City of Aurora Public Works Department

BUILDING PERMIT APPLICATION

Building Division • 15151 E. Alameda Parkway, Ste 2400 • Aurora, CO 80012 • 303-739-7420 • Fax: 303-739-7412
Email: **permitcounter@auroragov.org**

Project Address	1501 S. POTOMAC, AURORA, CO		**Unit #**
Project Name:	AT+T SITE: HUMANA (COLO1176)		
Contractor Company Name	HERB QUINTANA	**Phone** 303.915.4556	**Fax** N/A
Contact Person		**Phone**	
Email	HERB@Q3CONSULTING.COM		**Fax**
Architect and/or Engineer Contact information for correction items			
Architect or Engineer name	KEN MCCRACKEN	**Email**	KMCCRACKEN@PMDGINC.COM
Phone	303. 955-9040	**Fax**	N/A
Owner (Required for Certificate of Occupancy) only			
Owner address	1301 S. POTOMAC, AURORA, CO		
Email	N/A		
Valuation / FDA:$	10,000 – NW	**Materials Cost: $**	8,000

FDA = Fee Determination Assessment. (Also known as the value of project) has no relationship to the construction costs for the building which can vary greatly. Rather, The assessment is used only to determine the appropriate level of fees to fund our code compliance activities.

Describe The Work You Will Be Doing: SWAP EXISTING BATTERIES IN SHELTER. SWAP 3 EXISTING ANTENNAS ON ROOF. ADD 3 NEW REMOTE RADIO HEADS BEHIND ANTENNAS. Need GC Route to Planning

I declare under penalty that this application has been examined by me and that the statements made herein are made in good faith pursuant to City of Aurora tax and licensing regulations; and to the best of my knowledge and belief are true, correct and complete.

Print Name HERB QUINTANA **Signature** Herb Quintana **Date** 4/1/15

BOARD OF APPEALS: Contractor's Appeals and Standards Board. Applicants have the right to have the board hear appeals of orders, decisions or determinations made by the building official relative to the application and interpretation of the building code. Any application for appeal to the board shall be based on a claim that the true intent of the code or the rules legally adopted there under have been incorrectly interpreted, the provisions of the building code do not fully apply or an equally good or better form of construction is proposed.

THIS SPACE FOR OFFICE USE ONLY

Fee Determination Assessment: $ _____

Change of occupancy/use: ☐ Yes ☐ No

REVIEWS

- OK ☑ Structural NW
- ☐ Mechanical
- ☐ Plumbing
- ~~☑ Electrical~~
- OK ☑ Fire-Life Safety NW
- ☐ Building Life Safety

INSPECTIONS

- ☑ Structural
- ☐ Mechanical
- ☐ Plumbing
- ~~☑ Electrical~~ N/A
- ☑ Life Safety
- ☐ Gate/Hazard

Intake Date: 4-3-15

Balance Due: $ _____

PRE APPROVAL Initial PD ☑ Zoning ☐ Water

Exterior changes? ☑ Yes ☐ No

Homeowner verified: ☐ Yes ☑ No

Permit Type: LT

Mid roof / Ave Bldg Height: _____

Parent Permit RSN: NW 643347

Plans Examiner: _____

Subtype: Roof Antennas

RSN: 991193

Plans Picked Up By: _____

Company Name: _____

Phone Number _____

2015-942571 LT

benesch

Alfred Benesch & Company
7979 E. Tufts Avenue, Suite 800
Denver, CO 80237
www.benesch.com
P 303-771-6868
F 303-741-6745

March 25, 2015

Seth Collins
Black & Veatch
4600 South Syracuse Street, Suite 300
Denver, Colorado 80237

Subject: Humana (COL01176)
1501 South Potomac
Aurora, CO 80012
Benesch Project Number: 150931.03

Dear Mr. Collins:

I have completed a review of the construction documents for the Humana project (Site ID COL01176) as prepared by PM Design Group, Inc.

The existing at grade equipment shelter will support the additional components in the existing LTE rack and proposed battery rack. The removal of the existing LTE antennas and replacement with new LTE antennas does not present a significant change in weight nor projected wind area. The addition of the new LTE Remote Radio Heads and ballasted sled to the existing building and antenna mounts represent an increase in weight and projected wind area, but does not require additional structural modification.

To the best of our knowledge and belief, the existing framing and the mounts, installed per the construction documents, will be sufficient for the intended purpose.

Sincerely,
Alfred Benesch & Company

David A. Krell, P.E.
Project Manager I

cc: JP Illes, P.E., File

COLORADO LICENSED
DAVID A. KRELL
41222
3.25.15
PROFESSIONAL ENGINEER

#15-942571

CITY OF AURORA
BUILDING DIVISION
APPROVED AS NOTED C. MACY
DATED 5·13·15

STRUCTURAL PLAN REVIEW IS LIMITED TO A GENERAL SURVEY FOR CODE COMPLIANCE. NO REVIEW IS IMPLIED NOR WAS UNDERTAKEN TO VERIFY STRUCTURAL ADEQUACY.

Battery type	Lead weight		Electrolyte volume		Electrolyte weight		Sulfuric Acid weight		Sulfuric Acid volume	
M12V30	6.2 kg	13.7 lb	1.39 l	0.37 gal	1.81 kg	3.99 lb	0.74 kg	1.63 lb	0.40 l	0.11 gal
M12V30T	7.2 kg	15.9 lb	1.52 l	0.40 gal	2.00 kg	4.41 lb	0.84 kg	1.85 lb	0.45 l	0.12 gal
M12V40	13.4 kg	29.5 lb	2.08 l	0.55 gal	2.74 kg	6.04 lb	1.15 kg	2.53 lb	0.62 l	0.16 gal
M12V45	11.9 kg	26.2 lb	2.61 l	0.69 gal	3.45 kg	7.60 lb	1.45 kg	3.19 lb	0.78 l	0.21 gal
M12V70	19.6 kg	43.3 lb	4.04 l	1.07 gal	5.34 kg	11.76 lb	2.24 kg	4.93 lb	1.21 l	0.32 gal
M12V90	23.2 kg	51.1 lb	4.53 l	1.20 gal	5.98 kg	13.17 lb	2.51 kg	5.53 lb	1.36 l	0.36 gal
M12V90FT	24.2 kg	53.2 lb	4.50 l	1.19 gal	6.01 kg	13.24 lb	2.61 kg	5.75 lb	1.35 l	0.36 gal
M12V105FT	24.5 kg	54.0 lb	5.36 l	1.42 gal	7.07 kg	15.58 lb	2.97 kg	6.54 lb	1.61 l	0.43 gal
M12V125FT	32.1 kg	70.8 lb	6.95 l	1.84 gal	9.17 kg	20.19 lb	3.85 kg	8.47 lb	2.08 l	0.55 gal
M12V155FT	36.8 kg	81.0 lb	8.19 l	2.17 gal	10.80 kg	23.80 lb	4.53 kg	9.98 lb	2.46 l	0.65 gal
M6V190	23.8 kg	52.5 lb	5.06 l	1.34 gal	6.68 kg	14.71 lb	2.80 kg	6.17 lb	1.52 l	0.40 gal
M2V300	11.7 kg	25.8 lb	2.51 l	0.66 gal	3.31 kg	7.30 lb	1.39 kg	3.06 lb	0.75 l	0.20 gal
M2V550	24.4 kg	53.7 lb	5.21 l	1.38 gal	6.87 kg	15.13 lb	2.88 kg	6.35 lb	1.56 l	0.41 gal
M6V200	25.8 kg	56.8 lb	5.41 l	1.43 gal	7.14 kg	15.73 lb	3.01 kg	6.64 lb	1.62 l	0.43 gal
S12V120	9.6 kg	21.2 lb	1.45 l	0.38 gal	1.91 kg	4.21 lb	0.80 kg	1.77 lb	0.43 l	0.12 gal
S12V170	12.7 kg	28.0 lb	2.22 l	0.59 gal	2.93 kg	6.46 lb	1.23 kg	2.71 lb	0.67 l	0.18 gal
S12V285	19.6 kg	43.3 lb	4.04 l	1.07 gal	5.34 kg	11.76 lb	2.24 kg	4.93 lb	1.21 l	0.32 gal
S12V300	22.5 kg	49.6 lb	3.89 l	1.03 gal	5.14 kg	11.31 lb	2.15 kg	4.75 lb	1.17 l	0.31 gal
S12V370	26.1 kg	57.4 lb	4.80 l	1.27 gal	6.33 kg	13.95 lb	2.66 kg	5.85 lb	1.44 l	0.38 gal
S6V740	25.2 kg	55.6 lb	5.09 l	1.35 gal	6.72 kg	14.81 lb	2.82 kg	6.21 lb	1.53 l	0.40 gal
S12V500	35.5 kg	78.2 lb	7.11 l	1.88 gal	9.38 kg	20.67 lb	3.94 kg	8.67 lb	2.13 l	0.56 gal

INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE

2.17 gallons * (20) batteries = 43.4 gallons

15-942571

GNB

INDUSTRIAL POWER

ALL VALUES PER BATTERY
January 19, 2005

HUMANA
COL01176

at&t

LATITUDE: 39° 41' 22.9" N
LONGITUDE: 104° 49' 54" W
F.A.#10093833
LTE - 2C
ROOFTOP

15-942571

SHEET INDEX

T-1	TITLE SHEET
ARCHITECTURAL	
A-1	EXISTING ROOFTOP PLAN
A-2	PROPOSED EQUIPMENT LAYOUT
A-3	EXISTING & PROPOSED SOUTH ELEVATIONS
A-4	EXISTING & PROPOSED EAST ELEVATIONS
A-5	EXISTING & PROPOSED ANTENNA LAYOUTS
A-6	EXISTING & PROPOSED ANTENNA LAYOUTS
A-7	EQUIPMENT DETAILS
A-8	EQUIPMENT DETAILS
ELECTRICAL	
E-1	ELECTRICAL DC ONE-LINE DIAGRAM
E-2	ELECTRICAL DC SURGE SUPPRESSION DIAGRAMS
G-1	ELECTRICAL GROUNDING PLAN
G-2	GROUNDING DETAILS
GENERAL NOTES	
GN-1	GENERAL CONSTRUCTION NOTES
GN-2	GENERAL ELECTRICAL NOTES

TOTAL SHEET COUNT: 15

GENERAL NOTES

CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY BLACK & VEATCH WHO WILL CONTACT THE ARCHITECT TO DISCUSS ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK.

DRAWINGS WILL BE SCALED AS REQUIRED BY THE PERMITTING GOVERNING AGENCY. ALL OTHER DRAWINGS SUPPLIED TO AT&T WILL BE PLOTTED ON 11x17 SHEETS AT HALF SCALE.

THESE DRAWINGS MAY NOT INDICATE ALL UNDERGROUND UTILITIES. THE GENERAL CONTRACTOR SHALL EXERCISE EXTREME CARE DURING ALL EXCAVATIONS AND OTHER CONSTRUCTION ACTIVITIES.

Know what's below. Call before you dig. 811

ABBREVIATIONS

Ø	DIAMETER	FOM	FACE OF MASONRY	RET	REMOTE ELECTRIC TILT
@	AT	FOS	FACE OF STUD	RF	RADIO FREQUENCY
℄	CENTER LINE	FOW	FACE OF WALL	RMC	RIGID METALLIC CONDUIT
AB	ANCHOR BOLT	FS	FINISH SURFACE	RRH	REMOTE RADIO HEAD
ABV	ABOVE	FT	FOOT	RRU	REMOTE RADIO UNIT
AC	ALTERNATING CURRENT	FTG	FOOTING	RWY	RACEWAY
A/C	AIR CONDITIONING	(F)	FUTURE	SCH	SCHEDULE
ADDL	ADDITIONAL	GA	GAUGE	SHT	SHEET
AFF	ABOVE FINISHED FLOOR	GEN	GENERATOR	SIAD	SMART INTEGRATED ACCESS DEVICE
AFG	ABOVE FINISHED GRADE	GFCI	GROUND FAULT CIRCUIT INTERRUPTER	SIM	SIMILAR
AGL	ABOVE GROUND LEVEL	GLB	GLUE LAMINATED BEAM	SPEC	SPECIFICATION
AIC	AMPERAGE INTERRUPTION CAPACITY	GLV	GALVANIZED	SQ	SQUARE
ALUM	ALUMINUM	GPS	GLOBAL POSITIONING SYSTEM	SS	STAINLESS STEEL
ALT	ALTERNATE	GND	GROUND	STD	STANDARD
ANT	ANTENNA	GSM	GLOBAL SYSTEM FOR MOBILE	STL	STEEL
APPROX	APPROXIMATE	HDG	HOT DIPPED GALVANIZED	TEMP	TEMPORARY
ARCH	ARCHITECTURAL	HDR	HEADER	THK	THICKNESS
ATS	AUTOMATIC TRANSFER SWITCH	HGR	HANGER	TMA	TOWER MOUNTED AMPLIFIER
AWG	AMERICAN WIRE GAUGE	HVAC	HEAT/VENTILATION/AIR CONDITIONING	TN	TOE NAIL
BATT	BATTERY	HT	HEIGHT	TOA	TOP OF ANTENNA
BLDG	BUILDING	IGR	INTERIOR GROUND RING	TOC	TOP OF CURB
BLK	BLOCK	IN	INCH	TOF	TOP OF FOUNDATION
BLKG	BLOCKING	INT	INTERIOR	TOP	TOP OF PLATE (PARAPET)
BM	BEAM	LB(S)	POUND(S)	TOS	TOP OF STEEL
BTC	BARE TINNED COPPER CONDUCTOR	LF	LINEAR FEET	TOW	TOP OF WALL
BOF	BOTTOM OF FOOTING	LTE	LONG TERM EVOLUTION	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSION
CAB	CABINET	MAS	MASONRY		
CANT	CANTILEVERED	MAX	MAXIMUM	TYP	TYPICAL
CHG	CHARGING	MB	MACHINE BOLT	UG	UNDERGROUND
CLG	CEILING	MECH	MECHANICAL	UL	UNDERWRITERS LABORATORY
CLR	CLEAR	MFR	MANUFACTURER	UNO	UNLESS NOTED OTHERWISE
COL	COLUMN	MGB	MASTER GROUND BAR	UMTS	UNIVERSAL MOBILE TELECOMMUNICATIONS SYSTEM
COMM	COMMON	MIN	MINIMUM		
CONC	CONCRETE	MISC	MISCELLANEOUS	UPS	UNINTERRUPTIBLE POWER SYSTEM (DC POWER PLANT)
CONSTR	CONSTRUCTION	MTL	METAL		
DBL	DOUBLE	MTS	MANUAL TRANSFER SWITCH	VIF	VERIFIED IN FIELD
DC	DIRECT CURRENT	MW	MICROWAVE	W	WIDE
DEPT	DEPARTMENT	NEC	NATIONAL ELECTRIC CODE	W/	WITH
DF	DOUGLAS FIR	NM	NEWTON METERS	WD	WOOD
DIA	DIAMETER	#	NUMBER	WP	WEATHERPROOF
DIAG	DIAGONAL	NO	NUMBER	WT	WEIGHT
DIM	DIMENSION	NTS	NOT TO SCALE		
DWG	DRAWING	OC	ON-CENTER		
DWL	DOWEL	OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION		
EA	EACH				
EC	ELECTRICAL CONDUCTOR	OPNG	OPENING		
EL.	ELEVATION	P/C	PRECAST CONCRETE		
ELEC	ELECTRICAL	PCS	PERSONAL COMMUNICATION SERVICES		
EMT	ELECTRICAL METALLIC TUBING	PCU	PRIMARY CONTROL UNIT		
ENG	ENGINEER	PDF	POWER DISTRIBUTION FRAME		
EQ	EQUAL	PRC	PRIMARY RADIO CABINET		
EXP	EXPANSION	PP	POLARIZING PRESERVING		
EXIST	EXISTING	PSF	POUNDS PER SQUARE FOOT		
(E)	EXISTING	PSI	POUNDS PER SQUARE INCH		
EXT	EXTERIOR	PT	PRESSURE TREATED		
EW	EACH WAY	(P)	PROPOSED		
FAB	FABRICATION	PWR	POWER CABINET		
FF	FINISH FLOOR	QTY	QUANTITY		
FG	FINISH GRADE	RAD	RADIUS		
FIF	FACILITY INTERFACE FRAME	RECT	RECTIFIER		
FIN	FINISH(ED)	REF	REFERENCE		
FLR	FLOOR	REINF	REINFORCEMENT		
FDN	FOUNDATION	(R)	RELOCATED		
FOC	FACE OF CONCRETE	REQ'D	REQUIRED		

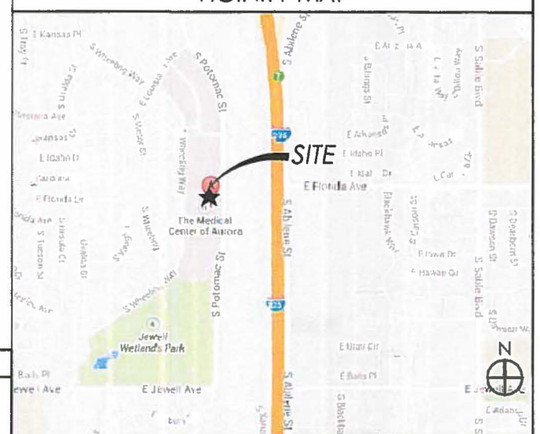
SYMBOLS

- RECTANGULAR DETAIL CALLOUT (X / X-X)
- ELEVATION CALLOUT (X / X-X)
- NORTH ARROW (N)
- KEY NOTE (#)
- ELEVATION MARK (LEVEL, ELEV: X'-X")

PROJECT DESCRIPTION

PROJECT IS AN (E) TELECOMMUNICATIONS SITE. REMOVE (E) BATTERIES. INSTALL (P) 23" BATTERY RACK AND (20) (P) MARATHON BATTERIES WITHIN (E) EQUIPMENT SHELTER AT GRADE. AT (E) BUILDING ROOFTOP, REMOVE (3) (E) AT&T LTE ANTENNAS (1) PER SECTOR. (3) SECTORS. INSTALL (3) (P) 8'-0" LTE ANTENNAS. (1) PER SECTOR. (3) SECTORS. (3) (P) REMOTE RADIO HEADS. (1) PER SECTOR. (3) SECTORS.

VICINITY MAP



DRIVING DIRECTIONS

FROM AT&T OFFICE 188 INVERNESS DR. WEST; HEAD WEST ON COUNTY LINE RD; TAKE THE RAMP ONTO I-25 N; TAKE EXIT 200 TO MERGE ONTO I-225 N TOWARD I-70/LIMON; TAKE EXIT 7 FOR MISSISSIPPI AVE; KEEP LEFT AT THE FORK, FOLLOW THE SIGNS FOR MISSISSIPPI AVE W; TURN LEFT ONTO E MISSISSIPPI AVE; TURN LEFT ONTO S POTOMAC ST; DESTINATION WILL BE ON THE RIGHT.

PROJECT INFORMATION

PROPERTY OWNER:	THE MEDICAL CENTER OF AURORA 1301 SOUTH POTOMAC AURORA, CO 80012
AT&T SITE ID#:	COL01176
AT&T SITE NAME:	HUMANA
SITE ADDRESS:	1501 SOUTH POTOMAC
CITY, COUNTY:	AURORA, ARAPAHOE
STATE, ZIP:	COLORADO, 80012
APPLICANT:	AT&T MOBILITY, LLC
ADDRESS:	188 INVERNESS DRIVE WEST, STE. 400 ENGLEWOOD, CO 80112
ENGINEERING MANAGER:	BLACK & VEATCH, INC. SETH COLLINS
ADDRESS:	4600 S SYRACUSE STREET, SUITE 300 DENVER, COLORADO 80237 913.458.8002
SITE ACQUISITION MANAGER:	BLACK & VEATCH, INC. COLLIN EDWARDS 913-458-9692
SITE ACQUISITION CONTACT:	BLACK & VEATCH, INC. JOSH WALKER 913.458.1236
RF ENGINEER:	AT&T MOBILITY, LLC. WINNIE LAI 720.412.9205
CONSTRUCTION MANAGER:	BLACK & VEATCH, INC. JOHN VAUGHAN 720.412.4989
A&E FIRM:	PM DESIGN GROUP, INC. MAURISSA MUHA 7200 S ALTON WAY, SUITE B270 ENGLEWOOD, CO. 80112 PHONE: 303.223.4864 mmuha@pmdginc.com

PROJECT DATA

JURISDICTION:	CITY OF AURORA
ZONING DESIGNATION:	PD
OCCUPANCY GROUP:	U2
CONSTRUCTION TYPE:	V-B
AREA:	370 SQ.FT. (EXISTING AT&T EQUIPMENT SHELTER)

REFER TO ATTACHED STRUCTURAL ANALYSIS BY ALFRED BENESCH FOR EXISTING ROOFTOP CAPACITY TO RECEIVE PROPOSED & RELOCATED EQUIPMENT, INSTALL PER MANUFACTURERS SPECIFICATIONS.

