QC Development
PO Box 916
Storrs, CT 06268
860-670-9068
Mark.Roberts@QCDevelopment.net

February 23, 2018

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

Notice of Exempt Modification – New Cingular Wireless PCS, LLC (AT&T)
51 Daniels Avenue, Waterford, CT 06385
N 41-19-48.95
W 72-10-02.00

Dear Ms. Bachman:

AT&T currently maintains nine (9) antennas at the 170-foot level of the existing 180-foot Self Support Tower at 51 Daniels Avenue, Waterford, CT. The tower is owned by SBA. The property is owned by the Town of Waterford. AT&T now intends to install three (3) new KMW antennas. These antennas would be installed at the 170-foot level of the tower. AT&T also intends to install three (3) Ericsson RRUS-32 B66 and (3) Ericsson B14-4478 Remote Radio Units (RRU), also at the 170-foot level.

This facility was approved under Special Permit #PZ2008-033 by the Town of Waterford Planning & Zoning Commission on November 24, 2008. This approval included no condition(s) that could feasibly be violated by this modification, including total facility height or mounting restrictions. This modification therefore complies with the aforementioned approval.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Daniel M. Steward, First Selectman of the Town of Waterford, as elected official and property owner, to

Waterford's Director of Planning and Zoning and to the tower owner.

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

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

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

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

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

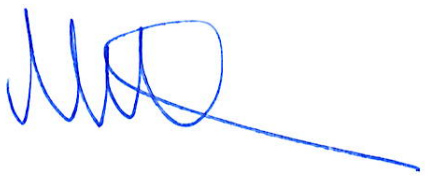
5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The existing structure and its foundation can support the proposed loading.

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

Please feel free to call me at (860) 670-9068 with any questions regarding this matter. Thank you for your consideration.

Sincerely,



Mark Roberts
QC Development
Consultant for AT&T

Attachments

cc: Mr. Daniel M. Steward - as Elected Official and Property Owner
Abby Piersall, AICP – Planning Director
SBA - as Tower Owner (via e-mail)

Power Density

Existing Loading on Tower

Carrier	# of Channels	ERP/Ch (W)	Antenna Centerline Height (ft)	Power Density (mW/cm^2)	Freq. Band (MHz**)	Limit S (mW /cm^2)	%MPE
Other Carriers*							5.09%
AT&T LTE	2	1791	170	0.0479	700	0.4667	1.03%
AT&T LTE	2	1104	170	0.0295	1900	1.0000	0.30%
AT&T LTE	2	2203	170	0.0589	2300	1.0000	0.59%
AT&T UMTS	2	492	170	0.0132	880	0.5867	0.22%
AT&T UMTS	2	491	170	0.0131	1900	1.0000	0.13%
AT&T GSM	2	817	170	0.0218	880	0.5867	0.37%
Site Total							7.73%

*Per CSC Records (available upon request, includes calculation formulas)

** If a range of frequencies are used, such as 880-894, enter the lowest value, i.e. 880

Proposed Loading on Tower

Carrier	# of Channels	ERP/Ch (W)	Antenna Centerline Height (ft)	Power Density (mW/cm^2)	Freq. Band (MHz**)	Limit S (mW /cm^2)	%MPE
Other Carriers*							5.09%
AT&T LTE	2	1476	170	0.0395	700	0.4667	0.85%
AT&T LTE	1	1734	170	0.0232	1900	1.0000	0.23%
AT&T LTE	2	3837	170	0.1026	2100	1.0000	1.03%
AT&T LTE	1	1094	170	0.0146	2300	1.0000	0.15%
AT&T UMTS	1	302	170	0.0040	880	0.5867	0.07%
AT&T UMTS	1	461	170	0.0048	1900	1.0000	0.05%
Site Total							7.46%

*Per CSC Records (available upon request, includes calculation formulas)

** If a range of frequencies are used, such as 880-894, enter the lowest value, i.e. 880

Note: Proposed Loading may also include corrections to certain Existing Loading values

PROJECT INFORMATION

SCOPE OF WORK:	UNMANNED TELECOMMUNICATIONS FACILITY MODIFICATIONS
SITE ADDRESS:	51 DANIELS AVENUE WATERFORD, CT 06385
LATITUDE: LONGITUDE:	41° 19' 50" N 72° 10' 01" W
JURISDICTION:	NATIONAL, STATE & LOCAL CODES OR ORDINANCES
CURRENT USE:	TELECOMMUNICATIONS FACILITY
PROPOSED USE:	TELECOMMUNICATIONS FACILITY
DESIGN GUIDELINE:	LTE 5C

SITE NUMBER: CT1270

SITE NAME: WATERFORD DANIELS AVE

51 DANIELS AVENUE
WATERFORD, CT 06385
NEW LONDON COUNTY

DRAWING INDEX

LOCUS MAP

DRIVING DIRECTIONS FROM 550 COCHITUATE ROAD, FRAMINGHAM, MA:
1. HEAD SOUTHWEST, TURN LEFT TOWARD LEGGATT MCCALL CONN
2. TURN LEFT ONTO LEGGATT MCCALL CONN
3. CONTINUE ONTO BURR ST
4. TURN LEFT ONTO COCHITUATE RD
5. USE THE RIGHT LANE TO TAKE THE RAMP TO I-90 E/MASSPIKE W/SPRINGFIELD/BOSTON
6. KEEP LEFT AT THE FORK, FOLLOW SIGNS FOR INTERSTATE 90 W/MASSACHUSETTS TURNPIKE/WORCESTER/SPRINGFIELD AND MERGE ONTO I-90 W/MASSACHUSETTS TURNPIKE
7. MERGE ONTO I-90 W/MASSACHUSETTS TURNPIKE
8. TAKE EXIT 10 TOWARD MA-12 N/AUBURN/WORCESTER
9. KEEP RIGHT AT THE FORK, FOLLOW SIGNS FOR I-395 S/US-20 E/NORWICH CT
10. CONTINUE ONTO I-395 S
11. TAKE EXIT 2 FOR CT-85 TOWARD WATERFORD/CHESTERFIELD
12. TURN LEFT ONTO CT-85 S
13. TURN RIGHT ONTO CROSS RD
14. CONTINUE ONTO SPITHEAD RD
15. TURN RIGHT ONTO DANIELS AVE
16. TURN LEFT AT THE 1ST CROSS STREET ONTO HIGH ST

GENERAL NOTES

1. THIS DOCUMENT IS THE CREATION, DESIGN, PROPERTY AND COPYRIGHTED WORK OF AT&T. ANY DUPLICATION OR USE WITHOUT EXPRESS WRITTEN CONSENT IS STRICTLY PROHIBITED. DUPLICATION AND USE BY GOVERNMENT AGENCIES FOR THE PURPOSES OF CONDUCTING THEIR LAWFULLY AUTHORIZED REGULATORY AND ADMINISTRATIVE FUNCTIONS IS SPECIFICALLY ALLOWED.
2. THE FACILITY IS AN UNMANNED PRIVATE AND SECURED EQUIPMENT INSTALLATION. IT IS ONLY ACCESSED BY TRAINED TECHNICIANS FOR PERIODIC ROUTINE MAINTENANCE AND THEREFORE DOES NOT REQUIRE ANY WATER OR SANITARY SEWER SERVICE. THE FACILITY IS NOT GOVERNED BY REGULATIONS REQUIRING PUBLIC ACCESS PER ADA REQUIREMENTS.
3. CONTRACTOR SHALL VERIFY ALL PLANS AND EXISTING DIMENSIONS AND CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE AT&T REPRESENTATIVE IN WRITING OF DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR SAME.

STATE OF CONNECTICUT
MARC R. CHRETIEN
No. 29307
LICENSED
PROFESSIONAL ENGINEER

CONNECTICUT
CALL BEFORE YOU DIG
CALL TOLL FREE: 800-922-4455

UNDERGROUND SERVICE ALERT

ADVANCED ENGINEERING GROUP, P.C.
Civil Engineering - Site Development - Surveying - Telecommunications
500 North Broadway
East Providence, RI 02914
Phone: (401) 354-2403
Fax: (401) 633-6354

SAI COMMUNICATIONS
12 INDUSTRIAL WAY
SALEM, NH 03079

SITE NUMBER: CT1270
SITE NAME: WATERFORD DANIELS AVE
51 DANIELS AVENUE
WATERFORD, CT 06385
NEW LONDON COUNTY

at&t
550 COCHITUATE ROAD, SUITE 13,
FRAMINGHAM, MA 01701-4681

NO.	DATE	REVISIONS	BY	CHK
0	01/26/18	ISSUED FOR REVIEW	AAB	MRC

TITLE SHEET

SHEET NO. T-1

GENERAL NOTES

1. THE CONTRACTOR SHALL GIVE ALL NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY, MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS, AND LOCAL AND STATE JURISDICTIONAL CODES BEARING ON THE PERFORMANCE OF THE WORK. THE WORK PERFORMED ON THE PROJECT AND THE MATERIALS INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES.

2. THE ARCHITECT/ENGINEER HAVE MADE EVERY EFFORT TO SET FORTH IN THE CONSTRUCTION AND CONTRACT DOCUMENTS THE COMPLETE SCOPE OF WORK. THE CONTRACTOR BIDDING THE JOB IS NEVERTHELESS CAUTIONED THAT MINOR OMISSIONS OR ERRORS IN THE DRAWINGS AND OR SPECIFICATIONS SHALL NOT EXCUSE SAID CONTRACTOR FROM COMPLETING THE PROJECT AND IMPROVEMENTS IN ACCORDANCE WITH THE INTENT OF THESE DOCUMENTS.

3. THE CONTRACTOR OR BIDDER SHALL BEAR THE RESPONSIBILITY OF NOTIFYING (IN WRITING) THE LESEE/LICENSEE REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK. IN THE EVENT OF DISCREPANCIES THE CONTRACTOR SHALL PRICE THE MORE COSTLY OR EXTENSIVE WORK, UNLESS DIRECTED IN WRITING OTHERWISE.

4. THE SCOPE OF WORK SHALL INCLUDE FURNISHING ALL MATERIALS, EQUIPMENT, LABOR AND ALL OTHER MATERIALS AND LABOR DEEMED NECESSARY TO COMPLETE THE WORK/PROJECT AS DESCRIBED HEREIN.

5. THE CONTRACTOR SHALL VISIT THE JOB SITE PRIOR TO THE SUBMISSION OF BIDS OR PERFORMING WORK TO FAMILIARIZE HIMSELF WITH THE FIELD CONDITIONS AND TO VERIFY THAT THE PROJECT CAN BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

6. THE CONTRACTOR SHALL OBTAIN AUTHORIZATION TO PROCEED WITH CONSTRUCTION PRIOR TO STARTING WORK ON ANY ITEM NOT CLEARLY DEFINED BY THE CONSTRUCTION DRAWINGS / CONTRACT DOCUMENTS.

7. THE CONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS ACCORDING TO THE MANUFACTURER'S / VENDOR'S SPECIFICATIONS UNLESS NOTED OTHERWISE OR WHERE LOCAL CODES OR ORDINANCES TAKE PRECEDENCE.

8. THE CONTRACTOR SHALL PROVIDE A FULL SET OF CONSTRUCTION DOCUMENTS AT THE SITE UPDATED WITH THE LATEST REVISIONS AND ADDENDUMS OR CLARIFICATIONS AVAILABLE FOR THE USE BY ALL PERSONNEL INVOLVED WITH THE PROJECT.

9. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE PROJECT DESCRIBED HEREIN. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES AND FOR COORDINATING ALL PORTIONS OF THE WORK UNDER THE CONTRACT.

10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS, ESTABLISHING AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS AS SHOWN HEREIN.

11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.

12. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS, EASEMENTS, PAVING, CURBING, ETC. DURING CONSTRUCTION. UPON COMPLETION OF WORK, THE CONTRACTOR SHALL REPAIR ANY DAMAGE THAT MAY HAVE OCCURRED DUE TO CONSTRUCTION ON OR ABOUT THE PROPERTY.

13. THE CONTRACTOR SHALL KEEP THE GENERAL WORK AREA CLEAN AND HAZARD FREE DURING CONSTRUCTION AND DISPOSE OF ALL DIRT, DEBRIS, RUBBISH AND REMOVE EQUIPMENT NOT SPECIFIED AS REMAINING ON THE PROPERTY. PREMISES SHALL BE LEFT IN CLEAN CONDITION AND FREE FROM PAINT SPOTS, DUST, OR SMUDGES OF ANY NATURE.

14. THE CONTRACTOR SHALL COMPLY WITH ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJECT.

15. THE CONTRACTOR SHALL NOTIFY THE LESEE/LICENSEE REPRESENTATIVE WHERE A CONFLICT OCCURS ON ANY OF THE CONTRACT DOCUMENTS. THE CONTRACTOR IS NOT TO ORDER MATERIAL OR CONSTRUCT ANY PORTION OF THE WORK THAT IS IN CONFLICT UNTIL CONFLICT IS RESOLVED BY THE LESEE/LICENSEE REPRESENTATIVE.

16. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS, PROPERTY LINES, ETC. ON THE JOB.

17. ALL UNDERGROUND UTILITY INFORMATION WAS DETERMINED FROM SURFACE INVESTIGATIONS AND EXISTING PLANS OF RECORD. THE CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES IN THE FIELD PRIOR TO ANY SITE WORK. CALL THE FOLLOWING FOR ALL PRE-CONSTRUCTION NOTIFICATION 72-HOURS PRIOR TO ANY EXCAVATION ACTIVITY: DIG SAFE SYSTEM (MA, ME, NH, RI, VT): 1-888-344-7233 CALL BEFORE YOU DIG (CT): 1-800-922-4455

18. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL NECESSARY CONSTRUCTION CONTROL SURVEYS AND MAINTAINING ALL LINES AND GRADES REQUIRED TO CONSTRUCT ALL IMPROVEMENTS SHOWN HEREIN.

19. ALL DIMENSIONS SHOWN THUS ± ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS WHICH EFFECT THE CONTRACTORS WORK. CONTRACTOR TO VERIFY ALL DIMENSIONS WITH PROJECT OWNER PRIOR TO CONSTRUCTION.

20. NORTH ARROW SHOWN ON PLANS REFERS TO APPROXIMATE TRUE NORTH. PRIOR TO THE START OF CONSTRUCTION, ORDERING OR FABRICATING OF ANTENNA MOUNTS, CONTRACTOR SHALL CONSULT WITH PROJECT OWNER'S RF ENGINEER AND FIELD VERIFY ALL ANTENNA SECTOR LOCATIONS AND ANTENNA AZIMUTHS.

21. THE CONTRACTOR AND OR HIS SUB CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND INSPECTIONS WHICH MAY BE REQUIRED FOR THE WORK BY THE ARCHITECT/ENGINEER, THE STATE, COUNTY OR LOCAL GOVERNMENT AUTHORITY.

22. ANTENNA INSTALLATION SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS, TRANSMISSION LINES AND SUPPORT STRUCTURES.

23. COAXIAL CABLE CONNECTORS AND TRANSMITTER EQUIPMENT SHALL BE PROVIDED BY THE PROJECT OWNER AND IS NOT INCLUDED IN THESE CONSTRUCTION DOCUMENTS. A SCHEDULE OF PROJECT OWNER SUPPLIED MATERIALS IS ATTACHED TO THE BID DOCUMENTS (SEE EXHIBIT 3). ALL OTHER HARDWARE TO BE PROVIDED BY THE CONTRACTOR. CONNECTION HARDWARE SHALL BE STAINLESS STEEL.

24. WHEN "PAINT TO MATCH" IS SPECIFIED FOR ANTENNA CONCEALMENT, PAINT PRODUCT FOR ANTENNA RADOME SHALL BE SHERWIN WILLIAMS COROTHANE II. SURFACE PREPARATION AND APPLICATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND PROJECT OWNER'S GUIDELINE'S.

25. COORDINATION, LAYOUT, AND FURNISHING OF CONDUIT, CABLE AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

26. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.

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

28. ALL (E)INACTIVE SEWER, WATER, GAS, ELECTRIC AND OTHER UTILITIES, WHICH INTERFERE WITH THE EXECUTION OF THE WORK, SHALL BE REMOVED AND/OR CAPPED, PLUGGED OR OTHERWISE DISCONTINUED AT POINTS WHICH WILL NOT INTERFERE WITH THE EXECUTION OF THE WORK, SUBJECT TO THE APPROVAL OF UTILITY COMPANY ENGINEERING. THE AREAS OF THE PROPERTY DISTURBED BY THE WORK AND NOT COVERED BY THE EQUIPMENT, DRIVEWAY OR

29. GRAVEL, SHALL BE GRADED TO A UNIFORM SLOPE, FERTILIZED, SEEDED AND COVERED WITH MULCH UNLESS OTHERWISE NOTED. THE CONTRACTOR SHALL ESTABLISH AND MAINTAIN SOIL EROSION AND SEDIMENTATION CONTROLS AT ALL TIMES

30. DURING CONSTRUCTION. PER FCC MANDATE, ENHANCED EMERGENCY (E911) SERVICE IS REQUIRED TO MEET NATIONWIDE STANDARDS

31. FOR WIRELESS COMMUNICATIONS SYSTEMS. PROJECT OWNER'S IMPLEMENTATION REQUIRES DEPLOYMENT OF EQUIPMENT AND ANTENNAS GENERALLY DEPICTED ON THIS PLAN, ATTACHED TO OR MOUNTED IN CLOSE PROXIMITY TO THE BTS RADIO CABINETS. PROJECT OWNER RESERVES THE RIGHT TO MAKE REASONABLE MODIFICATIONS TO E911 EQUIPMENT AND LOCATION AS TECHNOLOGY EVOLVES TO MEET REQUIRED SPECIFICATIONS.

32. APPLICABLE BUILDING CODES:
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.

BUILDING CODE:

2012 INTERNATIONAL BUILDING CODE
2016 CT STATE BUILDING CODE
ELECTRICAL CODE: NEC 2014
NFPA 780 2014

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, ASD, NINTH EDITION;

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA) 222-G, STRUCTURAL STANDARDS FOR STEEL

ANTENNA TOWER AND ANTENNA SUPPORTING STRUCTURES; REFER TO ELECTRICAL DRAWINGS FOR SPECIFIC ELECTRICAL STANDARDS.

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.

ELECTRICAL AND GROUNDING NOTES

1. ALL ELECTRICAL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (NEC) AS WELL AS APPLICABLE STATE AND LOCAL CODES.

2. ALL ELECTRICAL ITEMS SHALL BE U.L. APPROVED OR LISTED AND PROCURED PER SPECIFICATION REQUIREMENTS.

3. THE ELECTRICAL WORK INCLUDES ALL LABOR AND MATERIAL DESCRIBED BY DRAWINGS AND SPECIFICATION INCLUDING INCIDENTAL WORK TO PROVIDE COMPLETE OPERATING AND APPROVED ELECTRICAL SYSTEM.

4. GENERAL CONTRACTOR SHALL PAY FEES FOR PERMITS, AND IS RESPONSIBLE FOR OBTAINING SAID PERMITS AND COORDINATION OF INSPECTIONS.

5. ELECTRICAL AND TELCO WIRING OUTSIDE A BUILDING AND EXPOSED TO WEATHER SHALL BE IN WATER TIGHT GALVANIZED RIGID STEEL CONDUITS OR SCHEDULE 80 PVC (AS PERMITTED BY CODE) AND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.

6. BURIED CONDUIT SHALL BE SCHEDULE 40 PVC.

7. ELECTRICAL WIRING SHALL BE COPPER WITH TYPE XHHW, THWN, OR THHN INSULATION.

8. RUN ELECTRICAL CONDUIT OR CABLE BETWEEN ELECTRICAL UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE PPC AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE. COORDINATE INSTALLATION WITH UTILITY COMPANY.

9. RUN TELCO CONDUIT OR CABLE BETWEEN TELEPHONE UTILITY DEMARCATION POINT AND PROJECT OWNER CELL SITE TELCO CABINET AND BTS CABINET AS INDICATED ON THIS DRAWING. PROVIDE FULL LENGTH PULL ROPE AND GREENLEE CONDUIT MEASURING TAPE IN EACH INSTALLED TELCO CONDUIT.

10. WHERE CONDUIT BETWEEN BTS AND PROJECT OWNER CELL SITE PPC AND BETWEEN BTS AND PROJECT OWNER CELL SITE TELCO SERVICE CABINET ARE UNDERGROUND USE PVC, SCHEDULE 40 CONDUIT. ABOVE THE GROUND PORTION OF THESE CONDUITS SHALL BE PVC CONDUIT.

11. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NEMA 3R ENCLOSURE.

12. PPC SUPPLIED BY PROJECT OWNER.

13. GROUNDING SHALL COMPLY WITH NEC ART. 250.

14. GROUND COAXIAL CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURERS COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.

15. USE #6 COPPER STRANDED WIRE WITH GREEN COLOR INSULATION FOR ABOVE GRADE GROUNDING (UNLESS OTHERWISE SPECIFIED) AND #2 SOLID TINNED BARE COPPER WIRE FOR BELOW GRADE GROUNDING AS INDICATED ON THE DRAWING.

16. ALL GROUND CONNECTIONS TO BE BURNDY HYGROUND COMPRESSION TYPE CONNECTORS OR CADWELD EXOTHERMIC WELD. DO NOT ALLOW BARE COPPER WIRE TO BE IN CONTACT WITH GALVANIZED STEEL.

17. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AT RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY. BOND ANY METAL OBJECTS WITHIN 6 FEET OF PROJECT OWNER EQUIPMENT OR CABINET TO MASTER GROUND BAR OR GROUNDING RING.

18. CONNECTIONS TO GROUND BARS SHALL BE MADE WITH TWO HOLE COMPRESSION TYPE COPPER LUGS. APPLY OXIDE INHIBITING COMPOUND TO ALL LOCATIONS.

19. BOND ANTENNA MOUNTING BRACKETS, COAXIAL CABLE GROUND KITS, AND ALNA TO EGB PLACED NEAR THE ANTENNA LOCATION.

20. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTIONS.

21. CONTRACTOR SHALL PROVIDE AND INSTALL OMNI DIRECTIONAL ELECTRONIC MARKER SYSTEM (EMS) BALLS OVER EACH GROUND ROD AND BONDING POINT BETWEEN EXISTING TOWER/ (E) MONOPOLE GROUNDING RING AND EQUIPMENT GROUNDING RING.

22. CONTRACTOR SHALL TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION. 5 OHMS MAXIMUM RESISTANCE REQUIRED.

23.CONTRACTOR SHALL CONDUCT ANTENNA, COAX, AND LNA RETURN-LOSS AND DISTANCE- TO-FAULT MEASUREMENTS (SWEEP TESTS) AND RECORD RESULTS FOR PROJECT CLOSE OUT.

