NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

Northeast Site Solutions
Victoria Masse
420 Main Street #2, Sturbridge, MA 01566
860-306-2326
victoria@northeastsitesolutions.com

November 9, 2020

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification
99 Cedarwood Lane, Newington CT 06111
Latitude: 41.69428000
Longitude: -72.70856000
T-Mobile Site#: CT11174A_Anchor

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 163-foot level of the existing 170-foot guyed tower at 99 Cedarwood Lane, Newington CT. The 170-foot tower and property are both owned by the Callahan Acers LLC. T-Mobile now intends to replace six (6) of its existing antennas with three (3) new 2500 MHz antenna and three (3) new 600/700/1900/2100 MHz antenna. The new antennas would be installed at the 163-foot level of the tower.
Planned Modifications:
Remove: (13) 1-5/8" Coax
(3) TMA

Remove and Replace:
(3)APX16DWV Antenna (REMOVE) - (3) AIR6449 B41 Antenna 2500 MHz (REPLACE)
(2) LNX6515 Antenna (REMOVE) – (3) APXVAARR24_43U-NA20- 600/700/1900/2100 MHz (REPLACE)

Install New:
(3) RRU 4415 B25
(3) RRU 4449 B12
(3) Diplexers
(3) Hybrid Lines

Existing to Remain:
(3) AIR32 KRD901146-1 B66A_B2A 1900/2100 MHz
(6) 1-5/8" Coax
(1) Fiber Hybrid Line
(3) Twin TMA

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This facility was approved by the Town of Newington –on June 25, 1975. The approval did not come with conditions. Please see attached correspondence from previous Town Planner, Craig Minor.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to Mayor Beth DelBuono, Elected Official and Renata Bertolli, Town Planner for the Town of Newington, as well as the property owner and 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, T-Mobile respectfully submits that the proposed modifications to the above referenced telecommunications facility constitute an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Victoria Masse
Mobile: 860-306-2326
Fax: 413-521-0558
Office: 420 Main Street, Unit 2, Sturbridge MA 01566
Email: victoria@northeastsitesolutions.com

NORTHEAST SITE SOLUTIONS
Turnkey Wireless Development

Attachments
cc: Mayor Beth DelBuono - elected official
Renata Bertolli – Town Planner
Callahan Acres LLC - as property and tower owner

NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST. BUILDING #4, 2nd FLOOR
Sturbridge, MA 01566

WEBSTER BANK
51-7010/2111

4135

10/14/2020

PAY TO THE ORDER OF Connecticut Siting Council

$ *625.00

EXACTLY SIX HUNDRED TWENTY-FIVE DOLLARS

DOLLARS

Photo Safe Deposit®

Details on Back.

Connecticut Siting Council
10 Franklin Square
New Britain CT 06051

MEMO

AUTHORIZED SIGNATURE

⑈004135⑈ ⑆211170101⑆10 0010608887⑈

Check#: 4135 **Date: 10/14/2020** **Vendor#: 10023 Connecticut Siting Co** **Check Total: *625.00** 4135

Invoice#	*Invoice Date*	*Job/Description*	*Balance*	*Retain*	*Discount*	*This Check*
CT11174A Zoning	10/14/2020	60 TMO Anchor L700 4	625.00			625.00

Check#: 4135 **Date: 10/14/2020** **Vendor#: 10023 Connecticut Siting Co** **Check Total: *625.00** 4135

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CT11174A Zoning	10/14/2020	60 TMO Anchor L700 4	625.00			625.00

Exhibit A

Kyle Richers

From: Minor, Craig <CMinor@NewingtonCT.Gov>
Sent: Tuesday, June 14, 2016 2:08 PM
To: krichers@transcendwireless.com
Subject: RE: 99 Cedarwood Lane -- T-Mobile Tower -- CT11174A

Flag Status: Flagged

Kyle:

There is no "original" approval letter in our files from the Town to T-Mobile's predecessor, Omnipoint. The only letter we have that might be relevant is the 1975 site plan approval letter from the Town Plan and Zoning Commission to the property owner to build the tower.

Please let me know if I can be of any other assistance.

Craig Minor, AICP
Town Planner

From: Kyle Richers [mailto:krichers@transcendwireless.com]
Sent: Tuesday, June 07, 2016 9:13 AM
To: krichers@transcendwireless.com; Minor, Craig <CMinor@NewingtonCT.Gov>
Subject: RE: 99 Cedarwood Lane -- T-Mobile Tower -- CT11174A

Hi Craig,

Just wanted to follow up with you on our conversation yesterday, can you confirm that the Town of Newington does not have a copy of the original approval for the T-Mobile 99 Cedarwood Lane site?

Thanks

From: Kyle Richers [mailto:krichers@transcendwireless.com]
Sent: Monday, June 06, 2016 12:26 PM
To: cminor@newingtonct.gov
Cc: krichers@transcendwireless.com
Subject: 99 Cedarwood Lane -- T-Mobile Tower -- CT11174A

Good Afternoon Craig,

As per our conversation, please confirm the Town of Newington does not have a copy of the original approval of this T-Mobile tower site.

Thanks,

Kyle Richers
Transcend Wireless

Exhibit B

The Assessor's office is responsible for the maintenance of records on the ownership of properties. Assessments are computed at 70% of the estimated market value of real property at the time of the last revaluation which was 2015.

Information on the Property Records for the Municipality of Newington was last updated on 10/6/2020.

Property Summary Information

Parcel Data And Values | Building | Sales | Permits

Parcel Information

Location:	99 CEDARWOOD LN	Property Use:	Residential	Primary Use:	Residential
Unique ID:	C1000010	Map Block Lot:	17/480/000	Acres:	2.81
490 Acres:	0.00	Zone:	R-20	Volume / Page:	2117/0550
Developers Map / Lot:	N/E 2139 AKA 5	Census:			

Value Information

	Appraised Value	Assessed Value
Land	145,955	102,170
Buildings	455,180	318,620

	Appraised Value	Assessed Value
Detached Outbuildings	0	0
Total	601,135	420,790

Owner's Information

Owner's Data
CALLAHAN QUALIFIED PERSONAL RESIDENC THE CIOFFARI PAUL TRUSTEE 433 SOUTH MAIN ST STE 200 WEST HARTFORD CT 06110

Back To Search (JavaScript:window.history.back(1);)

Print View (PrintPage.aspx?towncode=094&uniqueid=C1000010)

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Exhibit C

EXISTING WIRELESS FACILITY UPGRADES BY

T-Mobile

T-MOBILE NORTHEAST LLC

PROJECT TITLE: ANCHOR
SITE NUMBER: CT11174A
SITE NAME: CALLAHAN TOWER_1
SITE ADDRESS: 99 CEDARWOOD LANE
NEWINGTON, CT 06111
RF CONFIGURATION 67D5997DB_2XAIR+1OP (U21 MARKET)

