

DUKES COUNTY EMERGENCY  
COMMUNICATIONS UPGRADE PROJECT  
RECC

9 FLIGHT PATH  
WEST TISBURY, MA 02575

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SITE COORDINATES: LATITUDE: 41° 23' 15.89" N  
LONGITUDE: 70° 36' 43.87" W  
GROUND ELEVATION: ± 54' AMSL

COORDINATES AND GROUND ELEVATION PROVIDED BY PYRAMID NETWORK SERVICES

VICINITY MAP

SCALE: 1" = 600'



PROJECT SCOPE

THE GENERAL SCOPE OF WORK CONSISTS OF:

1. THE INSTALLATION OF AN ADDITIONAL (6) DUKES COUNTY DIPOLE ANTENNAS AND AN ADDITIONAL (2) MW DISH ANTENNAS FOR A TOTAL OF (14) DUKES COUNTY ANTENNAS ON THE EXISTING 110' TALL SELF-SUPPORTING TOWER.
2. ADDITIONAL DUKES COUNTY EQUIPMENT AND RELATED APPURTENANCES WILL BE INSTALLED IN THE EXISTING EQUIPMENT ROOM LOCATED WITHIN THE BASEMENT OF THE EXISTING BUILDING.
3. THE INSTALLATION OF A 100KW PROPANE FUELED BACKUP GENERATOR ON A CONCRETE PAD, AS WELL AS THE RELATED CONTROL AND POWER LINES, ROUTED TO THE EXISTING EQUIPMENT ROOM.

PROJECT SUMMARY

SITE NAME: RECC  
SITE ADDRESS: 9 FLIGHT PATH  
WEST TISBURY, MA 02575  
TOWER OWNER: DUKES COUNTY SHERIFFS DEPARTMENT  
21 FLIGHT PATH  
VINEYARD HAVEN, MA 02568  
CUSTOMER CONTACT: DUKES COUNTY SHERIFFS DEPARTMENT  
DEPUTY ANTHONY GOULD  
(508) 696-7862  
PROJECT MANAGERS: MOTOROLA SOLUTIONS  
DIANE DAMINO  
(203) 615-3695  
PYRAMID NETWORK SERVICES, LLC  
ROB MCCABE  
(315) 373-3040  
PROJECT ENGINEER: MOTOROLA SOLUTIONS  
JEREMY BREEF-PILZ  
(508) 808-1821  
ENGINEER OF RECORD: CENTEK ENGINEERING, INC.  
63-2 NORTH BRANFORD ROAD  
BRANFORD, CT 06405  
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0	09/04/19	KAWJR	CAG	FINAL DRAWINGS - ISSUED FOR CONSTRUCTION
REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION

Project Name:  
RECC

Location:  
9 FLIGHT PATH  
WEST TISBURY, MA 02575

Centek Project No.: 19017.01

Drawing Title: TITLE SHEET

Dwg. No.: T - 1

Sheet 1 of 19





NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2015 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY 780 CMR 9TH EDITION.

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS)
- THE TOWER MUST BE DESIGNED SO THAT TWIST, SWAY AND HORIZONTAL MOVEMENT DO NOT CAUSE MORE THAN 3dB OR SIGNAL DEGRADATION AT EITHER END OF A MICROWAVE PATH AS DESCRIBED IN TIA 222-G ANNEX D.
- RISK CATEGORY III (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 155 MPH (Vasd) (EXPOSURE C/ IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10).
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7-10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES

- ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE MASSACHUSETTS STATE BUILDING CODE (780 CMR 9TH EDITION), INCLUDING THE TIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2016 MASSACHUSETTS FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
- CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
- CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
- CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
- CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
- CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
- LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
- THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.

- DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
- ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
- ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
- ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED' ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE SITE OWNER'S CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
- CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
- CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
- THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
- COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
- THE CONTRACTOR SHALL CONTACT "DIG SAFE" (DIAL 811) AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
- CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.
- CONTRACTOR MUST COMPLY WITH MOTOROLA R56 - STANDARDS AND GUIDELINES FOR COMMUNICATIONS SITES (LATEST REVISION) FOR SITE DESIGN AND INSTALLATION OF ALL FIXED NETWORK EQUIPMENT AND ASSOCIATED SYSTEMS INCLUDING BUT NOT LIMITED TO ANTENNA SYSTEMS, TOWERS, SHELTERS, BOUNDING, GROUNDING AND TRANSIENT VOLTAGE SURGE SUPPRESSION.

- THE COUNTY WILL MAKE PERIODIC FIELD OBSERVATION AND INSPECTIONS TO MONITOR THE INSTALLATION, MATERIALS, WORKMANSHIP AND EQUIPMENT INCORPORATED INTO THE PROJECT TO ENSURE COMPLIANCE WITH THE DESIGN PLANS, SPECIFICATIONS (R56), CONTRACT DOCUMENTS AND APPROVED SHOP DRAWINGS.  
  
THE COUNTY MUST BE NOTIFIED TWO WORKING DAYS PRIOR TO CONCEALMENT/BURIAL OF ANY SYSTEM OR MATERIAL THAT WILL PREVENT THE DIRECT INSPECTION OF MATERIALS, METHODS OR WORKMANSHIP. EXAMPLES OF THESE PROCESSES ARE BACKFILLING A GROUND RIND OR TOWER FOUNDATION, POURING TOWER FOUNDATIONS, BURYING GROUND RODS, PLATES OR GRIDS, ETC. THE CONTRACTOR MAY PROCEED WITH THE SCHEDULED PROCESS TWO WORKING DAYS AFTER PROVIDING NOTICE UNLESS NOTIFIED OTHERWISE BY THE COUNTY.
- WHEN PROVIDING A NEW SHELTER THE CONTRACTOR MUST COMPLY WITH DUKES COUNTY COMMUNICATIONS SHELTER SPECIFICATIONS.
- PREVAILING WAGE RATES APPLY TO THIS PROJECT. REFER TO ARTICLE 8 OF THE NEW YORK STATE DEPARTMENT OF LABOR FOR PREVAILING WAGE SCHEDULES/UPDATES ON A COUNTY-BY COUNTY BASIS. AN ORIGINAL WAGE SCHEDULE MUST BE REQUESTED FROM THE BUREAU OF PUBLIC WORK.

SITE NOTES

- THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
- ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
- THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
- CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
- IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.



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**Project Name:**  
RECC

**Location:**  
9 FLIGHT PATH  
WEST TISBURY, MA 02575

**Centek Project No.:** 19017.01

**Drawing Title:** NOTES AND SPECIFICATIONS

**Dwg. No.:** N - 1

Sheet 2 of 19







1  
C-0

**SITE LOCATION MAP**

SCALE: 1" = 150'

NORTH



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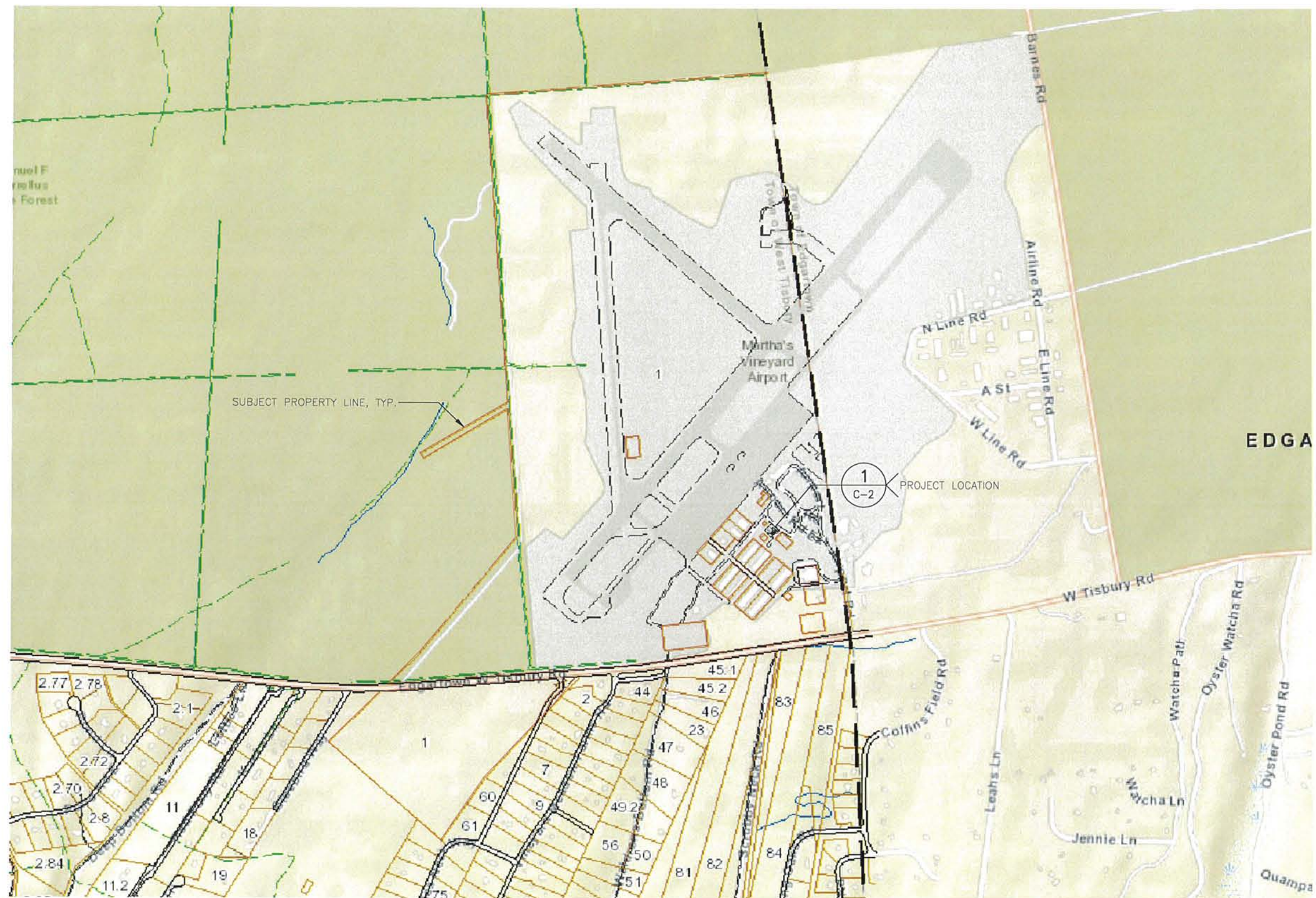
**Location:**  
9 FLIGHT PATH  
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**Centek Project No.:** 19017.01  
**Drawing Title:** SITE LOCATION MAP

**Dwg. No.:** C - 0 **Sheet 3 of 19**







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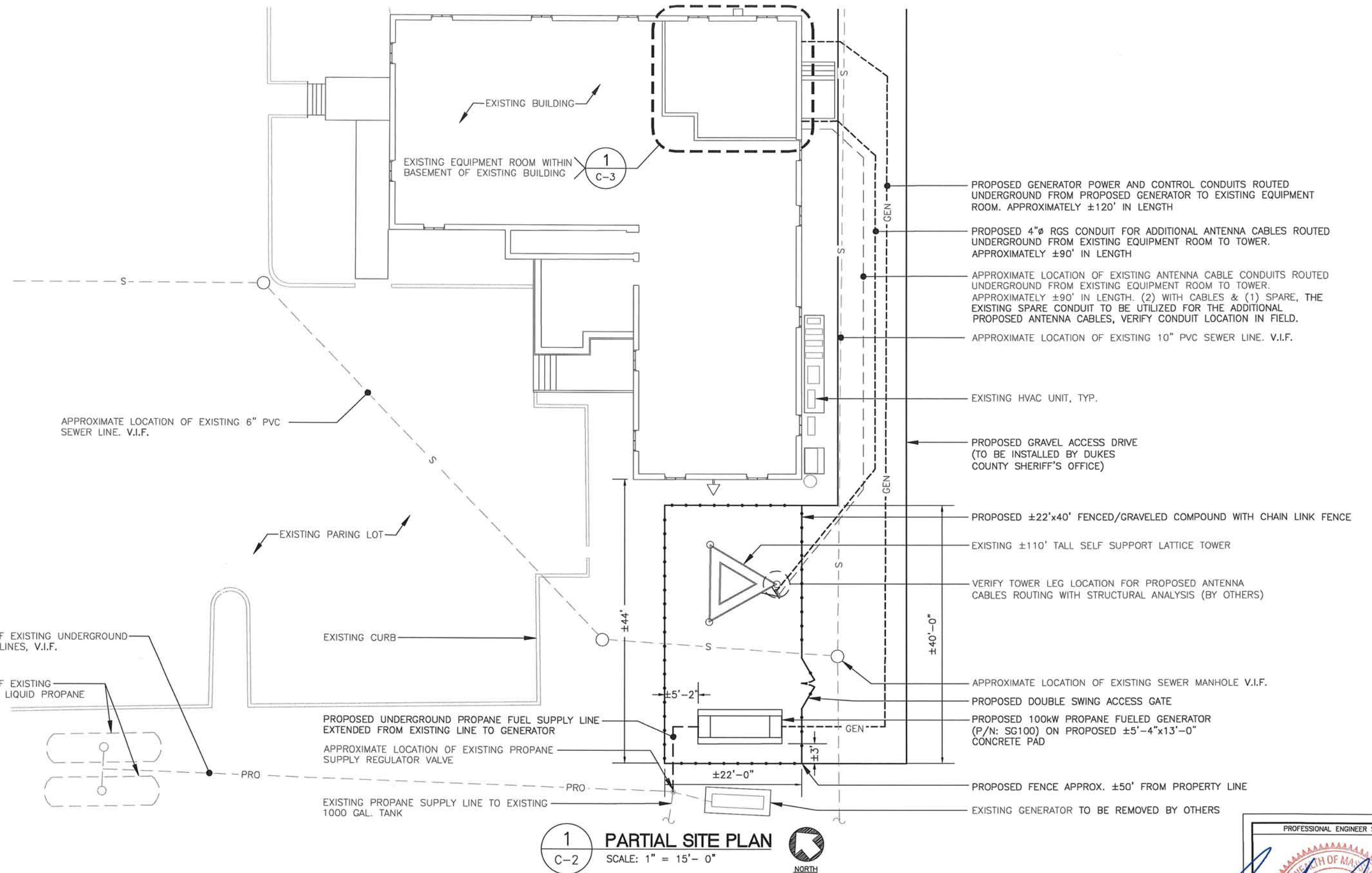
**Drawing Title:** PROJECT LOCATION PLAN