STATE OF CONNECTICUT
MARC R. CHRETIEN
No. 29307
LICENSED
PROFESSIONAL ENGINEER

ABBREVIATIONS

AGL	ABOVE GRADE LEVEL	G.C.	GENERAL CONTRACTOR	RF	RADIO FREQUENCY
AWG	AMERICAN WIRE GAUGE	MGB	MASTER GROUND BUS		
BCW	BARE COPPER WIRE	MIN	MINIMUM	TBD	TO BE DETERMINED
BTS	BASE TRANSCEIVER STATION	(P)	PROPOSED/NEW	TBR	TO BE REMOVED
(E)	EXISTING	N.T.S.	NOT TO SCALE	TBRR	TO BE REMOVED AND REPLACED
EG	EQUIPMENT GROUND	REF	REFERENCE		
EGR	EQUIPMENT GROUND RING	REQ	REQUIRED	TYP	TYPICAL
(F)	FUTURE				

ADVANCED ENGINEERING GROUP, P.C.
Civil Engineering - Site Development - Surveying - Telecommunications
500 North Broadway, East Providence, RI 02914
Phone: (401) 354-2403 Fax: (401) 633-6354

SAI COMMUNICATIONS
12 INDUSTRIAL WAY
SALEM, NH 03079

SITE NUMBER: CT1270
SITE NAME: WATERFORD DANIELS AVE
51 DANIELS AVENUE
WATERFORD, CT 06385
NEW LONDON COUNTY

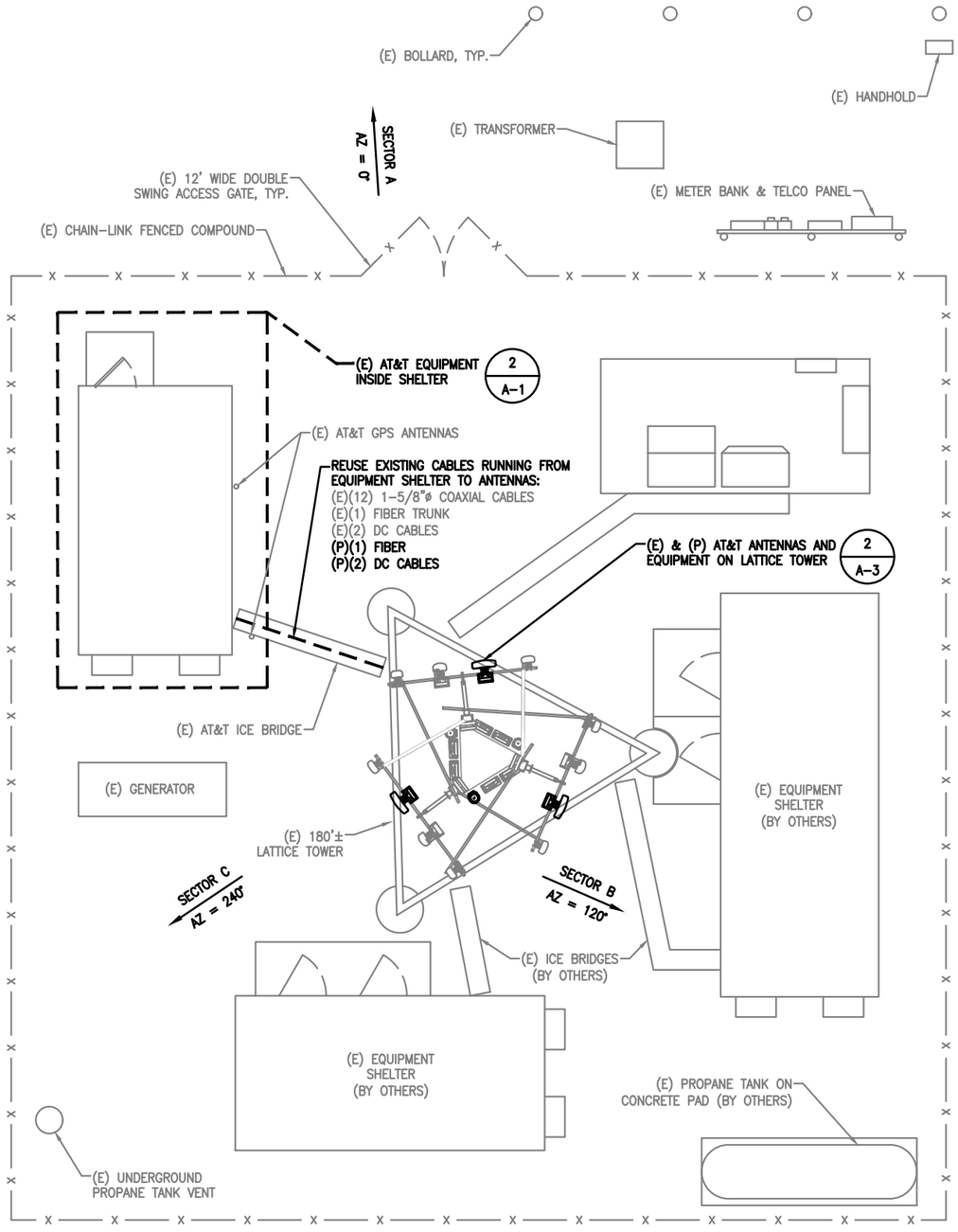
at&t
550 COCHITUATE ROAD, SUITE 13,
FRAMINGHAM, MA 01701-4681

NO.	DATE	REVISIONS	BY	CHK
0	01/26/18	ISSUED FOR REVIEW	AAB	MRC

GENERAL NOTES

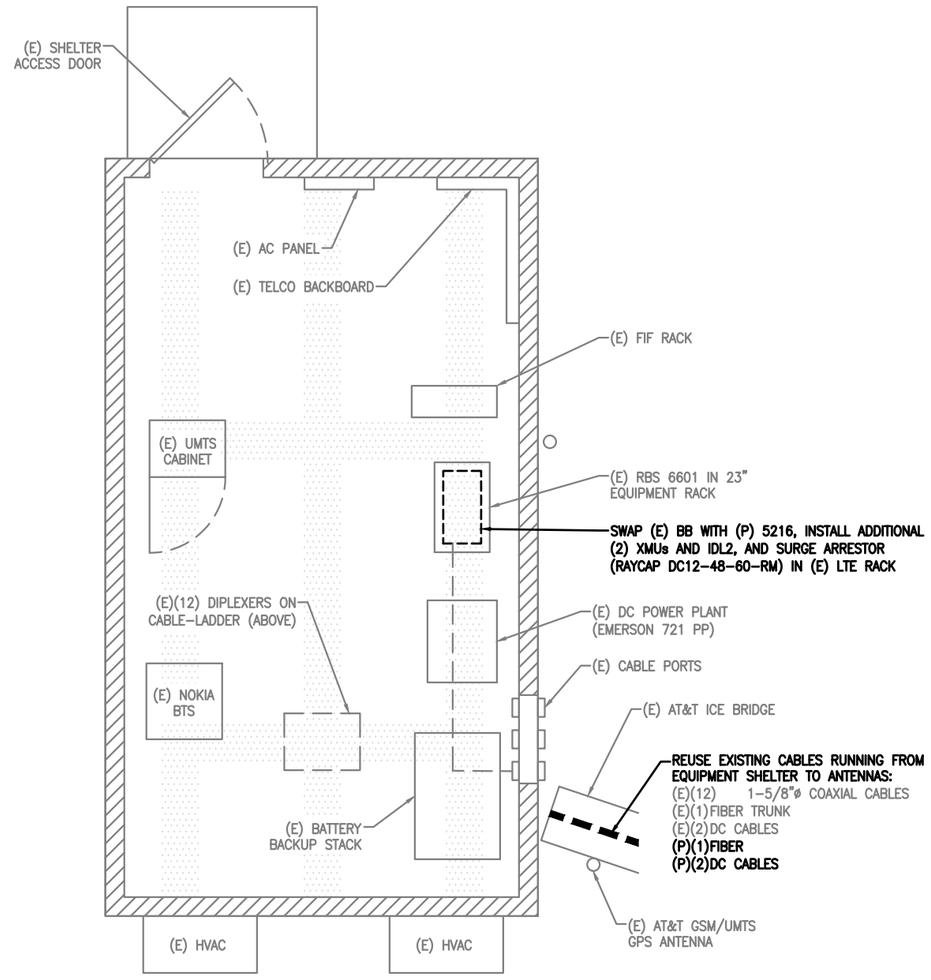
SHEET NO. GN-1

HALF SIZE PRINT
THIS DRAWING IS SCALEABLE AT HALF THE NOTED SCALE



NORTH

1 / A-1 COMPOUND PLAN
SCALE: 1"=10'-0"



NORTH

2 / A-1 EQUIPMENT SHELTER PLAN
SCALE: 1/2"=1'-0"

STATE OF CONNECTICUT
MARC R. CHRETIEN
No. 29307
LICENSED PROFESSIONAL ENGINEER

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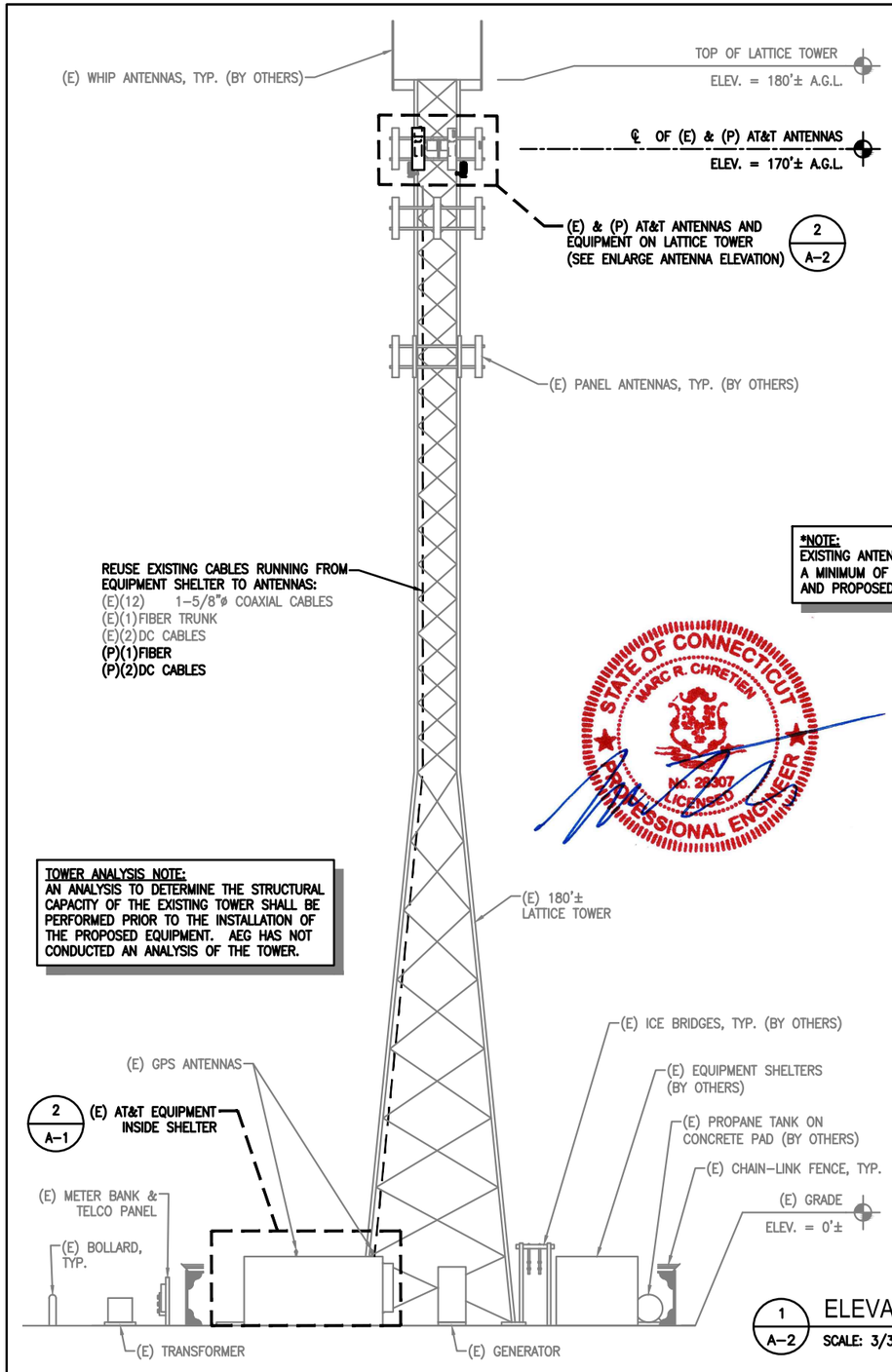
COMPOUND AND EQUIPMENT PLANS

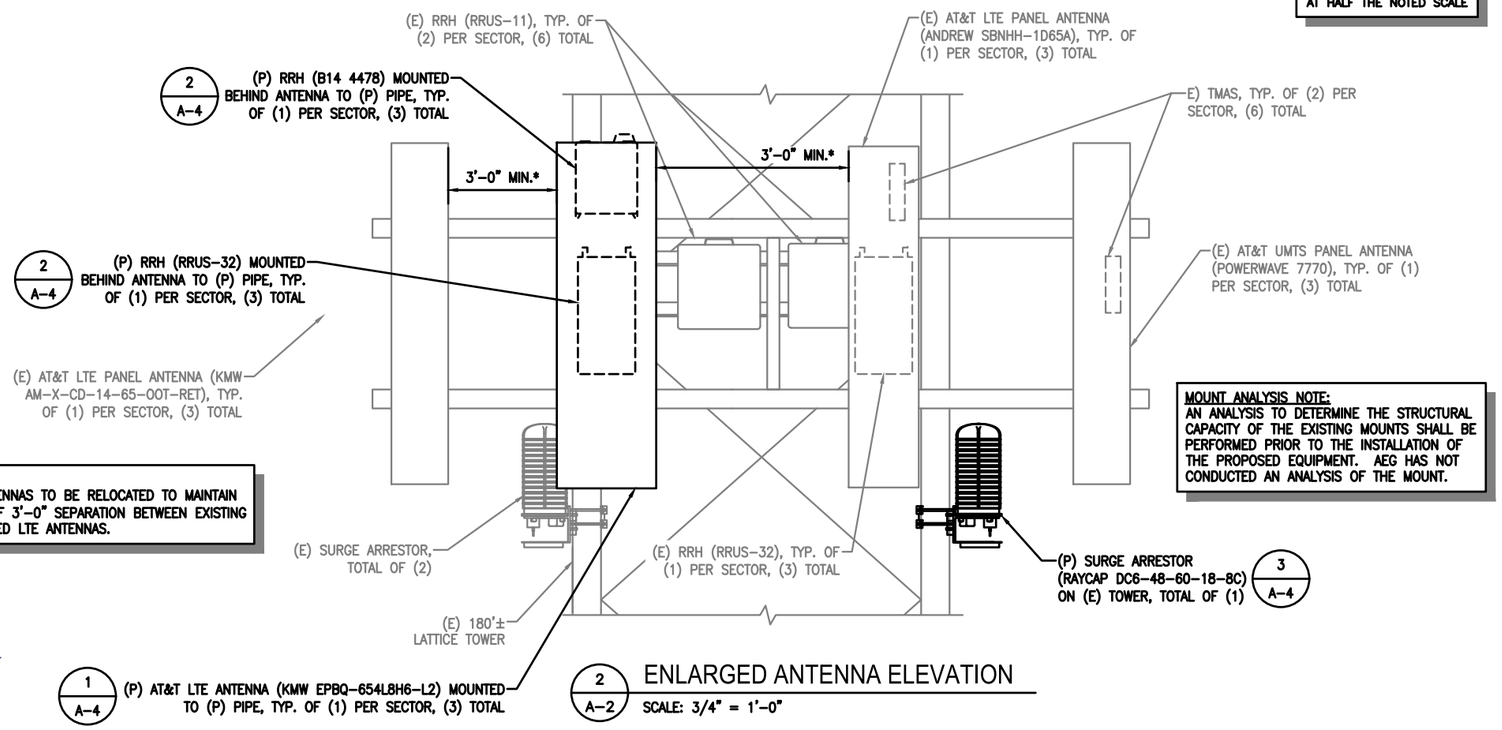
SHEET NO. A-1

HALF SIZE PRINT
THIS DRAWING IS SCALEABLE AT HALF THE NOTED SCALE



TOWER ANALYSIS NOTE:
AN ANALYSIS TO DETERMINE THE STRUCTURAL CAPACITY OF THE EXISTING TOWER SHALL BE PERFORMED PRIOR TO THE INSTALLATION OF THE PROPOSED EQUIPMENT. AEG HAS NOT CONDUCTED AN ANALYSIS OF THE TOWER.

1/A-2 ELEVATION
SCALE: 3/32" = 1'-0"



*NOTE:
EXISTING ANTENNAS TO BE RELOCATED TO MAINTAIN A MINIMUM OF 3'-0" SEPARATION BETWEEN EXISTING AND PROPOSED LTE ANTENNAS.

MOUNT ANALYSIS NOTE:
AN ANALYSIS TO DETERMINE THE STRUCTURAL CAPACITY OF THE EXISTING MOUNTS SHALL BE PERFORMED PRIOR TO THE INSTALLATION OF THE PROPOSED EQUIPMENT. AEG HAS NOT CONDUCTED AN ANALYSIS OF THE MOUNT.

2/A-2 ENLARGED ANTENNA ELEVATION
SCALE: 3/4" = 1'-0"

RF SYSTEM SCHEDULE

SECTOR	ANTENNA INFORMATION					RRH INFORMATION		TMA INFORMATION	
	POSITION	STATUS	MODEL	AZIMUTH	RAD CTR (A.G.L.)	STATUS	MODEL	STATUS	MODEL
ALPHA	I-A	EXISTING	7770	0°	170'	–	–	EXISTING	TT19-08BP111-001
	II-A	EXISTING	SBNHH-1D65A	0°	170'	EXISTING	RRUS-32	EXISTING	TT19-08BP111-001
	III-A	PROPOSED	EPBQ-654L8H6-L2	0°	170'	PROPOSED, PROPOSED	B14 4478, RRUS-32 B66	–	–
	IV-A	EXISTING	AM-X-CD-14-65-00T-RET	0°	170'	EXISTING, EXISTING	RRUS-11, RRUS-11	–	–
BETA	I-B	EXISTING	7770	120°	170'	–	–	EXISTING	TT19-08BP111-001
	II-B	EXISTING	SBNHH-1D65A	120°	170'	EXISTING	RRUS-32	EXISTING	TT19-08BP111-001
	III-B	PROPOSED	EPBQ-654L8H6-L2	120°	170'	PROPOSED, PROPOSED	B14 4478, RRUS-32 B66	–	–
	IV-B	EXISTING	AM-X-CD-14-65-00T-RET	120°	170'	EXISTING, EXISTING	RRUS-11, RRUS-11	–	–
GAMMA	I-C	EXISTING	7770	240°	170'	–	–	EXISTING	TT19-08BP111-001
	II-C	EXISTING	SBNHH-1D65A	240°	170'	EXISTING	RRUS-32	EXISTING	TT19-08BP111-001
	III-C	PROPOSED	EPBQ-654L8H6-L2	240°	170'	PROPOSED, PROPOSED	B14 4478, RRUS-32 B66	–	–
	IV-C	EXISTING	AM-X-CD-14-65-00T-RET	240°	170'	EXISTING, EXISTING	RRUS-11, RRUS-11	–	–

* CONTRACTOR TO VERIFY FINAL RFDS PRIOR TO CONSTRUCTION

ADVANCED ENGINEERING GROUP, P.C.
Civil Engineering - Site Development - Surveying - Telecommunications
500 North Broadway, East Providence, RI 02914
Phone: (401) 354-2403 Fax: (401) 633-6354

SAI COMMUNICATIONS
12 INDUSTRIAL WAY
SALEM, NH 03079

SITE NUMBER: CT1270
SITE NAME: WATERFORD DANIELS AVE
51 DANIELS AVENUE
WATERFORD, CT 06385
NEW LONDON COUNTY

at&t
550 COCHITUATE ROAD, SUITE 13,
FRAMINGHAM, MA 01701-4681

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0	01/26/18	ISSUED FOR REVIEW	AAB	MRC

ELEVATIONS AND RF SYSTEM SCHEDULE

SHEET NO. A-2

HALF SIZE PRINT

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MOUNT ANALYSIS NOTE:
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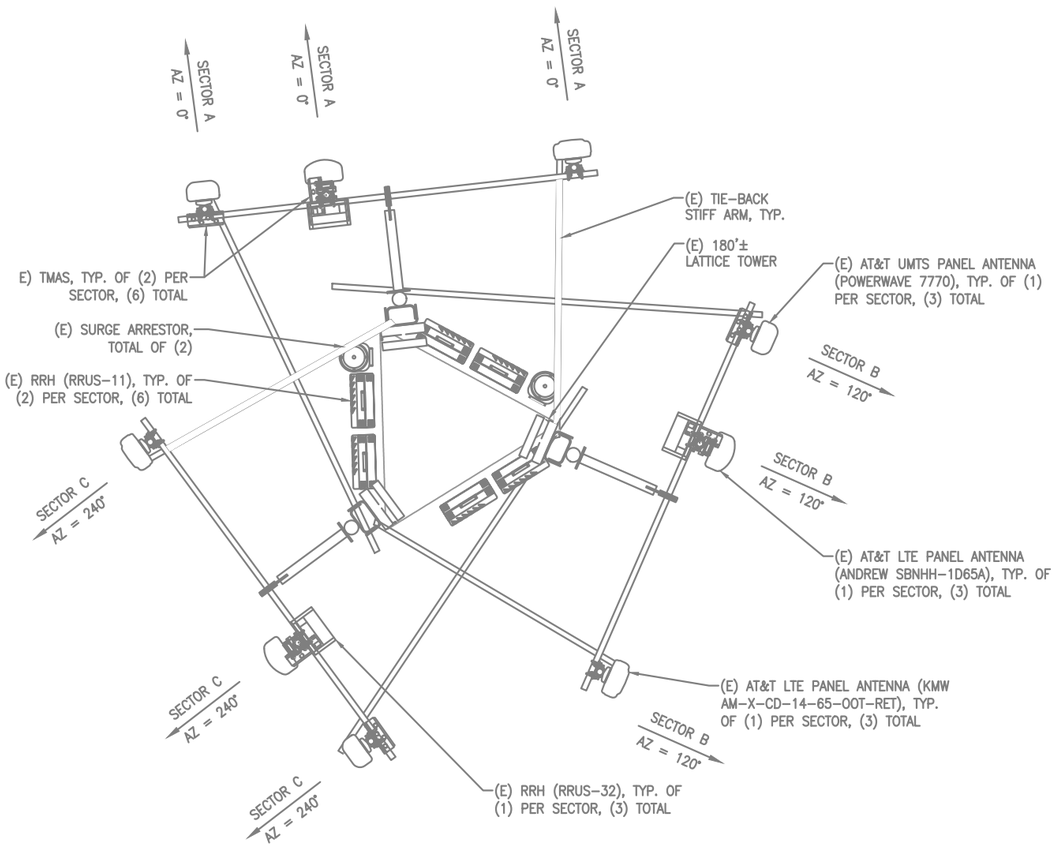
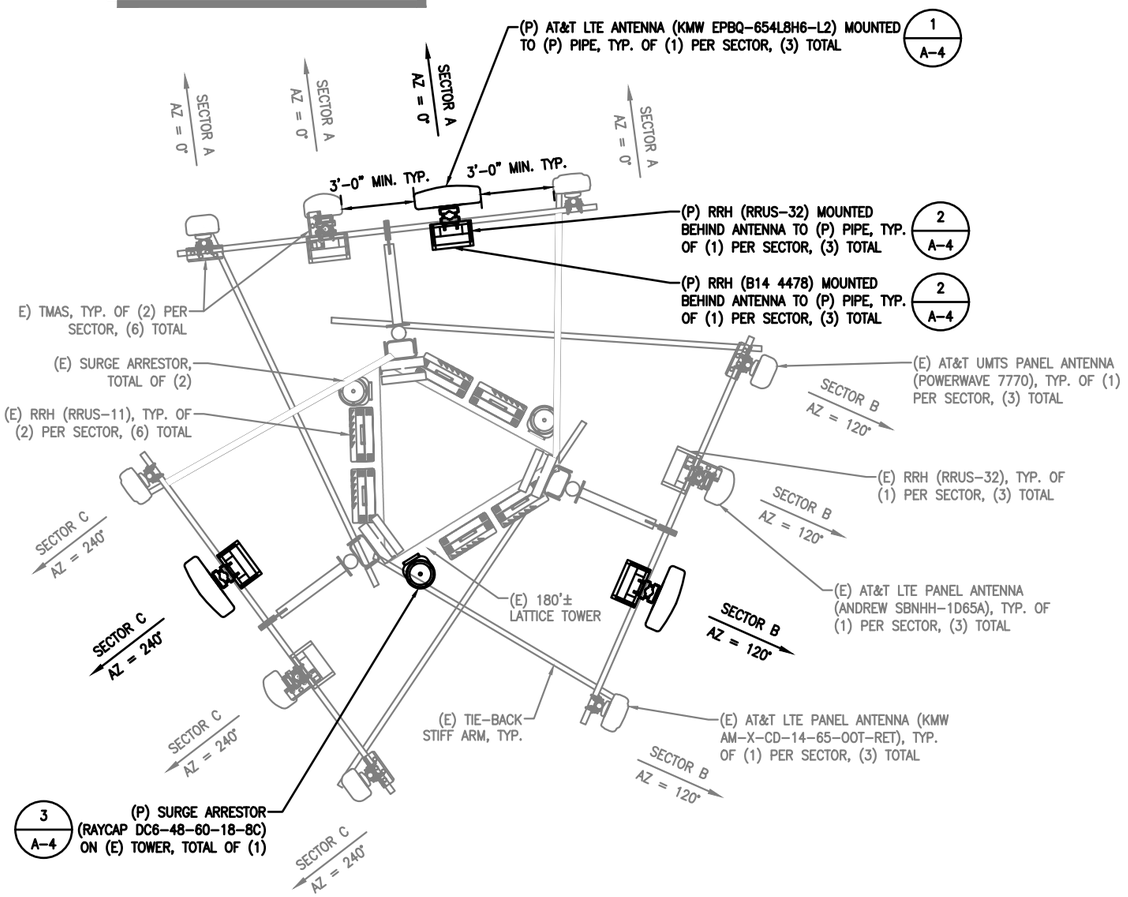


NORTH

1 / A-3 EXISTING ANTENNA PLAN

SCALE: 1/2" = 1'-0"

NOTE:
EXISTING ANTENNAS TO BE RELOCATED TO MAINTAIN A MINIMUM OF 3'-0" SEPARATION BETWEEN EXISTING AND PROPOSED LTE ANTENNAS.



NORTH

2 / A-3 PROPOSED ANTENNA PLAN

SCALE: 1/2" = 1'-0"

STATE OF CONNECTICUT
MARC R. CHRETIEN
No. 28307
LICENSED
PROFESSIONAL ENGINEER

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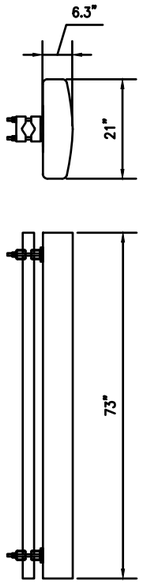
ANTENNA PLANS

SHEET NO. A-3

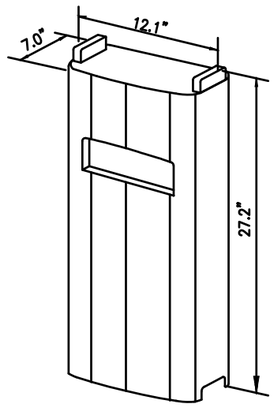


EPBQ-654L8H6-L2

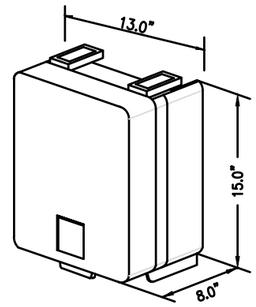
MANUFACTURER: KMW
DIMENSIONS (HxWxD): 73"x21"x6.3"
WEIGHT: 72.8 LBS.

1 A-4 ANTENNA DETAIL

SCALE: N.T.S.



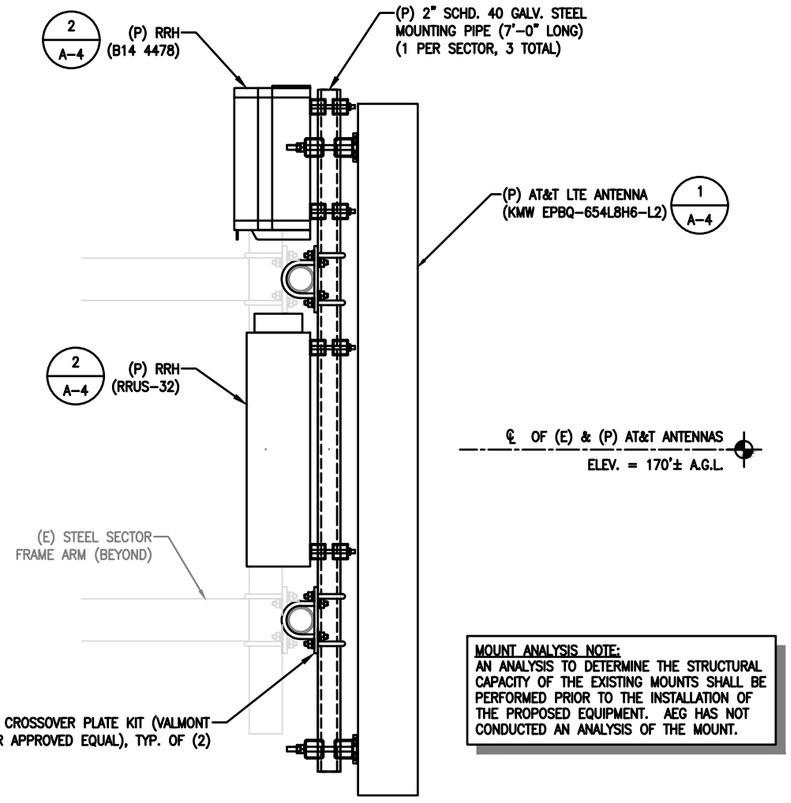
ERICSSON RRUS-32 B2
-DIMENSIONS (H x W x D): 27.2" x 12.1" x 7.0"
-WEIGHT: 53 LBS



ERICSSON RRUS-4478 B71
-DIMENSIONS (H x W x D): 15.0" x 13.0" x 8.0"
-WEIGHT: 60 LBS

2 A-4 REMOTE RADIO HEAD (RRH) DETAILS

SCALE: N.T.S.



