David Ford, Site Acquisition
c/o New Cingular Wireless, PCS LLC (AT&T)
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767
Mobile: (508) 821-6509
dford@clinellc.com

October 17, 2016

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification // Site Number: CT2151
177 West Rocks Road, Norwalk, CT (Site Name: Norwalk North-West Rocks Rd)
N 41.143922 // W -73.4182611

Dear Ms. Bachman:

New Cingular Wireless, PCS, LLC ("AT&T") currently maintains nine (9) antennas at the 111 foot level of the existing 108 foot water tank at 177 West Rocks Road, Norwalk, CT 06851. The water tank is owned by the First Taxing District off the City of Norwalk. They also own the property. AT&T now intends to replace three (3) of its existing antennas with three (3) upgraded models for its LTE upgrade. These antennas would be installed at the 111 foot level of the water tank. AT&T also intends to install six (6) remote radio units (3 are new, 3 are being swapped for existing radios), three (3) surge arrestors (all are being swapped for existing surge arrestors) and six (6) triplexers.

The current proposal involves an antenna swap only (three for three); no antennas will be added. AT&T was originally approved for twelve (12) total antennas on January 5, 2000.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Harry Rilling, City of Norwalk Mayor, as well as the water tank and ground owner, The First Taxing District of the City of Norwalk.

The planned modifications to the facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

Attached to accommodate this filing are construction drawings dated September 28, 2016 by ComEx Consultants, a structural analysis dated October 10, 2016 by Destek Engineering and an Emissions Analysis Report dated October 1, 2016 by EBI Consulting.

1. The proposed modifications will not result in an increase in the height of the existing structure.

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading as shown in the attached structural analysis by Destek Engineering dated October 10, 2016.

For the foregoing reasons, AT&T respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

David Ford, Site Acquisition
c/o New Cingular Wireless, PCS LLC (AT&T)
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767
Mobile: (508) 821-6509
dford@centerlincommunications.com

Attachments

cc: Harry Rilling, Mayor, City of Norwalk - as elected official
The First Taxing District of the City of Norwalk - as tower owner
The First Taxing District of the City of Norwalk - as property owner

EBI Consulting
environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

AT&T Existing Facility

Site ID: CT2151

Norwalk North-West Rocks Rd
177 West Rocks Road
Norwalk, CT 06851

October 1, 2016

EBI Project Number: 6216004400

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general public allowable limit:	**17.92 %**

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

October 1, 2016

AT&T Mobility – New England
Attn: Cameron Syme, RF Manager
550 Cochituate Road
Suite 550 – 13&14
Framingham, MA 06040

Emissions Analysis for Site: **CT2151 – Norwalk North-West Rocks Rd**

EBI Consulting was directed to analyze the proposed AT&T facility located at **177 West Rocks Road, Norwalk, CT**, for the purpose of determining whether the emissions from the Proposed AT&T Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately 467 $\mu W/cm^2$ and 567 $\mu W/cm^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed AT&T Wireless antenna facility located at **177 West Rocks Road, Norwalk, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since AT&T is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6-foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 UMTS channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 2 UMTS channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 4 LTE channels (700 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) 2 LTE channels (850 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 LTE channels (1900 MHz (PCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 2 LTE channels (2300 MHz (WCS)) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

7) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.

8) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

9) The antennas used in this modeling are the **Powerwave 7770, CCI OPA-65R-LCUU-H6 and the Quintel QS66512-2** for transmission in the 700 MHz, 850 MHz, 1900 MHz (PCS) and 2300 MHz (WCS) frequency bands. This is based on feedback from the carrier with regards to anticipated antenna selection. Maximum gain values for all antennas are listed in the Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

10) The antenna mounting height centerlines of the proposed antennas are **111 feet** above ground level (AGL) for **Sector A**, **111 feet** above ground level (AGL) for **Sector B** and **111 feet** above ground level (AGL) for Sector C.

11) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculations were done with respect to uncontrolled / general public threshold limits.

AT&T Site Inventory and Power Data by Antenna

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Powerwave 7770	Make / Model:	Powerwave 7770	Make / Model:	Powerwave 7770
Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd	Gain:	11.4 / 13.4 dBd
Height (AGL):	**111 feet**	Height (AGL):	**111 feet**	Height (AGL):	**111 feet**
Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)	Frequency Bands	850 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts	Total TX Power(W):	120 Watts
ERP (W):	2,140.89	ERP (W):	2,140.89	ERP (W):	2,140.89
Antenna A1 MPE%	**0.90 %**	Antenna B1 MPE%	**0.90 %**	Antenna C1 MPE%	**0.90 %**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	CCI OPA-65R-LCUU-H6	Make / Model:	CCI OPA-65R-LCUU-H6	Make / Model:	CCI OPA-65R-LCUU-H6
Gain:	12.45 / 11.65 dBd	Gain:	12.45 / 11.65 dBd	Gain:	12.45 / 11.65 dBd
Height (AGL):	**111 feet**	Height (AGL):	**111 feet**	Height (AGL):	**111 feet**
Frequency Bands	850 MHz / 700 MHz / 2300 MHz (WCS)	Frequency Bands	850 MHz / 700 MHz / 2300 MHz (WCS)	Frequency Bands	850 MHz / 700 MHz / 2300 MHz (WCS)
Channel Count	6	Channel Count	6	Channel Count	6
Total TX Power(W):	360 Watts	Total TX Power(W):	360 Watts	Total TX Power(W):	360 Watts
ERP (W):	8,073.14	ERP (W):	8,073.14	ERP (W):	8,073.14
Antenna A2 MPE%	**3.81 %**	Antenna B2 MPE%	**3.81 %**	Antenna C2 MPE%	**3.81 %**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Quintel QS66512-2	Make / Model:	Quintel QS66512-2	Make / Model:	Quintel QS66512-2
Gain:	10.85 / 13.85 / 0 / 0 dBd	Gain:	10.85 / 13.85 / 0 / 0 dBd	Gain:	10.85 / 13.85 / 0 / 0 dBd
Height (AGL):	**111 feet**	Height (AGL):	**111 feet**	Height (AGL):	**111 feet**
Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)	Frequency Bands	700 MHz / 1900 MHz (PCS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts	Total TX Power(W):	240 Watts
ERP (W):	4,371.36	ERP (W):	4,371.36	ERP (W):	4,371.36
Antenna A3 MPE%	**1.97 %**	Antenna B3 MPE%	**1.97 %**	Antenna C3 MPE%	**1.97 %**

Site Composite MPE%	
Carrier	**MPE%**
AT&T – Max per sector	**6.68 %**
Verizon Wireless	5.08 %
Clearwire	0.16 %
Nextel	4.73 %
Sprint	1.24 %
T-Mobile	0.03 %
Site Total MPE %:	**17.92 %**

AT&T Sector A Total:	6.68 %
AT&T Sector B Total:	6.68 %
AT&T Sector C Total:	6.68 %
Site Total:	17.92 %

AT&T Max Power Values Per Sector:

AT&T _ Frequency Band / Technology Per Sector	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu W/cm^2$)	Frequency (MHz)	Allowable MPE ($\mu W/cm^2$)	Calculated % MPE
AT&T 850 MHz UMTS	2	414.12	111	2.70	850 MHz	567	0.48%
AT&T 1900 MHz (PCS) UMTS	2	656.33	111	4.28	1900 MHz (PCS)	1000	0.43%
AT&T 850 MHz LTE	2	1,054.75	111	6.88	850 MHz	567	1.21%
AT&T 700 MHz LTE	2	877.31	111	5.72	700 MHz	467	1.23%
AT&T 2300 MHz (WCS) LTE	2	2,104.51	111	13.72	2300 MHz (WCS)	1000	1.37%
AT&T 700 MHz LTE	2	729.71	111	4.76	700 MHz	467	1.02%
AT&T 1900 MHz (PCS) LTE	2	1,455.97	111	9.50	1900 MHz (PCS)	1000	0.95%
						Total:	6.68%

Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the AT&T facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector A:	6.68 %
Sector B:	6.68 %
Sector C:	6.68 %
AT&T Maximum Total (per sector):	6.68 %
Site Total:	17.92 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **17.92 %** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

PROJECT INFORMATION

SCOPE OF WORK:
- AT&T ANTENNAS: (1) NEW ANTENNA PER SECTOR, FOR A TOTAL (3) NEW ANTENNAS. (2) EXISTING ANTENNAS PER SECTOR FOR 3 SECTORS, FOR A TOTAL OF (6) EXISTING ANTENNAS TO REMAIN. (1) EXISTING ANTENNA PER SECTOR FOR (3) SECTORS, FOR A TOTAL OF (3) EXISTING ANTENNAS TO BE REMOVED.
- AT&T RRUs: (2) NEW RRUs PER SECTOR WITH (3) SECTORS, FOR A TOTAL OF (6) NEW RRUs AT ANTENNAS; (2) EXISTING RRU PER SECTOR TO BE REUSED, FOR A TOTAL OF (6) EXISTING RRUs. (1) PROPOSED RRU PER SECTOR AT EQUIPMENT LOCATION FOR A TOTAL OF (3) RRUS
- AT&T SQUID: REPLACE (1) EXISTING DC-2 PER SECTOR WITH (1) DC-6 SQUID PER SECTOR (3) TOTAL

SITE ADDRESS:	177 WEST ROCKS ROAD NORWALK, CT 06851	
LATITUDE:	41.1439089	41° 8' 38.072"N
LONGITUDE:	-73.4183050	-73° 25' 5.898"W
USID:	60432	
BUILDING OWNER:	TBD	
TYPE OF SITE:	WATER TOWER	
TOWER ELEVATION:	108'-0"±	
RAD CENTER:	111'-0"±	
CURRENT USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY	
PROPOSED USE:	UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY	

DRAWING INDEX

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APPROVALS

THE FOLLOWING PARTIES HEREBY APPROVE AND ACCEPT THESE DOCUMENTS AND AUTHORIZE THE SUBCONTRACTOR TO PROCEED WITH THE CONSTRUCTION DESCRIBED HEREIN, ALL DOCUMENTS ARE SUBJECT TO REVIEW BY THE LOCAL BUILDING DEPARTMENT AND MAY IMPOSE CHANGES OR SITE MODIFICATIONS.

DISCIPLINE:	NAME:	DATE:
SITE ACQUISITION:		
CONSTRUCTION MANAGER:		
AT&T PROJECT MANAGER:		

at&t MOBILITY

FA CODE: 1005081

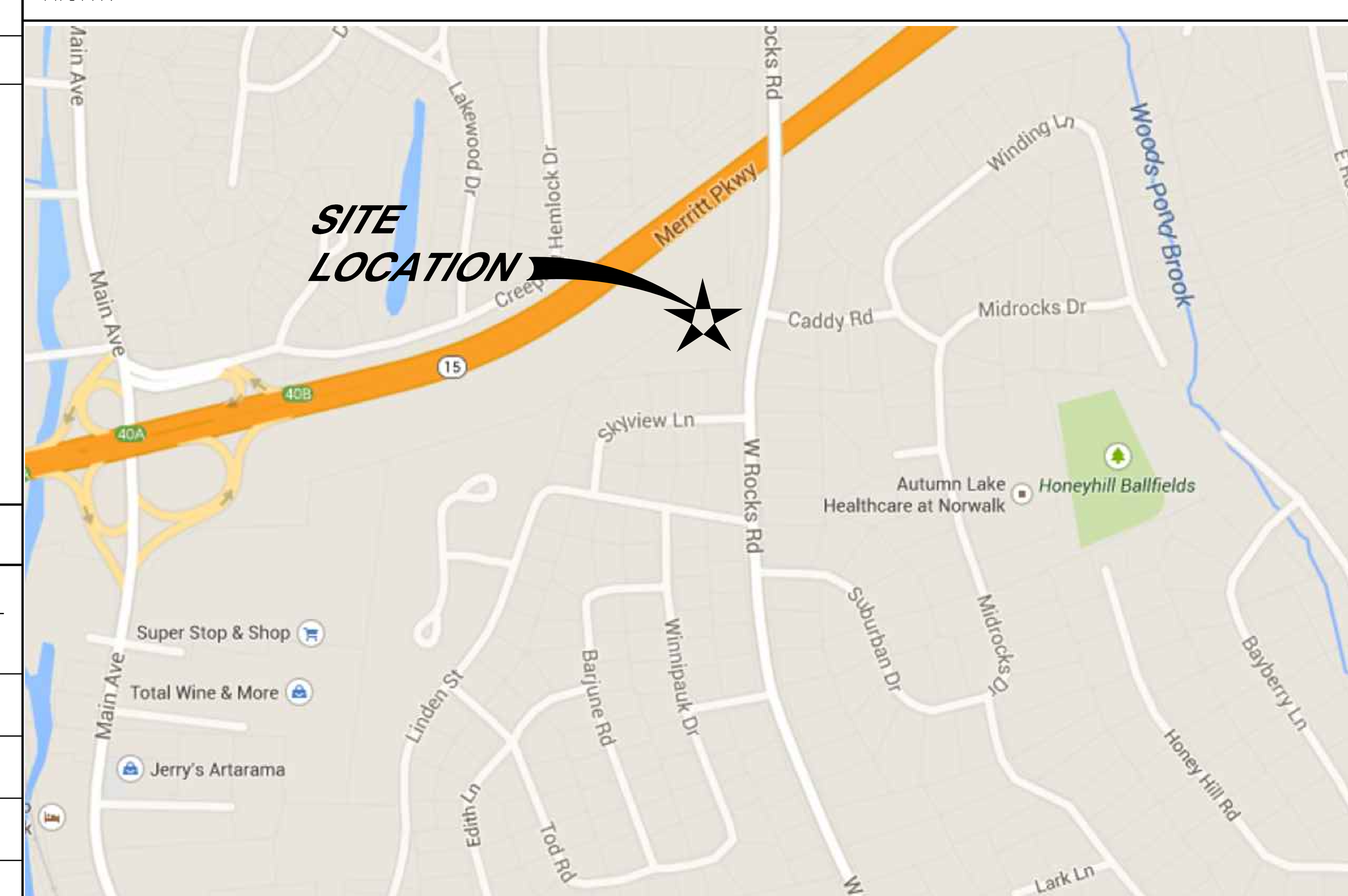
SITE NUMBER: CT2151

SITE NAME: NORWALK NORTH-WEST ROCKS RD

PROJECT: LTE 4C AND MULTICARRIER

VICINITY MAP

HEAD WEST ON I-90 W/MASSACHUSETTS TURNPIKE. HEAD EAST TOWARD MA-30 E. TURN RIGHT ONTO MA-30 W. TAKE THE RAMP TO I-90/MASSPIKE/SPRINGFIELD/BOSTON. KEEP LEFT AT THE FORK, FOLLOW SIGNS FOR INTERSTATE 90 W/MASSACHUSETTS TURNPIKE/WORCHESTER/SPRINGFIELD AND MERGE ONTO I-90 W/MASSACHUSETTS TURNPIKE. CONTINUE ON I-90 W/MASSACHUSETTS TURNPIKE. TAKE I-84 AND I-91 S TO CT-15 N IN NORWALK. MERGE ONTO I-90 W/MASSACHUSETTS TURNPIKE. TAKE EXIT 9 FOR I-84 TOWARD US-20/HARTFORD/NEW YORK CITY. CONTINUE ONTO I-84. TAKE EXIT 57 ON THE LEFT FOR CT-15 S TOWARD I-91 S/CHARTER OAK BRIDGE/N Y. CITY. CONTINUE ONTO CT-15 S. CONTINUE ONTO CT-15 S/US-5 S. TAKE EXIT 86 TO MERGE ONTO I-91 S TOWARD NEW HAVEN/NEW YORK CITY. TAKE EXIT 17 FOR CT-15 S/W CROSS PKWY. MERGE ONTO CT-15 S. TAKE EXIT 40A TOWARD US-7 S/NORWALK. TURN RIGHT ONTO MAIN AVE. SHARP LEFT TO MERGE ONTO CT-15 N. SITE WILL BE ON RIGHT.



PROJECT TEAM

CLIENT REPRESENTATIVE

COMPANY:	EMPIRE TELECOM
ADDRESS:	16 ESQUIRE ROAD BILLERICA, MA 01821
CONTACT:	DAVID COOPER
PHONE:	617-639-4908
EMAIL:	dcooper@empiretelecomm.com

SITE ACQUISITION:

COMPANY:	EMPIRE TELECOM
ADDRESS:	16 ESQUIRE ROAD BILLERICA, MA 01821
CONTACT:	DAVID COOPER
PHONE:	617-639-4908
EMAIL:	dcooper@empiretelecomm.com

ZONING:

COMPANY:	EMPIRE TELECOM
ADDRESS:	16 ESQUIRE ROAD BILLERICA, MA 01821
CONTACT:	DAVID COOPER
PHONE:	617-639-4908
EMAIL:	dcooper@empiretelecomm.com

ENGINEERING:

COMPANY:	COM-EX CONSULTANTS, LLC
ADDRESS:	115 ROUTE 46 SUITE E39 MOUNTAIN LAKES, NJ 07046
CONTACT:	NICHOLAS D. BARILE, P.E.
PHONE:	862-209-4300
EMAIL:	nbarile@comexconsultants.com

RF ENGINEER:

COMPANY:	AT&T MOBILITY - NEW ENGLAND
ADDRESS:	550 COCHITUATE ROAD SUITE 550 13 & 14 FRAMINGHAM, MA 01701
CONTACT:	CAMERON SYME
PHONE:	508-596-7146
EMAIL:	cs6970@att.com

CONSTRUCTION MANAGEMENT:

COMPANY:	EMPIRE TELECOM
ADDRESS:	16 ESQUIRE ROAD BILLERICA, MA 01821
CONTACT:	GRZEGORZ "GREG" DORMAN
PHONE:	484-683-1750
EMAIL:	gdorman@empiretelecomm.com

GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY, AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.

2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.

3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

CONNECTICUT ONE CALL SYSTEM, INC. 1-800-922-4455 CALL BEFORE YOU DIG! STOP

CONNECTICUT LAW REQUIRES TWO WORKING DAYS NOTICE PRIOR TO ANY EARTH MOVING ACTIVITIES BY CALLING 800-922-4455 OR DIAL 811

COM-EX Consultants
115 ROUTE 46
SUITE E39
MOUNTAIN LAKES, NJ 07046
PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CTU2151
SITE NAME: NORWALK NORTH-WEST ROCKS RD
177 WEST ROCKS ROAD
NORWALK, CONNECTICUT 06851
FAIRFIELD COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	09/28/16	REVISED PER CLIENT COMMENTS	KCD	NDB	NDB
0	08/30/16	ISSUED AS FINAL	KCD	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL: STATE OF CONNECTICUT NICHOLAS D. BARILE No. 28643 LICENSED PROFESSIONAL ENGINEER
NICHOLAS D. BARILE
PROFESSIONAL ENGINEER
CT LIC. NO. 28643

AT&T

DRAWING TITLE: TITLE SHEET

JOB NUMBER	DRAWING NUMBER	REV
16047-EMP	T-1	1

GROUNDING NOTES:

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ), THE SITE–SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL–OF–POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 81) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS. TESTS SHALL BE PERFORMED IN ACCORDANCE WITH 25471–000–3PS–EG00–0001, DESIGN & TESTING OF FACILITY GROUNDING FOR CELL SITES.
4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER FOR INDOOR BTS; 2 AWG STRANDED COPPER FOR OUTDOOR BTS.
6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED WITH STAINLESS STEEL HARDWARE TO THE BRIDGE AND THE TOWER GROUND BAR.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. MISCELLANEOUS ELECTRICAL AND NON–ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
11. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
12. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON–METALLIC MATERIAL SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON–METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
13. ALL TOWER GROUNDING SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF ANSI/TIA 222. FOR TOWERS BEING BUILT TO REV–G OF THE STANDARD, THE WIRE SIZE OF THE BURIED GROUND RING AND CONNECTIONS BETWEEN THE TOWER AND THE BURIED GROUND RING SHALL BE CHANGED FROM 2 AWG TO 2/0 AWG. IN ADDITION, THE MINIMUM LENGTH OF THE GROUND RODS SHALL BE INCREASED FROM EIGHT FEET (8') TO TEN FEET (10').
14. ALL NEW STRUCTURES WITH A FOUNDATION AND/OR FOOTING HAVING 20 FT. OR MORE ½" OR GREATER ELECTRICALLY CONDUCTIVE REINFORCING STEEL MUST HAVE IT BONDED TO THE GROUND RING USING AN EXOTHERMIC WELD CONNECTION USING #2 AWG SOLID TINNED COPPER GROUND WIRE, PER NEC 250.50.

