



Extenet Systems, Inc.

BACK BAY ARCHITECTURAL COMMISSION 9/8/21

Scope of Work:

- ▶ Replace an existing metal light pole with a similar steel light pole in accordance with City of Boston standards. Also, the Applicant will attach a wireless communications antenna at the top of the new pole along with related equipment inside a mounted cabinet. Utilities to be brought underground to the new pole.
- ▶ This replacement will be done in accordance with the Agreement between the Applicant and the City of Boston.

Locations:



287 Dartmouth St. Plans.pdf



NE-MA- BSTN5G01- 01049	Back Bay Architectural Commission	Charlesgate East & Beacon St.	Existing Metal Light Pole
---------------------------------------	--------------------------------------------------	----------------------------------------------	--------------------------------------

PER 8/9/21 SITE VISIT PLEASE NOTE LOCATION OF NODE MUST BE PAST HYDRANT GOING EASTWARD WITH A MINIMUM CLEARANCE FROM HYDRANT OF FOUR FEET. PLEASE SEE PIC WITH MARKUPS ON PG. 2 ~ COB PWD STREETLIGHTING

AT&T ID / EXTENET ID:
mmBOS1049/NE-MA-BSTN5G01-01049

LATITUDE / LONGITUDE:
42.350382° / -71.091518°

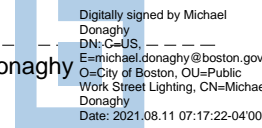
SITE ADDRESS:
CHARLES GATE E @ BEACON ST

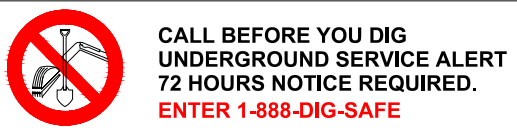
CITY, STATE, ZIP:
BOSTON, MA 02215

APPROVED



Location and Design Approved
Boston Public Works
Street Lighting Department

By:  Michael Donaghy
Date:



NOTE:
GENERAL CONTRACTOR IS REQUIRED TO CROSS CHECK COORDINATES, EXHIBIT PHOTO, AERIAL PHOTO AND SITE PLAN TO ENSURE PROPER POLE LOCATION PRIOR TO BREAKING GROUND, CONCERNS OR QUESTIONS SHOULD BE IMMEDIATELY DIRECTED TO ASSIGNED EXTENET PROJECT MANAGER.

GENERAL NOTES

THE FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION, A TECHNICIAN WILL VISIT THE SITE AS REQUIRED FOR ROUTINE MAINTENANCE. THE PROJECT WILL NOT RESULT IN ANY SIGNIFICANT DISTURBANCE OR EFFECT ON DRAINAGE; NO SANITARY SEWER SERVICE, POTABLE WATER OR TRASH DISPOSAL IS REQUIRED AND NO COMMERCIAL SIGNAGE.

SITE INFORMATION

CRAN ID:	mmBOS1049
EXTENET NODE ID:	NE-MA-BSTN5G01-01049
LATITUDE:	42.350382°
LONGITUDE:	-71.091518°
SITE ADDRESS:	CHARLES GATE E @ BEACON ST
CITY, STATE ZIP:	BOSTON, MA 02215
COUNTY:	SUFFOLK
JURISDICTION:	DCR
PROPERTY OWNER:	PUBLIC RIGHT-OF-WAY
APPLICANT:	EXTENET SYSTEMS 876 HAMMOND ST CHESTNUT HILL, MA 02467 (617) 232-4154

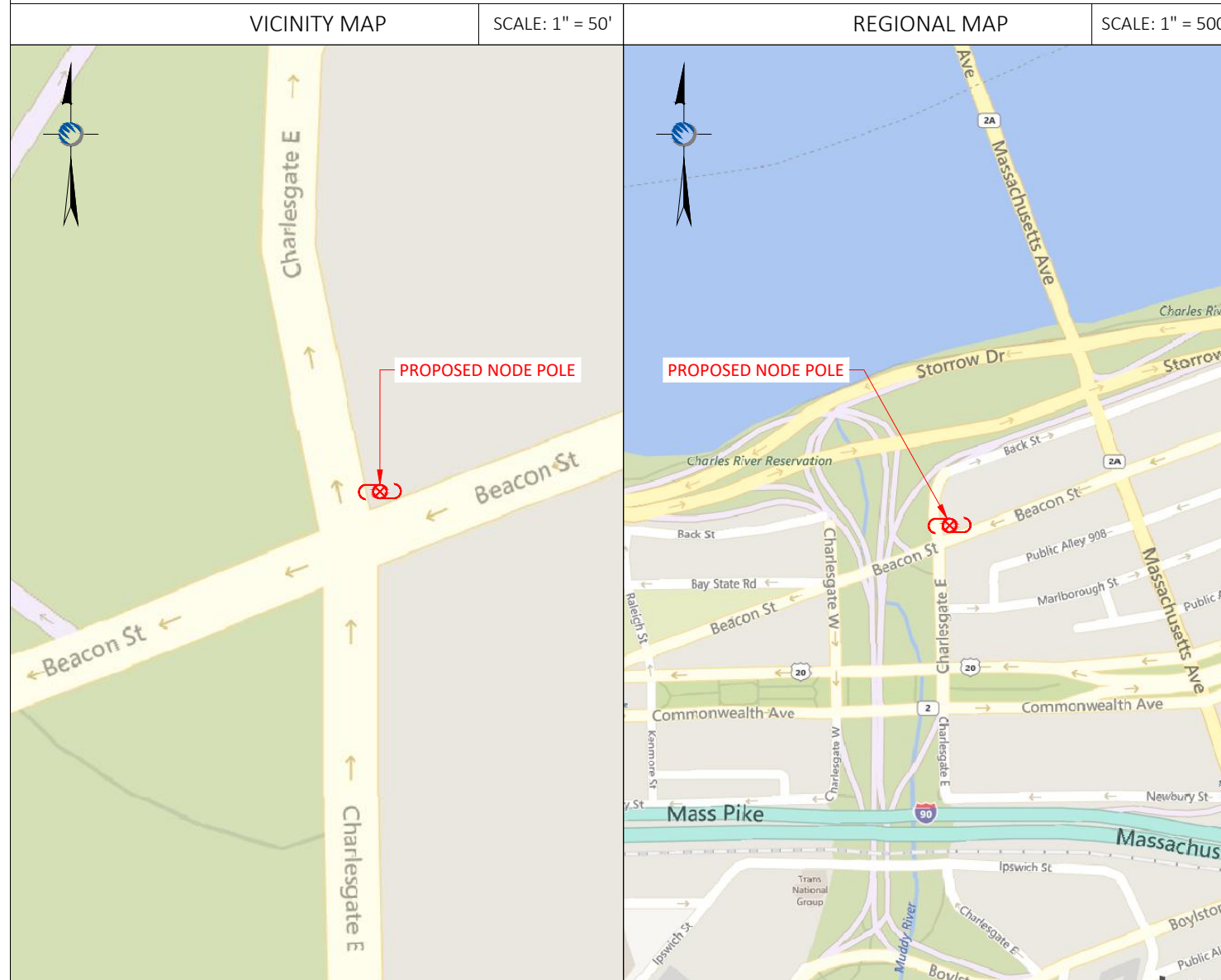
ENGINEER

RICK ANGELINI
3030 WARRENVILLE RD
SUITE 340
LISLE, IL 60532
NOC: (866) 892-5327

DO NOT SCALE DRAWINGS

CONTRACTORS SHALL VERIFY ALL PLANS, (EX.) DIMENSIONS & FIELD CONDITIONS ON THE JOB SITE & SHALL IMMEDIATELY NOTIFY THE ARCHITECT / ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

LOCATION MAPS



PROJECT DESCRIPTION

INVOLVING INSTALLMENT:
THESE PLANS REPRESENT A PORTION OF A PROPOSED SMALL CELL BUILD INVOLVING THE INSTALLMENT OF AN ANTENNA AND RADIO EQUIPMENT ON AN EXISTING WOODEN UTILITY OR REPLACEMENT METAL STREETLIGHT POLE.

CODES

2019 INTERNATIONAL BUILDING CODE
NATIONAL ELECTRIC SAFETY CODE
TIA/EIA-222-G-2 OR LATEST EDITION
LOCAL BUILDING / PLANNING CODE

DRAWING INDEX

SHEET NO:	SHEET TITLE
T-1	TITLE SHEET
A-1	SITE PLAN & EXHIBIT PHOTO
A-2	ELEVATIONS
A-3	ELEVATIONS
D-1	5G ANTENNA/RADIO DETAILS
D-2	4G ANTENNA DETAILS
D-3	4G RADIO SHROUD DETAILS
D-4	FOUNDATION DETAILS
D-5	GROUNDING & WIRING DIAGRAMS
GN-1	GENERAL NOTES
GN-2	GENERAL NOTES

LOCATION:
CHARLES GATE E @ BEACON ST
BOSTON, MA 02215

SUFFOLK COUNTY

P.E. STAMP AREA:

DRAWING NOTES:

ORIGINAL PLAN:	AS NOTED
SCALE:	AS NOTED
DRAWN BY:	DC
PLAN ORIG. DATE:	07/18/19

REV	DESCRIPTION	BY	DATE
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TITLE SHEET

SHEET NUMBER:
T-1

NOTE:
EXHIBIT PHOTO IS FOR
REFERENCE USE ONLY AND
SHOULD NOT BE USED FOR
CONSTRUCTION PURPOSES.

PROPOSED NODE POLE

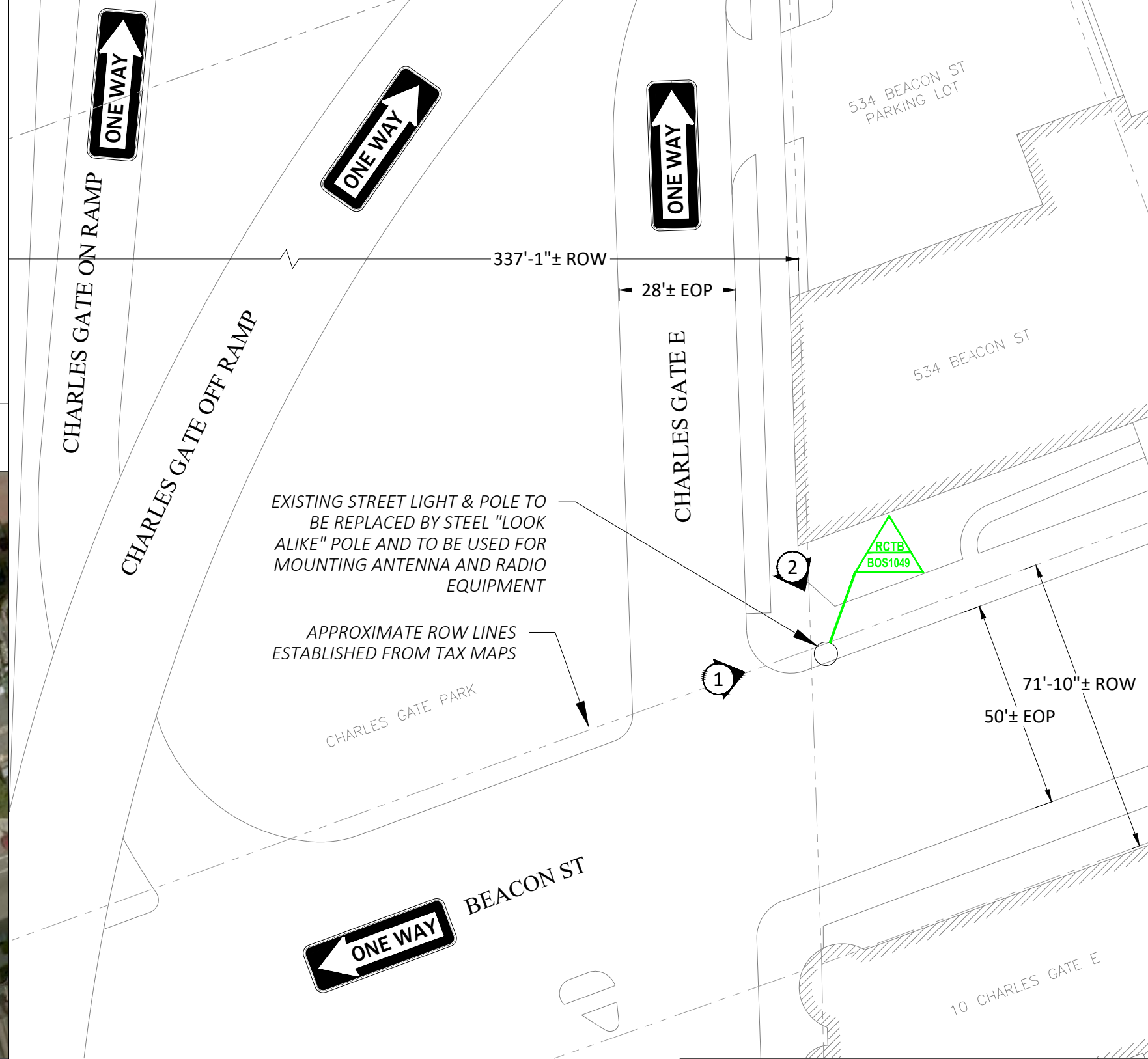


EXHIBIT PHOTO

SCALE: NOT TO SCALE

1

NOTE:
1. ALL DAMAGED AREAS SHALL BE RESTORED TO EQUAL OR BETTER CONDITION.
2. THIS SITE PLAN WAS GENERATED WITHOUT THE USE OF A SURVEY. PROPERTY LINES, RIGHT-OF-WAYS, POWER & TELCO UTILITY POINT CONNECTIONS / ROUTES AND EASEMENTS SHOWN ON THESE PLANS ARE ESTIMATED. ALL ITEMS AND DIMENSIONS SHOULD BE VERIFIED IN THE FIELD.
3. GENERAL CONTRACTORS ARE REQUIRED TO CROSS CHECK COORDINATES, AERIAL PHOTO AND SITE PLAN TO ENSURE PROPER POLE LOCATION PRIOR TO BREAKING GROUND. CONCERNS OR QUESTIONS SHOULD BE IMMEDIATELY DIRECTED TO THE ASSIGNED EXTENET PROJECT MANAGER.



ENLARGED SITE PLAN

SCALE: 1" = 30'

3

PLANS PREPARED FOR:

YOUR NETWORK. EVERYWHERE.

PLANS PREPARED BY:

Innovative Thinking. Engineered Solutions.
21 OXFORD RD
MANSFIELD, MA 02048
www.ucseeng.com 1-508-337-7600

LOCATION:
CHARLES GATE E @ BEACON ST
BOSTON, MA 02215
SUFFOLK COUNTY

P.E. STAMP AREA:

DRAWING NOTES:

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SCALE: AS NOTED
DRAWN BY: DC
PLAN ORIG. DATE: 07/18/19

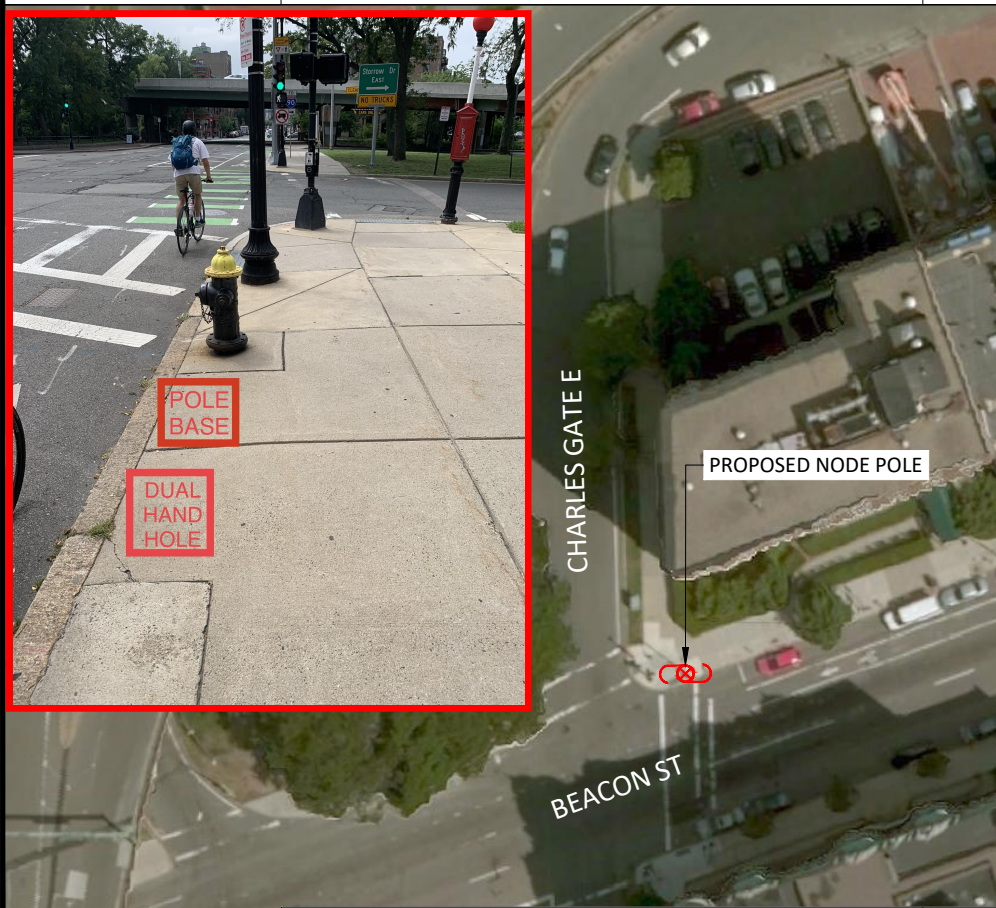
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SHEET TITLE:
SITE PLAN & EXHIBIT PHOTO

SHEET NUMBER:
A-1

7/26/19 \\MANYV-FILE01\Files\Engineering\Extenet_Systems\NE-MA-BSTN5G01-ATT 374AA - AUTOCAD\NPP\NE-MA-BSTN5G01-01049.dwg



AERIAL SITE LOCATION

SCALE: 1" = 60'

2

DRAWINGS NOTES:

NOTE 1:
40" MIN. WORKER SAFETY ZONE
BETWEEN LOWEST POWER & HIGHEST
COMMUNICATIONS CABLE
IN ACCORDANCE WITH NESC REGULATIONS.

NOTE 2:
PROPOSED FIBER TO BE INSTALLED BY OTHERS.

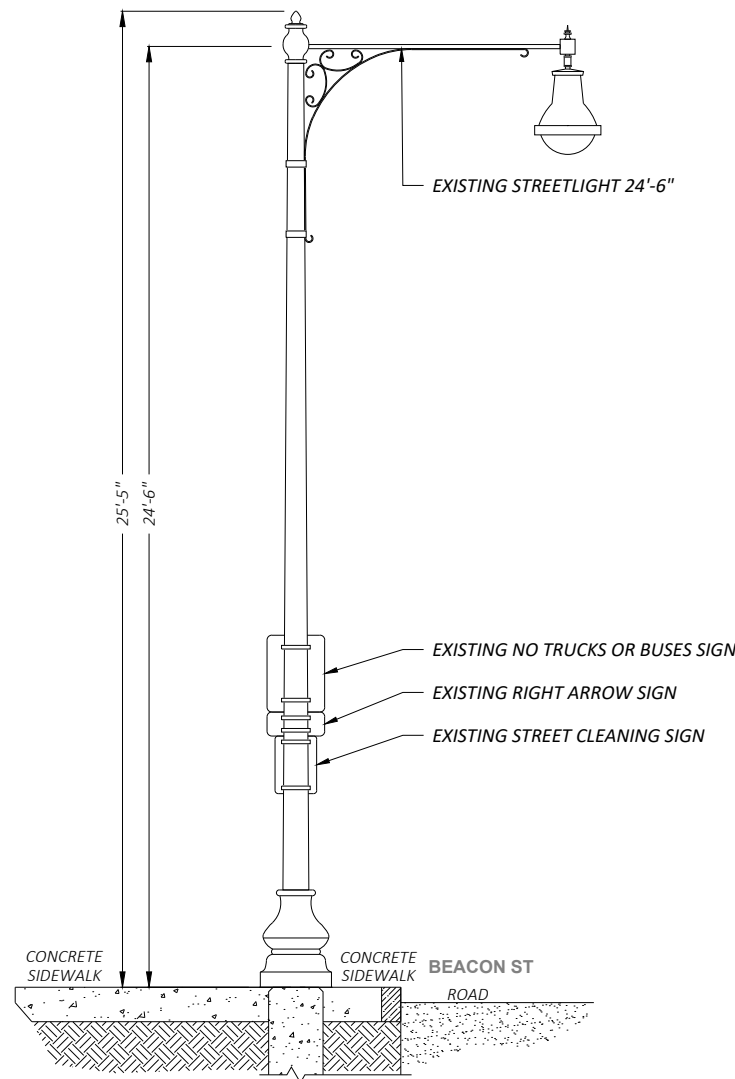
NOTE 3:
PROPOSED EQUIPMENT TO BE PAINTED TO BLEND
WITH POLE.