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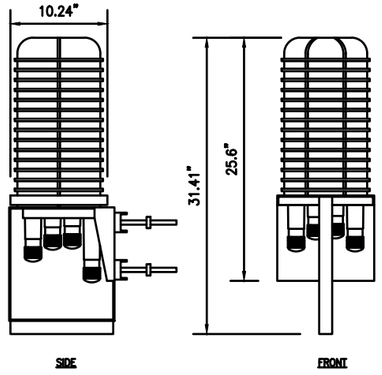
1 A-4 ANTENNA & RRH MOUNT DETAIL

SCALE: 1-1/2" = 1'-0"

RAYCAP DC6-48-60-18-8c

NUMBER OF RADIOS PROTECTED: 6
SUPPRESSION CONNECTION METHOD: COMPRESSION LUG, #2-#14 AWG
COPPER, #2-#12 ALUMINUM
ENVIRONMENTAL RATING: IP 68, 7M 72HRS
WEIGHT: 26.2 LBS



3 A-4 SURGE ARRESTOR DETAIL

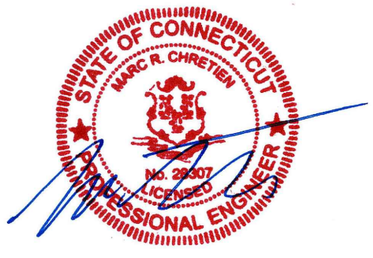
SCALE: N.T.S.

DC12-48-60-RM

MANUFACTURER: RAYCAP
WEIGHT: 15.0 LBS.
TYPE: INDOOR/RACK-MOUNTED

4 A-4 SURGE ARRESTOR DETAIL

SCALE: N.T.S.



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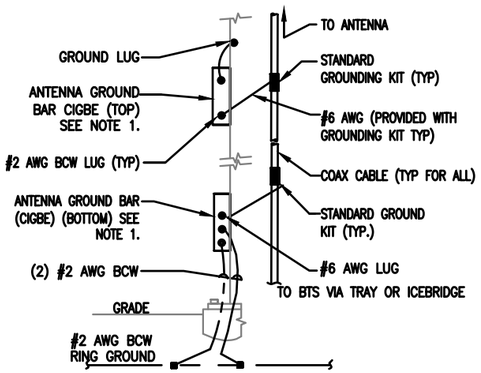
DETAILS

SHEET NO. A-4

	CIRCUIT BREAKER	ACCA	ANTENNA CABLE COVER ASSEMBLY
E	ELECTRIC BOX	AWG	AMERICAN WIRE GAUGE
	ELECTRICAL CONDUIT	BTCW	BARE TINNED COPPER WIRE
		C	CONDUIT
		CIGBE	COAX INSULATED GROUND BAR EXTERNAL
■	EXOTHERMIC CONNECTION (CADWELD) TO GROUND RING AND COMPRESSION TO GROUND HALO	CO	CONDUIT ONLY
		DWG	DRAWING
		EGB	EXTERNAL GROUND BAR
		EMT	ELECTRICAL METALLIC TUBING
	DISCONNECT SWITH	(E)	EXISTING
		(F)	FUTURE
⊗	GROUND ROD	GEN	GENERATOR
⊠	GROUND ROD WITH ACCESS	GFI	GROUND FAULT CIRCUIT INTERRUPTER
		GND	GROUND
•	MECHANICAL GROUND CONN.	GPS	GLOBAL POSITIONING SYSTEM
		GR	GROWTH
⊠	GROUND ACCESS WELL	IGR	INTERIOR GROUND RING (HALO)
		MIGB	MASTER ISOLATED GROUND BAR
— G —	GROUNDING WIRE	(P)	PROPOSED, NEW (PROVIDE AND INSTALL UNLESS NOTED OTHERWISE)
G	GENERATOR		
		PCS	PERSONAL COMMUNICATION SERVICE
	FUSE	PPC	POWER PROTECTION CABINET
	GROUND BUS BAR	PRC	PRIMARY RADIO CABINET
		PVC	POLYVINYL CHLORIDE CONDUIT
	REVISION	RGS	RIGID GALVANIZED STEEL
		RWY	RACEWAY
T	TELEPHONE BOX	S.L.D.	SINGLE LINE DIAGRAM
	UTILITY METER	TEL	TELEPHONE
		TYP.	TYPICAL
	XIT GROUND ROD	WP	WEATHERPROOF EQUIPMENT

1 G-1 ELEC. / GROUNDING LEGEND

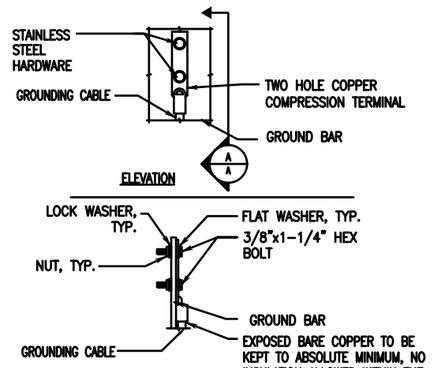
SCALE: N.T.S.



NOTE:
1. NUMBER OF GROUND BARS MAY VARY DEPENDING ON THE TYPE OF TOWER. ANTENNA LOCATION AND CONNECTION ANTENNA LOCATION AND CONNECTION ORIENTATION. PROVIDE AS REQUIRED.
2. A SEPARATE GROUND BAR TO BE USED FOR GPS ANTENNA IF REQUIRED.

2 G-1 TYP. ANTENNA CABLE GROUNDING

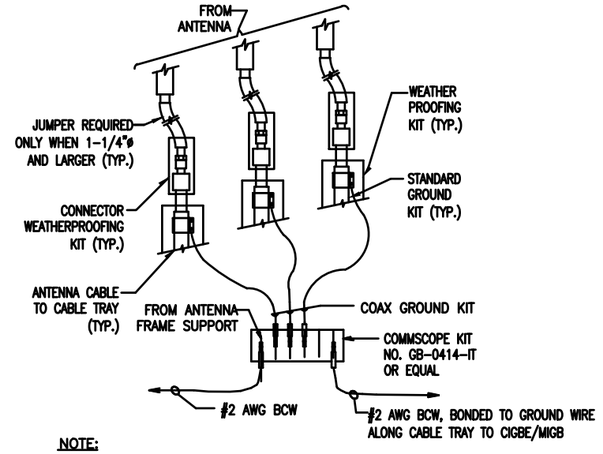
SCALE: N.T.S.



NOTES:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.
3. CADWELD DOWNLEADS FROM UPPER EGB, LOWER EGB, AND MGB.
4. ALL GROUND LUGS MUST BE HEAT SHRUNK AT WIRE/LUG CONNECTION

3 G-1 TYP. GROUND BAR CONNECTION

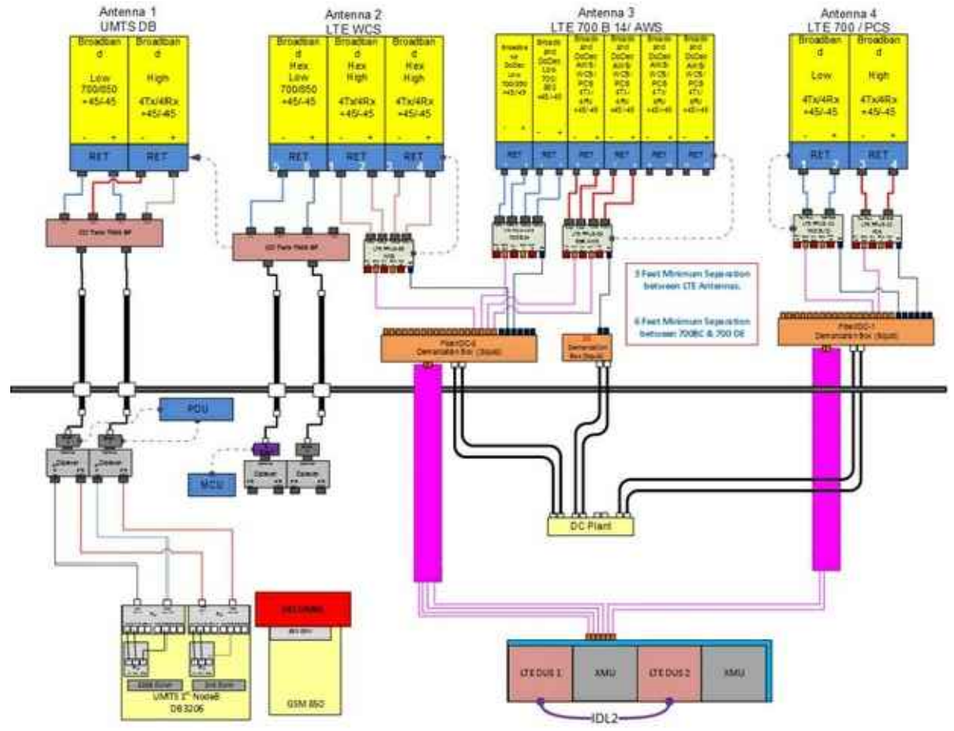
SCALE: N.T.S.



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

4 G-1 TYP. GROUND WIRE TO GROUND BAR CONN.

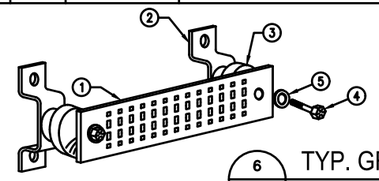
SCALE: N.T.S.



5 G-1 ONE LINE PLUMBING DIAGRAM

SCALE: N.T.S.

WIRELESS SOLUTIONS INC.			
NO.	REQ.	PART NO.	DESCRIPTION
1	1	HLGB-0420-IS	SOLID GND. BAR (20"x4"x1/4")
2	2	———	WALL MTG. BRKT.
3	2	———	INSULATORS
4	4	———	5/8"-11x1" H.H.C.S.
5	4	———	5/8 LOCKWASHER



6 G-1 TYP. GROUND BAR CONN.

SCALE: N.T.S.

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

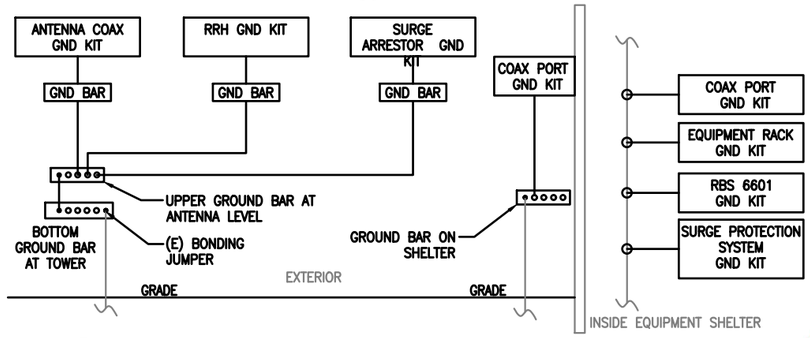
SECTION "P" – SURGE PRODUCERS

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)

GROUNDING NOTES:
ALL GROUNDING SHALL BE DONE IN ACCORDANCE WITH THE AT&T MOBILITY GROUNDING GUIDE.



7 G-1 ONE LINE GROUNDING DIAGRAM

SCALE: N.T.S.

ADVANCED ENGINEERING GROUP, P.C.
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GROUNDING DETAILS AND ONE LINE DIAGRAM

SHEET NO. G-1

Tower Structural Analysis Report for
SBA Communications Corporation

Existing 180' Self Supported Tower

SBA Site Name: Niantic
SBA Site ID: CT09865-S-03
Application # 75588, v1

Carrier Name: AT&T
Carrier Site Name: CT1270/Waterford-Route 156

Site Location:
Southwest School 51 Daniels Road
Waterford, CT

Latitude: 41.330264°
Longitude: -72.166672°

ACGI Job # 18-0486
(Ref Previous: ACGI Job # 16-3864 dated 10/28/2016)

ANALYSIS RESULTS		
Tower Components	64.6 %	**Pass**
Tower Base Foundation	77.8 %	**Pass**
Net change of tower stress ratio	+3.8 %	**Change from previous SA, ACGI#16-3864 dated 10/28/2016**

Prepared By:
Bob Akech
Staff Engineer

02/07/2018
Approved By:
Joji M. George, P.E.
CT PE # 24444

ALLPRO
CONSULTING GROUP, INC.

TABLE OF CONTENTS

1. ANALYSIS SUMMARY

The purpose of this structural analysis is to determine whether the existing structure is capable of supporting additional proposed loads.
The existing 180' Self Supported Tower located in Waterford, CT was analyzed by Allpro Consulting Group, Inc (ACGI) for the existing loads and the proposed **AT&T** antennas and coaxes per Application 75588, v1 as authorized by SBA Communication Corp. Based on the results of the analysis, the existing tower with mentioned proposed and existing loading is found **to be in compliance** with *TIA -222-G*, *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and IBC 2012.*

2. SCOPE & SOURCE OF INFORMATION

The purpose of this structural analysis is to determine whether the existing structure is capable of supporting additional proposed loads.

SOURCE OF INFORMATION		
Tower Data:	Tower Innovations	-Original Tower Drawings by Tower Innovations (Project Number : 5210 dated 11/05/2008)
	Allpro Consulting Group, Inc.	-Previous Structural Analysis by Allpro Consulting Group Inc., (ACGI Job # 15-4964, dated 09/09/2015)
	FDH Engineering, Inc.	-Previous Structural Analysis by FDH Engineering, Inc.(FDH Project Number 1325881400, dated 4/26/2013)
	Allpro Consulting Group, Inc.	-Previous Structural Analysis by Allpro Consulting Group Inc., (ACGI Job # 18-3864, dated 10/28/2016 -Previous Structural Analysis by Allpro Consulting Group, Inc. (AGI # 16-0431, dated 02/12/2016) -Previous Structural Analysis by Allpro Consulting Group Inc., (ACGI Job # 16-0568, dated 02/22/2016 Previous Structural Analysis by Allpro Consulting Group Inc., (ACGI Job # 16-1025, dated 04/06/2016

Foundation Data:	Tower Innovations	- Existing MAT foundation data is as per original foundation design by Tower Innovations, Project Number 5210 dated 11/5/2008
Geotechnical Report:	Dr.Clearance Welti, P.E., P.C.Geotechnical Engineering	Soil data is as per Geotechnical Report by Dr.Clearance Welti, P.E., P.C.Geotechnical Engineering (Ref: Geotechnical Study for proposed Cell Tower at Southwest School 51 Daniels Road, Waterford, CT -SBA Network Services, Inc. dated 10/23/2008)
Loading Data:	Allpro Consulting Group, Inc. SBA Communication Corp.	- Previous Structural Analysis by Allpro Consulting Group Inc., (ACGI Job # 18-3864, dated 10/28/2016 Proposed final loading for AT&Tas per Col. App # 75588. V1 downloaded from SBA portal
Authorization:	SBA Communication Corp.	

3. ANALYSIS METHODS & DATA

The analysis was performed in accordance with Telecommunication Industry Association specification TIA-222-G. The tower was modeled using TNX Tower, a 3-D finite element program. TNX Tower is a general-purpose modeling, analysis, and design program created specifically for communication towers using the EIA-222-C, EIA-222-D, TIA/EIA-222-F or TIA/EIA-222-G standards. The 3-D model included the tower, with existing appurtenances and all proposed loads.

SITE DATA	
SBA Site Name:	Niantic
SBA Site Number:	CT09865-S-03
Carrier Site ID:	CT1270 / Waterford-Route 156
City, State:	Waterford, CT
County:	New London County
Code Wind Load Requirement:	TIA-222-G & IBC 2012 (Ultimate wind speed of 134 mph 3 sec gust equivalent to Nominal design wind speed of 104 mph basic wind speed)
Wind Load Used:	TIA-222-G Code: • Nominal design wind speed of 104 mph (3 second gust wind speed) • Structure class: II • Topographic Category: 1 • Exposure Category: C • A wind speed of 50 mph is used in combination with ice thickness 0.75 in.
Seismic Requirement:	Ss=0.161g < 1.0g, thus Seismic loading can be ignored as per 2.7.3 of the TIA-222-G code.

*This structural analysis is based upon the tower being classified as a class II; however, if a different Classification is required subsequent to the date hereof, the tower classification will be changed to meet Such requirement and a new structural analysis will be run.

TOWER DATA	
Tower Type:	Self Supported Tower
Height:	180'
Cross Section:	Triangular
Steel Strength:	Legs – 50 ksi , Braces – 36 ksi
Type of Foundation:	Mat Foundation with (3) Pedestals

TOWER HISTORY	
Tower Manufacturer / Model:	Tower Innovations
Date of Original Design:	11/05/2008
Previous Modifications:	Unknown
Original Design Code Requirements:	TIA-222-G/ 120 mph wind speed & 1/2 " ice 50 mph wind speed

4. CONCLUSIONS

RESULT SUMMARY		
MEMBER	***% Capacity***	***Results***
Legs	**64.6 %**	**Pass**
Diagonals	**61.6 %**	**Pass**
Top Girt	**6.0 %**	**Pass**
Bottom Girt	**22.3 %**	**Pass**
Bolt Checks	**54.8 %**	**Pass**
Anchor Bolts	**31.5 %**	**Pass**
Mat Foundation (see attached MathCAD for details)	**Safety Factor against Overturning: (66.1 %)**	**Pass**
	Soil Bearing Capacity (50.6 %)	**Pass**
	Shear Capacity (77.9 %)	**Pass**
OVERALL TOWER RATING = 64.6% (Pass)		

As per the results of the analysis, the existing tower **is in code compliance** for the proposed and existing antenna loads.

Maximum tower member stress **is less than allowable,** making **it in code compliance** under the TIA-222-G code and IBC2012 requirements.

5. DISCLAIMER

Installation procedures and related loading are not within the scope of this analysis. A contractor experienced in similar work should perform all installation work. The engineering services provided by Allpro Consulting Group, Inc. (ACGI) are limited to the computer analysis and calculations of the structure with the proposed and existing loads. This analysis is considered void if the loading mentioned in this report is changed or is different as installed. It is assumed that the existing structure is properly maintained and is in good condition free of any defects. Scope of this analysis does not include existing connections, except as noted in this report.

ACGI does not make any warranties, expressed or implied in connection with this engineering analysis report and disclaims any liability arising from deficiencies or any existing conditions of the original structure. ACGI will not be responsible for consequential or incidental damages sustained by any parties as a result of any data or conclusions included in this Report. The maximum liability of ACGI pursuant to this report shall be limited to the consulting fee received for the preparation of the report.

6. ASSUMPTIONS

This analysis was completed based on the following assumptions:

- Tower has been properly maintained.
- Tower erection was in accordance to manufacturer drawings.
- Leg flanges have been properly designed by manufacturer to not be a limiting reaction.
- Welds have been properly designed and installed by manufacturer to not be a limiting reaction.
- Foundation was constructed in accordance to manufacturer drawings.
- Foundation does not have structural damage.
- Bolts have been properly tightened according to manufacturer specifications.
- Appurtenance, mount and transmission line sizes and weights are best estimates using the tnx Tower database and manufacturer information.
- It is assumed that all the radios are/will be mounted behind the antennas.

6. APPURTENANCE LISTING

EXISTING LOAD DESCRIPTION					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
180'±	2	Sinclair SC488-HF2LNF Omnis	(2) SitePRO1 HM6 6' Standoffs	(2) 1-5/8"	Town of Waterford
	1	DBSpectra ATS8TMA10 TMA			
170'±	3	Powerwave 7770 antennas	(3) T-Frames	(12) 1-5/8" (4) 3/4"DC (2) 1/2" Fiber	AT&T
	3	Andrew SBNHH-1D65A antennas			
	3	KMW AM-X-CD-14-65-00T			
	6	Ericsson RRUS 11 RRUs			
	3	Ericsson RRUS 32 RRUs			
	6	TT19-08BP111-001 TMA			
	2	Raycap DC6-48-60-18-8F Surge Suppressor			
160'±	3	RFS APX16DWV-16DWVS antennas	(3) T-Frames	(18) 1-5/8" (1) 1/2" (1) 1-5/8" Fiber	T-Mobile
	3	Commscope LNX-6515DS-VTM antennas			
	3	Ericsson Double TMA 17/21			
	3	RFS ATMAA1412D-1A20			
	3	Kathrein 782 11056 Bias T's			
140'±	3	Antel BXA-80063/6CF antennas	(3) T-Frames	(16) 1-5/8" coaxes (2) 1-5/8" Fiber	Verizon
	3	Antel BXA-70063/6CF -EDIN-0 antennas			
	6	Commscope SBNHH-1D65B antennas			
	3	Alcatel Lucent B66 RRH4X45 AWS Remote Radio			
	3	Alcatel Lucent RRH 700 4X30 B13 Remote Radio			
	2	Rfs Celwave DB-T1-6Z-8AB-0Z ODU			

FINAL LOAD DESCRIPTION (AT&T)					
ELEV (ft.)	***Qty.***	***Antenna Description***	***Mount Type & Qty.***	***TX. LINE (in)***	***TENANT***
170'±	**3**	**Powerwave 7770 Antenna**	(3) T-Frames	(12) 1-5/8" coaxes (2) ½" Fiber (4) 3/4" DC Power **(2) 3/4" DC Power (1) 7/16" Fiber**	AT&T
	3	Commscope SBNHH-1D65A Antenna			
	3	KMW- AM-X-CD-14-65-00T Antenna			
	3	**KMW EPBQ-654L8H6-L2 Antenna**			
	6	Powerwave TT19-08BP111-001 TMA-TTA			
	6	Ericson RRUS-11 RRU/RRH			
	6	**Ericson RRUS-32 RRU/RRH**			
	3	**Ericson 4478 RRU/RRH**			
	2	Raycap DC6-48-60-18-8F			

	1	Raycap DC6-48-60-18-8C			

Notes:

1. ACGI should be notified of any discrepancies found in the data listed in this report.

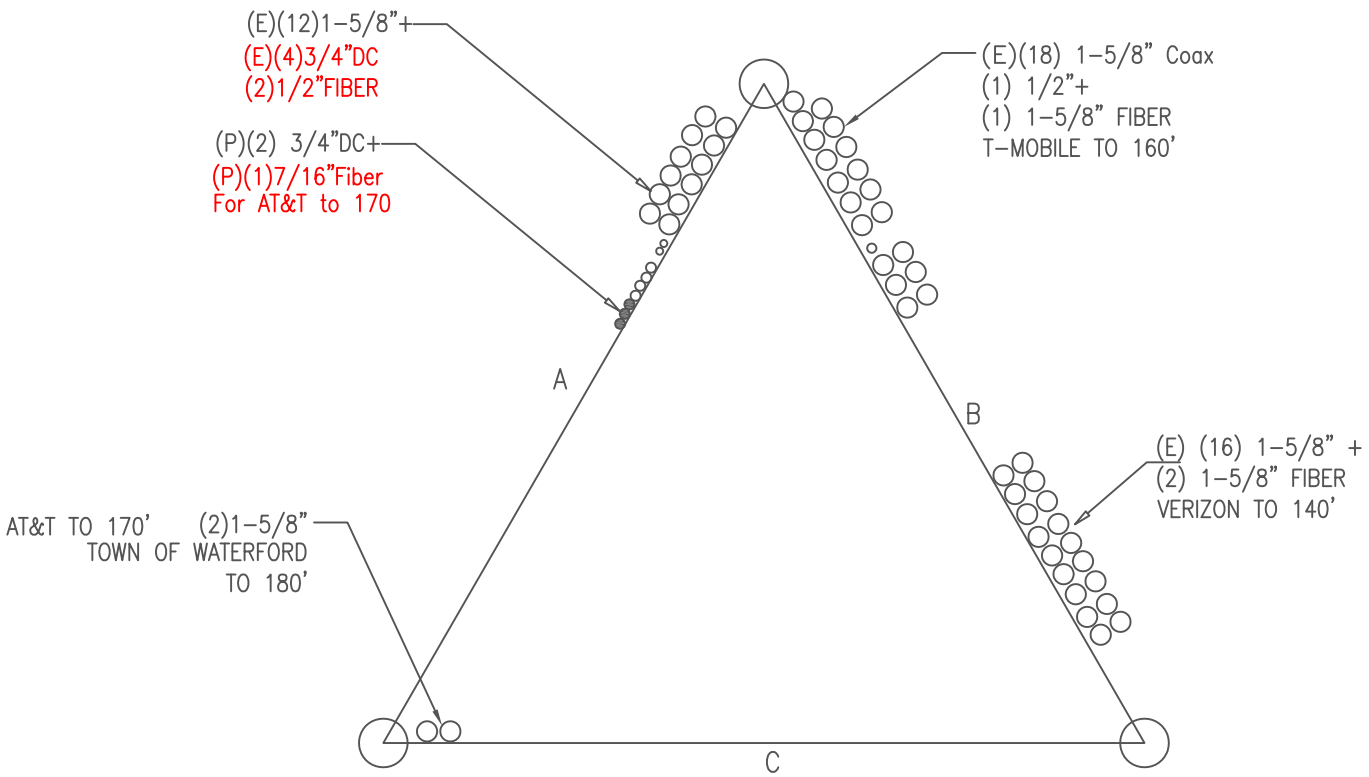
7. SUMMARY OF WORKING PERCENTAGE OF STRUCTURAL COMPONENTS

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Leg	1 3/4	3	-26.49	59.04	44.9	Pass
		Diagonal	7/8	13	-4.05	6.57	61.6	Pass
		Top Girt	7/8	6	-0.23	3.91	6.0	Pass
		Bottom Girt	7/8	7	-0.29	3.91	7.5	Pass
T2	160 - 140	Leg	2 1/2	48	-95.00	164.54	57.7	Pass
		Diagonal	1	58	-6.94	11.53	60.2	Pass
		Top Girt	1	50	-0.25	6.85	3.6	Pass
		Bottom Girt	1	52	-0.28	6.85	4.0	Pass
T3	140 - 120	Leg	3 1/2	93	-197.17	372.07	53.0	Pass
		Diagonal	1 1/8	103	-11.01	18.91	58.2	Pass
		Top Girt	1 1/8	94	-0.24	11.36	2.1	Pass
		Bottom Girt	1 1/8	98	-2.53	11.36	22.3	Pass
T4	120 - 90	Leg	4 1/4	138	-226.89	376.30	60.3	Pass
		Diagonal	L2 1/2x2 1/2x3/16	141	-3.78	10.18	37.1	Pass
							40.1 (b)	
T5	90 - 60	Leg	4 1/2	165	-259.51	446.66	58.1	Pass
		Diagonal	L3x3x3/16	168	-5.36	10.34	51.8	Pass
							54.8 (b)	
T6	60 - 30	Leg	4 3/4	192	-297.54	522.30	57.0	Pass
		Diagonal	L3 1/2x3 1/2x1/4	195	-7.10	13.68	51.9	Pass
T7	30 - 0	Leg	4 3/4	219	-337.39	522.30	64.6	Pass
		Diagonal	L4x4x5/16	222	-8.52	17.01	50.0	Pass
							Summary	
						Leg (T7)	64.6	Pass
						Diagonal (T1)	61.6	Pass
						Top Girt (T1)	6.0	Pass
						Bottom Girt (T3)	22.3	Pass
						Bolt Checks	54.8	Pass
						RATING =	**64.6**	**Pass**

