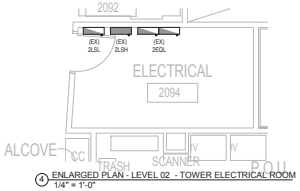
2 RELOCATED MEDICAL GAS ALARM PANELS. EXTEND EXISTING 120V LIFE SAFETY CIRCUIT SERVING PANELS AT PREVIOUS LOCATION TO NEW LOCATION, INDICATED TO BE 2LSL-2 ON RECORD DOCUMENTS. UTILIZE EXISTING ROUGH-IN INSTALLED UNDER THE PREPRECOVERY SCOPE. EXTEND EXISTING CONDUIT AND CONDUCTORS AS REQUIRED TO REACH NEW ROUGH-IN.



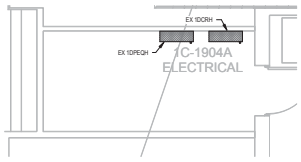
2 LEVEL 01 CATH LAB/PREP RECOVERY - POWER PLAN
1/4" = 1'-0"



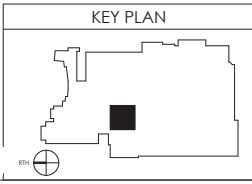
1 LEVEL 02 PENTHOUSE - POWER PLAN
1/4" = 1'-0"



4 ENLARGED PLAN - LEVEL 02 - TOWER ELECTRICAL ROOM
1/4" = 1'-0"



3 ENLARGED PLAN - LEVEL 01 - TOWER ELECTRICAL ROOM
1/4" = 1'-0"



City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC

RSN: 1156136
Permit #: 2016 1191012

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No.	Description	Date

COLORADO LICENSED 46502 PROFESSIONAL ENGINEER

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
FLOOR PLANS - POWER

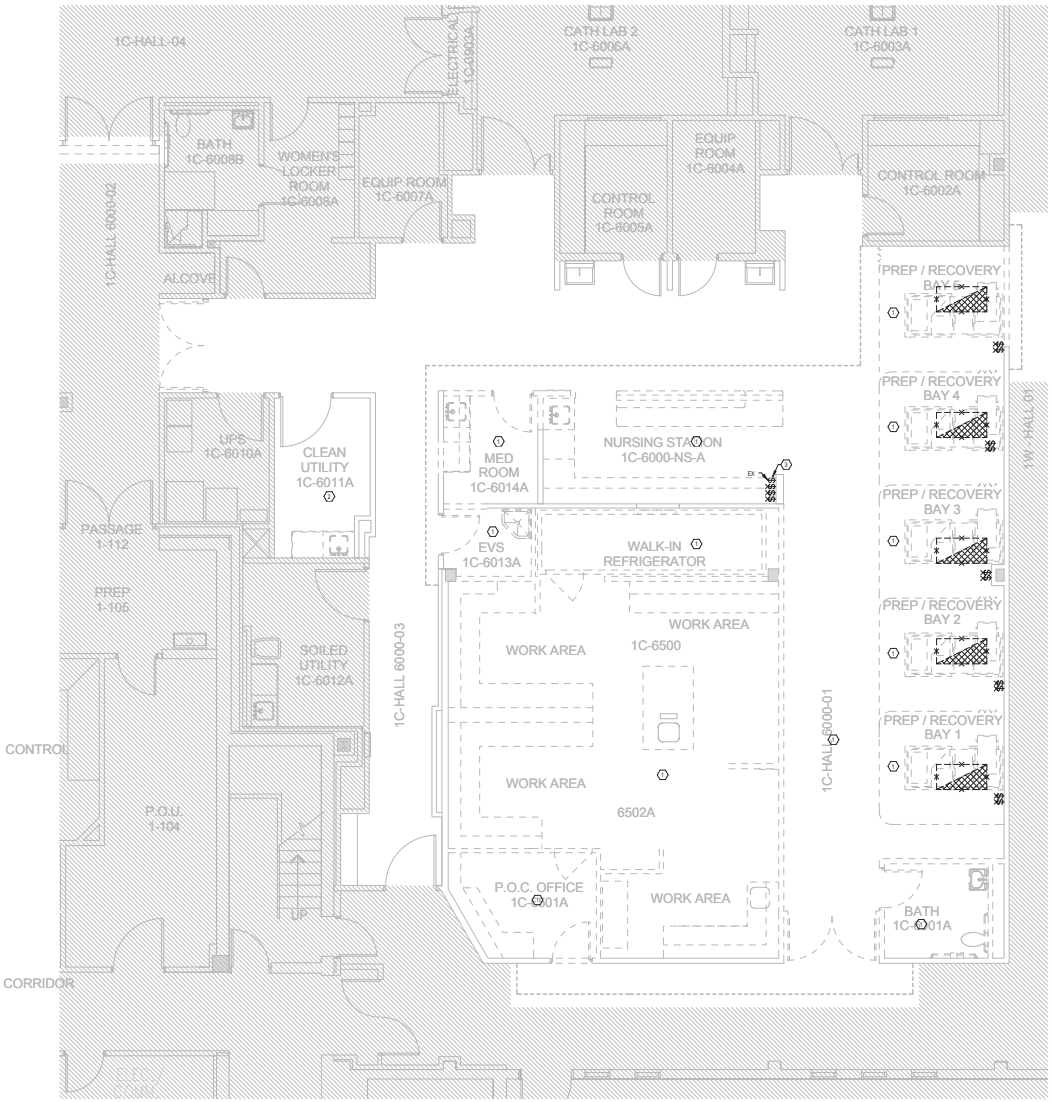
Sheet Number
E.202

GENERAL NOTES:

A. REFER TO SHEET E.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

② LEGEND NOTES:

1. ALL EXISTING ELECTRICAL DECEIVES, LIGHTING FIXTURES, LIGHTING CONTROLS, FIRE ALARM, AND LOW VOLTAGE WITHIN THIS SPACE SHALL BE DEMOLISHED, UNO. CIRCUITS BEING RECOVERED FOR REUSE SHALL BE DEMOLISHED BACK TO NEAREST ACTIVE JUNCTION BOX FOR EXTENSION TO NEW LOCATION. CIRCUITS NOT REUSED SHALL BE DEMOLISHED BACK TO SOURCE.
2. ALL EXISTING LIGHT FIXTURES AND CONTROLS WITHIN THIS SPACE ARE EXISTING TO REMAIN.
3. NORMAL BRANCH CORRIDOR LIGHTING CONTROL



1 LEVEL 01 - LIGHTING DEMOLITION PLAN
1/4" = 1'-0"

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No.	Description	Date

COLORADO LICENSED 46502 8/9/16 PROFESSIONAL ENGINEER

TMCA CATH LAB HYBRID LAB RENOVATION

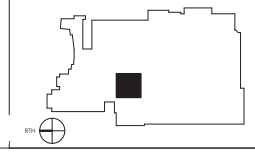
1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
FLOOR PLAN - LIGHTING DEMOLITION

Sheet Number
ED.301

KEY PLAN



City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

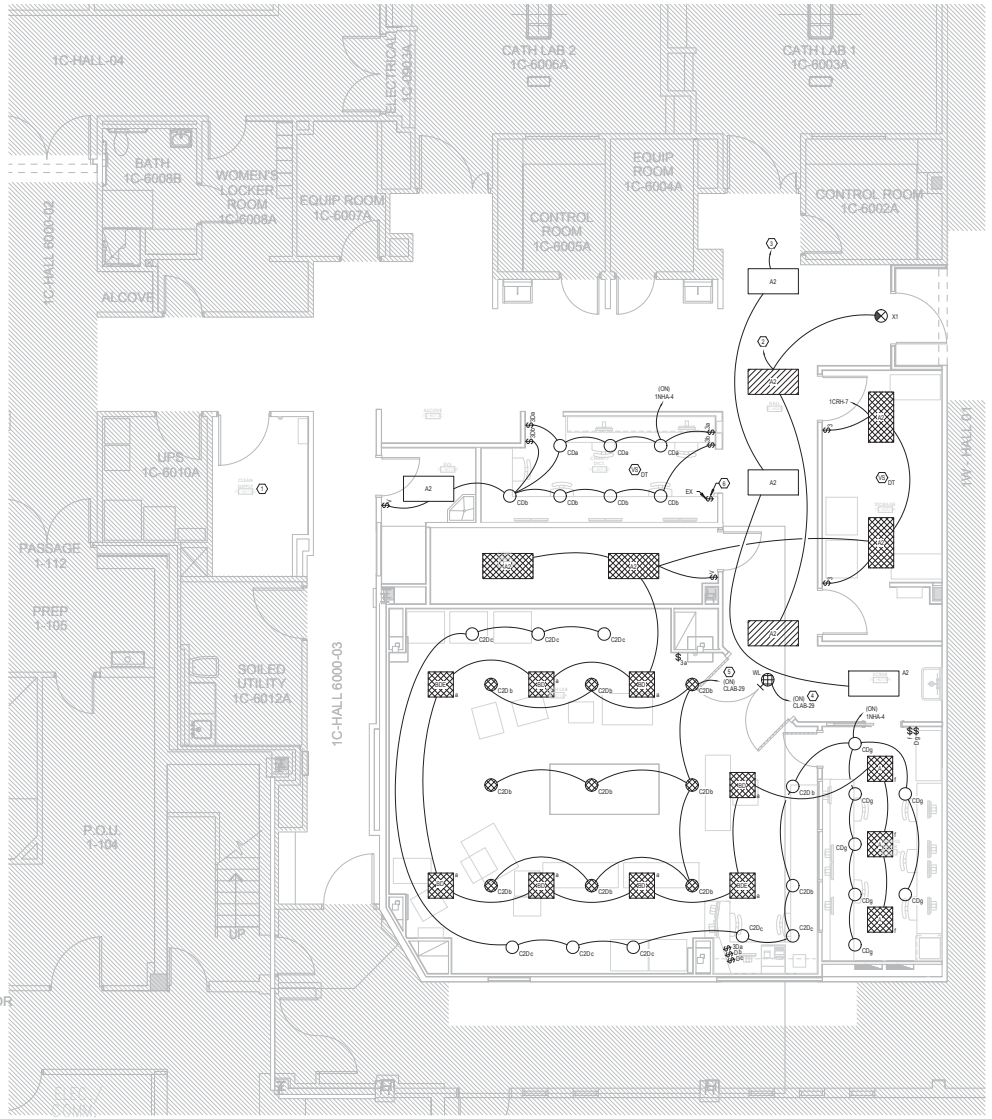
RSN: *1156136*
Permit #: *2016 1191012*

GENERAL NOTES:

A. REFER TO SHEET E.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1. ALL EXISTING LIGHT FIXTURES AND CONTROLS WITHIN THIS SPACE ARE EXISTING TO REMAIN.
2. CONNECT TO EXISTING 277V LIFE SAFETY BRANCH CIRCUIT SERVING THIS SPACE, INDICATED TO BE 2LSH-2 ON RECORD DOCUMENTS. DEMOLISHED LOAD = 138VA, NEW LOAD = 104VA, NET LOAD TO CIRCUIT = -34VA.
3. CONNECT TO EXISTING 277V NORMAL BRANCH CIRCUIT AND CONTROLS SERVING THIS SPACE, INDICATED TO BE 1NHA-4 ON RECORD DOCUMENTS. DEMOLISHED LOAD = 365VA, NEW LOAD = 141VA, NET LOAD TO CIRCUIT = -219VA.
4. ROUTE LIGHTING CIRCUIT THROUGH X-RAY LIGHTING CONTROL SYSTEM FOR CONTROL OF WARNING LIGHT DURING X-RAY EXPOSURE. COORDINATE ALL SYSTEM REQUIREMENTS WITH VENDOR DRAWINGS.
5. LIGHTING CIRCUIT TO HAVE CONTROL VIA PHILLIPS IMAGING EQUIPMENT. REFER TO PHILLIPS VENDOR DRAWINGS FOR REQUIRED CONTRACTOR SUPPLIED RELAYS AND WIRING REQUIREMENTS.
6. NORMAL BRANCH CORRIDOR LIGHTING CONTROL

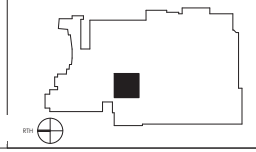


1 LEVEL 01 CATH LAB - LIGHTING PLAN
1/4" = 1'-0"

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
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No.	Description	Date

COLORADO LICENSED PROFESSIONAL ENGINEER 46502 8/9/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
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Sheet Title:
FLOOR PLAN - LIGHTING

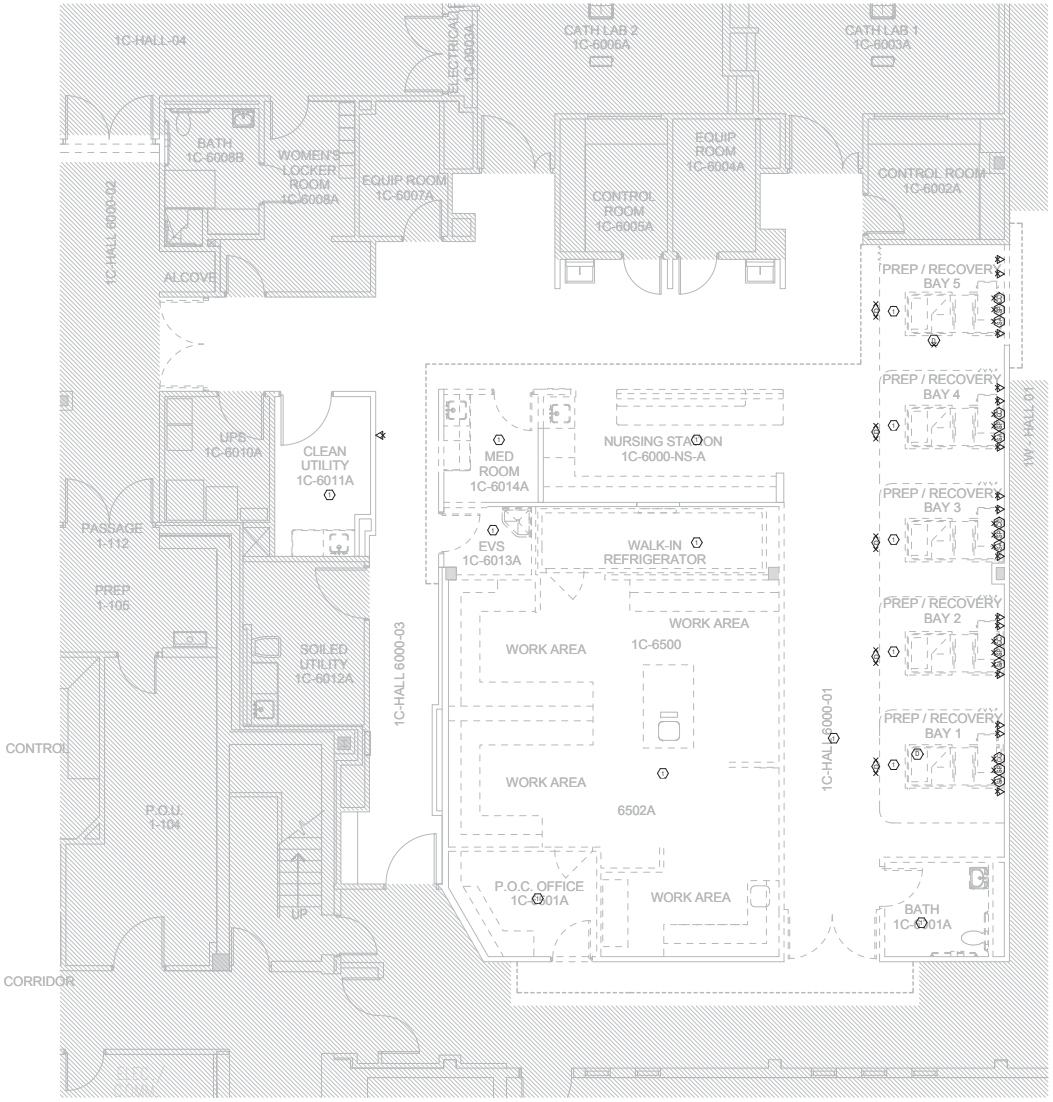
Sheet Number
E.301

GENERAL NOTES:

A. REFER TO SHEET E.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

LEGEND NOTES:

1. ALL EXISTING ELECTRICAL DEVICES, LIGHTING FIXTURES, LIGHTING CONTROLS, FIRE ALARM, AND LOW VOLTAGE WITHIN THIS SPACE SHALL BE DEMOLISHED, U.N.O. CIRCUITS BEING RECOVERED FOR REUSE SHALL BE DEMOLISHED BACK TO NEAREST ACTIVE JUNCTION BOX FOR EXTENSION TO NEW LOCATION. CIRCUITS NOT REUSED SHALL BE DEMOLISHED BACK TO SOURCE.



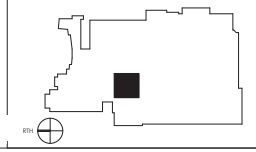
1 LEVEL 01 - SPECIAL SYSTEMS DEMOLITION PLAN
1/4" = 1'-0"

Install electrical connections per 2014 NEC 110.14, identify disconnects per 2014 NEC 110.22 and provide working space around electrical equipment per 2014 NEC 110.26

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Issue	100% CD
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Checked by	JG

Sheet Title:
FLOOR PLAN - SPECIAL SYSTEMS DEMOLITION

Sheet Number
ED.401



1 LEVEL 01 CATH LAB - SPECIAL SYSTEMS PLAN
1/4" = 1'-0"

GENERAL NOTES:

A. REFER TO SHEET E.100 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.
B. REFER TO ARCHITECTURAL ELEVATIONS FOR ALL DEVICE ELEVATIONS.
C. NEW FIRE ALARM DEVICES SHALL BE PRODUCTS OF EXISTING FIRE ALARM SYSTEM MANUFACTURER AND SHALL BE CONNECTED TO EXITING FIRE ALARM SYSTEM. UTILIZE EXISTING FIRE ALARM MAINTENANCE CONTRACTOR FOR INSTALLATION OF NEW FIRE ALARM DEVICES AND MODIFICATIONS OF EXISTING FIRE ALARM SYSTEMS AS REQUIRED TO ACCOMMODATE THE INSTALLATION.

LEGEND NOTES:

1. PROVIDE EMPTY RACEWAY FOR ACCESS CONTROL. REFER TO DETAIL 09/E.601 FOR ADDITIONAL INFORMATION. COORDINATE REQUIREMENTS WITH SECURITY CONTRACTOR.
2. TOUCH-LESS WAVE PLATE FOR AUTO DOOR OPERATION. COORDINATE ROUGH-IN REQUIREMENTS WITH EQUIPMENT VENDOR.
3. PROVIDE DEDUCTIVE ALTERNATE PRICING FOR THE REMOVAL OF THE CONDUIT PATHWAY SHOWN RUNNING BETWEEN POINTS C-N2 AND B-N2 ON STRYKER DRAWINGS.
4. REFER TO PHILIPS AND STRYKER DRAWINGS FOR ALL VENDOR RACEWAY, CONDUCTOR, AND ROUGH-IN REQUIREMENTS WITHIN THIS SPACE.
5. PROVIDE (1) 2-GANG AND (1) SINGLE GANG BACK BOX FOR SOUND SYSTEM COMPONENTS. REFER TO ARCHITECTURAL ELEVATIONS FOR MOUNTING HEIGHT. PROVIDE (1) 1"C FROM THIS LOCATION SOUND SYSTEM LOCATION AT NURSE WORKSTATION. PROVIDE (1) 1"C FROM THIS LOCATION FOR CONNECTION TO CEILING MOUNTED SPEAKERS.
6. PROVIDE (3) SINGLE GANG BACK BOXES IN THIS LOCATION FOR SOUND SYSTEM. PROVIDE (1) 1"C BETWEEN EACH BACK BOX AT THIS LOCATION. COORDINATE EXACT LOCATION AND ADDITIONAL REQUIREMENTS WITH SOUND SYSTEM VENDOR.
7. PROVIDE 2-GANG BACK BOX FOR OWNER FURNISHED SOUND SYSTEM COMPONENTS. REFER TO ARCHITECTURAL ELEVATIONS FOR MOUNTING HEIGHT. PROVIDE (1) 1-1/4"C TO ABOVE ACCESSIBLE CEILING.
8. COORDINATE CONDUIT REQUIREMENTS WITH STRYKER CONDUIT SCHEDULE.
9. EXTEND EXISTING MEDICAL GAS ALARM PANEL LOW VOLTAGE CONDUIT STUBBED TO THIS LOCATION UNDER THE PREP/RECOVERY PROJECT SCOPE. EXTEND CONDUITS TO DEMOLISHED AAP LOCATION TO INTERCEPT EXISTING LOW VOLTAGE SINGLE CABLE FOR EXTENSION TO NEW LOCATION AT PREP/RECOVERY NURSE STATION. LOW VOLTAGE CABLING BY OTHERS. PROVIDE EMPTY CONDUIT WITH PULL STRING
10. APPROXIMATE LOCATION OF CEILING MOUNTED SPEAKER. PROVIDE SINGLE GANG BACK BOX. COORDINATE ADDITIONAL REQUIREMENTS AND SPECIFIC LOCATION ARCHITECTURAL DRAWINGS AND SYSTEM VENDOR.
11. PROVIDE (1) 2-GANG BACK BOX BELOW COUNTER AND ONE ABOVE COUNTER BEHIND WALL MOUNTED COMPUTER MONITORS. PROVIDE (1) 1-1/4" BETWEEN UPPER AND LOWER BOX. COORDINATE BOX LOCATIONS WITH ARCHITECTURAL ELEVATIONS AND MONITOR ARMS. COORDINATE COVER PLATE REQUIREMENTS WITH A/V REQUIREMENTS.
12. PULL BOX FOR CONNECTION TO MAC LAB. COORDINATE REQUIREMENTS WITH FACILITY IT. PROVIDE (1) 2"C TO MAC LAB STATION AT NURSE WORKSTATION.
13. PULL BOX FOR CONNECTION TO MAC LAB. COORDINATE REQUIREMENTS WITH FACILITY IT. PROVIDE (1) 2"C TO MAC LAB STATION IN CONTROL ROOM AND (1) 1" C. TO PEDESTAL LOCATION INDICATED IN VENDOR DRAWINGS.

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

KEY PLAN

RSN: *1156136*
Permit #: *2016 1191012*

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No.	Description	Date

COLORADO LICENSED 45502 PROFESSIONAL ENGINEER 8/9/16

TMCA CATH LAB HYBRID LAB RENOVATION
1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
FLOOR PLAN - SPECIAL SYSTEMS

Sheet Number
E.401

AVAILABLE FAULT CURRENT CALCULATIONS

UTILITY CONTRIBUTION

Utility Fault Current	56500 Amperes	kVA	=	2500
		E	=	480
I = (kVAx1000)/(Ext.732) = trans FLA		trans FLA	=	3007.1209

FAULT CURRENT FROM UTILITY TO HMSBA

Feeder: 11 sets 3 # 500
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): PVC
Voltage: 480

Conductor Length (distance)	L	=	95
ASC	ISCA	=	56,500
# conductors per phase	N	=	11
Phase conductor constant	C	=	26706
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.066
M = 1/(1+f)	M	=	0.938
ISCA = ISCA x M	ISCA	=	53,005

FAULT CURRENT FROM PANEL HMSBA TO ATS-1DPCRH

Feeder: 2 sets 4 # 350
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	10
ASC	ISCA	=	53,005
# conductors per phase	N	=	2
Phase conductor constant	C	=	19703
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.049
M = 1/(1+f)	M	=	0.954
ISCA = ISCA x M	ISCA	=	50,552

FAULT CURRENT FROM ATS-1DPCRH TO 1DPCRH

Feeder: 2 sets 4 # 350
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	10
ASC	ISCA	=	50,552
# conductors per phase	N	=	2
Phase conductor constant	C	=	19703
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.046
M = 1/(1+f)	M	=	0.956
ISCA = ISCA x M	ISCA	=	48,315

FAULT CURRENT FROM PANEL 1DPCRH TO 150A HYBRID DISCONNECT

Feeder: 1 sets 3 # 400
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	360
ASC	ISCA	=	48,315
# conductors per phase	N	=	1
Phase conductor constant	C	=	20565
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	3.052
M = 1/(1+f)	M	=	0.247
ISCA = ISCA x M	ISCA	=	11,924

FAULT CURRENT FROM PANEL 1DPCRH TO 1CRH

Feeder: 1 sets 4 # 1
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	212
ASC	ISCA	=	48,315
# conductors per phase	N	=	1
Phase conductor constant	C	=	7292
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	5.069
M = 1/(1+f)	M	=	0.165
ISCA = ISCA x M	ISCA	=	7,962

FAULT CURRENT FROM PANEL 1DPCRH TO T-2DPCRL PRIMARY

Feeder: 1 sets 3 # 4/0
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	138
ASC	ISCA	=	48,315
# conductors per phase	N	=	1
Phase conductor constant	C	=	15082
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	1.596
M = 1/(1+f)	M	=	0.385
ISCA = ISCA x M	ISCA	=	18,617

FAULT CURRENT FROM TFMR T-2DPCRL PRIMARY TO TFMR T-2DPCRL SECONDARY

ASC	ISCA(P)	=	18,617
transformer kva	KVA	=	112.5
transformer impedance	%Z	=	3.5
Voltage Primary	VP	=	480
Voltage Secondary	VS	=	208
f = (ISCA(P)xVPx1.732x%Z)/(100,000xKVA)	f	=	4.815
M = 1/(1+f)	M	=	0.172
ISCA(S) = VP/VS x M x ISCA(P)	ISCA(S)	=	3,201

FAULT CURRENT FROM T-2DPCRL SECONDARY TO PANEL 2DPCRL

Feeder: 2 sets 4 # 250
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 208

Conductor Length (distance)	L	=	10
ASC	ISCA	=	3,201
# conductors per phase	N	=	2
Phase conductor constant	C	=	16483
Voltage L-L	EL-L	=	208
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.006
M = 1/(1+f)	M	=	0.992
ISCA = ISCA x M	ISCA	=	3,176

FAULT CURRENT FROM PANEL 2DPCRL TO PANEL CLAB

Feeder: 1 sets 4 # 1/0
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 208

Conductor Length (distance)	L	=	280
ASC	ISCA	=	3,176
# conductors per phase	N	=	1
Phase conductor constant	C	=	8924
Voltage L-L	EL-L	=	208
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.830
M = 1/(1+f)	M	=	0.547
ISCA = ISCA x M	ISCA	=	1,736

FAULT CURRENT FROM PANEL HMSBA TO ATS-1DPEQH

Feeder: 3 sets 4 # 300
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	18
ASC	ISCA	=	53,005
# conductors per phase	N	=	3
Phase conductor constant	C	=	18176
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.063
M = 1/(1+f)	M	=	0.941
ISCA = ISCA x M	ISCA	=	49,858

FAULT CURRENT FROM ATS-1DPEQH TO PANEL 1DPEQH

Feeder: 3 sets 4 # 300
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	10
ASC	ISCA	=	49,858
# conductors per phase	N	=	3
Phase conductor constant	C	=	18176
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.033
M = 1/(1+f)	M	=	0.968
ISCA = ISCA x M	ISCA	=	48,266

FAULT CURRENT FROM PANEL 1DPEQH TO 2DPEQH

Feeder: 2 sets 4 # 3/0
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	226
ASC	ISCA	=	48,266
# conductors per phase	N	=	2
Phase conductor constant	C	=	12843
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	1.532
M = 1/(1+f)	M	=	0.395
ISCA = ISCA x M	ISCA	=	19,060

FAULT CURRENT FROM PANEL 2DPEQH TO 1DPEQHA

Feeder: 1 sets 4 # 250
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	60
ASC	ISCA	=	19,060
# conductors per phase	N	=	1
Phase conductor constant	C	=	16483
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.250
M = 1/(1+f)	M	=	0.800
ISCA = ISCA x M	ISCA	=	15,243

FAULT CURRENT FROM PANEL 1DPEQH TO T-2EQL PRIMARY

Feeder: 1 sets 3 # 2
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	132
ASC	ISCA	=	48,266
# conductors per phase	N	=	1
Phase conductor constant	C	=	5906
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	3.892
M = 1/(1+f)	M	=	0.204
ISCA = ISCA x M	ISCA	=	9,865

FAULT CURRENT FROM TFMR T-2EQL PRIMARY TO TFMR T-2EQL SECONDARY

ASC	ISCA(P)	=	9,865
transformer kva	KVA	=	45
transformer impedance	%Z	=	3.4
Voltage Primary	VP	=	480
Voltage Secondary	VS	=	208
f = (ISCA(P)xVPx1.732x%Z)/(100,000xKVA)	f	=	6.197
M = 1/(1+f)	M	=	0.139
ISCA(S) = VP/VS x M x ISCA(P)	ISCA(S)	=	1,371

FAULT CURRENT FROM T-2EQL SECONDARY TO PANEL 2EQL

Feeder: 1 sets 4 # 1/0
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 208

Conductor Length (distance)	L	=	10
ASC	ISCA	=	1,371
# conductors per phase	N	=	1
Phase conductor constant	C	=	8924
Voltage L-L	EL-L	=	208
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.013
M = 1/(1+f)	M	=	0.987
ISCA = ISCA x M	ISCA	=	1,353

FAULT CURRENT FROM PANEL HMSBA TO PANEL 1DPNH

Feeder: 2 sets 4 # 350
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	12
ASC	ISCA	=	53,005
# conductors per phase	N	=	2
Phase conductor constant	C	=	19703
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.058
M = 1/(1+f)	M	=	0.945
ISCA = ISCA x M	ISCA	=	50,088

FAULT CURRENT FROM PANEL 1DPNH TO PANEL 1NHA

Feeder: 1 sets 4 # 1
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	315
ASC	ISCA	=	50,088
# conductors per phase	N	=	1
Phase conductor constant	C	=	7292
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	7.807
M = 1/(1+f)	M	=	0.114
ISCA = ISCA x M	ISCA	=	5,687

FAULT CURRENT FROM PANEL 1DPNH TO T-1NLA PRIMARY

Feeder: 1 sets 3 # 4/0
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	10
ASC	ISCA	=	50,088
# conductors per phase	N	=	1
Phase conductor constant	C	=	15082
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.120
M = 1/(1+f)	M	=	0.893
ISCA = ISCA x M	ISCA	=	44,728

FAULT CURRENT FROM TFMR T-1NLA PRIMARY TO TFMR T-1NLA SECONDARY

ASC	ISCA(P)	=	44,728
transformer kva	KVA	=	112.5
transformer impedance	%Z	=	3.5
Voltage Primary	VP	=	480
Voltage Secondary	VS	=	208
f = (ISCA(P)xVPx1.732x%Z)/(100,000xKVA)	f	=	11.569
M = 1/(1+f)	M	=	0.080
ISCA(S) = VP/VS x M x ISCA(P)	ISCA(S)	=	3,559

FAULT CURRENT FROM T-1NLA SECONDARY TO PANEL 1DPNL

Feeder: 2 sets 4 # 3/0
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 208

Conductor Length (distance)	L	=	10
ASC	ISCA	=	3,559
# conductors per phase	N	=	2
Phase conductor constant	C	=	12843
Voltage L-L	EL-L	=	208
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.012
M = 1/(1+f)	M	=	0.989
ISCA = ISCA x M	ISCA	=	3,518

FAULT CURRENT FROM PANEL 1DPNL TO PANEL NLAB

Feeder: 1 sets 4 # 1
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 208

Conductor Length (distance)	L	=	258
ASC	ISCA	=	3,518
# conductors per phase	N	=	1
Phase conductor constant	C	=	7292
Voltage L-L	EL-L	=	208
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	1.036
M = 1/(1+f)	M	=	0.491
ISCA = ISCA x M	ISCA	=	1,728

2

GENERAL NOTES

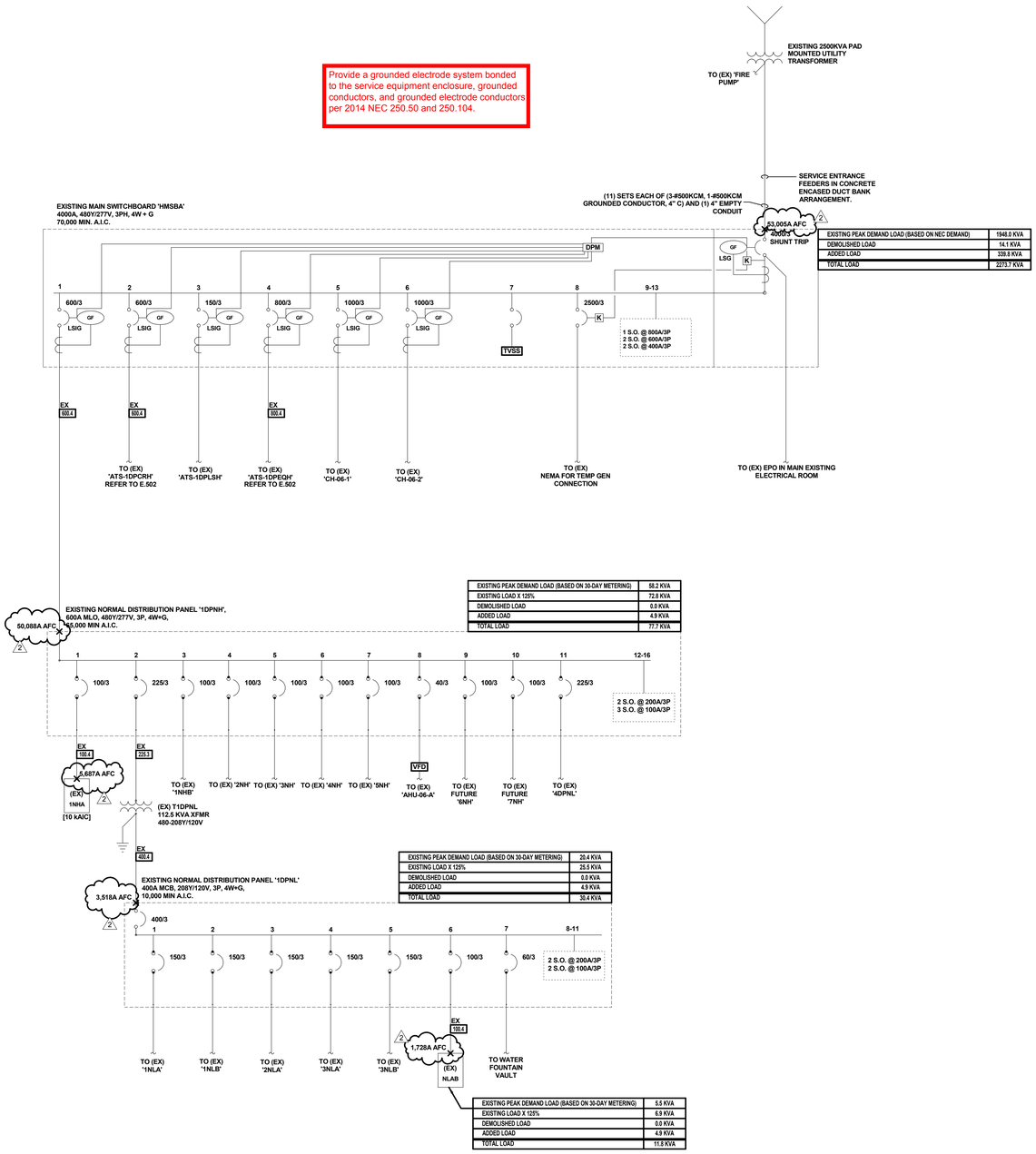
A. REFER TO SHEET E.001 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

2 B. ALL NEW BREAKERS ADDED TO EXISTING PANELS ARE REQUIRED TO MEET OR EXCEED THE AVAILABLE FAULT CURRENT. IF THE EXISTING PANEL CANNOT ACCEPT A NEW BREAKER WITH THE REQUIRED AIC RATING, A NEW PANEL SHALL BE PROVIDED.