ENGINEERING

GOVERNING CODES IF APPLICABLE:
2009 INTERNATIONAL BUILDING CODE
2011 NATIONAL ELECTRIC CODE
2009 INTERNATIONAL FIRE CODE
TIA/EIA-222-G OR LATEST EDITION

A.D.A. COMPLIANCE:
NOT REQUIRED PER 1103.2.9 FOR AT&T WORK. THIS FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.

APPROVALS

TITLE	SIGNATURE	DATE
AT&T RF ENGINEER		
AT&T PROJECT MGR		
AT&T OPS		
AT&T COMPLIANCE		
B&V CONST MGR		
B&V SITE ACQUISITION		
SITE OWNER		

ACKNOWLEDGMENT OR "SIGN-OFF" BY PARTIES TO THE CONSTRUCTION DRAWINGS DOES NOT CONSTITUTE ALTERATION OF THE LEASE TERMS.

at&t

BLACK & VEATCH
304 INVERNESS WAY SOUTH, SUITE 400
ENGLEWOOD, COLORADO 80112

PM design group Architects
7200 South Alton Way, Suite B270
Centennial, CO 80112
Ph. (303) 955-9040
e-mail: kmcracken@pmdginc.com
Ken McCracken, Architect

DRAWN BY	CHECKED
F.A.	MFA

DATE	REVISION
05/20/2015	CONSTRUCTION

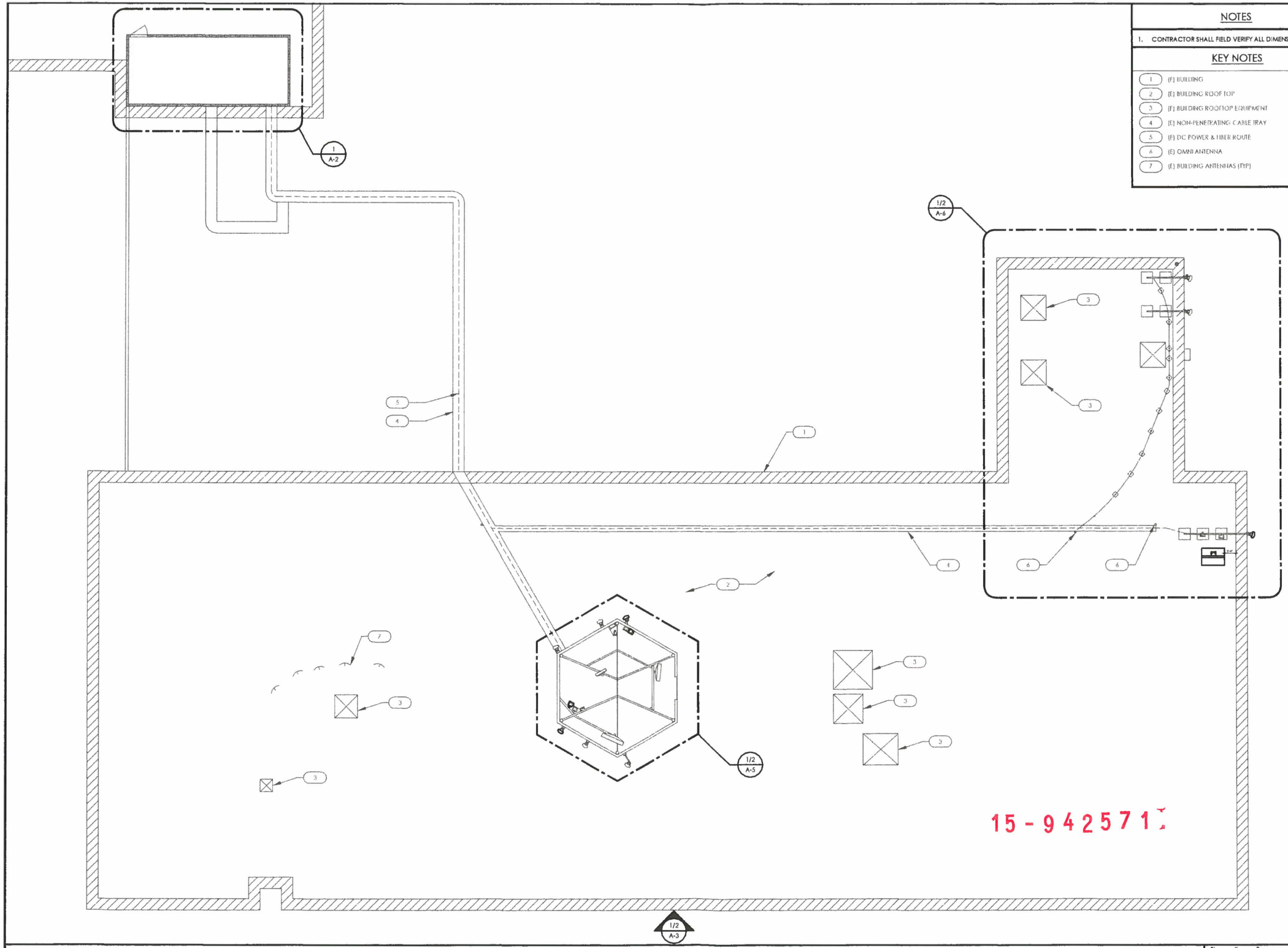
STATE OF COLORADO
GEORGE J. VINEGAR
305548
LICENSED ARCHITECT
Seal
5/19/2015

SITE NAME:
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

Project Number
BVC14200.0

Sheet Name
TITLE SHEET

Sheet Number
T-1



NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.

KEY NOTES

1. (E) BUILDING
2. (E) BUILDING ROOFTOP
3. (E) BUILDING ROOFTOP EQUIPMENT
4. (E) NON-PENETRATING CABLE TRAY
5. (E) DC POWER & FIBER ROUTE
6. (E) OMNI ANTENNA
7. (E) BUILDING ANTENNAS (TYP)

15-942571

EXISTING ROOFTOP PLAN

SCALE 8' 4' 0 8' 16'

at&t

BLACK & VEATCH
304 INVERNESS WAY SOUTH,
SUITE 400
ENGLEWOOD, COLORADO 80112

PMdesign group Architects
7200 South Alton Way, Suite B270
Centennial, CO 80112
Ph. (303) 955-9040
e-mail: kmcracken@pmdginc.com
Ken McCracken, Architect

DRAWN BY	CHECKED
KA	KMM

DATE	REVISION
09/23/2015	CONSTRUCTION

STATE OF COLORADO
GEORGE J. VINCENT
305548
9-29-2015
LICENSED ARCHITECT
Seal

SITE NAME:
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

Project Number
BVC14200.0

Sheet Name
EXISTING
ROOFTOP PLAN

Sheet Number
A-1

NOTES:

BATTERY ELECTROLYTES LESS THAN 50 GALLONS ← SEE "GNB" SHEET PROVIDED TO VERIFY BATTERY TYPE INSTALLED.

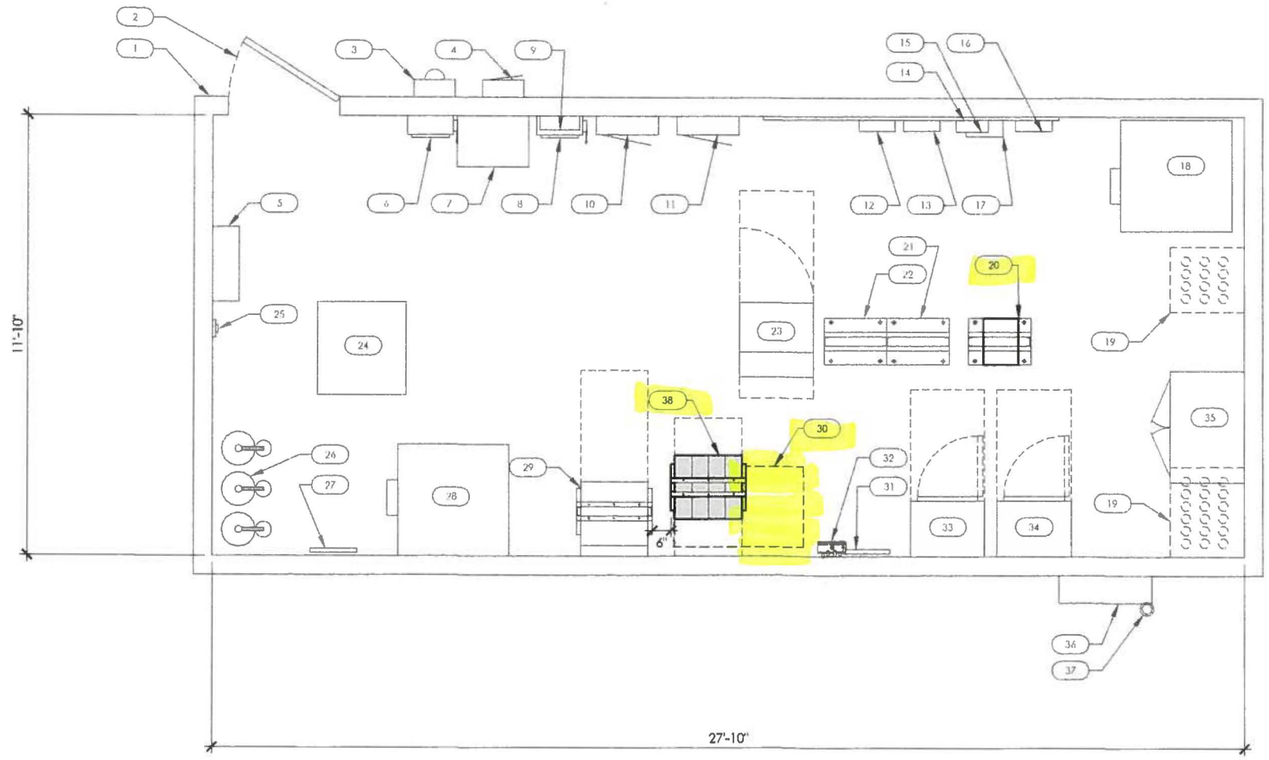
PROVIDE AT&T & FIRE DEPARTMENT APPROVED FIRE EXTINGUISHER IN EQUIPMENT ROOM. ← 2A40BC MINIMUM OR EQUIVALENT

CONTRACTOR TO VERIFY THAT APPROVED SIGN IS PROVIDED AT DOOR INTO EQUIPMENT ROOM. PROVIDE AS NECESSARY.

SIGN SHALL STATE THE FOLLOWING:

1. THE ROOM CONTAINS ENERGIZED BATTERY SYSTEMS.
2. THE ROOM CONTAINS ENERGIZED ELECTRICAL CIRCUITS.
3. THE BATTERY ELECTROLYTE SOLUTIONS, WHERE PRESENT, ARE CORROSIVE LIQUIDS.

CITY OF AURORA
BUILDING DIVISION
APPROVED AS NOTED FIRE/LIFE-SAFETY <50 gallons
DATE 5/14/15
15-942571-LT
RSN 991193



KEY NOTES

1. (E) AT&T EQUIPMENT SHELTER
2. (E) 3'-0" ACCESS DOOR
3. (E) 120/480V 4W METER
4. (E) PANEL
5. (E) ANSUL FIRE SYSTEM
6. (E) 100 AMP/240 V TRANSFER SWITCH
7. (E) 45KVA TRANSFORMER
8. (E) 100 AMP/240 V TRANSFER SWITCH
9. (E) AC SURGE ARRESTOR
10. (E) 225 AMP, 120/240V, 1PH, 3W AC PANEL (CP)
11. (E) 225 AMP, 120/240V, 3PH, 4W AC PANEL (CPA)
12. (E) FIBER TOWER TELCO BOX
13. (E) TELCO FEEDER BOX
14. (E) TELCO BOARD
15. (E) TELCO BOX
16. (E) FIRST AID KIT
17. (E) TELCO CARD BOX
18. (E) AIR HANDLING UNIT WITH 30AMP DISCONNECT SWITCH
19. (E) COAX PORT IN C.ERING
20. (E) 19" LTE RACK ; INSTALL (P) BCEM CARD: RE: A/A-7
21. (E) 19" TELCO RACK
22. (E) 19" FIF RACK
23. (E) UMTS CABINET
24. (E) FIBER TOWER
25. (E) LEAD LAG CONTROLLER
26. (E) (3) HAI ON TANKS
27. (E) GROUND BAR
28. (E) AIR HANDLING UNIT WITH 30AMP DISCONNECT SWITCH
29. (E) IMAGE POWER PLANT
30. (E) ABSOLYTE BATTERIES TO BE REMOVED
31. (E) GROUND BAR
32. (E) (6) DIPLEXERS STACKED
33. (E) 1900 GSM CABINET
34. (E) 850 GSM CABINET
35. (E) STORAGE CABINET
36. (E) VERTICAL CABLE TRAY
37. (E) GPS UNIT
38. (P) 23" BATTERY RACK WITH (20) (P) MARATHON BATTERIES: RE: B.C/A-7

1 PROPOSED EQUIPMENT LAYOUT @ GRADE

SCALE 12" 6" 0 1' 2' 3' 4' 5'

at&t

BLACK & VEATCH
304 INVERNESS WAY SOUTH, SUITE 400
ENGLEWOOD, COLORADO 80112

PMG design group Architects
7200 South Alton Way, Suite B270
Centennial, CO 80112
Ph. (303) 955-9040
e-mail: kmcracken@pmdginc.com
Ken McCracken, Architect

DRAWN BY	CHECKED
EA	MM

DATE	REVISION
01 FEBRUARY 2015	CONSTRUCTION

STATE OF COLORADO
GEORGE J. VITALE
30548
LICENSED ARCHITECT
4/9/2015

SITE NAME:
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

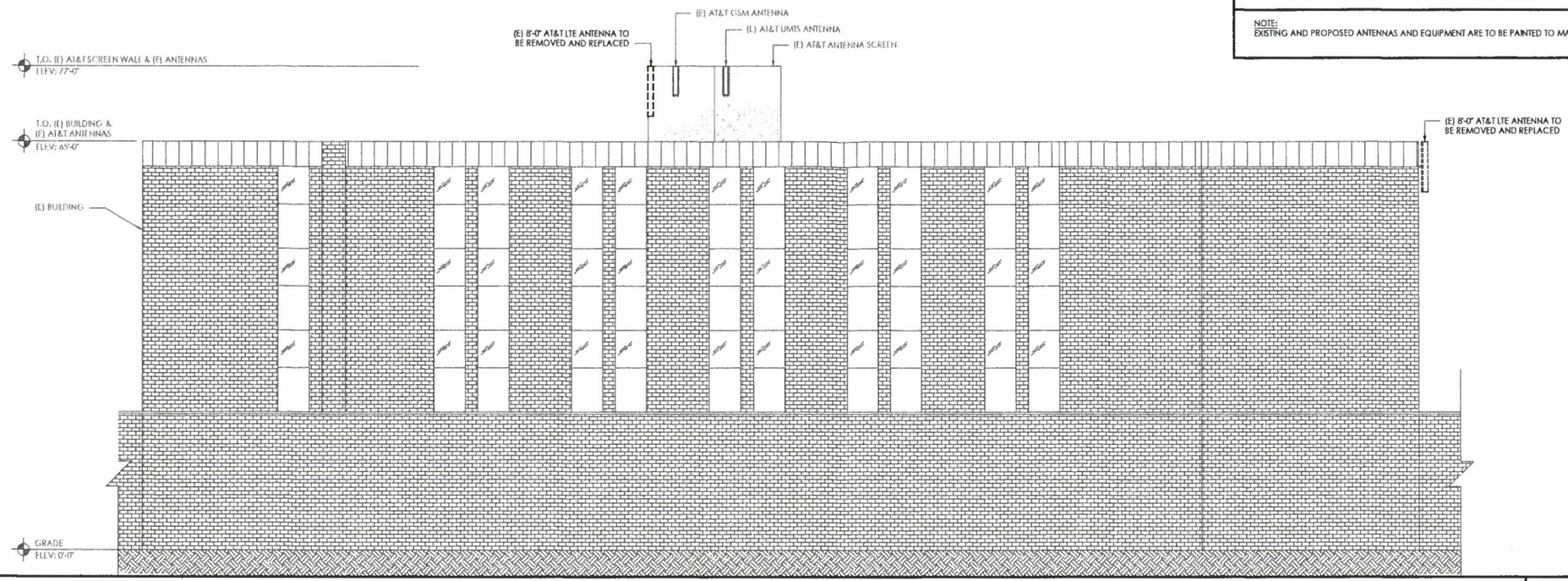
Project Number
BVC14200.0

Sheet Name
PROPOSED EQUIPMENT LAYOUT

Sheet Number
A-2

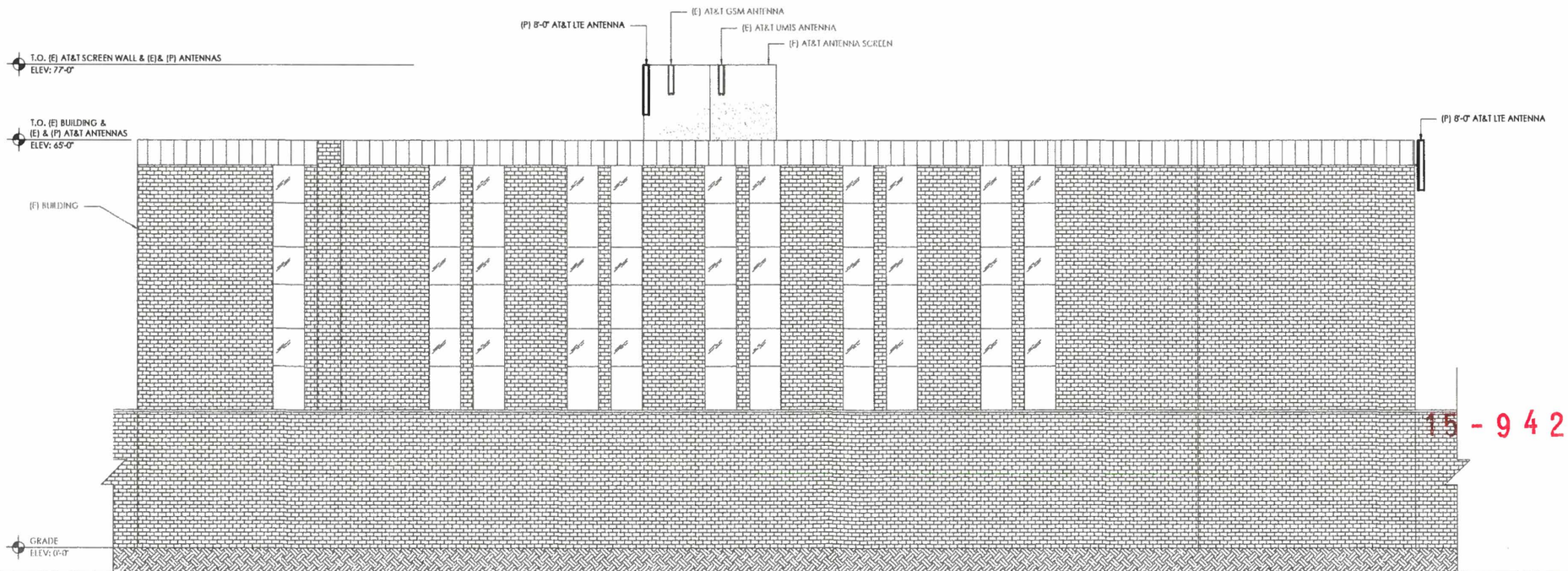
REFER TO ATTACHED STRUCTURAL ANALYSIS BY ALFRED BENESCH FOR EXISTING BUILDING ROOFTOP CAPACITY TO RECEIVE PROPOSED AND RELOCATED EQUIPMENT. INSTALL PER MANUFACTURERS SPECIFICATIONS.