NOTE 4:
FCC MANDATED SIGNAGE TO BE ATTACHED TO POLE.

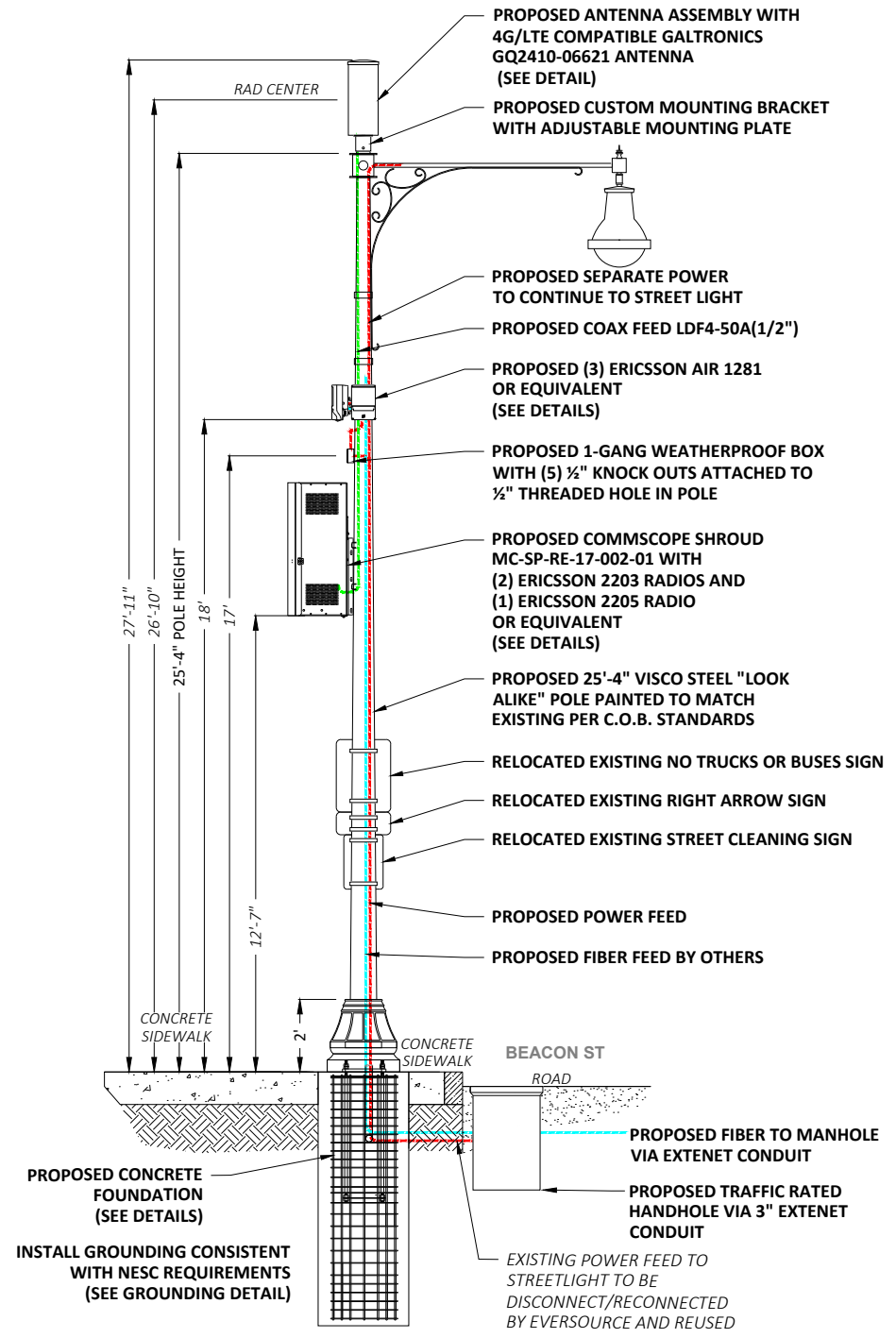
NOTE 5:
PROPOSED EQUIPMENT SHALL BE INSTALLED NO
HIGHER THAN 30" BELOW TELEPHONE UTILITY LINES.

NOTE:
REPLACE EXISTING POLE
WITH NEW 25'-4" STEEL
"LOOK ALIKE" POLE

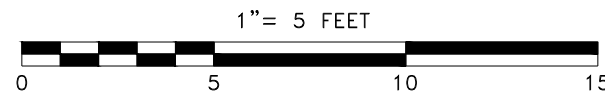
**ABSOLUTELY NO FIELD CUTTING
OR CORING OF METAL POLES TO
BE ALLOWED**



① EXISTING PROFILE - SIDE VIEW
LOOKING EAST ALONG BEACON ST



① PROPOSED PROFILE - SIDE VIEW
LOOKING EAST ALONG BEACON ST



PLANS PREPARED FOR:

PLANS PREPARED BY:

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MANSFIELD, MA 02048
www.uc seng.com 1-508-337-7600

LOCATION:
CHARLES GATE E @ BEACON ST
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SHEET TITLE:
POLE ELEVATIONS

SHEET NUMBER:
A-2

7/26/19 \\MANV-FILE01\Files\Engineering\Extenet_Systems\NE-MA-BSTN5G01-ATT 374AA - AUTOCAD\PPP\NE-MA-BSTN5G01-01049.dwg

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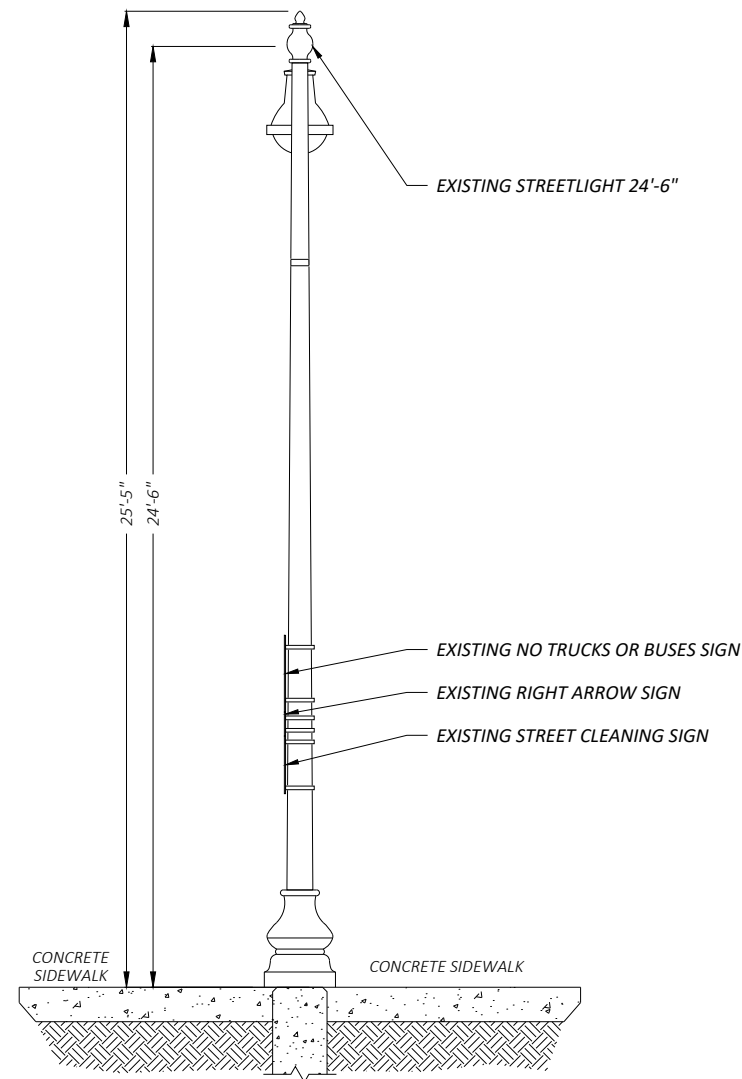
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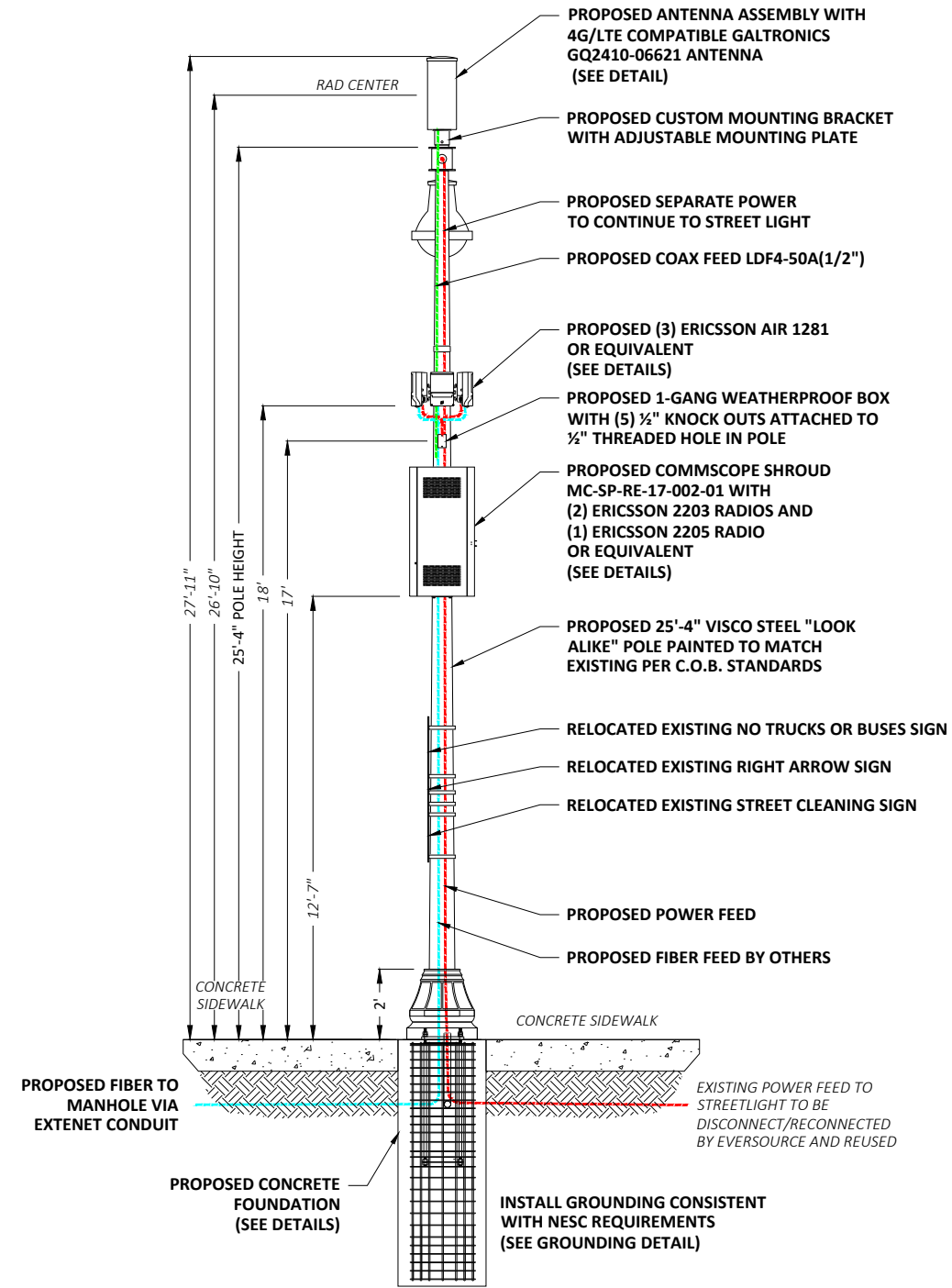
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REPLACE EXISTING POLE
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"LOOK ALIKE" POLE

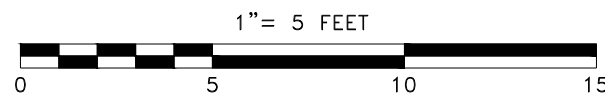
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OR CORING OF METAL POLES TO
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② EXISTING PROFILE - REAR VIEW
LOOKING SOUTH TOWARD BEACON ST



② PROPOSED PROFILE - REAR VIEW
LOOKING SOUTH TOWARD BEACON ST



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SHEET TITLE:
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A-3

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AIR 1281

General

OOB Spurious Emission	FCC and 3GPP compliant
Number of beams	4x400MHz, 2x800MHz,
Max total EIRP	56/53 dBm
OBW	400/800 MHz
IBW	Full band

Interface

Fronthaul IF	C1 CPRI, 10 and 25Gbps
Power Supply	100-250VAC, -48VDC
Typ. Power Consumption	< 150 W

Mechanical

Installation type	Pole/Wall/Strand mounted
Dimensions	~270x200x130
Weight	8.4 kg
Operating temperature	-40°C to +55°C
IP Class	IP65



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 SHEET TITLE:
 5G ANTENNA/RADIO DETAILS

SHEET NUMBER:
D-1

ERICSSON AIR 1281 ANTENNA INTEGRATED RADIO
 SCALE: NOT TO SCALE

1

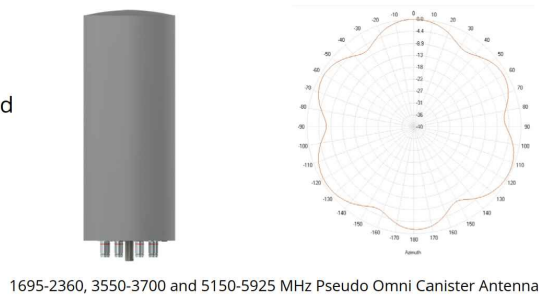


24"x 10" Pseudo Omni 10-Port Canister Antenna [1695-2360, 3550-3700 and 5150-5925 MHz]

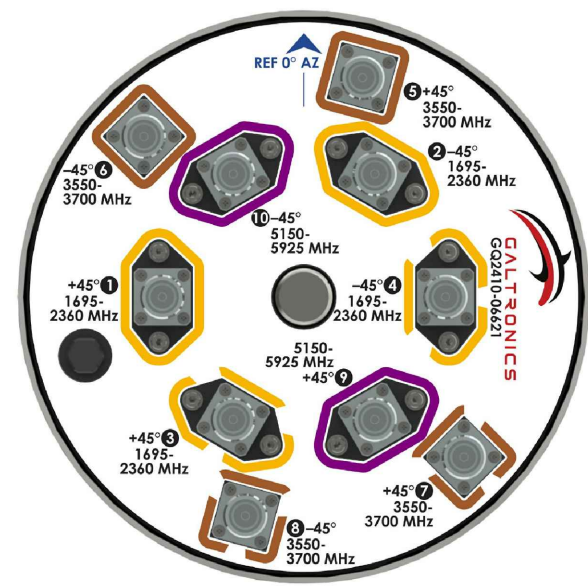
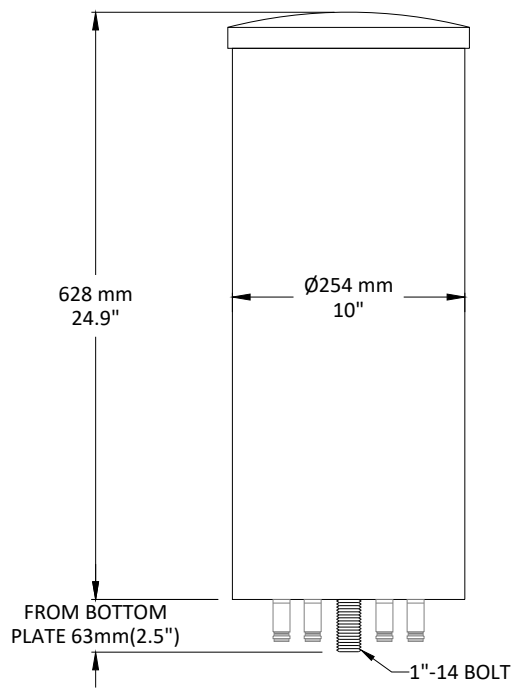
GQ2410-06621

Description:

- Pseudo Omni Canister Antenna for Outdoor DAS and Small Cells.
- 4x ports for AWS/PCS/WCS Band 1695-2360 MHz
- 4x ports for CBRS Band 3550-3700 MHz
- 2x ports for UNII Band 5150-5925 MHz*

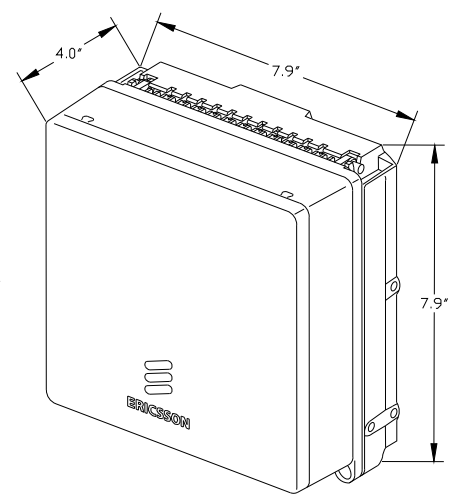


1695-2360, 3550-3700 and 5150-5925 MHz Pseudo Omni Canister Antenna

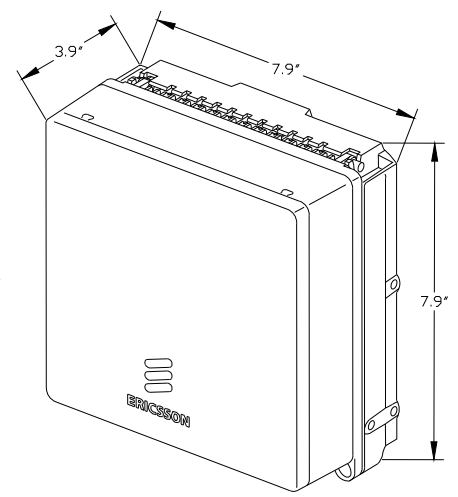


GALTRONICS GQ2410-06621 ANTENNA	1
SCALE: NOT TO SCALE	

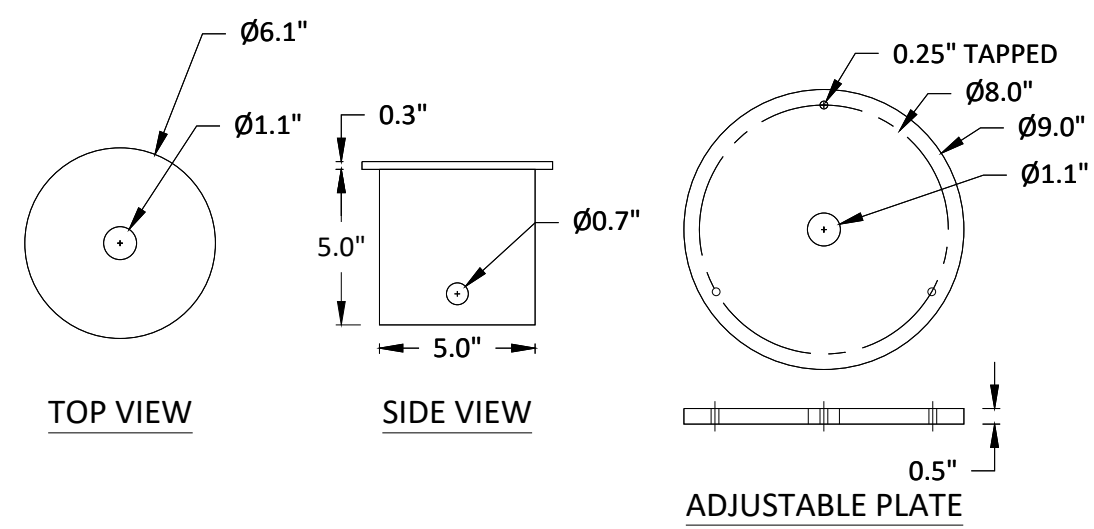
ERICSSON RADIO 2205 WITH COVER



ERICSSON RADIO 2203 WITH COVER



ERICSSON 2203 & 2205 RADIOS WITH COVER POLE MOUNT REMOTE UNIT	2
SCALE: NOT TO SCALE	



CUSTOM MOUNTING BRACKET	3
SCALE: NOT TO SCALE	

PLANS PREPARED FOR:

PLANS PREPARED BY:

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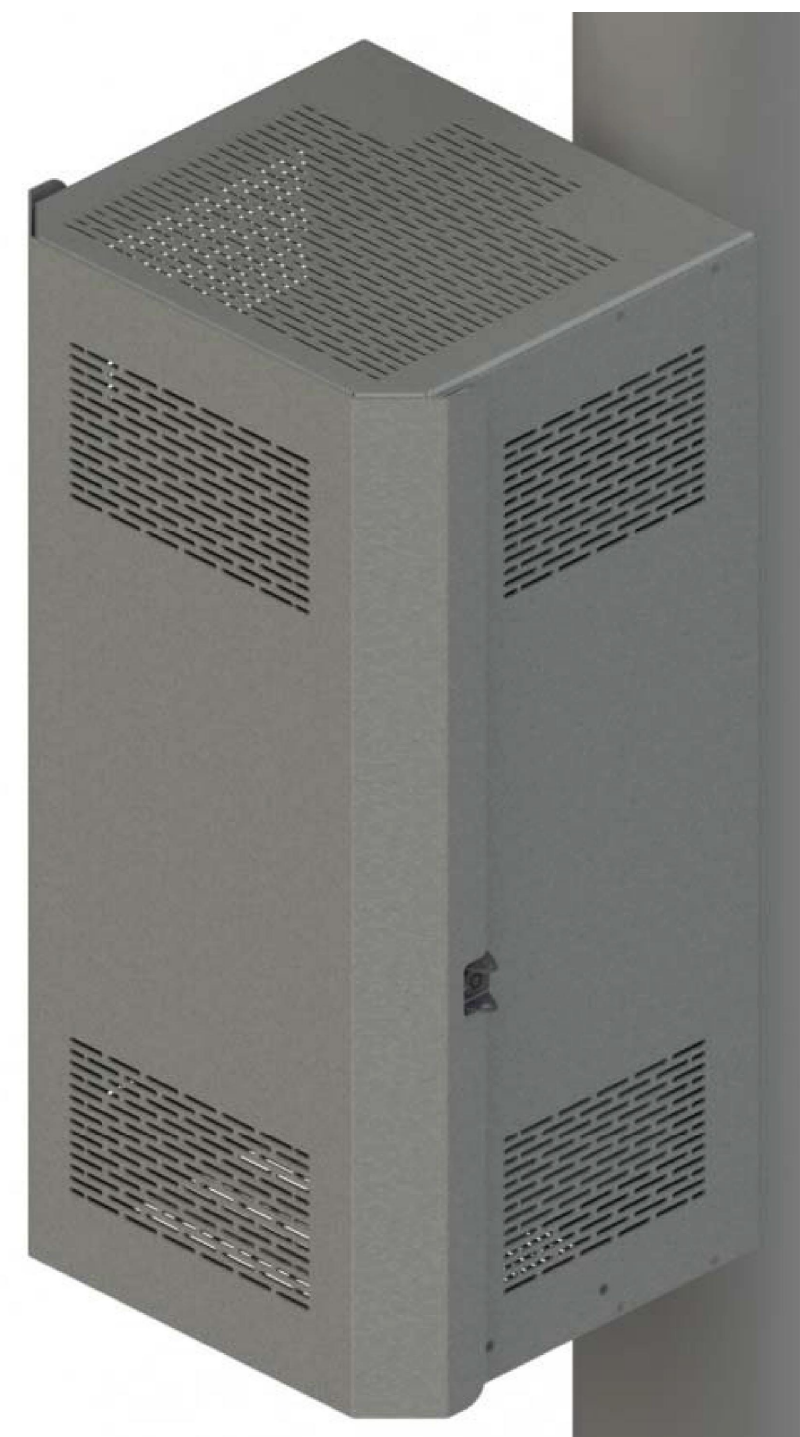
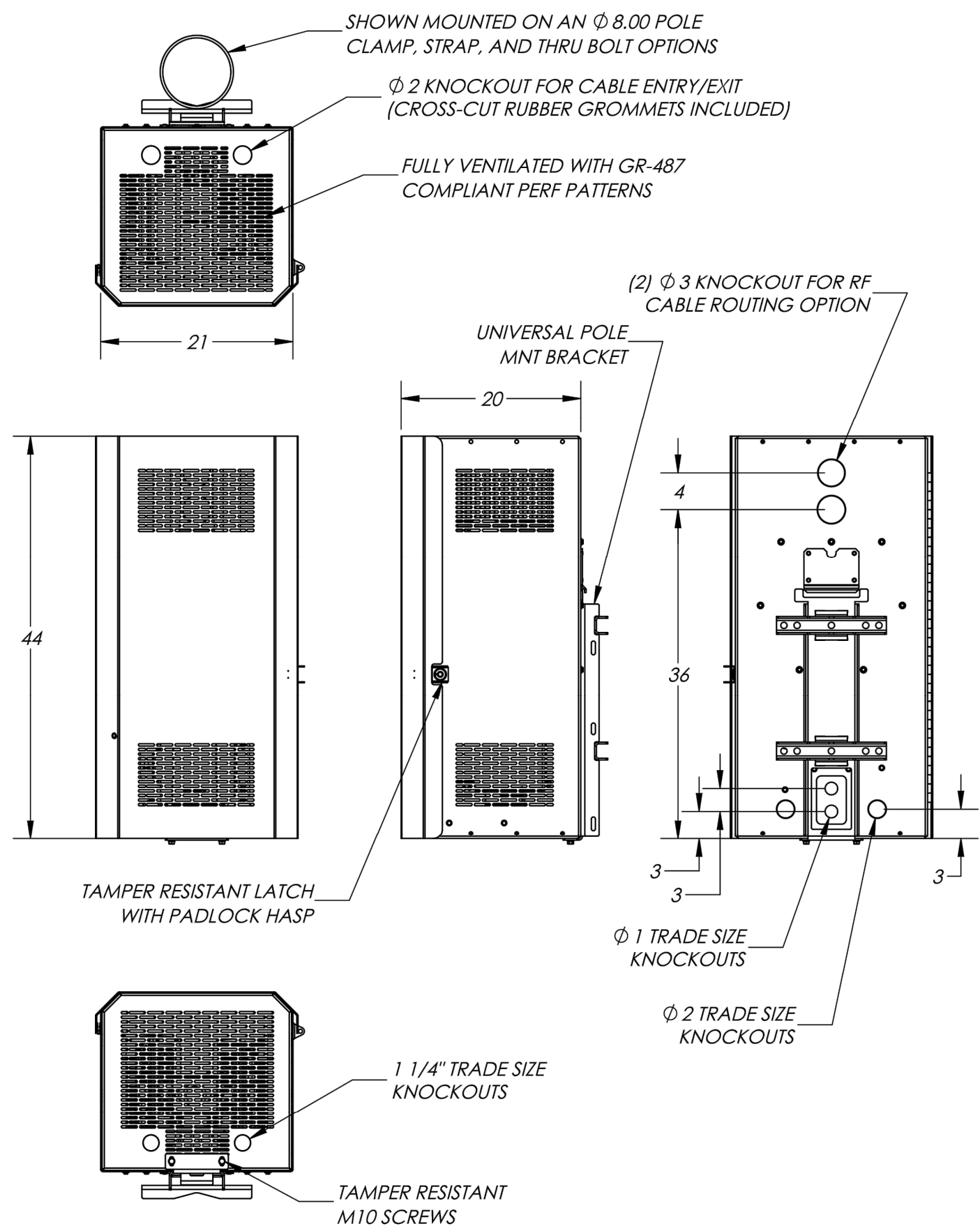
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MICRO RADIO CONCEALMENT ENCLOSURE - 10.7 CU FT
SCALE: NOT TO SCALE

1

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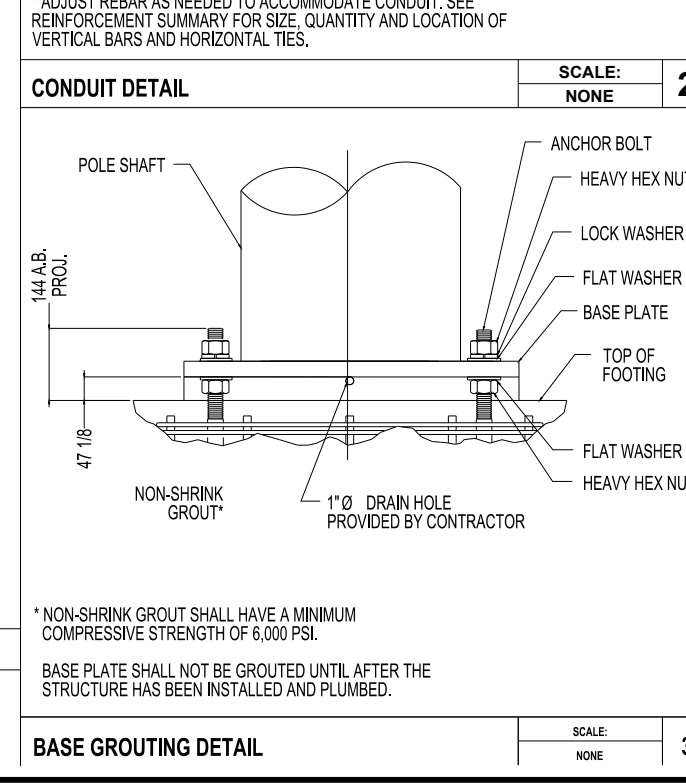
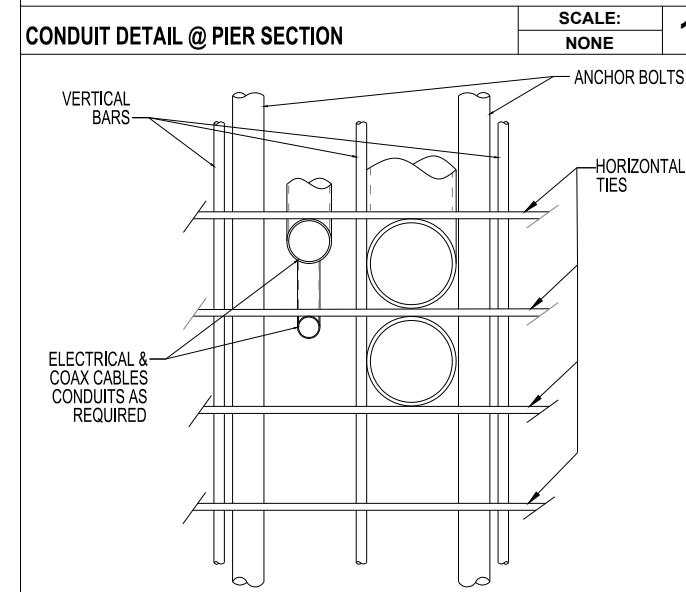
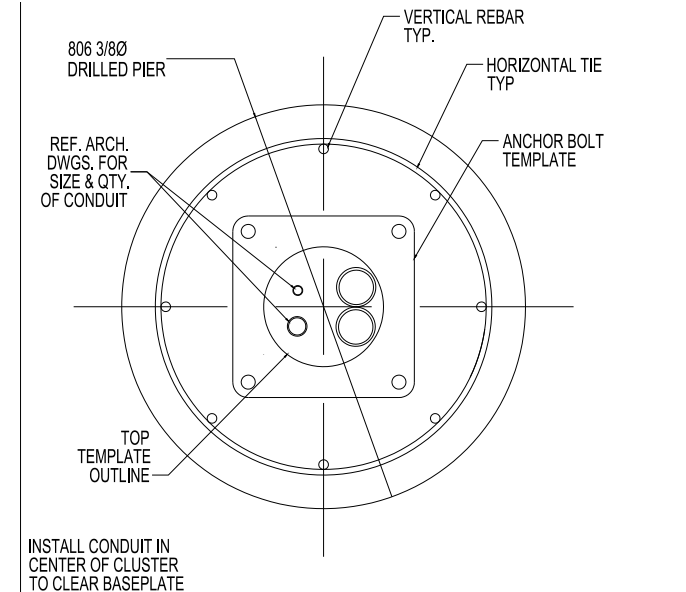
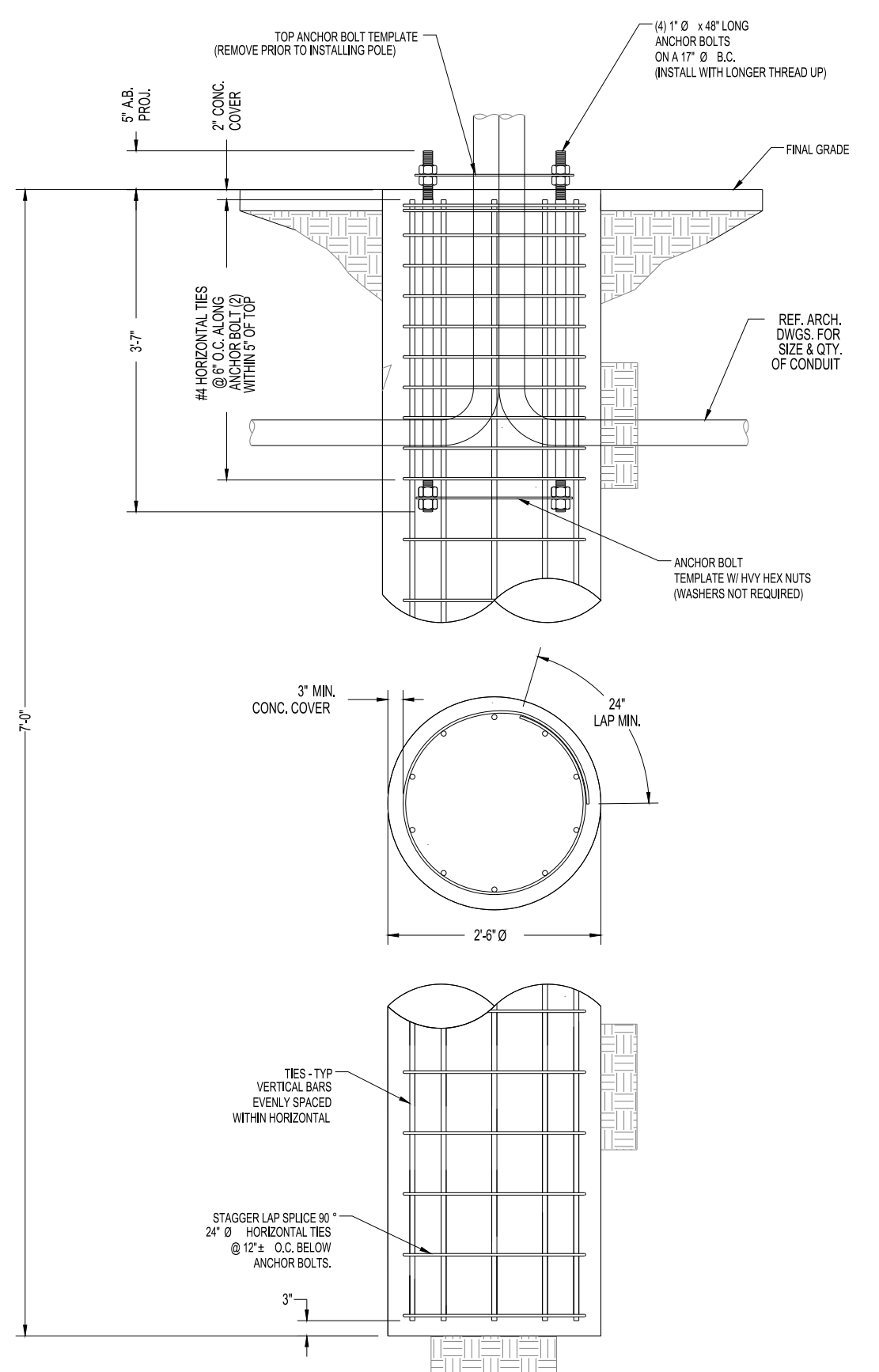
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4G RADIO SHROUD DETAILS

SHEET NUMBER:
D-3

7/26/19 \\MANV-FILE01\Files\Engineering\Extenet_Systems\NE-MA-BSTN5G01-ATT 37AAA - AUTOCAD\NPP\NE-MA-BSTN5G01-01049.dwg



GENERAL NOTES

- CONTRACTOR IS RESPONSIBLE FOR CHECKING AREA FOR UNDERGROUND FACILITIES PRIOR TO EXCAVATING ANY MATERIALS.
- CONTRACTOR SHALL INSPECT AND REMOVE ALL DEBRIS FROM BOTTOM OF EXCAVATION.
- CONTRACTOR SHALL VERIFY ANCHOR BOLT LAYOUT PRIOR TO, AND IMMEDIATELY AFTER PLACING CONCRETE. ANCHOR BOLT LAYOUT IS CRITICAL FOR MONOPOLE INSTALLATION.
- CONTRACTOR SHALL USE AND PROVIDE DEFORMED REINFORCING BARS CONFORMING TO ASTM A615 GR. 60 (60,000 PSI MIN. YIELD). CONTRACTOR SHALL USE STEEL WIRE TO HOLD REINFORCING BARS TOGETHER. IF WELDING REBAR IS PREFERRED, SUBSTITUTE USING A706 GR. 60 DEFORMED BARS.
- CONTRACTOR SHALL USE AND PROVIDE CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI. CONCRETE SHALL USE 1" MAXIMUM STONE AGGREGATE, MIX DESIGN: 6 1/2 SACKS OF CEMENT MINIMUM PER CUBIC YARD. 5" MINIMUM AND 7" MAXIMUM CONCRETE SLUMP.
- CONCRETE SHALL BE CONSOLIDATED USING VIBRATORY METHODS THROUGHOUT DEPTH OF FOUNDATION. VIBRATING LOWER DEPTHS MAY BE ACCOMPLISHED BY TOUCHING REBAR CAGE WITH VIBRATOR.
- CONTRACTOR SHOULD ANTICIPATE THE USE OF A FULL-LENGTH TEMPORARY CASING TO STABILIZE THE EXCAVATION. THE CASING SHALL BE WITHDRAWN DURING THE PLACEMENT OF CONCRETE IN THE EXCAVATED HOLE. CONCRETE SHALL BE PLACED USING CONVENTIONAL METHODS TO MINIMIZE SEGREGATION OF CONCRETE AND AGGREGATE. CONCRETE SHALL NOT FREE FALL MORE THAN 5 FT. CONCRETE MAY BE PLACED BELOW WATER USING TREMIE METHODS.
- CONCRETE SHALL BE PLACED TO THE DEPTH INDICATED, AND THE ABOVE GRADE PORTION SHALL BE FORMED, THE REBAR CAGE, ANCHOR BOLTS, AND CONCRETE SHALL BE PLACED WITHIN 24 HOURS OF COMPLETING THE EXCAVATION. COLD JOINTS ARE NOT ALLOWED.
- THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ADEQUATE CONCRETE COVERAGE OVER REINFORCING BARS TO MINIMIZE CORROSION POTENTIAL. UNLESS OTHERWISE NOTED, CONTRACTOR SHALL USE 3" CONCRETE COVER OVER REBAR. TOP OF FOOTING SHALL BE TROWELLED LEVEL AND SMOOTH.
- DRILLED PIER FOUNDATION DESIGN PER 2009/2012 IBC, TABLE 1806.2, CLASS 4 MATERIAL.
- TOTAL VOLUME OF CONCRETE REQUIRED FOR THIS FOUNDATION IS APPROXIMATELY 1.1 CU. YDS.