**Dwg. No.:** C - 1

**Sheet** 4 of 19







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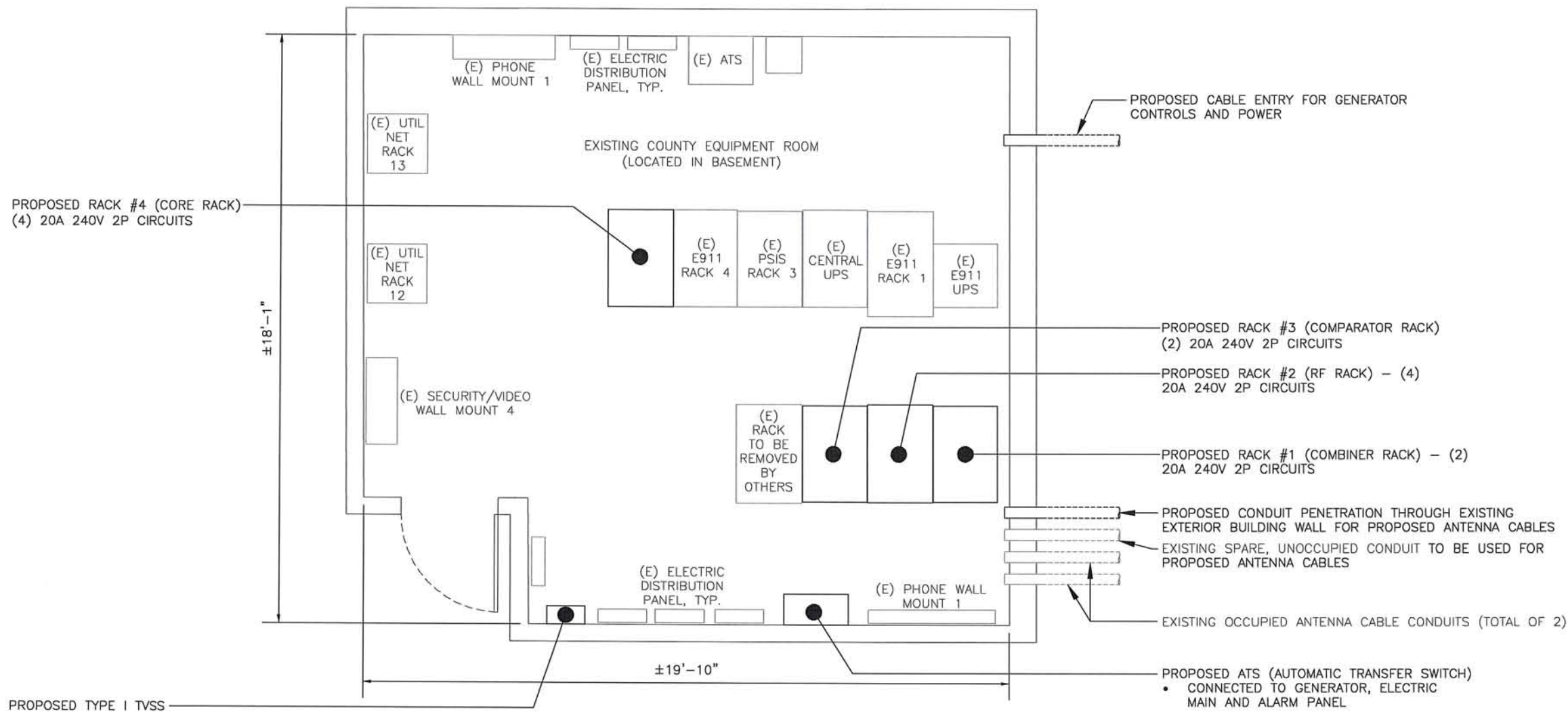
**Centek Project No.:** 19017.01  
**Drawing Title:** PARTIAL SITE PLAN

**Dwg. No.:** C-2 **Sheet 5 of 19**



**NOTES:**

1. CONTRACTOR TO COORDINATE LOCATION OF ALL PROPOSED EQUIPMENT AND ANCILLARY ITEMS PRIOR TO INSTALLATION.
2. INSTALL 30-AMP BREAKERS WITHIN EXISTING DISTRIBUTION PANEL AND WIRE TO PROPOSED MW RECTIFIER RACK.
3. INSTALL ADDITIONAL COPPER BUSS BAR
4. REFER TO ELECTRICAL DRAWING SHEETS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.



1  
C-3

**EQUIPMENT LAYOUT PLAN - PROPOSED CONDITIONS**

SCALE: 1/4" = 1'- 0"



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**Drawing Title:** EQUIPMENT LAYOUT PLAN

**Dwg. No.:** C - 3 **Sheet** 6 of 19





NOTE: ALL EXISTING ANTENNAS TO REMAIN.

PROPOSED ANTENNA (1) DB SPECTRA DS1F06F36U-D MOUNTED AT ±95' WITH (1) 7/8" COAX CABLE. THE ANTENNA WILL BE MOUNTED ON A NEW 6' SIDE-ARM MOUNT. TIP HEIGHT IS ±115'-10"

BASE PROPOSED ANTENNA EL. ±95'-0" A.G.L.

PROPOSED ANTENNA (1) TELAWAVE ANT150F2 MOUNTED AT ±80' WITH (1) 1/2" COAX CABLE. THE ANTENNA WILL BE MOUNTED ON A NEW 6' SIDE-ARM MOUNT. TIP HEIGHT IS ±85'-0"

PROPOSED ANTENNA (1) TELAWAVE ANT790F2 MOUNTED AT ±80' WITH (1) 1/2" COAX CABLE. THE ANTENNA WILL BE MOUNTED ON A NEW 6' SIDE-ARM MOUNT. TIP HEIGHT IS ±83'-2"

PROPOSED MW DISH EL. ±70'-0" A.G.L.

PROPOSED MW DISH (1) RFS SC3-W60A TO BE INSTALLED AT AZIMUTH OF 84.02', CENTER OF DISH AT ±70' A.G.L. EW63 LINE WILL RUN FROM BUILDING TO MW DISH.

PROPOSED ANTENNA (1) TELAWAVE ANT790F2 MOUNTED AT ±60' WITH (1) 1/2" COAX CABLE. THE ANTENNA WILL BE MOUNTED ON A NEW 6' SIDE-ARM MOUNT. TIP HEIGHT IS ±63'-2"

PROPOSED MW DISH EL. ±55'-0" A.G.L.

PROPOSED MW DISH (1) RFS SC3-W60A TO BE INSTALLED AT AZIMUTH OF 250.80', CENTER OF DISH AT ±55' A.G.L. EW63 LINE WILL RUN FROM BUILDING TO MW DISH.

(2) PROPOSED ELLIPTICAL LINES ARE TO BE ROUTED FROM THE PROPOSED AVIAT ODU 600 BOX ROUTED UP ALONG THE LATTICE TOWER LEG TO BOTH PROPOSED MW DISHES.

PROPOSED ANTENNA AND TRANSMISSION LINE REQUIREMENTS					
ELEVATION (A.G.L.)	MFG	MODEL NO.	ANTENNA SIZE	ANTENNA TYPE	TRANSMISSION LINE DIA.
55'	RFS	SC3-W60A	36"	MICROWAVE	2.01"
60'	TELAWAVE	ANT790F2	38"	OMNI	1/2"
60'	TELAWAVE	ANT150F2	60"	OMNI	1/2"
70'	DB SPECTRA	DS1F06F36U-D	250"	TX	7/8"
70'	RFS	SC3-W60A	36"	MICROWAVE	2.01"
80'	TELAWAVE	ANT790F2	38"	OMNI	1/2"
80'	TELAWAVE	ANT150F2	60"	OMNI	1/2"
95'	DB SPECTRA	DS1F06F36U-D	250"	RX	7/8"

PROPOSED AVIAT ODU 600 BOX EL. ±8'-0" A.G.L.

(2) PROPOSED LMR CABLES ARE TO BE ROUTED FROM MW RACK LOCATED WITHIN EXISTING EQUIPMENT ROOM LOCATED IN BASEMENT TO PROPOSED AVIAT ODU 600 BOX LOCATED ON EXISTING LATTICE TOWER LEG.

TOP OF EXISTING SS LATTICE TOWER EL. ±110'-0" A.G.L.

EXISTING ANTENNA, TYP.

PROPOSED ANTENNA (1) DB SPECTRA DS1F06F36U-D MOUNTED AT ±70' WITH (1) 7/8" COAX CABLE. THE ANTENNA WILL BE MOUNTED ON A NEW 6' SIDE-ARM MOUNT. TIP HEIGHT IS ±90'-10"

BASE PROPOSED ANTENNA EL. ±80'-0" A.G.L.

BASE PROPOSED ANTENNA EL. ±70'-0" A.G.L.

BASE PROPOSED ANTENNA EL. ±60'-0" A.G.L.

PROPOSED ANTENNA (1) TELAWAVE ANT150F2 MOUNTED AT ±60' WITH (1) 1/2" COAX CABLE. THE ANTENNA WILL BE MOUNTED ON A NEW 6' SIDE-ARM MOUNT. TIP HEIGHT IS ±65'-0"

#### TOWER STRUCTURAL NOTES:

1. TOWER STRUCTURAL ANALYSIS TO BE PERFORMED BY OTHERS.
2. TOWER STRUCTURAL ANALYSIS REPORT, SIGNED AND SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF MASSACHUSETTS, TO BE PROVIDED PRIOR TO INSTALLATION OF THE ADDITIONAL TOWER LOADING DEPICTED HEREIN.
3. ALL ANTENNAS, CABLES AND APPURTENANCES TO BE INSTALLED IN ACCORDANCE WITH STRUCTURAL ANALYSIS.
4. THE TOWER SHALL USE TAPERED SECTIONS UP TO THE TOP 30' OF THE STRUCTURE

NOTE: GROUND EQUIPMENT NOT SHOWN FOR CLARITY.

1 TOWER ELEVATION  
C-4 SCALE: 1" = 15'-0"



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Drawing Title: TOWER ELEVATION AND ANTENNA SCHEDULE  
  
Dwg. No.: C - 4 Sheet 7 of 19





FLOOR OR WALL	MIN. THICK.	MAX. PIPE DIA.	MIN. ANNULAR SPACE	MAX. ANNULAR SPACE	MIN. FILL THICK.	MIN. FORM. MAT. THICK.	F RATING
F	3 3/4"	1 1/2"	3/8"	2 1/8"	1"	2 3/4"	2
F	3 3/4"	6"	3/8"	3/4"	1"	2 3/4"	2
F	3 3/4"	6"	3/8"	1"	2"	1 3/4"	2
F	4 1/2"	1 1/2"	3/8"	2 1/8"	1"	3 1/2"	3
F	4 1/2"	6"	3/8"	3/4"	1"	3 1/2"	3
F	4 1/2"	6"	3/8"	1"	2"	2 1/2"	3
W	5 1/2"	1 1/2"	3/8"	2 1/8"	1"	3 1/2"	3
W	5 1/2"	6"	3/8"	3/4"	1"	3 1/2"	3
W	6 1/2"	1 1/2"	3/8"	2 1/8"	2"	2 1/2"	3
W	6 1/2"	6"	3/8"	1"	2"	2 1/2"	3

### THROUGH PENETRANTS

ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL.

FORMING MATERIAL SHALL BE A MIN. OF 1 1/2" THICK OF MIN. 4.0 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED IN OPENING, USG INTERIORS-TYPE SAF

THICKNESS OF SEALANT APPLIED FLUSH W/THE TOP SURFACE OF BOTH SIDES OF FLOOR/WALL (SEE TABLE), USG INTERIORS-TYPE SS

UL SYSTEM NUMBER: CAJ1020

F RATING - 3 HR.

### PIPE AND CONDUIT PENETRATION

#### DETAIL IN CONCRETE OR MASONRY

4

C-5

N.T.S.

MAX. DIA. OF THROUGH PENETRANT	NOMINAL ANNULAR SPACE IN.	FILL MATERIAL TYPE
1"	1/2"	FSP 1100 PUTTY
2"	1"	FS 1900 SEALANT

ONE 2"Ø SCHEDULE 40 PVC PIPE TO BE CENTERED WITHIN FIRESTOP SYSTEM. PIPE SHALL BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL/FLOOR ASSEMBLY

SEALANT, MIN. OF 1 1/4" THICK, FLUSH WITH BOTH SURFACES OF WALL FOR 2 HR. ASSEMBLY, 5/8" THICK FOF 1 HR. ASSEMBLY. A 5/8" CROWN AROUND CONDUIT WITH A 1" MIN. LAP AROUND OPENING SEALANT: INTERNAT'L PROTECTIVE COATINGS CORP-FSP 110 PUTTY OR FS1900 SEALANT

UL SYSTEM NUMBER:

WL2038

F RATING - 1 & 2 HR.

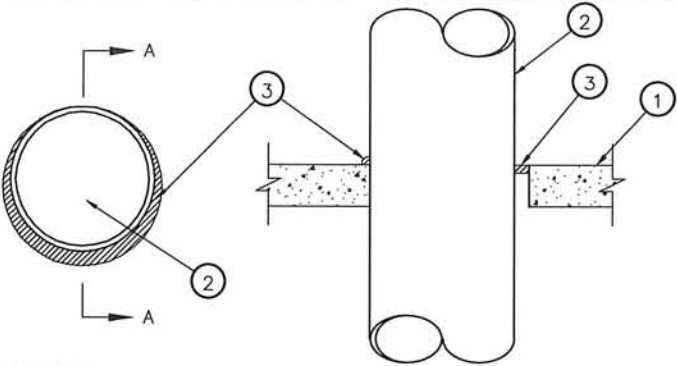
### PVC CONDUIT PENETRATION

#### DETAIL IN GYPSUM WALLBOARD

5

C-5

N.T.S.