NOTE:
EXISTING AND PROPOSED ANTENNAS AND EQUIPMENT ARE TO BE PAINTED TO MATCH EXTERIOR BUILDING



1 EXISTING SOUTH ELEVATION

10' 0 10' 20'
SCALE



2 PROPOSED SOUTH ELEVATION

10' 0 10' 20'
SCALE

at&t

BLACK & VEATCH
304 INVERNESS WAY SOUTH, SUITE 400
ENGLEWOOD, COLORADO 80112

PMG design group Architects
7200 South Alton Way, Suite B270
Centennial, CO 80112
Ph. (303) 955-9040
e-mail: kmccracken@pmginc.com
ken McCracken, Architect

DRAWN BY	EA	
CHECKED	MM	

0	CONSTRUCTION	07/20/15
REVISION		DATE

STATE OF COLORADO
GEORGE J. VITALE
395548
LICENSED ARCHITECT
Seal

SITE NAME:
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

15-942571

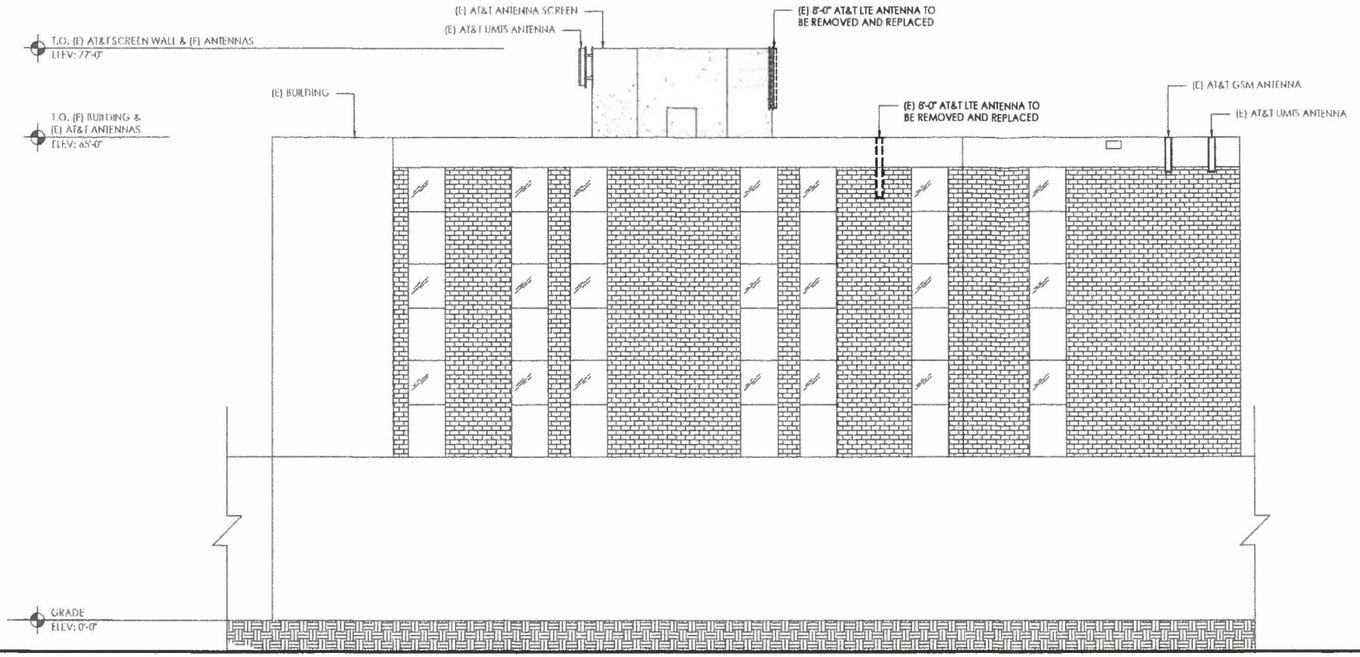
Project Number
BVC14200.0

Sheet Name
EXISTING & PROPOSED SOUTH ELEVATIONS

Sheet Number
A-3

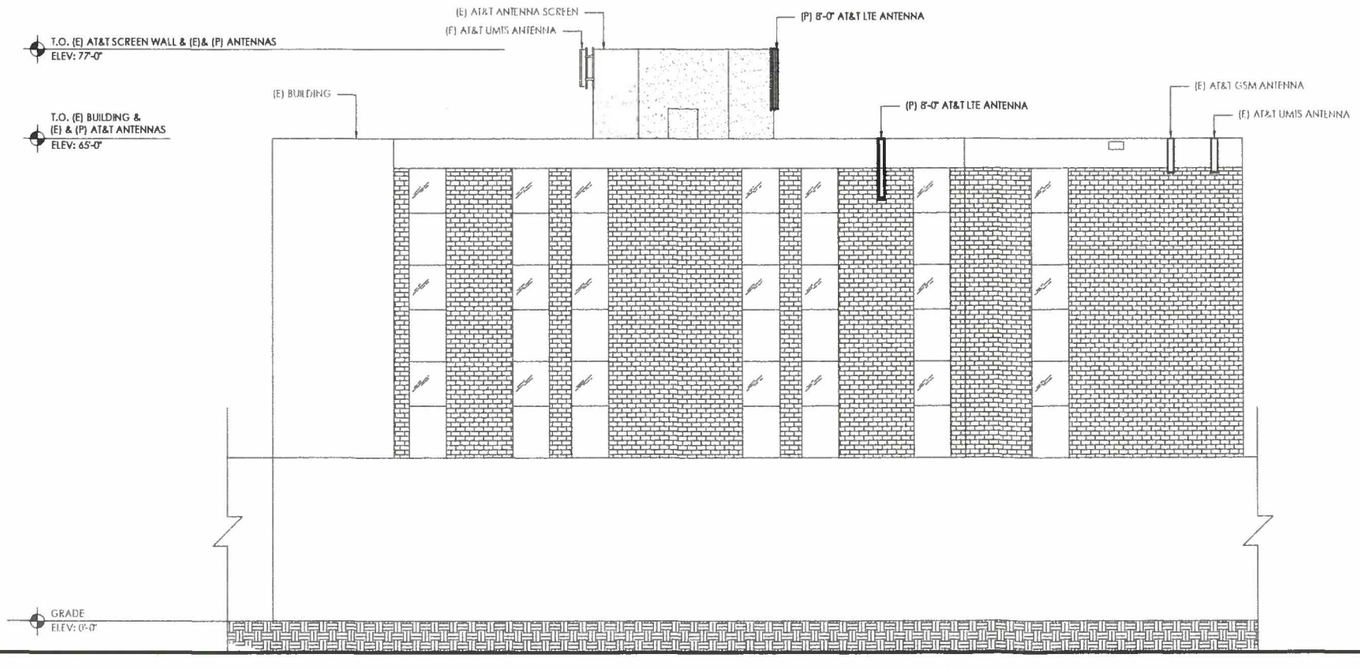
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NOTE:
EXISTING AND PROPOSED ANTENNAS AND EQUIPMENT ARE TO BE PAINTED TO MATCH EXTERIOR BUILDING



1 EXISTING EAST ELEVATION

10' 0 10' 20'
SCALE



15-942571

2 PROPOSED EAST ELEVATION

10' 0 10' 20'
SCALE

at&t

BLACK & VEATCH
304 INVERNESS WAY SOUTH,
SUITE 400
ENGLEWOOD, COLORADO 80112

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Ken McCracken, Architect

DRAWN BY	CHECKED
EA	MM

NO.	DATE	REVISION
1	09/29/2015	CONSTRUCTION

STATE OF COLORADO
GEORGE J. VITKOVICH
305548
LICENSED ARCHITECT

Site Name:
HITMAN
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

Project Number
BVC14200.0

Sheet Name
EXISTING & PROPOSED
EAST ELEVATIONS

Sheet Number
A-4

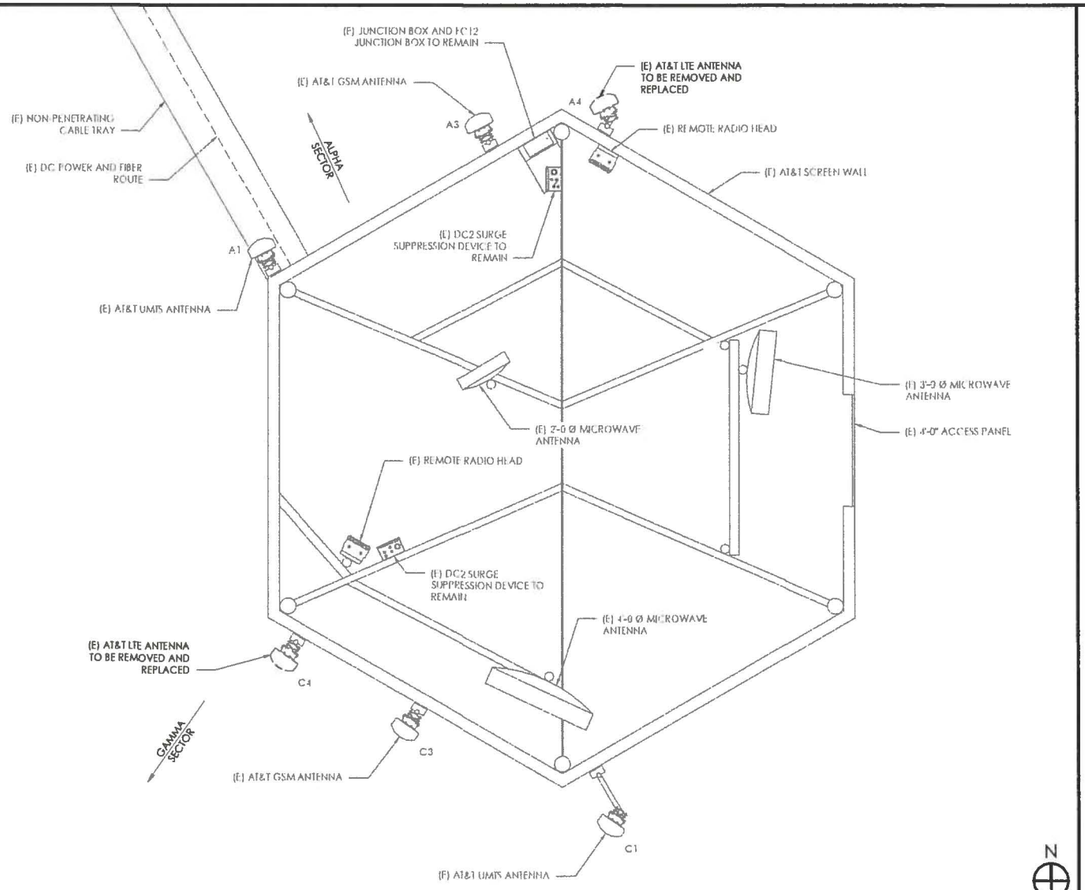
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NOTE:
EXISTING AND PROPOSED ANTENNAS AND EQUIPMENT ARE TO BE PAINTED TO MATCH EXTERIOR BUILDING

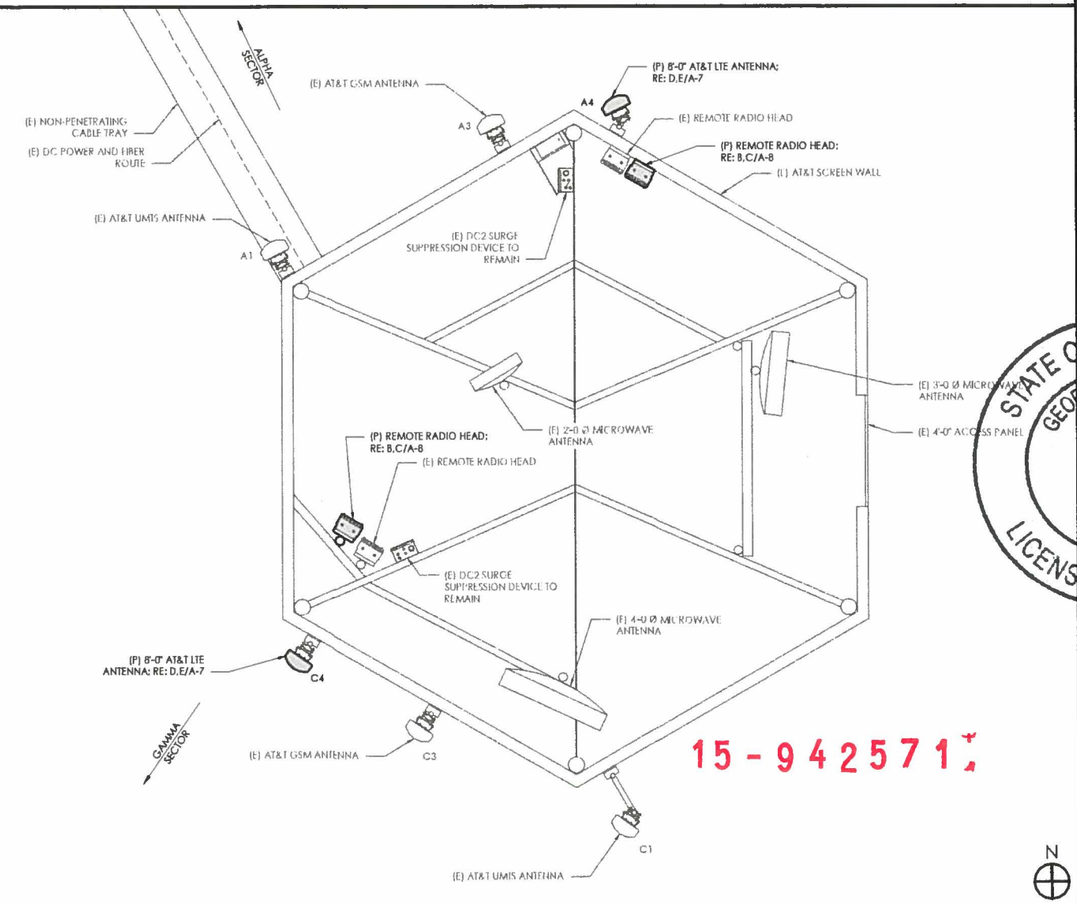
PROPOSED ANTENNA AND TRANSMISSION CABLE REQUIREMENT

SECTOR	ANTENNA TYPE	TECHNOLOGY	TRANSMISSION CABLE		DC JUMPERS NEEDED	FIBER JUMPERS NEEDED
			QTY.	TYPE		
A1	EXISTING ANTENNA	UMTS	-	NO CHANGE	-	-
A2	———————	———	-	———————	-	-
A3	EXISTING ANTENNA	GSM	-	NO CHANGE	-	-
A4	**PROPOSED ANTENNA**	**LTE**	**1**	**FIBER**	**YES**	**YES**
B1	EXISTING ANTENNA	UMTS	-	NO CHANGE	-	-
B2	EXISTING ANTENNA	GSM	-	NO CHANGE	-	-
B3	———————	———	-	———————	-	-
B4	**PROPOSED ANTENNA**	**LTE**	**1**	**FIBER**	**YES**	**YES**
C1	EXISTING ANTENNA	UMTS	-	NO CHANGE	-	-
C2	———————	———	-	———————	-	-
C3	EXISTING ANTENNA	GSM	-	NO CHANGE	-	-
C4	**PROPOSED ANTENNA**	**LTE**	**1**	**FIBER**	**YES**	**YES**

CONTRACTOR TO REFER TO FINAL CONSTRUCTION RFDS FOR ALL FINAL ANTENNA CONFIGURATIONS.



1 EXISTING ANTENNA LAYOUT @ 77'-0" NO SCALE



2 PROPOSED ANTENNA LAYOUT @ 77'-0" NO SCALE

15-942571

at&t

BLACK & VEATCH
304 INVERNESS WAY SOUTH, SUITE 400
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7200 South Alton Way, Suite B270
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e-mail: kmcracken@pmdginc.com
Ken McCracken, Architect

DRAWN BY: KA | CHECKED: MM

REVISION	DATE	REMARK
1	2/20/15	CONSTRUCTION

STATE OF COLORADO
GEORGE J. MATAE
30568
LICENSED ARCHITECT
9-2015

SITE NAME:
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

Project Number
BVC14200.0

Sheet Name
EXISTING & PROPOSED ANTENNA LAYOUTS

Sheet Number
A-5

PROPOSED ANTENNA AND TRANSMISSION CABLE REQUIREMENT

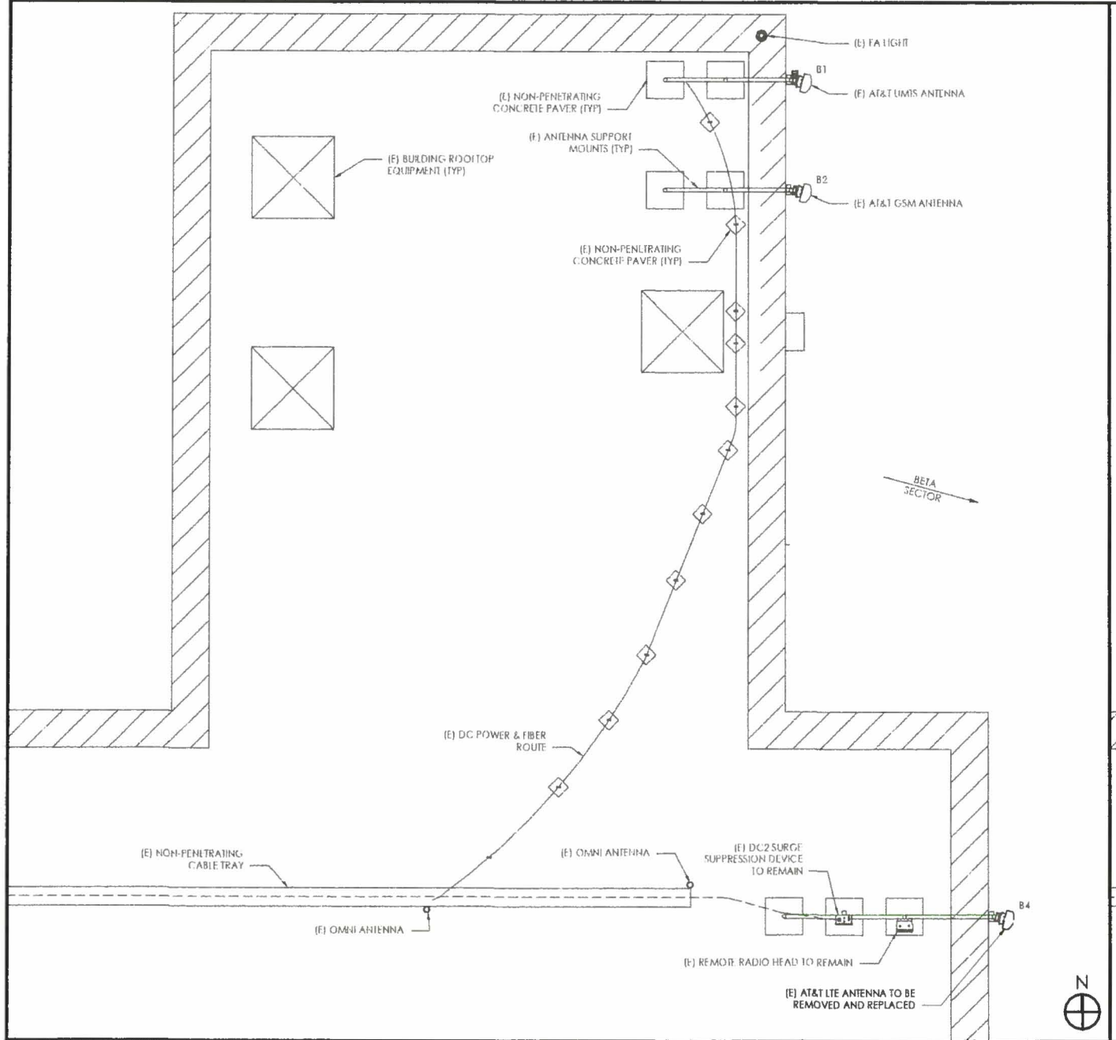
SECTOR	ANTENNA TYPE	TECHNOLOGY	TRANSMISSION CABLE		DC JUMPERS NEEDED	FIBER JUMPERS NEEDED
			QTY.	TYPE		
A1	EXISTING ANTENNA	UMTS	-	NO CHANGE	-	-
A2	———	—	-	———	-	-
A3	EXISTING ANTENNA	GSM	-	NO CHANGE	-	-
A4	**PROPOSED ANTENNA**	**LTE**	1	**FIBER**	**YES**	**YES**
B1	EXISTING ANTENNA	UMTS	-	NO CHANGE	-	-
B2	EXISTING ANTENNA	GSM	-	NO CHANGE	-	-
B3	———	—	-	———	-	-
B4	**PROPOSED ANTENNA**	**LTE**	1	**FIBER**	**YES**	**YES**
C1	EXISTING ANTENNA	UMTS	-	NO CHANGE	-	-
C2	———	—	-	———	-	-
C3	EXISTING ANTENNA	GSM	-	NO CHANGE	-	-
C4	**PROPOSED ANTENNA**	**LTE**	1	**FIBER**	**YES**	**YES**

CONTRACTOR TO REFER TO FINAL CONSTRUCTION RFDS FOR ALL FINAL ANTENNA CONFIGURATIONS.