LEGEND NOTES

1 ADDED LOAD IS LESS THAN 5% OF THE PANELBOARD/ SWITCHBOARD,S RATED CAPACITY. THEREFORE, METERING IS NOT REQUIRED.

Provide a grounded electrode system bonded to the service equipment enclosure, grounded conductors, and grounded electrode conductors per 2014 NEC 250.50 and 250.104.



01 PARTIAL ONE-LINE DIAGRAM - NORMAL

SCALE: NTS

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC

RSN: 1156136
Permit #: 2016 1191012

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ph: 303.694.4755

No.	Description	Date
2	AS1.02	10/18/2016

COLORADO LICENSED 48502 10-18-16 PROFESSIONAL ENGINEER

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
ELECTRICAL ONE-LINE DIAGRAM

Sheet Number
E.501

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GENERAL NOTES

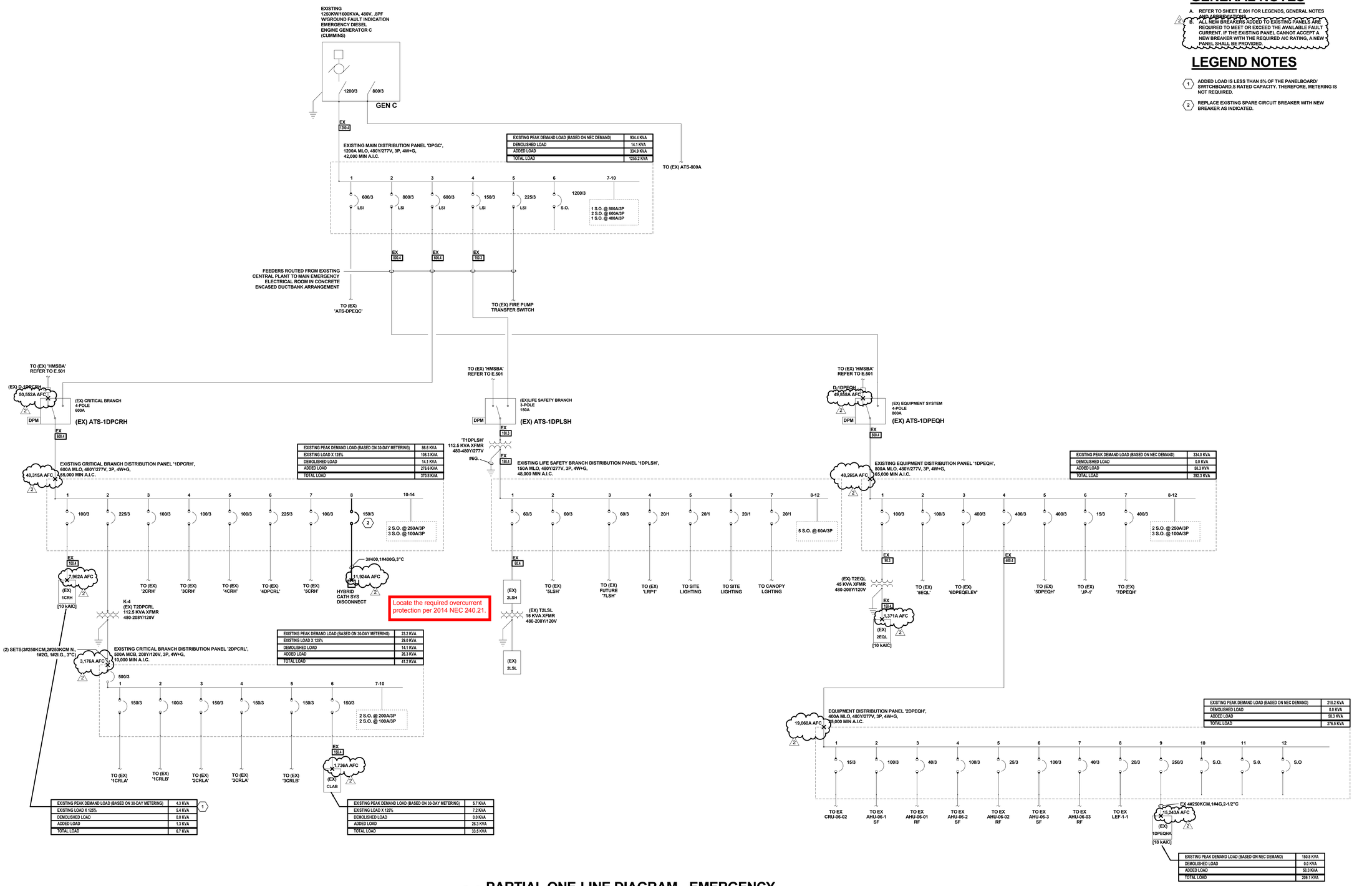
A. REFER TO SHEET E.001 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

2 B. ALL NEW BREAKERS ADDED TO EXISTING PANELS ARE REQUIRED TO MEET OR EXCEED THE AVAILABLE FAULT CURRENT. IF THE EXISTING PANEL CANNOT ACCEPT A NEW BREAKER WITH THE REQUIRED AIC RATING, A NEW PANEL SHALL BE PROVIDED.

LEGEND NOTES

1 ADDED LOAD IS LESS THAN 5% OF THE PANELBOARD/ SWITCHBOARD,S RATED CAPACITY. THEREFORE, METERING IS NOT REQUIRED.

2 REPLACE EXISTING SPARE CIRCUIT BREAKER WITH NEW BREAKER AS INDICATED.



01 PARTIAL ONE-LINE DIAGRAM - EMERGENCY

SCALE: NTS

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1156136*
Permit #: *2016 1191012*

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Greenwood Village, CO 80111
ph: 303.694.4755

No.	Description	Date
2	AS1 02	10/18/2016

COLORADO LICENSED MICHAEL G. GRAY 45502 10-18-16 PROFESSIONAL ENGINEER

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:

ELECTRICAL ONE-LINE DIAGRAM

Sheet Number

E.502

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AVAILABLE FAULT CURRENT CALCULATIONS

UTILITY CONTRIBUTION

Utility Fault Current	45200 Amperes	kVA	=	2000
		E	=	480
I = (kVAx1000)/(Ex1.732) = trans FLA		trans FLA	=	2405.697

FAULT CURRENT FROM UTILITY TO MSBA

Feeder: 11 sets 4 # 500
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): PVC
Voltage: 480

Conductor Length (distance)	L	=	150
ASC	ISCA	=	45,200
# conductors per phase	N	=	11
Phase conductor constant	C	=	26706
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.083
M = 1/(1+f)	M	=	0.923
ISCA = ISCA x M	ISCA	=	41,725

FAULT CURRENT FROM PANEL MSBA TO SSB

Feeder: 6 sets 4 # 400
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	24
ASC	ISCA	=	41,725
# conductors per phase	N	=	6
Phase conductor constant	C	=	20565
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.029
M = 1/(1+f)	M	=	0.972
ISCA = ISCA x M	ISCA	=	40,538

FAULT CURRENT FROM PANEL SSB TO ATS-CR

Feeder: 2 sets 4 # 350
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	24
ASC	ISCA	=	40,538
# conductors per phase	N	=	2
Phase conductor constant	C	=	19703
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.089
M = 1/(1+f)	M	=	0.918
ISCA = ISCA x M	ISCA	=	37,222

FAULT CURRENT FROM ATS-CR TO PANEL CR

Feeder: 2 sets 4 # 350
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	8
ASC	ISCA	=	37,222
# conductors per phase	N	=	2
Phase conductor constant	C	=	19703
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	0.027
M = 1/(1+f)	M	=	0.973
ISCA = ISCA x M	ISCA	=	36,234

FAULT CURRENT FROM PANEL CR TO CRCH-H

Feeder: 1 sets 4 # 350
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

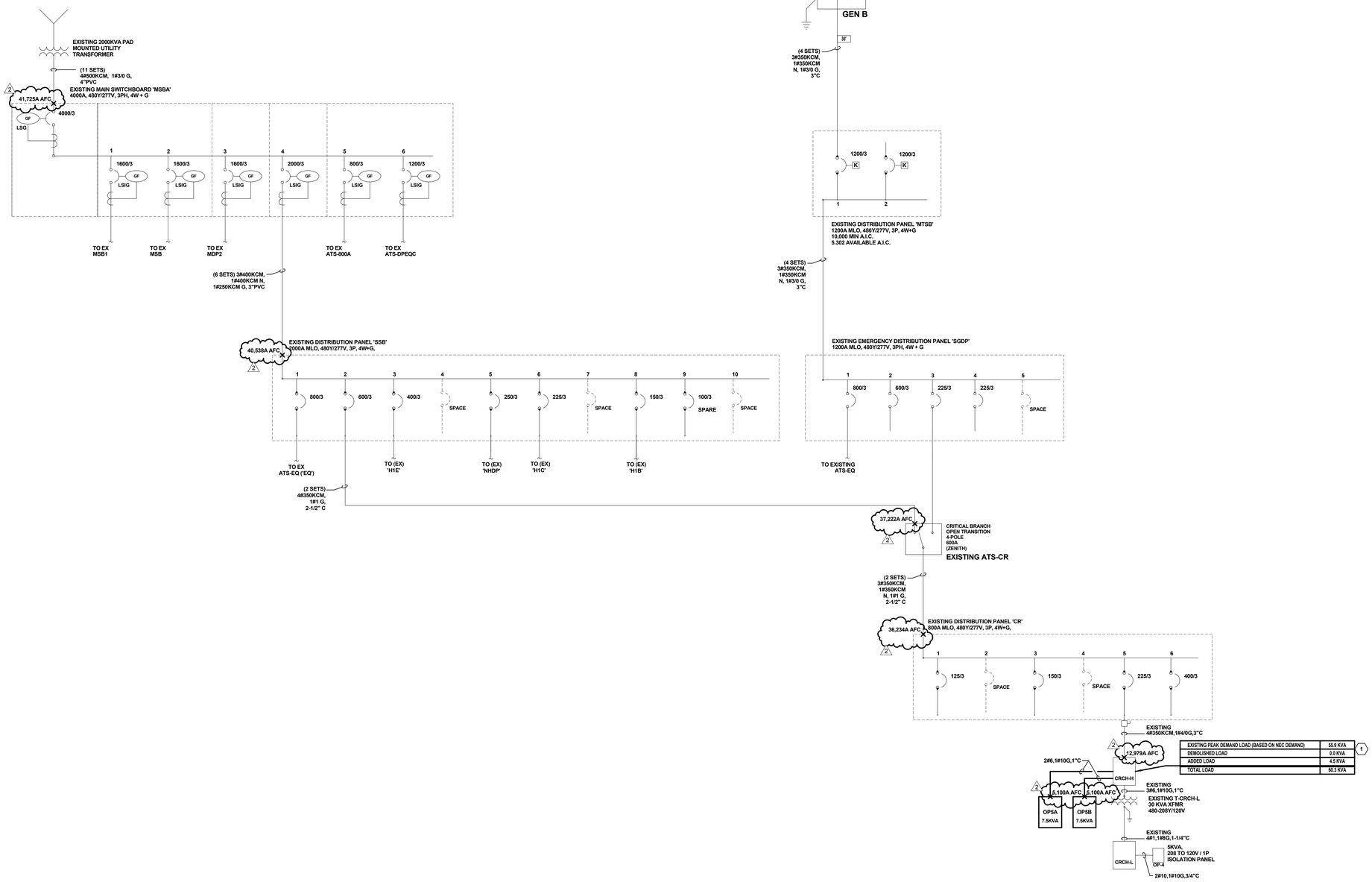
Conductor Length (distance)	L	=	270
ASC	ISCA	=	36,234
# conductors per phase	N	=	1
Phase conductor constant	C	=	19703
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	1.792
M = 1/(1+f)	M	=	0.358
ISCA = ISCA x M	ISCA	=	12,979

FAULT CURRENT FROM PANEL CRCH-H TO PANELS OPSA AND OPSB

Feeder: 1 sets 2 # 6
Conductor (Copper/Aluminum): Copper
Raceway (Steel/Aluminum): Steel
Voltage: 480

Conductor Length (distance)	L	=	80
ASC	ISCA	=	12,979
# conductors per phase	N	=	1
Phase conductor constant	C	=	2425
Voltage L-L	EL-L	=	480
f = (1.732xLxISCA)/(NxCxEL-L)	f	=	1.545
M = 1/(1+f)	M	=	0.393
ISCA = ISCA x M	ISCA	=	5,100

2



01 PARTIAL ONE-LINE DIAGRAM
SCALE: NTS

GENERAL NOTES

A. REFER TO SHEET E.001 FOR LEGENDS, GENERAL NOTES AND ABBREVIATIONS.

2 B. ALL NEW BREAKERS ADDED TO EXISTING PANELS ARE REQUIRED TO MEET OR EXCEED THE AVAILABLE FAULT CURRENT. IF THE EXISTING PANEL CANNOT ACCEPT A NEW BREAKER WITH THE REQUIRED AIC RATING, A NEW PANEL SHALL BE PROVIDED.

LEGEND NOTES

1 ADDED LOAD IS LESS THAN 5% OF THE PANELBOARD/ SWITCHBOARD.S RATED CAPACITY. THEREFORE, METERING IS NOT REQUIRED.

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
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RSN: 1156136
Permit #: 2016 1191012

path 21 architecture
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No.	Description	Date
2	AS1.02	10/18/2016

COLORADO LICENSED JOSHUA N. GRAY 45502 10-18-16 PROFESSIONAL ENGINEER

TMCA CATH LAB HYBRID LAB RENOVATION

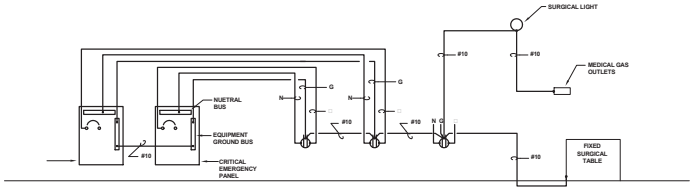
1501 S Potamac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
ELECTRICAL ONE-LINE DIAGRAM

Sheet Number
E.503

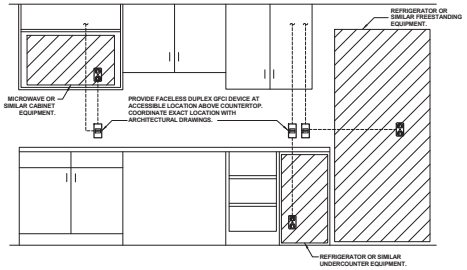
10/19/2016 4:47:28 PM



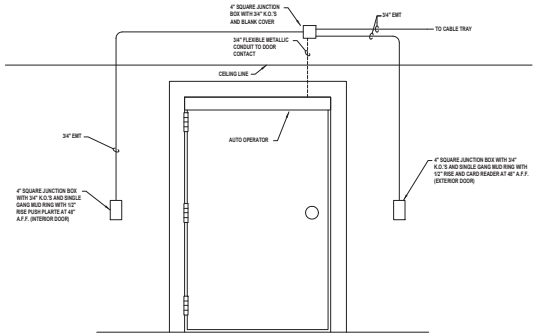
IN ADDITION TO SPECIFIC EQUIPMENT SHOWN, EXTEND A #10 TO ANY FIXED METAL OBJECTS LIKELY TO BE ENERGIZED PER NFPA 99 AND NEC

04 CRITICAL CARE PATIENT VICINITY GROUNDING DETAIL
NO SCALE

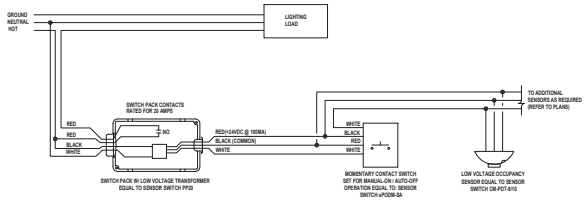
City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC



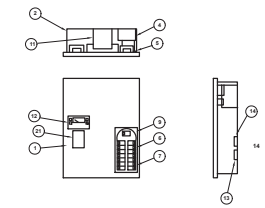
03 ACCESSIBLE GFCI DETAIL
NO SCALE

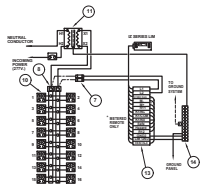


06 SINGLE AUTO DOOR - CARD READER, EMERGENCY BUTTON AND ONE DELAYED EGRESS MAGLOCK
NO SCALE



LOW VOLTAGE VACANCY SENSOR W/ LOW-VOLTAGE OVERRIDE
02
NO SCALE

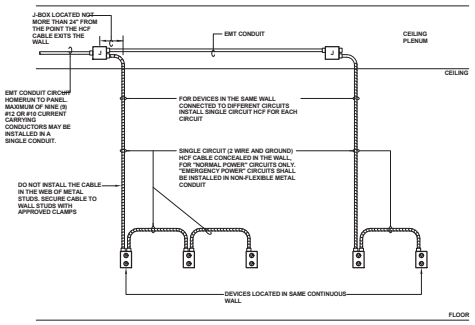




NOTES BY SYMBOL:

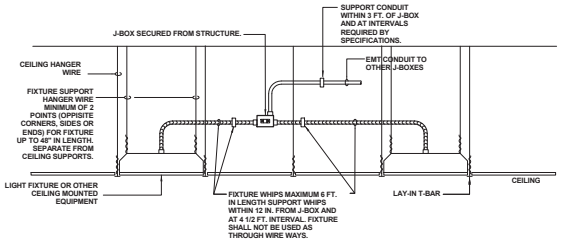
1. PANEL FRONT
2. BACKBOX, GALVANIZED STEEL
3. NOT USED
4. BRANCH BREAKER SUB-CHASSIS
5. BREAKER DEADFRONT
6. HINGED DOOR OVER CIRCUIT BREAKERS
7. LIM FUSES FOR OCP
8. LOADCENTER
9. PRIMARY CIRCUIT BREAKERS, 277V, 1 PH., 1-POLE C.B.
10. BRANCH CIRCUIT BREAKER, 2-PHASE
11. ISOLATION TRANSFORMER
12. LINE ISOLATION MONITOR, 1-PHASE, ANALOG OR DIGITAL
13. LIM CONNECTOR PLATE
14. REFERENCE GROUND BUS

07 SINGLE VOLTAGE ISOLATION PANEL DETAIL
NO SCALE



NOTES
1. NOT APPLICABLE FOR EMERGENCY POWER CIRCUITS
2. HFC CABLE MAY BE INSTALLED ONLY CONCEALED IN WALLS.

05 HEALTHCARE FACILITIES CABLE (HFC) INSTALLATION DETAIL
NO SCALE



01 LAY-IN FIXTURE MOUNTING DETAIL
NO SCALE

RSN: 1156136

Permit #: 2016 1191012

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No.	Description	Date

COLORADO LICENSED PROFESSIONAL ENGINEER 46502 8/9/16

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potomac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
ELECTRICAL DETAILS

Sheet Number
E.601

15243 AIC

EXISTING PANEL: 1DPEQHA — EQUIPMENT

LOCATION: CATH CORRIDOR | FED FROM: 2DPEQH | NEUTRAL BUS: Yes
MAIN BUS: 400A | WIRES: 4W + G | GROUND BUS: Yes
MCB: N/A | ENCLOSURE: NEMA 1 | ISOLATED GROUND BUS: No
VOLTAGE: 480/277 | BUS TYPE: Copper | 200% NEUTRAL: No
AIC: 14,000A | MOUNTING: Recessed | FEED THROUGH LUGS: No
PANEL LUGS: Main Lugs Only

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
1	EXISTING LOAD	-	90	3	A	*70	3	13884	H-1	2
3	---	-	-	-	B	-	-	13884	---	4
5	---	-	-	-	C	-	-	13884	---	6
7	EXISTING LOAD	-	30	3	A	*20	3	2439	AHU-## SF	8
9	---	-	-	-	B	-	-	2439	---	10
11	---	-	-	-	C	-	-	2439	---	12
13	EXISTING LOAD	-	20	3	A	*15	3	1912	AHU-## RF	14
15	---	-	-	-	B	-	-	1912	---	16
17	---	-	-	-	C	-	-	1912	---	18
19	EXISTING LOAD	-	20	3	A	*15	3	583	PHP-AHU	20
21	---	-	-	-	B	-	-	583	---	22
23	---	-	-	-	C	-	-	583	---	24
25	EXISTING LOAD	-	20	1	A			-	S.O.	26
27	EXISTING LOAD	-	20	1	B			-	S.O.	28
29	EXISTING LOAD	-	20	1	C			-	S.O.	30
31	EXISTING LOAD	-	20	1	A			-	S.O.	32
33	EXISTING LOAD	-	20	1	B			-	S.O.	34
35	S.O.	-			C			-	S.O.	36
37	S.O.	-			A			-	S.O.	38
39	S.O.	-			B			-	S.O.	40
41	S.O.	-			C			-	S.O.	42

NOTES:
* INDICATES TO PROVIDE A NEW CIRCUIT BREAKER IN EXISTING PREPARED SPACE.

'1DPEQHA' LOAD SUMMARY

	LTS	RCPTS	MTRS	HEAT	MISC	TOTAL (KVA)	TOTAL (AMPS)
TOTAL CONNECTED LOAD	0.0	0.0	14.8	41.7	0.0	56.5	67.9
DEMAND FACTOR	SEE DEMAND FACTOR TABLE						
TOTAL DEMAND LOAD	0.0	0.0	16.6	41.7	0.0	58.3	70.1
CONTINUOUS (DESIGN) FACTOR	1.25	1.00	1.00	1.00	1.00		
TOTAL DESIGN LOAD	0.0	0.0	16.6	41.7	0.0	58.3	70.1

EXISTING PANEL: 1NHA — NORMAL

LOCATION: CORR. 1062 | FED FROM: 1DPNH | NEUTRAL BUS: Yes
MAIN BUS: 100A | WIRES: 4W + G | GROUND BUS: Yes
MCB: N/A | ENCLOSURE: NEMA 1 | ISOLATED GROUND BUS: No
VOLTAGE: 480/277 | BUS TYPE: Copper | 200% NEUTRAL: No
AIC: 10,000A | MOUNTING: Surface | FEED THROUGH LUGS: No
PANEL LUGS: Main Lugs Only

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
1	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	2
3	EXISTING LOAD	-	20	1	B	*20	1	923	LTG - HYBRID CATH	4
5	EXISTING LOAD	-	20	1	C	20	1	-	SPARE	6
7	EXISTING LOAD	-	15	3	A	20	1	-	SPARE	8
9	---	-	-	-	B	20	1	-	SPARE	10
11	---	-	-	-	C	20	1	-	SPARE	12
13	SPARE	-	20	1	A	20	1	-	SPARE	14
15	SPARE	-	20	1	B	20	1	-	SPARE	16
17	SPARE	-	20	1	C	20	1	-	SPARE	18
19	SPARE	-	20	1	A	20	1	-	SPARE	20
21	SPARE	-	20	1	B	20	1	-	SPARE	22
23	SPARE	-	20	1	C	20	1	-	SPARE	24
25	SPARE	-	20	1	A	20	1	-	SPARE	26
27	SPARE	-	20	1	B	20	1	-	SPARE	28
29	SPARE	-	20	1	C	20	1	-	SPARE	30
31	SPARE	-	20	1	A	20	1	-	SPARE	32
33	SPARE	-	20	1	B	20	1	-	SPARE	34
35	SPARE	-	20	1	C	20	1	-	SPARE	36
37	SPARE	-	20	1	A	20	1	-	SPARE	38
39	SPARE	-	20	1	B	20	1	-	SPARE	40
41	SPARE	-	20	1	C	20	1	-	SPARE	42

NOTES:
* INDICATES LOAD ADDED TO AN EXISTING SPARE CIRCUIT BREAKER.

'1NHA' LOAD SUMMARY

	LTS	RCPTS	MTRS	HSPTL	MISC	TOTAL (KVA)	TOTAL (AMPS)
TOTAL CONNECTED LOAD	0.9	0.0	0.0	0.0	0.0	0.9	1.1
DEMAND FACTOR	SEE DEMAND FACTOR TABLE						
TOTAL DEMAND LOAD	0.9	0.0	0.0	0.0	0.0	0.9	1.1
CONTINUOUS (DESIGN) FACTOR	1.25	1.00	1.00	1.00	1.00		
TOTAL DESIGN LOAD	1.2	0.0	0.0	0.0	0.0	1.2	1.4

EXISTING PANEL: 1CRH — CRITICAL

LOCATION: ELEC CLOSET 1090A | FED FROM: 1DPCRH | NEUTRAL BUS: Yes
MAIN BUS: 100A | WIRES: 4W + G | GROUND BUS: Yes
MCB: N/A | ENCLOSURE: NEMA 1 | ISOLATED GROUND BUS: No
VOLTAGE: 480/277 | BUS TYPE: Copper | 200% NEUTRAL: No
AIC: 10,000A | MOUNTING: Surface | FEED THROUGH LUGS: No
PANEL LUGS: Main Lugs Only

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
1	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	2
3	EXISTING LOAD	-	20	1	B	20	1	-	EXISTING LOAD	4
5	EXISTING LOAD	-	20	1	C	20	1	-	EXISTING LOAD	6
7	LTG - HYBRID CATH	1072	*20	1	A	20	1	-	SPARE	8
9	SPARE	-	20	1	B	20	1	-	SPARE	10
11	SPARE	-	20	1	C	20	1	-	SPARE	12
13	SPARE	-	20	1	A	20	1	-	SPARE	14
15	SPARE	-	20	1	B	20	1	-	SPARE	16
17	SPARE	-	20	1	C	20	1	-	SPARE	18
19	SPARE	-	20	1	A	20	1	-	SPARE	20
21	SPARE	-	20	1	B	20	1	-	SPARE	22
23	SPARE	-	20	1	C	20	1	-	SPARE	24
25	SPARE	-	20	1	A	20	1	-	SPARE	26
27	SPARE	-	20	1	B	20	1	-	SPARE	28
29	SPARE	-	20	1	C	20	1	-	SPARE	30
31	SPARE	-	20	1	A	20	1	-	SPARE	32
33	SPARE	-	20	1	B	20	1	-	SPARE	34
35	SPARE	-	20	1	C	20	1	-	SPARE	36
37	SPARE	-	20	1	A	20	1	-	SPARE	38
39	SPARE	-	20	1	B	20	1	-	SPARE	40
41	SPARE	-	20	1	C	20	1	-	SPARE	42

NOTES:
* INDICATES LOAD ADDED TO AN EXISTING SPARE CIRCUIT BREAKER.

'1CRH' LOAD SUMMARY

	LTS	RCPTS	MISC	TOTAL (KVA)	TOTAL (AMPS)
TOTAL CONNECTED LOAD	1.1	0.0	0.0	1.1	1.3
DEMAND FACTOR	SEE DEMAND FACTOR TABLE				
TOTAL DEMAND LOAD	1.1	0.0	0.0	1.1	1.3
CONTINUOUS (DESIGN) FACTOR	1.25	1.00	1.00		
TOTAL DESIGN LOAD	1.3	0.0	0.0	1.3	1.6

EXISTING PANEL: 2EQL — EQUIPMENT

LOCATION: ELEC. 2094 | FED FROM: 1DPEQH | NEUTRAL BUS: Yes
MAIN BUS: 225A | WIRES: 4W + G | GROUND BUS: Yes
MCB: 150A | ENCLOSURE: NEMA 1 | ISOLATED GROUND BUS: No
VOLTAGE: 208/120 | BUS TYPE: Copper | 200% NEUTRAL: No
AIC: 10,000A | MOUNTING: Surface | FEED THROUGH LUGS: Yes
PANEL LUGS: Main Circuit Breaker

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
1	SPARE	-	20	1	A	20	1	-	EXISTING LOAD	2
3	SPARE	-	20	1	B	20	1	-	EXISTING LOAD	4
5	EXISTING LOAD	-	20	1	C	20	1	-	EXISTING LOAD	6
7	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	8
9	EXISTING LOAD	-	20	1	B	20	1	-	EXISTING LOAD	10
11	EXISTING LOAD	-	20	1	C	20	1	-	EXISTING LOAD	12
13	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	14
15	EXISTING LOAD	-	20	1	B	20	1	-	EXISTING LOAD	16
17	EXISTING LOAD	-	20	1	C	20	1	-	EXISTING LOAD	18
19	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	20
21	EXISTING LOAD	-	20	1	B	20	1	-	EXISTING LOAD	22
23	EXISTING LOAD	-	20	1	C	20	1	-	EXISTING LOAD	24
25	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	26
27	EXISTING LOAD	-	20	1	B	20	1	-	EXISTING LOAD	28
29	EXISTING LOAD	-	20	1	C	20	1	-	EXISTING LOAD	30
31	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	32
33	EXISTING LOAD	-	20	1	B	20	1	-	EXISTING LOAD	34
35	EXISTING LOAD	-	20	1	C	20	1	-	SPARE	36
37	EXISTING LOAD	-	20	1	A	20	1	-	SPARE	38
39	TEMP CNTRLS - CATH PENT	500	*20	1	B	20	1	-	SPARE	40
41	SPARE	-	20	1	C	20	1	-	SPARE	42

NOTES:
* INDICATES LOAD ADDED TO AN EXISTING SPARE CIRCUIT BREAKER.