PROJECT NOTES:

1. THIS IS AN UNMANNED TELECOMMUNICATION FACILITY AND NOT FOR HUMAN HABITATION:
   HANDICAPPED ACCESS IS NOT REQUIRED.
   POTABLE WATER OR SANITARY SERVICE IS NOT REQUIRED.
   NO OUTDOOR STORAGE OR ANY
   SOLID WASTE RECEPTACLES REQUIRED.
2. CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, AND CONDITIONS ON THE JOB SITE. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ARCHITECT/ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK. FAILURE TO NOTIFY THE ARCHITECT/ENGINEER PLACES THE RESPONSIBILITY ON THE CONTRACTOR TO CORRECT THE DISCREPANCIES AT THE CONTRACTOR'S EXPENSE.
3. DEVELOPMENT AND USE OF THE SITE WILL CONFORM TO ALL APPLICABLE CODES, ORDINANCES AND SPECIFICATIONS.
4. A STRUCTURAL EVALUATION OF THE TOWER AND ANTENNA MOUNTS ARE NOT PART OF SCOPE OF FORESITE LLC'S SCOPE OF WORK. REFER TO STRUCTURAL ANALYSIS REPORT AND MOUNT ANALYSIS BY AECOM, DATED AUGUST 11, 2020 FOR EVALUATION AND REQUIREMENTS.

CODE COMPLIANCE:

ALL WORK SHALL COMPLY WITH THE CURRENT NATIONAL AND CONNECTICUT STATE BUILDING AND LIFE SAFETY CODES, SUPPLEMENTS AND AMENDMENTS INCLUDING BUT NOT LIMITED TO THE LATEST EDITION OF:
CONNECTICUT STATE BUILDING CODE (CSBC).
ANSI/TIA-222-G STRUCTURAL STANDARD FOR ANTENNA SUPPORTING STRUCTURES AND ANTENNAS.
NATIONAL ELECTRICAL CODE (NEC) FOR POWER AND GROUNDING REQUIREMENTS.
OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA).
NFPA - NATIONAL FIRE PROTECTION ASSOCIATION.

811 Connecticut - Call Before You Dig
811 or 1-800-922-4455

Advance Notice: Minimum of 2 working days in advance, no more than 30 days in advance

APPROVALS:

FSA CM	DATE
RF ENGINEER	DATE
FOPS	DATE
T-MOBILE ENGINEERING AND DEVELOPMENT	DATE
	DATE
	DATE

SITE IMAGE:

VICINITY MAP:

PROJECT SCOPE:

UPGRADE OF EXISTING WIRELESS FACILITY AS FOLLOWS:

UPGADE EXISTING RBS 6102 CABINET INTERNALLY.
ADD (1) 6160 AND (1) B160 CABINETS ON EXISTING CONCRETE PAD.
REPLACE (6) OF (9) EXISTING ANTENNAS.
REMOVE (3) OF (6) EXISTING TMA'S AND REPLACE THE REMAINING (3) TMA'S.
ADD (6) REMOTE RADIO UNITS AT ANTENNAS.
ADD (3) DIPLEXER AT ANTENNAS.
REMOVE (13) OF (19) EXISTING COAX, ADD (3) 6X12 HCS FOR FINAL COUNT OF (4) 6X12 HCS AND (6) 1-5/8" COAX.

PROJECT INFORMATION:

ADDRESS:	99 CEDARWOOD LANE NEWINGTON, CT 06111
STRUCTURE TYPE:	GUYED TOWER
PARCEL ID:	C1000010
ZONING DISTRICT:	R-20
COORDINATES:	41° 41' 41.13" N, 72° 42' 32.36" W
APPROXIMATE GROUND ELEV:	348'±

PROJECT TEAM:

APPLICANT:	T-MOBILE NORTHEAST, LLC. 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002 860-692-7100
LANDLORD:	CALLAHAN QUALIFIED PERSONAL RESIDENC THE CIOFFARI PAUL TRUSTEE 433 SOUTH MAIN ST STE 200 WEST HARTFORD CT 06110
PROJECT MANAGER:	NORTHEAST SITE SOLUTIONS 420 MAIN STREET, BLDG 4 STURBRIDGE, MA 01566 SHELDON FREINCLE SHELDON@NORTHEASTSITESOLUTIONS.COM 201-776-8521
CONSULTANTS:	FORESITE LLC 462 WALNUT ST NEWTON, MA 02460 SAEED MOSSAVAT SMOSSAVAT@FORESITELLC.COM 617-212-3123

SHEET INDEX:

APPLICANT:
T-Mobile
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

PROJECT MANAGER
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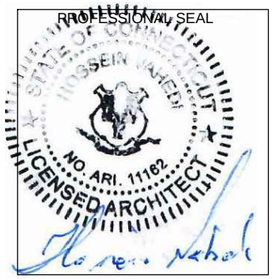
PROFESSIONAL SEAL



DRAWING SCALES ARE INTENDED FOR 11"x17" SIZE PRINTED MEDIA ONLY. ALL OTHER PRINTED SIZES ARE DEEMED "NOT TO SCALE".

REV	DESCRIPTION	DATE
A	PRELIMINARY	10/13/20
0	FINAL ISSUED	10/28/20
1	REVISED PER COMMENTS	11/04/20

SITE NUMBER: CT11174A
SITE NAME: CALLAHAN TOWER_1
SITE ADDRESS: 99 CEDARWOOD LANE
NEWINGTON, CT 06111

SHEET TITLE:
T-1: TITLE SHEET

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 HAS 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 CLIENT'S REPRESENTATIVE OF ANY CONFLICTS, ERRORS, OR OMISSIONS PRIOR TO THE SUBMISSION OF CONTRACTOR'S PROPOSAL OR PERFORMANCE OF WORK.

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 CONSTRUCTION DOCUMENTS.

6. 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.

7. THE CONTRACTOR SHALL MAKE NECESSARY PROVISIONS TO PROTECT EXISTING IMPROVEMENTS DURING CONSTRUCTION.

8. THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT SECTIONS OF THE BASIC STATE BUILDING CODE, LATEST EDITION, AND ALL OSHA REQUIREMENTS AS THEY APPLY TO THIS PROJEC

9. THE CONTRACTOR SHALL NOTIFY THE CLIENT'S REPRESENTATIVE IN WRITING 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 CLIENT'S REPRESENTATIVE.