UL SYSTEM NUMBER: C-AJ-1291

F RATING - 2-HR

SECTION A-A

### METAL PIPE THROUGH CONCRETE

#### FLOOR/ WALL OR BLOCK WALL

3

C-5

N.T.S.

#### NOTES:

1. FLOOR OR WALL ASSEMBLY - MIN 2-1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS\*. MAX DIAM OF OPENING IS 30-7/8 IN. SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

A. STEEL FLOOR UNIT/FLOOR ASSEMBLY (NOT SHOWN) - AS AN ALTERNATE TO ITEM 1, THE FLOOR ASSEMBLY MAY CONSIST OF A FLUTED STEEL FLOOR UNIT/ CONCRETE FLOOR ASSEMBLY. THE FLOOR ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL FLOOR CEILING DESIGN IN THE FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

B. CONCRETE - MIN 2-1/2 IN. THICK REINFORCED LIGHTWEIGHT ON NORMAL WEIGHT (100-150 PCF) CONCRETE, AS MEASURED FROM THE TOP PLANE OF THE FLOOR UNITS.

C. STEEL FLOOR AND FORM UNITS\* - COMPOSITE OR NON-COMPOSITE 1-1/2 TO 3 IN. DEEP FLUTED GALV STEEL UNITS AS SPECIFIED IN THE INDIVIDUAL FLOOR-CEILING DESIGN. MAX DIAM OF OPENING IS 30-7/8 IN.

2. THROUGH-PENETRANT - ONE METALLIC PIPE OR CONDUIT TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE BETWEEN PIPE OR CONDUIT AND PERIPHERY OF OPENING SHALL BE MIN 0 IN. TO MAX 7/8 IN. PIPE OR CONDUIT TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES OR CONDUITS MAY BE USED:

A. STEEL PIPE NOM 30 IN. DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.

B. IRON PIPE NOM 30 IN. DIAM (OR SMALLER) CAST OR DUCTILE IRON PIPE.

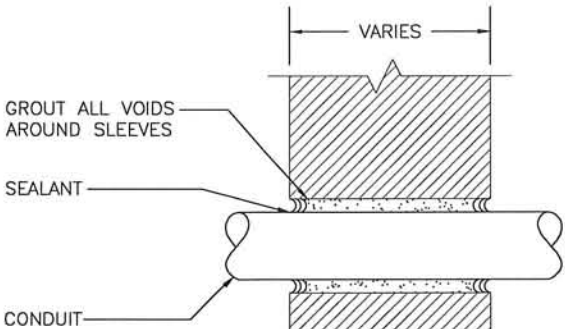
C. COPPER PIPE NOM 6 IN. DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.

D. COPPER TUBING NOM 6 IN. DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.

E. CONDUIT NOM 6 IN. DIAM (OR SMALLER) STEEL CONDUIT.

F. CONDUIT NOM 4 IN. DIAM (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING (EMT).

3. FILL, VOID OR CAVITY MATERIAL\* - SEALANT - MIN 1/2 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH TOP SURFACE OF FLOOR OR WITH BOTH SURFACES OF WALL. AT THE POINT CONTACT LOCATION BETWEEN PIPE AND CONCRETE, A MIN 1/4 IN. DIAM BEAD OF FILL MATERIAL SHALL BE APPLIED AT THE CONCRETE/PIPE INTERFACE ON THE TOP SURFACE OF FLOOR AND ON BOTH SURFACES OF WALL.



#### NOTE:

CORE HOLE 1 1/2" LARGER THAN THE DIAMETER OF THE CONDUIT. CORE DRILLS TO BE SEALED WITH ELASTOMERIC SEALANT.

### PIPE AND CONDUIT PENETRATION

#### DETAIL IN NON-RATED PARTITION

1

C-5

N.T.S.

PIPE OR CONDUIT	ANNULAR SPACE IN.	MIN. FILL MATERIAL THICKNESS	F RATING HR
PIPE	3/4"	1 1/4"	2
CONDUIT	3/4"	3/4"	1

ONE 2"Ø METALLIC PIPE OR CONDUIT TO BE CENTERED WITHIN FIRESTOP SYSTEM. PIPE SHALL BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL/FLOOR ASSEMBLY

FILL VOID WITH CAULK, FLUSH WITH BOTH SURFACES OF WALL (SEE TABLE) SEALANT: TREMCO INC, TREMSTOP-WBM

UL SYSTEM NUMBER: WL1051

F RATING - 1 & 2 HR.

### PIPE AND CONDUIT PENETRATION

#### DETAIL IN GYPSUM WALLBOARD

2

C-5

N.T.S.

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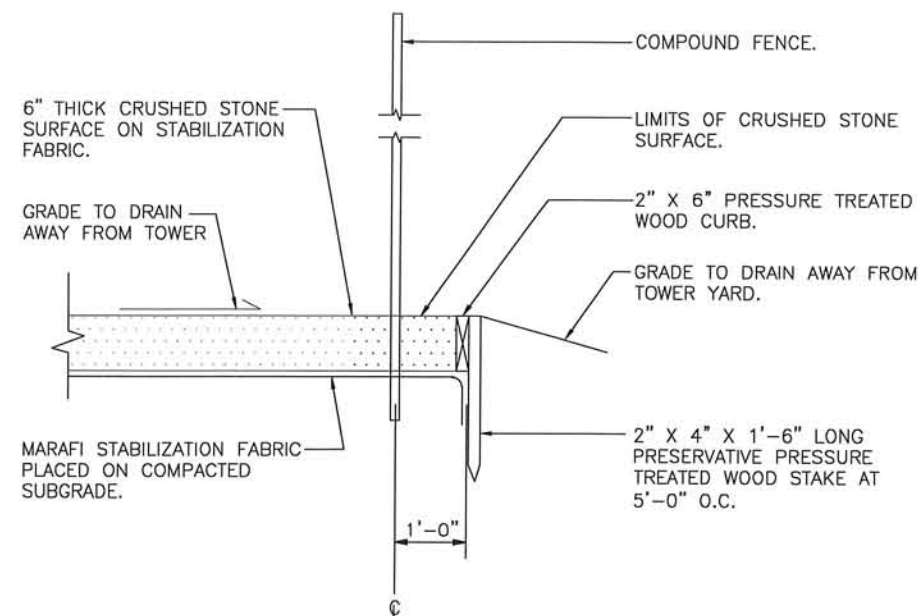
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Dwg. No.: C - 5

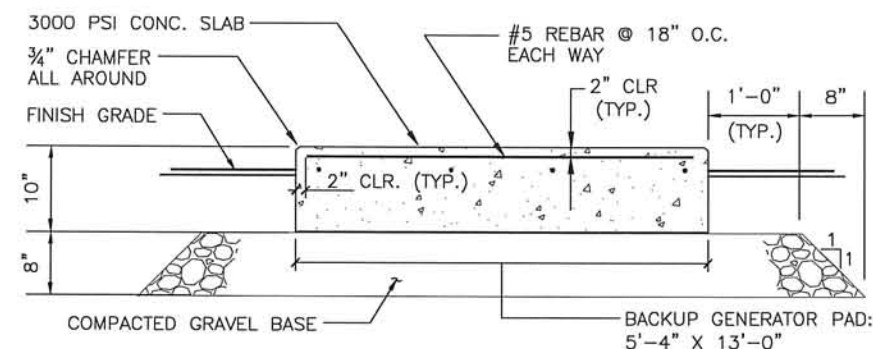
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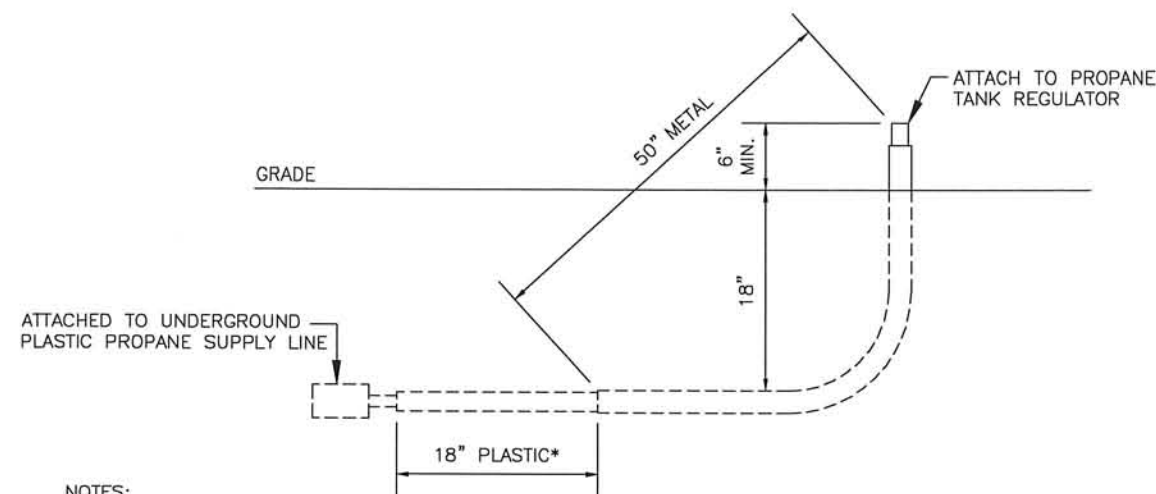


**1 COMPOUND SURFACING DETAIL**  
C-6 NOT TO SCALE



**NOTE:**  
REFER TO EQUIPMENT UNIT MANUFACTURER FOR RECOMMENDED HOLD-DOWN HARDWARE.

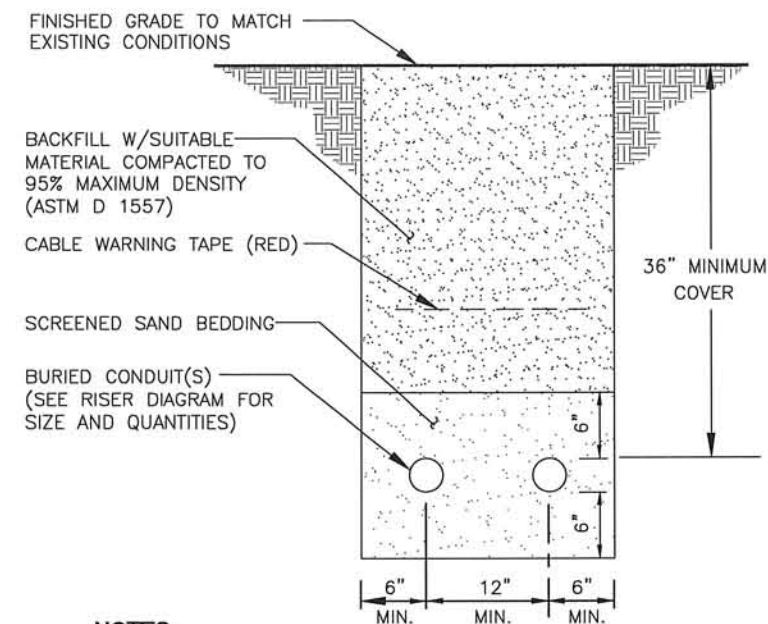
**2 GENERATOR PAD DETAIL**  
C-6 NOT TO SCALE



**NOTES:**

- \*PLASTIC PROPANE SUPPLY LINE MUST BE PROTECTED WITH CONDUIT IF IT CAN NOT BE BURIED 18" OR MORE DEEP WITH SAND TO PROTECT IT (AT LEAST 1" OF SAND AROUND THE PIPE REQUIRED FOR PLASTIC)
- POLYETHYLENE PIPE AND TUBING AND THERMOPLASTIC COMPRESSION-TYPE MECHANICAL FITTINGS SHALL BE INSTALLED OUTSIDE UNDERGROUND WITH A MINIMUM 18 IN. (460mm) OF COVER. THE COVER SHALL BE PERMITTED TO BE REDUCED TO 12 IN. (300mm) IF EXTERNAL DAMAGE TO THE PIPE OR TUBING IS NOT LIKELY TO RESULT. IF A MINIMUM OF 12 IN. (300mm) OF COVER CANNOT BE MAINTAINED, THE PIPING SHALL BE INSTALLED IN CONDUIT OR BRIDGED (SHIELDED). UNDERGROUND POLYETHYLENE PIPING SYSTEMS SHALL REQUIRE ASSEMBLED ANODELESS RISERS TO TERMINATE ABOVE GROUND. THE HORIZONTAL PORTION OF RISERS SHALL BE BURIED AT LEAST 12 IN. (300mm) BELOW GRADE AND THE CASING MATERIAL USED FOR THE RISERS SHALL BE PROTECTED AGAINST CORROSION.

**4 PROPANE SUPPLY LINE DETAIL**  
C-6 NOT TO SCALE



**NOTES:**

- THE CLEAN FILL SHALL PASS THROUGH A 3/8" MESH SCREEN AND SHALL NOT CONTAIN SHARP STONES. OTHER BACKFILL SHALL NOT CONTAIN ASHES, CINDERS, SHELLS, FROZEN MATERIAL, LOOSE DEBRIS OR STONES LARGER THAN 2" IN MAXIMUM DIMENSION.
- WHERE EXISTING UTILITIES ARE LIKELY TO BE ENCOUNTERED, CONTRACTOR SHALL HAND DIG AND PROTECT EXISTING UTILITIES.
- WHERE SHALLOW BEDROCK IS ENCOUNTERED BETWEEN UTILITY SOURCE AND SERVICE EQUIPMENT, COORDINATE WITH UTILITY COMPANY FOR BURIAL DEPTH REQUIREMENTS.
- COORDINATE WITH ELECTRICAL ENGINEER WHERE SHALLOW BEDROCK IS ENCOUNTERED BETWEEN SERVICE EQUIPMENT AND EQUIPMENT SHELTER.

