



August 21, 2018

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

Regarding: Notice of Exempt Modification – Swap of (3) antennas and addition of (6) remote radio units and (1) Surge Arrestors

Property Address: 2 LARKIN DRIVE, MIDDLEBURY CT (the “Property”, AT&T Site # CT1078)

Applicant: AT&T Mobility (“AT&T”)

Dear Ms. Bachman:

AT&T currently maintains a wireless telecommunications facility on an existing 160 foot, Lattice Tower (“tower”) at the above-referenced address, latitude 41.51356944, longitude -73.12407778.

AT&T’s facility consists of nine (9) wireless telecommunications antennas at 140 feet. The tower is controlled and owned by the Connecticut Department of Emergency Services and Public Protection (Connecticut State Police). Assessor’s information is attached hereto.

AT&T desires to modify its existing telecommunications facility by swapping three (3) antennas for newer models and adding six (6) remote radios heads, and one (1) surge arrestors, and removing three (3) TMA units and six (6) diplexers. The centerline height of said antennas is and will remain at 140 feet.

Please accept this application as notification pursuant to R.C.S.A. § 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 the First Selectman of the Town of Middlebury, the Chief Building Official of the Town of Middlebury, and the Zoning Enforcement Officer of the Town of Middlebury. Notice is also being sent to the Connecticut Department of Emergency Services and Public Protection, the owner of the above-referenced tower.

The planned modifications to AT&T’s facility fall squarely within those activities explicitly provided for in R.C.S.A. § 16-50j-72(b)(2).

1. The planned modifications will not result in an increase in the height of the existing structure. AT&T’s antennas and associated lines will be installed at 140 foot level of the 160 foot tower.
2. The proposed modifications will not involve any changes to ground-mounted equipment and, therefore will not require an extension of the site boundary.



3. The proposed modification will not increase the noise level at the facility by six decibel or more, or to levels that exceed state and local criteria.
4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. An RF emissions calculation is attached.
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.
6. The tower and its foundation can support AT&T's proposed modifications. (Please see attached Structural Analysis completed by AECOM dated April 9, 2018).

For the foregoing reasons AT&T respectfully requests that the proposed swap of antennas and addition of remote radio heads and surge arrestors, along with removal of TMAs and diplexers be allowed within the exempt modifications under R.C.S.A. § 16-50j-72(b)(2).

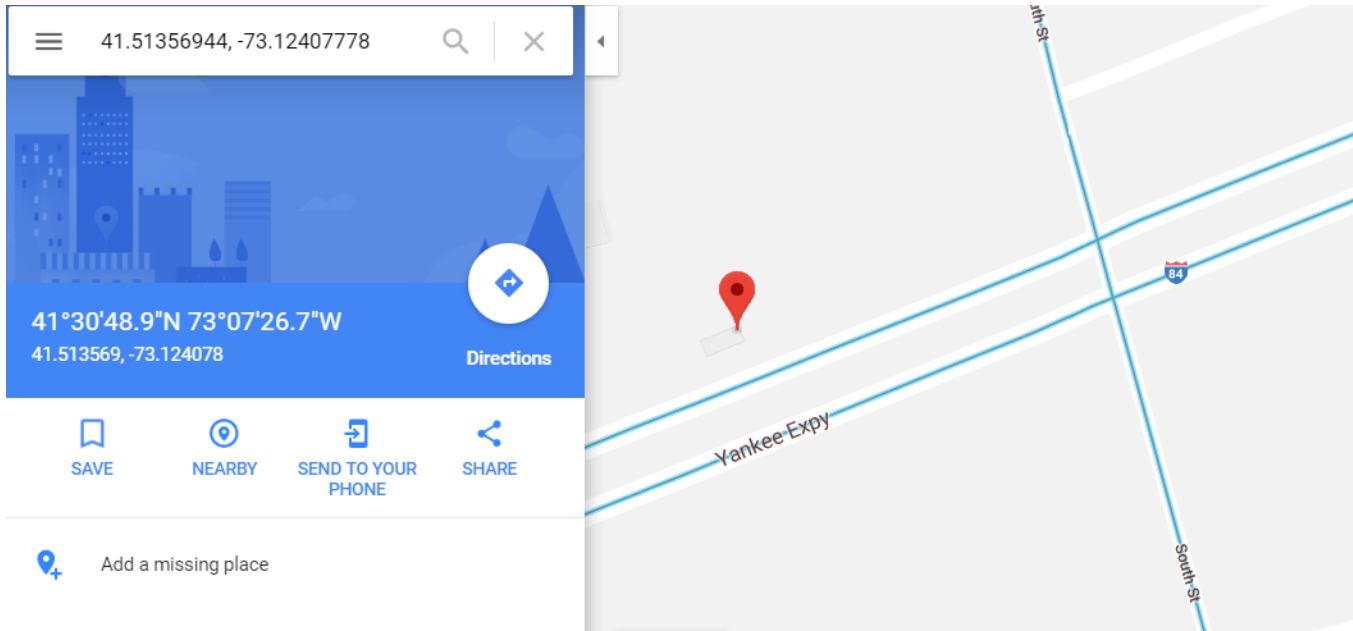
Sincerely,

John Fasanello
Site Acquisition Specialist
Empire Telecom

CC: The Honorable Edward St. John, First Selectman, Town of Middlebury
Mr. Ollie LeDuc, Building Official, Town of Middlebury
Mr. Curtis Bosco, Zoning Enforcement Officer, Town of Middlebury
Connecticut Department of Emergency Services and Public Protection, c/o Brian Benito

16 Esquire Road, Billerica, MA 01862 Phone 978-608-8405 Email: jfasanello@empiretelecomm.com

This Cell Tower site abuts i-84, AKA 2 Larkin Road, Middlebury CT.
Per conversation with Middlebury CT GIS representative, no property card exists for this area.



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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; (1) NEW A2 MODULE PER SECTOR, FOR A TOTAL OF (3) NEW A2 MODULES; (1) EXISTING RRU PER SECTOR TO BE REUSED, FOR A TOTAL OF (3) EXISTING RRUS.
- AT&T SQUID: (1) NEW DC6 SURGE, FOR A TOTAL OF (1) NEW SQUID, (1) EXISTING DC-6 SURGE PROTECTOR, FOR A TOTAL OF (1) EXISTING SQUID TO REMAIN.

SITE ADDRESS: 2 LARKIN DRIVE
MIDDLEBURY, CT 06762

LATITUDE: 41.5136031 41° 30' 48.97116"N
LONGITUDE: -73.1244431 -73° 07' 27.99516"W

USID: 61147

TOWER OWNER: TBD

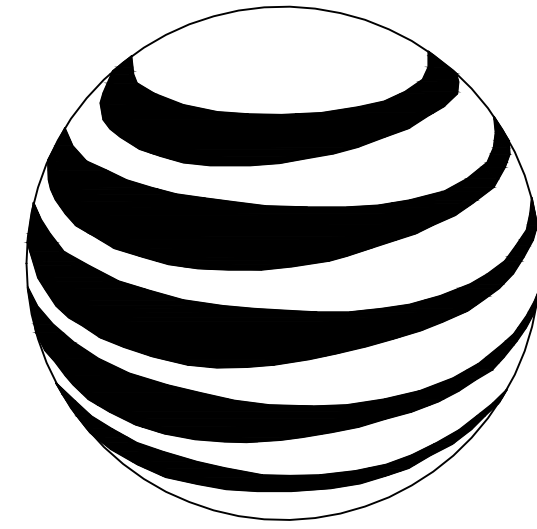
TYPE OF SITE: SELF SUPPORT TOWER/INDOOR EQUIPMENT

TOWER HEIGHT: 160'-0"±

RAD CENTER: 140'-0"±

CURRENT USE: UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY

PROPOSED USE: UNMANNED WIRELESS TELECOMMUNICATIONS FACILITY



at&t
MOBILITY

FA CODE: 10035063
SITE NUMBER: CT1078
SITE NAME: MIDDLEBURY-2 LARKIN DR

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

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

COMPANY: COM-EX CONSULTANTS, LLC
ADDRESS: 4 SECOND AVENUE
SUITE 204
DENVER, NJ 07834
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

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VICINITY MAP

FROM ROCKY HILL, CT: HEAD NE ON ENTERPRISE DRIVE TOWARD CAPITAL BLVD, TURN LEFT ONTO CAPITAL BLVD, TURN LEFT ONTO WEST ST, TURN LEFT TO MERGE ONTO I-91 S TOWARD NEW HAVEN, TAKE EXIT 18 TO MERGE ONTO I-691 W TOWARD MERIDEN/WATERBURY, TAKE EXIT 1 ON THE LEFT TO MERGE ONTO I-84 W TOWARD MERIDEN/WATERBURY PROCEED 13.5 MILES AND PASS UNDER SOUTH ST OVERPASS, STAY RIGHT AND PULL OVER ONTO THE SERVICE ROAD AT TOWER SITE.



GENERAL NOTES

- 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.
- 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.
- 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.

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:
SITE ACQUISITION:	
CONSTRUCTION MANAGER:	
AT&T PROJECT MANAGER:	



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



SITE NUMBER: CT1078
SITE NAME: MIDDLEBURY-2 LARKIN DR
2 LARKIN DRIVE
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY



NO.	DATE	REVISIONS	BY	CHK	APP'D
A	10/20/15	INITIAL SUBMISSION		NJM	NDB
SCALE: AS SHOWN		DESIGNED BY: NJM	DRAWN BY: NJM		

AT&T		
DRAWING TITLE:		
TITLE SHEET		
JOB NUMBER	DRAWING NUMBER	REV
15101-EMP	T-1	A

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 1/2" 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.
23. INFORMATION SHOWN ON THIS SET OF PLANS TAKEN FROM DRAWINGS PREPARED BY DEWBERRY ENGINEERING FOR A RECENT UPGRADE DATED 09/12/2012. CONTRACTOR TO NOTIFY DESIGN ENGINEER OF ANY DISCREPANCIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.

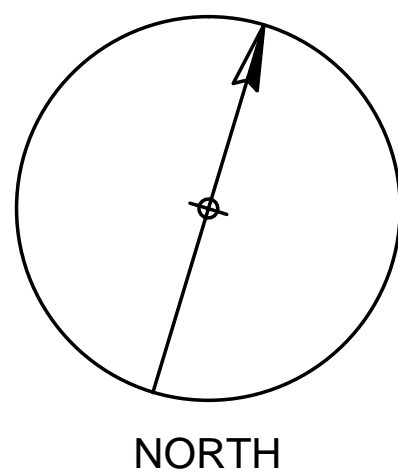
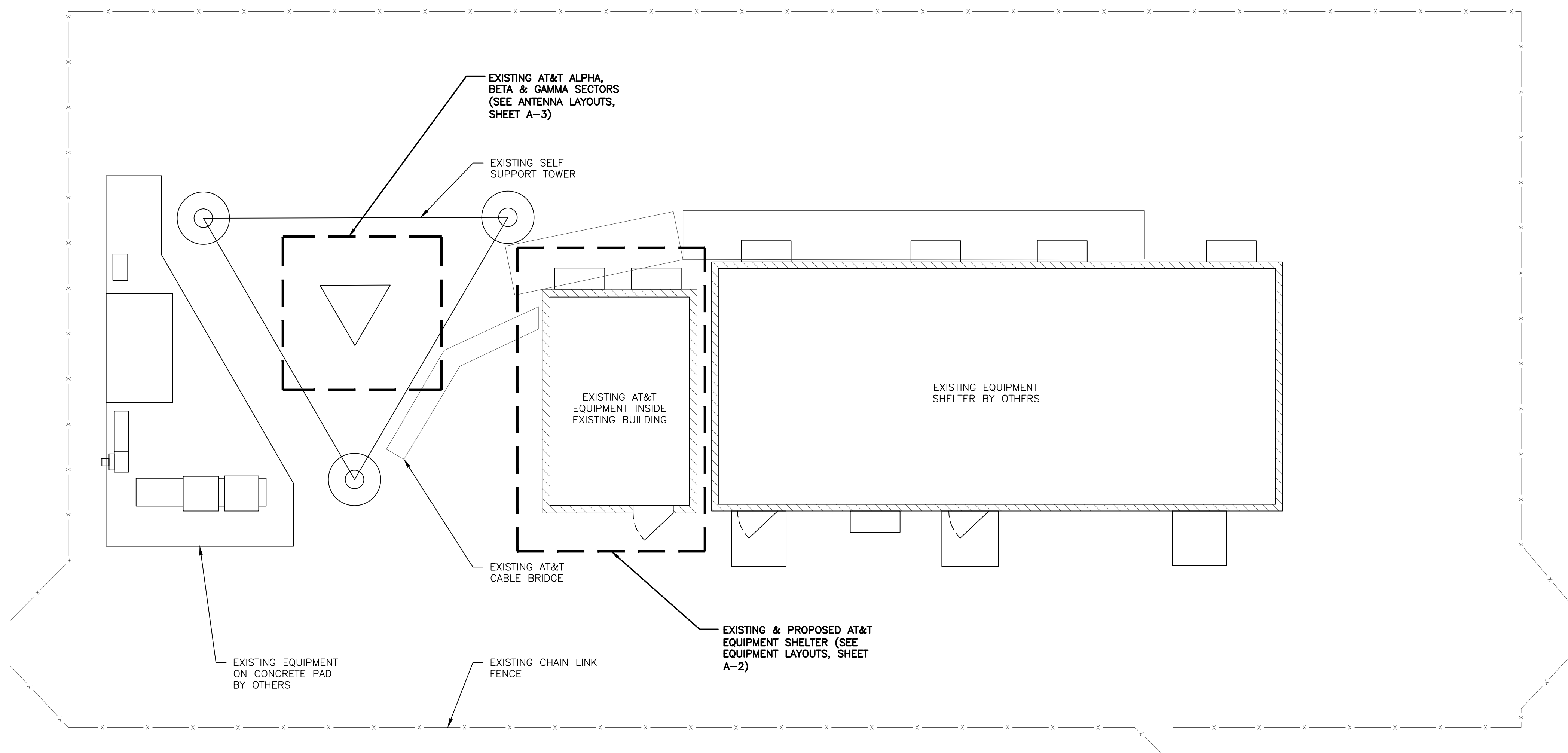


SITE NUMBER: CT1078
SITE NAME: MIDDLEBURY-2 LARKIN DR
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 MIDDLEBURY, CT 06762
 NEW HAVEN COUNTY

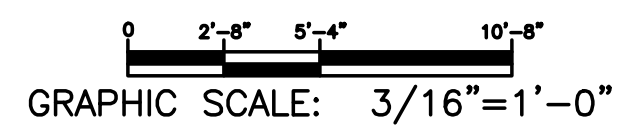


A	10/20/15	INITIAL SUBMISSION	NJM	NDB	NDB
NO.	DATE	REVISIONS	BY	CHK	APP'D
SCALE: AS SHOWN		DESIGNED BY: NJM	DRAWN BY: NJM		

AT&T		
DRAWING TITLE: GROUNDING & GENERAL NOTES		
JOB NUMBER	DRAWING NUMBER	REV
15101-EMP	GN-1	A



COMPOUND LAYOUT
SCALE: 3/16" = 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.

COM-EX
Consultants
4 SECOND AVENUE
SUITE 204
DENVER, NJ 07834
PHONE: 862.209.4300
FAX: 862.209.4301

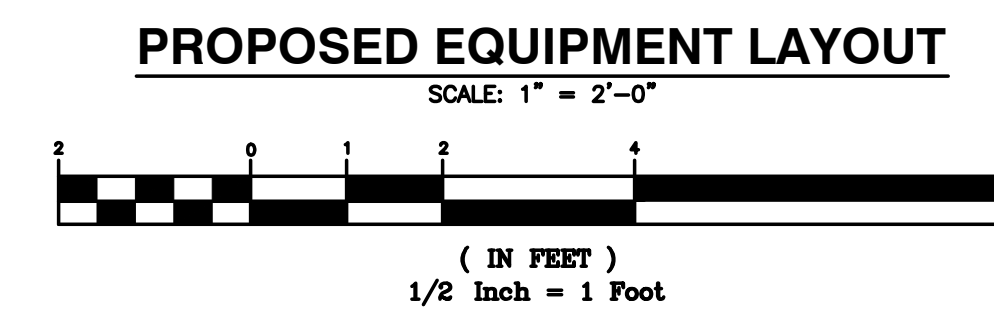
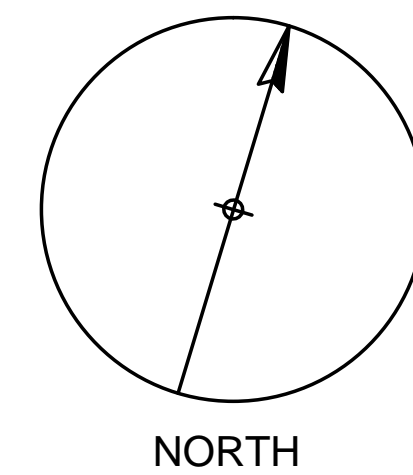
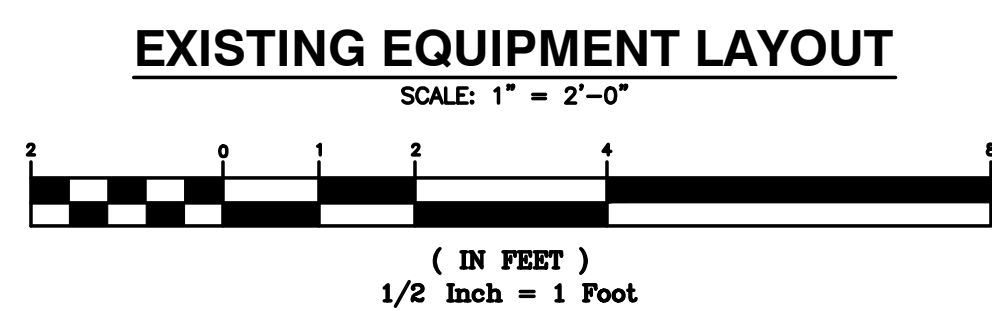
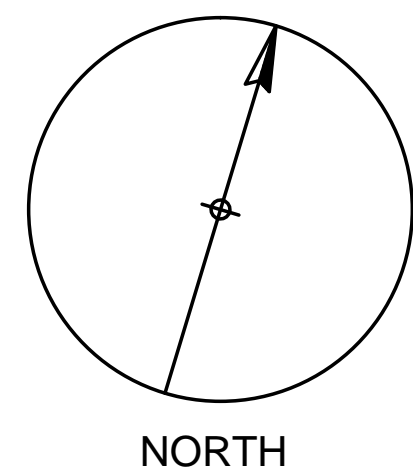
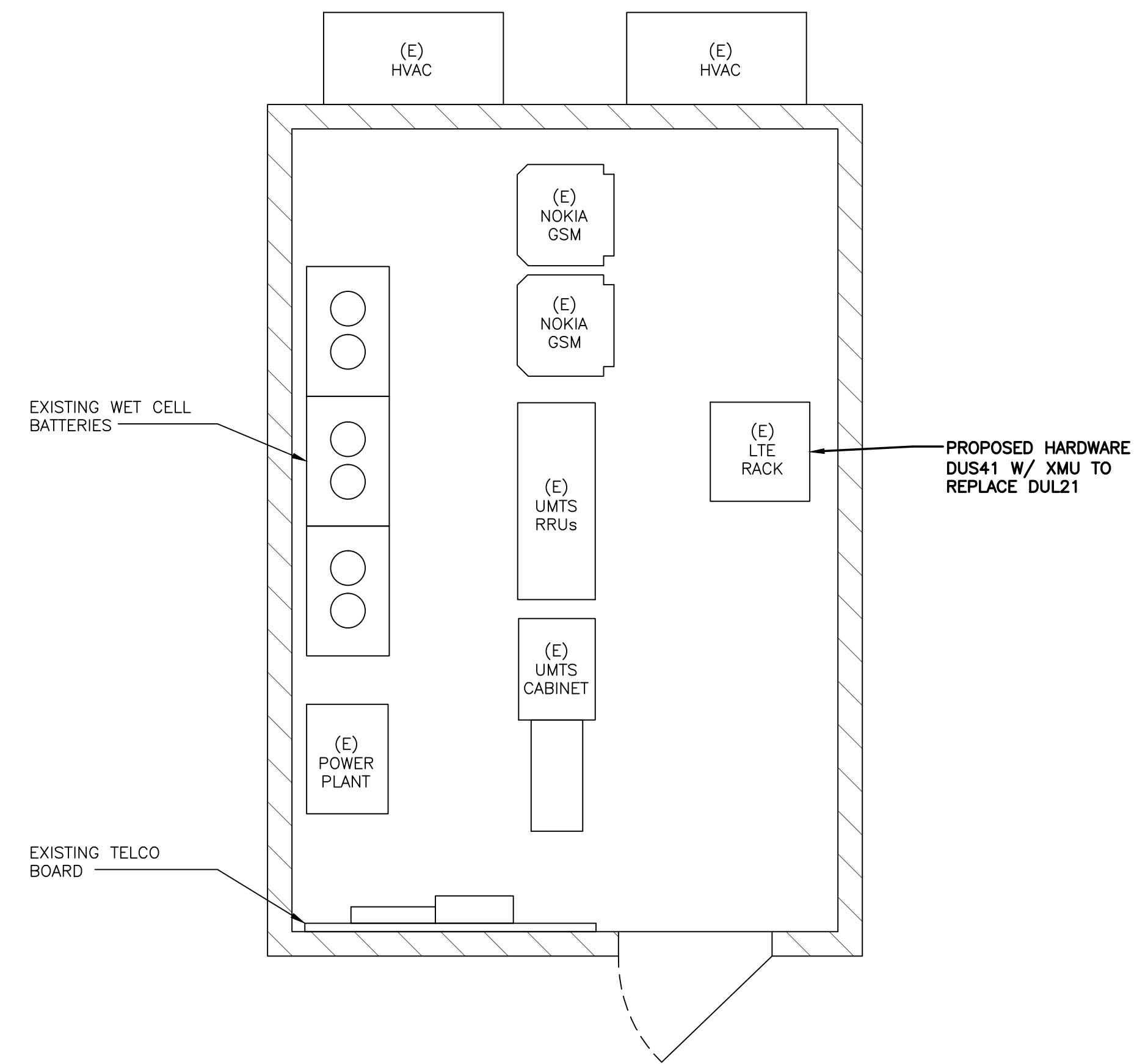
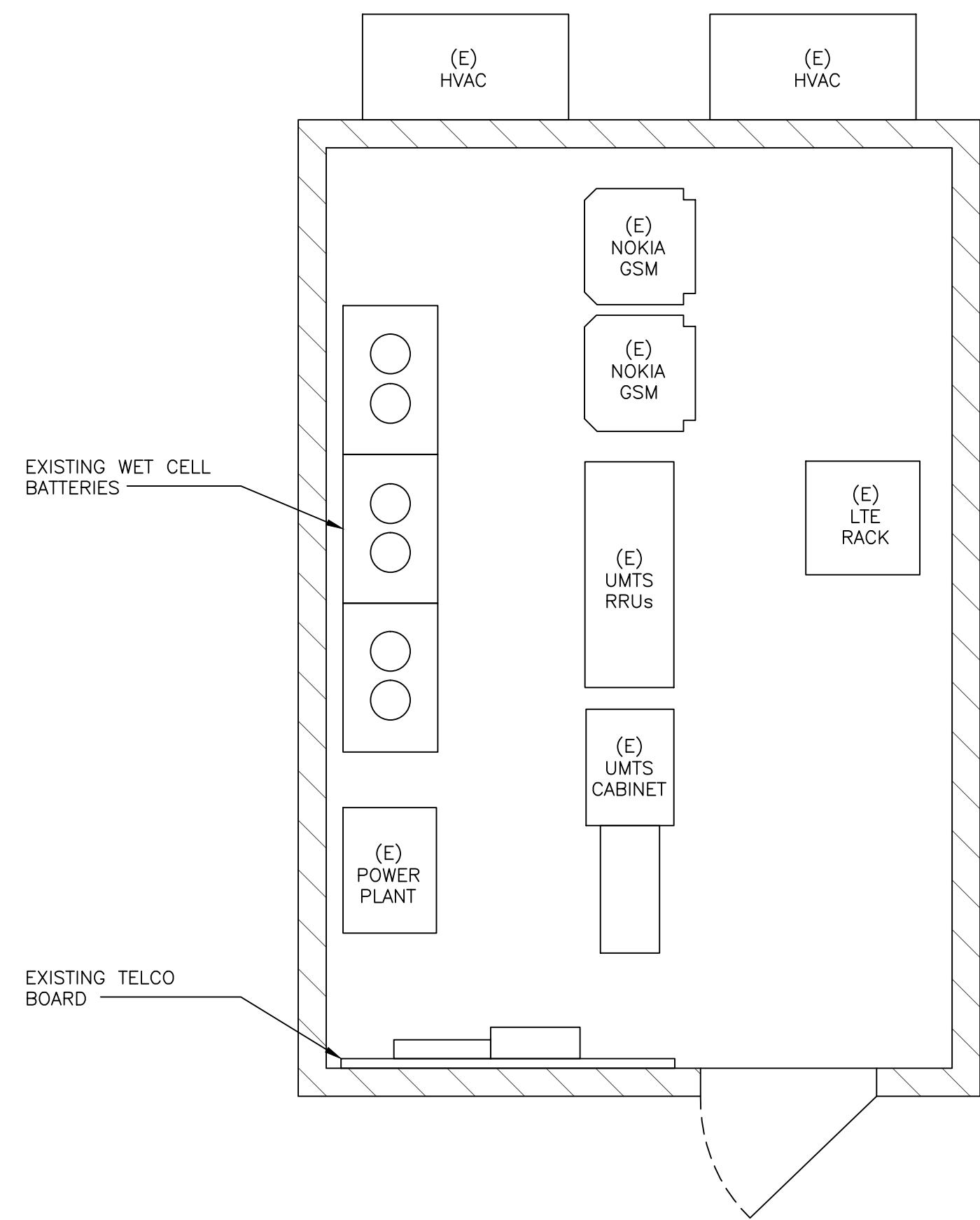
EMPIRE
telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT1078
SITE NAME: MIDDLEBURY-2 LARKIN DR
2 LARKIN DRIVE
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

 **at&t**
MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
A	10/20/15	INITIAL SUBMISSION	NJM	NDB	NDB
SCALE: AS SHOWN		DESIGNED BY: NJM	DRAWN BY: NJM		

AT&T		
DRAWING TITLE: COMPOUND LAYOUT		
JOB NUMBER	DRAWING NUMBER	REV
15101-EMP	A-1	A



COM-EX
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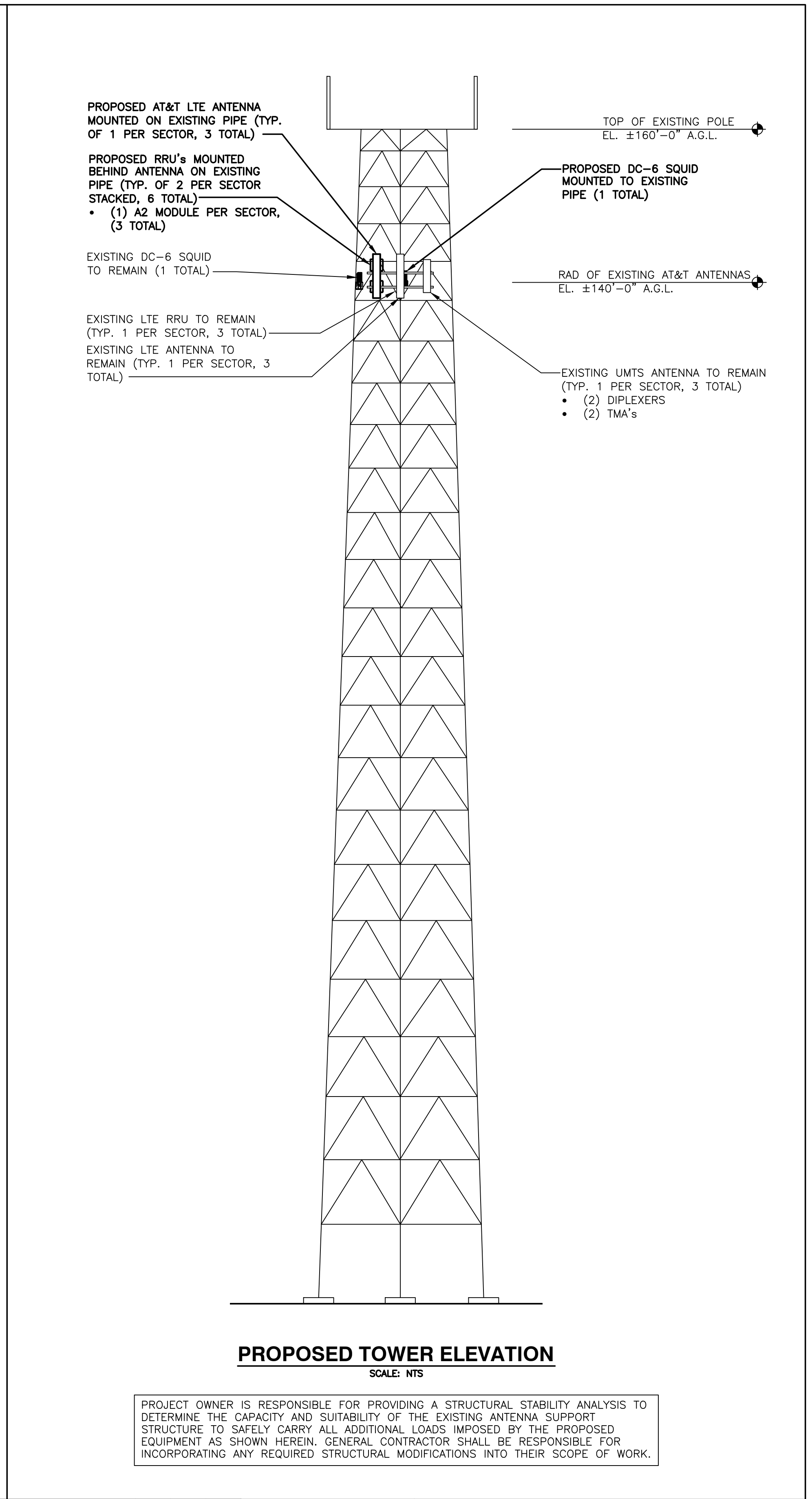
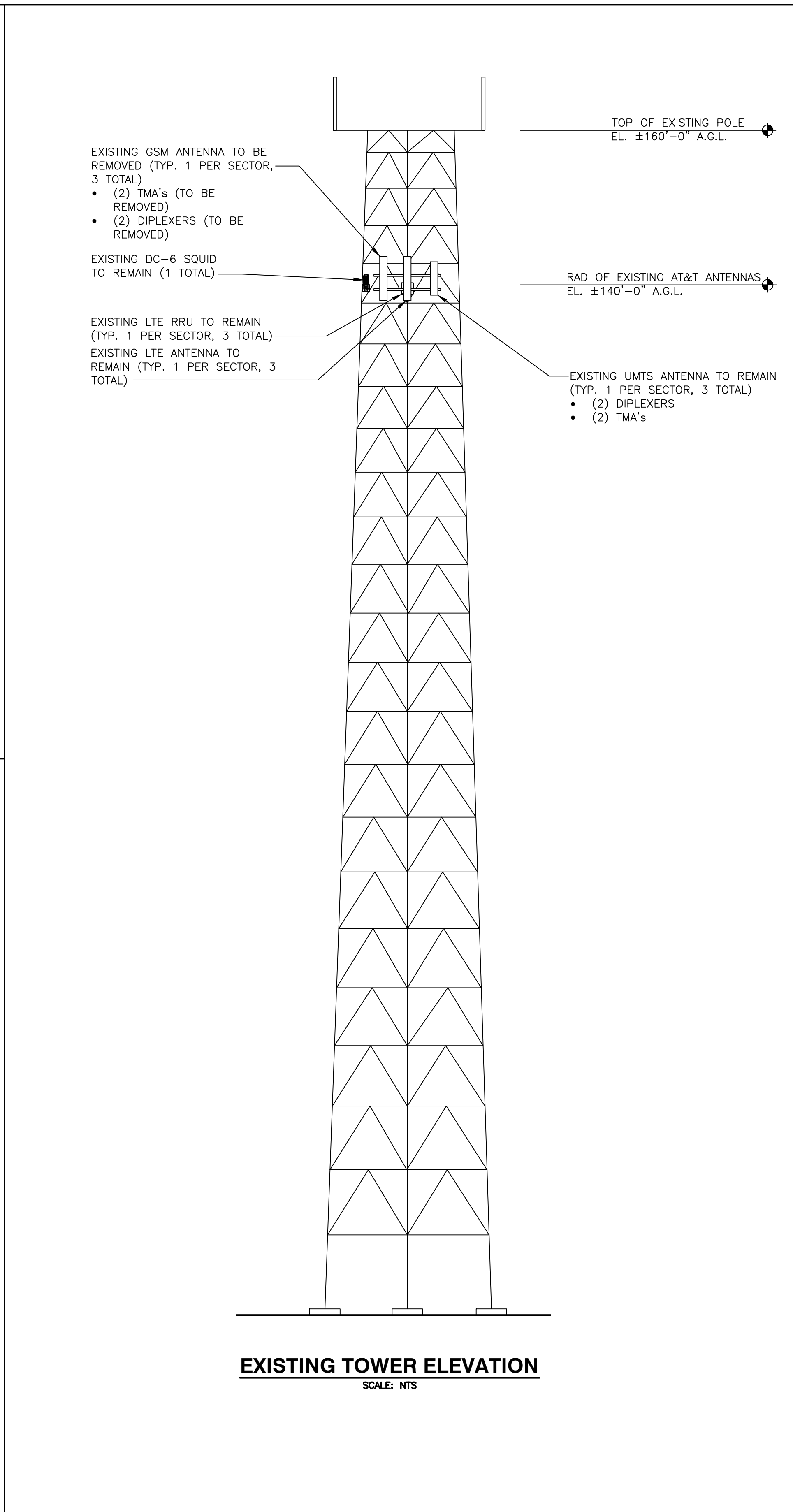
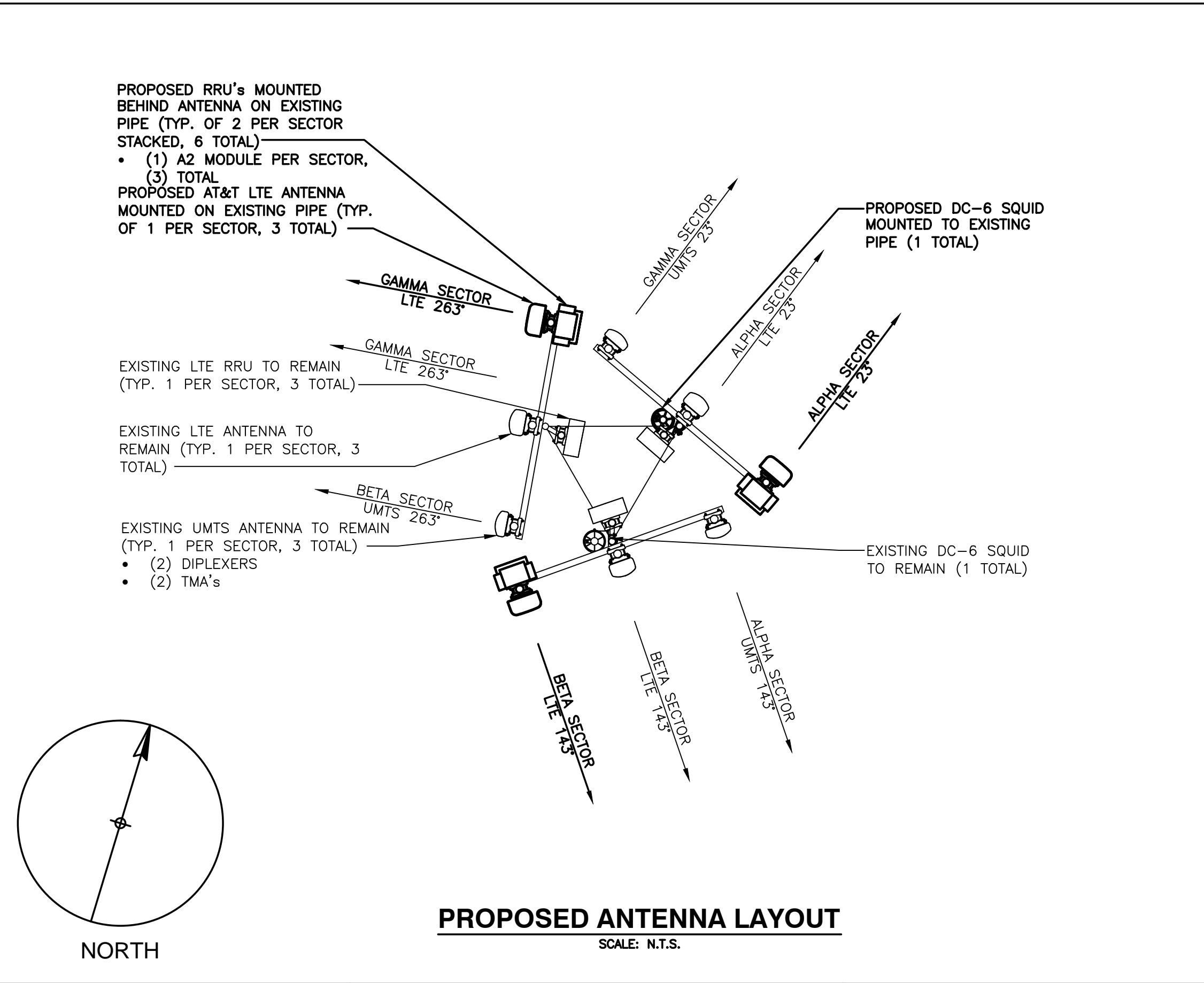
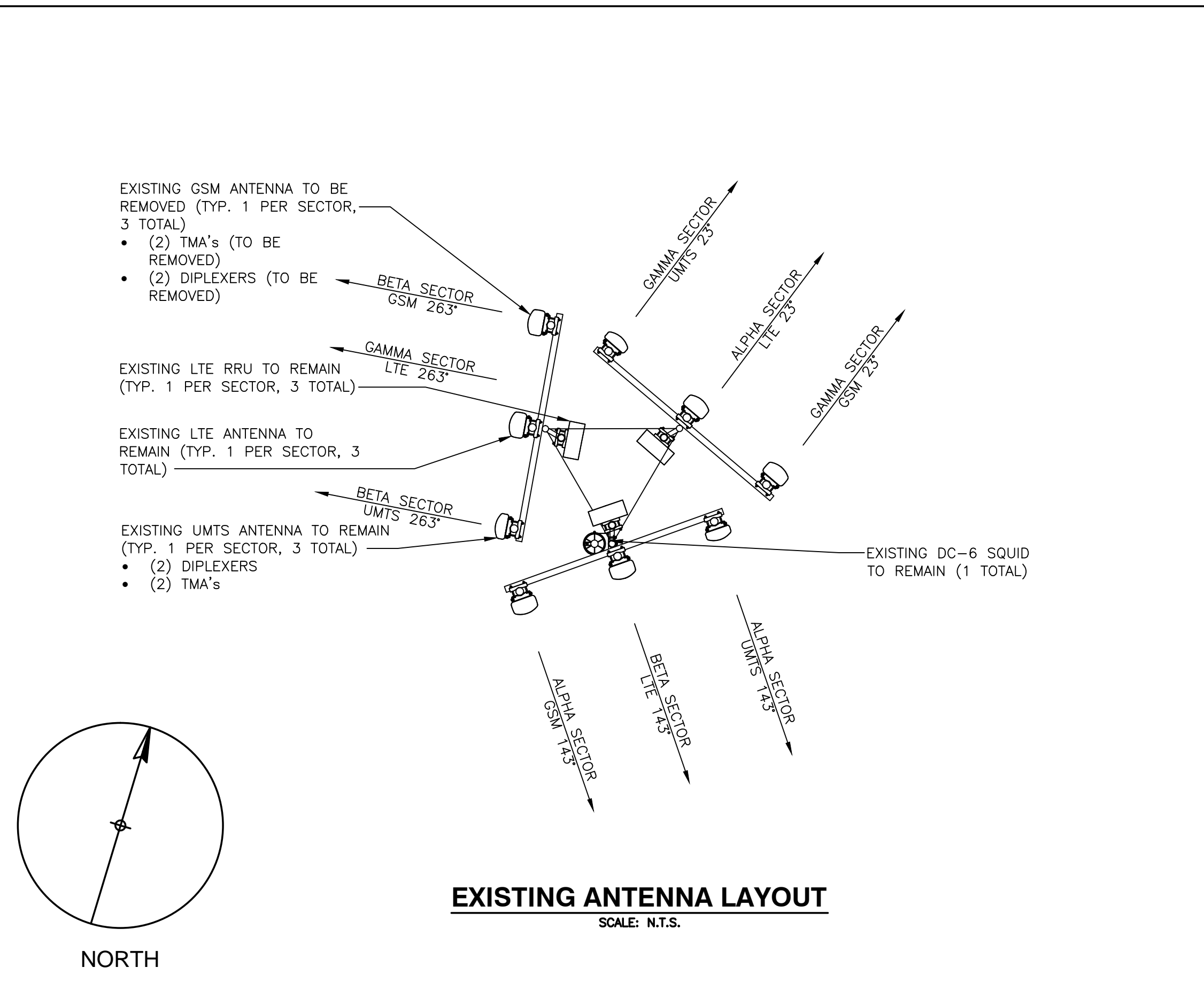
EMPIRE
telecom
16 ESQUIRE ROAD
BILLERICA, MA 01821

SITE NUMBER: CT1078
SITE NAME: MIDDLEBURY-2 LARKIN DR
2 LARKIN DRIVE
MIDDLEBURY, CT 06762
NEW HAVEN COUNTY

at&t
MOBILITY
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

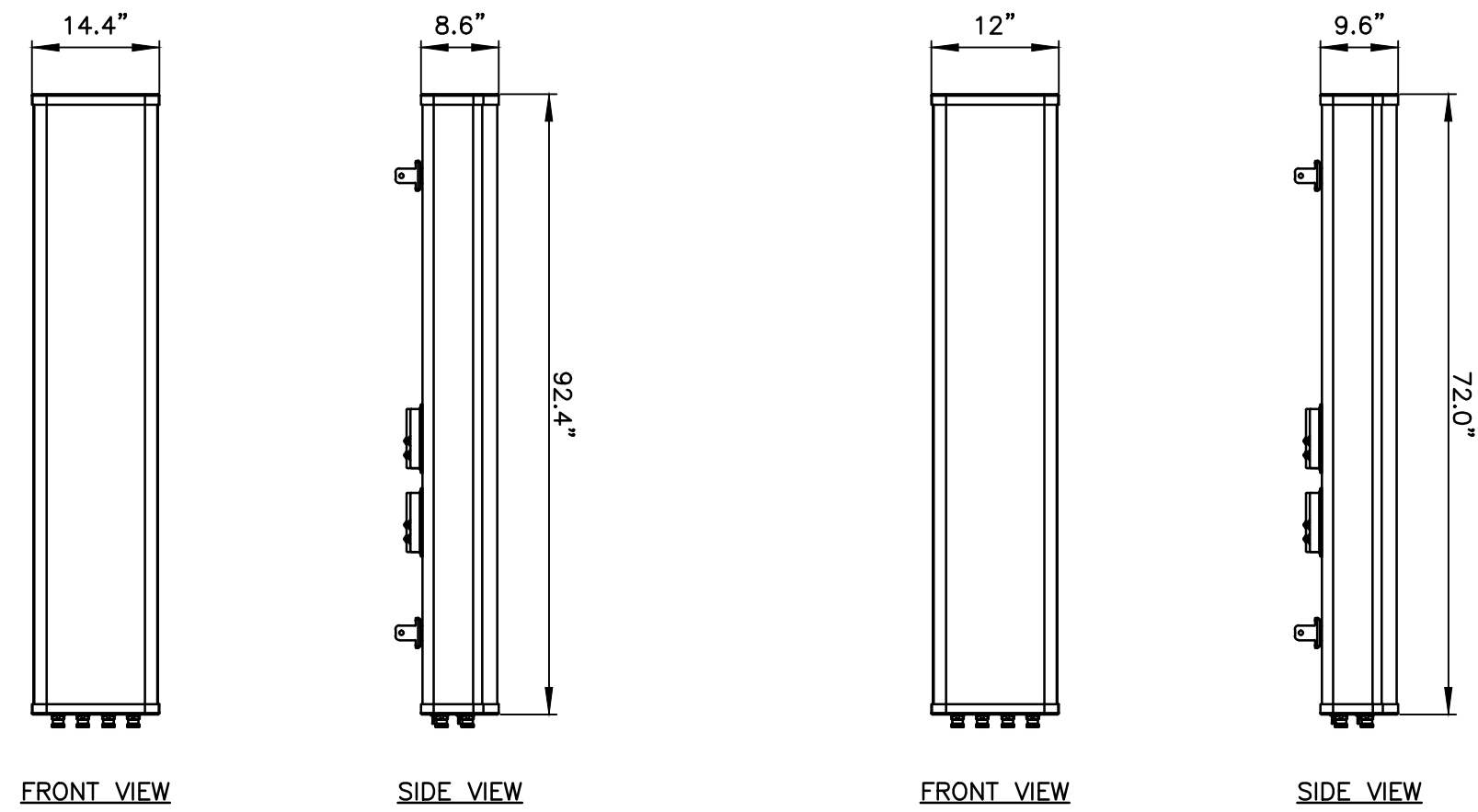
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A	10/20/15	INITIAL SUBMISSION	NJM	NDB	NDB
SCALE: AS SHOWN		DESIGNED BY: NJM	DRAWN BY: NJM		

AT&T		
DRAWING TITLE: EQUIPMENT LAYOUT		
JOB NUMBER 15101-EMP	DRAWING NUMBER A-2	REV A



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.