10. THE WORK SHALL CONFORM TO THE CODES AND STANDARDS OF THE FOLLOWING AGENCIES AS FURTHER CITED HEREIN:

A. ASTM: AMERICAN SOCIETY FOR TESTING AND MATERIALS, AS PUBLISHED IN "COMPILATION OF ASTM STANDARDS BUILDING CODES" OR LATEST EDITION.

B. AWS: AMERICAN WELDING SOCIETY INC. AS PUBLISHED IN "STANDARD D1.1-08, STRUCTURAL WELDING CODE" OR LATEST EDITION.

C. AISC: AMERICAN INSTITUTE FOR STEEL CONSTRUCTION AS PUBLISHED IN "CODE FOR STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES"; "SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" (LATEST EDITION).

11. BOLTING:

A. BOLTS SHALL BE CONFORMING TO ASTM A325 HIGH STRENGTH, HOT DIP GALVANIZED WITH ASTM A153 HEAVY HEX TYPE NUTS.

B. BOLTS SHALL BE 3/4"ϕ MINIMUM (UNLESS OTHERWISE NOTED)

C. ALL CONNECTIONS SHALL BE 2 BOLTS MINIMUM.

12. FABRICATION:

A. FABRICATION OF STEEL SHALL CONFORM TO THE AISC AND AWS STANDARDS AND CODES (LATEST EDITION).

B. ALL STRUCTURAL STEEL SHALL BE HOT-DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 (LATEST EDITION), UNLESS OTHERWISE NOTED.

13. ERECTION OF STEEL:

A. PROVIDE ALL ERECTION EQUIPMENT, BRACING, PLANKING, FIELD BOLTS, NUTS, WASHERS, DRIFT PINS, AND SIMILAR MATERIALS WHICH DO NOT FORM A PART OF THE COMPLETED CONSTRUCTION BUT ARE NECESSARY FOR ITS PROPER ERECTION.

B. ERECT AND ANCHOR ALL STRUCTURAL STEEL IN ACCORDANCE WITH AISC REFERENCE STANDARDS. ALL WORK SHALL BE ACCURATELY SET TO ESTABLISHED LINES AND ELEVATIONS AND RIGIDLY FASTENED IN PLACE WITH SUITABLE ATTACHMENTS TO THE CONSTRUCTION OF THE BUILDING.

C. TEMPORARY BRACING, GUYING AND SUPPORT SHALL BE PROVIDED TO KEEP THE STRUCTURE SAFE AND ALIGNED AT ALL TIMES DURING CONSTRUCTION, AND TO PREVENT DANGER TO PERSONS AND PROPERTY. CHECK ALL TEMPORARY LOADS AND STAY WITHIN SAFE CAPACITY OF ALL BUILDING COMPONENTS.

14. ANTENNA INSTALLATION:

A. INSTALL ANTENNAS AS INDICATED ON DRAWINGS AND CLIENT'S REPRESENTATIVE SPECIFICATIONS.

B. INSTALL GALVANIZED STEEL ANTENNA MOUNTS AS INDICATED ON DRAWINGS.

C. INSTALL COAXIAL / FIBER CABLES AND TERMINATIONS BETWEEN ANTENNAS AND EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS. WEATHERPROOF ALL CONNECTORS BETWEEN THE ANTENNA AND EQUIPMENT PER MANUFACTURER'S REQUIREMENTS.

15. ANTENNA AND COAXIAL / FIBER CABLE GROUNDING:

A. ALL EXTERIOR #6 GREEN GROUND WIRE "DAISY CHAIN" CONNECTIONS ARE TO BE WEATHER SEALED WITH ANDREWS CONNECTOR/SPLICE WEATHERPROOFING KIT TYPE #221213 OR EQUAL.

B. ALL COAXIAL / FIBER CABLE GROUNDING KITS ARE TO BE INSTALLED ON STRAIGHT RUNS OF COAXIAL / FIBER CABLE (NOT WITHIN BENDS).

16. RELATED WORK, FURNISH THE FOLLOWING WORK AS SPECIFIED UNDER CONSTRUCTION DOCUMENTS, BUT COORDINATE WITH OTHER TRADES PRIOR TO BID:

A. FLASHING OF OPENING INTO OUTSIDE WALLS

B. SEALING AND CAULKING ALL OPENINGS

C. PAINTING

D. CUTTING AND PATCHING

17. REQUIREMENTS OF REGULATORY AGENCIES:

A. FURNISH U.L. LISTED EQUIPMENT WHERE SUCH LABEL IS AVAILABLE. INSTALL IN CONFORMANCE WITH U.L. STANDARDS WHERE APPLICABLE.

B. INSTALL ANTENNA, ANTENNA CABLES, GROUNDING SYSTEM IN ACCORDANCE WITH DRAWINGS AND SPECIFICATION IN EFFECT AT PROJECT LOCATION AND RECOMMENDATIONS OF STATE AND LOCAL BUILDING CODES, AND SPECIAL CODES HAVING JURISDICTION OVER SPECIFIC PORTIONS OF WORK. THIS WORK INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:

C. TIA-EIA - 222 (LATEST EDITION). STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES.

D. FAA - FEDERAL AVIATION ADMINISTRATION ADVISORY CIRCULAR AC 70/7460-IH, OBSTRUCTION MARKING AND LIGHTING.

E. FCC - FEDERAL COMMUNICATIONS COMMISSION RULES AND REGULATIONS FORM 715, OBSTRUCTION MARKING AND LIGHTING SPECIFICATION FOR ANTENNA STRUCTURES AND FORM 715A, HIGH INTENSITY OBSTRUCTION LIGHTING SPECIFICATIONS FOR ANTENNA STRUCTURES.

F. AISC - AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 BOLTS (LATEST EDITION).

G. NEC - NATIONAL ELECTRICAL CODE - ON TOWER LIGHTING KITS.

H. UL - UNDERWRITER'S LABORATORIES APPROVED ELECTRICAL PRODUCTS.

I. IN ALL CASES, PART 77 OF THE FAA RULES AND PARTS 17 AND 22 OF THE FCC RULES ARE APPLICABLE AND IN THE EVENT OF CONFLICT, SUPERSEDE ANY OTHER STANDARDS OR SPECIFICATIONS.