GENERAL NOTES:

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – EMPIRE TELECOM
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – AT&T MOBILITY
   OEM – ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSION OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. ANY DISCREPANCY FOUND SHALL BE BROUGHT TO THE ATTENTION OF CONTRACTOR (EMPIRE TELECOM).
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
6. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
7. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION SPACE FOR APPROVAL BY THE CONTRACTOR.
8. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND T1 CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR. ROUTING OF TRENCHING SHALL BE APPROVED BY CONTRACTOR
9. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF OWNER.
10. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OFF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FROM THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
12. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.
13. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS UNLESS OTHERWISE SPECIFIED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
14. ALL STRUCTURAL STEEL WORK SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS. ALL STRUCTURAL STEEL SHALL BE ASTM A36 (Fy=36 ksi). ALL STEEL EXPOSED TO WEATHER SHALL BE HOT DIPPED GALVANIZED. TOUCH UP ALL SCRATCHES AND OTHER MARKS IN THE FIELD AFTER STEEL IS ERECTED USING A COMPATIBLE ZINC RICH PAINT.
15. CONSTRUCTION SHALL COMPLY WITH SPECIFICATION 25741–000–3APS–A00Z–00002, "GENERAL CONSTRUCTION SERVICES FOR CONSTRUCTION OF AT&T MOBILITY SITES."
16. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
17. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK MAY NEED TO BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
18. SINCE THE CELL SITE MAY BE ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUTDOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE REQUIRED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.
19. SUBCONTRACTOR'S WORK SHALL COMPLY WITH ALL APPLICABLE NATIONAL, STATE, AND LOCAL CODES AS ADOPTED BY THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ) FOR THE LOCATION. THE EDITION OF THE AHJ ADOPTED CODES AND STANDARDS IN EFFECT ON THE DATE OF CONTRACT AWARD SHALL GOVERN THE DESIGN.
   - INTERNATIONAL BUILDING CODE: IBC 2009 WITH LOCAL & COUNTY AMENDMENTS
   - NATIONAL ELECTRICAL CODE: NEC 2011 WITH LOCAL & COUNTY AMENDMENTS
   - FIRE/LIFE SAFETY CODE: NFPA–101 2009 WITH LOCAL & COUNTY AMENDMENTS
20. SUBCONTRACTOR'S WORK SHALL COMPLY WITH THE LATEST EDITION OF THE FOLLOWING STANDARDS:
   - AMERICAN CONCRETE INSTITUTE (ACI) 318, BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
   - AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), MANUAL OF STEEL CONSTRUCTION, THIRTEENTH EDITION
   - AMERICAN SOCIETY OF TESTING OF MATERIALS, ASTM
   - TELECOMMUNICATIONS INDUSTRY ASSOCIATION (ANSI/TIA–222–G–1), STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES:
   - TIA 607, COMMERCIAL BUILDING GROUNDING AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS
   - OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, OSHA
   - INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) 81, GUIDE FOR MEASURING EARTH RESISTIVELY, GROUND IMPEDANCE, AND EARTH SURFACE POTENTIALS OF A GROUND SYSTEM IEEE 1100 (1999) RECOMMENDED PRACTICE FOR POWERING AND GROUNDING OF ELECTRONIC EQUIPMENT
   - TELCORDIA GR–1503, COAXIAL CABLE CONNECTIONS
21. FOR ANY CONFLICTS BETWEEN SECTIONS OF LISTED CODES AND STANDARDS REGARDING MATERIAL, METHODS OF CONSTRUCTION, OR OTHER REQUIREMENTS, THE MOST RESTRICTIVE REQUIREMENT SHALL GOVERN. WHERE THERE IS CONFLICT BETWEEN A GENERAL REQUIREMENT AND A SPECIFIC REQUIREMENT, THE SPECIFIC REQUIREMENT SHALL GOVERN.
22. 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 AND SUBMIT TO THE ENGINEER ANY DISCREPANCIES FROM THE DRAWINGS.

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BILLERICA, MA 01821

SITE NUMBER: CTU2151
SITE NAME: NORWALK NORTH-WEST ROCKS RD
177 WEST ROCKS ROAD
NORWALK, CONNECTICUT 06851
FAIRFIELD COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
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0	08/30/16	ISSUED AS FINAL	KCD	NDB	NDB

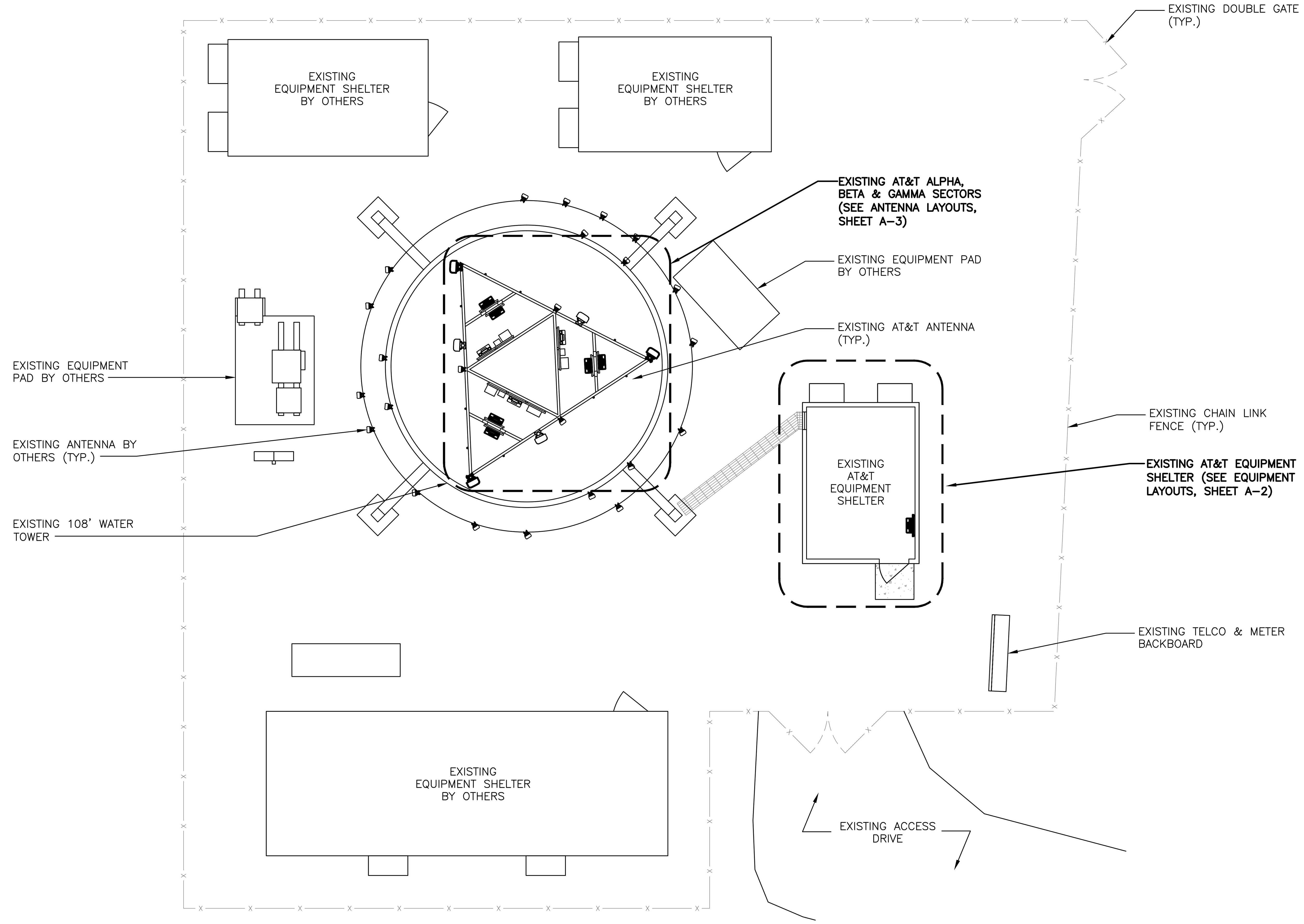
SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

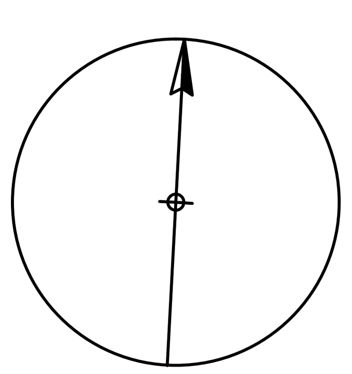
SEAL: STATE OF CONNECTICUT NICHOLAS D. BARILE No. 28643 LICENSED PROFESSIONAL ENGINEER
NICHOLAS D. BARILE
PROFESSIONAL ENGINEER
CT LIC. NO. 28643

AT&T

DRAWING TITLE: GROUNDING & GENERAL NOTES

JOB NUMBER	DRAWING NUMBER	REV
16047–EMP	GN–1	1





NORTH

COMPOUND LAYOUT

SCALE: 3/32" = 1'-0"

0 5'-4" 10'-8" 21'-4"

GRAPHIC SCALE: 3/32"=1'-0"

NOTE:
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 AND SUBMIT TO THE ENGINEER ANY DISCREPANCIES FROM THE DRAWINGS.

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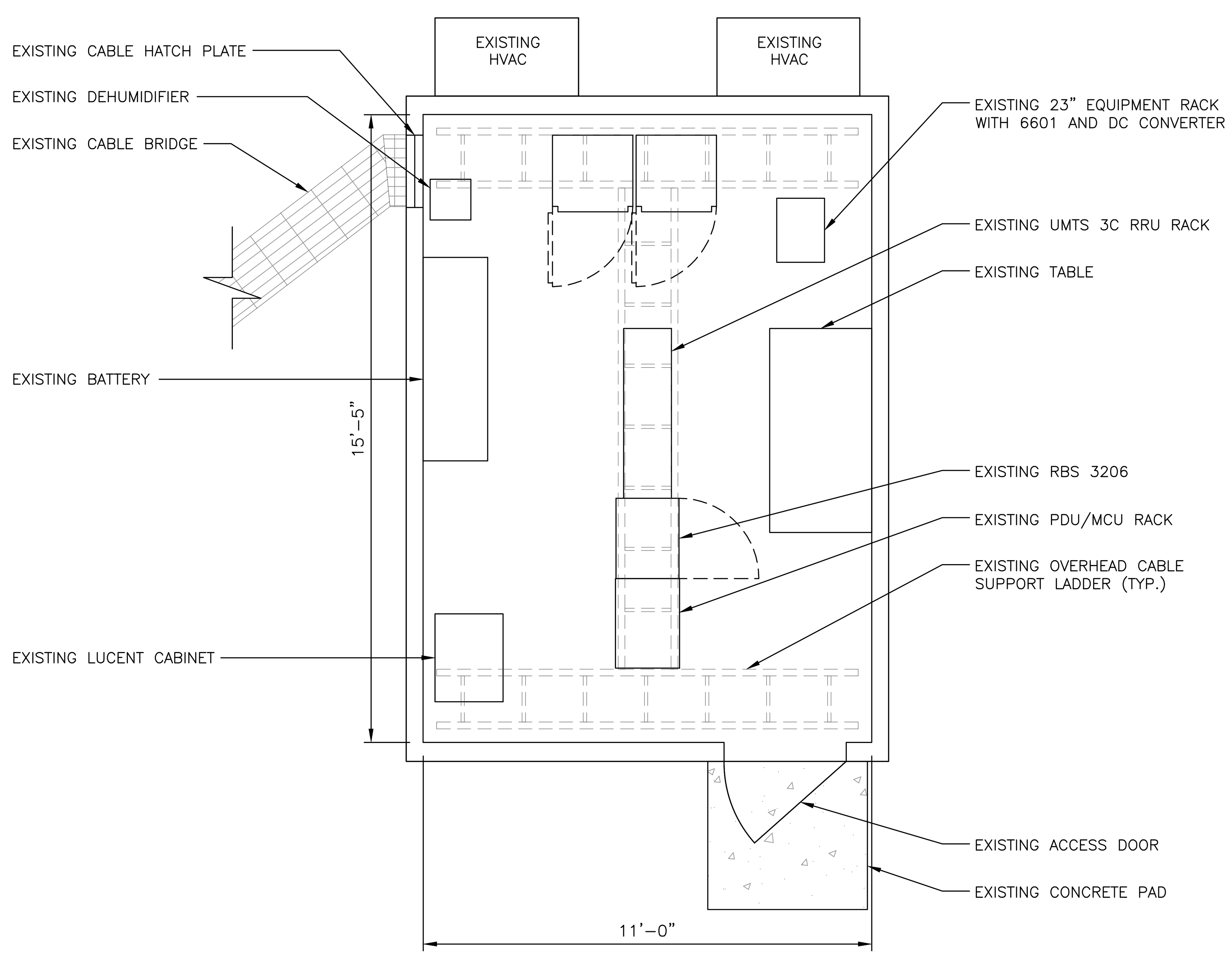
SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL:
STATE OF CONNECTICUT
NICHOLAS D. BARILE
PROFESSIONAL ENGINEER
CT LICENSE NO. 28643

AT&T

DRAWING TITLE:
COMPOUND LAYOUT

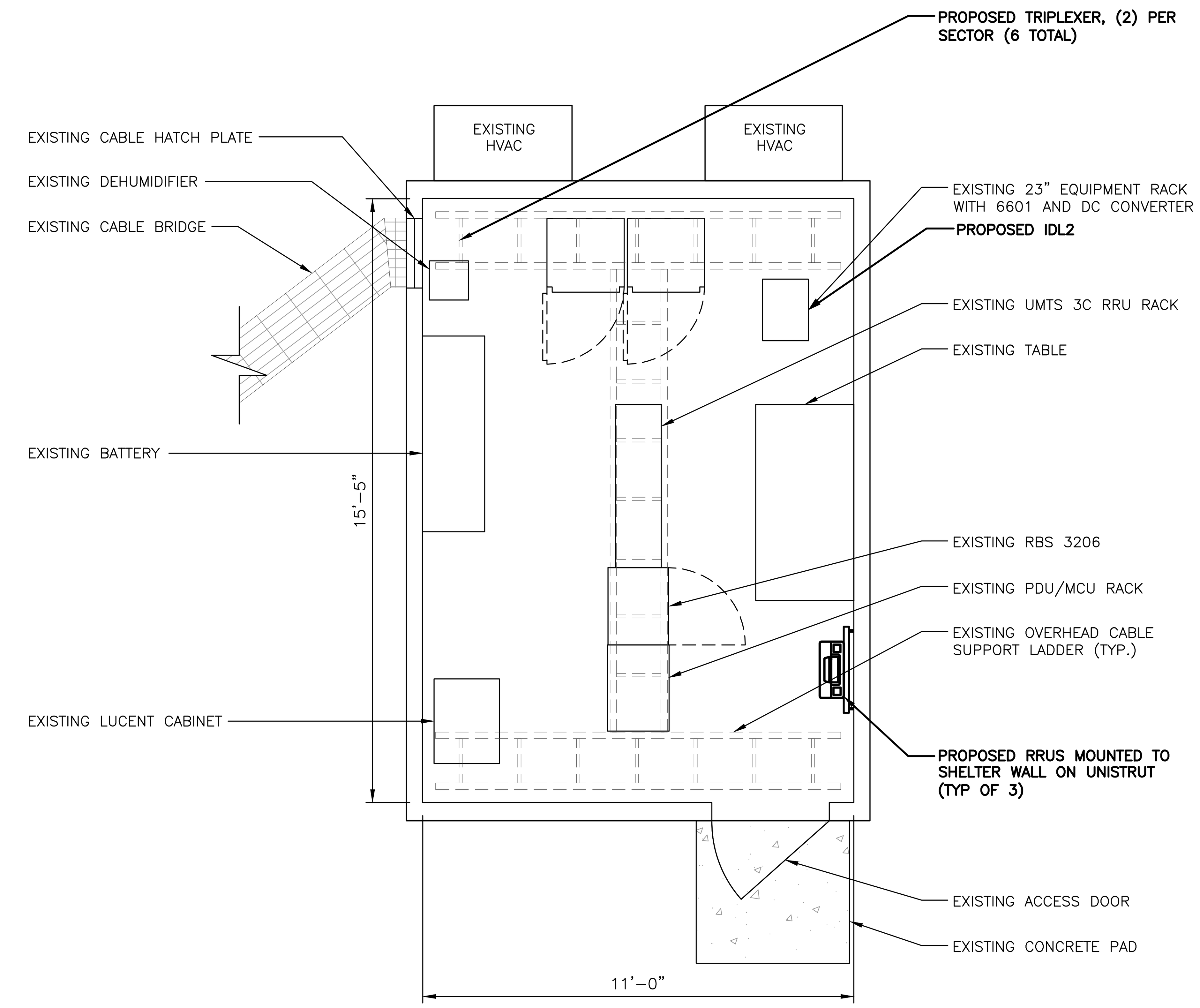
JOB NUMBER	DRAWING NUMBER	REV
16047-EMP	A-1	1



EXISTING EQUIPMENT LAYOUT

SCALE: 3/8" = 1'-0"

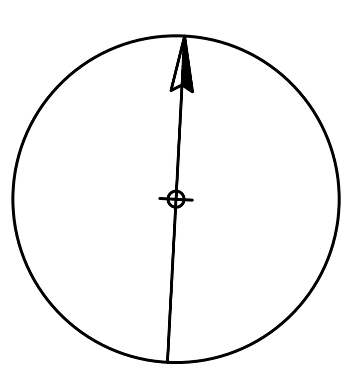
(IN FEET)
3/8 Inch = 1 Foot



PROPOSED EQUIPMENT LAYOUT

SCALE: 3/8" = 1'-0"

(IN FEET)
3/8 Inch = 1 Foot



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SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL:
PROFESSIONAL ENGINEER
CT ... 28643