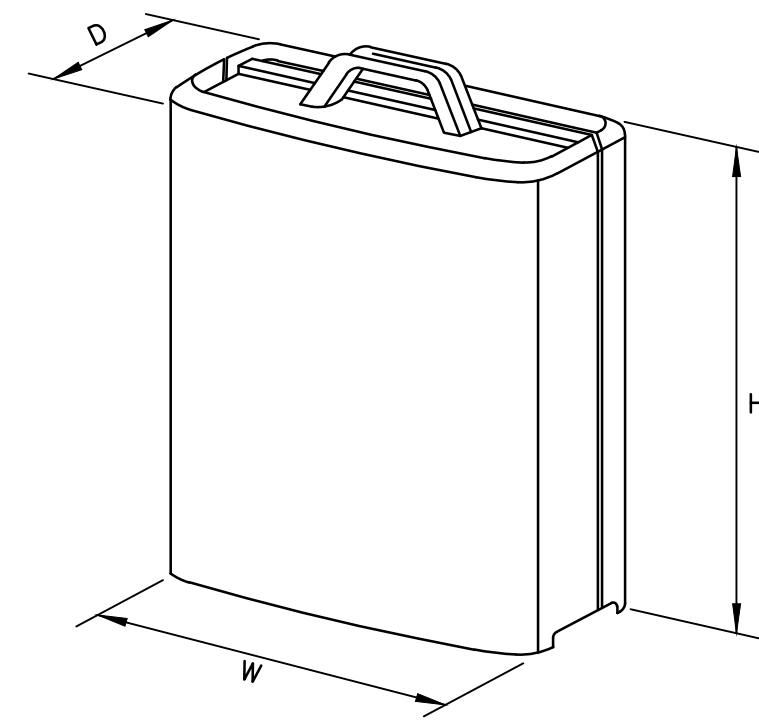
NO.	DATE	REVISIONS	BY	CHK	APP'D
A	10/20/15	INITIAL SUBMISSION	NJM	NDB	NDB
SCALE: AS SHOWN		DESIGNED BY: NJM	DRAWN BY: NJM		



FRONT VIEW SIDE VIEW FRONT VIEW SIDE VIEW

	MANUFACTURER	CCI
	MODEL	TPA-65R-LCUUUU-H8
	WEIGHT	75.0 LBS

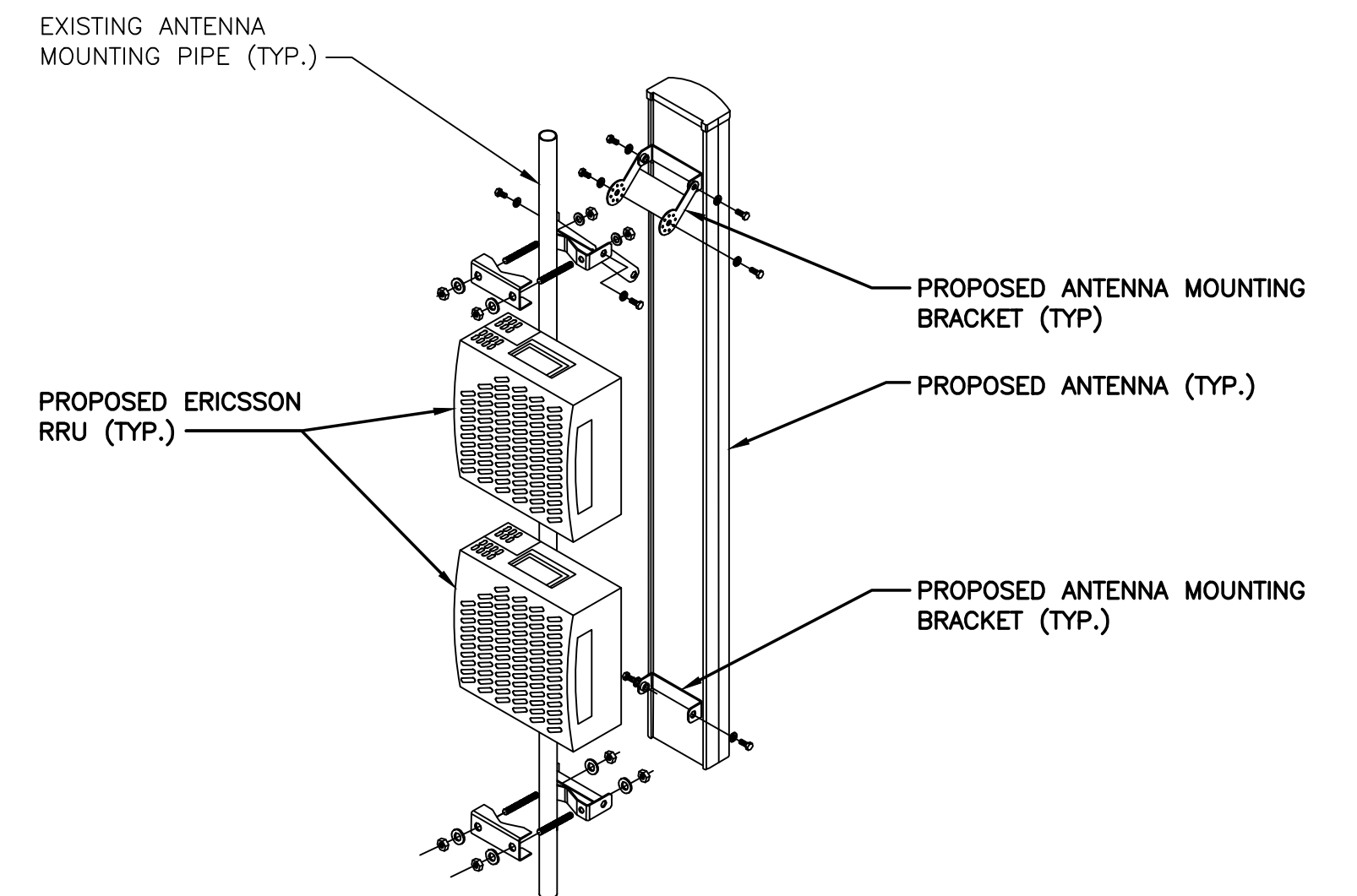
LTE ANTENNA DETAIL
SCALE: N.T.S.



MODEL	L x W x H	WEIGHT
*RRUS-11	19.69" x 16.97" x 7.17"	50.7 LBS
RRUS-12	20.4"x18.5"x7.5"	58 LBS
RRUS-32	29.9"x13.3"x9.5"	77 LBS
A2 MODULE	16.4" X 15.2" X 3.4"	22 LBS

*DENOTES EXISTING.

RRUS DETAIL
SCALE: N.T.S.



ANTENNA AND RRU MOUNTING DETAIL
SCALE: N.T.S.

EXISTING ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770.00.850.10	55"x11"x5"
	A2	ANDREW	SBNH-1D6565C	96.4"x11.9"x7.1"
	A3	ANDREW	SBNH-1D6565C	96.4"x11.9"x7.1"
	-	-	-	-
BETA	B1	POWERWAVE	7770.00.850.08	55"x11"x5"
	B2	ANDREW	SBNH-1D6565C	96.4"x11.9"x7.1"
	B3	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	-	-	-	-
GAMMA	G1	POWERWAVE	7770.00.850.10	55"x11"x5"
	G2	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	G3	ANDREW	SBNH-1D6565C	96.4"x11.9"x7.1"
	-	-	-	-

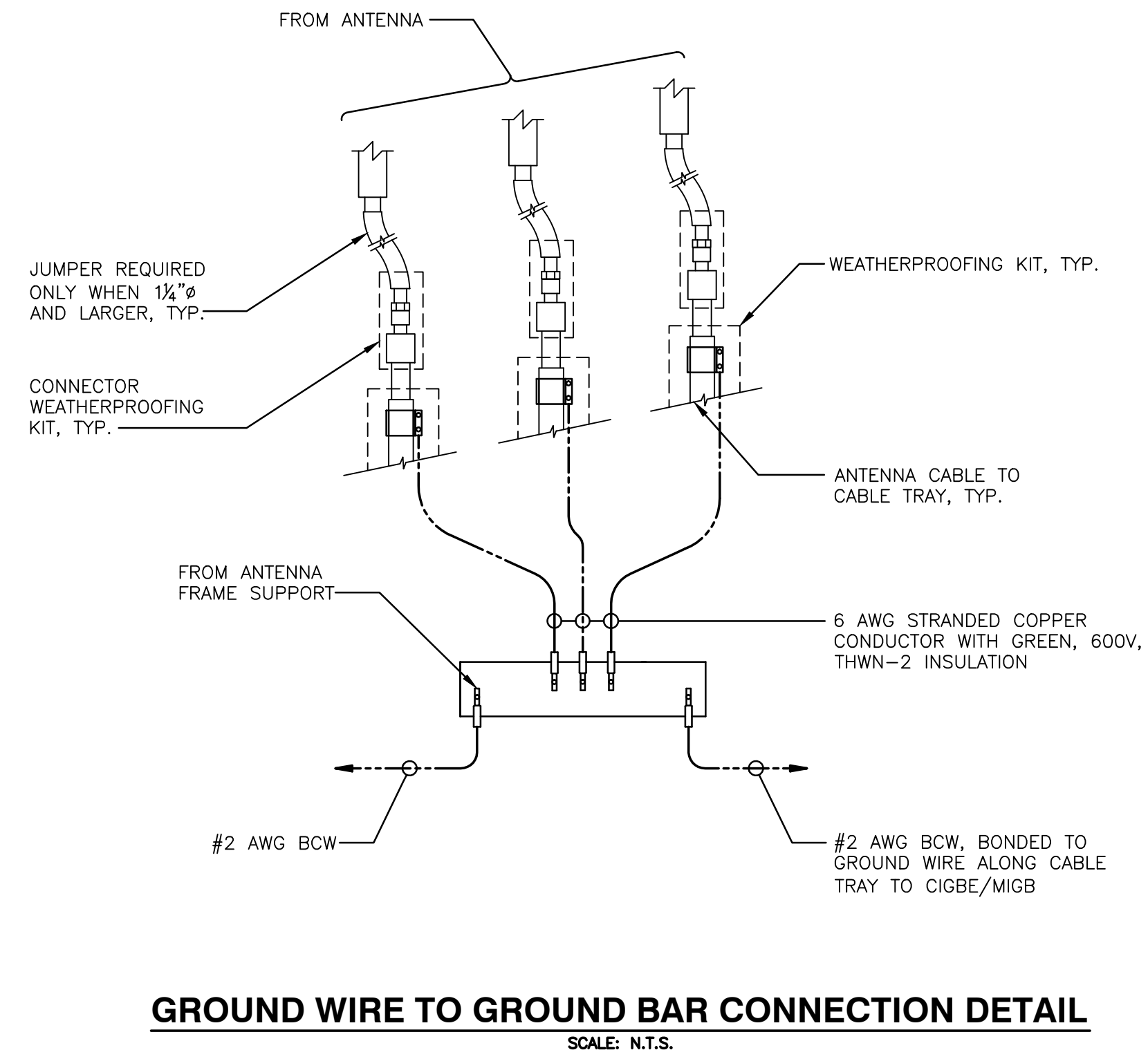
FINAL ANTENNA SCHEDULE

SECTOR	POSITION	MAKE	MODEL	SIZE (INCHES)
ALPHA	A1	POWERWAVE	7770.00.850.10	55"x11"x5"
	A2	ANDREW	SBNH-1D6565C	96.4"x11.9"x7.1"
	A3	CCI	TPA-65R-LCUUUU-H8	92.4"x14.4"x8.6"
	-	-	-	-
BETA	B1	POWERWAVE	7770.00.850.08	55"x11"x5"
	B2	ANDREW	SBNH-1D6565C	96.4"x11.9"x7.1"
	B3	CCI	TPA-65R-LCUUUU-H8	92.4"x14.4"x8.6"
	-	-	-	-
GAMMA	G1	POWERWAVE	7770.00.850.10	55"x11"x5"
	G2	KMW	AM-X-CD-16-65-00T-RET	72"x11.8"x5.9"
	G3	QUINTEL	QS66512-3	72"x12"x9.6"
	-	-	-	-

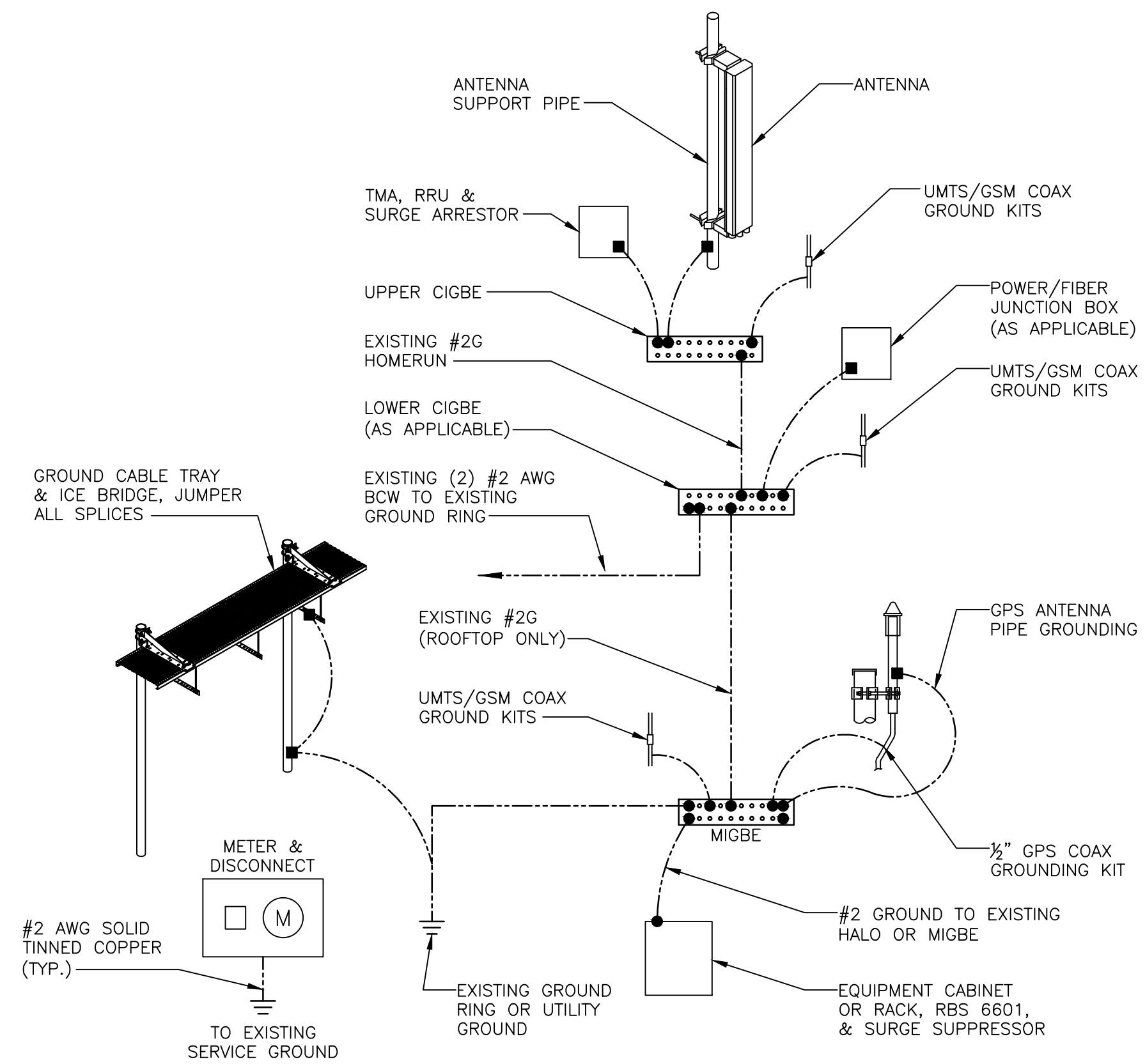
PROPOSED RRU SCHEDULE

SECTOR	MAKE	MODEL	SIZE (INCHES)	ADDITIONAL COMPONENT	SIZE (INCHES)
ALPHA	ERICSSON	RRUS-32	29.9"x13.3"x9.5"	A2 MODULE	16.4"x15.2"x3.4"
	ERICSSON	RRUS-12	20.4"x18.5"x7.17"	-	-
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"	-	-
BETA	ERICSSON	RRUS-32	29.9"x13.3"x9.5"	A2 MODULE	16.4"x15.2"x3.4"
	ERICSSON	RRUS-12	20.4"x18.5"x7.17"	-	-
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"	-	-
GAMMA	ERICSSON	RRUS-32	29.9"x13.3"x9.5"	A2 MODULE	16.4"x15.2"x3.4"
	ERICSSON	RRUS-12	20.4"x18.5"x7.17"	-	-
	ERICSSON	RRUS-11 (EXISTING)	19.7"x16.9"x7.2"	-	-

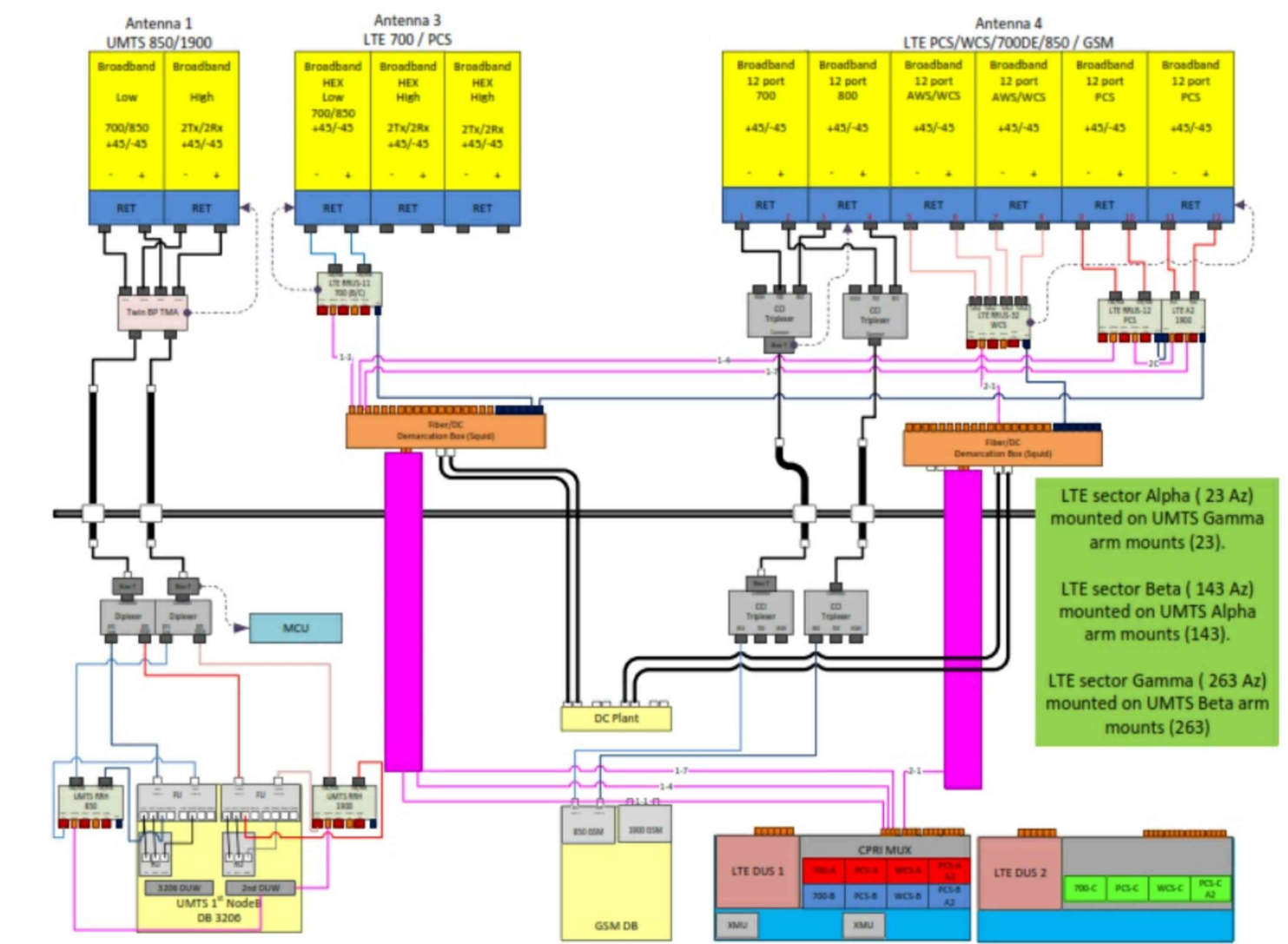
PROJECT OWNER IS RESPONSIBLE FOR PROVIDING A STRUCTURAL STABILITY ANALYSIS TO DETERMINE THE CAPACITY AND SUITABILITY OF THE EXISTING ANTENNA SUPPORT STRUCTURE TO SAFELY CARRY ALL ADDITIONAL LOADS IMPOSED BY THE PROPOSED EQUIPMENT AS SHOWN HEREIN. GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR INCORPORATING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



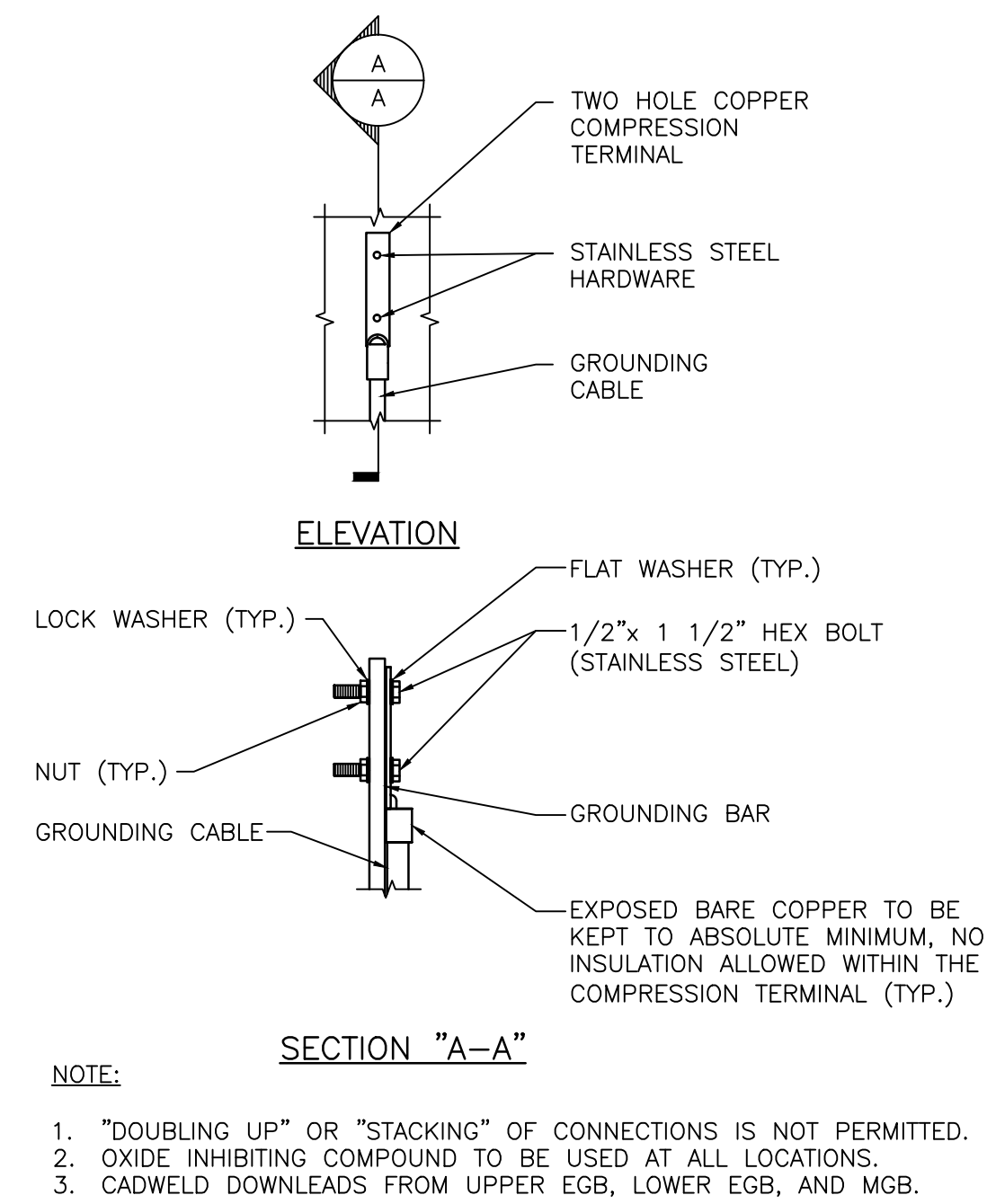
GROUND WIRE TO GROUND BAR CONNECTION DETAIL
SCALE: N.T.S.



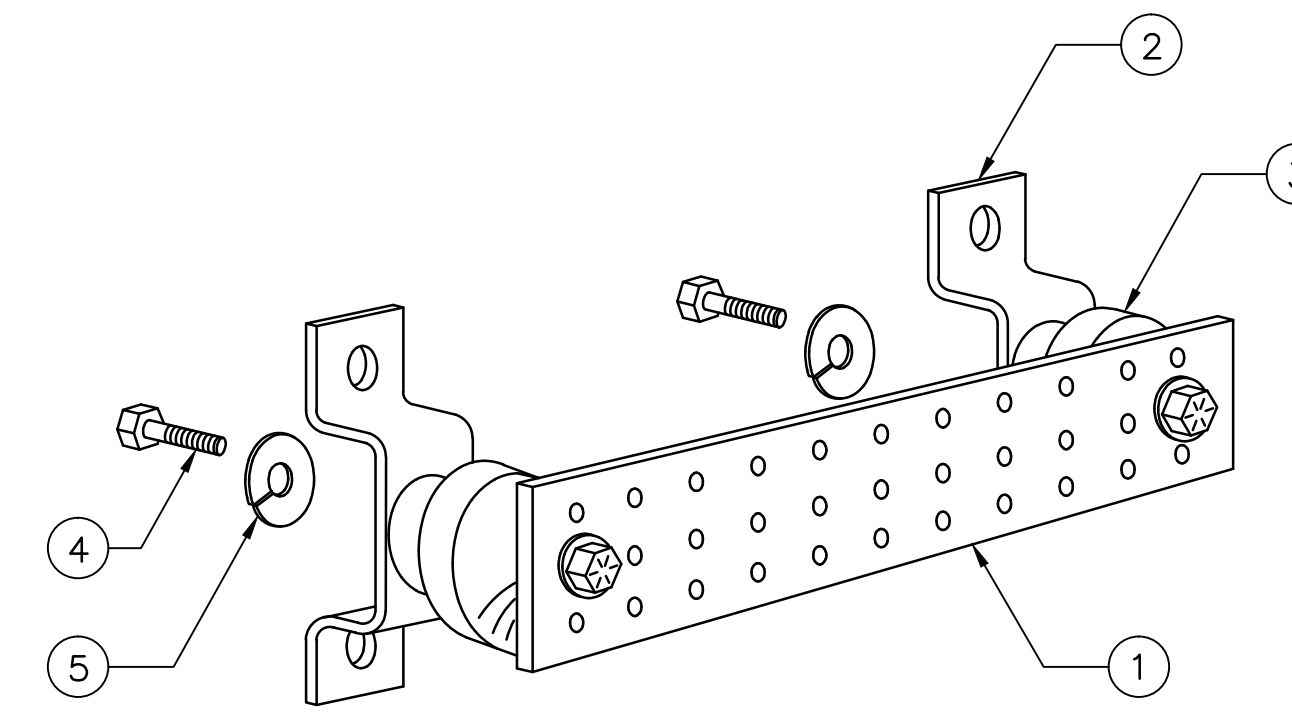
GROUNDING RISER DIAGRAM
SCALE: N.T.S.



TYPICAL PLUMBING DIAGRAM (PER SECTOR)
SCALE: N.T.S.



TYPICAL GROUND BAR CONNECTION DETAIL
SCALE: N.T.S.



ITEM NO.	QTY.	DESCRIPTION
1	1	SOLID GROUND BAR (20"x 4"x 1/4")
2	2	WALL MOUNTING BRACKET
3	2	INSULATORS
4	4	5/8"-11x1" H.H.C.S.
5	4	5/8" 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.

NO.	DATE	REVISIONS	BY	CHK	APP'D
A	10/20/15	INITIAL SUBMISSION	NJM	NDB	NDB
SCALE: AS SHOWN		DESIGNED BY: NJM	DRAWN BY: NJM		



Submitted to
Empire Telecom USA, LLC
16 Esquire Road
Billerica, MA 01862

Submitted by
AECOM
500 Enterprise Drive,
Suite 3B
Rocky Hill, CT 06067
April 9, 2018

Airosmith Development, Inc.
32 Clinton Street
Saratoga Springs, NY 12866

DETAILED STRUCTURAL ANALYSIS AND MODIFICATION OF AN EXISTING 160' SELF SUPPORTING LATTICE TOWER AND FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENT



AT&T Site Name:

CT1078

Sprint Site Name :

CT03XC028

Site Address:

Intersection of I-84 and South Street
Middlebury, Connecticut

60567641 / EMP-006

60567639 / ASM-006

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 - FOUNDATION EVALUATION**

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis and modification of the existing 160' self-supporting lattice tower located west of the intersection of I-84 and South Street in Middlebury, Connecticut.

The structural analysis was conducted in accordance with the 2016 Connecticut State Building Code which includes the TIA-222-G¹ Standard, 2012 International Building Code, the 2016 Connecticut State Building Code Amendments, the AISC² Load Resistance Factor Design (LRFD), the ASCE 7³ design Code, and the Connecticut State Police Requirements which include the TIA/EIA-222-F⁴.

The antenna loading considered in the analysis consists of all the existing and proposed antennas, transmission lines and ancillary items as outlined in the Introduction Section of this Report.

The proposed AT&T and Sprint antenna installation is listed below:

Proposed Appurtenances	Carrier	Antenna Center Elevation
<u>Remove:</u>		
(2) Andrew SBNH-1DC6565C Panel Antennas (Alpha and Gamma Sectors) (1) KMW AM-X-CD-16-65-00T-RET Panel Antenna (Beta Sector) (3) TMA Units (6) Diplexer Units	AT&T (existing)	@ 140'
<u>Install:</u>		
(2) CCI TPA-65R-LCUUUU-H8 Panels (Alpha and Beta Sectors) (1) Quintel QS66512-3 Panel Antenna (Gamma Sector) (3) Ericsson RRUS-32 RRH Units (3) Ericsson RRUS-12 RRH Units (3) Ericsson A2 Module Units (1) Raycap DC6 Surge Suppressor (Squid) Unit	AT&T (Proposed)	@ 140'
(3) Commscope DT465B-2XR Panel Antennas (3) 2x50W 800 MHz RRH Units (3) TD-RRH8x20-25 RRH Units (1) Hybrid Cable (1-1/4" Outside Diameter Hybriflex Cable) (3) Pipe Mount Assemblies (Modeled Commscope Part # PM-SU35-48 Pipe Mount Kits	Sprint (Proposed)	@97'

1. TIA = Telecommunications Industry Association Structural Standard for Antenna Supporting Structures and Antennas (Version G)

2. AISC = American Institute of Steel Construction (14th Edition)

3. ASCE 7 = American Society of Civil Engineers Standard 7 (2010 Edition)

4. TIA/EIA = Telecommunications Industry Association Structural Standard for Antenna Supporting Structures and Antennas (Version F)

1. EXECUTIVE SUMMARY *(continued)*

The results of an initial analysis indicated the existing tower structure did not have enough capacity for the proposed loading conditions. The tower structure requires modifications indicated on sheets SK-1 and SK-2. **Once the modifications indicated on sheets SK-1 and SK-2 are performed, the modified structure with the existing tower anchor bolts and existing foundation are considered structurally adequate with the wind load classification specified herein with the existing and proposed antenna loading.**

The tower deflection (sway) is 0.5175 degrees, and the tower rotation (twist) is 0.2026 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. **The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees for combined deflection (sway) and rotation (twist).**

This analysis is based on:

- 1) The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- 2) Tower geometry, member sizes and foundation taken from Tower and Foundation reports prepared by Stainless, Inc. project number 358807 dated December 14, 1993.
- 3) Soil information taken from geotechnical report prepared by Dr. Clarence Welti, P.E., P.C., dated December 17, 2012.
- 4) Previous structural analysis and modification performed by AECOM on behalf of Verizon Wireless, project number 60404004, signed and sealed on July 10, 2015.
- 5) Previous structural analysis performed by AECOM on behalf of Northwest CT Public Safety Communication Center, project number 60492507, signed and sealed on April 26, 2016.
- 6) Tower Mapping and Inventory of tower performed by D & K Nationwide Communications, Inc., dated March 27, 2016.
- 7) Previous structural analysis and evaluation performed by AECOM on behalf of Pyramid Network Services, LLC, project number 60509756.21, signed and sealed on February 19, 2017.
- 8) Proposed AT&T antenna configuration obtained Construction Drawings and Radio Frequency Data Sheet (RFDS) via e-mail dated July 8, 2016.
- 9) Proposed antenna configuration obtained by Sprint from Construction Drawings dated December 26, 2017 obtained via e-mail.
- 10) Previous structural analysis and evaluation performed by AECOM on behalf of AT&T project number 60564916 / EMP-002, signed and sealed on January 24, 2018.
- 11) Previous structural analysis and evaluation performed by AECOM on behalf of Sprint, project number 60558618 / ASM-001, signed and sealed on February 9, 2018.
- 12) Coax cable orientation as specified in section 6 of this report.


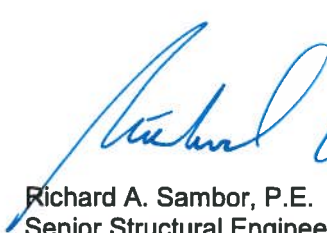
1. **EXECUTIVE SUMMARY** *(continued)*

This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the antenna, cabling and mount configuration used, as well as the physical condition of the tower members, connections and foundations. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,

AECOM,



Richard A. Sambor, P.E.
Senior Structural Engineer

RAS/mcd

cc: IA, CF/Book – AECOM

2. INTRODUCTION

The subject tower is located west of the intersection of I-84 and South Street in Middlebury, Connecticut. The structure is a self-supporting three-legged 160' steel tapered lattice tower manufactured by Stainless Incorporated.

The structural analysis was conducted in accordance with the following:

- TIA-222-G Standard for Standard for a wind velocity of range of 95 mph to 115 mph (3-second gust) and 50 mph (3-second gust) concurrent with 0.75" ice thickness, considered to increase in thickness with height
- 2012 International Building Code with 2016 Connecticut State Building Code Amendments for a wind speed of 101 mph (3-second gust)
- 2010 AISC Load Resistance Factor Design (LRFD)
- 2010 ASCE 7 Minimum Design Loads for Buildings and Other Structures for the ice thickness referenced in the TIA-222-G Standard
- Connecticut State Police Requirements for a wind velocity of 90 mph (fastest mile) and 90 mph (fastest mile) concurrent with 0.5" ice. Twist (rotation) and sway (deflection) were determined in accordance with Connecticut State Police Requirements for a wind velocity of 90 mph (fastest mile) concurrent with 0.5" ice, analyzed under the TIA/EIA-222-F design Standard.

The inventory together with the proposed AT&T and Sprint antenna arrangement is summarized in the table below:

Antenna Type	Carrier	Mount	Centerline Elevation	Cable
4' Lightning Rod	D&K – 33 (existing)	Pipe mount above	177'	---
16' Lightning Rod Mounting Pipe	(existing)	None	168'	---
Tower Light	(existing)	None	160'-6"	---
(1) Sinclair SC479-HF1LDF(D00-E6085) Omni Antenna	CSP (Existing)	<i>Shared with Below Mount</i>	160'	(1) 1-5/8" AVA Cable
(1) Bird 432E-831-01 TTA Junction Box (Mounted to Leg)	CSP (Existing)	(1) 6' Side-arm Mount attached to Leg (PSA6)	160'	(1) 1-5/8" AVA Cable (1) 1/2" Coax Cable
(1) Sinclair SC479-HF1LDF(D00I-E6085) (Inverted) Omni Antenna	CSP (Existing)	<i>Shared with Above Mount</i>	160'	(1) Jumper Cable from above TTA Unit
(1) 12' Omni Antenna	D&K – 29 (existing)	<i>Mount Shared with D&K – 21 (below)</i>	159'	(1) 1-5/8" coax cable
(1) Junction Box	D&K – 30 CSP (existing)	Face Mounted	158'	(1) 1/2" coax cable
(1) Junction Box	D&K – 25 CSP (existing)	<i>Mount shared with D&K – 18 (below)</i>	158'	(2) 3/8" coax cables (1) 1/2" coax cable
(1) Sinclair SC479-HF1LDF(D00I-E6085) (Inverted) Omni Antenna	CSP (Existing)	<i>Mount Shared with 6' Side-arm (PSA6) (above)</i>	157.5'	(1) 1/2" Jumper from TTA from Above CSP TTA unit @ 160'
(1) 8-Bay 20' Dipole Antenna	D&K – 28 FBI – 3 (existing)	<i>Mount Shared with D&K – 30 (above)</i>	157'	(1) 7/8" coax cable

Antenna Type	Carrier	Mount	Centerline Elevation	Cable
(1) OGT9-806 Omni*	D&K – 26 CSP-8 (existing)	<i>Mount Shared with D&K – 19 (below)</i>	157'	(1) 1-5/8" coax cable*
(1) 4-Bay 20' Dipole Antenna	D&K – 27 ATF – 2 (existing)	<i>Mount Shared with D&K – 22 (below)</i>	155'	(1) 7/8" coax cable
(1) Raycap Distribution Unit (Squid)	D&K – 23 (existing)	1' Standoff Mounted to Leg	145'	(1) 1-1/4" coax cable
(1) (Inverted) OGT9-806 Omni Antenna *	D&K – 21 CSP-11 (existing)	(2) 8' Stiff-Arm Mounts	141.3333'	(1) 1-5/8" coax cable
(1) (inverted) Omni	D&K – 22 (existing)	(2) 8' Stiff-Arm Mounts	141'	(1) 1-5/8" coax cable
(1) (inverted) Omni	D&K – 18 (existing)	(2) 8' Stiff-Arm Mounts	141'	(1) 1-5/8" coax cable
(1) Radiowaves HD2-4.7 (2 foot dish)	Northwest CT Public Safety (existing)	Mounted to Face	140'	(2) 7/8" AVA5-50FX Heliax Andrew Virtual Air Coaxial Cables
(1) (inverted) Omni	D&K – 20 (existing)	<i>Shared with below Mount</i>	139.5'	(1) 1-5/8" coax cable
(1) (inverted) Omni	D&K – 19 (existing)	(1) 10' Stand-off Arm	139.5'	(1) 1-5/8" coax cable
(2) CCI TPA-65R- LCUUUU-H8 Panels (1 A, 1 B) (1) Quintel QS66512-3 Panel (1 C) (3) RRUS-32 RRH Units (3) RRUS-12 RRH Units (3) A2 Module Units (1) DC6 Squid Unit	AT&T (Proposed)	See Below Mounts	140'	(1) Fiber Optic Cable (2) DC cables
(3) Powerwave 7770 (3) TT19-08BP111-001 Twin TMA Units (3) LGP21401 Diplexers (2) SBNH-1D6565C (1 A, 1 B) (1) KMW AM-X-CD-16- 65-00T (1 C) (3) RRUS-11 RRH Units (1) Surge Suppressor	AT&T (existing)	(3) T-Frames	140'	(12) 1 1/4" coax cable (1) 3" Flex Conduit with 1 Fiber & 2 DC Cables
(1) Celwave PD1142	D&K – 11 DOT – 4 (existing)	(2) 8' Stiff-Arm Mounts	120'	(1) 7/8" coax cable
(3) LNX-6515DS-VTM Panel Antennas (3) Smart Bias-T Units (3) EMS RR90-17-02-DP antennas (3) TMA Units	T-Mobile (existing)	(3) 2-Panel Antenna Mounts	119'	(12) 1 5/8" coax cable
(2) 6' Dishes w/ Ice Shields	D&K – 5 & 6 CSP – 6 & 7 (existing)	(2) Dish Mounts	107'	(2) WEP65 coax cable

Antenna Type	Carrier	Mount	Centerline Elevation	Cable
(3) DT465B-2XR Panel Antennas (3) 2x50W 800 MHz RRH Units (3) TD-RRH8x20-25 RRH Units	Sprint (Proposed)	(3) Pipe Mounts attached to Tower (Modeled) (3) Commscope PM-SU35-48 Mounts)	97'	(1) Hybriflex Cable (1-1/4" OD)
(3) RFS APXVSP-20 Antennas (3) Andrew RRH 800 MHz 2x40W (3) Panasonic RRH 1900 MHz 2x40W	Sprint (existing)	Existing Pipe Mounts w/ (3) Commscope PM-SU35-48 Mounts	97'	(3) Hybriflex cable (1-1/4" OD)
(1) PD10054	D&K-1 CSP – 5 (existing)	1' Standoff Mounted to Leg	82'	(1) 7/8" coax cable
(2) SBNHH-1D65B (1A & 1B) 700 MHz and shared with 2100 MHz (AWS)) (2) 700 MHz RRH Units (1A & 1B) 700 MHz and shared with 2100 MHz (AWS) (2) 2100 MHz (AWS) Units (1A & 1B) 700 MHz and shared with 2100 MHz (AWS) (2) SBNHH-1D65B (1A, 1B) 850 MHz and shared with 1900 MHz (PCS) (1) DB-T1-6Z-8AB-0Z Distribution Box	Verizon (existing)	(2) Antenna Mount Frames (Alpha & Beta Sectors)	75'	(1) 1-5/8" Fiber Optic Cable (HB158-1-08U8-S8J18)

NOTES: Antenna ID Numbering and elevations obtained from Tower Mapping and Existing inventory via tower climb performed by D&K Nationwide Communications, Inc. on March 27, 2016.

"*" indicates future decommissioning of CSP antennas

This structural analysis of the communications tower was performed by AECOM for AT&T and Sprint. The purpose of this analysis was to investigate the structural integrity of the modified tower and existing foundation for existing and proposed antenna loads in compliance with the 2016 Connecticut State Building Code. This analysis was conducted to evaluate stress on the tower and the effect forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with, the TIA-222-G–Structural Standard for Antenna Towers and Antenna Supporting Structures and Antennas, the 2012 International Building Code with 2016 Connecticut State Building Code Amendments and the American Institute of Steel Construction (AISC) Manual of Steel Construction – Load Resistance Factor Design (LRFD)

The structural analysis was conducted using TNX Tower version 7.0.8.3 and used the following conditions for this tower review (following the TIA/EIA-222-G Standard):

- Structure Class 3 – (Essential Communications)
 - NOTE: ASCE 7 and CT State Building Code Applied Risk Category 4 for design wind loads (see below)
- Topographic Category 3 – (Tower location on top of hill – rolling wind conditions considered)
 - Crest Height used for analysis: (approximate elevations listed below)
 - Tower Base Elevation = 770 feet
 - High point (2 mile Radius) = 800 feet (Ref. Bedlam Hill)
 - Low Point (2 mile Radius) = 389 feet (Ref. Johnson School Building)
 - “H” = (Avg of High/Low) – Base Elevation = 176 feet
- Exposure Class C – (Open Terrain with scattered obstructions)
- Load Conditions:
 - Two load conditions were evaluated as shown which were compared to design stresses according to AISC and TIA-222-G Standard.

Basic Wind Speed:

- TIA-222-G:
 - New Haven County (Wind Speed Range): $V = 95 \text{ mph} - 115 \text{ mph}$ (3-second gust) [Annex of TIA/EIA-222-G 2006]
- IBC 2012 w/ 2016 CT State Building Code Amendment:
 - (2012) IBC Section 1609.1.1 – Determination of Wind Loads – Exception 5 “Designs using TIA-222” applies for determination of Design Wind Load obtained as “ V_{ult} ” are to be converted to “ V_{asd} ” when applying the TIA-222-G design Standard (under Section 1609.3) for Basic Wind Speed.
 - (2016) CT State Building Code Amendment to the IBC Section 1609.3 wind loads are obtained from Appendix N of the State Building Code.
 - **$V_{asd} = 101 \text{ mph}$** (3-Second Gust) Wind Design Parameter for the Town of Middlebury, Connecticut for Risk Category four (IV) for essential communications (Connecticut State Police).

LOAD CONDITION 1 = 101 MPH (3-SECOND GUST) WIND LOAD (WITHOUT ICE) + TOWER DEAD LOAD

Load Condition 2 = 50 mph (3-second gust) Wind Load (with ice) + Ice Load + Tower Dead Load

Ice thickness used for this analysis is **0.75 inch** (assumed to start at the base of the tower) and is considered to increase in thickness with height. The initial ice thickness for design is referenced in the Annex of TIA-222-G and follows the same design criteria as the ASCE 7 Standard.

The below load condition implements the design requirements of the Connecticut State Police for the tower structures deflection limits with the allowable deflection limit of the combination of the tower’s sway (deflection) and twist (rotation) under the TIA-222-F design Standard. This design limit required the design combined value of sway (deflection) and twist (rotation) to be under 0.75 degrees following the TIA-222-F design Standard.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS (cont.)

Load Condition 3 = 90 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Seismic event consideration factors/values for design:

- $S_s = 0.191$ (2016 CT State Building Code – Location Specific Value)
- $S_1 = 0.064$ (2016 CT State Building Code – Location Specific Value)
- Site Classification = "D" – from Geotechnical Report
- Seismic Design Category = "C" – (2012 International Building Code)
- $F_a = 1.6$ (Obtained from TIA-222-G Table 2-12 Considering above conditions)
- $F_v = 2.4$ (Obtained from TIA-222-G Table 2-13 Considering above conditions)

Strength Limit State Load Combinations (TIA-222-G Section 2.3.2):

The structural analysis herein has considered the following load combinations within the analysis:

1. **1.2 Dead Load Tower structure + 1.0 Dead Load Guy Assemblies + 1.6 Wind load without ice**
2. 1.2 Dead Load Tower structure + 1.0 Dead Load Guy Assemblies + 1.0 Dead weight of ice due to factored ice thickness + 1.0 Concurrent wind load with factored ice thickness + 1.0 Load effects due to temperature
3. 1.2 Dead Load Tower structure + 1.0 Dead Load Guy Assemblies + 1.0 Earthquake Load

NOTE 1: The above **bolded** load combination is considered to create the governing design loads per the results of the analysis.

NOTE 2: The above "Dead Load Guy Assemblies" are not considered as part of the analysis and are considered as a value of zero.

NOTE 3: The "Load effects due to temperature" do not apply for structures that are self-sustaining (from the TIA-222-G Standard)

4. FINDINGS AND EVALUATION

Combined axial and bending stresses on the existing tower structure were evaluated to compare with strength design in accordance with AISC (LRFD). The results of an initial analysis indicated that the existing tower structure did not have enough capacity to support the proposed loading conditions. The tower structure requires modifications shown on sheets SK-1 and SK-2. **Once the modifications indicated on sheets SK-1 and SK-2 are performed, the modified tower structure, existing anchor bolts and existing foundation are considered structurally adequate with the wind load specification with the existing and proposed antenna loading included herein.**

The tower sway (deflection) is 0.5175 degrees and the tower twist (rotation) is 0.2026 degrees. These figures are within the Connecticut State Police specification of 0.75 degrees for sway and twist.

Tower Base Reactions:

Description	Factored Loads (TIA-222-G)
Axial Load (kips)	59
Pier Compression (kips)	444
Pier Uplift (kips)	389
Overall Overturning (kip-ft)	8440
Overall Shear (kips)	107
Shear per Leg (kips)	59

Tower Component Stress vs. Capacity Summary:

Component / (Section No.)	Critical Component Size	Controlling Elevation	Stress (% capacity)	Pass/Fail
Tower Leg (T10)	HSS 6.875x0.5 with (3) 2x5/8 Welded Bars	0' – 25'	86.2	Pass
Diagonal (T10)	(2)L4x3x3/8 Back to Back Angles	0' – 25'	96.4	Pass
Horizontal (T10)	L4x4x1/2	0' – 25'	90.0	Pass
Top Girt (T8)	L4x4x1/4	37.5' – 50'	89.7	Pass
Redundant Horizontal Bracing (T9)	L2x2x5/16	25' – 37.5'	42.1	Pass
Redundant Diagonal Bracing (T9)	L2x2x5/16	25' – 37.5'	80.9	Pass
Inner Bracing (T7)	L2-1/2x2x3/16	50' – 58.333'	12.9	Pass
Tower connection Bolts	(2) A325X 5/8" Bolts (Horizontal)	25'	90.0	Pass

Foundation Summary:

Component	Required	Computed	% Capacity	Pass/Fail
Anchor Rod Capacity (TIA-222-G – 4.9.9)	Ratio < 1.0	0.938	93.8 %	Pass
Overturning Moment Factor of Safety TIA-222-G Conditions	Resist OT * (0.75) Reduction Factor (TIA-222-G – Section 9.4.1) 11745 Kip*ft	9084.71	77.5 %	Pass
Bearing Pressure (TIA-222-G Conditions)	6.750 ksf max	2.2388 ksf	33.2 %	Pass
Footing Pad Flexure (Steel Reinforcement)	Required < 53.04 in^2	51.9677 in^2	98.0 %	Pass

4. FINDINGS AND EVALUATION (cont.)

Maximum Deformations – Proposed Condition

ANSI/TIA-222-G Section 2.8.2 - Limit State Deformations

1. A rotation of 4 degrees about the vertical axis (twist) or any horizontal axis (sway) of the structure
2. A horizontal displacement (in feet) of 3% of the height of the structure.