**3 TYPICAL ELECTRICAL TRENCH DETAIL**  
C-6 NOT TO SCALE

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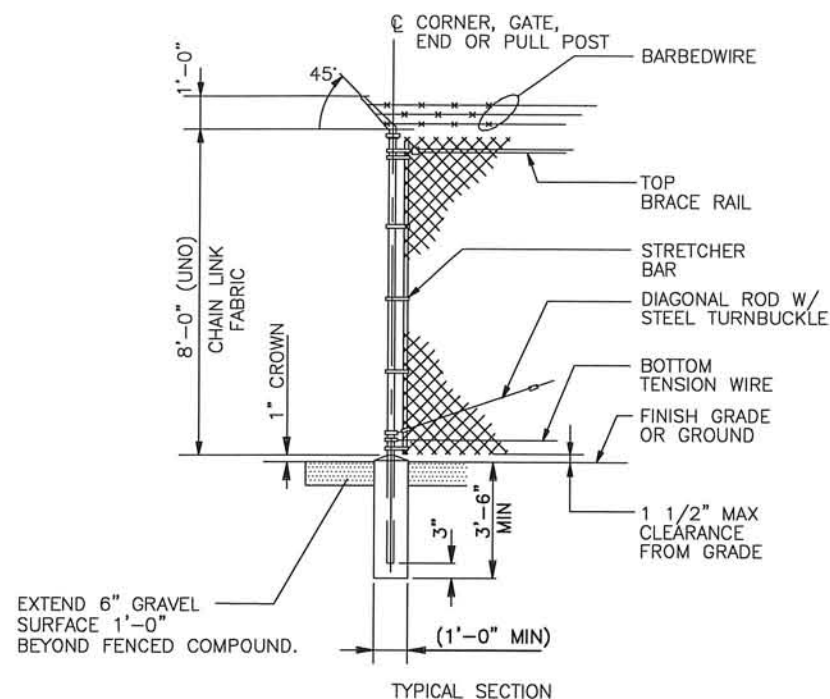
**Drawing Title:** TYPICAL DETAILS

**Dwg. No.:** C - 6

**Sheet 9 of 19**

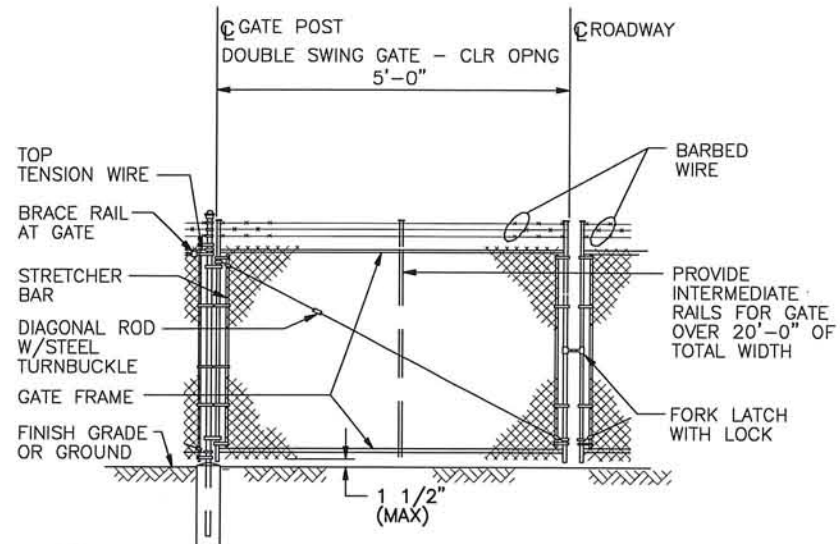




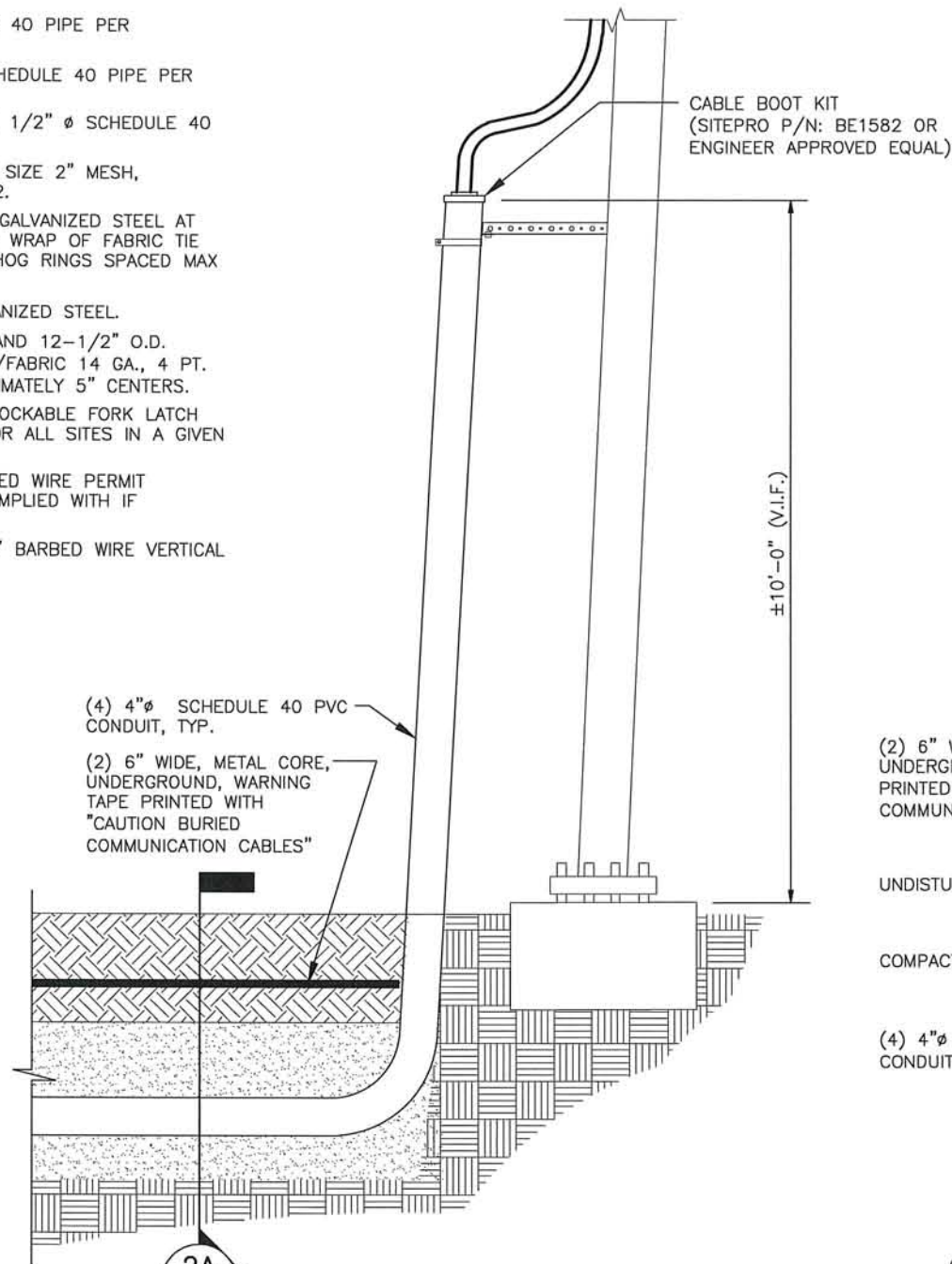


**1 WOVEN WIRE FENCE DETAIL**  
C-7 NOT TO SCALE

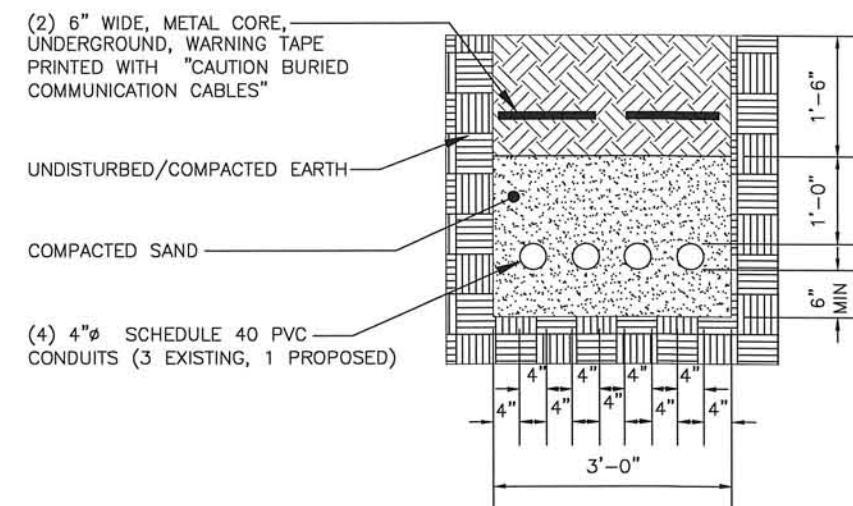
- WOVEN WIRE FENCE NOTES**
1. GATE POST, CORNER, TERMINAL OR PULL POST 2 1/2" Ø SCHEDULE 40 FOR GATE WIDTHS UP THRU 6 FEET OR 12 FEET FOR DOUBLE SWING GATE PER ASTM-F1083.
  2. LINE POST: 2" Ø SCHEDULE 40 PIPE PER ASTM-F1083.
  3. GATE FRAME: 1 1/2" Ø SCHEDULE 40 PIPE PER ASTM-F1083.
  4. TOP RAIL & BRACE RAIL: 1 1/2" Ø SCHEDULE 40 PIPE PER ASTM-F1083.
  5. FABRIC: 12 GA. CORE WIRE SIZE 2" MESH, CONFORMING TO ASTM-A392.
  6. TIE WIRE: MINIMUM 11 GA. GALVANIZED STEEL AT POSTS AND RAILS A SINGLE WRAP OF FABRIC TIE AND AT TENSION WIRE BY HOG RINGS SPACED MAX 24" INTERVALS.
  7. TENSION WIRE: 7 GA. GALVANIZED STEEL.
  8. BARBED WIRE: DOUBLE STRAND 12-1 1/2" O.D. TWISTED WIRE TO MATCH W/FABRIC 14 GA., 4 PT. BARBS SPACED ON APPROXIMATELY 5" CENTERS.
  9. GATE LATCH: DROP DOWN LOCKABLE FORK LATCH AND LOCK, KEYED ALIKE FOR ALL SITES IN A GIVEN MTA.
  10. LOCAL ORDINANCE OF BARBED WIRE PERMIT REQUIREMENT SHALL BE COMPLIED WITH IF REQUIRED.
  11. HEIGHT = 8' VERTICAL + 1' BARBED WIRE VERTICAL DIMENSION.



**1A WOVEN WIRE SWING GATE-DOUBLE**  
C-7 NOT TO SCALE



**2 TYP. CONDUIT RISER AT POLE**  
C-7 NOT TO SCALE



**2A TYP. COAX DUCT BANK SECTION**  
C-7 NOT TO SCALE



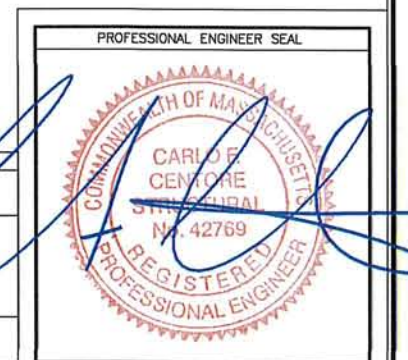
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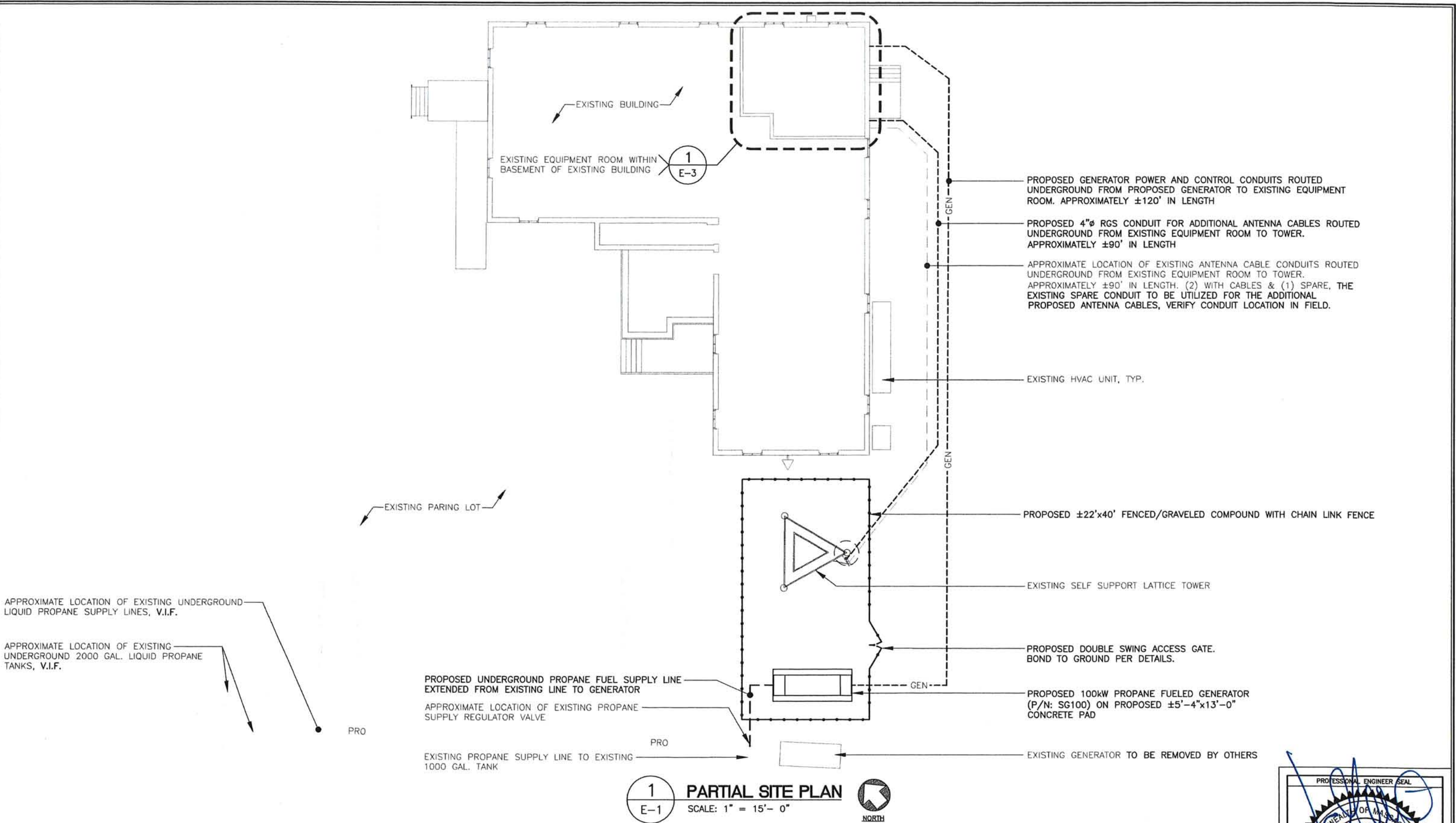
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**Location:**  
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**Dwg. No.:** C - 7 **Sheet** 10 of 19