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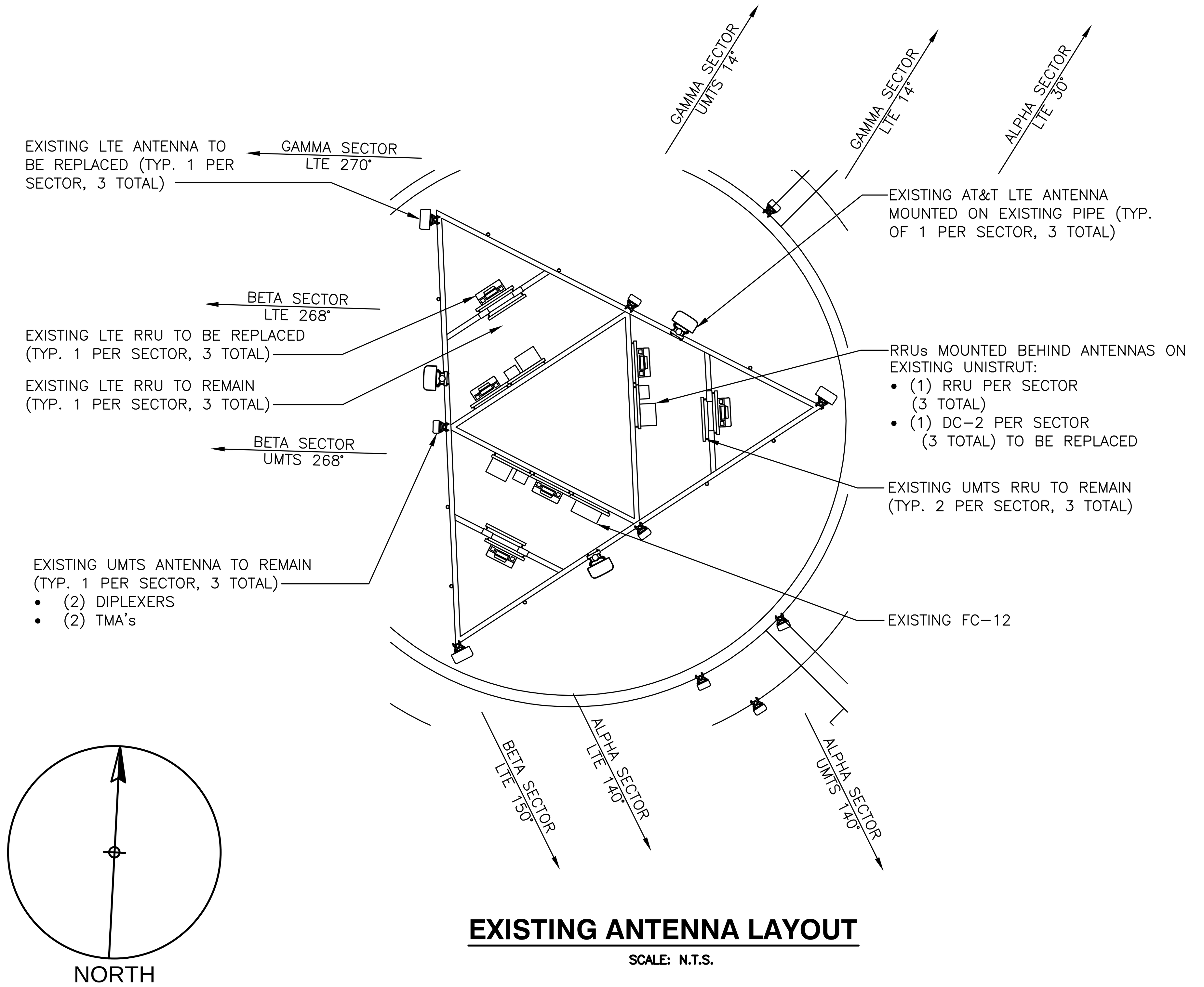
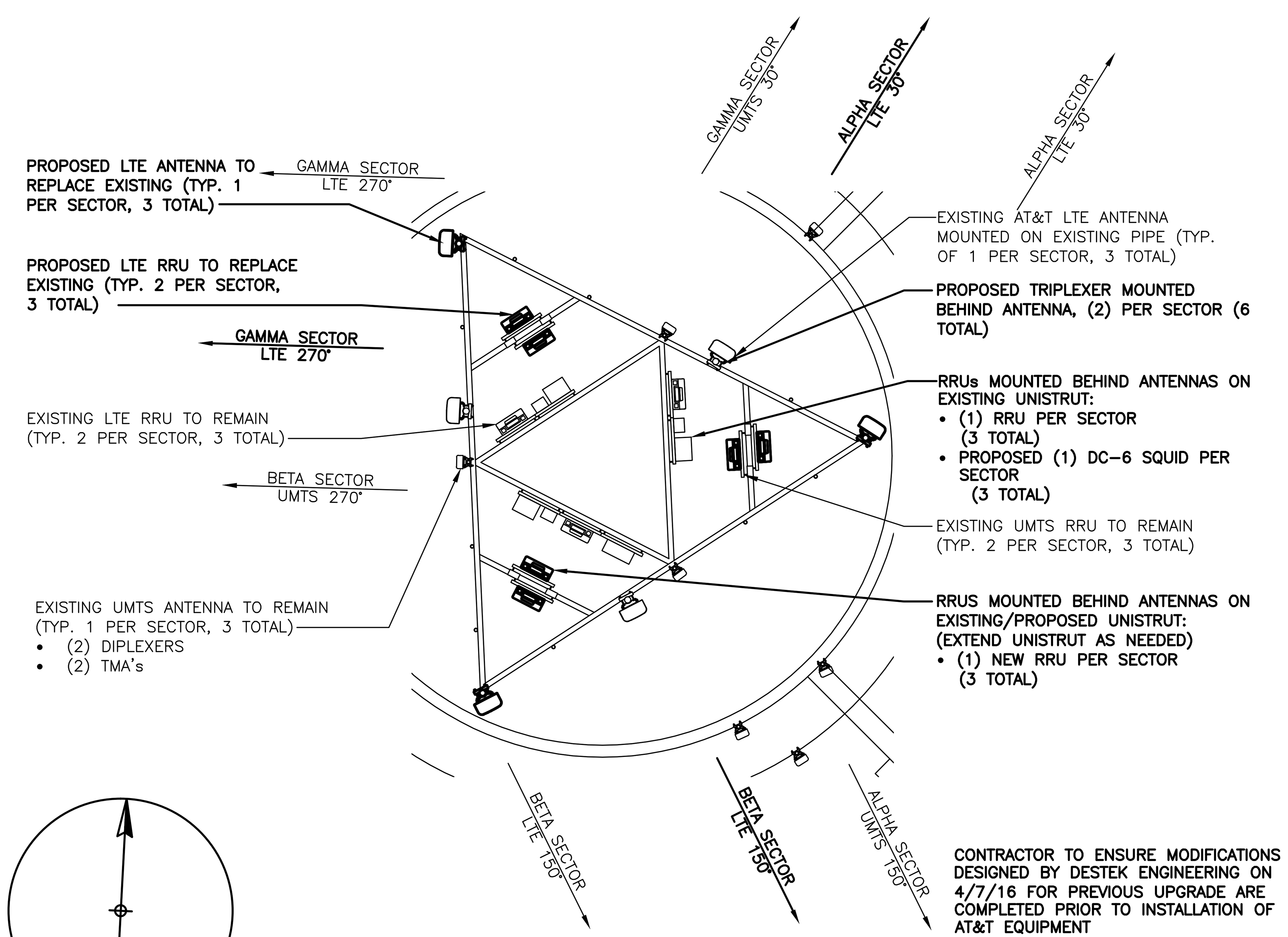
DRAWING TITLE:
EQUIPMENT LAYOUTS

JOB NUMBER	DRAWING NUMBER	REV
16047-EMP	A-2	1



EXISTING ANTENNA LAYOUT

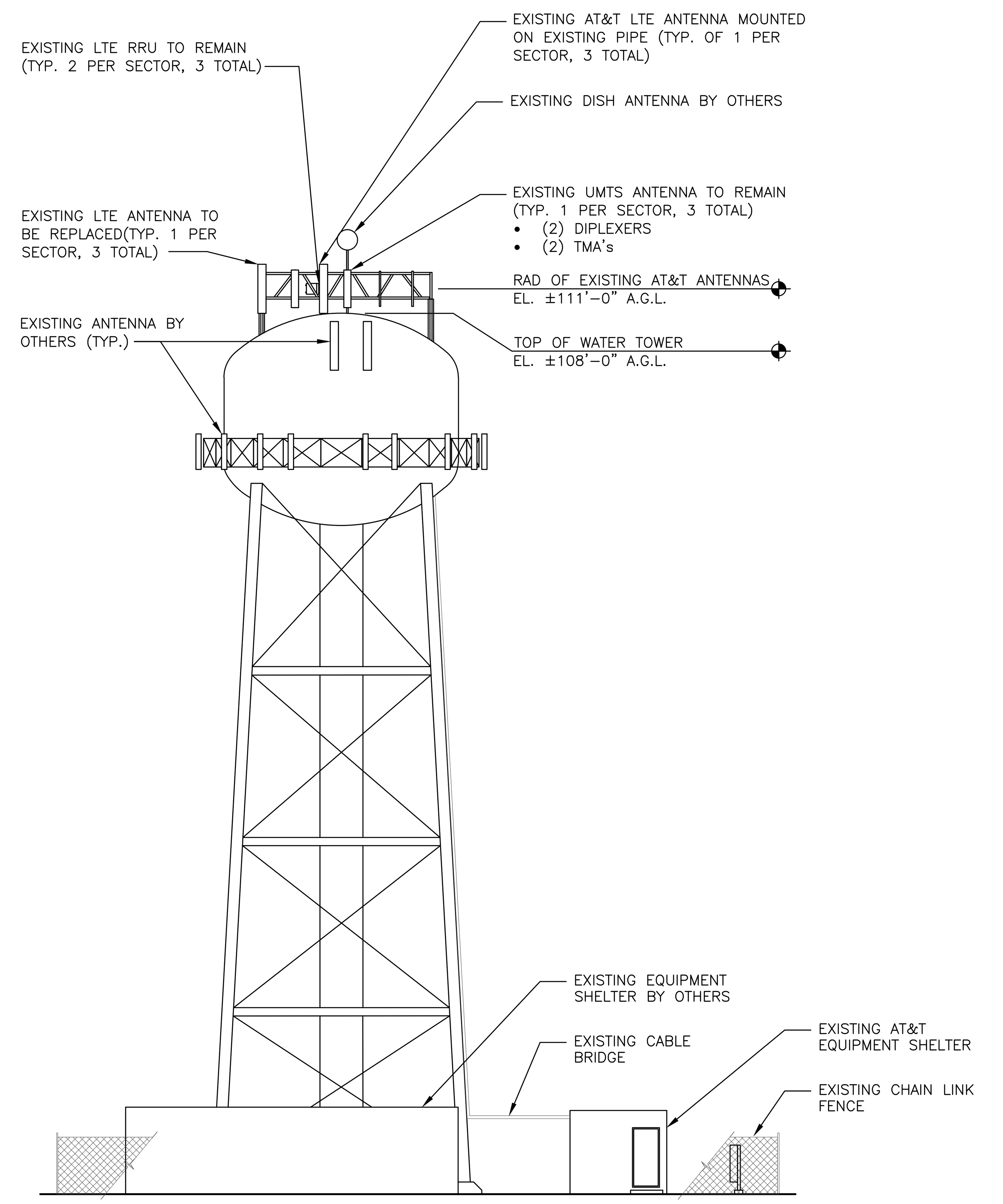
SCALE: N.T.S.



CONTRACTOR TO ENSURE MODIFICATIONS DESIGNED BY DESTEK ENGINEERING ON 4/7/16 FOR PREVIOUS UPGRADE ARE COMPLETED PRIOR TO INSTALLATION OF AT&T EQUIPMENT

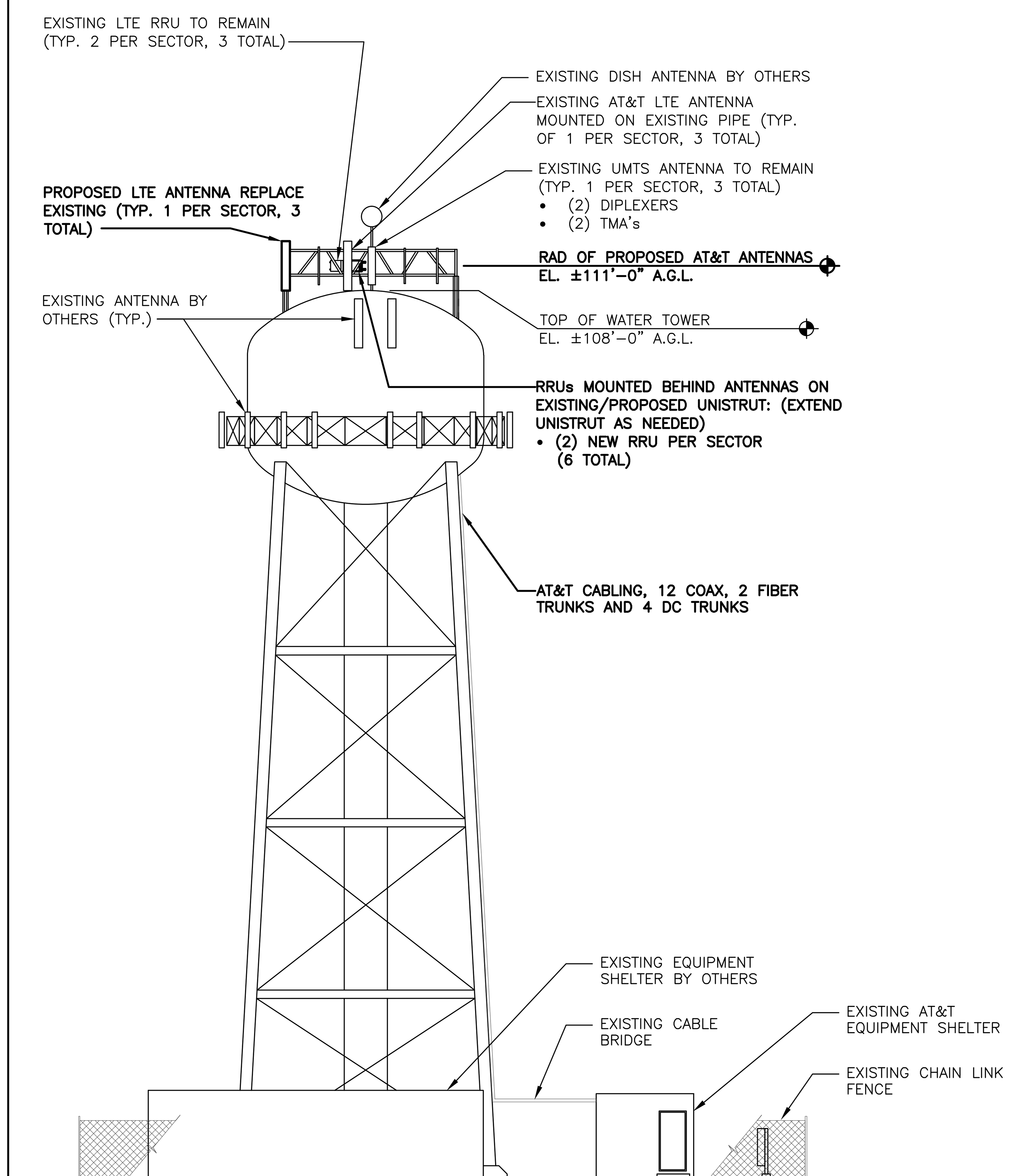
PROPOSED ANTENNA LAYOUT

SCALE: N.T.S.



EXISTING TOWER ELEVATION

SCALE: NTS



PROPOSED TOWER ELEVATION

SCALE: NTS

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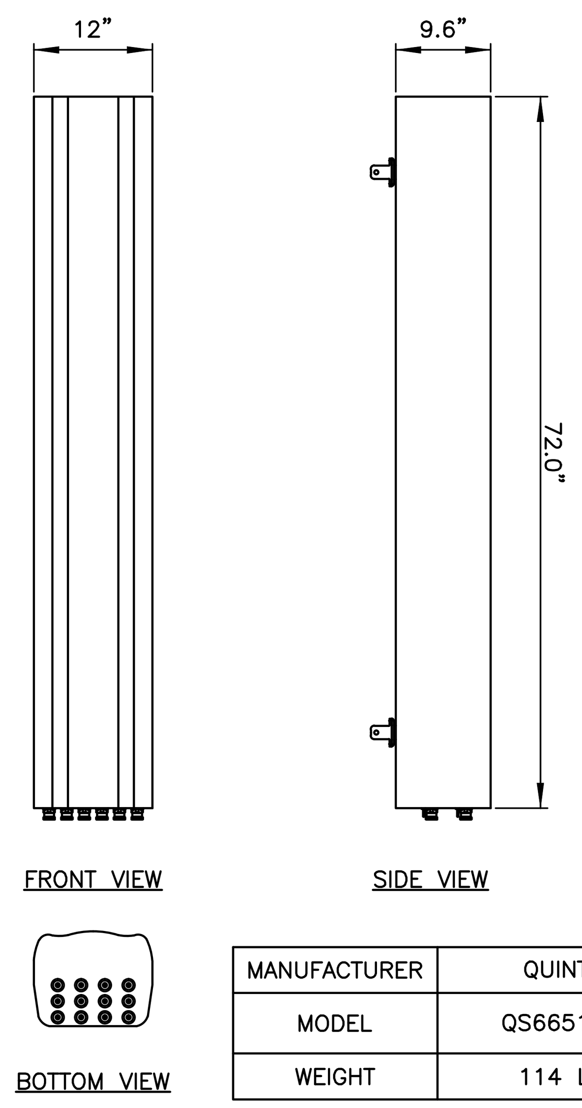
SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL: PROFESSIONAL ENGINEER CT ... 18643

AT&T

DRAWING TITLE: ANTENNA LAYOUTS & ELEVATIONS

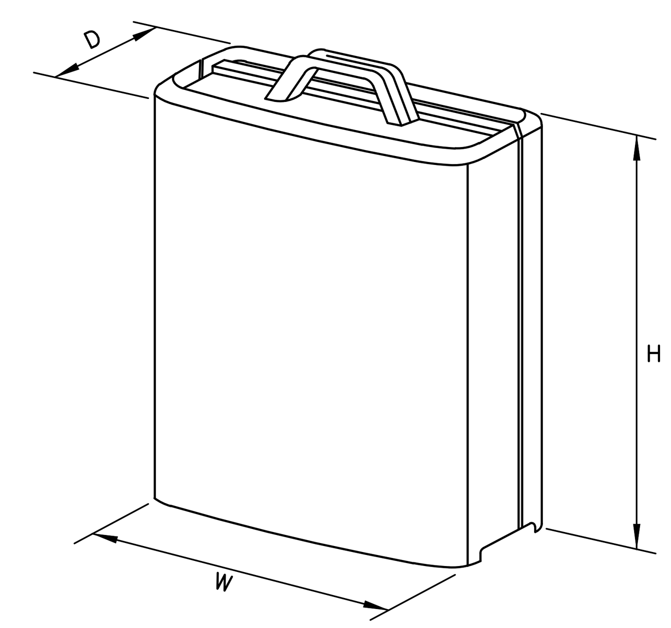
JOB NUMBER	DRAWING NUMBER	REV
16047-EMP	A-3	1



MANUFACTURER	QUINTEL
MODEL	QS66512-2
WEIGHT	114 LBS

LTE ANTENNA DETAIL

SCALE: N.T.S.



MODEL	L x W x H	WEIGHT
RRUS-11	19.69" x 16.97" x 7.17"	50.7 LBS
RRUS-32	29.9" x 13.3" x 9.5"	77 LBS
RRUS-32 B2	27.2" x 12.1" x 7"	60 LBS

*DENOTES EXISTING.

RRUS DETAIL

SCALE: N.T.S.

FINAL ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	55"x11"x5"
	A2	CCI	OPA-65R-LCUU-H6	72"x14.8"x7.4"
	A3	–	–	–
	A4	POWERWAVE	P65-16-XLH-RR	72"x12"x6"
BETA	B1	POWERWAVE	7770	55"x11"x5"
	B2	CCI	OPA-65R-LCUU-H6	72"x14.8"x7.4"
	B3	–	–	–
	B4	POWERWAVE	P65-16-XLH-RR	72"x12"x6"
GAMMA	G1	POWERWAVE	7770	55"x11"x5"
	G2	CCI	OPA-65R-LCUU-H6	72"x14.8"x7.4"
	G3	–	–	–
	G4	POWERWAVE	P65-16-XLH-RR	72"x12"x6"

FINAL ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770	55"x11"x5"
	A2	CCI	OPA-65R-LCUU-H6	72"x14.8"x7.4"
	A3	–	–	–
	A4	**QUINTEL**	**QS66512-2**	**72"x12"x9.6"**
BETA	B1	POWERWAVE	7770	55"x11"x5"
	B2	CCI	OPA-65R-LCUU-H6	72"x14.8"x7.4"
	B3	–	–	–
	B4	**QUINTEL**	**QS66512-2**	**72"X12"X9.6"**
GAMMA	G1	POWERWAVE	7770	55"x11"x5"
	G2	CCI	OPA-65R-LCUU-H6	72"x14.8"x7.4"
	G3	–	–	–
	G4	**QUINTEL**	**QS66512-2**	**72"X12"X9.6"**

PROPOSED RRU SCHEDULE

SECTOR	MAKE	MODEL	SIZE (INCHES)	ADDITIONAL COMPONENT	SIZE (INCHES)
ALPHA	**ERICSSON**	**RRUS-11 (GROUND)**	**19.7"X16.9"X7.2"**	–	–
	ERICSSON	RRUS-32	29.9"x13.3"x9.5"		
	ERICSSON	**RRUS-32 B2**	**27.2"X12.1"X7"**	–	–
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"		
BETA	**ERICSSON**	**RRUS-11 (GROUND)**	**19.7"X16.9"X7.2"**	–	–
	ERICSSON	RRUS-32	29.9"X13.3"X9.5"		
	ERICSSON	**RRUS-32 B2**	**27.2"X12.1"X7"**	–	–
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"		
GAMMA	**ERICSSON**	**RRUS-11 (GROUND)**	**19.7"X16.9"X7.2"**	–	–
	ERICSSON	RRUS-32	29.9"x13.3"x9.5"		
	ERICSSON	**RRUS-32 B2**	**27.2"X12.1"X7"**	–	–
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"		

PROJECT OWNER IS RESPONSIBLE FOR PROVIDING A STRUCTURAL STABILITY ANALYSIS TO DETERMINE THE CAPACITY AND SUITABILITY OF THE EXISTING ANTENNA SUPPORT STRUCTURE TO SAFELY CARRY ALL ADDITIONAL LOADS IMPOSED BY THE PROPOSED EQUIPMENT AS SHOWN HEREIN. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR INCORPORATING ANY REQUIRED STRUCTURAL MODIFICATIONS INTO THEIR SCOPE OF WORK.