Load Case Description	Current		Allowable	
	Sway (degree)	Displacement (Feet)	Sway (degree)	Displacement (Feet)
Service Wind Load	0.1142	0.2143	4.0	4.8

Tower Twist & Sway at Top (Connecticut State Police Requirements - TIA-222-F):

Description	Current	Total	Allowable
Tower Twist (degrees)	0.2026	0.7201	0.750
Tower Sway (degrees)	0.5175		

5. CONCLUSIONS

The results of an initial analysis indicated the existing tower structure did not have enough capacity for the proposed loading conditions. The tower structure requires modifications indicated on sheets SK-1 and SK-2. **Once the modifications indicated on sheets SK-1 and SK-2 are performed, the modified structure with the existing tower anchor bolts and existing foundation are considered structurally adequate with the wind load classification specified herein with the existing and proposed antenna loading.**

The tower deflection (sway) is 0.5175 degrees, and the tower rotation (twist) is 0.2026 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. **The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees for combined deflection (sway) and rotation (twist).**

Limitations/Assumptions:

This report is based on the following:

- 1) Tower inventory as listed in this report.
- 2) Tower is properly installed and maintained.
- 3) All members are as specified in the original design documents and are in good condition.
- 4) All required members are in place.
- 5) All bolts are in place and are properly tightened.
- 6) Tower is in plumb condition.
- 7) All member protective coatings are in good condition.
- 8) All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
- 9) Foundations are in good condition without defects and were properly constructed to support original design loads as specified in the original design documents.

AECOM is not responsible for any modifications completed prior to or hereafter in which AECOM is not or was not directly involved. Modifications include but are not limited to:

- A. Adding antennas
- B. Removing/replacing antennas
- C. Adding coaxial cables

AECOM hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact AECOM. AECOM disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

Ongoing and Periodic Inspection and Maintenance:

After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

The owner shall refer to TIA-222-G Section 14.2 for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. It is also recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

REINFORCEMENT DRAWINGS SK-1 AND SK-2

GENERAL CONSTRUCTION NOTES

1. ALL WORK SHALL COMPLY WITH THE CONNECTICUT STATE BUILDING, SUPPLEMENTS AND AMENDMENTS AND LIFE SAFETY CODES.
2. CONTRACTOR IS TO REVIEW ALL DRAWINGS AND NOTES 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 SUB-CONTRACTORS AND ALL RELATED PARTIES. THE SUB-CONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND NOTES FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON DRAWINGS.
4. 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.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION AND ELECTRICAL SUB-CONTRACTORS SHALL PAY FOR THEIR PERMITS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS ON SITE AT ALL TIMES AND ENSURE THE DISTRIBUTION OF NEW DRAWINGS TO SUB-CONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. CONTRACTOR SHALL FURNISH 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. INSTALLATION OF THIS WIRELESS COMMUNICATIONS EQUIPMENT SITE REQUIRES WORK IN THE IMMEDIATE VICINITY OF EXISTING OPERATING TELECOMMUNICATION SYSTEMS. THE CONTRACTOR SHALL PROVIDE AND COORDINATE THE METHODS OF PROTECTION WITH THE VARIOUS TELECOMMUNICATION CARRIERS AND THE TOWER OWNER. THERE SHALL BE NO INTERRUPTION OF OPERATION WITHOUT TIMELY COORDINATION WITH AND APPROVAL BY THE VARIOUS COMMUNICATIONS OPERATORS.
8. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUB-CONTRACTORS FOR ANY CONDITION PER MFR'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR ARCHITECT.
9. 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.
10. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ARCHITECT FOR REVIEW. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTAL TO THE ARCHITECT FOR REVIEW.
11. 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. SUBMIT ANY DISCREPANCIES FROM THE DRAWINGS TO THE ARCHITECT.
12. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURE AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
13. CONTRACTOR TO CONTACT "CALL BEFORE YOU DIG" AT 1-800-922-4455 TO VERIFY AND IDENTIFY THE EXACT LOCATIONS OF ALL UNDERGROUND UTILITIES AND OBSTRUCTIONS IDENTIFIED PRIOR TO COMMENCING WORK IN THE CONTRACT AREA.
14. EXISTING DIMENSIONS OF STRUCTURE SHOWN ON THESE DOCUMENTS ARE BASED ON ORIGINAL TOWER CONSTRUCTION DRAWINGS BY STAINLESS INC., DATED DECEMBER 1995, AND ARE NOT GUARANTEED. CONTRACTOR SHALL TAKE FIELD DIMENSIONS AS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK AND SHALL ASSUME FULL RESPONSIBILITY FOR THEIR ACCURACY. WHEN SHOP DRAWINGS BASED ON FIELD MEASUREMENT ARE SUBMITTED FOR REVIEW, DIMENSIONS ARE PROVIDED FOR THE ENGINEER'S REFERENCE ONLY.

STRUCTURAL NOTES

STRUCTURAL STEEL MATERIAL:

STRUCTURAL STEEL BEAMS, CHANNELS, PLATES..... A36
 STRUCTURAL ANGLES..... A36 & A529-50
 EXISTING TOWER LEG A 572-Gr. 50 & Gr. 60

STRUCTURAL STEEL SHALL CONFORM TO ALL THE REQUIREMENTS OF THE ASTM SPECIFICATION, AS REFERENCED IN THE CODE.

UNLESS OTHERWISE NOTED, ALL STEEL WILL BE GALVANIZED IN ACCORDANCE WITH ASTM 123 AFTER FABRICATION. TOUCH UP ALL DAMAGED GALVANIZED STEEL WITH APPROVED COLD ZINC, "GALVANOX", "DRY GALV", "ZINC-IT", OR APPROVED EQUIVALENT, IN ACCORDANCE WITH MANUFACTURERS GUIDELINES. TOUCH-UP DAMAGED NON GALVANIZED STEEL WITH SAME PAINT APPLIED IN SHOP OR FIELD.

SHOP AND ERECTION DRAWINGS SHALL BE SUBMITTED FOR ALL STRUCTURAL STEEL WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. SUBMIT 2 SETS OF PRINTS FOR THE ENGINEER REVIEW.

MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

THE OMISSION OF ANY MATERIAL THAT WAS SHOWN ON THE CONTRACT DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR OF PROVIDING THE SAME.

CONNECTIONS / FIELD ASSEMBLY:

BOLTED CONNECTIONS: UNLESS OTHERWISE NOTED, ALL JOINTS ARE SUP CRITICAL TYPE, REQUIRING 5/8" DIA. A325-N BOLTS, A563 NUTS AND F436 WASHERS, ALL GALVANIZED. BEVELED WASHERS SHALL BE USED ON BEAM FLANGES HAVING A SLOPE GREATER THAN 1:20.

STRUCTURE IS DESIGNED TO BE LEVEL AND PLUMB, SELF-SUPPORTING AND STABLE AFTER WORK IS COMPLETED.

COMMENCEMENT OF WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION. NO MEMBER OF THE TOWER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY. THE CONTRACTOR SHALL BE AWARE OF WEATHER AND WIND CONDITIONS AND NOT PERFORM MEMBER REPLACEMENT IN A WIND.

INSPECTIONS:

SPECIAL INSPECTIONS ARE REQUIRED PER THE CODE FOR STRUCTURAL STEEL WORK.

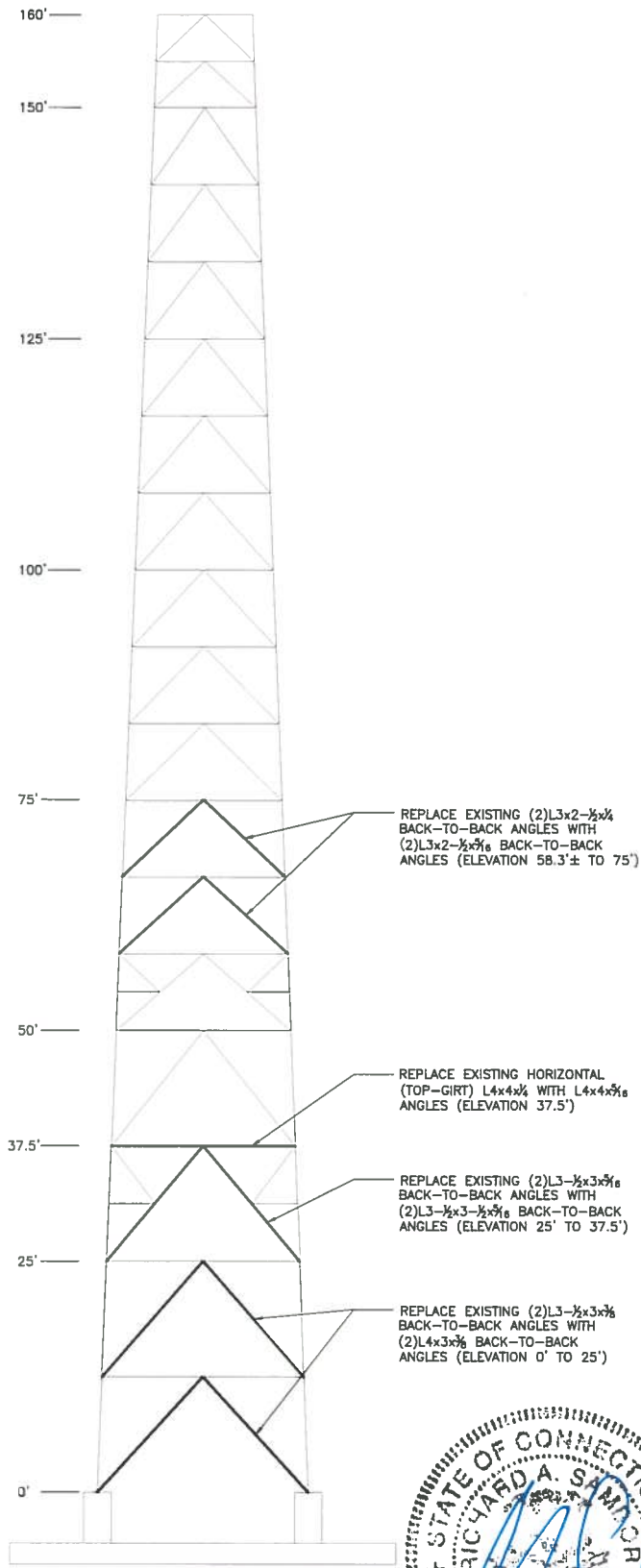
OWNER WILL SUPPLY THE SERVICES OF A SPECIAL INSPECTOR AND TESTING AGENTS AS REQUIRED BY THE AUTHORITY HAVING JURISDICTION. CONTRACTOR SHALL COORDINATE INSPECTIONS OF FABRICATOR'S AND ERECTOR'S WORK AND MATERIALS TO MEET THE REQUIREMENTS OF THE STATEMENT OF SPECIAL INSPECTIONS FOR THIS PROJECT.

COPIES OF TESTING AND INSPECTION REPORTS WILL BE PROVIDED TO THE OWNER, BUILDING OFFICIAL, ENGINEER OF RECORD AND CONTRACTOR.

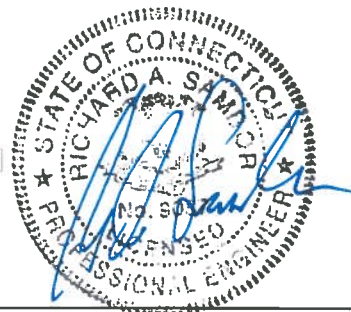


Project No.: ASM008/EMPO08 Designed by: MCD Drawn by: GAT Checked by: KAB Approved by: RAS	AECOM 500 ENTERPRISE DRIVE ROCKY HILL, CONNECTICUT (860)-529-8882	SITE ADDRESS: CSP #20, INTERSECTION OF I-84W & SOUTH ST MIDDLEBURY, CONNECTICUT	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> </table> Dwg. No. <div style="font-size: 2em; font-weight: bold; text-align: center;">SK-1</div> Scale: NONE Date: 04/09/18 Job No. File No. Dwg. 1 of 2																

- NOTE:**
1. REFER TO STRUCTURAL NOTES ON SK-1 FOR INFORMATION.
 2. REINFORCEMENT OF TOWER IS REQUIRED FOR ALL 3 SIDES OF EXISTING TOWER STRUCTURE.
 3. CONNECTION BOLTS THAT ARE REMOVED DURING MEMBER REPLACEMENT SHALL NOT BE RE-USED FOR CONNECTING REPLACEMENT MEMBERS.
 4. CONTRACTOR SHALL VERIFY INFORMATION SHOWN ON THIS SHEET PRIOR TO ORDERING MATERIALS.
 5. ANGLE MEMBER REPLACEMENT INDICATED ON THIS SHEET SHALL HAVE A MINIMUM YIELD STRESS OF 50 KSI UNLESS NOTED OTHERWISE.





1 TOWER ELEVATION
SK-4 SCALE: 1" = 20'-0"



Project No.:
ASMD06/EMP006
Designed by:
MCD
Drawn by:
GAT
Checked by:
KAB
Approved by:
RAS

AECOM
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
(860)-529-8882

Sprint  **AT&T** 

SITE ADDRESS:
CSP #20, INTERSECTION OF I-84W & SOUTH ST
MIDDLEBURY, CONNECTICUT

REV.	DATE:	DESCRIPTION

Scale: _____ Date: 04/06/18

Job No. VZ5-190 File No. _____

Dwg. No.
SK-2
Dwg. 2 of 2

SEISMIC BASE SHEAR ANALYSIS



Seismic (Vs) Base Shear Implementing TIA-222-G, IBC 2012 & Connecticut State Building Code of 2016

Calculation of Seismic Base Shear Implementing TIA-222-G, IBC 2012 & CT State Building Code 2016.

Location: Middlebury, CT -Site Class “D”

$$S_{DS} = \frac{2}{3} F_A S_S, \text{ where } S_S = 0.191 \quad \text{and } F_A = 1.6 \quad S_{DS} = \frac{2}{3} F_A S_S = \frac{2}{3} * 1.6 * 0.191 = 0.204$$

$$S_{D1} = \frac{2}{3} F_V S_1, \text{ where } S_1 = 0.064 \quad \text{and } F_V = 2.4 \quad S_{D1} = \frac{2}{3} F_V S_1 = \frac{2}{3} * 2.4 * 0.064 = 0.102$$

TIA-222-G SECTION 2.7 EARTHQUAKE LOADS (PROCEDURES):

1. Importance Factor “I” (tables 2-3 TIA-222-G) = 1.5 (Structure Class 3)

ANSI/TIA-222-G 2.7.7.1 (TOTAL BASE SEISMIC SHEAR (Vs))

W=DL TOWER	=	34.109	Kips	
W=Antennas/Mounts	=	9.778	Kips	
W=Cables	=	5.937	Kips	
		<u>49.824</u>	Kips	= WT Total = “W”

$$V_S = \frac{S_{DS} * W * I}{R} = \frac{0.204 * 49.824 kips * 1.5}{3.0} = 5.0820 kips, \quad \text{where R = 3.0 for Lattice Tower}$$

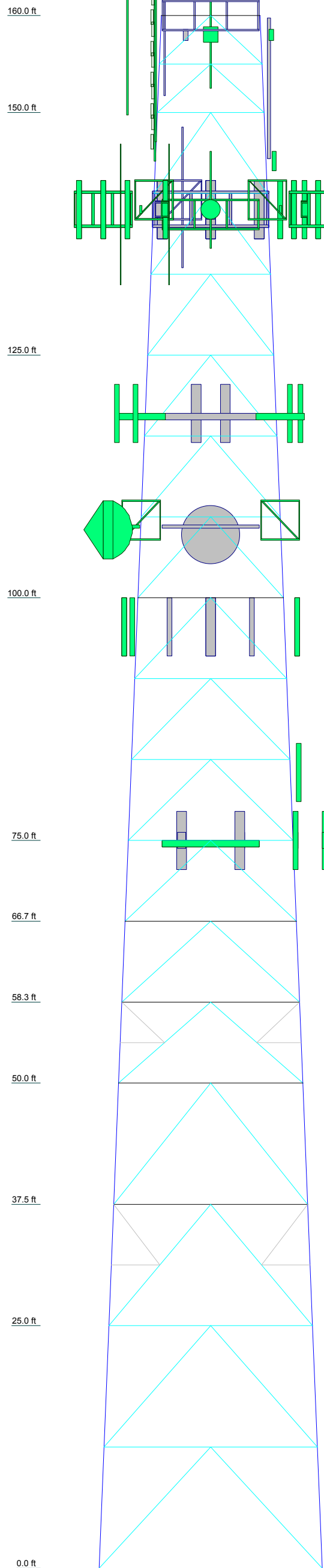
$$V_{S.min} = \frac{0.5 * S_{D1} * W * I}{R} = \frac{0.5 * 0.102 * 49.824 kips * 1.5}{3.0} = 1.271 kips$$

*By visual inspection, the above “Base Shear” value when considering the following Load Combination is less that the base shear of wind on structure.

1.2 * DL + 1.0 E < 1.2 DL + 1.6 W, (107 Kips), therefore seismic effect on structure Does NOT control Design.

TNX TOWER INPUT / OUTPUT SUMMARY

Section	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	HSS6.875x0.5 w/ (3) 2x6/8 Bars	HSS6.875x4	HSS5x.4	P5x0.4 w/ (3) 1.5x5/8 Plates	P5x0.3 w/ (3) 1.5x5/8 Plates	A500-50	A500-50	P.5x.250		
Leg Grade	A500-50	A514-60	A572-50	A572-50	A572-50	A500-50	A500-50			
Diagonals	2L4x3x3/8	2L3 1/2x3 1/2x5/16	2L3x3x5/16	2L3x2 1/2x5/16	2L3x2 1/2x5/16	2L3x2 1/2x5/16	2L2 1/2x2 1/2x5/16	2L2 1/2x2 1/2x5/16	2L2 1/2x2 1/2x5/16	
Diagonal Grade	A529-50	A36	A36	A529-50	A529-50	A36	A36	A36	A36	
Top Girts	N.A.	L4x4x1/4	L3x3x1/2	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	L3x3x1/4
Horizontals	L4x4x1/2	L4x4x5/16	L3x3x1/2	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	L3x3x1/4
Red. Horizontals	N.A.	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16
Red. Diagonals	N.A.	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16
Inner Bracing	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	N.A.
Face Width (ft)	23	21	20	19	18.3333	17.6667	17	15	13	11
# Panels @ (ft)	4 @ 12.5	4 @ 12.5	4 @ 12.5	4 @ 12.5	4 @ 12.5	4 @ 12.5	4 @ 12.5	4 @ 12.5	4 @ 12.5	2 @ 5
Weight (lb)	8678.7	3416.1	3003.5	2318.3	2103.3	2141.0	5984.2	3880.0	2323.9	1181.7



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 2"x21" (DNK-33)	160	SC479-HF1LDF (DNK-19)	139.5
(PSA6) 6" Side-Arm (CSP)	160	10' PCS Frame (1) (DNK-19 (3 antennas Attached - 19,20,26))	139.5
SC479-HF1LDF(D00-E6085) (CSP)	160	SC479-HF1LDF (DNK-20)	139.5
SC479-HF1LDF(D00-E6085) (Inverted) (CSP)	160 - 145	PD1142-1 (DNK-11)	120
SC479-HF1LDF (DNK-29)	159	DSM2 (T-Mobile DNK 8-10)	119
TMA 432-83H-01T (DNK-25)	158	DSM2 (T-Mobile DNK 8-10)	119
TMA 432-83H-01T (DNK-30)	158	DSM2 (T-Mobile DNK 8-10)	119
432E-83I-01T TTA Unit (CSP)	158	RR90-17-02DP (T-Mobile DNK 8-10)	119
SC479-HF1LDF(D00-E6085) (DNK-32 - Troop L RX (PNS-Proposed 01272017))	157.5	LNX-6515DS-VTM w/ 6" 2" sch 40 Pipe Mount (T-Mobile DNK 8-10)	119
SC479-HF1LDF (DNK-26)	157	LNX-6515DS-VTM w/ 6" 2" sch 40 Pipe Mount (T-Mobile DNK 8-10)	119
DB228-A (DNK-28)	157	LNX-6515DS-VTM w/ 6" 2" sch 40 Pipe Mount (T-Mobile DNK 8-10)	119
DB304-A (DNK-27)	155	LNX-6515DS-VTM w/ 6" 2" sch 40 Pipe Mount (T-Mobile DNK 8-10)	119
DC6-48-60-18-8F (Squid) Suppressor (DNK-23)	145	RR90-17-02DP (T-Mobile DNK 8-10)	119
SC479-HF1LDF (DNK-21)	141.25	RR90-17-02DP (T-Mobile DNK 8-10)	119
SC479-HF1LDF (DNK-18)	141	RR90-17-02DP (T-Mobile DNK 8-10)	119
8' Stiff-Arm (DNK-18 (4 antennas Attached - 18, 24, 25, Sinclair))	141	8' Stiff-Arm (DNK-7)	108
8' Stiff-Arm (DNK-18 (4 antennas Attached - 18, 24, 25, Sinclair))	141	8' Stiff-Arm (DNK-7)	108
8' Stiff-Arm (DNK-21 (2 antennas Attached - 21,29))	141	4"x96"x72" Ice Canopy (DNK-5)	107.5
8' Stiff-Arm (DNK-21 (2 antennas Attached - 21,29))	141	4"x96"x72" Ice Canopy (DNK-6)	107.5
8' Stiff-Arm (DNK-22 (5 antennas Attached - 22,27,31,32,33))	141	6' w/ Radome (DNK-6 / CSP-7)	107
8' Stiff-Arm (DNK-22 (5 antennas Attached - 22,27,31,32,33))	141	6' w/ Radome (DNK-5 / CSP-6)	106.5
8' Stiff-Arm (DNK-22 (5 antennas Attached - 22,27,31,32,33))	141	PM-SU35-48 - Pipe Mount 48" (Sprint DNK 2-4)	97
8' Stiff-Arm (DNK-22 (5 antennas Attached - 22,27,31,32,33))	141	PM-SU35-48 - Pipe Mount 48" (Sprint DNK 2-4)	97
T-Frame (ATT DNK 12-17)	140	RRH 1900 MHz 2x40W (Sprint DNK 2-4)	97
T-Frame (ATT DNK 12-17)	140	RRH 1900 MHz 2x40W (Sprint DNK 2-4)	97
T-Frame (ATT DNK 12-17)	140	RRH 800MHz 2x50W (Sprint)	97
7770.00 (ATT DNK 12-17)	140	RRH 800MHz 2x50W (Sprint)	97
7770.00 (ATT DNK 12-17)	140	RRH 800MHz 2x50W (Sprint)	97
7770.00 (ATT DNK 12-17)	140	RRH 800MHz 2x50W (Sprint)	97
SBNH-1D6565C (ATT DNK 12-17)	140	RRH 800MHz 2x50W (Sprint DNK 2-4)	97
SBNH-1D6565C (ATT DNK 12-17)	140	RRH 800MHz 2x50W (Sprint DNK 2-4)	97
AM-X-CD-16-65-00T-RET (6") (ATT DNK 12-17)	140	TD-RRH8x20 (Sprint)	97
Surge Suppressor (ATT DNK 12-17)	140	TD-RRH8x20 (Sprint)	97
TPA-65R-LCUUUU-H8 Panel w/ RET (ATT)	140	TD-RRH8x20 (Sprint)	97
TPA-65R-LCUUUU-H8 Panel w/ RET (ATT)	140	RRH 1900 MHz 2x40W (Sprint DNK 2-4)	97
QS66512-3 Quintel Panel (ATT)	140	APXVSP18-C-A20 (Sprint DNK 2-4)	97
RRUS-32 (ATT)	140	APXVSP18-C-A20 (Sprint DNK 2-4)	97
RRUS-12 (ATT)	140	PM-SU35-48 - Pipe Mount 48" (Sprint)	97
RRUS-11 (ATT DNK 12-17)	140	PM-SU35-48 - Pipe Mount 48" (Sprint)	97
A2 Module Unit (ATT)	140	APXVSP18-C-A20 (Sprint DNK 2-4)	97
RRUS-32 (ATT)	140	PM-SU35-48 - Pipe Mount 48" (Sprint DNK 2-4)	97
RRUS-12 (ATT)	140	16x16 Panel 19dBi 2.45GHz ISM (DNK-1)	82
RRUS-11 (ATT DNK 12-17)	140	1" Side Mount Standoff (DNK-1)	82
A2 Module Unit (ATT)	140	SBNHH-1D65B (VZW-700AWS)	75
RRUS-32 (ATT)	140	RH_2x60-07-L (700 MHz) (VZW)	75
RRUS-12 (ATT)	140	SBNHH-1D65B (VZW-850ECS)	75
RRUS-11 (ATT DNK 12-17)	140	5' T-arm (VZW)	75
A2 Module Unit (ATT)	140	RRH_2x60-AWS (VZW)	75
DC6-48-60-18-8F (Squid) Suppressor (ATT)	140	SBNHH-1D65B (VZW-700AWS)	75
TT19-08BP111-001 TMA's (ATT DNK 12-17)	140	RRH_2x60-AWS (VZW)	75
TT19-08BP111-001 TMA's (ATT DNK 12-17)	140	5' T-arm (VZW)	75
TT19-08BP111-001 TMA's (ATT DNK 12-17)	140	RH_2x60-07-L (700 MHz) (VZW)	75
(2) LGP21401 Diplexer (ATT DNK 12-17)	140	SBNHH-1D65B (VZW-850ECS)	75
(2) LGP21401 Diplexer (ATT DNK 12-17)	140	DC6-48-60-18-8F (VZW)	75
(2) LGP21401 Diplexer (ATT DNK 12-17)	140		
HPD2-4.7 (NWCT)	140		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A529-50	50 ksi	65 ksi
A36	36 ksi	58 ksi	A514-60	60 ksi	80 ksi
A572-50	50 ksi	65 ksi			

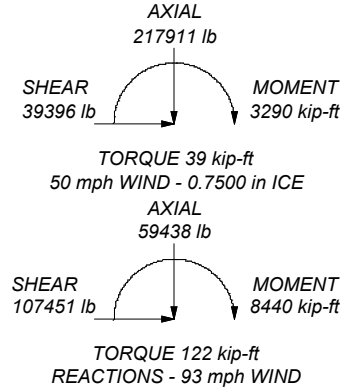
TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 3 with Crest Height of 176.00 ft
7. TOWER RATING: 96.4%

ALL REACTIONS ARE FACTORED

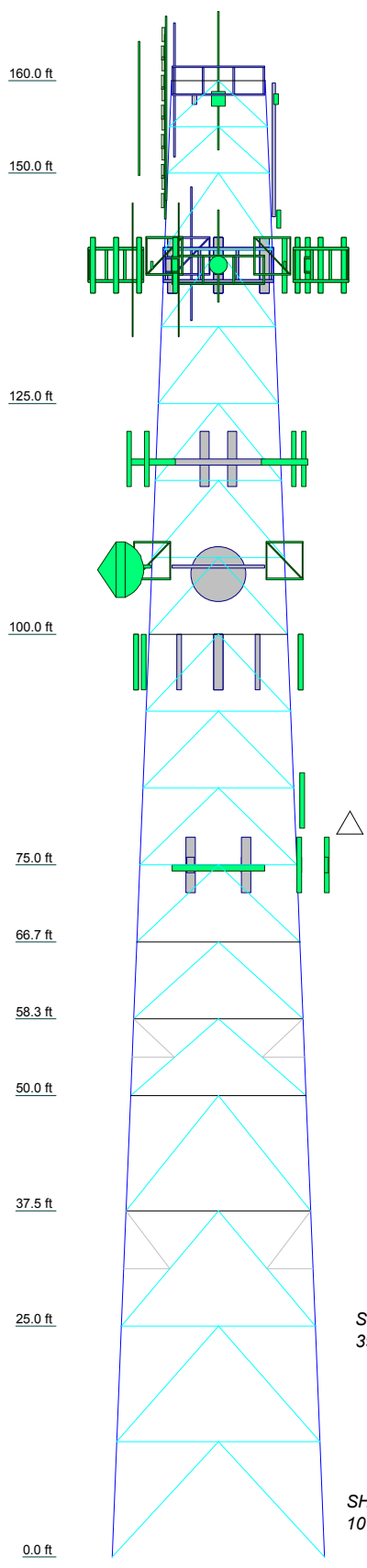
MAX. CORNER REACTIONS AT BASE:
DOWN: 443539 lb
SHEAR: 58923 lb

UPLIFT: -388871 lb
SHEAR: 53656 lb



<p>AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991</p>	<p>Job: 160' Self Support Lattice - CSP #20</p>
	<p>Project: Structural Analysis / Tower MODification</p>
	<p>Client: Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006</p>
	<p>Code: TIA-222-G</p>
<p>Path:</p>	<p>Drawn by: MCD</p>
<p>Date: 04/02/18</p>	<p>Scale: NTS</p>
<p>Dwg No. E-1</p>	<p></p>

Section	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	HSS6.875x0.5 w/ (3) 2x5/8 Bars	HSS6.875x.4	HSS5x.4	A	A572-50	A572-50	P5x0.3 w/ (3) 1.5x5/8 Plates	P 5x.250		
Leg Grade	A500-50	A514-60	A572-50	A572-50	A572-50	A572-50	A500-50	A500-50		
Diagonals	2L4x3x3/8	B	2L3x2 1/2x5/16	2L3x2 1/2x5/16	2L3x2 1/2x5/16	2L3x2 1/2x5/16	2L2 1/2x2 1/2x5/16	2L2 1/2x2 1/2x5/16	2L2 1/2x2x3/16	
Diagonal Grade	A529-50	A36	A36	A36	A36	A36	A36	A36	A36	
Top Girts	N.A.	L4x4x5/16	L3x3x1/2	L3x3x1/4	L3x3x1/2	L3x3x1/4	L3x3x1/2	L3x3x5/16	L2 1/2x2 1/2x3/16	L3x3x1/4
Horizontals	L4x4x1/2	N.A.	N.A.	L3x3x1/2	L3x3x1/2	L3x3x1/2	L3x3x1/2	L3x3x5/16	L2 1/2x2 1/2x3/16	L3x3x1/4
Red. Horizontals	N.A.	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	N.A.	N.A.	N.A.
Red. Diagonals	N.A.	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	L2x2x5/16	N.A.	N.A.	N.A.
Inner Bracing	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	N.A.
Face Width (ft)	23	21	20	19	18.3333	17.6667	17	15	13	11
# Panels @ (ft)	23	4 @ 12.5	20	19	18.3333	17.6667	12 @ 8.33333	12 @ 8.33333	2323.9	2 @ 5
Weight (lb)	34108.8	6876.7	3416.1	3003.5	2316.3	2103.3	5084.2	3860.0	2232.9	1181.7



SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	P5x0.4 w/ (3) 1.5x5/8 Plates	B	2L3 1/2x3 1/2x5/16

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A529-50	50 ksi	65 ksi
A36	36 ksi	58 ksi	A514-60	60 ksi	80 ksi
A572-50	50 ksi	65 ksi			

TOWER DESIGN NOTES

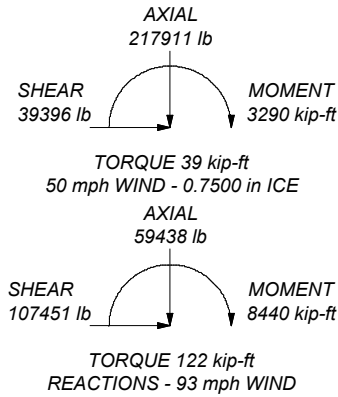
1. Tower designed for Exposure C to the TIA-222-G Standard.
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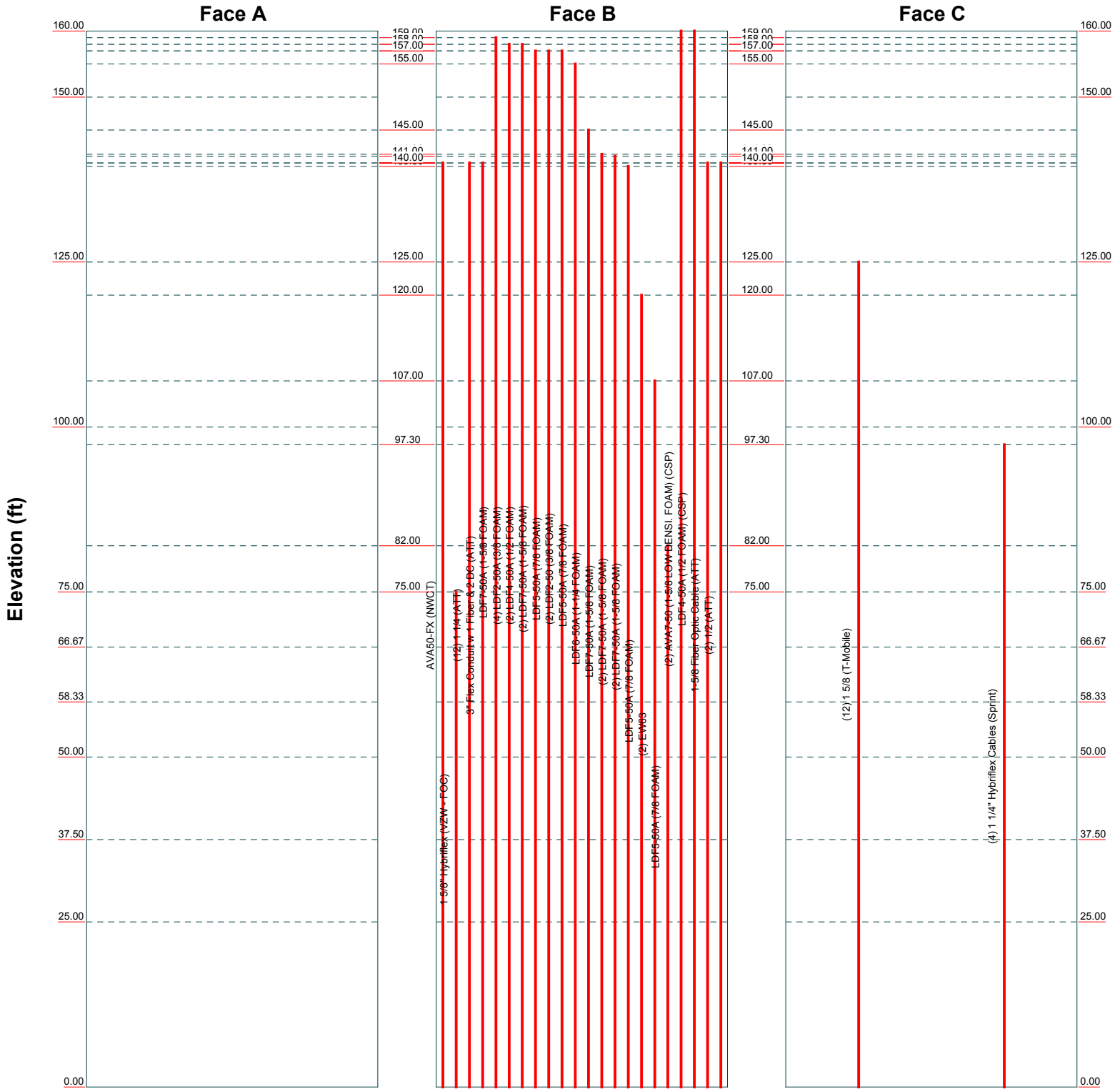
AECOM		Job: 160' Self Support Lattice - CSP #20	
500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991		Project: Structural Analysis / Tower Modification	
Client: Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Code: TIA-222-G	Drawn by: MCD	App'd:
Date: 04/02/18	Path:	Scale: NTS	Dwg No. E-1

TNX TOWER FEEDLINE DISTRIBUTION

Feed Line Distribution Chart

0' - 160'

— Round
 — Flat
 — App In Face
 — App Out Face
 — Truss Leg

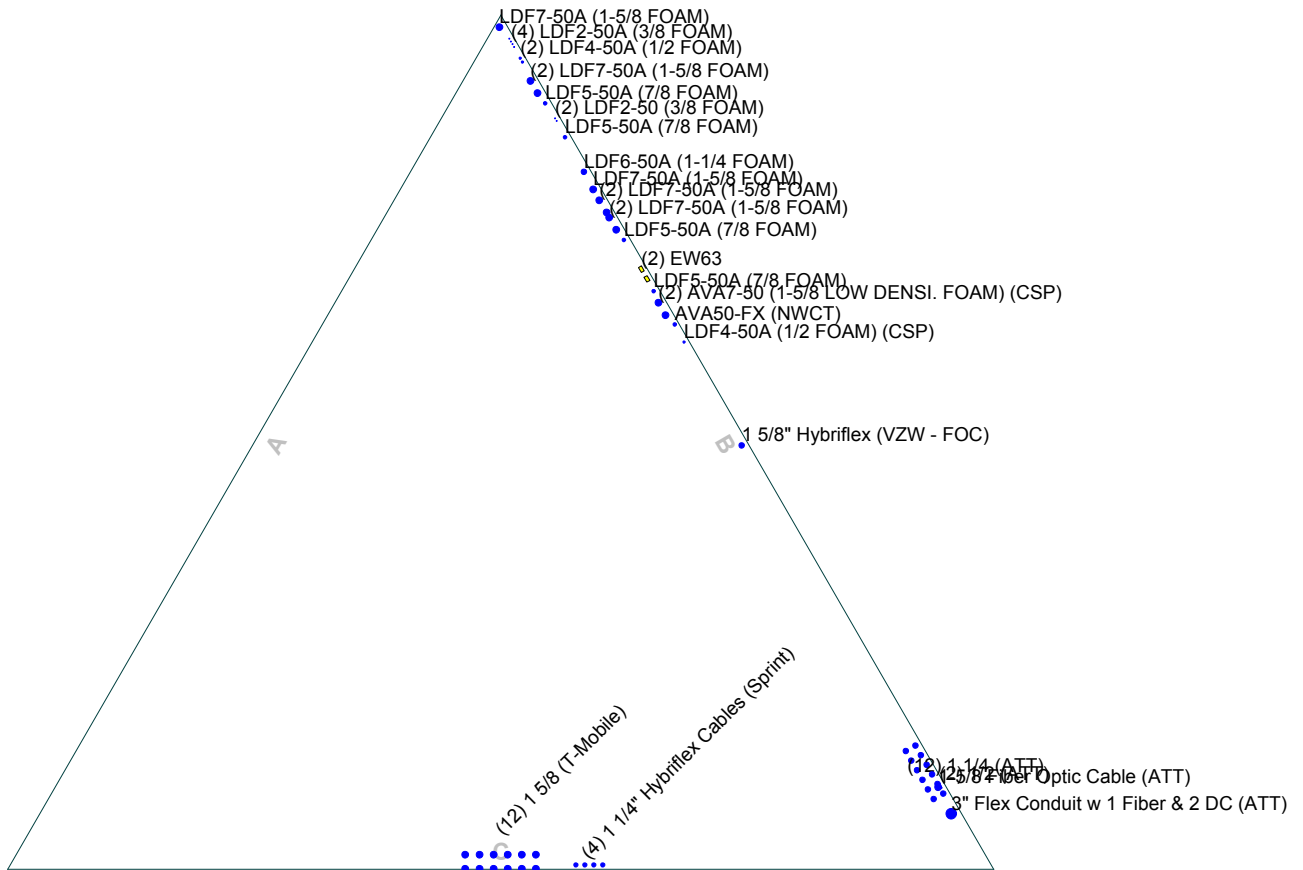


AECOM		Job: 160' Self Support Lattice - CSP #20	
500 Enterprise Drive, Suite 3B		Project: Structural Analysis / Tower MODIFICATION	
Rocky Hill, CT		Client: Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Drawn by: MCD App'd:
Phone: 860-529-8882		Code: TIA-222-G	Date: 04/02/18 Scale: NTS
FAX: 860-529-3991		Path:	Dwg No. E-7

TNX TOWER FEEDLINE PLAN

Feed Line Plan

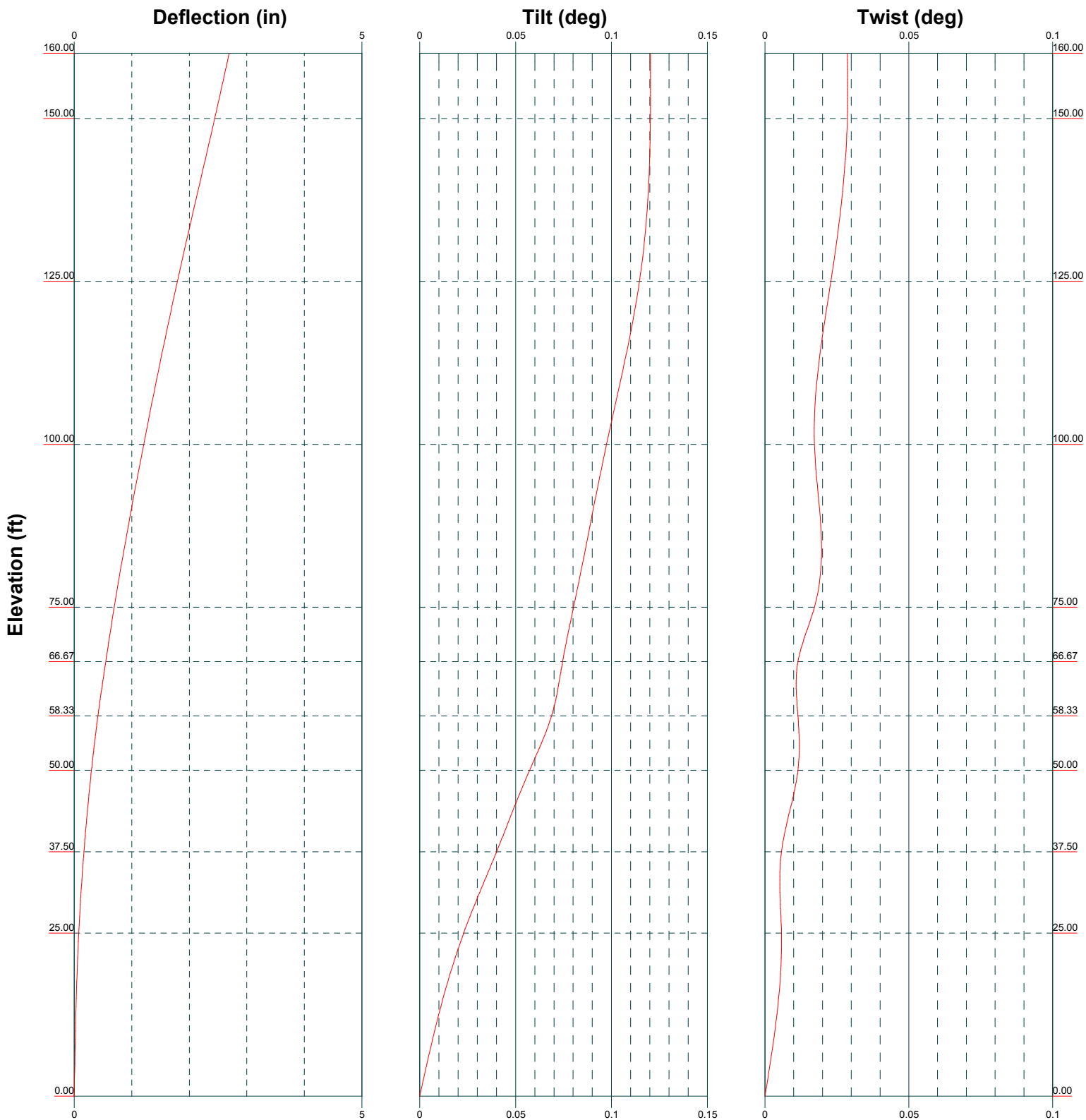
— Round
 — Flat
 — App In Face
 — App Out Face



- (12) 1-1/4 Coax Cables
- (1) 3" Flex Conduit w/ 1 F.O.C. & 2 DC Cables
- (2) 1/2" (Proposed) DC Cables
- (1) 1-5/8" F.O.C (Proposed)

AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job: 160' Self Support Lattice - CSP #20		
	Project: Structural Analysis / Tower Modification		
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	Code: TIA-222-G	Date: 04/02/18	Scale: NTS
	Path:		Dwg No. E-7

TNX TOWER DEFLECTION, TILT, AND TWIST



AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991		Job: 160' Self Support Lattice - CSP #20	
		Project: Structural Analysis / Tower Modification	
Client: Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006		Drawn by: MCD	App'd:
Code: TIA-222-G		Date: 04/02/18	Scale: NTS
Path:		Dwg No. E-5	

TNX TOWER DETAILED OUTPUT

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job 160' Self Support Lattice - CSP #20	Page 1 of 63
	Project Structural Analysis / Tower MODification	Date 17:59:23 04/09/18
	Client Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by MCD

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 160.00 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 10.20 ft at the top and 23.00 ft at the base.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

Basic wind speed of 93 mph.

Structure Class III.

Exposure Category C.

Topographic Category 3.

Crest Height 176.00 ft.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Deflections calculated using a wind speed of 60 mph.

Pressures are calculated at each section.