EXISTING PANEL: 2EQL (SECTION 2) — EQUIPMENT

LOCATION: ELEC. 2094 | WIRES: 4W + G | NEUTRAL BUS: Yes
MAIN BUS: 225A | ENCLOSURE: NEMA 1 | GROUND BUS: Yes
MCB: N/A | BUS TYPE: Copper | ISOLATED GROUND BUS: No
VOLTAGE: 208/120 | MOUNTING: Surface | 200% NEUTRAL: No
AIC: 10,000A | PANEL LUGS: Main Lugs Only | FEED THROUGH LUGS: No

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
43	EXISTING LOAD	-	15	1	A	20	1	-	EXISING LOAD	44
45	EXISING LOAD	-	15	1	B	20	1	-	SPARE	46
47	EXISING LOAD	-	15	1	C	20	1	-	EXISING LOAD	48
49	EXISING LOAD	-	15	1	A	20	1	-	EXISING LOAD	50
51	EXISING LOAD	-	20	1	B	20	1	-	EXISING LOAD	52
53	EXISING LOAD	-	20	1	C	20	1	-	EXISING LOAD	54
55	EXISING LOAD	-	20	1	A	20	1	-	EXISING LOAD	56
57	EXISING LOAD	-	20	1	B	20	1	-	EXISING LOAD	58
59	EXISING LOAD	-	20	1	C	20	1	-	EXISING LOAD	60
61	EXISING LOAD	-	20	1	A	20	1	-	EXISING LOAD	62
63	EXISING LOAD	-	20	1	B	20	1	-	EXISING LOAD	64
65	EXISING LOAD	-	20	1	C	20	1	-	SPARE	66
67	EXISING LOAD	-	20	1	A	20	1	-	SPARE	68
69	SPARE	-	20	1	B	20	1	-	SPARE	70
71	SPARE	-	20	1	C	20	1	-	SPARE	72
73	SPARE	-	20	1	A	20	1	-	SPARE	74
75	SPARE	-	20	1	B	20	1	-	SPARE	76
77	SPARE	-	20	1	C	20	1	-	SPARE	78
79	SPARE	-	20	1	A	20	1	-	SPARE	80
81	SPARE	-	20	1	B	20	1	-	SPARE	82
83	SPARE	-	20	1	C	20	1	-	SPARE	84

NOTES:

'2EQL' LOAD SUMMARY

	LTS	RCPTS	MTRS	MISC	TOTAL (KVA)	TOTAL (AMPS)
TOTAL CONNECTED LOAD	0.0	0.0	0.0	0.5	0.5	1.4
DEMAND FACTOR	SEE DEMAND FACTOR TABLE					
TOTAL DEMAND LOAD	0.0	0.0	0.0	0.5	0.5	1.4
CONTINUOUS (DESIGN) FACTOR	1.25	1.00	1.00	1.00		
TOTAL DESIGN LOAD	0.0	0.0	0.0	0.5	0.5	1.4

EXISTING PANEL: NLAB — NORMAL

LOCATION: LAB 1097 | FED FROM: 1DPNL | NEUTRAL BUS: Yes
MAIN BUS: 100A | WIRES: 4W + G | GROUND BUS: Yes
MCB: N/A | ENCLOSURE: NEMA 1 | ISOLATED GROUND BUS: No
VOLTAGE: 208/120 | BUS TYPE: Copper | 200% NEUTRAL: No
AIC: 10,000A | MOUNTING: Surface | FEED THROUGH LUGS: No
PANEL LUGS: Main Lugs Only

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
1	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	2
3	EXISTING LOAD	-	20	1	B	20	1	-	EXISTING LOAD	4
5	EXISTING LOAD	-	20	1	C	20	1	-	EXISTING LOAD	6
7	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	8
9	EXISTING LOAD	-	20	1	B	20	1	-	EXISTING LOAD	10
11	EXISTING LOAD	-	20	1	C	*20	1	-	EXISTING LOAD	12
13	EXISTING LOAD	-	*20	1	A	*20	1	-	EXISTING LOAD	14
15	EXISTING LOAD	-	20	1	B	*20	1	-	EXISTING LOAD	16
17	SPARE	-	20	1	C	20	1	-	EXISTING LOAD	18
19	SPARE	-	20	1	A	20	1	-	EXISTING LOAD	20
21	SPARE	-	20	1	B	20	1	-	EXISTING LOAD	22
23	EXISTING LOAD	-	*20	1	C	20	1	-	EXISTING LOAD	24
25	RCPT - CHART / EVS	720	*20	1	A	20	1	-	EXISTING LOAD	26
27	PLUGMOLD - STORAGE	900	*20	1	B	20	1	-	EXISTING LOAD	28
29	RCPT - CHART	1080	*20	1	C	20	1	-	EXISTING LOAD	30
31	RCPT - CATH CNTRL	1080	*20	1	A	*20	1	360	PLUGMOLD - CLEAN SUPPLY	32
33	RCPT - CHART	720	*20	1	B	20	1	-	SPARE	34
35	EXISTING LOAD	-	20	1	C	20	1	-	SPARE	36
37	PANEL 'LPQA'	-	60	3	A	*20	1	-	SPARE	38
39	--	-	-	-	B	20	1	-	SPARE	40
41	--	-	-	-	C	20	1	-	SPARE	42

NOTES:

'NLAB' LOAD SUMMARY

	LTS	RCPTS	MTRS	HSPTL	MISC	TOTAL (KVA)	TOTAL (AMPS)
TOTAL CONNECTED LOAD	0.0	4.9	0.0	0.0	0.0	4.9	13.5
DEMAND FACTOR	SEE DEMAND FACTOR TABLE						
TOTAL DEMAND LOAD	0.0	4.9	0.0	0.0	0.0	4.9	13.5
CONTINUOUS (DESIGN) FACTOR	1.25	1.00	1.00	1.00	1.00		
TOTAL DESIGN LOAD	0.0	4.9	0.0	0.0	0.0	4.9	13.5

12979 AIC

EXISTING PANEL: CRCH-H — CRITICAL

LOCATION: CATH 4 CNTRL RM | FED FROM: CR | NEUTRAL BUS: Yes
MAIN BUS: 400A | WIRES: 4W + G | GROUND BUS: Yes
MCB: N/A | ENCLOSURE: NEMA 1 | ISOLATED GROUND BUS: No
VOLTAGE: 480/277 | BUS TYPE: Copper | 200% NEUTRAL: No
AIC: EXISTING | MOUNTING: Surface | FEED THROUGH LUGS: No
PANEL LUGS: Main Lugs Only

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
1	EXISTING LOAD	-	30	3	A	45	3	-	EXISTING LOAD	2
3	---	-	-	-	B	-	-	-	---	4
5	---	-	-	-	C	-	-	-	---	6
7	EXISTING LOAD	-	30	3	A	15	3	-	EXISTING LOAD	8
9	---	-	-	-	B	-	-	-	---	10
11	---	-	-	-	C	-	-	-	---	12
13	EXISTING LOAD	-	15	3	A	15	3	-	EXISTING LOAD	14
15	---	-	-	-	B	-	-	-	---	16
17	---	-	-	-	C	-	-	-	---	18
19	EXISTING LOAD	-	20	3	A	*45	1	3740	OP5A	20
21	---	-	-	-	B	*45	1	4000	OP5B	22
23	---	-	-	-	C	20	1	-	SPARE	24

NOTES:
* INDICATES TO REPLACE EXISTING SPARE CIRCUIT BREAKER WITH NEW BREAKER AS INDICATED.

'CRCH-H' LOAD SUMMARY

	LTS	RCPTS	HSPTL	MISC	TOTAL (KVA)	TOTAL (AMPS)
TOTAL CONNECTED LOAD	0.0	0.0	5.5	2.2	7.7	9.3
DEMAND FACTOR	SEE DEMAND FACTOR TABLE					
TOTAL DEMAND LOAD	0.0	0.0	2.2	2.2	4.4	5.3
CONTINUOUS (DESIGN) FACTOR	1.25	1.00	1.00	1.00		
TOTAL DESIGN LOAD	0.0	0.0	2.2	2.2	4.4	5.3

EXISTING PANEL: CLAB — CRITICAL

LOCATION: LAB 1097 | FED FROM: 2DPCRL | NEUTRAL BUS: Yes
MAIN BUS: 225A | WIRES: 4W + G | GROUND BUS: Yes
MCB: N/A | ENCLOSURE: NEMA 1 | ISOLATED GROUND BUS: No
VOLTAGE: 208/120 | BUS TYPE: Copper | 200% NEUTRAL: No
AIC: 10,000A | MOUNTING: Surface | FEED THROUGH LUGS: Yes
PANEL LUGS: Main Lugs Only

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
1	EXISTING LOAD	-	20	1	A	*20	1	-	EXISTING LOAD	2
3	EXISTING LOAD	-	20	1	B	20	1	-	EXISTING LOAD	4
5	EXISTING LOAD	-	20	1	C	20	1	-	EXISTING LOAD	6
7	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	8
9	EXISTING LOAD	-	20	2	B	20	1	-	EXISTING LOAD	10
11	--	-	-	-	C	20	1	-	EXISTING LOAD	12
13	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	14
15	EXISTING LOAD	-	20	1	B	*20	1	360	RCPT - CATCH EQUIPM RM	16
17	EXISTING LOAD	-	20	1	C	*20	1	180	RCPT - HYBRID CATH	18
19	EXISTING LOAD	-	20	1	A	20	1	-	EXISTING LOAD	20
21	CRAC-1	1768	*20+	2	B	20	1	-	EXISTING LOAD	22
23	---	1768	-	-	C	20	1	-	EXISTING LOAD	24
25	RCPT - HYBRID CATH	540	*20	1	A	*30+	2	2184	CU-1	26
27	RCPT - CHART / CLEAN SPLY	900	*20	1	B	-	-	2184	---	28
29	LTG - HYBRID CATH	549	*20	1	C	20	1	-	EXISTING LOAD	30
31	RCPT - HYBRID CATH	360	*20	1	A	20	1	-	EXISTING LOAD	32
33	UCF - HYBRID CATH	480	*20	1	B	20	1	-	EXISTING LOAD	34
35	RCPT / PYXIS - HYBRID CATH	360	*20	1	C	20	1	-	SPARE	36
37	RCPT - HYBRID CNTRL RM	900	*20	1	A	20	1	-	EXISTING LOAD	38
39	RCPT - HYBRID CNTRL RM	540	*20	1	B	20	1	-	EXISTING LOAD	40
41	RCPT - HYBRID CNTRL RM	900	*20	1	C	20	1	-	EXISTING LOAD	42

NOTES:
* INDICATES LOAD RECOVERED TO DUE TO DEMOLITION
~~+ REPLACE EXISTING CIRCUIT BREAKER WITH NEW BREAKER AS INDICATED.~~

EXISTING PANEL: CLAB (SECTION 2) — CRITICAL

LOCATION: LAB 1097 | WIRES: 4W + G | NEUTRAL BUS: Yes
MAIN BUS: 225A | ENCLOSURE: NEMA 1 | GROUND BUS: Yes
MCB: N/A | BUS TYPE: Copper | ISOLATED GROUND BUS: No
VOLTAGE: 208/120 | MOUNTING: Surface | 200% NEUTRAL: No
AIC: 10,000A | PANEL LUGS: Main Lugs Only | FEED THROUGH LUGS: Yes

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
43	EXISTING LOAD	1920	20	1	A	20	1	720	EXISTING LOAD	44
45	EXISTING LOAD	840	20	1	B	20	1	720	EXISTING LOAD	46
47	EXISTING LOAD	1068	20	1	C	20	1	1800	EXISTING LOAD	48
49	EXISTING LOAD	168	20	1	A	20	1	720	EXISTING LOAD	50
51	EXISTING LOAD	1200	20	1	B	20	1	720	EXISTING LOAD	52
53	SPARE	-	20	1	C	20	1	360	EXISTING LOAD	54
55	EXISTING LOAD	1200	20	1	A	20	1	360	EXISTING LOAD	56
57	EXISTING LOAD	720	20	1	B	20	1	720	EXISTING LOAD	58
59	EXISTING LOAD	720	20	1	C	20	1	540	EXISTING LOAD	60
61	SPARE	-	20	1	A	20	1	360	EXISTING LOAD	62
63	EXISTING LOAD	540	20	1	B	20	1	360	EXISTING LOAD	64
65	EXISTING LOAD	540	20	1	C	20	1	360	EXISTING LOAD	66
67	EXISTING LOAD	720	20	1	A	20	1	360	EXISTING LOAD	68
69	EXISTING LOAD	360	20	1	B	20	1	-	SPARE	70
71	EXISTING LOAD	640	20	1	C	20	1	-	SPARE	72
73	EXISTING LOAD	640	20	1	A	20	1	-	SPARE	74
75	EXISTING LOAD	-	20	1	B	20	1	-	SPARE	76
77	EXISTING LOAD	540	20	1	C	20	1	-	SPARE	78
79	EXISTING LOAD	360	20	1	A	20	1	-	SPARE	80
81	EXISTING LOAD	360	20	1	B	20	1	-	SPARE	82
83	SPARE	-	20	1	C	20	1	-	SPARE	84

NOTES:

EXISTING PANEL: CLAB (SECTION 3) — CRITICAL

LOCATION: LAB 1097 | WIRES: 4W + G | NEUTRAL BUS: Yes
MAIN BUS: 225A | ENCLOSURE: NEMA 1 | GROUND BUS: Yes
MCB: N/A | BUS TYPE: Copper | ISOLATED GROUND BUS: No
VOLTAGE: 208/120 | MOUNTING: Surface | 200% NEUTRAL: No
AIC: 10,000A | PANEL LUGS: Main Lugs Only

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	PHASE	CIRCUIT BREAKER AMPS	CIRCUIT BREAKER POLES	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
85	SPARE	-	20	1	A	20	1	-	SPARE	86
87	SPARE	-	20	1	B	20	1	-	SPARE	88
89	SPARE	-	20	1	C	20	1	-	SPARE	90
91	SPARE	-	20	1	A	20	1	-	SPARE	92
93	SPARE	-	20	1	B	20	1	-	SPARE	94
95	SPARE	-	20	1	C	20	1	-	SPARE	96
97	SPARE	-	20	1	A	20	1	-	SPARE	98
99	SPARE	-	20	1	B	20	1	-	SPARE	100
101	SPARE	-	20	1	C	20	1	-	SPARE	102
103	SPARE	-	20	1	A	20	1	-	SPARE	104
105	SPARE	-	20	1	B	20	2	-	SPARE	106
107	SPARE	-	20	1	C	-	-	-	--	108
109	SPARE	-	20	1	A	20	2	-	SPARE	110
111	SPARE	-	20	1	B	-	-	-	--	112
113	SPARE	-	20	1	C	20	2	-	SPARE	114
115	SPARE	-	20	1	A	-	-	-	--	116
117	SPARE	-	20	1	B	20	1	-	SPARE	118
119	SPARE	-	20	1	C	20	1	-	SPARE	120
121	SPARE	-	20	1	A	20	1	-	SPARE	122
123	SPARE	-	20	1	B	20	1	-	SPARE	124
125	SPARE	-	20	1	C	20	1	-	SPARE	126

NOTES:

'CLAB' LOAD SUMMARY

	LTS	RCPTS	HSPTL	MISC	TOTAL (KVA)	TOTAL (AMPS)
TOTAL CONNECTED LOAD	0.7	18.1	7.4	8.4	34.6	96.1
DEMAND FACTOR	SEE DEMAND FACTOR TABLE					
TOTAL DEMAND LOAD	0.7	14.0	3.0	8.4	26.1	72.5
CONTINUOUS (DESIGN) FACTOR	1.25	1.00	1.00	1.00		
TOTAL DESIGN LOAD	0.9	14.0	3.0	8.4	26.3	73.1

Legibly identify each breaker or switch for it's use or purpose on the circuit directory in the panel/switchboard per 2014 NEC 408.4.

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

RSN: *1156136*
Permit #: *2016 1191012*

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Consultant Team
MEP
WSP + CCRD

No.	Description	Date

TMCA CATH LAB HYBRID LAB RENOVATION
1501 S Potomac St, Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title: ELECTRICAL SCHEDULES
Sheet Number: E.701

PANEL: OP5A — CRITICAL

LOCATION: CONTROL 1C-6017A
FED FROM: CRCH-H
INPUT VOLTAGE: 277/1
ISOLATION XFMR: 7.5KVA
BUS VOLTAGE/PH: 120/1

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	LOAD (VA) LTS	RCPT	X-RAY	MISC	CIRCUIT BREAKER AMPS	POLES	PHASE	CIRCUIT BREAKER AMPS	POLES	LOAD (VA) LTS	RCPT	X-RAY	MISC	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
1	RCPT - EAST WALL	180		180			20	2	A	20	2		540			540	RCPT - EQUIP BOOM	2
3	RCPT - DOC STATION	180		180			20	2	B	20	2		360			360	RCPT - EQUIP BOOM	4
5	RCPT - WEST WALL	180		180			20	2	A	20	2				500	500	EQUIP BOOM	6
7	RCPT - WEST WALL	180		180			20	2	B	20	2		180			180	RCPT - CLG	8
9	RCPT - CLG	360		360			20	2	A	20	2	190				190	BOOM LIGHTS	10
11	RCPT - CLG	360		360			20	2	B	20	2		360			360	RCPT - SOUTH WALL	12
13	RCPT - INTEGRATION SYS	180		180			20	2	A	20	2					-	SPARE	14
15	RCPT - CLG	180		180			20	2	B	20	2					-	SPARE	16

'OP5A- LS' LOAD SUMMARY

	LTS	RCPTS	HS/PTL	X-RAY	MISC	TOTAL (KVA)	TOTAL (AMPS)
TOTAL CONNECTED LOAD	0.2	0.0	3.2	0.0	0.5	3.9	10.9
DEMAND FACTOR	SEE DEMAND FACTOR TABLE						
TOTAL DEMAND LOAD	0.2	0.0	1.3	0.0	0.5	2.0	5.5
CONTINUOUS (DESIGN) FACTOR	1.25	1.00	1.00	1.00	1.00		
TOTAL DESIGN LOAD	0.2	0.0	1.3	0.0	0.5	2.0	5.6

PANEL: OP5B — CRITICAL

LOCATION: CONTROL 1C-6017A
FED FROM: CRCH-H
INPUT VOLTAGE: 277/1
ISOLATION XFMR: 7.5KVA
BUS VOLTAGE/PH: 120/1

CKT NO.	DESCRIPTION	TOTAL LOAD (VA)	LOAD (VA) LTS	RCPT	X-RAY	MISC	CIRCUIT BREAKER AMPS	POLES	PHASE	CIRCUIT BREAKER AMPS	POLES	LOAD (VA) LTS	RCPT	X-RAY	MISC	TOTAL LOAD (VA)	DESCRIPTION	CKT NO
1	RCPT - DOC STATION	360		360			20	2	A	20	2		540			540	RCPT - EQUIP BOOM	2
3	RCPT - W WALL / POU	360		360			20	2	B	20	2				1200	1200	EQUIP BOOM	4
5	RCPT - WEST WALL	180		180			20	2	A	20	2				500	500	EQUIP BOOM	6
7	RCPT - CLG	360		360			20	2	B	20	2		180			180	RCPT - CLG	8
9	RCPT - CLG	360		360			2	2	A	20	2					-	SPARE	10
11	RCPT - INTEGRATION SYS	180		180			20	2	B	20	2					-	SPARE	12
13	RCPT - INTEGRATION SYS	180		180			20	2	A	20	2					-	SPARE	14
15	SPARE	-					20	2	B	20	2					-	SPARE	16

'OP5B- LS' LOAD SUMMARY

	LTS	RCPTS	HS/PTL	X-RAY	MISC	TOTAL (KVA)	TOTAL (AMPS)
TOTAL CONNECTED LOAD	0.0	0.0	2.3	0.0	1.7	4.0	11.2
DEMAND FACTOR	SEE DEMAND FACTOR TABLE						
TOTAL DEMAND LOAD	0.0	0.0	0.9	0.0	1.7	2.6	7.3
CONTINUOUS (DESIGN) FACTOR	1.25	1.00	1.00	1.00	1.00		
TOTAL DESIGN LOAD	0.0	0.0	0.9	0.0	1.7	2.6	7.3

4

COMcheck Software Version 4.0.4.1

Interior Lighting Compliance Certificate

Project Information

Energy Code: 2015 IECC
Project Title: TMCA Cath Lab - Hybrid Lab Renovation
Project Type: Alteration

Construction Site: 1501 S. Potamac St Aurora, CO, CO 80012
Owner/Agent:
Designer/Contractor:

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-Common Space Types:Storage	400	0.63	252
2-Healthcare Facility:Nurses Station	335	0.71	238
3-Healthcare Facility:Operating Room	890	2.48	2207
4-Healthcare Facility:Corridor/Transition <8 ft wide	360	0.79	284
		Total Allowed Watts =	2981

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Common Space Types:Storage (400 sq.ft.)				
LED 2: A2: 2x4 Troffer: LED Panel 54W:	1	5	47	235
Healthcare Facility:Nurses Station (335 sq.ft.)				
LED 1: A: 2x2 Troffer: LED Panel 36W:	1	3	36	108
LED 4: C: 6" Downlight: LED Panel 19W:	1	14	19	266
Healthcare Facility:Operating Room (890 sq.ft.)				
LED 3: B: 2x2 Surgical Troffer: LED Panel 54W: Exemption:Medical/Dental Procedure Lighting	1	8	97	Exempt
LED 5: C2: 6" Surgical Downlight: LED Panel 60W:	1	19	61	1159
Healthcare Facility:Corridor/Transition <8 ft wide (360 sq.ft.)				
LED 2: A2: 2x4 Troffer: LED Panel 54W:	1	5	47	235
LED 6: X1: Single Face Exit Sign: LED Linear 8W:	1	1	5	5
		Total Proposed Watts =		2008

Interior Lighting PASSES

Interior Lighting Compliance Statement

Compliance Statement: The proposed interior lighting alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2015 IECC requirements in COMcheck Version 4.0.4.1 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Chris Langstreet - Electrical Designer — Signature — 10/9/16 Date

Project Title: TMCA Cath Lab - Hybrid Lab Renovation — Report date: 10/10/16
Data filename: F:\2016 Projects\B1605611 TMCA Cath Lab 4\Engineering\Energy\Cath Lab.cck — Page 1 of 5

10/10/2016 11:19:36 AM

LUMINAIRE SCHEDULE

TYPE	DESCRIPTION
0	DESCRIPTION: FIXTURES INDICATED IN SCHEDULE BELOW ARE ACUITY LIGHTING TO BE PURCHASED THROUGH GRAYBAR DISTRIBUTORS LAMP(S): 825 8TH AVENUE SOUTH BALLAST(S): NASHVILLE, TN 37203 VOLTAGE: 1-800-676-4081 INSTALLATION: HCA@GRAYBAR.COM MANF: QUOTATIONS CONTACT: JESS HOOVER 615-743-3232 jess.hoover@graybar.com
A	DESCRIPTION: 2' X 2' LENSED TROFFER, WHITE, FLAT STEEL LENS, MIN. 80% EFFICIENT, 0.125" ACRYLIC LENS LAMP(S): 3000LM LED - 4000K BALLAST(S): INTEGRAL LED DRIVER VOLTAGE: 277 INSTALLATION: RECESSED LAY-IN GRID (OR DRYWALL CEILING INSTALL. REF. ARCH. PLANS TO COORDINATE TRIM) MANF: LITHONIA #2GTL-2-33L-EZ1-LP840
A2	DESCRIPTION: 2' X 4' LENSED TROFFER, WHITE, FLAT STEEL LENS, MIN. 80% EFFICIENT, 0.125" ACRYLIC LENS LAMP(S): 4800 LM LED - 4000K BALLAST(S): INTEGRAL LED DRIVER VOLTAGE: 277 INSTALLATION: RECESSED LAY-IN GRID (OR DRYWALL CEILING INSTALL. REF. ARCH. PLANS TO COORDINATE TRIM) MANF: LITHONIA #2GTL-2-48L-EZ1-LP840
B	DESCRIPTION: 2'X2' SURGICAL TROFFER, ASYMMETRIC/SYMMETRIC ACRYLIC LENS, GASKETED FLAT STEEL LENS, ONE PIECE HOUSING LAMP(S): 7800 LM LED - 4000K BALLAST(S): INTEGRAL LED DRIVER VOLTAGE: 120 INSTALLATION: DRYWALL CEILING INSTALL. REF. ARCH. PLANS TO COORDINATE TRIM MANF: HEALTHCARE LIGHTING #HSTLED22-F-120-LED40-1C-GW
C	DESCRIPTION: 6" LED MEDIUM BEAM DOWNLIGHT WITH 50 DEGREE CUT OFF, TWO-STAGE REFLECTOR SYSTEM, DIE-CAST ALUMINUM HOUSING, UNIVERSAL MOUNTING BRACKET, EXTRUDED ALUMINUM HEAT SINK, FLEXIBLE DISCONNECT, INTEGRAL LED DIMMING DRIVER, LED REFLECTOR/POWER MODULE, WIDE BEAM, SEMI-SPECULAR CLEAR, MATTE WHITE SELF-FLANGED LENSED REFLECTOR, HIGH EFFICACY LAMP(S): 1500LM LED - 4000K BALLAST(S): INTEGRAL LED DRIVER VOLTAGE: 120V INSTALLATION: RECESSED LAY-IN GRID (OR DRYWALL CEILING INSTALL. REF. ARCH. PLANS TO COORDINATE TRIM) MANF: GOTHAM #ALED 41/15 6AR MVOLT ECOS3 TRW
C2	DESCRIPTION: 6" LEDSURGICAL DOWNLIGHT ANTI-MICROBIAL TRIM, SPECULAR CLEAR RELFECTOR FINISH. CLEAR POLYCARBONATE LENS, WET LOCATION LISTED. LAMP(S): 1500 LM LED - 4000K BALLAST(S): INTEGRAL LED DIMMING DRIVER VOLTAGE: 120 INSTALLATION: RECESSED LAY-IN GRID (OR DRYWALL CEILING INSTALL. REF. ARCH. PLANS TO COORDINATE TRIM) MANF: KENALL #M2RDL6L-26L40K-DV-DCC-ALG-CSS-G-FS KIRLIN FAIL-SAFE
*E	DESCRIPTION: FIXTURES WITH AN 'E' SUFFIX SHALL BE PROVIDED WITH A 90 MINUTE BATTERY BACK-UP BALLAST WITH SELF-TESTING DIAGNOSTICS, UNO. LAMP(S): 1 LAMPS MINIMUM 1100 LUMEN OUTPUT BALLAST(S): N/A VOLTAGE: N/A INSTALLATION: INTEGRAL TO FIXTURE MANF: BODINE IOTA
F	DESCRIPTION: SOLID FRONT LED UNDERCABINET LIGHT, 20 GA. STEEL HOUSING, PLIABLE NON-YELLOWING FLAT P-12 PRISMATIC ACRYLIC LENS, 1'-0", 2'-0", 3'-0", OR 4'-0" AS REQUIRED, PAINTED AFTER FABRICATION. CONTRACTOR SHALL PROVIDE VARYING LENGTHS AS REQ'D BY ARCH. DETAILS AND ELEVATIONS TO RUN FIXTURES END TO END CONTINUOUSLY MAXIMIZING LENGTHS. (650,1200,1900, 2600)LM LED, 3500K LAMP(S): REMOTE DRIVER BALLAST(S): 277V VOLTAGE: SURFACE INSTALLATION: HEALTHCARE-LIGHTING #HUC5 (12)(23)(35)(46) MVOLT-LED35-GW MANF:
WL	DESCRIPTION: LED RECESSED X-RAY "IN USE" LIGHT, DIE-CAST ALUMINUM HOUSING, WHITE HOUSING AND FACEPLATE, STENCIL STYLE WITH RED LETTERS. LAMP(S): LED - INCLUDED BALLAST(S): VOLTAGE: 120/277V MULTI-TAP BALLAST INSTALLATION: RECESSED IN WALL ABOVE DOOR MANF: DUAL-LITE #SE-S-R-W-SW4
X1	DESCRIPTION: LED DECORATIVE RECESSED EDGE-LIT EXIT LIGHT, SINGLE FACE, EXTRUDED ALUMINUM HOUSING, SATIN ALUMINUM TRIM PLATE, MOLDED ACRYLIC PLAQUE, 6 INCH HIGH RED LETTERS ON CLEAR BACKGROUND, PAINTED CHEVRON ARROWS AS REQUIRED PER PLANS, BACK / CEILING / END MOUNTING AS REQUIRED PER PLANS, LOW ENERGY CONSUMPTION. LAMP(S): LED - INCLUDED BALLAST(S): VOLTAGE: 120/277V MULTI-TAP BALLAST INSTALLATION: CEILING MOUNTED MANF: LITHONIA #LRP 1 RC XX 120/277

LIGHTING FIXTURE SCHEDULE NOTES:

A. COMPLIANCE WITH A PARTICULAR LIGHTING FIXTURE PACKAGE SHALL NOT BE SOLE REASON FOR SUBSTITUTIONS.
B. ALL DIMMING DRIVERS MUST BE 100% COMPATIBLE WITH DIMMING SWITCHES.
C. CONTRACTOR SHALL VERIFY ALL CEILING TYPES PRIOR TO ORDERING FIXTURES.
D. CONSULT GRAYBAR NASHVILLE FOR PRICING ON ALL FIXTURES NOT INCLUDED IN THE HCA STANDARD LIGHTING FIXTURE SCHEDULE, AS INDICATED IN INNOVATION MEMO #5.

City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: John Eckert
Date: Oct 25, 2016
2009 INTERNATIONAL CODES & 2011 NEC

RSN: 1156136
Permit #: 2016 1191012

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No.	Description	Date
1	ASI 01	10/10/2016

COLORADO LICENSED — JOHN G. GOSSELIN — 36502 — 10-10-16 — PROFESSIONAL ENGINEER

TMCA CATH LAB HYBRID LAB RENOVATION

1501 S Potamac St,
Aurora, CO 80012

Issue	100% CD
Date	08/19/16
Project Number	16-003
Drawn by	CL
Checked by	JG

Sheet Title:
ELECTRICAL SCHEDULES

Sheet Number
E.702

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City of Aurora Building Division
Reviewed for Code Compliance
Approved as Noted: *John Eckert*
Date: *Oct 25, 2016*
2009 INTERNATIONAL CODES & 2011 NEC

Healthcare
www.healthcare.philips.com

Final Site Preparation Support Document

The equipment components shown in this drawing package are based on the current proposed purchase and are subject to change if modifications are made to the configuration.