J. 2018 LIFE SAFETY CODE NFPA - 101.

APPLICANT:

T-MOBILE NORTHEAST LLC

35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

PROJECT MANAGER

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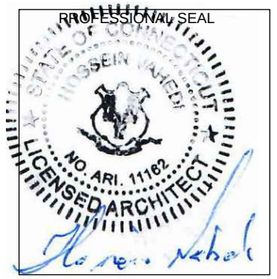

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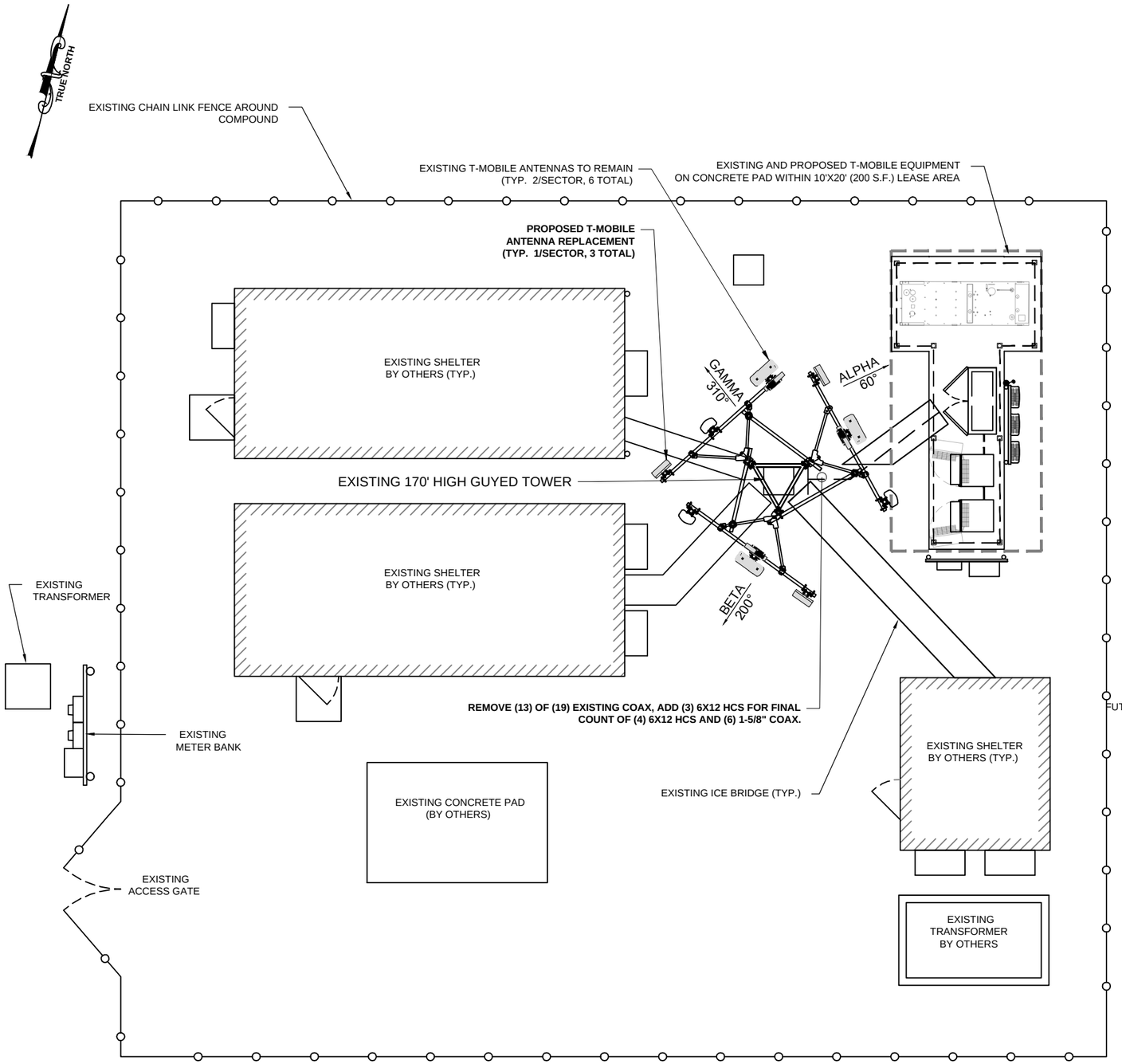
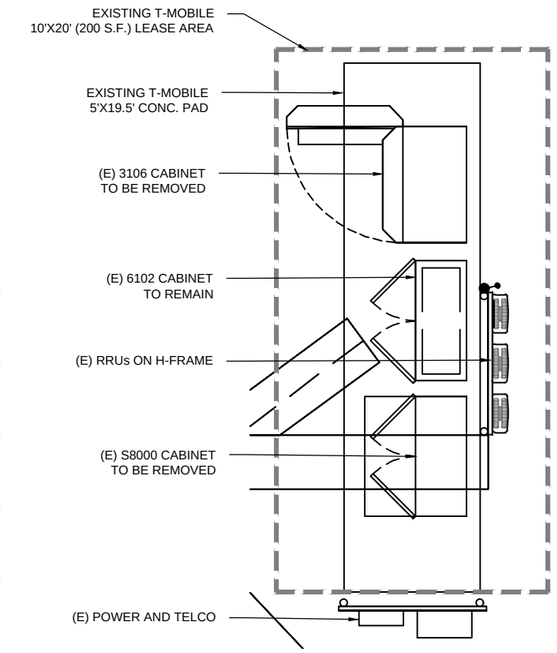
SHEET TITLE:

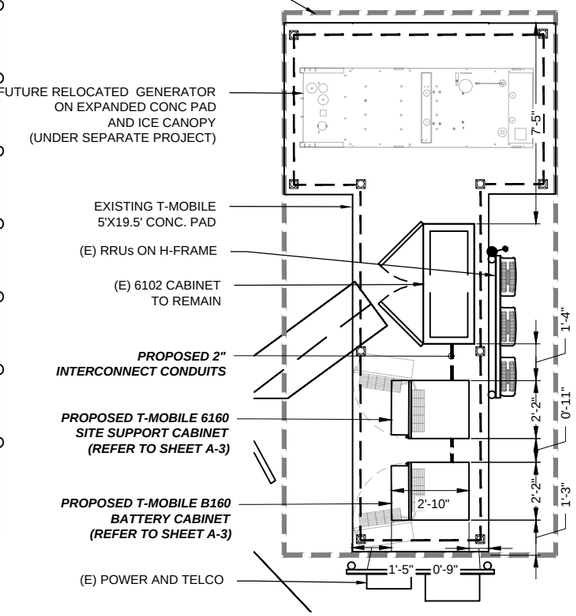
N-1: NOTES AND DISCLAIMERS



SITE PLAN
SCALE: 1/8" = 1'-0" (1 / A-1)



SITE PLAN
N.T.S. (1 / A-1)



SITE PLAN
N.T.S. (1 / A-1)

APPLICANT:
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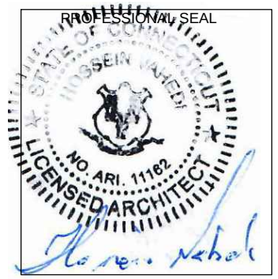