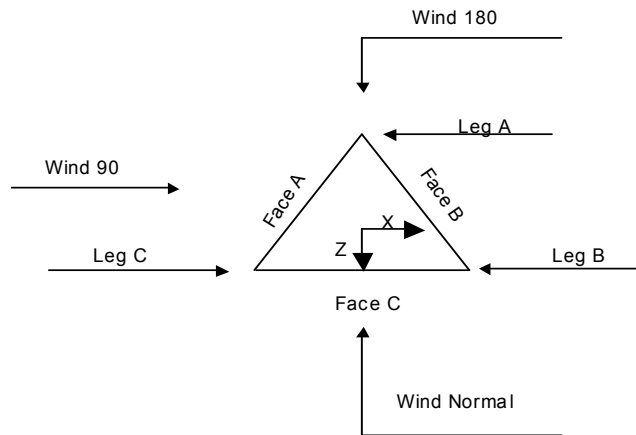
Stress ratio used in tower member design is 1.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile √ Include Bolts In Member Capacity Leg Bolts Are At Top Of Section √ Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) √ SR Members Have Cut Ends SR Members Are Concentric | <ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area √ Use Clear Spans For KL/r Retension Guys To Initial Tension √ Bypass Mast Stability Checks Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination √ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder | <ul style="list-style-type: none"> Use ASCE 10 X-Brace Ly Rules √ Calculate Redundant Bracing Forces Ignore Redundant Members in FEA √ SR Leg Bolts Resist Compression √ All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feed Line Torque √ Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <li style="text-align: center;">Poles √ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets |
|--|--|---|

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job 160' Self Support Lattice - CSP #20	Page 2 of 63
	Project Structural Analysis / Tower MODification	Date 17:59:23 04/09/18
	Client Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by MCD



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	<i>ft</i>			<i>ft</i>		<i>ft</i>
T1	160.00-150.00			10.20	1	10.00
T2	150.00-125.00			11.00	1	25.00
T3	125.00-100.00			13.00	1	25.00
T4	100.00-75.00			15.00	1	25.00
T5	75.00-66.67			17.00	1	8.33
T6	66.67-58.33			17.67	1	8.33
T7	58.33-50.00			18.33	1	8.33
T8	50.00-37.50			19.00	1	12.50
T9	37.50-25.00			20.00	1	12.50
T10	25.00-0.00			21.00	1	25.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	<i>ft</i>	<i>ft</i>				<i>in</i>	<i>in</i>
T1	160.00-150.00	5.00	K Brace Down	No	Yes	0.0000	0.0000
T2	150.00-125.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T3	125.00-100.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T4	100.00-75.00	8.33	K Brace Down	No	Yes	0.0000	0.0000
T5	75.00-66.67	8.33	K Brace Down	No	Yes	0.0000	0.0000

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	3 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T6	66.67-58.33	8.33	K Brace Down	No	Yes	0.0000	0.0000
T7	58.33-50.00	8.33	K1 Down	No	Yes	0.0000	0.0000
T8	50.00-37.50	12.50	K Brace Down	No	Yes	0.0000	0.0000
T9	37.50-25.00	12.50	K1 Down	No	Yes	0.0000	0.0000
T10	25.00-0.00	12.50	K Brace Down	No	Yes	0.0000	0.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 160.00-150.00	Pipe	P.5x.250	A500-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T2 150.00-125.00	Pipe	P.5x.250	A500-50 (50 ksi)	Double Angle	2L2 1/2x2x3/16	A36 (36 ksi)
T3 125.00-100.00	Pipe	P.5x.250	A500-50 (50 ksi)	Double Angle	2L2 1/2x2 1/2x5/16	A36 (36 ksi)
T4 100.00-75.00	Arbitrary Shape	P5x0.3 w/ (3) 1.5x5/8 Plates	A500-50 (50 ksi)	Double Angle	2L3x2 1/2x1/4	A36 (36 ksi)
T5 75.00-66.67	Arbitrary Shape	P5x0.4 w/ (3) 1.5x5/8 Plates	A572-50 (50 ksi)	Double Angle	2L3x2 1/2x5/16	A529-50 (50 ksi)
T6 66.67-58.33	Arbitrary Shape	P5x0.4 w/ (3) 1.5x5/8 Plates	A572-50 (50 ksi)	Double Angle	2L3x2 1/2x5/16	A529-50 (50 ksi)
T7 58.33-50.00	Pipe	HSS5x.4	A514-60 (60 ksi)	Double Angle	2L3x3x5/16	A36 (36 ksi)
T8 50.00-37.50	Pipe	HSS6.875x.4	A514-60 (60 ksi)	Double Angle	2L3 1/2x3x3/8	A36 (36 ksi)
T9 37.50-25.00	Pipe	HSS6.875x.4	A514-60 (60 ksi)	Double Angle	2L3 1/2x3 1/2x5/16	A529-50 (50 ksi)
T10 25.00-0.00	Arbitrary Shape	HSS6.875x0.5 w/ (3) 2x5/8 Bars	A500-50 (50 ksi)	Double Angle	2L4x3x3/8	A529-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 160.00-150.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Solid Round		A36M-50 (50 ksi)
T4 100.00-75.00	Single Angle	L3x3x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T6 66.67-58.33	Single Angle	L3x3x1/2	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T7 58.33-50.00	Single Angle	L3x3x1/2	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T8 50.00-37.50	Single Angle	L4x4x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T9 37.50-25.00	Single Angle	L4x4x5/16	A529-50 (50 ksi)	Single Angle		A36 (36 ksi)

<p>tnxTower</p> <p>AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991</p>	<p>Job</p> <p>160' Self Support Lattice - CSP #20</p>	<p>Page</p> <p>4 of 63</p>
	<p>Project</p> <p>Structural Analysis / Tower MODification</p>	<p>Date</p> <p>17:59:23 04/09/18</p>
	<p>Client</p> <p>Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006</p>	<p>Designed by</p> <p>MCD</p>

Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 160.00-150.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T2 150.00-125.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 125.00-100.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T4 100.00-75.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T5 75.00-66.67	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T6 66.67-58.33	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T7 58.33-50.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L3x3x1/2	A36 (36 ksi)
T8 50.00-37.50	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T9 37.50-25.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x4x1/4	A36 (36 ksi)
T10 25.00-0.00	None	Flat Bar		A36 (36 ksi)	Single Angle	L4x4x1/2	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T3 125.00-100.00	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T4 100.00-75.00	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T5 75.00-66.67	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T6 66.67-58.33	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T7 58.33-50.00	Equal Angle		A36 (36 ksi)	Single Angle	L2 1/2x2x3/16	A36 (36 ksi)
T8 50.00-37.50	Equal Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T9 37.50-25.00	Equal Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T10 25.00-0.00	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

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Tower Elevation	Redundant Bracing Grade	Redundant Type	Redundant Size	K Factor	
ft					
T7 58.33-50.00	A36 (36 ksi)	Horizontal (1) Diagonal (1)	Equal Angle Equal Angle	L2x2x5/16 L2x2x5/16	1 1
T9 37.50-25.00	A36 (36 ksi)	Horizontal (1) Diagonal (1)	Equal Angle Single Angle	L2x2x5/16 L2x2x5/16	1 1

Tower Section Geometry (cont'd)

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals	Double Angle Stitch Bolt Spacing Redundants
ft	ft ²	in					in	in	in
T1 160.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	0.0000	36.0000
T2 150.00-125.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T3 125.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T4 100.00-75.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T5 75.00-66.67	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T6 66.67-58.33	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T7 58.33-50.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	0.0000	36.0000	36.0000
T8 50.00-37.50	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000
T9 37.50-25.00	0.00	0.0000	A36 (36 ksi)	1	1	1.03	0.0000	36.0000	36.0000
T10 25.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	0.0000	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1 160.00-150.00	Yes	Yes	1	1	1	1	1	0.65	0.65	1
T2 150.00-125.00	Yes	Yes	1	1	1	1	1	0.65	0.65	1
T3 125.00-100.00	Yes	Yes	1	1	1	1	1	0.65	0.65	1
T4 100.00-75.00	Yes	Yes	1	1	1	1	1	0.65	0.65	1
T5 75.00-66.67	Yes	Yes	1	1	1	1	1	0.65	0.65	1
T6 66.67-58.33	Yes	Yes	1	1	1	1	1	0.65	0.65	1

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Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T4 100.00-75.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T5 75.00-66.67	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T6 66.67-58.33	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T7 58.33-50.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T8 50.00-37.50	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T9 37.50-25.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T10 25.00-0.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 160.00-150.00	Flange	0.7500 A325X	6	0.7500 A325N	1	0.6250 A325N	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T2 150.00-125.00	Flange	0.7500 A325X	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T3 125.00-100.00	Flange	0.7500 A325X	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T4 100.00-75.00	Flange	0.7500 A325X	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T5 75.00-66.67	Flange	0.8750 A325X	6	0.7500 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T6 66.67-58.33	Flange	0.8750 A325X	6	0.7500 A325N	1	0.6250 A325X	2	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T7 58.33-50.00	Flange	0.8750 A325X	6	0.7500 A325N	1	0.6250 A325X	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T8 50.00-37.50	Flange	1.0000 A325X	8	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T9 37.50-25.00	Flange	1.0000 A325X	8	1.0000 A325N	1	0.6250 A325X	2	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0
T10 25.00-0.00	Flange	1.0000 A325X	8	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	2	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
AVA50-FX (NWCT)	B	No	Ar (CaAa)	140.00 - 0.00	-0.5000	-0.14	1	1	1.1020	1.1020		0.29
1 5/8" Hybriflex	B	No	Ar (CaAa)	75.00 - 0.00	-1.0000	0	1	1	1.6250	1.6250		1.48
(VZW - FOC)	C	No	Ar (CaAa)	125.00 - 0.00	-3.0000	0	12	6	1.9800	1.9800		1.04

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991</p>	Job	160' Self Support Lattice - CSP #20	Page	8 of 63
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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(T-Mobile) 1 1/4 (ATT)	B	No	Ar (CaAa)	140.00 - 0.00	-4.0000	0.38	12	6	1.5500	1.5500		0.66
3" Flex Conduit w 1 Fiber & 2 DC (ATT)	B	No	Ar (CaAa)	140.00 - 0.00	-1.0000	0.43	1	1	3.0000	3.0000		3.00
LDF7-50A (1-5/8 FOAM)	B	No	Ar (CaAa)	159.00 - 0.00	-1.0000	-0.49	1	1	1.9800	1.9800		0.82
LDF2-50A (3/8 FOAM)	B	No	Ar (CaAa)	158.00 - 0.00	-1.0000	-0.47	4	4	0.4400	0.4400		0.08
LDF4-50A (1/2 FOAM)	B	No	Ar (CaAa)	158.00 - 0.00	-1.0000	-0.45	2	2	0.6300	0.6300		0.15
LDF7-50A (1-5/8 FOAM)	B	No	Ar (CaAa)	157.00 - 0.00	-1.0000	-0.42	2	2	1.9800	1.9800		0.82
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	157.00 - 0.00	-1.0000	-0.4	1	1	1.0900	1.0900		0.33
LDF2-50 (3/8 FOAM)	B	No	Ar (CaAa)	157.00 - 0.00	-1.0000	-0.38	2	2	0.4400	0.4400		0.08
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	155.00 - 0.00	-1.0000	-0.36	1	1	1.0900	1.0900		0.33
LDF6-50A (1-1/4 FOAM)	B	No	Ar (CaAa)	145.00 - 0.00	-1.0000	-0.32	1	1	1.5500	1.5500		0.66
LDF7-50A (1-5/8 FOAM)	B	No	Ar (CaAa)	141.33 - 0.00	-1.0000	-0.3	1	1	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	B	No	Ar (CaAa)	141.00 - 0.00	-1.0000	-0.28	2	2	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM)	B	No	Ar (CaAa)	139.50 - 0.00	-1.0000	-0.26	2	2	1.9800	1.9800		0.82
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	120.00 - 0.00	-1.0000	-0.24	1	1	1.0900	1.0900		0.33
EW63	B	No	Af (CaAa)	107.00 - 0.00	-1.0000	-0.2	2	2	1.5742	1.5742		0.51
LDF5-50A (7/8 FOAM)	B	No	Ar (CaAa)	82.00 - 0.00	-1.0000	-0.18	1	1	1.0900	1.0900		0.33
AVA7-50 (1-5/8 LOW DENSI FOAM) (CSP)	B	No	Ar (CaAa)	160.00 - 0.00	-1.0000	-0.16	2	2	1.9800	1.9800		0.72
LDF4-50A (1/2 FOAM) (CSP)	B	No	Ar (CaAa)	160.00 - 0.00	-1.0000	-0.12	1	1	0.6300	0.6300		0.15
1-5/8 Fiber Optic Cable (ATT)	B	No	Ar (CaAa)	140.00 - 0.00	-1.0000	0.4	1	1	1.9800	1.9800		1.30
1/2 (ATT)	B	No	Ar (CaAa)	140.00 - 0.00	-1.0000	0.4	2	2	0.5800	0.5800		0.25
1 1/4" Hybriflex Cables (Sprint)	C	No	Ar (CaAa)	97.30 - 0.00	-0.5000	-0.09	4	4	1.2500	1.2500		1.13

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight lb
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Tower Section	Tower Elevation ft	Face	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
T1	160.00-150.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	13.484	0.000	44.80
		C	0.000	0.000	0.000	0.000	0.00
T2	150.00-125.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	98.660	0.000	409.01
		C	0.000	0.000	0.000	0.000	0.00
T3	125.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	140.472	0.000	595.24
		C	0.000	0.000	59.400	0.000	312.00
T4	100.00-75.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	151.116	0.000	617.56
		C	0.000	0.000	70.550	0.000	412.80
T5	75.00-66.67	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	52.353	0.000	220.14
		C	0.000	0.000	23.967	0.000	141.67
T6	66.67-58.33	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	52.339	0.000	220.14
		C	0.000	0.000	23.967	0.000	141.67
T7	58.33-50.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	52.327	0.000	220.14
		C	0.000	0.000	23.967	0.000	141.67
T8	50.00-37.50	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	78.472	0.000	330.21
		C	0.000	0.000	35.950	0.000	212.50
T9	37.50-25.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	78.468	0.000	330.21
		C	0.000	0.000	35.950	0.000	212.50
T10	25.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	157.038	0.000	660.43
		C	0.000	0.000	71.900	0.000	425.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
T1	160.00-150.00	A	2.326	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	69.238	0.000	973.95
		C		0.000	0.000	0.000	0.000	0.00
T2	150.00-125.00	A	2.328	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	377.244	0.000	6093.04
		C		0.000	0.000	0.000	0.000	0.00
T3	125.00-100.00	A	2.334	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	498.307	0.000	8350.28
		C		0.000	0.000	89.051	0.000	2588.29
T4	100.00-75.00	A	2.343	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	531.086	0.000	8872.18
		C		0.000	0.000	130.070	0.000	3278.60
T5	75.00-66.67	A	2.349	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	186.028	0.000	3134.66
		C		0.000	0.000	45.040	0.000	1122.35
T6	66.67-58.33	A	2.350	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	186.106	0.000	3137.31
		C		0.000	0.000	45.048	0.000	1122.87
T7	58.33-50.00	A	2.350	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	186.096	0.000	3136.97
		C		0.000	0.000	45.047	0.000	1122.81
T8	50.00-37.50	A	2.345	0.000	0.000	0.000	0.00	

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
T9	37.50-25.00	B	2.326	0.000	0.000	278.793	0.000	4693.49
		C		0.000	0.000	67.532	0.000	1681.83
		A		0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	277.413	0.000	4646.60
T10	25.00-0.00	C	2.217	0.000	0.000	67.377	0.000	1672.48
		A		0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	538.887	0.000	8760.58
		C		0.000	0.000	132.973	0.000	3237.69

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
T1	160.00-150.00	2.0742	-11.3500	1.8629	-10.5142
T2	150.00-125.00	13.4705	-13.4176	8.4593	-13.3985
T3	125.00-100.00	16.4424	-3.8532	11.0565	-9.5042
T4	100.00-75.00	17.5795	-3.9453	11.8079	-8.9009
T5	75.00-66.67	19.0261	-4.5039	13.3877	-10.1500
T6	66.67-58.33	19.5692	-4.6420	13.8131	-10.4660
T7	58.33-50.00	18.7454	-4.4549	13.5178	-10.2332
T8	50.00-37.50	21.3083	-5.0729	15.2086	-11.4919
T9	37.50-25.00	20.6000	-4.9046	15.0159	-11.2949
T10	25.00-0.00	22.0539	-5.2174	16.4071	-12.0710

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	7	LDF7-50A (1-5/8 FOAM)	150.00 - 159.00	0.6000	0.5992
T1	8	LDF2-50A (3/8 FOAM)	150.00 - 158.00	0.6000	0.5992
T1	9	LDF4-50A (1/2 FOAM)	150.00 - 158.00	0.6000	0.5992
T1	10	LDF7-50A (1-5/8 FOAM)	150.00 - 157.00	1.0000	1.0000
T1	11	LDF5-50A (7/8 FOAM)	150.00 - 157.00	0.6000	0.5992
T1	12	LDF2-50 (3/8 FOAM)	150.00 - 157.00	0.6000	0.5992
T1	13	LDF5-50A (7/8 FOAM)	150.00 - 155.00	0.6000	0.5992
T1	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	150.00 - 160.00	1.0000	1.0000
T1	22	LDF4-50A (1/2 FOAM)	150.00 - 160.00	0.6000	0.5992
T2	1	AVA50-FX	125.00 - 140.00	0.6000	0.6000
T2	5	1 1/4	125.00 - 140.00	0.6000	0.6000

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	6	3" Flex Conduit w 1 Fiber & 2 DC	125.00 - 140.00	1.0000	0.6000
T2	7	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T2	8	LDF2-50A (3/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T2	9	LDF4-50A (1/2 FOAM)	125.00 - 150.00	0.6000	0.6000
T2	10	LDF7-50A (1-5/8 FOAM)	125.00 - 150.00	1.0000	1.0000
T2	11	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T2	12	LDF2-50 (3/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T2	13	LDF5-50A (7/8 FOAM)	125.00 - 150.00	0.6000	0.6000
T2	14	LDF6-50A (1-1/4 FOAM)	125.00 - 145.00	0.6000	0.6000
T2	15	LDF7-50A (1-5/8 FOAM)	125.00 - 141.33	1.0000	1.0000
T2	16	LDF7-50A (1-5/8 FOAM)	125.00 - 141.00	0.6000	0.6000
T2	17	LDF7-50A (1-5/8 FOAM)	125.00 - 139.50	0.6000	0.6000
T2	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	125.00 - 150.00	1.0000	1.0000
T2	22	LDF4-50A (1/2 FOAM)	125.00 - 150.00	0.6000	0.6000
T2	23	1-5/8 Fiber Optic Cable	125.00 - 140.00	0.6000	0.6000
T2	24	1/2	125.00 - 140.00	0.6000	0.6000
T3	1	AVA50-FX	100.00 - 125.00	0.6000	0.6000
T3	4	1 5/8	100.00 - 125.00	0.6000	0.6000
T3	5	1 1/4	100.00 - 125.00	0.6000	0.6000
T3	6	3" Flex Conduit w 1 Fiber & 2 DC	100.00 - 125.00	1.0000	0.6000
T3	7	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T3	8	LDF2-50A (3/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T3	9	LDF4-50A (1/2 FOAM)	100.00 - 125.00	0.6000	0.6000
T3	10	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	1.0000	1.0000
T3	11	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T3	12	LDF2-50 (3/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T3	13	LDF5-50A (7/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T3	14	LDF6-50A (1-1/4 FOAM)	100.00 - 125.00	0.6000	0.6000
T3	15	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	1.0000	1.0000
T3	16	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000
T3	17	LDF7-50A (1-5/8 FOAM)	100.00 - 125.00	0.6000	0.6000

Job	160' Self Support Lattice - CSP #20	Page	12 of 63
Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T3	18	LDF5-50A (7/8 FOAM)	100.00 - 120.00	0.6000	0.6000
T3	19	EW63	100.00 - 107.00	0.6000	0.6000
T3	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	100.00 - 125.00	1.0000	1.0000
T3	22	LDF4-50A (1/2 FOAM)	100.00 - 125.00	0.6000	0.6000
T3	23	1-5/8 Fiber Optic Cable	100.00 - 125.00	0.6000	0.6000
T3	24	1/2	100.00 - 125.00	0.6000	0.6000
T4	1	AVA50-FX	75.00 - 100.00	0.6000	0.6000
T4	4	1 5/8	75.00 - 100.00	0.6000	0.6000
T4	5	1 1/4	75.00 - 100.00	0.6000	0.6000
T4	6	3" Flex Conduit w 1 Fiber & 2 DC	75.00 - 100.00	1.0000	0.6000
T4	7	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	8	LDF2-50A (3/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	9	LDF4-50A (1/2 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	10	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	1.0000	1.0000
T4	11	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	12	LDF2-50 (3/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	13	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	14	LDF6-50A (1-1/4 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	15	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	1.0000	1.0000
T4	16	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	17	LDF7-50A (1-5/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	18	LDF5-50A (7/8 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	19	EW63	75.00 - 100.00	0.6000	0.6000
T4	20	LDF5-50A (7/8 FOAM)	75.00 - 82.00	0.6000	0.6000
T4	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	75.00 - 100.00	1.0000	1.0000
T4	22	LDF4-50A (1/2 FOAM)	75.00 - 100.00	0.6000	0.6000
T4	23	1-5/8 Fiber Optic Cable	75.00 - 100.00	0.6000	0.6000
T4	24	1/2	75.00 - 100.00	0.6000	0.6000
T4	25	1 1/4" Hybriflex Cables	75.00 - 97.30	0.6000	0.6000
T5	1	AVA50-FX	66.67 - 75.00	0.6000	0.6000
T5	2	1 5/8" Hybriflex	66.67 - 75.00	0.6000	0.6000
T5	4	1 5/8	66.67 - 75.00	0.6000	0.6000
T5	5	1 1/4	66.67 - 75.00	0.6000	0.6000
T5	6	3" Flex Conduit w 1 Fiber & 2 DC	66.67 - 75.00	1.0000	0.6000
T5	7	LDF7-50A (1-5/8 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	8	LDF2-50A (3/8 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	9	LDF4-50A (1/2 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	10	LDF7-50A (1-5/8 FOAM)	66.67 - 75.00	1.0000	1.0000
T5	11	LDF5-50A (7/8 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	12	LDF2-50 (3/8 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	13	LDF5-50A (7/8 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	14	LDF6-50A (1-1/4 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	15	LDF7-50A (1-5/8 FOAM)	66.67 - 75.00	1.0000	1.0000
T5	16	LDF7-50A (1-5/8 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	17	LDF7-50A (1-5/8 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	18	LDF5-50A (7/8 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	19	EW63	66.67 - 75.00	0.6000	0.6000
T5	20	LDF5-50A (7/8 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	66.67 - 75.00	1.0000	1.0000
T5	22	LDF4-50A (1/2 FOAM)	66.67 - 75.00	0.6000	0.6000
T5	23	1-5/8 Fiber Optic Cable	66.67 - 75.00	0.6000	0.6000
T5	24	1/2	66.67 - 75.00	0.6000	0.6000

Job	160' Self Support Lattice - CSP #20	Page	13 of 63
Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T5	25	1 1/4" Hybriflex Cables	66.67 - 75.00	0.6000	0.6000
T6	1	AVA50-FX	58.33 - 66.67	0.6000	0.6000
T6	2	1 5/8" Hybriflex	58.33 - 66.67	0.6000	0.6000
T6	4	1 5/8	58.33 - 66.67	0.6000	0.6000
T6	5	1 1/4	58.33 - 66.67	0.6000	0.6000
T6	6	3" Flex Conduit w 1 Fiber & 2 DC	58.33 - 66.67	1.0000	0.6000
T6	7	LDF7-50A (1-5/8 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	8	LDF2-50A (3/8 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	9	LDF4-50A (1/2 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	10	LDF7-50A (1-5/8 FOAM)	58.33 - 66.67	1.0000	1.0000
T6	11	LDF5-50A (7/8 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	12	LDF2-50 (3/8 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	13	LDF5-50A (7/8 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	14	LDF6-50A (1-1/4 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	15	LDF7-50A (1-5/8 FOAM)	58.33 - 66.67	1.0000	1.0000
T6	16	LDF7-50A (1-5/8 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	17	LDF7-50A (1-5/8 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	18	LDF5-50A (7/8 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	19	EW63	58.33 - 66.67	0.6000	0.6000
T6	20	LDF5-50A (7/8 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	58.33 - 66.67	1.0000	1.0000
T6	22	LDF4-50A (1/2 FOAM)	58.33 - 66.67	0.6000	0.6000
T6	23	1-5/8 Fiber Optic Cable	58.33 - 66.67	0.6000	0.6000
T6	24	1/2	58.33 - 66.67	0.6000	0.6000
T6	25	1 1/4" Hybriflex Cables	58.33 - 66.67	0.6000	0.6000
T7	1	AVA50-FX	50.00 - 58.33	0.6000	0.6000
T7	2	1 5/8" Hybriflex	50.00 - 58.33	0.6000	0.6000
T7	4	1 5/8	50.00 - 58.33	0.6000	0.6000
T7	5	1 1/4	50.00 - 58.33	0.6000	0.6000
T7	6	3" Flex Conduit w 1 Fiber & 2 DC	50.00 - 58.33	1.0000	0.6000
T7	7	LDF7-50A (1-5/8 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	8	LDF2-50A (3/8 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	9	LDF4-50A (1/2 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	10	LDF7-50A (1-5/8 FOAM)	50.00 - 58.33	1.0000	1.0000
T7	11	LDF5-50A (7/8 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	12	LDF2-50 (3/8 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	13	LDF5-50A (7/8 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	14	LDF6-50A (1-1/4 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	15	LDF7-50A (1-5/8 FOAM)	50.00 - 58.33	1.0000	1.0000
T7	16	LDF7-50A (1-5/8 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	17	LDF7-50A (1-5/8 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	18	LDF5-50A (7/8 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	19	EW63	50.00 - 58.33	0.6000	0.6000
T7	20	LDF5-50A (7/8 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	50.00 - 58.33	1.0000	1.0000
T7	22	LDF4-50A (1/2 FOAM)	50.00 - 58.33	0.6000	0.6000
T7	23	1-5/8 Fiber Optic Cable	50.00 - 58.33	0.6000	0.6000
T7	24	1/2	50.00 - 58.33	0.6000	0.6000
T7	25	1 1/4" Hybriflex Cables	50.00 - 58.33	0.6000	0.6000
T8	1	AVA50-FX	37.50 - 50.00	0.6000	0.6000
T8	2	1 5/8" Hybriflex	37.50 - 50.00	0.6000	0.6000
T8	4	1 5/8	37.50 - 50.00	0.6000	0.6000
T8	5	1 1/4	37.50 - 50.00	0.6000	0.6000
T8	6	3" Flex Conduit w 1 Fiber & 2 DC	37.50 - 50.00	1.0000	0.6000
T8	7	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	8	LDF2-50A (3/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	9	LDF4-50A (1/2 FOAM)	37.50 - 50.00	0.6000	0.6000

Job	160' Self Support Lattice - CSP #20	Page	14 of 63
Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T8	10	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	1.0000	1.0000
T8	11	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	12	LDF2-50 (3/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	13	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	14	LDF6-50A (1-1/4 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	15	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	1.0000	1.0000
T8	16	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	17	LDF7-50A (1-5/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	18	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	19	EW63	37.50 - 50.00	0.6000	0.6000
T8	20	LDF5-50A (7/8 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	37.50 - 50.00	1.0000	1.0000
T8	22	LDF4-50A (1/2 FOAM)	37.50 - 50.00	0.6000	0.6000
T8	23	1-5/8 Fiber Optic Cable	37.50 - 50.00	0.6000	0.6000
T8	24	1/2	37.50 - 50.00	0.6000	0.6000
T8	25	1 1/4" Hybriflex Cables	37.50 - 50.00	0.6000	0.6000
T9	1	AVA50-FX	25.00 - 37.50	0.6000	0.6000
T9	2	1 5/8" Hybriflex	25.00 - 37.50	0.6000	0.6000
T9	4	1 5/8	25.00 - 37.50	0.6000	0.6000
T9	5	1 1/4	25.00 - 37.50	0.6000	0.6000
T9	6	3" Flex Conduit w 1 Fiber & 2 DC	25.00 - 37.50	1.0000	0.6000
T9	7	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	8	LDF2-50A (3/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	9	LDF4-50A (1/2 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	10	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	1.0000	1.0000
T9	11	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	12	LDF2-50 (3/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	13	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	14	LDF6-50A (1-1/4 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	15	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	1.0000	1.0000
T9	16	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	17	LDF7-50A (1-5/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	18	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	19	EW63	25.00 - 37.50	0.6000	0.6000
T9	20	LDF5-50A (7/8 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	25.00 - 37.50	1.0000	1.0000
T9	22	LDF4-50A (1/2 FOAM)	25.00 - 37.50	0.6000	0.6000
T9	23	1-5/8 Fiber Optic Cable	25.00 - 37.50	0.6000	0.6000
T9	24	1/2	25.00 - 37.50	0.6000	0.6000
T9	25	1 1/4" Hybriflex Cables	25.00 - 37.50	0.6000	0.6000
T10	1	AVA50-FX	0.00 - 25.00	0.6000	0.6000
T10	2	1 5/8" Hybriflex	0.00 - 25.00	0.6000	0.6000
T10	4	1 5/8	0.00 - 25.00	0.6000	0.6000
T10	5	1 1/4	0.00 - 25.00	0.6000	0.6000
T10	6	3" Flex Conduit w 1 Fiber & 2 DC	0.00 - 25.00	1.0000	0.6000
T10	7	LDF7-50A (1-5/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	8	LDF2-50A (3/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	9	LDF4-50A (1/2 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	10	LDF7-50A (1-5/8 FOAM)	0.00 - 25.00	1.0000	1.0000
T10	11	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	12	LDF2-50 (3/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	13	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	14	LDF6-50A (1-1/4 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	15	LDF7-50A (1-5/8 FOAM)	0.00 - 25.00	1.0000	1.0000
T10	16	LDF7-50A (1-5/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	17	LDF7-50A (1-5/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	18	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	19	EW63	0.00 - 25.00	0.6000	0.6000

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job 160' Self Support Lattice - CSP #20	Page 15 of 63
	Project Structural Analysis / Tower MODification	Date 17:59:23 04/09/18
	Client Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by MCD

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T10	20	LDF5-50A (7/8 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	21	AVA7-50 (1-5/8 LOW DENS. FOAM)	0.00 - 25.00	1.0000	1.0000
T10	22	LDF4-50A (1/2 FOAM)	0.00 - 25.00	0.6000	0.6000
T10	23	1-5/8 Fiber Optic Cable	0.00 - 25.00	0.6000	0.6000
T10	24	1/2	0.00 - 25.00	0.6000	0.6000
T10	25	1 1/4" Hybriflex Cables	0.00 - 25.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C_{AA} Front	C_{AA} Side	Weight
			ft ft ft	°	ft	ft ²	ft ²	lb
*** Inventory from D&K Climb (3/272016)								
*** Existing Carrier VZW								
SBNHH-1D65B (VZW-700&AWS)	A	From Leg	2.00 -3.00 0.00	0.0000	75.00	No Ice 8.20 1/2" Ice 8.66 1" Ice 9.13	5.42 5.88 6.35	40.60 91.24 148.02
SBNHH-1D65B (VZW-850&PCS)	A	From Leg	2.00 3.00 0.00	0.0000	75.00	No Ice 8.20 1/2" Ice 8.66 1" Ice 9.13	5.42 5.88 6.35	40.60 91.24 148.02
SBNHH-1D65B (VZW-700&AWS)	B	From Leg	2.00 -3.00 0.00	0.0000	75.00	No Ice 8.20 1/2" Ice 8.66 1" Ice 9.13	5.42 5.88 6.35	40.60 91.24 148.02
SBNHH-1D65B (VZW-850&PCS)	B	From Leg	2.00 3.00 0.00	0.0000	75.00	No Ice 8.20 1/2" Ice 8.66 1" Ice 9.13	5.42 5.88 6.35	40.60 91.24 148.02
5' T-arm (VZW)	A	None		0.0000	75.00	No Ice 4.50 1/2" Ice 5.50 1" Ice 6.50	2.50 3.20 3.90	250.00 315.00 380.00
5' T-arm (VZW)	A	None		0.0000	75.00	No Ice 4.50 1/2" Ice 5.50 1" Ice 6.50	2.50 3.20 3.90	250.00 315.00 380.00
RH_2x60-07-L (700 MHz) (VZW)	A	From Leg	2.00 -3.00 0.00	0.0000	75.00	No Ice 1.82 1/2" Ice 1.99 1" Ice 2.18	1.52 1.69 1.86	60.00 77.37 97.53
RH_2x60-07-L (700 MHz) (VZW)	B	From Leg	2.00 -3.00 0.00	0.0000	75.00	No Ice 1.82 1/2" Ice 1.99 1" Ice 2.18	1.52 1.69 1.86	60.00 77.37 97.53
DC6-48-60-18-8F (VZW)	C	None		0.0000	75.00	No Ice 1.27 1/2" Ice 1.46 1" Ice 1.66	1.27 1.46 1.66	20.00 35.12 52.57
RRH_2x60-AWS (VZW)	A	From Leg	2.00 3.00 0.00	0.0000	75.00	No Ice 1.87 1/2" Ice 2.04 1" Ice 2.23	1.23 1.38 1.53	44.00 59.92 78.53
RRH_2x60-AWS (VZW)	B	From Leg	2.00 3.00 0.00	0.0000	75.00	No Ice 1.87 1/2" Ice 2.04 1" Ice 2.23	1.23 1.38 1.53	44.00 59.92 78.53

*** Existing Carrier -
T-Mobile @ 119' Climbed by

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	16 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C _{AA}		Weight lb
			Horz Lateral ft	Vert ft			Front ft ²	Side ft ²	
D&K									
RR90-17-02DP (T-Mobile DNK 8-10)	A	From Leg	2.50	0.0000		119.00	No Ice 4.36 1/2" Ice 4.70 1" Ice 5.06	1.97 2.31 2.66	18.00 40.42 67.36
RR90-17-02DP (T-Mobile DNK 8-10)	B	From Leg	2.50	0.0000		119.00	No Ice 4.36 1/2" Ice 4.70 1" Ice 5.06	1.97 2.31 2.66	18.00 40.42 67.36
RR90-17-02DP (T-Mobile DNK 8-10)	C	From Leg	2.50	0.0000		119.00	No Ice 4.36 1/2" Ice 4.70 1" Ice 5.06	1.97 2.31 2.66	18.00 40.42 67.36
DSM2 (T-Mobile DNK 8-10)	A	From Leg	0.50	0.0000		119.00	No Ice 2.03 1/2" Ice 2.30 1" Ice 2.58	1.56 1.78 2.01	90.00 134.51 183.60
DSM2 (T-Mobile DNK 8-10)	B	From Leg	0.50	0.0000		119.00	No Ice 2.03 1/2" Ice 2.30 1" Ice 2.58	1.56 1.78 2.01	90.00 134.51 183.60
DSM2 (T-Mobile DNK 8-10)	C	From Leg	0.50	0.0000		119.00	No Ice 2.03 1/2" Ice 2.30 1" Ice 2.58	1.56 1.78 2.01	90.00 134.51 183.60
LNX-6515DS-VTM w/ 6' 2" sch 40 Piipe Mount (T-Mobile DNK 8-10)	A	From Leg	2.00	0.0000		119.00	No Ice 11.45 1/2" Ice 12.06 1" Ice 12.69	9.12 10.21 11.18	70.00 153.66 244.76
LNX-6515DS-VTM w/ 6' 2" sch 40 Piipe Mount (T-Mobile DNK 8-10)	B	From Leg	2.00	0.0000		119.00	No Ice 11.45 1/2" Ice 12.06 1" Ice 12.69	9.12 10.21 11.18	70.00 153.66 244.76
LNX-6515DS-VTM w/ 6' 2" sch 40 Piipe Mount (T-Mobile DNK 8-10)	C	From Leg	2.00	0.0000		119.00	No Ice 11.45 1/2" Ice 12.06 1" Ice 12.69	9.12 10.21 11.18	70.00 153.66 244.76
*** Existing Carrier - AT&T @ 135' Climbed by D&K *** D&K Climbed Inventory - Remaining Antennas									
16x16 Panel 19dBi 2.45GHz ISM (DNK-1)	B	From Leg	1.00	0.0000		82.00	No Ice 2.34 1/2" Ice 2.65 1" Ice 2.96	2.34 2.65 2.96	10.00 20.00 30.00
1' Side Mount Standoff (DNK-1)	B	None		0.0000		82.00	No Ice 2.64 1/2" Ice 3.69 1" Ice 4.74	2.64 3.69 4.74	40.00 50.00 60.00
4"x96"x72" Ice Canopy (DNK-5)	A	From Leg	3.00	0.0000		107.50	No Ice 3.73 1/2" Ice 4.39 1" Ice 5.05	2.80 3.30 3.80	300.00 551.38 814.11
4"x96"x72" Ice Canopy (DNK-6)	C	From Leg	3.00	0.0000		107.50	No Ice 3.73 1/2" Ice 4.39 1" Ice 5.05	2.80 3.30 3.80	300.00 551.38 814.11
8' Stiff-Arm (DNK-7)	B	From Leg	0.00	45.0000		108.00	No Ice 5.00 1/2" Ice 10.00 1" Ice 15.00	5.00 10.00 15.00	250.00 300.00 350.00
8' Stiff-Arm (DNK-7)	C	From Leg	0.00	-45.0000		108.00	No Ice 5.00 1/2" Ice 10.00 1" Ice 15.00	5.00 10.00 15.00	250.00 300.00 350.00
PD1142-1 (DNK-11)	C	From Face	5.00	0.0000		120.00	No Ice 1.32 1/2" Ice 3.21 1" Ice 5.12	1.32 3.21 5.12	10.00 23.85 49.42
*** Mount shared with DNK-7									
SC479-HF1LDF (DNK-18)	C	From Face	2.50	0.0000		141.00	No Ice 4.31 1/2" Ice 6.54	4.31 6.54	34.00 69.82

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	17 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight	
			Horz	Vert			Front	Side		
			ft	ft	°	ft	ft ²	ft ²	lb	
8' Stiff-Arm (DNK-18 (4 antennas Attached - 18, 24, 25, Sinclair))	B	From Leg	0.00		45.0000	141.00	1" Ice	8.04	8.04	114.98
			0.00				No Ice	5.00	5.00	250.00
			0.00				1/2" Ice	10.00	10.00	300.00
			0.00				1" Ice	15.00	15.00	350.00
8' Stiff-Arm (DNK-18 (4 antennas Attached - 18, 24, 25, Sinclair))	C	From Leg	0.00		-45.0000	141.00	No Ice	5.00	5.00	250.00
			0.00				1/2" Ice	10.00	10.00	300.00
			0.00				1" Ice	15.00	15.00	350.00
SC479-HF1LDF (DNK-19)	C	From Leg	1.00		0.0000	139.50	No Ice	4.31	4.31	34.00
			5.00				1/2" Ice	6.54	6.54	69.82
			0.00				1" Ice	8.04	8.04	114.98
10' PCS Frame (1) (DNK-19 (3 antennas Attached - 19,20,26))	C	None			0.0000	139.50	No Ice	9.00	9.00	250.00
							1/2" Ice	13.20	13.20	350.00
							1" Ice	17.40	17.40	450.00
SC479-HF1LDF (DNK-20)	C	From Leg	1.00		0.0000	139.50	No Ice	4.31	4.31	34.00
			-5.00				1/2" Ice	6.54	6.54	69.82
			0.00				1" Ice	8.04	8.04	114.98
SC479-HF1LDF (DNK-21)	A	From Face	0.00		0.0000	141.25	No Ice	4.31	4.31	34.00
			0.00				1/2" Ice	6.54	6.54	69.82
			0.00				1" Ice	8.04	8.04	114.98
8' Stiff-Arm (DNK-21 (2 antennas Attached - 21,29))	A	From Face	0.00		-30.0000	141.00	No Ice	5.00	5.00	250.00
			0.00				1/2" Ice	10.00	10.00	300.00
			0.00				1" Ice	15.00	15.00	350.00
8' Stiff-Arm (DNK-21 (2 antennas Attached - 21,29))	C	From Leg	0.00		0.0000	141.00	No Ice	5.00	5.00	250.00
			0.00				1/2" Ice	10.00	10.00	300.00
			0.00				1" Ice	15.00	15.00	350.00
8' Stiff-Arm (DNK-22 (5 antennas Attached - 22,27,31,32,33))	A	From Leg	0.00		0.0000	141.00	No Ice	5.00	5.00	250.00
			0.00				1/2" Ice	10.00	10.00	300.00
			0.00				1" Ice	15.00	15.00	350.00
8' Stiff-Arm (DNK-22 (5 antennas Attached - 22,27,31,32,33))	C	From Face	0.00		30.0000	141.00	No Ice	5.00	5.00	250.00
			0.00				1/2" Ice	10.00	10.00	300.00
			0.00				1" Ice	15.00	15.00	350.00
DC6-48-60-18-8F (Squid) Suppressor (DNK-23)	B	From Leg	1.00		0.0000	145.00	No Ice	0.79	0.79	20.00
			0.00				1/2" Ice	1.27	1.27	35.12
			0.00				1" Ice	1.45	1.45	52.57
*** Appears to be leg mounted from Climb Photos										
*** Mount Shared with DNK-18										
TMA 432-83H-01T (DNK-25)	B	From Leg	1.25		0.0000	158.00	No Ice	1.40	0.82	25.00
			0.00				1/2" Ice	1.55	0.94	37.44
			0.00				1" Ice	1.70	1.06	52.22
*** Mount Shared with DNK-18										
SC479-HF1LDF (DNK-26)	C	From Leg	1.00		0.0000	157.00	No Ice	4.33	4.33	34.00
			5.00				1/2" Ice	6.54	6.54	69.82
			0.00				1" Ice	8.04	8.04	114.98
*** Mount Shared with DNK-19										
DB304-A (DNK-27)	C	From Leg	0.50		0.0000	155.00	No Ice	4.85	4.85	45.00
			0.00				1/2" Ice	8.73	8.73	58.50
			0.00				1" Ice	12.61	12.61	72.00
*** Mount Shared with DNK-22										
DB228-A (DNK-28)	C	From Leg	0.50		0.0000	157.00	No Ice	7.30	7.30	72.00
			0.00				1/2" Ice	13.14	13.14	93.60

Job	160' Self Support Lattice - CSP #20	Page	18 of 63
Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
			ft	ft	°	ft	ft ²	ft ²	lb
			0.00			1" Ice	18.98	18.98	115.20
*** Mount Shared with DNK-30									
SC479-HF1LDF (DNK-29)	A	From Face	2.50	0.0000	159.00	No Ice	4.33	4.33	34.00
			0.00			1/2" Ice	6.54	6.54	69.82
			0.00			1" Ice	8.04	8.04	114.98
*** Mount Shared with DNK-21									
TMA 432-83H-01T (DNK-30)	A	From Face	0.00	0.0000	158.00	No Ice	1.40	0.82	25.00
			0.00			1/2" Ice	1.55	0.94	37.44
			0.00			1" Ice	1.70	1.06	52.22
*** Mount Shared with DNK-22									
SC479-HF1LDF(D00I-E6085)	A	From Leg	2.50	0.0000	157.50	No Ice	5.06	5.06	30.00
)			0.00			1/2" Ice	6.54	6.54	69.82
(DNK-32 - Troop L RX (PNS-Proposed 01272017))			0.00			1" Ice	8.04	8.04	114.98
*** Mount Shared with DNK-22									
Lightning Rod 2"x21' (DNK-33)	A	None		0.0000	160.00	No Ice	4.20	4.20	80.00
						1/2" Ice	6.33	6.33	112.30
						1" Ice	8.47	8.47	157.78
*** PNS-621 Proposal Mount/Ant (PSA6) 6' Side-Arm (CSP)	A	From Leg	0.00	45.0000	160.00	No Ice	10.60	10.60	140.00
			0.00			1/2" Ice	15.40	15.40	212.00
			0.00			1" Ice	20.20	20.20	284.00
SC479-HF1LDF(D00-E6085) (CSP)	A	From Leg	0.00	45.0000	160.00	No Ice	5.06	5.06	30.00
			6.00			1/2" Ice	6.54	6.54	69.82
			0.00			1" Ice	8.04	8.04	114.98
432E-83I-01T TTA Unit (CSP)	A	None		0.0000	158.00	No Ice	2.85	0.97	25.00
						1/2" Ice	3.06	1.11	44.70
						1" Ice	3.28	1.26	67.39
SC479-HF1LDF(D00I-E6085) (Inverted) (CSP)	A	From Leg	0.00	45.0000	145.00 - 160.00	No Ice	4.33	4.33	34.00
			6.00			1/2" Ice	6.54	6.54	69.82
			0.00			1" Ice	8.04	8.04	114.98
*** AIROsmith Antennas - Sprint (1/12/2018)									
APXVSP18-C-A20 (Sprint DNK 2-4)	A	From Face	0.50	0.0000	97.00	No Ice	8.26	6.71	90.00
			0.00			1/2" Ice	8.81	7.66	149.38
			0.00			1" Ice	9.36	8.49	223.56
APXVSP18-C-A20 (Sprint DNK 2-4)	B	From Face	0.50	0.0000	97.00	No Ice	8.26	6.71	90.00
			0.00			1/2" Ice	8.81	7.66	149.38
			0.00			1" Ice	9.36	8.49	223.56
APXVSP18-C-A20 (Sprint DNK 2-4)	C	From Leg	0.50	0.0000	97.00	No Ice	8.26	6.71	90.00
			0.00			1/2" Ice	8.81	7.66	149.38
			0.00			1" Ice	9.36	8.49	223.56
DT465B-2XR-V2 Panels (Commscope) (Sprint)	A	From Leg	1.50	0.0000	97.00	No Ice	9.10	5.97	58.00
			0.00			1/2" Ice	9.56	6.43	116.00
			0.00			1" Ice	10.04	6.90	180.29
DT465B-2XR-V2 Panels (Commscope) (Sprint)	B	From Leg	1.50	0.0000	97.00	No Ice	9.10	5.97	58.00
			0.00			1/2" Ice	9.56	6.43	116.00
			0.00			1" Ice	10.04	6.90	180.29
DT465B-2XR-V2 Panels (Commscope) (Sprint)	C	From Leg	1.50	0.0000	97.00	No Ice	9.10	5.97	58.00
			0.00			1/2" Ice	9.56	6.43	116.00
			0.00			1" Ice	10.04	6.90	180.29
RRH 800MHz 2x50W	A	From Face	1.00	0.0000	97.00	No Ice	2.49	2.34	70.00

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	19 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight lb
			Horz Lateral ft	Vert ft					
(Sprint)			1.00			1/2" Ice	2.71	2.66	95.17
			0.00			1" Ice	2.94	3.02	125.05
RRH 800MHz 2x50W (Sprint)	B	From Face	1.00	0.0000	97.00	No Ice	2.49	2.34	70.00
			1.00			1/2" Ice	2.71	2.66	95.17
			0.00			1" Ice	2.94	3.02	125.05
RRH 800MHz 2x50W (Sprint)	C	From Face	1.00	0.0000	97.00	No Ice	2.49	2.34	70.00
			-5.00			1/2" Ice	2.71	2.66	95.17
			0.00			1" Ice	2.94	3.02	125.05
RRH 800MHz 2x50W (Sprint DNK 2-4)	A	From Face	1.00	0.0000	97.00	No Ice	2.49	2.34	70.00
			1.00			1/2" Ice	2.71	2.66	95.17
			0.00			1" Ice	2.94	3.02	125.05
RRH 800MHz 2x50W (Sprint DNK 2-4)	B	From Face	1.00	0.0000	97.00	No Ice	2.49	2.34	70.00
			1.00			1/2" Ice	2.71	2.66	95.17
			0.00			1" Ice	2.94	3.02	125.05
RRH 800MHz 2x50W (Sprint DNK 2-4)	C	From Face	1.00	0.0000	97.00	No Ice	2.49	2.34	70.00
			-5.00			1/2" Ice	2.71	2.66	95.17
			0.00			1" Ice	2.94	3.02	125.05
TD-RRH8x20 (Sprint)	A	From Face	0.50	0.0000	97.00	No Ice	4.72	1.70	66.13
			0.00			1/2" Ice	5.01	1.92	93.27
			0.00			1" Ice	5.32	2.14	123.93
TD-RRH8x20 (Sprint)	B	From Face	0.50	0.0000	97.00	No Ice	4.72	1.70	66.13
			0.00			1/2" Ice	5.01	1.92	93.27
			0.00			1" Ice	5.32	2.14	123.93
TD-RRH8x20 (Sprint)	C	From Face	0.50	0.0000	97.00	No Ice	4.72	1.70	66.13
			-5.00			1/2" Ice	5.01	1.92	93.27
			0.00			1" Ice	5.32	2.14	123.93
RRH 1900 MHz 2x40W (Sprint DNK 2-4)	A	From Face	0.50	0.0000	97.00	No Ice	2.49	3.34	100.00
			0.00			1/2" Ice	2.71	3.69	126.85
			0.00			1" Ice	2.94	4.08	162.74
RRH 1900 MHz 2x40W (Sprint DNK 2-4)	B	From Face	0.50	0.0000	97.00	No Ice	2.49	3.34	100.00
			0.00			1/2" Ice	2.71	3.69	126.85
			0.00			1" Ice	2.94	4.08	162.74
RRH 1900 MHz 2x40W (Sprint DNK 2-4)	C	From Face	0.50	0.0000	97.00	No Ice	2.49	3.34	100.00
			-5.00			1/2" Ice	2.71	3.69	126.85
			0.00			1" Ice	2.94	4.08	162.74
PM-SU35-48 - Pipe Mount 48" (Sprint DNK 2-4)	A	From Leg	1.50	0.0000	97.00	No Ice	5.07	5.07	112.00
			0.00			1/2" Ice	5.39	5.39	156.37
			0.00			1" Ice	5.73	5.73	205.59
PM-SU35-48 - Pipe Mount 48" (Sprint DNK 2-4)	B	From Leg	1.50	0.0000	97.00	No Ice	5.07	5.07	112.00
			0.00			1/2" Ice	5.39	5.39	156.37
			0.00			1" Ice	5.73	5.73	205.59
PM-SU35-48 - Pipe Mount 48" (Sprint DNK 2-4)	C	From Leg	1.50	0.0000	97.00	No Ice	5.07	5.07	112.00
			0.00			1/2" Ice	5.39	5.39	156.37
			0.00			1" Ice	5.73	5.73	205.59
*** AIROSmith Antennas - Sprint (1/12/2018)									
*** Empire Antennas - 1/16/2018									
T-Frame (ATT DNK 12-17)	A	From Leg	2.00	0.0000	140.00	No Ice	8.90	8.90	224.00
			0.00			1/2" Ice	13.80	13.80	317.00
			0.00			1" Ice	18.80	18.80	410.00
T-Frame (ATT DNK 12-17)	B	From Leg	2.00	0.0000	140.00	No Ice	8.90	8.90	224.00
			0.00			1/2" Ice	13.80	13.80	317.00
			0.00			1" Ice	18.80	18.80	410.00
T-Frame (ATT DNK 12-17)	C	From Leg	2.00	0.0000	140.00	No Ice	8.90	8.90	224.00
			0.00			1/2" Ice	13.80	13.80	317.00
			0.00			1" Ice	18.80	18.80	410.00