Revision History

Note for Architects and/or Contractors: If revisions are listed, these drawings must be thoroughly reviewed so that all changes can be incorporated into your project

Rev.	Date	Revision Descriptions	By
A	5/23/2016	Updated drawing per quote 1-1G0RDK8 Rev. 6; changed to show Release 8.1.	MT
B	6/14/2016	Updated CAD background and drawing per quote 1-1G0RDK8 Rev. 9; added ACIST injector, removed ceiling mounted injector.	MT
C	7/8/2016	Completed Pre-Order Site Preparation Support Documents per quote #: 1-1G0RDK8 Rev. 10. Added surgical boom.	SC
D	7/27/2016	A1/S1/S2/EL/E1/E2: Updated CAD background, included boom layout, shifted MA rack, planned for two additional TVs, and updated VB locations.	MT
E	8/3/2016	AL/A1/AD7/EL/E1/E2/E4: Updated drawing per Order: 6600274533.010000 and 6600274533.020000; removed optional IVUS.	MT
F	8/19/2016	A1/S1/S2/E1/E2/E3/E4: Updated CAD background, isocenter and Stryker boom locations remain the same, and relocated VB6.	MT
G	8/30/2016	All Sheets Affected: Updated drawing to show new Order: 6600276231.010000 & 6600276231.020000; showing Release 8.2, planned for Low Load UPS, and relocated VB6.	MT

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Project
Allura Biplane FD20/20
The Medical Center of Aurora
Aurora, CO
-IC-6016A

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Project Details
Drawing Number
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C1

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RSN: *1156136*
Permit #: *2016 1191012*

General Specifications

1. Responsibility
The customer shall be solely responsible, at its expense for preparation of site, including any required structural alterations. The site preparation shall be in accordance with plans and specifications provided by Philips. Compliance with all safety electrical and building codes relevant to the equipment and its installation is the sole responsibility of customer. The customer shall advise Philips of conditions at or near the site which could adversely affect the carrying out of the installation work and shall ensure that such conditions are corrected and that the site is fully prepared and available to Philips before the installation work is due to begin. The customer shall provide all necessary plumbing, carpentry work, or conduit wiring required to attach and install products ready for use.

2. Permits
Customer shall obtain all permits and licenses required by federal, state/provincial or local authorities in connection with the construction, installation and operation of the products and related rules, regulations, shall bear any expense in obtaining same or in complying with any ordinances and statutes.

3. Radiation Protection
The customer or his contractor, at his own expense, shall obtain the service of a licensed radiation physicist to specify radiation protection. (X-Ray Tube output 125 KVp max.)

4. Asbestos and Other Toxic Substances
Philips assumes no hazardous waste (i.e., PCB's in existing transformers) exists at the site. If any hazardous material is found, it shall be the sole responsibility of the customer to properly remove and dispose of this material at its expense. Any delays caused in the project for this special handling shall result in Philips time period for completion being extended by like period of time. Philips assumes that no asbestos material is involved in this project in any ceilings, walls or floors. If any asbestos material is found anywhere on the site, it shall be the customer's sole responsibility to properly remove and/or make safe this condition, at the customer's sole expense.

5. Labor
In the event local labor conditions make it impossible or undesirable to use Philips' regular employees for such installation and connection, such work shall be performed by laborers supplied by the customer, or by an independent contractor chosen by the customer at the customer's expense, and in such case, Philips agrees to furnish adequate engineering supervision for proper completion of the installation.

6. Schedule
The general contractor should provide Philips with a schedule of work to assist in the coordination of delivery of Philips supplied products which are to be installed by the contractor and delivery of the primary equipment.

7. Extended Installation or Turnkey Work by Philips
Any room preparation requirements for Philips equipment indicated on these drawings is the responsibility of the customer. If an extended installation or turnkey contract exists between Philips and the customer for room preparation work required by the equipment represented on these drawings, some of the responsibilities of the customer as depicted in these drawings may be assumed by Philips. In the event of a conflict between the work described in the turnkey contract workscope and these drawings, the turnkey contract workscope shall govern.

8. Infection Control and Interim Life Safety Measures
Compliance with all Infection Control and Interim Life Safety Measures shall be the sole responsibility of the customer. The customer shall provide all means and methods necessary for compliance with Infection Control (IC) and Interim Life Safety Measures (ILSM) in connection with the construction and installation/operation of the products shown herein and shall bear any expenses related to same.

(14.0)

Minimum Site Preparation Requirements

A smooth efficient installation is vital to Philips and their customers. Understanding what the minimum site preparation requirements are will help achieve this goal. The following list clearly defines the requirements which must be fulfilled before the installation can begin.

1. Walls to be painted or covered, baseboards installed, floors to be tiled and/or covered, ceiling shall have grid tiles and lighting fixtures installed and operational.

2. Doors and windows, especially radiation protection barriers, installed and finished with locksets operational.

3. All electrical convenience, conduit, raceway, knockouts, cable openings, chase nipples, and junction boxes installed and operational.

4. Incoming mains power operational and connected to room x-ray breaker.

5. 120V convenience outlets operational.

6. All support structure correctly installed. All channels, pipes, beams and/or other supporting devices should be level, parallel, and free of lateral or longitudinal movements.

7. All contractor supplied cables pulled and terminated.

8. A dust-free environment in and around the procedure room.

9. All HVAC (heating, ventilating and air conditioning) installed and operational as per specifications.

10. Architectural features such as computer floor, wood floor, casework, bulkheads, installed and finished. When technical cabinets are installed in a closet with doors, it is suggested that the customer install a temperature alarm in the event of an air conditional failure.

11. All plumbing installed and finished.

12. Philips does not install or connect developing tanks, automatic processors or associated equipment, built in illuminators, cassette pass boxes, loading benches and cabinets, lead protective screens, panels or lead glass window and frame. This is to be done by the customer/contractor.

13. Clear door openings for moving equipment into the building must be 42" (1067mm) W x 82" (2083mm) H min. 48" (1219mm) W x 82" (2083mm) H rec., Or larger contingent on an 8'-0" (2438mm) corridor width.

14. Countertop is 30" (765mm) for seated height and 36" (915mm) for standing height.

Note
Once Philips has moved equipment into the suite and started the installation, the contractor shall schedule his work around the Philips installation team on site. It is suggested that a telephone be provided in the room to receive telephone calls. This would alleviate facility staff from answering calls for Philips personnel.

Remote Service Diagnostics
Medical imaging equipment to be installed by Philips Medical is equipped with a service diagnostic feature which allows for remote and on site service diagnostics. To establish this feature, a RJ45 type ethernet 10/100/1000 Mbit network connector must be installed as shown on plan. Access to customer's network via their remote access server is needed for Remote Service Network (RSN) connectivity. All cost with this feature are the responsibility of the customer.

(12.0)

HVAC Requirement for General Equipment Locations

Operation	
Temperature	50°F (10°C) to 86°F (30°C)
Temperature gradient	Max. 1°F / Minute (0.5°C / Minute)
Humidity (non-condensing) Humidity shall be stable within 10%	20% to 80%
Exam Room	*6483 BTU/hr
Equipment Room	*8189 BTU/hr
Control Room	*1706 BTU/hr

*Average heat emission during clinical use
Data applicable for basic system:
Large monitor + 4 x small monitor in Monitor Ceiling Suspension
1 workstation + 2 x small monitor in Control Room

Add 1706 BTU/hr for additional large monitor
Add 273 BTU/hr for additional small monitor
Add 1024 BTU/hr for additional workstation

Equipment's designed airflow is from bottom to top and front to back. Please design the air handling in the rack cabinet equipment area accordingly.

(14.0)

Electrical Requirements
Mains 40E Cabinet

Power Output:	100kW
Supply Configuration:	3 phase, identical 3 wire power and isolated unity ground with bonding conductor, delta (preferred) or wye
Nominal Line Voltage:	480 VAC, 60 Hz
Branch Power Requirement:	225 kVA
Circuit Breaker:	3 phase, Type D 125 A with long-time delay.

(14.2)

Remote Control of Room Lighting

The control of customer lighting must incorporate an electrical isolation system such as demonstrated on Sheet ED3. Lighting scheme is the responsibility of the customer.

(12.0)

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AN

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Permit #: *2016 1191012*

Equipment Legend

A Furnished and installed by Philips
B Furnished by customer/contractor and installed by customer/contractor
C Installed by customer/contractor
D Furnished by Philips and installed by contractor
E Existing
F Future
G Optional item furnished by Philips

	Equipment Designation	Description	Weight (lbs)	Heat Load (btu/hr)	Detail Sheet
A	DH	Dosimetry Hub	.44	-	AD6
G	NVA	Network video adapter	1.1	-	AD6
G	PEA	Power over ethernet adapter	1.3	-	AD6
G	PDMR	Personal Dose Meter Rack	-	-	AD6

Equipment Legend

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B Furnished by customer/contractor and installed by customer/contractor
C Installed by customer/contractor
D Furnished by Philips and installed by contractor
E Existing
F Future
G Optional item furnished by Philips

	Equipment Designation	Description	Weight (lbs)	Heat Load (btu/hr)	Detail Sheet
A	SP	Floor Clea	2513	1706	AD3
A	PB1	Larc N Neuro with Extension Rails	1763	854	AD3
A	MSA	Angio Diagnost 7 with Swivel	1873	205	AD3
A	ME	Velara Generator 40E Cabinet	510	2971	AD4
A	2ME	Velara Generator 40E Cabinet	510	2971	AD4
A	MP	Peripheral 40E Cabinet	510	2049	AD4
A	MA	Mains 40E Cabinet	826	5464	AD4
A	MB	Image 40E Cabinet	826	5464	AD4
A	CY	Viewing/Control	126	567	AD4
A	DB	Documentation Box - Mounted on Wheels (Final location to be coordinated with customer and/or local Philips Service)	176	0	AD5
A	ATY	Exam Room Auxiliary Box	7	1.7	AD5
A	TV	58" LCD Monitor Suspension (to be mounted on boom)	603	1020	AD5
A	VB1	Video Connection Box	11	34	AD5
	~				
A	VB5	Video Connection Box	11	34	AD5
A	VB6	Video Connection Box (not shown - to be ceiling mounted)	11	34	AD5
A	VB7	Video Connection Box	11	34	AD5
A	VB8	Video Connection Box (not shown - to be ceiling mounted)	11	34	AD5
D	UPS	Galaxy 5000 - 80 kVA UPS with Top Entry	1,062	8,531	AD6
D	BC	Galaxy 5000 - 32" Battery Cabinet	2,950	-	AD6
D	RASP	Remote Alarm Status Panel (for UPS)	20	-	ADX
A	HB	Hose Balancer Unit	13	-	
A	INJ	ACIST Injector on Pedestal	-	5118	AD6
B	B	CHROMOPHARE F628 SURGICAL LIGHT (1500) / LEAD SHIELD (1400) / DUAL FLAT PANEL (1200)	-	-	-
B	C	CHROMOPHARE F628 SURGICAL LIGHT (1500) / LEAD SHIELD (1400) / DUAL FLAT PANEL (1200)	-	-	-
B	F	TANDEM: MCS MONITOR BOOM (1000/1000) / TELETOM TP-622 EQUIPMENT BOOM (1300)	-	-	-
A	TV2	Live/Reference Slave Monitor (To be mounted on Boom B)	-	-	-
A	TV3	Live/Reference Slave Monitor (To be mounted on Boom C)	-	-	-
A	TV4	Live/Reference Slave Monitor (To be wall mounted in control room)	-	-	-
A	TV5	Live/Reference Slave Monitor (To be wall mounted)	-	-	-

PHILIPS

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Equipment Layout

Required Ceiling Height: 9' - 9 5/16", +3/16" / -0 (2980mm, +4mm / -0)
Ceiling Heights measured from top of Clea floor plate to bottom of Unistrut.

0 1' 2' 4' 8'
0 .5m 1m 2m

Planning Issues and Considerations

1. Patient loading may be difficult. Verify with customer requirement.
2. A.D.A. requires a clear width of 1'-0" (305mm) on the push side of the door and 4'-0" (1220mm) clear space. Verify all other applicable code(s) with the architect of record.
3. Exact equipment configuration to be verified with local Philips Sales. FlexVision TV Monitor is listed on order but shown on Stryker boom instead due to Philips Project Manager request.
4. Third Party Items - It is the region's responsibility to interface and coordinate customer's non-catalog item(s) with Philips' equipment. Verify feasibility and ensure full functionality and movement of FD20 Biplane system.
5. Shifted Boom F plan east 2'-5" plan east to avoid conflict with unistrut.
6. N.E.C. requires a clear floor space of 3'-0" (915mm) in front of electrical equipment and 3'-6" (1070mm) in front electrical equipment when facing each other. Verify all applicable code(s) with the architect of record.

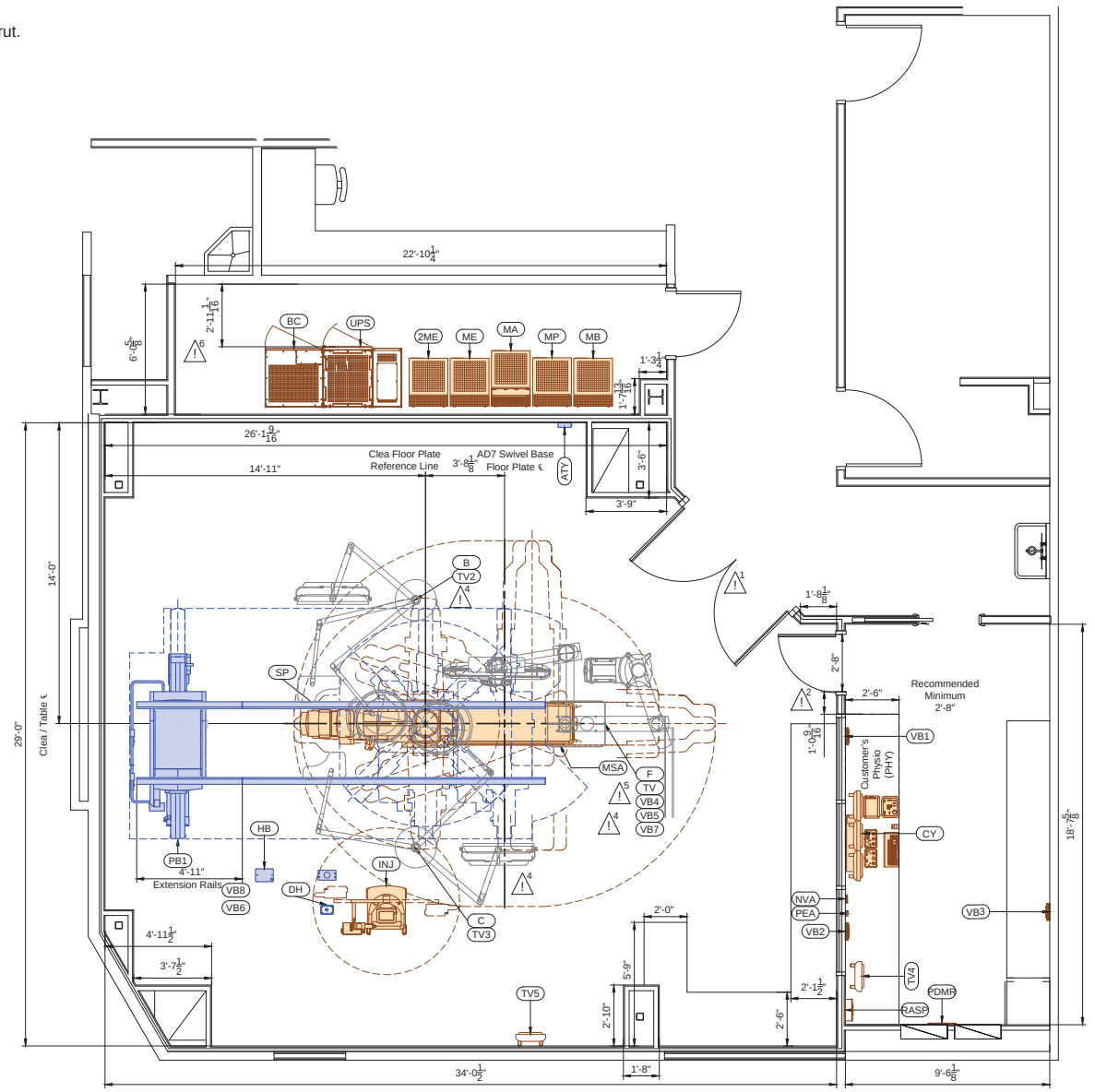
General Notes

* The equipment components shown in this drawing package are subject to availability. Final configuration to be verified by the factory.
* Counters and cabinetry shown to be supplied and installed by contractor.
* Architect to coordinate with end users/technicians to determine final placement of control desk components prior to installation in order to avoid rework. Architect to coordinate with Philips Project Manager to reflect final placement on Philips drawings.

	Source	Location	Displayed
VB1	Physio	Control	FlexVision
VB2	DH	Control	FlexVision
VB3	TBD	Control	FlexVision
VB4	TV	Exam	FlexVision
VB5	TV	Exam	FlexVision
VB6	TBD	Exam	FlexVision
VB7	Boom F	Exam	FlexVision
VB8	Anes.	Exam	FlexVision

DB

Exact location to be coordinated by Customer and local Philips service.



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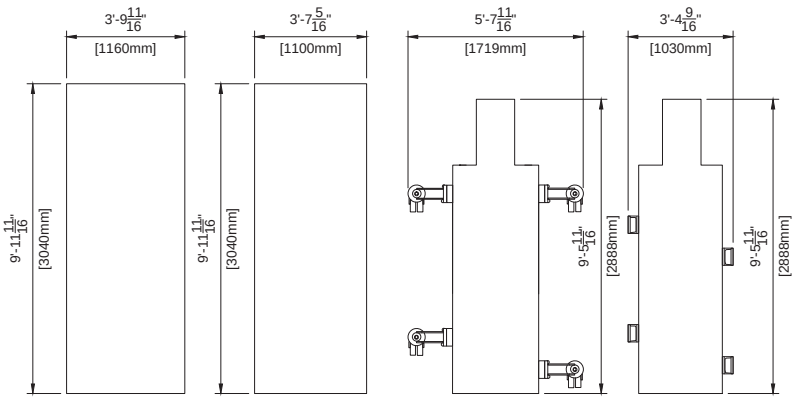
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Detail - Clea Floor Transport Details



Transport Possibilities				
	Crate	**Pallet**	**Klick Wheel Wide**	**Castors**
Height	79.53" (2020mm)	78.54" (1995mm)	69.65" (1769mm)	72.40" (1839mm)
Weight	3285 lbs (1490 kg)	3064 lbs (1390 kg)	3241 lbs (1470 kg)	2954 lbs (1340 kg)

Minimum Elevator Size	
Length	88.58" (2250mm)
Width	51.18" (1300mm)
Height	85.03" (2160mm)

Note: This size can be reached by means of C-arc and junction rotation.

(12.0)

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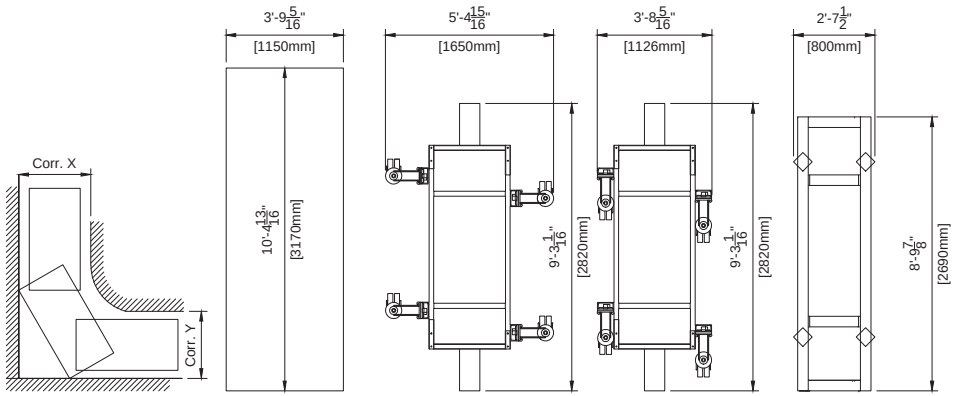
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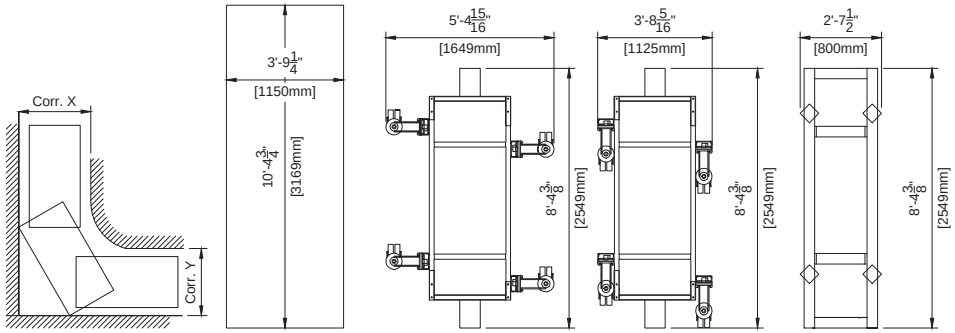
Detail - Lateral Arc N (C-ARC) Transport Details



Transport Possibilities				
	Crate Wide	Klick Wheels Wide	Klick Wheels Small	Castors
Height	85.45" (2145mm)	74.80" (1900mm)	74.80" (1900mm)	74.80" (1900mm)
Weight	1565 lbs (710 kg)	1587 lbs (720 kg)	1587 lbs (720 kg)	1312 lbs (595 kg)
Corridor X Measured	66.73" (1695mm)	66.73" (1695mm)	66.73" (1695mm)	66.73" (1695mm)
Corridor Y Must Be	86.02" (2185mm)	111.57" (2834mm)	73.80" (1874mm)	52.83" (1342mm)

* Corridor values, a tolerance of 3.93" (100mm) is added for wall obstructions.

Detail - Lateral Arc N (U-ARC) Transport Details



Transport Possibilities				
	Crate Wide	Klick Wheels Wide	Klick Wheels Small	Castors
Height	84.45" (2145mm)	77.56" (1970mm)	77.56" (1970mm)	77.56" (1970mm)
Weight	1761 lbs (799 kg)	1748 lbs (793 kg)	1748 lbs (793 kg)	1510 lbs (685 kg)
Corridor X Measured	64.96" (1650mm)	64.96" (1650mm)	64.96" (1650mm)	64.96" (1650mm)
Corridor Y Must Be	86.02" (2185mm)	101.85" (2587mm)	66.14" (1680mm)	49.33" (1253mm)

* Corridor values, a tolerance of 3.93" (100mm) is added for wall obstructions.

Detail - Lateral Arc FD (Assembled) Transport Details

Transport Possibilities		
	Including Crate	Without Crate
Length	114.17" (2900mm)	107.48" (2730mm)
Width	45.28" (1150mm)	31.50" (800mm)
Height	81.69" (2075mm)	74.80" (1900mm)
Weight	2094 lbs (950 kg)	2094 lbs (950 kg)

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AD2

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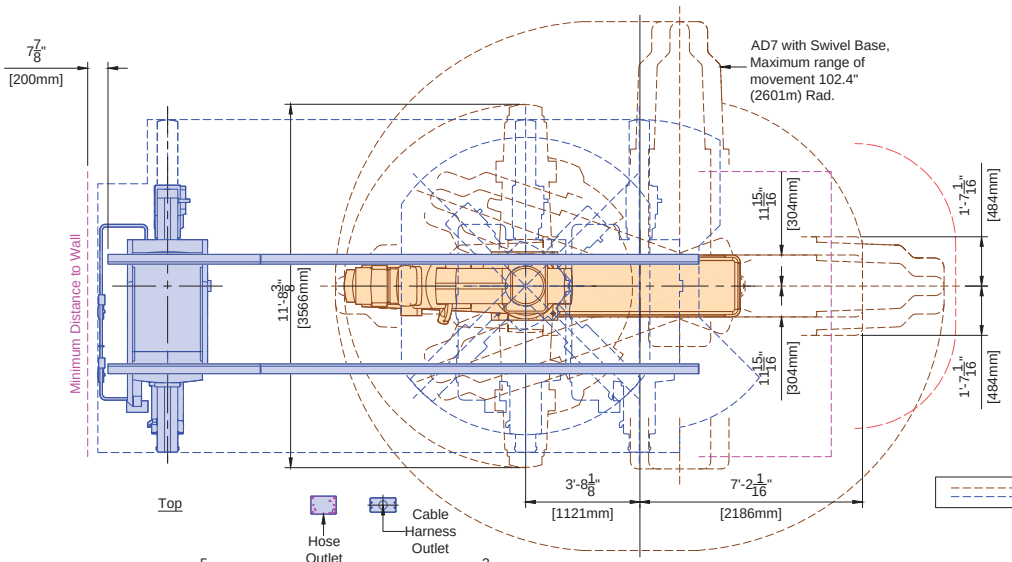
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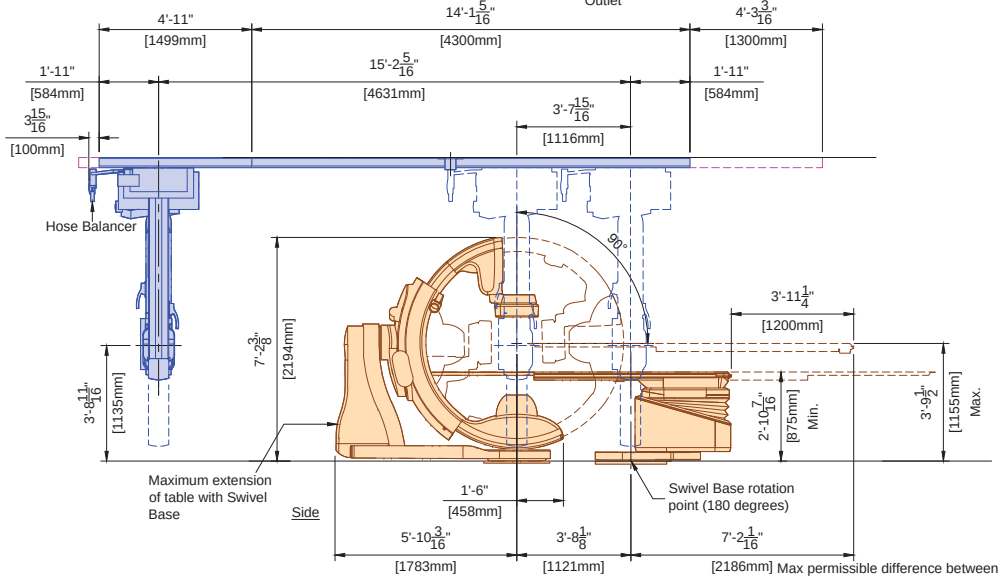
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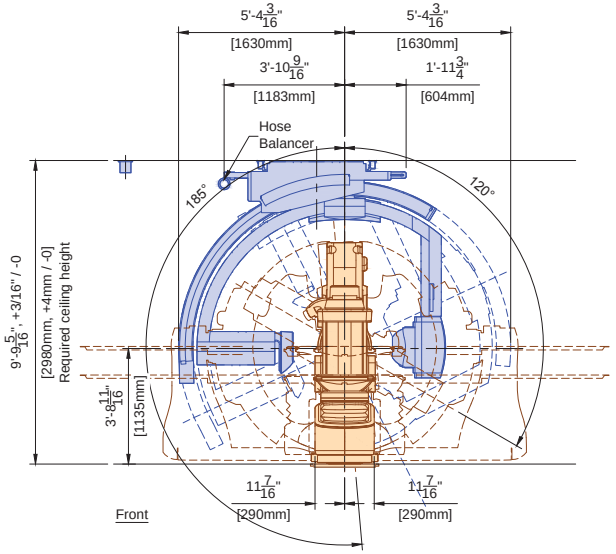
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Max permissible difference between isocenters of Clea and Larc N is $\frac{3}{8}$" (10mm).

Tilt table (not shown) is option. This allows the tabletop to tilt ±17°.

SP	Floor Clea (12.0)	
	Weight	Heat Dissipation
	2513 lbs	1706 btu/hr

PB1	Larc N Neuro w/ Extension Rails (12.0)	
	Weight	Heat Dissipation
	1763 lbs	854 btu/hr

MSA	Angio Diagnost 7 with Swivel (12.0)	
	Weight	Heat Dissipation
	1873 lbs	205 btu/hr

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AD3

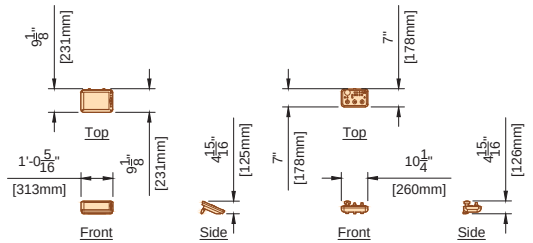
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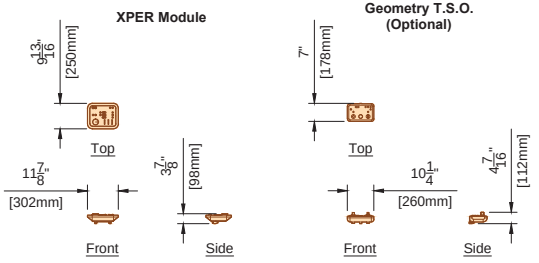
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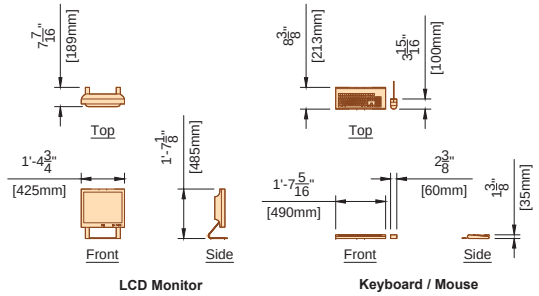
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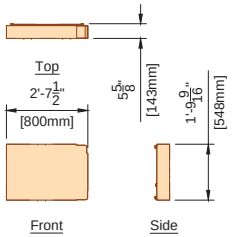
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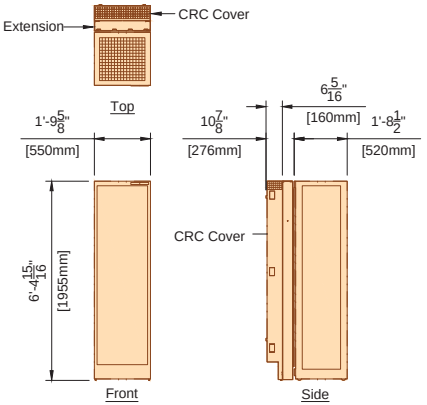




Connection Box
(See SD3 for mounting options)

(12.0)

	View/Control (All Components)	
CY	Weight	Heat Dissipation
	126 lbs	567 btu/hr

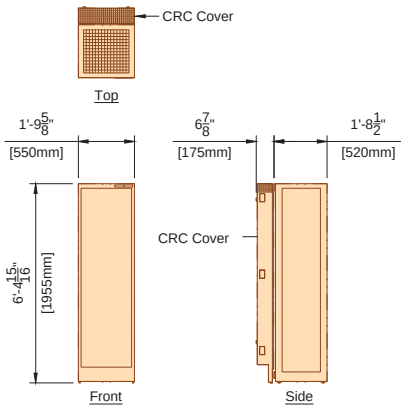


The CRC Cover must be attached to the back box.

Acoustic noise level: <= 55 dB(A) @ 1 meter in front of the rack and 1 meter high (1 meter = 39.37")

(12.0)

	Mains 40E Cabinet	
MA	Weight	Heat Dissipation
	826 lbs	5464 btu/hr

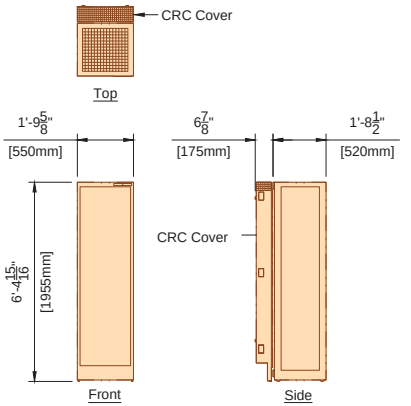


The CRC Cover must be attached to the back box.