FACTORED BASE REACTIONS

MOMENT = 30.9 ft-kips
 SHEAR = 2.46 kips
 VERTICAL = 1.67 kips

SPECIAL INSPECTIONS

SPECIAL INSPECTION: THE FOLLOWING ELEMENTS OF CONSTRUCTION SHALL REQUIRE SPECIAL INSPECTION PER 2009/2012 IBC, SECTION 1704

ITEM	DESCRIPTION	INSPECTION BY	MATERIAL
1	PIER EXCAVATION LATERAL BEARING CAPACITY	SOILS ENGINEER	300 PSF/FT LATERAL
2	PIER CONSTRUCTION REINFORCING STEEL BAR SIZES AND INSTALLATION	SPECIAL INSPECTOR	ASTM A615 GR. 60
3	ANCHOR BOLTS BOLT SIZE AND LENGTHS INSTALLATION	SPECIAL INSPECTOR	ASTM F1554 GR. 55
4	CONCRETE TEST SPECIMENS PLACEMENT OF CONCRETE	SPECIAL INSPECTOR	f _c = 4,000 PSI TYPE II CEMENT

CONDUIT DETAIL @ PIER SECTION SCALE: NONE 1

CONDUIT DETAIL SCALE: NONE 2

BASE GROUTING DETAIL SCALE: NONE 3

DESCRIPTION	QTY.	SIZE	LENGTH	WEIGHT	OVERLAP
VERTICAL BARS	8	#6	5'-6"	66 LBS.	N/A
HORIZONTAL TIES	10	#4	8'-4"	55 LBS.	2'-0"

PLANS PREPARED FOR:

PLANS PREPARED BY:

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 MANSFIELD, MA 02048
 www.ucseng.com 1-508-337-7600

LOCATION:
CHARLES GATE E @ BEACON ST
 BOSTON, MA 02215
 SUFFOLK COUNTY

P.E. STAMP AREA:

DRAWING NOTES:

ORIGINAL PLAN:	AS NOTED
DRAWN BY:	DC
PLAN ORIG. DATE:	07/18/19

REV	DESCRIPTION	BY	DATE
1	NEW NODE LOCATION	EP	11/27/19

SITE INFO:
 LAT: 42.350382
 LONG: -71.091518
 AT&T ID:
mmBOS1049
 EXTENET NODE ID:
NE-MA-BSTN5G01-01049
 SITE ADDRESS:
CHARLES GATE E @ BEACON ST
 SHEET TITLE:
FOUNDATION DETAILS

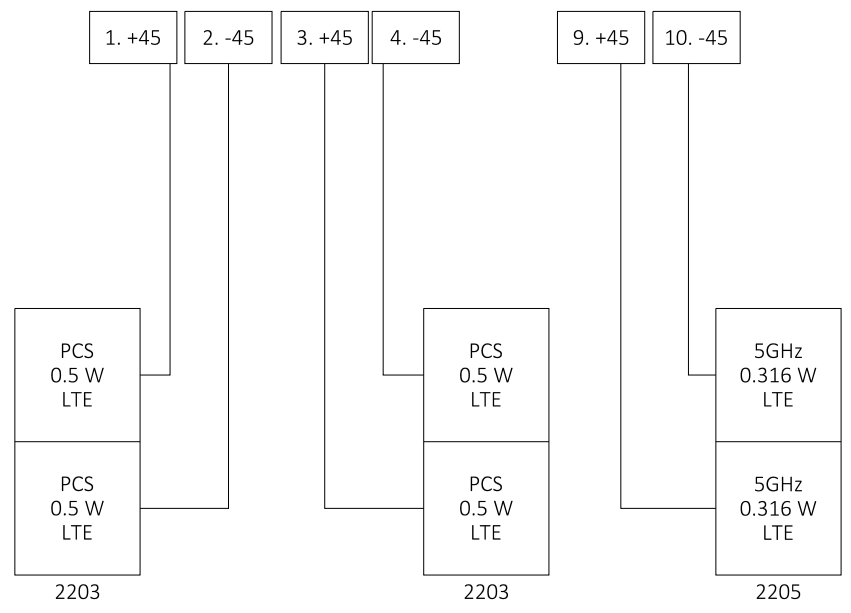
SHEET NUMBER:
D-4



EXISTING POLE
SCALE: NOT TO SCALE

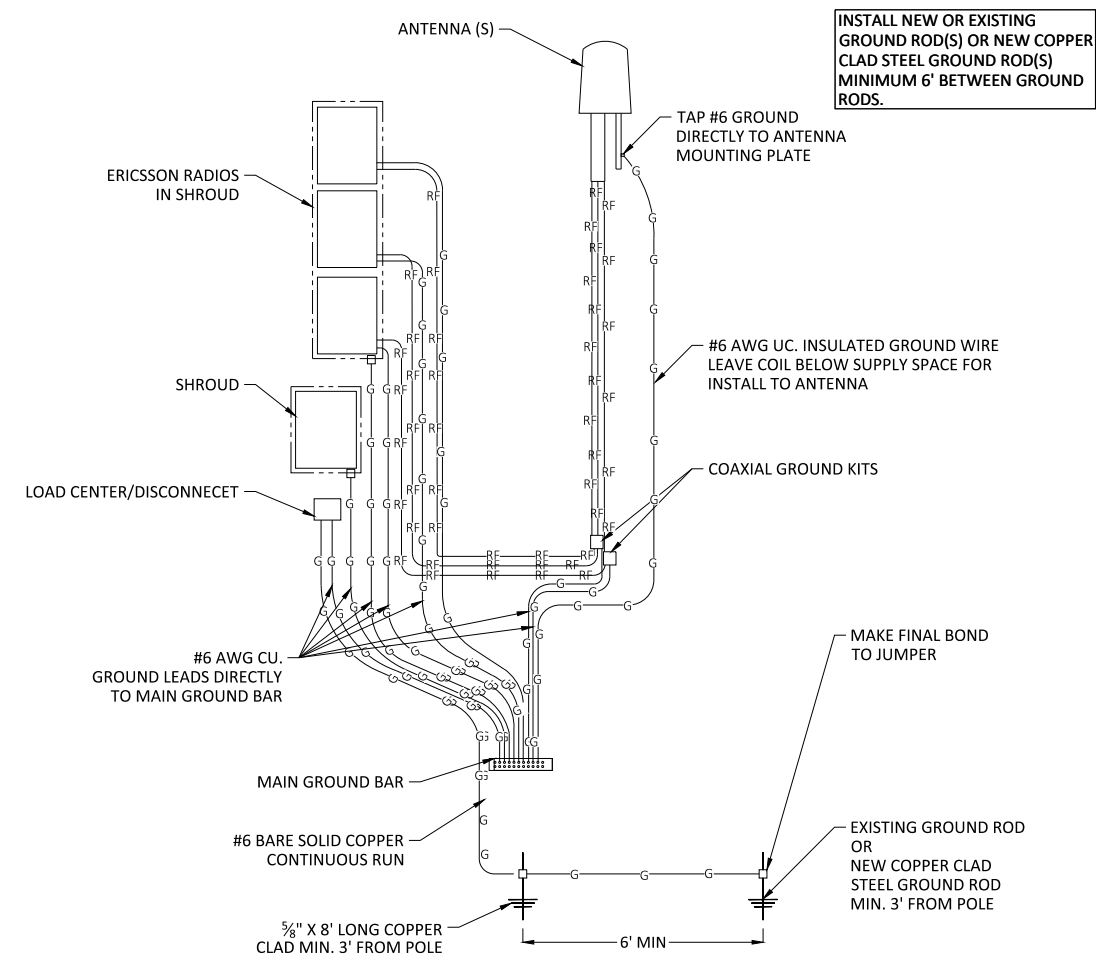
1

GALTRONICS GQ2410-06621 ANTENNA



WIRING DIAGRAM
SCALE: NOT TO SCALE

2



GROUNDING DIAGRAM
SCALE: NOT TO SCALE

3

PLANS PREPARED FOR:

PLANS PREPARED BY:

Innovative Thinking. Engineered Solutions.
21 OXFORD RD
MANSFIELD, MA 02048
www.ucseeng.com 1-508-337-7600

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CHARLES GATE E @ BEACON ST
SHEET TITLE:
GROUNDING & WIRING DIAGRAMS

SHEET NUMBER:
D-5

1. GENERAL PROVISIONS

1.1 CONTRACT OVERVIEW

1. THE INTENTION OF THESE DOCUMENTS IS TO SHOW THE COMPLETE INSTALLATION AND TO INCLUDE ALL LABOR AND MATERIALS REASONABLY NECESSARY, WHETHER OR NOT SPECIFICALLY INDICATED, FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK AS STIPULATED IN THE CONTRACT. THE INTENT OF THESE DOCUMENTS IS NOT TO DESIGNATE THE MEANS AND METHODS OF PROCEDURE OF THE WORK. THE CONTRACTORS SHALL SUPERVISE AND COORDINATE ALL WORK, USING THEIR PROFESSIONAL KNOWLEDGE AND SKILLS. THEY ARE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, PROCEDURES, SEQUENCING AND COORDINATING OF ALL PORTIONS OF THE WORK UNDER THE CONTRACT.

2. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT EDITION OF THE FOLLOWING CODES, STANDARDS, AND SUPPLEMENTS:

- RULES AND SPECIFICATIONS FOR EXCAVATION ACTIVITY WITHIN THE CITY OF BOSTON
• IBC - INTERNATIONAL BUILDING CODE
• ACI - AMERICAN CONCRETE INSTITUTE
• AISC - AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATIONS
• IEEE - INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
• NEC - NATIONAL ELECTRICAL CODE
• NFPA - NATIONAL FIRE PROTECTION ASSOCIATION
• OSHA - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
• ANS/ITA - TELECOMMUNICATIONS INDUSTRY ASSOCIATION - 222-G STANDARD
• ALL GOVERNING STATE, COUNTY AND LOCAL CODES AND ORDINANCES

THE MOST STRINGENT CODE WILL APPLY IN THE CASE OF DISCREPANCIES OR DIFFERENCES IN THE CODE REQUIREMENTS.

3. THE ENGINEERING DRAWINGS SHOW PRINCIPAL AREAS WHERE WORK MUST BE ACCOMPLISHED UNDER THIS CONTRACT. INCIDENTAL WORK MAY ALSO BE NECESSARY IN AREAS NOT SHOWN ON THE ENGINEERING DRAWINGS DUE TO CHANGES AFFECTING EXISTING ELECTRICAL OR OTHER SYSTEMS, SUCH AS INCIDENTAL WORK IS ALSO A PART OF THIS CONTRACT. INSPECT THOSE AREAS AND ASCERTAIN WHAT IS NEEDED TO DO THAT WORK IN ACCORDANCE WITH THE CONTRACT REQUIREMENTS AT NO ADDITIONAL COST TO THE OWNER.

4. NOT ESTIMATE DESIRED MEASUREMENTS BY MEASURING DRAWINGS. ALL SHOWN DIMENSIONS TAKE PRECEDENCE OVER SKETCHING.

5. MINOR DEVIATIONS FROM THE DESIGN LAYOUT ARE ANTICIPATED AND SHALL BE CONSIDERED AS PART OF THE WORK. HOWEVER, NO CHANGE THAT ALTERS THE OBJECTIVE AND INTENT OF THE DESIGN WILL BE MADE OR PERMITTED BY THE OWNER WITHOUT A CHANGE ORDER.

6. GENERAL CIVIL, STRUCTURAL, ELECTRICAL, AND ANTENNA DRAWINGS ARE INTERRELATED. IN PERFORMANCE OF THE WORK, EACH CONTRACTOR MUST REFER TO ALL DRAWINGS. ALL COORDINATION SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR.

7. THE GENERAL NOTES CONTAINED HEREIN ARE PART OF THE PLANS AND SPECIFICATIONS, AND ARE TO BE COMPLIED WITH IN ALL RESPECTS. THE MOST RESTRICTIVE NOTES SPECIFIED ARE TO TAKE PRECEDENCE. CERTAIN SECTIONS OF THE GENERAL NOTES MAY NOT APPLY TO EVERY SITE. THE CONTRACTOR IS TO COMPLY WITH ALL APPLICABLE GENERAL NOTES IN ALL RESPECTS.

8. ALL GENERAL NOTES AND STANDARD DETAILS ARE THE MINIMUM REQUIREMENT TO BE USED IN CONDITIONS WHICH ARE NOT SPECIFICALLY SHOWN OTHERWISE.

9. REPRESENTATION OF THE TRUE NORTH OTHER THAN THOSE FOUND ON THE PLOT OF THE SURVEY DRAWING SHALL NOT BE USED TO IDENTIFY OR ESTABLISH THE BEARING OF THE TRUE NORTH AT THE SITE. THE CONTRACTOR SHALL RELY SOLELY ON THE PLOT OF THE SURVEY DRAWING AND SURVEYORS MARKINGS AT THE SITE FOR THE ESTABLISHMENT OF THE TRUE NORTH, AND SHALL NOTIFY THE ENGINEER PRIOR TO PROCEEDING WITH THE WORK IF ANY DISCREPANCY IS FOUND BETWEEN THE VARIOUS ELEMENTS OF THE WORKING DRAWINGS AND THE TRUE NORTH ORIENTATION AS DEPICTED ON THE CIVIL SURVEY. THE CONTRACTOR SHALL ASSUME SOLE LIABILITY FOR ANY FAILURE TO NOTIFY THE ENGINEER.

10. THE CONTRACTOR SHALL USE ADEQUATE NUMBERS OF SKILLED WORKMEN WHO ARE THOROUGHLY TRAINED AND EXPERIENCED IN THE NECESSARY CRAFTS, AND WHO ARE COMPLETELY FAMILIAR WITH THE SPECIFIED REQUIREMENTS AND METHODS NEEDED FOR PROPER PERFORMANCE OF THE WORK.

11. THE CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT. THIS INCLUDES THE SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT IS MADE TO APPLY CONTINUOUSLY AND IS NOT LIMITED TO NORMAL WORKING HOURS. THE CONTRACTOR FURTHER AGREES TO INDemnIFY, DEFEND, HOLD THE DESIGN ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF THE WORK ON THIS PROJECT.

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL SAFETY PRECAUTIONS AND REGULATIONS, SUCH AS OSHA COMPLIANCE, DURING THE PROGRESS OF WORK. THE ENGINEER WILL NOT ADVISE NOR PROVIDE DIRECTION AS TO SAFETY PRECAUTIONS AND PROGRAMS.

13. SAFETY MEETINGS SHALL TAKE PLACE EVERY MORNING BEFORE THE WORK DAY BEGINS.

14. THE CONTRACTOR SHALL ASSUME COMPLETE RESPONSIBILITY FOR THE SECURITY OF THE SITE UNTIL COMPLETION OF THE CONSTRUCTION.

15. IT IS THE CONTRACTOR'S RESPONSIBILITY TO EXAMINE ALL PLAN SHEETS AND SPECIFICATIONS AND COORDINATE THEIR WORK WITH THE WORK OF ALL OTHER CONTRACTORS TO ENSURE THAT WORK PROGRESSION IS NOT INTERRUPTED.

16. THE CONTRACTOR IS INSTRUCTED TO COOPERATE WITH ANY AND ALL OTHER CONTRACTORS PERFORMING WORK ON THIS JOBSITE DURING THE PERFORMANCE OF THIS CONTRACT TO AVOID DELAYS IN THE SCHEDULE OR OTHER WORK PERFORMED IN THE VICINITY OF THE CONSTRUCTION AREA.

17. THE CONTRACTOR SHALL SUBMIT A CONSTRUCTION SCHEDULE TO THE PROPERTY OWNER WELL IN ADVANCE OF THE STARTING DATE OF THE WORK. THE OWNER SHALL ALSO BE NOTIFIED OF A CHANGE IN THE CONSTRUCTION SCHEDULE.

18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED PERMITS.

19. EACH CONTRACTOR IS RESPONSIBLE FOR PULLING BUILDING PERMITS AT THE LOCAL JURISDICTION AS THE CONTRACTOR OF RECORD, AND SHALL PROVIDE THE JURISDICTION WITH ALL PROOF REQUIRED TO OPERATE AS CONTRACTOR IN THIS JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND INCURRING THE COST OF ALL REQUIRED PERMITS, INSPECTIONS, CERTIFICATIONS, ETC. PRIOR TO BEGINNING WORK.

20. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING AMPLIFIED NOTICE TO THE BUILDING INSPECTION DEPARTMENT TO SCHEDULE THE REQUIRED INSPECTIONS. A MINIMUM OF 48 HOURS OF NOTICE SHOULD BE GIVEN TO AUTHORITIES. AN EXTENSION IN THE CONTRACT SCHEDULE WILL NOT BE GRANTED DUE TO DELAY CAUSED BY INSPECTIONS.

21. EACH CONTRACTOR IS RESPONSIBLE FOR APPLICATION AND PAYMENT OF CONTRACTOR LICENSES, BONDS AND INSURANCES. DOCUMENTATION SHALL BE PROVIDED TO THE OWNER PRIOR TO WORK.

22. A COPY OF THE APPROVED PLANS SHALL BE KEPT IN A PLACE SPECIFIED BY THE GOVERNING AGENCY, AND BY LAW IS AVAILABLE FOR INSPECTION AT ALL TIMES. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE ALL CONSTRUCTION SETS REFLECT THE SAME INFORMATION AS THE APPROVED PLANS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DOCUMENTING ALL AS-BUILTS, CHANGES, REVISIONS, AGENDA, OR CHANGE ORDERS.

23. THE CONTRACTOR IS TO PROVIDE THE OWNER WITH A FULL SET OF RECORD DRAWINGS WITH ACTUAL DIMENSIONS, ROUTING AND CIRCUITS UPON COMPLETION OF CONSTRUCTION.

24. THE CONTRACTOR IS TO CONTACT BOTH LOCAL POWER AND TELEPHONE UTILITY COMPANIES BEFORE CONSTRUCTION BEGINS TO ORDER SERVICE, OBTAIN AND PAY ALL FEES ASSOCIATED WITH THE CONSTRUCTION, SCHEDULE INSTALLATION OF SERVICE, COORDINATE CONDUIT RUN/INTERMEDIATE POINTS AND OBTAIN ANY FIELD MATERIALS THAT MAY BE SUPPLIED BY THE UTILITY COMPANIES AND INSTALLED BY THE CONTRACTORS.

25. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TEMPORARY BRACING, SHORING, TIES, FORM WORK AND THE PROTECTION OF ALL WORK DURING CONSTRUCTION TO AVOID DAMAGE, COLLAPSE, DISTORTION, MISALIGNMENT AND ALTERATION OF EXISTING WARRANTIES.

26. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE TEMPORARY POWER, WATER AND TOILET FACILITIES AS REQUIRED BY THE PROPERTY OWNER OR GOVERNING AGENCY.

27. THE CONTRACTOR SHALL MONITOR ALL EXISTING STRUCTURES DURING CONSTRUCTION.

28. THE CONTRACTOR SHALL COORDINATE THE FINAL DIMENSIONS OF ANY TYPE OF STRUCTURAL LAYOUT WITH THE FOOTPRINT OF THE NEW EQUIPMENT BEFORE ORDERING ANY MATERIALS.

29. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND IN SAFE CONDITION PRIOR TO INSTALLATION, AND SHALL BE OF THE BEST GRADE AND OF THE SAME MANUFACTURER THROUGHOUT, FOR EACH CLASS, GROUP, OR EQUIPMENT.

30. ALL MATERIALS MUST BE STORED ON A LEVEL AND DRY LOCATION AND IN A MANNER THAT WILL NOT OBSTRUCT THE FLOW OF OTHER WORK RELATED OR NOT RELATED TO THIS CONTRACT. ANY EQUIPMENT OR MATERIAL STORAGE WHICHEVER IS OF THE MANUFACTURER, THE CONTRACTOR SHALL INSPECT THOROUGHLY ALL MATERIALS AND EQUIPMENT PRIOR TO FINAL INSTALLATION. DAMAGED EQUIPMENT OR MATERIALS SHALL NOT BE INSTALLED.

31. ALL MATERIALS SHALL BE INSTALLED PER THE MANUFACTURER'S INSTRUCTIONS.

32. EXCEPT FOR WARNING SIGNS SUCH AS "NO TRESPASSING" AND SIGNS THAT STATE OWNERSHIP AND EMERGENCY TELEPHONE NUMBERS, NO SIGN SHALL BE LOCATED ON THE PROPERTY. EXISTING SIGNS WILL BE MAINTAINED AND PROTECTED.