<p>tnxTower</p> <p>AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991</p>	Job	160' Self Support Lattice - CSP #20	Page	20 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			Lateral		°	ft	ft ²	ft ²	lb
7770.00 (ATT DNK 12-17)	A	From Leg	1.50	0.0000		140.00	No Ice 5.53	4.01	52.03
			-5.00				1/2" Ice 5.89	4.64	97.08
			0.00				1" Ice 6.26	5.28	148.33
7770.00 (ATT DNK 12-17)	B	From Leg	1.50	0.0000		140.00	No Ice 5.53	4.01	52.03
			-5.00				1/2" Ice 5.89	4.64	97.08
			0.00				1" Ice 6.26	5.28	148.33
7770.00 (ATT DNK 12-17)	C	From Leg	1.50	0.0000		140.00	No Ice 5.53	4.01	52.03
			-5.00				1/2" Ice 5.89	4.64	97.08
			0.00				1" Ice 6.26	5.28	148.33
SBNH-1D6565C (ATT DNK 12-17)	A	From Leg	1.50	0.0000		140.00	No Ice 11.48	9.64	81.81
			0.00				1/2" Ice 12.11	11.07	169.21
			0.00				1" Ice 12.75	12.39	266.40
SBNH-1D6565C (ATT DNK 12-17)	B	From Leg	1.50	0.0000		140.00	No Ice 11.48	9.64	81.81
			0.00				1/2" Ice 12.11	11.07	169.21
			0.00				1" Ice 12.75	12.39	266.40
AM-X-CD-16-65-00T-RET (6') (ATT DNK 12-17)	B	From Leg	1.50	0.0000		140.00	No Ice 8.26	4.64	50.00
			0.00				1/2" Ice 8.81	5.09	95.50
			0.00				1" Ice 9.36	5.54	148.00
Surge Suppressor (ATT DNK 12-17)	B	From Face	0.50	0.0000		140.00	No Ice 0.80	0.80	30.00
			5.00				1/2" Ice 0.94	0.94	41.94
			0.00				1" Ice 1.09	1.09	55.86
TPA-65R-LCUUUU-H8 Panel w/ RET (ATT)	A	From Leg	1.50	0.0000		140.00	No Ice 12.86	10.38	104.20
			-5.00				1/2" Ice 13.46	11.79	202.42
			0.00				1" Ice 14.08	13.05	310.44
TPA-65R-LCUUUU-H8 Panel w/ RET (ATT)	B	From Leg	1.50	0.0000		140.00	No Ice 12.86	10.38	104.20
			-5.00				1/2" Ice 13.46	11.79	202.42
			0.00				1" Ice 14.08	13.05	310.44
QS66512-3 Quintel Panel (ATT)	C	From Leg	1.50	0.0000		140.00	No Ice 8.13	8.22	126.90
			-5.00				1/2" Ice 8.59	9.19	199.99
			0.00				1" Ice 9.05	10.02	281.01
RRUS-32 (ATT)	A	From Leg	1.50	0.0000		140.00	No Ice 3.33	2.36	80.00
			-5.00				1/2" Ice 3.55	2.56	112.20
			0.00				1" Ice 3.78	2.76	148.06
RRUS-12 (ATT)	A	From Leg	1.50	0.0000		140.00	No Ice 3.15	1.29	58.00
			-5.00				1/2" Ice 3.36	1.44	81.22
			0.00				1" Ice 3.59	1.60	107.64
RRUS-11 (ATT DNK 12-17)	A	From Leg	1.50	0.0000		140.00	No Ice 2.57	1.07	50.00
			-5.00				1/2" Ice 2.76	1.21	69.57
			0.00				1" Ice 2.97	1.36	92.08
A2 Module Unit (ATT)	A	From Leg	1.50	0.0000		140.00	No Ice 2.08	0.50	22.00
			-5.00				1/2" Ice 2.26	0.61	34.73
			0.00				1" Ice 2.44	0.73	49.92
RRUS-32 (ATT)	B	From Leg	1.50	0.0000		140.00	No Ice 3.33	2.36	80.00
			-5.00				1/2" Ice 3.55	2.56	112.20
			0.00				1" Ice 3.78	2.76	148.06
RRUS-12 (ATT)	B	From Leg	1.50	0.0000		140.00	No Ice 3.15	1.29	58.00
			-5.00				1/2" Ice 3.36	1.44	81.22
			0.00				1" Ice 3.59	1.60	107.64
RRUS-11 (ATT DNK 12-17)	B	From Leg	1.50	0.0000		140.00	No Ice 2.57	1.07	50.00
			-5.00				1/2" Ice 2.76	1.21	69.57
			0.00				1" Ice 2.97	1.36	92.08
A2 Module Unit (ATT)	B	From Leg	1.50	0.0000		140.00	No Ice 2.08	0.50	22.00
			-5.00				1/2" Ice 2.26	0.61	34.73
			0.00				1" Ice 2.44	0.73	49.92
RRUS-32 (ATT)	C	From Leg	1.50	0.0000		140.00	No Ice 3.33	2.36	80.00
			-5.00				1/2" Ice 3.55	2.56	112.20
			0.00				1" Ice 3.78	2.76	148.06

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz Lateral	Vert					
RRUS-12 (ATT)	C	From Leg	1.50	0.0000	140.00	No Ice	3.15	1.29	58.00
			-5.00			1/2" Ice	3.36	1.44	81.22
			0.00			1" Ice	3.59	1.60	107.64
RRUS-11 (ATT DNK 12-17)	C	From Leg	1.50	0.0000	140.00	No Ice	2.57	1.07	50.00
			-5.00			1/2" Ice	2.76	1.21	69.57
			0.00			1" Ice	2.97	1.36	92.08
A2 Module Unit (ATT)	C	From Leg	1.50	0.0000	140.00	No Ice	2.08	0.50	22.00
			-5.00			1/2" Ice	2.26	0.61	34.73
			0.00			1" Ice	2.44	0.73	49.92
DC6-48-60-18-8F (Squid) Suppressor (ATT)	A	From Leg	0.50	0.0000	140.00	No Ice	0.79	0.79	20.00
			0.00			1/2" Ice	1.27	1.27	35.12
			0.00			1" Ice	1.45	1.45	52.57
TT19-08BP111-001 TMA's (ATT DNK 12-17)	A	From Leg	1.50	0.0000	140.00	No Ice	0.55	0.45	16.00
			0.00			1/2" Ice	0.65	0.53	21.80
			0.00			1" Ice	0.75	0.63	29.22
TT19-08BP111-001 TMA's (ATT DNK 12-17)	B	From Leg	1.50	0.0000	140.00	No Ice	0.55	0.45	16.00
			0.00			1/2" Ice	0.65	0.53	21.80
			0.00			1" Ice	0.75	0.63	29.22
TT19-08BP111-001 TMA's (ATT DNK 12-17)	C	From Leg	1.50	0.0000	140.00	No Ice	0.55	0.45	16.00
			0.00			1/2" Ice	0.65	0.53	21.80
			0.00			1" Ice	0.75	0.63	29.22
(2) LGP21401 Diplexer (ATT DNK 12-17)	A	From Leg	1.50	0.0000	140.00	No Ice	1.10	0.21	14.10
			0.00			1/2" Ice	1.24	0.27	21.26
			0.00			1" Ice	1.38	0.35	30.32
(2) LGP21401 Diplexer (ATT DNK 12-17)	B	From Leg	1.50	0.0000	140.00	No Ice	1.10	0.21	14.10
			0.00			1/2" Ice	1.24	0.27	21.26
			0.00			1" Ice	1.38	0.35	30.32
(2) LGP21401 Diplexer (ATT DNK 12-17)	C	From Leg	1.50	0.0000	140.00	No Ice	1.10	0.21	14.10
			0.00			1/2" Ice	1.24	0.27	21.26
			0.00			1" Ice	1.38	0.35	30.32
PM-SU35-48 - Pipe Mount 48" (Sprint)	A	From Leg	1.50	0.0000	97.00	No Ice	5.07	5.07	112.00
			0.00			1/2" Ice	5.39	5.39	156.37
			0.00			1" Ice	5.73	5.73	205.59
PM-SU35-48 - Pipe Mount 48" (Sprint)	B	From Leg	1.50	0.0000	97.00	No Ice	5.07	5.07	112.00
			0.00			1/2" Ice	5.39	5.39	156.37
			0.00			1" Ice	5.73	5.73	205.59
PM-SU35-48 - Pipe Mount 48" (Sprint)	C	From Leg	1.50	0.0000	97.00	No Ice	5.07	5.07	112.00
			0.00			1/2" Ice	5.39	5.39	156.37
			0.00			1" Ice	5.73	5.73	205.59

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets:		Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				Horz Lateral	Vert							ft
HPD2-4.7 (NWCT)	C	Paraboloid w/Shroud (HP)	From Face	0.50	0.00	Worst		140.00	2.00	No Ice	3.14	27.00
				0.00						1/2" Ice	3.41	44.50
				0.00						1" Ice	3.68	62.00
6' w/ Radome	A	Paraboloid	From	1.00		Worst		106.50	6.00	No Ice	28.27	230.00

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Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight lb	
(DNK-5 / CSP-6)		w/Radome	Leg	0.00					1/2" Ice 1" Ice	29.07 29.86	340.00 450.00
6' w/ Radome (DNK-6 / CSP-7)	C	Paraboloid w/Radome	From Leg	1.00	Worst		107.00	6.00	No Ice 1/2" Ice 1" Ice	28.27 29.07 29.86	230.00 340.00 450.00

222-G Verification Constants

Constant	Value
Wind Importance Factor Without Ice	1.15
Wind Importance Factor With Ice Factor	1
Ice Importance Factor	1.25
K _d	0.85
Z _g	900
α	9.5
K _{zmin}	0.85
K _c	1
K _t	0.53
f	2

222-G Section Verification ArRr By Element

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	F a c e	e	e w/Ice	A _r ft ²	A _r w/Ice ft ²	A _r R _r ft ²	A _r R _r w/Ice ft ²
T1 160.00-150.00	1	P.5x.250	53.414	51.698	C	0.175	0.401	4.171	8.053	1.992	5.126
	1	P.5x.250	53.414	51.698	A	0.175	0.401	4.171	8.053	1.992	5.126
	2	P.5x.250	53.414	51.698	C	0.175	0.401	4.171	8.053	1.992	5.126
	2	P.5x.250	53.414	51.698	B	0.175	0.401	4.171	8.053	1.992	5.126
	3	P.5x.250	53.414	51.698	B	0.175	0.401	4.171	8.053	1.992	5.126
	3	P.5x.250	53.414	51.698	A	0.175	0.401	4.171	8.053	1.992	5.126
								Sum:	8.342	16.105	3.984
T2 150.00-125.00	22	P.5x.250	53.713	52.006	C	0.13	0.301	10.428	20.139	4.790	12.066
	22	P.5x.250	53.713	52.006	A	0.13	0.301	10.428	20.139	4.790	12.066
	23	P.5x.250	53.713	52.006	C	0.13	0.301	10.428	20.139	4.790	12.066
	23	P.5x.250	53.713	52.006	B	0.13	0.301	10.428	20.139	4.790	12.066
	24	P.5x.250	53.713	52.006	B	0.13	0.301	10.428	20.139	4.790	12.066
	24	P.5x.250	53.713	52.006	A	0.13	0.301	10.428	20.139	4.790	12.066
								Sum:	20.856	40.277	9.580
T3 125.00-100.00	52	P.5x.250	54.318	52.657	C	0.122	0.281	10.428	20.164	4.731	11.961
	52	P.5x.250	54.318	52.657	A	0.122	0.281	10.428	20.164	4.731	11.961
	53	P.5x.250	54.318	52.657	C	0.122	0.281	10.428	20.164	4.731	11.961
	53	P.5x.250	54.318	52.657	B	0.122	0.281	10.428	20.164	4.731	11.961
	54	P.5x.250	54.318	52.657	B	0.122	0.281	10.428	20.164	4.731	11.961
	54	P.5x.250	54.318	52.657	A	0.122	0.281	10.428	20.164	4.731	11.961

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Section Elevation	Elem. Num.	Size	C	C w/Ice	F a c e	e	e w/Ice	A _r	A _r w/Ice	A _r R _r	A _r R _r w/Ice	
ft								ft ²	ft ²	ft ²	ft ²	
T4 100.00-75.00	91	P5x0.3 w/ (3) 1.5x5/8 Plates	79.844	57.301	A	0.14	0.286	Sum:	20.856	40.327	9.461	23.923
					B			20.856	40.327	9.461	23.923	
					C			20.856	40.327	9.461	23.923	
					C			15.101	24.874	6.248	14.793	
					A			15.101	24.874	6.248	14.793	
					B			15.101	24.874	6.248	14.793	
T5 75.00-66.67	130	P5x0.4 w/ (3) 1.5x5/8 Plates	80.757	57.998	C	0.134	0.275	Sum:	30.202	49.748	12.496	29.586
					B			30.202	49.748	12.496	29.586	
					C			30.202	49.748	12.496	29.586	
					C			5.034	8.299	2.066	4.910	
					A			5.034	8.299	2.066	4.910	
					B			5.034	8.299	2.066	4.910	
T6 66.67-58.33	145	P5x0.4 w/ (3) 1.5x5/8 Plates	81.216	58.34	C	0.131	0.27	Sum:	10.067	16.598	4.133	9.819
					B			10.067	16.598	4.133	9.819	
					C			10.067	16.598	4.133	9.819	
					C			5.034	8.301	2.059	4.900	
					A			5.034	8.301	2.059	4.900	
					B			5.034	8.301	2.059	4.900	
T7 58.33-50.00	160	HSS5x.4	56.379	54.836	C	0.131	0.32	Sum:	6.952	13.487	3.106	8.165
					B			6.952	13.487	3.106	8.165	
					C			6.952	13.487	3.106	8.165	
					C			3.476	6.743	1.553	4.082	
					A			3.476	6.743	1.553	4.082	
					B			3.476	6.743	1.553	4.082	
T8 50.00-37.50	187	HSS6.875x.4	77.918	65.716	C	0.118	0.23	Sum:	7.169	12.060	2.890	6.999
					A			7.169	12.060	2.890	6.999	
					C			7.169	12.060	2.890	6.999	

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Section Elevation <i>ft</i>	Elem. Num.	Size	C	C w/Ice	F a c e	e	e w/Ice	A _r <i>ft</i> ²	A _r w/Ice <i>ft</i> ²	A _r R _r <i>ft</i> ²	A _r R _r w/Ice <i>ft</i> ²
T9 37.50-25.00	188	HSS6.875x.4	77.918	65.716	B	0.118	0.23	7.169	12.060	2.890	6.999
	189	HSS6.875x.4	77.918	65.716	B	0.118	0.23	7.169	12.060	2.890	6.999
	189	HSS6.875x.4	77.918	65.716	A	0.118	0.23	7.169	12.060	2.890	6.999
					A		Sum:	14.338	24.121	5.780	13.998
					B			14.338	24.121	5.780	13.998
					C			14.338	24.121	5.780	13.998
	202	HSS6.875x.4	78.005	65.575	C	0.129	0.272	7.169	12.021	2.929	7.102
	202	HSS6.875x.4	78.005	65.575	A	0.129	0.272	7.169	12.021	2.929	7.102
	203	HSS6.875x.4	78.005	65.575	C	0.129	0.272	7.169	12.021	2.929	7.102
	203	HSS6.875x.4	78.005	65.575	B	0.129	0.272	7.169	12.021	2.929	7.102
T10 25.00-0.00	204	HSS6.875x.4	78.005	65.575	B	0.129	0.272	7.169	12.021	2.929	7.102
	204	HSS6.875x.4	78.005	65.575	A	0.129	0.272	7.169	12.021	2.929	7.102
					A		Sum:	14.338	24.042	5.858	14.204
					B			14.338	24.042	5.858	14.204
					C			14.338	24.042	5.858	14.204
	229	HSS6.875x0.5 w/ (3) 2x5/8 Bars	108.841	71.147	C	0.133	0.23	20.293	29.543	8.324	17.147
	229	HSS6.875x0.5 w/ (3) 2x5/8 Bars	108.841	71.147	A	0.133	0.23	20.293	29.543	8.324	17.147
	230	HSS6.875x0.5 w/ (3) 2x5/8 Bars	108.841	71.147	C	0.133	0.23	20.293	29.543	8.324	17.147
	230	HSS6.875x0.5 w/ (3) 2x5/8 Bars	108.841	71.147	B	0.133	0.23	20.293	29.543	8.324	17.147
	231	HSS6.875x0.5 w/ (3) 2x5/8 Bars	108.841	71.147	B	0.133	0.23	20.293	29.543	8.324	17.147
231	HSS6.875x0.5 w/ (3) 2x5/8 Bars	108.841	71.147	A	0.133	0.23	20.293	29.543	8.324	17.147	
				A		Sum:	40.587	59.085	16.648	34.293	
				B			40.587	59.085	16.648	34.293	
				C			40.587	59.085	16.648	34.293	

222-G Section Verification Tables - No Ice

Section Elevation <i>ft</i>	<i>z</i> _{wind} <i>ft</i>	<i>z</i> _{ice} <i>ft</i>	<i>K</i> _z	<i>K</i> _h	<i>K</i> _{st}	<i>t</i> _z <i>in</i>	<i>q</i> _z <i>psf</i>	F a c e	<i>e</i>	A _r R _r <i>ft</i> ²
T1 160.00-150.00	155.00		1.388	5.82	1.19		36	A	0.175	3.984
								B	0.175	3.984
								C	0.175	3.984
T2 150.00-125.00	137.50		1.353	4.771	1.235		36	A	0.13	9.580
								B	0.13	9.580
								C	0.13	9.580
T3 125.00-100.00	112.50		1.297	3.591	1.317		37	A	0.122	9.461
								B	0.122	9.461
								C	0.122	9.461
T4 100.00-75.00	87.50		1.231	2.703	1.431		38	A	0.14	12.496
								B	0.14	12.496
								C	0.14	12.496
T5 75.00-66.67	70.83		1.177	2.237	1.53		39	A	0.134	4.133
								B	0.134	4.133
								C	0.134	4.133
T6 66.67-58.33	62.50		1.146	2.034	1.589		39	A	0.131	4.119

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Section Elevation	z_{wind}	z_{ice}	K_z	K_h	K_{zt}	t_z	q_z	F a c e	e	$A_s R_r$
ft	ft	ft				in	psf			ft ²
T7 58.33-50.00	54.17		1.112	1.851	1.655		40	B C A B C	0.131 0.131 0.131 0.131 0.131	4.119 4.119 3.106 3.106 3.106
T8 50.00-37.50	43.75		1.063	1.644	1.749		40	A B C	0.118 0.118 0.118	5.780 5.780 5.780
T9 37.50-25.00	31.25		0.991	1.426	1.881		40	A B C	0.129 0.129 0.129	5.858 5.858 5.858
T10 25.00-0.00	12.50		0.85	1.153	2.131		39	A B C	0.133 0.133 0.133	16.648 16.648 16.648

222-G Section Verification Tables - Ice

Section Elevation	z_{wind}	z_{ice}	K_z	K_h	K_{zt}	t_z	q_z	F a c e	e	$A_s R_r$
ft	ft	ft				in	psf			ft ²
T1 160.00-150.00	155.00	155.00	1.388	5.82	1.19	2.3264	9	A B C	0.401 0.401 0.401	22.167 22.167 22.167
T2 150.00-125.00	137.50	137.50	1.353	4.771	1.235	2.3281	9	A B C	0.301 0.301 0.301	45.954 45.954 45.954
T3 125.00-100.00	112.50	112.50	1.297	3.591	1.317	2.3341	9	A B C	0.281 0.281 0.281	47.877 47.877 47.877
T4 100.00-75.00	87.50	87.50	1.231	2.703	1.431	2.3431	10	A B C	0.286 0.286 0.286	55.787 55.787 55.787
T5 75.00-66.67	70.83	70.83	1.177	2.237	1.53	2.3487	10	A B C	0.275 0.275 0.275	19.049 19.049 19.049
T6 66.67-58.33	62.50	62.50	1.146	2.034	1.589	2.3503	10	A B C	0.27 0.27 0.27	19.286 19.286 19.286
T7 58.33-50.00	54.17	54.17	1.112	1.851	1.655	2.3501	10	A B C	0.32 0.32 0.32	22.989 22.989 22.989
T8 50.00-37.50	43.75	43.75	1.063	1.644	1.749	2.3453	10	A B C	0.23 0.23 0.23	25.270 25.270 25.270
T9 37.50-25.00	31.25	31.25	0.991	1.426	1.881	2.3264	10	A B C	0.272 0.272 0.272	31.470 31.470 31.470
T10 25.00-0.00	12.50	12.50	0.85	1.153	2.131	2.2174	10	A B C	0.23 0.23 0.23	57.132 57.132 57.132

222-G Section Verification Tables - Service

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	26 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section Elevation	z_{wind}	z_{ice}	K_z	K_h	K_{st}	t_z	q_z	F_{ac}	e	A_{Rr}
ft	ft	ft				in	psf			ft ²
T1 160.00-150.00	155.00		1.388	5.82	1.19		13	A B C	0.175 0.175 0.175	3.984 3.984 3.984
T2 150.00-125.00	137.50		1.353	4.771	1.235		13	A B C	0.13 0.13 0.13	9.580 9.580 9.580
T3 125.00-100.00	112.50		1.297	3.591	1.317		13	A B C	0.122 0.122 0.122	9.461 9.461 9.461
T4 100.00-75.00	87.50		1.231	2.703	1.431		14	A B C	0.14 0.14 0.14	12.496 12.496 12.496
T5 75.00-66.67	70.83		1.177	2.237	1.53		14	A B C	0.134 0.134 0.134	4.133 4.133 4.133
T6 66.67-58.33	62.50		1.146	2.034	1.589		14	A B C	0.131 0.131 0.131	4.119 4.119 4.119
T7 58.33-50.00	54.17		1.112	1.851	1.655		14	A B C	0.131 0.131 0.131	3.106 3.106 3.106
T8 50.00-37.50	43.75		1.063	1.644	1.749		15	A B C	0.118 0.118 0.118	5.780 5.780 5.780
T9 37.50-25.00	31.25		0.991	1.426	1.881		15	A B C	0.129 0.129 0.129	5.858 5.858 5.858
T10 25.00-0.00	12.50		0.85	1.153	2.131		14	A B C	0.133 0.133 0.133	16.648 16.648 16.648

Tower Pressures - No Ice

$$G_H = 0.850$$

Section Elevation	z	K_Z	q_z	A_G	F_{ac}	A_F	A_R	A_{leg}	Leg %	C_{AA} In Face	C_{AA} Out Face
ft	ft		psf	ft ²	ft ²	ft ²	ft ²	ft ²		ft ²	ft ²
T1 160.00-150.00	155.00	1.388	36	110.170	A B C	10.889 10.889 10.889	8.342 8.342 8.342	8.342	43.38 43.38 43.38	0.000 13.484 0.000	0.000 0.000 0.000
T2 150.00-125.00	137.50	1.353	36	310.425	A B C	19.557 19.557 19.557	20.856 20.856 20.856	20.856	51.61 51.61 51.61	0.000 98.660 0.000	0.000 0.000 0.000
T3 125.00-100.00	112.50	1.297	37	360.425	A B C	23.281 23.281 23.281	20.856 20.856 20.856	20.856	47.25 47.25 47.25	0.000 140.472 59.400	0.000 0.000 0.000
T4 100.00-75.00	87.50	1.231	38	416.680	A B C	28.204 28.204 28.204	30.202 30.202 30.202	30.202	51.71 51.71 51.71	0.000 151.116 70.550	0.000 0.000 0.000
T5 75.00-66.67	70.83	1.177	39	150.004	A B C	9.964 9.964 9.964	10.067 10.067 10.067	10.067	50.26 50.26 50.26	0.000 52.353 23.967	0.000 0.000 0.000
T6 66.67-58.33	62.50	1.146	39	155.560	A B	10.257 10.257	10.067 10.067	10.067	49.53 49.53	0.000 52.339	0.000 0.000

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job 160' Self Support Lattice - CSP #20	Page 27 of 63
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Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e ft ²	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
T7 58.33-50.00	54.17	1.112	40	159.031	C	10.257	10.067	6.952	49.53	23.967	0.000
					A	13.957	6.952		33.25	0.000	0.000
					B	13.957	6.952		33.25	52.327	0.000
T8 50.00-37.50	43.75	1.063	40	250.917	C	13.957	6.952	14.338	33.25	23.967	0.000
					A	15.266	14.338		48.43	0.000	0.000
					B	15.266	14.338		48.43	78.472	0.000
T9 37.50-25.00	31.25	0.991	40	263.417	C	15.266	14.338	14.338	48.43	35.950	0.000
					A	19.771	14.338		42.04	0.000	0.000
					B	19.771	14.338		42.04	78.468	0.000
T10 25.00-0.00	12.50	0.85	39	572.674	C	19.771	14.338	40.587	42.04	35.950	0.000
					A	35.491	40.587		53.35	0.000	0.000
					B	35.491	40.587		53.35	157.038	0.000
					C	35.491	40.587		53.35	71.900	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e ft ²	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
T1 160.00-150.00	155.00	1.388	9	2.3264	114.050	A	10.889	34.822	16.105	35.23	0.000	0.000
						B	10.889	34.822		35.23	69.238	0.000
						C	10.889	34.822		35.23	0.000	0.000
T2 150.00-125.00	137.50	1.353	9	2.3281	320.133	A	19.557	76.701	40.277	41.84	0.000	0.000
						B	19.557	76.701		41.84	377.244	0.000
						C	19.557	76.701		41.84	0.000	0.000
T3 125.00-100.00	112.50	1.297	9	2.3341	370.158	A	23.281	80.707	40.327	38.78	0.000	0.000
						B	23.281	80.707		38.78	498.307	0.000
						C	23.281	80.707		38.78	89.051	0.000
T4 100.00-75.00	87.50	1.231	10	2.3431	426.451	A	28.204	93.804	49.748	40.77	0.000	0.000
						B	28.204	93.804		40.77	531.086	0.000
						C	28.204	93.804		40.77	130.070	0.000
T5 75.00-66.67	70.83	1.177	10	2.3487	153.269	A	9.964	32.201	16.598	39.37	0.000	0.000
						B	9.964	32.201		39.37	186.028	0.000
						C	9.964	32.201		39.37	45.040	0.000
T6 66.67-58.33	62.50	1.146	10	2.3503	158.827	A	10.257	32.674	16.603	38.67	0.000	0.000
						B	10.257	32.674		38.67	186.106	0.000
						C	10.257	32.674		38.67	45.048	0.000
T7 58.33-50.00	54.17	1.112	10	2.3501	162.297	A	13.957	37.974	13.487	25.97	0.000	0.000
						B	13.957	37.974		25.97	186.096	0.000
						C	13.957	37.974		25.97	45.047	0.000
T8 50.00-37.50	43.75	1.063	10	2.3453	255.807	A	15.266	43.542	24.121	41.02	0.000	0.000
						B	15.266	43.542		41.02	278.793	0.000
						C	15.266	43.542		41.02	67.532	0.000
T9 37.50-25.00	31.25	0.991	10	2.3264	268.268	A	19.771	53.268	24.042	32.92	0.000	0.000
						B	19.771	53.268		32.92	277.413	0.000
						C	19.771	53.268		32.92	67.377	0.000
T10 25.00-0.00	12.50	0.85	10	2.2174	581.921	A	35.491	98.435	59.085	44.12	0.000	0.000
						B	35.491	98.435		44.12	538.887	0.000
						C	35.491	98.435		44.12	132.973	0.000

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job 160' Self Support Lattice - CSP #20	Page 28 of 63
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Tower Pressure - Service

$$G_H = 0.850$$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		psf	ft ²	e	ft ²	ft ²	ft ²		ft ²	ft ²
T1 160.00-150.00	155.00	1.388	13	110.170	A	10.889	8.342	8.342	43.38	0.000	0.000
					B	10.889	8.342	43.38	13.484	0.000	
					C	10.889	8.342	43.38	0.000	0.000	
T2 150.00-125.00	137.50	1.353	13	310.425	A	19.557	20.856	20.856	51.61	0.000	0.000
					B	19.557	20.856	51.61	98.660	0.000	
					C	19.557	20.856	51.61	0.000	0.000	
T3 125.00-100.00	112.50	1.297	13	360.425	A	23.281	20.856	20.856	47.25	0.000	0.000
					B	23.281	20.856	47.25	140.472	0.000	
					C	23.281	20.856	47.25	59.400	0.000	
T4 100.00-75.00	87.50	1.231	14	416.680	A	28.204	30.202	30.202	51.71	0.000	0.000
					B	28.204	30.202	51.71	151.116	0.000	
					C	28.204	30.202	51.71	70.550	0.000	
T5 75.00-66.67	70.83	1.177	14	150.004	A	9.964	10.067	10.067	50.26	0.000	0.000
					B	9.964	10.067	50.26	52.353	0.000	
					C	9.964	10.067	50.26	23.967	0.000	
T6 66.67-58.33	62.50	1.146	14	155.560	A	10.257	10.067	10.067	49.53	0.000	0.000
					B	10.257	10.067	49.53	52.339	0.000	
					C	10.257	10.067	49.53	23.967	0.000	
T7 58.33-50.00	54.17	1.112	14	159.031	A	13.957	6.952	6.952	33.25	0.000	0.000
					B	13.957	6.952	33.25	52.327	0.000	
					C	13.957	6.952	33.25	23.967	0.000	
T8 50.00-37.50	43.75	1.063	15	250.917	A	15.266	14.338	14.338	48.43	0.000	0.000
					B	15.266	14.338	48.43	78.472	0.000	
					C	15.266	14.338	48.43	35.950	0.000	
T9 37.50-25.00	31.25	0.991	15	263.417	A	19.771	14.338	14.338	42.04	0.000	0.000
					B	19.771	14.338	42.04	78.468	0.000	
					C	19.771	14.338	42.04	35.950	0.000	
T10 25.00-0.00	12.50	0.85	14	572.674	A	35.491	40.587	40.587	53.35	0.000	0.000
					B	35.491	40.587	53.35	157.038	0.000	
					C	35.491	40.587	53.35	71.900	0.000	

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb	e			psf			ft ²	lb	plf	
T1 160.00-150.00	44.80	1181.68	A	0.175	2.683	36	1	1	14.873	1540.72	154.07	C
			B	0.175	2.683	1	1	14.873				
			C	0.175	2.683	1	1	14.873				
T2 150.00-125.00	409.01	2323.89	A	0.13	2.846	36	1	1	29.136	4706.11	188.24	C
			B	0.13	2.846	1	1	29.136				
			C	0.13	2.846	1	1	29.136				
T3 125.00-100.00	907.24	3860.01	A	0.122	2.875	37	1	1	32.743	7132.79	285.31	C
			B	0.122	2.875	1	1	32.743				
			C	0.122	2.875	1	1	32.743				
T4 100.00-75.00	1030.36	5084.15	A	0.14	2.808	38	1	1	40.700	8423.30	336.93	C
			B	0.14	2.808	1	1	40.700				
			C	0.14	2.808	1	1	40.700				
T5 75.00-66.67	361.81	2103.33	A	0.134	2.833	39	1	1	14.097	2981.33	357.76	C
			B	0.134	2.833	1	1	14.097				

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Section Elevation <i>ft</i>	Add Weight <i>lb</i>	Self Weight <i>lb</i>	F a c e	e	C _F	q _z <i>psf</i>	D _F	D _R	A _E <i>ft²</i>	F <i>lb</i>	w <i>plf</i>	Ctrl. Face
T6 66.67-58.33	361.81	2140.98	C	0.134	2.833	39	1	1	14.097	3046.62	365.59	C
			A	0.131	2.844		1	1	14.376			
			B	0.131	2.844		1	1	14.376			
T7 58.33-50.00	361.81	2316.33	C	0.131	2.844	40	1	1	14.376	3335.42	400.25	C
			A	0.131	2.841		1	1	17.063			
			B	0.131	2.841		1	1	17.063			
T8 50.00-37.50	542.71	3003.52	C	0.131	2.841	40	1	1	17.063	4649.30	371.94	C
			A	0.118	2.893		1	1	21.047			
			B	0.118	2.893		1	1	21.047			
T9 37.50-25.00	542.71	3416.13	C	0.118	2.893	40	1	1	21.047	5075.04	406.00	C
			A	0.129	2.848		1	1	25.629			
			B	0.129	2.848		1	1	25.629			
T10 25.00-0.00	1085.43	8678.73	C	0.129	2.848	39	1	1	25.629	9929.61	397.18	C
			A	0.133	2.836		1	1	52.139			
			B	0.133	2.836		1	1	52.139			
Sum Weight:	5647.68	34108.77						OTM	3493.76 kip-ft	50820.24		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation <i>ft</i>	Add Weight <i>lb</i>	Self Weight <i>lb</i>	F a c e	e	C _F	q _z <i>psf</i>	D _F	D _R	A _E <i>ft²</i>	F <i>lb</i>	w <i>plf</i>	Ctrl. Face
T1 160.00-150.00	44.80	1181.68	A	0.175	2.683	36	0.825	1	12.967	1385.31	138.53	C
			B	0.175	2.683		0.825	1	12.967			
			C	0.175	2.683		0.825	1	12.967			
T2 150.00-125.00	409.01	2323.89	A	0.13	2.846	36	0.825	1	25.714	4406.75	176.27	C
			B	0.13	2.846		0.825	1	25.714			
			C	0.13	2.846		0.825	1	25.714			
T3 125.00-100.00	907.24	3860.01	A	0.122	2.875	37	0.825	1	28.668	6764.55	270.58	C
			B	0.122	2.875		0.825	1	28.668			
			C	0.122	2.875		0.825	1	28.668			
T4 100.00-75.00	1030.36	5084.15	A	0.14	2.808	38	0.825	1	35.765	7974.45	318.98	C
			B	0.14	2.808		0.825	1	35.765			
			C	0.14	2.808		0.825	1	35.765			
T5 75.00-66.67	361.81	2103.33	A	0.134	2.833	39	0.825	1	12.353	2817.66	338.12	C
			B	0.134	2.833		0.825	1	12.353			
			C	0.134	2.833		0.825	1	12.353			
T6 66.67-58.33	361.81	2140.98	A	0.131	2.844	39	0.825	1	12.581	2875.56	345.07	C
			B	0.131	2.844		0.825	1	12.581			
			C	0.131	2.844		0.825	1	12.581			
T7 58.33-50.00	361.81	2316.33	A	0.131	2.841	40	0.825	1	14.621	3100.45	372.05	C
			B	0.131	2.841		0.825	1	14.621			
			C	0.131	2.841		0.825	1	14.621			
T8 50.00-37.50	542.71	3003.52	A	0.118	2.893	40	0.825	1	18.375	4384.90	350.79	C
			B	0.118	2.893		0.825	1	18.375			
			C	0.118	2.893		0.825	1	18.375			
T9 37.50-25.00	542.71	3416.13	A	0.129	2.848	40	0.825	1	22.169	4737.12	378.97	C
			B	0.129	2.848		0.825	1	22.169			
			C	0.129	2.848		0.825	1	22.169			
T10 25.00-0.00	1085.43	8678.73	A	0.133	2.836	39	0.825	1	45.928	9342.71	373.71	C
			B	0.133	2.836		0.825	1	45.928			
							0.825	1	45.928			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
Sum Weight:	5647.68	34108.77	C	0.133	2.836		0.825	1 OTM	45.928 3283.33 kip-ft	47789.45		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
T1 160.00-150.00	44.80	1181.68	A	0.175	2.683	36	0.8	1	12.695	1363.11	136.31	C
			B	0.175	2.683	0.8	1	12.695				
			C	0.175	2.683	0.8	1	12.695				
T2 150.00-125.00	409.01	2323.89	A	0.13	2.846	36	0.8	1	25.225	4363.98	174.56	C
			B	0.13	2.846	0.8	1	25.225				
			C	0.13	2.846	0.8	1	25.225				
T3 125.00-100.00	907.24	3860.01	A	0.122	2.875	37	0.8	1	28.086	6711.94	268.48	C
			B	0.122	2.875	0.8	1	28.086				
			C	0.122	2.875	0.8	1	28.086				
T4 100.00-75.00	1030.36	5084.15	A	0.14	2.808	38	0.8	1	35.060	7910.32	316.41	C
			B	0.14	2.808	0.8	1	35.060				
			C	0.14	2.808	0.8	1	35.060				
T5 75.00-66.67	361.81	2103.33	A	0.134	2.833	39	0.8	1	12.104	2794.27	335.31	C
			B	0.134	2.833	0.8	1	12.104				
			C	0.134	2.833	0.8	1	12.104				
T6 66.67-58.33	361.81	2140.98	A	0.131	2.844	39	0.8	1	12.324	2851.13	342.14	C
			B	0.131	2.844	0.8	1	12.324				
			C	0.131	2.844	0.8	1	12.324				
T7 58.33-50.00	361.81	2316.33	A	0.131	2.841	40	0.8	1	14.272	3066.88	368.03	C
			B	0.131	2.841	0.8	1	14.272				
			C	0.131	2.841	0.8	1	14.272				
T8 50.00-37.50	542.71	3003.52	A	0.118	2.893	40	0.8	1	17.994	4347.13	347.77	C
			B	0.118	2.893	0.8	1	17.994				
			C	0.118	2.893	0.8	1	17.994				
T9 37.50-25.00	542.71	3416.13	A	0.129	2.848	40	0.8	1	21.675	4688.85	375.11	C
			B	0.129	2.848	0.8	1	21.675				
			C	0.129	2.848	0.8	1	21.675				
T10 25.00-0.00	1085.43	8678.73	A	0.133	2.836	39	0.8	1	45.041	9258.86	370.35	C
			B	0.133	2.836	0.8	1	45.041				
			C	0.133	2.836	0.8	1	45.041				
Sum Weight:	5647.68	34108.77						OTM	3253.27 kip-ft	47356.48		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job 160' Self Support Lattice - CSP #20	Page 31 of 63
	Project Structural Analysis / Tower MODification	Date 17:59:23 04/09/18
	Client Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by MCD

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T1 160.00-150.00	44.80	1181.68	A	0.175	2.683	36	0.85	1	13.239	1407.51	140.75	C
			B	0.175	2.683		0.85	1	13.239			
			C	0.175	2.683		0.85	1	13.239			
T2 150.00-125.00	409.01	2323.89	A	0.13	2.846	36	0.85	1	26.203	4449.52	177.98	C
			B	0.13	2.846		0.85	1	26.203			
			C	0.13	2.846		0.85	1	26.203			
T3 125.00-100.00	907.24	3860.01	A	0.122	2.875	37	0.85	1	29.250	6817.15	272.69	C
			B	0.122	2.875		0.85	1	29.250			
			C	0.122	2.875		0.85	1	29.250			
T4 100.00-75.00	1030.36	5084.15	A	0.14	2.808	38	0.85	1	36.470	8038.57	321.54	C
			B	0.14	2.808		0.85	1	36.470			
			C	0.14	2.808		0.85	1	36.470			
T5 75.00-66.67	361.81	2103.33	A	0.134	2.833	39	0.85	1	12.603	2841.04	340.92	C
			B	0.134	2.833		0.85	1	12.603			
			C	0.134	2.833		0.85	1	12.603			
T6 66.67-58.33	361.81	2140.98	A	0.131	2.844	39	0.85	1	12.837	2900.00	348.00	C
			B	0.131	2.844		0.85	1	12.837			
			C	0.131	2.844		0.85	1	12.837			
T7 58.33-50.00	361.81	2316.33	A	0.131	2.841	40	0.85	1	14.970	3134.01	376.08	C
			B	0.131	2.841		0.85	1	14.970			
			C	0.131	2.841		0.85	1	14.970			
T8 50.00-37.50	542.71	3003.52	A	0.118	2.893	40	0.85	1	18.757	4422.67	353.81	C
			B	0.118	2.893		0.85	1	18.757			
			C	0.118	2.893		0.85	1	18.757			
T9 37.50-25.00	542.71	3416.13	A	0.129	2.848	40	0.85	1	22.663	4785.39	382.83	C
			B	0.129	2.848		0.85	1	22.663			
			C	0.129	2.848		0.85	1	22.663			
T10 25.00-0.00	1085.43	8678.73	A	0.133	2.836	39	0.85	1	46.816	9426.55	377.06	C
			B	0.133	2.836		0.85	1	46.816			
			C	0.133	2.836		0.85	1	46.816			
Sum Weight:	5647.68	34108.77						OTM	3313.39 kip-ft	48222.42		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T1 160.00-150.00	973.95	4811.28	A	0.401	2.062	9	1	1	33.056	919.14	91.91	C
			B	0.401	2.062		1	1	33.056			
			C	0.401	2.062		1	1	33.056			
T2 150.00-125.00	6093.04	9531.09	A	0.301	2.294	9	1	1	65.511	3184.80	127.39	C
			B	0.301	2.294		1	1	65.511			
			C	0.301	2.294		1	1	65.511			
T3 125.00-100.00	10938.57	12846.86	A	0.281	2.348	9	1	1	71.158	4404.16	176.17	C
			B	0.281	2.348		1	1	71.158			
			C	0.281	2.348		1	1	71.158			
T4 100.00-75.00	12150.78	16522.28	A	0.286	2.334	10	1	1	83.991	5134.24	205.37	C
			B	0.286	2.334		1	1	83.991			
			C	0.286	2.334		1	1	83.991			
T5 75.00-66.67	4257.01	6088.78	A	0.275	2.364	10	1	1	29.014	1831.46	219.78	C
			B	0.275	2.364		1	1	29.014			
			C	0.275	2.364		1	1	29.014			

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	32 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T6 66.67-58.33	4260.19	6218.81	A	0.27	2.378	10	1	1	29.543	1866.78	224.01	C
			B	0.27	2.378		1	1	29.543			
			C	0.27	2.378		1	1	29.543			
T7 58.33-50.00	4259.78	7092.54	A	0.32	2.244	10	1	1	36.947	1994.24	239.31	C
			B	0.32	2.244		1	1	36.947			
			C	0.32	2.244		1	1	36.947			
T8 50.00-37.50	6375.32	8354.74	A	0.23	2.499	10	1	1	40.536	2821.55	225.72	C
			B	0.23	2.499		1	1	40.536			
			C	0.23	2.499		1	1	40.536			
T9 37.50-25.00	6319.07	9985.80	A	0.272	2.372	10	1	1	51.241	2993.76	239.50	C
			B	0.272	2.372		1	1	51.241			
			C	0.272	2.372		1	1	51.241			
T10 25.00-0.00	11998.27	21412.84	A	0.23	2.498	10	1	1	92.623	5623.92	224.96	C
			B	0.23	2.498		1	1	92.623			
			C	0.23	2.498		1	1	92.623			
Sum Weight:	67625.99	102865.02						OTM	2166.81 kip-ft	30774.05		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T1 160.00-150.00	973.95	4811.28	A	0.401	2.062	9	0.825	1	31.150	889.11	88.91	C
			B	0.401	2.062		0.825	1	31.150			
			C	0.401	2.062		0.825	1	31.150			
T2 150.00-125.00	6093.04	9531.09	A	0.301	2.294	9	0.825	1	62.089	3124.14	124.97	C
			B	0.301	2.294		0.825	1	62.089			
			C	0.301	2.294		0.825	1	62.089			
T3 125.00-100.00	10938.57	12846.86	A	0.281	2.348	9	0.825	1	67.084	4328.58	173.14	C
			B	0.281	2.348		0.825	1	67.084			
			C	0.281	2.348		0.825	1	67.084			
T4 100.00-75.00	12150.78	16522.28	A	0.286	2.334	10	0.825	1	79.055	5040.48	201.62	C
			B	0.286	2.334		0.825	1	79.055			
			C	0.286	2.334		0.825	1	79.055			
T5 75.00-66.67	4257.01	6088.78	A	0.275	2.364	10	0.825	1	27.270	1797.13	215.66	C
			B	0.275	2.364		0.825	1	27.270			
			C	0.275	2.364		0.825	1	27.270			
T6 66.67-58.33	4260.19	6218.81	A	0.27	2.378	10	0.825	1	27.748	1830.83	219.70	C
			B	0.27	2.378		0.825	1	27.748			
			C	0.27	2.378		0.825	1	27.748			
T7 58.33-50.00	4259.78	7092.54	A	0.32	2.244	10	0.825	1	34.504	1947.58	233.71	C
			B	0.32	2.244		0.825	1	34.504			
			C	0.32	2.244		0.825	1	34.504			
T8 50.00-37.50	6375.32	8354.74	A	0.23	2.499	10	0.825	1	37.865	2764.13	221.13	C
			B	0.23	2.499		0.825	1	37.865			
			C	0.23	2.499		0.825	1	37.865			
T9 37.50-25.00	6319.07	9985.80	A	0.272	2.372	10	0.825	1	47.781	2923.02	233.84	C
			B	0.272	2.372		0.825	1	47.781			
			C	0.272	2.372		0.825	1	47.781			
T10 25.00-0.00	11998.27	21412.84	A	0.23	2.498	10	0.825	1	86.412	5493.95	219.76	C
			B	0.23	2.498		0.825	1	86.412			
			C	0.23	2.498		0.825	1	86.412			

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job 160' Self Support Lattice - CSP #20	Page 33 of 63
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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
Sum Weight:	67625.99	102865.02						OTM	2123.56 kip-ft	30138.95		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
T1 160.00-150.00	973.95	4811.28	A	0.401	2.062	9	0.8	1	30.878	884.82	88.48	C
			B	0.401	2.062		0.8	1	30.878			
			C	0.401	2.062		0.8	1	30.878			
T2 150.00-125.00	6093.04	9531.09	A	0.301	2.294	9	0.8	1	61.600	3115.48	124.62	C
			B	0.301	2.294		0.8	1	61.600			
			C	0.301	2.294		0.8	1	61.600			
T3 125.00-100.00	10938.57	12846.86	A	0.281	2.348	9	0.8	1	66.502	4317.78	172.71	C
			B	0.281	2.348		0.8	1	66.502			
			C	0.281	2.348		0.8	1	66.502			
T4 100.00-75.00	12150.78	16522.28	A	0.286	2.334	10	0.8	1	78.350	5027.08	201.08	C
			B	0.286	2.334		0.8	1	78.350			
			C	0.286	2.334		0.8	1	78.350			
T5 75.00-66.67	4257.01	6088.78	A	0.275	2.364	10	0.8	1	27.021	1792.23	215.07	C
			B	0.275	2.364		0.8	1	27.021			
			C	0.275	2.364		0.8	1	27.021			
T6 66.67-58.33	4260.19	6218.81	A	0.27	2.378	10	0.8	1	27.491	1825.70	219.08	C
			B	0.27	2.378		0.8	1	27.491			
			C	0.27	2.378		0.8	1	27.491			
T7 58.33-50.00	4259.78	7092.54	A	0.32	2.244	10	0.8	1	34.155	1940.92	232.91	C
			B	0.32	2.244		0.8	1	34.155			
			C	0.32	2.244		0.8	1	34.155			
T8 50.00-37.50	6375.32	8354.74	A	0.23	2.499	10	0.8	1	37.483	2755.93	220.47	C
			B	0.23	2.499		0.8	1	37.483			
			C	0.23	2.499		0.8	1	37.483			
T9 37.50-25.00	6319.07	9985.80	A	0.272	2.372	10	0.8	1	47.287	2912.91	233.03	C
			B	0.272	2.372		0.8	1	47.287			
			C	0.272	2.372		0.8	1	47.287			
T10 25.00-0.00	11998.27	21412.84	A	0.23	2.498	10	0.8	1	85.525	5475.38	219.02	C
			B	0.23	2.498		0.8	1	85.525			
			C	0.23	2.498		0.8	1	85.525			
Sum Weight:	67625.99	102865.02						OTM	2117.38 kip-ft	30048.23		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
T1	973.95	4811.28	A	0.401	2.062	9	0.85	1	31.423	893.40	89.34	C