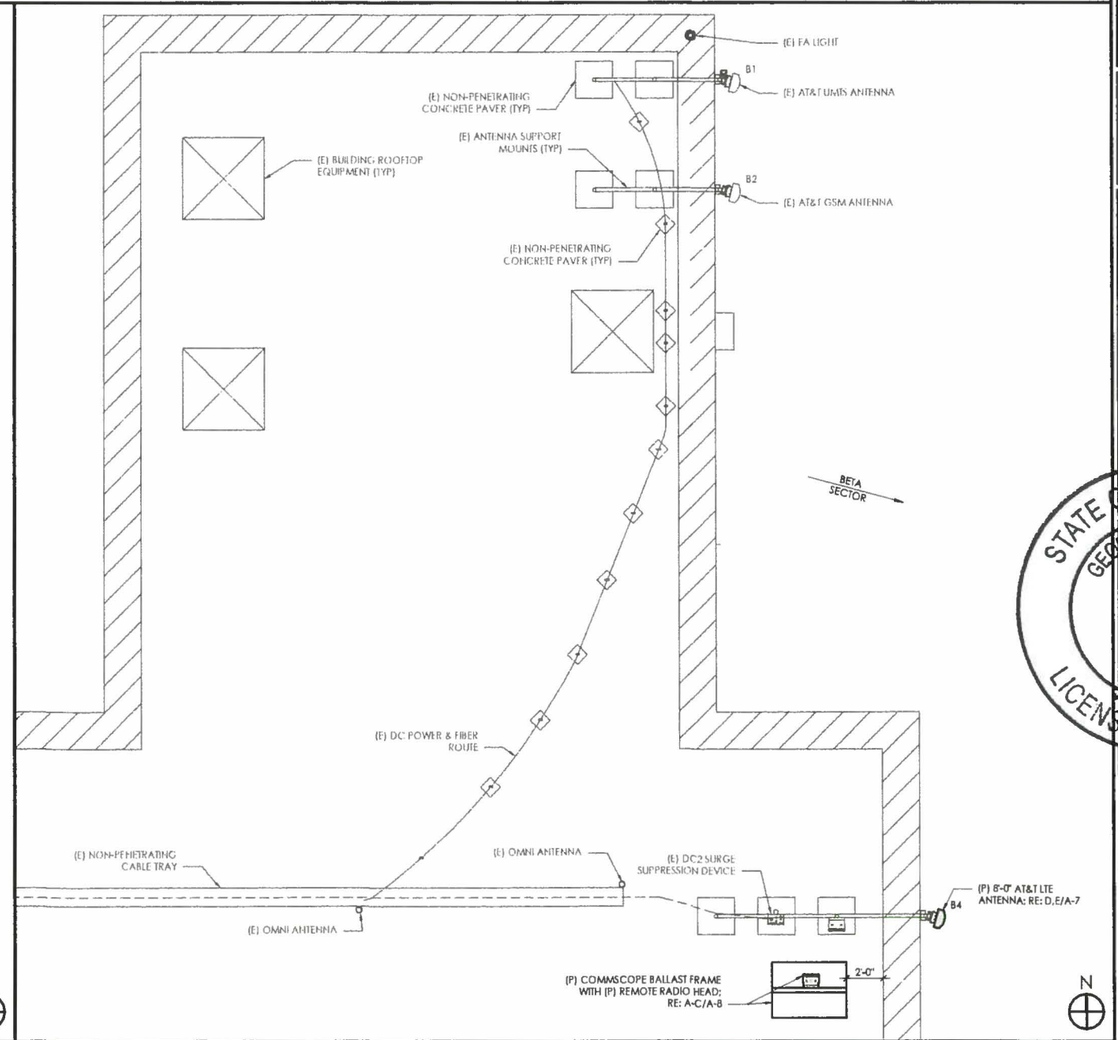
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NOTE:
EXISTING AND PROPOSED ANTENNAS AND EQUIPMENT ARE TO BE PAINTED TO MATCH EXTERIOR BUILDING

15-942571



1 EXISTING ANTENNA LAYOUT @ 77'-0" — NO SCALE



2 PROPOSED ANTENNA LAYOUT @ 77'-0" — NO SCALE

at&t

BLACK & VEATCH
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Ken McCracken, Architect

DRAWN BY	CHECKED
EA	MM

DATE	REVISION	
10/22/2015	CONSTRUCTION	

STATE OF COLORADO
GEORGE J. VIRAVEC
30748
10-19-2015
Seal
LICENSED ARCHITECT

SITE NAME:
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

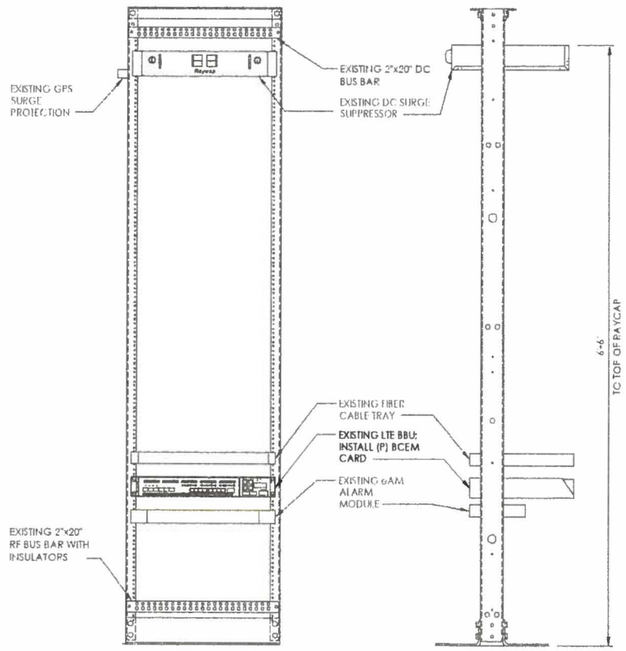
Project Number
BVC14200.0

Sheet Name
EXISTING & PROPOSED ANTENNA LAYOUTS

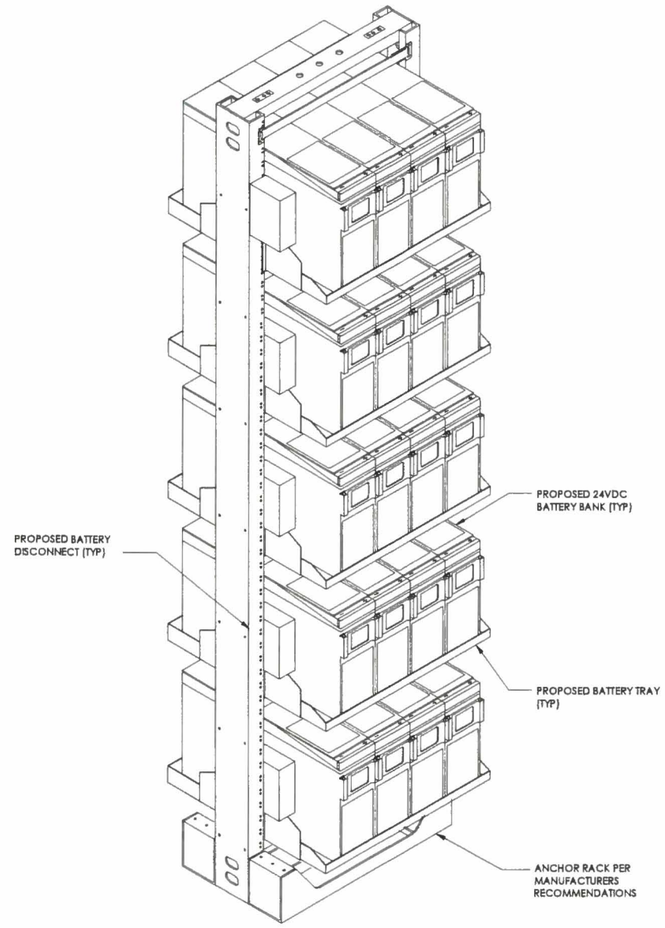
Sheet Number
A-6

NOTES:

1. SPACING BETWEEN EQUIPMENT WITHIN THE LTE RACK SHALL BE ONE RACK UNIT (OR APPROXIMATELY 3").
2. THE MAXIMUM WEIGHT CAPACITY OF THIS RACK IS 1,200 LBS.



EXISTING 19" LTE EQUIPMENT RACK | NO SCALE | A



PROPOSED INDOOR POWER DISTRIBUTION FRAME | NO SCALE | B

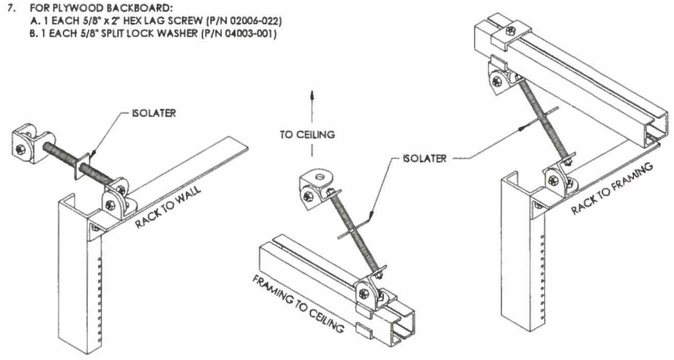
CHATSWORTH PRODUCTS, INC. UNIVERSAL EARTHQUAKE BRACING KIT

THIS ADJUSTABLE WALL/CEILING BRACE PROVIDES A MEANS OF SECURING, AN EQUIPMENT RACK OR AUXILIARY FRAME TO MEET EARTHQUAKE SAFETY CODES.

1. MATERIAL IS 2" x 1/4" STEEL FINISHED WITH GOLD CHEM FILM OVER ZINC PLATING
2. KIT CONSISTS OF:
   A. 4 EACH BRACKETS (MAKE 2 SWIVEL BRACKETS)
   B. 2 EACH 1/2"-13 x 1 1/4" HEX BOLTS
   C. 2 EACH 1/2"-13 HEX NUTS
   D. 2 EACH 1/2" SPLIT LOCK WASHERS
3. INSTALLATION WILL REQUIRE (NOT INCLUDED):
   A. 1 EACH 5/8"-11 THREADED ROD OF APPROPRIATE LENGTH. (SEE P/N 11440.) ROD MUST BE TRIMMED TO PROPER LENGTH DURING INSTALLATION
   B. 2 EACH 5/8"-11 HEX NUTS
   C. 2 EACH 5/8" FLAT TYPE A WASHER, WIDE
   D. CLIP KIT AND HARDWARE FOR ATTACHMENT TO CHANNEL OR BAR

INSTALLATION MAY ALSO REQUIRE (NOT INCLUDED):

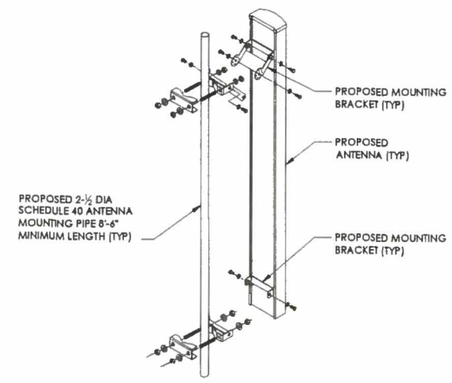
4. FOR CONCRETE CEILING:
   A. 1 EACH 5/8"-11 CONCRETE ANCHOR (P/N 06001-001)
   B. 1 EACH 5/8"-11 x 3" STUD (P/N 08001-002)
   C. 2 EACH 5/8"-11 HEX NUTS (P/N 20142-111)
   D. 1 EACH 5/8" SPLIT LOCK WASHER (P/N 04003-001)
   E. 1 EACH 5/8" FLAT, WASHER, WIDE, TYPE A (P/N 20283-022)
5. FOR RACK:
   A. 1 EACH 5/8"-11 x 1 1/4" HEX CAP SCREW (P/N 02004-006)
   B. 1 EACH 5/8"-11 HEX NUT (P/N 20142-111)
   C. 1 EACH 5/8" SPLIT LOCK WASHER (P/N 04003-001)
6. FOR AUXILIARY FRAME OR GRID:
   A. 1 EACH GRID CLAMP KIT (P/N 10609)
   B. 1 EACH 5/8"-11 x 3 1/4" HEX SCREW CAP (P/N 02004-007)
   C. 1 EACH 5/8"-11 HEX NUT (P/N 20142-111)
   D. 1 EACH 5/8" SPLIT LOCK WASHER (P/N 04003-001)
7. FOR PLYWOOD BACKBOARD:
   A. 1 EACH 5/8" x 2" HEX LAG SCREW (P/N 02006-022)
   B. 1 EACH 5/8" SPLIT LOCK WASHER (P/N 04003-001)



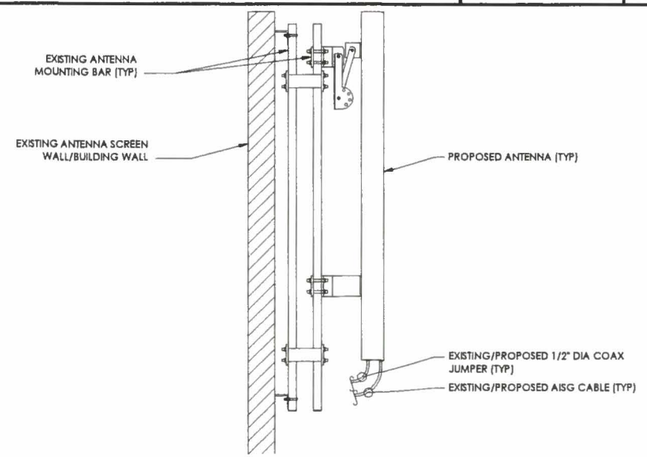
RACK TO WALL | FRAMING TO CEILING | RACK TO FRAMING

PART NUMBER	DESCRIPTION	SHIPPING WEIGHT
10562-001	UNIVERSAL EARTHQUAKE BRACING KIT	3 LBS

EARTHQUAKE BRACING | NO SCALE



PIPE MOUNTING DETAIL | NO SCALE | D



ANTENNA MOUNTING | NO SCALE | E

NOT USED | NO SCALE | F

15-942571

STATE OF COLORADO
GEORGE J. VITALE
305548
LICENSED ARCHITECT

at&t

BLACK & VEATCH
304 INVERNESS WAY SOUTH, SUITE 400
ENGLEWOOD, COLORADO 80112

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7200 South Alton Way, Suite B270
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Ken McCracken, Architect

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EA	MRA

NO.	REVISION	DATE	BY
1	CONSTRUCTION	05/20/2015	PD

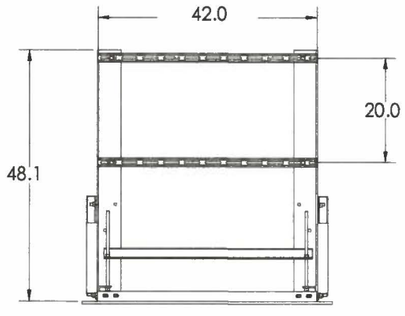
Site Name
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

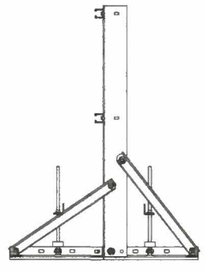
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BVC14200.0

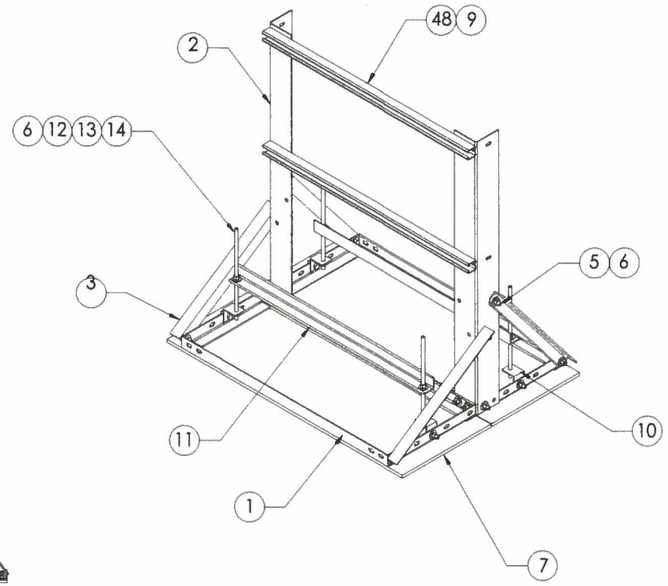
Sheet Name
EQUIPMENT DETAILS

Sheet Number
A-7

ITEM	PART NO.	DESCRIPTION	QTY.	WEIGHT
1	M T416.10	WELDMNT BALLAST SLED FRAME	2	22.40 LBS
2	M TC329420	VERTICAL ANGLE	2	13.93 LBS
3	M TC329421	BRACE ANGLE	4	4.71 LBS
4	M TC329414	1 5/8" UNISTRUT	2	6.25 LBS
5	G B-04145	1/2" X 1-1/2" GALV BOLT KIT	18	0.13 LBS
6	G WF-04	1/2" GALV FLAT WASHER	28	0.06 LBS
7	M T-F1637	RUBBER MAT .5" X 18" X 48"	2	15.61 LBS
8	G WF-03	3/8" GALV FLAT WASHER	8	0.01 LBS
9	G B-03145	3/8" X 1-1/2" GALV BOLT KIT	4	0.07 LBS
10	MTC8326.01	CLIP ANGLE	4	0.478 LBS
11	MTC329422	BRACE ANGLE	2	7.92 LBS
12	GWL-04	1/2" GALV LOCK WASHER	8	0.09 LBS
13	GN-04	1/2" GALV HEX NUT	8	0.04 LBS
14	MT-379-16	1/2" X 16" GALV THREADED ROD	4	0.88 LBS







COMMSCOPE REMOTE RADIO HEAD BALLAST FRAME | NO SCALE | A

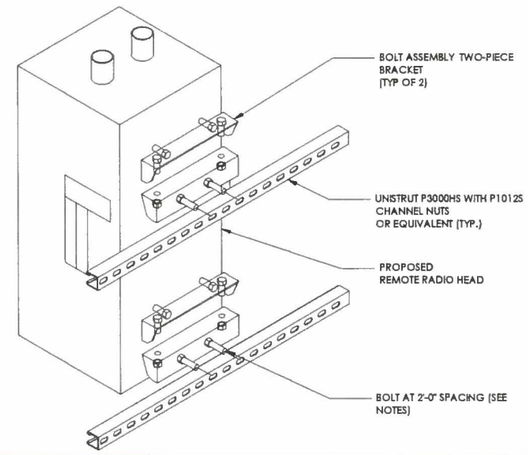
ALCATEL-LUCENT RRH2X60W-2100

DIMENSIONS, WxDxH: (10.63"7.9"x20.8") 270x180x510mm

WEIGHT, WITHOUT MOUNTING KIT: (40.0 lbs) 18kg



LTE 2C RRH SPECIFICATIONS | NO SCALE | B



RRH/SURGE SUPPRESSOR MOUNTING DETAIL | NO SCALE | C

NOT USED | NO SCALE | D

NOT USED | NO SCALE | E

NOT USED | NO SCALE | F

15-942571

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BLACK & VEATCH
304 INVERNESS WAY SOUTH, SUITE 400
ENGLEWOOD, COLORADO 80112