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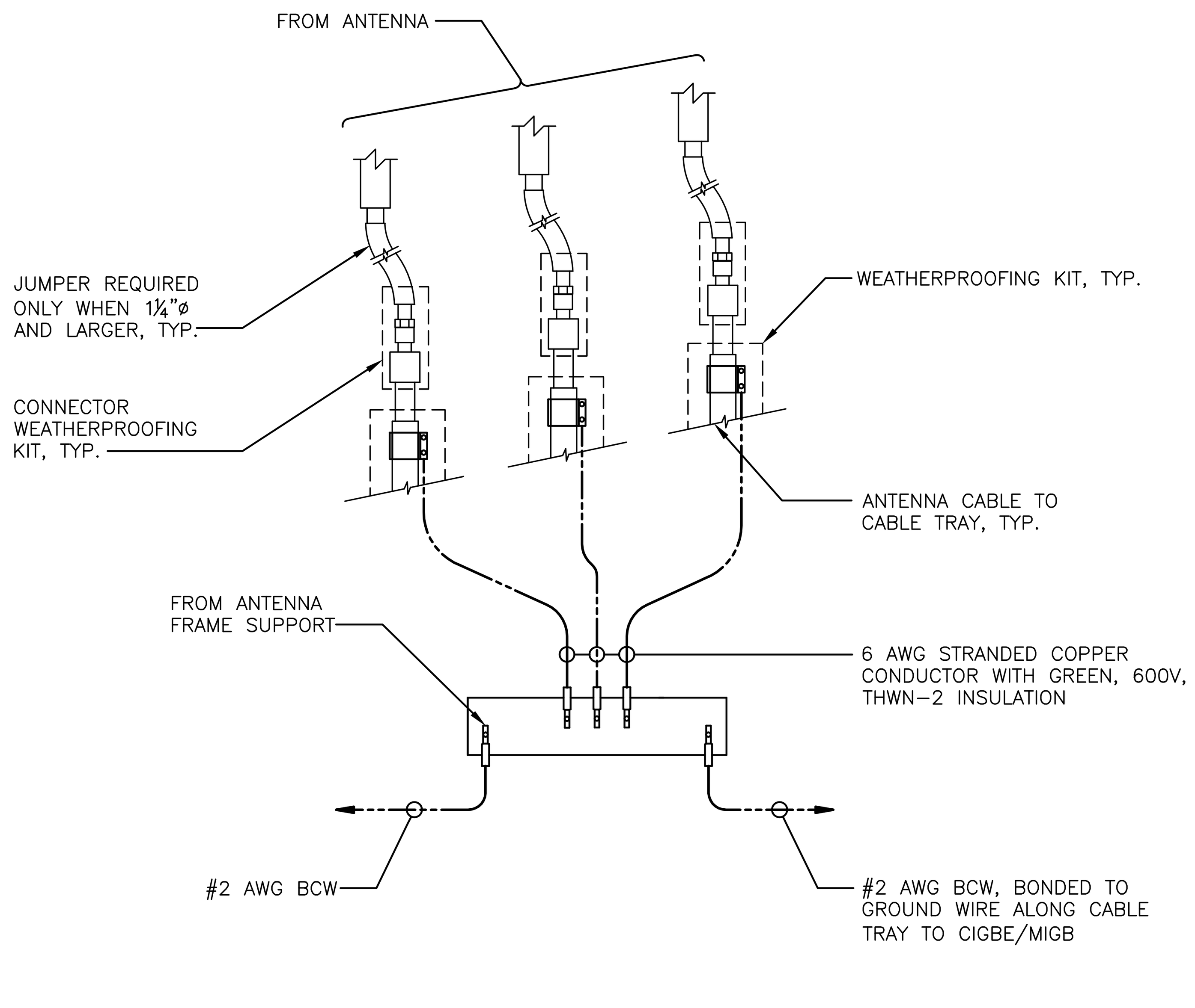
SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL: STATE OF CONNECTICUT NICHOLAS D. BARILE No. 28643 LICENSED PROFESSIONAL ENGINEER
NICHOLAS D. BARILE
PROFESSIONAL ENGINEER
CT LIC. NO. 28643

AT&T

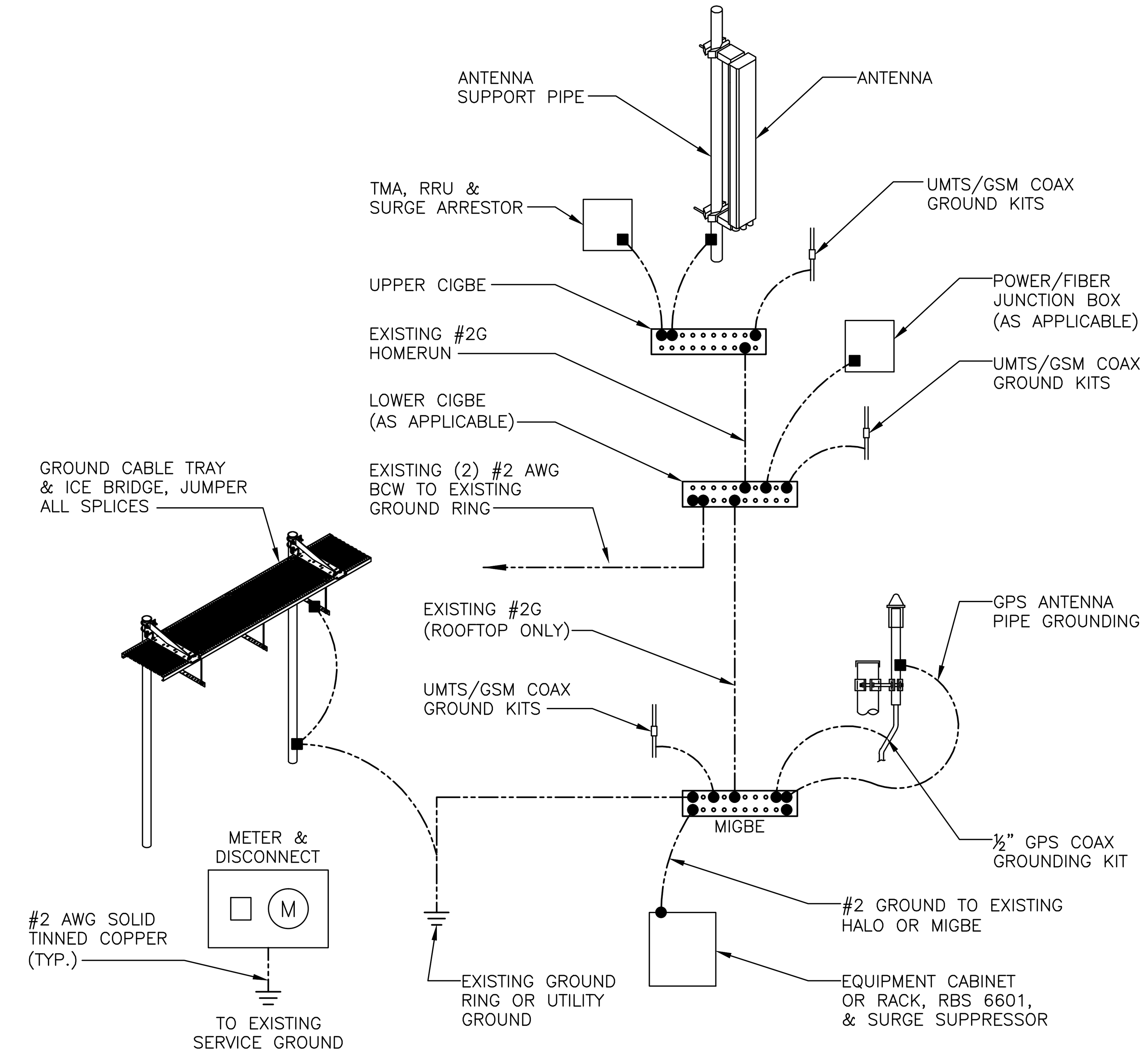
DRAWING TITLE: DETAILS

JOB NUMBER	DRAWING NUMBER	REV
16047-EMP	A-4	1



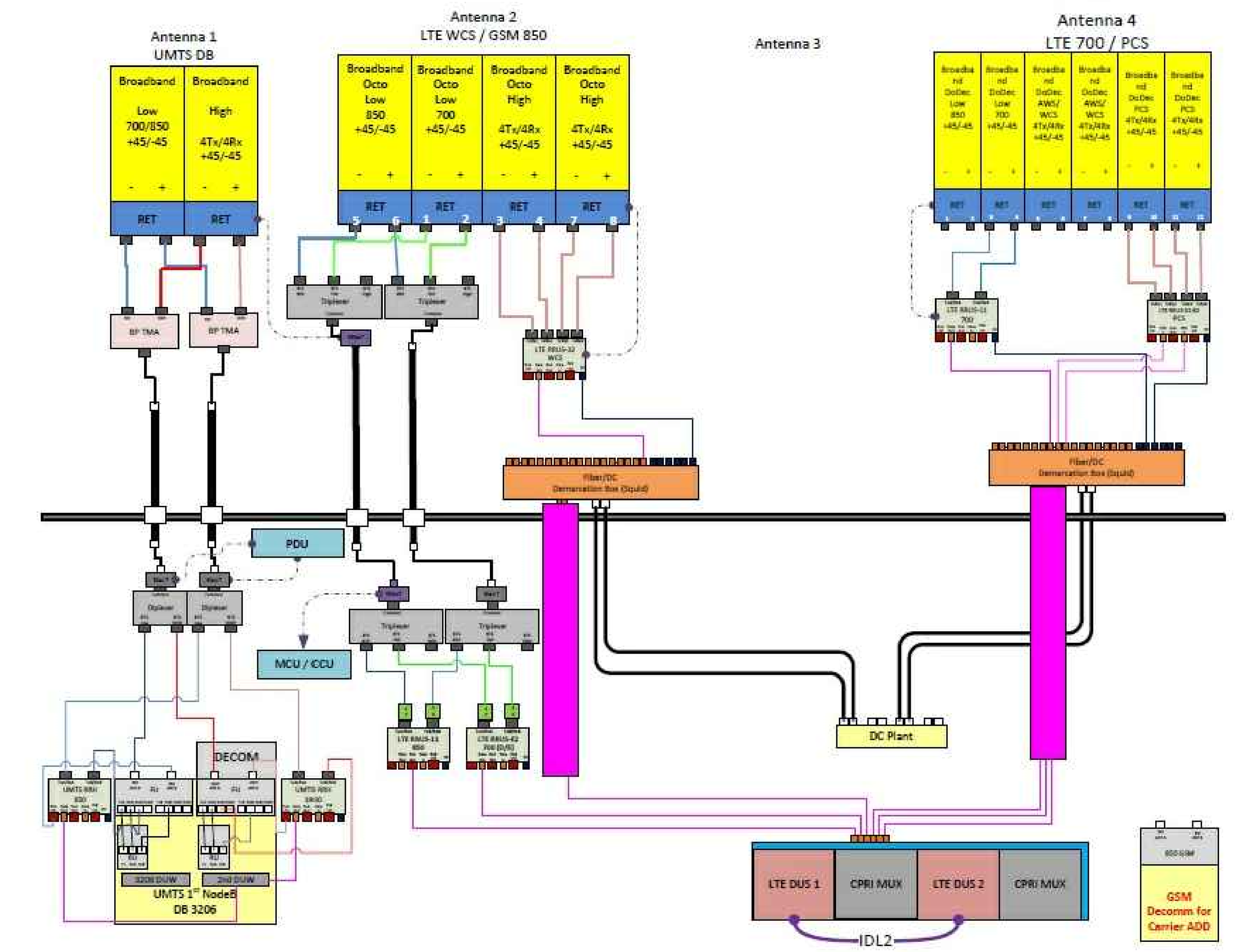
GROUND WIRE TO GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



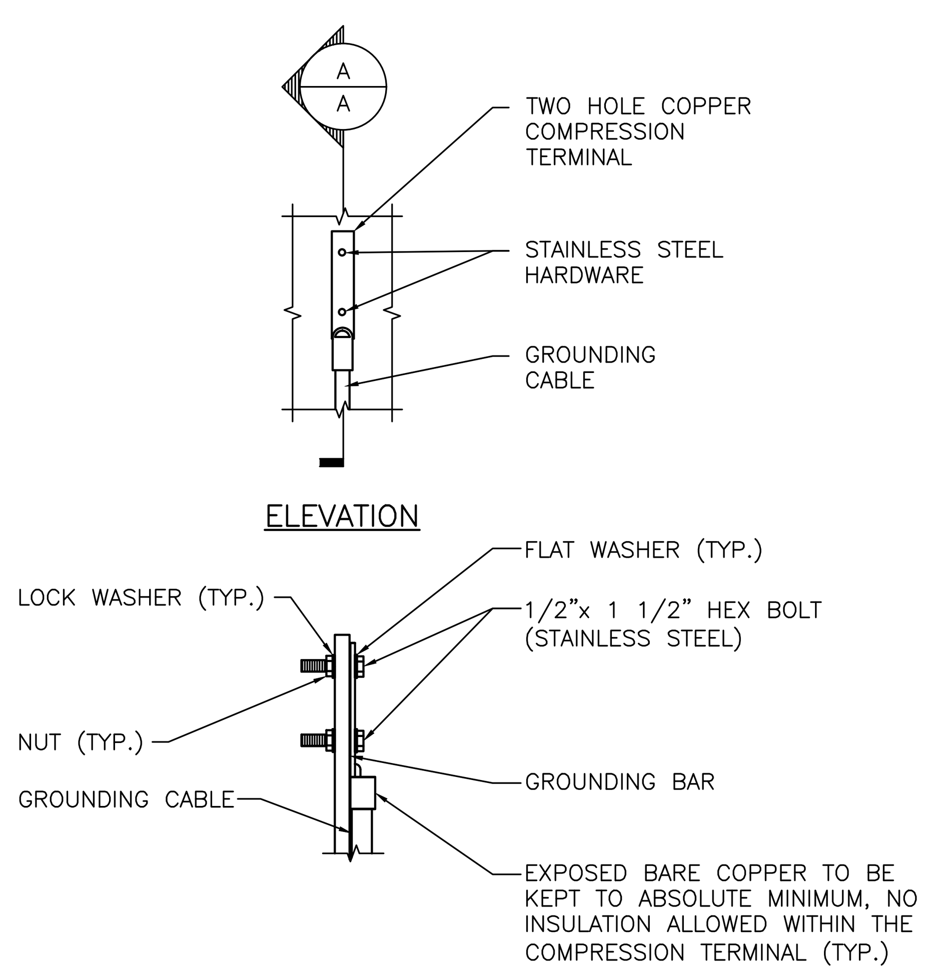
GROUNDING RISER DIAGRAM

SCALE: N.T.S.



TYPICAL PLUMBING DIAGRAM (PER SECTOR)

SCALE: N.T.S.

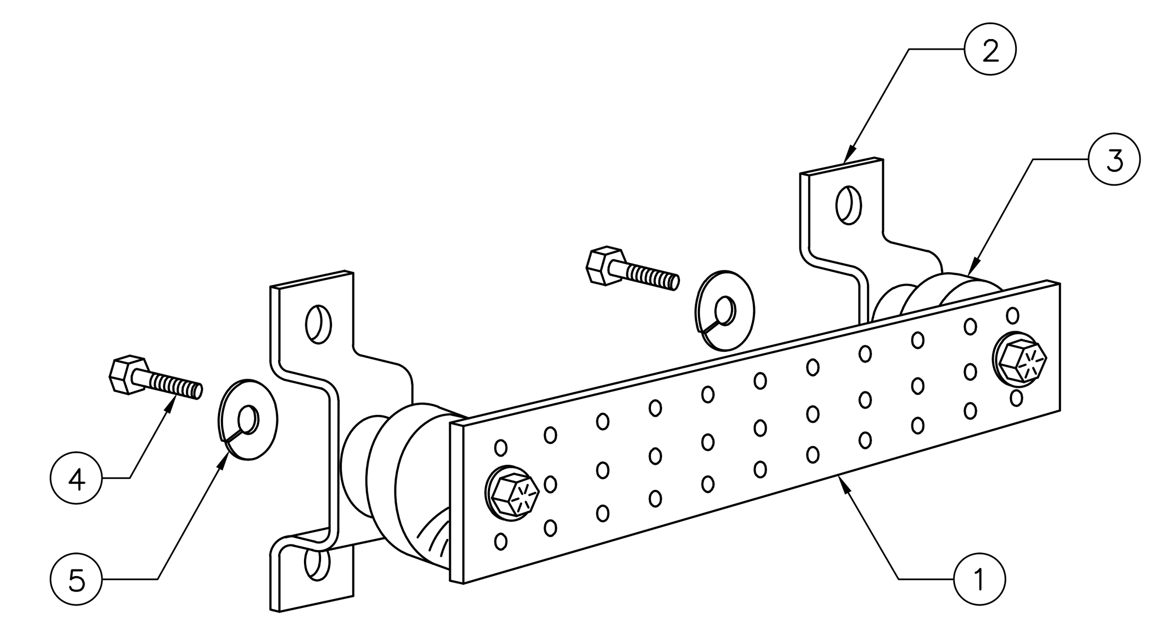


NOTE:

1. "DOUBLING UP" OR "STACKING" OF CONNECTIONS IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.

TYPICAL GROUND BAR CONNECTION DETAIL

SCALE: N.T.S.



ITEM NO.	QTY.	DESCRIPTION
1	1	SOLID GROUND BAR (20"x 4"x ¼")
2	2	WALL MOUNTING BRACKET
3	2	INSULATORS
4	4	⅜"-11x1" H.H.C.S.
5	4	⅜" LOCK WASHER

NOTES:

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

SECTION "P" – SURGE PRODUCERS
- CABLE ENTRY PORTS (HATCH PLATES) (#2)
- GENERATOR FRAMEWORK (IF AVAILABLE) (#2)
- TELCO GROUND BAR
- COMMERCIAL POWER COMMON NEUTRAL/GROUND BOND (#2)
- +24V POWER SUPPLY RETURN BAR (#2)
- –48V POWER SUPPLY RETURN BAR (#2)
- RECTIFIER FRAMES

SECTION "A" – SURGE ABSORBERS
- INTERIOR GROUND RING (#2)
- EXTERNAL EARTH GROUND FIELD (BURIED GROUND RING) (#2)
- METALLIC COLD WATER PIPE (IF AVAILABLE) (#2)
- BUILDING STEEL (IF AVAILABLE) (#2)

GROUND BAR DETAIL

SCALE: N.T.S.