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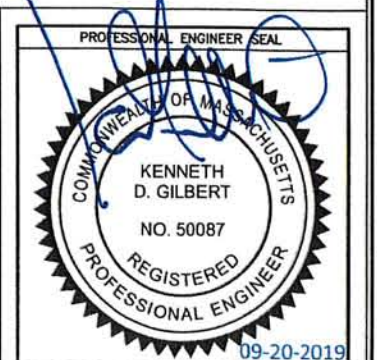
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**Drawing Title:** PARTIAL SITE PLAN

**Dwg. No.:** E - 1

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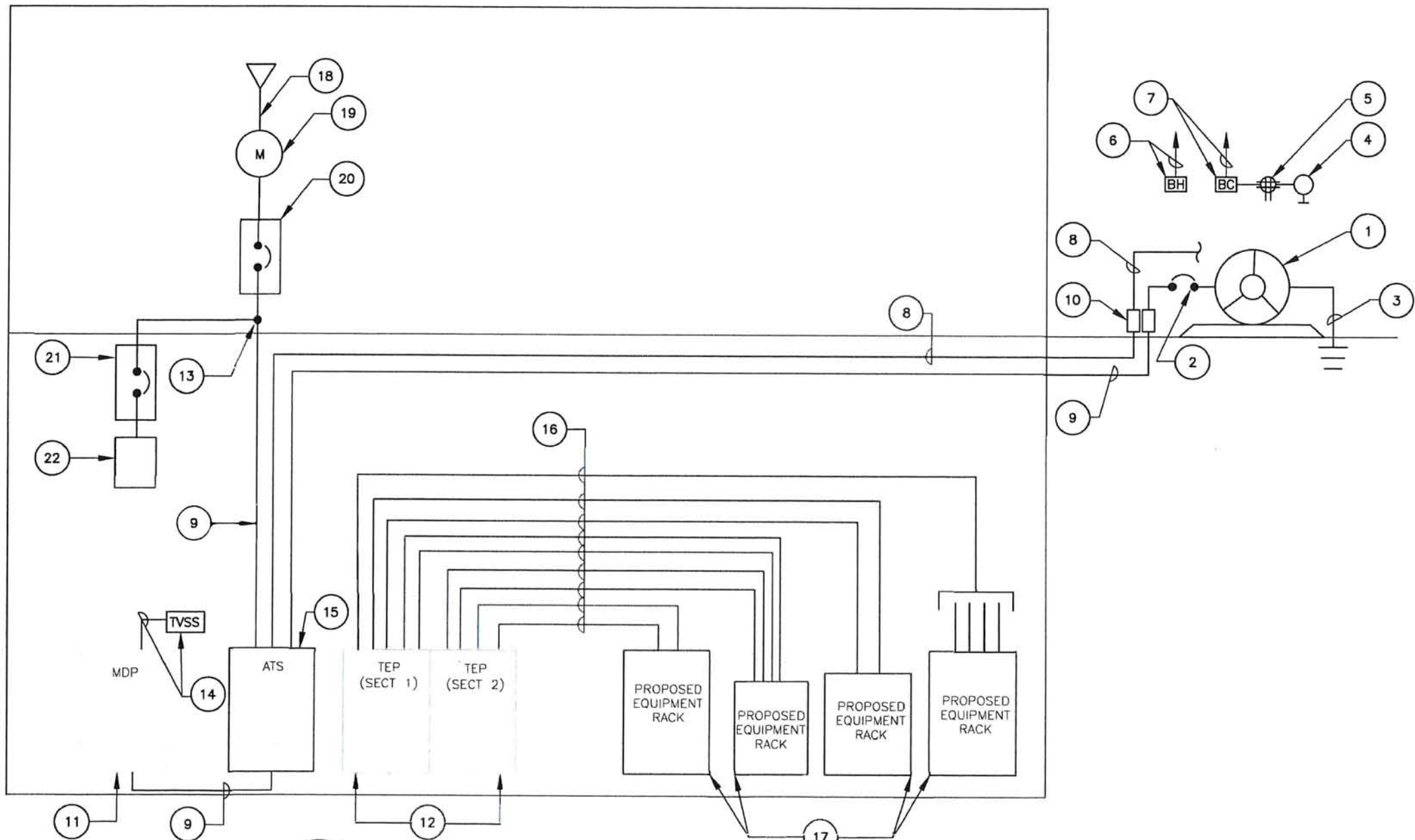


### CAPACITY NOTES

1. GENERATOR CAPACITY SHALL MEET OR EXCEED THE EXISTING PLUS NEW LOAD CAPACITY PER NEC 702.4(B) FOR AN OPTIONAL STANDBY SYSTEM.
2. THE ELECTRICAL LOAD DUE TO THE ADDITION OF THE PROPOSED EQUIPMENT RACKS SHALL PROVIDE FOR THE TOTAL LOAD TO MEET OR BE LESS THAN THE AVAILABLE CAPACITY TO PANEL TEP, PANEL MDP, AND THE ELECTRICAL SERVICE AS PER NEC 220

### ELECTRICAL RISER DIAGRAM NOTES

- 1 NEW 100KW, 120/208V, 3 PHASE PROPANE FUELED GENERATOR
- 2 400A/3P GENERATOR SERVICE MAIN BREAKER INTEGRAL WITH GENERATOR
- 3 GENERATOR GROUND PER NEC.
- 4 WORK LIGHT MOUNTED ADJACENT TO GENERATOR.
- 5 GFCI WORK RECEPTACLE MOUNTED IN WEATHERPROOF ENCLOSURE LOCATED ADJACENT TO GENERATOR.
- 6 GENERATOR BLOCK HEATER. SUPPLY FROM NEW OR SPARE DEDICATED 20/1P BREAKER SUITABLE AND LISTED FOR APPLICATION IN PANEL MDP.
- 7 GENERATOR BATTERY CHARGER. PROVIDE WITH DEDICATED 20A/1P BREAKER SUITABLE AND LISTED FOR APPLICATION IN PANEL MDP TO SERVE BATTERY CHARGER, WORK LIGHT, AND RECEPTACLE
- 8 1" CONDUIT AND CONDUCTORS FOR GENERATOR CONTROL WIRING. PER MANUFACTURER SPECS.
- 9 2 SETS OF: (4) #3/0 AWG, (1) #3 AWG GROUND, 2"C
- 10 EXPANSION COUPLING (TYPICAL)
- 11 EXISTING DISTRIBUTION PANEL TO REMAIN. DEMO EXISTING SUPPLY FEEDER AND REPLACE WITH NEW FEEDER FROM NEW ATS AS SHOWN (NOTE 9).
- 12 EXISTING DOUBLE SECTION PANEL FED FROM MDP VIA UPS TO REMAIN. EXISTING CONNECTIONS NOT SHOWN FOR CLARITY.
- 13 DEMO EXISTING FEEDER TO EXISTING ATS. CORRECTLY SPLICE/TAP A NEW FEEDER TO EXISTING FEEDER FROM SERVICE MAIN BREAKER AND EXISTING TAP TO CIRCUIT BREAKER FOR PANEL LC2 PER NEC WITH LISTED TAPS, LUGS, AND PROPERLY SIZED JUNCTION BOX AS REQUIRED.
- 14 TVSS AND ASSOCIATED CONDUITS AND CONDUCTORS. COORDINATE REQUIREMENTS WITH MANUFACTURER.
- 15 DEMO EXISTING ATS. INSTALL NEW 2 SOURCE AUTOMATIC TRANSFER SWITCH THAT IS RATED 240V, 400A, 3-PHASE, 3-POLE, AND SOLID NEUTRAL (NON-SEPARATELY DERIVED SYSTEM)
- 16 (3) #12 AWG, (1) #12 AWG GROUND, 3/4" CONDUIT CONNECTED TO NEW 20A/2P CIRCUIT BREAKER.
- 17 NEW EQUIPMENT RACK
- 18 EXISTING 120/208V 4W 3PH ELECTRICAL SERVICE TO REMAIN
- 19 EXISTING 320A UTILITY COMPANY METER TO REMAIN
- 20 EXISTING 400/3P SERVICE MAIN BREAKER TO REMAIN
- 21 EXISTING FEEDER TAP TO 200/3P CIRCUIT BREAKER TO REMAIN
- 22 EXISTING PANEL LC2 TO REMAIN



1 ELECTRICAL RISER DIAGRAM  
E-2 SCALE: NOT TO SCALE

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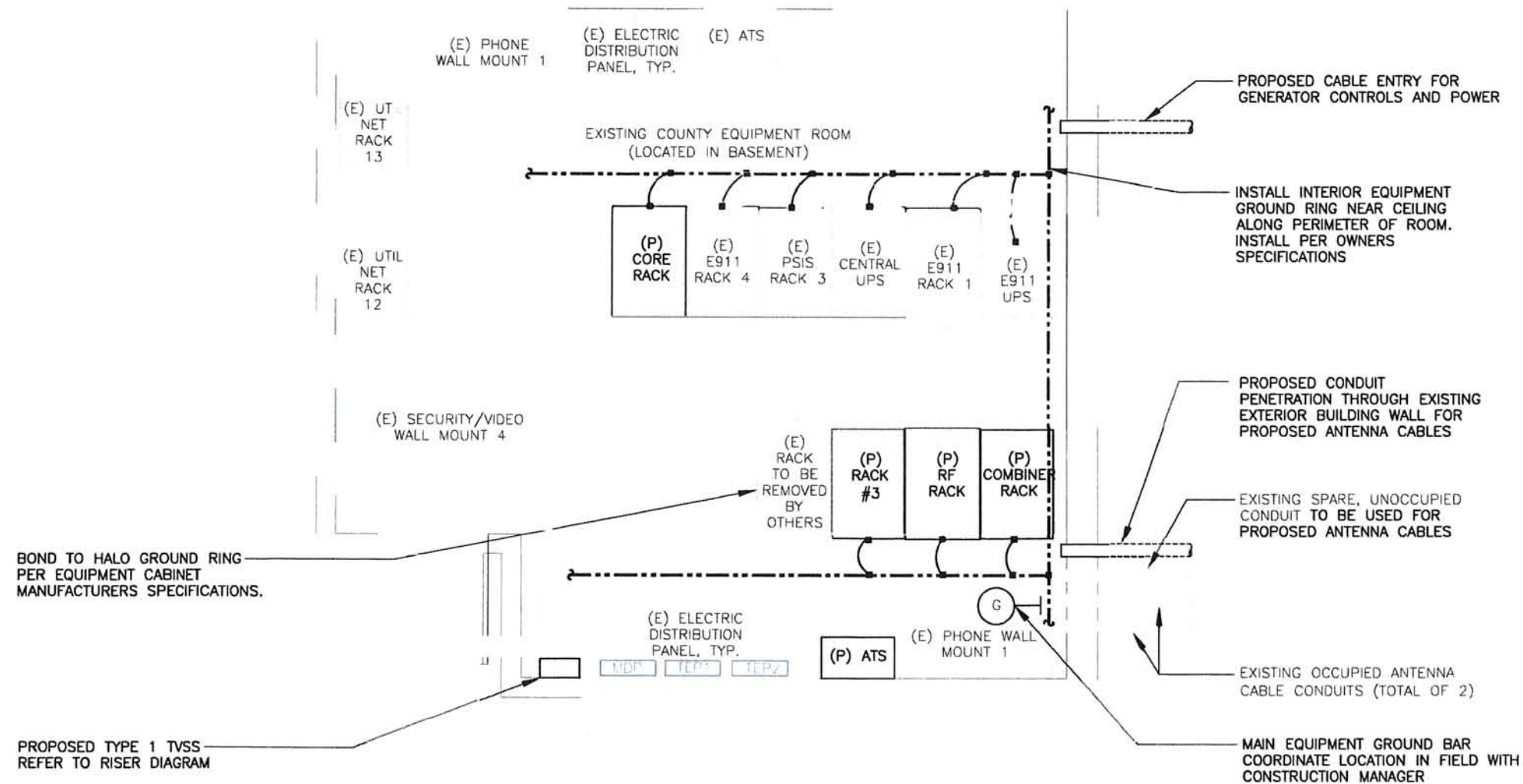
Drawing Title: ELECTRICAL RISER DIAGRAM

Dwg. No.: E - 2

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1  
E-3

**EQUIPMENT LAYOUT PLAN - PROPOSED CONDITIONS**

SCALE: 1/4" = 1'- 0"