APPENDIX

COAX LAYOUT

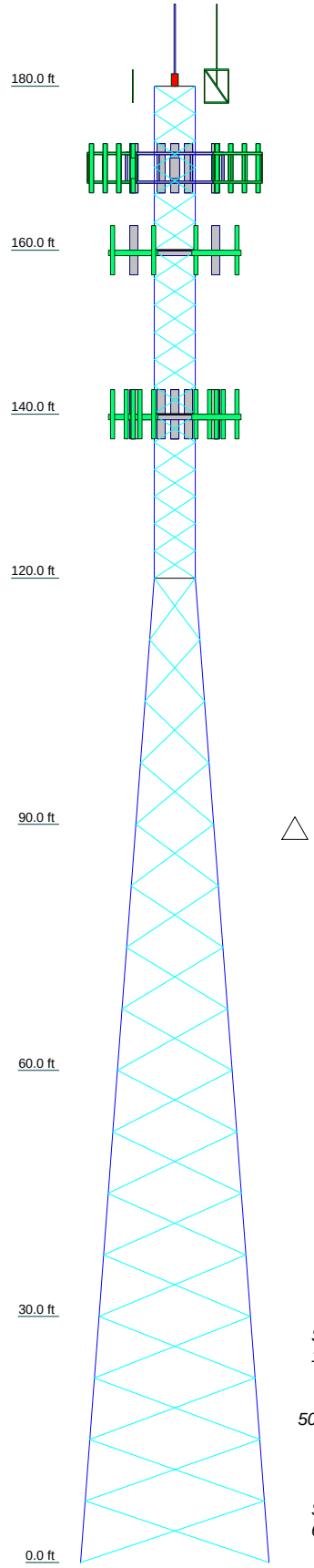


COAX LAYOUT

N.T.S

TOWER ELEVATION DRAWING

Section		T1	T2	T3	T4	T5	T6	T7
Legs		SR 1 3/4	SR 2 1/2	SR 3 1/2	SR 4 1/4	SR 4 1/2	SR 4 3/4	
Leg Grade		A572-50						
Diagonals		SR 7/8	SR 1	SR 1 1/8	L2 1/2x2 1/2x3/16	L3x3x3/16	L3 1/2x3 1/2x1/4	L4x4x5/16
Diagonal Grade		A572-50				A36		
Top Girts		SR 7/8	SR 1	SR 1 1/8	N.A.			
Bottom Girts		SR 7/8	SR 1	SR 1 1/8	N.A.			
Face Width (ft)	5					9.5	14	18.5
# Panels @ (ft)		6 @ 3.31944	6 @ 3.30556	6 @ 3.31944	16 @ 7.5			
Weight (K)	36.1	1.0	1.7	2.9	5.4	6.4	8.3	10.3



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 104 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 64.6%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 341 K
SHEAR: 42 K

UPLIFT: -296 K
SHEAR: 36 K

AXIAL 140 K
SHEAR 16 K *MOMENT 1763 kip-ft*
TORQUE 6 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL 64 K
SHEAR 64 K *MOMENT 6370 kip-ft*
TORQUE 29 kip-ft
REACTIONS - 104 mph WIND

Allpro Consultants group inc
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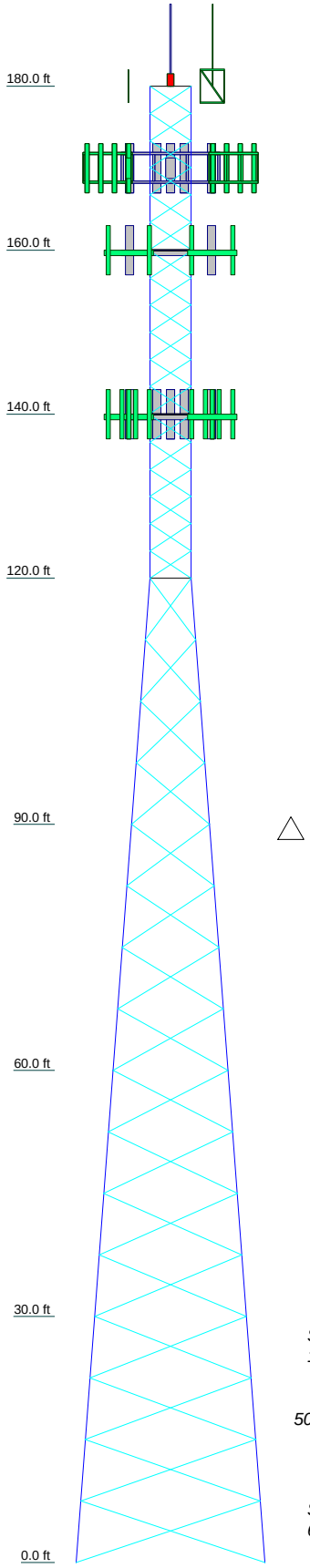
Dalls Tx. 75243
Phone: 972 231 8893
FAX: 866 364 8375

Job: ***18-0486 180' SST***			
Project: ***CT09865-S-03_Niantic Structural***			
Client: SBA	Drawn by: bakech	App'd:	
Code: TIA-222-G	Date: 02/07/18	Scale: NTS	
Path: P:\2018\Structural\18-0486 CT09865-S-03 Niantic SA SBA-180SST\TNX\TNX 18-0486.eri		Dwg No. E-1	

Section	T1	T2	T3	T4	T5	T6	T7					
Legs	SR 1 3/4	SR 2 1/2	SR 3 1/2	SR 4 1/4	SR 4 1/2	SR 4 3/4						
Leg Grade	A572-50											
Diagonals	SR 7/8	SR 1	SR 1 1/8	L2 1/2x2 1/2x3/16	L3x3x3/16	L3 1/2x3 1/2x1/4	L4x4x5/16					
Diagonal Grade	A572-50				A36							
Top Girts	SR 7/8	SR 1	SR 1 1/8	N.A.								
Bottom Girts	SR 7/8	SR 1	SR 1 1/8	N.A.								
Face Width (ft)	5				9.5	14	18.5	23				
# Panels @ (ft)	6 @ 3.31944	6 @ 3.30556	6 @ 3.31944	16 @ 7.5								
Weight (K)	1.0	1.7	2.9	5.4	6.4	8.3	10.3	36.1				



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(E) Lightning Rod	180	LNX-6515DS-VTM (T-Mobile)	160
(E) Flash Beacon Lighting	180	Double TMA 17/21 (T-Mobile)	160
(E)Sinclair SC488-HF2LNF Omni (Town of Waterford)	180	Double TMA 17/21 (T-Mobile)	160
(E)Sinclair SC488-HF2LNF Omni (Town of Waterford)	180	(2) (E)Antenna Pipe Mount (T-Mobile)	160
(E)DBSpectra ATS8TMA10 TMA (Town of Waterford)	180	(2) (E)Antenna Pipe Mount (T-Mobile)	160
(E) SitePRO1 HM6 6' Stanoffs (Town of Waterford)	180	(2) (E)Antenna Pipe Mount (T-Mobile)	160
(E) SitePRO1 HM6 6' Stanoffs (Town of Waterford)	180	Double TMA 17/21 (T-Mobile)	160
(E)Powerwave 7770.00 (ATI)	170	ATMAA1412D-1A20 (T-Mobile)	160
SBNHH-1D65A (ATI)	170	ATMAA1412D-1A20 (T-Mobile)	160
SBNHH-1D65A (ATI)	170	ATMAA1412D-1A20 (T-Mobile)	160
SBNHH-1D65A (ATI)	170	782 11056 (T-Mobile)	160
RRU 32 (ATI)	170	782 11056 (T-Mobile)	160
RRU 32 (ATI)	170	782 11056 (T-Mobile)	160
RRU 32 (ATI)	170	APX16DWV-16DWVS-E-A20 (T-Mobile)	160
(2) (E) RRUS 11 (ATI)	170	APX16DWV-16DWVS-E-A20 (T-Mobile)	160
(2) (E) RRUS 11 (ATI)	170	APX16DWV-16DWVS-E-A20 (T-Mobile)	160
(2) (E) RRUS 11 (ATI)	170	LNX-6515DS-VTM (T-Mobile)	160
(E)Raycap DC6-48-60-18-F (ATI)	170	LNX-6515DS-VTM (T-Mobile)	160
(E)Raycap DC6-48-60-18-F (ATI)	170	(E)T-Frame (T-Mobile)	160
(E)Powerwave 7770.00 (ATI)	170	(E)T-Frame (T-Mobile)	160
(E)Powerwave 7770.00 (ATI)	170	(E)T-Frame (T-Mobile)	160
(E) T-Frame (ATI)	170	(2) SBNHH-1D65B (Verizon)	140
(E) T-Frame (ATI)	170	(2) SBNHH-1D65B (Verizon)	140
(E) T-Frame (ATI)	170	B66 RRH4X45 AWS (Verizon)	140
(3) (E)Antenna Pipe Mount (ATI)	170	B66 RRH4X45 AWS (Verizon)	140
(3) (E)Antenna Pipe Mount (ATI)	170	B66 RRH4X45 AWS (Verizon)	140
(3) (E)Antenna Pipe Mount (ATI)	170	RRH 700 4X30 B13 (Verizon)	140
(2) (P) TT19-08BP111-001 TMA (ATI)	170	RRH 700 4X30 B13 (Verizon)	140
(2) (P) TT19-08BP111-001 TMA (ATI)	170	RRH 700 4X30 B13 (Verizon)	140
(2) (P) TT19-08BP111-001 TMA (ATI)	170	DB-T1-6Z-8AB-0Z (Verizon)	140
(E)AM-X-CD-14-65-00T-RET (ATI)	170	DB-T1-6Z-8AB-0Z (Verizon)	140
(E) AM-X-CD-14-65-00T-RET (ATI)	170	(4) (E)Antenna Pipe Mount (Verizon)	140
(E)AM-X-CD-14-65-00T-RET (ATI)	170	(4) (E)Antenna Pipe Mount (Verizon)	140
EPBQ-654L8-H6-L2 (ATI)	170	(E)Antel BXA-80063/6CF (Verizon)	140
EPBQ-654L8-H6-L2 (ATI)	170	(E)Antel BXA-80063/6CF (Verizon)	140
EPBQ-654L8-H6-L2 (ATI)	170	(E)Antel BXA-80063/6CF (Verizon)	140
RRU 32 (ATI)	170	(E)Antel BXA-70063/6CF (Verizon)	140
RRU 32 (ATI)	170	(E)Antel BXA-70063/6CF (Verizon)	140
RRU 32 (ATI)	170	(E)Antel BXA-70063/6CF (Verizon)	140
4478 B5 (ATI)	170	(E)T-Frame (Verizon)	140
4478 B5 (ATI)	170	(E)T-Frame (Verizon)	140
4478 B5 (ATI)	170	(4) (E)Antenna Pipe Mount (Verizon)	140
DC6-48-60-18-8C (ATI)	170	(2) SBNHH-1D65B (Verizon)	140
		(E)T-Frame (Verizon)	140

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14

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower is located in New London County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 104 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 64.6%

SHEAR
16 K

TORQUE 3 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL
64 K

SHEAR
64 K

MOMENT
6370 kip-ft

TORQUE 29 kip-ft
REACTIONS - 104 mph WIND

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Phone: 972 231 8893
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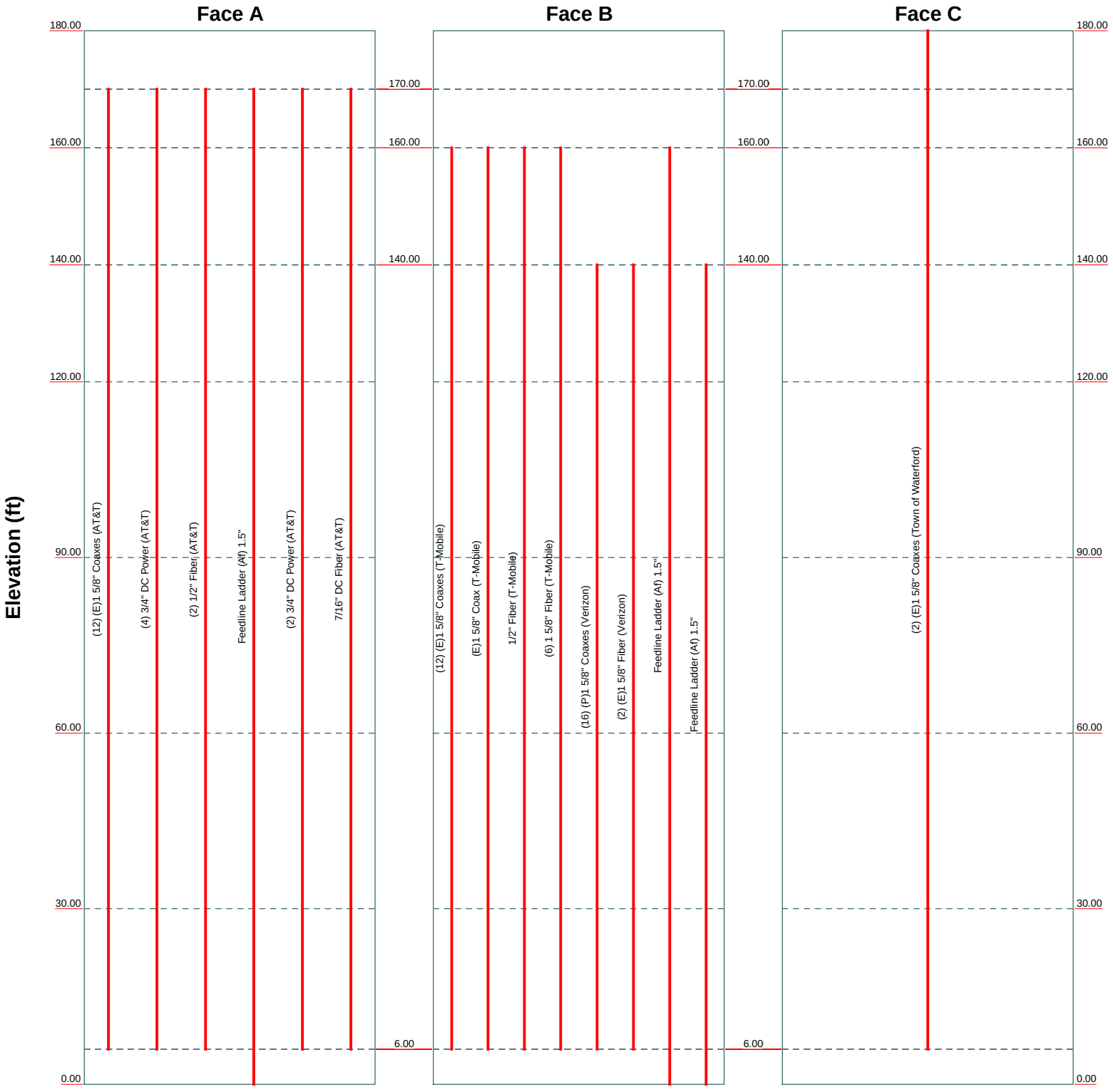
Job: 18-0486 180' SST			
Project: CT09865-S-03_Niantic Structural			
Client: SBA	Drawn by: bakech	App'd:	
Code: TIA-222-G	Date: 02/07/18	Scale: NTS	
Path: P:\2018\Structural\18-0486 CT09865-S-03 Niantic SA SBA-180SST\TNX\TNX 18-0486.eri		Dwg No. E-1	

MISCELLANEOUS PLOTS

Feed Line Distribution Chart
0' - 180'

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



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Client: SBA	Drawn by: bakech	App'd:
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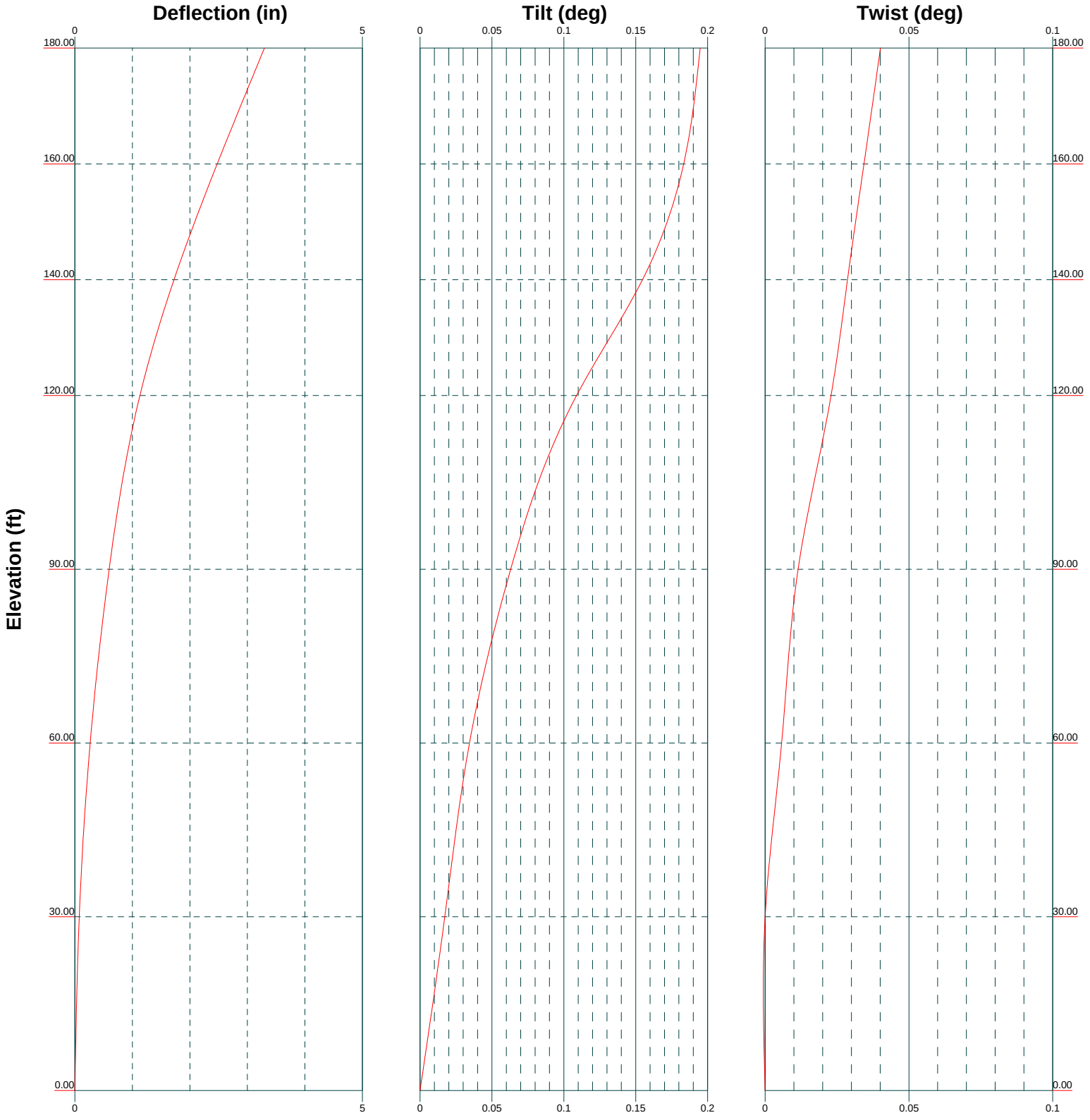
Path: P:\2018\Structural\18-0486 CT09865-S-03 Niantic SA SBA-180SST\TNX\TNX 18-0486.er		Dwg No. E-7

TIA-222-G - Service - 60 mph

Maximum Values



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Job: ***18-0486 180' SST***			
Project: ***CT09865-S-03_Niantic Structural***			
Client: SBA	Drawn by: bakech	App'd:	
Code: TIA-222-G	Date: 02/07/18	Scale: NTS	
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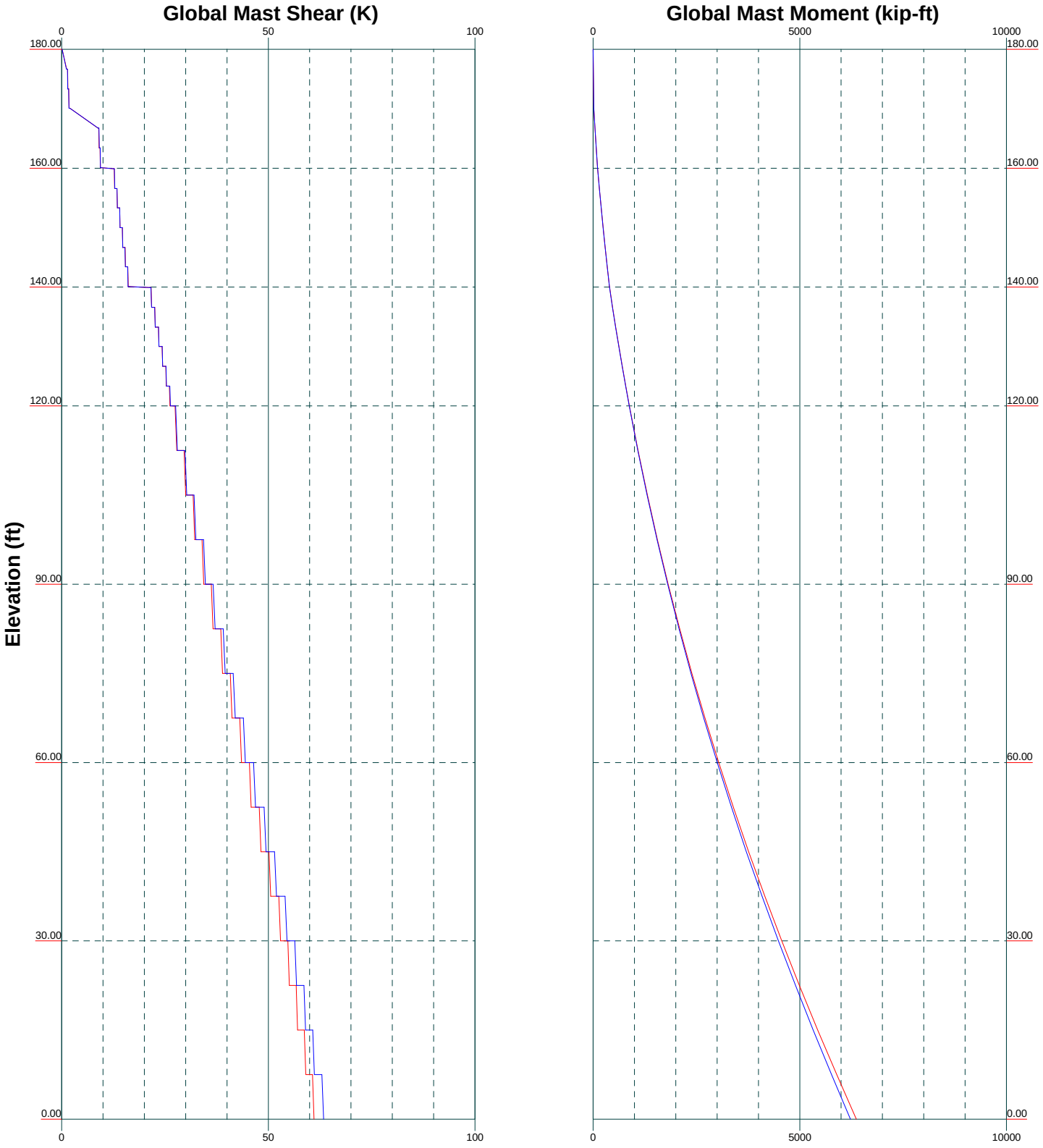
TIA-222-G - 104 mph/50 mph 0.7500 in Ice Exposure C

Maximum Values

Vx Vz Mx Mz



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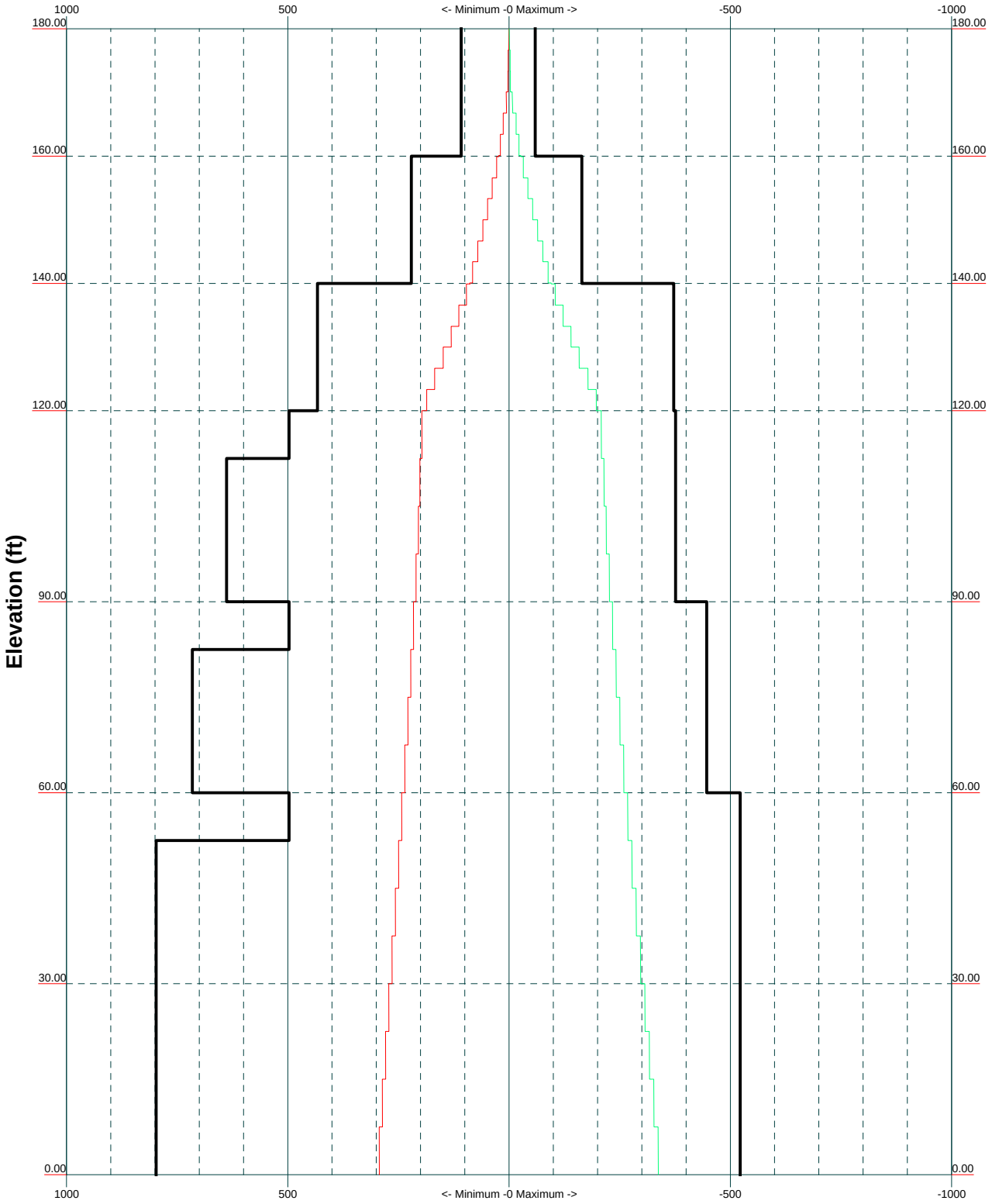
Dalls Tx. 75243
Phone: 972 231 8893
FAX: 866 364 8375