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Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
160.00-150.00			B	0.401	2.062		0.85	1	31.423			
			C	0.401	2.062		0.85	1	31.423			
T2	6093.04	9531.09	A	0.301	2.294	9	0.85	1	62.578	3132.81	125.31	C
150.00-125.00			B	0.301	2.294		0.85	1	62.578			
			C	0.301	2.294		0.85	1	62.578			
T3	10938.57	12846.86	A	0.281	2.348	9	0.85	1	67.666	4339.38	173.58	C
125.00-100.00			B	0.281	2.348		0.85	1	67.666			
			C	0.281	2.348		0.85	1	67.666			
T4	12150.78	16522.28	A	0.286	2.334	10	0.85	1	79.760	5053.87	202.15	C
100.00-75.00			B	0.286	2.334		0.85	1	79.760			
			C	0.286	2.334		0.85	1	79.760			
T5	4257.01	6088.78	A	0.275	2.364	10	0.85	1	27.519	1802.04	216.24	C
75.00-66.67			B	0.275	2.364		0.85	1	27.519			
			C	0.275	2.364		0.85	1	27.519			
T6	4260.19	6218.81	A	0.27	2.378	10	0.85	1	28.004	1835.97	220.32	C
66.67-58.33			B	0.27	2.378		0.85	1	28.004			
			C	0.27	2.378		0.85	1	28.004			
T7	4259.78	7092.54	A	0.32	2.244	10	0.85	1	34.853	1954.25	234.51	C
58.33-50.00			B	0.32	2.244		0.85	1	34.853			
			C	0.32	2.244		0.85	1	34.853			
T8	6375.32	8354.74	A	0.23	2.499	10	0.85	1	38.246	2772.33	221.79	C
50.00-37.50			B	0.23	2.499		0.85	1	38.246			
			C	0.23	2.499		0.85	1	38.246			
T9	6319.07	9985.80	A	0.272	2.372	10	0.85	1	48.275	2933.12	234.65	C
37.50-25.00			B	0.272	2.372		0.85	1	48.275			
			C	0.272	2.372		0.85	1	48.275			
T10	11998.27	21412.84	A	0.23	2.498	10	0.85	1	87.300	5512.51	220.50	C
25.00-0.00			B	0.23	2.498		0.85	1	87.300			
			C	0.23	2.498		0.85	1	87.300			
Sum Weight:	67625.99	102865.02						OTM	2129.74 kip-ft	30229.68		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T1	44.80	1181.68	A	0.175	2.683	13	1	1	14.873	557.65	55.77	C
160.00-150.00			B	0.175	2.683		1	1	14.873			
			C	0.175	2.683		1	1	14.873			
T2	409.01	2323.89	A	0.13	2.846	13	1	1	29.136	1703.34	68.13	C
150.00-125.00			B	0.13	2.846		1	1	29.136			
			C	0.13	2.846		1	1	29.136			
T3	907.24	3860.01	A	0.122	2.875	13	1	1	32.743	2581.66	103.27	C
125.00-100.00			B	0.122	2.875		1	1	32.743			
			C	0.122	2.875		1	1	32.743			
T4	1030.36	5084.15	A	0.14	2.808	14	1	1	40.700	3048.74	121.95	C
100.00-75.00			B	0.14	2.808		1	1	40.700			
			C	0.14	2.808		1	1	40.700			
T5	361.81	2103.33	A	0.134	2.833	14	1	1	14.097	1079.07	129.49	C
75.00-66.67			B	0.134	2.833		1	1	14.097			
			C	0.134	2.833		1	1	14.097			
T6	361.81	2140.98	A	0.131	2.844	14	1	1	14.376	1102.70	132.32	C

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	35 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
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Section Elevation <i>ft</i>	Add Weight <i>lb</i>	Self Weight <i>lb</i>	F a c e	e	C _F	q _z <i>psf</i>	D _F	D _R	A _E <i>ft²</i>	F <i>lb</i>	w <i>plf</i>	Ctrl. Face
66.67-58.33			B	0.131	2.844		1	1	14.376			
			C	0.131	2.844		1	1	14.376			
T7	361.81	2316.33	A	0.131	2.841	14	1	1	17.063	1207.23	144.87	C
58.33-50.00			B	0.131	2.841		1	1	17.063			
			C	0.131	2.841		1	1	17.063			
T8	542.71	3003.52	A	0.118	2.893	15	1	1	21.047	1682.78	134.62	C
50.00-37.50			B	0.118	2.893		1	1	21.047			
			C	0.118	2.893		1	1	21.047			
T9	542.71	3416.13	A	0.129	2.848	15	1	1	25.629	1836.87	146.95	C
37.50-25.00			B	0.129	2.848		1	1	25.629			
			C	0.129	2.848		1	1	25.629			
T10	1085.43	8678.73	A	0.133	2.836	14	1	1	52.139	3593.94	143.76	C
25.00-0.00			B	0.133	2.836		1	1	52.139			
			C	0.133	2.836		1	1	52.139			
Sum Weight:	5647.68	34108.77						OTM	1264.54 kip-ft	18393.97		

Tower Forces - Service - Wind 45 To Face

Section Elevation <i>ft</i>	Add Weight <i>lb</i>	Self Weight <i>lb</i>	F a c e	e	C _F	q _z <i>psf</i>	D _F	D _R	A _E <i>ft²</i>	F <i>lb</i>	w <i>plf</i>	Ctrl. Face
T1	44.80	1181.68	A	0.175	2.683	13	0.825	1	12.967	501.40	50.14	C
160.00-150.00			B	0.175	2.683		0.825	1	12.967			
			C	0.175	2.683		0.825	1	12.967			
T2	409.01	2323.89	A	0.13	2.846	13	0.825	1	25.714	1594.99	63.80	C
150.00-125.00			B	0.13	2.846		0.825	1	25.714			
			C	0.13	2.846		0.825	1	25.714			
T3	907.24	3860.01	A	0.122	2.875	13	0.825	1	28.668	2448.37	97.93	C
125.00-100.00			B	0.122	2.875		0.825	1	28.668			
			C	0.122	2.875		0.825	1	28.668			
T4	1030.36	5084.15	A	0.14	2.808	14	0.825	1	35.765	2886.29	115.45	C
100.00-75.00			B	0.14	2.808		0.825	1	35.765			
			C	0.14	2.808		0.825	1	35.765			
T5	361.81	2103.33	A	0.134	2.833	14	0.825	1	12.353	1019.83	122.38	C
75.00-66.67			B	0.134	2.833		0.825	1	12.353			
			C	0.134	2.833		0.825	1	12.353			
T6	361.81	2140.98	A	0.131	2.844	14	0.825	1	12.581	1040.79	124.89	C
66.67-58.33			B	0.131	2.844		0.825	1	12.581			
			C	0.131	2.844		0.825	1	12.581			
T7	361.81	2316.33	A	0.131	2.841	14	0.825	1	14.621	1122.18	134.66	C
58.33-50.00			B	0.131	2.841		0.825	1	14.621			
			C	0.131	2.841		0.825	1	14.621			
T8	542.71	3003.52	A	0.118	2.893	15	0.825	1	18.375	1587.08	126.97	C
50.00-37.50			B	0.118	2.893		0.825	1	18.375			
			C	0.118	2.893		0.825	1	18.375			
T9	542.71	3416.13	A	0.129	2.848	15	0.825	1	22.169	1714.56	137.16	C
37.50-25.00			B	0.129	2.848		0.825	1	22.169			
			C	0.129	2.848		0.825	1	22.169			
T10	1085.43	8678.73	A	0.133	2.836	14	0.825	1	45.928	3381.52	135.26	C
25.00-0.00			B	0.133	2.836		0.825	1	45.928			
			C	0.133	2.836		0.825	1	45.928			
Sum Weight:	5647.68	34108.77						OTM	1188.38	17297.00		

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	36 of 63
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	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
									kip-ft			

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
T1 160.00-150.00	44.80	1181.68	A	0.175	2.683	13	0.8	1	12.695	493.37	49.34	C
			B	0.175	2.683		0.8	1	12.695			
			C	0.175	2.683		0.8	1	12.695			
T2 150.00-125.00	409.01	2323.89	A	0.13	2.846	13	0.8	1	25.225	1579.51	63.18	C
			B	0.13	2.846		0.8	1	25.225			
			C	0.13	2.846		0.8	1	25.225			
T3 125.00-100.00	907.24	3860.01	A	0.122	2.875	13	0.8	1	28.086	2429.33	97.17	C
			B	0.122	2.875		0.8	1	28.086			
			C	0.122	2.875		0.8	1	28.086			
T4 100.00-75.00	1030.36	5084.15	A	0.14	2.808	14	0.8	1	35.060	2863.08	114.52	C
			B	0.14	2.808		0.8	1	35.060			
			C	0.14	2.808		0.8	1	35.060			
T5 75.00-66.67	361.81	2103.33	A	0.134	2.833	14	0.8	1	12.104	1011.36	121.36	C
			B	0.134	2.833		0.8	1	12.104			
			C	0.134	2.833		0.8	1	12.104			
T6 66.67-58.33	361.81	2140.98	A	0.131	2.844	14	0.8	1	12.324	1031.94	123.83	C
			B	0.131	2.844		0.8	1	12.324			
			C	0.131	2.844		0.8	1	12.324			
T7 58.33-50.00	361.81	2316.33	A	0.131	2.841	14	0.8	1	14.272	1110.03	133.20	C
			B	0.131	2.841		0.8	1	14.272			
			C	0.131	2.841		0.8	1	14.272			
T8 50.00-37.50	542.71	3003.52	A	0.118	2.893	15	0.8	1	17.994	1573.41	125.87	C
			B	0.118	2.893		0.8	1	17.994			
			C	0.118	2.893		0.8	1	17.994			
T9 37.50-25.00	542.71	3416.13	A	0.129	2.848	15	0.8	1	21.675	1697.09	135.77	C
			B	0.129	2.848		0.8	1	21.675			
			C	0.129	2.848		0.8	1	21.675			
T10 25.00-0.00	1085.43	8678.73	A	0.133	2.836	14	0.8	1	45.041	3351.17	134.05	C
			B	0.133	2.836		0.8	1	45.041			
			C	0.133	2.836		0.8	1	45.041			
Sum Weight:	5647.68	34108.77						OTM	1177.50 kip-ft	17140.29		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb				psf			ft ²	lb	plf	
T1 160.00-150.00	44.80	1181.68	A	0.175	2.683	13	0.85	1	13.239	509.44	50.94	C
			B	0.175	2.683		0.85	1	13.239			

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	37 of 63
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	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F lb	w plf	Ctrl. Face
T2 150.00-125.00	409.01	2323.89	C	0.175	2.683	13	0.85	1	13.239	1610.47	64.42	C
			A	0.13	2.846		0.85	1	26.203			
			B	0.13	2.846		0.85	1	26.203			
			C	0.13	2.846		0.85	1	26.203			
T3 125.00-100.00	907.24	3860.01	A	0.122	2.875	13	0.85	1	29.250	2467.41	98.70	C
			B	0.122	2.875		0.85	1	29.250			
			C	0.122	2.875		0.85	1	29.250			
T4 100.00-75.00	1030.36	5084.15	A	0.14	2.808	14	0.85	1	36.470	2909.49	116.38	C
			B	0.14	2.808		0.85	1	36.470			
			C	0.14	2.808		0.85	1	36.470			
T5 75.00-66.67	361.81	2103.33	A	0.134	2.833	14	0.85	1	12.603	1028.29	123.39	C
			B	0.134	2.833		0.85	1	12.603			
			C	0.134	2.833		0.85	1	12.603			
T6 66.67-58.33	361.81	2140.98	A	0.131	2.844	14	0.85	1	12.837	1049.63	125.96	C
			B	0.131	2.844		0.85	1	12.837			
			C	0.131	2.844		0.85	1	12.837			
T7 58.33-50.00	361.81	2316.33	A	0.131	2.841	14	0.85	1	14.970	1134.33	136.12	C
			B	0.131	2.841		0.85	1	14.970			
			C	0.131	2.841		0.85	1	14.970			
T8 50.00-37.50	542.71	3003.52	A	0.118	2.893	15	0.85	1	18.757	1600.75	128.06	C
			B	0.118	2.893		0.85	1	18.757			
			C	0.118	2.893		0.85	1	18.757			
T9 37.50-25.00	542.71	3416.13	A	0.129	2.848	15	0.85	1	22.663	1732.03	138.56	C
			B	0.129	2.848		0.85	1	22.663			
			C	0.129	2.848		0.85	1	22.663			
T10 25.00-0.00	1085.43	8678.73	A	0.133	2.836	14	0.85	1	46.816	3411.86	136.47	C
			B	0.133	2.836		0.85	1	46.816			
			C	0.133	2.836		0.85	1	46.816			
Sum Weight:	5647.68	34108.77						OTM	1199.26 kip-ft	17453.71		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M _x kip-ft	Sum of Overturning Moments, M _z kip-ft	Sum of Torques kip-ft
Leg Weight	11767.25					
Bracing Weight	22341.53					
Total Member Self-Weight	34108.77					
Total Weight	49531.86			3.06	-13.37	
Wind 0 deg - No Ice		-180.21	-67031.58	-5437.38	7.46	74.33
Wind 30 deg - No Ice		32040.05	-55711.16	-4541.88	-2624.73	45.99
Wind 45 deg - No Ice		45098.60	-45127.96	-3680.39	-3695.92	28.27
Wind 60 deg - No Ice		54925.28	-31627.84	-2578.87	-4505.15	8.94
Wind 90 deg - No Ice		64392.23	180.21	23.89	-5272.18	-30.01
Wind 120 deg - No Ice		58105.20	33671.85	2741.33	-4734.25	-64.24
Wind 135 deg - No Ice		47129.16	47158.52	3839.26	-3848.67	-73.94
Wind 150 deg - No Ice		32352.18	55891.37	4568.84	-2660.81	-75.99
Wind 180 deg - No Ice		180.21	63567.81	5203.02	-34.20	-69.12
Wind 210 deg - No Ice		-32040.05	55711.16	4548.01	2598.00	-45.99
Wind 225 deg - No Ice		-45098.60	45127.96	3686.52	3669.18	-28.27
Wind 240 deg - No Ice		-57924.99	33359.72	2705.25	4686.68	-10.09
Wind 270 deg - No Ice		-64392.23	-180.21	-17.76	5245.44	30.01

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Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M _x kip-ft	Sum of Overturning Moments, M _z kip-ft	Sum of Torques kip-ft
Wind 300 deg - No Ice		-55105.49	-31939.97	-2614.95	4499.24	60.19
Wind 315 deg - No Ice		-47129.16	-47158.52	-3833.13	3821.93	73.94
Wind 330 deg - No Ice		-32352.18	-55891.37	-4562.71	2634.07	75.99
Member Ice	68756.24					
Total Weight Ice	208004.76			-120.99	-175.21	
Wind 0 deg - Ice		-38.91	-39373.50	-3376.67	-171.04	28.37
Wind 30 deg - Ice		19373.24	-33607.56	-2906.30	-1780.88	10.51
Wind 45 deg - Ice		27353.89	-27364.67	-2389.57	-2443.75	0.48
Wind 60 deg - Ice		33437.21	-19290.14	-1720.51	-2949.77	-9.53
Wind 90 deg - Ice		38813.89	38.91	-116.83	-3393.76	-27.10
Wind 120 deg - Ice		34104.70	19720.45	1510.45	-2996.75	-38.08
Wind 135 deg - Ice		27781.02	27791.80	2178.82	-2474.99	-39.42
Wind 150 deg - Ice		19440.64	33646.47	2668.48	-1788.10	-37.61
Wind 180 deg - Ice		38.91	38647.68	3085.25	-179.38	-27.59
Wind 210 deg - Ice		-19373.24	33607.56	2664.31	1430.46	-10.51
Wind 225 deg - Ice		-27353.89	27364.67	2147.58	2093.33	-0.48
Wind 240 deg - Ice		-34065.79	19653.05	1503.23	2642.16	9.71
Wind 270 deg - Ice		-38813.89	-38.91	-125.16	3043.34	27.10
Wind 300 deg - Ice		-33476.12	-19357.54	-1727.72	2603.52	37.12
Wind 315 deg - Ice		-27781.02	-27791.80	-2420.81	2124.57	39.42
Wind 330 deg - Ice		-19440.64	-33646.47	-2910.47	1437.67	37.61
Total Weight	49531.86			3.06	-13.37	
Wind 0 deg - Service		-65.23	-24261.53	-1970.15	11.68	26.90
Wind 30 deg - Service		11596.63	-20164.20	-1646.03	-941.02	16.64
Wind 45 deg - Service		16323.07	-16333.70	-1334.22	-1328.73	10.23
Wind 60 deg - Service		19879.76	-11447.44	-935.54	-1621.62	3.23
Wind 90 deg - Service		23306.24	65.23	6.51	-1899.24	-10.86
Wind 120 deg - Service		21030.70	12187.25	990.06	-1704.54	-23.25
Wind 135 deg - Service		17058.02	17068.64	1387.45	-1384.01	-26.76
Wind 150 deg - Service		11709.61	20229.42	1651.52	-954.08	-27.51
Wind 180 deg - Service		65.23	23007.85	1881.05	-3.40	-25.02
Wind 210 deg - Service		-11596.63	20164.20	1643.98	949.30	-16.64
Wind 225 deg - Service		-16323.07	16333.70	1332.17	1337.01	-10.23
Wind 240 deg - Service		-20965.48	12074.28	977.01	1705.29	-3.65
Wind 270 deg - Service		-23306.24	-65.23	-8.57	1907.52	10.86
Wind 300 deg - Service		-19944.98	-11560.41	-948.60	1637.44	21.78
Wind 315 deg - Service		-17058.02	-17068.64	-1389.51	1392.30	26.76
Wind 330 deg - Service		-11709.61	-20229.42	-1653.57	962.36	27.51

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice

<p>tnxTower</p> <p>AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991</p>	Job	160' Self Support Lattice - CSP #20	Page	39 of 63
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<i>Comb. No.</i>	<i>Description</i>
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

<i>Section No.</i>	<i>Elevation ft</i>	<i>Component Type</i>	<i>Condition</i>	<i>Gov. Load Comb.</i>	<i>Axial lb</i>	<i>Major Axis Moment kip-ft</i>	<i>Minor Axis Moment kip-ft</i>
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tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	40 of 63
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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft		
T1	160 - 150	Leg	Max Tension	29	647.22	-0.35	-0.01		
			Max. Compression	35	-4053.30	-0.15	-0.04		
			Max. Mx	28	495.85	0.45	-0.09		
			Max. My	25	-347.51	-0.17	0.50		
			Max. Vy	18	-558.39	0.00	0.00		
			Max. Vx	10	901.74	0.00	0.00		
		Diagonal	Max Tension	21	2406.32	0.00	0.00		
			Max. Compression	20	-2525.70	0.00	0.00		
			Max. Mx	34	-232.82	0.14	0.00		
			Max. My	34	-213.51	0.00	0.00		
			Max. Vy	34	-75.43	0.00	0.00		
			Max. Vx	34	-2.35	0.00	0.00		
		Horizontal	Max Tension	6	1954.40	0.02	0.00		
			Max. Compression	25	-1954.37	0.00	0.00		
			Max. Mx	48	-125.95	0.09	0.02		
			Max. My	35	532.85	0.08	0.02		
			Max. Vy	48	-81.45	0.09	0.02		
			Max. Vx	35	5.36	0.00	0.00		
		Top Girt	Max Tension	29	928.18	0.00	0.00		
			Max. Compression	12	-958.97	0.02	0.00		
Max. Mx	48		-41.41	0.08	0.02				
Max. My	38		-317.27	0.08	0.02				
Max. Vy	48		78.25	0.08	0.02				
Max. Vx	38		5.20	0.00	0.00				
T2	150 - 125	Leg	Max Tension	29	16264.90	-0.84	-0.10		
			Max. Compression	35	-22651.01	0.12	-0.02		
			Max. Mx	28	5468.84	2.30	-0.14		
			Max. My	4	-1016.46	-0.06	2.34		
			Max. Vy	28	-2885.78	-1.81	-0.14		
			Max. Vx	20	2782.09	-0.02	1.68		
		Diagonal	Max Tension	17	10718.57	0.00	0.00		
			Max. Compression	16	-10835.86	0.00	0.00		
			Max. Mx	34	-226.88	0.24	0.00		
			Max. My	34	-202.79	0.00	-0.01		
			Max. Vy	34	-89.22	0.00	0.00		
			Max. Vx	34	-3.35	0.00	0.00		
		Horizontal	Max Tension	30	6720.51	0.00	0.00		
			Max. Compression	15	-6690.85	0.02	0.00		
			Max. Mx	38	31.59	0.11	0.03		
			Max. My	38	-493.44	0.11	0.03		
			Max. Vy	38	80.19	0.11	0.03		
			Max. Vx	35	-6.25	0.00	0.00		
		T3	125 - 100	Leg	Max Tension	29	58959.36	-0.46	-0.14
					Max. Compression	12	-70679.79	1.25	0.13
Max. Mx	8				55850.33	-1.28	0.12		
Max. My	26				-6289.12	-0.04	-1.37		
Max. Vy	8				-981.37	-0.46	0.19		
Max. Vx	32				1128.62	-0.01	0.44		
Diagonal	Max Tension			17	15749.42	0.00	0.00		
	Max. Compression			16	-16028.06	0.00	0.00		
	Max. Mx			34	-449.39	0.35	0.00		
	Max. My			34	-399.42	0.00	-0.01		
	Max. Vy			34	-123.26	0.00	0.00		
	Max. Vx			34	4.26	0.00	0.00		
Horizontal	Max Tension			30	10721.21	0.00	0.00		
	Max. Compression			15	-10606.18	0.05	0.01		
	Max. Mx			38	61.71	0.22	0.01		
	Max. My			12	2131.24	0.00	-0.03		
	Max. Vy			38	123.40	0.22	0.01		
	Max. Vx			12	-4.58	0.00	-0.03		
Inner Bracing	Max Tension			13	6.59	0.00	0.00		

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Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T4	100 - 75	Leg	Max. Compression	43	-13.31	0.00	0.00
			Max. Mx	34	-9.90	-0.12	0.00
			Max. Vy	34	68.40	0.00	0.00
			Max Tension	29	121713.94	-0.27	-0.10
			Max. Compression	12	-142193.41	0.64	0.10
			Max. Mx	8	73185.14	2.54	-0.08
			Max. My	4	-6890.18	-0.02	2.67
			Max. Vy	8	-1326.64	-1.28	0.12
			Max. Vx	4	-1355.37	-0.02	-1.14
			Max Tension	33	22093.76	0.00	0.00
			Max. Compression	32	-22443.81	0.00	0.00
			Max. Mx	34	-646.72	0.44	0.00
		Max. My	34	-581.12	0.00	-0.01	
		Max. Vy	34	-147.10	0.00	0.00	
		Max. Vx	34	-4.76	0.00	0.00	
		Horizontal	Max Tension	16	15959.57	0.10	-0.00
			Max. Compression	33	-15768.94	0.00	0.00
			Max. Mx	38	-238.54	0.30	0.01
			Max. My	12	260.15	0.04	-0.03
			Max. Vy	38	-159.30	0.30	0.01
			Max. Vx	12	-5.48	0.04	-0.03
		Top Girt	Max Tension	30	13097.35	0.00	0.00
			Max. Compression	15	-12988.18	0.04	0.01
			Max. Mx	38	-547.41	0.20	0.01
Max. My	12		572.41	0.02	-0.03		
Max. Vy	38		118.95	0.20	0.01		
Max. Vx	12		-5.10	0.02	-0.03		
Inner Bracing	Max Tension	15	223.75	0.00	0.00		
	Max. Compression	14	-228.47	0.00	0.00		
	Max. Mx	34	-11.70	-0.16	0.00		
	Max. Vy	34	78.30	0.00	0.00		
	Max Tension	29	145578.68	-0.63	-0.10		
	Max. Compression	12	-169266.82	0.99	0.10		
T5	75 - 66.6667	Leg	Max. Mx	12	-169266.82	0.99	0.10
			Max. My	4	-9316.43	-0.02	-0.83
			Max. Vy	28	-951.35	-0.63	-0.10
			Max. Vx	2	-1233.57	-0.35	-0.81
			Max Tension	33	24732.69	0.00	0.00
			Max. Compression	32	-25141.78	0.00	0.00
		Diagonal	Max. Mx	34	-590.48	0.50	0.00
			Max. My	34	-668.97	0.00	-0.02
			Max. Vy	34	-164.24	0.00	0.00
			Max. Vx	34	5.21	0.00	0.00
			Max Tension	32	18177.55	0.00	0.00
			Max. Compression	33	-18001.91	0.00	0.00
		Horizontal	Max. Mx	38	-426.37	0.31	0.01
			Max. My	12	3118.54	0.06	-0.04
			Max. Vy	38	165.03	0.31	0.01
			Max. Vx	12	-5.53	0.06	-0.04
			Max Tension	13	6.52	0.00	0.00
			Max. Compression	43	-15.91	0.00	0.00
Inner Bracing	Max. Mx	34	-12.50	-0.17	0.00		
	Max. Vy	34	81.73	0.00	0.00		
	Max Tension	29	170961.17	-0.89	-0.10		
	Max. Compression	12	-197898.16	-0.80	0.17		
	Max. Mx	12	-197493.53	0.99	0.10		
	Max. My	4	-11131.51	-0.14	-1.65		
T6	66.6667 - 58.3333	Leg	Max. Vy	2	387.33	0.98	-0.15
			Max. Vx	2	412.34	0.19	-1.57
			Max Tension	33	25775.27	0.00	0.00
			Max. Compression	12	-197898.16	-0.80	0.17
			Max. Mx	12	-197493.53	0.99	0.10
			Max. My	4	-11131.51	-0.14	-1.65

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	42 of 63
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	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T7	58.3333 - 50	Top Girt	Max. Compression	32	-26204.49	0.00	0.00
			Max. Mx	34	-769.29	0.53	0.00
			Max. My	34	-716.57	0.00	-0.02
			Max. Vy	34	170.53	0.00	0.00
			Max. Vx	34	-5.32	0.00	0.00
			Max Tension	32	19320.08	0.00	0.00
			Max. Compression	33	-19052.74	0.00	0.00
			Max. Mx	38	466.81	0.34	0.01
			Max. My	12	-875.40	0.06	-0.04
			Max. Vy	38	171.51	0.34	0.01
		Inner Bracing	Max. Vx	12	5.29	0.06	-0.04
			Max Tension	33	328.78	0.00	0.00
			Max. Compression	32	-336.17	0.00	0.00
			Max. Mx	34	-12.87	-0.19	0.00
			Max. Vy	34	85.00	0.00	0.00
			Max Tension	29	196246.44	0.55	-0.16
			Max. Compression	12	-226223.03	0.02	0.22
			Max. Mx	12	-226124.31	2.72	-0.15
			Max. My	4	-11844.72	-0.14	-1.65
			Max. Vy	12	-913.72	2.72	-0.15
		Diagonal	Max. Vx	4	-745.95	-0.14	-1.65
			Max Tension	33	26728.09	0.00	0.00
			Max. Compression	32	-27308.17	0.00	0.00
			Max. Mx	30	14032.56	-0.26	0.01
			Max. My	38	-1031.59	-0.01	-0.03
			Max. Vy	37	119.22	-0.17	-0.03
			Max. Vx	40	6.89	0.00	0.00
			Max Tension	32	20249.95	0.00	0.00
			Max. Compression	33	-20144.93	0.00	0.00
			Max. Mx	38	-527.16	0.39	0.00
		Top Girt	Max. My	12	2983.44	0.04	-0.04
			Max. Vy	38	-182.09	0.39	0.00
			Max. Vx	46	5.50	0.32	-0.02
			Max Tension	12	3922.49	0.00	0.00
			Max. Compression	12	-3922.49	0.00	0.00
			Max. Mx	34	904.20	-0.05	0.00
			Max. My	34	689.65	0.00	0.00
			Max. Vy	34	45.15	0.00	0.00
			Max. Vx	34	-1.04	0.00	0.00
			Max Tension	12	2598.54	0.00	0.00
Redund Horiz 1 Bracing	Max. Compression	12	-2598.54	0.00	0.00		
	Max. Mx	34	599.00	-0.07	0.00		
	Max. My	34	456.87	0.00	-0.00		
	Max. Vy	34	43.50	0.00	0.00		
	Max. Vx	34	1.38	0.00	0.00		
	Max Tension	17	345.84	0.00	0.00		
	Max. Compression	16	-354.69	0.00	0.00		
	Max. Mx	34	-5.01	-0.20	0.00		
	Max. Vy	34	88.65	0.00	0.00		
	Max Tension	29	223483.36	-0.17	-0.21		
Redund Diag 1 Bracing	Max. Compression	12	-256852.96	-0.85	0.35		
	Max. Mx	12	-256852.96	-1.27	0.35		
	Max. My	4	-13352.28	-0.18	-2.53		
	Max. Vy	25	330.13	0.06	0.07		
	Max. Vx	2	505.51	0.15	-2.48		
	Max Tension	33	34418.55	0.00	0.00		
	Max. Compression	32	-34934.53	0.00	0.00		
	Max. Mx	34	-602.89	0.91	0.00		
	Max. My	34	-780.86	0.00	-0.03		
	Max. Vy	34	-780.86	0.00	-0.03		
T8	50 - 37.5	Leg	Max. Compression	12	-256852.96	-0.85	0.35
			Max. Mx	12	-256852.96	-1.27	0.35
			Max. My	4	-13352.28	-0.18	-2.53
			Max. Vy	25	330.13	0.06	0.07
			Max. Vx	2	505.51	0.15	-2.48
		Diagonal	Max Tension	33	34418.55	0.00	0.00
			Max. Compression	32	-34934.53	0.00	0.00
			Max. Mx	34	-602.89	0.91	0.00
			Max. My	34	-780.86	0.00	-0.03
			Max. Vy	34	-780.86	0.00	-0.03

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Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T9	37.5 - 25	Top Girt	Max. Vy	34	-227.54	0.00	0.00
			Max. Vx	34	8.41	0.00	0.00
			Max Tension	32	21760.82	0.00	0.00
			Max. Compression	33	-21419.91	0.00	0.00
			Max. Mx	38	488.13	0.45	0.02
			Max. My	12	-845.99	-0.03	-0.07
			Max. Vy	38	194.27	0.45	0.02
			Max. Vx	12	-8.36	-0.03	-0.07
			Max Tension	33	369.16	0.00	0.00
			Max. Compression	32	-379.16	0.00	0.00
		Inner Bracing	Max. Mx	34	-17.26	-0.23	0.00
			Max. Vy	34	97.53	0.00	0.00
			Max Tension	29	261461.82	0.55	-0.33
			Max. Compression	12	-299541.54	-2.92	0.42
			Max. Mx	12	-299368.78	7.04	-0.30
			Max. My	4	-14925.65	-0.33	-3.19
			Max. Vy	12	1725.77	7.04	-0.30
			Max. Vx	2	1017.65	0.96	-3.10
			Max Tension	33	36609.32	-0.29	-0.01
			Max. Compression	32	-37328.57	0.00	0.00
		Leg	Max. Mx	30	18594.74	-0.45	0.02
			Max. My	35	-1160.90	-0.23	0.05
			Max. Vy	37	-151.25	-0.29	-0.05
			Max. Vx	48	9.76	0.00	0.00
			Max Tension	32	23374.91	0.00	0.00
			Max. Compression	33	-23278.24	0.00	0.00
			Max. Mx	38	-608.61	0.54	0.01
			Max. My	12	3598.77	-0.03	-0.07
			Max. Vy	38	-217.82	0.54	0.01
			Max. Vx	12	-8.53	-0.03	-0.07
		Top Girt	Max Tension	12	5194.45	0.00	0.00
			Max. Compression	12	-5194.45	0.00	0.00
			Max. Mx	34	1043.04	-0.06	0.00
			Max. My	34	824.93	0.00	0.00
			Max. Vy	34	48.71	0.00	0.00
			Max. Vx	34	-1.12	0.00	0.00
			Max Tension	12	4078.42	0.00	0.00
			Max. Compression	12	-4078.42	0.00	0.00
			Max. Mx	34	846.85	-0.09	0.00
			Max. My	34	647.69	0.00	-0.00
Redund Horz 1 Bracing	Max. Vy	34	46.27	0.00	0.00		
	Max. Vx	34	-1.77	0.00	0.00		
	Max Tension	33	398.94	0.00	0.00		
	Max. Compression	32	-410.25	0.00	0.00		
	Max. Mx	34	-6.08	-0.26	0.00		
	Max. Vy	34	-102.27	0.00	0.00		
	Max Tension	29	346016.67	-3.35	-0.27		
	Max. Compression	12	-395615.40	0.00	0.00		
	Max. Mx	12	-348233.71	3.63	0.29		
	Max. My	4	-15906.33	-0.33	-3.19		
Redund Diag 1 Bracing	Max. Vy	2	-855.83	3.62	-0.43		
	Max. Vx	2	-677.97	-1.78	-2.29		
	Max Tension	33	39832.63	0.00	0.00		
	Max. Compression	32	-40580.61	0.00	0.00		
	Max. Mx	34	-1071.45	1.17	0.00		
	Max. My	34	-451.30	0.00	0.04		
	Max. Vy	34	-275.78	0.00	0.00		
	Max. Vx	34	-9.41	0.00	0.00		
	Max Tension	32	27327.22	0.00	0.00		
	T10	25 - 0	Leg	Max. Vy	34	-227.54	0.00
Max. Vx				34	8.41	0.00	0.00
Max Tension				32	21760.82	0.00	0.00
Max. Compression				33	-21419.91	0.00	0.00
Max. Mx				38	488.13	0.45	0.02
Max. My				12	-845.99	-0.03	-0.07
Max. Vy				38	194.27	0.45	0.02
Max. Vx				12	-8.36	-0.03	-0.07
Max Tension				33	369.16	0.00	0.00
Max. Compression				32	-379.16	0.00	0.00
Diagonal			Max. Mx	34	-17.26	-0.23	0.00
			Max. Vy	34	97.53	0.00	0.00
			Max Tension	29	261461.82	0.55	-0.33
			Max. Compression	12	-299541.54	-2.92	0.42
			Max. Mx	12	-299368.78	7.04	-0.30
			Max. My	4	-14925.65	-0.33	-3.19
			Max. Vy	12	1725.77	7.04	-0.30
			Max. Vx	2	1017.65	0.96	-3.10
			Max Tension	33	36609.32	-0.29	-0.01
			Max. Compression	32	-37328.57	0.00	0.00
Horizontal	Max. Mx	30	18594.74	-0.45	0.02		
	Max. My	35	-1160.90	-0.23	0.05		
	Max. Vy	37	-151.25	-0.29	-0.05		
	Max. Vx	48	9.76	0.00	0.00		
	Max Tension	32	23374.91	0.00	0.00		
	Max. Compression	33	-23278.24	0.00	0.00		
	Max. Mx	38	-608.61	0.54	0.01		
	Max. My	12	3598.77	-0.03	-0.07		
	Max. Vy	38	-217.82	0.54	0.01		
	Max. Vx	12	-8.53	-0.03	-0.07		

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	44 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	33	-26933.69	0.00	0.00
			Max. Mx	38	-154.56	0.68	0.01
			Max. My	12	4133.59	0.07	-0.08
			Max. Vy	38	-263.22	0.68	0.01
			Max. Vx	12	8.98	0.06	-0.07
		Inner Bracing	Max Tension	13	9.61	0.00	0.00
			Max. Compression	43	-25.78	0.00	0.00
			Max. Mx	34	-20.50	-0.29	0.00
			Max. Vy	34	-105.98	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	24	439245.78	50930.73	-28918.32
	Max. H _x	24	439245.78	50930.73	-28918.32
	Max. H _z	7	-375383.41	-43703.19	27931.13
	Min. Vert	9	-387019.35	-46365.97	26348.70
	Min. H _x	9	-387019.35	-46365.97	26348.70
	Min. H _z	22	408996.65	45710.17	-29077.47
Leg B	Max. Vert	12	443538.82	-49677.99	-31685.59
	Max. H _x	29	-388871.15	45202.42	28907.99
	Max. H _z	33	-339172.41	35770.60	31977.73
	Min. Vert	29	-388871.15	45202.42	28907.99
	Min. H _x	12	443538.82	-49677.99	-31685.59
	Min. H _z	16	375226.89	-37793.03	-33150.83
Leg A	Max. Vert	2	441191.92	3022.89	58738.66
	Max. H _x	26	21301.29	14715.31	1489.04
	Max. H _z	2	441191.92	3022.89	58738.66
	Min. Vert	19	-388229.54	-2798.19	-53492.48
	Min. H _x	13	-197509.85	-14779.14	-27854.31
	Min. H _z	19	-388229.54	-2798.19	-53492.48

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	49531.86	-0.00	-0.00	3.06	-13.37	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	59438.23	-288.34	-107250.52	-8393.28	17.29	118.93
0.9 Dead+1.6 Wind 0 deg - No Ice	44578.67	-288.34	-107250.52	-8394.20	21.30	118.93
1.2 Dead+1.6 Wind 30 deg - No Ice	59438.23	51264.08	-89137.86	-7010.83	-4045.61	73.58
0.9 Dead+1.6 Wind 30 deg - No Ice	44578.67	51264.08	-89137.86	-7011.75	-4041.60	73.58
1.2 Dead+1.6 Wind 45 deg - No Ice	59438.23	72157.76	-72204.73	-5680.91	-5699.19	45.23
0.9 Dead+1.6 Wind 45 deg - No Ice	44578.67	72157.76	-72204.73	-5681.83	-5695.18	45.23
1.2 Dead+1.6 Wind 60 deg - No Ice	59438.23	87880.45	-50604.54	-3980.56	-6948.52	14.30

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991</p>	Job	Page
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Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Ice						
0.9 Dead+1.6 Wind 60 deg - No Ice	44578.67	87880.45	-50604.54	-3981.48	-6944.50	14.30
1.2 Dead+1.6 Wind 90 deg - No Ice	59438.23	103027.57	288.34	37.01	-8132.90	-48.01
0.9 Dead+1.6 Wind 90 deg - No Ice	44578.67	103027.57	288.34	36.09	-8128.89	-48.01
1.2 Dead+1.6 Wind 120 deg - No Ice	59438.23	92968.32	53874.97	4231.02	-7302.92	-102.79
0.9 Dead+1.6 Wind 120 deg - No Ice	44578.67	92968.32	53874.97	4230.10	-7298.91	-102.79
1.2 Dead+1.6 Wind 135 deg - No Ice	59438.23	72565.53	72612.50	5735.40	-5746.32	-118.30
0.9 Dead+1.6 Wind 135 deg - No Ice	44578.67	72565.53	72612.50	5734.48	-5742.31	-118.30
1.2 Dead+1.6 Wind 150 deg - No Ice	59438.23	51763.49	89426.19	7051.51	-4103.33	-121.59
0.9 Dead+1.6 Wind 150 deg - No Ice	44578.67	51763.49	89426.19	7050.59	-4099.32	-121.59
1.2 Dead+1.6 Wind 180 deg - No Ice	59438.23	288.34	101708.50	8029.88	-49.37	-110.60
0.9 Dead+1.6 Wind 180 deg - No Ice	44578.67	288.34	101708.50	8028.96	-45.36	-110.60
1.2 Dead+1.6 Wind 210 deg - No Ice	59438.23	-51264.08	89137.86	7018.18	4013.52	-73.58
0.9 Dead+1.6 Wind 210 deg - No Ice	44578.67	-51264.08	89137.86	7017.26	4017.54	-73.58
1.2 Dead+1.6 Wind 225 deg - No Ice	59438.23	-72157.76	72204.73	5688.27	5667.11	-45.23
0.9 Dead+1.6 Wind 225 deg - No Ice	44578.67	-72157.76	72204.73	5687.35	5671.12	-45.23
1.2 Dead+1.6 Wind 240 deg - No Ice	59438.23	-92679.98	53375.55	4173.29	7237.51	-16.14
0.9 Dead+1.6 Wind 240 deg - No Ice	44578.67	-92679.98	53375.55	4172.37	7241.52	-16.14
1.2 Dead+1.6 Wind 270 deg - No Ice	59438.23	-103027.57	-288.34	-29.65	8100.82	48.01
0.9 Dead+1.6 Wind 270 deg - No Ice	44578.67	-103027.57	-288.34	-30.57	8104.83	48.01
1.2 Dead+1.6 Wind 300 deg - No Ice	59438.23	-88168.78	-51103.95	-4038.29	6949.76	96.30
0.9 Dead+1.6 Wind 300 deg - No Ice	44578.67	-88168.78	-51103.95	-4039.21	6953.77	96.30
1.2 Dead+1.6 Wind 315 deg - No Ice	59438.23	-72565.53	-72612.50	-5728.04	5714.24	118.30
0.9 Dead+1.6 Wind 315 deg - No Ice	44578.67	-72565.53	-72612.50	-5728.96	5718.25	118.30
1.2 Dead+1.6 Wind 330 deg - No Ice	59438.23	-51763.49	-89426.19	-7044.15	4071.25	121.59
0.9 Dead+1.6 Wind 330 deg - No Ice	44578.67	-51763.49	-89426.19	-7045.07	4075.26	121.59
1.2 Dead+1.0 Ice	217911.13	0.00	-0.00	-120.38	-177.89	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice	217911.13	-38.91	-39373.50	-3245.24	-173.72	28.37
1.2 Dead+1.0 Wind 30 deg+1.0 Ice	217911.13	19373.24	-33607.56	-2793.81	-1718.96	10.52
1.2 Dead+1.0 Wind 45 deg+1.0 Ice	217911.13	27353.89	-27364.67	-2297.81	-2355.28	0.48
1.2 Dead+1.0 Wind 60 deg+1.0 Ice	217911.13	33437.21	-19290.14	-1655.57	-2841.05	-9.53
1.2 Dead+1.0 Wind 90 deg+1.0 Ice	217911.13	38813.89	38.91	-116.21	-3267.26	-27.10

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Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Ice						
1.2 Dead+1.0 Wind 120 deg+1.0 Ice	217911.13	34104.70	19720.45	1445.66	-2886.14	-38.08
1.2 Dead+1.0 Wind 135 deg+1.0 Ice	217911.13	27408.92	27419.70	2062.94	-2361.17	-39.42
1.2 Dead+1.0 Wind 150 deg+1.0 Ice	217911.13	19440.64	33646.47	2557.22	-1726.18	-37.61
1.2 Dead+1.0 Wind 180 deg+1.0 Ice	217911.13	38.91	38647.68	2957.23	-182.05	-27.59
1.2 Dead+1.0 Wind 210 deg+1.0 Ice	217911.13	-19373.24	33607.56	2553.05	1363.19	-10.52
1.2 Dead+1.0 Wind 225 deg+1.0 Ice	217911.13	-27353.89	27364.67	2057.05	1999.51	-0.48
1.2 Dead+1.0 Wind 240 deg+1.0 Ice	217911.13	-34065.79	19653.05	1438.44	2526.20	9.71
1.2 Dead+1.0 Wind 270 deg+1.0 Ice	217911.13	-38813.89	-38.91	-124.55	2911.49	27.10
1.2 Dead+1.0 Wind 300 deg+1.0 Ice	217911.13	-33476.12	-19357.54	-1662.79	2489.44	37.12
1.2 Dead+1.0 Wind 315 deg+1.0 Ice	217911.13	-27408.92	-27419.70	-2303.70	2005.40	39.42
1.2 Dead+1.0 Wind 330 deg+1.0 Ice	217911.13	-19440.64	-33646.47	-2797.98	1370.41	37.61
Dead+Wind 0 deg - Service	49531.86	-65.23	-24261.53	-1896.44	-5.83	26.90
Dead+Wind 30 deg - Service	49531.86	11596.63	-20164.20	-1583.71	-924.91	16.64
Dead+Wind 45 deg - Service	49531.86	16323.07	-16333.70	-1282.87	-1298.97	10.23
Dead+Wind 60 deg - Service	49531.86	19879.76	-11447.44	-898.22	-1581.59	3.23
Dead+Wind 90 deg - Service	49531.86	23306.24	65.23	10.60	-1849.51	-10.86
Dead+Wind 120 deg - Service	49531.86	21030.70	12187.25	959.35	-1661.76	-23.25
Dead+Wind 135 deg - Service	49531.86	16415.31	16425.94	1299.66	-1309.64	-26.76
Dead+Wind 150 deg - Service	49531.86	11709.61	20229.42	1597.38	-937.97	-27.51
Dead+Wind 180 deg - Service	49531.86	65.23	23007.85	1818.70	-20.91	-25.02
Dead+Wind 210 deg - Service	49531.86	-11596.63	20164.20	1589.84	898.17	-16.64
Dead+Wind 225 deg - Service	49531.86	-16323.07	16333.70	1289.00	1272.24	-10.23
Dead+Wind 240 deg - Service	49531.86	-20965.48	12074.28	946.29	1627.48	-3.65
Dead+Wind 270 deg - Service	49531.86	-23306.24	-65.23	-4.47	1822.78	10.86
Dead+Wind 300 deg - Service	49531.86	-19944.98	-11560.41	-911.28	1562.39	21.78
Dead+Wind 315 deg - Service	49531.86	-16415.31	-16425.94	-1293.53	1282.90	26.76
Dead+Wind 330 deg - Service	49531.86	-11709.61	-20229.42	-1591.25	911.23	27.51