COM-EX Consultants
115 ROUTE 46
SUITE E39
MOUNTAIN LAKES, NJ 07046
PHONE: 862.209.4300
FAX: 862.209.4301

EMPIRE telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CTU2151
SITE NAME: NORWALK NORTH-WEST ROCKS RD
177 WEST ROCKS ROAD
NORWALK, CONNECTICUT 06851
FAIRFIELD COUNTY

at&t MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
1	09/28/16	REVISED PER CLIENT COMMENTS	KCD	NDB	NDB
0	08/30/16	ISSUED AS FINAL	KCD	NDB	NDB

SCALE: AS SHOWN | DESIGNED BY: NJM | DRAWN BY: NJM

SEAL:
STATE OF CONNECTICUT
PROFESSIONAL ENGINEER
CT 28643

AT&T

DRAWING TITLE:
GROUNDING, ONE-LINE DIAGRAM & DETAILS

JOB NUMBER	DRAWING NUMBER	REV
16047-EMP	G-1	1

STRUCTURAL ANALYSIS REPORT – UPGRADE – REV.1
WATER TANK

Prepared For:

Com-Ex Consultants, LLC
115 Route 46 – Suite E39
Mountain Lakes, NJ 07046

Structure Rating:

Water Tank:	**Pass**
Mount:	**Pass w/ Mod**

Sincerely,
Destek Engineering, LLC
License # PEC 001429

10-10-2016

Ahmet Colakoglu, PE
Connecticut Professional Engineer
License No: 27057

AT&T Site ID: CT2151
FA: 1005081
Site Name: Norwalk North-West Rocks Rd
177 West Rocks Road
Norwalk, CT 06851

Destek Job No: 1629006 October 10, 2016

CONTENTS

APPENDIX

DESTEK ENGINEERING, LLC
1281 Kennestone Circle, Ste 100, Marietta, GA 30066 -Tel: (770) 693-0835

1.0 SUBJECT AND REFERENCES

The purpose of this analysis is to evaluate the structural capacity of the telecommunication installation on the existing 108'-0" tall water tank located at 177 West Rocks Road, Norwalk, CT 06851, for the additions and alterations proposed by AT&T Mobility.

The structural analysis is based on the following documentation provided to Destek Engineering, LLC (Destek):

- Loading Email by Com-Ex, dated 09/28/2016.
- Construction Drawings prepared by Com-Ex, dated 09/28/2016.
- Structural Evaluation Letter prepared by Centek Engineering, dated 12/15/2014.
- Construction Drawings prepared by Centek Engineering, dated 12/20/2011.
- Structural Certification Letter prepared by Centek Engineering, dated 12/20/2011.
- Structural Analysis Report prepared by Centek Engineering, dated 12/16/2011.

1.1 STRUCTURE

The subject structure is an elevated water tank supported on (4) braced legs. The tank has a diameter of approximately 28 feet and the top of the tank is approximately 108 feet above the ground level (AGL). The tank has an approximate capacity of 135,000 gal. At the RAD center of 111.0 feet AGL, AT&T currently has nine (9) pipe mounted antennas on the existing triangular corral.

2.0 EXISTING AND PROPOSED APPURTENANCES

The analysis is based on the following existing and proposed appurtenances:

Existing AT&T Appurtenances:

Sector	Rad Center (ft.)	Antennas & Equipment	Coax	Mounts
Alpha, Beta & Gamma	111	(6) Powerwave 7770 (3) Powerwave P65-16-XLH-RR (18) Diplexers (6) Surge Arrestors (6) TMA-Powerwave/LGP 21401 (6) RRUS-11 (3) FC-12	(12) 1-5/8"	(9) Pipe Mounts on Triangular Corral

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Proposed & Final AT&T Appurtenances:

Sector	Rad Center (ft.)	Antennas & Equipment	Coax	Mounts
Alpha, Beta & Gamma	111	(3) Powerwave 7770 (3) CCI OPA-65R-LCUU-H6 (3) Quintel QS66512-2 (6) Triplexers, (6) Surge Arrestors (6) TMA-Powerwave/LGP 21401 (3) RRUS-11, (3) RRUS-32 (3) RRUS-32 B2	(12) 1-5/8”, (4) DC trunk, (2) Fiber trunk	(9) Pipe Mounts on Triangular Corral

Others Appurtenances:

Rad Center (ft.)	Antennas & Equipment	Coax	Mounts
94	(12) Verizon Panel Antennas	(18) 1-5/8”	(12) Pipe Mounts on the handrail
103.75	(6) Sprint Panel Antennas	(6) 1-5/8”	(6) Pipe Mounts on the wall of tank
108	(3) T-Mobile Panel Antennas	(12) 1-1/4”	(3) Pipe Mounts on the wall of tank
111	(3) Nextel Panel Antennas	(9) 1-1/4”	(3) Pipe Mounts on the Triangular Corral
111	(3) Clearwire Panel Antennas	(1) 2” inner-duct (2) 1/2”coaxila	(3) Pipe Mounts on the Triangular Corral
111	(3) Unknown Carrier Panel Antennas	--	(3) Pipe Mounts on the Triangular Corral
117	(2) Clearwire 2’-6” Dish (1) Clearwire 2”-0” Dish	(3) 1/2" coaxial	(3) Pipe Mounts on the Triangular Corral

3.0 CODES AND LOADING

The analysis is in accordance with:

- *2005 State Building Code with all of the adopted Supplements and Amendments*
- *Minimum Design Loads for Building and Other Structures ASCE/SEI 7-02*, American Society of Civil Engineers
- *Specifications for Structural Steel Buildings – Allowable Stress ANSI/AISC 335-89s1*, American National Standards Institute/American Institute for Steel Construction

The following loading parameters are used:

- Occupancy Category IV
- S_s: 0.301g
- S_1: 0.066g
- Seismic Site Class D
- Basic Wind Speed: 105 mph
- Exposure: B

4.0 STANDARD CONDITIONS FOR ENGINEERING SERVICES ON EXISTING STRUCTURES

The analysis is based on the information provided to Destek and is assumed to be current and correct. Unless noted otherwise, the structure and the foundation system are assumed to be in good condition, free of defects and can achieve theoretical strength.

It is assumed that the structure has been maintained and shall be maintained during its service. The superstructure and the foundation system are assumed to be designed with proper engineering practice and fabricated, constructed and erected in accordance with the design documents. Destek will accept no liability which may arise due to any existing deficiency in design, material, fabrication, erection, construction, etc. or lack of maintenance.

The analysis results presented in this report are only applicable for the previously mentioned existing and proposed additions and alterations. Any deviation of the proposed equipment and placement, etc., will require Destek to generate an additional structural analysis.

5.0 ANALYSIS AND ASSUMPTIONS

The structure is considered to have adequate strength for the proposed loading if the existing structural members that will be used to support the proposed equipment are structurally adequate per the applicable code criteria, or that the additions or alterations to the existing structure do not increase the force in any structural element by more than 5%.

This analysis was performed by utilizing Risa 3-D, a commercially available structural engineering software package by Risa Technologies, as applicable.

6.0 RESULTS AND CONCLUSION

Water Tank: The existing water tank is considered to have **adequate** structural capacity for the proposed additions by AT&T. Utilizing a conservative approach, seismic shear and moment are calculated to be 2.13 & 2.98 times higher than the wind shear and moment respectively, thus tank structural design is governed by seismic loads. The additional gravity load on the tank due to the existing equipment by others and AT&T additions are approximately 1.25% of the design gravity loads, less than 5%. Therefore, further analysis of the tank is not required and the structure is considered to have adequate capacity.

Antenna Mounts: The existing antenna sector mounts **will have adequate** capacity for the proposed changes by AT&T once they have been upgraded per Destek Drawings dated 04/06/2016. Under the proposed load configuration and as a maximum, the structural members are stressed to **94%** of their structural capacity.

Therefore, the alterations proposed by AT&T **can** be implemented as intended once the upgrades have been installed and with the conditions and recommendations outlined in this report.

Should you need any clarifications or have any questions about this report, please contact Ahmet Colakoglu at (770) 693-0835 or acolakoglu@destekengineering.com.

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APPENDIX A
PICTURES & CALCULATIONS

Sector Mount View-1

Sector Mount View-2

Sector Mount View-3

CALCULATION SHEET

PURPOSE

The purpose of these calculations is to determine whether the Water Tank located at 177 West Rocks Road, Norwalk, CT 06851, has adequate structural capacity for the proposed changes by AT&T.

Wind Load

(reference Connecticut Building Code 2005 with all amendments and supplements)

ASCE 7-02 Reference

Location:	Norwalk, CT 06002	
Occupancy category:	IV	Table 1-1, pg. 3
Exposure category:	Exp := "B"	Section 6.5.6.3, pg. 25

$$z_g := \begin{cases} 1200\cdot ft & \text{if } Exp = \text{"B"} \\ 900\cdot ft & \text{if } Exp = \text{"C"} \\ 700\cdot ft & \text{if } Exp = \text{"D"} \end{cases} = 1200\,ft \qquad \alpha := \begin{cases} 7.0 & \text{if } Exp = \text{"B"} \\ 9.5 & \text{if } Exp = \text{"C"} \\ 11.5 & \text{if } Exp = \text{"D"} \end{cases} = 7$$

Topographic factor:	$K_{zt} := 1.0$	Section 6.5.7.2, pg. 26
Wind directional factor:	$K_d := 0.95$	Table 6-4, pg. 80
Basic wind speed:	$V := 105$ mph	Figure 6-1c, pg. 36
Importance factor:	$I := 1.15$	Table 6-1, pg. 77
Gust effect factor:	$G := 0.85$	Section 6.5.8, pg. 26
Velocity pressure:	$q_z := 0.00256\cdot K_{zt}\cdot K_d\cdot V^2\cdot I\cdot psf$	Equation 6-15, pg. 27
	$q_z = 31\cdot psf$	

Force coeifficients: Figure 6-21, pg 74

for Flat surface

$$C_{F\_flat} := \begin{pmatrix} 1 & 1.3 \\ 7 & 1.4 \\ 25 & 2 \end{pmatrix}$$

for D*sqrt(qz) >2.5

$$C_{F\_round\_1} := \begin{pmatrix} 1 & 0.5 \\ 7 & 0.6 \\ 25 & 0.7 \end{pmatrix}$$

for D*sqrt(qz) < 2.5

$$C_{F\_round\_2} := \begin{pmatrix} 1 & 0.7 \\ 7 & 0.8 \\ 25 & 1.2 \end{pmatrix}$$

Compute Wind Load on the Water Tank

Water Tower Elevation at Critical Elements:

Top of Tank Elevation: $H_{tank} := 108ft$ AGL

Top of Shaft Elevation: $H_{shaft} := 78ft$ AGL

Top of Leg Elevation: $H_{legs} := 89ft$ AGL

Compute Wind Loads on Reservoir:

Height (at one half point): $z_{tank\_wind} := H_{tank} - \frac{1}{2}(H_{tank} - H_{shaft}) = 93\,ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{tank\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 0.968$ Table 6-3, pg. 79

Reservoir Height: $h_{tank} := H_{tank} - H_{shaft} = 30\,ft$

Reservoir Diameter: $D_{tank} := 28ft$

Force coefficient: $C_f := \text{linterp}\left(C_{F\_round\_1}^{\langle 0 \rangle}, C_{F\_round\_1}^{\langle 1 \rangle}, \frac{D_{tank}}{h_{tank}}\right) = 0.499$

Area: $A_{tank} := \pi \cdot \frac{h_{tank}}{2} \cdot \frac{D_{tank}}{2} = 659.7\,ft^2$

Wind Load: $F_{tank} := G \cdot A_{tank} \cdot C_f \cdot q_z \cdot K_z = 8.3 \cdot kip$

Compute Wind Loads on Shaft:

Height (at two thirds point): $z_{shaft\_wind} := \frac{2}{3}(H_{shaft}) = 52\,ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{shaft\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 0.82$ Table 6-3, pg. 79

Shaft Height: $h_{shaft} := H_{shaft} = 78\,ft$

Shaft Diameter: $D_{shaft} := 5ft$ approximate

Force coefficient: $C_f := \min\left(\text{linterp}\left(C_{F\_round\_1}^{\langle 0 \rangle}, C_{F\_round\_1}^{\langle 1 \rangle}, \frac{h_{shaft}}{D_{shaft}}\right), 0.7\right) = 0.648$

Area: $A_{shaft} := h_{shaft} \cdot D_{shaft} = 390\,ft^2$

Wind Load: $F_{shaft} := G \cdot A_{shaft} \cdot C_f \cdot q_z \cdot K_z = 5.4 \cdot kip$

Compute Wind Loads on Legs:

Height (at two thirds point): $z_{leg\_wind} := \frac{2}{3} \cdot H_{legs} = 59.333\,ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{leg\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 0.851$ Table 6-3, pg. 79

Leg Height: $h_{leg} := H_{legs} = 89\,ft$

Leg width: $D_{leg} := 12.4in$

Number of legs: $n_{leg} := 4$

Force coefficient: $C_f := \min\left(\text{linterp}\left(C_{F\_round\_1}^{\langle 0 \rangle}, C_{F\_round\_1}^{\langle 1 \rangle}, \frac{h_{leg}}{D_{leg}}\right), 0.7\right) = 0.7$

Area: $A_{legs} := n_{leg} \cdot h_{leg} \cdot D_{leg} = 367.87\,ft^2$

Wind Load: $F_{legs} := G \cdot A_{legs} \cdot C_f \cdot q_z \cdot K_z = 5.7 \cdot kip$

Compute Wind Loads on Diagonal Leg Bracing:

For Lower Level:

Height (at two thirds point): $z_{DBrace1\_wind} := \frac{2}{3} \cdot 30ft = 20\,ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{DBrace1\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 0.624$ Table 6-3, pg. 79

Brace Length: $H_{DBrace1} := 38.5ft$ approximate

Brace Diameter: $D_{DBrace1} := 1.125in$ approximate

Number of Braces: $n_{DBrace1} := 8$

Force coefficient: $C_f := \min\left(\text{linterp}\left(C_{F\_round\_2}^{\langle 0 \rangle}, C_{F\_round\_2}^{\langle 1 \rangle}, \frac{H_{DBrace1}}{D_{DBrace1}}\right), 1.2\right) = 1.2$

Area: $A_{DBrace1} := n_{DBrace1} \cdot H_{DBrace1} \cdot D_{DBrace1} = 28.875\,ft^2$

Wind Load: $F_{DBrace1} := G \cdot A_{DBrace1} \cdot C_f \cdot q_z \cdot K_z = 0.6 \cdot kip$

CALCULATION SHEET

DESTEK ENGINEERING

Compute Wind Loads on Diagonal Leg Bracing:

For Middle Level:

Height (at two thirds point): $z_{DBrace2\_wind} := \frac{2}{3} \cdot 30ft + 30ft = 50\,ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{DBrace2\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 0.811$ Table 6-3, pg. 79

Brace Length: $H_{DBrace2} := 36.3ft$ approximate

Brace Diameter: $D_{DBrace2} := 1.0625in$ approximate

Number of Braces: $n_{DBrace2} := 8$

Force coefficient: $C_f := \min\left(\text{linterp}\left(C_{F\_round\_2}^{\langle 0 \rangle}, C_{F\_round\_2}^{\langle 1 \rangle}, \frac{H_{DBrace2}}{D_{DBrace2}}\right), 1.2\right) = 1.2$

Area: $A_{DBrace2} := n_{DBrace2} \cdot H_{DBrace2} \cdot D_{DBrace2} = 25.712\,ft^2$

Wind Load: $F_{DBrace2} := G \cdot A_{DBrace2} \cdot C_f \cdot q_z \cdot K_z = 0.7 \cdot kip$

Compute Wind Loads on Diagonal Leg Bracing:

For Upper Level:

Height (at two thirds point): $z_{DBrace3\_wind} := \frac{2}{3} \cdot 30ft + 60ft = 80\,ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{DBrace3\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 0.927$ Table 6-3, pg. 79

Brace Length: $H_{DBrace3} := 31.75ft$ approximate

Brace Diameter: $D_{DBrace3} := 1.0in$ approximate

Number of Braces: $n_{DBrace3} := 8$

Force coefficient: $C_f := \min\left(\text{linterp}\left(C_{F\_round\_2}^{\langle 0 \rangle}, C_{F\_round\_2}^{\langle 1 \rangle}, \frac{H_{DBrace3}}{D_{DBrace3}}\right), 1.2\right) = 1.2$

Area: $A_{DBrace3} := n_{DBrace3} \cdot H_{DBrace3} \cdot D_{DBrace3} = 21.167\,ft^2$

Wind Load: $F_{DBrace3} := G \cdot A_{DBrace3} \cdot C_f \cdot q_z \cdot K_z = 0.6 \cdot kip$

Compute Wind Loads on Horizontal Bracing:

For Lower Member:

Height: $z_{HBrace1\_wind} := 30ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{HBrace1\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 0.701$ Table 6-3, pg. 79

Brace Length: $H_{HBrace1} := 30ft$ approximate

Brace Depth: $D_{HBrace1} := 8in$ approximate

Number of Braces: $n_{HBrace1} := 4$

Force coefficient: $C_f := \min\left(\text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H_{HBrace1}}{D_{HBrace1}}\right), 2\right) = 2$

Area: $A_{HBrace1} := n_{HBrace1} \cdot H_{HBrace1} \cdot D_{HBrace1} = 80\,ft^2$

Wind Load: $F_{HBrace1} := A_{HBrace1} \cdot C_f \cdot q_z \cdot K_z = 3.456 \cdot kip$

For Upper Member:

Height: $z_{HBrace2\_wind} := 60ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{HBrace2\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 0.854$ Table 6-3, pg. 79

Brace Length: $H_{HBrace2} := 25ft$ approximate

Brace Depth: $D_{HBrace2} := 8in$ approximate

Number of Braces: $n_{HBrace2} := 4$

Force coefficient: $C_f := \min\left(\text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H_{HBrace2}}{D_{HBrace2}}\right), 2\right) = 2$

Area: $A_{HBrace2} := n_{HBrace2} \cdot H_{HBrace2} \cdot D_{HBrace2} = 66.667\,ft^2$

Wind Load: $F_{HBrace2} := A_{HBrace2} \cdot C_f \cdot q_z \cdot K_z = 3.511 \cdot kip$

Compute Wind Loads on Handrail Members:

For Longitudinal Member:

Height: $z_{HR1\_wind} := 111ft$ Approximate

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{HR1\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 1.018$ Table 6-3, pg. 79

Member Length: $H_{HR1} := 28ft$ Approximate

Member Depth: $D_{HR1} := 2in$ Approximate

Number of Longitudinal Members: $n_{HR1} := 1$ Approximate

Force coefficient: $C_f := \min\left(\text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H_{HR1}}{D_{HR1}}\right), 2\right) = 2$

Area: $A_{HR1} := n_{HR1} \cdot H_{HR1} \cdot D_{HR1} = 4.7\, ft^2$

Wind Load: $F_{HR1} := G \cdot A_{HR1} \cdot C_f \cdot q_z \cdot K_z = 0.2 \cdot kip$

For Bracing Members:

Height: $z_{HR2\_wind} := 111ft$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z_{HR2\_wind}}{z_g}\right)^{\frac{2}{\alpha}} = 1.018$ Table 6-3, pg. 79

Vertical Dimension: $H_{HR2} := 3ft$

Vertical Dimension: $D_{HR2} := 2in$

Number of Verticals: $n_{HR2} := 18$

Force coefficient: $C_f := \min\left(\text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H_{HR2}}{D_{HR2}}\right), 2\right) = 1.767$

Area: $A_{HR2} := n_{HR2} \cdot H_{HR2} \cdot D_{HR2} = 9\, ft^2$

Wind Load: $F_{HR2} := G \cdot A_{HR2} \cdot C_f \cdot q_z \cdot K_z = 0.4 \cdot kip$

Compute Wind Loads at the Base of the Watertank

Wind Loads on the Water Tank:

Water Tank Sphere: $F_{tank} = 8.35 \cdot kip$ $\quad r_{tank\_wind} := H_{tank} - \frac{1}{2}(H_{tank} - H_{shaft}) = 93\ ft$

Shaft: $F_{shaft} = 5.428 \cdot kip$ $\quad r_{shaft\_wind} := \frac{1}{2} \cdot H_{shaft} = 39\ ft$