33. ALL EQUIPMENT SHALL BE INSTALLED LEVEL AND PLUMB.

1.2 EXISTING CONDITIONS AND STRUCTURES

1. BEFORE BEGINNING WORK AT THE SITE, THE CONTRACTOR SHALL INSPECT THE EXISTING PROPERTY OR BUILDING AND DETERMINE THE EXTENT OF EXISTING FINISHES, SPECIALTIES, EQUIPMENT AND OTHER ITEMS WHICH MUST BE REMOVED AND REINSTALLED IN ORDER TO PERFORM THE WORK UNDER THIS CONTRACT. THE CONTRACTOR MUST VERIFY ALL DIMENSIONS, CONDITIONS AND ELEVATIONS BEFORE STARTING WORK. NO EXTRA CHARGE OR COMPENSATION SHALL BE ALLOWED DUE TO DIFFERENCES BETWEEN ACTUAL DIMENSIONS AND DIMENSIONS INDICATED ON THE CONSTRUCTION DRAWINGS. ALL WORK SHALL BE PERFORMED IN A WORKMANLIKE MANNER IN ACCORDANCE WITH ACCEPTED CONSTRUCTION PRACTICES.

2. BY SUBMITTING A BID FOR THIS WORK, THE CONTRACTOR ACKNOWLEDGES THAT HE HAS THOROUGHLY REVIEWED AND UNDERSTOOD THE CONSTRUCTION DOCUMENTS, VISITED THE SITE, AND IS FAMILIAR WITH THE CONDITIONS ENCOUNTERED AT THE SITE.

3. THE CONTRACTOR, IF AWARDED THE CONTRACT, WILL NOT BE ALLOWED ANY EXTRA COMPENSATION BY REASON OF ANY MATTER OR THING WHICH THE CONTRACTOR MIGHT NOT HAVE FULLY EXPLORED PRIOR TO BIDDING.

4. NO FLEA OF IGNORANCE OR CONDITIONS THAT EXIST, OR OF DIFFICULTIES THAT MAY BE ENCOUNTERED OR OF ANY OTHER RELEVANT MATTER CONCERNING THE WORK TO BE PERFORMED WILL BE ACCEPTED AS A REASON FOR ANY FAILURE OR OMISSION ON THE PART OF THE CONTRACTOR TO FULFILL THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

5. IT IS UNDERSTOOD BY THE OWNER THAT THE CONTRACTOR IN SUBMITTING HIS BID, WARRANTS THAT HE HAS CAREFULLY EXAMINED THE SITE OF THE PROJECT TO BECOME ACQUAINTED WITH THE SURROUNDING PROPERTIES, THE MEANS OF APPROACH TO THE SITE, THE CONDITIONS OF THE ACTUAL JOB SITE, THE FACILITIES FOR DELIVERING, STORING, PLACING, HANDLING, AND THE REMOVAL OF MATERIALS AND EQUIPMENT AND ANY AND ALL DIFFICULTIES THAT MAY BE ENCOUNTERED DURING THE EXECUTION OF ALL THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

6. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES HAVE NOT BEEN VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR IS RESPONSIBLE FOR HAVING ALL UNDERGROUND UTILITIES LOCATED WITH THE LIMITS OF CONSTRUCTIONS AND ACCEPTS FULL RESPONSIBILITY FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY THE CONTRACTOR'S FAILURE TO LOCATE ALL UNDERGROUND UTILITIES BEFORE COMMENCING WORK.

7. SHOULD ANY ERROR OR INCONSISTENCY APPEAR IN THE DRAWINGS OR SPECIFICATIONS, THE CONTRACTOR, BEFORE PROCEEDING WITH THE WORK, MUST MAKE MENTION OF THE SAME TO THE ENGINEER AND OWNER FOR PROPER ADJUSTMENT AND IN NO CASE PROCEED WITH THE WORK IN UNCERTAINTY OR WITH INSUFFICIENT INSTRUCTION.

8. THE CONTRACTOR AND EACH SUBCONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ALL MEASUREMENTS AT THE SITE BEFORE ORDERING ANY MATERIALS OR DOING ANY WORK. NO EXTRA CHARGE OR COMPENSATION SHALL BE ALLOWED DUE TO DIFFERENCES BETWEEN ACTUAL DIMENSIONS AND DIMENSIONS INDICATED ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY IN DIMENSIONS WHICH MAY BE FOUND SHALL BE SUBMITTED TO THE ENGINEER AND THE OWNER REPRESENTATIVE FOR CONSIDERATION BEFORE THE CONTRACTOR PROCEEDS WITH THE WORK IN THE AFFECTED AREAS. THE CONTRACTORS WORK SHALL NOT VARY FROM THE PLANS WITHOUT THE EXPRESSED APPROVAL OF THE OWNER OR OWNER REPRESENTATIVE.

9. TRADE, PRODUCT NAMES, MANUFACTURER NAMES, CATALOG NUMBERS, AND INDICATIONS OF EXISTING PRODUCT TYPES SHOWN ON THE DRAWINGS ARE BELIEVED TO BE ACCURATE. IF THEY ARE DISCOVERED TO BE INACCURATE, NOTIFY OWNERS/ENGINEERS IMMEDIATELY AND DO NOT PROCEED WITHOUT INSTRUCTIONS.

10. PRIOR TO STARTING CONSTRUCTION, THE CONTRACTOR SHALL PROTECT ALL AREAS FROM DAMAGES WHICH MAY OCCUR DURING CONSTRUCTION. ANY DAMAGES TO NEW OR EXISTING SURFACES, STRUCTURES, PROPERTY, SHRUBBERY, TREES, OR EQUIPMENT, SHALL BE IMMEDIATELY REPAIRED OR REPLACED TO THE SATISFACTION OF THE PROPERTY OWNER. THE CONTRACTOR SHALL BEAR THE COST OF REPAIRING OR REPLACING ANY DAMAGED AREAS.

11. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES AND EFFORTS TO PROTECT THE STRUCTURAL INTEGRITY OF EXISTING STRUCTURES AND PROPERTIES. WHEN WORK IS PERFORMED IN THE VICINITY OF EXISTING STRUCTURES, THE STRUCTURAL INTEGRITY AND STABILITY SHALL BE MONITORED AT ALL TIMES DURING EVERY PHASE OF THE CONSTRUCTION.

12. THE CONTRACTOR SHALL PROTECT EXISTING PROPERTY LINE MONUMENTATION, ANY MONUMENTATION DISTURBED OR DESTROYED, AS JUDGED BY THE OWNER OR OWNER'S REPRESENTATIVE SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE UNDER SUPERVISION OF A LICENSED LAND SURVEYOR.

13. NEW CONSTRUCTION ADDED TO EXISTING CONSTRUCTION SHALL BE MATCHED IN FORM, TEXTURE, MATERIAL AND PAINT COLOR EXCEPT AS NOTED IN THE PLANS.

14. WHERE INDICATED ON THE PLANS, THE CONTRACTOR SHALL PAINT ALL NEW ANTENNAS, SHROUDS, AND RELATED MOUNTING HARDWARE TO MATCH THE EXISTING ADJACENT SURFACES. THE CONTRACTOR SHALL NOT USE A METAL BASED PAINT FOR ANTENNAS. ALL SURFACE CONTAMINATION SHALL BE REMOVED PRIOR TO PAINTING NEW SURFACES.

15. THE PLANS SHOW SOME KNOWN SUBSURFACE STRUCTURES, ABOVE GROUND STRUCTURES, AND/OR UTILITIES BELIEVED TO EXIST IN THE WORKING AREA. THE EXACT LOCATIONS MAY VARY FROM THE LOCATIONS INDICATED. IN PARTICULAR, THE CONTRACTOR IS WARNED THAT THE EXACT OR EVEN APPROXIMATE LOCATION OF SUCH PIPELINES, SUBSURFACE STRUCTURES, AND/OR UTILITIES IN THE AREA MAY BE SHOWN OR MAY NOT BE SHOWN; AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROCEED WITH GREAT CARE IN EXECUTING ANY WORK, BEFORE DIGGING, DRILLING OR BLASTING, CALL THE UNDERGROUND SERVICES ALERT NUMBER WELL IN ADVANCE OF THE COMMENCEMENT OF WORK. THE PERIOD OF ADVANCE NOTICE PROVIDED SHALL NOT BE LESS THAN THE MINIMUM REQUIRED BY LAW.

16. IN THE EVENT THAT THE CONTRACTOR DAMAGES ANY EXISTING WATER, SEWER, DRAINAGE, ELECTRICAL, GAS, TRAFFIC SYSTEM, COMMUNICATIONS OR OTHER UTILITY STRUCTURES, DUCTS, PIPES, OR OTHER FACILITIES, THE CONTRACTOR SHALL NOTIFY THE RELEVANT THE LOCAL JURISDICTION AND THE UTILITY OWNER IMMEDIATELY AND CONFORM TO ANY PROCEDURES REQUIRED BY THE LOCAL JURISDICTION(S).

17. ALL EXISTING ACTIVE SEWER, WATER, GAS, ELECTRIC, AND OTHER UTILITIES WHERE ENCOUNTERED IN THE WORK SHALL BE PROTECTED AT ALL TIMES. WHERE REQUIRED FOR THE PROPER EXECUTION OF THE WORK, THEY SHALL BE RELOCATED AS DIRECTED BY ENGINEERS. EXTREME CAUTION SHOULD BE USED BY THE CONTRACTOR WHEN EXCAVATING OR PIER DRILLING AROUND OR NEAR UTILITIES. THE CONTRACTOR SHALL PROVIDE SAFETY TRAINING FOR THE WORKING CREW.

18. IF AN INACTIVE ELECTRICAL, TELEPHONE, SEWER, WATER, OR ANY OTHER UTILITY ARE ENCOUNTERED AND INTERFERES WITH THE EXECUTION OF THE WORK, THE CONTRACTOR IS TO REMOVE THE UTILITY AND CAP, PLUG, OR OTHERWISE PROPERLY TERMINATE THE UTILITY AT A POINT WHERE IT NO LONGER CONFLICTS WITH THE WORK. THE UTILITY WORK SHALL BE DONE IN ACCORDANCE WITH THE UTILITY COMPANY'S RECOMMENDATIONS AND PER LOCAL AUTHORITY HAVING JURISDICTION.

19. ALL UTILITY WORK INVOLVING CONNECTIONS TO EXISTING SYSTEMS SHALL BE COORDINATED WITH THE OWNER OR OWNER'S REPRESENTATIVE AND THE UTILITY OWNER BEFORE EACH AND EVERY CONNECTION TO EXISTING SYSTEMS IS MADE.

20. MAINTAIN FLOW FOR ALL EXISTING UTILITIES.

21. THE CONTRACTOR SHALL RESTORE ALL PUBLIC OR PRIVATE PROPERTY DAMAGED OR REMOVED TO AT LEAST AS GOOD CONDITION AS BEFORE DISTURBED AS DETERMINED BY THE OWNER OR OWNER'S REPRESENTATIVE.

22. PROTECT FINISHED SURFACES INCLUDING JAMBS AND HEADS OF OPENINGS USED AS PASSAGEWAYS THROUGH WHICH EQUIPMENT AND MATERIALS WILL PASS.

23. PROVIDE PROTECTION FOR EQUIPMENT ROOM SURFACES PRIOR TO ALLOWING EQUIPMENT OR MATERIALS TO BE MOVED OVER, AROUND, OR WITHIN SURFACES.

24. KEEP FINISHED SURFACES CLEAN, UNHARMED AND SUITABLY PROTECTED UNTIL JOB SITE IS ACCEPTED BY THE OWNER.

25. IN THE EVENT OF DAMAGE TO AN EXISTING STRUCTURE, THE CONTRACTOR SHALL NOTIFY THE OWNER OR OWNER'S REPRESENTATIVE IMMEDIATELY, AND THEN PROMPTLY MAKE ALL REPLACEMENTS AND REPAIRS TO THE SATISFACTION OF THE OWNER. THE OWNER MAY ELECT TO USE A THIRD-PARTY CONTRACTOR TO PERFORM THE REPAIRS. ALL EXPENSES ASSOCIATED WITH THE REPAIRS AND REPLACEMENTS SHALL BE PAID BY THE GENERAL CONTRACTOR SELECTED FOR THIS CONTRACT.

26. ALL CUTS ON CONCRETE SIDEWALKS SHALL BE MADE FROM THE NEAREST JOINT OR SCORE LINE ON ONE SIDE OF THE EXCAVATION, TO THE NEAREST JOINT OR SCORE LINE ON THE OTHER SIDE OF THE EXCAVATION.

27. ALL CUTS ON BRICK SIDEWALKS SHALL BE MADE BY NEATLY SQUARING ALL EDGES OF THE EXCAVATION TO THE NEAREST LINE OF FULL SIZE BRICKS. ALL BRICKS IN THE WAY OF THE EXCAVATION SHALL BE NEATLY REMOVED BY THE CONTRACTOR PRIOR TO ANY WORK BEING PERFORMED, AND SAFELY STORED. SAFE STORAGE MAY INCLUDE STORAGE BY THE CONTRACTOR OR WITH ANOTHER FACILITY AS DIRECTED BY THE LOCAL JURISDICTION. BRICK SIDEWALK RESTORATION AFTER CONSTRUCTION SHALL CONFORM TO LOCAL JURISDICTION REQUIREMENTS.

28. ALL CUTS ON ASPHALT SIDEWALKS SHALL BE MADE BY NEATLY SQUARING ALL EDGES TO FORM A RECTANGULAR SHAPE AT A 90 DEGREE ANGLE.

29. ANY PAVEMENT OR LANE MARKINGS THAT ARE DISRUPTED BY THE WORK SHALL BE RESTORED ACCORDING TO LOCAL JURISDICTION REQUIREMENTS.

30. ANY TRAFFIC LOOPS OR OTHER SIGNAL SYSTEMS EMBEDDED IN THE PUBLIC RIGHT-OF-WAY DISRUPTED BY THE WORK SHALL BE RESTORED ACCORDING TO LOCAL JURISDICTION REQUIREMENTS.

31. ADDITIONAL TIME REQUIRED TO REPLACE REPLACEMENT AND MAKE REPAIRS WILL NOT BE CONSIDERED BY THE OWNER TO JUSTIFY AN EXTENSION IN THE CONTRACT TIME FOR COMPLETION.

32. ABSOLUTELY NO FIELD CORING / DRILLING / CUTTING OF METALLIC POLES TO BE ALLOWED.

1.1 ACCESS

1. COORDINATE WITH THE SITE OWNER AND/OR LOCAL JURISDICTION REGARDING THE CONSTRUCTION SCHEDULE & SITE ACCESS. ENSURE THAT THE OWNER OF PARENT PARCEL IS NOTIFIED IN WRITING OF CONSTRUCTION ACTIVITIES.

2. THE CONTRACTOR SHALL COORDINATE ALL SPECIAL CONSIDERATIONS OF CONSTRUCTION SUCH AS NOISY OPERATION, INTERRUPTION OF ANY MECHANICAL AND/OR ELECTRICAL SERVICES, MATERIAL DELIVERIES AND STORAGE, STAGING AREA, CRANE LIFTS, ETC. WITH THE PROPERTY OWNER, OWNER'S REPRESENTATIVE, AND/OR LOCAL JURISDICTION PRIOR TO THE START OF WORK.

3. CONTRACTOR SHALL COORDINATE WITH A PROPERTY OWNER REPRESENTATIVE, THE TEMPORARY REMOVAL OF FENCE, LANDSCAPING & ANY EXPECTED DAMAGE TO ACCESS ROAD OR ADJACENT REPAIR OF PROPERTY PRIOR TO COMMENCING THE WORK.

4. THE CONTRACTOR SHALL COORDINATE WORK HOURS & STAGING AREAS WITH PROPERTY OWNER, PROPERTY OWNER'S REPRESENTATIVE, AND/OR LOCAL JURISDICTION.

5. CONTRACTOR TO NOTIFY PROPERTY OWNER OF THE CONSTRUCTION START DATE WELL IN ADVANCE OF CONSTRUCTION.

1.2 SITE MAINTENANCE

1. REMOVE STAINING OR REACTIVE MATERIALS FROM NEW AND EXISTING SURFACES IMMEDIATELY. REMOVE HAZARDOUS ACCUMULATIONS OF DEBRIS PROMPTLY. AT LEAST DAILY. CONFINE DUST PRODUCING OPERATIONS DURING CUTTING, DRILLING, PAINTING AND FINISHING. THERE SHOULD BE NO OVER SPRAYING PAINT IN PARKING AREA. VACUUM IMMEDIATELY AFTER COMPLETION.

2. THERE SHALL NOT BE ANY CREATION OF NOISE OUTSIDE THE NORMAL HOURS MANDATED BY THE LOCAL JURISDICTION AND THE PROPERTY OWNER OR OWNER'S REPRESENTATIVE, UNLESS OTHERWISE AGREED UPON WITH THE LOCAL JURISDICTION AND PROPERTY OWNER OR OWNER'S REPRESENTATIVE. NOISE SHOULD BE KEPT TO A MINIMUM THROUGHOUT CONSTRUCTION.

3. NOISE AND EXISTING BUILDING STRUCTURE VIBRATION GENERATED BY THE CONSTRUCTION PROCEDURES, EQUIPMENT, TOOLS AND OPERATIONS ARE TO BE KEPT TO A PRACTICABLE MINIMUM. WHERE USE OF HIGH NOISE LEVEL EQUIPMENT IS UNAVOIDABLE, AND CAN BE HEARD, CONFINE TO HOURS MANDATED BY THE LOCAL JURISDICTION AND THE PROPERTY OWNER OR OWNER'S REPRESENTATIVE.

4. THE CONTRACTOR IS TO PROVIDE PORTABLE FIRE EXTINGUISHERS WITH A RATINGS OF NOT LESS THAN 2-A OR 2-ABC WITHIN 75FT OF TRAVEL TO ALL PORTIONS OF THE CONSTRUCTION AREA.

5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING A NEAT AND ORDERLY SITE, YARD AND GROUNDS. REMOVE AND DISPOSE LEGALLY OFF SITE, ALL RUBBISH, WASTE MATERIALS, LITTER, AND ALL FOREIGN SUBSTANCES. REMOVE PETROCHEMICAL SPILLS, STAINS AND OTHER FOREIGN DEPOSITS. RAKE GROUNDS TO A SMOOTH EVEN-TEXTURED SURFACE AT PROJECT COMPLETION. REMOVE TEMPORARY SERVICES, CONSTRUCTION EQUIPMENT, TOOLS AND FACILITIES, MOCKUPS, TEMPORARY STRUCTURES, SURPLUS MATERIALS, DEBRIS, AND RUBBISH FROM PROPERTY OWNER'S PROPERTY. PUT SITE IN NEAT, ORDERLY CONDITION, READY FOR USE. LEAVE ROOF AREAS, PIPE SPACES AND OTHER SPACES CLEAN AND FREE FROM DEBRIS ON A DAILY BASIS.

6. THE SITE AND/OR BUILDING SECURITY SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION IN ORDER TO PREVENT UNAUTHORIZED PERSONS FROM ENTERING THE PREMISES. EXISTING AND NEW EQUIPMENT AND MATERIALS REMAIN THE CONTRACTOR'S RESPONSIBILITY AT ALL TIMES DURING CONSTRUCTION.

7. THE TENANT'S INGRESS AND EGRESS OF THE SITE AND/OR BUILDING SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION.

8. THE CONTRACTOR SHALL TAKE ALL MEASURES NECESSARY TO MAINTAIN POLLUTION CONTROL, COMPLY WITH ALL GOVERNING REGULATIONS PERTAINING TO ENVIRONMENTAL PROTECTION, AND PROMPTLY REMOVE ALL DEBRIS AND ACCUMULATION OF MATERIALS RESULTING FROM THE WORK.

2. DEMOLITION AND EXISTING STRUCTURAL ALTERATION

1.1 DEMOLITION SPECIFICS

1. GENERAL CONTRACTOR IS SOLELY RESPONSIBLE FOR SHORING, BRACING, PROVIDING LATERAL SUPPORT, AND FOR MAINTAINING THE INTEGRITY OF THE EXISTING STRUCTURE DURING ALL PHASES OF THE DEMOLITION AND CONSTRUCTION AND SHALL PROVIDE, IF REQUIRED, SIGNED AND SEALED SHOP DRAWINGS, BY A REGISTERED PROFESSIONAL ENGINEER, FOR THE SHORING OF ALL WALLS, BEAMS, SLABS, ROOF JOISTS, OR OTHER ELEVATED STRUCTURAL ITEMS, THAT ARE HAVING SUPPORT NOTED FOR DEMOLITION.

2. ANY DAMAGE DUE TO DEMOLITION, OR OTHER CONSTRUCTION ACTIVITIES, DONE TO ANY EXISTING SURFACE TO REMAIN SHALL BE REPAIRED TO MATCH EXISTING AT NO ADDITIONAL COST TO THE OWNER.