Acoustic noise level: <= 65 dB(A) @ 1 meter in front of the rack and 1 meter high (1 meter = 39.37")

(12.0)

	Peripheral 40E Cabinet	
MP	Weight	Heat Dissipation
	510 lbs	2049 btu/hr

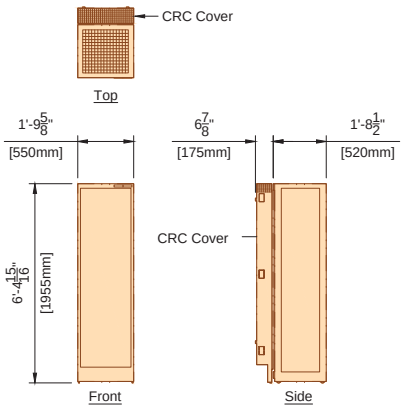


The CRC Cover must be attached to the back box.

Acoustic noise level: <= 48 dB(A) @ 1 meter in front of the rack and 1 meter high (1 meter = 39.37")

(12.0)

	Image 40E Cabinet	
MB	Weight	Heat Dissipation
	826 lbs	5464 btu/hr



The CRC Cover must be attached to the back box.

Acoustic noise level: <= 55 dB(A) @ 1 meter in front of the rack and 1 meter high (1 meter = 39.37")

(12.0)

	Velara Generator 40E Cabinet	
ME 2ME	Weight	Heat Dissipation
	510 lbs	2971 btu/hr

PHILIPS

Project Allura Biplane FD20/20
The Medical Center of Aurora
Aurora, CO
-IC-6016A

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Drawn By: Melanie Thi

Project Details
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Quote: 1-1HNAHX1 Rev. 1
Order: 6600276231.010000, 6600276231.020000

AD4

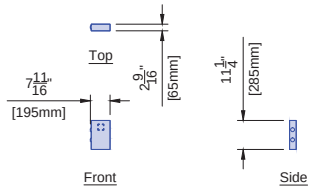
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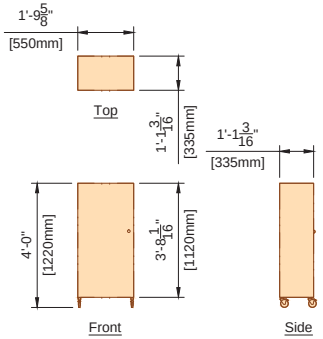
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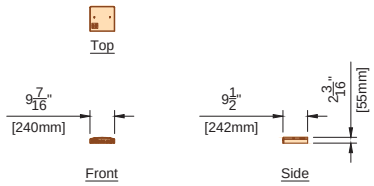
(12.0)

	Auxiliary Box	
ATY	Weight	Heat Dissipation
	7 lbs	1.7 btu/hr



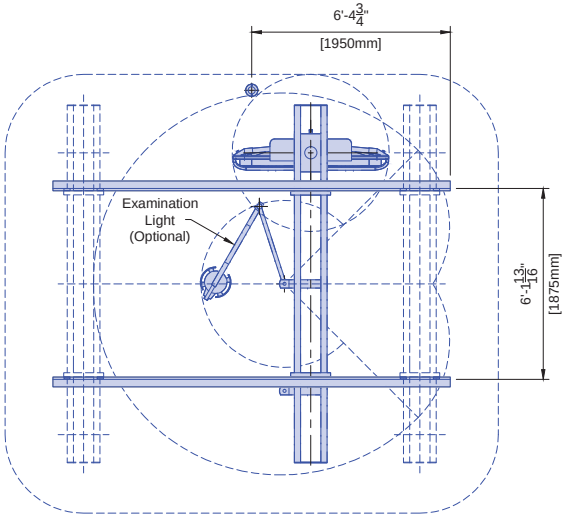
(12.0)

	Documentation Box	
DB	Weight	Heat Dissipation
	176 lbs	0 btu/hr

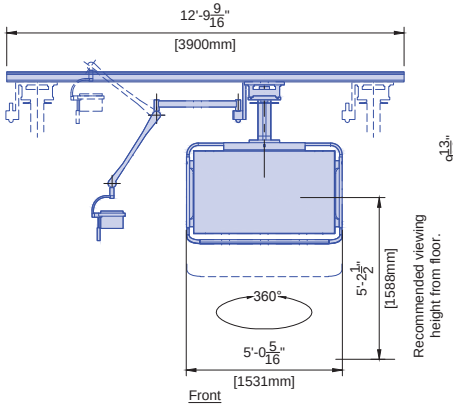


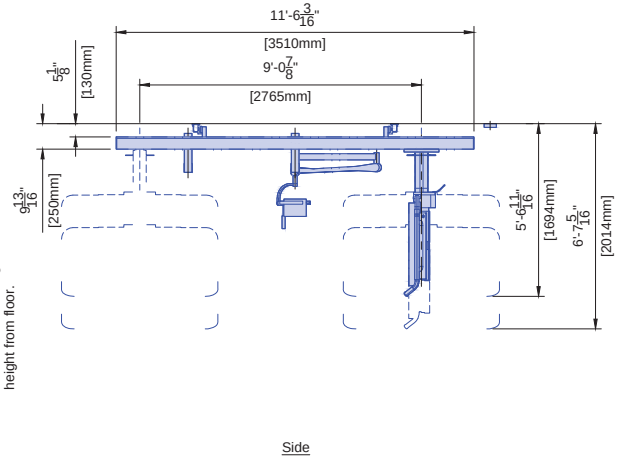
(13.0)

	Video Connection Box	
VB1 ~ VB8	Weight	Heat Dissipation
	11 lbs	34 btu/hr



Bearing Forces:
(Tension) Tmax = 661 lbs/support
(Shear) Vmax = 150 lbs/support





For swing labs, 2700mm long ceiling rails are delivered. Maximum longitudinal column travel = 2100mm.
Weight shown is total weight including monitors, suspension, cabling, and options.

(12.0)

	58" LCD Monitor Suspension	
TV	Weight	Heat Dissipation
	603 lbs	1020 btu/hr

PHILIPS

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-IC-6016A

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Drawn By: Melanie Thi

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AD5

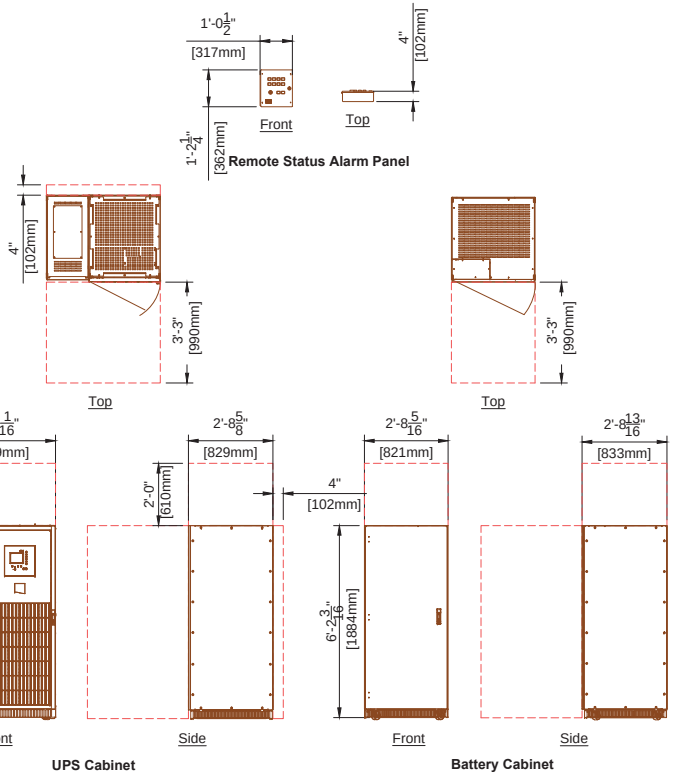
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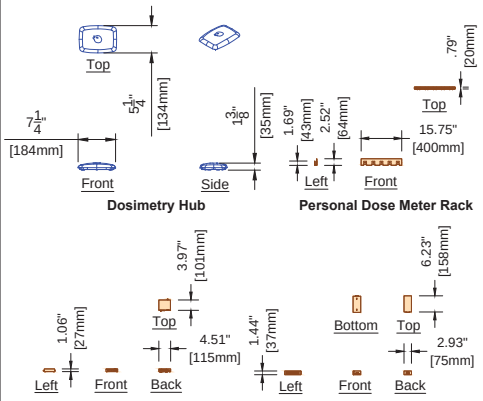
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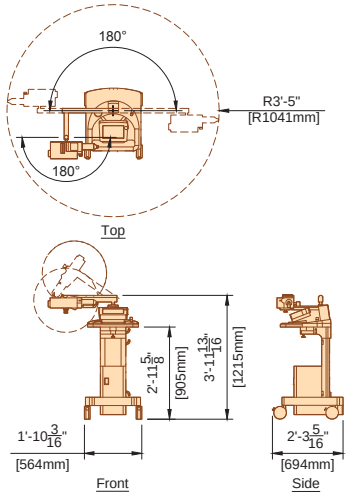
(16.0)

	Galaxy 5000 80 kVA UPS	
	Weight	Heat Dissipation
UPS	1062 lbs	8531 btu/hr
BC	2950 lbs	
RASP	20 lbs	- btu/hr



(15.0)

	DoseAwareXtend	
	Weight	Heat Dissipation
DH	.44 lbs	- btu/hr
NVA	1.1 lbs	- btu/hr
PEA	1.3 lbs	- btu/hr
PDMR	- lbs	- btu/hr



(12.0)

	ACIST Injector on Pedestal	
	Weight	Heat Dissipation
INJ	- lbs	5118 btu/hr

PHILIPS

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AD6

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Permit #: *2016 1191012*

Equipment Support Information

1. General
The customer shall be solely responsible, at its expense, for preparation of the site, including any required structural alterations. The site preparation shall be in accordance with this plan and specifications, the architectural/construction drawings and in compliance with all safety and building codes. The customer shall be solely responsible for obtaining all construction permits from jurisdictional authority.

2. Equipment Anchorage
Philips provides, with this plan and specifications, information relative to equipment size, weight, shape, anchoring hole locations and forces which may be exerted on anchoring fasteners. The customer shall be solely responsible, through the engineer of record for the building, to provide on the architectural/construction drawings, information regarding the approved method of equipment anchoring to floors, wall and/or ceiling of the building. Any anchorage test required by local authority shall be the customer's responsibility. Stud type anchor bolts should not be specified as they hinder equipment removal for service. Consult with Philips service prior to specifying anchor methods. Philips equipment must be electrically isolated from anchorage.

3. Floor Loading and Surface
Philips provides, with this plan and specifications, information relative to size, weight and shape of floor mounted equipment. The customer shall be solely responsible, through the engineer of record for the building, to provide on the architectural/construction drawings confirmation of the structural adequacy of the floor upon which the equipment will be placed. Any load test required by local authority, shall be the customer's responsibility.
The floor surface upon which Philips equipment is to be placed/anchored shall be flat and level to within plus or minus $\frac{1}{16}$" (2mm) over a length of 39" (1m).

4. Ceiling Support Apparatus
a. Philips provides, with this plan and specifications, information relative to size, weight and shape of ceiling supported equipment. The customer shall be solely responsible, through the engineer of record for the building, to provide on the architectural/construction drawings, information regarding the approved method of structural support apparatus, fasteners and anchorage to which Philips will attach equipment. Any anchorage and/or load test required by local authority shall be the customer's responsibility. Philips equipment must be electrically isolated from anchorage.

b. Contractor to clearly mark Philips equipment longitudinal centerline on bottom of each structural support.

c. The structural support apparatus surface to which Philips equipment is to be attached, shall have horizontal equipment attachment surfaces parallel, square and level to within plus or minus $\frac{1}{16}$" (2mm) per entire span.

d. Any drilling and/or tapping of holes required to attach Philips equipment to the structural support apparatus shall be the responsibility of the customer.

e. Fasteners/anchors (i.e., bolts, spring nuts, lock and flat washers) and strip closures shall be provided by the customer.

5. Lighting
Lighting fixtures shall be placed in such a position that they are not obscured by equipment or its movement, nor shall they interfere with Philips ceiling rails and equipment movement or otherwise adversely affect the equipment. Such lighting fixture locations shall be the sole responsibility of the customer.

6. Ceiling Obstructions
There shall be no obstructions that project below the finished ceiling in the area covered by ceiling suspended equipment travel.

7. Seismic Anchorage (For Seismic Zones Only)
All seismic anchorage hardware, including brackets, backing plates, bolts, etc., shall be supplied and installed by the customer/contractor unless otherwise specified within the support legend on this sheet. Installation of electronic cabinets to meet seismic anchorage requirements must be accomplished using flush mounted expansion type anchor/bolt systems to facilitate the removal of a cabinet for maintenance. Do not use threaded rod/adhesive anchor systems. Consult with Philips regarding any anchor system issues. Philips equipment must be electrically isolated from anchorage.

8. Floor Obstructions/ Floor Coverings
There shall be no obstructions on the floor (sliding door tracks, etc.) in front of the Philips technical cabinets. Floor must be clear to allow cabinets to be pulled away from the wall for service.
Contractor to verify with Philips the preferred floor covering installation method.

9. Safety Factors
In a worst case situation the dynamic bolt force of a floor or ceiling must be multiplied by factor 4. (static bolt force of the ceiling must be multiplied by factor 8). All safety factors are included in the bearing force values in sheet SD1.

10. Stiffness Requirements of Ceiling
Stiffness: 10,000,000 Newton/meter - 57.1 klb/in
Stiffness: 20,000,000 Newtonmeter/Rad - 177,014 (klb in)/Rad
The maximum deflection on the Philips rails must not exceed 0.04" (1mm) caused by the static load (weight) of the ceiling stand

11. Vibration
The maximal allowed external frequency that will not destroy the image quality of our equipment is:

a. 0 Hz till 20 Hz (frequency area of our equipment) - Displacement amplitude is smaller than 0.005mm
b. Greater than 20 Hz - Displacement amplitude is smaller than 0.01mm

PHILIPS

Project
Allura Biplane FD20/20
The Medical Center of Aurora
Aurora, CO
-IC-6016A

Philips Contacts
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Drawn By: Melanie Thi

Project Details
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Quote: 1-1HNAHX1 Rev. 1
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See S1 for Floor & Wall Support Layout

Notes:

1. Anchors for items that are installed/anchored by customer/contractor shall be provided by customer/contractor.
2. Anchors for items that are installed/anchored by Philips shall be provided by Philips. If customer's engineering documents specify anchors other than those listed in this document, the anchors shall be provided by customer/contractor and installed by Philips.
3. In all instances, the wall and/or floor support are the sole responsibility of the customer/contractor. The customer's architect/engineer of record shall specify wall and/or floor support sufficient for the bolt forces shown on the details.

Floor & Wall Support Legend

A Furnished and installed/anchored by Philips (exceptions may exist, see Note 2)
B Furnished and installed by customer/contractor and installed/anchored by customer/contractor
C Installed/anchored by customer/contractor
D Furnished by Philips and installed/anchored by contractor
E Existing
F Future
G Optional

	Item Number	Description	Detail Sheet
D	F1	AD7 Swivel Floor Plate	SD1
D	F2	Floor Clea Floor Plate	SD1
B	F3	Support in wall for Control Room Connection Box (CY)	SD3
A	F3	Anchors in wall for Control Room Connection Box (CY)	SD3
G	F4	Network Video Adapter Bracket	SD4
G	F5	Personal Dose Meter Rack	SD4

See S2 for Ceiling Support Layout

Ceiling Support Legend

A Furnished and installed by Philips
B Furnished by customer/contractor and installed by customer/contractor
C Installed by customer/contractor
D Furnished by Philips and installed by contractor
E Existing
F Future
G Optional

	Item Number	Description	Detail Sheet
A	C1	2 - Philips Larc N Neuro Rails	SD2
B	C2	Dosimetry Hub Ceiling Plate	SD4
B	C3	Unistrut (P1001 or equal) - Bottom of Unistrut $\frac{1}{4}$" (6mm) Below Finished Ceiling	SD2
D	C4	Hose Balancer (Maximum total pull force: 34 lbs.)	SD4
B	C5	Hose Balancer Plate (Maximum total pull force: 34lbs)	SD4

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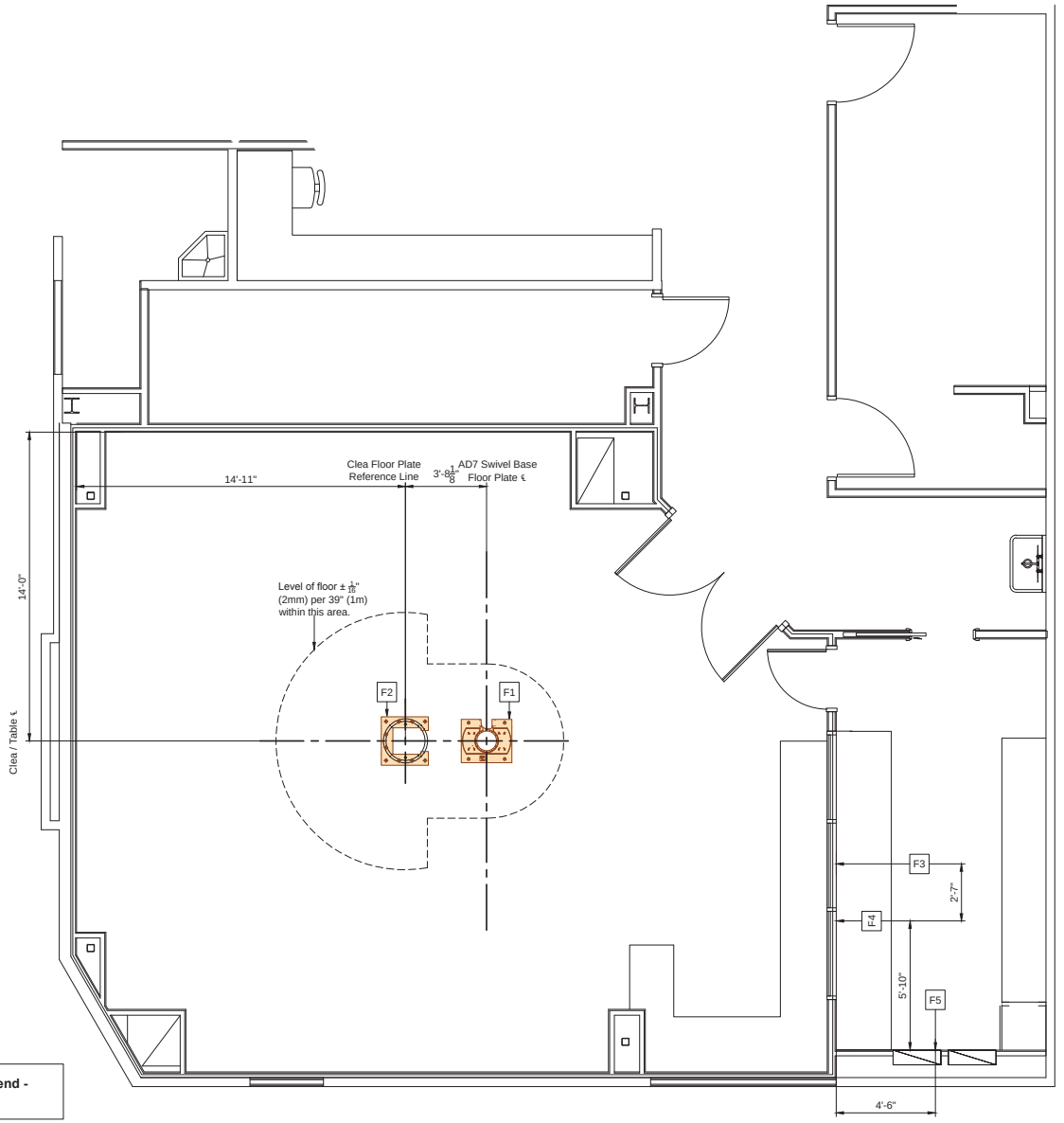
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RSN: *1156136*
Permit #: *2016 1191012*

Floor & Wall Support Layout

Required Ceiling Height: 9' - 9 $\frac{5}{16}$", +$\frac{3}{16}$" / -0 (2980mm, +4mm / -0)
Ceiling Heights measured from top of Clea floor plate to bottom of Unistrut.

0 1' 2' 4' 8'
0 .5m 1m 2m



Refer to Floor/Wall Support Legend - Sheet SL

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S1

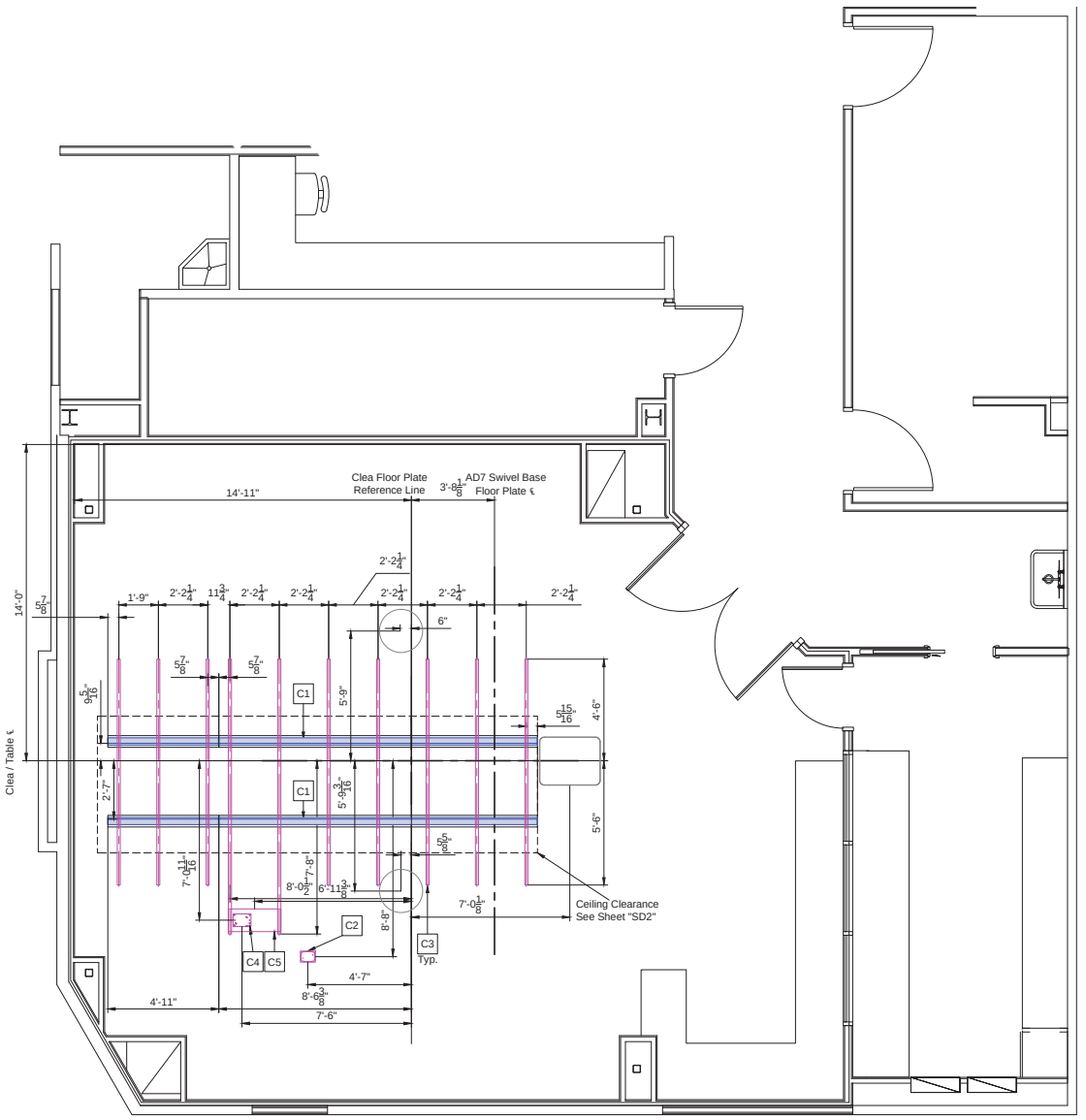
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Ceiling Support Layout

Required Ceiling Height: 9' - 9 5/16", +3/16" / -0 (2980mm, +4mm / -0)
Ceiling Heights measured from top of Clea floor plate to bottom of Unistrut.

0 1' 2' 4' 8'
0 .5m 1m 2m



Refer to Ceiling Support Legend - Sheet SL

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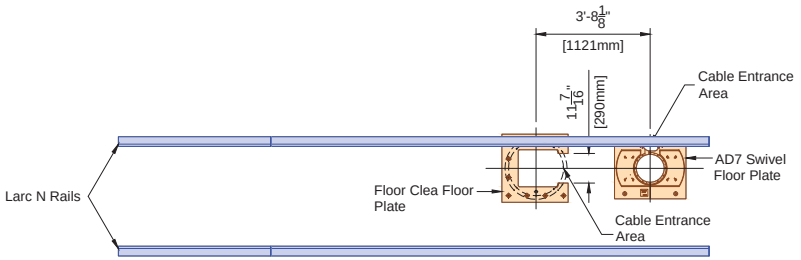
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RSN: *1156136*
Permit #: *2016 1191012*

Detail - Floor Structural Allura FD20 Biplane, AD7 Swivel



Floor plates supplied by Philips / installed by customer.

Floor Clea
Floor Plate to Floor Bolt Forces:
(Tension) Tmax = 2666 lbs/support
(Shear) Vmax = 892 lbs/support

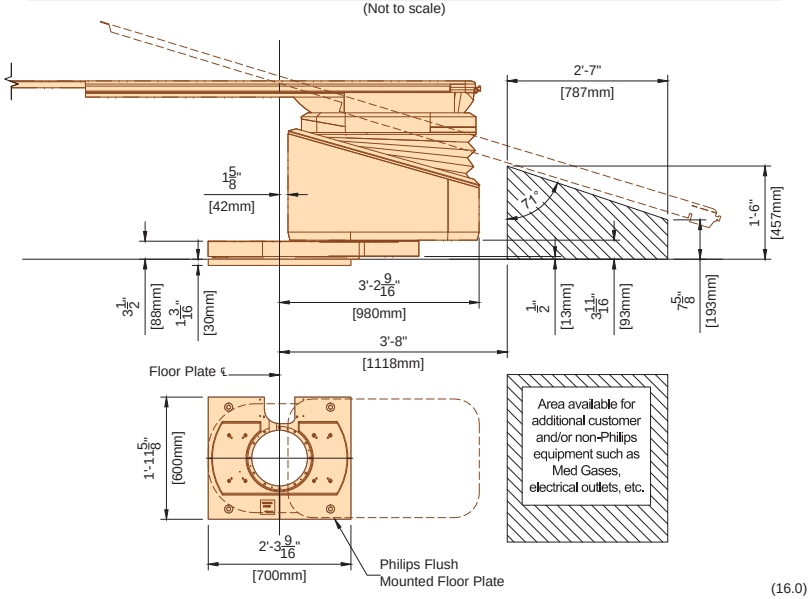
AD7 Swivel Table
Floor Plate to Floor Bolt Forces:
(Tension) Tmax = 2332 lbs/bolt
(Shear) Vmax = 1164 lbs/bolt

F1 F2

(12.0)

Detail - AD7 SyncraTilt/Tilt Table, Swivel Base - Clearance Area for Table in Normal Position

(Not to scale)



(16.0)

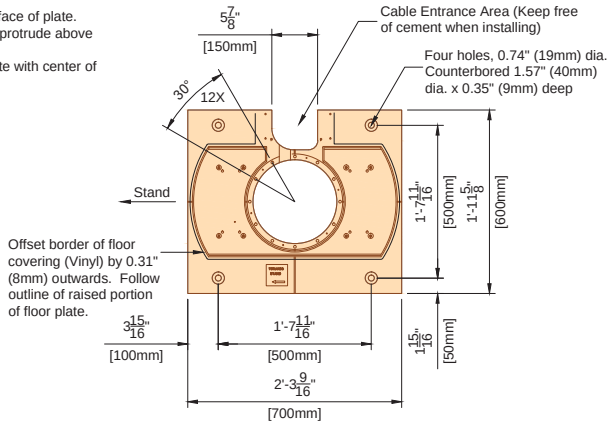
Detail - AD7 Swivel Floor Plate - Notes for Installation

(Not to scale)

1. 1.18" (30mm) thick floor plate, flush mounted with top of slab.
2. Level within 1/16" (1.5mm) across surface of plate.
3. Anchor bolts with washer must not protrude above surface of floor plate.
4. Align center of AD7 swivel floor plate with center of Clea floor plate.

Floor plate mounting to the building:
In case threaded rods are used and the nut protrudes above the floor plate surface, DO NOT GRIND DOWN THE NUT, but follow the procedure stated below to ensure the nut is flush with the floor plate surface.

1. Use Jam nuts M16 (h=8.0mm) or (h=9.5mm)
2. Use only 1 washer.
3. Use loctite 243 instead of a lock washer.
4. Use fastening torque wrench between 40 and 50 Nm.



F1

(12.0)

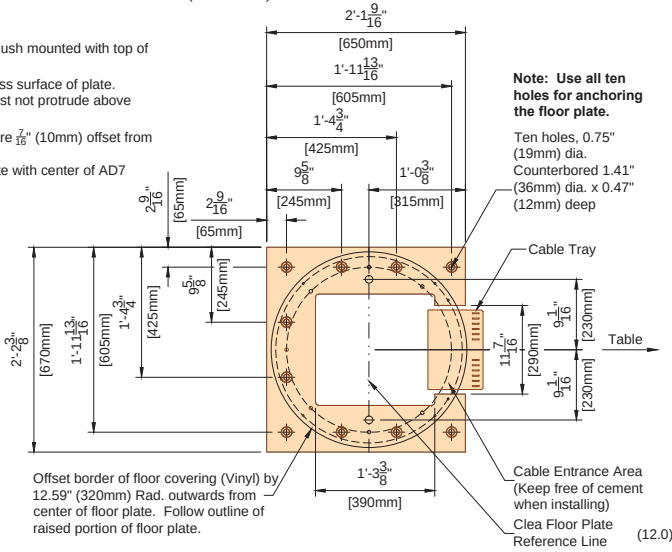
Detail - Floor Clea Floor Plate - Notes for Installation

(Not to scale)

1. 13/16" (20mm) thick floor plate, flush mounted with top of slab.
2. Level within 1/16" (1.5mm) across surface of plate.
3. Anchor bolts with washer must not protrude above surface of floor plate.
4. Installation alignment holes are 7/16" (10mm) offset from center of plate.
5. Align center of Clea floor plate with center of AD7 swivel floor plate.

Floor plate mounting to the building:
In case threaded rods are used and the nut protrudes above the floor plate surface, DO NOT GRIND DOWN THE NUT, but follow the procedure stated below to ensure the nut is flush with the floor plate surface.

1. Use Jam nuts M16 (h=8.0mm) or (h=9.5mm)
2. Use only 1 washer.
3. Use loctite 243 instead of a lock washer.
4. Use fastening torque wrench between 40 and 50 Nm.