NORTH

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**Dwg. No.:** E - 3

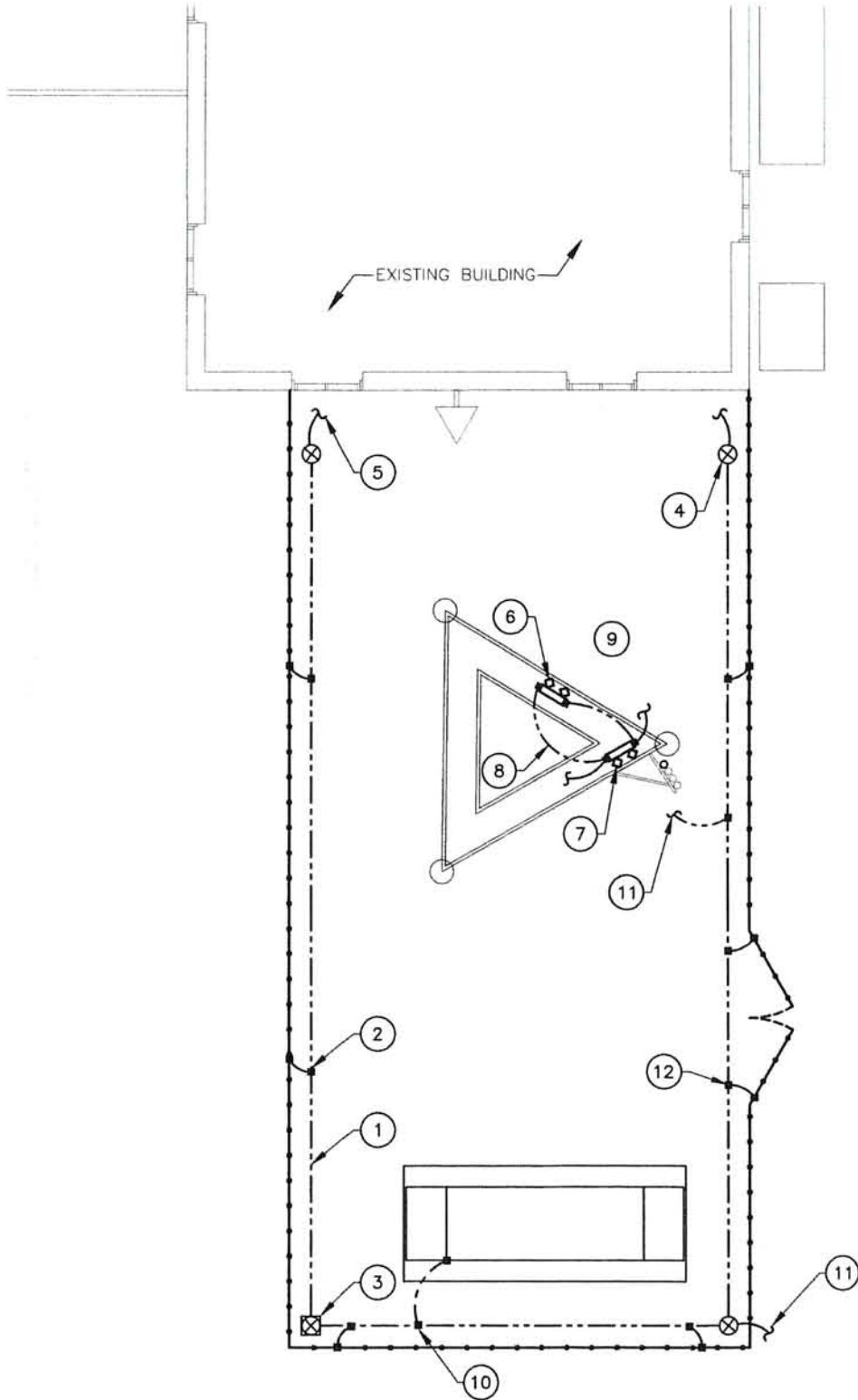
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GROUNDING PLAN NOTES

- 1 #2 SOLID TINNED BCW GROUND RING (2'-0" FROM OUTSIDE EDGE OF EQUIPMENT SHELTER FOUNDATION) (TYP.).
- 2 CONNECT FENCE TO GROUNDING RING (TYP. 4 PLACES).
- 3 GROUNDING ROD WITH ACCESS (TYP.) PER DETAILS.
- 4 GROUNDING ROD (TYP.) PER DETAILS.
- 5 BOND COMPOUND GROUND RING TO EXISTING COMPOUND GROUND RING (TYP OF 2). CONTRACTOR TO VERIFY LOCATION IN FIELD.
- 6 UPPER TOWER MOUNTED GROUND BAR PER DETAILS.
- 7 LOWER TOWER MOUNTED GROUND BAR PER DETAILS.
- 8 BOND UPPER TOWER MOUNTED GROUND BAR TO LOWER TOWER MOUNTED GROUND BAR (2 GROUND LEADS) PER DETAILS.
- 9 BOND GROUND BAR TO EXISTING TOWER GROUND RING (TYP OF 2). CONTRACTOR TO VERIFY LOCATION IN FIELD.
- 10 BOND GENERATOR TO GROUND RING PER NEC AND MANUFACTURERS SPECIFICATIONS.
- 11 BOND NEW COMPOUND GROUND RING TO EXISTING TOWER GROUND RING.
- 12 BOND FENCE GATE TO GROUND PER DETAILS



1  
E-4  
GROUNDING PLAN  
SCALE: 1/8" = 1'- 0"







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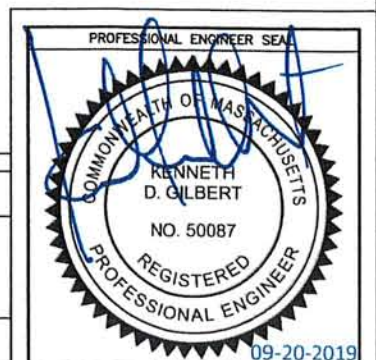
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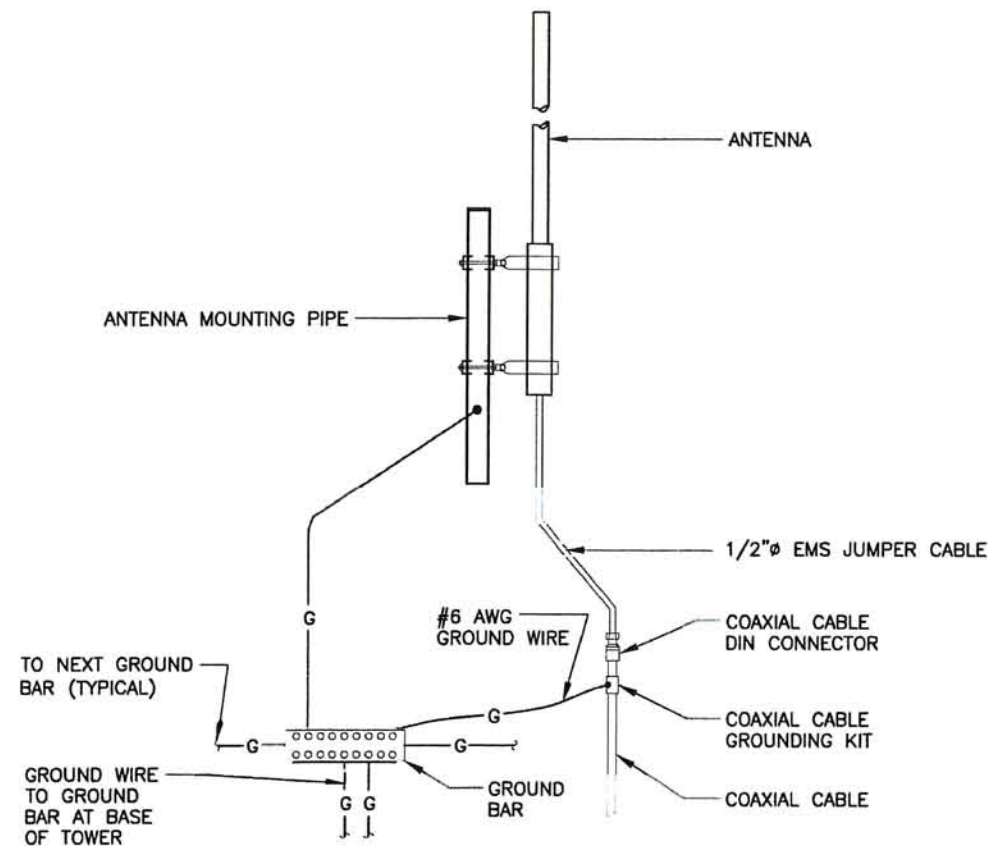
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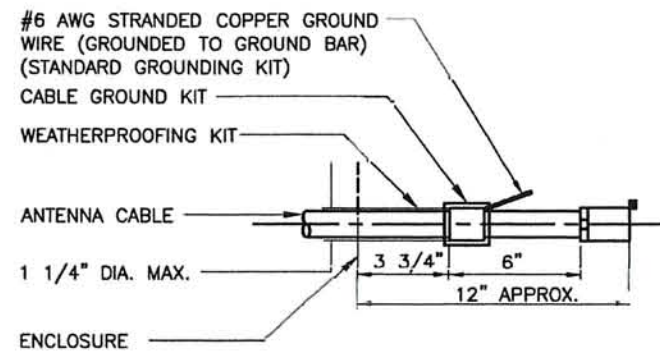
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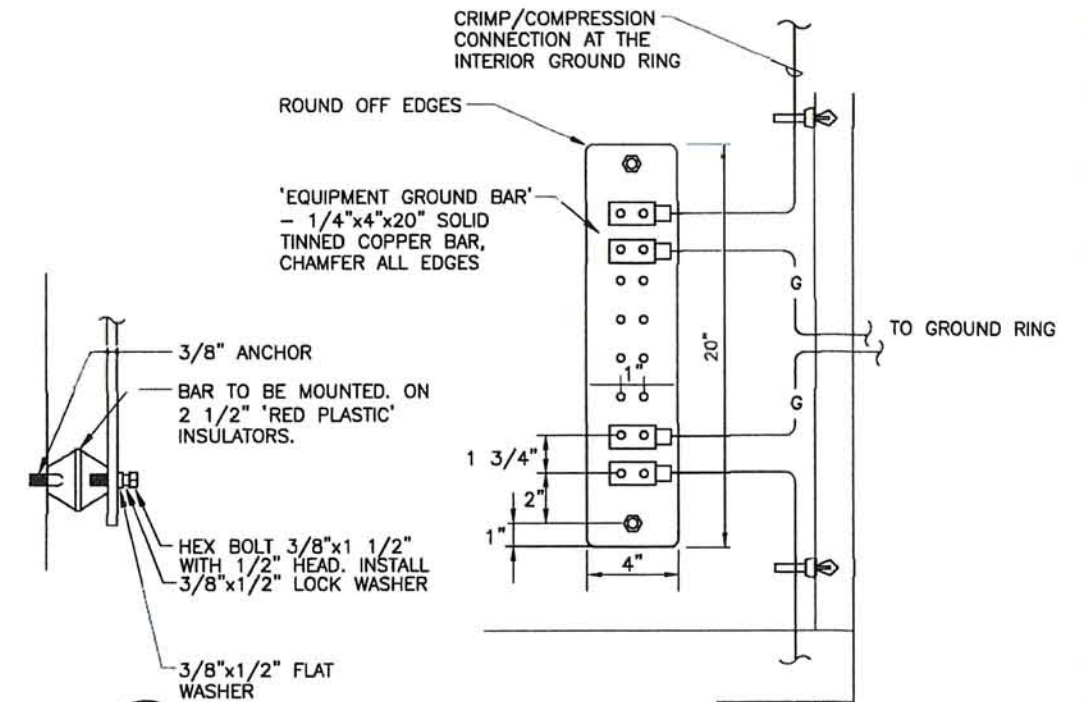


1  
E-5  
TYPICAL ANTENNA GROUNDING DETAIL  
NOT TO SCALE

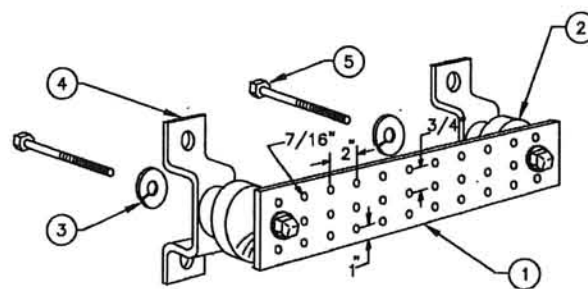


- NOTES**
- DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

2  
E-5  
ANTENNA CABLE GROUNDING DETAIL  
NOT TO SCALE



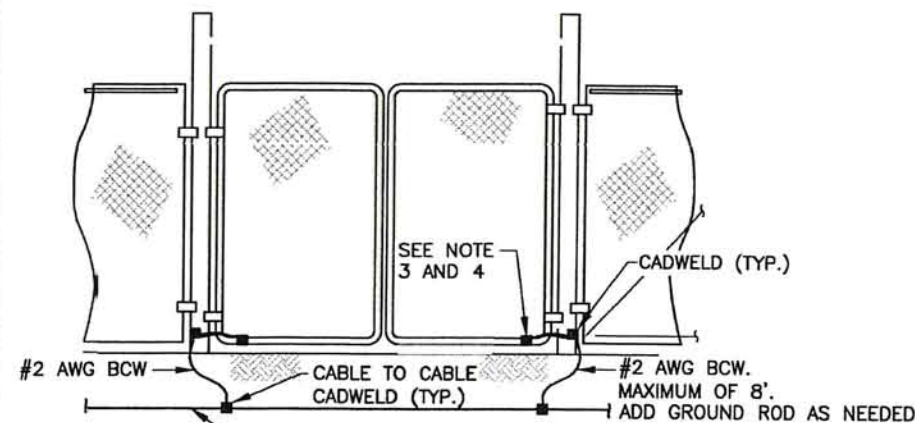
3  
E-5  
EQUIPMENT GROUND BAR DETAIL  
NOT TO SCALE



- NOTES**
- TINNED COPPER GROUND BAR, 1/4" x 4" x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.
  - INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4. DO NOT INSTALL INSULATORS WHEN MOUNTED TO TOWER.
  - 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8.
  - WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT. NO. A-6056.
  - 5/8-11 x 1" STAINLESS STEEL TRUSS SPANNER MACHINE SCREWS.