1.2 CUTTING & PATCHING

1. DO NOT DRILL OR CUT EXISTING FLOOR JOISTS, BEAMS, COLLUMNS OR OTHER STRUCTURAL ELEMENTS UNLESS SPECIFICALLY INDICATED. DRILL SLABS WHERE APPROVED. CORE DRILL CIRCULAR OPENINGS THROUGH CONCRETE SLAB. LINE DRILL FOR RECTANGULAR OPENINGS. MAKE OPENINGS OF PROPER SIZE FOR CONDUIT, DUCTS, PIPES AND OTHER ITEMS PASSING THROUGH OPENINGS. MAKE ALL NEW HOLES OR OPENINGS WEATHER TIGHT AND/OR FIRE SAFE AS REQUIRED BY LOCAL BUILDING CODES & ORDINANCES.

2. WHERE CUTTING OF EXISTING SURFACES OR REMOVAL OF EXISTING FINISHES IS REQUIRED TO PERFORM THE WORK UNDER THIS CONTRACT AND A NEW FINISH IS NOT INDICATED, FILL RESULTING OPENINGS AND PATCH THE SURFACE AFTER DOING THE WORK AND FINISH TO MATCH ADJACENT EXISTING SURFACES

3. EXCEPT IN SPACE WHERE NO WORK UNDER THIS CONTRACT IS REQUIRED, ENCLOSE EXISTING AND NEW CONDUITS, DUCTS, PIPES, AND SIMILAR ITEMS IN FURRING WHERE SUCH ITEMS PASS THROUGH FINISHED SPACES WHETHER OR NOT FURRING IS INDICATED.

4. REPAIR, PATCH, FINISH AND/OR REFINISH AS APPLICABLE TO MATCH ADJACENT EXISTING FINISHES. ANY EXISTING SURFACES DAMAGED OR NEW PROPOSED SURFACES DAMAGED DURING PERFORMANCE OF THE WORK UNDER THIS CONTRACT.

5. REPAIR ALL METAL SURFACES THAT HAVE BEEN CUT OR DAMAGED BY REMOVING ANY EXISTING RUST AND APPLYING COLD GALVANIZATION.

3. SITE WORK

1. CLEARING AND GRUBBING

1. CLEARING OF TREES AND VEGETATION ON THE SITE SHOULD BE HELD TO A MINIMUM. ONLY TREES NECESSARY FOR THE CONSTRUCTION OF THE FACILITY SHALL BE REMOVED. ANY DAMAGES TO PROPERTY OUTSIDE THE CONSTRUCTION UNIT SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE.

2. THE CONTRACTOR SHALL PROTECT EXISTING TREES, VEGETATION, LANDSCAPING, MATERIALS AND SITE IMPROVEMENTS NOT SCHEDULED FOR CLEARING OR REMOVAL WHICH MIGHT BE DAMAGED BY CONSTRUCTION ACTIVITIES.

3. TRIM EXISTING TREES AND VEGETATION AS RECOMMENDED BY THE ARBORIST FOR PROTECTION DURING CONSTRUCTION.

4. CLEAR AND GRUB STUMPS, VEGETATION, DEBRIS, RUBBISH, DESIGNATED TREES REQUIRED FOR THE SITE IMPROVEMENT.

5. STRIP AND STOCKPILE TOPSOIL.

6. PROTECT TEMPORARILY ADJACENT PROPERTY, STRUCTURES, BENCHMARKS, AND MONUMENTS.

7. MARK DESIGNATED TREES AND VEGETATION DURING CONSTRUCTION ACTIVITIES.

8. PROVIDE TEMPORARY EROSION CONTROL, SILTATION CONTROL AND DUST CONTROL.

9. REMOVE AND LEGALLY DISPOSE OF CLEARED MATERIALS.

2. EXCAVATION AND BACKFILL

1. ALL SUITABLE BORROW MATERIAL FOR BACK FILL OF THE SITE SHALL BE INCLUDED IN THE BID. EXCESS TOPSOIL AND UNSUITABLE MATERIAL SHALL BE DISPOSED OF OFF-SITE AT A LOCATION APPROVED BY GOVERNING AGENCIES PRIOR TO DISPOSAL.

2. BROKEN PAVEMENT, STONES GREATER THAN THREE (3) INCHES IN DIAMETER, ROOTS AND OTHER DEBRIS SHALL NOT BE USED IN BACKFILL. NO MATERIAL SHALL BE LEFT IN THE PUBLIC RIGHT-OF-WAY ONCE WORK HAS BEEN COMPLETED.

3. EXCAVATED MATERIAL SHALL BE REMOVED FROM THE WORK SITE AND DISPOSED OF IN A MANNER SUCH THAT INTERFERENCE WITH AND OBSTRUCTION TO VEHICULAR AND PEDESTRIAN TRAFFIC IS MINIMIZED.

4. PRIOR TO BACKFILLING, THE CONTRACTOR SHALL NOTIFY THE LOCAL JURISDICTION IF REQUIRED AND ALLOW ADEQUATE TIME FOR INSPECTION.

5. BACKFILLING SHALL OCCUR ON THE SAME DAY AS THE EXCAVATION. IF THIS IS NOT POSSIBLE DUE TO THE COMPLEX NATURE OF THE WORK, EMERGENCY, OR UN-PREVENTABLE CONDITIONS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE LOCAL JURISDICTION(S) AND TAKE APPROPRIATE MEASURES TO PROTECT PUBLIC SAFETY AND INFRASTRUCTURE UNTIL WORK COMMENCES.

6. UNDER NO CIRCUMSTANCES SHALL AN OPEN EXCAVATION BE LEFT UNMANTENDED OVERNIGHT, UNLESS PROPERLY BARRICADED IN A MANNER MEETING WITH APPROVAL FROM LOCAL JURISDICTION(S).

7. ALL PAVEMENT BACKFILL MATERIAL SHALL BE PROCESSED GRAVEL. PAVEMENT BACKFILL SHALL MEET THE SELECTED FILL STANDARDS AS SHOWN BELOW, UNLESS STRICTER REQUIREMENTS ARE IMPOSED BY THE OWNER'S REPRESENTATIVE, GEOTECHNICAL REPORT RECOMMENDATIONS, OR THE REQUIREMENTS OF THE LOCAL JURISDICTION, WHICHEVER IS MORE STRINGENT.

Table with 2 columns: SIEVE DESIGNATION, PERCENT PASSING

3 INCH 100

1-1/2 INCH 75-100

3/4 INCH 50-85

NO. 4 35-60

NO. 20 30-60

NO. 40 15-35

NO. 60 10-12

NO. 100 5-10

NO. 200 2-5

NO. 425 1-2

NO. 600 0.75-1.0

NO. 840 0.5-0.75

NO. 1060 0.3-0.5

NO. 1490 0.2-0.3

NO. 2000 0.15-0.2

NO. 2800 0.1-0.15

NO. 3750 0.075-0.1

NO. 4750 0.05-0.075

NO. 6000 0.03-0.05

NO. 7500 0.02-0.03

NO. 9500 0.015-0.02

NO. 12500 0.01-0.015

NO. 16000 0.0075-0.01

NO. 20000 0.005-0.0075

NO. 25000 0.00375-0.005

NO. 31500 0.0025-0.00375

NO. 39600 0.00175-0.0025

NO. 49500 0.00125-0.00175

NO. 61500 0.000875-0.00125

NO. 76000 0.000625-0.000875

NO. 93000 0.00045-0.000625

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3.1 **EROSION CONTROL**

- CONTRACTOR SHALL PROVIDE ALL EROSION AND SEDIMENTATION CONTROL MEASURES AS REQUIRED BY LOCAL CODES AND ORDINANCES TO PROTECT EMBANKMENTS FROM SOIL LOSS AND TO PREVENT ACCUMULATION OF SOIL AND SILT IN STREAMS AND DRAINAGE PATHS LEAVING THE CONSTRUCTION AREA. THIS MAY INCLUDE SUCH MEASURES AS SILT FENCE, STRAW BALES, SEDIMENT BARRIERS, AND CHECK DAMS.
- EROSION CONTROL MEASURES MAY BE REQUIRED IN ADDITION TO THOSE SHOWN ON DRAWINGS WHERE DETERMINED NECESSARY BY ACTUAL SITE CONDITIONS.

4. **CONCRETE**

4.1 **GENERAL**

- DESIGN AND CONSTRUCTION OF ALL CONCRETE ELEMENTS SHALL CONFORM TO THE LATEST EDITIONS OF THE FOLLOWING APPLICABLE CODES:
 - ACI 301 - SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS
 - ACI 304 - GUIDE FOR MEASURING, MIXING, TRANSPORTING, AND PLACING CONCRETE
 - ACI 309 - GUIDE FOR CONSOLIDATION OF CONCRETE
 - ACI 318 - BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE
 - ACI 544.1R - FIBER REINFORCED CONCRETE (IF SPECIFIED)
 - ACI 544.2R - MEASUREMENT OF PROPERTIES OF FIBER REINFORCED CONCRETE (IF SPECIFIED)
- MIX DESIGN SHALL BE APPROVED BY THE OWNERS REPRESENTATIVE AND/OR REQUIREMENTS OF THE LOCAL JURISDICTION PRIOR TO POURING CONCRETE.
- CONCRETE SHALL MEET THE FOLLOWING REQUIREMENTS: 6% AIR ENTRAINED (+/- 1.5%) WITH A MAXIMUM OF 4-1/2" SLUMP, AND HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 4000 PSI UNLESS OTHERWISE NOTED. THE USE OF MINERAL ADDITIVES OR SUPPLEMENTS IS PROHIBITED. WATER MAY BE ADDED TO THE MIX IN ACCORDANCE WITH ASTM C94.
- MAXIMUM AGGREGATE SIZE SHALL BE 1"
- THE FOLLOWING MATERIALS SHALL BE USED:
 - PORTLAND CEMENT: ASTM C150, TYPE 11
 - REINFORCEMENT: ASTM A185 & A615
 - NORMAL WEIGHT AGGREGATE: ASTM C33
 - WATER: DRINKABLE
 - ADMIXTURES: NON - CHLORIDE CONTAINING
 - FIBROUS REINFORCEMENT: ASTM C1116 (IF SPECIFIED)
- REINFORCING DETAILS SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF ACI 315.
- REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS OTHERWISE NOTED, WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 165 WELDED WIRE FABRIC UNLESS OTHERWISE NOTED. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, U.N.O.
- THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
 - CONCRETE CAST AGAINST EARTH: 3 IN
 - CONCRETE EXPOSED TO EARTH OR WEATHER:
 - #6 AND LARGER: 3 IN
 - #5 AND SMALLER AND W/F: 1 1/2 IN
 - CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
 - SLABS AND WALL: 1/2 IN
 - BEAMS AND COLUMNS: 1 1/2 IN
- A CHAMFER OF 1/4 IN SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, U.N.O, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4
- INSTALLATION OF CONCRETE EXPANSION/SHRINKAGE ANCHORS SHALL BE PER MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR ENGINEERING APPROVAL WHEN DRILLING HOLES IN CONCRETE.
- EXPOSED EDGES SHALL CONFORM TO ASTM C - 309.
- ADMIXTURE SHALL CONFORM TO THE APPROPRIATE ASTM STANDARD AS REFERENCED IN ACI-301.
- CONCRETE FOR REPLACEMENT CONCRETE SIDEWALKS OR DRIVEWAYS SHALL BE PLACED TO A THICKNESS NOT LESS THAN 4", AND NOT MORE THAN THE THICKNESS OF THE ADJACENT CONCRETE SIDEWALK OR DRIVEWAY.
- DO NOT WELD OR TACKWELD REINFORCING STEEL.
- ALL DOWELS, ANCHOR BOLTS, EMBEDMENT STEEL, ELECTRICAL CONDUITS, PIPE SLEEVES, GROUNDS AND ALL OTHER EMBEDDED ITEMS AND FORMED DETAILS SHALL BE IN PLACE BEFORE START OF CONCRETE PLACEMENT.
- LOCATE ADDITIONAL CONSTRUCTION JOINTS REQUIRED TO FACILITATE CONSTRUCTION ACCORDING TO ENGINEER. PLACE REINFORCEMENT CONTINUOUSLY THROUGH JOINT.
- REINFORCEMENT SHALL BE COLD BENT WHEN BENDING IS REQUIRED.
- PLACE CONCRETE IN A UNIFORM MANNER TO PREVENT THE FORMATION OF COLD JOINTS AND OTHER PLANES OF WEAKNESS. VIBRATE THE CONCRETE TO FULLY EMBED REINFORCING. DO NOT USE VIBRATOR TO TRANSPORT CONCRETE THROUGH CHUTES OR FORMWORK.
- DO NOT PLACE CONCRETE IN PONDING WATER, ICE, OR ON FROZEN GROUND.
- FOR COLD WEATHER AND HOT WEATHER CONCRETE PLACEMENT, CONFORM TO APPLICABLE ACI CODES AND RECOMMENDATIONS. IN EITHER CASE, MATERIALS CONTAINING CHLORIDE, CALCIUM, SALTS, ETC. SHALL NOT BE USED. PROTECT FRESH CONCRETE FROM WEATHER FOR 7 DAYS MINIMUM.
- FIBER REINFORCED CONCRETE MIX, IF SPECIFIED, SHALL INCLUDE 1 1/2 LBS. OF FIBER PER CUBIC YARD.
- WASTE CEMENT FROM CLEANING OF CONCRETE DELIVERY TRUCKS SHALL NOT BE ALLOWED TO ENTER THE STORM DRAIN OR SEWER SYSTEM.

5. **FOUNDATION**

5.1 **GENERAL**

- ALL WORK SHALL COMPLY WITH OSHA AND STATE SAFETY REQUIREMENTS. PROCEDURES FOR THE PROTECTION OF EXCAVATIONS, EXISTING CONSTRUCTIONS AND UTILITIES SHALL BE ESTABLISHED PRIOR TO FOUNDATION INSTALLATION.
- PRIOR TO INITIATING EARTHWORK OPERATIONS, GROUND WATER AND SURFACE WATER CONTROL MEASURES NEED TO BE TAKEN.
- THE CONTRACTOR SHALL PROVIDE ADEQUATE SLOPING, SHORING, AND BRACING FOR ALL EXCAVATION TO PROTECT ADJACENT STRUCTURES AND COMPLY WITH LOCAL CODES, ORDINANCES, OSHA AND ANSI REQUIREMENTS.
- PRIOR TO CONSTRUCTION OF ANY PERMANENT STRUCTURE, THE SITE SHALL BE STRIPPED OF ALL SURFACE VEGETATION, TOP SOIL, AND ORGANIC MATERIAL; ALL WET, SOFT, LOOSE, FROZEN, OR OTHERWISE UNSUITABLE SOIL SHALL BE REMOVED.
- THE CONTRACTOR IS TO PREVENT SURFACE WATER FROM ENTERING EXCAVATIONS, PUDDLE, AND FROM FLOODING ADJACENT PROPERTIES DURING CONSTRUCTION. CONTRACTOR IS ALSO RESPONSIBLE FOR PREVENTING SOFTENING OF THE FOUNDATION SOILS PRIOR TO PLACING CONCRETE.
- THE EXPOSED SUB GRADE SHALL BE PROOF-ROLLED WITH MEDIUM WEIGHT ROLLERS OR OTHER APPROVED EQUIPMENT TO DETERMINE IF ANY POCKETS OF SOFT, COMPRESSIBLE SOIL EXISTS BELOW THE EXPOSED SUB GRADE. WHEREVER SUCH MATERIAL IS ENCOUNTERED, THE AREA SHALL BE UNDERCUT TO SUITABLE SOIL, AS DIRECTED BY A QUALIFIED ENGINEER.
- ALL STRUCTURAL FILL EXTENDING FROM SUITABLE SUB GRADE TO BOTTOM OF FOUNDATIONS OR FLOOR SLABS SHALL CONSIST OF GRANULAR MATERIAL AND 3% TO 10% BY DRY WEIGHT PASSING THE U.S. STD #200 SIEVE SIZE, COMPACTED TO 95% OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557 IN LAYERS NOT EXCEEDING 6".
- THE SOIL PREPARATION, INCLUDING FOOTING EXCAVATION, FILL, BACK FILL, AND COMPACTING SHALL BE DONE FOLLOWING THE RECOMMENDATION CONTAINED IN INTERNATIONAL BUILDING CODE (2012).
- PROPORTIONS OF CONCRETE MATERIALS SHALL BE SUITABLE FOR THE INSTALLATION METHOD UTILIZED AND SHALL RESULT IN DURABLE CONCRETE OF RESISTANCE TO ANTICIPATED AGGRESSIVE ACTIONS IN THE VICINITY OF THE FOUNDATION. THE DURABILITY REQUIREMENTS OF ACI 318 CHAPTER 4 SHALL BE SATISFIED BASED ON CONDITIONS EXPECTED AT THE SITE. AS A MINIMUM, CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI (20.7 MPa) IN 28 DAYS.
- CONCRETE MATERIALS SHALL CONFORM TO THE APPROPRIATE STATE REQUIREMENTS FOR EXPOSED STRUCTURAL CONCRETE.
 - WELDING IS PROHIBITED ON REINFORCING STEEL EMBEDMENTS.
 - MINIMUM CONCRETE COVER FOR REINFORCEMENT SHALL BE 3 INCHES (76MM) UNLESS OTHERWISE NOTED. APPROVED SPACERS SHALL BE USED TO INSURE A 3" (76MM) MINIMUM COVER ON REINFORCEMENT.
 - CONCRETE COVER FROM THE TOP OF FOUNDATION TO ENDS OF REINFORCEMENT SHALL NOT EXCEED 3 INCHES (76MM) NOR BE LESS THAN 2 INCHES (51MM).
 - FOOTINGS IS DESIGNED TO BEAR ON EXISTING NATURALLY OCCURRING, NON-EXPANSIVE SOILS, OR ENGINEERED FILL CAPABLE OF SAFELY SUSTAINING 2000 PSI.
 - IF SOIL PROPERTIES WERE NOT AVAILABLE, THE FOUNDATION DESIGN HAS BEEN DEVELOPED IN ACCORDANCE WITH GENERALLY ACCEPTED PROFESSIONAL ENGINEERING PRINCIPLES AND PRACTICES WITHIN THE LIMITS OF THE SUBSURFACE DATA PRESCRIBED BY GOVERNING CODE. FOUNDATION DESIGN IS BASED ON SOIL PARAMETERS FROM THE ABOVE REFERENCED BUILDING CODE AS FOLLOWS:
 - ALLOWABLE SOIL BEARING PRESSURE = 2000 PSI
 - ALLOWABLE SLIDING RESISTANCE = 150 PSF/FT.
 - FOUNDATION SHALL BE FORMED WITH PLYWOOD OR METAL PANELS SUFFICIENT FOR STRUCTURAL AND VISUAL REQUIREMENTS. FORMS SHALL BE STRUCTURALLY ADEQUATE TO WITHSTAND UNCURED CONCRETE PRESSURE. FORMS SHALL BE REMOVED ONCE CONCRETE HAS ATTAINED 75% OF ITS ULTIMATE STRENGTH.
 - THE CONTRACTOR SHALL EXPECT SUBMERGED DRILLING CONDITIONS FOR DEEP FOUNDATION CONSTRUCTION SUCH AS DRILLED PIERS OR DEADMAN ANCHORS AND SHALL MOBILIZE ACCORDINGLY.
 - FOUNDATION INSTALLATION SHALL BE SUPERVISED BY PERSONNEL KNOWLEDGEABLE AND EXPERIENCED WITHIN THE PROPOSED FOUNDATION TYPE. CONSTRUCTION SHALL BE IN ACCORDANCE WITH GENERALLY ACCEPTED INSTALLATION PRACTICES.
 - FOUNDATION DESIGN ASSUMES FIELD INSPECTIONS WILL BE PERFORMED TO VERIFY THAT CONSTRUCTION MATERIALS, INSTALLATION METHODS, AND ASSUMED DESIGN PARAMETERS ARE ACCEPTABLE BASED ON CONDITIONS EXISTING AT THE SITE.
 - CONCRETE SHALL BE PLACED IN A MANNER THAT WILL PREVENT SEGREGATION OF CONCRETE MATERIALS, INFILTRATION OF WATER OR SOIL, AND OTHER OCCURRENCES WHICH MAY DECREASE THE STRENGTH OR DURABILITY OF THE FOUNDATION. FREE FALL CONCRETE MAY BE USED PROVIDED FALL IS VERTICAL DOWN WITHOUT HITTING SIDINGS OF EXCAVATION, FORM WORK, REINFORCING BARS, FORM TIES, OR OTHER OBSTRUCTIONS. UNDER NO CIRCUMSTANCES SHALL CONCRETE FALL THROUGH WATER.
 - FOUNDATION DESIGN ASSUMES CONTINUOUS CONCRETE PLACEMENT WITHOUT CONSTRUCTION JOINTS.
 - TOP OF FOUNDATION OUTSIDE LIMITS OF ANCHOR BOLTS SHALL BE SLOPED TO DRAIN WITH A FLAATED FINISH AREA INSIDE LIMITS OF ANCHOR BOLTS SHALL BE LEVEL, WITH A SCRATCHED FINISH.
 - EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 1/4"x1/4" (19mm x 19mm) MINIMUM.
 - INTIMATE CONTACT BETWEEN CONCRETE AND SOIL WALLS OF PAD IS ESSENTIAL FOR ADEQUATE FOUNDATION PERFORMANCE. THE CONCRETE SHOULD BE APPROPRIATELY VIBRATED DURING CONSTRUCTION.
 - THE CONTRACTOR MIGHT HAVE TO BUILD THE FOUNDATION WITH SUBMERGED CONDITIONS AND SHALL MOBILIZE ACCORDINGLY.
 - ALL EXISTING GROUNDING RINGS AND DEVICES EXPOSED BY EXCAVATION OR REGRADING SHALL BE REPLACED AND PROPERLY CONNECTED TO EXISTING SYSTEM PER NEC OR LOCAL JURISDICTION REQUIREMENTS.