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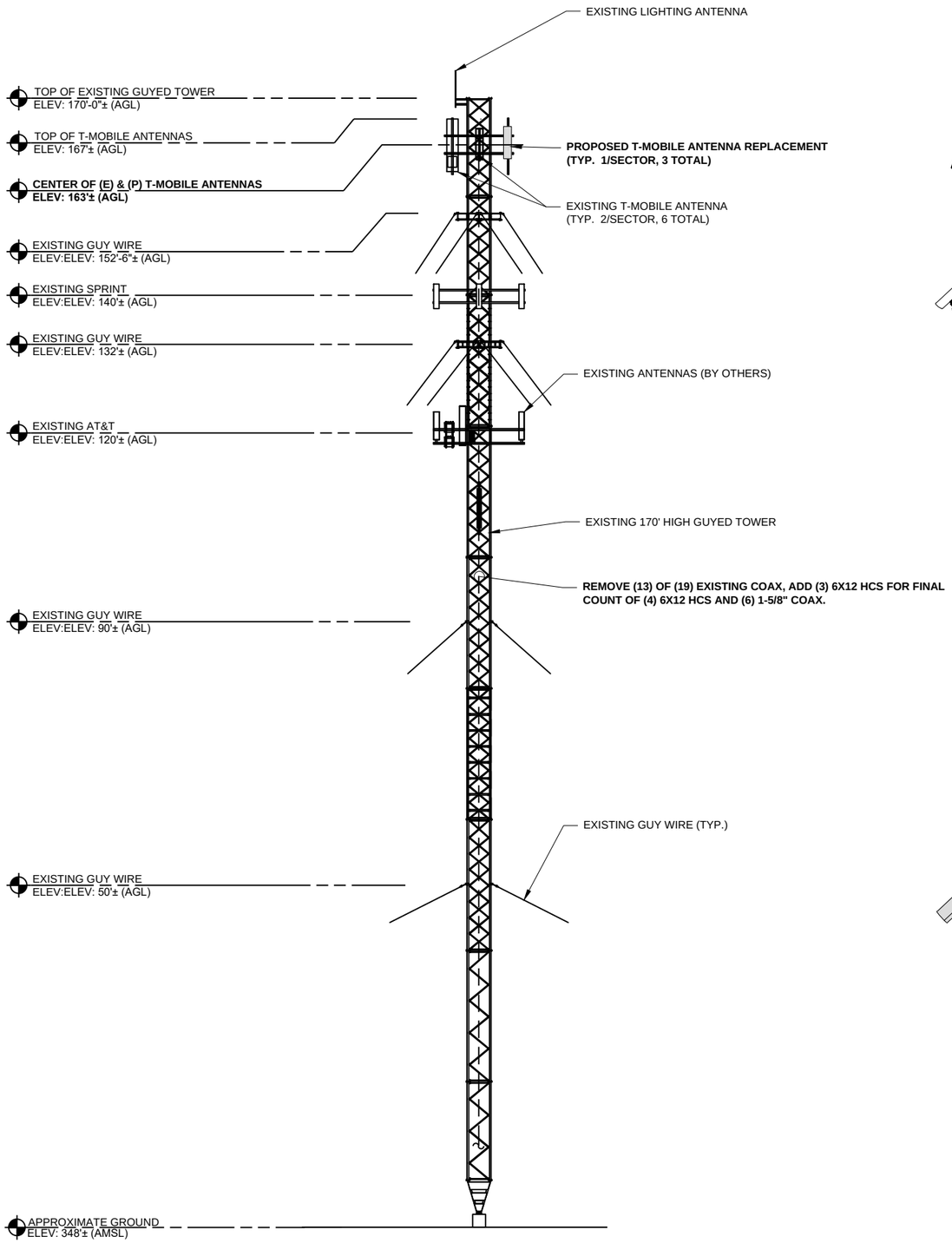
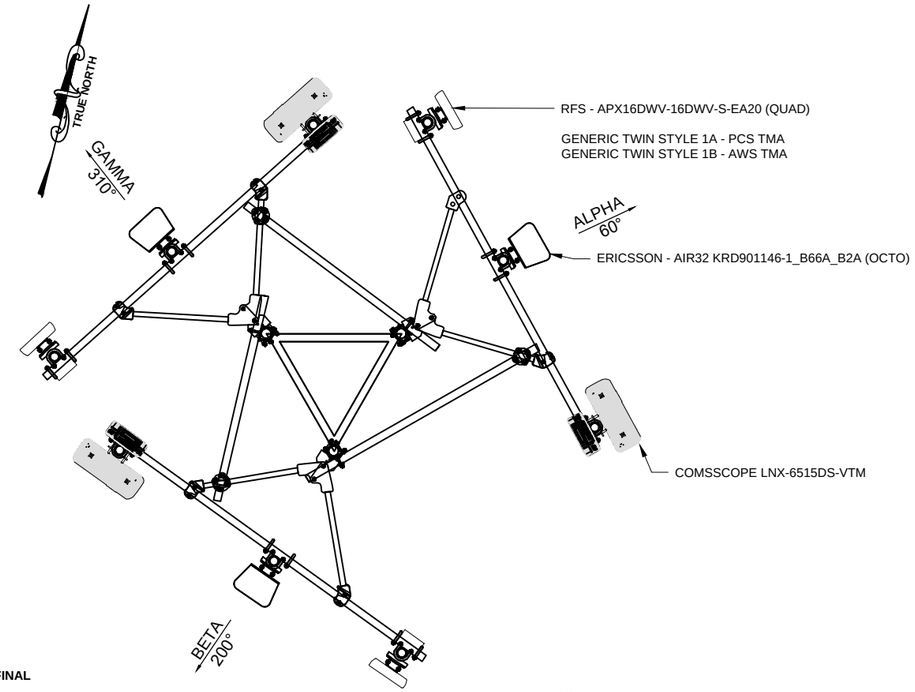
A-1: PLAN