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Ken McCracken, Architect

DRAWN BY	CHECKED
EA	KMA

MARK	DATE	DESCRIPTION
0	08/31/2015	CONSTRUCTION
1		REVISION

STATE OF COLORADO
GEORGE J. VITAL
30[illegible]
LICENSED ARCHITECT
8-9-2015

SITE NUMBER:
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

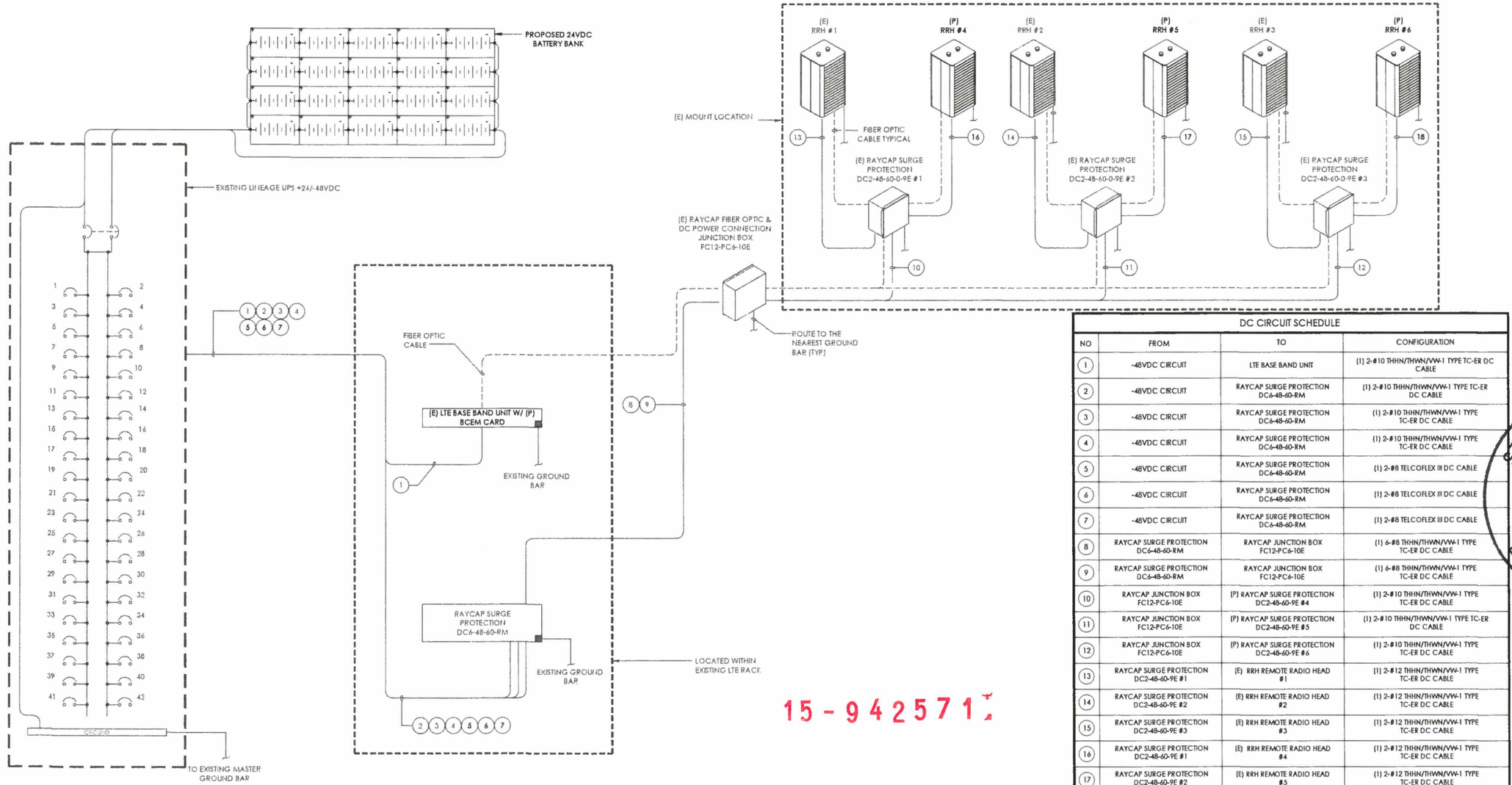
Project Number
BVC14200.0

Sheet Name
EQUIPMENT DETAILS

Sheet Number
A-8

NOTES

1. DC POWER WIRING SHALL BE COLOR CODED AT EACH END FOR IDENTIFYING +24V AND -48V CONDUCTORS. RED MARKINGS SHALL IDENTIFY +24V AND BLUE MARKINGS SHALL IDENTIFY -48V. REFER TO ATT-002-290-701.
2. LTE DC POWER WIRING SIZE 14 AWG TO 10 AWG SHALL BE TELCOFLEX III. DC POWER WIRING 8 AWG AND LARGER SHALL BE TELCOFLEX IV.
3. LTE POWER WIRING SHALL BE IN ACCORDANCE WITH ATT-002-290-531.
4. GROUND CONDUCTOR MINIMUM SIZE SHALL BE 750 KCMIL FOR POWER PLANT CAPACITY GREATER THAN OR EQUAL TO 1,200 AMP.
5. DC ELECTRICAL LOAD DEMAND FOR PROPOSED ADDITIONS WERE INCLUDED IN PRIOR AC CALCULATION.



15-942571

DC CIRCUIT SCHEDULE

NO	FROM	TO	CONFIGURATION
1	-48VDC CIRCUIT	LTE BASE BAND UNIT	(1) 2-#10 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
2	-48VDC CIRCUIT	RAYCAP SURGE PROTECTION DC6-48-60-RM	(1) 2-#10 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
3	-48VDC CIRCUIT	RAYCAP SURGE PROTECTION DC6-48-60-RM	(1) 2-#10 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
4	-48VDC CIRCUIT	RAYCAP SURGE PROTECTION DC6-48-60-RM	(1) 2-#10 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
5	-48VDC CIRCUIT	RAYCAP SURGE PROTECTION DC6-48-60-RM	(1) 2-#8 TELCOFLEX III DC CABLE
6	-48VDC CIRCUIT	RAYCAP SURGE PROTECTION DC6-48-60-RM	(1) 2-#8 TELCOFLEX III DC CABLE
7	-48VDC CIRCUIT	RAYCAP SURGE PROTECTION DC6-48-60-RM	(1) 2-#8 TELCOFLEX III DC CABLE
8	RAYCAP SURGE PROTECTION DC6-48-60-RM	RAYCAP JUNCTION BOX FC12-PC6-10E	(1) 6-#8 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
9	RAYCAP SURGE PROTECTION DC6-48-60-RM	RAYCAP JUNCTION BOX FC12-PC6-10E	(1) 6-#8 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
10	RAYCAP JUNCTION BOX FC12-PC6-10E	(P) RAYCAP SURGE PROTECTION DC2-48-60-9E #4	(1) 2-#10 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
11	RAYCAP JUNCTION BOX FC12-PC6-10E	(P) RAYCAP SURGE PROTECTION DC2-48-60-9E #5	(1) 2-#10 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
12	RAYCAP JUNCTION BOX FC12-PC6-10E	(P) RAYCAP SURGE PROTECTION DC2-48-60-9E #6	(1) 2-#10 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
13	RAYCAP SURGE PROTECTION DC2-48-60-9E #1	(E) RRH REMOTE RADIO HEAD #1	(1) 2-#12 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
14	RAYCAP SURGE PROTECTION DC2-48-60-9E #2	(E) RRH REMOTE RADIO HEAD #2	(1) 2-#12 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
15	RAYCAP SURGE PROTECTION DC2-48-60-9E #3	(E) RRH REMOTE RADIO HEAD #3	(1) 2-#12 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
16	RAYCAP SURGE PROTECTION DC2-48-60-9E #1	(E) RRH REMOTE RADIO HEAD #4	(1) 2-#12 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
17	RAYCAP SURGE PROTECTION DC2-48-60-9E #2	(E) RRH REMOTE RADIO HEAD #5	(1) 2-#12 THHN/THWN/VW-1 TYPE TC-ER DC CABLE
18	RAYCAP SURGE PROTECTION DC2-48-60-9E #3	(E) RRH REMOTE RADIO HEAD #6	(1) 2-#12 THHN/THWN/VW-1 TYPE TC-ER DC CABLE

ELECTRICAL DC ONE-LINE DIAGRAM | NO SCALE | 1

at&t

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LA	MM

DATE	REVISION
03/20/15	CONSTRUCTION

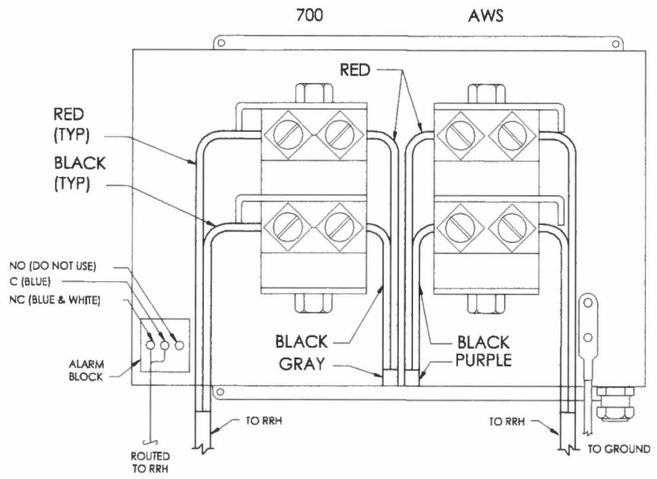
STATE OF COLORADO
GEORGE S. WALLACE
30654
3-19-2015
LICENSED ARCHITECT

SITE NAME:
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

Project Number
BVC14200.0

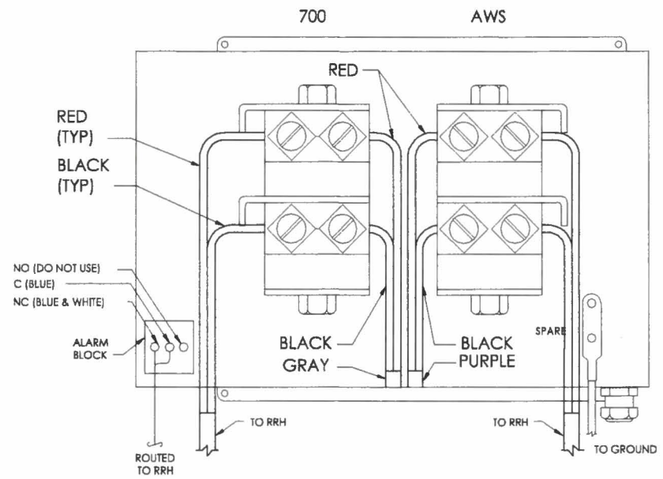
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ELECTRICAL DC ONE-LINE DIAGRAM

Sheet Number
E-1



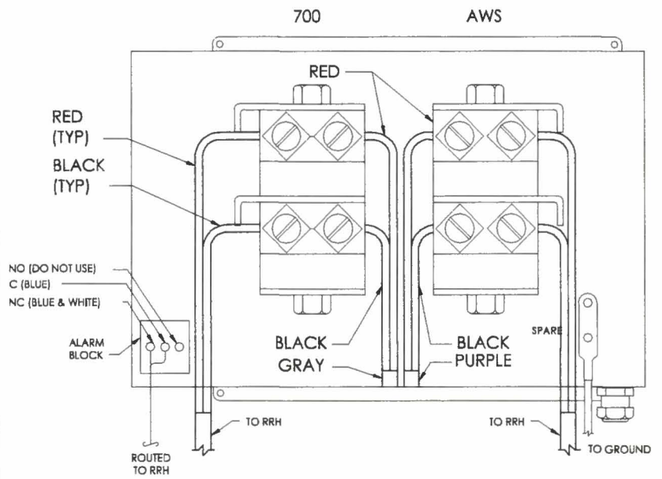
RAYCAP SURGE SUPPRESSION
DC2-48-60-0-9E #1

NO SCALE



RAYCAP SURGE SUPPRESSION
DC2-48-60-0-9E #2

NO SCALE

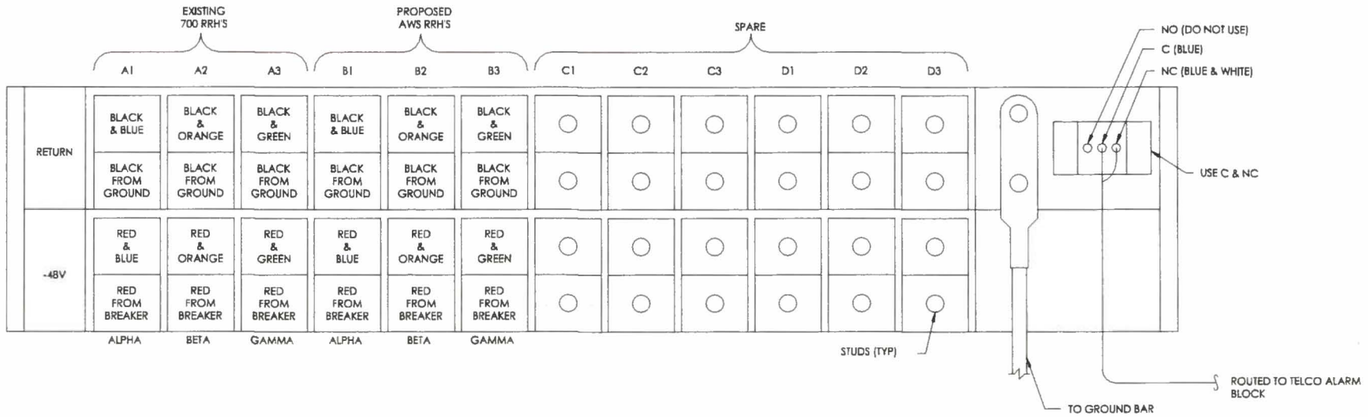


RAYCAP SURGE SUPPRESSION
DC2-48-60-0-9E #3

NO SCALE

NOTE

1. FOLLOW ATT-002-290-701 STANDARD COLOR CODE AND LABEL PER ATT-TP-76300 SECTION L INSTALLATION REQUIREMENTS.



REAR VIEW OF DC6-48-60-RM
DC SURGE SUPPRESSION WIRE DIAGRAM

NO SCALE

15-942571

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Mark	DATE	REVISION
1	03/19/2015	CONSTRUCTION

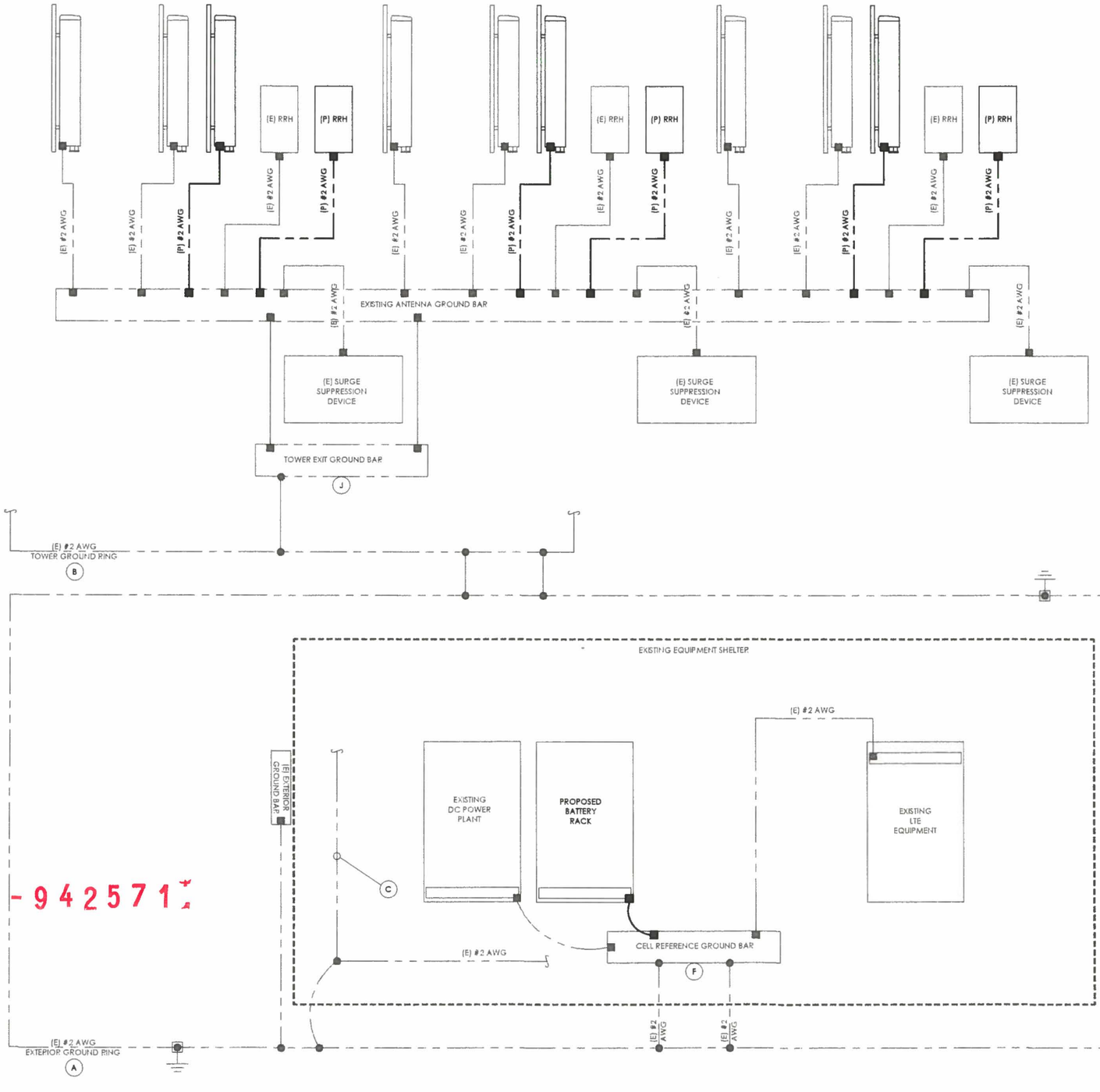
STATE OF COLORADO
GEORGE T. VALDEZ
305548
3-19-2015
LICENSED ARCHITECT

Customer:
HUMANA
COL01176
SITE ADDRESS:
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Project Number
BVC14200.0

Sheet Name
ELECTRICAL DC SURGE SUPPRESSION DIAGRAMS

Sheet Number
E-2



15-942571

ANTENNA EQUIPMENT GROUNDING ONE-LINE

NO SCALE

A

● EXOTHERMIC CONNECTION
■ MECHANICAL CONNECTION
GROUND ROD
T TEST GROUND ROD WITH INSPECTION SLEEVE

LEGEND

1. GROUNDING IS SHOWN DIAGRAMMATICALLY ONLY.
2. CONTRACTOR SHALL GROUND ALL EQUIPMENT AS A COMPLETE SYSTEM. GROUNDING SHALL BE IN COMPLIANCE WITH NEC SECTION 250 AND AT&T GROUNDING AND BONDING REQUIREMENTS (ATT-TP-76416) AND MANUFACTURER'S SPECIFICATIONS.
3. ALL GROUND CONDUCTORS SHALL BE COPPER; NO ALUMINUM CONDUCTORS SHALL BE USED.
4. GROUDING IS TYPICAL FOR BOTH UMTS AND LTE ANTENNAS AND REMOTE RADIO HEADS.