5.2 **DRILLED SHAFT**

- REINFORCING STEEL SHALL BE BRACED TO RETAIN PROPER DIMENSIONS DURING HANDLING AND THROUGHOUT PLACEMENT OF CONCRETE. WHEN TEMPORARY CAGES ARE UTILIZED, BRACING SHALL BE ADEQUATE TO RESIST FORCES OCCURRING FROM THE FLOWING CONCRETE DURING CASING EXTRACTION.
- CONCRETE COVER FROM TOP OF FOUNDATION TO ENDS OF VERTICAL REINFORCEMENT SHALL NOT EXCEED 3 INCHES (76 MM) NOR BE LESS THAN 2 INCHES (51 MM).
- SPACERS SHALL BE ATTACHED INTERMITTENTLY THROUGHOUT THE ENTIRE LENGTH OF VERTICAL REINFORCING CAGES TO INSURE CONCENTRIC PLACEMENT OF CAGES IN EXCAVATIONS.
- FOUNDATION DESIGN MODIFICATIONS MAY BE REQUIRED IN THE EVENT OF THE FOLLOWING DESIGN PARAMETERS ARE NOT APPLICABLE FOR THE SUBSURFACE CONDITIONS ENCOUNTERED.
- FOR FOUNDATION AND ANCHOR TOLERANCES REFER TO TOWER MANUFACTURER DRAWINGS FOR SPECIFIC JOB NUMBER AND DATE. IN ABSENCE OF MORE SPECIFIC INFORMATION, THE CONTRACTOR MAY USE THE FOLLOWING:
 - POLE FOUNDATION:
 - LOCATION: 1/24 OF SHAFT DIAMETER (MAX)
 - OUT-OF-PLUMB: 1/500 OF SHAFT LENGTH, NOT TO EXCEED 12.5% OF SHAFT DIAMETER OR 1/2"
 - CONCRETE CUT OFF ELEVATION: +/- 1/2"
 - FOUNDATION DESIGN ASSUMES CASING, IF USED, WILL NOT BE LEFT IN PLACE. EQUIPMENT, PROCEDURES AND PROPORTIONS OF CONCRETE MATERIALS SHALL INSURE CONCRETE WILL NOT BE ADVERSELY DISTURBED UPON CASING REMOVAL.
 - DRILLING FLUID, IF USED, SHALL BE FULLY DISPLACED BY CONCRETE AND SHALL NOT BE DETRIMENTAL TO CONCRETE OR SURROUNDING SOIL. CONTAMINATED CONCRETE SHALL BE REMOVED FROM TOP OF FOUNDATION AND REPLACED WITH FRESH CONCRETE.
 - INTIMATE CONTACT BETWEEN CONCRETE AND SOIL WALLS OF DRILLED SHAFT IS ESSENTIAL FOR ADEQUATE FOUNDATION PERFORMANCE. THE CONCRETE SHOULD BE APPROPRIATELY VIBRATED DURING CONSTRUCTION.

6. **ELECTRICAL**

6.1 **GENERAL**

- THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, INSURANCE, EQUIPMENT, TRANSPORTATION, CONSTRUCTION TOOLS, ETC. FOR THE INSTALLATION OF COMPLETE AND PROPERLY OPERATING SYSTEMS.
- INSTALLATION SHALL COMPLY WITH ALL APPLICABLE LAWS AND ORDINANCES OF ALL AUTHORITIES HAVING JURISDICTION AND WITH ALL ASSOCIATED UTILITY COMPANY REGULATIONS AND APPLICABLE REQUIREMENTS. INSTALLATION WILL ALSO COMPLY WITH THE LATEST EDITIONS OF ALL CODES AND STANDARDS OF THE ENTITIES LISTED UNDER THE 1.1. PARAGRAPH 1. THE MOST STRINGENT CODE WILL APPLY IN THE CASE OF DISCREPANCIES OR DIFFERENCES IN THE CODE REQUIREMENTS.
- THE CONTRACTOR SHALL SECURE ALL NECESSARY ELECTRICAL PERMITS AND PAY ALL REQUIRED FEES.
- RECORD DRAWINGS: MAINTAIN A RECORD OF ALL CHANGES, SUBSTITUTIONS BETWEEN WORK AS SPECIFIED AND INSTALLED. RECORD CHANGES ON A CLEAN SET OF CONTRACT DOCUMENTS WHICH SHALL BE TURNED OVER TO THE CONSTRUCTION MANAGER UPON COMPLETION OF THE PROJECT.
- ALL BROCHURES, OPERATION MANUALS, CATALOGS, SHOP DRAWINGS, SPECIFICATIONS, ETC. SHALL BE TURNED OVER TO THE CARRIER AT THE COMPLETION OF THE PROJECT.
- GUARANTEE/WARRANTY: GUARANTEE INSTALLATION TO BE FREE OF DEFECTS, SHORTS, GROUND, ETC. FOR A PERIOD OF ONE YEAR. FURNISH WARRANTY SO THE DEFECTIVE MATERIAL AND/OR WORKMANSHIP WILL BE REPAIRED/REPLACED IMMEDIATELY UPON NOTIFICATION AT NO COST TO THE OWNER FOR THE OPTION OF WARRANTY, IF, AFTER THIRTY (30) DAYS THE CORRECTIONS ARE NOT COMPLETE, THE OWNER RESERVES THE OPTION OF ARRANGING FOR THE NECESSARY REPAIRS AND BACK CHARGING THE CONTRACTOR FOR THE WORK.
- THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES, AS NECESSARY.
- DO NOT INTERRUPT EXISTING SERVICES WITHOUT WRITTEN PERMISSION OF THE OWNER OF THAT SERVICE AND WRITTEN PERMISSION OF THIS INSTALLATIONS CARRIER.
- CHANGES: NO ADDITIONAL COSTS FOR LABOR OR MATERIALS WILL BE ALLOWED FOR CHANGES OR MODIFICATIONS MADE UNLESS PRIOR WRITTEN APPROVAL IS OBTAINED FROM THE ARCHITECT, ENGINEER OR OWNER IN THE FORM OF A CHANGE ORDER.
- DRAWINGS: ELECTRICAL DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE NOT TO BE SCALED.
- DISCREPANCIES: DISCREPANCIES ON THESE PLANS, SPECIFICATIONS, ETC. MUST BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ENGINEER.
- SURVEY AND CONDITIONS: VISIT THE JOB SITE PRIOR TO SUBMITTING BID, AND MAKE A SURVEY OF EXISTING CONDITIONS WHICH MAY AFFECT THE WORK TO BE PERFORMED. NO OTHER ALLOWANCES WILL BE GIVEN FOR THIS SITE CONDITION.
- CO-OPERATION: CO-OPERATE WITH OTHER CONTRACTORS AND SUBCONTRACTORS ON THE SITE ARRANGE AND EXECUTE WORK IN SUCH A MANNER AS REQUIRED FOR THE SATISFACTORY AND EFFICIENT CONSTRUCTION OF THIS PROJECT BY ALL TRADES CONCERNED.
- INSTALLATION SHALL COMPLY SPECIFICALLY WITH ENGINEERING STANDARDS MANUAL. ANY DEVIATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE PROJECT MANAGER PRIOR TO COMMENCEMENT OF WORK.
- PROCUREMENT VERIFICATION: PROVIDE AN ITEMIZED CERTIFICATION TO THE PROJECT MANAGER THAT EQUIPMENT AND RELATED HARDWARE HAVE BEEN ORDERED WITHIN 24 HOURS OF NOTICE TO PROCEED.
- THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS

6.2 **INSPECTIONS**

- GENERAL: DURING AND UPON COMPLETION OF WORK, ARRANGE AND PAY ALL ASSOCIATED INSPECTIONS OF ALL ELECTRICAL WORK INSTALLED UNDER THIS CONTRACT IN ACCORDANCE WITH THE CONDITIONS OF THE CONTRACT.
- INSPECTIONS REQUIRED: AS PER THE LAWS AND REGULATIONS OF THE LOCAL AND/OR STATE AGENCIES HAVING JURISDICTION AT THE PROJECT SITE.
- INSPECTIONS AGENCY: APPROVED BY THE LOCAL AND/OR STATE AGENCIES HAVING JURISDICTION AT THE PROJECT SITE.
- CERTIFICATES: SUBMIT ALL REQUIRED INSPECTION CERTIFICATES TO THE CARRIER AND UTILITY.

6.3 **HANGERS AND SUPPORTS**

- MATERIALS: ALL HANGERS, SUPPORTS, FASTENERS AND HARDWARE SHALL BE ZINC COATED OR OF EQUIVALENT CORROSION RESISTANCE BY TREATMENT OR INHERENT PROPERTY AND SHALL BE MANUFACTURED PRODUCTS DESIGNED FOR THE APPLICATION. PRODUCTS FOR OUTDOOR USE SHALL BE HOT DIP GALVANIZED.
- TYPES: HANGERS, STRAPS, RISER SUPPORTS, CLAMPS, U-CHANNEL, THREADED RODS, ETC. AS INDICATED OR REQUIRED.
- INSTALLATION: RIGIDLY SUPPORT AND SECURE ALL MATERIAL, RACEWAY AND EQUIPMENT AS BUILDING STRUCTURE USING HANGERS, SUPPORTS AND FASTENERS SUITABLE FOR THE USE ON MATERIALS AND LOADS ENCOUNTERED, PROVIDE ALL NECESSARY HARDWARE, PROVIDE CONDUIT SUPPORTS AT MAXIMUM 5 FT. O.C.
- STRUCTURAL MEMBERS: DO NOT CUT, DRILL OR WELD ANY STRUCTURAL MEMBER EXCEPT AS SPECIFICALLY APPROVED BY THE ENGINEER.
- MISCELLANEOUS SUPPORTS: PROVIDE ANY ADDITIONAL STRUCTURAL SUPPORT STEEL BRACKETS, ANGLES, FASTENERS AND HARDWARE AS REQUIRED TO ADEQUATELY SUPPORT ALL ELECTRICAL MATERIALS AND EQUIPMENT.
- ONE-HOLE STRAPS SHALL NOT BE USED FOR CONDUITS LARGER THAN 1/2 INCH.

6.4 **ENCLOSURES/WIREWAYS**

- EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL. SHALL MEET OR EXCEED UL 50, AND BE RATED NEMA 1 (OR BETTER) INDOORS OR NEMA 3R (OR BETTER) OUTDOORS.
- WIREWAYS SHALL BE EPOXY-COATED (GRAY) AND INCLUDE A HINGED COVER AND RATE NEMA 1 (OR BETTER) INDOORS, OR NEMA 3R (OR BETTER) OUTDOORS.
- JUNCTION BOXES: JUNCTION BOXES SHALL BE A MINIMUM SIZE OF 4 INCHES SQUARE BY 1-1/4 INCHES DEEP.
- HOLES, SLEEVES AND OPENINGS
- GENERAL: PROVIDE ALL HOLES, SLEEVES AND OPENINGS REQUIRED FOR THE COMPLETION OF WORK AND RESTORE ALL DAMAGED SURFACES TO MATCH SURROUNDING SURFACES.
- CONDUIT PENETRATIONS: SIZE CORE-DRILLED HOLES SO THAT AN ANNULAR SPACE OF NOT LESS THAN 1/8 INCH AND NOT MORE THAN 1 INCH IS LEFT AROUND THE CONDUIT. PIPE, ETC. WHEN OPENINGS ARE CUT IN LIEU OF CORE-DRILLED, PROVIDE SLEEVE IN ROUGH OPENING. SIZE SLEEVES TO PROVIDE AN ANNULAR SPACE OF NOT LESS THAN 1/8 INCH AND NOT MORE THAN 1 INCH AROUND THE CONDUIT. PIPE, ETC. PATCH AROUND SLEEVE TO MATCH SURROUNDING SURFACE.
- PROVIDE APPROPRIATE WEATHERPROOFING MATERIALS FOR PENETRATIONS NEEDING TO BE SEALED FROM POTENTIAL WATER INTRUSION. PROVIDE FIREPROOF MATERIALS FOR PENETRATIONS REQUIRING A FIRE RATED SEAL. REFER TO CUTTING AND PATCHING NOTES UNDER SECTION 1 - GENERAL.
- IF ANY ROOFTOP WORK IS TO BE PERFORMED, THE CONTRACTOR SHALL USE THE BUILDING OWNERS APPROVED ROOFING CONTRACTOR TO PREVENT VOIDING ANY EXISTING ROOFING WARRANTIES. ANY DAMAGE TO THE EXISTING ROOFING MEMBRANE SHALL BE REPAIRED IMMEDIATELY TO AVOID MOISTURE INTRUSION INTO THE BUILDING SHELL.
- GENERAL: PROVIDE ALL CUTTING, DRILLING, FITTING AND PATCHING NECESSARY FOR ACCOMPLISHING THE WORK. THIS INCLUDES REMOVAL AND REPLACEMENT OF DEFECTIVE WORK AND WORK NOT CONFORMING TO THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.
- REPAIRS: REPAIR ANY AND ALL DAMAGE TO WORK OR TO CUTTING AND PATCHING OPERATIONS, USING SKILLED MECHANICS OF THE TRADES INVOLVED.
- DO NOT CUT MAJOR STRUCTURAL ELEMENTS WITHOUT APPROVAL. PATCHING SHALL BE OF QUALITY EQUAL TO AND OF MATCHING APPEARANCE OF EXISTING CONSTRUCTION.
- ABSOLUTELY NO FIELD CORING / DRILLING / CUTTING OF METALLIC POLES TO BE ALLOWED.

6.6 **CONDUCTORS**

- USE 98% CONDUCTIVITY COPPER WITH TYPE XHM-2 INSULATION, 600 VOLT, COLOR CODED. USE SOLID CONDUCTORS FOR WIRE UP TO AND INCLUDING NO. 8 AWG, STRANDED CONDUCTORS FOR WIRE LARGER THAN NO. 8 AWG. USE PRESSURE-TYPE INSULATED TWIST-ON CONNECTORS FOR NO. 10 AWG AND SMALLER, SOLDERLESS MECHANICAL TERMINAL LUGS FOR NO. 8 AWG AND LARGER. ALUMINUM CONDUCTORS SHALL NOT BE USED.
- NO. 10, MC OR ROMEX CABLE SHALL BE PERMITTED.
- EACH END OF EVERY POWER, GROUNDING AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC AND OSHA AND MATCH EXISTING INSULATION REQUIREMENTS.
- ALL THE WRAPS SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL. REMOVE SHARP EDGES.
- ALL CONDUIT SIZES SPECIFIED IN THIS DOCUMENT WERE DONE TAKING INTO ACCOUNT THE USE OF COPPER CONDUCTORS.

6.7 **ELECTRICAL SERVICE**

- GENERAL: COMPLY WITH AND CO-ORDINATE ALL REQUIREMENTS OF THE UTILITY COMPANY.
- SHORT CIRCUIT RATINGS: PROVIDE EQUIPMENT WITH HIGHER FAULT CURRENT RATINGS AS NEEDED TO MATCH UTILITY COMPANY AVAILABLE FAULT CURRENT.
- CONTRACTOR TO VERIFY UTILITY CO. FAULT CURRENT AND ENSURE THAT ALL EQUIPMENT MEETS FAULT CURRENT (AT A MINIMUM ALL EQUIPMENT TO BE 10,000 AC).
- THE CONTRACTOR IS RESPONSIBLE FOR MAKING ARRANGEMENTS WITH THE ELECTRIC UTILITY RELATIVE TO A TIMELY INSTALLATION OF THE NEW SERVICE AND PAYING ALL ASSOCIATED FEES.
- IDENTIFICATION: IDENTIFY SERVICE DISCONNECTION MEANS WITH PERMANENT NAMEPLATE.
- THE LOCATION SHOWN FOR A UTILITY POLE OR CONNECTION TO NEW UTILITIES IS FOR CONCEPTUAL USE ONLY. THE CONTRACTOR SHALL COORDINATE THE ACTUAL LOCATION WITH THE ELECTRIC UTILITY.
- LOCATION AND ARRANGEMENTS: DRAWINGS INDICATE DIAGRAMMATICALLY THE DESIRED LOCATION OF EQUIPMENT, FIXTURES, OUTLETS, ETC., AND ARE NOT TO BE SCALED. PROPER JUDGMENT MUST BE EXERCISED IN THE EXECUTION TO ENSURE THE BEST POSSIBLE INSTALLATION.
- PANEL AND DISTRIBUTION BOARD IDENTIFICATION: SWITCHBOARDS, PANELBOARDS, TRANSFORMERS AND DISTRIBUTION SECTIONS SHALL BE IDENTIFIED WITH ENGRAVED, WHITE ON BLACK, LAMINATED, RIGID PHENOLIC NAMEPLATES WITH 1/4 INCH CHARACTERS, SECURELY AFFIXED TO FACE OF CABINET.

6.8 **CHECKOUT, TESTING AND ADJUSTING**

- CORRECTION/REPLACEMENT: AFTER TESTING BY CONTRACTOR, OWNER OR ENGINEER, CORRECT ANY DEFICIENCIES AND REPLACE MATERIALS AND EQUIPMENT SHOWN TO BE DEFECTIVE OR UNABLE TO PERFORM AT DESIGN OR RATED CAPACITY.
- POWER CONDUCTORS: CONTRACTOR SHALL CONDUCT A CONTINUITY AND INSULATION TEST ON CONDUCTORS BETWEEN SERVICE DISCONNECT SWITCH AND LOAD CENTER.
- WHEN SITE POWER IS DERIVED FROM A 3-PHASE SOURCE, LOAD READINGS WILL BE TAKEN AND RECORDED TO MAINTAIN A BALANCED LOAD AT THE PRIMARY SOURCE. RECORDS SHALL BE RETURNED TO THE OWNER'S REPRESENTATIVE.

6.9 **RACEWAY SYSTEMS/CONDUIT**

- UNDERGROUND CONDUIT SHALL BE SCHEDULE 40 PVC CONDUIT OR BETTER AS REQUIRED BY LOCAL JURISDICTION AND/OR UTILITY. UNDERGROUND PVC CONDUIT SHALL TRANSITION TO RIGID GALVANIZED STEEL CONDUIT OR SCHEDULE 80 PVC CONDUIT BEFORE RISING ABOVE GRADE OR CONCRETE SLAB.
- CURVED CONDUIT SHALL CONFORM TO ASTM C - 309.
- GRS CONDUITS, WHEN SPECIFIED, SHALL MEET UL-6 FOR GALVANIZED STEEL. ALL FITTINGS SHALL BE USED WITH THREADED RIGID CONDUIT.
- ELECTRICAL METALLIC TUBING (EMT) OR RIGID, NONMETALLIC CONDUIT (RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
- ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (RIGID PVC SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
- LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
- PLUG AND CAP EACH END OF SPARE AND EMPTY CONDUITS AND PROVIDE TWO SEPARATE PULL STRINGS - 200 LB. TEST POLYETHYLENE CORD.
- ALL CONDUIT BENDS SHALL BE MINIMUM OF 24-INCH RADIUS.
- ALL METALLIC RACEWAYS SHALL BE GROUNDED PER NEC.
- THE CONTRACTOR SHALL FIELD VERIFY THE BEST AND LEAST DISRUPTIVE ROUTING OF CONDUITS, CABLE TRAYS AND DUCTS. CONDUIT ROUTING IS SHOWN AS A GUIDE ONLY, ACTUAL CONDUIT PLACEMENT IS TO BE DONE IN A PROFESSIONAL MANNER.