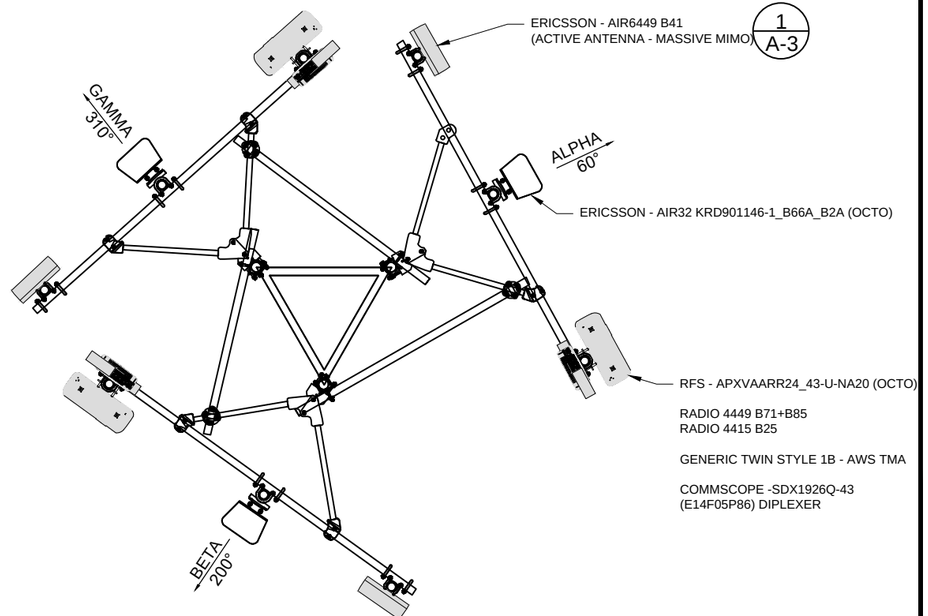
ELEVATION
SCALE: 1" = 20'-0"

1 / A-2



EXISTING ANTENNA PLAN
N.T.S

2 / A-2



FINAL ANTENNA PLAN
N.T.S

3 / A-2

APPLICANT:
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

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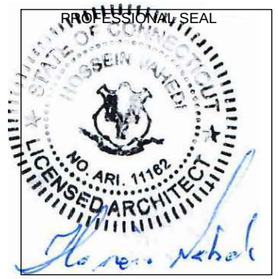
617-212-3123

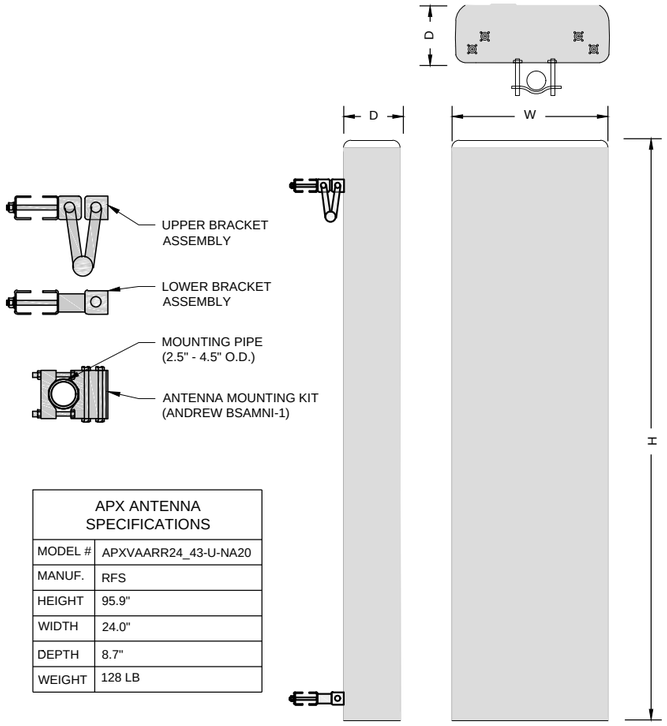
PROFESSIONAL SEAL



REV	DESCRIPTION	DATE
A	PRELIMINARY	10/13/20
0	FINAL ISSUED	10/28/20
1	REVISED PER COMMENTS	11/04/20

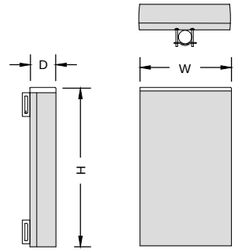
SITE NUMBER: CT11174A
SITE NAME: CALLAHAN TOWER_1
SITE ADDRESS: 99 CEDARWOOD LANE
NEWINGTON, CT 06111

SHEET TITLE:
A-2: ELEVATION



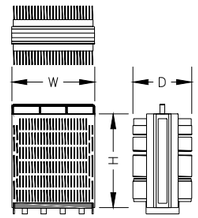
APX ANTENNA SPECIFICATIONS	
MODEL #	APXVAARR24_43-U-NA20
MANUF.	RFS
HEIGHT	95.9"
WIDTH	24.0"
DEPTH	8.7"
WEIGHT	128 LB

APXVAARR24 ANTENNA
N.T.S. — 1 / A-3



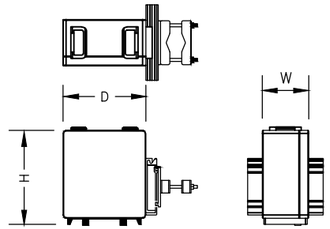
ERICSON ANTENNA SPECIFICATIONS	
MODEL #	AIR6449 B41
MANUF.	ERICSSON
HEIGHT	34.8"
WIDTH	20.5"
DEPTH	7.2"
WEIGHT	103 LB

AIR6488 ANTENNA
N.T.S. — 2 / A-3



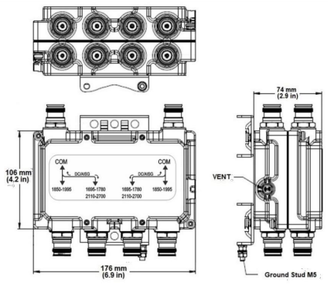
REMOTE RADIO UNIT SPECIFICATIONS	
MODEL #	RADIO 4449 B71+B85
MANUF.	ERICSSON
HEIGHT	14.9"
WIDTH	13.2"
DEPTH	10.4"
WEIGHT	74 LB

REMOTE RADIO UNIT
N.T.S. — 3 / A-3



REMOTE RADIO UNIT SPECIFICATIONS	
MODEL #	RADIO 4415 B25
MANUF.	ERICSSON
HEIGHT	14.9"
WIDTH	13.2"
DEPTH	5.4"
WEIGHT	46.3 LB