Legs: $F_{legs} = 5.746 \cdot kip$ $\quad r_{legs\_wind} := \frac{1}{2} \cdot H_{legs} = 44.5\ ft$

Diagonal Bracing: $F_{DBrace1} = 0.567 \cdot kip$ $\quad r_{DBrace1} := 22.5ft$

$F_{DBrace2} = 0.656 \cdot kip$ $\quad r_{DBrace2} := 67.5ft$

$F_{DBrace3} = 0.617 \cdot kip$ $\quad r_{DBrace3} := 112.5ft$

Horizontal Bracing: $F_{HBrace1} = 3.456 \cdot kip$ $\quad r_{HBrace1} := 45ft$

$F_{HBrace2} = 3.511 \cdot kip$ $\quad r_{HBrace2} := 90ft$

Handrail Horizontal: $F_{HR1} = 0.249 \cdot kip$ $\quad r_{HR1} := 127ft$

Handrail Diagonal: $F_{HR2} = 0.424 \cdot kip$ $\quad r_{HR2} := 125ft$

Wind Base Shear:

$$F_{wind\_tank\_base} := F_{tank} + F_{shaft} + F_{legs} + F_{DBrace1} + F_{DBrace2} + F_{DBrace3} + F_{HBrace1} \cdots + F_{HBrace2} + F_{HR1} + F_{HR2} = 29 \cdot kip$$

Wind Base Moment:

$$M_{wind\_tank\_base} := F_{tank} \cdot r_{tank\_wind} + F_{shaft} \cdot r_{shaft\_wind} + F_{legs} \cdot r_{legs\_wind} \cdots + F_{DBrace1} \cdot r_{DBrace1} + F_{DBrace2} \cdot r_{DBrace2} + F_{DBrace3} \cdot r_{DBrace3} + F_{HBrace1} \cdot r_{HBrace1} \cdots + F_{HBrace2} \cdot r_{HBrace2} + F_{HR1} \cdot r_{HR1} + F_{HR2} \cdot r_{HR2} = 1926.6 \cdot kip \cdot ft$$

Seismic Load per ASCE 7-02

The following variables will remain constant throughout the analysis of the water tank and the antennas/appurtenances:

			ASCE 7-02 Reference
Occupancy category:	IV		Table 1-1, pg. 3
Importance factor:	$I := 1.5$		Table 11.5-1, pg. 116
Spectral Parameters:	$S_s := 0.301$		Figure 22-1
	$S_1 := 0.066$		Figure 22-2
	$F_a := 1.5592$	Site Class D assumed per code	Table 11.4-1, pg. 115
	$F_v := 2.4$		Table 11.4-2, pg. 115
	$S_{MS} := F_a \cdot S_s$	$S_{MS} = 0.469$	Eq. 11.4-1, pg. 115
	$S_{M1} := F_v \cdot S_1$	$S_{M1} = 0.158$	Eq. 11.4.2, pg. 115
	$S_{DS} := \frac{2}{3} \cdot S_{MS}$	$S_{DS} = 0.313$	Eq. 11.4-3, pg. 115
	$S_{D1} := \frac{2}{3} \cdot S_{M1}$	$S_{D1} = 0.106$	Eq. 11.4-4, pg. 115
Response Modification Factor:	$R := 3$		Table 15.4-1, pg. 162
Seismic Reponse Coeficient:	$C_{s1} := \frac{S_{DS}}{\frac{R}{I}}$	$C_{s1} = 0.1564$	Computed from Equation 12.8-2, pg. 129. Must be compared to max. and min. values.

Maximum Value of Cs:

Maximum value of Cs need not be greater than the value given by Equation 12.8-3:
$C_s = S_{D1}/T(R/I)$

Period Determination, T:
per Section 12.8.2, pg. 90

Structure Height:	$h_n := 108$	ft	
Coefficients:	$C_t := 0.02$		Table 12.8-2, pg. 129
	$x := 0.75$		Table 12.8-2, pg. 129
Approx. Fundamental Period:	$T_a := C_t \cdot h_n^{x} = 0.67$	sec	Eq. 12.8-7, pg. 129

The fundamental period should not exceed:

$C_u := 1.686$ — Table 12.8-1, pg. 129

$T_{max} := C_u \cdot T_a = 1.13$ sec — Section 12.8.2, pg. 129

Therefore, $T := T_a$ $\quad T = 0.67$ sec

Maximum Seismic Response Coeficient: $C_{s\_max} := \dfrac{S_{D1}}{T \cdot \left(\dfrac{R}{I}\right)} = 0.0788$ — Eq. 12.8-3, pg. 129

Minimum value for Cs:

Minimum value of Cs should not be taken less than:

Therefore, use: $C_{s\_min} := 0.01$ — Eq. 12.8-5, pg. 129

$C_s := \min(C_{s1}, C_{s\_max}) = 0.0788$

$C_s := \max(C_s, C_{s\_min}) = 0.0788$

Compute Seismic Loads at the Base of the Watertank

Height of the tank: $h_{tank} := 30ft$

Height of the tank2: $h_{tank\_1} := 10ft$ — Cylindrical Part of tank

$D_{tank\_1} := 28ft$

Tank Volume2: $Tank_{Volume1} := \pi \cdot \left(\dfrac{D_{tank\_1}}{2}\right)^2 \cdot h_{tank\_1} = 46061\ gal$

Height of the tank3: $h_{tank\_2} := 10ft$ $\quad D_{tank\_2} := 28ft$ — Spherical Part of tank (top and bottom)

Tank Volume3: $Tank_{Volume2} := \dfrac{4}{3}\pi \cdot \left(\dfrac{D_{tank\_2}}{2}\right)^2 \cdot h_{tank\_2} \cdot 2 = 122831\ gal$

Tank Volume: $Tank_{VolumeTank.} := (Tank_{Volume1} + Tank_{Volume2}) \cdot 0.8 = 135113.6\ gal$ — Assume 80% full

Tank Weight: $Weight_{Tank} := Tank_{VolumeTank.} \cdot 62pcf = 1120 \cdot kip$

Seismic Load Factor: $LF_{Seismic} := 0.7$ — IBC 2012 Section 1605.3

Seismic Base Shear: $F_{seismic\_tank} := LF_{Seismic} \cdot C_s \cdot Weight_{Tank} = 62 \cdot kip$ — Eq. 12.8-1, pg. 89

Seismic Base Moment: $r_{Tank} := H_{shaft} + 0.5 \cdot h_{tank} = 93\ ft$

$M_{seismic\_tank} := F_{seismic\_tank} \cdot r_{Tank} = 5745 \cdot kip \cdot ft$

Determine Governing Load

$$\frac{F_{wind\_tank\_base}}{F_{seismic\_tank}} = 0.47$$

$$\frac{M_{wind\_tank\_base}}{M_{seismic\_tank}} = 0.335$$

==> Seismic Load Governs

Compute Antenna Seismic Loads:

$Weight_{ant1} := 105lbf + 7ft \cdot 3.66plf = 130.62\ lbf$

One antenna (largest) and pipe, use 140 lbf to include accesories and others

AT&T Additions @ 111ft AGL:

Antenna Weight: $W_{adda} := 9 \cdot 140 \cdot lbf = 1260\ lbf$

RRH,TMA, DC2 & FC12,etc Weight: $W_{RRH} := 6 \cdot 50.7lbf + 3 \cdot 52.9lbf + 6 \cdot 16lbf \ldots + 3 \cdot 77lbf + 6 \cdot 17lbf + 1 \cdot 21lbf + 12 \cdot 7lbf + 9 \cdot 1lbf = 1005.9\ lbf$

Coax Weight: $W_{addATTc} := 110 \cdot ft \cdot (12 \cdot 1plf + 6 \cdot 1.25plf) = 2145\ lbf$

Mounts frame: $W_{mount} := 1500 \cdot lbf$

Total Addition Weight: $W_{ATT} := W_{adda} + W_{addATTc} + W_{mount} + W_{RRH} = 5910.9\ lbf$

Other Carrier @ 90ft, 98ft,111ft AGL:

Antenna Weight: $W_{adda} := 30 \cdot 80 \cdot lbf + 3 \cdot 50lbf + 2 \cdot 20lbf = 2590\ lbf$

Coax Weight: $W_{addOCc1} := 100 \cdot ft \cdot 1plf \cdot 50 = 5000\ lbf$

Mounts: $W_{mount} := 500 \cdot lbf$

Total Addition Weight: $W_{OC1} := W_{adda} + W_{addOCc1} + W_{mount} = 8090\ lbf$

Compare Tank and Antenna Addition Loads:

Weight and Seismic Shear Comparison:

Weight Comparison: $\frac{W_{ATT} + W_{OC1}}{Weight_{Tank}} = 1.25 \cdot \%$ < 5% **==> OK**

Seismic Shear: $W_{add} := W_{ATT} + W_{OC1} = 14000.9\ lbf$

$F_{add} := LF_{Seismic} \cdot W_{add} \cdot C_s = 772.307\ lbf$

Shear Comparison: $\frac{F_{add}}{F_{seismic\_tank}} = 1.25 \cdot \%$ < 5% **==> OK**

Seismic Moment Comparison:

Seismic Moment: $$M_{add} := \left[\left(W_{ATT} - W_{addATTc}\right) \cdot 111ft + W_{addATTc} \cdot \frac{111ft}{2} \ldots + \left(W_{OC1} - W_{addOCc1}\right) \cdot 93ft + W_{addOCc1} \cdot \frac{93ft}{2}\right] \cdot C_s \cdot LF_{Seismic} = 58.302 \cdot kip \cdot ft$$

Moment Comparison: $\frac{M_{add}}{M_{seismic\_tank}} = 1.015 \cdot \%$ < 5% **==> OK**

The total mass with the existing and proposed antennas is increased by less than 5%, thus lateral seismic load and gravity load increase is less than 5%. No further analysis is required.

Check Antenna Mounts

Wind Load

ASCE 7 Reference

RAD Center: $z := 111\text{ft}$

Velocity pressure exposure coefficient: $K_z := 2.01 \cdot \left(\frac{z}{z_g}\right)^{\frac{2}{\alpha}} = 1.018$ — Table 29.3-1, pg. 310

Wind directional factor: $K_d := 0.95$

Importance factor: $I := 1.15$

Velocity Pressure: $q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I \cdot \text{psf}$ — Equation 29.3-1, pg. 307

$q_z = 31.39 \cdot \text{psf}$

Loads on Antenna (Powerwave 7770):

Dimensions: $H := 55\text{in}$ $W := 11\text{in}$ $D := 5.0\text{in}$ $W_{7770} := 35\text{lb}$

$Cf_F := \text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.367$ — Figure (6-21), pg 74

$Cf_S := \text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.533$ — Figure (6-21), pg 74

$F_{7770} := q_z \cdot G \cdot Cf_F \cdot H \cdot W = 153.2\text{ lbf}$ — Equation (6-28), pg29

$S_{7770} := q_z \cdot G \cdot Cf_S \cdot H \cdot D = 78.1\text{ lbf}$ — Equation (6-28), pg29

Loads on Antenna (CCI OPA-65R-LCUU-H6):

Dimensions : $H := 72\text{in}$ $W := 14.8\text{in}$ $D := 7.4\text{in}$ $W_{OPA} := 73\text{lb}$

$Cf_F := \text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.364$ — Figure (6-21), pg 74

$Cf_S := \text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.491$ — Figure (6-21), pg 74

$F_{P65} := q_z \cdot G \cdot Cf_F \cdot H \cdot W = 269.4\text{ lbf}$ — Equation (6-28), pg29

$S_{P65} := q_z \cdot G \cdot Cf_S \cdot H \cdot D = 147.2\text{ lbf}$ — Equation (6-28), pg29

Loads on Antenna (Quintel QS66512-2):

Dimensions : $H := 72in$ $W := 12in$ $D := 9.6in$ $W_{QS} := 105lb$

$C_{f\_F} := \text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.383$ Figure (6-21), pg 74

$C_{f\_S} := \text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.417$ Figure (6-21), pg 74

$F_{QS} := q_z \cdot G \cdot C_{f\_F} \cdot H \cdot W = 221.5\,lbf$ Equation (6-28), pg29

$S_{QS} := q_z \cdot G \cdot C_{f\_S} \cdot H \cdot D = 181.5\,lbf$ Equation (6-28), pg29

Loads on Antenna (Typical Panel Antenna By Others):

Dimensions : $H := 64in$ $W := 11in$ $D := 6in$ $W_{others} := 60lb$

$C_{f\_F} := \text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.38$ Figure (6-21), pg 74

$C_{f\_S} := \text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{D}\right) = 1.522$ Figure (6-21), pg 74

$F_{other} := q_z \cdot G \cdot C_{f\_F} \cdot H \cdot W = 180.1\,lbf$ Equation (6-28), pg29

$S_{other} := q_z \cdot G \cdot C_{f\_S} \cdot H \cdot D = 108.3\,lbf$ Equation (6-28), pg29

Loads on Dish (By Others):

Dimensions : $H := 30.0in$ $W := 30in$ $D := 12in$ $W_{dish} := 30lb$

$C_{f\_F} := \text{linterp}\left(C_{F\_round\_2}^{\langle 0 \rangle}, C_{F\_round\_2}^{\langle 1 \rangle}, \frac{H}{W}\right) = 0.7$ Figure (6-21), pg 74

$C_{f\_S} := \text{linterp}\left(C_{F\_round\_2}^{\langle 0 \rangle}, C_{F\_round\_2}^{\langle 1 \rangle}, \frac{H}{D}\right) = 0.725$ Figure (6-21), pg 74

$F_{dish} := q_z \cdot G \cdot C_{f\_F} \cdot H \cdot W = 116.7\,lbf$ Equation (6-28), pg29

$S_{dish} := q_z \cdot G \cdot C_{f\_S} \cdot H \cdot D = 48.4\,lbf$ Equation (6-28), pg29

Loads on (RRUS-32):

Dimensions : $H := 29.9in$ $W := 13.3in$ $D := 9.5in$ $W_{RRUS\_32} := 77lb$

$C_{f\_F} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{W}\right) = 1.321$ Figure (6-21), pg 74

$C_{f\_S} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{D}\right) = 1.336$ Figure (6-21), pg 74

$F_{RRU\_32} := q_z \cdot G \cdot C_{f\_F} \cdot H \cdot W = 97.3\ lbf$ Equation (6-28), pg29

$S_{RRU\_32} := q_z \cdot G \cdot C_{f\_S} \cdot H \cdot D = 70.3\ lbf$ Equation (6-28), pg29

Loads on (RRUS-32 B2):

Dimensions : $H := 27.2in$ $W := 12.1in$ $D := 7in$ $W_{RRUS\_32B2} := 52.9lb$

$C_{f\_F} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{W}\right) = 1.321$ Figure (6-21), pg 74

$C_{f\_S} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{D}\right) = 1.348$ Figure (6-21), pg 74

$F_{RRU\_32B2} := q_z \cdot G \cdot C_{f\_F} \cdot H \cdot W = 80.6\ lbf$ Equation (6-28), pg29

$S_{RRU\_32B2} := q_z \cdot G \cdot C_{f\_S} \cdot H \cdot D = 47.6\ lbf$ Equation (6-28), pg29

Loads on (RRUS-11):

Dimensions : $H := 19.69in$ $W := 16.97in$ $D := 7.17in$ $W_{RRUS\_11} := 50.7lb$

$C_{f\_F} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{W}\right) = 1.303$ Figure (6-21), pg 74

$C_{f\_S} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{D}\right) = 1.329$ Figure (6-21), pg 74

$F_{RRUS\_11} := q_z \cdot G \cdot C_{f\_F} \cdot H \cdot W = 80.7\ lbf$ Equation (6-28), pg29

$S_{RRUS\_11} := q_z \cdot G \cdot C_{f\_S} \cdot H \cdot D = 34.8\ lbf$ Equation (6-28), pg29

Loads on (TMA):

Dimensions : $H := 12in$ $W := 12in$ $D := 6in$ $W_{TMA} := 25lb$

$C_{f\_F} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{W}\right) = 1.3$ Figure (6-21), pg 74

$C_{f\_S} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{D}\right) = 1.317$ Figure (6-21), pg 74

$F_{TMA} := q_z \cdot G \cdot C_{f\_F} \cdot H \cdot W = 34.7\,lbf$ Equation (6-28), pg29

$S_{TMA} := q_z \cdot G \cdot C_{f\_S} \cdot H \cdot D = 17.6\,lbf$ Equation (6-28), pg29

Loads on(Diplexer):

Dimensions : $H := 10.5in$ $W := 7in$ $D := 1.9in$ $W_{diplexer} := 7lb$

$C_{f\_F} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{W}\right) = 1.308$ Figure (6-21), pg 74

$C_{f\_S} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{D}\right) = 1.375$ Figure (6-21), pg 74

$F_{Diplexer} := q_z \cdot G \cdot C_{f\_F} \cdot H \cdot W = 17.8\,lbf$ Equation (6-28), pg29

$S_{Diplexer} := q_z \cdot G \cdot C_{f\_S} \cdot H \cdot D = 5.1\,lbf$ Equation (6-28), pg29

Loads on (Surge Arrestor):

Dimensions : $H := 5in$ $W := 3.6in$ $D := 1.3in$ $W_{surge} := 1lb$

$C_{f\_F} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{W}\right) = 1.306$ Figure (6-21), pg 74

$C_{f\_S} := \text{linterp}\left(C_{F\_flat}^{\langle 0\rangle}, C_{F\_flat}^{\langle 1\rangle}, \frac{H}{D}\right) = 1.347$ Figure (6-21), pg 74

$F_{suege} := q_z \cdot G \cdot C_{f\_F} \cdot H \cdot W = 4.4\,lbf$ Equation (6-28), pg29

$S_{surge} := q_z \cdot G \cdot C_{f\_S} \cdot H \cdot D = 1.6\,lbf$ Equation (6-28), pg29

Loads on Mount Pipe 2.0 STD:

Dimensions: $Dia := 2.375in$ $H := 60in$

$C_{f\_F} := \text{linterp}\left(C_{F\_round\_2}^{\langle 0 \rangle}, C_{F\_round\_2}^{\langle 1 \rangle}, \frac{H}{Dia}\right) = 1.206$ — Figure (6-21), pg 74

$C_{f\_F} := \begin{cases} C_{f\_F} & \text{if } C_{f\_F} \le 1.2 \\ 1.2 & \text{otherwise} \end{cases} = 1.2$ — Figure (6-21), pg 74

$F_{Pipe\_F} := q_z \cdot G \cdot C_{f\_F} \cdot Dia = 6.3 \cdot plf$ — Equation (6-28), pg29

Loads on Mount Pipe 2.5 STD:

Dimensions: $Dia := 2.9in$ $H := 72in$

$C_{f\_F} := \text{linterp}\left(C_{F\_round\_2}^{\langle 0 \rangle}, C_{F\_round\_2}^{\langle 1 \rangle}, \frac{H}{Dia}\right) = 1.196$ — Figure (6-21), pg 74

$C_{f\_F} := \begin{cases} C_{f\_F} & \text{if } C_{f\_F} \le 1.2 \\ 1.2 & \text{otherwise} \end{cases} = 1.196$ — Figure (6-21), pg 74

$F_{Pipe\_F} := q_z \cdot G \cdot C_{f\_F} \cdot Dia = 7.7 \cdot plf$ — Equation (6-28), pg29

Loads on Mount Pipe 3.0 STD:

Dimensions: $Dia := 3.5in$ $H := 72in$

$C_{f\_F} := \text{linterp}\left(C_{F\_round\_2}^{\langle 0 \rangle}, C_{F\_round\_2}^{\langle 1 \rangle}, \frac{H}{Dia}\right) = 1.102$ — Figure (6-21), pg 74

$C_{f\_F} := \begin{cases} C_{f\_F} & \text{if } C_{f\_F} \le 1.2 \\ 1.2 & \text{otherwise} \end{cases} = 1.102$ — Figure (6-21), pg 74

$F_{Pipe\_F} := q_z \cdot G \cdot C_{f\_F} \cdot Dia = 8.6 \cdot plf$ — Equation (6-28), pg29