Job: ***18-0486 180' SST***			
Project: ***CT09865-S-03_Niantic Structural***			
Client: SBA	Drawn by: bakech	App'd:	
Code: TIA-222-G	Date: 02/07/18	Scale: NTS	
Path: P:\2018\Structural\18-0486 CT09865-S-03 Niantic SA SBA-180SST\TNX\TNX 18-0486.eri		Dwg No. E-4	

TIA-222-G - 104 mph/50 mph 0.7500 in Ice Exposure C

Leg Capacity ——— **Leg Compression (K)**



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Job: ***18-0486 180' SST***		
Project: ***CT09865-S-03_Niantic Structural***		
Client: SBA	Drawn by: bakech	App'd:
Code: TIA-222-G	Date: 02/07/18	Scale: NTS
Path: P:\2018\Structural\18-0486 CT09865-S-03 Niantic SA SBA-180SST\TNX\TNX 18-0486.eri		Dwg No. E-3

CALCULATION PRINTOUT

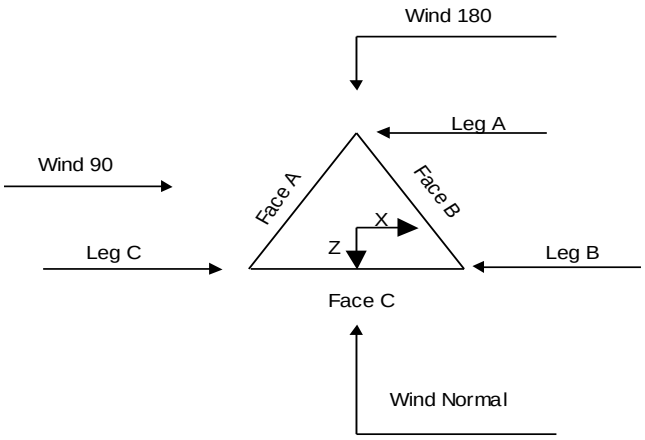
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 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 5.00 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:

Tower is located in New London County, Connecticut.
ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
Basic wind speed of 104 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 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.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
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

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned	√	Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r	√	All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys	√	Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients	√	Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
√	Include Bolts In Member Capacity	√	Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
√	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
√	Secondary Horizontal Braces Leg		Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)	√	Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends	√	Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric				



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	180.00-160.00			5.00	1	20.00
T2	160.00-140.00			5.00	1	20.00
T3	140.00-120.00			5.00	1	20.00
T4	120.00-90.00			5.00	1	30.00
T5	90.00-60.00			9.50	1	30.00
T6	60.00-30.00			14.00	1	30.00
T7	30.00-0.00			18.50	1	30.00

Tower Section Geometry *(cont'd)*

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
T1	180.00-160.00	3.32	X Brace	No	Yes	0.0000	1.0000
T2	160.00-140.00	3.31	X Brace	No	Yes	1.0000	1.0000
T3	140.00-120.00	3.32	X Brace	No	Yes	1.0000	0.0000
T4	120.00-90.00	7.50	X Brace	No	No	0.0000	0.0000
T5	90.00-60.00	7.50	X Brace	No	No	0.0000	0.0000
T6	60.00-30.00	7.50	X Brace	No	No	0.0000	0.0000
T7	30.00-0.00	7.50	X Brace	No	No	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 180.00-160.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 160.00-140.00	Solid Round	2 1/2	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T3 140.00-120.00	Solid Round	3 1/2	A572-50 (50 ksi)	Solid Round	1 1/8	A572-50 (50 ksi)
T4 120.00-90.00	Solid Round	4 1/4	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 90.00-60.00	Solid Round	4 1/2	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T6 60.00-30.00	Solid Round	4 3/4	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T7 30.00-0.00	Solid Round	4 3/4	A572-50 (50 ksi)	Equal Angle	L4x4x5/16	A36 (36 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 180.00-160.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A570-50 (50 ksi)
T2 160.00-140.00	Solid Round	1	A572-50 (50 ksi)	Solid Round	1	A572-50 (50 ksi)
T3 140.00-120.00	Solid Round	1 1/8	A572-50 (50 ksi)	Solid Round	1 1/8	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T4 120.00-90.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T5 90.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000
T6 60.00-30.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T7 30.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
180.00-160.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
160.00-140.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
120.00-90.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
90.00-60.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
60.00-30.00				1	1	1	1	1	1	1
T7 30.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

[1]*Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.*

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
180.00-160.00														
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
160.00-140.00														
T3	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
140.00-120.00														
T4	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
120.00-90.00														
T5 90.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 60.00-30.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 30.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

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 180.00-160.00	Flange	0.0000 A325N	0	0.0000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 160.00-140.00	Flange	1.1250 A325N	6	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	1.2500 A325N	6	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-90.00	Flange	1.2500 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 90.00-60.00	Flange	1.2500 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 60.00-30.00	Flange	1.2500 A325N	6	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 30.00-0.00	Flange	1.5000 A325N	0	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	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
(E)1 5/8" Coaxes (Town of Waterford)	C	No	Ar (CaAa)	180.00 - 6.00	0.0000	0.45	2	2	0.5000	1.9800		1.04
(E)1 5/8" Coaxes (AT&T)	A	No	Ar (CaAa)	170.00 - 6.00	0.0000	0.35	12	6	0.5000	1.9800		1.04
3/4" DC Power (AT&T)	A	No	Ar (CaAa)	170.00 - 6.00	0.0000	0.25	4	4	0.8650	0.8650		0.15
1/2" Fiber (AT&T)	A	No	Ar (CaAa)	170.00 - 6.00	0.0000	0.25	2	2	0.5000	0.5000		0.25
*												
(E)1 5/8" Coaxes (T-Mobile)	B	No	Ar (CaAa)	160.00 - 6.00	0.0000	-0.45	12	6	0.5000	1.9800		1.04
(E)1 5/8" Coax (T-Mobile)	B	No	Ar (CaAa)	160.00 - 6.00	0.0000	-0.35	1	1	0.5000	1.9800		1.04
1/2" Fiber (T-Mobile)	B	No	Ar (CaAa)	160.00 - 6.00	0.0000	-0.3	1	1	0.5800	0.5800		0.25
1 5/8" Fiber (T-Mobile)	B	No	Ar (CaAa)	160.00 - 6.00	0.0000	-0.25	6	3	0.5000	1.9800		1.04
*												
*												
(P)1 5/8" Coaxes (Verizon)	B	No	Ar (CaAa)	140.00 - 6.00	0.0000	0.3	16	8	0.5000	1.9800		1.04
(E)1 5/8" Fiber (Verizon)	B	No	Ar (CaAa)	140.00 - 6.00	0.0000	0.3	2	1	0.5000	1.9800		1.04
Feedline	A	No	Af (CaAa)	170.00 - 0.00	0.0000	0.25	1	1	1.5000	1.5000		4.20

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
Ladder (Af) 1.5" Feedline	B	No	Af (CaAa)	160.00 - 0.00	0.0000	-0.35	1	1	1.5000	1.5000		4.20
Ladder (Af) 1.5" Feedline	B	No	Af (CaAa)	140.00 - 0.00	0.0000	0.3	1	1	1.5000	1.5000		4.20
Ladder (Af) 1.5" *******												
3/4" DC Power (AT&T)	A	No	Ar (CaAa)	170.00 - 6.00	0.0000	0.25	2	2	0.8650	0.8650		0.15
7/16" DC Fiber (AT&T)	A	No	Ar (CaAa)	170.00 - 6.00	0.0000	0.25	1	1	0.8650	0.8650		0.15

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf
*							

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	0.000	0.000	33.315	0.000	0.18
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.920	0.000	0.04
T2	160.00-140.00	A	0.000	0.000	66.630	0.000	0.36
		B	0.000	0.000	81.400	0.000	0.48
		C	0.000	0.000	7.920	0.000	0.04
T3	140.00-120.00	A	0.000	0.000	66.630	0.000	0.36
		B	0.000	0.000	157.680	0.000	0.94
		C	0.000	0.000	7.920	0.000	0.04
T4	120.00-90.00	A	0.000	0.000	99.945	0.000	0.55
		B	0.000	0.000	236.520	0.000	1.41
		C	0.000	0.000	11.880	0.000	0.06
T5	90.00-60.00	A	0.000	0.000	99.945	0.000	0.55
		B	0.000	0.000	236.520	0.000	1.41
		C	0.000	0.000	11.880	0.000	0.06
T6	60.00-30.00	A	0.000	0.000	99.945	0.000	0.55
		B	0.000	0.000	236.520	0.000	1.41
		C	0.000	0.000	11.880	0.000	0.06
T7	30.00-0.00	A	0.000	0.000	81.456	0.000	0.46
		B	0.000	0.000	192.216	0.000	1.18
		C	0.000	0.000	9.504	0.000	0.05

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_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	1.767	0.000	0.000	65.639	0.000	1.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	24.279	0.000	0.29
T2	160.00-140.00	A	1.745	0.000	0.000	130.503	0.000	1.98
		B		0.000	0.000	112.748	0.000	2.13
		C		0.000	0.000	24.127	0.000	0.28
T3	140.00-120.00	A	1.720	0.000	0.000	129.629	0.000	1.95
		B		0.000	0.000	208.229	0.000	4.01
		C		0.000	0.000	23.954	0.000	0.28
T4	120.00-90.00	A	1.684	0.000	0.000	192.524	0.000	2.87
		B		0.000	0.000	310.004	0.000	5.92
		C		0.000	0.000	35.552	0.000	0.41
T5	90.00-60.00	A	1.628	0.000	0.000	189.583	0.000	2.79
		B		0.000	0.000	306.419	0.000	5.77
		C		0.000	0.000	34.972	0.000	0.39
T6	60.00-30.00	A	1.547	0.000	0.000	185.308	0.000	2.66
		B		0.000	0.000	301.205	0.000	5.55
		C		0.000	0.000	34.127	0.000	0.37
T7	30.00-0.00	A	1.386	0.000	0.000	144.633	0.000	2.01
		B		0.000	0.000	239.020	0.000	4.23
		C		0.000	0.000	25.963	0.000	0.27

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	180.00-160.00	-2.0235	-2.8596	-0.8306	-1.5526
T2	160.00-140.00	-0.4121	-5.4325	-0.2523	-3.5060
T3	140.00-120.00	1.5744	-3.3189	1.1704	-2.3778
T4	120.00-90.00	2.1261	-4.5544	1.6420	-3.3822
T5	90.00-60.00	3.2026	-6.9594	2.5012	-5.2132
T6	60.00-30.00	4.1450	-9.0671	3.2789	-6.8757
T7	30.00-0.00	4.6056	-10.0869	3.8349	-8.0503

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	1	(E)1 5/8" Coaxes	160.00 - 180.00	0.6000	0.5692
T1	2	(E)1 5/8" Coaxes	160.00 - 170.00	0.6000	0.5692
T1	3	3/4" DC Power	160.00 - 170.00	0.6000	0.5692
T1	4	1/2" Fiber	160.00 - 170.00	0.6000	0.5692
T1	14	Feedline Ladder (Af) 1.5"	160.00 - 170.00	0.6000	0.5692
T1	18	3/4" DC Power	160.00 -	0.6000	0.5692

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	19	7/16" DC Fiber	160.00 - 170.00	0.6000	0.5692
T2	1	(E)1 5/8" Coaxes	140.00 - 160.00	0.6000	0.5513
T2	2	(E)1 5/8" Coaxes	140.00 - 160.00	0.6000	0.5513
T2	3	3/4" DC Power	140.00 - 160.00	0.6000	0.5513
T2	4	1/2" Fiber	140.00 - 160.00	0.6000	0.5513
T2	6	(E)1 5/8" Coaxes	140.00 - 160.00	0.6000	0.5513
T2	7	(E)1 5/8" Coax	140.00 - 160.00	0.6000	0.5513
T2	8	1/2" Fiber	140.00 - 160.00	0.6000	0.5513
T2	9	1 5/8" Fiber	140.00 - 160.00	0.6000	0.5513
T2	14	Feedline Ladder (Af) 1.5"	140.00 - 160.00	0.6000	0.5513
T2	15	Feedline Ladder (Af) 1.5"	140.00 - 160.00	0.6000	0.5513
T2	18	3/4" DC Power	140.00 - 160.00	0.6000	0.5513
T2	19	7/16" DC Fiber	140.00 - 160.00	0.6000	0.5513
T3	1	(E)1 5/8" Coaxes	120.00 - 140.00	0.6000	0.5292
T3	2	(E)1 5/8" Coaxes	120.00 - 140.00	0.6000	0.5292
T3	3	3/4" DC Power	120.00 - 140.00	0.6000	0.5292
T3	4	1/2" Fiber	120.00 - 140.00	0.6000	0.5292
T3	6	(E)1 5/8" Coaxes	120.00 - 140.00	0.6000	0.5292
T3	7	(E)1 5/8" Coax	120.00 - 140.00	0.6000	0.5292
T3	8	1/2" Fiber	120.00 - 140.00	0.6000	0.5292
T3	9	1 5/8" Fiber	120.00 - 140.00	0.6000	0.5292
T3	12	(P)1 5/8" Coaxes	120.00 - 140.00	0.6000	0.5292
T3	13	(E)1 5/8" Fiber	120.00 - 140.00	0.6000	0.5292
T3	14	Feedline Ladder (Af) 1.5"	120.00 - 140.00	0.6000	0.5292
T3	15	Feedline Ladder (Af) 1.5"	120.00 - 140.00	0.6000	0.5292
T3	16	Feedline Ladder (Af) 1.5"	120.00 - 140.00	0.6000	0.5292
T3	18	3/4" DC Power	120.00 - 140.00	0.6000	0.5292
T3	19	7/16" DC Fiber	120.00 - 140.00	0.6000	0.5292
T4	1	(E)1 5/8" Coaxes	90.00 - 120.00	0.6000	0.6000
T4	2	(E)1 5/8" Coaxes	90.00 - 120.00	0.6000	0.6000
T4	3	3/4" DC Power	90.00 - 120.00	0.6000	0.6000
T4	4	1/2" Fiber	90.00 - 120.00	0.6000	0.6000
T4	6	(E)1 5/8" Coaxes	90.00 - 120.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	7	(E)1 5/8" Coax	90.00 - 120.00	0.6000	0.6000
T4	8	1/2" Fiber	90.00 - 120.00	0.6000	0.6000
T4	9	1 5/8" Fiber	90.00 - 120.00	0.6000	0.6000
T4	12	(P)1 5/8" Coaxes	90.00 - 120.00	0.6000	0.6000
T4	13	(E)1 5/8" Fiber	90.00 - 120.00	0.6000	0.6000
T4	14	Feedline Ladder (Af) 1.5"	90.00 - 120.00	0.6000	0.6000
T4	15	Feedline Ladder (Af) 1.5"	90.00 - 120.00	0.6000	0.6000
T4	16	Feedline Ladder (Af) 1.5"	90.00 - 120.00	0.6000	0.6000
T4	18	3/4" DC Power	90.00 - 120.00	0.6000	0.6000
T4	19	7/16" DC Fiber	90.00 - 120.00	0.6000	0.6000
T5	1	(E)1 5/8" Coaxes	60.00 - 90.00	0.6000	0.6000
T5	2	(E)1 5/8" Coaxes	60.00 - 90.00	0.6000	0.6000
T5	3	3/4" DC Power	60.00 - 90.00	0.6000	0.6000
T5	4	1/2" Fiber	60.00 - 90.00	0.6000	0.6000
T5	6	(E)1 5/8" Coaxes	60.00 - 90.00	0.6000	0.6000
T5	7	(E)1 5/8" Coax	60.00 - 90.00	0.6000	0.6000
T5	8	1/2" Fiber	60.00 - 90.00	0.6000	0.6000
T5	9	1 5/8" Fiber	60.00 - 90.00	0.6000	0.6000
T5	12	(P)1 5/8" Coaxes	60.00 - 90.00	0.6000	0.6000
T5	13	(E)1 5/8" Fiber	60.00 - 90.00	0.6000	0.6000
T5	14	Feedline Ladder (Af) 1.5"	60.00 - 90.00	0.6000	0.6000
T5	15	Feedline Ladder (Af) 1.5"	60.00 - 90.00	0.6000	0.6000
T5	16	Feedline Ladder (Af) 1.5"	60.00 - 90.00	0.6000	0.6000
T5	18	3/4" DC Power	60.00 - 90.00	0.6000	0.6000
T5	19	7/16" DC Fiber	60.00 - 90.00	0.6000	0.6000
T6	1	(E)1 5/8" Coaxes	30.00 - 60.00	0.6000	0.6000
T6	2	(E)1 5/8" Coaxes	30.00 - 60.00	0.6000	0.6000
T6	3	3/4" DC Power	30.00 - 60.00	0.6000	0.6000
T6	4	1/2" Fiber	30.00 - 60.00	0.6000	0.6000
T6	6	(E)1 5/8" Coaxes	30.00 - 60.00	0.6000	0.6000
T6	7	(E)1 5/8" Coax	30.00 - 60.00	0.6000	0.6000
T6	8	1/2" Fiber	30.00 - 60.00	0.6000	0.6000
T6	9	1 5/8" Fiber	30.00 - 60.00	0.6000	0.6000
T6	12	(P)1 5/8" Coaxes	30.00 - 60.00	0.6000	0.6000
T6	13	(E)1 5/8" Fiber	30.00 - 60.00	0.6000	0.6000
T6	14	Feedline Ladder (Af) 1.5"	30.00 - 60.00	0.6000	0.6000
T6	15	Feedline Ladder (Af) 1.5"	30.00 - 60.00	0.6000	0.6000
T6	16	Feedline Ladder (Af) 1.5"	30.00 - 60.00	0.6000	0.6000
T6	18	3/4" DC Power	30.00 - 60.00	0.6000	0.6000
T6	19	7/16" DC Fiber	30.00 - 60.00	0.6000	0.6000
T7	1	(E)1 5/8" Coaxes	6.00 - 30.00	0.6000	0.6000
T7	2	(E)1 5/8" Coaxes	6.00 - 30.00	0.6000	0.6000
T7	3	3/4" DC Power	6.00 - 30.00	0.6000	0.6000
T7	4	1/2" Fiber	6.00 - 30.00	0.6000	0.6000
T7	6	(E)1 5/8" Coaxes	6.00 - 30.00	0.6000	0.6000
T7	7	(E)1 5/8" Coax	6.00 - 30.00	0.6000	0.6000
T7	8	1/2" Fiber	6.00 - 30.00	0.6000	0.6000
T7	9	1 5/8" Fiber	6.00 - 30.00	0.6000	0.6000
T7	12	(P)1 5/8" Coaxes	6.00 - 30.00	0.6000	0.6000
T7	13	(E)1 5/8" Fiber	6.00 - 30.00	0.6000	0.6000
T7	14	Feedline Ladder (Af) 1.5"	0.00 - 30.00	0.6000	0.6000
T7	15	Feedline Ladder (Af) 1.5"	0.00 - 30.00	0.6000	0.6000
T7	16	Feedline Ladder (Af) 1.5"	0.00 - 30.00	0.6000	0.6000
T7	18	3/4" DC Power	6.00 - 30.00	0.6000	0.6000
T7	19	7/16" DC Fiber	6.00 - 30.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(E) Lightning Rod	C	From Leg	3.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	0.25 0.66 0.97	0.25 0.66 0.97	0.03 0.04 0.04
(E) Flash Beacon Lighting	C	None		0.0000	180.00	No Ice 1/2" Ice 1" Ice	2.70 3.10 3.50	2.70 3.10 3.50	0.05 0.07 0.09
(E)Sinclair SC488-HF2LNF Omni (Town of Waterford)	A	From Leg	3.00 0.00 5.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	4.39 5.95 7.51	4.39 5.95 7.51	0.03 0.06 0.10
(E)Sinclair SC488-HF2LNF Omni (Town of Waterford)	B	From Leg	3.00 0.00 5.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	4.39 5.95 7.51	4.39 5.95 7.51	0.03 0.06 0.10
(E)DBSpectra ATS8TMA10 TMA (Town of Waterford) **	C	From Leg	3.00 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice 1" Ice	2.74 3.03 3.33	2.74 3.03 3.33	0.03 0.04 0.07
(E)Powerwave 7770.00 (AT&T)	A	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	6.74 7.36 7.99	3.47 3.90 4.34	0.04 0.08 0.12
(E)Powerwave 7770.00 (AT&T)	B	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	6.74 7.36 7.99	3.47 3.90 4.34	0.04 0.08 0.12
(E)Powerwave 7770.00 (AT&T)	C	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	6.74 7.36 7.99	3.47 3.90 4.34	0.04 0.08 0.12
SBNHH-1D65A (AT&T)	A	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	5.96 6.32 6.70	3.91 4.27 4.63	0.03 0.07 0.12
SBNHH-1D65A (AT&T)	B	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	5.96 6.32 6.70	3.91 4.27 4.63	0.03 0.07 0.12
SBNHH-1D65A (AT&T)	C	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	5.96 6.32 6.70	3.91 4.27 4.63	0.03 0.07 0.12
RRU 32 (AT&T)	A	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	3.46 3.71 3.96	2.42 2.64 2.86	0.08 0.11 0.14
RRU 32 (AT&T)	B	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	3.46 3.71 3.96	2.42 2.64 2.86	0.08 0.11 0.14
RRU 32 (AT&T)	C	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	3.46 3.71 3.96	2.42 2.64 2.86	0.08 0.11 0.14
(2) (E) RRUS 11 (AT&T)	A	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	2.17 2.44 2.71	1.66 1.90 2.15	0.05 0.07 0.08
(2) (E) RRUS 11 (AT&T)	B	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	2.17 2.44 2.71	1.66 1.90 2.15	0.05 0.07 0.08
(2) (E) RRUS 11 (AT&T)	C	From Leg	3.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice 1" Ice	2.17 2.44 2.71	1.66 1.90 2.15	0.05 0.07 0.08
(E)Raycap DC6-48-60-18-F (AT&T)	A	From Leg	3.00 0.00	0.0000	170.00	No Ice 1/2" Ice	3.34 3.70	0.73 0.95	0.03 0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	4.06	1.16	0.06
(E)Raycap DC6-48-60-18-F	B	From Leg	3.00	0.0000	170.00	No Ice	3.34	0.73	0.03
(AT&T)			0.00			1/2" Ice	3.70	0.95	0.04
			0.00			1" Ice	4.06	1.16	0.06
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APX16DWV-16DWVS-E-A	A	From Leg	3.00	0.0000	160.00	No Ice	6.59	2.15	0.04
20			0.00			1/2" Ice	6.96	2.49	0.07
(T-Mobile)			0.00			1" Ice	7.34	2.84	0.11
APX16DWV-16DWVS-E-A	B	From Leg	3.00	0.0000	160.00	No Ice	6.59	2.15	0.04
20			0.00			1/2" Ice	6.96	2.49	0.07
(T-Mobile)			0.00			1" Ice	7.34	2.84	0.11
APX16DWV-16DWVS-E-A	C	From Leg	3.00	0.0000	160.00	No Ice	6.59	2.15	0.04
20			0.00			1/2" Ice	6.96	2.49	0.07
(T-Mobile)			0.00			1" Ice	7.34	2.84	0.11
LNX-6515DS-VTM	A	From Leg	3.00	0.0000	160.00	No Ice	11.45	7.70	0.05
(T-Mobile)			0.00			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
LNX-6515DS-VTM	B	From Leg	3.00	0.0000	160.00	No Ice	11.45	7.70	0.05
(T-Mobile)			0.00			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
LNX-6515DS-VTM	C	From Leg	3.00	0.0000	160.00	No Ice	11.45	7.70	0.05
(T-Mobile)			0.00			1/2" Ice	12.06	8.29	0.12
			0.00			1" Ice	12.69	8.89	0.19
Double TMA 17/21	A	From Leg	3.00	0.0000	160.00	No Ice	0.35	0.14	0.01
(T-Mobile)			0.00			1/2" Ice	0.43	0.19	0.01
			0.00			1" Ice	0.51	0.25	0.02
Double TMA 17/21	B	From Leg	3.00	0.0000	160.00	No Ice	0.35	0.14	0.01
(T-Mobile)			0.00			1/2" Ice	0.43	0.19	0.01
			0.00			1" Ice	0.51	0.25	0.02
Double TMA 17/21	C	From Leg	3.00	0.0000	160.00	No Ice	0.35	0.14	0.01
(T-Mobile)			0.00			1/2" Ice	0.43	0.19	0.01
			0.00			1" Ice	0.51	0.25	0.02
ATMAA1412D-1A20	A	From Leg	3.00	0.0000	160.00	No Ice	1.00	0.41	0.01
(T-Mobile)			0.00			1/2" Ice	1.13	0.50	0.02
			0.00			1" Ice	1.26	0.59	0.03
ATMAA1412D-1A20	B	From Leg	3.00	0.0000	160.00	No Ice	1.00	0.41	0.01
(T-Mobile)			0.00			1/2" Ice	1.13	0.50	0.02
			0.00			1" Ice	1.26	0.59	0.03
ATMAA1412D-1A20	C	From Leg	3.00	0.0000	160.00	No Ice	1.00	0.41	0.01
(T-Mobile)			0.00			1/2" Ice	1.13	0.50	0.02
			0.00			1" Ice	1.26	0.59	0.03
782 11056	A	From Leg	3.00	0.0000	160.00	No Ice	0.15	0.08	0.00
(T-Mobile)			0.00			1/2" Ice	0.20	0.13	0.00
			0.00			1" Ice	0.26	0.18	0.01
782 11056	B	From Leg	3.00	0.0000	160.00	No Ice	0.15	0.08	0.00
(T-Mobile)			0.00			1/2" Ice	0.20	0.13	0.00
			0.00			1" Ice	0.26	0.18	0.01
782 11056	C	From Leg	3.00	0.0000	160.00	No Ice	0.15	0.08	0.00
(T-Mobile)			0.00			1/2" Ice	0.20	0.13	0.00
			0.00			1" Ice	0.26	0.18	0.01
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(E) SitePRO1 HM6 6'	A	From Leg	3.00	0.0000	180.00	No Ice	2.64	4.40	0.08
Stanoffs			0.00			1/2" Ice	3.69	6.20	0.10
(Town of Waterford)			0.00			1" Ice	4.74	8.00	0.12
(E) SitePRO1 HM6 6'	B	From Leg	3.00	0.0000	180.00	No Ice	2.64	4.40	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Stanoffs			0.00			1/2" Ice	3.69	6.20	0.10
(Town of Waterford)			0.00			1" Ice	4.74	8.00	0.12
(E) T-Frame	A	From Leg	3.00	0.0000	170.00	No Ice	18.81	9.20	0.30
(AT&T)			0.00			1/2" Ice	25.20	13.30	0.40
			0.00			1" Ice	31.59	17.40	0.50
(E) T-Frame	B	From Leg	3.00	0.0000	170.00	No Ice	18.81	9.20	0.30
(AT&T)			0.00			1/2" Ice	25.20	13.30	0.40
			0.00			1" Ice	31.59	17.40	0.50
(E) T-Frame	C	From Leg	3.00	0.0000	170.00	No Ice	18.81	9.20	0.30
(AT&T)			0.00			1/2" Ice	25.20	13.30	0.40
			0.00			1" Ice	31.59	17.40	0.50
(E)T-Frame	A	From Leg	3.00	0.0000	160.00	No Ice	10.60	5.00	0.26
(T-Mobile)			0.00			1/2" Ice	16.80	8.00	0.36
			0.00			1" Ice	23.00	11.00	0.46
(E)T-Frame	B	From Leg	3.00	0.0000	160.00	No Ice	10.60	5.00	0.26
(T-Mobile)			0.00			1/2" Ice	16.80	8.00	0.36
			0.00			1" Ice	23.00	11.00	0.46
(E)T-Frame	C	From Leg	3.00	0.0000	160.00	No Ice	10.60	5.00	0.26
(T-Mobile)			0.00			1/2" Ice	16.80	8.00	0.36
			0.00			1" Ice	23.00	11.00	0.46
(E)T-Frame	A	From Leg	3.00	0.0000	140.00	No Ice	10.60	5.00	0.26
(Verizon)			0.00			1/2" Ice	16.80	8.00	0.36
			0.00			1" Ice	23.00	11.00	0.46
(E)T-Frame	B	From Leg	3.00	0.0000	140.00	No Ice	10.60	5.00	0.26
(Verizon)			0.00			1/2" Ice	16.80	8.00	0.36
			0.00			1" Ice	23.00	11.00	0.46
(E)T-Frame	C	From Leg	3.00	0.0000	140.00	No Ice	10.60	5.00	0.26
(Verizon)			0.00			1/2" Ice	16.80	8.00	0.36
			0.00			1" Ice	23.00	11.00	0.46
(3) (E)Antenna Pipe Mount	A	From Leg	3.00	0.0000	170.00	No Ice	1.32	1.32	0.04
(AT&T)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
(3) (E)Antenna Pipe Mount	B	From Leg	3.00	0.0000	170.00	No Ice	1.32	1.32	0.04
(AT&T)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
(3) (E)Antenna Pipe Mount	C	From Leg	3.00	0.0000	170.00	No Ice	1.32	1.32	0.04
(AT&T)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
(2) (E)Antenna Pipe Mount	A	From Leg	4.00	0.0000	160.00	No Ice	1.32	1.32	0.04
(T-Mobile)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
(2) (E)Antenna Pipe Mount	B	From Leg	4.00	0.0000	160.00	No Ice	1.32	1.32	0.04
(T-Mobile)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
(2) (E)Antenna Pipe Mount	C	From Leg	4.00	0.0000	160.00	No Ice	1.32	1.32	0.04
(T-Mobile)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
(4) (E)Antenna Pipe Mount	A	From Leg	4.00	0.0000	140.00	No Ice	1.32	1.32	0.04
(Verizon)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
(4) (E)Antenna Pipe Mount	B	From Leg	4.00	0.0000	140.00	No Ice	1.32	1.32	0.04
(Verizon)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07
(4) (E)Antenna Pipe Mount	C	From Leg	4.00	0.0000	140.00	No Ice	1.32	1.32	0.04
(Verizon)			0.00			1/2" Ice	1.58	1.58	0.06
			0.00			1" Ice	1.84	1.84	0.07