F2

(12.0)

Project
Allura Biplane FD20/20
The Medical Center of Aurora
Aurora, CO
-IC-6016A

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Project Details
Drawing Number
N-WES160230 G
Date Drawn: 8/30/2016
Quote: 1-1HNAHX1 Rev. 1
Order: 6600276231.010000,
6600276231.020000

SD1

7.11.14

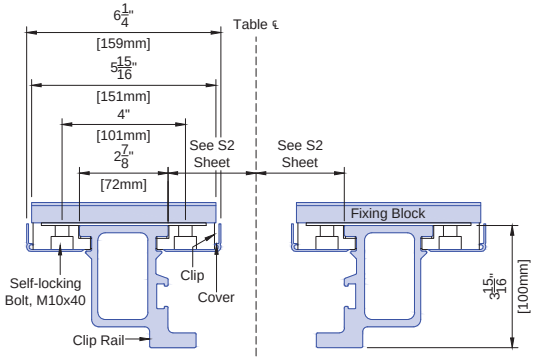
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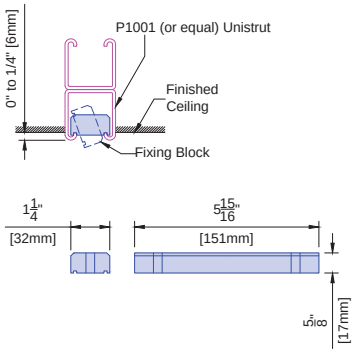
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Detail - Clip Rail Cross-Section
(Not to scale)



Detail - Fixing Block for Philips Ceiling Rails (Clip Rails)
(Not to scale)

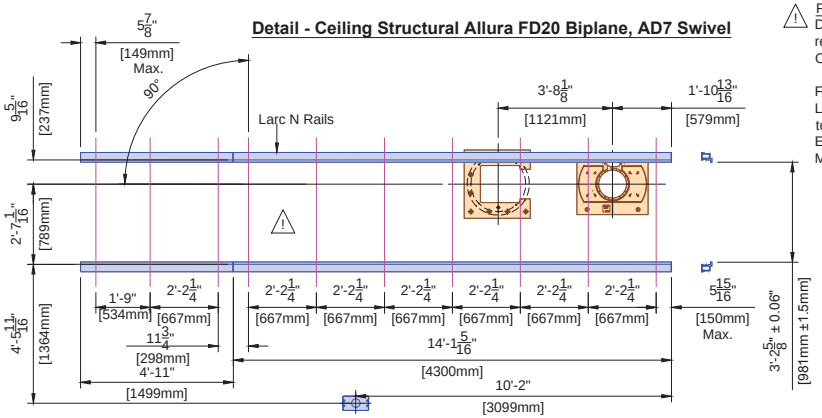


- Philips does not specify the overhead equipment support structure. Unistrut (or equal) may or may not be used. If Unistrut are used, it is up to Unistrut and the structural engineer for the project to determine which of its products are appropriate for each project.
- Finished ceiling must **NOT** be lower than the bottom of the Unistrut in order to prevent damage to the finished ceiling during the installation of clip rails. Finished ceiling height to be mounted 0" to 1/4" (6mm) above bottom of Unistrut.
- Nothing shall be attached to the Unistrut with any fastener that protrudes into the Unistrut which would interfere with positioning of the fixing block.
- Fixing blocks for Philips ceiling rails (Clip rails) are designed to be installed in P1001 Unistrut.
- The inside of the Unistrut must be clear of obstructions (including paint).
- Unistrut elements must be rigid and comply with the ceiling structure requirements. See SN sheet, line #4 "Ceiling Support Apparatus".
- Welding Unistrut may warp Unistrut and deteriorate the structural integrity of the Unistrut. Consult the Structural Engineer of Record prior to welding any Unistrut.

C1 C3

(14.0)

Detail - Ceiling Structural Allura FD20 Biplane, AD7 Swivel



27" (685mm) maximum allowed distance between unistrut (seven unistrut required)

Larc N Neuro
Larc N Bearing Forces:
(Tension) Tmax = 1939 lbs/support
(Shear) Vmax = 845 lbs/support

Note: The bearing force shown for the Larc is the maximum instantaneous equipment bearing load that can result from abusive use of the system. This force can occur at two locations simultaneously on the same Unistrut (or equal) rail. If seismic forces must be considered, please refer to the seismic calculation sheets provided by Philips for the specific system components.

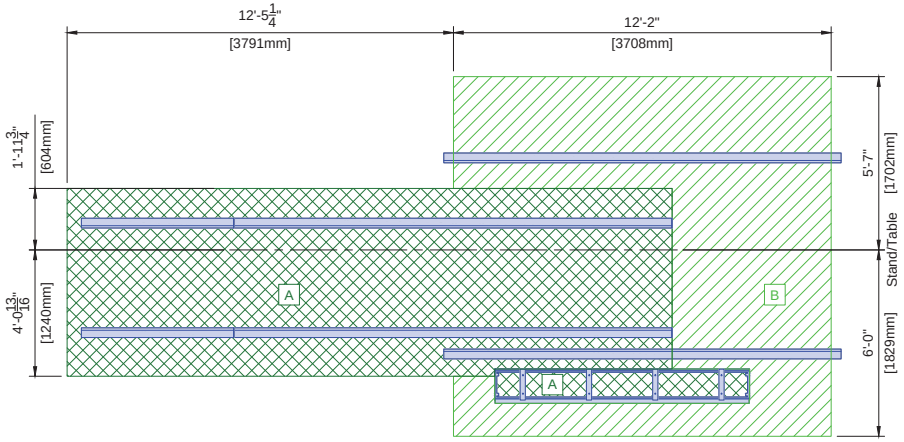
C1

(12.0)

⚠ For Philips Installer Only
Dimensions shown as a reference for Architect / Contractor only.

For exact location of the Larc N rails with reference to isocenter, see the Philips Engineer's Installation Manual.

Detail - Restricted Ceiling Area for Objects that Project Below Finished Ceiling
(Not site specific)



A No objects that project below finished ceiling are allowed in this area (lights, smoke detectors, sprinkler heads, etc).

B No objects that project more than 4.5" (115mm) below finished ceiling are allowed in this area (lights, smoke detectors, sprinkler heads, soffit, etc).

(12.0)

PHILIPS

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Pre-Evaluated and -Approved Anchor Reference List for Philips Installers

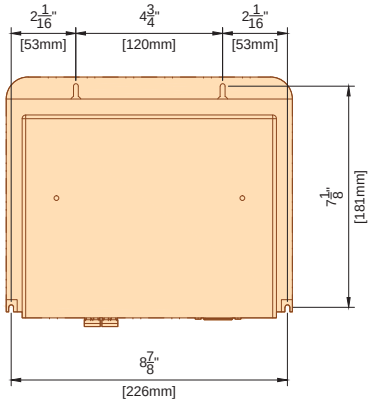
Anchors for items that are installed/anchored by customer/contractor shall be provided by customer/contractor. Anchors for items that are installed/anchored by Philips shall be provided by Philips. If customer's engineering documents specify anchors other than those listed below, the anchors shall be provided by customer/contractor and installed by Philips. In all instances, the wall and/or floor support are the sole responsibility of the customer/contractor. The customer's architect/engineer of record shall specify wall and/or floor support sufficient for the bolt forces shown on the details.

Equipment	Option	Anchor Style (provided by Philips)	Anchor Size (provided by Philips)	Qty.	Support Size & Material (provided & installed by customer/contractor)
Mavig Ceiling Track	A	Bolts, flat washer, lock washer, spring nuts	A307 Grade or ASME Grade 5 Bolts: $\frac{3}{8}$" (10mm) x 2" (50mm) L Spring Nuts: $\frac{3}{8}$" (10mm)	8	Unistrut
Control Room Connection Box (IXR)	A	Round Phillips Head Self Drilling Screws	#10-16 x 1 $\frac{1}{2}$" (38mm) L	3	Drywall with minimum 20 gauge Steel backing
	B	SPAX Multipurpose flat head screw	#10 x 1 $\frac{1}{2}$" (38mm) L	3	Drywall with minimum 20 gauge Steel backing
	C	Toggler Snaptoggle and (round head screws)	#BA and (#10-24 x 2 $\frac{1}{2}$" (63.5mm) L)	3	Minimum $\frac{5}{8}$" (16mm) Drywall

(12.0)

Detail - Wall Connection Box - Hole Pattern for Mounting

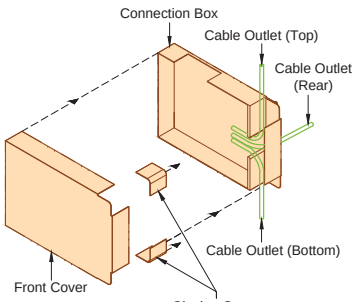
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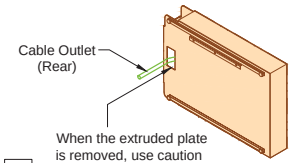


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Detail - Connection Box - Cable Outlets

(Not to scale)





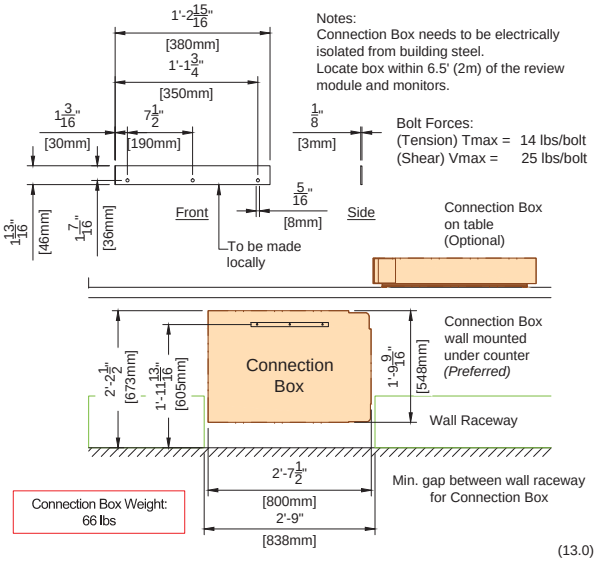
When the extruded plate is removed, use caution to protect cables against sharp edges

F3

(13.0)

Detail - Connection Box - Wall Mount Template

(Not to scale)



Notes:
Connection Box needs to be electrically isolated from building steel.
Locate box within 6.5' (2m) of the review module and monitors.

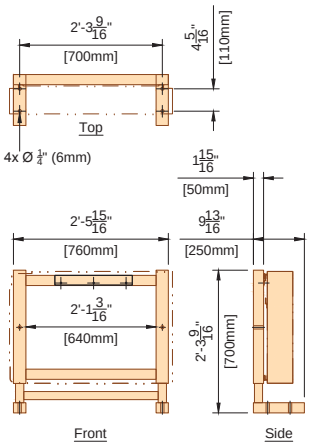
Bolt Forces:
(Tension) Tmax = 14 lbs/bolt
(Shear) Vmax = 25 lbs/bolt

Connection Box Weight: 66 lbs

(13.0)

Detail - Connection Box Support Frame Option

(Not to scale)

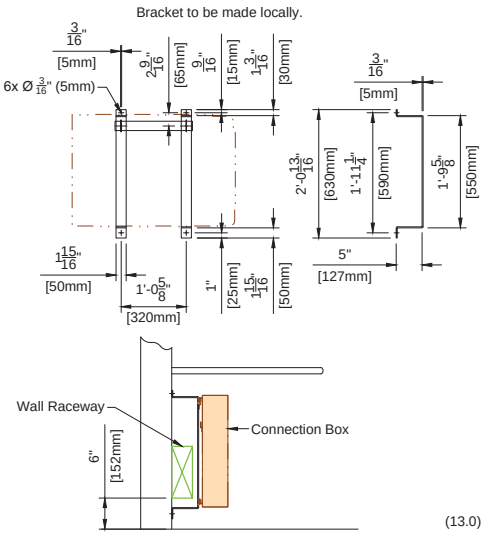


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Detail - Connection Box - Bracket Mount Option

(Not to scale)

Bracket to be made locally.



(13.0)

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SD3

7.11.14

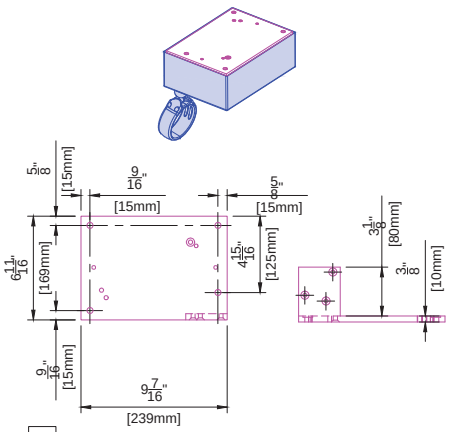
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Detail - Hose Balancer Base Plate (Not to scale)

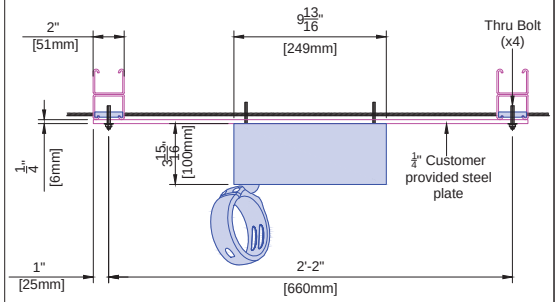


C4

Top

Side

Detail - Hose Balancer (Not to scale)

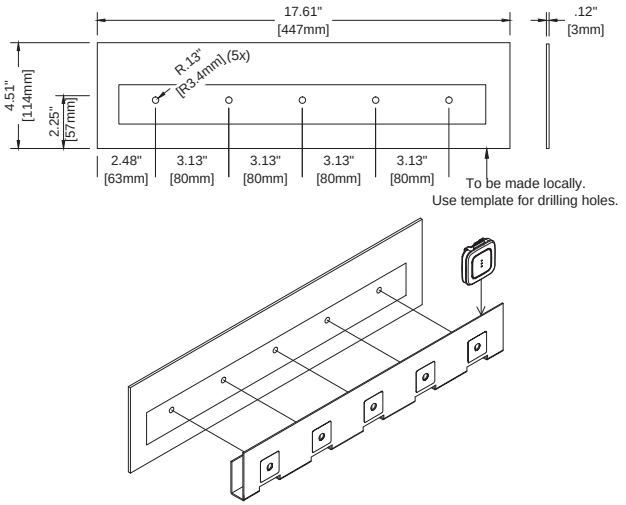


C5

Side

(14.0)

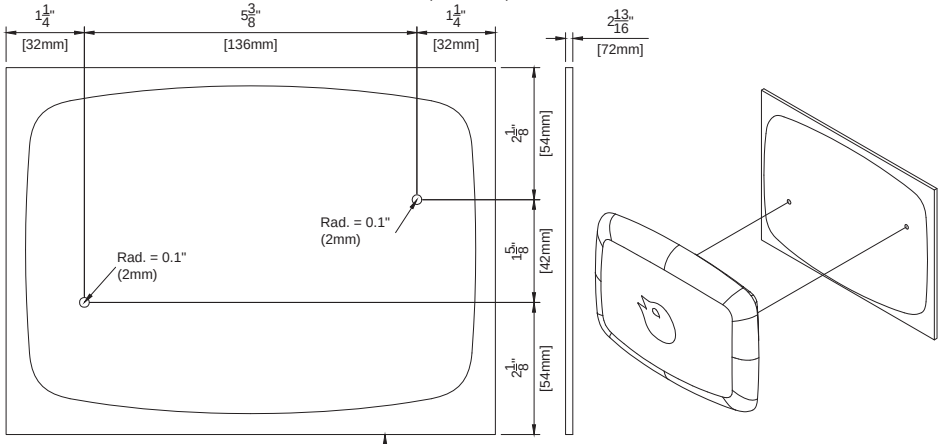
Detail - Personal Dose Meter Template (Not to scale)



F5

(15.0)

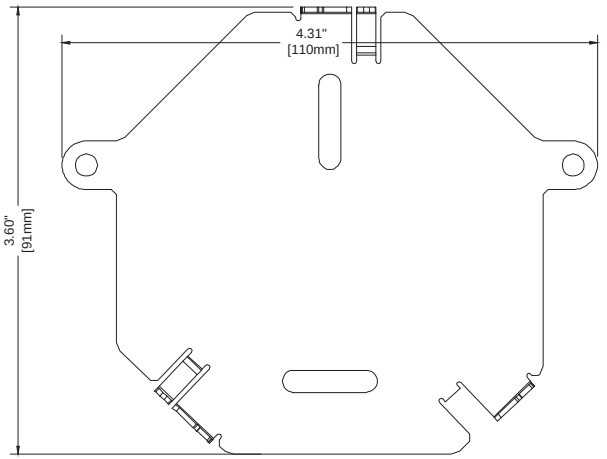
Detail - Dosimeter Hub Template (Not to scale)



C2

(13.0)

Detail - Network Video Adapter Bracket (Not to scale)



F4

(15.0)

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Project
Allura Biplane FD20/20
The Medical Center of Aurora
Aurora, CO
-IC-6016A

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Emergency Power

Philips does not require equipment to be on emergency power. If the customer deems it necessary for the equipment to be supplied with emergency power, the following specifications must be applied:

The Mains 40E cabinet feeding an Allura Xper system will have an absolute peak surge current of <380A.

The transfer switch must be double actuator type with a minimum time delay of 400 milliseconds in both directions (utility to emergency - emergency to utility). This time is required to allow filters to dissipate their stored energy before a different mains voltage is applied. Russelectric type RMTD, Asco Series 7000 delayed transition transfer switch or equivalent is recommended.

To reduce the emergency power generator load demand, Philips equipment can be put into a lower power mode of operation by the connection of a potential free closure from the transfer switch. This potential free, normally open contact, has to be rated for 24VDC/100mA. For Philips cardio/vascular Allura equipment, the two wires from this contact have to be routed to the equipment area and connected to the System Coordinator cabinet (MA).

(14.0)

Electrical Requirement Notes for Systems with Mains 40E Cabinet

Electrical power distribution at the facility shall comply with:

Utilization voltages per ANSI C84.1 - 1982 range A.

Voltage to be supplied is 3 phase, delta.

Phase conductors to be sized for instantaneous voltage drop per NEC 517 - 73 and Philips recommendations.

Metal conduit shall not be used as the equipment ground conductor.

The Philips system uses an isolated ground scheme grounding only the Allura system per clause 250.96B of the NEC. The raceway from the X-ray breaker (CB) to the Mains 40E Cabinet shall be supplemented by an internal insulated equipment grounding conductor installed in accordance with clause 250.146(D) of the NEC.

ANSI / NFPA 70 - National Electrical Code
Article 250 - Grounding
Article 517 - Healthcare Facilities
ANSI / NFPA 99 - Healthcare Facilities
NEMA standard XR9 - Power Supply Guideline for X-ray Machines

Power Quality Guidelines

1. Power supplied to medical imaging equipment must be separate from power feeds to air conditioning, elevators, outdoor lighting, and other frequently switched or motorized loads. Such loads can cause waveform distortion and voltage fluctuations that can hinder high quality imaging.

2. Equipment that utilizes the facility power system to transmit control signals (especially clock systems) may interfere with medical imaging equipment, thus requiring special filtering.

3. The following devices provide a high impedance, nonlinear voltage source, which may affect image quality:

Static UPS systems, Series filters, Power conditioners, and Voltage regulators.

Do not install such devices at the mains supply to medical imaging equipment without consulting Philips installation or service personnel.

4. Line impedance is the combined resistance and inductance of the electrical system and includes the impedance of the power source, the facility distribution system, and all phase conductors between the source and the imaging equipment. Philips publishes recommended conductor sizes based on equipment power requirements, acceptable voltage drops, and assumptions about the facility source impedance. The minimum conductor size is based on the total line impedance and NEC requirements. Unless impedance calculations are performed by an electrical engineer, the recommended values must be used.

(14.0)

General Electrical Information

1. General
The customer shall be solely responsible, at its expense, for preparation of the site, including any required electrical alterations. The site preparation shall be in accordance with this plan and specifications, the architectural/construction drawings and in compliance with all safety and electrical codes, the customer shall be solely responsible for obtaining all electrical permits from jurisdictional authority.

2. Materials and Labor
The customer shall be solely responsible, at its expense, to provide and install all electrical ducts, boxes, conduit, cables, wires, fittings, bushing, etc., As separately specified herein.

3. Electrical Ducts and Boxes
Electrical ducts and boxes shall be accessible and have removable covers. Floor ducts and boxes shall have watertight covers. Ducts shall be divided into as many as four separate channels by metal dividers, separately specified herein, to separate wiring and/or cables into groups as follows: Group A: incoming power wiring with associated protective earth wiring (PE). Group B: Output power wiring with associated protective earth wiring (PE). Group C: signal and/or data wiring and/or cables. Group D: X-Ray high-voltage cables, the use of 90 deg. ells is not acceptable. On ceiling duct and wall duct use 45 deg. bends at all corners. All intersecting points in duct to have cross over tunnels supplied and installed by contractor to maintain separation of cables.

4. Conduit
Conduit point - to - point runs shall be as direct as possible. Empty conduit runs used for cables may require pull boxes located along the run. Consult with Philips. A pull wire or cord shall be installed in each conduit run. All conduits which enter duct prior to their termination point must maintain separation from other cables via use of dividers, cross over tunnels, or conduit supplied and installed by contractor from entrance into duct to exit from duct. Do not use flex conduit unless approved by Philips Service.

5. Conductors
All conductors, separately specified, shall be 75°C stranded copper, rung out and marked.

6. Disconnecting Means
A disconnecting means shall be provided as separately specified.

7. Warning Lights and Door Switches
"X-ray on" warning lights and x-ray termination door switches should be provided at all entrances to x-ray rooms as required by code.

8. Dimmer Switches
X-ray room lights should be provided with dimmer switches.

(12.0)

Electrical Notes

1. The contractor will supply & install all breakers, shunt trip and incoming power to the breakers. The exact location of the breakers and shunt trips will be determined by the architect or contractor.

2. The contractor shall supply & install all pull boxes, raceways, conduit runs, stainless steel covers, etc. Conduit/raceways must be free from burrs and sharp edges over its entire length. A Greenlee pull string/measuring tape (part no. 435, or equivalent) shall be provided with conduit runs.

3. All pre - terminated, cut to length cables, will be supplied and installed by Philips. All cables to the breakers, will be supplied and installed by the contractor, subject to local arrangements.

4. Provide and install 50mm diameter chase nipples between adjacent wall boxes.

5. Electrical raceway shall be installed with removable covers. The raceway should be accessible for the entire length. In case of non - accessible floors, walls and ceilings, an adequate number of access hatches should be supplied to enable installation of cabling. Approved conduits may be substituted. All raceways will be designed in a manner that will not allow cables to fall out of the raceway when the covers are removed. In most cases, this will require above - ceiling raceway to be installed with the covers removable from the top. Raceway system as illustrated on this drawing are based upon length of furnished cables. Any changes in routing of raceway system could exceed maximum allowable length of furnished cables. Conduit or raceway above - ceiling must be kept as near to finished ceiling as possible.

6. Conduit sizes shall be verified by the architect, electrical engineer or contractor, in accordance with local or National Electrical Codes, whichever govern.

7. Convenience outlets are not illustrated. Their number and location are to be specified by the customer/architect.

8. Electrical contractor shall install ground bond wires at conduit openings within wall boxes as required by national and local electrical codes. Ground bond wires and lugs shall be installed in such a way to prevent the inadvertent contact with the installed Philips equipment to maintain Philips isolated ground scheme and maintain patient safety.

9. Install an insulated stranded ground wire per feeder/conductor size from the Main Disconnect (CB) to the ERB and from the ERB to the Mains 40E Cabinet (per NEC clause 250.146(D)).

10. Philips equipment must be electrically isolated from conduits, raceways, ducts, seismic anchoring, floor anchoring, etc.

(14.1)

PHILIPS

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RSN: *1156136*
Permit #: *2016 1191012*

Electrical Legend

A Furnished and installed by Philips
B Furnished by customer/contractor and installed by customer/contractor
C Installed by customer/contractor
D Furnished by Philips and installed by contractor
E Existing
F Future
G Optional

	Item Number	Description	Detail Sheet
B	CB	480V, 3 phase, Type D 125 A circuit breaker with long-time delay (e.g. Square D HDL36125 or equivalent) . Run power from breaker to "MA", leaving an 8' (2440mm) tail at "MA". See Sheet "ED1" for power quality requirements. Location per local code or owner requirements. (Not shown on plan)	ED1 ED4
B	ST	Shunt Trip (emergency off) - Large mushroom-head button on remote control station with contacts to operate feature of "CB" (if required by local code or owner, and mandatory for VA and D.O.D installations). If UPS is utilized, EPO switch will run 2 sets of communication wires to input breaker to UPS and to UPS itself (Not shown on plan)	ED4
B	GE	Local building steel (i.e. I-beam, rebar, raceway steel). (Not shown on plan)	
B	ERB	Equi-Potential Reference Bar mounted in a 12" (305mm) W x 12" (305mm) H x 4" (105mm) D pull box with hinged cover, surface mounted to the bottom of "WR2" when possible.	ED2
D	MP, MG, MA, ME, 2ME	19 ¼" (490mm) W x 67" (1705mm) H x 4" (105mm including rubber isolation strips) D flanged-edge terminal back box, surface mounted 82" (2085mm) A.F.F. to top of box.	ED2
B	CY, WM, VB1, TV4	Grommet opening on "WR3". Approximate location shown is recommended and may be changed - verify relocation with local Philips Service.	
B	MSA	10" (255mm) W x 10" (255mm) L x 6" (155mm) D floor box, under the floor with a 5" (130mm) core drill up to the underside of AD7 swivel floor plate cable opening. Contractor to provide protection around core drill hole so that there are no sharp edges for protection of cables. Consult with local Philips Service.	
B	SP	12" (305mm) W x 12" (305mm) L x 4" (105mm) D floor box, under the floor with a 8" (205mm) core drill up to the underside of Clea floor plate. See "Detail - Clea Floor Plate Cable Entrance" on Sheet "ED3" for cable routing methods. Contractor to provide protection around core drill hole so that there are no sharp edges for protection of cables. Consult with local Philips Service.	ED3
B	PB1	18" (460mm) W x 18" (460mm) L x 6" (155mm) D ceiling box, flush mounted with removable screw-type cover plate. Provide one 3" (80mm) diameter knockout.	
B	TV, VB4, VB5, VB7	18" (460mm) W x 18" (460mm) L x 6" (155mm) D ceiling box above finished ceiling. Provide a 2 1/2" (65mm) round cutout (Two 2 1/2" (65mm) round cutouts are required for systems with two monitor carriages - verify with local Philips Service). VB4 and VB5 to be mounted on back of monitor.VB7 to be mounted on Boom F.	
B	WR1, WR2	10" (255mm) W x 4" (105mm) D wall raceway, surface mounted with removable screw-type cover plate. "WR1" is at 5" (130mm) A.F.F. to bottom of raceway. "WR2" is at 82" (2085mm) A.F.F. to bottom of raceway.	ED3
B	WR3	10" (255mm) W x 4" (105mm) D wall raceway, surface mounted with removable screw-type cover plate. "WR3" is at finished floor. "WR3" may need to be cut at the location of the "CY" connection box.	ED3
B	R1	10" (255mm) W x 4" (105mm) D riser duct with removable screw-type cover plate, surface mounted from wall raceway to wall box.	ED3
B	PHY	Stub up point for physiological monitoring cables. Run conduit to customer's physiological console location. Contact manufacturer for power requirements, etc.	
G		120V/20A dedicated duplex outlet for PEA (Power over ethernet adapter) and NVA (Network video adapter).	
G	PEA, VB2, NVA	Grommet opening on "WR3". Approximate location shown is recommended and may be changed - verify relocation with local Philips Service.	
G	DH	4" (105mm) W x 4" (105mm) L x 4" (105mm) D ceiling box, flush mounted with removable screw-type cover plate	
B	TV5	Grommet opening on "WR5". Approximate location shown is recommended and may be changed - verify relocation with local Philips Service.	

Electrical Legend

A Furnished and installed by Philips
B Furnished by customer/contractor and installed by customer/contractor
C Installed by customer/contractor
D Furnished by Philips and installed by contractor
E Existing
F Future
G Optional

	Item Number	Description	Detail Sheet
B	ATY	Auxiliary Box - 6" (155mm) W x 6" (155mm) H x 4" (105mm) D wall box, flush mounted 70" (1780mm) A.F.F. to the bottom of the box with removable screw-type cover plate. Height and location shown are recommended and may be changed - verify height and relocation with local Philips Service.	
B	WL	Warning Light - Provide a surface or flush mounted light fixture above door to indicate when X-ray is on, if required by local code or physicist of record. See Sheet "ED2" diagram for connection details. (Not shown on plan)	ED2
B	DS	Door Switch - 120V/5A switch limited to open when door is open. Mount in upper corner on strike side of main entry door(s) (Cooper no. 1665 or equivalent), if required by local code or physicist of record. See Sheet "ED2" diagram for connection details. (Not shown on plan)	ED2
B	N1	RJ45 type Ethernet 10/100/1000 Mbit network connector with access to customer's network. Locate within 10' (3050mm) of network card. Network fiber optic and Ethernet cabling, connectors, wall boxes, patch panels, etc. are the responsibility of the purchaser. Philips assumes no responsibility for procurement, installation, or maintenance of these components.	
B	N2	RJ45 type Ethernet 10/100/1000 Mbit network connector. Access to customer's network via their remote access server is needed for Remote Service Network (RSN) connectivity.	N1
B	S	120V/20A dedicated duplex outlet for service in the equipment room. (Not shown on plan)	
B		120V/20A dedicated duplex outlet for each of the Video Connection Boxes. Verify electrical requirements for customer provided equipment.	
B	VB3	4" (105mm) W x 4" (105mm) H x 4" (105mm) D pull box with removable screw-type cover plate, flush mounted. Exact height to be determined. Location shown is recommended and may be changed - verify relocation with local Philips Service.	
B	VB6, VB8	4" (105mm) W x 4" (105mm) H x 4" (105mm) D ceiling box above finished ceiling. Exact height to be determined. Location shown is recommended and may be changed - verify relocation with local Philips Service.	
B		120V/20A dedicated duplex outlet for Pedestal Injector.	
B	TV2, TV3	6" (155mm) W x 6" (155mm) H x 4" (105mm) D ceiling box, above ceiling. Location shown is recommended and may be changed - verify relocation with local Philips Service.	
B	CB2	UPS input breaker. 150 Amp, 3-pole circuit breaker with shunt trip. (Not shown on plan).	ED4
D	UPS	UPS - 80 kVA.	ED4
D	BC	Battery Cabinet for UPS.	ED4
D	RASP	Remote Alarm Status Panel (wall mounted in the control area). Exact height to be determined. Location shown is recommended and may be changed - verify relocation with customer/contractor.	ED4
B	3	120VAC with 1Amp power draw RSAP (Remote Status Alarm Panel)	

See E1 - E3 sheets for conduit and raceway requirements.