4  
E-5  
GROUND BAR DETAIL  
NOT TO SCALE



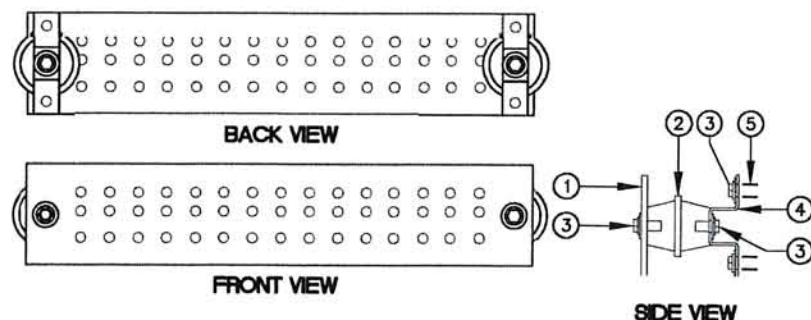


#### NOTES

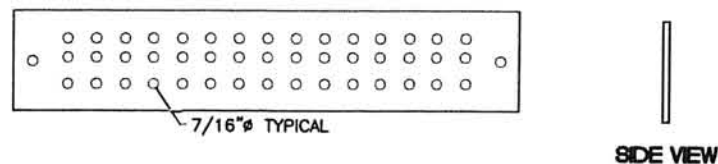
1. THE #2 AWG, BCW, FROM THE RING GROUND SHALL BE CADWELDED TO THE POST, ABOVE GRADE.
2. BOND EACH HORIZONTAL POLE/BRACE TO EACH OTHER AND TO EACH VERTICAL POLE BONDED TO THE EXTERIOR GROUND RING.
3. GATE JUMPER SHALL BE #4/0 AWG WELDING CABLE OR FLEXIBLE COPPER BRAID BURNDY TYPE B WITH SLEEVES ON EACH END DESIGNED FOR EXOTHERMIC WELDING.
4. GATE JUMPER SHALL BE INSTALLED SO THAT IT WILL NOT BE SUBJECTED TO DAMAGING STRAIN WHEN GATE IS FULLY OPEN IN EITHER DIRECTION.

### 1 FENCE GATE GROUNDING

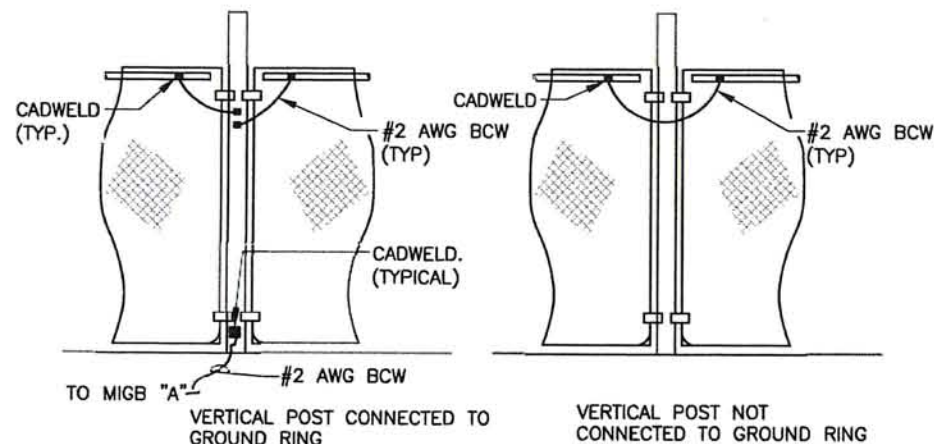
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TYPICAL GROUND BAR ASSEMBLY  
N.T.S.



TYPICAL GROUND BAR - DIMENSIONS  
N.T.S.



#### NOTES

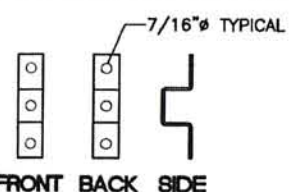
1. VERTICAL POSTS SHALL BE BONDED TO THE RING AT EACH CORNER AND AT EACH GATE POST. AS A MINIMUM ONE VERTICAL POST SHALL BE BONDED TO THE GROUND RING IN EVERY 40 FOOT STRAIGHT RUN OF FENCE.
2. HORIZONTAL POLES SHALL BE BONDED TO EACH OTHER.
3. BOND EACH HORIZONTAL POLE / BRACE TO EACH OTHER AND TO EACH VERTICAL POST THAT IS BONDED TO THE EXTERIOR GROUND RING.

### 2 GROUND-STD. DETAIL FENCE GROUNDING

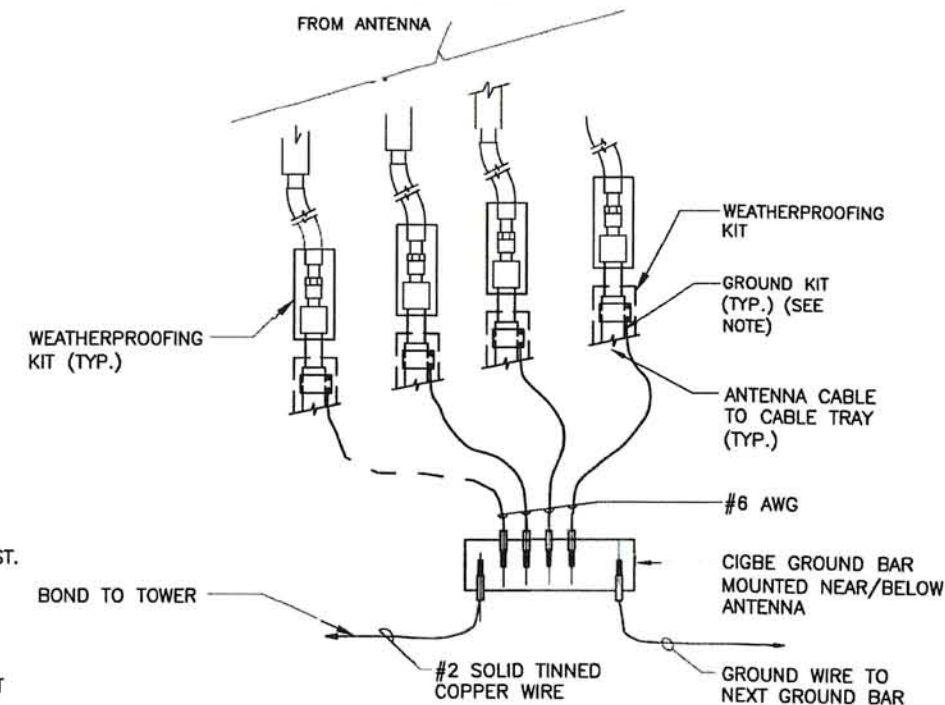
E-6 NOT TO SCALE

#### NOTES

1. HIGH CONDUCTIVITY TINNED COPPER BAR 1'-8\"/>



BRACKET FOR GROUND  
BAR-DIMENSIONS  
N.T.S.



#### NOTES

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

### 3 CONNECTION OF GROUND WIRES TO GROUND BAR

E-6 NOT TO SCALE

### 4 MASTER/EQUIPMENT GROUND BAR DETAILS

E-6 NOT TO SCALE



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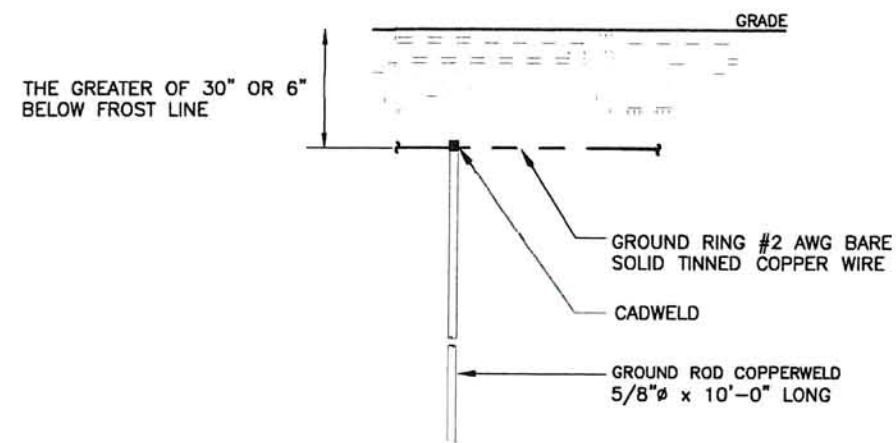
**Project Name:**  
RECC  
**Location:**  
9 FLIGHT PATH  
WEST TISBURY, MA 02575

**Centek Project No.:** 19017.01  
**Drawing Title:** ELECTRICAL DETAILS

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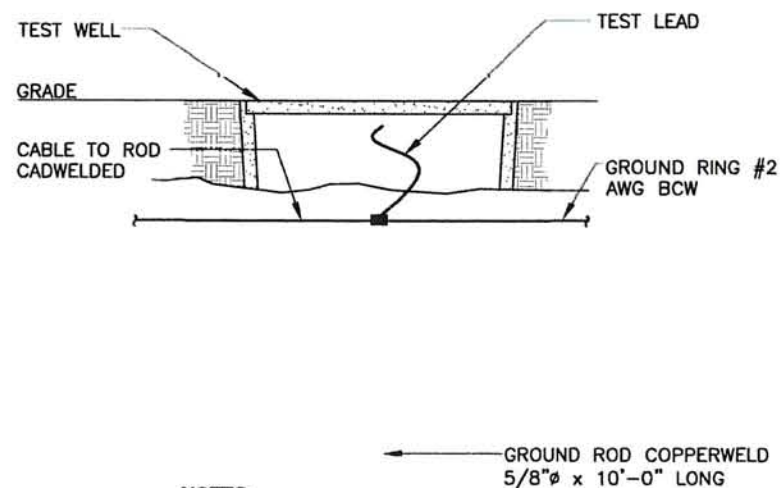




**NOTES:**

1. USE GROUND PLATE DETAIL IF 10 FT. GROUND ROD DEPTH CANNOT BE ACHIEVED DUE TO LEDGE CONDITION OR IF EXISTING TOWER FOUNDATION IS ENCOUNTERED.

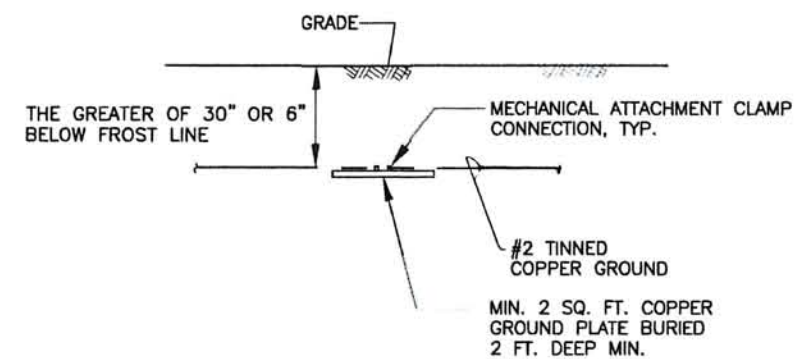
**1 GROUND ROD DETAIL**  
E-7 NOT TO SCALE



**NOTES:**

1. INSPECTION HAND HOLE MAY BE CONCRETE OR PVC AND SHALL BE A MINIMUM OF 12" DIA x 18" DEEP.

**2 GROUND ROD WITH ACCESS DETAIL**  
E-7 NOT TO SCALE



**NOTES:**

1. GROUND PLATE DETAIL TO BE USED ONLY IF 10 FT. GROUND ROD DEPTH CANNOT BE ACHIEVED DUE TO LEDGE CONDITION OR IF EXISTING TOWER FOUNDATION IS ENCOUNTERED.

**3 GROUND PLATE DETAIL**  
E-7 NOT TO SCALE



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**SECTION 16010**

**1.01. SCOPE OF WORK**

- A. WORK SHALL INCLUDE ALL LABOR, EQUIPMENT AND SERVICES REQUIRED TO COMPLETE (MAKE READY FOR OPERATION) ALL THE ELECTRICAL WORK INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:
1. GENERATOR/TRANSFER SWITCH.
  2. FEEDERS AND BRANCH CIRCUIT WIRING TO PANELS, RECEPTACLES, EQUIPMENT, LIGHTING FIXTURES, ETC. AS INDICATED OR NOTED ON PLANS.
  3. SITE ALARMS, ASSOCIATED WIRING AND DEVICES.
  4. R56 COMPLIANT GROUNDING SYSTEMS, CONSISTING OF ANTENNA GROUNDING, INTERIOR GROUNDING RING, GROUND BARS, ETC.
  5. FIELD MEASURE EXISTING ELECTRICAL SERVICES TO CONFIRM AVAILABLE EXISTING POWER.

**1.02. GENERAL REQUIREMENTS**

- A. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.
- B. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNERS REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.
- C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES THAT MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR SCHEDULING OF ALL INSPECTIONS THAT MAY BE REQUIRED BY THE LOCAL AUTHORITY.
- D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.
- E. NO MATERIAL OTHER THAN THAT CONTAINED IN THE "LATEST LIST OF ELECTRICAL FITTINGS" APPROVED BY THE UNDERWRITERS' LABORATORIES, SHALL BE USED IN ANY PART OF THE WORK. ALL MATERIAL FOR WHICH LABEL SERVICE HAS BEEN ESTABLISHED SHALL BEAR THE U.L. LABEL.
- F. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF THREE YEAR'S FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.
- G. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.
- H. THE ELECTRICAL CONTRACTOR SHALL SUPPLY THREE (3) COMPLETE SETS OF APPROVED DRAWINGS, ENGINEERING DATA SHEETS, MAINTENANCE AND OPERATING INSTRUCTION MANUALS FOR ALL SYSTEMS AND THEIR RESPECTIVE EQUIPMENT. THESE MANUALS SHALL BE INSERTED IN VINYL COVERED 3-RING BINDERS AND TURNED OVER TO OWNER'S REPRESENTATIVE ONE (1) WEEK PRIOR TO FINAL PUNCH LIST.
- I. ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMAN LIKE MANNER AND WILL BE SUBJECT TO THE APPROVAL OF THE OWNER'S REPRESENTATIVE.
- J. ALL EQUIPMENT AND MATERIALS TO BE INSTALLED SHALL BE NEW, UNLESS OTHERWISE NOTED.