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
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(E)Antel BXA-80063/6CF	A	From Leg	3.00	0.0000	140.00	No Ice	7.74	4.17	0.02
(Verizon)			0.00			1/2" Ice	8.44	4.63	0.06
			0.00			1" Ice	9.13	5.10	0.10
(E)Antel BXA-80063/6CF	B	From Leg	3.00	0.0000	140.00	No Ice	7.74	4.17	0.02
(Verizon)			0.00			1/2" Ice	8.44	4.63	0.06
			0.00			1" Ice	9.13	5.10	0.10
(E)Antel BXA-80063/6CF	C	From Leg	3.00	0.0000	140.00	No Ice	7.74	4.17	0.02
(Verizon)			0.00			1/2" Ice	8.44	4.63	0.06
			0.00			1" Ice	9.13	5.10	0.10
(E)Antel BXA-70063/6CF	A	From Leg	3.00	0.0000	140.00	No Ice	7.74	4.17	0.02
(Verizon)			0.00			1/2" Ice	8.44	4.63	0.06
			0.00			1" Ice	9.13	5.10	0.10
(E)Antel BXA-70063/6CF	B	From Leg	3.00	0.0000	140.00	No Ice	7.74	4.17	0.02
(Verizon)			0.00			1/2" Ice	8.44	4.63	0.06
			0.00			1" Ice	9.13	5.10	0.10
(E)Antel BXA-70063/6CF	C	From Leg	3.00	0.0000	140.00	No Ice	7.74	4.17	0.02
(Verizon)			0.00			1/2" Ice	8.44	4.63	0.06
			0.00			1" Ice	9.13	5.10	0.10
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(2) (P) TT19-08BP111-001	A	From Leg	2.00	0.0000	170.00	No Ice	0.64	0.52	0.02
TMA			0.00			1/2" Ice	0.76	0.62	0.02
(AT&T)			0.00			1" Ice	0.88	0.74	0.03
(2) (P) TT19-08BP111-001	B	From Leg	2.00	0.0000	170.00	No Ice	0.64	0.52	0.02
TMA			0.00			1/2" Ice	0.76	0.62	0.02
(AT&T)			0.00			1" Ice	0.88	0.74	0.03
(2) (P) TT19-08BP111-001	C	From Leg	2.00	0.0000	170.00	No Ice	0.64	0.52	0.02
TMA			0.00			1/2" Ice	0.76	0.62	0.02
(AT&T)			0.00			1" Ice	0.88	0.74	0.03
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(2) SBNHH-1D65B	A	From Leg	3.00	0.0000	140.00	No Ice	8.05	5.34	0.05
(Verizon)			0.00			1/2" Ice	8.51	5.79	0.10
			0.00			1" Ice	8.97	6.26	0.16
(2) SBNHH-1D65B	B	From Leg	3.00	0.0000	140.00	No Ice	8.05	5.34	0.05
(Verizon)			0.00			1/2" Ice	8.51	5.79	0.10
			0.00			1" Ice	8.97	6.26	0.16
(2) SBNHH-1D65B	C	From Leg	3.00	0.0000	140.00	No Ice	8.05	5.34	0.05
(Verizon)			0.00			1/2" Ice	8.51	5.79	0.10
			0.00			1" Ice	8.97	6.26	0.16
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B66 RRH4X45 AWS	A	From Leg	3.00	0.0000	140.00	No Ice	2.45	1.43	0.06
(Verizon)			0.00			1/2" Ice	2.66	1.61	0.08
			0.00			1" Ice	2.88	1.79	0.10
B66 RRH4X45 AWS	B	From Leg	3.00	0.0000	140.00	No Ice	2.45	1.43	0.06
(Verizon)			0.00			1/2" Ice	2.66	1.61	0.08
			0.00			1" Ice	2.88	1.79	0.10
B66 RRH4X45 AWS	C	From Leg	3.00	0.0000	140.00	No Ice	2.45	1.43	0.06
(Verizon)			0.00			1/2" Ice	2.66	1.61	0.08
			0.00			1" Ice	2.88	1.79	0.10
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RRH 700 4X30 B13	A	From Leg	3.00	0.0000	140.00	No Ice	2.16	1.62	0.06
(Verizon)			0.00			1/2" Ice	2.35	1.79	0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	2.55	1.97	0.10
RRH 700 4X30 B13	B	From Leg	3.00	0.0000	140.00	No Ice	2.16	1.62	0.06
(Verizon)			0.00			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
RRH 700 4X30 B13	C	From Leg	3.00	0.0000	140.00	No Ice	2.16	1.62	0.06
(Verizon)			0.00			1/2" Ice	2.35	1.79	0.08
			0.00			1" Ice	2.55	1.97	0.10
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DB-T1-6Z-8AB-0Z	A	From Leg	3.00	0.0000	140.00	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	B	From Leg	3.00	0.0000	140.00	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
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(E)AM-X-CD-14-65-00T-RE	A	From Leg	3.00	0.0000	170.00	No Ice	5.51	2.83	0.03
T			0.00			1/2" Ice	6.01	3.22	0.06
(AT&T)			0.00			1" Ice	6.52	3.61	0.08
(E)	B	From Leg	3.00	0.0000	170.00	No Ice	5.51	2.83	0.03
AM-X-CD-14-65-00T-RET			0.00			1/2" Ice	6.01	3.22	0.06
(AT&T)			0.00			1" Ice	6.52	3.61	0.08
(E)AM-X-CD-14-65-00T-RE	C	From Leg	3.00	0.0000	170.00	No Ice	5.51	2.83	0.03
T			0.00			1/2" Ice	6.01	3.22	0.06
(AT&T)			0.00			1" Ice	6.52	3.61	0.08
*****									
EPBQ-654L8-H6-L2	A	From Leg	0.00	0.0000	170.00	No Ice	13.24	4.96	0.07
(AT&T)			0.00			1/2" Ice	13.74	5.41	0.14
			0.00			1" Ice	14.26	5.88	0.22
EPBQ-654L8-H6-L2	B	From Leg	0.00	0.0000	170.00	No Ice	13.24	4.96	0.07
(AT&T)			0.00			1/2" Ice	13.74	5.41	0.14
			0.00			1" Ice	14.26	5.88	0.22
EPBQ-654L8-H6-L2	C	From Leg	0.00	0.0000	170.00	No Ice	13.24	4.96	0.07
(AT&T)			0.00			1/2" Ice	13.74	5.41	0.14
			0.00			1" Ice	14.26	5.88	0.22
****									
RRU 32	A	From Leg	3.00	0.0000	170.00	No Ice	3.46	2.42	0.08
(AT&T)			0.00			1/2" Ice	3.71	2.64	0.11
			0.00			1" Ice	3.96	2.86	0.14
RRU 32	B	From Leg	3.00	0.0000	170.00	No Ice	3.46	2.42	0.08
(AT&T)			0.00			1/2" Ice	3.71	2.64	0.11
			0.00			1" Ice	3.96	2.86	0.14
RRU 32	C	From Leg	3.00	0.0000	170.00	No Ice	3.46	2.42	0.08
(AT&T)			0.00			1/2" Ice	3.71	2.64	0.11
			0.00			1" Ice	3.96	2.86	0.14
*****									
4478 B5	A	From Leg	0.00	0.0000	170.00	No Ice	1.84	1.06	0.06
(AT&T)			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
4478 B5	B	From Leg	0.00	0.0000	170.00	No Ice	1.84	1.06	0.06
(AT&T)			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
4478 B5	C	From Leg	0.00	0.0000	170.00	No Ice	1.84	1.06	0.06
(AT&T)			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
****									
DC6-48-60-18-8C	A	From Leg	0.00	0.0000	170.00	No Ice	0.00	0.00	0.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T)			0.00			1/2" Ice	0.00	0.00	0.00
			0.00			1" Ice	0.00	0.00	0.00
****									
****									

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	1.2D+1.6W (pattern 1) 0 deg - No Ice
4	1.2D+1.6W (pattern 2) 0 deg - No Ice
5	0.9 Dead+1.6 Wind 0 deg - No Ice
6	1.2 Dead+1.6 Wind 30 deg - No Ice
7	1.2D+1.6W (pattern 1) 30 deg - No Ice
8	1.2D+1.6W (pattern 2) 30 deg - No Ice
9	0.9 Dead+1.6 Wind 30 deg - No Ice
10	1.2 Dead+1.6 Wind 60 deg - No Ice
11	1.2D+1.6W (pattern 1) 60 deg - No Ice
12	1.2D+1.6W (pattern 2) 60 deg - No Ice
13	0.9 Dead+1.6 Wind 60 deg - No Ice
14	1.2 Dead+1.6 Wind 90 deg - No Ice
15	1.2D+1.6W (pattern 1) 90 deg - No Ice
16	1.2D+1.6W (pattern 2) 90 deg - No Ice
17	0.9 Dead+1.6 Wind 90 deg - No Ice
18	1.2 Dead+1.6 Wind 120 deg - No Ice
19	1.2D+1.6W (pattern 1) 120 deg - No Ice
20	1.2D+1.6W (pattern 2) 120 deg - No Ice
21	0.9 Dead+1.6 Wind 120 deg - No Ice
22	1.2 Dead+1.6 Wind 150 deg - No Ice
23	1.2D+1.6W (pattern 1) 150 deg - No Ice
24	1.2D+1.6W (pattern 2) 150 deg - No Ice
25	0.9 Dead+1.6 Wind 150 deg - No Ice
26	1.2 Dead+1.6 Wind 180 deg - No Ice
27	1.2D+1.6W (pattern 1) 180 deg - No Ice
28	1.2D+1.6W (pattern 2) 180 deg - No Ice
29	0.9 Dead+1.6 Wind 180 deg - No Ice
30	1.2 Dead+1.6 Wind 210 deg - No Ice
31	1.2D+1.6W (pattern 1) 210 deg - No Ice
32	1.2D+1.6W (pattern 2) 210 deg - No Ice
33	0.9 Dead+1.6 Wind 210 deg - No Ice
34	1.2 Dead+1.6 Wind 240 deg - No Ice
35	1.2D+1.6W (pattern 1) 240 deg - No Ice
36	1.2D+1.6W (pattern 2) 240 deg - No Ice
37	0.9 Dead+1.6 Wind 240 deg - No Ice
38	1.2 Dead+1.6 Wind 270 deg - No Ice
39	1.2D+1.6W (pattern 1) 270 deg - No Ice
40	1.2D+1.6W (pattern 2) 270 deg - No Ice
41	0.9 Dead+1.6 Wind 270 deg - No Ice
42	1.2 Dead+1.6 Wind 300 deg - No Ice

Comb. No.	Description
43	1.2D+1.6W (pattern 1) 300 deg - No Ice
44	1.2D+1.6W (pattern 2) 300 deg - No Ice
45	0.9 Dead+1.6 Wind 300 deg - No Ice
46	1.2 Dead+1.6 Wind 330 deg - No Ice
47	1.2D+1.6W (pattern 1) 330 deg - No Ice
48	1.2D+1.6W (pattern 2) 330 deg - No Ice
49	0.9 Dead+1.6 Wind 330 deg - No Ice
50	1.2 Dead+1.0 Ice+1.0 Temp
51	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
52	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
53	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
54	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
55	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
56	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
57	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
58	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
59	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
60	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
61	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
62	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
63	Dead+Wind 0 deg - Service
64	Dead+Wind 30 deg - Service
65	Dead+Wind 60 deg - Service
66	Dead+Wind 90 deg - Service
67	Dead+Wind 120 deg - Service
68	Dead+Wind 150 deg - Service
69	Dead+Wind 180 deg - Service
70	Dead+Wind 210 deg - Service
71	Dead+Wind 240 deg - Service
72	Dead+Wind 270 deg - Service
73	Dead+Wind 300 deg - Service
74	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	3.297	63	0.1958	0.0376
T2	160 - 140	2.475	63	0.1860	0.0332
T3	140 - 120	1.724	63	0.1524	0.0278
T4	120 - 90	1.131	63	0.1087	0.0205
T5	90 - 60	0.596	63	0.0633	0.0096
T6	60 - 30	0.266	63	0.0367	0.0049
T7	30 - 0	0.076	63	0.0172	0.0020

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	(E) Lightning Rod	63	3.297	0.1958	0.0376	275163
170.00	(E)Powerwave 7770.00	63	2.882	0.1930	0.0355	137581
160.00	APX16DWV-16DWVS-E-A20	63	2.475	0.1860	0.0332	68083
140.00	(E)T-Frame	63	1.724	0.1524	0.0278	30308

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	15.588	2	0.9227	0.1814
T2	160 - 140	11.707	2	0.8773	0.1601
T3	140 - 120	8.166	2	0.7189	0.1341
T4	120 - 90	5.361	2	0.5128	0.0989
T5	90 - 60	2.828	2	0.2988	0.0464
T6	60 - 30	1.268	2	0.1732	0.0234
T7	30 - 0	0.366	2	0.0814	0.0097

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	(E) Lightning Rod	2	15.588	0.9227	0.1814	58960
170.00	(E)Powerwave 7770.00	2	13.627	0.9098	0.1710	29480
160.00	APX16DWV-16DWVS-E-A20	2	11.707	0.8773	0.1601	14562
140.00	(E)T-Frame	2	8.166	0.7189	0.1341	6325

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T2	160	Leg	A325N	1.1250	6	3.91	67.10	0.058 ✔	1	Bolt Tension
T3	140	Leg	A325N	1.2500	6	14.78	82.83	0.178 ✔	1	Bolt Tension
T4	120	Leg	A325N	1.2500	6	32.83	82.83	0.396 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	3.59	8.97	0.401 ✔	1	Member Block Shear
T5	90	Leg	A325N	1.2500	6	35.99	82.83	0.435 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	5.19	9.46	0.548 ✔	1	Member Bearing
T6	60	Leg	A325N	1.2500	6	40.43	82.83	0.488 ✔	1	Bolt Tension
		Diagonal	A325N	0.8750	1	6.93	14.79	0.468 ✔	1	Member Bearing
T7	30	Diagonal	A325N	0.8750	1	8.32	18.49	0.450 ✔	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	1 3/4	20.00	3.32	91.0 K=1.00	2.4053	-26.49	59.04	0.449 [1] ✔
T2	160 - 140	2 1/2	20.00	3.31	63.5 K=1.00	4.9087	-95.00	164.54	0.577 [1] ✔
T3	140 - 120	3 1/2	20.00	3.32	45.5 K=1.00	9.6211	-197.17	372.07	0.530 [1] ✔
T4	120 - 90	4 1/4	30.11	7.53	85.0 K=1.00	14.1863	-226.89	376.30	0.603 [1] ✔
T5	90 - 60	4 1/2	30.11	7.53	80.3 K=1.00	15.9043	-259.51	446.66	0.581 [1] ✔
T6	60 - 30	4 3/4	30.11	7.53	76.1 K=1.00	17.7205	-297.54	522.30	0.570 [1] ✔
T7	30 - 0	4 3/4	30.11	7.53	76.1 K=1.00	17.7205	-337.39	522.30	0.646 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	7/8	6.00	2.91	143.8 K=0.90	0.6013	-4.05	6.57	0.616 [1] ✔
T2	160 - 140	1	5.99	2.87	124.1 K=0.90	0.7854	-6.94	11.53	0.602 [1] ✔
T3	140 - 120	1 1/8	6.00	2.83	108.5 K=0.90	0.9940	-11.01	18.91	0.582 [1] ✔
T4	120 - 90	L2 1/2x2 1/2x3/16	11.67	5.84	141.5 K=1.00	0.9023	-3.78	10.18	0.371 [1] ✔
T5	90 - 60	L3x3x3/16	15.39	7.67	154.3 K=1.00	1.0898	-5.36	10.34	0.518 [1] ✔
T6	60 - 30	L3 1/2x3 1/2x1/4	19.44	9.66	167.1 K=1.00	1.6900	-7.10	13.68	0.519 [1] ✔
T7	30 - 0	L4x4x5/16	23.66	11.77	178.5 K=1.00	2.4000	-8.52	17.01	0.500 [1] ✔

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	7/8	5.00	4.85	186.4 K=0.70	0.6013	-0.23	3.91	0.060 [1] ✔
T2	160 - 140	1	5.00	4.79	161.0 K=0.70	0.7854	-0.25	6.85	0.036 [1] ✔
T3	140 - 120	1 1/8	5.00	4.71	140.6 K=0.70	0.9940	-0.24	11.36	0.021 [1] ✔

[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	7/8	5.00	4.85	186.4 K=0.70	0.6013	-0.29	3.91	0.075 [1] ✔
T2	160 - 140	1	5.00	4.79	161.0 K=0.70	0.7854	-0.28	6.85	0.040 [1] ✔
T3	140 - 120	1 1/8	5.00	4.71	140.6 K=0.70	0.9940	-2.53	11.36	0.223 [1] ✔

[1] $P_u / \phi P_n$ controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	1 3/4	20.00	3.32	91.0	2.4053	23.46	108.24	0.217 [1] ✔
T2	160 - 140	2 1/2	20.00	3.31	63.5	4.9087	88.69	220.89	0.402 [1] ✔
T3	140 - 120	3 1/2	20.00	3.32	45.5	9.6211	186.22	432.95	0.430 [1] ✔
T4	120 - 90	4 1/4	30.11	7.53	85.0	14.1863	210.31	638.38	0.329 [1] ✔
T5	90 - 60	4 1/2	30.11	7.53	80.3	15.9043	235.56	715.69	0.329 [1] ✔
T6	60 - 30	4 3/4	30.11	7.53	76.1	17.7205	264.41	797.42	0.332 [1] ✔
T7	30 - 0	4 3/4	30.11	7.53	76.1	17.7205	293.47	797.42	0.368 [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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	7/8	6.00	2.91	159.8	0.6013	4.01	27.06	0.148 [1] ✔
T2	160 - 140	1	5.99	2.87	137.9	0.7854	6.85	35.34	0.194 [1] ✔
T3	140 - 120	1 1/8	6.00	2.83	120.6	0.9940	10.71	44.73	0.239 [1] ✔
T4	120 - 90	L2 1/2x2 1/2x3/16	11.67	5.84	92.1	0.5537	3.59	24.09	0.149 [1] ✔
T5	90 - 60	L3x3x3/16	15.39	7.67	99.7	0.6943	5.19	30.20	0.172 [1] ✔
T6	60 - 30	L3 1/2x3 1/2x1/4	19.44	9.66	108.0	1.0800	6.93	46.98	0.147 [1] ✔
T7	30 - 0	L4x4x5/16	23.66	11.77	115.3	1.5656	8.32	68.10	0.122 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	7/8	5.00	4.85	266.3	0.6013	0.21	27.06	0.008 [1] ✔
T2	160 - 140	1	5.00	4.79	230.0	0.7854	0.27	35.34	0.008 [1] ✔
T3	140 - 120	1 1/8	5.00	4.71	200.9	0.9940	0.27	44.73	0.006 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	180 - 160	7/8	5.00	4.85	266.3	0.6013	0.31	27.06	0.012 [1] ✔
T2	160 - 140	1	5.00	4.79	230.0	0.7854	0.29	35.34	0.008 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T3	140 - 120	1 1/8	5.00	4.71	200.9	0.9940	2.15	44.73	0.048 [1] ✔

[1] $P_u / \phi P_n$ controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	180 - 160	Leg	1 3/4	3	-26.49	59.04	44.9	Pass
		Diagonal	7/8	13	-4.05	6.57	61.6	Pass
		Top Girt	7/8	6	-0.23	3.91	6.0	Pass
		Bottom Girt	7/8	7	-0.29	3.91	7.5	Pass
T2	160 - 140	Leg	2 1/2	48	-95.00	164.54	57.7	Pass
		Diagonal	1	58	-6.94	11.53	60.2	Pass
		Top Girt	1	50	-0.25	6.85	3.6	Pass
		Bottom Girt	1	52	-0.28	6.85	4.0	Pass
T3	140 - 120	Leg	3 1/2	93	-197.17	372.07	53.0	Pass
		Diagonal	1 1/8	103	-11.01	18.91	58.2	Pass
		Top Girt	1 1/8	94	-0.24	11.36	2.1	Pass
		Bottom Girt	1 1/8	98	-2.53	11.36	22.3	Pass
T4	120 - 90	Leg	4 1/4	138	-226.89	376.30	60.3	Pass
		Diagonal	L2 1/2x2 1/2x3/16	141	-3.78	10.18	37.1	Pass
							40.1 (b)	
T5	90 - 60	Leg	4 1/2	165	-259.51	446.66	58.1	Pass
		Diagonal	L3x3x3/16	168	-5.36	10.34	51.8	Pass
							54.8 (b)	
T6	60 - 30	Leg	4 3/4	192	-297.54	522.30	57.0	Pass
		Diagonal	L3 1/2x3 1/2x1/4	195	-7.10	13.68	51.9	Pass
T7	30 - 0	Leg	4 3/4	219	-337.39	522.30	64.6	Pass
		Diagonal	L4x4x5/16	222	-8.52	17.01	50.0	Pass
							Summary	
						Leg (T7)	64.6	Pass
						Diagonal (T1)	61.6	Pass
						Top Girt (T1)	6.0	Pass
						Bottom Girt (T3)	22.3	Pass
						Bolt Checks	54.8	Pass
						RATING =	**64.6**	**Pass**

MATHCAD CALCULATION PRINTOUT

Existing 180 ft. Self Supported Tower Foundation Check

Customer Name: SBA Communications Corp
Customer Site Name: Niantic
Customer Site ID: CT09865-S-03

Carrier Name: AT&T
Carrier Site Name: CT 1270 Waterford - Route 156

Site Location:
Southwest School 51 Daniels Road
Waterford, CT

Latitude: 41.330264
Longitude:-72.166672

ACGI Job # 18-0486

(Previous Job ACGI Job # 16-3864)