NOTES

(A) EXTERIOR GROUND RING: #2 AWG SOLID COPPER, BURIED AT A DEPTH OF AT LEAST 30 INCHES BELOW GRADE, OR 6 INCHES BELOW THE FROST LINE AND APPROXIMATELY 24 INCHES FROM THE EXTERIOR WALL OR FOOTING. (ATT-TP-76416 2.2.3.5/7.5.1)

(B) TOWER GROUND RING: THE GROUND RING SYSTEM SHALL BE INSTALLED AROUND AN ANTENNA TOWER'S LEGS, AND/OR GUY ANCHORS. WHERE SEPARATE SYSTEMS HAVE BEEN PROVIDED FOR THE TOWER AND THE BUILDING, AT LEAST TWO BONDS SHALL BE MADE BETWEEN THE TOWER RING GROUND SYSTEM AND THE BUILDING RING GROUND SYSTEM USING MINIMUM #2 AWG SOLID COPPER CONDUCTORS. (ATT-TP-76416 7.5.1)

(C) INTERIOR GROUND RING: #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTOR EXTENDED AROUND THE PERIMETER OF THE EQUIPMENT AREA. ALL NON-TELECOMMUNICATIONS RELATED METALLIC OBJECTS FOUND WITHIN A SITE SHALL BE GROUNDED TO THE INTERIOR GROUND RING WITH #6 AWG STRANDED GREEN INSULATED CONDUCTOR. (ATT-TP-76416 7.6.4)

(D) BOND TO INTERIOR GROUND RING: #2 AWG SOLID TINNED COPPER WIRE PRIMARY BONDS SHALL BE PROVIDED AT LEAST AT FOUR POINTS ON THE INTERIOR GROUND RING, LOCATED AT THE CORNERS OF THE BUILDING. (ATT-TP-76416 7.5.2.2)

(E) GROUND ROD: UL LISTED COPPER CLAD STEEL, MINIMUM 5/8 " DIAMETER BY EIGHT FEET LONG. ALL GROUND RODS MAY BE INSTALLED WITH INSPECTION SLEEVES. GROUND RODS SHALL BE DRIVEN TO THE DEPTH OF GROUND RING CONDUCTOR. (ATT-TP-76416 1.4 / 2.2.3.10)

(F) CELL REFERENCE GROUND BAR: POINT OF GROUND REFERENCE FOR ALL COMMUNICATIONS EQUIPMENT FRAMES. ALL BONDS ARE MADE WITH #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS. BOND TO GROUND RING WITH (2) #2 SOLID TINNED COPPER CONDUCTORS. (ATT-TP-76416 7.6.7)

(G) HATCH PLATE GROUND BAR: BOND TO THE INTERIOR GROUND RING WITH TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS. WHEN A HATCH-PLATE AND A CELL REFERENCE GROUND BAR ARE BOTH PRESENT, THE CRGB MUST BE CONNECTED TO THE HATCH-PLATE AND TO THE INTERIOR GROUND RING USING TWO #2 AWG STRANDED GREEN INSULATED COPPER CONDUCTORS.

(H) EXTERIOR CABLE ENTRY PORT GROUND BARS: LOCATED AT THE ENTRANCE TO THE CELL SITE BUILDING. BOND TO GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTORS WITH AN EXOTHERMIC WELD AND INSPECTION SLEEVE. (ATT-TP-76416 7.6.7.2)

(J) TOWER EXIT GROUND BAR: #2 AWG SOLID TINNED COPPER BOND TO THE TOWER GROUND RING. (ATT-TP-76416 7.5.5)

(K) TELCO GROUND BAR: BOND TO BOTH CELL REFERENCE GROUND BAR AND EXTERIOR GROUND RING. (ATT-TP-76416 7.6.8)

(L) FRAME BONDING: THE BONDING POINT FOR TELECOM EQUIPMENT FRAMES SHALL BE THE GROUND BUS THAT IS NOT ISOLATED FROM THE EQUIPMENTS METAL FRAMEWORK. BOND THE FRAME GROUND BUS OR SUPPLEMENTARY CONDUCTOR TO THE "I" SECTION OF THE CELL REFERENCE GROUND BAR. (ATT-TP-76416 6.5.3 AND 7.8)

(M) INTERIOR UNIT BONDS: METAL FRAMES, CABINETS AND INDIVIDUAL METALLIC UNITS LOCATED WITH THE AREA OF THE INTERIOR GROUND RING REQUIRE A #6 AWG STRANDED GREEN INSULATED COPPER BOND TO THE INTERIOR GROUND RING. (ATT-TP-76416 7.12.8.1)

(N) FENCE AND GATE GROUNDING: METAL FENCES WITHIN 7 FEET OF THE EXTERIOR GROUND RING OR OBJECTS BONDED TO THE EXTERIOR GROUND RING SHALL BE BONDED TO THE GROUND RING WITH A #2 AWG SOLID TINNED COPPER CONDUCTOR AT AN INTERVAL NOT EXCEEDING 25 FEET. BONDS SHALL BE MADE AT EACH GATE POST AND ACROSS GATE OPENINGS. (ATT-TP-76416 7.12.2.2)

(P) EXTERIOR UNIT BONDS: METALLIC OBJECTS, EXTERNAL TO OR MOUNTED TO THE BUILDING, SHALL BE BONDED TO THE EXTERIOR GROUND RING. (ATT-TP-76416 7.12.2)

(Q) ICE BRIDGE SUPPORTS: EACH ICE BRIDGE LEG SHALL BE BONDED TO THE GROUND RING WITH #2 AWG BARE TINNED COPPER CONDUCTOR. PROVIDE EXOTHERMIC WELDS AT BOTH THE ICE BRIDGE LEG AND BURIED GROUND RING. (ATT-TP-76416 7.4.2.6)

(R) DURING ALL DC POWER SYSTEM CHANGES INCLUDING DC SYSTEM CHANGE OUTS, RECTIFIER REPLACEMENTS OR ADDITIONS, BREAKER DISTRIBUTION CHANGES, BATTERY ADDITIONS, BATTERY REPLACEMENTS AND INSTALLATIONS OR CHANGES TO DC CONVERTER SYSTEMS IT SHALL BE REQUIRED THAT SERVICES CONTRACTORS VERIFY ALL DC POWER SYSTEMS ARE EQUIPPED WITH A MASTER DC SYSTEM RETURN GROUND CONDUCTOR FROM THE DC POWER SYSTEM COMMON RETURN BUS DIRECTLY CONNECTED TO THE CELL SITE REFERENCE GROUND BAR (CRGB) PER TP76300 SECTION H 6 AND TP76416 FIGURE 7-11 REQUIREMENTS.

GROUNDING KEY NOTES

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EA	MM

REVISION #	DATE
0	08/19/2015
CONSTRUCTION	

STATE OF COLORADO
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36548
8-19-2015
LICENSED ARCHITECT

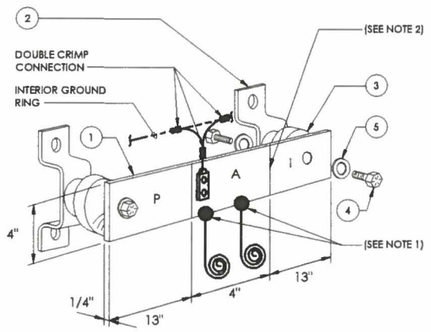
SITE NAME:
HUMANA
COL01176
SITE ADDRESS:
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AURORA, CO 80012

Project Number
BVC14200.0

Sheet Name
ELECTRICAL GROUNDING PLAN

Sheet Number
G-1

NEWTON INSTRUMENT COMPANY, INC. BUTNER, N.C.			
NO	REQUIRED	PART NUMBER	DESCRIPTION
1	1	1/4"x4"x30"	SOLID GROUND BAR
2	2	A-6056	WALL MOUNTING BRACKET
3	2	3061-4	INSULATORS
4	4	3012-1	5/8"-11, 1" H.H.C.S.
5	4	3015-8	5/8" LOCKWASHER



EACH GROUND CONDUCTOR TERMINATING ON ANY GROUND BAR SHALL HAVE AN IDENTIFICATION TAG ATTACHED AT EACH END THAT WILL IDENTIFY ITS ORIGIN AND DESTINATION

SECTION "P" - SURGE PROTECTORS

(EC) CELL REFERENCE GROUND BAR (IF COLLOCATED)
(EC) GENERATOR FRAMEWORK (IF AVAILABLE) (#2 AWG)
(EC) TELCO GROUND BAR (#2 AWG)
(EC) COMMERCIAL POWER COMMON NEUTRAL/GROUNDING BOND (3/0)
(EC) FIBER GROUND BAR (#2 AWG)
(EC) POWER ROOM REFERENCE GROUND BAR (#2 AWG)
(AT&T) RECTIFIER FRAMES

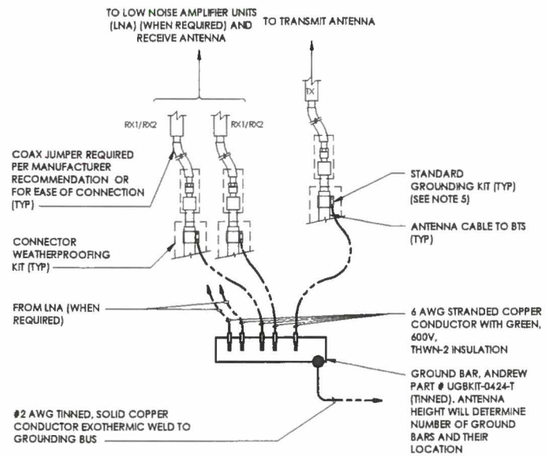
SECTION "A" - SURGE ABSORBERS

(EC) INTERIOR GROUND RING (#2 AWG)
(EC) EXTERNAL EARTH GROUNDING FIELD (BURIED GROUND RING) ((2) #2 AWG)
(EC) METALLIC COLD WATER PIPE (IF AVAILABLE) (1/0 AWG)
(EC) BUILDING STEEL (IF AVAILABLE) (1/0 AWG)

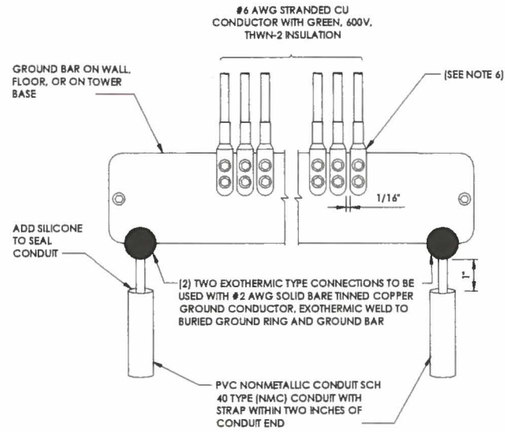
SECTION "I" - ISOLATED GROUNDING ZONE

(AT&T) ALL ISOLATED GROUNDING REFERENCE
(AT&T) GROUND WINDOW BAR

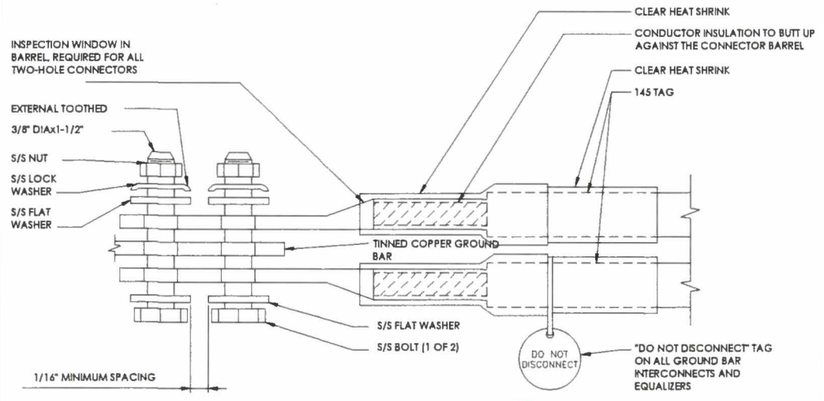
(MGB) REFERENCE GROUND BAR | NO SCALE | 1



ANTENNA GROUND BAR | NO SCALE | 2

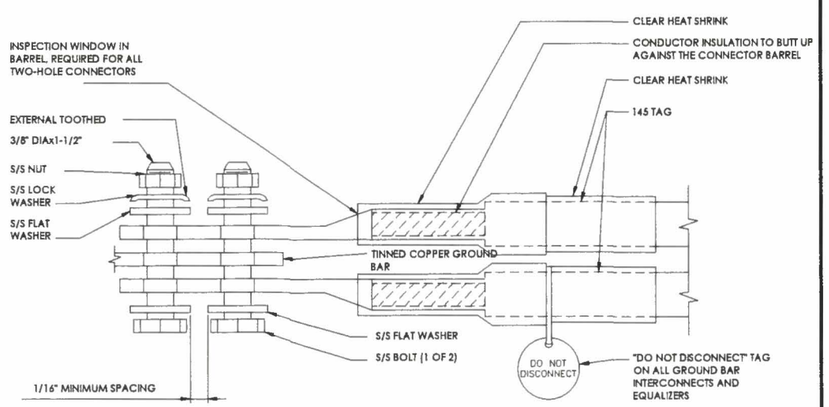


GROUND BAR DETAIL | NO SCALE | 3

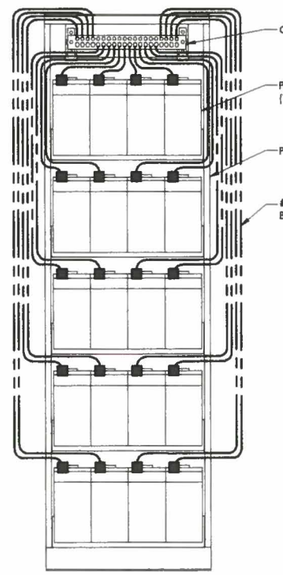


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EXTERIOR TWO HOLE LUG DETAIL | NO SCALE | 4



INTERIOR TWO HOLE LUG DETAIL | NO SCALE | 5



BATTERY RACK GROUNDING DETAIL | NO SCALE | 6

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EA	MM

REVISION	DATE	BY
CONSTRUCTION	10/19/2015	EA

STATE OF COLORADO
GEORGE J. VITALE
303548
9-2015
LICENSED ARCHITECT
Seal

SITE NAME:
HUMANA
COL01176
SITE ADDRESS:
1501 SOUTH POTOMAC
AURORA, CO 80012

Project Number
BVC14200.0

Sheet Name
GROUNDING DETAILS

Sheet Number
G-2

GENERAL CONSTRUCTION NOTES

GENERAL CONSTRUCTION

1. FOR THE PURPOSE OF CONSTRUCTION DRAWINGS, THE FOLLOWING DEFINITIONS SHALL APPLY:
   GENERAL CONTRACTOR: OVERLAND CONTRACTING INC. (B&V)
   CONTRACTOR: (CONSTRUCTION)
   OWNER: AT&T
2. ALL SITE WORK SHALL BE COMPLETED AS INDICATED ON THE DRAWINGS AND AT&T PROJECT SPECIFICATIONS.
3. GENERAL CONTRACTOR SHALL VISIT THE SITE AND SHALL FAMILIARIZE HIMSELF WITH ALL CONDITIONS AFFECTING THE PROPOSED WORK AND SHALL MAKE NECESSARY PROVISIONS. PRIOR TO PROCEEDING WITH CONSTRUCTION, GENERAL CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH ALL CONTRACT DOCUMENTS, SITE CONDITIONS, DIMENSIONS, AND CONFIRMING THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON PLAN. ANY DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.
4. MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. GENERAL CONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF WORK.
5. ALL WORK CARRIED OUT SHALL COMPLY WITH APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS IN ADDITION TO LOCAL JURISDICTIONAL CODES, ORDINANCES, AND APPLICABLE REGULATIONS.
6. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS SHOWN ON THE DRAWINGS.
7. PLANS SHALL NOT BE SCALED. THESE PLANS ARE INTENDED TO BE A DIAGRAMMATIC OUTLINE ONLY, UNLESS OTHERWISE NOTED. DIMENSIONS SHOWN ARE TO FINISH SURFACES, UNLESS OTHERWISE NOTED. SPACING BETWEEN EQUIPMENT IS THE MINIMUM REQUIRED CLEARANCE. IT IS CRITICAL TO FIELD VERIFY ALL DIMENSIONS. SHOULD THERE BE ANY QUESTIONS REGARDING THE PLAN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A CLARIFICATION FROM THE ENGINEER PRIOR TO PROCEEDING WITH THE WORK. DETAILS ARE INTENDED TO SHOW DESIGN INTENT. MODIFICATIONS MAY BE REQUIRED TO SUIT JOB DIMENSIONS OR CONDITIONS. SUCH MODIFICATIONS SHALL BE INCLUDED AS PART OF WORK AND APPROVED BY THE ENGINEER PRIOR TO PROCEEDING WITH WORK.
8. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
9. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THE PLAN, THE CONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE ENGINEER PRIOR TO PROCEEDING.
10. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE SAFETY OF WORK AREA, ADJACENT AREAS, AND BUILDING OCCUPANTS THAT ARE LIKELY TO BE AFFECTED BY THE WORK UNDER THIS CONTRACT. WORK SHALL CONFORM TO ALL OSHA REQUIREMENTS AND THE LOCAL JURISDICTION.
11. GENERAL CONTRACTOR SHALL COORDINATE AND SCHEDULE WORK ACTIVITIES WITH OTHER DISCIPLINES.
12. ERECTION SHALL BE DONE IN A WORKMANLIKE MANNER BY COMPETENT, EXPERIENCED WORKMEN IN ACCORDANCE WITH APPLICABLE CODES AND THE BEST ACCEPTED PRACTICE. ALL MEMBERS SHALL BE LAID PLUMB AND TRUE AS INDICATED ON THE DRAWINGS.
13. SEAL PENETRATIONS THROUGH FIRE RATED AREAS, SHALL BE MADE WITH UL LISTED MATERIALS, APPROVED BY THE LOCAL JURISDICTION. CONTRACTOR SHALL KEEP AREA CLEAN AND HAZARD FREE, AND DISPOSE OF ALL DEBRIS DAILY.
14. AS-BUILT CONDITIONS ARE REPRESENTED BY LIGHT SHADED LINES AND NOTES. THE SCOPE OF WORK FOR THIS PROJECT IS REPRESENTED BY DARK SHADED LINES AND NOTES. CONTRACTOR SHALL NOTIFY THE GENERAL CONTRACTOR OF ANY EXISTING CONDITIONS THAT DEVIATE FROM THE DRAWINGS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
15. CONTRACTOR SHALL PROVIDE WRITTEN NOTICE TO THE CONSTRUCTION MANAGER, 48 HOURS PRIOR TO COMMENCEMENT OF WORK.
16. THE CONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING, AND STRUCTURES DURING CONSTRUCTION OPERATIONS. ANY DAMAGED AREAS/ SITE ELEMENTS SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
17. THE CONTRACTOR SHALL CONTACT UTILITY LOCATING SERVICES PRIOR TO THE START OF CONSTRUCTION. CONTRACTOR IS ALSO RESPONSIBLE FOR THE NOTIFICATION OF TIER-TWO FACILITY/UTILITY OWNERS.
18. GENERAL CONTRACTOR SHALL COORDINATE AND MAINTAIN ACCESS FOR ALL TRADES AND CONTRACTORS TO THE SITE AND/OR BUILDING.
19. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR SECURITY OF THE SITE FOR THE DURATION OF CONSTRUCTION UNTIL JOB COMPLETION.
20. THE GENERAL CONTRACTOR SHALL MAINTAIN IN GOOD CONDITION ONE COMPLETE SET OF PLANS WITH ALL REVISIONS, ADDENDA, AND CHANGE ORDERS, ON THE PREMISES, AT ALL TIMES.
21. THE CONTRACTOR SHALL PROVIDE PORTABLE FIRE EXTINGUISHERS WITH A RATING OF NOT LESS THAN 2-A OT 2-A:10-B:C LOCATED WITHIN 25 FEET OF TRAVEL DISTANCE TO WORK ALL AREAS OR WHERE WORK IS BEING PERFORMED DURING CONSTRUCTION.
22. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES SHALL BE PROTECTED AT ALL TIMES, AND WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, SHALL BE RELOCATED AS DIRECTED BY THE ENGINEER. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR DRILLING PIERS AROUND OR NEAR UTILITIES. CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW. TRAINING SHALL INCLUDE BUT NOT BE LIMITED TO A) FALL PROTECTION, B) CONFINED SPACE, C) ELECTRICAL SAFETY, AND D) TRENCHING & EXCAVATION.
23. ALL EXISTING INACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED, CAPPED, PLUGGED, OR OTHERWISE DISCONNECTED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, AS DIRECTED BY THE RESPONSIBLE ENGINEER, AND SUBJECT TO THE APPROVAL OF THE OWNER AND/OR LOCAL UTILITIES.
24. THE AREAS OF THE OWNER'S PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE TOWER, EQUIPMENT, OR DRIVEWAY, SHALL BE GRADED TO A UNIFORM SLOPE AND PROPERLY STABILIZED TO PREVENT EROSION.
25. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO THE SITE DURING CONSTRUCTION. EROSION CONTROL AND SEDIMENT CONTROL MEASURES, IF REQUIRED DURING CONSTRUCTION, SHALL BE IN CONFORMANCE WITH FEDERAL AND/OR LOCAL JURISDICTIONS.
26. FILL OR EMBANKMENT MATERIAL SHALL NOT BE PLACED ON FROZEN GROUND. FROZEN MATERIALS, SNOW, OR ICE SHALL NOT BE PLACED IN ANY FILL OR EMBANKMENT.
27. THE SUBGRADE SHALL BE BROUGHT TO A SMOOTH UNIFORM GRADE AND COMPACTED TO 95 PERCENT STANDARD PROCTOR UNDER PAVEMENT AND STRUCTURES AND 80 PERCENT STANDARD PROCTOR IN OPEN SPACE. ALL TRENCHES IN THE PUBLIC RIGHT-OF-WAY SHALL BE BACKFILLED WITH FLOWABLE FILL OR OTHER MATERIAL, PRE-APPROVED BY THE LOCAL JURISDICTION.
28. ALL NECESSARY RUBBISH, STUMPS, DEBRIS, STICKS, STONES, AND OTHER REFUSE SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A LAWFUL MANNER.
29. ALL BROCHURES, OPERATION MANUALS, MAINTENANCE MANUALS, CATALOGS, SHOP DRAWINGS, AND OTHER DOCUMENTS SHALL BE TURNED OVER TO THE GENERAL CONTRACTOR AT COMPLETION OF CONSTRUCTION AND PRIOR TO PAYMENT.
30. CONTRACTOR SHALL SUBMIT A COMPLETE SET OF AS-BUILT REDLINES TO THE GENERAL CONTRACTOR UPON COMPLETION OF PROJECT AND PRIOR TO FINAL PAYMENT.
31. THE PROPOSED FACILITY WILL BE UNMANNED, DOES NOT REQUIRE POTABLE WATER OR SEWER SERVICE, AND IS NOT FOR HUMAN HABITAT (NO HANDICAP ACCESS REQUIRED).
32. OCCUPANCY IS LIMITED TO PERIODIC MAINTENANCE AND INSPECTION OF APPROXIMATELY TWO TIMES PER MONTH BY AT&T TECHNICIANS.
33. NO OUTDOOR STORAGE OR SOLID WASTE CONTAINERS ARE PROPOSED.
34. ALL MATERIAL SHALL BE FURNISHED AND WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST REVISION AT&T MOBILITY GROUNDING STANDARD "TECHNICAL SPECIFICATION FOR CONSTRUCTION OF GSM WIRELESS SITES" AND "TECHNICAL SPECIFICATION FOR FACILITY GROUNDING". IN CASE OF A CONFLICT BETWEEN THE CONSTRUCTION SPECIFICATIONS AND THE DRAWINGS, THE DRAWINGS SHALL GOVERN.
35. CONTRACTORS SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS REQUIRED FOR CONSTRUCTION. IF CONTRACTOR CANNOT OBTAIN A PERMIT, THEY MUST NOTIFY THE GENERAL CONTRACTOR IMMEDIATELY.
36. CONTRACTOR SHALL REMOVE ALL TRASH AND DEBRIS FROM THE SITE ON A DAILY BASIS.
37. CONTRACTOR SHALL LEAVE PREMISES IN A CLEAN CONDITION.
38. INFORMATION SHOWN ON THESE DRAWINGS WAS OBTAINED FROM SITE OBSERVATIONS AND/OR DRAWINGS PROVIDED BY THE SITE OWNER. CONTRACTORS SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
39. WHITE STROBE LIGHTS ARE NOT PERMITTED. IF LIGHTING IS REQUIRED, IT SHALL MEET FAA STANDARDS AND REQUIREMENTS.
40. ALL COAXIAL CABLE CONTRACTOR SHALL INSTALL PER MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.