Loads on Mount Pipe 4.0 STD:

Dimensions: $Dia := 4.5in$ $H := 72in$

$C_{f\_F} := linterp\left(C_{F\_round\_2}^{\langle 0 \rangle}, C_{F\_round\_2}^{\langle 1 \rangle}, \frac{H}{Dia}\right) = 1$ Figure (6-21), pg 74

$C_{f\_F} := \begin{vmatrix} C_{f\_F} & \text{if } C_{f\_F} \le 1.2 \\ 1.2 & \text{otherwise} \end{vmatrix} = 1$ Figure (6-21), pg 74

$F_{Pipe\_F} := q_z \cdot G \cdot C_{f\_F} \cdot Dia = 10 \cdot plf$ Equation (6-28), pg29

Loads on L 4x4x4/16:

Dimensions: $W := 4in$ $H := 260in$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 3.333$ Figure (6-21), pg 74

$C_f := \begin{vmatrix} C_f & \text{if } C_f \le 2.0 \\ 2.0 & \text{otherwise} \end{vmatrix} = 2$ Figure (6-21), pg 74

$F_{L2.5} := q_z \cdot G \cdot C_f \cdot W = 17.79 \cdot plf$

Loads on L 3.5x3.5x4/16:

Dimensions: $W := 3.5in$ $H := 65in$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.786$ Figure (6-21), pg 74

$C_f := \begin{vmatrix} C_f & \text{if } C_f \le 2.0 \\ 2.0 & \text{otherwise} \end{vmatrix} = 1.786$ Figure (6-21), pg 74

$F_{L2.5} := q_z \cdot G \cdot C_f \cdot W = 13.898 \cdot plf$

Loads on L 3.0x3.0x4/16:

Dimensions: $W := 3.0in$ $H := 130in$

$C_f := linterp\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 2.611$ Figure (6-21), pg 74

$C_f := \begin{vmatrix} C_f & \text{if } C_f \le 2.0 \\ 2.0 & \text{otherwise} \end{vmatrix} = 2$ Figure (6-21), pg 74

$F_{L2.5} := q_z \cdot G \cdot C_f \cdot W = 13.342 \cdot plf$

Loads on L 2.5x2.5x4/16:

Dimensions: $W := 2.5in$ $H := 58in$

$$C_f := \text{linterp}\left(C_{F\_flat}^{\langle 0 \rangle}, C_{F\_flat}^{\langle 1 \rangle}, \frac{H}{W}\right) = 1.94$$

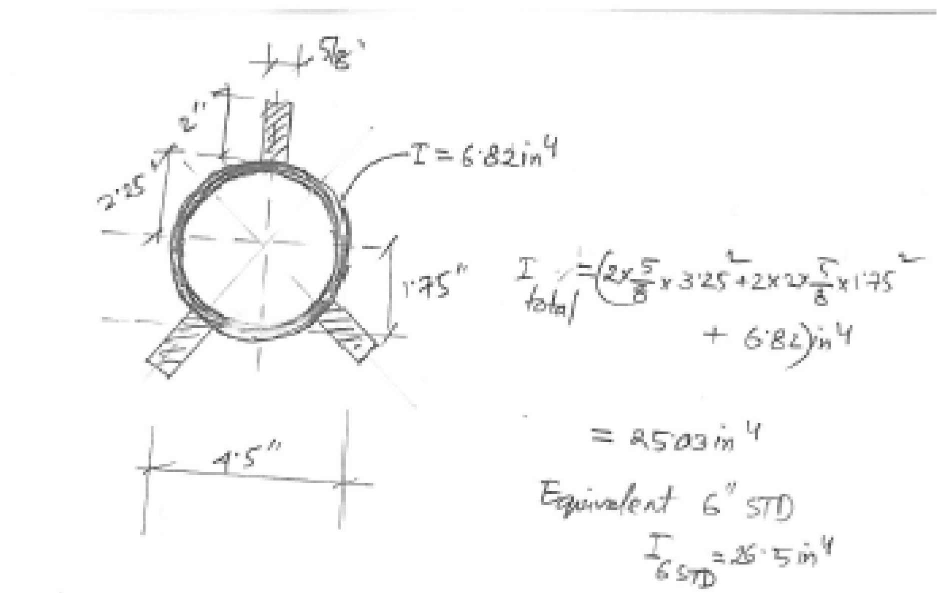
Figure (6-21), pg 74

$$C_f := \begin{cases} C_f & \text{if } C_f \le 2.0 \\ 2.0 & \text{otherwise} \end{cases} = 1.94$$

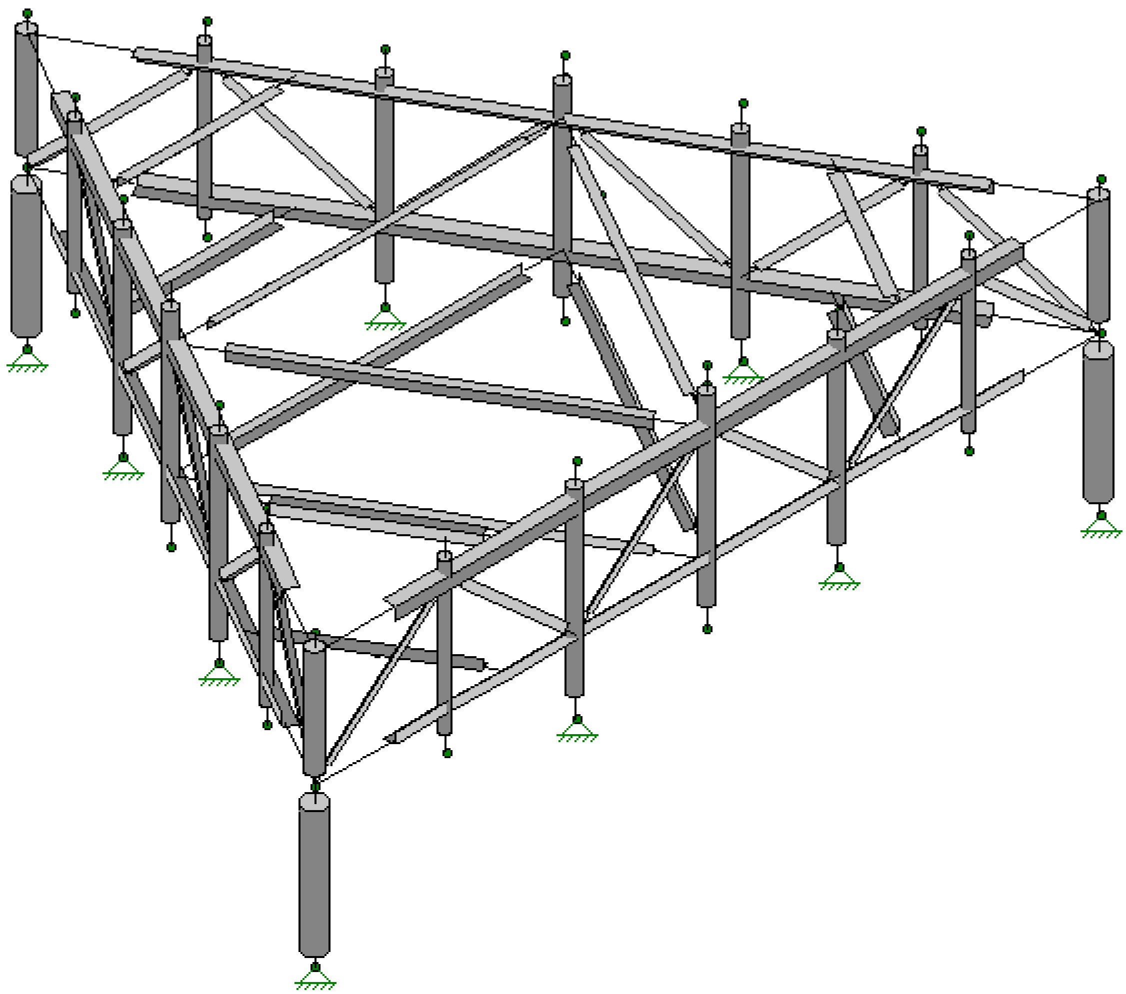
Figure (6-21), pg 74

$$F_{L2.5} := q_z \cdot G \cdot C_f \cdot W = 10.785 \cdot plf$$

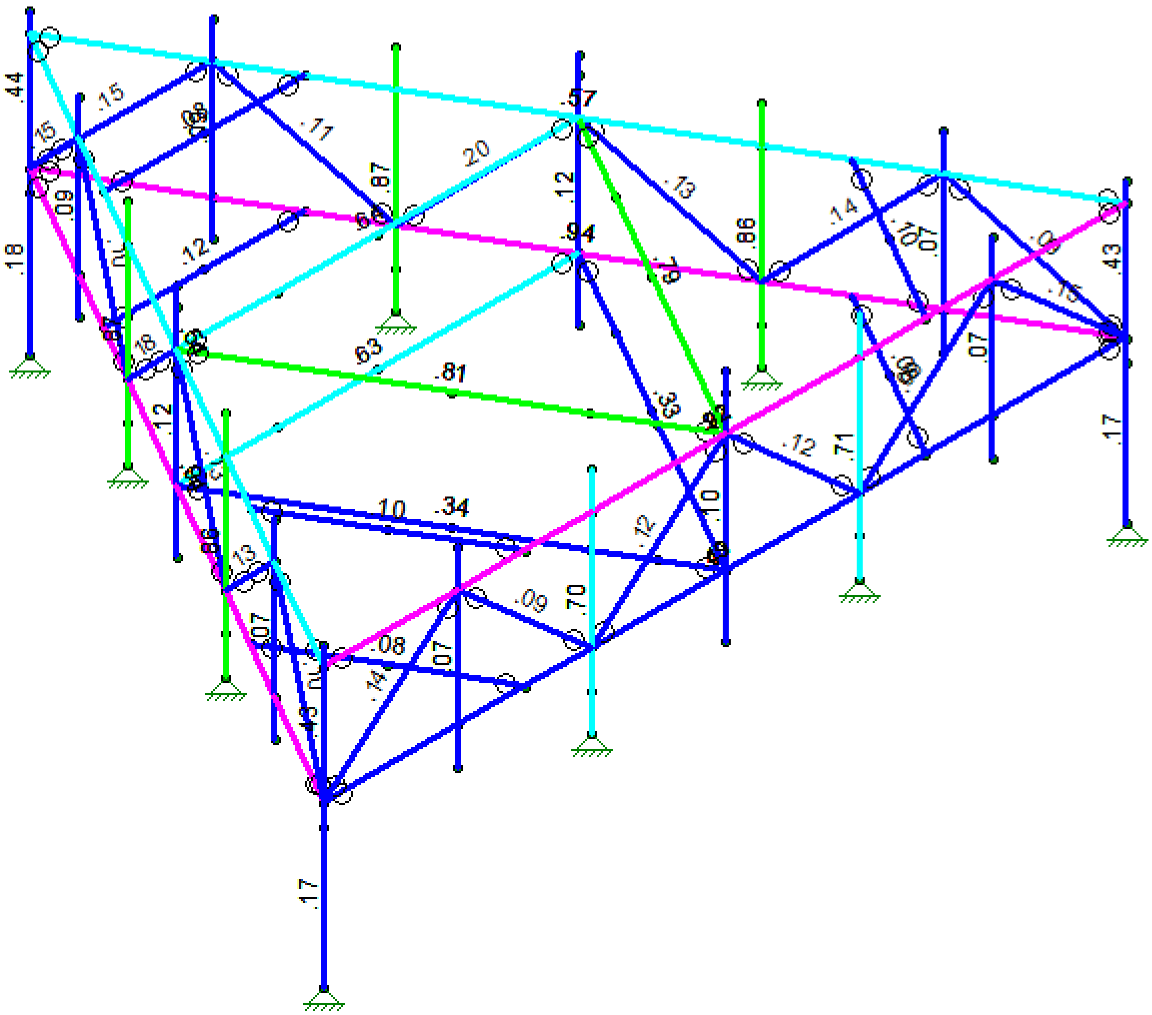
Composite Steel Column Section: 6" STD Equivalent



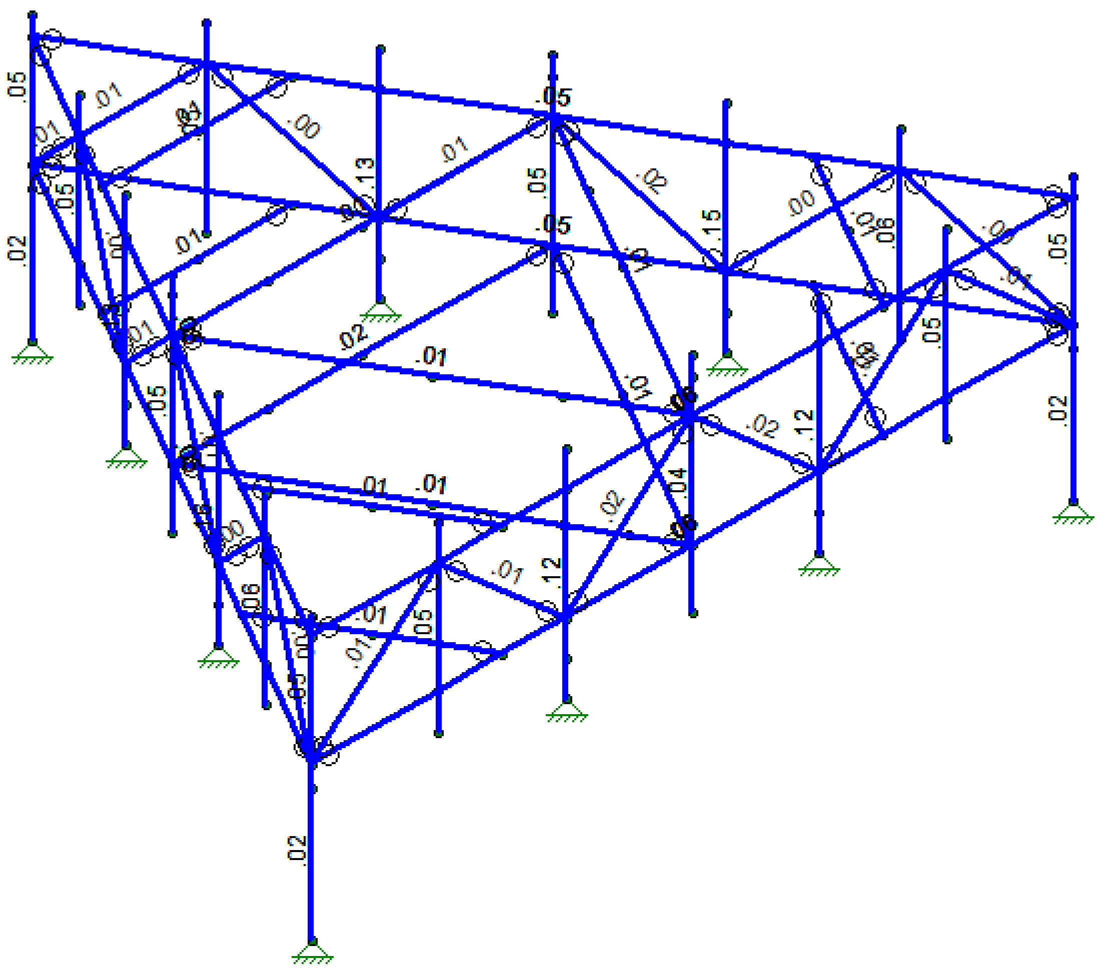
RISA 3D MODEL: TRIANGULAR FRAME



Rendering



Code Check



Shear Check

As a maximum, the structural members are stressed to 94% of their structural capacity

1. DESIGN INFORMATION AND GENERAL REQUIREMENTS

1.0 GENERAL
a. ALL DIMENSIONS ARE APPROXIMATE, CONTRACTOR SHOULD VERIFY ALL DIMENSIONS BEFORE FABRICATION OF STEEL AND COMMENCEMENT OF WORK.
1.1 CODES
a. 2005 CONNECTICUT BUILDING CODE WITH ALL THE AMENDMENTS AND SUPPLEMENTS.
b. MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES, SEI/ASCE 7-02, AMERICAN SOCIETY OF CIVIL ENGINEERS
c. STEEL CONSTRUCTION MANUAL, 9TH EDITION, AMERICAN INSTITUTE OF STEEL CONSTRUCTION

1.2 GENERAL
a. PRIOR TO PURCHASE OR FABRICATION OF MATERIAL, THE CONTRACTOR SHALL PERFORM AN INSPECTION VERIFYING MEMBER DIMENSIONS AND BOLT SIZES. SHOULD THE CONTRACTOR DISCOVER ANY DAMAGED OR MISSING MEMBERS OR THE MEMBER OR BOLT SIZES DO NOT MATCH THOSE LISTED, DESTEK SHALL BE NOTIFIED IMMEDIATELY.
b. CONTRACTOR TO REPLACE ALL BOLTS REMOVED WITH NEW BOLTS OF SAME TYPE, UNLESS NOTED OTHERWISE.

2. STRUCTURAL STEEL

2.1 MATERIALS
a. STRUCTURAL STEEL . . . . ASTM A992
MISC ANGLE & PLATE . . . . ASTM A36
RODS . . . . ASTM A572-50 (MINIMUM)
HSS. . . . . ASTM A500, GRADE B, Fy=46 KSI
PIPE . . . . ASTM A53 GR.B
b. BOLTS . . . . ASTM A325 U.N.O.
c. WELDING RODS . . . . AWS 5.1 – E7018 LOW HYDROGEN RODS (PROPERLY STORED)
d. STEEL CONSTRUCTION SHALL CONFORM TO "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, ANSI/AISC 360-10"
e. WELDING SHALL CONFORM TO "STRUCTURAL WELDING CODE – STEEL, AWS D1.1/D1.3/D1.4" AS APPLICABLE.
f. THE FABRICATOR SHALL FURNISH CHECKED SHOP AND ERECTION DRAWINGS TO THE ENGINEER, AND OBTAIN APPROVAL PRIOR TO FABRICATING ANY STRUCTURAL STEEL. SHOP DRAWINGS SHALL CONFORM TO "DETAILING FOR STEEL CONSTRUCTION 3RD EDITION"
g. POOR MATCHING OF HOLES SHALL BE CORRECTED BY DRILLING TO THE NEXT LARGER SIZE. WELDING FOR REDRILLING WILL NOT BE PERMITTED.

2.2 CONNECTIONS
a. SHOP CONNECTIONS MAY BE BOLTED OR WELDED
b. SIMPLE CONNECTIONS SHALL BE DESIGNED TO 1/2 OF AISC UNIFORM LOAD CAPACITY OF THE BEAMS.
c. FIELD CONNECTIONS SHALL BE MADE WITH A325 BOLTS AND HARDENED WASHERS EXCEPT AS INDICATED ON THE DESIGN DRAWINGS
d. CONNECTIONS NOT SHOWN ON DRAWINGS SHALL BE DESIGNED BY THE STEEL FABRICATOR. CONNECTIONS SHALL BE DESIGNED IN ACCORDANCE WITH AISC "SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS" AND "AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"
e. DO NOT FIELD CUT OR ALTER STRUCTURAL MEMBERS WITHOUT PRIOR WRITTEN APPROVAL OF ENGINEER.
f. BOLT HOLES SHALL BE CUT, DRILLED OR PUNCHED AT RIGHT ANGLES TO THE SURFACE OF THE METAL AND SHALL NOT BE MADE OR ENLARGED BY BURNING. HOLES SHALL BE CLEAN CUT WITHOUT TORN OR RAGGED EDGES. OUTSIDE BURRS RESULTING FROM DRILLING OR REAMING OPERATION SHALL BE REMOVED WITH A TOOL MAKING A 1/16 INCH BEVEL. BOLT HOLES SHALL BE 1/16 INCH OVERSIZE.