- K. BEFORE FINAL PAYMENT, THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF PRINTS (AS-BUILTS), LEGIBLY MARKED IN RED PENCIL TO SHOW ALL CHANGES FROM THE ORIGINAL PLANS.
- L. PROVIDE TEMPORARY POWER AND LIGHTING IN WORK AREAS AS REQUIRED.
- M. SHOP DRAWINGS:
1. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS PROPOSED FOR USE ON THIS PROJECT, GIVING ALL DETAILS, WHICH INCLUDE DIMENSIONS, CAPACITIES, ETC.
  2. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF ALL TEST REPORTS CALLED FOR IN THE SPECIFICATIONS AND DRAWINGS.
- N. ENTIRE ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH OWNER'S SPECIFICATIONS, AND REQUIREMENTS OF ALL LOCAL AUTHORITIES HAVING JURISDICTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH APPROPRIATE INDIVIDUALS TO OBTAIN ALL SUCH SPECIFICATIONS AND REQUIREMENTS. NOTHING CONTAINED IN, OR OMITTED FROM, THESE DOCUMENTS SHALL RELIEVE CONTRACTOR FROM THIS OBLIGATION.

**SECTION 16111**

**1.01. CONDUIT**

- A. MINIMUM CONDUIT SIZE FOR BRANCH CIRCUITS, LOW VOLTAGE CONTROL AND ALARM CIRCUITS SHALL BE 3/4". ALL CONDUIT RUNS LOCATED WITHIN THE OWNER'S EQUIPMENT ROOM SHALL ORIGINATE FROM THE WIREWAY AND RUN VERTICALLY TO ITS DESTINATION. NO BENDS WILL BE ACCEPTED. CONDUITS SHALL BE PROPERLY FASTENED TO THE WALLS AND CEILINGS AS REQUIRED BY THE N.E.C. USE OF COMPRESSION FITTINGS ONLY.
- CONDUIT MATERIAL SHALL BE AS FOLLOWS:
1. ELECTRIC METALLIC TUBING (EMT) - BRANCH CIRCUITS INSIDE EQUIPMENT ROOM
  2. GALVANIZED RIGID CONDUIT (GRC) - FEEDERS AND CIRCUITS EXPOSED TO EXTERIOR & UNDERGROUND.
  3. LIQUID TIGHT FLEXIBLE METAL CONDUIT - FOR SHORT LENGTHS (MAX. 3'-0") WIRING TO VIBRATING EQUIPMENT (HVAC UNITS, MOTORS, ETC.) IN WET LOCATIONS.
  4. FLEXIBLE METAL CONDUIT - FOR SHORT LENGTHS (MAX. 3'-0") WIRING TO VIBRATING EQUIPMENT IN DRY LOCATIONS.
  5. PVC CONDUIT - WHERE SHOWN ON GROUNDING DETAILS.

**SECTION 16123**

**1.01. CONDUCTORS**

- A. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT-BOLT TYPE CONNECTORS. #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION:
- | LINE | 120/208/240V     | 277/480V                 |
|------|------------------|--------------------------|
| A    | BLACK            | BROWN                    |
| B    | RED              | ORANGE                   |
| C    | BLUE             | YELLOW                   |
| N    | CONTINUOUS WHITE | GREY                     |
| G    | CONTINUOUS GREEN | GREEN WITH YELLOW STRIPE |
- B. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.

**SECTION 16130**

**1.01. BOXES**

- A. FURNISH AND INSTALL OUTLET BOXES FOR ALL DEVICES, SWITCHES, RECEPTACLES, ETC.. BOXES TO BE ZINC COATED STEEL.
- B. FURNISH AND INSTALL PULL BOXES IN MAIN FEEDERS RUNS WHERE REQUIRED. PULL BOXES SHALL BE GALVANIZED STEEL WITH SCREW REMOVABLE COVERS, SIZE AND QUANTITY AS REQUIRED. PROVIDE WEATHERPROOF CONSTRUCTION IN WET LOCATIONS.

**SECTION 16140**

**1.01. WIRING DEVICES**

- A. THE FOLLOWING LIST IS PROVIDED TO CONVEY THE QUALITY AND RATING OF WIRING DEVICES WHICH ARE TO BE INSTALLED. A COMPLETE LIST OF ALL DEVICES MUST BE SUBMITTED BEFORE INSTALLATION FOR APPROVAL.
1. DUPLEX RECEPTACLE - P&S #2095 (GFCI) SPECIFICATION GRADE.
  2. SINGLE POLE SWITCH - P&S #CSB20AC2 (20A-120V HARD USE) SPECIFICATION GRADE.
  3. DUPLEX RECEPTACLE - P&S #5362 (20A-120V HARD USE) SPECIFICATION GRADE
  4. PLATES - ALL PLATES USED SHALL BE CORROSION RESISTANT TYPE 304 STAINLESS STEEL. PLATES SHALL BE FROM SAME MANUFACTURER AS SWITCHES AND RECEPTACLES. PROVIDE WEATHERPROOF HOUSING FOR DEVICES LOCATED IN WET LOCATIONS.
  5. OTHER MANUFACTURERS OF THE SWITCHES, RECEPTACLES AND PLATES MAY BE SUBMITTED FOR APPROVAL BY THE ENGINEER.



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SECTION 16170

1.01. DISCONNECT SWITCHES

- A. FUSIBLE AND NON-FUSIBLE, 600V, HEAVY DUTY DISCONNECT SWITCHES SHALL BE AS MANUFACTURED BY SQUARE "D". PROVIDE FUSES AS CALLED FOR ON THE CONTRACT DRAWINGS. AMPERE RATING SHALL BE CONSISTENT WITH LOAD BEING SERVED. DISCONNECT SWITCH COVER SHALL BE MECHANICALLY INTERLOCKED TO PREVENT COVER FROM OPENING WHEN THE SWITCH IS IN THE "ON" POSITION. EXTERIOR APPLICATIONS SHALL BE NEMA 3R CONSTRUCTION WITH PADLOCK FEATURE.

SECTION 16190

1.01. SEISMIC RESTRAINT

- A. ALL DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH ZONE 2A SEISMIC REQUIREMENTS.

SECTION 16195

1.01. LABELING AND IDENTIFICATION NOMENCLATURE FOR ELECTRICAL EQUIPMENT

- A. CONTRACTOR SHALL FURNISH AND INSTALL NON-METALLIC ENGRAVED BACK-LIT NAMEPLATES ON ALL PANELS AND MAJOR ITEMS OF ELECTRICAL EQUIPMENT.
- B. LETTERS TO BE WHITE ON BLACK BACKGROUND WITH LETTERS 1-1/2 INCH HIGH WITH 1/4 INCH MARGIN.
- C. IDENTIFICATION NOMENCLATURE SHALL BE IN ACCORDANCE WITH THE COUNTY'S STANDARDS.
- D. PROVIDE NAMEPLATE FOR PORTABLE ENGINE/GENERATOR CONNECTION SHOWING VOLTAGE KVA/KW RATING, # PHASE, AND # OF WIRES. PLATE TO BE PLASTIC ENGRAVED, RED WITH WHITE LETTERS.
- E. ALL RECEPTACLES, SWITCHES, DISCONNECT SWITCHES, ETC. SHALL BE LABELED WITH THE CORRECT BRANCH CIRCUIT NUMBER SERVED BY MEANS OF PERMANENT PRESSED TYPE BLACK 1/4" TRANSFER LETTERING. (FOR EXAMPLE: "MDP-5", ETC.).
- F. PROVIDE A NAMEPLATE AT THE SERVICE EQUIPMENT INDICATING THE TYPE AND LOCATION OF THE ON SITE GENERATOR.

SECTION 16450

1.01. GROUNDING

- A. GROUNDING SHALL CONFORM WITH THE MOTOROLA R56 STANDARD LATEST VERSION AND ALL FEDERAL, STATE, AND LOCAL CODES. IN THE EVENT OF A CONFLICT, MEET THE MOST STRINGENT REQUIREMENT.
- B. ALL NON-CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.
- C. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.
- D. GROUNDING OF PANELBOARDS:
  - 1. PANELBOARD SHALL BE GROUNDED BY TERMINATING THE PANELBOARD FEEDER'S EQUIPMENT GROUND CONDUCTOR TO THE EQUIPMENT GROUND BAR KIT(S) LUGGED TO THE CABINET. ENSURE THAT THE SURFACE BETWEEN THE KIT AND CABINET ARE BARE METAL TO BARE METAL. PRIME AND PAINT OVER TO PREVENT CORROSION.
  - 2. CONDUIT(S) TERMINATING INTO THE PANELBOARD SHALL HAVE GROUNDING TYPE BUSHINGS. THE BUSHINGS SHALL BE BONDED TOGETHER WITH BARE #10 AWG COPPER CONDUCTOR WHICH IN TURN IS TERMINATED INTO THE PANELBOARD'S EQUIPMENT GROUND BAR KIT(S).
- E. EQUIPMENT GROUNDING CONDUCTOR:
  - 1. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250-122.
  - 2. THE MINIMUM SIZE OF EQUIPMENT GROUND CONDUCTOR SHALL BE #12 AWG COPPER.
  - 3. REFER TO PANEL SCHEDULE "BRANCH CIRCUIT" DATA FOR EQUIPMENT GROUND CONDUCTOR SIZE FOR EACH BRANCH CIRCUIT.
  - 4. EACH FEEDER OR BRANCH CIRCUIT SHALL HAVE EQUIPMENT GROUND CONDUCTOR(S) INSTALLED IN THE SAME RACEWAY(S).
- F. GROUNDING SYSTEM:

CONTRACTOR SHALL PROVIDE A EARTHING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO EARTH GROUND OF 10 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3-POINT TEST PROCEDURE IF APPLICABLE. (REFER TO SECTION 16960).

PROVIDE THE GROUNDING SYSTEM AS SPECIFIED ON DRAWINGS, INCLUDING, BUT NOT LIMITED TO:

  - 1. GROUND BARS
  - 2. INTERIOR GROUND RING
  - 3. EXTERIOR GROUNDING (WHERE REQUIRED DUE TO MEASURED AC RESISTANCE GREATER THAN SPECIFIED).
  - 4. ANTENNA GROUND CONNECTIONS AND PLATES.
- F. CONTRACTOR, AFTER COMPLETION OF THE COMPLETE GROUNDING SYSTEM BUT PRIOR TO CONCEALMENT/BURIAL OF SAME, SHALL NOTIFY THE COUNTY'S THE COUNTY'S PROJECT ENGINEER WHO WILL HAVE A DESIGN ENGINEER VISIT SITE AND MAKE A VISUAL INSPECTION OF THE GROUNDING GRID AND CONNECTIONS OF THE SYSTEM.
- G. ALL EQUIPMENT SHALL BE BONDED TO GROUND AS REQUIRED BY N.E.C., MFG. SPECIFICATIONS, R56 STANDARDS, AND THE COUNTY'S SPECIFICATIONS.

SECTION 16477

1.01. FUSES

- A. FUSES SHALL BE NONRENEWABLE TYPE AS MANUFACTURED BY "BUSSMAN" OR APPROVED EQUAL. FUSES RATED TO 1/10 AMPERE UP TO 600 AMPERES SHALL BE EQUIVALENT TO BUSSMAN TYPE LPN-RK (250V) UL CLASS RK1, LOW PEAK, DUAL ELEMENT, TIME-DELAY FUSES. FUSES SHALL HAVE SEPARATE SHORT CIRCUIT AND OVERLOAD ELEMENTS AND HAVE AN INTERRUPTING RATING OF 200 KAIC. UPON COMPLETION OF WORK, PROVIDE ONE SPARE SET OF FUSES FOR EACH TYPE INSTALLED.

SECTION 16620

(SUPPLIED BY OWNER, INSTALLED BY CONTRACTOR)

1.01. GENERATOR SET

- A. REFER TO CONTRACT DRAWINGS FOR DETAILS AND SCHEDULES.

SECTION 16960

1.01. TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

- A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: THERMAL OVERLOAD AND MAGNETIC TRIP TEST, AND CABLE INSULATION TEST FOR ALL CIRCUIT BREAKERS RATED 100 AMPS OR GREATER.

TEST 2: RESISTANCE TO GROUND TEST ON THE GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

- 1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
- 2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
- 3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.
- B. THESE TESTS SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNER'S CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION REPRESENTATIVE AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.
- C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM'S REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.
- D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

SECTION 16961

1.01. TESTS BY CONTRACTOR

- A. ALL TESTS AS REQUIRED UPON COMPLETION OF WORK, SHALL BE MADE BY THIS CONTRACTOR. THESE SHALL BE CONTINUITY AND INSULATION TESTS; TEST TO DETERMINE THE QUALITY OF MATERIALS, ETC. AND SHALL BE MADE IN ACCORDANCE WITH N.E.C. RECOMMENDATIONS. ALL FEEDERS AND BRANCH CIRCUIT WIRING (EXCEPT CLASS 2 SIGNAL CIRCUITS) MUST BE TESTED FREE FROM SHORT CIRCUIT AND GROUND FAULT CONDITIONS AT 500V IN A REASONABLY DRY AMBIENT OF APPROXIMATELY 70 DEGREES F.
- B. CONTRACTOR SHALL PERFORM LOAD PHASE BALANCING TESTS. CIRCUITS SHALL BE SO CONNECTED TO THE PANELBOARDS SUCH THAT THE NEW LOAD IS DISTRIBUTED AS EQUALLY AS POSSIBLE BETWEEN EACH LOAD AND NEUTRAL. 10% SHALL BE CONSIDERED AS A REASONABLE AND ACCEPTABLE ALLOWANCE. BRANCH CIRCUITS SHALL BE BALANCED ON THEIR OWN PANELBOARDS; FEEDER LOADS SHALL, IN TURN, BE BALANCED ON THE SERVICE EQUIPMENT. REASONABLE LOAD TEST SHALL BE ARRANGED TO VERIFY LOAD BALANCE IF REQUESTED BY THE ENGINEER.
- C. ALL TESTS, UPON REQUEST, SHALL BE REPEATED IN THE PRESENCE OF OWNER'S REPRESENTATIVE. ALL TESTS SHALL BE DOCUMENTED AND TURNED OVER TO OWNER. OWNER SHALL HAVE THE AUTHORITY TO STOP ANY OF THE WORK NOT BEING PROPERLY INSTALLED. ALL SUCH DETECTED WORK SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER AND THE TESTS SHALL BE REPEATED.



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