6.10 **BELOW GRADE**

- THIS SITE INCLUDES NEW CRITICAL UNDERGROUND ELECTRIC, TELEPHONE AND OTHER SERVICES IN THE VICINITY OF OTHER UNDERGROUND SERVICES AND EQUIPMENT SUPPORTS. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID SERVICE DISRUPTION TO THESE FACILITIES. THE CONTRACTOR SHALL ALSO CONTACT ELECTRIC AND TELEPHONE, AND ALL OTHER APPROPRIATE AGENCIES PRIOR TO EXCAVATION AT THIS SITE.
- PRIOR TO EXCAVATION, A UTILITY MARK OUT SHALL BE DONE TO LOCATE EXISTING UNDERGROUND UTILITIES. ALL UNDERGROUND UTILITIES MUST BE LOCATED AND MARKED OUT PRIOR TO ANY EXCAVATION WORK BEING PERFORMED. PHOTOS SHALL BE TAKEN OF ALL UNDERGROUND WORK AND GIVEN TO THE OWNER OR OWNERS REPRESENTATIVE DURING THE SITE'S HANDOFF.
- ALL TRENCHING AND EXCAVATION WITH EXISTING COMPANES MUST BE PERFORMED BY HAND IN ACCORDANCE WITH THE OWNER'S SPECIFICATIONS. ANY OTHER METHODS OF DIGGING MUST FIRST BE APPROVED BY THE CONSTRUCTION MANAGER.
- ALL LOW VOLTAGE CONDUIT (600V OR LESS) SHALL HAVE A MINIMUM BURIAL DEPTH OF 24". ALL HIGH VOLTAGE CONDUIT (600V OR MORE) SHALL HAVE A MINIMUM BURIAL DEPTH OF 36"
- UNDERGROUND CONDUIT SHALL BE ENCASED IN REINFORCED CONCRETE IN AREAS OF VEHICLE TRAFFIC. CONCRETE ENCASEMENT SHALL BE 3" MINIMUM ALL AROUND AND BETWEEN CONDUITS.
- ALL BURIED CONDUIT SHALL BE IDENTIFIED WITH ELECTRICAL MARKER TAPE. TAPE SHALL BE PLACED 12" ABOVE CONDUIT FOR EASY IDENTIFICATION.

6.11 **EQUIPMENT**

- THE MAIN CIRCUIT BREAKER SHALL BE RATED FOR STANDARD A I.C. RATING HIGHER THAN INCOMING EQUIPMENT A I.C.
- ALL EQUIPMENT SHALL BE BRACED FOR STANDARD A I.C. RATING HIGHER THAN INCOMING FROM UTILITY CO.
- THE CONTRACTOR SHALL PROVIDE AN ITEMIZED CERTIFICATION TO THE CARRIER OF ALL EQUIPMENT AND RELATED HARDWARE, SPECIFIED TO BE PURCHASED AND INSTALLED BY THE CONTRACTOR, WHERE ORDERED WITHIN 24 HRS. OF THE NOTICE TO PROCEED.
- ALL ELECTRICAL SWITCHES SHALL BE CLEARLY LABELED WITH ENGRAVED PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH ITS VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR CAPACITY RATING AND BRANCH CIRCUIT ID NUMBERS (I.E. PANELBOARD AND CIRCUIT ID'S).
- ALL RECEPTACLE, SWITCH AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED OR NON-CORRODING. SHALL MEET OR EXCEED UL 51A AND NEMA OS 1, AND BE RATED NEMA 1 (OR BETTER) INDOORS OR WEATHER-PROTECTED (WP OR BETTER) OUTDOORS.
- NONMETALLIC RECEPTACLE SWITCH AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2, AND BE RATED NEMA 1 (OR BETTER) INDOORS OR WEATHER-PROTECTED (WP OR BETTER) OUTDOORS.

6.12 **TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)**

- TVSS DEVICES FOR AC POWER SHALL BE INSTALLED IN ALL EXISTING FACILITIES THAT ARE MISSING TVSS DEVICES OR HAVE UNSUITABLE TVSS DEVICES.
- THE AC POWER COMMON MODE SURGE SUPPRESSION SHALL BE CONNECTED TO THE COMMON MODE POWER SUPPLY AND THE COMMON MODE POWER SUPPLY TO THE MANUAL TRANSFER SWITCH.
- IN MARKETS WITH LIGHTNING ZONE + OR - TO 4, RF TVSS DEVICE SHALL BE INSTALLED AT THE ENTRANCE TO THE SHELTER OR AS CLOSE AS POSSIBLE TO THE BTS CABINET FOR OUTDOOR SITES, TO PROTECT AGAINST LIGHTNING AND TRANSIENT VOLTAGES.
- A T1 TRANSPORT TVSS DEVICE SHALL BE INSTALLED AT ALL SITES BETWEEN THE NTU AND THE BTS.

7. **GROUNDING**

7.1 **GENERAL GROUNDING MATERIALS AND NOTES**

- THE SUBCONTRACTOR SHALL VERIFY THAT THE SYSTEM IS EFFECTIVELY GROUNDED, MEETS NEC ARTICLE 250 REQUIREMENTS, IS ACCEPTABLE TO THE LOCAL UTILITY AND THE LOCAL AUTHORITY HAVING JURISDICTION, AND MEETS THE CARRIER'S ELECTRICAL AND GROUNDING SPECIFICATIONS. FOLLOWING COMPLETION OF WORK, CONDUCT GROUND TEST. CONTRACTOR SHALL INSPECT CABLES AND REVIEW GROUND TEST PRIOR TO BURIAL. USE CLEAN SAND AND CLAY BACKFILL FOR BURIED GROUND CONDUCTORS.
- ALL DETAILS SHOWN ARE DIAGRAMMATICAL. ACTUAL GROUNDINGS INSTALLATION AND CONSTRUCTION MAY VARY DUE TO SITE SPECIFIC CONDITIONS.
- NOTIFY CONSTRUCTION MANAGER IF THERE ARE ANY DIFFICULTIES INSTALLING THE GROUND SYSTEM DUE TO SITE/SOIL CONDITIONS.
- GROUND CONNECTIONS: WHERE GROUND CONNECTIONS ARE MADE, THE CONTACT POINTS SHALL BE THOROUGHLY CLEANED AND MADE OF FOREIGN MATERIAL SUCH AS PAINT, GALVANIZATION, AND CORROSION, TO ENSURE ADEQUATE BOND. REFER TO EXOTHERMIC WELD, LUGS, AND ANTI-OXIDATION COMPOUND NOTES FOR FURTHER DETAILS.
- GROUND WIRE: OUTSIDE/UNDERGROUND, MINIMUM NO. 2 AMERICAN WIRE GAUGE (AWG) BARE, SOLID, ANNEALED, TINED COPPER WIRE (B7C) BUT SIZED IN ACCORDANCE WITH NEC TABLE 250.68. SERVICE SIZE, AND LOCAL UTILITY REQUIREMENTS. UNDER NO CIRCUMSTANCES IS STRANDED WIRE ACCEPTABLE. ALL BURIED WIRE SHALL BE INSTALLED TO MEET MINIMUM BEND RADIUS. SHARP BENDS AND KINKS ARE NEVER ACCEPTABLE. WHEN ANY GROUNDING OR BONDING WIRE RUNS THROUGH CONCRETE, IT SHALL BE SLEEVED IN PVC. GROUND WIRES SHALL NOT BE INSTALLED OR ROUTED THROUGH HOLES IN ANY METAL OBJECTS OR SUPPORTS.
- GROUND WIRE - INSIDE: WIRE SHALL BE NO. 2 AWG THIN OR THIN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90 WC (WET AND DRY) OPERATION, GREEN INSULATED (A HIGH-STRAIN CORD TYPE IS PREFERRED).
- BURIED GROUND RING: THE EQUIPMENT/SHELTER PAD OR PLATFORM SHALL HAVE A BURIED GROUND RING (BRG) THAT CONSISTS OF A RING NO. 2 AWG BARE, SOLID, ANNEALED, TINED COPPER WIRE AND EXOTHERMICALLY WELDED GROUND RODS. THE BRG DESIGN SHOULD RESULT IN 10 OHMS OR LESS WITH SOIL RESISTIVITY OF UP TO 50,000 OHM-CM. SOIL RESISTIVITIES HIGHER THAN THIS WILL REQUIRE FURTHER ALUMINATION ALL UNDERGROUND (BELOW GRADE) GROUNDING CONNECTIONS, INCLUDED COPPER GROUND RODS, CHEMICAL GROUND RODS ATTACHMENTS, AND GROUND LEADS FROM EQUIPMENT, TOWER, AND COAX SHALL BE MADE BY AN EXOTHERMIC WELD. THE GROUND RING SHALL BE BETWEEN A MINIMUM OF TWO FEET FROM THE SHELTER FOUNDATION, BRG PAD, OR PLATFORM PERIMETER AT A MINIMUM DEPTH OF TWO FEET, SIX INCHES, AND WITH NO BEND HAVING A RADIUS OF LESS THAN TWO FEET. THE TRENCH SHALL BE 6 INCHES BELOW THE REQUIRED WIRE DEPTH. GROUND RODS SHALL BE INSTALLED AT EACH CORNER OF THE BRG, OR PER NPPA 70, ARTICLE 250-56. EVERY EFFORT SHALL BE MADE TO ENSURE THAT ALL GROUND PATHS TO THE BRG ARE INSTALLED SO THAT ANY POTENTIAL DISCHARGE OF ELECTRICITY WILL NOT GO THROUGH ANY GROUND PATH CO UPWARD.
- EXOTHERMIC WELDING: EXOTHERMIC WELDS SHALL BE CADWELD, A REGISTERED TRADEMARK OF ERCO PRODUCTS, INC. OF CLEVELAND, OHIO, OR THERMOWELD, A DIVISION OF CONTINENTAL INDUSTRIES, INC. OF TULSA, OKLAHOMA OR EQUIVALENT.
- GROUND ROD: 5/8" X 8-FEET (MINIMUM LENGTH) STEEL WITH PURE COPPER JACKET NOT LESS THAN 0.012 INCHES THICK. GROUND RODS SHALL BE SPACED NO GREATER THAN 15 FT. O.C. AND NO LESS THAN 6 FT. O.C.
- GROUND ROD COUPLING: 5/8" GROUND ROD COUPLING MADE OF THE SAME MATERIAL AS THE GROUND ROD TO PREVENT DISSIMILAR METAL HIGH OXIDATION POINTS.
- CHEMICAL GROUND ROD: COMPRISED OF A HOLLOW COPPER GROUND ROD, A GROUND TEST WELL, A 4'-0" EXOTHERMICALLY WELDED DIGITAL AND CONDUCTIVE BACKFILL MATERIAL. THE CHEMICAL GROUND ELECTRODE SHALL BE MADE OF A MINIMUM OF 2-INCH L.D. TYPE K COPPER TUBE WITH A MINIMUM WALL THICKNESS OF 0.083 INCH AND SHALL BE A MINIMUM OF 8 FEET IN LENGTH. THE CHEMICAL GROUND ROD SHALL BE UL LISTED. IN SITUATIONS WHERE DRILLING VERTICALLY IS TOO DIFFICULT OR COSTLY, HORIZONTAL X-SHAPE CHEMICAL GROUND RODS ARE ACCEPTABLE.
- GROUND BARS: GROUND BARS MANUFACTURED EXACTLY AS SPECIFIED. OR, ALTERNATIVELY, GROUND BARS SHALL BE ACCURATE WITHIN 1/32 INCH. HOLE DIAMETERS SHALL BE ACCURATE WITHIN 1/64 INCH. BARS SHALL BE 1/2 INCH THICK SOLID ELECTRICAL GRADE COPPER MANUFACTURED BY HANGER OR APPROVED EQUAL. GROUND BARS SHALL NOT BE FABRICATED OR MODIFIED IN THE FIELD. COAXIAL CABLE GROUND BARS SHOULD BE MECHANICALLY CONNECTED TO THE TOWER STRUCTURAL STEEL. HOWEVER, DO NOT DRILL HOLES OR USE EXOTHERMIC WELDS TO CONNECT GROUND LEADS TO A STEEL TOWER EXCEPT ON STEEL TABS OR FLANGES SPECIFICALLY DESIGNED FOR THAT PURPOSE. HOLES AND/OR EXOTHERMIC WELDING CAN NEGATIVELY IMPACT THE STRUCTURAL INTEGRITY OF THE TOWER AND INCREASE CHANCES OF CORROSION.
- INSULATORS: POLYESTER FIBERGLASS, 15 KV MINIMUM DIELECTRIC STRENGTH, FLAME RESISTANT PER UL 94 VO CLASSIFICATION.
- CUPS: WHEN SECURING ANY GROUND WIRES, SOLID OR STRANDED, INSULATED OR UNINSULATED, NEVER USE ANY CUPS OR OTHER DEVICES THAT ARE CONDUCTIVE AND FORM A CLOSED LOOP. METALLIC CLIPS ARE ACCEPTABLE IF THEY DO NOT FORM A CLOSED LOOP.
- GROUND CLAMP: BURNIDY GAR STYLE UL CLAMP WITH TWO-HOLE PROVISIONS FOR LONG BARREL MULTIPLE CRIMP TWO-HOLE LUGS.
- COAX GROUNDING KIT: COAX GROUND KITS SHALL BE FROM THE SAME MANUFACTURER AS THE COAX. GROUND KITS SHALL BE SOLID STRAP TYPE WITH NO. 6 AWG WIRE AND 2-HOLE COMPRESSION CRIMPED LUGS (INSTALLED USING THE PROPER UL TOOL AND CIRCUMFERENTIAL HEXAGON DIE), BRAND OR HOSE CLAMP TYPE SHALL NOT BE USED. SOLID COPPER STRAP TYPE WITH SINGLE HOLE LUGS SHALL NOT BE USED. ALL COAX CABLES ARE TO BE GROUNDED AT THEIR SECTOR CGB, THE COLLECTOR CGB, MIDPOINT CGB (IF REQUIRED), BOTTOM CGB, WAVEGUIDED BRIDGE CGB (IF REQUIRED), AND AT THE SHELTER WALL. A MIDPOINT CGB IS ONLY REQUIRED IF THE COAX LENGTH EXCEEDS 200'. A WAVEGUIDE BRIDGE CGB IS ONLY REQUIRED WHEN THE LENGTH OF CABLE (FROM TOWER TO EQUIPMENT) IS GREATER THAN 15 FEET.
- WEATHERPROOFING: ALL COAX GROUND KITS SHALL BE WEATHERPROOFED. ONLY GROUND KITS APPROVED BY THE COAX MANUFACTURER SHALL BE USED.
- METALLIC PROTECT: ANY GROUND RODS WIRES, SOLID OR STRANDED, THAT PASS-THROUGH CONDUIT, METALLIC SLEEVE, OR CABLE COVER, SHALL BE BONDED AT BOTH ENDS.
- ANTENNA GROUNDING: ALL ANTENNAS (INCLUDING THE GPS ANTENNAS) ARE GROUNDED BY THEIR MOUNTS/MOUNTS AND BY THE GROUND KITS ON THE COAXIAL CABLE CONNECTED TO THE COAX GROUND BARS. DO NOT INSTALL SEPARATE ANTENNA GROUND CONNECTIONS UNLESS SPECIFIED BY THE ANTENNA'S MANUFACTURER. THE GPS ANTENNAS SHALL BE INSTALLED AND CONNECTED TO THE COAX GROUND BAR AT THE END OF THE WAVEGUIDE BRIDGE.
- ANTI-OXIDATION COMPOUND: ANTI-OXIDATION COMPOUND SHALL BE THOMAS AND BETTS KOPR-SHIELD (TM OF JET LUBE, INC.) OR BURNIDY PENETROX - E. ANTI-OXIDATION COMPOUND SHALL BE APPLIED BETWEEN LUG AND GROUND BAR ONLY, DO NOT COVER THE LUG.
- SERVICE DISCONNECT GROUNDING: IF THERE IS A SERVICE DISCONNECT SEPARATE FROM THE PPC MAIN CIRCUIT BREAKERS, THE NEUTRAL TO GROUND BOND SHALL BE MADE AT THE SERVICE DISCONNECT SWITCH LOCATED SEPARATELY AND ON THE SUPPLY SIDE OF THE PPC CABINET AND NO NEUTRAL TO GROUND CONNECTION SHOULD BE IN THE PPC. IT IS CRITICAL THAT ONLY ONE NEUTRAL TO GROUND BOND BE MADE AT THE SERVICE ENTRANCE EQUIPMENT AS DEFINED BY THE NATIONAL ELECTRIC CODE.

8. **COAXIAL CABLE REQUIREMENTS**

8.1 **GENERAL**

- PROVIDE ALL LABOR, EQUIPMENT, AND MATERIALS NECESSARY FOR RECEIVING, INSTALLING, TESTING, AND ADJUSTING ANTENNA CABLES FROM THE ANTENNA TO THE CONNECTIONS AT THE BASE TRANSMISSION SYSTEM (BTS). THIS SHALL INCLUDE ALL EQUIPMENT SHOWN OR REQUIRED FOR A COMPLETE OPERATING SYSTEM, ANTENNA, ANTENNA CABLES, CONNECTORS, AND FITTING SHALL BE THIRD PARTY FURNISHED COMPONENTS AS SHOWN ON THE BILL OF MATERIALS.

8.2 **INSTALLATION**

- COAXIAL CABLE LENGTHS SHALL BE FIELD MEASURED. INSTALLER SHALL NOTIFY CARRIER PRIOR TO PURCHASE OF CABLE OF THE OVERALL LENGTH REQUIRED.
- COAXIAL CABLE TYPE AND DIAMETER SHALL BE VERIFIED WITH CARRIER.
- COAXIAL CABLE SHALL BE LABELED IN ACCORDANCE WITH CARRIER ELECTRICAL MATERIALS AND METHODS SPECIFICATIONS. ALL MAIN CABLES WILL BE COLOR CODED AT FOUR LOCATIONS: A) AT ANTENNA PRIOR TO JUMPER, B) AT THE BOTTOM OF THE TOWER, C) EXTERIOR PART OF THE WAVE GUIDE ENTRY PORT (AT THE SHELTER/CABINET WALL), D) INTERIOR OF THE SHELTER/CABINET.
- INSTALL CONNECTORS TO COAXIAL CABLE AT BOTH ENDS (ANTENNA END AND BTS LOCATION).
- UPON SUCCESSFUL COMPLETION OF THE SWEEP TEST, THE CONTRACTOR SHALL PROVIDE A WEATHERTIGHT SEAL ON THE COAX CABLE AT THE ANTENNA CONNECTION ONLY.
- THE MINIMUM BENDING RADIUS FOR ALL ANTENNA CABLES SHALL BE AS SHOWN BELOW OR PER THE MANUFACTURER, WHICHEVER IS MORE CONSERVATIVE:

CABLE	IN AIR OR CABLE TRAY	IN CONDUIT
1/4"		1"
1/2"	5"	1"
7/8"	10"	16"
1"		26"
1.5"		26"

3. CABLES SHALL BE INSTALLED WITH THE MINIMUM NUMBER OF BENDS. CABLE SHALL NOT BE LEFT UNTERMINATED IN THE FIELD.

4. **GROUNDING**

- GROUNDING KITS - AFTER INSTALLATION OF GROUND STRAPS, THE CONNECTIONS SHALL BE MADE WEATHER TIGHT USING WEATHERPROOF KITS AS IDENTIFIED. GROUND PIGTAILS SHALL BE BROUGHT OUT IN THE DOWNWARD DIRECTION FROM THE CONNECTION SHALL BE MADE TO GROUNDING SYSTEM.

8.2 **ANTENNA REQUIREMENTS**

- AZIMUTHS ARE ORIENTED CLOCKWISE