ANTENNA MOUNTING

41. DESIGN AND CONSTRUCTION OF ANTENNA SUPPORTS SHALL CONFORM TO CURRENT ANSI/TIA-222 OR APPLICABLE LOCAL CODES.
42. ALL STEEL MATERIALS SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT-DIP GALVANIZED) COATINGS ON IRON AND STEEL PRODUCTS", UNLESS NOTED OTHERWISE.
43. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC-COATING (HOT-DIP) ON IRON AND STEEL HARDWARE", UNLESS NOTED OTHERWISE.
44. DAMAGED GALVANIZED SURFACES SHALL BE REPAIRED BY COLD GALVANIZING IN ACCORDANCE WITH ASTM A780.
45. ALL ANTENNA MOUNTS SHALL BE INSTALLED WITH LOCK WASHERS AND/OR DOUBLE NUTS, AND SHALL BE TORQUED TO MANUFACTURER'S RECOMMENDATIONS.
46. CONTRACTOR SHALL INSTALL ANTENNA AND ASSOCIATED GROUNDING PER MANUFACTURER'S RECOMMENDATIONS.
47. ALL UNUSED PORTS ON ANY ANTENNA OR TMA, SHALL BE COVERED BY CONCEALOR CAP WITH PROPER WEATHER PROOFING OR BE TERMINATED WITH A 50 Ω LOAD.
48. PRIOR TO SETTING ANTENNA AZIMUTHS AND DOWNTILTS, ANTENNA CONTRACTOR SHALL CHECK THE ANTENNA MOUNT FOR TIGHTNESS AND ENSURE THAT THEY ARE PLUMB. ANTENNA AZIMUTHS SHALL BE SET FROM TRUE NORTH AND BE ORIENTED WITHIN +/- 3 DEGREES AS DEFINED BY THE RFDS. ANTENNA DOWNTILTS SHALL BE WITHIN +/- 0.5 DEGREES AS DEFINED BY THE RFDS. REFER TO ATT-002-290-210.
49. JUMPERS FROM THE TOWER MOUNTED AMPLIFIERS MUST TERMINATE TO OPPOSITE POLARIZATIONS IN EACH SECTOR.
50. CONTRACTOR SHALL RECORD THE SERIAL NUMBER, SECTOR, AND POSITION OF EACH ACTUATOR INSTALLED AT THE ANTENNAS AND PROVIDE THE INFORMATION TO AT&T.
51. TOWER MOUNTED AMPLIFIERS SHALL BE MOUNTED ON PIPE DIRECTLY BEHIND ANTENNAS AS CLOSE TO ANTENNA AS FEASIBLE IN A VERTICAL POSITION.
52. ANTENNAS SHALL HAVE A 4'-0" MINIMUM CENTER-TO-CENTER HORIZONTAL SEPARATION.

TORQUE REQUIREMENTS

53. ALL RF CONNECTIONS SHALL BE TIGHTENED BY A TORQUE WRENCH.
54. A TORQUE MARK FORMING A CONTINUOUS STRAIGHT LINE IS TO BE MADE IN THE FOLLOWING APPLICATIONS:
    A. RF CONNECTIONS - MARK BOTH SIDES OF THE CONNECTOR
    B. GROUNDING AND ANTENNA HARDWARE - MARK ON THE NUT SIDE OF THE BOLT, STARTING FROM THE THREADS TO THE SOLID SURFACE. SOLID SURFACE EXAMPLES INCLUDE A GROUND BAR OR ANTENNA BRACKET METAL.
55. ALL 8M ANTENNA HARDWARE SHALL BE TIGHTENED TO 9 LB-FT (12 NM).
56. ALL 12M ANTENNA HARDWARE SHALL BE TIGHTENED TO 43 LB-FT (58 NM).
57. ALL GROUNDING HARDWARE SHALL BE TIGHTENED UNTIL THE LOCK WASHER COLLAPSES AND THE GROUNDING HARDWARE IS NO LONGER LOOSE.
58. ALL DIN TYPE CONNECTIONS SHALL BE TIGHTENED TO 18-22 LB-FT (24.4 - 29.8 NM).
59. ALL N TYPE CONNECTIONS SHALL BE TIGHTENED TO 15-20 LB-IN (1.7 - 2.3 NM).

FIBER & POWER CABLE MOUNTING

60. THE FIBER OPTIC TRUNK CABLES SHALL BE INSTALLED IN CONDUITS OR INNERDUCT. WHEN UTILIZING A CABLE TRAY SYSTEM, PLACE FIBER OPTIC TRUNK CABLE INTO AN INTER-DUCT. A PARTITION BARRIER SHALL BE INSTALLED BETWEEN THE 600 VOLT CABLES AND THE INTER-DUCT IN ORDER TO SEGREGATE CABLE TYPES. OPTIC FIBER TRUNK CABLES SHALL HAVE APPROVED CABLE RESTRAINTS EVERY (6) SIX FEET AND SHALL BE SECURELY FASTENED TO THE CABLE TRAY SYSTEM. NFPA 70 (NEC) ATRICLE 770 RULES SHALL APPLY.
61. TYPE TC-ER CABLES SHALL BE INSTALLED INTO CONDUITS OR CABLE TRAYS, AND SHALL BE SECURED AT INTERVALS NOT EXCEEDING (6) FEET. WHERE TYPE TC-ER CABLES ARE NOT SUBJECT TO PHYSICAL DAMAGE, CABLES SHALL BE PERMITTED TO MAKE A TRANSITION BETWEEN CONDUITS OR CABLE TRAYS THAT ARE SERVICING UTILIZATION EQUIPMENT OR DEVICES. A TRANSITION DISTACE EXCEEDING (6) FEET REQUIRES CONTINUOUS SUPPORTING. NFPA 70 (NEC) ARTICLES 336 AND 392 RULES SHALL APPLY.
62. WHEN INSTALLING OPTIC FIBER TRUNK CABLES OR TYPE TC-ER CABLES INTO CONDUITS, NFPA 70 (NEC) ARTICLE 300 RULES SHALL APPLY.

COAXIAL CABLE NOTES

63. TYPES AND SIZES OF THE ANTENNA CABLES ARE BASED ON ESTIMATED LENGTHS. PRIOR TO ORDERING CABLE, CONTRACTOR SHALL VERIFY ACTUAL LENGTH BASED ON CONSTRUCTION LAYOUT AND NOTIFY THE PROJECT MANAGER IF ACTUAL LENGTHS EXCEED ESTIMATED LENGTHS.
64. CONTRACTOR SHALL VERIFY THAT THE DOWNTILT OF EACH ANTENNA IS WITHIN +/- 0.5 DEGREES OF SPECIFICATION WITH AN OCI APPROVED DIGITAL LEVEL.
65. CONTRACTOR SHALL CONFIRM COAX COLOR CODING PRIOR TO CONSTRUCTION. REFER TO LASTEST REVISION OF THE "ANTENNA SYSTEM LABELING STANDARD."
66. ALL COAXIAL CABLE SHALL BE SECURED TO THE DESIGNED SUPPORT STRUCTURE IN AN APPROVED MANNER, NOT TO EXCEED MANUFACTURER'S RECOMMENDATIONS.
67. COAXIAL CABLE SHALL BE SECURED TO THE DESIGNATED SUPPORT STRUCTURE(S) PER MANUFACTURER'S SPECIFICATIONS.

GENERAL CABLE AND EQUIPMENT NOTES

68. CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ANTENNA, TMAS, DIPLEXERS, COAX CONFIGURATION, MAKES, AND MODELS PRIOR TO INSTALLATION.
69. ALL CONNECTIONS FOR HANGERS, SUPPORTS, BRACING, ETC. SHALL BE INSTALLED PER TOWER MANUFACTURER'S RECOMMENDATIONS.
70. CONTRACTOR SHALL REFERENCE THE TOWER STRUCTURAL ANALYSIS/DESIGN DRAWINGS FOR DIRECTIONS ON CABLE DISTRIBUTION/ROUTING.
71. AFTER INSTALLATION AND FINAL CONNECTIONS ARE MADE, ALL OUTDOOR RF CONNECTORS/CONNECTIONS SHALL BE WEATHERPROOFED, EXCEPT THE RET CONNECTORS, USING BUTYL TAPE. BUTYL TAPE SHALL HAVE A MINIMUM OF ONE-HALF TAPE WIDTH OVERLAP ON EACH TURN AND EACH LAYER SHALL BE WRAPPED THREE TIMES. WEATHERPROOFING SHALL BE SMOOTH WITHOUT BUCKLING. BUTYL BLEEDING IS NOT ALLOWED. SELF BONDING TAPE AND PLASTIC ENCLOSURES ARE PERMITTED PER ATT-002-290-041, SECTION 7.
72. IF REQUIRED TO PAINT ANTENNAS AND/OR COAX:
    A. TEMPERATURE SHALL BE ABOVE 50 DEGREES FAHRENHEIT.
    B. PAINT COLOR MUST BE APPROVED BY BUILDING OWNER/LANDLORD.
    C. FOR REGULATED TOWERS, FAA/FCC APPROVED PAINT IS REQUIRED.
    D. DO NOT PAINT OVER COLOR CODING OR ON EQUIPMENT MODEL NUMBERS.
75. ALL CABLES SHALL BE GROUNDED WITH COAXIAL CABLE GROUND KITS. AT THE FOLLOWING LOCATIONS PER MANUFACTURER'S RECOMMENDATIONS:
    A. THE ANTENNA LEVEL.
    B. THE MID LEVEL, TOWERS WHICH ARE OVER 200'-0", ADDITIONAL CABLE GROUNDING REQUIRED.
    C. BASE OF TOWER PRIOR TO TURNING HORIZONTAL.
    D. OUTSIDE THE EQUIPMENT SHELTER AT ENTRY PORT.
76. ANTENNA CONTRACTOR SHALL FURNISH AND INSTALL A 12'-0" T-BOOM SECTOR ANTENNA MOUNT INCLUDING ALL HARDWARE, IF APPLICABLE.

15-942571

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DRAWN BY: EA | CHECKED: AMA

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Project Number: BVC14200.0

Sheet Name: GENERAL CONSTRUCTION NOTES

Sheet Number: GN-1

GENERAL ELECTRICAL NOTES

PART 1 - GENERAL

1.1 GENERAL CONDITIONS:

A. CONTRACTOR SHALL INSPECT THE EXISTING SITE CONDITIONS PRIOR TO PERFORMING WORK. ANY QUESTIONS ARISING DURING THE BID PERIOD REGARDING THE CONTRACTORS FUNCTIONS, THE SCOPE OF WORK, OR ANY OTHER ISSUE RELATED TO THIS PROJECT SHALL BE BROUGHT UP DURING THE BID PERIOD WITH THE PROJECT MANAGER FOR CLARIFICATION, PRIOR TO THE AWARD OF THE CONTRACT.

B. THE CONTRACTOR SHALL OBTAIN PERMITS, LICENSES, MAKE ALL DEPOSITS, AND PAY ALL FEES REQUIRED FOR THE CONSTRUCTION PERFORMANCE OF THE WORK UNDER THIS SECTION.

C. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS. DRAWING SHALL NOT BE SCALED TO DETERMINE DIMENSIONS. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF ALL SYSTEMS AND COMPONENTS COVERED UNDER THIS SECTION.

1.2 LAWS, REGULATIONS, ORDINANCES, STATUTES, AND CODES:

A. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, AND ALL APPLICABLE LOCAL LAWS, REGULATIONS, ORDINANCES, STATUTES, AND CODES. CONDUIT BENDS SHALL BE THE RADIUS BEND FOR THE TRADE SIZE OF CONDUIT IN COMPLIANCE WITH THE LATEST EDITIONS OF NEC.

1.3 REFERENCES:

A. THE PUBLICATIONS LISTED BELOW ARE PART OF THIS SPECIFICATION. EACH PUBLICATION SHALL BE THE LATEST REVISION AND ADDENDUM IN EFFECT ON THE DATE OF CONSTRUCTION, EXCEPT AS MODIFIED BY THE REQUIREMENT SPECIFIED HEREIN OR THE DETAILS OF THE DRAWINGS, WORK INCLUDED IN THIS SPECIFICATION SHALL CONFORM TO THE APPLICABLE PROVISION OF THESE PUBLICATIONS.

1. ANSI/IEEE (AMERICAN NATIONAL STANDARDS INSTITUTE)
2. ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)
3. ICE (INSULATED CABLE ENGINEERS ASSOCIATION)
4. NEMA (NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION)
5. NFPA (NATIONAL FIRE PROTECTION ASSOCIATION)
6. OSHA (OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION)
7. UL (UNDERWRITERS LABORATORIES, INC.)
8. AT&T GROUNDING AND BONDING STANDARDS TP-76416

1.4 SCOPE OF WORK:

A. WORK UNDER THIS SECTION SHALL CONSIST OF FURNISHING ALL LABOR, MATERIAL, AND ASSOCIATED SERVICES REQUIRED TO COMPLETE REQUIRED CONSTRUCTION AND TO ACHIEVE OPERATIONAL STATUS.

B. ALL ELECTRICAL EQUIPMENT UNDER THIS CONTRACT SHALL BE PROPERLY TESTED, ADJUSTED, AND ALIGNED BY THE CONTRACTOR.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATING, DRAINING, TRENCHING, BACKFILLING, AND REMOVAL OF EXCESS SOIL, FILL, AND DEBRIS.

D. THE CONTRACTOR SHALL FURNISH THE OWNER WITH CERTIFICATES OF A FINAL INSPECTION AND APPROVAL FROM THE JURISDICTIONAL AUTHORITIES.

E. IF APPLICABLE, THE CONTRACTOR SHALL PREPARE A COMPLETE SET OF AS-BUILT DRAWINGS TO DOCUMENT ALL WIRING EQUIPMENT CONDITIONS AND CHANGES WHILE COMPLETING THIS CONTRACT. THE AS-BUILT DRAWINGS SHALL BE SUBMITTED AT COMPLETION OF THE PROJECT TO THE APPROPRIATE PARTY.

PART 2 - PRODUCTS

2.1 GENERAL:

A. ALL MATERIALS AND EQUIPMENT SHALL BE NEW, UL LISTED, AND FREE FROM DEFECTS.

B. ALL EQUIPMENT SHALL BEAR THE UNDERWRITERS LABORATORIES (UL) LABEL OF APPROVAL AND SHALL CONFORM TO REQUIREMENT OF THE NATIONAL ELECTRICAL CODE.

C. ALL ITEMS, MATERIALS, AND EQUIPMENT SHALL BE ACCEPTABLE TO THE JURISDICTIONAL AUTHORITY AND SUITABLE FOR THE USE INTENDED.

D. ALL OVERCURRENT DEVICES SHALL HAVE AN INTERRUPTING CURRENT RATING OF GREATER THAN THE SHORT CIRCUIT CURRENT TO WHICH THEY ARE SUBJECTED (10,000 AIC MINIMUM). CONTRACTOR SHALL VERIFY THAT AVAILABLE SHORT CIRCUIT CURRENT DOES NOT EXCEED THE RATING OF ELECTRICAL EQUIPMENT IN ACCORDANCE WITH ARTICLE 110.24 NEC OR THE MOST CURRENT ADOPTED CODE PER THE GOVERNING JURISDICTION.

2.2 MATERIALS AND EQUIPMENT:

A. CONDUIT:

1. RIGID METAL CONDUIT (RMC) SHALL BE HOT-DIPPED GALVANIZED INSIDE AND OUTSIDE INCLUDING ENDS AND THREADS, AND ENAMELED OR LACQUERED INSIDE IN ADDITION TO GALVANIZING.
2. LIQUIDTIGHT FLEXIBLE METAL CONDUIT SHALL BE UL LISTED.
3. CONDUIT CLAMPS, STRAPS, AND SUPPORTS SHALL BE STEEL OR MALLEABLE IRON. ALL FITTINGS SHALL BE COMPRESSION AND CONCRETE-TIGHT TYPE. GROUNDING BUSHINGS WITH INSULATED THROATS SHALL BE INSTALLED ON ALL CONDUIT TERMINATIONS.
4. NONMETALLIC CONDUIT AND FITTINGS SHALL BE SCHEDULE 40 PVC AND INSTALLED USING SOLVENT-CEMENT-TYPE JOINTS AS RECOMMENDED BY THE MANUFACTURER.