REMOTE RADIO UNIT
N.T.S. — 4 / A-3

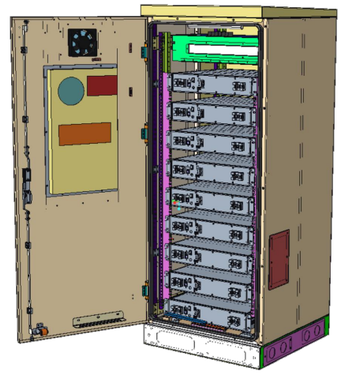


DIPLEXER	
MODEL #	SDX1926Q-43
MANUF.	COMMSCOPE
HEIGHT	4.173"
WIDTH	6.929"
DEPTH	2.913"
WEIGHT	0.441 LB

DIPLEXER
N.T.S. — 5 / A-3

SITE SUPPORT CABINET SPECIFICATIONS	
MODEL #	6160
MANUF.	ERICSSON
HEIGHT	63"
WIDTH	25.6"
DEPTH	25.6"
WEIGHT	605 LBS

SITE SUPPORT CABINET
N.T.S. — 6 / A-3



BATTERY CABINET SPECIFICATIONS	
MODEL #	B160
MANUF.	ERICSSON
HEIGHT	63"
WIDTH	26"
DEPTH	26"
WEIGHT	1883 LBS

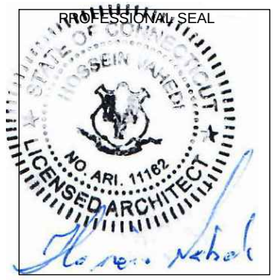
BATTERY CABINET
N.T.S. — 7 / A-3

APPLICANT:
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

PROJECT MANAGER
NORTHEAST SITE SOLUTIONS
420 MAIN STREET, BLDG 4
STURBRIDGE, MA 01566
203-275-6669

CONSULTANT:
FORESITE LLC
Architects . Engineers . Surveyors
462 WALNUT STREET
NEWTON, MA 02460
617-212-3123

PROFESSIONAL SEAL



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SITE NUMBER: CT11174A
SITE NAME: CALLAHAN TOWER_1
SITE ADDRESS: 99 CEDARWOOD LANE
NEWINGTON, CT 06111

SHEET TITLE:
A-3: EQUIPMENT SPECIFICATIONS

ELECTRICAL & 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 PRODUCED 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 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) ND WHERE REQUIRED IN LIQUID TIGHT FLEXIBLE METAL OR NONMETALLIC CONDUITS.

6. RIGID STEEL CONDUITS SHALL BE GROUNDED AT BOTH ENDS.

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

8. RUN ELECTRICAL CONDUIT OR CABLING BETWEEN ELECTRICAL ROOM AND PROPOSED CELL SITE ARE PEDESTAL 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 PROPOSED CELL SITE TELECOM CABINET AND RBS CABINET AS INDICATED ON DRAWING A -1. PROVIDE FULL LENGTH PULL ROPE INSTALLED TELCO CONDUIT. PROVIDE GREENLEE CONDUIT MEASURING TAPE AT EACH END.

10. ALL EQUIPMENT LOCATED OUTSIDE SHALL HAVE NAME 3R ENCLOSURE.

11. GROUNDING SHALL COMPLY WITH NEC ART. 250.

12. GROUNDING COAX CABLE SHIELDS MINIMUM AT BOTH ENDS USING MANUFACTURES COAX CABLE GROUNDING KITS SUPPLIED BY PROJECT OWNER.

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

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

15. ROUTE GROUNDING CONDUCTORS ALONG THE SHORTEST AND STRAIGHTEST PATH POSSIBLE, EXCEPT AS OTHERWISE INDICATED. GROUNDING LEADS SHOULD NEVER BE BENT AS RIGHT ANGLE. ALWAYS MAKE AT LEAST 12" RADIUS BENDS. #6 WIRE CAN BE BENT AT 6" RADIUS WHEN NECESSARY BOND ANY METER OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.

16. CONNECTIONS TO MGB SHALL BE ARRANGED IN THREE MAIN GROUPS: SURGE PROCEDURES (COAXIAL CABLE GROUND KITS, TELCO AND POWER PANEL GROUND); (GROUNDING ELECTRODE RING OR BUILDING STEEL); NON-SURGING OBJECTS (EGB GROUND IN RBS UNIT).

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

18. APPLY OXIDE INHIBITING COMPOUND TO ALL COMPRESSION TYPE GROUND CONNECTION.

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

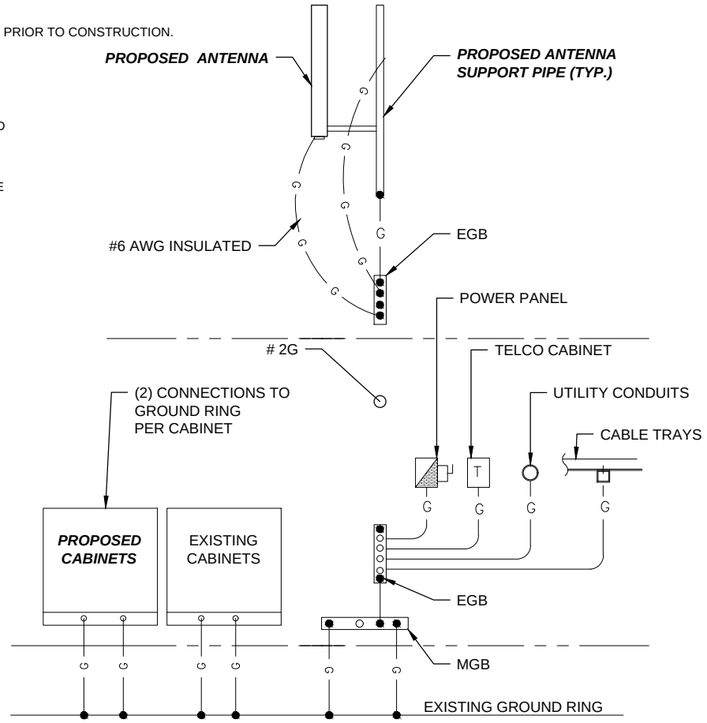
20 BOND ANTENNA EGB'S AND MGB TO WATER MAIN.

21. TEST COMPLETED GROUND SYSTEM AND RECORD RESULTS FOR PROJECT CLOSE-OUT DOCUMENTATION.

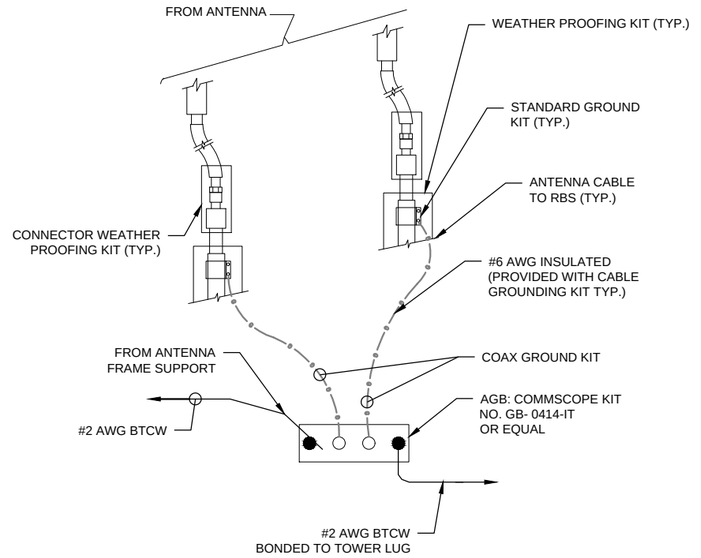
22. BOND ANY METAL OBJECTS WITHIN 7 FEET OF PROPOSED EQUIPMENT OR CABINET TO MASTER GROUND BAR.