2.3 FINISHES
a. STRUCTURAL STEEL SHALL BE HOT DIP GALVANIZED AFTER FABRICATION PER ASTM A123
b. BOLTS AND NUTS SHALL BE HOT DIP GALVANIZED PER ASTM A153.
c. ALL SURFACES DAMAGED DURING THE WORK SHALL BE PAINTED WITH COLD GALVANIZING COMPOUND TWICE. THE PAINT SHOULD BE AT LEAST 93% PURE ZINC. RUST-OLEUM PROFESSIONAL, (MODEL# 7585838) OR SIMILAR. NEW STRUCTURAL STEEL PAINT COLOR SHALL MATCH THE EXISTING TOWER STEEL COLOR.

2.4 WELDING
a. CONTRACTOR TO TAKE ALL NECESSARY PRECAUTIONS FOR FIRE PREVENTION DURING WELDING, SUCH AS; INSTALLING 3000 (NFPA 701) FIRE BLANKET AROUND COAX. MORE SPLATTER AND SPARKS SHOULD BE ANTICIPATED WHILE WELDING ON GALVANIZED SURFACE. COAX IS FLAMMABLE AND SHALL CATCH FIRE IF NOT PROTECTED. WATER SHALL BE ON SITE OF ADEQUATE AMOUNT AND AVAILABLE AT SHORT NOTICE AT ALL TIMES DURING WELDING ACTIVITY. CONTRACTOR SHOULD BE ABLE TO TRANSPORT THE WATER TO THE HEIGHT WELDING BEING PERFORMED.
b. WELDING ON GALVANIZED SURFACE SHOULD BE DONE WITH EXTREME CAUTION. IF THE WELD MATERIAL IS CONTAMINATED WITH ZINC, IT DOES NOT PROVIDE A STRUCTURAL WELD. GROUND GALVANIZING BEFORE WELDING.
c. WELDING CERTIFICATE MUST BE PROVIDED PRIOR TO WELDING. ALL WELDING SHALL BE PERFORMED BY AWS QUALIFIED WELDER WHO HAS EXPERIENCE WITH GALVANIZED SURFACES.

2.5 SPECIAL WELDING
a. DO NOT WELD ON TANK SURFACES OPPOSITE TO WATER. WATER LEVEL SHOULD BE MINIMUM 3 FEET BELOW THE POINT OF WELDING. DRAW THE WATER LEVEL ACCORDINGLY.
b. DO NOT WELD ON JOINTS OF THE TANK SHELL.
c. WELDING ON GALVANIZED SURFACES SHOULD BE DONE WITH CAUTION BY A WELDER WHO IS EXPERIENCED WITH GALVANIZED SURFACES. IF THE WELD MATERIAL IS CONTAMINATED WITH ZINC, IT DOES NOT PROVIDE A STRUCTURAL WELD. GRIND SURFACE BEFORE WELD.

3. STUD WELDING

3.1 GENERAL
a. WELDING STUDS SHALL BE FLANGED THREADED LOW CARBON COPPER COATED STEEL STUDS, GRADE 1010 THROUGH 1020, CONFORMING TO ASTM A-108 "STEEL BAR, CARBON, COLD FINISHED, STANDARD QUALITY". ALL STUDS SHALL BE 1/4"ø x 1 3/4" LONG, UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS.
b. STUDS MUST BE WELDED BY THE CAPACITOR DISCHARGE METHOD, NELSON NCD 100 SYSTEM, AS MANUFACTURED AND MARKETED BY TRW NELSON STUD WELDING DIVISION, ELYRIA, OHIO, (800) 635-9353 OR (216) 329-0400 OR APPROVED EQUAL. FILLET WELDS ARE NOT ACCEPTABLE.
c. CONTRACTOR SHALL COMPLY WITH AWS D1.1 AND AWS C5.4 FOR PROCEDURES, APPEARANCE AND QUALITY OF WELDS, AND FOR METHODS USED IN CORRECTING WELDING. ALL WELDERS AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". CONTRACTOR SHALL ADHERE TO AWS RECOMMENDED "SAFE PRACTICES FOR WELDING".
d. WELDING PARAMETERS, MACHINE POWER, AND DWELL TIME SHALL BE QUALIFIED FOR THE WELDING POSITION, MATERIAL THICKNESS AND STUD SIZE TO BE USED. IF CHANGES IN THE SETUP OCCUR AS DEFINED IN AWS D1.1, THE PROCEDURE MUST BE REQUALIFIED.

3.2 SURFACE PREPARATION:
a. CLEANING PROCEDURES SHALL BE VERIFIED AS MEETING MINIMUM REQUIREMENTS PER THE AWS WELDING HANDBOOK, VOLUME 2, "QUALITY CONTROL AND INSPECTION" FOR STUD WELDING. IF THE EXISTING COATING SYSTEM CONTAINS LEAD OR OTHER POTENTIALLY HAZARDOUS MATERIALS, SPECIAL PROCEDURES FOR REMOVAL AND DISPOSAL WILL BE REQUIRED.
b. PREPARE SURFACE TO BE WELDED BY SPOT REMOVING PAINT TO BARE METAL USING POWER BRUSHING IN ACCORDANCE WITH SSPC-SP11, (STEEL STRUCTURES PAINTING COUNCIL SSPC-V151-571). USE 3M STRIP-N-CLEAN FLEXIBLE WHEEL OR APPROVED EQUAL. A WIRE WHEEL IS NOT ACCEPTABLE.
c. FOLLOW POWER TOOL CLEANING WITH A NONFLAMMABLE SOLVENT CLEANING TO REMOVE ANY OILS, CONTAMINANTS, RUST OR DIRT PRIOR TO STUD WELDING (SSPC-SP1 BY STEEL STRUCTURES PAINTING COUNCIL, SSPC-VIS 1-571).

3.3 REPAINTING:
a. ALL PAINTED SURFACES AFFECTED BY WELDING OPERATIONS SHALL BE REPAINTED TO MATCH ADJACENT EXISTING SURFACES. PAINTING SHALL INCLUDE COATING OF THE STUDS.
b. PRIOR TO REPAINTING, SURFACES SHALL BE SOLVENT CLEANED TO REMOVE ANY OILS, CONTAMINANTS, RUST OR DIRT PRIOR TO REPAINTING (SSPC-SP1 BY STEEL STRUCTURES PAINTING COUNCIL, SSPC-VIS 1-571).
c. PAINT USED TO REPAIR INTERIOR COATING SHALL MATCH THE EXISTING COATING SYSTEM OR SHALL BE A SIMILAR SYSTEM COMPATIBLE WITH THE EXISTING SYSTEM AND ACCEPTABLE TO THE OWNER. VERIFY EXISTING COATING SYSTEM WITH THE OWNER.
d. EXTERIOR STEEL SHALL BE PAINTED WITH 1 COAT EPOXY PRIMER (DFT=5-7 MIL) AND 2 COATS POLYURETHANE FINISH (DFT=4-6 MIL) WITH COLOR TO MATCH EXISTING SURFACE. CONTRACTOR SHALL VERIFY OWNER'S PAINT REQUIREMENTS PRIOR TO COMMENCEMENT OF THE WORK.
e. CONTRACTOR TO VERIFY THAT CANS OF THE PRODUCT ARE NOT BEYOND MANUFACTURER RECOMMENDED SHELF LIFE. ASSURE THROUGH MIXING OF PRE MEASURED TWO COMPONENT COATING SYSTEMS.
f. SURFACE CLEANING SHALL BE FOLLOWED WITH PRIMER COAT THE SAME DAY
g. PAINT MUST BE APPLIED AT SURFACE AND AMBIENT TEMPERATURES AS SPECIFIED BY THE MANUFACTURER.
h. PAINT SHALL BE APPLIED USING A NATURAL BRISTLE BRUSH FOR A SMOOTH BRUSH FINISH.
i. PAINT SHALL BE FEATHERED OUT AT THE TIE-IN AREAS OF EXISTING COATING. PAINT SHALL BE WORKED IN AND AROUND IRREGULARITIES IN THE SURFACE.

STATE OF CONNECTICUT
AHMET COLAKOGLU
PEN. 27057
LICENSED PROFESSIONAL ENGINEER
4/6/2016

Ahmet Colakoglu, PE
CT License No: 27057

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PREPARED FOR:
Com-Ex Consultants, LLC
115 Route 46-Suite E39
Mountain Lakes, NJ 07046

NUM	DATE	DESCRIPTION:
A	4/7/2016	ISSUED FOR CONSTRUCTION

NORWALK NORTH-WEST ROCKS RD

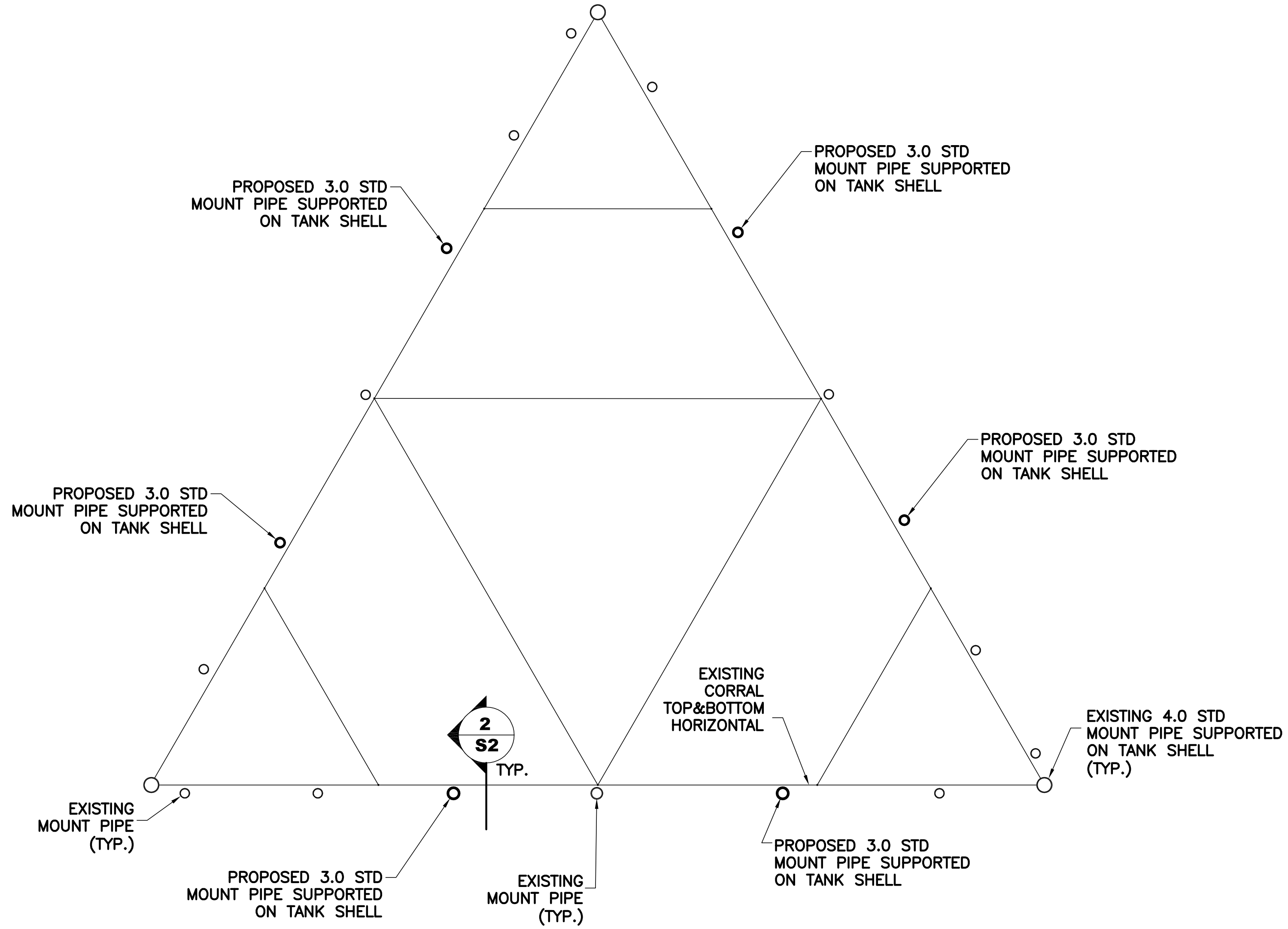
ADDRESS:
177 WEST ROCKS ROAD
NORWALK, CT 06851

DESIGNED: IK
DRAWN: RH
CHECKED: AC

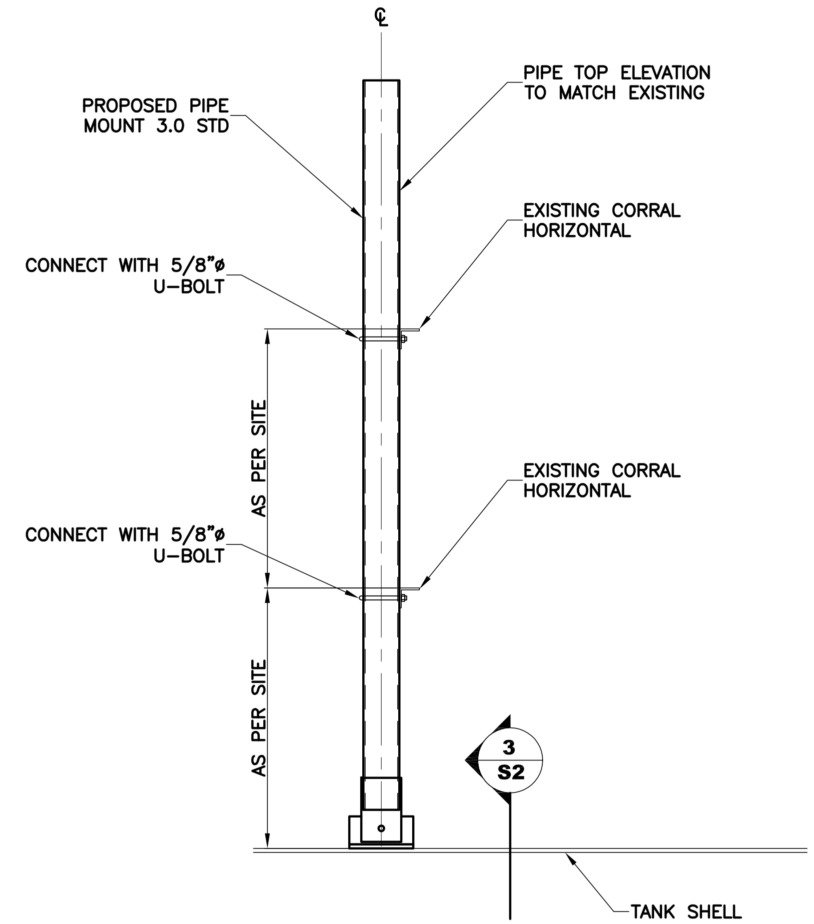
JOB #: 1629006

S1
NOTES

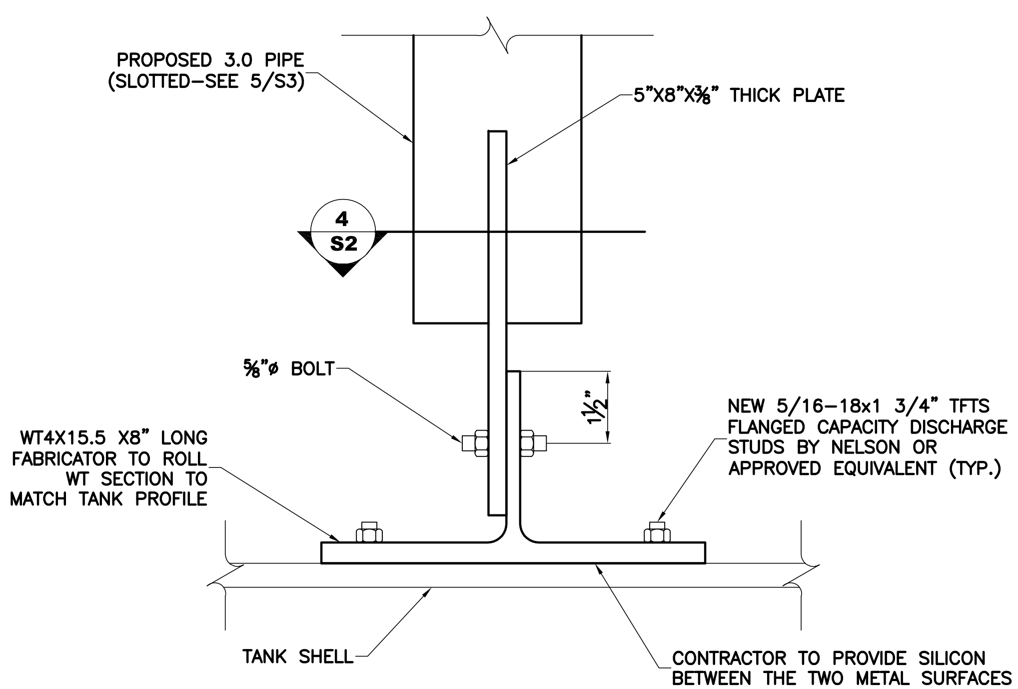
DRAWINGS PLOTTED TO SCALE ON 11x17 SHEETS



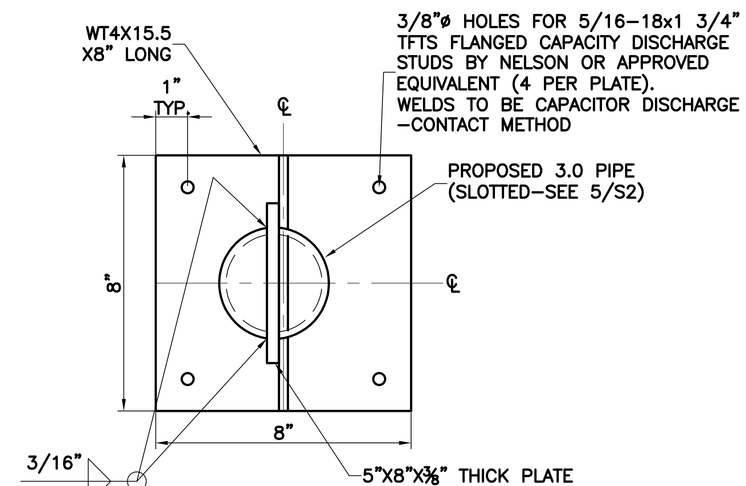
1 S2 **WATER TANK CORRAL/HANDRAIL PLAN**
3/8" = 1'-0"



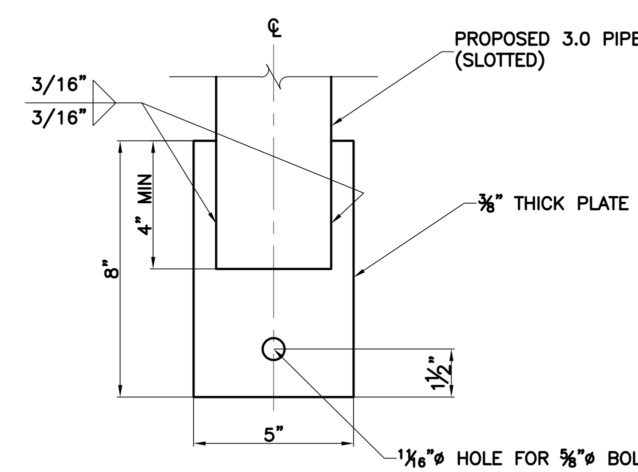
2 S2 **PIPE MOUNT ELEVATION**
1/2" = 1'-0"



3 S2 **PIPE CONNECTION TO TANK SHELL**
3" = 1'-0"



4 S2 **PIPE MOUNT BASE DETAIL**
2" = 1'-0"



5 S2 **PIPE SLOT DETAIL**
2" = 1'-0"

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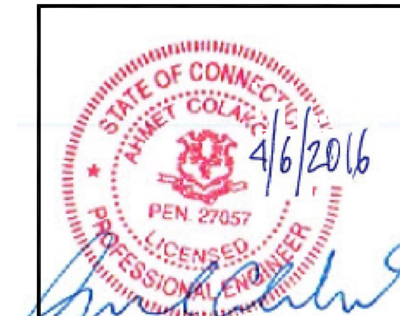

Ahmet Colakoglu, PE
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DESIGNED: IK
DRAWN: RH
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S2
MOUNT DETAILS