Foundation check

-Foundation Factored Reactions-

As per TNX output results:

Total Shear	$S := 64 \cdot kips$	Compression on Pedestal:	$P_c := 341 \cdot kips$
Moment	$M := 6370 \cdot ft\_K$	Uplift on Pedestal:	$P_{up} := -296 \cdot kips$
Down load	$Pv := 64 \cdot kips$	Shear on Pedestal:	$Sh := 42 \cdot kips$

-Soil Properties- **Soil data is as per Geotechnical Report by Dr.Clearance Welti, P.E., P.C.Geotechnical Engineering (Ref: Geotechnical Study for proposed Cell Tower at Southwest School 51 Daniels Road, Waterford,CT -SBA Network Services, Inc. dated 10/23/2008)**

Allowable Bearing Capacity	$Brg_{allw} := 4000 \cdot psf$	$SF_b := 2$
Ultimate Bearing Capacity	$Brg_{ult} := Brg_{allw} \cdot SF_b = 8 \cdot ksf$	
Internal angle of friction for soil,	$\phi := 34 \cdot deg$	
Unit wt. of soil,	$\gamma_s := 0.110 \cdot kcf$	
Alowable Passive Pressure	see next page	
Cohesion of soil,	$c_u := 0 \cdot ksf$	
Friction Factor	$FF := 0.6$	
Depth to be neglected	$L_{neg} := 1 \cdot ft$	

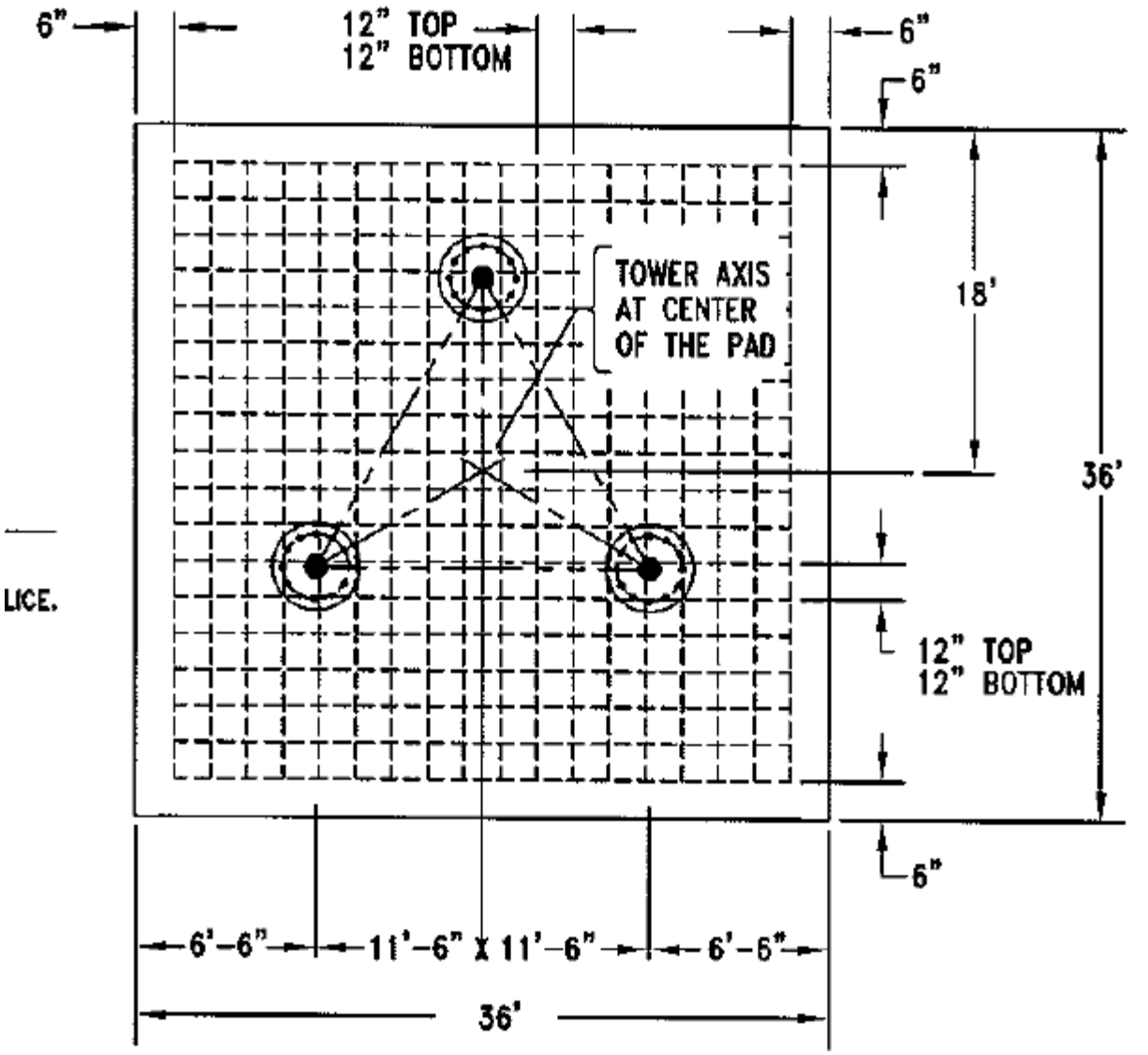
-Material Parameters-

Conforming to the design requirements as in ACI 318

Unit wt. of concrete,	$\gamma_c := 0.150 \cdot kcf$
Concrete compressive strength,	$f_c := 4000 \cdot psi$
Rebar yield strength,	$f_y := 60000 \cdot psi$

-Factor of Safety- **Assumed**

FS concrete weight	$FS_c := 1.25$
FS soil weight	$FS_s := 1.50$
FS passive pressure	$FS_{pp} := 2.00$
FS bearing pressure	$FS_{bp} := 2.00$



DIMENSIONS

Tower face width TWFW := 23·ft Tower ht. Tw_{ht} := 180·ft

The tower location is eccentric by L_{pe} := 0·ft with respect to the mat foundation center towards the base

Type of column, col.t=0 for circular,=1 for rectangular/square col_t := 0

(Existing MAT foundation data is as per original foundation design by Tower Innovations, Project Number 5210 dated 11/5/2008).

Depth of mat, D_f := 6.5·ft

Thickness of mat, T_f := 2·ft

Pedestal size, Ped_s := 3.5·ft No. of pedestals Nped := 3

Extension above the grade, E_g := 0.5·ft

Mat Dimensions, LxB L := 36·ft x B := 36·ft Brg_{allw} = 4·ksf

MAT CALCULATIONS

$K_p := \tan\left(45\cdot deg + \frac{\phi}{2}\right)^2$ $K_p = 3.537$

$P_{pave} := \frac{(D_f - T_f - L_{neg})\cdot K_p\cdot\gamma_s + (D_f - L_{neg})\cdot K_p\cdot\gamma_s}{2}$ $P_{pave} = 1.751\cdot ksf$

Safety against overturning and location of resultant on the base

Resisting Moments about mid axis parallel to base $Area_{ped} := if\left(col_t = 1\ , Ped_s^2\ , \frac{\pi}{4}\cdot Ped_s^2\right)$ $Area_{ped} = 9.621\,ft^2$

component	value, kips	lever arm, ft	resisting moment, ft-kips
1) Concrete wt.	$C_w := L\cdot B\cdot T_f\cdot(\gamma_c) + Area_{ped}\cdot\gamma_c\cdot(D_f + E_g - T_f)\cdot Nped$	$L_c := \frac{L}{2}$	$R_c := C_w\cdot L_c$
	$C_w = 410.448\cdot kips$	$L_c = 18\,ft$	$R_c = 7388.056\cdot ft\_K$
2) Soil wt.	$S_w := \left[L\cdot B\cdot(D_f - T_f) - Area_{ped}\cdot(D_f - T_f)\cdot Nped\right]\cdot\gamma_s$	$L_s := \frac{L}{2}$	$R_s := S_w\cdot L_s$
	$S_w = 627.233\cdot kips$	$L_s = 18\,ft$	$R_s = 11290.187\cdot ft\_K$
3) Wt. of soil wedge	$W_w := (D_f)\cdot\frac{1}{2}\cdot(D_f\cdot\tan(\phi))\cdot B\cdot(\gamma_s)$	$L_w := \left(L + D_f\cdot\frac{\tan(\phi)}{3}\right)$	$R_w := W_w\cdot L_w$
	$W_w = 56.426\cdot kips$	$L_w = 37.461\,ft$	$R_w = 2113.799\cdot ft\_K$
4) Passive pressure	$Pe_p := T_f\cdot B\cdot P_{pave}$	$L_p := \frac{T_f}{3}$	$R_p := Pe_p\cdot L_p$
	$Pe_p = 126.063\cdot kips$	$L_p = 0.667\,ft$	$R_p = 84.042\cdot ft\_K$
5) Vertical	$Pv = 64\cdot kips$	$L_v := \frac{L}{2}$	$R_v := Pv\cdot L_v$
$S_{w1} := L\cdot B\cdot D_f\cdot\gamma_s$	$S_{w1} = 926.64\cdot kips$ <--- for net calcs		
Total weight	$T_w := C_w + S_w + W_w + Pv$ $T_w = 1158.106\cdot kips$	$L_v = 18\,ft$	$R_v = 1152\cdot ft\_K$

Total resisting Moment= $M_r := \frac{R_c}{FS_c} + \frac{R_s}{FS_s} + \frac{R_w}{FS_s} + \frac{R_p}{FS_{pp}} + \frac{R_v}{FS_{bp}}$ $M_r = 15464.457\cdot ft\_K$

Overturning Moments

component	value, kips	lever arm, ft	Overturning Moment ft-kips
1) Moment on foundation due to eccentric location of tower	$Pv = 64\cdot kips$	$L_{pe} = 0$	$M_{pe} := L_{pe}\cdot Pv$ $M_{pe} = 0\cdot ft\_K$
2) Moment on foundation	-	-	$M = 6370\cdot ft\_K$
3) Moment due to horizontal shear	$S_t := S$	$L_{hs} := D_f + E_g$ $L_{hs} = 7\,ft$	$O_{hs} := L_{hs}\cdot S_t$ $O_{hs} = 448\cdot ft\_K$

Total Overturning Moment= $M_o := M + O_{hs} + M_{pe}$ $M_o = 6818\cdot ft\_K$

Check Safety Factor against Overturning about mid axis parallel to base

$SF := \frac{M_r}{M_o}$ $SF = 2.268 > 1.5$ **O.K!**

Calculate eccentricity, e

$e := \frac{M_o}{T_w}$ $e = 5.887\,ft$

Check location of eccentricity and determine pressure distribution under the mat

$L_{loc} := \frac{L}{6}$ $L_{loc} = 6\,ft$ For net bearing calcs $T_{w1} := S_{w1} + W_w$ $T_{w1} = 983.066 \cdot kips$

$P_{max1} := if\left[e \le L_{loc}, \frac{T_w}{L \cdot B} \cdot \left[1 + \left(6 \cdot \frac{e}{L}\right)\right], 4 \cdot \frac{T_w}{3 \cdot B \cdot (L - 2 \cdot e)}\right]$ $P_{max1} = 1.77 \cdot ksf$

$P_{max2} := \left(\frac{T_{w1}}{L \cdot B}\right)$ $P_{max2} = 0.759 \cdot ksf$ $P_{net} := P_{max1} - P_{max2}$ $P_{max} := P_{net}$

Net soil pressure, $P_{net} = 1.012 \cdot ksf$ < $Brg_{allw} = 4 \cdot ksf$ **O.K.!**

$P_{min} := if\left[e \le L_{loc}, \frac{T_w}{L \cdot B} \cdot \left[1 - \left(6 \cdot \frac{e}{L}\right)\right], 0 \cdot ksf\right]$ $P_{min} = 0.017 \cdot ksf$ $FS_{shear} := 2$

Check for horizontal shear $P_{hor} := \frac{(Pe_p + Pv \cdot FF)}{FS_{shear}}$

$P_{hor} = 82.232 \cdot kips$ > $S = 64 \cdot kips$ Since P.hor > S it is safe!

REINFORCED CONCRETE CHECK CALCULATIONS

General Input parameters

Concrete Cover $cc := 3.0 \cdot in$

Reduction factors as per respective ACI sections

$\phi_{shear} := 0.85$ as per ACI 9.3.2.3

$\phi_{compr} := 0.65$ as per ACI 9.3.2.2

$\phi_{axten} := 0.9$ as per ACI 9.3.2.2 a

Reinforced concrete load factor as per EIA 3.1.16 $RC_{fac} := 1.0$

(Loads already factored under TIA-222-G Code)

Check for wide beam or single shear in mat

Allowable shear stress in concrete for wide beam shear criteria=

$\nu_{wide} := 2\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi}$ $\nu_{wide} = 107.517\cdot psi$

Effective depth of steel= $d := T_f - cc$ $d = 21\cdot in$ $L_{eff} := if\left(e \le L_{loc}, L, L - 2\cdot e\right)$ $L_{eff} = 36\,ft$

$$dist := if\left[Nped = 3, \left(\frac{L}{2} - \frac{1}{3}\cdot\sin(60\cdot deg)\cdot TWFW - \frac{1}{2}\cdot Ped_s - d\right), \left(\frac{L}{2} - \frac{TWFW}{2} - \frac{1}{2}\cdot Ped_s - d\right)\right]$$

Factor load by RC $P_{maxf} := P_{max}\cdot RC_{fac}$ $P_{minf} := P_{min}\cdot RC_{fac}$

shear on the face of concrete=

$$Shear_{wide} := (dist)\cdot B\cdot\left[\frac{P_{maxf} + \left[P_{maxf} - \frac{P_{maxf} - P_{minf}}{L_{eff}}\cdot(dist)\right]}{2}\right] \qquad Shear_{wide} = 255.593\cdot kips$$

Area of concrete in shear= $A_{shear} := B\cdot d$ $A_{shear} = 9072\cdot in^2$

Shear stress acting on concrete fa $\nu_{act} := \frac{Shear_{wide}}{A_{shear}}$ $\nu_{act} = 28.174\cdot psi$

$\nu_{act} = 28.174\cdot psi$ < $\nu_{wide} = 107.517\cdot psi$ **O.K!**

Check for punching or two-way shear in mat

Calculate allowable shear stress in concrete for punching/two-way shear

$\beta := \frac{L}{B}$ $\beta = 1$ $\nu_{punch} := if\left[\left(2 + \frac{4}{\beta}\right)\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi} \le 4\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi}, \left(2 + \frac{4}{\beta}\right)\cdot\phi_{shear}\cdot\sqrt{f_c\cdot psi}, 4\cdot\phi_{shear}\cdot\sqrt{f_c}\right.$

$\nu_{punch} = 215.035\cdot psi$ $Area_{col} := if\left[col_t = 0, \frac{\pi}{4}\cdot\left(Ped_s + d\right)^2, \left(Ped_s + d\right)^2\right]$

$P_{avg} := \frac{P_{maxf} + P_{minf}}{2}$ $Peri_{col} := if\left[col_t = 0, 2\cdot\pi\cdot\frac{Ped_s + d}{2}, 4\cdot\left(Ped_s + d\right)\right]$

Factor vertical load $Pvf := RC_{fac}\cdot Pv$

Shear stress acting on the concrete face= $\nu_{act} := \frac{P_c - Area_{col}\cdot P_{avg}}{Peri_{col}\cdot d\cdot 4}$

$\nu_{act} = 19.841\cdot psi$ < $\nu_{punch} = 215.035\cdot psi$ **O.K!**

Check of Pedestal Column

$d_i := Ped_s - 2\cdot cc$ $d_i = 36\cdot in$

Effective diameter/size= $D_{eff} := Ped_s - cc\cdot 2$ $D_{eff} = 36\cdot in$ $h := Ped_s$ $h = 42\cdot in$

$D_{pier} := Ped_s$

$M_{col} := Sh\cdot\left(D_f - T_f + E_g\right)$ $M_{col} = 210\cdot ft\_K$ $\sigma_{bend} := 0.6\cdot f_y$ $\sigma_{bend} = 36000\cdot psi$

-Minimum required area of steel per ACI-

$Area_{stlmin} := 0.005\cdot D_{pier}^2$ $Area_{stlmin} = 8.82\cdot in^2$

-Rebar details-

Rebar size $d_{bar} := 7$

-Rebar details-

$No := (0 \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10 \quad 11 \quad 12 \quad 13 \quad 14 \quad 15 \quad 16 \quad 17 \quad 18)^T$

$d_b := (0 \quad 0 \quad 0 \quad 0.375 \quad 0.5 \quad 0.625 \quad 0.75 \quad 0.875 \quad 1.00 \quad 1.125 \quad 1.25 \quad 1.41 \quad 0 \quad 0 \quad 1.693 \quad 0 \quad 0 \quad 0 \quad 2.257)^T \cdot in$

$A_b := (0 \quad 0 \quad 0 \quad 0.11 \quad 0.20 \quad 0.31 \quad 0.44 \quad 0.60 \quad 0.79 \quad 1.00 \quad 1.27 \quad 1.56 \quad 0 \quad 0 \quad 2.25 \quad 0 \quad 0 \quad 0 \quad 4.00)^T \cdot in^2$

$B_1 := d_{bar}$ $d_{b_{B_1}} = 0.875 \cdot in$ Bar area= $Area_{abar} := A_{b_{B_1}}$ $Area_{abar} = 0.6 \cdot in^2$

$Lg_{dia} := d_{b_{B_1}}$

-Number of vertical rebars required-

$NRB := ceil\left(\frac{Area_{stlmin}}{Area_{abar}}\right)$ $NRB = 15$ $Area_{stluse} := Area_{abar} \cdot NRB$ $Area_{stluse} = 9 \cdot in^2$

Number of vertical rebars used: $NRB := 24$

Check pedestal in compression

Allowable compressive load on column ACI 10.15= $P_{comp} := \phi_{compr} \cdot 0.85 \cdot f_c \cdot Area$ $P_{comp} = 3061.828 \cdot kips$

$P_{comp} = 3061.828 \cdot kips$ > $P_c = 341 \cdot kips$ **O.K!**

Design of lateral ties for the pedestal

$TM := 4$ Tie bar diameter= $d_{b_{TM}} := \frac{1}{8} \cdot TM \cdot in$ $d_{b_{TM}} = 0.5 \cdot in$

Used #4 ties @ 12" O.C over complete pedestal length.

Check of mat footing

$C_{wped} := Area_{ped} \cdot \gamma_c \cdot (D_f + E_g - T_f) \cdot Nped$ Wt. of concrete pedestals

$P_{upnet} := P_{up} - \frac{C_{wped} + S_w \cdot 0.95}{Nped}$ $P_{upnet} = -501.84 \cdot kips$ Net uplift acting at mat level creating bending moment in the slab. Soil wt. reduced by 5 % to account for variation in compaction . ACI 9.3.2.2

Calculate bending moment for mat design:

$\phi_{bend} := 0.9$ $Langle := if(Nped = 3, \sin(60 \cdot deg), 1)$

$\beta_1 := if\left[f_c \le 4000 \cdot psi, 0.85, if\left[f_c \ge 8000 \cdot psi, 0.65, 0.85 - \left(\frac{f_c}{psi} - 4000\right) \cdot 0.05\right]\right]$ ACI 10.2.7.3

$B_{mo} := RC_{fac} \cdot \left[(TWFW \cdot P_{upnet}) \cdot Langle + S_t \cdot (D_f + E_g)\right]$ $B_{mo} = -9547.933 \cdot ft\_K$

$B_{mo1} := \frac{P_{max} - P_{min}}{(L - 2 \cdot e) \cdot 2} \cdot \left(TWFW \cdot Langle \cdot \frac{1}{3} + \frac{Ped_s}{2}\right) \cdot \left[\left[(L - 2 \cdot e) - \left(TWFW \cdot Langle \cdot \frac{1}{3} + \frac{Ped_s}{2}\right)\right]^2 \cdot 0.5\right] \cdot B$

$W_e := TWFW \cdot Langle + Ped_s$ $W_e = 23.419\,ft$ Reinforcement middle bandwidth. $B_{mo1} = 777769.384\,ft \cdot lb$

required R_u $R_u := \frac{B_{mo}}{\phi_{bend} \cdot B \cdot d^2}$ $R_u = -668.23 \cdot psi$ $m := \frac{f_y}{\beta_1 \cdot f_c}$ $m = 17.647$

required

$\rho := \frac{1}{m} \cdot \left[1 - \sqrt{1 - \left(\frac{2 \cdot m \cdot R_u}{f_y}\right)}\right]$ $\rho = -0.01$ required area of steel for mat=

minimum area of steel required, $Ast_f := \rho \cdot B \cdot d$ $Ast_f = -92.682 \cdot in^2$

$Ast_{minf} := .0018 \cdot B \cdot T_f$ $Ast_{minf} = 18.662 \cdot in^2$ per ACI 10.5.3 & 7.12

$Ast_{fuse} := if(Ast_f > Ast_{minf}, Ast_f, Ast_{minf})$ $Ast_{fuse} = 18.662 \cdot in^2$

Bar size is: $f_{bar} := 9$ $f_{dia} := \frac{f_{bar}}{8} \cdot in$ $f_{dia} = 1.125 \cdot in$

Bar area= $f_{abar} := \pi \cdot \frac{f_{dia}^2}{4}$ $f_{abar} = 0.994 \cdot in^2$

Number of bars required= $Nf_{bars} := if\left(Ast_{fuse} = Ast_{minf}, \frac{Ast_{fuse}}{f_{abar}}, \frac{Ast_{fuse}}{f_{abar}} \cdot \frac{L}{W_e}\right)$ $Nf_{bars} = 18.775$

Used $Nf_{bars} := 36$

Used($Nf_{bars} = 36$)# $f_{bar} = 9$ bars > Number of bars required= 18.8 **O.K.!**

Summary

-Foundation Factored Reactions-

Shear $S = 64 \cdot kips$

Down load $Pv = 64 \cdot kips$ (Weight)

Uplift load $P_{up} = -296 \cdot kips$

Moment; $M = 6370 \cdot ft \cdot kip$

Size of Mat

$L = 36\,ft$ $B = 36\,ft$

Depth of base of mat $D_f = 6.5\,ft$ Thickness of Mat $T_f = 2\,ft$

Pedestal size $Ped_s = 3.5\,ft$

The tower location is eccentric by $L_{pe} = 0$ with respect to the mat foundation center towards the base

Stability Calculations

Safety Factor against Overturning	$SF = 2.268$	>	1.5	$\frac{1.5}{SF} = 66.132 \cdot \%$	**O.K.!**
Net soil pressure,	$P_{net} = 1.012 \cdot ksf$	<	$\frac{Brg_{allw}}{FS_{bp}} = 2 \cdot ksf$	$\frac{P_{net}}{\left(\frac{Brg_{allw}}{FS_{bp}}\right)} = 50.593 \cdot \%$	**O.K.!**
Check for horizontal shear	$P_{hor} = 82.232 \cdot kips$	>	$S = 64 \cdot kips$	$\frac{S}{P_{hor}} = 77.829 \cdot \%$	**O.K.!**

EXISTING 180' SELF SUPPORT TOWER ANCHOR BOLT CHECK

REACTIONS ON THE FOUNDATION

As per Tnx output (see attached)

Down load; $Pv := 341 \cdot kips$ Shear; $V_u := 42 \cdot kips$

Uplift load; $P_{up} := 296 \cdot kips$ Moment; $M := 0 \cdot kips \cdot ft$

Anchor Rod Data is as per tower design by Tower Innovations, Project No. 5210 dated 11/05/2008.

Number of Anchor Rods: $N_{anchors} := 8$

Diameter of Anchors: $D_{anchors} := 1.5in$ $n := 6in^{-1}$

Area of anchor bolts $A_b := \frac{\pi \cdot \left(D_{anchors}^{2}\right)}{4} = 1.767 \cdot in^2$

Net Tensile Area of Anchors: $A_{net} := \frac{\pi}{4} \cdot \left(D_{anchors} - \frac{0.9743}{n}\right)^2 = 1.405 \cdot in^2$

Minimum Yield Stress $F_{Yanchors} := 105ksi$ (Assume ASTM A687)

Ultimate Tensile Stress: $F_{Uanchors} := 150ksi$

Saftey Factor for Anchor: $\phi_t := 0.8$ (Section 4.9.9, TIA-222-G Addendum 2)

Allowable Axial Load per Anchor: $T_{cap} := \phi_t \cdot F_{Uanchors} \cdot A_{net}$

$T_{cap} = 168.63 \cdot kips$

Interaction Equation for Anchor Rods as per Section 4.9.9, TIA-222-G Addendum 1 and Figure 4.4

For detail type (D) as per Figure 4.4 $\eta := 0.50$

$P_u := if\left(\eta > 0.5, P_{up}, Pv\right) = 341 \cdot kips$

Maximum Load on Anchor: $T_{max} := \frac{P_u + \frac{V_u}{\eta}}{N_{anchors}}$

$T_{max} = 53.125 \cdot kips$

Anchor Rod Capacity: $\frac{T_{max}}{T_{cap}} = 31.504 \cdot \%$ OK!

$Anchor\_Rod\_Check := if\left(T_{max} < T_{cap}, "OK", "Not OK"\right)$

Anchor_Rod_Check = "OK"

For detail type (d), when the clear distance from top of concrete to the bottom of leveling nut exceeds 1.0 times the diameter of the anchor rod, the interaction equation as per section 4.9.9.,TIA-222-G Addendum 1 shall also be satisfied.

Clear distance > $D_{anchors}$ We need to check!