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-49531.86	0.00	0.00	49531.86	0.00	0.000%
2	-288.34	-59438.23	-107250.52	288.34	59438.23	107250.52	0.000%
3	-288.34	-44578.67	-107250.52	288.34	44578.67	107250.52	0.000%
4	51264.08	-59438.23	-89137.86	-51264.08	59438.23	89137.86	0.000%
5	51264.08	-44578.67	-89137.86	-51264.08	44578.67	89137.86	0.000%
6	72157.76	-59438.23	-72204.73	-72157.76	59438.23	72204.73	0.000%
7	72157.76	-44578.67	-72204.73	-72157.76	44578.67	72204.73	0.000%
8	87880.45	-59438.23	-50604.54	-87880.45	59438.23	50604.54	0.000%
9	87880.45	-44578.67	-50604.54	-87880.45	44578.67	50604.54	0.000%
10	103027.57	-59438.23	288.34	-103027.57	59438.23	-288.34	0.000%
11	103027.57	-44578.67	288.34	-103027.57	44578.67	-288.34	0.000%
12	92968.32	-59438.23	53874.97	-92968.32	59438.23	-53874.97	0.000%
13	92968.32	-44578.67	53874.97	-92968.32	44578.67	-53874.97	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
14	72565.53	-59438.23	72612.50	-72565.53	59438.23	-72612.50	0.000%
15	72565.53	-44578.67	72612.50	-72565.53	44578.67	-72612.50	0.000%
16	51763.49	-59438.23	89426.19	-51763.49	59438.23	-89426.19	0.000%
17	51763.49	-44578.67	89426.19	-51763.49	44578.67	-89426.19	0.000%
18	288.34	-59438.23	101708.50	-288.34	59438.23	-101708.50	0.000%
19	288.34	-44578.67	101708.50	-288.34	44578.67	-101708.50	0.000%
20	-51264.08	-59438.23	89137.86	51264.08	59438.23	-89137.86	0.000%
21	-51264.08	-44578.67	89137.86	51264.08	44578.67	-89137.86	0.000%
22	-72157.76	-59438.23	72204.73	72157.76	59438.23	-72204.73	0.000%
23	-72157.76	-44578.67	72204.73	72157.76	44578.67	-72204.73	0.000%
24	-92679.98	-59438.23	53375.55	92679.98	59438.23	-53375.55	0.000%
25	-92679.98	-44578.67	53375.55	92679.98	44578.67	-53375.55	0.000%
26	-103027.57	-59438.23	-288.34	103027.57	59438.23	288.34	0.000%
27	-103027.57	-44578.67	-288.34	103027.57	44578.67	288.34	0.000%
28	-88168.78	-59438.23	-51103.95	88168.78	59438.23	51103.95	0.000%
29	-88168.78	-44578.67	-51103.95	88168.78	44578.67	51103.95	0.000%
30	-72565.53	-59438.23	-72612.50	72565.53	59438.23	72612.50	0.000%
31	-72565.53	-44578.67	-72612.50	72565.53	44578.67	72612.50	0.000%
32	-51763.49	-59438.23	-89426.19	51763.49	59438.23	89426.19	0.000%
33	-51763.49	-44578.67	-89426.19	51763.49	44578.67	89426.19	0.000%
34	0.00	-217911.13	0.00	-0.00	217911.13	0.00	0.000%
35	-38.91	-217911.13	-39373.50	38.91	217911.13	39373.50	0.000%
36	19373.24	-217911.13	-33607.56	-19373.24	217911.13	33607.56	0.000%
37	27353.89	-217911.13	-27364.67	-27353.89	217911.13	27364.67	0.000%
38	33437.21	-217911.13	-19290.14	-33437.21	217911.13	19290.14	0.000%
39	38813.89	-217911.13	38.91	-38813.89	217911.13	-38.91	0.000%
40	34104.70	-217911.13	19720.45	-34104.70	217911.13	-19720.45	0.000%
41	27408.92	-217911.13	27419.70	-27408.92	217911.13	-27419.70	0.000%
42	19440.64	-217911.13	33646.47	-19440.64	217911.13	-33646.47	0.000%
43	38.91	-217911.13	38647.68	-38.91	217911.13	-38647.68	0.000%
44	-19373.24	-217911.13	33607.56	19373.24	217911.13	-33607.56	0.000%
45	-27353.89	-217911.13	27364.67	27353.89	217911.13	-27364.67	0.000%
46	-34065.79	-217911.13	19653.05	34065.79	217911.13	-19653.05	0.000%
47	-38813.89	-217911.13	-38.91	38813.89	217911.13	38.91	0.000%
48	-33476.12	-217911.13	-19357.54	33476.12	217911.13	19357.54	0.000%
49	-27408.92	-217911.13	-27419.70	27408.92	217911.13	27419.70	0.000%
50	-19440.64	-217911.13	-33646.47	19440.64	217911.13	33646.47	0.000%
51	-65.23	-49531.86	-24261.53	65.23	49531.86	24261.53	0.000%
52	11596.63	-49531.86	-20164.20	-11596.63	49531.86	20164.20	0.000%
53	16323.07	-49531.86	-16333.70	-16323.07	49531.86	16333.70	0.000%
54	19879.76	-49531.86	-11447.44	-19879.76	49531.86	11447.44	0.000%
55	23306.24	-49531.86	65.23	-23306.24	49531.86	-65.23	0.000%
56	21030.70	-49531.86	12187.25	-21030.70	49531.86	-12187.25	0.000%
57	16415.31	-49531.86	16425.94	-16415.31	49531.86	-16425.94	0.000%
58	11709.61	-49531.86	20229.42	-11709.61	49531.86	-20229.42	0.000%
59	65.23	-49531.86	23007.85	-65.23	49531.86	-23007.85	0.000%
60	-11596.63	-49531.86	20164.20	11596.63	49531.86	-20164.20	0.000%
61	-16323.07	-49531.86	16333.70	16323.07	49531.86	-16333.70	0.000%
62	-20965.48	-49531.86	12074.28	20965.48	49531.86	-12074.28	0.000%
63	-23306.24	-49531.86	-65.23	23306.24	49531.86	65.23	0.000%
64	-19944.98	-49531.86	-11560.41	19944.98	49531.86	11560.41	0.000%
65	-16415.31	-49531.86	-16425.94	16415.31	49531.86	16425.94	0.000%
66	-11709.61	-49531.86	-20229.42	11709.61	49531.86	20229.42	0.000%

Maximum Tower Deflections - Service Wind

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 150	2.694	56	0.1195	0.0273
T2	150 - 125	2.441	56	0.1196	0.0266
T3	125 - 100	1.793	56	0.1165	0.0223
T4	100 - 75	1.208	56	0.0991	0.0188
T5	75 - 66.6667	0.695	56	0.0819	0.0145
T6	66.6667 - 58.3333	0.548	56	0.0753	0.0129
T7	58.3333 - 50	0.412	56	0.0677	0.0112
T8	50 - 37.5	0.300	56	0.0550	0.0096
T9	37.5 - 25	0.169	56	0.0401	0.0070
T10	25 - 0	0.079	56	0.0236	0.0044

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	Lightning Rod 2"x21'	56	2.694	0.1195	0.0273	210057
159.00	SC479-HF1LDF	56	2.669	0.1195	0.0272	210057
158.00	TMA 432-83H-01T	56	2.644	0.1195	0.0272	210057
157.50	SC479-HF1LDF(D001-E6085)	56	2.631	0.1195	0.0271	210057
157.00	SC479-HF1LDF	56	2.619	0.1195	0.0271	210057
155.00	DB304-A	56	2.569	0.1195	0.0270	210057
150.00	SC479-HF1LDF(D001-E6085) (Inverted)	56	2.441	0.1196	0.0266	125540
145.00	DC6-48-60-18-8F (Squid) Suppressor	56	2.312	0.1197	0.0260	202099
141.25	SC479-HF1LDF	56	2.214	0.1196	0.0254	658661
141.00	SC479-HF1LDF	56	2.207	0.1196	0.0253	775446
140.00	HPD2-4.7	56	2.181	0.1196	0.0251	Inf
139.50	SC479-HF1LDF	56	2.168	0.1196	0.0251	Inf
120.00	PD1142-1	56	1.669	0.1139	0.0216	83012
119.00	RR90-17-02DP	56	1.645	0.1133	0.0214	84840
108.00	8' Stiff-Arm	56	1.387	0.1053	0.0199	111393
107.50	4"x96"x72" Ice Canopy	56	1.376	0.1049	0.0199	112975
107.00	6' w/ Radome	56	1.364	0.1045	0.0198	114602
106.50	6' w/ Radome	56	1.353	0.1041	0.0197	116276
97.00	APXVSP18-C-A20	56	1.142	0.0970	0.0184	121962
82.00	16x16 Panel 19dBi 2.45GHz ISM	56	0.829	0.0870	0.0158	69893
75.00	SBNHH-1D65B	56	0.695	0.0819	0.0145	61907

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 150	11.876	12	0.5281	0.1205
T2	150 - 125	10.760	12	0.5282	0.1176
T3	125 - 100	7.898	12	0.5139	0.0988
T4	100 - 75	5.318	12	0.4365	0.0832
T5	75 - 66.6667	3.061	12	0.3604	0.0640
T6	66.6667 - 58.3333	2.412	12	0.3311	0.0570
T7	58.3333 - 50	1.817	12	0.2978	0.0496

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T8	50 - 37.5	1.321	12	0.2417	0.0423
T9	37.5 - 25	0.745	12	0.1765	0.0310
T10	25 - 0	0.350	12	0.1038	0.0193

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	Lightning Rod 2"x21'	12	11.876	0.5281	0.1205	48545
159.00	SC479-HF1LDF	12	11.765	0.5281	0.1203	48545
158.00	TMA 432-83H-01T	12	11.655	0.5281	0.1201	48545
157.50	SC479-HF1LDF(D00I-E6085)	12	11.599	0.5281	0.1200	48545
157.00	SC479-HF1LDF	12	11.544	0.5281	0.1198	48545
155.00	DB304-A	12	11.321	0.5281	0.1193	48545
150.00	SC479-HF1LDF(D00I-E6085) (Inverted)	12	10.760	0.5282	0.1176	29050
145.00	DC6-48-60-18-8F (Squid) Suppressor	12	10.188	0.5284	0.1148	47285
141.25	SC479-HF1LDF	12	9.755	0.5282	0.1121	163650
141.00	SC479-HF1LDF	12	9.726	0.5282	0.1119	195768
140.00	HPD2-4.7	12	9.610	0.5280	0.1112	298073
139.50	SC479-HF1LDF	12	9.552	0.5279	0.1108	264420
120.00	PD1142-1	12	7.353	0.5023	0.0953	18718
119.00	RR90-17-02DP	12	7.246	0.4995	0.0946	19121
108.00	8' Stiff-Arm	12	6.108	0.4639	0.0881	25063
107.50	4"x96"x72" Ice Canopy	12	6.058	0.4622	0.0878	25422
107.00	6' w/ Radome	12	6.008	0.4604	0.0875	25792
106.50	6' w/ Radome	12	5.958	0.4587	0.0872	26172
97.00	APXVSP18-C-A20	12	5.028	0.4270	0.0813	27466
82.00	16x16 Panel 19dBi 2.45GHz ISM	12	3.650	0.3827	0.0699	15842
75.00	SBNHH-1D65B	12	3.061	0.3604	0.0640	14070

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria	
T1	160	Leg	A325X	0.7500	6	225.18	29820.60	0.008	✓	1	Bolt Tension
		Diagonal	A325N	0.7500	1	2406.32	17943.80	0.134	✓	1	Member Block Shear
		Horizontal	A325X	0.6250	2	977.20	10263.30	0.095	✓	1	Member Block Shear
		Top Girt	A325N	0.6250	2	464.09	10263.30	0.045	✓	1	Member Block Shear
T2	150	Leg	A325X	0.7500	6	2710.82	29820.60	0.091	✓	1	Bolt Tension
		Diagonal	A325N	0.7500	1	10718.60	17943.80	0.597	✓	1	Member Block Shear
		Horizontal	A325X	0.6250	2	3360.26	7187.70	0.468	✓	1	Member Block Shear

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T3	125	Leg	A325X	0.7500	6	9826.56	29820.60	0.330	✓	1 Bolt Tension
		Diagonal	A325N	0.7500	1	15749.40	29906.30	0.527	✓	1 Member Block Shear
		Horizontal	A325X	0.6250	2	5360.61	12829.10	0.418	✓	1 Member Block Shear
T4	100	Leg	A325X	0.7500	6	20285.70	29820.60	0.680	✓	1 Bolt Tension
		Diagonal	A325N	0.7500	1	22093.80	25230.00	0.876	✓	1 Member Bearing
		Horizontal	A325X	0.6250	2	7979.78	15186.40	0.525	✓	1 Bolt Shear
T5	75	Leg	A325X	0.8750	6	24263.10	40589.10	0.598	✓	1 Bolt Tension
		Diagonal	A325N	0.7500	1	25141.80	35784.70	0.703	✓	1 Bolt Shear
		Horizontal	A325X	0.6250	2	9088.77	15186.40	0.598	✓	1 Bolt Shear
T6	66.6667	Leg	A325X	0.8750	6	28493.50	40589.10	0.702	✓	1 Bolt Tension
		Diagonal	A325N	0.7500	1	26204.50	35784.70	0.732	✓	1 Bolt Shear
		Top Girt	A325X	0.6250	2	9660.04	15186.40	0.636	✓	1 Bolt Shear
T7	58.3333	Leg	A325X	0.8750	6	32677.80	40589.10	0.805	✓	1 Bolt Tension
		Diagonal	A325N	0.7500	1	26728.10	31537.50	0.848	✓	1 Member Bearing
		Top Girt	A325X	0.6250	2	10125.00	15186.40	0.667	✓	1 Bolt Shear
T8	50	Leg	A325X	1.0000	8	27935.40	53014.40	0.527	✓	1 Bolt Tension
		Diagonal	A325N	1.0000	1	34418.60	48810.90	0.705	✓	1 Member Block Shear
T9	37.5	Leg	A325X	1.0000	8	32640.60	53014.40	0.616	✓	1 Bolt Tension
		Diagonal	A325N	1.0000	1	36609.30	45703.10	0.801	✓	1 Member Block Shear
		Top Girt	A325X	0.6250	2	11687.50	15186.40	0.770	✓	1 Bolt Shear
T10	25	Leg	A325X	1.0000	8	43252.10	53014.40	0.816	✓	1 Bolt Tension
		Diagonal	A325N	1.0000	1	39832.60	54843.80	0.726	✓	1 Member Block Shear
		Horizontal	A325X	0.6250	2	13663.60	15186.40	0.900	✓	1 Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio P _u / φP _n
T1	160 - 150	P.5x.250	10.01	5.01	35.7 K=1.00	3.7306	-4053.30	152929.00	0.027 ¹ ✓
T2	150 - 125	P.5x.250	25.03	8.34	59.5 K=1.00	3.7306	-22651.00	129561.00	0.175 ¹ ✓
T3	125 - 100	P.5x.250	25.03	8.34	59.5 K=1.00	3.7306	-70679.80	129561.00	0.546 ¹ ✓

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T4	100 - 75	P5x0.3 w/ (3) 1.5x5/8 Plates	25.03	8.34	51.4 K=1.00	7.2544	-142193.00	269039.00	0.529 ¹ ✓
T5	75 - 66.6667	P5x0.4 w/ (3) 1.5x5/8 Plates	8.34	8.34	53.2 K=1.00	8.6530	-169267.00	316528.00	0.535 ¹ ✓
T6	66.6667 - 58.3333	P5x0.4 w/ (3) 1.5x5/8 Plates	8.34	8.34	53.2 K=1.00	8.6530	-197898.00	316528.00	0.625 ¹ ✓
T7	58.3333 - 50	HSS5x.4	8.34	4.17	30.7 K=1.00	5.7805	-226223.00	287435.00	0.787 ¹ ✓
T8	50 - 37.5	HSS6.875x.4	12.51	12.51	65.5 K=1.00	8.1367	-256853.00	301661.00	0.851 ¹ ✓
T9	37.5 - 25	HSS6.875x.4	12.51	6.26	32.7 K=1.00	8.1367	-299542.00	399956.00	0.749 ¹ ✓
T10	25 - 0	HSS6.875x0.5 w/ (3) 2x5/8 Bars	25.03	12.51	58.7 K=1.00	13.1229	-395615.00	459193.00	0.862 ¹ ✓

¹ P_u / φP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 150	2L2 1/2x2x3/16	7.43	6.88	104.5 K=1.00	1.6200	-2525.70	29528.70	0.086 ¹ ✓
T2	150 - 125	2L2 1/2x2x3/16	10.57	9.96	151.3 K=1.00	1.6200	-10835.90	15986.60	0.678 ¹ ✓
T3	125 - 100	2L2 1/2x2 1/2x5/16	11.21	10.63	167.6 K=1.00	2.9300	-16028.10	23555.00	0.680 ¹ ✓
T4	100 - 75	2L3x2 1/2x1/4	11.91	11.21	142.4 K=1.00	2.6300	-22443.80	29311.90	0.766 ¹ ✓
T5	75 - 66.6667	2L3x2 1/2x5/16	12.15	11.46	146.8 K=1.00	3.2422	-25141.80	33987.10	0.740 ¹ ✓
T6	66.6667 - 58.3333	2L3x2 1/2x5/16	12.39	11.71	150.0 K=1.00	3.2422	-26204.50	32542.60	0.805 ¹ ✓
T7	58.3333 - 50	2L3x3x5/16	12.64	12.09	115.1 K=1.00	3.5500	-27308.20	57230.60	0.477 ¹ ✓
T8	50 - 37.5	2L3 1/2x3x3/8	16.01	15.22	167.5 K=1.00	4.5900	-34934.50	36939.50	0.946 ¹ ✓
T9	37.5 - 25	2L3 1/2x3 1/2x5/16	16.33	15.55	126.9 K=1.00	4.1800	-37328.60	58613.30	0.637 ¹ ✓
T10	25 - 0	2L4x3x3/8	16.99	16.06	163.3 K=1.00	4.9700	-40580.60	42115.30	0.964 ¹ ✓

¹ P_u / φP_n controls

Horizontal Design Data (Compression)

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 150	L3x3x1/4	10.60	5.09	93.5 K=0.91	1.4400	-1954.37	29433.90	0.066 ¹
T2	150 - 125	L2 1/2x2 1/2x3/16	12.33	5.96	106.9 K=0.74	0.9020	-6690.85	16005.30	0.418 ¹
T3	125 - 100	L3x3x5/16	14.33	6.96	106.1 K=0.75	1.7800	-10606.20	31894.50	0.333 ¹
T4	100 - 75	L3x3x1/2	16.33	7.86	112.5 K=0.70	2.7500	-15768.90	45750.70	0.345 ¹
T5	75 - 66.6667	L3x3x1/2	17.00	8.20	114.7 K=0.68	2.7500	-18001.90	44548.30	0.404 ¹
T10	25 - 0	L4x4x1/2	22.00	10.59	112.8 K=0.69	3.7500	-26933.70	62155.00	0.433 ¹

¹ P_u / φP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 150	L3x3x1/4	10.20	4.69	107.6 K=1.13	1.4400	-958.97	25371.20	0.038 ¹
T4	100 - 75	L3x3x1/4	15.00	7.29	141.2 K=0.96	1.4400	-12988.20	16310.60	0.796 ¹
T6	66.6667 - 58.3333	L3x3x1/2	17.67	8.33	159.1 K=0.93	2.7500	-19052.70	24547.70	0.776 ¹
T7	58.3333 - 50	L3x3x1/2	18.33	8.67	164.3 K=0.92	2.7500	-20144.90	23013.00	0.875 ¹
T8	50 - 37.5	L4x4x1/4	19.00	9.29	135.5 K=0.97	1.9400	-21419.90	23877.90	0.897 ¹
T9	37.5 - 25	L4x4x5/16	20.00	9.52	138.6 K=0.96	2.4000	-23278.20	28223.90	0.825 ¹

¹ P_u / φP_n controls

Redundant Horizontal (1) Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T7	58.3333 - 50	L2x2x5/16	4.58	4.38	134.6 K=1.00	1.1500	-3922.49	14336.70	0.274 ¹
T9	37.5 - 25	L2x2x5/16	5.00	4.71	145.0 K=1.00	1.1500	-5194.45	12351.20	0.421 ¹

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¹ $P_u / \phi P_n$ controls

Redundant Diagonal (1) Design Data (Compression)

Section No.	Elevation <i>ft</i>	Size	<i>L</i> <i>ft</i>	<i>L_u</i> <i>ft</i>	<i>Kl/r</i>	<i>A</i> <i>in²</i>	<i>P_u</i> <i>lb</i>	ϕP_n <i>lb</i>	Ratio $\frac{P_u}{\phi P_n}$
T7	58.3333 - 50	L2x2x5/16	6.07	5.66	174.1 K=1.00	1.1500	-2598.54	8572.07	0.303 ¹ ✓
T9	37.5 - 25	L2x2x5/16	7.85	7.38	227.0 K=1.00	1.1500	-4078.42	5040.84	0.809 ¹ ✓

¹ $P_u / \phi P_n$ controls

Inner Bracing Design Data (Compression)

Section No.	Elevation <i>ft</i>	Size	<i>L</i> <i>ft</i>	<i>L_u</i> <i>ft</i>	<i>Kl/r</i>	<i>A</i> <i>in²</i>	<i>P_u</i> <i>lb</i>	ϕP_n <i>lb</i>	Ratio $\frac{P_u}{\phi P_n}$
T3	125 - 100	L2 1/2x2x3/16	7.17	7.17	201.4 K=1.00	0.8090	-13.31	4505.54	0.003 ¹ ✓
T4	100 - 75	L2 1/2x2x3/16	7.50	7.50	210.8 K=1.00	0.8090	-228.47	4113.95	0.056 ¹ ✓
T5	75 - 66.6667	L2 1/2x2x3/16	8.50	8.50	238.9 K=1.00	0.8090	-15.91	3202.90	0.005 ¹ ✓
T6	66.6667 - 58.3333	L2 1/2x2x3/16	8.83	8.83	248.2 K=1.00	0.8090	-336.17	2965.74	0.113 ¹ ✓
T7	58.3333 - 50	L2 1/2x2x3/16	9.17	9.17	257.6 K=1.00	0.8090	-354.70	2753.97	0.129 ¹ ✓
T8	50 - 37.5	KL/R > 250 (C) - 184 L2 1/2x2 1/2x3/16	9.50	9.50	230.3 K=1.00	0.9020	-379.16	3841.91	0.099 ¹ ✓
T9	37.5 - 25	L2 1/2x2 1/2x3/16	10.00	10.00	242.4 K=1.00	0.9020	-410.25	3467.32	0.118 ¹ ✓
T10	25 - 0	L2 1/2x2 1/2x3/16 KL/R > 250 (C) - 242	11.00	11.00	266.7 K=1.00	0.9020	-25.78	2865.56	0.009 ¹ ✓

¹ $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 150	P.5x.250	10.01	5.01	35.7	3.7306	651.95	167879.00	0.004 ¹
T2	150 - 125	P.5x.250	25.03	8.34	59.5	3.7306	16264.90	167879.00	0.097 ¹
T3	125 - 100	P.5x.250	25.03	8.34	59.5	3.7306	58959.40	167879.00	0.351 ¹
T4	100 - 75	P5x0.3 w/ (3) 1.5x5/8 Plates	25.03	8.34	51.4	7.2544	121714.00	326448.00	0.373 ¹
T5	75 - 66.6667	P5x0.4 w/ (3) 1.5x5/8 Plates	8.34	8.34	53.2	8.6530	145579.00	389385.00	0.374 ¹
T6	66.6667 - 58.3333	P5x0.4 w/ (3) 1.5x5/8 Plates	8.34	8.34	53.2	8.6530	170961.00	389385.00	0.439 ¹
T7	58.3333 - 50	HSS5x.4	8.34	4.17	30.7	5.7805	196246.00	312149.00	0.629 ¹
T8	50 - 37.5	HSS6.875x.4	12.51	12.51	65.5	8.1367	223483.00	439383.00	0.509 ¹
T9	37.5 - 25	HSS6.875x.4	12.51	6.26	32.7	8.1367	261462.00	439383.00	0.595 ¹
T10	25 - 0	HSS6.875x0.5 w/ (3) 2x5/8 Bars	25.03	12.51	58.7	13.1229	346017.00	590531.00	0.586 ¹

¹ P_u / φP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 150	2L2 1/2x2x3/16	7.43	6.88	108.6	0.9689	2406.32	42147.40	0.057 ¹
T2	150 - 125	2L2 1/2x2x3/16	10.57	9.96	155.4	0.9689	10718.60	42147.40	0.254 ¹
T3	125 - 100	2L2 1/2x2 1/2x5/16	11.21	10.63	171.9	1.7873	15749.40	77749.50	0.203 ¹
T4	100 - 75	2L3x2 1/2x1/4	11.91	11.21	145.8	1.6444	22093.80	71530.30	0.309 ¹
T5	75 - 66.6667	2L3x2 1/2x5/16	12.15	11.46	150.3	2.0215	24732.70	98547.40	0.251 ¹
T6	66.6667 - 58.3333	2L3x2 1/2x5/16	12.39	11.71	153.5	2.0215	25775.30	98547.40	0.262 ¹
T7	58.3333 - 50	2L3x3x5/16	12.64	12.09	117.7	2.2523	26728.10	97977.00	0.273 ¹
T8	50 - 37.5	2L3 1/2x3x3/8	16.01	15.22	171.2	2.8097	34418.60	122221.00	0.282 ¹
T9	37.5 - 25	2L3 1/2x3 1/2x5/16	16.33	15.55	129.6	2.6077	36609.30	127123.00	0.288 ¹
T10	25 - 0	2L4x3x3/8	16.99	16.06	166.7	3.0947	39832.60	150866.00	0.264 ¹

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¹ $P_u / \phi P_n$ controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 150	L3x3x1/4	10.60	5.09	98.5	0.9394	1954.40	40862.80	0.048 ¹
T2	150 - 125	L2 1/2x2 1/2x3/16	12.33	5.96	137.9	0.5710	6720.51	24839.90	0.271 ¹
T3	125 - 100	L3x3x5/16	14.33	6.96	90.6	1.1592	10721.20	50426.00	0.213 ¹
T4	100 - 75	L3x3x1/2	16.33	7.86	105.1	1.7813	15959.60	77484.40	0.206 ¹
T5	75 - 66.6667	L3x3x1/2	17.00	8.20	109.6	1.7813	18177.50	77484.40	0.235 ¹
T10	25 - 0	L4x4x1/2	22.00	10.59	104.2	2.5313	27327.20	110109.00	0.248 ¹

¹ $P_u / \phi P_n$ controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	160 - 150	L3x3x1/4	10.20	4.69	94.7	0.9394	928.18	40862.80	0.023 ¹
T4	100 - 75	L3x3x1/4	15.00	7.29	94.1	1.4400	13097.40	46656.00	0.281 ¹
T6	66.6667 - 58.3333	L3x3x1/2	17.67	8.33	114.0	1.7813	19320.10	77484.40	0.249 ¹
T7	58.3333 - 50	L3x3x1/2	18.33	8.67	118.5	1.7813	20249.90	77484.40	0.261 ¹
T8	50 - 37.5	L4x4x1/4	19.00	9.29	89.2	1.9400	21760.80	62856.00	0.346 ¹
T9	37.5 - 25	L4x4x5/16	20.00	9.52	94.0	1.6242	23374.90	79180.70	0.295 ¹

¹ $P_u / \phi P_n$ controls

Redundant Horizontal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T7	58.3333 - 50	L2x2x5/16	4.58	4.38	87.4	1.1500	3922.49	37260.00	0.105 ¹
T9	37.5 - 25	L2x2x5/16	5.00	4.71	94.1	1.1500	5194.45	37260.00	0.139 ¹

¹ P_u / φP_n controls

Redundant Diagonal (1) Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T7	58.3333 - 50	L2x2x5/16	6.07	5.66	113.0	1.1500	2598.54	37260.00	0.070 ¹
T9	37.5 - 25	L2x2x5/16	7.85	7.38	147.3	1.1500	4078.42	37260.00	0.109 ¹

¹ P_u / φP_n controls

Inner Bracing Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u lb	φP _n lb	Ratio $\frac{P_u}{\phi P_n}$
T3	125 - 100	L2 1/2x2x3/16	7.17	7.17	143.4	0.8090	6.59	26211.60	0.000 ¹
T4	100 - 75	L2 1/2x2x3/16	7.50	7.50	150.1	0.8090	223.75	26211.60	0.009 ¹
T5	75 - 66.6667	L2 1/2x2x3/16	8.50	8.50	170.1	0.8090	6.52	26211.60	0.000 ¹
T6	66.6667 - 58.3333	L2 1/2x2x3/16	8.83	8.83	176.7	0.8090	328.78	26211.60	0.013 ¹
T7	58.3333 - 50	L2 1/2x2x3/16	9.17	9.17	183.4	0.8090	345.84	26211.60	0.013 ¹
T8	50 - 37.5	L2 1/2x2 1/2x3/16	9.50	9.50	146.5	0.9020	369.16	29224.80	0.013 ¹
T9	37.5 - 25	L2 1/2x2 1/2x3/16	10.00	10.00	154.2	0.9020	398.94	29224.80	0.014 ¹
T10	25 - 0	L2 1/2x2 1/2x3/16	10.50	10.50	162.0	0.9020	9.61	29224.80	0.000 ¹

¹ P_u / φP_n controls

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Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	160 - 150	Leg	P.5x.250	1	-2141.17	152929.00	1.4	Pass
		Leg	P.5x.250	2	-1803.74	152929.00	1.2	Pass
		Leg	P.5x.250	3	-4053.30	152929.00	2.7	Pass
T2	150 - 125	Leg	P.5x.250	22	-22317.70	129561.00	17.2	Pass
		Leg	P.5x.250	23	-22396.80	129561.00	17.3	Pass
		Leg	P.5x.250	24	-22651.00	129561.00	17.5	Pass
T3	125 - 100	Leg	P.5x.250	52	-70347.00	129561.00	54.3	Pass
		Leg	P.5x.250	53	-70679.80	129561.00	54.6	Pass
		Leg	P.5x.250	54	-70492.50	129561.00	54.4	Pass
T4	100 - 75	Leg	P5x0.3 w/ (3) 1.5x5/8 Plates	91	-140864.00	269039.00	52.4	Pass
		Leg	P5x0.3 w/ (3) 1.5x5/8 Plates	92	-142193.00	269039.00	52.9	Pass
		Leg	P5x0.3 w/ (3) 1.5x5/8 Plates	93	-141317.00	269039.00	52.5	Pass
T5	75 - 66.6667	Leg	P5x0.4 w/ (3) 1.5x5/8 Plates	130	-167433.00	316528.00	52.9	Pass
		Leg	P5x0.4 w/ (3) 1.5x5/8 Plates	131	-169267.00	316528.00	53.5	Pass
		Leg	P5x0.4 w/ (3) 1.5x5/8 Plates	132	-168203.00	316528.00	53.1	Pass
T6	66.6667 - 58.3333	Leg	P5x0.4 w/ (3) 1.5x5/8 Plates	145	-195712.00	316528.00	61.8	Pass
		Leg	P5x0.4 w/ (3) 1.5x5/8 Plates	146	-197898.00	316528.00	62.5	Pass
		Leg	P5x0.4 w/ (3) 1.5x5/8 Plates	147	-196650.00	316528.00	62.1	Pass
T7	58.3333 - 50	Leg	HSS5x.4	160	-223712.00	287435.00	77.8	Pass
		Leg	HSS5x.4	161	-226223.00	287435.00	78.7	Pass
		Leg	HSS5x.4	162	-224805.00	287435.00	78.2	Pass
T8	50 - 37.5	Leg	HSS6.875x.4	187	-253939.00	301661.00	84.2	Pass
		Leg	HSS6.875x.4	188	-256853.00	301661.00	85.1	Pass
		Leg	HSS6.875x.4	189	-255204.00	301661.00	84.6	Pass
T9	37.5 - 25	Leg	HSS6.875x.4	202	-296210.00	399956.00	74.1	Pass
		Leg	HSS6.875x.4	203	-299542.00	399956.00	74.9	Pass
		Leg	HSS6.875x.4	204	-297670.00	399956.00	74.4	Pass
T10	25 - 0	Leg	HSS6.875x0.5 w/ (3) 2x5/8 Bars	229	-391459.00	459193.00	85.2	Pass
		Leg	HSS6.875x0.5 w/ (3) 2x5/8 Bars	230	-395615.00	459193.00	86.2	Pass
		Leg	HSS6.875x0.5 w/ (3) 2x5/8 Bars	231	-393296.00	459193.00	85.6	Pass
T1	160 - 150	Diagonal	2L2 1/2x2x3/16	8	-1439.36	29528.70	4.9	Pass
		Diagonal	2L2 1/2x2x3/16	9	-1468.52	29528.70	5.0	Pass
		Diagonal	2L2 1/2x2x3/16	11	-2135.98	29528.70	7.2	Pass
		Diagonal	2L2 1/2x2x3/16	12	-2097.57	29528.70	7.1	Pass
		Diagonal	2L2 1/2x2x3/16	14	-2520.79	29528.70	8.5	Pass
		Diagonal	2L2 1/2x2x3/16	15	-2525.70	29528.70	8.6	Pass
		Diagonal	2L2 1/2x2x3/16	16	-467.89	30254.00	1.5	Pass
		Diagonal	2L2 1/2x2x3/16	17	-466.21	30254.00	1.5	Pass
		Diagonal	2L2 1/2x2x3/16	18	-1160.43	30254.00	3.8	Pass

<p>tnxTower</p> <p>AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991</p>	<p>Job</p> <p>160' Self Support Lattice - CSP #20</p>	<p>Page</p> <p>58 of 63</p>
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Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail		
T2	150 - 125	Diagonal	2L2 1/2x2x3/16	19	-1139.01	30254.00	3.8	Pass		
		Diagonal	2L2 1/2x2x3/16	20	-1139.63	30254.00	5.8 (b)	Pass		
		Diagonal	2L2 1/2x2x3/16	21	-1157.96	30254.00	3.8	Pass		
		Diagonal	2L2 1/2x2x3/16	26	-8995.12	15986.60	56.3	Pass		
		Diagonal	2L2 1/2x2x3/16	27	-9005.51	15986.60	56.3	Pass		
		Diagonal	2L2 1/2x2x3/16	29	-10835.90	15986.60	67.8	Pass		
		Diagonal	2L2 1/2x2x3/16	30	-10830.70	15986.60	67.7	Pass		
		Diagonal	2L2 1/2x2x3/16	32	-10172.10	15986.60	63.6	Pass		
		Diagonal	2L2 1/2x2x3/16	33	-10166.90	15986.60	63.6	Pass		
		Diagonal	2L2 1/2x2x3/16	35	-7712.54	16654.00	46.3	Pass		
		Diagonal	2L2 1/2x2x3/16	36	-7726.57	16654.00	46.4	Pass		
		Diagonal	2L2 1/2x2x3/16	38	-9211.58	16654.00	55.3	Pass		
		Diagonal	2L2 1/2x2x3/16	39	-9204.66	16654.00	55.3	Pass		
		Diagonal	2L2 1/2x2x3/16	41	-8912.52	16654.00	53.5	Pass		
		Diagonal	2L2 1/2x2x3/16	42	-8905.41	16654.00	53.5	Pass		
		T3	125 - 100	Diagonal	2L2 1/2x2x3/16	44	-1688.35	17339.00	9.7	Pass
				Diagonal	2L2 1/2x2x3/16	45	-1692.13	17339.00	9.8	Pass
Diagonal	2L2 1/2x2x3/16			47	-3087.96	17339.00	17.8	Pass		
Diagonal	2L2 1/2x2x3/16			48	-2993.44	17339.00	17.3	Pass		
Diagonal	2L2 1/2x2x3/16			50	-3195.24	17339.00	18.4	Pass		
Diagonal	2L2 1/2x2x3/16			51	-3229.77	17339.00	18.6	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			56	-13739.70	23555.00	58.3	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			57	-13762.50	23555.00	58.4	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			59	-16028.10	23555.00	68.0	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			60	-16017.00	23555.00	68.0	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			62	-15102.30	23555.00	64.1	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			63	-15090.50	23555.00	64.1	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			68	-11841.20	24561.80	48.2	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			69	-11839.30	24561.80	48.2	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			71	-14110.20	24561.80	57.4	Pass		
Diagonal	2L2 1/2x2 1/2x5/16			72	-14113.50	24561.80	57.5	Pass		
T4	100 - 75			Diagonal	2L2 1/2x2 1/2x5/16	74	-12499.20	24561.80	50.9	Pass
		Diagonal	2L2 1/2x2 1/2x5/16	75	-12497.90	24561.80	50.9	Pass		
		Diagonal	2L2 1/2x2 1/2x5/16	80	-9733.10	25605.30	38.0	Pass		
		Diagonal	2L2 1/2x2 1/2x5/16	81	-9738.53	25605.30	38.0	Pass		
		Diagonal	2L2 1/2x2 1/2x5/16	83	-11863.90	25605.30	46.3	Pass		
		Diagonal	2L2 1/2x2 1/2x5/16	84	-11860.70	25605.30	46.3	Pass		
		Diagonal	2L2 1/2x2 1/2x5/16	86	-10823.90	25605.30	42.3	Pass		
		Diagonal	2L2 1/2x2 1/2x5/16	87	-10821.70	25605.30	42.3	Pass		
		Diagonal	2L3x2 1/2x1/4	98	-19468.40	29311.90	66.4	Pass		
		Diagonal	2L3x2 1/2x1/4	99	-19469.60	29311.90	75.8 (b)	Pass		
		Diagonal	2L3x2 1/2x1/4	101	-22441.70	29311.90	66.4	Pass		
		Diagonal	2L3x2 1/2x1/4	102	-22443.80	29311.90	75.8 (b)	Pass		
Diagonal	2L3x2 1/2x1/4	104	-20160.20	29311.90	76.6	Pass				
Diagonal	2L3x2 1/2x1/4	105	-20156.80	29311.90	87.6 (b)	Pass				
Diagonal	2L3x2 1/2x1/4	110	-18801.00	30584.10	68.8	Pass				
Diagonal	2L3x2 1/2x1/4	111	-18807.50	30584.10	78.5 (b)	Pass				
Diagonal	2L3x2 1/2x1/4	113	-21565.90	30584.10	61.5	Pass				
Diagonal	2L3x2 1/2x1/4	114	-21564.10	30584.10	73.2 (b)	Pass				

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Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	2L3x2 1/2x1/4	116	-19792.40	30584.10	84.2 (b) 64.7	Pass
		Diagonal	2L3x2 1/2x1/4	117	-19787.70	30584.10	77.1 (b) 64.7	Pass
		Diagonal	2L3x2 1/2x1/4	121	-16534.80	31912.00	77.1 (b) 51.8	Pass
		Diagonal	2L3x2 1/2x1/4	122	-16551.80	31912.00	64.6 (b) 51.9	Pass
		Diagonal	2L3x2 1/2x1/4	123	-19087.40	31912.00	64.5 (b) 59.8	Pass
		Diagonal	2L3x2 1/2x1/4	124	-19077.80	31912.00	74.6 (b) 59.8	Pass
		Diagonal	2L3x2 1/2x1/4	125	-17876.90	31912.00	74.6 (b) 56.0	Pass
		Diagonal	2L3x2 1/2x1/4	126	-17869.50	31912.00	69.8 (b) 56.0	Pass
T5	75 - 66.6667	Diagonal	2L3x2 1/2x5/16	134	-21241.10	33987.10	69.8 (b) 62.5	Pass
		Diagonal	2L3x2 1/2x5/16	135	-21227.10	33987.10	62.5	Pass
		Diagonal	2L3x2 1/2x5/16	137	-25135.50	33987.10	74.0	Pass
		Diagonal	2L3x2 1/2x5/16	138	-25141.80	33987.10	74.0	Pass
		Diagonal	2L3x2 1/2x5/16	140	-21697.00	33987.10	63.8	Pass
		Diagonal	2L3x2 1/2x5/16	141	-21704.70	33987.10	63.9	Pass
T6	66.6667 - 58.3333	Diagonal	2L3x2 1/2x5/16	151	-22134.90	32542.60	68.0	Pass
		Diagonal	2L3x2 1/2x5/16	152	-22116.80	32542.60	68.0	Pass
		Diagonal	2L3x2 1/2x5/16	153	-26194.80	32542.60	80.5	Pass
		Diagonal	2L3x2 1/2x5/16	154	-26204.50	32542.60	80.5	Pass
		Diagonal	2L3x2 1/2x5/16	155	-22391.50	32542.60	68.8	Pass
		Diagonal	2L3x2 1/2x5/16	156	-22400.00	32542.60	68.8	Pass
T7	58.3333 - 50	Diagonal	2L3x3x5/16	166	-23133.60	57230.60	40.4	Pass
		Diagonal	2L3x3x5/16	169	-23121.30	57230.60	71.4 (b) 40.4	Pass
		Diagonal	2L3x3x5/16	172	-27300.40	57230.60	71.5 (b) 47.7	Pass
		Diagonal	2L3x3x5/16	175	-27308.20	57230.60	84.8 (b) 47.7	Pass
		Diagonal	2L3x3x5/16	178	-23214.30	57230.60	84.7 (b) 40.6	Pass
		Diagonal	2L3x3x5/16	181	-23218.70	57230.60	71.7 (b) 40.6	Pass
T8	50 - 37.5	Diagonal	2L3 1/2x3x3/8	193	-29400.30	36939.50	71.7 (b) 79.6	Pass
		Diagonal	2L3 1/2x3x3/8	194	-29366.40	36939.50	79.5	Pass
		Diagonal	2L3 1/2x3x3/8	195	-34913.30	36939.50	94.5	Pass
		Diagonal	2L3 1/2x3x3/8	196	-34934.50	36939.50	94.6	Pass
		Diagonal	2L3 1/2x3x3/8	197	-29248.70	36939.50	79.2	Pass
		Diagonal	2L3 1/2x3x3/8	198	-29261.40	36939.50	79.2	Pass
T9	37.5 - 25	Diagonal	2L3 1/2x3 1/2x5/16	208	-31610.00	58613.30	53.9	Pass
		Diagonal	2L3 1/2x3 1/2x5/16	211	-31587.80	58613.30	67.5 (b) 53.9	Pass
		Diagonal	2L3 1/2x3 1/2x5/16	214	-37311.40	58613.30	67.6 (b) 63.7	Pass
		Diagonal	2L3 1/2x3 1/2x5/16	217	-37328.60	58613.30	80.1 (b) 63.7	Pass
		Diagonal	2L3 1/2x3 1/2x5/16	220	-31141.20	58613.30	80.0 (b) 53.1	Pass
		Diagonal	2L3 1/2x3 1/2x5/16	223	-31146.20	58613.30	66.6 (b) 53.1	Pass
T10	25 - 0	Diagonal	2L4x3x3/8	233	-34197.70	42115.30	66.6 (b) 81.2	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail		
T1	160 - 150	Diagonal	2L4x3x3/8	234	-34145.30	42115.30	81.1	Pass		
		Diagonal	2L4x3x3/8	236	-40544.20	42115.30	96.3	Pass		
		Diagonal	2L4x3x3/8	237	-40580.60	42115.30	96.4	Pass		
		Diagonal	2L4x3x3/8	239	-33232.80	42115.30	78.9	Pass		
		Diagonal	2L4x3x3/8	240	-33248.80	42115.30	78.9	Pass		
		Diagonal	2L4x3x3/8	245	-32132.60	43926.10	73.2	Pass		
		Diagonal	2L4x3x3/8	246	-32084.00	43926.10	73.0	Pass		
		Diagonal	2L4x3x3/8	248	-38215.00	43926.10	87.0	Pass		
		Diagonal	2L4x3x3/8	249	-38248.00	43926.10	87.1	Pass		
		Diagonal	2L4x3x3/8	251	-31438.50	43926.10	71.6	Pass		
		Diagonal	2L4x3x3/8	252	-31454.10	43926.10	71.6	Pass		
		Horizontal	L3x3x1/4	7	-1252.81	29433.90	4.3	Pass		
		T2	150 - 125	Horizontal	L3x3x1/4	10	-1744.12	29433.90	6.1 (b) 5.9	Pass
Horizontal	L3x3x1/4			13	-1954.37	29433.90	8.4 (b) 6.6	Pass		
Horizontal	L2 1/2x2 1/2x3/16			25	-5474.26	16005.30	9.5 (b) 34.2	Pass		
Horizontal	L2 1/2x2 1/2x3/16			28	-6690.85	16005.30	38.3 (b) 41.8	Pass		
Horizontal	L2 1/2x2 1/2x3/16			31	-6290.89	16005.30	46.8 (b) 39.3	Pass		
Horizontal	L2 1/2x2 1/2x3/16			34	-5142.15	16479.60	44.0 (b) 31.2	Pass		
Horizontal	L2 1/2x2 1/2x3/16			37	-6151.82	16479.60	34.6 (b) 37.3	Pass		
Horizontal	L2 1/2x2 1/2x3/16			40	-5980.79	16479.60	41.2 (b) 36.3	Pass		
Horizontal	L2 1/2x2 1/2x3/16			43	-911.16	16955.80	40.2 (b) 5.4	Pass		
Horizontal	L2 1/2x2 1/2x3/16			46	-1735.71	16955.80	6.8 (b) 10.2	Pass		
Horizontal	L2 1/2x2 1/2x3/16			49	-1815.98	16955.80	12.0 (b) 10.7	Pass		
T3	125 - 100			Horizontal	L3x3x5/16	55	-9012.54	31894.50	12.9 (b) 28.3	Pass
				Horizontal	L3x3x5/16	58	-10606.20	31894.50	35.6 (b) 33.3	Pass
		Horizontal	L3x3x5/16	61	-10037.40	31894.50	41.8 (b) 31.5	Pass		
		Horizontal	L3x3x5/16	67	-7540.42	32682.10	39.6 (b) 23.1	Pass		
		Horizontal	L3x3x5/16	70	-9057.15	32682.10	29.8 (b) 27.7	Pass		
		Horizontal	L3x3x5/16	73	-8131.00	32682.10	35.8 (b) 24.9	Pass		
		Horizontal	L3x3x5/16	79	-6029.68	33472.00	32.2 (b) 18.0	Pass		
		Horizontal	L3x3x5/16	82	-7384.66	33472.00	23.7 (b) 22.1	Pass		
		Horizontal	L3x3x5/16	85	-6782.20	33472.00	29.0 (b) 20.3	Pass		
		T4	100 - 75	Horizontal	L3x3x1/2	97	-13645.80	45750.70	26.6 (b) 29.8	Pass
				Horizontal	L3x3x1/2	100	-15768.90	45750.70	45.6 (b) 34.5	Pass
				Horizontal	L3x3x1/2	103	-14138.40	45750.70	52.5 (b) 30.9	Pass
				Horizontal	L3x3x1/2	109	-12947.50	46961.00	47.2 (b) 27.6 43.0 (b)	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T5	75 - 66.6667	Horizontal	L3x3x1/2	112	-14882.70	46961.00	31.7	Pass
		Horizontal	L3x3x1/2	115	-13744.00	46961.00	49.4 (b) 29.3	Pass
		Horizontal	L3x3x1/2	133	-15181.20	44548.30	45.7 (b) 34.1	Pass
		Horizontal	L3x3x1/2	136	-18001.90	44548.30	50.6 (b) 40.4	Pass
		Horizontal	L3x3x1/2	139	-15615.80	44548.30	59.8 (b) 35.1	Pass
T10	25 - 0	Horizontal	L4x4x1/2	232	-22611.40	62155.00	52.0 (b) 36.4	Pass
		Horizontal	L4x4x1/2	235	-26933.70	62155.00	75.7 (b) 43.3	Pass
		Horizontal	L4x4x1/2	238	-22021.30	62155.00	90.0 (b) 35.4	Pass
		Horizontal	L4x4x1/2	244	-20958.30	64003.00	73.8 (b) 32.7	Pass
		Horizontal	L4x4x1/2	247	-24812.40	64003.00	69.2 (b) 38.8	Pass
T1	160 - 150	Horizontal	L4x4x1/2	250	-20531.60	64003.00	82.5 (b) 32.1	Pass
		Top Girt	L3x3x1/4	4	-402.11	25371.20	68.4 (b) 1.6	Pass
		Top Girt	L3x3x1/4	5	-958.97	25371.20	1.9 (b) 3.8	Pass
T4	100 - 75	Top Girt	L3x3x1/4	6	-957.27	25371.20	4.5 (b) 3.8	Pass
		Top Girt	L3x3x1/4	94	-11148.90	16310.60	68.4	Pass
		Top Girt	L3x3x1/4	95	-12988.20	16310.60	79.6	Pass
T6	66.6667 - 58.3333	Top Girt	L3x3x1/4	96	-12245.00	16310.60	75.1	Pass
		Top Girt	L3x3x1/2	148	-16040.60	24547.70	65.3	Pass
T7	58.3333 - 50	Top Girt	L3x3x1/2	149	-19052.70	24547.70	77.6	Pass
		Top Girt	L3x3x1/2	150	-16236.00	24547.70	66.1	Pass
		Top Girt	L3x3x1/2	163	-16948.90	23013.00	73.6	Pass
T8	50 - 37.5	Top Girt	L3x3x1/2	164	-20144.90	23013.00	87.5	Pass
		Top Girt	L3x3x1/2	165	-17072.70	23013.00	74.2	Pass
		Top Girt	L4x4x1/4	190	-17962.20	23877.90	75.2	Pass
T9	37.5 - 25	Top Girt	L4x4x1/4	191	-21419.90	23877.90	89.7	Pass
		Top Girt	L4x4x1/4	192	-17877.30	23877.90	74.9	Pass
		Top Girt	L4x4x5/16	205	-19537.20	28223.90	69.2	Pass
T7	58.3333 - 50	Top Girt	L4x4x5/16	206	-23278.20	28223.90	82.5	Pass
		Top Girt	L4x4x5/16	207	-19347.70	28223.90	68.6	Pass
		Redund Horiz 1 Bracing	L2x2x5/16	167	-3878.95	14336.70	27.1	Pass
T9	37.5 - 25	Redund Horiz 1 Bracing	L2x2x5/16	170	-3922.49	14336.70	27.4	Pass
		Redund Horiz 1 Bracing	L2x2x5/16	173	-3922.49	14336.70	27.4	Pass
		Redund Horiz 1 Bracing	L2x2x5/16	176	-3897.90	14336.70	27.2	Pass
T9	37.5 - 25	Redund Horiz 1 Bracing	L2x2x5/16	179	-3897.90	14336.70	27.2	Pass
		Redund Horiz 1 Bracing	L2x2x5/16	182	-3878.95	14336.70	27.1	Pass
		Redund Horiz 1 Bracing	L2x2x5/16	209	-5136.68	12351.20	41.6	Pass
T9	37.5 - 25	Redund Horiz 1 Bracing	L2x2x5/16	212	-5194.45	12351.20	42.1	Pass
		Redund Horiz 1 Bracing	L2x2x5/16	215	-5194.45	12351.20	42.1	Pass