B. CONDUCTORS AND CABLE:

1. CONDUCTORS AND CABLE SHALL BE FLAME-RETARDANT, MOISTURE AND HEAT RESISTANT THERMOPLASTIC, SINGLE CONDUCTOR, COPPER, TYPE THHN/THWN-2, 600 VOLT, SIZE AS INDICATED, ON PLANS THE MINIMUM SIZE CONDUCTOR USED SHALL BE #12 AWG.
2. #10 AWG AND SMALLER CONDUCTOR SHALL BE SOLID OR STRANDED. #8 AWG AND LARGER CONDUCTORS SHALL BE STRANDED.
3. SOLDERLESS COMPRESSION TYPE CONNECTORS SHALL BE USED FOR TERMINATION OF ALL STRANDED CONDUCTORS.
4. STRAIN-RELIEF SUPPORTS GRIPS SHALL BE HUBBELL KELLEMS OR APPROVED EQUAL. CABLES SHALL BE SUPPORTED IN ACCORDANCE WITH THE NEC AND CABLE MANUFACTURER'S RECOMMENDATIONS.
5. ALL CONDUCTORS SHALL BE TAGGED AT BOTH ENDS OF THE CONDUCTOR, AT ALL PULL BOXES, J-BOXES, EQUIPMENT, CABINETS SHALL BE IDENTIFIED WITH APPROVED PLASTIC TAGS (ACTION CRAFT, BRADY, OR APPROVED EQUAL).

C. DISCONNECT SWITCHES:

1. DISCONNECT SWITCHES SHALL BE HEAVY DUTY, DEAD-FRONT, QUICK-MAKE, QUICK-BREAK, EXTERNALLY OPERABLE, HANDLE LOCKABLE, INTERLOCK WITH COVER IN CLOSED POSITION, RATING AS INDICATED, UL LABELED, FURNISHED IN NEMA 3R ENCLOSURE, SQUARE-D, OR ENGINEERED APPROVED EQUAL.

D. CHEMICAL ELECTROLYTIC GROUNDING SYSTEM:

1. INSTALL CHEMICAL GROUNDING AS REQUIRED. THE SYSTEM SHALL BE ELECTROLYTIC MAINTENANCE FREE ELECTRODE CONSISTING OF RODS WITH A MINIMUM #2 AWG CU EXOTHERMALLY WELDED PIGTAIL, PROTECTIVE BOXES, AND BACKFILL MATERIAL. MANUFACTURER SHALL BE LYNCOLE XIT GROUNDING ROD TYPES K2-(*)CS OR K2L-(*)CS (*) LENGTH AS REQUIRED.
2. GROUND ACCESS BOX SHALL BE A POLYPLASTIC BOX FOR NON-TRAFFIC APPLICATIONS, INCLUDING BOLT DOWN FLUSH COVER WITH "BREATHER" HOLES, XIT MODEL #XB-22. ALL DISCONNECT SWITCHES AND CONTROLLING DEVICES SHALL BE PROVIDED WITH ENGRAVED LAMICOID NAMEPLATES INDICATING EQUIPMENT CONTROLLED, BRANCH CIRCUITS IDENTIFICATION NUMBERING, AND THE ELECTRICAL POWER SOURCE.
3. BACKFILL MATERIAL SHALL BE LYNCONITE AND LYNCOLE GROUNDING GRAVEL.

E. SYSTEM GROUNDING:

1. ALL GROUNDING COMPONENTS SHALL BE TINNED AND GROUNDING CONDUCTOR SHALL BE #2 AWG BARE, SOLID, TINNED COPPER. ABOVE-GRADE GROUNDING CONDUCTORS SHALL BE INSULATED WHERE NOTED.
2. GROUNDING BUSES SHALL BE BARE, TINNED, ANNEALED COPPER BARS OF RECTANGULAR CROSS SECTION. STANDARD BUS BARS MGB SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AND THEY SHALL NOT BE FABRICATED OR MODIFIED IN THE FIELD. ALL GROUNDING BUSES SHALL BE IDENTIFIED WITH MINIMUM 3/4" LETTERS BY STENCILING OR DESIGNATION PLATE.
3. CONNECTORS SHALL BE HIGH CONDUCTIVITY, HEAVY DUTY, LISTED AND LABELED AS GROUNDING CONNECTORS FOR THE MATERIALS USED. USE TWO-HOLE COMPRESSION LUGS WITH CLEAR HEAT SHRINK FOR MECHANICAL CONNECTIONS. USE TWO-HOLE COMPRESSION LUGS WITH INSPECTION WINDOW AND CLEAR HEAT SHRINK FOR INTERIOR AND BLACK HEAT SHRINK FOR EXTERIOR.
4. EXOTHERMIC WELDED CONNECTIONS SHALL BE PROVIDED IN KIT FORM AND SELECTED FOR THE SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND OTHER ITEMS TO BE CONNECTED.
5. GROUND RODS SHALL BE ERICO #615800, COPPER-CLAD STEEL WITH HIGH STRENGTH STEEL CORE AND ELECTROLYTIC GRADE COPPER OUTER SHEATH, MOLTEN WELDED TO CORE, AND 5/8"x10'-0". ALL GROUNDING RODS SHALL BE INSTALLED WITH INSPECTION SLEEVES AS SHOWN ON DRAWINGS.
6. INSTALL AN EQUIPMENT GROUNDING CONDUCTOR IN ALL CONDUITS IN COMPLIANCE WITH THE AT&T SPECIFICATIONS AND NEC. THE EQUIPMENT GROUNDING CONDUCTORS SHALL BE BONDED AT ALL JUNCTION BOXES, PULLBOXES, DISCONNECT SWITCHES, STARTERS, AND EQUIPMENT CABINETS.

F. OTHER MATERIALS:

1. THE CONTRACTOR SHALL PROVIDE OTHER MATERIALS, THOUGH NOT SPECIFICALLY DESCRIBED, WHICH ARE REQUIRED FOR A COMPLETELY OPERATIONAL SYSTEM AND PROPER INSTALLATION OF THE WORK.
2. PROVIDE PULL BOXES AND JUNCTION BOXES WHERE SHOWN OR REQUIRED BY NEC.

G. PANELS AND LOAD CENTERS:

1. ALL PANEL DIRECTORIES SHALL BE TYPEWRITTEN.

PART 3 - EXECUTION

3.1 GENERAL:

A. ALL MATERIAL AND EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

B. DURING INSTALLATION AND CONSTRUCTION PERIODS EQUIPMENT SHALL BE TIGHTLY COVERED AND PROTECTED AGAINST DIRT, WATER, AND CHEMICAL OR MECHANICAL INJURY.

3.2 LABOR AND WORKMANSHIP:

A. ALL LABOR FOR THE INSTALLATION OF MATERIALS AND EQUIPMENT FURNISHED FOR THE ELECTRICAL SYSTEM SHALL BE INSTALLED BY EXPERIENCED WIREMEN IN A NEAT AND WORKMAN-LIKE MANNER.

B. ALL ELECTRICAL EQUIPMENT SHALL BE ADJUSTED, ALIGNED, AND TESTED BY THE CONTRACTOR AS REQUIRED TO CONFIRM THE INTENDED PERFORMANCE.

C. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL THOROUGHLY CLEAN ALL EXPOSED EQUIPMENT, REMOVE ALL NECESSARY LABELS, DEBRIS, CRATING, OR CARTONS, AND LEAVE THE INSTALLATION FINISHED AND READY FOR OPERATION.

3.3 COORDINATION:

A. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ELECTRICAL ITEMS WITH THE OWNER-FURNISHED EQUIPMENT DELIVERY SCHEDULE TO PREVENT UNNECESSARY DELAYS IN THE SCHEDULED WORK.

3.4 INSTALLATION:

B. CONDUIT:

1. ALL ELECTRICAL WIRING SHALL BE INSTALLED IN CONDUIT AS SPECIFIED. NO CONDUIT OR TUBING OF LESS THAN 3/4" TRADE SIZE SHALL BE UTILIZED.
2. PROVIDE RIGID PVC SCHEDULE 80 CONDUITS FOR ALL RISERS UNLESS OTHERWISE NOTED. EMT MAY BE INSTALLED FOR EXTERIOR CONDUITS WHERE NOT SUBJECT TO PHYSICAL DAMAGE.
3. INSTALL SCHEDULE 40 PVC CONDUIT WITH A MINIMUM COVER OF 24" UNDER ROADWAYS, PARKING LOTS, STREETS, AND ALLEYS. CONDUIT SHALL HAVE A MINIMUM COVER OF 18" IN ALL NON-TRAFFIC APPLICATIONS (REFER TO 2008 OR LASTEST NEC, TABLE 300.5).
4. USE GALVANIZED FLEXIBLE STEEL CONDUIT AT LOCATIONS OF DIRECT CONNECTION TO EQUIPMENT THAT MOVES OR VIBRATES, OR FOR EASE OF MAINTENANCE. USE LIQUID TIGHT, FLEXIBLE METAL CONDUIT FOR OUTDOOR APPLICATIONS. INSTALL GALVANIZED FLEXIBLE STEEL CONDUIT AT ALL POINTS OF CONNECTION TO EQUIPMENT MOUNTED ON SUPPORTS TO ALLOW FOR EXPANSION AND CONTRACTION.
5. A RUN OF CONDUIT BETWEEN BOXES OR EQUIPMENT SHALL NOT CONTAIN MORE THAN THE EQUIVALENT OF THREE QUARTER-BENDS. CONDUIT BEND SHALL BE MADE WITH THE UL LISTED BENDER OR FACTORY 90 DEGREE ELBOWS MAY BE USED.
6. FIELD FABRICATED CONDUITS SHALL BE CUT SQUARE WITH A CONDUIT CUTTING TOOL AND REAMED TO PROVIDE A SMOOTH INSIDE SURFACE.
7. CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL CONDUITS DURING CONSTRUCTION. TEMPORARY OPENINGS IN THE CONDUIT SYSTEM SHALL BE PLUGGED OR CAPPED TO PREVENT ENTRANCE OF MOISTURE OR FOREIGN MATTER. CONTRACTOR SHALL REPLACE ANY CONDUITS CONTAINING FOREIGN MATERIALS THAT CANNOT BE REMOVED.
8. ALL CONDUITS SHALL BE SWABBED CLEAN BY PULLING AN APPROPRIATE SIZE MANDREL THROUGH THE CONDUIT BEFORE INSTALLATION OF CONDUCTORS OR CABLES. CONDUIT SHALL BE FREE OF DIRT AND DEBRIS.
9. INSTALL PULL STRINGS IN ALL CLEAN EMPTY CONDUITS. IDENTIFY PULL STRINGS AT EACH END.
10. INSTALL 2" HIGHLY VISIBLE AND DETECTABLE TAPE 12" ABOVE ALL UNDERGROUND CONDUITS AND CONDUCTORS.
11. CONDUITS SHALL BE INSTALLED IN SUCH A MANNER AS TO INSURE AGAINST COLLECTION OF TRAPPED CONDENSATION.
13. PROVIDE CORE DRILLING AS NECESSARY FOR PENETRATIONS TO ALLOW FOR RACEWAYS AND CABLES TO BE ROUTED THROUGH THE BUILDING. DO NOT PENETRATE STRUCTURAL MEMBERS. SLEEVES AND/OR PENETRATIONS IN FIRE RATED CONSTRUCTION SHALL BE EFFECTIVELY SEALED WITH FIRE RATED MATERIAL WHICH SHALL MAINTAIN THE FIRE RATING OF THE WALL OR STRUCTURE. FIRE STOPS AT FLOOR PENETRATIONS SHALL BE INSTALLED TO PREVENT PASSAGE OF WATER, SMOKE, FIRE, AND FUMES. ALL MATERIAL SHALL BE UL APPROVED FOR THIS PURPOSE.

B. CONDUCTORS AND CABLE:

1. ALL POWER WIRING SHALL BE COLOR CODED AS FOLLOWS:

DESCRIPTION	208/240/120 VOLT SYSTEMS
PHASE A	BLACK
PHASE B	RED
PHASE C	BLUE
NEUTRAL	WHITE
GROUNDING	GREEN

2. SPLICES SHALL BE MADE ONLY AT OUTLETS, JUNCTION BOXES, OR ACCESSIBLE RACEWAY CONDULETS APPROVED FOR THIS PURPOSE.
3. PULLING LUBRICANTS SHALL BE UL APPROVED. CONTRACTOR SHALL USE NYLON OR HEMP ROPE FOR PULLING CONDUCTOR OR CABLES INTO THE CONDUIT.
4. CABLES SHALL BE NEATLY TRAINED, WITHOUT INTERLACING, AND BE OF SUFFICIENT LENGTH IN ALL BOXES AND EQUIPMENT TO ALLOW FOR A NEAT ARRANGEMENT. CABLES SHALL BE SECURED IN A MANNER TO AVOID TENSION ON CONDUCTORS AND/OR TERMINALS. CONDUCTORS SHALL BE PROTECTED FROM MECHANICAL INJURY AND MOISTURE. SHARP BENDS OVER CONDUIT BUSHINGS ARE PROHIBITED. DAMAGED CABLES SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

C. DISCONNECT SWITCHES:

1. INSTALL DISCONNECT SWITCHES LEVEL AND PLUMB, AND CONNECT TO WIRING SYSTEM AND GROUNDING SYSTEM AS REQUIRED.

D. GROUNDING:

1. ALL METALLIC PARTS OF ELECTRICAL EQUIPMENT WHICH DO NOT CARRY CURRENT SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE BUILDING MANUFACTURER, AT&T GROUNDING AND BONDING STANDARDS TP-76416, TP-76300, AND THE NATIONAL ELECTRICAL CODE.
2. PROVIDE ELECTRICAL GROUNDING AND BONDING SYSTEM WITH ASSEMBLY OF MATERIALS, INCLUDING GROUNDING ELECTRODES, BONDING JUMPERS, AND ADDITIONAL ACCESSORIES AS REQUIRED FOR A COMPLETE INSTALLATION.
3. ALL GROUNDING CONDUCTORS SHALL PROVIDE A STRAIGHT DOWNWARD PATH TO GROUND. GROUNDING CONDUCTORS SHALL NOT BE LOOPED OR SHARPLY BENT. ROUTE GROUNDING CONNECTIONS AND CONDUCTORS TO GROUND IN THE SHORTEST AND STRAIGHTEST PATHS POSSIBLE TO MINIMIZE TRANSIENT VOLTAGE RISES.
4. AT BUILDINGS AND/OR NEW TOWERS GREATER THAN 75 FEET IN HEIGHT AND WHERE THE MAIN GROUNDING CONDUCTORS ARE REQUIRED TO BE ROUTED TO GRADE, THE CONTRACTOR SHALL ROUTE TWO GROUNDING CONDUCTORS FROM THE ROOFTOP, TOWERS, AND WATER TOWER GROUND RING, TO THE EXISTING GROUNDING SYSTEM. THE GROUNDING CONDUCTORS SHALL NOT BE SMALLER THAN #2 AWG COPPER. ROOFTOP GROUND RING SHALL BE BONDED TO THE EXISTING GROUNDING SYSTEM, THE BUILDING STEEL COLUMNS, THE LIGHTNING PROTECTION SYSTEM, AND/OR THE BUILDING MAIN WATER LINE (FERROUS OR NONFERROUS METAL PIPING ONLY). SEE STANDARD 6.3.2.2.
5. TIGHTEN GROUNDING AND BONDING CONNECTORS, INCLUDING SCREWS AND BOLTS, IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED TORQUE TIGHTENING SPECIFICATIONS. WHERE MANUFACTURER'S TORQUING REQUIREMENTS ARE NOT AVAILABLE, TIGHTEN CONNECTIONS TO COMPLY WITH TIGHTENING TORQUE VALUES SPECIFIED IN UL TO ASSURE PERMANENT AND EFFECTIVE GROUNDING.
6. CONTRACTOR SHALL VERIFY THE LOCATIONS OF GROUNDING TIE-IN POINTS TO THE EXISTING GROUNDING SYSTEM. ALL UNDERGROUND GROUNDING CONNECTIONS SHALL BE MADE BY THE EXOTHERMIC WELD PROCESS AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. ALL GROUNDING CONNECTIONS SHALL BE INSPECTED FOR TIGHTNESS. EXOTHERMIC WELDED CONNECTIONS SHALL BE APPROVED BY THE INSPECTOR HAVING JURISDICTION PRIOR TO PERMANENT CONCEALMENT.
8. APPLY CORROSION-RESISTANCE FINISH TO FIELD CONNECTIONS AND AREAS/COMPONENTS WHERE FACTORY APPLIED PROTECTIVE COATINGS HAVE BEEN DESTROYED.
9. A SEPARATE, CONTINUOUS, INSULATED EQUIPMENT GROUNDING CONDUCTOR SHALL BE INSTALLED IN ALL FEEDER AND BRANCH CIRCUITS.
10. BOND ALL INSULATED GROUNDING BUSHINGS WITH A BARE #6 AWG GROUNDING CONDUCTOR TO A GROUND BUS.
11. DIRECT-BURIED GROUNDING CONDUCTORS SHALL BE INSTALLED AT A NOMINAL DEPTH OF 36" MINIMUM BELOW GRADE, OR 6" MINIMUM BELOW THE FROST LINE, USING THE GREATER OF THE TWO DISTANCES.
12. ALL GROUNDING CONDUCTORS EMBEDDED IN OR PENETRATING CONCRETE SHALL BE INSTALLED IN SCHEDULE 40 PVC CONDUIT.
13. THE INSTALLATION OF A CHEMICAL ELECTROLYTIC GROUNDING SYSTEM IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. REMOVE SEALING TAPE FROM LEACHING AND BREATHER HOLES. INSTALL THE PROTECTIVE BOX FLUSH WITH GRADE.
14. DRIVE GROUND RODS UNTIL TOPS ARE A MINIMUM DISTANCE OF 36" DEPTH OR 6" BELOW FROST LINE, USING THE GREATER OF THE TWO DISTANCES.
15. IF COAX ON THE ICE BRIDGE IS MORE THAN 6 FEET FROM THE GROUND BAR AT THE BASE OF THE TOWER, INSTALL A SECOND GROUND BAR AT THE END OF THE ICE BRIDGE TO GROUND THE COAX CABLE GROUNDING KITS AND IN-LINE ARRESTORS.
16. CONTRACTOR SHALL REPAIR, AND/OR REPLACE, EXISTING GROUNDING SYSTEM COMPONENTS DAMAGED DURING CONSTRUCTION AT THE CONTRACTORS EXPENSE.

3.5 ACCEPTANCE TESTING:

A. CERTIFIED PERSONNEL USING CERTIFIED EQUIPMENT SHALL PERFORM REQUIRED TESTS AND SUBMIT WRITTEN TEST REPORTS UPON COMPLETION.

B. WHEN MATERIAL AND/OR WORKMANSHIP IS FOUND TO BE NON-COMPLIANT WITH THE SPECIFIED REQUIREMENTS, THE NON-COMPLIANT ITEMS/ELEMENTS SHALL BE PROMPTLY REMOVED FROM THE PROJECT SITE AND REPLACED WITH ITEMS COMPLYING WITH THE SPECIFIED REQUIREMENTS.

C. TEST PROCEDURES:

1. ALL FEEDERS SHALL HAVE INSULATION TESTED AFTER INSTALLATION, BEFORE CONNECTION TO DEVICES. THE CONDUCTORS SHALL TEST FREE FROM SHORT CIRCUITS AND GROUNDS. TESTING SHALL BE FOR ONE MINUTE USING 1,000VOLT DC.
2. PRIOR TO ENERGIZING CIRCUITRY, TEST WIRING DEVICES FOR ELECTRICAL CONTINUITY AND PROPER POLARITY CONNECTIONS.
3. MEASURE AND RECORD VOLTAGES BETWEEN PHASES AND BETWEEN PHASE CONDUCTORS AND NEUTRALS. SUBMIT A REPORT OF MAXIMUM AND MINIMUM VOLTAGES TO APPROPRIATE PARTS.
4. PERFORM GROUNDING TEST TO MEASURE RESISTANCE OF GROUNDING SYSTEM USING THE IEEE STANDARD 3-POINT "FALL-OF-POTENTIAL" METHOD. PROVIDE PLOTTED TEST VALUES AND LOCATION SKETCH. NOTIFY THE ENGINEER IMMEDIATELY IF MEASURED VALUE IS OVER 5 OHMS.

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DRAWN BY	CHECKED
EA	MM

MARK	DATE	REVISION
0	05/19/2015	CONSTRUCTION

STATE OF COLORADO
GEORGE A. VITALI
805548
5-19-2015
LICENSED ARCHITECT

Site Name:
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COL01176
SITE ADDRESS:
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Project Number
BVC14200.0

Sheet Name
GENERAL ELECTRICAL NOTES

Sheet Number
GN-2