PHILIPS

Project
Allura Biplane FD20/20
The Medical Center of Aurora
Aurora, CO
-IC-6016A

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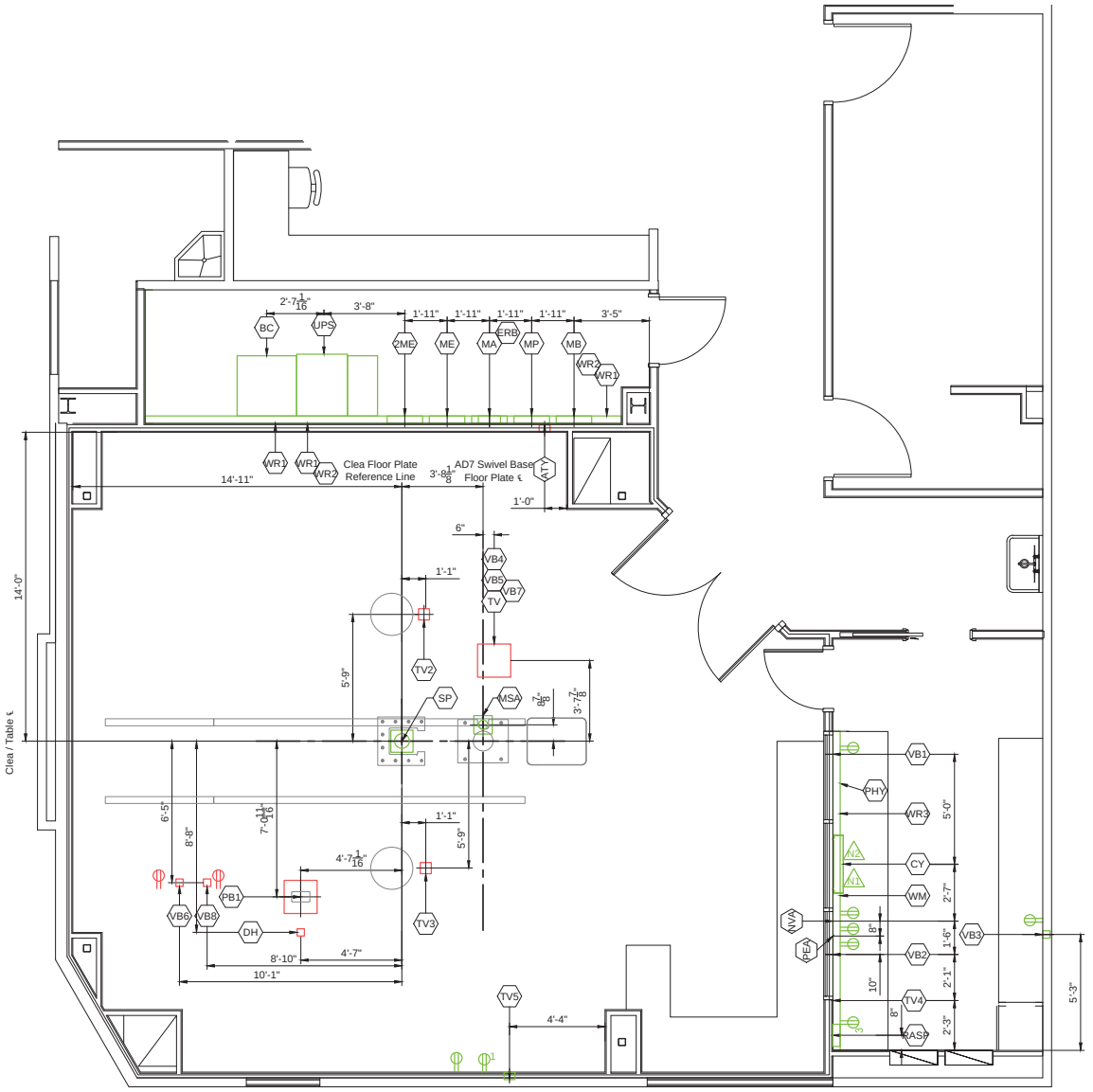
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Electrical Layout

Required Ceiling Height: 9' - 9 5/16", +3/16" / -0 (2980mm, +4mm / -0)
Ceiling Heights measured from top of Clea floor plate to bottom of Unistrut.

0 1' 2' 4' 8'
0 .5m 1m 2m



Refer to Electrical Legend - Sheet EL and Raceway/Conduit - Sheet E2-E4

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E1

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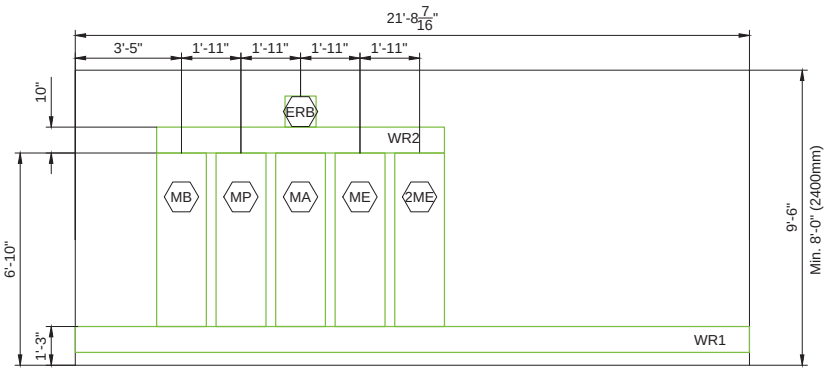
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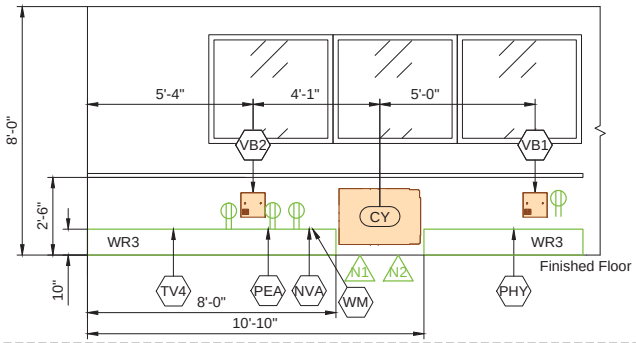
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Equipment Closet
(Site Specific)



Control Room
(Site Specific)



Note: The use of 90 degree ells is not acceptable. Use 45 degree bends at all raceway corners. For conduit runs, use the minimum bending radius specific to the conduit diameter. The use of crossover tunnels at all applicable locations is required. The above mentioned recommendations will help to ensure the integrity of the cables and fiber optic runs.

*** Countertop Height Guide:**
30" (765mm) for standard seated height.
36" (915mm) for standard standing height.
*** Ensure that the wall junction boxes are mounted perpendicular to the floor.**
*** Verify exact ceiling height of Equipment and Control Room Area.**
*** Local Philips Service to consult with customer for final placement of control desk components.**

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E2

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Conduit Required

General Notes

1. All conduit runs must take most direct route point to point.
2. All conduit runs must have a pull string.

A Conduit supplied/installed by contractor - Philips cables installed by Philips
B Conduit supplied/installed by contractor - Philips cables installed by contractor
C Conduits and cables supplied and installed by contractor
D Conduit existing - cables supplied and installed by Philips
E Conduit existing - cables supplied by Philips and installed by contractor
F Conduit existing - cables supplied and installed by contractor
G Optional equipment, verify with local Philips Service

* P Power (AC), D Power (DC), G Ground, S Signal, H High Tension, C Cooling Hose, A Air Supply Hose

	Conduit Run No.	From	To	Conduit Quantity	Cable Type (*)	Minimum Conduit Size	Maximum Conduit Length	Special Requirements
C	1	ERB	GE	1	P	3/4"	6'	
C	2	ERB	Room Outlets	1	P	3/4"	-	See Sheet "ED2" for details.
C	3	MA	WL	1	P	3/4"	55'	
C	4	ATY	DS	1	S	3/4"	55'	
A	5	ATY	MA	1	S	2 1/2"	41'	
A	6	ATY	TV	1	S	3/4"	65'	
A	7	SP	ME	2	C	1 1/2"	44'	Tube Cooling Hoses.
A	8	SP	ME	1	P/G	1 1/2"	52'	
A	9	SP	ME	1	S	1"	52'	
A	10	SP	ME	1	H	2 1/2"	50'	High Tension Cables.
A	11	SP	MP	1	P/G	2"	47'	
A	12	SP	MP	1	S	2"	47'	
A	13	SP	MA	1	S	2"	50'	
A	14	MSA	MA	1	S	2 1/2"	39'	
A	15	MSA	MP	1	P/G	2"	39'	
A	16	MSA	MP	1	S	2 1/2"	39'	
A	17	TV	MA	1	P	1 1/2"	52'	
A	18	TV	MA	1	S	2 1/2"	52'	
A	19	TV	MP	1	S	2"	52'	
A	20	TV	MB	1	S	1 1/2"	52'	For FlexVision XL.
A	21	TV	WM	1	S	3/4"	65'	For Intercom.
A	22	CY	MP	1	S	2"	50'	
A	23	CY	MA	1	P/G	1 1/2"	55'	
A	24	CY	MA	1	S	2 1/2"	55'	
A	25	MP	WM	1	S	1 1/2"	82'	
A	26	MA	WM	1	S	1"	82'	
A	27	PB1	2ME	1	H	2 1/2"	47'	High Tension Cables.
A	28	PB1	2ME	1	S	1"	49'	
A	29	PB1	2ME	1	P/G	1"	49'	
A	30	PB1	2ME	2	C	1 1/2"	54'	Tube Cooling Hoses.

Conduit Required

General Notes

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2. All conduit runs must have a pull string.

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G Optional equipment, verify with local Philips Service

* P Power (AC), D Power (DC), G Ground, S Signal, H High Tension, C Cooling Hose, A Air Supply Hose

	Conduit Run No.	From	To	Conduit Quantity	Cable Type (*)	Minimum Conduit Size	Maximum Conduit Length	Special Requirements
A	31	PB1	MP	2	C	2 1/2"	47'	Flat Detector Cooling Hoses.
A	32	PB1	MP	1	S	2 1/2"	45'	
A	33	PB1	MP	1	P/G	1 1/2"	45'	
A	34	PB1	MA	1	S	2"	45'	
C	35	TV	WR3	2	S	1 1/2"	-	For optional equipment. (IE. Physio Monitor/ Slave Monitor)
C	36	MSA	WR3	2	S	1 1/2"	-	For future options (Patient Monitoring). Verify with local Philips Service if auxiliary box should be used.
C	37	MSA	PHY	1	S	2 1/2"	-	For future options (Patient Monitoring). Verify with local Philips Service if auxiliary box should be used.
G	38	PHY	Physio Monitor	1	S	2"	33'	Optional for remote location.
G	39	Third Party	Third Party	-	-	-	-	For Injector, Auxiliary Box, Patient Monitoring, Video Networking, etc.
G	40	Third Party	ERB	-	G	-	-	For Injector, Auxiliary Box, Patient Monitoring, Video Networking, etc.
A	41	VB1	MB	1	S	1"	82'	
A	42	VB2	MB	1	S	1"	82'	
A	43	VB3	MB	1	S	1"	82'	
A	44	VB6	MB	1	S	1"	82'	
A	45	VB8	MB	1	S	1"	82'	
A	46	VB3	CY	1	S	1/2"	91'	
A	47	VB6	CY	1	S	3/8"	91'	
A	48	VB8	CY	1	S	1/2"	91'	
A	49	TV2	MB	1	S	1 1/2"	82'	Live/reference monitors.
A	50	TV2	MB	1	P	1 1/2"	82'	Live/reference monitors.
A	51	TV3	MB	1	S	1 1/2"	82'	Live/reference monitors.
A	52	TV3	MB	1	P	1 1/2"	82'	Live/reference monitors.
G	53	DH	PEA	1	S	1/2"	98'	Verify with customer if they would like to install for future upgrade.
G	54	PEA	CY	1	S	1/2"	98'	Verify with customer if they would like to install for future upgrade.
A	55	TV4	MB	1	S	1 1/2"	82'	Live/reference monitors.
A	56	TV4	MB	1	P	1 1/2"	82'	Live/reference monitors.
A	57	TV5	MB	1	S	1 1/2"	82'	Live/reference monitors.
A	58	TV5	MB	1	P	1 1/2"	82'	Live/reference monitors.
C	59	Power Panel	CB2	1	P	Per N.E.C.	Per N.E.C.	
C	60	Power Panel	ERB	1	G	Per N.E.C.	Per N.E.C.	

PHILIPS

Project
Allura Biplane FD20/20
The Medical Center of Aurora
Aurora, CO
-IC-6016A

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E3

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Conduit Required

General Notes

1. All conduit runs must take most direct route point to point.
2. All conduit runs must have a pull string.

A Conduit supplied/installed by contractor - Philips cables installed by Philips
B Conduit supplied/installed by contractor - Philips cables installed by contractor
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F Conduit existing - cables supplied and installed by contractor
G Optional equipment, verify with local Philips Service

* P Power (AC), D Power (DC), G Ground, S Signal, H High Tension, C Cooling Hose, A Air Supply Hose

	Conduit Run No.	Conduit From	Conduit To	Conduit Quantity	Cable Type (*)	Minimum Conduit Size	Maximum Conduit Length	Special Requirements
C	61	CB2	UPS	1	P	Per N.E.C.	Per N.E.C.	
C	62	UPS	ST	1	S	Per N.E.C.	Per N.E.C.	
C	63	UPS	CB	1	P	Per N.E.C.	Per N.E.C.	
C	64	CB	MA	1	P	Per N.E.C.	Per N.E.C.	
C	65	UPS	MA	1	S	Per N.E.C.	Per N.E.C.	
C	66	UPS	ERB	1	G	Per N.E.C.	Per N.E.C.	
C	67	RASP	UPS	1	S	Per N.E.C.	Per N.E.C.	For Remote Status Alarm Panel.

Conduit Required

General Notes

1. All conduit runs must take most direct route point to point.
2. All conduit runs must have a pull string.

A Conduit supplied/installed by contractor - Philips cables installed by Philips
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G Optional equipment, verify with local Philips Service

* P Power (AC), D Power (DC), G Ground, S Signal, H High Tension, C Cooling Hose, A Air Supply Hose

	Conduit Run No.	Conduit From	Conduit To	Conduit Quantity	Cable Type (*)	Minimum Conduit Size	Maximum Conduit Length	Special Requirements

PHILIPS

Project
Allura Biplane FD20/20
The Medical Center of Aurora
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-IC-6016A

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RSN: *1156136*
Permit #: *2016 1191012*

Power Quality Requirements (Mains 40E Cabinet)

Power Output	100kW
Supply Configuration	3 phase, identical 3 wire power and isolated unity ground with bonding conductor, delta (preferred) or wye
Nominal Line Voltage	480 VAC, 60 Hz
Line Voltage Variation	Voltage Variations are never to exceed ±10% when measured using 10 minute mean RMS values with a measurement window of 1 week. At least 95% of all measured 10 minute mean RMS values shall be within ±5% of the configured nominal voltage.
Line Voltage Balance	2% maximum of nominal voltage between phases
Frequency Variation	± 1.0 Hz
Voltage Surges	To 110% of steady-state voltage 100 msecs. Maximum duration, 6 per hour max.
Voltage Sags	To 90% of steady-state voltage 100 msecs. Maximum duration, 6 per hour max.
Line Impulses	1000 VPK above phase-neutral RMS absolute maximum. No more than 1 impulse per hour to exceed 500 VPK.
Neutral-Ground Voltage	2.0 volts maximum RMS value
Neutral-Ground Impulses	No more than 1 per hour that exceeds 25 volts and 1 Mjoule
High Frequency Noise	3.0 volts steady-state maximum. Over 3.0 volts permitted for 100 msec. maximum, 1 per hour max.
Grounded Conductor Impedance	0.1 Ohms @ 60 hz. maximum

Branch Circuit and Wire Gauge Requirements (Mains 40E Cabinet)

Branch Power	225 kVA
Max. Standby Current	8 A @ 3mA, 100 kVP continuous
Circuit Breaker (CB)	3 phase, Type D 125 A with long-time delay
****Conductor/Ground Size Chart: Engineer of record responsible for calculating conductor/ground sizes. Recommended conductor/ground sizes for 1% impedance of supply conductors to circuit breaker (CB). Based on 20°C copper conductors:**	
Nominal Line Voltage (in VAC) (60 Hz)	**480**
1/0 AWG	76.92ft
2/0 AWG	96.74ft
3/0 AWG	121.95ft
4/0 AWG	155.34ft
250 KCM	181.82ft
300 KCM	217.98ft
400 KCM	294.12ft
Max. Instantaneous Power (1000mA @ 100 kVP)	249 kVA
Max. Inst. Current @ CB (RMS value over half-cycle)	300 A
Max. Phase-phase impedance @ CRC	0.465 Ω
Max. Load Voltage Drop @ CB (RMS value over half-cycle)	139.5 V
Output Voltage Mains 40E Cabinet	480 VAC ± 10%
Max. Inst. Current @ Mains 40E Cabinet output (RM value over half-cycle)	300 A
Max Phase-phase impedance @ Mains 40E Cabinet CRC input terminal	0.545 Ω
Max. Load Voltage Drop @ Mains 40E Cabinet output	163.5 V

CB

(14.2)

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Project Allura Biplane FD20/20

The Medical Center of Aurora
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ED1

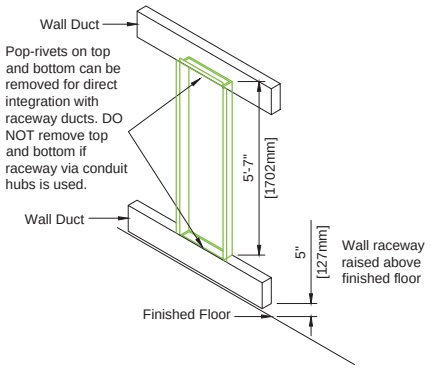
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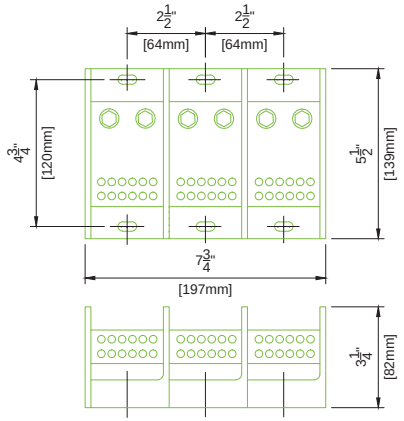
Detail - Back Box Mounting

(Not to scale)



ME 2ME MP MA MB

(16.0)

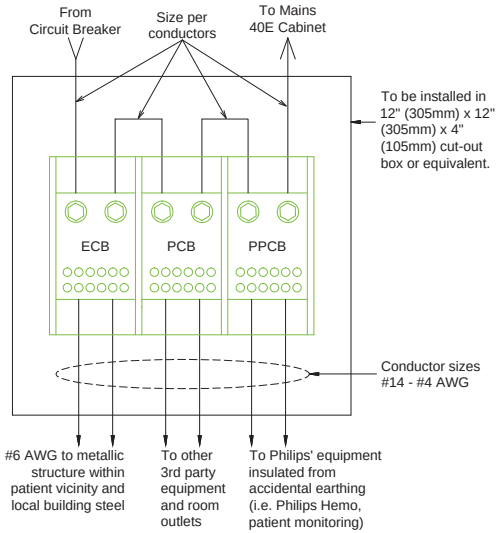


1. Furnished and installed by Contractor
2. Purchase from local Ferraz Shawmut distributor, http://www.ferrazshawmutsales.com/index.htm Catalog #69143.
3. 62000 - 69000 Series Blocks http://www.ferrazshawmutsales.com/pdfs/PDB-LARGE.pdf

ERB

Detail - Equi-Potential Reference Bar Application

(Not to scale)



(14.0)

Invasive Procedures

This equipment may be used for invasive procedures; therefore, the area to be installed is classified as critical care area per NFPA-99 and NFPA-70 (NEC). These documents specify maximum touch voltages and ground impedance in these areas.

Test performed by GSSNA service require that these specifications are met by the GSSNA equipment. It is the facility's responsibility to ensure that these specifications are met by the wall outlet, facility structure, and other equipment not installed by GSSNA.

The GSSNA specified "Equi-Potential Reference Bar (ERB)" serves as a ground reference for GSSNA equipment. It may also serve as the "Reference Grounding Point" of the room as defined in NFPA 99-3.3.140 for non-Philips Healthcare equipment.

Equi-Potential Reference Bar (ERB)
A) Equip-Potential Conductor Bar (ECB)
B) Protective Conductor Bar (PCB)
C) Philips Protective Conductor Bar (PPCB)

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PHILIPS

Project Allura Biplane FD20/20

The Medical Center of Aurora
Aurora, CO
-IC-6016A

Philips Contacts
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Contact Number: (303) 709-9001
Email: steve.horst@philips.com
Drawn By: Melanie Thi

Project Details
Drawing Number
N-WES160230 G
Date Drawn: 8/30/2016
Quote: 1-1HNAHX1 Rev. 1
Order: 6600276231.010000, 6600276231.020000

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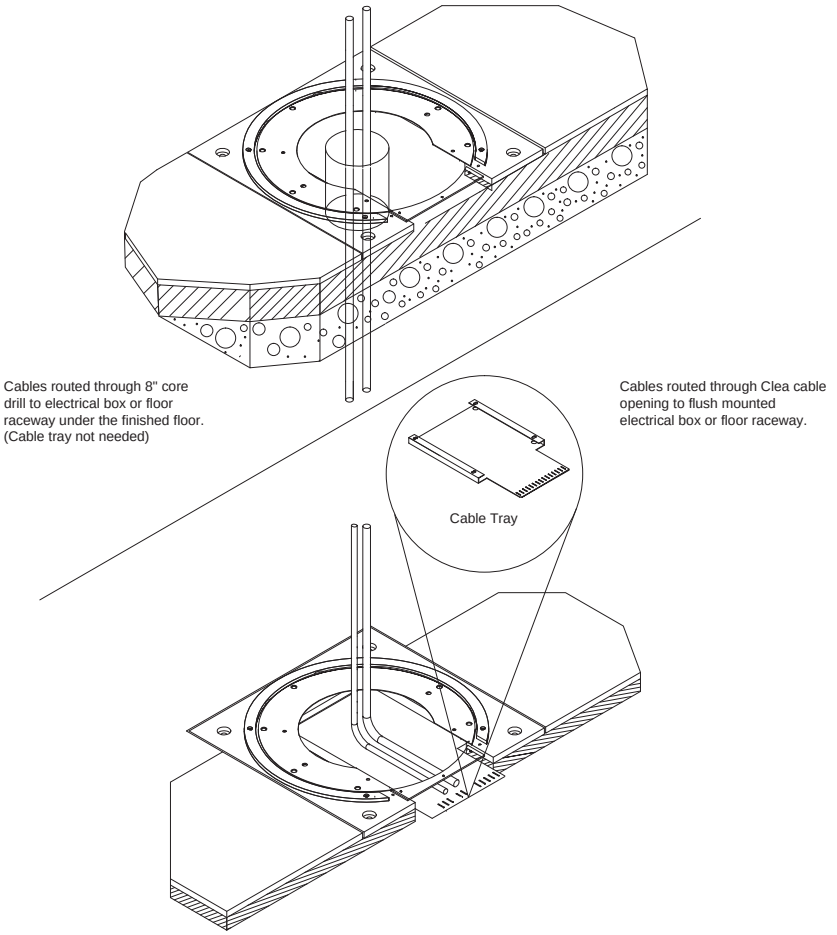
7.11.14

RSN: *1156136*
Permit #: *2016 1191012*

Detail - Clea Floor Plate Cable Entrance

Floor plate delivered from BEST

(Not to scale)



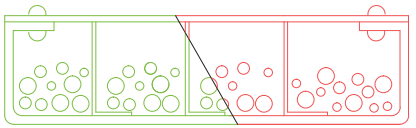
(12.0)

Detail - Cable Trough Divisions

(Not to scale)

Troughs or ducts must be separated by metal barriers into four sections:

1. Input Power wires and associated PE.
2. Output Power wires and associated PE.
3. High-Voltage wires to X-Ray stands.
4. Signal, data and video cables.



5. It is important that all cables are placed in the appropriate trough and at not given point do any cables from one division cross cables from another. Trough separation must be continuous from the beginning.
6. Trough or ducts: steel with steel dividers grounded to building ground.
7. Contractor to provide cable restraints in all troughs.

WR1 WR2 WR3

(12.0)

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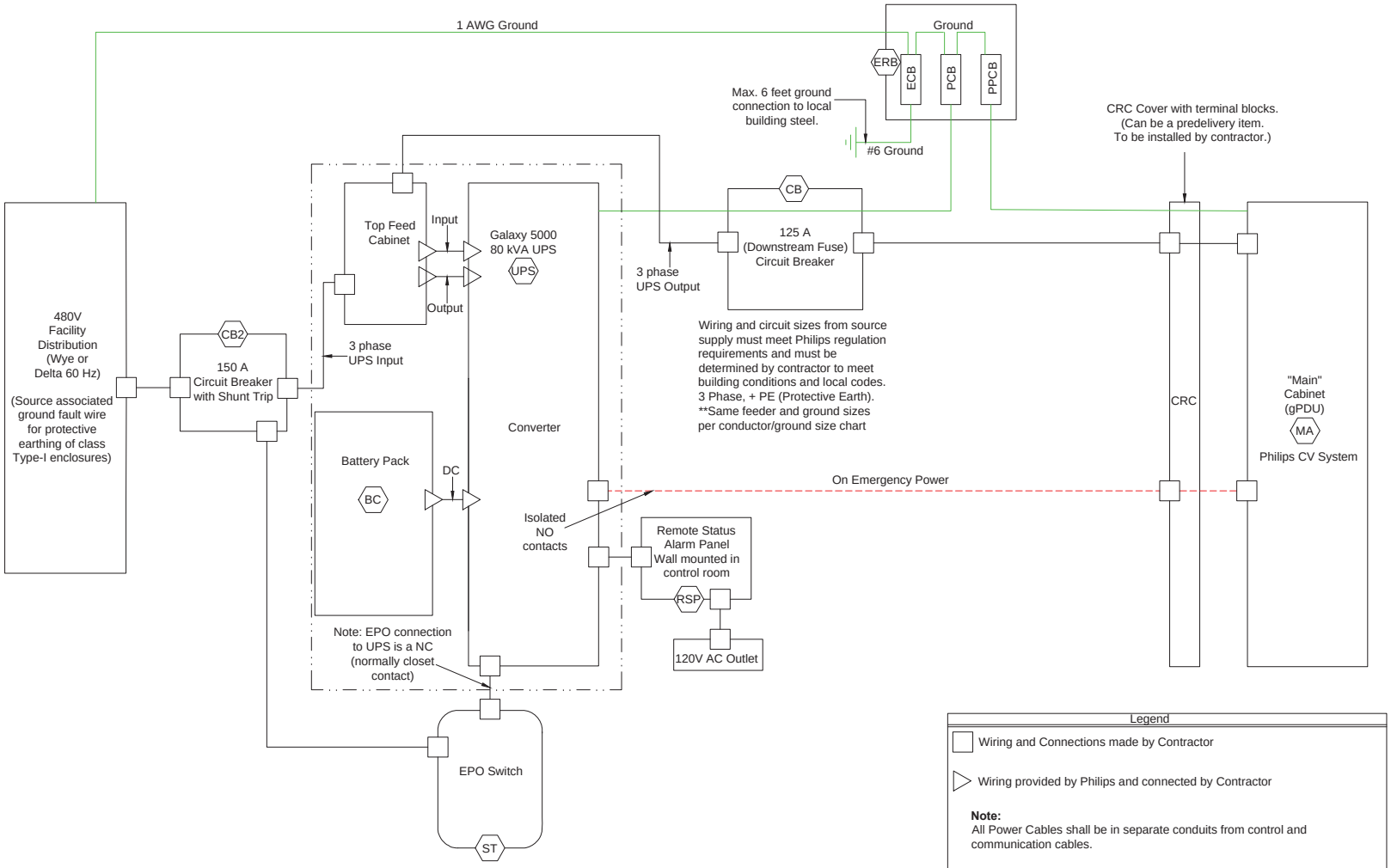


Diagram - Standard Top Feed Connection

(16.0)

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Drawn By: Melanie Thi

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Date Drawn: 8/30/2016
Quote: 1-1HNAHX1 Rev. 1
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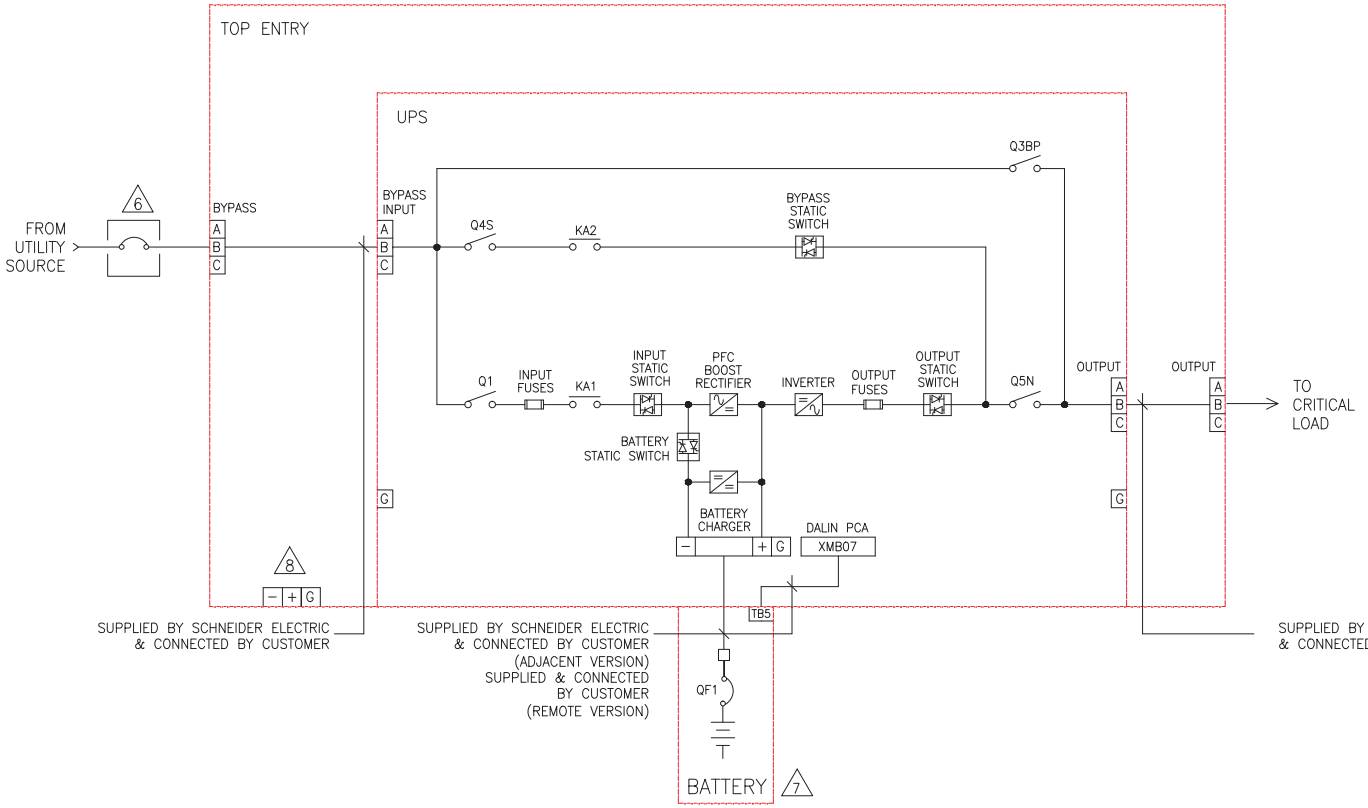
80 kVA UPS Cabinet - 480V

Input						Bypass	Output		Battery	
Input Voltage	Nominal Input Current (A) *1	Maximum Input Current (A) *2	Input Current Limitation	Input Phase Rotation (A) *3	Recommended Overcurrent Protection	Nominal Bypass Current	Nominal Output Current	Recommended Overcurrent Protection	Nominal Discharge (A) *4	Max. Discharge (A) *5
80 kVA	98	111	111	A, B, C clockwise	150	94	94	125	180	219

* NOTES:
1) Input current based on rated load and batteries fully charged.
2) Input current based on full battery recharge, nominal voltage, and rated load.
3) Nominal Voltage - 10% voltage with partial recharge.
4) Nominal battery discharge current based on rated load and nominal battery voltage.
5) Maximum battery discharge based on rated load at the end of the discharge.

Recommended UPS Cable Sizes		
	80% Rated Breaker	100% Rated Breaker
Input	2 x 1 AWG	1/0 AWG
Bypass	2 x 1 AWG	1/0 AWG
Output	2 x 1 AWG	1/0 AWG

Recommended Battery Cable Sizes	
Battery Circuit Breaker rating (A)	Cable Size
250	250 kcmil



Notes for Recommended Cable Sizes:

All wiring must comply with all applicable national and/or electrical codes. Cable sizes in this manual are based on table 310-16 of the National Electrical Code (NEC) with the following assertions: 90 degree conductors (THHN) for 75 degree Celcius termination and the use of copper conductors. Recommended 75 degrees Celcius cable sizes below are for 480V input/output UPS, depending upon recommended over current protection stated. Ground wires are sized in accordance with NEC Article 250-122 and Table 250-122. Power and control communication cables must be routed in separate conduits.