<p>tnxTower</p> <p>AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991</p>	Job	160' Self Support Lattice - CSP #20	Page	62 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Bracing						
		Redund Horz 1	L2x2x5/16	218	-5162.00	12351.20	41.8	Pass
		Bracing						
		Redund Horz 1	L2x2x5/16	221	-5162.00	12351.20	41.8	Pass
		Bracing						
		Redund Horz 1	L2x2x5/16	224	-5136.68	12351.20	41.6	Pass
		Bracing						
T7	58.3333 - 50	Redund Diag 1	L2x2x5/16	168	-2569.70	8572.07	30.0	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	171	-2598.54	8572.07	30.3	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	174	-2598.54	8572.07	30.3	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	177	-2582.26	8572.07	30.1	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	180	-2582.26	8572.07	30.1	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	183	-2569.70	8572.07	30.0	Pass
		Bracing						
T9	37.5 - 25	Redund Diag 1	L2x2x5/16	210	-4033.06	5040.84	80.0	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	213	-4078.42	5040.84	80.9	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	216	-4078.42	5040.84	80.9	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	219	-4052.94	5040.84	80.4	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	222	-4052.94	5040.84	80.4	Pass
		Bracing						
		Redund Diag 1	L2x2x5/16	225	-4033.06	5040.84	80.0	Pass
		Bracing						
T3	125 - 100	Inner Bracing	L2 1/2x2x3/16	64	-13.24	4505.54	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	65	-13.31	4505.54	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	66	-13.18	4505.54	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	76	-12.70	4955.83	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	77	-12.76	4955.83	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	78	-12.62	4955.83	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	88	-12.10	5477.15	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	89	-12.16	5477.15	0.9	Pass
		Inner Bracing	L2 1/2x2x3/16	90	-12.03	5477.15	0.9	Pass
T4	100 - 75	Inner Bracing	L2 1/2x2x3/16	106	-14.90	3469.70	1.1	Pass
		Inner Bracing	L2 1/2x2x3/16	107	-14.96	3469.70	1.1	Pass
		Inner Bracing	L2 1/2x2x3/16	108	-14.83	3469.70	1.1	Pass
		Inner Bracing	L2 1/2x2x3/16	118	-14.74	3771.28	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	119	-14.81	3771.28	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	120	-14.68	3771.28	1.0	Pass
		Inner Bracing	L2 1/2x2x3/16	127	-228.47	4113.95	5.6	Pass
		Inner Bracing	L2 1/2x2x3/16	128	-228.47	4113.95	5.6	Pass
		Inner Bracing	L2 1/2x2x3/16	129	-215.70	4113.95	5.2	Pass
T5	75 - 66.6667	Inner Bracing	L2 1/2x2x3/16	142	-15.86	3202.90	1.1	Pass
		Inner Bracing	L2 1/2x2x3/16	143	-15.91	3202.90	1.1	Pass
		Inner Bracing	L2 1/2x2x3/16	144	-15.76	3202.90	1.1	Pass
T6	66.6667 - 58.3333	Inner Bracing	L2 1/2x2x3/16	157	-336.17	2965.74	11.3	Pass
		Inner Bracing	L2 1/2x2x3/16	158	-336.17	2965.74	11.3	Pass
		Inner Bracing	L2 1/2x2x3/16	159	-287.41	2965.74	9.7	Pass
T7	58.3333 - 50	Inner Bracing	L2 1/2x2x3/16	184	-354.70	2753.97	12.9	Pass
		Inner Bracing	L2 1/2x2x3/16	185	-354.69	2753.97	12.9	Pass
		Inner Bracing	L2 1/2x2x3/16	186	-301.51	2753.97	10.9	Pass
T8	50 - 37.5	Inner Bracing	L2 1/2x2 1/2x3/16	199	-379.16	3841.91	9.9	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	200	-379.15	3841.91	9.9	Pass

tnxTower AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job	160' Self Support Lattice - CSP #20	Page	63 of 63
	Project	Structural Analysis / Tower MODification	Date	17:59:23 04/09/18
	Client	Empire Telecom (AT&T) / EMP-006 / Airosmith (Sprint) ASM-006	Designed by	MCD

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T9	37.5 - 25	Inner Bracing	L2 1/2x2 1/2x3/16	201	-319.21	3841.91	8.3	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	226	-410.25	3467.32	11.8	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	227	-410.24	3467.32	11.8	Pass
T10	25 - 0	Inner Bracing	L2 1/2x2 1/2x3/16	228	-345.39	3467.32	10.0	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	241	-25.76	2865.56	1.2	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	242	-25.78	2865.56	1.2	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	243	-25.53	2865.56	1.2	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	253	-25.39	3144.96	1.1	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	254	-25.42	3144.96	1.1	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	255	-25.15	3144.96	1.1	Pass
Summary								
						Leg (T10)	86.2	Pass
						Diagonal (T10)	96.4	Pass
						Horizontal (T10)	90.0	Pass
						Top Girt (T8)	89.7	Pass
						Redund Horz 1	42.1	Pass
						Bracing (T9)		
						Redund Diag 1	80.9	Pass
						Bracing (T9) Inner	12.9	Pass
						Bracing (T7)		
						Bolt Checks	90.0	Pass
						RATING =	96.4	Pass

Program Version 7.0.8.5 - 9/29/2017

File:P:/Projects/Telcom/StructuralsByLocation/Connecticut/MiddleburyCSP#20/25_ASM-006_EMP-006_MOD/MODification
Files/_G_ERI/MOD_03232018_G_Middlebury CSP.eri

ANCHOR BOLT ANALYSIS

Job 160' Stainless Lattice Tower - Middlebury, CT
 Description Anchor Bolt Analysis (TIA-222-G)
Modification Analysis (AT&T / Sprint)

Project No. _____
 Computed by MCD
 Checked by _____

Sheet 1 of 4
 Date 04/09/18
 Date _____

ANCHOR BOLT ANALYSIS

Input Data

Tower Reactions:

Uplift: Uplift := 388.871·kips *user input*

Shear: Shear := 58.923·kips *user input*

Compression: Compression := 443.539·kips *user input*

Anchor Bolt Data:

Use ASTM A36

Use ASTM A36 per page 4.1 of structural analysis dated November 23, 1993

Number of Anchor Bolts = N $N := 6$ *user input*

Bolt Ultimate Strength: $F_u := 58\text{-ksi}$ *user input*

Bolt Yield Strength: $F_y := 36\text{-ksi}$ *user input*

Bolt Modulus: $E := 29000\text{-ksi}$ *user input*

Thickness of Anchor Bolts $D := 1.75\text{in}$ *user input*

Threads per Inch: $n := 5$ *user input*

Coefficient of Friction: $\mu := 0.55$ *user input* (for baseplate with grout ASCE 10-15)

Length from top of pier to
bottom of leveling nut: $L_{ar} := 0\text{in}$ *user input*

Bolt Modulus: $E := 29000\text{-ksi}$ *user input*

Job 160' Stainless Lattice Tower - Middlebury, CT
 Description Anchor Bolt Analysis (TIA-222-G)
Modification Analysis (AT&T / Sprint)

Project No. _____
 Computed by MCD
 Checked by _____
 Sheet 2 of 4
 Date 04/09/18
 Date _____

Anchor Bolt Section Properties:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 2.41 \cdot \text{in}^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 \qquad A_n = 1.9 \cdot \text{in}^2$$

Net Diameter:

$$D_n := D - \frac{0.9743 \text{in}}{n} \qquad D_n = 1.56 \cdot \text{in}$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \qquad r = 0.39 \cdot \text{in}$$

Plastic Section Modulus of Bolt:

$$Z_x := \frac{D_n^3}{6} \qquad Z_x = 0.63 \cdot \text{in}^3$$

Forces:

Tension Force:

$$T_u := \frac{\text{Uplift}}{N}$$

$$T_u = 64.81 \cdot \text{kip}$$

$$T_{ub} := T_u$$

Resistance Factor for Flexure (ANSI/TIA-222-G 4.7):

$$\phi_f := 0.9$$

Resistance Factor for Anchor Bolt (ANSI/TIA-222-G 4.5.4.2):

$$\phi_b := 0.80$$

Resistance Factor for Tension (ANSI/TIA-222-G 4.9.6.1):

$$\phi_t := 0.75$$

Shear Force:

$$V_u := \frac{\text{Shear}}{N}$$

$$V_u = 9.82 \cdot \text{kip}$$

$$V_{ub} := V_u$$

Resistance Factor for Shear (ANSI/TIA-222-G 4.9.6.3):

$$\phi_v := 0.75$$

Job	160' Stainless Lattice Tower - Middlebury, CT	Project No.	_____	Sheet	3	of	4
Description	Anchor Bolt Analysis (TIA-222-G)	Computed by	MCD	Date	04/09/18		
	MODification Analysis (AT&T / Sprint)	Checked by	_____	Date	_____		

ANSI/TIA-222-G 4.7.1 Flexural Members:

Nominal Flexure Strength, Mn:

$$M_n := F_y \cdot Z_x$$

$$M_n = 1.88 \cdot \text{ft} \cdot \text{kip}$$

$$\phi_f \cdot M_n = 1.69 \cdot \text{ft} \cdot \text{kip}$$

Applied Moment due to Shear (worst case lever arm), Mu:

$$M_u := L_{ar} \cdot V_u$$

$$M_u = 0 \cdot \text{ft} \cdot \text{kip}$$

Flexure Check:

$$\text{FlexureCheck} := \text{if}(M_u \leq \phi_f \cdot M_n, \text{"OK"}, \text{"NO GOOD"})$$

FlexureCheck = "OK"

$$\frac{M_u}{\phi_f \cdot M_n} = 0.0\%$$

ANSI/TIA-222-G 4.9.6.1 Tensile Strength:

Design Tensile Strength, Rnt:

$$R_{nt} := F_u \cdot A_n$$

$$R_{nt} = 110.17 \cdot \text{ft} \cdot \text{kip}$$

$$\phi_t \cdot R_{nt} = 82.63 \cdot \text{ft} \cdot \text{kip}$$

Tension Check:

$$\text{TensionCheck} := \text{if}(T_u \leq \phi_t \cdot R_{nt}, \text{"OK"}, \text{"NO GOOD"})$$

TensionCheck = "OK"

$$\frac{T_u}{\phi_t \cdot R_{nt}} = 78.44\%$$

ANSI/TIA-222-G 4.9.6.3 Design Shear Strength:

Design Shear Strength, Rnv:

$$R_{nv} := 0.45 \cdot F_u \cdot A_g$$

$$R_{nv} = 62.78 \cdot \text{ft} \cdot \text{kip}$$

$$\phi_v \cdot R_{nv} = 47.08 \cdot \text{ft} \cdot \text{kip}$$

Shear Check:

$$\text{ShearCheck} := \text{if}(V_u \leq \phi_v \cdot R_{nv}, \text{"OK"}, \text{"NO GOOD"})$$

ShearCheck = "OK"

$$\frac{V_u}{\phi_v \cdot R_{nv}} = 20.86\%$$

Job	<u>160' Stainless Lattice Tower - Middlebury, CT</u>	Project No.	_____	Sheet	<u>4</u> of <u>4</u>
Description	<u>Anchor Bolt Analysis (TIA-222-G)</u>	Computed by	<u>MCD</u>	Date	<u>04/09/18</u>
	<u>Modification Analysis (AT&T / Sprint)</u>	Checked by	_____	Date	_____

ANSI/TIA-222-G 4.9.6.4 Combined Shear and Tension:

$$\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv})} \right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt})} \right]^2 \leq 1$$

$$\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv})} \right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt})} \right]^2 = 0.66$$

Combined Shear and Tension Check:

$$\text{ShearAndTensionCheck} := \text{if} \left[\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv})} \right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt})} \right]^2 \leq 1, \text{"OK"}, \text{"NO GOOD"} \right]$$

ShearAndTensionCheck = "OK"

ANSI/TIA-222-G 4.9.9 Anchor Rods (Capacity):

$$\frac{\left[T_u + \left(\frac{V_u}{\eta} \right) \right]}{\phi_b \cdot P_n} \leq 1$$

$\eta := 0.55$ *user input from ANSI/TIA-222-G 4.9.9*

$$\frac{\left[T_u + \left(\frac{V_u}{\eta} \right) \right]}{\phi_b \cdot F_u \cdot A_n} = 0.938$$

Capacity Check:

$$\text{CapacityCheck} := \text{if} \left[\frac{\left[T_u + \left(\frac{V_u}{\eta} \right) \right]}{\phi_b \cdot F_u \cdot A_n} \leq 1, \text{"OK"}, \text{"NO GOOD"} \right]$$

CapacityCheck = "OK"

NOTE: Previous additional tensile reinforcement (project 60404004) for tower anchor is not required due to the existing anchor (previous to MODification) capacity being below the allowable stress limit, therefore the anchor calculation modifications have been removed for this case. Refer to Project 60404004, Rev 2. for reinforcement details.

FOUNDATION ANALYSIS

PIER AND MAT FOUNDATION ANALYSIS - 3 PIERS

TOWER FORCES:

Moment Caused by Tower $M_t := 8440 \cdot \text{kip} \cdot \text{ft}$
 Shear at Base of Tower $S_t := 107.451 \cdot \text{kip}$
 Max Compressive Force $C_t := 443.539 \cdot \text{kip}$
 Max Uplift $U_t := 388.871 \cdot \text{kip}$
 Height of Tower $H_t := 160 \cdot \text{ft}$
 Width of Tower at Base $W_t := 23 \cdot \text{ft}$
 Weight of Tower $WT_t := 1.0 \cdot \text{kip}$

FOOTING DIMENSIONS:

Width of Footing $W_f := 36 \cdot \text{ft}$
 Overall Depth of Footing $D_f := 5 \text{ft}$
 Length of Pier $L_p := 3.75 \cdot \text{ft}$
 Extension of Pier Above Grade $L_{pag} := 1 \cdot \text{ft}$
 Diameter of Pier $d_p := 3.5 \cdot \text{ft}$
 Thickness of Footing $T_f := 2.25 \cdot \text{ft}$
 Reinforcement Cover: $C_{vr} := 3 \text{in}$

NOTE: Weight of Tower is incorporated into the other loads listed above and is therefore set equal to one for programming.

MATERIAL PROPERTIES:

Compressive Strength of Concrete	$f_c := 3000 \cdot \text{psi}$	Unit Weight of Soil	$\gamma_s := 125 \cdot \text{pcf}$
Yield Strength of Steel Reinforcement	$f_y := 60000 \cdot \text{psi}$	Unit Weight of Concrete	$\gamma_c := 150 \cdot \text{pcf}$
Internal Friction Angle of Soil	$\phi_s := 34 \cdot \text{deg}$	Depth to Neglect	$n := 0 \cdot \text{ft}$
Allowable Bearing Capacity	$q_s := 4500 \cdot \text{psf}$	Cohesion of Clay Type Soil	$c_{\text{max}} := 0 \cdot \text{ksf}$
Ultimate Bearing Capacity	$R_s := 2 \cdot q_s$	Note: Use 0 for Sandy Soil	

Coefficient of Lateral Soil Pressure $K_p := \frac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)}$ $K_p = 3.5371$

What is Position of Center of Tower with respect to Center of Pad?
 1=Offset $Pos_{\text{tower}} := 2$
 2=Not Offset

STEEL REINFORCING:

PIER REINFORCEMENT:

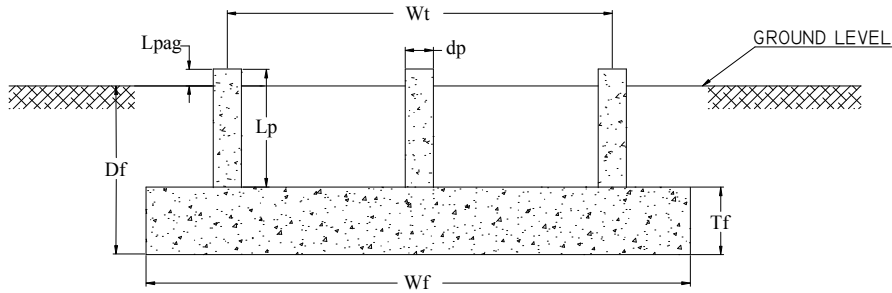
Bar Size	$BS_{\text{pier}} := 9$	Bar Diameter	$d_{\text{bpier}} := 1.1280 \cdot \text{in}$
Number of Bars	$NB_{\text{pier}} := 9$	Bar Area	$A_{\text{bpier}} := 1.0 \cdot \text{in}^2$

PAD REINFORCEMENT:

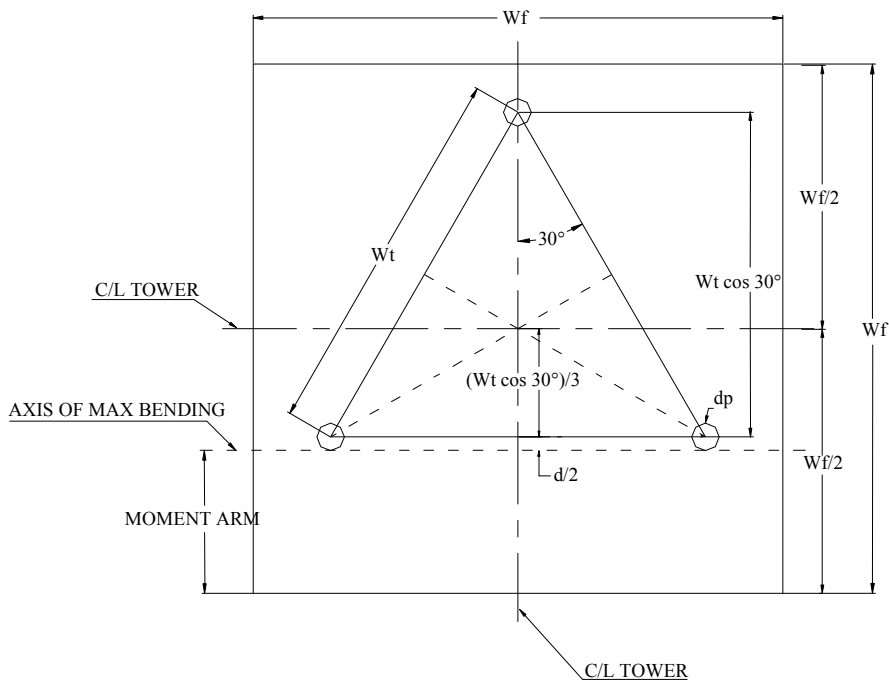
Bar Size	$BS_{\text{pad}} := 11$	Bar Diameter	$d_{\text{bpad}} := 1.41 \cdot \text{in}$
Number of Bars	$NB_{\text{pad}} := 34$	Bar Area	$A_{\text{bpad}} := 1.56 \cdot \text{in}^2$

NOTE: Bar equivalent used here for weakest Moment resistance.

FOUNDATION OVERVIEW



ELEVATION



PLAN

STABILITY OF FOOTING

NOTE: Reduction factor is implemented as 0.75 for pull-out/uplift of foundation. Reduction factor shall be applied to Overturning Moment in this case

Passive Pressure:	$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p}$ $P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p}$ $P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}]$ $P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p}$ $P_{ave} := \frac{P_{top} + P_{bot}}{2}$	$P_{pn} = 0 \cdot \text{ksf}$ $P_{pt} = 1.2159 \cdot \text{ksf}$ $P_{top} = 1.2159 \cdot \text{ksf}$ $P_{bot} = 2.2107 \cdot \text{ksf}$ $P_{ave} = 1.7133 \cdot \text{ksf}$
Shear:	$T_{pp} := \text{if}[n < (D_f - T_f), T_f, (D_f - n)]$ $A_{pp} := W_f \cdot T_{pp}$	$T_{pp} = 2.25 \cdot \text{ft}$ $A_{pp} = 81 \cdot \text{ft}^2$
Ultimate Shear:	$S_u := P_{ave} \cdot A_{pp}$	$S_u = 138.7772 \cdot \text{kip}$
Weight of Concrete Pad:	$WT_c := (W_f^2 \cdot T_f) \cdot \gamma_c$	$WT_c = 437.4 \cdot \text{kip}$
Weight of Soil above Footing:	$WT_{s1} := W_f^2 \cdot (D_f - T_f) \cdot \gamma_s$	$WT_{s1} = 445.5 \cdot \text{kip}$
Weight of Soil Wedge at back face:	$WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\phi_s)}{2} \cdot W_f \right] \cdot \gamma_s$	$WT_{s2} = 37.9411 \cdot \text{kip}$
Distance to center of Tower Leg from Edge of Footing:	$X_{t1} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot \text{deg})}{2}$ $X_t := \text{if}(\text{Pos}_{\text{tower}} = 1, X_{t1}, X_{t2})$	$X_{t2} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot \text{deg})}{3}$ $X_t = 11.3605 \cdot \text{ft}$
Additional Offset of Footing:	$X_{off1} := \frac{W_f}{2} - \left(\frac{W_t \cdot \cos(30 \cdot \text{deg})}{3} + X_t \right)$ $X_{off} := \text{if}(\text{Pos}_{\text{tower}} = 1, X_{off1}, X_{off2})$	$X_{off2} := 0$ $X_{off} = 0 \cdot \text{ft}$
Resisting Moment:	$M_r := \left[0.9(WT_c + WT_{s1}) \cdot \frac{W_f}{2} + 0.90 \cdot \left[WT_t \cdot \left(\frac{W_f}{2} - X_{off} \right) \right] + 0.90 \cdot \left(S_u \cdot \frac{T_{pp}}{3} \right) \right] \dots$ $+ WT_{s2} \cdot 0.90 \cdot \left(W_f + \frac{T_{pp} \cdot \tan(\phi_s)}{3} \right)$	$M_r = 15659.4207 \cdot \text{kip} \cdot \text{ft}$
	$\phi_{OT} := 0.75 \quad \text{ANSI/TIA-222-G REDUCTION FACTOR}$	
(Factored) Overturning Moment:	$M_{ot} := M_t + S_t \cdot (L_p + T_f) + WT_t \cdot X_{off}$	$M_{ot} = 9084.706 \cdot \text{kip} \cdot \text{ft}$
Overturn Ratio (%):	$\text{Ratio}_{\text{Stability}} := \frac{M_{ot}}{M_r \cdot \phi_{OT}}$	$\text{Ratio}_{\text{Stability}} = 77.35\%$
	$\text{StabilityCheck} := \text{if}(M_r \cdot \phi_{OT} > M_{ot}, \text{"Okay"}, \text{"No Good"})$	$\text{StabilityCheck} = \text{"Okay"}$

BEARING PRESSURE CHECK:

Pressure Applied:

	$LOAD_{tot} := (WT_c + WT_{s1} + WT_t) \cdot 0.9$	$LOAD_{tot} = 795.51 \cdot \text{kip}$
	$A_{mat} := W_f^2$	$A_{mat} = 1296 \cdot \text{ft}^2$
	$S := \frac{W_f^3}{6}$	$S = 7776 \cdot \text{ft}^3$
	$P_{max} := \frac{LOAD_{tot}}{A_{mat}} + \frac{M_{ot}}{S}$	$P_{max} = 1.7821 \cdot \text{ksf}$
	$P_{min} := \frac{LOAD_{tot}}{A_{mat}} - \frac{M_{ot}}{S}$	$P_{min} = -0.5545 \cdot \text{ksf}$
	$MaxPressure := \text{if}(P_{max} < 0.75R_s, \text{"Okay"}, \text{"No Good"})$	$MaxPressure = \text{"Okay"}$
	$MinPressure := \text{if}[(P_{min} \geq 0) \cdot (P_{min} < 0.75 \cdot R_s), \text{"Okay"}, \text{"No Good"}]$	$MinPressure = \text{"No Good"}$

Distance to Resultant of Pressure Distribution:

	$X_p := \frac{\frac{P_{max}}{P_{max} - P_{min}} \cdot \frac{1}{3}}{W_f}$	$X_p = 9.1524 \cdot \text{ft}$
--	--	--------------------------------

Distance to Kern:	$X_k := \frac{W_f}{3}$	$X_k = 12 \cdot \text{ft}$
-------------------	------------------------	----------------------------

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity:	$e := \frac{M_{ot}}{LOAD_{tot}}$	$e = 11.42$
---------------	----------------------------------	-------------

Adjusted Soil Pressure:	$q_a := \frac{2 \cdot LOAD_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)}$	$q_a = 2.2388 \cdot \text{ksf}$
-------------------------	--	---------------------------------

Revised Maximum:	$q_{max} := \text{if}(X_p < X_k, q_a, P_{max})$	$q_{max} = 2.2388 \cdot \text{ksf}$
------------------	---	-------------------------------------

$PressureCheck := \text{if}(q_{max} < 0.75 \cdot R_s, \text{"Okay"}, \text{"No Good"})$	$PressureCheck = \text{"Okay"}$
---	---------------------------------

CHECK PUNCHING AND BEAM SHEAR:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$$\phi_c := 0.85 \quad (\text{ACI 9.3.2.3})$$

$$d := T_f - C_{vr} - .5 \cdot \text{in}$$

$$d = 23.5 \cdot \text{in}$$

Factored load:

$$FL := \frac{C_t}{W_f^2}$$

$$FL = 0.3422 \cdot \text{ksf}$$

$$V_{req} := \frac{FL \cdot (X_t - 0.5 \cdot d_p - d) \cdot W_f}{\phi_c}$$

$$V_{req} = 110.9157 \cdot \text{kip}$$

ACI 11.3.1.1

$$V_{Avail} := 2 \cdot \sqrt{f_c \cdot \text{psi}} \cdot W_f \cdot d$$

$$V_{Avail} = 1112.0959 \cdot \text{kip}$$

$$\text{BeamShearCheck} := \text{if}(V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"})$$

$$\text{BeamShearCheck} = \text{"Okay"}$$

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.12.2.1)

$$b_o := (d_p + d) \cdot \pi$$

$$b_o = 17.1479 \cdot \text{ft}$$

$$V_{req} := FL \cdot \frac{W_f^2 - (d_p + d)^2 \cdot \frac{\pi}{4}}{\phi_c}$$

$$V_{req} = 512.3891 \cdot \text{kip}$$

$$V_{Avail} := 4 \cdot \sqrt{f_c \cdot \text{psi}} \cdot b_o \cdot d$$

$$V_{Avail} = 1059.448 \cdot \text{kip}$$

$$\text{PunchingShearCheck} := \text{if}(V_{req} < V_{Avail}, \text{"Okay"}, \text{"No Good"})$$

$$\text{PunchingShearCheck} = \text{"Okay"}$$

TENSILE REINFORCEMENT IN PAD:

$$\phi_m := 0.90 \quad \text{per ACI 9.3.2.2}$$

Applied Moments:

$$M_{nT} := \left[U_t \left(W_t \cdot \sin(60 \cdot \text{deg}) - \frac{d_p}{2} \right) + S_t \cdot (D_f + L_{\text{pag}}) \right] - W_{T_t} \cdot 1.2 \cdot X_{\text{off}}$$

$$M_{nS} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} \right)^2 \cdot 0.9 W_t \cdot [\gamma_s \cdot (T_{pp} - T_f)] \dots \right. \\ \left. + 0.9 W_{T_s} \cdot \left[\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} + (D_f - n) \cdot \tan(\phi_s) \right] \right]$$

$$M_{nC} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} \right)^2 \cdot 0.9 W_t \cdot (\gamma_c \cdot T_f) \right]$$

Design Moment: $M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} \quad M_n = 5536.6845 \cdot \text{kips} \cdot \text{ft}$

Required Reinforcement:

ACI 10.2.7.3 $\beta := \text{if} \left[f_c \leq 4000 \cdot \text{psi}, .85, \text{if} \left[f_c \geq 8000 \cdot \text{psi}, .65, .85 - \left(\frac{f_c - 4000}{1000} \right) \cdot .05 \right] \right] \quad \beta = 0.85$

Effective Width: $b_{\text{eff}} := W_t \cdot \cos(30 \cdot \text{deg}) + d_p \quad b_{\text{eff}} = 281.023 \cdot \text{in}$

$$A_s := \frac{M_n}{\phi_m \cdot f_y \cdot d} \quad A_s = 52.3564 \cdot \text{in}^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{\text{eff}}} \quad a = 4.3837 \cdot \text{in}$$

$$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2} \right)} \quad A_s = 51.9677 \cdot \text{in}^2$$

$$\rho := \frac{A_s}{b_{\text{eff}} \cdot d} \quad \rho = 0.0079$$

Job	<u>160' Stainless Lattice Tower - Middlebury, CT</u>	Project No.	
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	<u>MODification Analysis (AT&T / Sprint)</u>	Checked by	

Temperature and Shrinkage: $\rho_{sh} := \text{if}(f_y \geq 60000 \cdot \text{psi}, 0.0018, 0.0020)$ $\rho_{sh} = 0.0018$
 (ACI 7.12.2.1b)

Area Required: $A_s := \text{if}\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right)$ $A_s = 51.9677 \cdot \text{in}^2$

Area Provided: $A_{s_{prov}} := A_{bpad} \cdot N_{bpad}$ $A_{s_{prov}} = 53.04 \cdot \text{in}^2$

PadReinforcement := $\text{if}(A_{s_{prov}} > A_s, \text{"Okay"}, \text{"No Good"})$ PadReinforcement = "Okay"

NOTE: Moment applied to area of steel has applied the Load factor and Resistance factor to obtain the following result. $\frac{A_s}{A_{s_{prov}}} = 98.0\%$

DEVELOPMENT LENGTH OF PAD REINFORCEMENT:

TENSION (ACI 12.2.3)

Bar Spacing: $B_{sPad} := \frac{W_f - 2 \cdot C_{vr} - N_{bpad} \cdot d_{bpad}}{N_{bpad} - 1}$ $B_{sPad} = 11.4564 \cdot \text{in}$

Development Length Factors:

- Reinforcement Location Factor $\alpha := 1.0$
- Coating Factor $\beta := 1.0$
- Concrete strength Factor $\lambda := 1.0$
- Reinforcement Size Factor $\gamma := 1.0$

Spacing or Cover Dimension: $c := \text{if}\left(C_{vr} < \frac{B_{sPad}}{2}, C_{vr}, \frac{B_{sPad}}{2}\right)$ $c = 3 \cdot \text{in}$

Transverse Reinforcement Index allowed by ACI 12.2.4 $k_{tr} := 0$

Development Length: $L_{dbt} := \frac{3}{40} \cdot \frac{f_y}{\sqrt{f_c \cdot \text{psi}}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{c + k_{tr}} \cdot d_{bpad}$ $L_{dbt} = 54.4464 \cdot \text{in}$
 $L_{dbmin} := 12 \cdot \text{in}$

Minimum Development Length: $L_{dbtCheck} := \text{if}(L_{dbt} \geq L_{dbmin}, \text{"Use L.dbt"}, \text{"Use L.dbmin"})$ $L_{dbtCheck} = \text{"Use L.dbt"}$
 (ACI 12.2.1)

Available Length in Pad: $L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - C_{vr}$ $L_{Pad} = 75 \cdot \text{in}$

$L_{padTension} := \text{if}(L_{Pad} > L_{dbt}, \text{"Okay"}, \text{"No Good"})$ LpadTension = "Okay"



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REINFORCEMENT IN PIER:

$$A_p := \frac{\pi \cdot d_p^2}{4} \quad A_p = 1385.4424 \cdot \text{in}^2$$

(ACI 10.8.4 and 10.9.1) $A_{smin} := 0.01 \cdot 0.5 \cdot A_p \quad A_{smin} = 6.9272 \cdot \text{in}^2$

$$A_{sprov} := NB_{pier} \cdot A_{bpier} \quad A_{sprov} = 9 \cdot \text{in}^2$$

$$\text{SteelAreaCheck} := \text{if}(A_{sprov} > A_{smin}, \text{"Okay"}, \text{"No Good"}) \quad \text{SteelAreaCheck} = \text{"Okay"}$$

Bar Spacing In Pier: $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} \quad B_{sPier} = 13.5328 \cdot \text{in}$

Diameter of Reinforcement Cage: $\text{Diam}_{cage} := d_p - 2 \cdot C_{vr} \quad \text{Diam}_{cage} = 36 \cdot \text{in}$

Maximum Moment in Pier: $M_p := (S_t \cdot L_p) \quad M_p = 4835.295 \cdot \text{kips} \cdot \text{in}$

Pier Check evaluated from outside program and results are listed below;

(defined variables)

$$(f_c \ f_y \ c_l \ \text{Spiral}) = (3 \ 60 \ 4 \ 0)$$

The required input is column diameter in inches, number of reinforcing bars, bar size number, factored axial load in kips and moment in kip inches:

$$(D \ N \ n \ P_u \ M_{xu}) := (42 \ 9 \ 9 \ 525.6 \ 5751)$$

Clears any previous output:

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := (0 \ 0 \ 0 \ 0)$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := \phi P'_n (D, N, n, P_u, M_{xu})^T$$

The Output is given as useable axial load in kips, moment capacity in kip inches, splicing stress in ksi, and reinforcement ratio:

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) = (1296.7567 \ 14188.8273 \ -60 \ 0.0065)$$

Column size and reinforcement may be changed to match capacity to the applied load.

$$\text{AxialLoadCheck} := \text{if}(\phi P_n \geq P_u, \text{"Okay"}, \text{"No Good"}) \quad \text{AxialLoadCheck} = \text{"Okay"}$$

$$\text{BendingCheck} := \text{if}(\phi M_{xn} \geq M_{xu}, \text{"Okay"}, \text{"No Good"}) \quad \text{BendingCheck} = \text{"Okay"}$$

Job 160' Stainless Lattice Tower - Middlebury, CT
 Description Foundation Analysis (TIA-222-G)
MODification Analysis (AT&T / Sprint)

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 Computed by MCD Date 04/09/18
 Checked by _____ Date _____

 Sheet 9 of 10
DEVELOPMENT LENGTH OF PIER REINFORCEMENT:
TENSION (ACI 12.2.3)

 Spacing and Cover: $C_{vr} = 3 \cdot \text{in}$ $B_{sPier} = 13.5328 \cdot \text{in}$

 Factors for development: Reinforcement Location Factor $\alpha := 1.0$
 Coating Factor $\beta := 1.0$
 Concrete strength Factor $\lambda := 1.0$
 Reinforcement Size Factor $\gamma := 1.0$

 Spacing or Cover Dimension: $c := \text{if} \left(C_{vr} < \frac{B_{sPier}}{2}, C_{vr}, \frac{B_{sPier}}{2} \right)$ $c = 3 \cdot \text{in}$

 Transverse Reinforcement: As allowed by ACI 12.2.4 $k_{tr} := 0$

$$L_{dbt} := \frac{3}{40} \cdot \frac{f_y}{\sqrt{f_c \cdot \text{psi}}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{c + k_{tr}} \cdot d_{bpier} \quad L_{dbt} = 34.8457 \cdot \text{in}$$

 Minimum Development Length: (ACI 12.2.1) $L_{dbmin} := 12 \cdot \text{in}$

$$L_{dbtCheck} := \text{if} (L_{dbt} \geq L_{dbmin}, \text{"Use L.dbt"}, \text{"Use L.dbmin"}) \quad L_{dbtCheck} = \text{"Use L.dbt"}$$

COMPRESSION: (ACI 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot \text{psi}}} \quad L_{dbc1} = 24.7132 \cdot \text{in}$$

$$L_{dbmin} := 0.0003 \cdot \frac{\text{in}^2}{\text{lb}} \cdot (d_{bpier} \cdot f_y) \quad L_{dbmin} = 20.304 \cdot \text{in}$$

$$L_{dbc} := \text{if} (L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}) \quad L_{dbc} = 24.7132 \cdot \text{in}$$



Job	<u>160' Stainless Lattice Tower - Middlebury, CT</u>	Project No.	_____	Sheet	<u>10</u>	of	<u>10</u>
Description	<u>Foundation Analysis (TIA-222-G)</u>	Computed by	<u>MCD</u>	Date	<u>04/09/18</u>		
	<u>MODification Analysis (AT&T / Sprint)</u>	Checked by	_____	Date	_____		

Available Length in Pier: $L_{\text{pier}} := L_p - 3 \cdot \text{in}$ $L_{\text{pier}} = 42 \cdot \text{in}$

$L_{\text{piertension}} := \text{if}(L_{\text{pier}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$ $L_{\text{piertension}} = \text{"Okay"}$

$L_{\text{piercompression}} := \text{if}(L_{\text{pier}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$ $L_{\text{piercompression}} = \text{"Okay"}$

Available Length in Pad: $L_{\text{pad}} := T_f - 3 \cdot \text{in}$ $L_{\text{pad}} = 24 \cdot \text{in}$

$L_{\text{padtension}} := \text{if}[L_{\text{pad}} > (L_{\text{dbt}} - L_{\text{pier}}), \text{"Okay"}, \text{"No Good"}]$ $L_{\text{padtension}} = \text{"Okay"}$

$L_{\text{padcompression}} := \text{if}[L_{\text{pad}} > (L_{\text{dbc}} - L_{\text{pier}}), \text{"Okay"}, \text{"No Good"}]$ $L_{\text{padcompression}} = \text{"Okay"}$



Radio Frequency Emissions Analysis Report

AT&T Existing Facility

Site ID: CT1078

FA#: 10035063

Middlebury - 2 Larkin Drive
2 Larkin Drive
Middlebury, CT 06762

June 25, 2018

Centerline Communications Project Number: 950006-130

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	32.99 %



June 25, 2018

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

Emissions Analysis for Site: **CT1078 – Middlebury - 2 Larkin Drive**

Centerline Communications, LLC (“Centerline”) was directed to analyze the proposed AT&T facility located at **2 Larkin Drive, Middlebury, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ 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 population 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 population 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.

Population exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limits for the 700 and 850 MHz Bands are approximately $467 \mu\text{W}/\text{cm}^2$ and $567 \mu\text{W}/\text{cm}^2$ respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 2300 MHz (WCS) bands is $1000 \mu\text{W}/\text{cm}^2$. 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 performed for the proposed AT&T Wireless antenna facility located at **2 Larkin Drive, Middlebury, 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.

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. All power values expressed and analyzed are maximum power levels expected to be used on all radios.

All emissions values for additional carriers were taken from the Connecticut Siting Council (CSC) active MPE database. Values in this database are provided by the individual carriers themselves

For each sector the following channel counts, frequency bands and power levels were utilized as shown in *Table 1*:

Technology	Frequency Band	Channel Count	Transmit Power per Channel (W)
UMTS	850 MHz	2	30
UMTS	1900 MHz (PCS)	2	30
LTE	700 MHz	2	60
GSM	850 MHz	2	30
LTE	1900 MHz (PCS)	4	40
LTE	2300 MHz (WCS)	4	30

Table 1: Channel Data Table



The following antennas listed in *Table 2* were used in the modeling 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.

Sector	Antenna Number	Antenna Make / Model	Antenna Centerline (ft)
A	1	Powerwave 7770	140
A	2	Commscope SBNH-1D6565C	140
A	3	CCI TPA-65R-LCUUUU-H8	140
B	1	Powerwave 7770	140
B	2	Commscope SBNH-1D6565C	140
B	3	CCI TPA-65R-LCUUUU-H8	140
C	1	Powerwave 7770	140
C	2	KMW AM-X-CD-16-65-00T-RET	140
C	3	Quintel QS66512-3	140

Table 2: Antenna Data

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



RESULTS

Per the calculations completed for the proposed AT&T configurations *Table 3* shows resulting emissions power levels and percentages of the FCC's allowable general population limit.

Antenna ID	Antenna Make / Model	Frequency Bands	Antenna Gain (dBd)	Channel Count	Total TX Power (W)	ERP (W)	MPE %
Antenna A1	Powerwave 7770	850 MHz / 1900 MHz (PCS)	11.4 / 13.4	4	120	2,140.89	0.56
Antenna A2	Commscope SBNH-1D6565C	700 MHz	13.65	2	80	1,853.92	0.79
Antenna A3	CCI TPA-65R-LCUUUU-H8	850 MHz / 1900 MHz (PCS) / 2300 MHz (WCS)	13.45 / 13.75 / 14.45	10	340	8,465.40	1.90
Sector A Composite MPE%							3.25
Antenna B1	Powerwave 7770	850 MHz / 1900 MHz (PCS)	11.4 / 13.4	4	120	2,140.89	0.56
Antenna B2	Commscope SBNH-1D6565C	700 MHz	13.65	2	80	1,853.92	0.79
Antenna B3	CCI TPA-65R-LCUUUU-H8	850 MHz / 1900 MHz (PCS) / 2300 MHz (WCS)	13.45 / 13.75 / 14.45	10	340	8,465.40	1.90
Sector B Composite MPE%							3.25
Antenna C1	Powerwave 7770	850 MHz / 1900 MHz (PCS)	11.4 / 13.4	4	120	2,140.89	0.56
Antenna C2	KMW AM-X-CD-16-65-00T-RET	700 MHz	13.35	2	80	1,730.17	0.74
Antenna C3	Quintel QS66512-3	850 MHz / 1900 MHz (PCS) / 2300 MHz (WCS)	11.4 / 12.78 / 15.15	10	340	7,791.05	1.69
Sector C Composite MPE%							2.98

Table 3: AT&T Emissions Levels



The Following table (table 4) shows all additional carriers on site and their MPE% as recorded in the CSC active MPE database for this facility along with the newly calculated maximum AT&T MPE contributions per this report. FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. For this site, the sectors with the largest calculated MPE% are Sectors A & B. Table 5 below shows a summary for each AT&T Sector as well as the composite MPE value for the site.

Site Composite MPE%	
Carrier	MPE%
AT&T – Max Sector Value	3.25 %
Verizon Wireless	19.10 %
MetroPCS	0.96 %
Sprint	1.50 %
unidentified (from DPS)	6.92 %
DOT	0.13 %
T-Mobile	1.13 %
Site Total MPE %:	32.99 %

Table 4: All Carrier MPE Contributions

AT&T Sector A Total:	3.25 %
AT&T Sector B Total:	3.25 %
AT&T Sector C Total:	2.98 %
Site Total:	
	32.99 %

Table 5: Site MPE Summary



FCC OET 65 specifies that for carriers utilizing directional antennas that the highest recorded sector value be used for composite site MPE values due to their greatly reduced emissions contributions in the directions of the adjacent sectors. *Table 6* below details a breakdown by frequency band and technology for the MPE power values for the maximum calculated AT&T sector(s). For this site, the sectors with the largest calculated MPE% are Sectors A & B.

AT&T _ Frequency Band / Technology Max Power Values (Sectors A & B)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu\text{W}/\text{cm}^2$)	Frequency (MHz)	Allowable MPE ($\mu\text{W}/\text{cm}^2$)	Calculated % MPE
AT&T 850 MHz UMTS – Antenna 1	2	414.12	140	1.66	850 MHz	567	0.29%
AT&T 1900 MHz (PCS) UMTS – Antenna 1	2	656.33	140	2.63	1900 MHz (PCS)	1000	0.26%
AT&T 700 MHz LTE – Antenna 2	2	926.96	140	3.71	700 MHz	467	0.79%
AT&T 850 MHz GSM – Antenna 3	2	663.93	140	2.66	850 MHz	567	0.47%
AT&T 1900 MHz (PCS) LTE – Antenna 3	4	948.55	140	7.60	1900 MHz (PCS)	1000	0.76%
AT&T 2300 MHz (WCS) LTE – Antenna 3	4	835.84	140	6.69	2300 MHz (WCS)	1000	0.67%
						Total:	3.25%

Table 6: AT&T Maximum Sector MPE Power Values



Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general population 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 population exposure to RF Emissions are shown here:

AT&T Sector	Power Density Value (%)
Sector A:	3.25 %
Sector B:	3.25 %
Sector C:	2.98 %
AT&T Maximum Total (Sectors A & B):	3.25 %
Site Total:	32.99 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **32.99 %** of the allowable FCC established general population 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.

A handwritten signature in black ink, appearing to read 'Scott Heffernan', is positioned above the contact information.

Scott Heffernan
RF Engineering Director
Centerline Communications, LLC
95 Ryan Drive, Suite 1
Raynham, MA 02767

SENDER: COMPLETE THIS SECTION

Complete items 1, 2, and 3. Print your name and address on the reverse so that we can return the card to you. Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to: Hon. Edward St. John 1212 Whittemore Rd Middlebury, CT 06762

3. Service Type: Adult Signature, Adult Signature Restricted Delivery, Certified Mail, Collect on Delivery, Collect on Delivery Restricted Delivery, Insured Mail, Insured Mail Restricted Delivery (over \$500)

7016 3010 0000 7828 3624 Domestic Return Receipt

COMPLETE THIS SECTION ON DELIVERY

Signature: Connie Brunswick, Received by (Printed Name): C. Brunswick, Date of Delivery: 8-28-18

Is delivery address different from item 1? No. If YES, enter delivery address below:

3. Service Type: Adult Signature, Adult Signature Restricted Delivery, Certified Mail, Collect on Delivery, Collect on Delivery Restricted Delivery, Insured Mail, Insured Mail Restricted Delivery (over \$500)

7016 3010 0000 7828 3594 Domestic Return Receipt

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1. Article Addressed to: Mr Curtis Basco Zoning Enforcement Officer 1212 Whittemore Rd Middlebury, CT 06762

3. Service Type: Adult Signature, Adult Signature Restricted Delivery, Certified Mail, Collect on Delivery, Collect on Delivery Restricted Delivery, Insured Mail, Insured Mail Restricted Delivery (over \$500)

7016 3010 0000 7828 3624 Domestic Return Receipt

COMPLETE THIS SECTION ON DELIVERY

Signature: Connie Brunswick, Received by (Printed Name): C. Brunswick, Date of Delivery: 8-28-18

Is delivery address different from item 1? No. If YES, enter delivery address below:

3. Service Type: Adult Signature, Adult Signature Restricted Delivery, Certified Mail, Collect on Delivery, Collect on Delivery Restricted Delivery, Insured Mail, Insured Mail Restricted Delivery (over \$500)

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1. Article Addressed to: Ollie LeDuc Bldg official 1212 Whittemore Rd Middlebury CT 06762

3. Service Type: Adult Signature, Adult Signature Restricted Delivery, Certified Mail, Collect on Delivery, Collect on Delivery Restricted Delivery, Insured Mail, Insured Mail Restricted Delivery (over \$500)

7016 3010 0000 7828 3617 Domestic Return Receipt

COMPLETE THIS SECTION ON DELIVERY

Signature: Connie Brunswick, Received by (Printed Name): C. Brunswick, Date of Delivery: 8-28-18

Is delivery address different from item 1? No. If YES, enter delivery address below:

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COMPLETE THIS SECTION ON DELIVERY

Signature: Connie Brunswick, Received by (Printed Name): C. Brunswick, Date of Delivery: 8-28-18

Is delivery address different from item 1? No. If YES, enter delivery address below:

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