$I_{ar} := 2.5in$ (estimated)

$M_u := 0.65 \cdot I_{ar} \cdot V_u = 5.688 \cdot kips \cdot ft$

$\frac{V_u}{N_{anchors}} = 5.25 \cdot kips$ $\frac{P_u}{N_{anchors}} = 42.625 \cdot kips$ $\frac{M_u}{N_{anchors}} = 0.711 \cdot kips \cdot ft$

Design Shear Strength of anchor rod $\phi_v := 0.75$

$\phi R_{nv} := \phi_v \cdot 0.45 \cdot F_{Uanchors} \cdot A_b = 89.462 \cdot kips$

Design Tensile Strength of anchor rod $\phi_t = 0.8$

$\phi R_{nt} := \phi_t \cdot F_{Uanchors} \cdot A_{net} = 168.63 \cdot kips$

Design Flexural Strength of anchor rod $\phi_f := 0.9$

M.n = M.p = FyZ <= 1.6*FySy (AISC Specifications F11)

$S_y := \pi \cdot \frac{\left(D_{anchors} - \frac{0.9743}{n}\right)^3}{32} = 1.36 \times 10^{-4} \cdot ft^3$ $Z := \frac{\left(D_{anchors} - \frac{0.9743}{n}\right)^3}{6} = 2.308 \times 10^{-4} \cdot ft^3$

$\phi R_{nm} := \min\left(\phi_f F_{Yanchors} \cdot Z, \phi_f \cdot 1.6 \cdot F_{Yanchors} \cdot S_y\right) = 2.961 \cdot kips \cdot ft$

$$Bending := \left(\frac{\frac{V_u}{N_{anchors}}}{\phi R_{nv}}\right)^2 + \left(\frac{\frac{P_u}{N_{anchors}}}{\phi R_{nt}} + \frac{\frac{M_u}{N_{anchors}}}{\phi R_{nm}}\right)^2 = 0.246$$

Bending_Check := if(Bending > 1.05, "NOT OK" , "ACCEPTABLE")

Bending_Check := if(Bending < 1, "OK" , Bending_Check)

Bending_Check = "OK"

Summary

-Foundation Reactions from Tower Base-

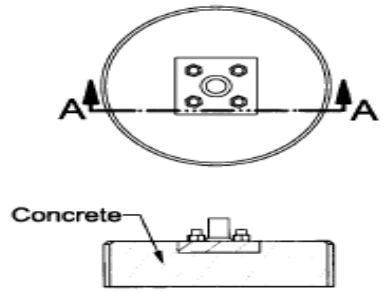
Shear	$V_u = 42 \cdot kips$
Down load	$Pv = 341 \cdot kips$
Uplift load	$P_{up} = 296 \cdot kips$
Moment	$M = 0 \cdot ft \cdot kip$

Anchor Rod Check $T_{max} = 53.125 \cdot kips$ < $T_{cap} = 168.63 \cdot kips$

Anchor_Rod_Check := if$\left(T_{max} < T_{cap}, \text{"OK"}, \text{"Not OK"}\right)$

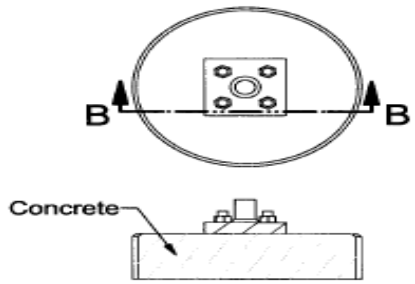
Anchor_Rod_Check = "OK"

ANSI/TIA-222-G



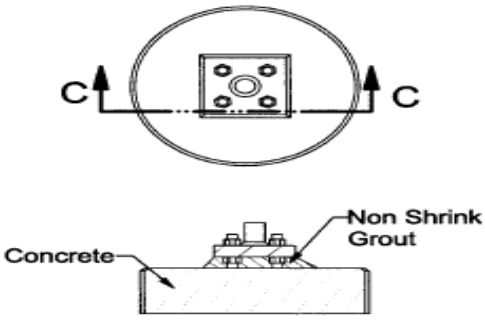
SECTION A-A

Detail Type (a)



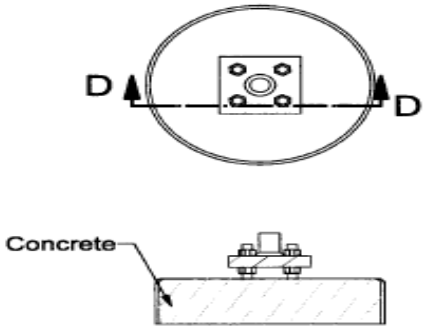
SECTION B-B

Detail Type (b)



SECTION C-C

Detail Type (c)



SECTION D-D

Detail Type (d)

(See Note 1 below)

Note:

1. When clear distance from top of concrete to the bottom face of the leveling nut exceeds 1.5 times the diameter of the anchor rod, bending of the anchor rod shall be considered (refer to 4.9.9).

Figure 4-4: Anchor Rod Detail Types

4.9.9 Anchor Rods

For anchor rods, the following interaction equation shall be satisfied:

$$\left(\frac{P_u + \frac{V_u}{\eta}}{\phi R_{nt}} \right) \leq 1$$

where:

$\phi = 0.80$

P_u = tension force for detail types (a), (b) & (c) and larger of compression or tension force for type (d) as depicted in Figure 4-4.

V_u = shear force (direct shear and torsion components) corresponding to P_u

R_{nt} = nominal tensile strength of anchor rod as per 4.9.6.1

η = 0.90 for detail type (a)
= 0.70 for detail type (b)
= 0.55 for detail type (c)
= 0.50 for detail type (d)

For detail type (d), when the clear distance from the top of concrete to the bottom leveling nut exceeds 1.0 times the diameter of the anchor rod, the following interaction equation shall also be satisfied:

$$\left(\frac{V_u}{\phi R_{nv}} \right)^2 + \left(\left| \frac{P_u}{\phi R_{nt}} \right| + \left| \frac{M_u}{\phi R_{nm}} \right| \right)^2 \leq 1$$

where:

M_u = bending moment corresponding to V_u
= 0.65 $l_{ar} V_u$

l_{ar} = length from top of concrete to bottom of anchor rod leveling nut

Addendum 1

ϕR_{nv} = design shear strength of anchor rod as per 4.9.6.3

ϕR_{nm} = design flexural strength of anchor rod in accordance with 4.7.1 using the tensile root diameter for the determination of z

d_{rt} = tensile root diameter of rod, in [mm]
= d – 0.9743/n inches
= d – 0.9382(p) mm

d = nominal rod diameter, in [mm]

n = number of threads per inch

p = pitch of threads, mm

4.9.6.3 Design Shear Strength

The design shear strength of a bolt, ϕR_{nv}, shall be taken as:

$\phi = 0.75$

(a) When threads are excluded from the shear plane:
$R_{nv} = 0.55\ F_{ub}\ A_b$

(b) When threads are included in the shear plane:
$R_{nv} = 0.45\ F_{ub}\ A_b$

where:

F_{ub} = Specified minimum tensile strength of bolt

A_b = nominal unthreaded area of bolt

4.7.1 Solid Round Members

For solid round members, M_n shall be determined as follows:

$M_n = F_y'Z$

where:

F_y' = effective yield stress as determined from 4.5.4.1

Z = plastic section modulus

4.5.4.1 Effective Yield Stress

For 60^O and 90^O angle members, the effective yield stress for axial compression, F'_y, shall be determined as follows:

$w/t \le 0.47\sqrt{\frac{E}{F_y}}$	$F'_y = F_y$
$0.47\sqrt{\frac{E}{F_y}} < w/t \le 0.85\sqrt{\frac{E}{F_y}}$	$F'_y = [1.677\text{-}0.677\left(\frac{w/t}{0.47\sqrt{E/F_y}}\right)]\ F_y$
$0.85\sqrt{\frac{E}{F_y}} < w/t \le 25$	$F'_y = [0.0332\ \pi^2\ E/(w/t)^2]$

The width to thickness ratio (w/t) shall not exceed 25 for angle members (refer to Figure 4-3).

For solid round members, the effective yield stress, F'_y, shall be equal to F_y.

For tubular round members, the diameter to thickness ratio (D/t) shall not exceed 400. The effective yield stress, F'_y, shall be determined as follows:

$D/t \le 0.114\ E/F_y$	$F'_y = F_y$
$0.114\ E/F_y < D/t \le 0.448\ E/F_y$	$F'_y = \left(\frac{0.0379E}{(D/t)F_y} + \frac{2}{3}\right)F_y$
$0.448\ E/F_y < D/t \le 400$	$F'_y = \frac{0.337E}{(D/t)}$

51 DANIELS AVENUE

Location	51 DANIELS AVENUE	**Mblu**	143/ / 1783/ /
Acct#	143	**Owner**	WATERFORD TOWN OF
Assessment	$2,924,780	**Appraisal**	$4,178,220
PID	1783	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$2,498,220	$1,680,000	$4,178,220
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$1,748,780	$1,176,000	$2,924,780

Parcel Addreses

Additional Addresses		
Address	**City, State Zip**	**Type**
51 DANIELS AVENUE		Primary

Owner of Record

Owner WATERFORD TOWN OF
Co-Owner SOUTHWEST SCHOOL

Sale Price $0
Certificate
Book & Page 107/ 567
Sale Date 09/15/1956
Instrument 00

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
WATERFORD TOWN OF	$0		107/ 567	00	09/15/1956

Building Information

Building 1 : Section 1

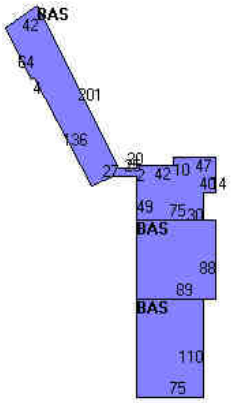
Year Built: 1960
Living Area: 29,626
Replacement Cost: $3,608,779
Building Percent Good: 65

Building Photo

Building Attributes	
Field	**Description**
STYLE	School
MODEL	Comm/Ind
Grade	Above Ave
Stories:	1.00
Occupancy	1
Exterior Wall 1	Brick Veneer
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Rolled
Interior Wall 1	Typical
Interior Wall 2	
Interior Floor 1	Comp Tile
Interior Floor 2	
Heating Fuel	Oil
Heating Type	Hot Water
% Central Air	0
Foundation	Poured Conc
Bldg Use	Exempt Comm
Total Rooms	0
Total Bedrms	0
Total Fixtures	0
% Wet Sprinkler	
% Dry Sprinkler	
1st Floor Use	
Heat/AC	Typical
Frame Type	MASONRY
Baths/Plumbing	AVERAGE
% Finished	100
Class	C
Wall Height	10

(http://images.vgsi.com/photos/WaterfordCTPhotos//\00\01\54/22.jpg)

Building Layout



(http://images.vgsi.com/photos/WaterfordCTPhotos//Sketches/1

Building Sub-Areas (sq ft)			Legend
Code	**Description**	**Gross Area**	**Living Area**
BAS	First Floor	29,626	29,626
		29,626	29,626

Extra Features

Extra Features				Legend
Code	**Description**	**Size**	**Value**	**Bldg #**
ELV1	ELEVATOR PASS	1 STOPS	$16,250	1
	RADIO TOWER	5000 UNITS	$40,630	1

Land

Land Use

Land Line Valuation

Use Code	920	**Size (Acres)**	20
Description	Exempt Comm	**Frontage**	0
Zone	R-40	**Depth**	0
Neighborhood	800	**Assessed Value**	$1,176,000
Alt Land Appr	No	**Appraised Value**	$1,680,000
Category			

Outbuildings

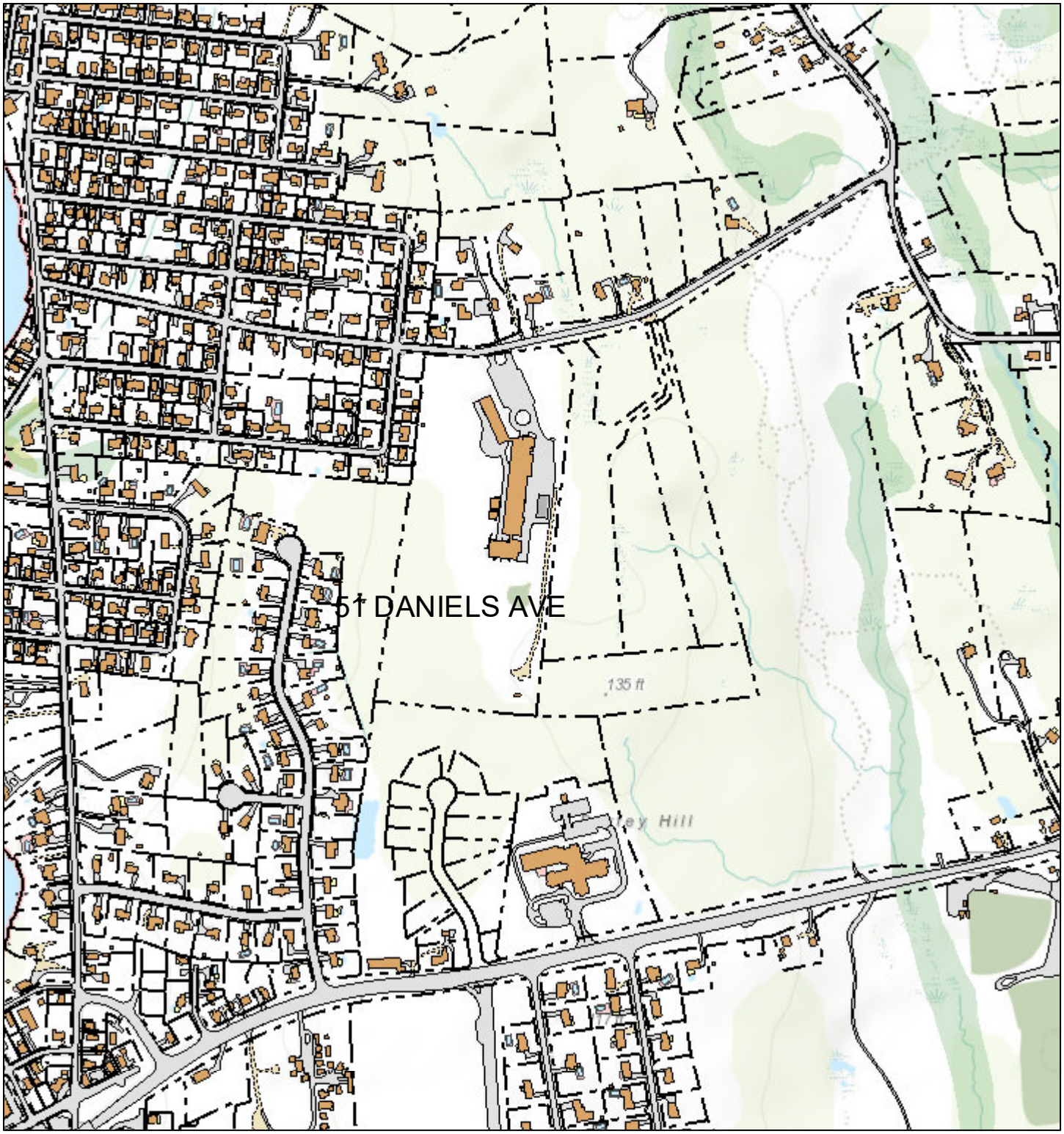
Outbuildings						Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Value**	**Bldg #**
PAV1	Paving	AS	Asphalt	42000 S.F.	$78,750	1
SHD1	Shed	FR	Frame	400 S.F.	$6,750	1
SHD1	Shed	FR	Frame	200 S.F.	$3,380	1
SHD1	Shed	FR	Frame	400 S.F.	$6,750	1

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$2,294,830	$1,680,000	$3,974,830
2013	$2,294,830	$1,680,000	$3,974,830
2010	$0	$0	$6,099,657

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2016	$1,606,400	$1,176,000	$2,782,400
2013	$1,606,400	$1,176,000	$2,782,400
2010	$0	$0	$4,269,760

ArcGIS Web Map



2 / 22 / 2018 12 : 21 : 56 PM

1:9,028

0 0.075 0.15 0.3 mi

0 0.075 0.15 0.3 km

Property Information

Property Line

Road Name

Townline

Road

Patios

Parking Lot

Driveway

PAVED

PAVED ISLAND

UNPAVED

Docks

Decks

Buildings

Wetland_Soils

Tidal Wetlands

VOL: 1047 PG: 252
Inst: 00082034

FIFTEEN ROPE FERRY ROAD

WATERFORD, CT 06385-2886

TOWN OF WATERFORD
PLANNING & ZONING COMMISSION

NOTICE OF GRANT OF A SPECIAL PERMIT

This is to certify that on November 24, 2008, the Waterford Planning & Zoning Commission granted Special Permit #PZ2008-033.

Owner of Record: Town of Waterford

Address: 51 Daniels Avenue

Description of Premises:

As recorded in Volumes 107, Page(s) 567 of the Waterford Land Records.

Nature of Special Permit: Special Permit and site plan approval granted for erection of a telecommunications tower

Applicable Zoning Regulations: Sections 5, 22 & 23.

Permit findings, stipulations and conditions are filed in the office of the Town Clerk as stated in the minutes of the Planning & Zoning Commission meeting of November 24, 2008.

PLANNING & ZONING COMMISSION

By: Dawn Choisy
Dawn Choisy
Recording Secretary
Planning & Zoning Commission

This notice is to be recorded on the land records of the Town of Waterford, indexed in the Grantor's Index under the name of the record owner.

RECEIVED FOR RECORD
Dec 12,2008 09:07A
ROBERT M. NYE
TOWN CLERK
WATERFORD, CT

SPECIAL PERMIT – 51 Daniels Avenue Telecommunications Tower

APPLICATION: #PZ2008-033 - Request of the Town of Waterford by its agent SBA Towers II, LLC, applicant; Town of Waterford, owner, Christopher B. Fisher, Esq. agent for special permit and site plan approval to locate a communications tower at 51 Daniels Avenue, R-40 zone, in accordance with Sections 5.2.1, 5.2.2, 22 and 23 of the Zoning Regulations and as shown on plans entitled "Site Name: Southwest School, Site Address: 51 Daniels Avenue, Waterford, CT 06385" dated July 28, 2008 with revisions to September 13, 2008.

HEARING DATE: November 10, 2008

PUBLIC HEARING NOTICE PUBLISHED: New London Day, 10/27 & 11/3/2008

NOTIFICATION OF PROPERTY OWNERS WITHIN 150':

PROJECT DESCRIPTION: Construct 180' lattice tower with antennae to a total height of 195' for the purpose of providing a municipal facility to accommodate the Town's public safety radio system. Project also includes leasing an area 100' by 100' within which will be a 70' x 70' fenced compound for the tower and equipment required to operate the radio system and future collocating telecommunication uses. Improvements are planned to provide vehicular access to the leased area, by way of a 30' wide utility and access easement as detailed on the site plan. Temporary construction easement areas will also be necessary as detailed on the site plan.

FINDINGS: SECTION 23.5

23.5.1 Compliance with the Adopted Land Use Plan and the Zoning Regulations

Sections 5.2.4 Municipal Facilities and 5.2.1 Towers exceeding 40' in height are allowed subject to the issuance of a special permit. The police radio system is considered a necessary municipal improvement as brought forward by the Emergency Management Advisory Council. The tower is one of five locations from which the radio system will operate. The Commission has previously approved the Rogers Hill location and the others involve collocation on existing or reconstructed locations.

The 1998 Plan of Preservation, Conservation and Development, (1998 Plan) Chapter 12 INFRASTRUCTURE, Other Utilities, (p84) Recommends:

"Consider other utility improvements as well" ...

"To encourage economic development and to best meet the needs of local residents and businesses, the Town should encourage a program of continual improvement of: Communications services and capacity."

"The Town should continue to carefully review the evolution of telecommunications technology (such as cellular communications from towers) in order to provide for the reasonable needs of residents and businesses while considering the overall impact on the community."

The Commission finds that the tower as proposed is consistent with the 1998 Plan as a necessary public safety infrastructure project with secondary benefits for users of cellular communications.

23.5.2 ORDERLY DEVELOPMENT:

Access to the site and the location of the tower have been placed to minimize their impact on the current operation of the school and potential adaptive reuse of this site since it is due to close upon completion of the new elementary school project. The leased area has been set back from the property line in accordance with current bulk requirements.

23.5.3 PROPERTY VALUES AND CHARACTER:

The School property, and two open space parcels are adjacent to the site. The millstone station and power transmission lines emanating there from are significant part of the visual landscape. The development of this site for the use intended will not have an impact on property values.

23.5.4 PUBLIC SAFETY:

Adequate access for police and emergency vehicles is provided, to the extent necessary.

23.5.5 TRAFFIC CONSIDERATIONS:

During construction adequate provisions for vehicular access to the site will be provided and separated from the school use. Post construction access will be intermittent and service related. Access at the entrance off of Daniels Ave. is considered adequate for the minimal increase in traffic.

23.5.6 LANDSCAPING AND BUFFERS:

30 feet of the leased area on three sides will be landscaped to minimize the visibility of any of the equipment shelter(s) and fencing within the compound. The design of the tower is consistent with others approved by this commission with the knowledge that they can not be fully screened. Based on the renderings provided the tower height and design is acceptable.

23.5.7 RELATIONSHIP TO UTILITY SYSTEMS, DRAINAGE AND IMPACT ON COMMUNITY FACILITIES.

The project will not require water or sewerage service either public or on site. The majority of the site will be pervious and therefore drainage improvements will be minor. The tower is an essential part of the public safety radio system and as such will have a positive impact on communications necessary to protect the public.

23.5.8 COMPLIANCE WITH THE ZONING REGULATIONS:

The proposed site plan conforms to the requirements of the Zoning Regulations. The development anticipates collocation of telecommunications users which are not subject to Zoning Compliance, but rather the requirements of the CT Siting Council.

MODIFICATIONS & CONDITIONS:

1. Revisions as detailed in 11/5/2008 correspondence from Christopher Fisher, Esq. to sheets Z-3 and Z-8 dated 10/30/08, except as modified herein.
2. Add temporary construction fencing along the western side of the access drive filling in where it is not currently proposed from its current southern terminus to the compound.
3. A permanent 4 foot high chain link fence is to be installed upon completion of the project and removal of the construction fencing.
4. Based on the need of the Town to expedite the construction of the tower, a temporary use permit may be issued in lieu of completion of all site work as determined by the Commission's agent, upon such guarantees that it will be completed as soon as weather permits. Such use may not proceed if the site and access drive are not maintained in compliance with the erosion control plan and regulations.
5. The Tower shall not be considered for co-location until the Town has completed construction and has installed all its antennae and equipment.

COMMISSION ACTION:

The Commission approves application #PZ2008-033 for special permit and site plan approval. All potential adverse impacts have been addressed as modified herein. Approval pursuant to CGS 8-24 is also included in this action.

MODIFICATION, REVISIONS, EXTENSIONS:

All revisions, extensions and modifications to any items, conditions or stipulations in this permit shall be governed by the provisions of section 23.9 of the Waterford Zoning Regulations.

VIOLATIONS:

Any violations of the findings, stipulations or conditions of this permit shall be subject to section 23.8 of the Waterford Zoning Regulations.

LIST OF EXHIBITS:

EXHIBIT A -	Application and support materials.
EXHIBIT B -	Notice of Public Hearing advertised in the Day newspaper on 10/27/08 and 11/3/08
EXHIBIT C -	Notification letter to applicant, along with certificates of mailing.
EXHIBIT D -	Staff and agency condensed comment sheet.
EXHIBIT E -	Plan titled "Southwest School, 51 Daniels Avenue, Waterford, CT 06385" dated 9/13/08.
EXHIBIT F -	Letter dated November 5, 2008 from Christopher B. Fisher, Cuddy & Feder, to the Planning and Zoning Commission addressing Staff and agency comments, with attachments.
EXHIBIT G -	e-mail correspondence from Jonathan Scott regarding the impact of the proposed tower on the view from his future home.
EXHIBIT H -	Map of areas currently covered by communication system.
EXHIBIT I -	Series of photographs submitted by Michael Bonanno

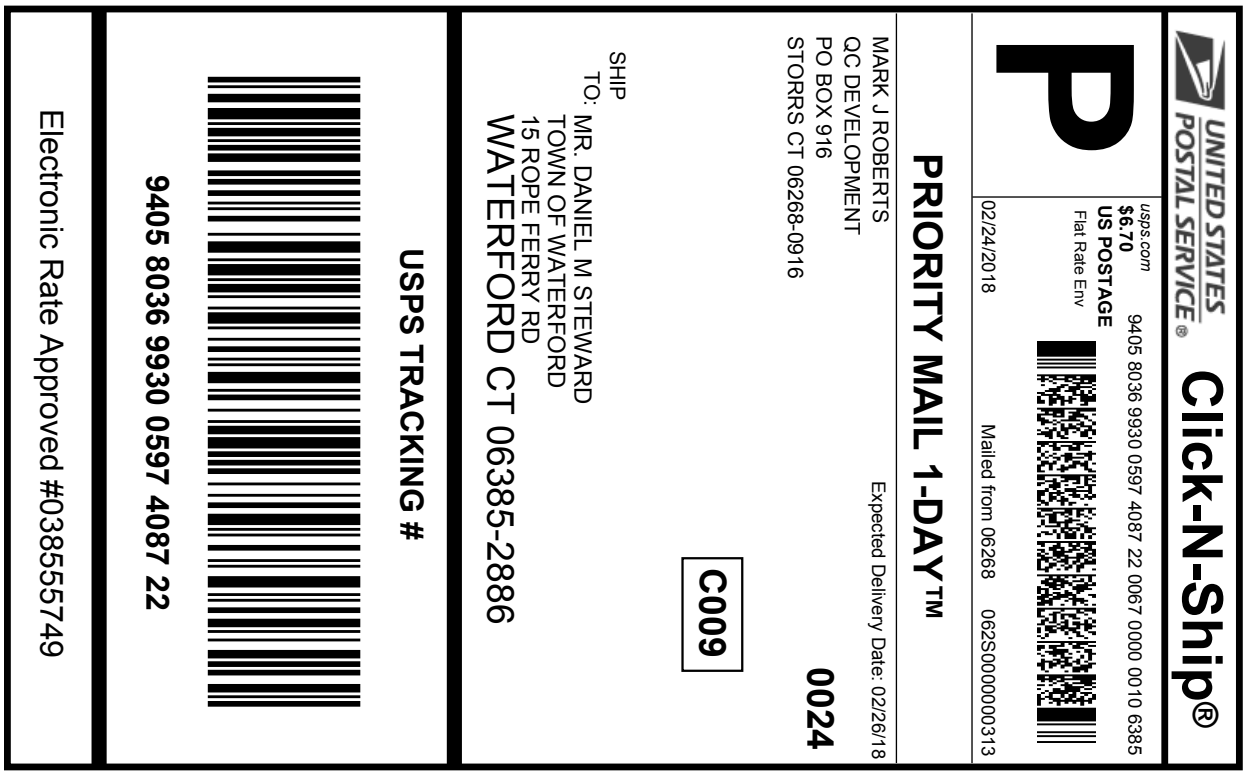
CERTIFICATION:

This is to certify that this Special Permit was approved on November 24, 2008.

Waterford Planning and Zoning Commission

Dawn Choisy

Recording Secretary



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Ship Date:	02/24/2018
Expected Delivery Date:	02/26/2018
Insured Value:	$50.00

Priority Mail® Postage:	**$6.70**
Insurance Fee	**$0.00**
Total	**$6.70**

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QC DEVELOPMENT
PO BOX 916
STORRS CT 06268-0916

To: MR. DANIEL M STEWARD
TOWN OF WATERFORD
15 ROPE FERRY RD
WATERFORD CT 06385-2886

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