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Permit #: *2016 1191012*

Philips Healthcare Remote Services Network (RSN)

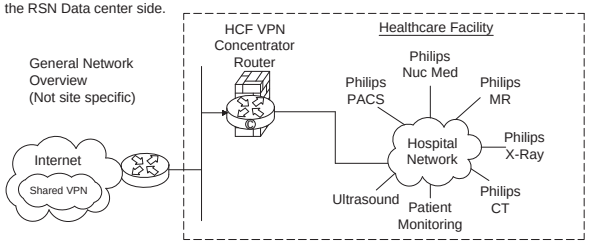
Secure broadband connection required for Philips remote technical support, diagnostics, and applications assistance

Broadband Site-to-Site Connectivity (Preferred)

This connectivity method is designed for customers who prefer a connection from the RSN Data Center to the Health Care Facility (HCF) utilizing their existing VPN equipment.

Connectivity Details:

- A Site-to-Site connection from the RSN data center's Cisco router will be established to the HCF's VPN concentrator.
- The VPN Tunnel will be an IPSEC, 3DES encrypted Tunnel using IKE as standard, but alternative standards are also available, such as AES, MD5, SHA, Security Association lifetime and Encryption Mode.
- Every system that we will be servicing remotely will have a static NAT IP that we configure on the RSN Data center side.



Action Required by Hospital:

- Review and approve connection details.
- Complete appropriate Site Checklist.
- Configure and allow Site-to-Site access prior to setting up connectivity depending on the access criteria that the HCF decides to implement (ex: Source IP filtering, destination IP filtering, NAT assignment, etc.).
- Route traffic from within the hospital network with destination addresses 192.68.48.0/22 to the designed IP provided by Philips.

Broadband Router Installed at Health Care Facility

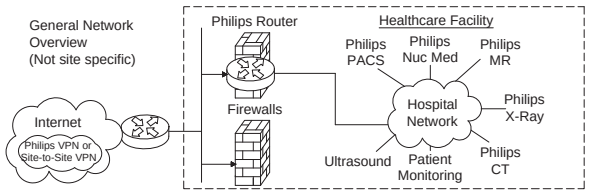
This connectivity method is designed for customers who have a dedicated high speed connection for Philips equipment.

Connectivity Details:

- An RSN Cisco 1711 or 1712 router will be preconfigured and installed at the HCF by Philips in conjunction with the HCF IT representative.
- The VPN Tunnel will be an IPSEC, 3DES encrypted Tunnel using IKE and will be established from the RSN-DC and terminated at the RSN Router on-site.
- One to One NAT is used to limit access to Philips equipment only.
- Router Config and IP auditing is enabled for Customer IT to view via website 24/7.
- Dedicated DSL connections are also supported.

Option 1: Parallel to HCF Firewall Connectivity Method

This connectivity method is designed for customers who prefer a Philips RSN Router installed on site utilizing all the security features provided and managed by Philips.

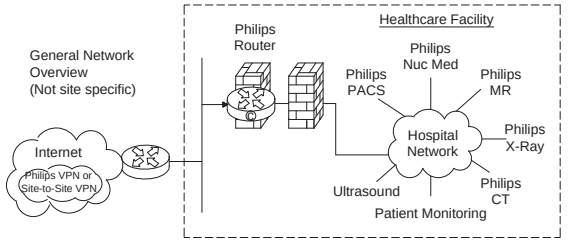


Action Required by Hospital:

- Assign a fixed public IP Address from the ISP to be configured on the Philips router. This is the DOTTED link on the picture connected to the firewall.
- Assign a Back end IP for the Philips router on the Hospital Network.
- Complete appropriate Site Checklist.
- Route traffic from within the hospital network with destination addresses 192.68.48.0/22 to internal Philips router Ethernet interface. This is the DASHED line connected to the firewall.

Option 2: Back End Connected to the HCF Firewall Connectivity Method

This connectivity method is designed for customers who prefer a Philips RSN Router installed on site by setting up an IP-Based policy allowing access thru existing HCF Firewall to Philips equipment.

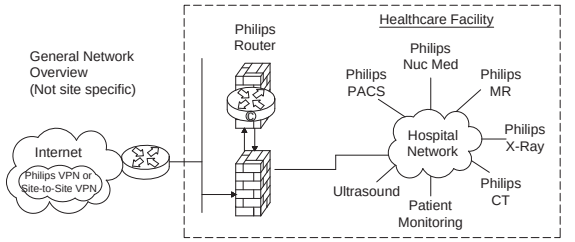


Action Required by Hospital:

- Assign a fixed public IP Address from the ISP to be configured on the Philips router. This is the DOTTED link on the picture connected to the firewall.
- Assign a Back end IP for the Philips router on the Hospital Network.
- Complete appropriate Site Checklist.
- Route traffic from within the hospital network with destination addresses 192.68.48.0/22 to internal Philips router Ethernet interface. This is the DASHED line connected to the firewall.
- Configure and allow on the firewall on the DASHED line interface access between the IP address allocated by the hospital to the Philips internal Ethernet router interface and the target modality IP address.

Option 3: Router Installed Inside the HCF's DZM

This connectivity method is designed for customers who prefer the RSN Router installed inside and existing, or new DMZ, allowing access to Philips equipment.



Action Required by Hospital:

- Assign a fixed public IP Address from the ISP to be configured on the Philips router. This is the DOTTED link on the picture connected to the firewall.
- Assign a Back end IP for the Philips router on the Hospital Network.
- Complete appropriate Site Checklist.
- Route traffic from within the hospital network with destination addresses 192.68.48.0/22 to internal Philips router Ethernet interface. This is the DASHED line connected to the firewall.
- Configure and allow on the firewall on the DASHED line interface IPSec protocol communication by opening protocol 500, 50, 51, 47 and port 23 + TACACS. Traffic should be between external IP Address located on the Philips router and the RSN Data center IP address 192.68.48/24 and IP address AOSN TACAS.
- Configure and allow on the firewall on the DASHED line interface access between the IP address allocated by the hospital to the Philips internal Ethernet router interface and the target modality IP address.

(12.0)

PHILIPS

Project
Allura Biplane FD20/20

The Medical Center of Aurora
Aurora, CO
-IC-6016A

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System Network Information

IMPORTANT NOTE: *It is the customer's responsibility to coordinate with the local Philips Engineer to provide ALL required network information and install ALL required network cabling & drops according to Philips specifications PRIOR to the scheduled installation start date. Failure to do so may delay system installation and jeopardize the customer hand over date.*

Allura	IP Sec [ ]yes [ ]no
Physical Location:	
Hostname:	
MAC Address:	
IP Address	
Netmask:	
Gateway:	
AE Title:	
Port Number (5101):	

XtraVision	IP Sec [ ]yes [ ]no
Physical Location:	
Hostname:	
MAC Address:	
IP Address	
Netmask:	
Gateway:	
AE Title XtraVision:	
Port Number (3110):	
AE Title for X-Ray Mod:	
IP for X-Ray Modality:	

EP Navigator	IP Sec [ ]yes [ ]no
Physical Location:	
Hostname:	
MAC Address:	
IP Address	
Netmask:	
Gateway:	
AE Title:	
Port Number:	

View Forum	IP Sec [ ]yes [ ]no
Physical Location:	
Hostname:	
MAC Address:	
IP Address	
Netmask:	
Gateway:	
AE Title:	
Port Number:	

XperIM	IP Sec [ ]yes [ ]no		
	Location 1	Location 2	Location3
Physical Location:			
Hostname:			
MAC Address:			
IP Address			
Netmask:			
Gateway:			
AE Title:			
Port Number (3010):			

Remote Software Installation (RPS)	
Enable Distribution:	[ ] yes [ ] no
Enable Installation:	[ ] yes [ ] no

Dicom Printer				
	Location 1	Location 2	Location3	Location 4
Physical Location:				
Hostname:				
IP Address				
AE Title:				
Port Number :				

PACS	Physical Location:				
	Store/ Import 1	Store/ Import 2	Store/ Export	Query/ Retrieve	Storage/ Commit
Hostname:					
IP Address					
AE Title:					
Port Number :					

PACS	Physical Location:				
	Store/ Import 1	Store/ Import 2	Store/ Export	Query/ Retrieve	Storage/ Commit
Hostname:					
IP Address					
AE Title:					
Port Number :					

Audit Trail	
Physical Location:	
Hostname:	
IP Address	
AE Title:	
Port Number :	

Time Synchronization	
Physical Location:	
Server Name:	

RIS	**Physical Location:**		
	Basic Local RIS	WLM	MPPS
Hostname:			
IP Address:			
AE Title:			
Max PDU Size:	16384 or		
Port Number:		[ ] yes [ ] no	[ ] yes [ ] no
Secure Node:		[ ] yes [ ] no	[ ] yes [ ] no
Encryption:			
Certificate Name:			
PPSM IHE Compatible:			[ ] yes [ ] no

Time Synchronization	
Allura Xper:	20/21(ftp), 80(http), 443(https), 5900(vnc), 9903(fsf.net)
Allura CV20:	20/21(ftp), 80(http), 4440(fsf)
XtraVision:	20/21(ftp), 80(http), 443(https), 5660(ist/ice), 5900(vnc), 9905(lots)
EP Navigator (R3):	20/21(ftp), 443(https), 5660(ist/ice), 9055(lots)
EP Cockpit (R1.2):	20/21(ftp), 80(http), 443(https), 5900(vnc), 9903(fsf.net)
CX50:	
Xper IM:	
View Forum	

Hospital Network			
	M2M Server (PRS)	Proxy	ePO Server (PRS)
Scheme (https):			
IP Address (192.68.49.50):			
Portnumber (443):			
Use Proxy Server:	[ ] yes [ ] no		
IP Address			
Port Number:			
User Name:			
Password:			

(13.0)

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RSN: *1156136*
Permit #: *2016 1191012*

Instructions

This form is to be used by Project Manager, Contractor and Service Engineer.

Information is used to develop and determine site ready date.

Items listed are go/no go items for delivery unless noted as delay only items.

Items identified with *** as delayed items must be completed after hours or on weekend. These items cannot be accomplished while installation is in progress. Also, these items must be completed within two days of installation start or they may stop installation.

Site Readiness Checklist

Modality: _____

Order: _____

Site Name: _____

Location: _____

Contact Name: _____

Contact Phone Number _____

- ☐ Customer site preparation verified in general against the Philips final planning drawings.
- ☐ Walls finished including painting.
- ☐ Doors installed.
- ☐ Floor leveled according to Philips drawings and specifications.
- ☐ Floors are tiled/covered finished. Flooring is covered with protective covering (scratch protection).
- ☐ Ceiling lights installed.
- ☐ Cable conduit and ductwork installed and clean. Position checked. Duct covers in place but not finally closed. Cable opening are clear, without sharp edges. Pull strings in conduit. Installation per Philips specifications.
- ☐ HVAC environmental equipment installed and working according to Philips specifications.
- ☐ Ceiling installation completed.
- ☐ Electrical preparation according to Philips specifications.
- ☐ All network cabling, drops installed according to Philips specifications (including hardcopy cameras).
- ☐ All pre-cabling identified on Philips drawings has been installed.
- ☐ Pre-move survey completed - Delivery route identified.
- ☐ Lead glass installed ***.
- ☐ X-Ray warning lights installed ***.
- ☐ Dedicated phone line for modem use***.
- ☐ Room has been cleaned ***.
- ☐ Cabinets and casework installed (with insulation and building steel) according Philips specifications***.
- ☐ RSN survey completed and submitted
- ☐ Philips RSN Champion contacted.

Approved for Delivery

Project Manager _____ Date

Service Engineer _____ Date

Items Specific for the Cardio/Vascular Modality

- ☐ Unistrut installed and level according to Philips specifications.
- ☐ Floor plates installed and level according to Philips specifications.
- ☐ All cover plates have holes punched and nipples required and bushings installed.
- ☐ Emergency power requirements installed according to Philips specifications.
- ☐ Building steel ground installed to ECB section of ERB.
- ☐ Non-Philips provided room electrical equipment grounds installed to PCB middle section of ERB.
- ☐ Conduit lengths measured according to Philips specifications. Note: Specifications is from source box to destination box (not just conduit run length).
- ☐ Routing of ductwork and conduits must be installed according to Philips specifications.

PHILIPS

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Permit #: *2016 1191012*

THE MEDICAL CENTER OF AURORA

HYBRID OR

AURORA, CO

DATE: 12 AUG 16

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ENGINEER: ASA KLEIN 469.766.0891
ASA.KLEIN@STRYKER.COM

TABLE OF CONTENTS

EQUIPMENT LAYOUTS ..... (R) SHEET SECTION

PRE-INSTALL NOTES ..... (P) SHEET SECTION

ENGINEERING APPROVAL

AUTHORIZED SIGNATURE:

DRAWING#: CO-20166-2039_4

APPROVED REVISION: 4

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stryker

REP: MARK BRAYTON
PM: GUNNAR SCHMID

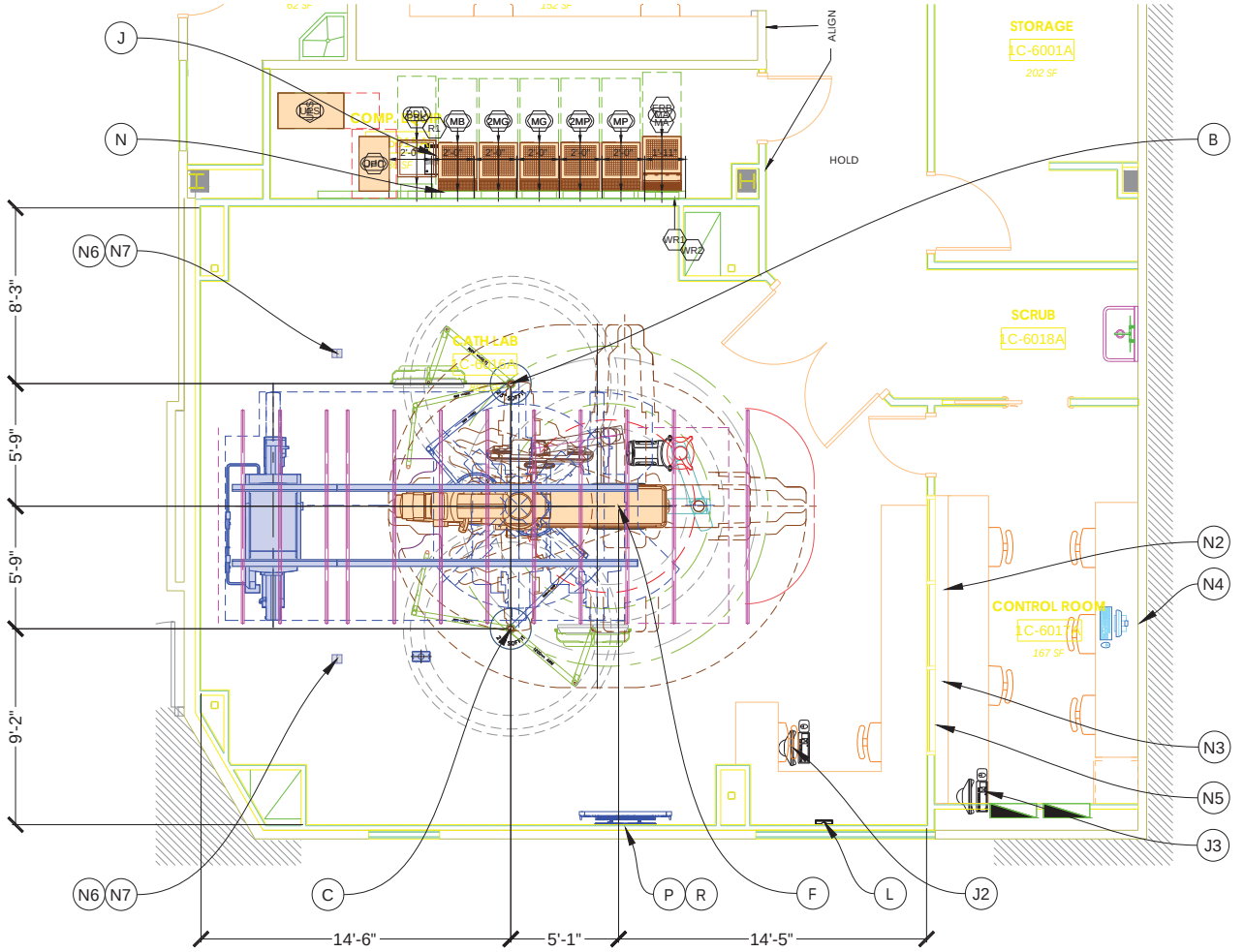
SHEET:
TITLE

RSN: *1156136*
Permit #: *2016 1191012*

NOTES: (UNLESS OTHERWISE SPECIFIED)

EQUIPMENT SCHEDULE		
KEY ITEM	NAME	QTY
B	CHROMOPHARE F628 SURGICAL LIGHT (1500) / LEAD SHIELD (1400) / DUAL FLAT PANEL (1200)	1
C	CHROMOPHARE F628 SURGICAL LIGHT (1500) / LEAD SHIELD (1400) / DUAL FLAT PANEL (1200)	1
F	TANDEM: MCS MONITOR BOOM (1000/1000) / TELETOM TP-622 EQUIPMENT BOOM (1300)	1
J	<FUTURE> SWITCHPOINT INFINITY 3	1
J2	<FUTURE> TOUCH PANEL #1	1
J3	<FUTURE> TOUCH PANEL #2	1
K	CHROMOPHARE SK ENCLOSURE (LOCATION TBD)	1
L	CHROMOPHARE WALL CONTROL PANEL	1
N	PHILIPS LIVE & REFERENCE	1
N2	MACLAB	1
N3	IVUS & PACS PC	1
N4	MEDITECH PC	1
N5	CONTROL ROOM	1
N6	DVI CEILING PLATE	2
N7	TRIPLE CEILING PLATE (VGA/S-VIDEO/BNC)	2
P	<FUTURE> 55" LCD MONITOR	1
R	<FUTURE> HD PTZ CAMERA	1

CONDUIT SCHEDULE		
CONDUIT RUN ITEM - ITEM	CONDUIT QTY	CONDUIT SIZE
B - J	1	1¼"
B - N2	1	1¼"
B - K	2	1"
B - C	1	1"
C - J	1	1¼"
C - N2	1	1¼"
C - N5	1	2"
C - K	2	1"
F - J	3	2"
L - K	1	1"
K - *	1	1"
N - J	1	CABLE TRAY
N2 - J	1	2"
N3 - J	1	2"
N4 - J	1	1¼"
N6 - J	1	1½"
N7 - J	1	1"
P - J	1	1¼"
R - J	1	1"
* - NEAREST ELECTRICAL PANEL		



SCALE: 3/8" = 1'

AUTOCAD DRAWING TEMPLATE | TEM100XX | REV. A

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EQUIPMENT LAYOUT

HYBRID OR

THE MEDICAL CENTER OF AURORA
HYBRID OR
AURORA, CO

REP: MARK BRAYTON
PM: GUNNAR SCHMID

SHEET:
R-HYB

RSN: *1156136*
Permit #: *2016 1191012*

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. **ALL CONDUIT RUNS INCLUDE INSULATED BUSHINGS AND PULL STRINGS.**
2. **CONDUIT RUNS CANNOT EXCEED 50' FROM END-TO-END. DO NOT EXCEED FOUR (4) 90 DEGREE BENDS.**
3. **CABLES BETWEEN ITEMS OVER 50 FEET IN LENGTH ARE PROVIDED BY THE CUSTOMER / CONTRACTOR. PLEASE REFER TO EQUIPMENT LIST FOR CABLE SPECIFICATIONS.**
4. **THE PRE-INSTALL MANUAL REQUIREMENTS SUPERSEDE ALL PRE-INSTALL NOTES IN THIS DRAWING PACKAGE.**
5. **EQUIPMENT LIST:**

PRE-INSTALL NOTES SCHEDULE

KEY ITEM	NAME
B C	**CHROMOPHARE SURGICAL LIGHT / LEAD SHIELD / DUAL FLAT PANEL** **CHROMOPHARE SURGICAL LIGHT / LEAD SHIELD / DUAL FLAT PANEL** CONDUIT: - REFER TO ROOM LAYOUT FOR CONDUIT SIZE ACCESS PANEL: - ONE (1) 24" X 24" ACCESS PANEL ADJACENT TO SUSPENSION STRUCTURAL: - STRYKER PRE-INSTALL PLATE SHALL BE INSTALLED BY CUSTOMER/CONTRACTOR FLUSH WITH FINISHED CEILING PER CUSTOMER PROVIDED STRUCTURAL ENGINEER SPECS. - STANDARD MOUNTING PLATE, A 12" CIRCULAR HOLE CENTERED ON STRYKER PRE-INSTALL PLATE IN THE FINISHED CEILING IS REQUIRED FOR NEW INSTALLATION. A 18" CIRCULAR CEILING COVER CONCEALS HOLE AFTER SUSPENSION IS INSTALLED. - UNIVERSAL MOUNTING PLATE, A 18.25" CIRCULAR HOLE CENTERED ON STRYKER PRE-INSTALL PLATE IN THE FINISHED CEILING IS REQUIRED FOR NEW INSTALLATION. A 23" CIRCULAR CEILING COVER CONCEALS HOLE AFTER SUSPENSION IS INSTALLED.
F	**TANDEM MOUNT: MCS BOOM / EQUIPMENT BOOM** STRUCTURAL: STRYKER TANDEM COMMON PRE-INSTALL PLATE SHALL BE INSTALLED BY CUSTOMER/CONTRACTOR AT 3-INCH, ± .125-INCH ABOVE FINISHED CEILING PER CUSTOMER PROVIDED STRUCTURAL ENGINEER SPECS. - TO ENSURE ADEQUATE ROOM FOR INSTALLATION OF THE TELETOM THE OWNER AND/OR CONTRACTOR MUST ENSURE THAT STRUCTURAL/UTILITY COMPONENTS DO NOT INTERFERE WITH ANY PART OF THE TELETOM. THIS "NO-FLY" ZONE EXTENDS 12-INCHES FROM THE MOUNTING PLATE ON ALL SIDES, AND 16-INCHES UP FROM THE FINISHED CEILING. - REQUIRED: A 23-INCH X 27-INCH RECTANGLER HOLE CENTERED ON THE STRYKER PRE-INSTALL PLATE IN THE FINISHED CEILING IS REQUIRED FOR INSTALLATION. A 25-INCH X 32-INCH RECTANGLE CEILING COVER CONCEALS HOLE AFTER BOOM IS INSTALLED POWER: REFER TO SEPARATE TELETOM AND FLEXIS MANUFACTURING SERVICE MODULE DRAWINGS FOR ELECTRICAL CIRCUIT COUNT. - THE CONTRACTOR / ELECTRICIAN TO HARDWIRE STRYKER ELECTRICAL WHIP DURING STRYKER INSTALLATION. - ALL ELECTRICAL CIRCUITS FOR TELETOM BOOM SHALL BE CONNECTED TO TELETOM OUTLET BOX OR BOXES. - THE TELETOM OUTLET BOXE (8-INCH HEIGHT X 8-INCH WIDTH X 4-INCH DEPTH) ARRIVES ATTACHED TO TELETOM BOOM AND MOUNTS TO THE STRYKER PROVIDED MOUNTING PLATE VIA A MOUNTING BRACKET. IT IS STRYKERS RESPONSIBILITY TO MOUNT THE TELETOM OUTLET BOX. - ALL ELECTRICAL CIRCUITS FOR FLEXIS BOOM SHALL BE LOCATED AT CONTRACTOR SUPPLIED JUNCTION BOX WITHIN 18" OF CENTER OF PRE-INSTALL PLATE. REQUIRED ACCESS PANEL: ONE (1) 24-INCH X 24-INCH ACCESS PANEL ADJACENT TO BOOM, ON THE OUTLET BOX SIDE OF THE MOUNTING PLATE. CONDUIT: REFER TO ROOM LAYOUT FOR CONDUIT SIZE. TERMINATE ALL CONDUITS WITHIN 18-INCHES OF THE CENTER OF THE CEILING MOUNT. PLUMBING: INSTALL VALVE BRIDGES TO TOP OF PRE-INSTALL PLATE. ALL GAS LINES MUST BE TERMINATED WITH STRYKER SUPPLIED GAS RISERS BY CUSTOMER/MEDGAS INSTALLER. - STRYKER SUPPLIED BRAKE REGULATOR, FOR FLEXIS BOOM, INSTALLED BY CUSTOMER/MEDGAS INSTALLER IN AN ORIENTATION THAT THE GAUGE CAN BE READ FROM THE ACCESS PANEL. - ALL FINAL DISS CONNECTIONS TO BE MADE BY CUSTOMER/MEDGAS INSTALLER AFTER STRYKER INSTALLATION.

PRE-INSTALL NOTES SCHEDULE

KEY ITEM	NAME
J	**SWITCHPOINT INFINITY 3** DIMENSIONS: - MEDIA ROUTER: 20.6"W X 24"H X 17"D - CONTROL SECTION: 12.5"W X 2.6"H X 17"D - TOTAL SPACE REQUIRED: 27.5"W X 31"H X 29"D DATA: ONE (1) ETHERNET CONNECTION POWER: RECOMMEND THREE (3) 20 AMP CIRCUITS AND THREE (3) QUAD OUTLETS FOR VIDEO ROUTER AND ANY ADDITIONAL STRYKER PROVIDED EQUIPMENT. - CIRCUITS REQUIRE CRITICAL POWER. BACKBOX: ONE (1) 18"W X 18"H X 4"D (OR LARGER) JUNCTION BOX FLUSH MOUNTED. - MOUNT BEHIND VIDEO ROUTER. SET BOTTOM OF BOX 9" ABOVE FINISHED FLOOR. SPACE REQUIREMENTS: MUST ALLOW FOR A MINIMUM 2" CABLE PASSAGE BETWEEN ALL COMPONENTS HOUSED INSIDE. SECTION HOUSING VIDEO ROUTER: - MUST HAVE AN INTERIOR DIMENSION OF AT LEAST 27.5"W X 31"H X 29"D. - MUST BE VENTED. - MUST ALLOW FOR DIRECT ACCESS TO BACKBOXES PER REQUIREMENTS LISTED BELOW. NOTE: TERMINATE ALL INTEGRATION CONDUITS TO THIS JUNCTION BOX.
J2 J3	**TOUCH PANEL #1** **TOUCH PANEL #2** CONDUIT: REFER TO ROOM LAYOUT FOR CONDUIT SIZE. BACK BOX: ONE (1) 4"W X 4"H JUNCTION BOX WITH SINGLE-GANG MUD RING - MOUNT J-BOX WITHIN 18" OF TOUCH PANEL LOCATION POWER: ONE (1) STANDARD OUTLET WITHIN 18" OF TOUCH PANEL LOCATION.
K	**CHROMOPHARE SK ENCLOSURE** ENCLOSURE DIMENSIONS/MOUNTING: - RECESSED MOUNT COLLAR IS REQUIRED FOR INSTALLATION - SINGLE ENCLOSURE 19.69" X 15.75" x 7.87" (1-2 LIGHTHEADS), WEIGHT = 64LBS - DOUBLE ENLCOSURE 19.69" x 31.5" X 7.87" (3-4 LIGHTHEADS), WEIGHT = 128 LBS - MUST BE MOUNTED DIRECTLY TO WALL AND EASILY ACCESSIBLE CONDUIT: - MAXIMUM LENGTH OF 45 FEET (15M) OF CONDUIT RUN TO BOTH THE MOUNTING PLATE AND THE TO WALL CONTROL BOX - TWO (2) 1" FROM SK ENCLOSURE TO EACH LIGHT MOUNTING LOCATION, - ONE (1) 1" BETWEEN LIGHT MOUNTING LOCATIONS, - ONE (1) 1" FOR MAINS 120VAC TO SK ENCLOSURE (UP TO TWO(2)) LIGHTS PER CIRCUIT). POWER: - MAINS AC POWER SHOULD BE 120 VAC, 50/60 HZ CONNECTED WITH 3 WIRE, 12 AWG MIN., 600 V TERMINATED TO FUSED TERMINAL BLOCK INSIDE THE SK ENCLOSURE - DC WIRING FROM SK ENCLOSURE TO MOUNTING PLATE SHOULD BE 12 AWG, 600 VOLT, 1 WIRE PAIR PER LIGHT HEAD AND 1 GROUND WIRE PER MOUNTING PLATE. WIRES TERMINATE AT NON-FUSED TERMINAL BLOCK INSIDE THE SK ENCLOSURE AND FALL A MINIMUM OF 18 INCHES BELOW THE CEILING AT THE MOUNTING PLATE - CONTRACTOR IS RESPONSIBLE FOR RUNNING POWER FROM AN AC MAINS SUPPLY TO THE SK BOX - CONTRACTOR IS RESPONSIBLE FOR RUNNING DC WIRING FROM THE SK ENCLOSURE TO THE SURGICAL LIGHT MOUNTING PLATE - CONTRACTOR IS RESPONSIBLE FOR MAKING BOTH AC AND DC CONNECTIONS IN THE SK ENCLOSURE

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PRE-INSTALL NOTES

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PM: GUNNAR SCHMID

SHEET: P-1

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Permit #: *2016 1191012*

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KEY ITEM	NAME
L	**CHROMOPHARE WALL CONTROL PANEL** CONDUIT: ONE (1) 1" CONDUIT WITH FINISH GROMMETS TO SK ENCLOSURE OR ON TUBE ELECTRONICS. BACK BOX: CONTRACTOR MUST SUPPLY ONE (1) STANDARD 4X4 JUNCTION BOX MOUNTED DIRECTLY BEHIND THE WALL CONTROL BOX POWER: NONE
N	**PHILIPS LIVE & REFERENCE** CABLE TRAY TO SPI3.
N2 N3 N4	**MACLAB** **IVUS & PACS PC** **MEDITECH PC** CONDUIT: REFER TO ROOM LAYOUT FOR CONDUIT SIZE. BACK BOX: ONE (1) 4"W X 4"H JUNCTION BOX WITH SINGLE-GANG MUD RING - MOUNT THE J-BOX UNDER DESK. POWER: NONE REQUIRED, BUT SHOULD BE LOCATED NEXT TO OUTLET.
N5	**CONTROL ROOM** CONDUIT: REFER TO ROOM LAYOUT FOR CONDUIT SIZE. BACK BOX: ONE (1) 4"W X 4"H JUNCTION BOX WITH SINGLE-GANG MUD RING - MOUNT THE J-BOX 24" FROM THE FINISHED CEILING. POWER: NONE REQUIRED, BUT SHOULD BE LOCATED NEXT TO OUTLET.
N6 N7	**DVI CEILING PLATE** **TRIPLE CEILING PLATE (VGA/S-VIDEO/BNC)** CONDUIT: REFER TO ROOM LAYOUT FOR CONDUIT SIZE. BACK BOX: ONE (1) 4"W X 4"H JUNCTION BOX WITH SINGLE-GANG MUD RING POWER: NONE REQUIRED, BUT SHOULD BE LOCATED NEXT TO OUTLET.
P	**55" LCD MONITOR** CONDUIT: REFER TO ROOM LAYOUT FOR CONDUIT SIZE. BACK BOX: ONE (1) 4"W X 4"H JUNCTION BOX WITH SINGLE-GANG MUD RING - MOUNTED DIRECTLY ABOVE THE TOP OF THE MOUNTING BRACKET. POWER: ONE (1) STANDARD DUPLEX OUTLET MOUNTED ADJACENT TO JUNCTION BOX. STRUCTURAL: CUSTOMER/CONTRACTOR TO MOUNT STRYKER PROVIDED BRACKET TO THE WALL IN THE DESIRED LOCATION WITH PROPER REINFORCEMENT TO SUPPORT THE MONITOR PRIOR TO STRYKER INSTALLATION. DIMENSIONS: 51.9" X 30.5" X 4.7" NOTE: STRYKER PROJECT MANAGER WILL PROVIDE MOUNTING SPECIFICATIONS.
R	**HD PAN/TILT/ZOOM CAMERA** CONDUIT: REFER TO ROOM LAYOUT FOR CONDUIT SIZE. BACK BOX: ONE (1) 4"W X 4"H JUNCTION BOX WITH SINGLE-GANG MUD RING - FLUSH MOUNT J-BOX IN WALL 12" BELOW FINISHED CEILING POWER: NONE

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