23. VERIFY PROPOSED SERVICE UPGRADE WITH LOCAL UTILITY COMPANY

PRIOR TO CONSTRUCTION.



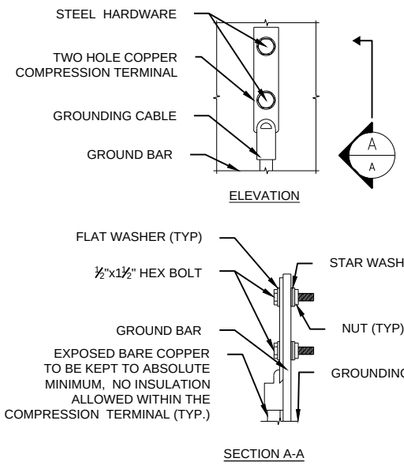
GROUNDING RISER DIAGRAM 1/E-1
N.T.S.



NOTES:
INSTALL CABLE GROUND KIT ABOVE HORIZONTAL BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO AGB/EGB

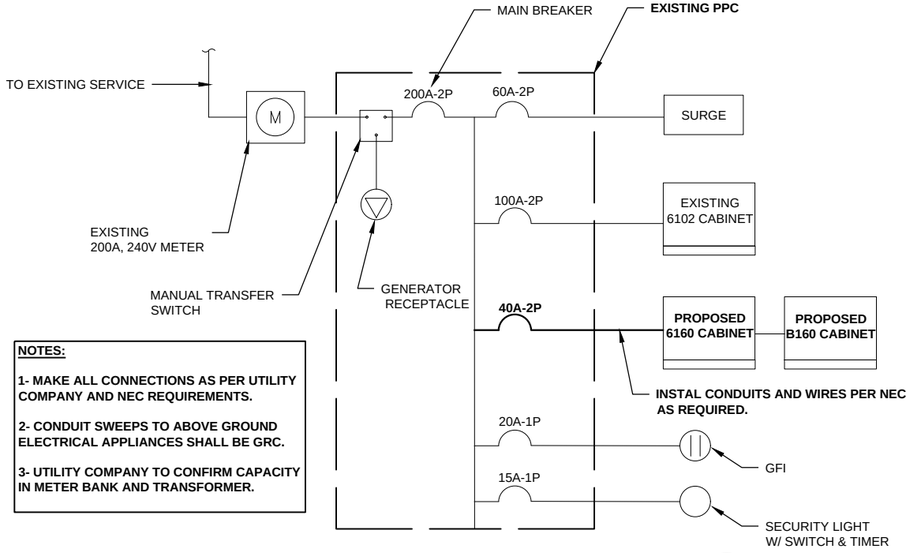
ANTENNA CABLE GROUNDING 2/E-1
N.T.S.

NOTE:
CONTRACTOR TO VERIFY THE POWER FEED & PHASE OF METER BANK AND THAT THE EXISTING AND PROPOSED CONDUITS AND WIRE SIZES ARE ADEQUATE FOR THE PROPOSED LOADING IN ACCORDANCE WITH NEC AND INCLUDE ELECTRICAL UPGRADES IN THE SCOPE OF WORK AS REQUIRED.



NOTES:
1. "DOUBLING UP" OR "STACKING " OF CONNECTION IS NOT PERMITTED.
2. OXIDE INHIBITING COMPOUND TO BE USED AT ALL LOCATIONS.

GROUND BAR CONNECTIONS 3/E-1
N.T.S.



NOTES:

1- MAKE ALL CONNECTIONS AS PER UTILITY COMPANY AND NEC REQUIREMENTS.

2- CONDUIT SWEEPS TO ABOVE GROUND ELECTRICAL APPLIANCES SHALL BE GRC.

3- UTILITY COMPANY TO CONFIRM CAPACITY IN METER BANK AND TRANSFORMER.

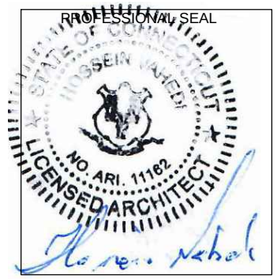
TYPICAL ONE LINE DIAGRAM 4/E-1
N.T.S.

APPLICANT:
T-MOBILE NORTHEAST LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860-692-7100

PROJECT MANAGER
NORTHEAST SITE SOLUTIONS
420 MAIN STREET, BLDG 4
STURBRIDGE, MA 01566
203-275-6669

CONSULTANT:
FORESITE LLC
Architects . Engineers . Surveyors
462 WALNUT STREET
NEWTON, MA 02460
617-212-3123

PROFESSIONAL SEAL



REV	DESCRIPTION	DATE
A	PRELIMINARY	10/13/20
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1	REVISED PER COMMENTS	11/04/20

SITE NUMBER: CT11174A
SITE NAME: CALLAHAN TOWER_1
SITE ADDRESS: 99 CEDARWOOD LANE
NEWINGTON, CT 06111

SHEET TITLE:
E-1: GROUNDING AND ELECTRICAL DETAILS

Exhibit D

AECOM

Submitted to
Northeast Site Solutions
420 Main Street
Sturbridge, MA 01566

Submitted by
AECOM
500 Enterprise Drive,
Suite 3B
Rocky Hill, CT 06067
August 11, 2020

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 170’ GUYED TOWER AND FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENT

Site Name: Callahan Tower
Site Address: 99 Cedarwood Lane
Newington, Connecticut

60633538
NSS-048

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis and evaluation of the existing 170' guyed tower structure located at 99 Cedarwood Lane in Newington, Connecticut.

The structural analysis was conducted in accordance with the 2018 Connecticut State Building Code which includes the TIA-222-G[1] Standard, the 2015 International Building Code with 2018 Connecticut State Building Code Amendments, the AISC[2] Load Resistance Factor Design (LRFD) and the ASCE 7[3] design Code.

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

The proposed T-Mobile antenna installation are listed below:

Antenna and Mount	Carrier	Antenna Center Elevation
Remove:		
(3) RFS APX16DWV-16DWV-S-E-A20 Panel Antennas **(3) DB Andrew LNX-6515DS-A1M Panels** **(3) Generic Twin 1A Units** **(13) 1-5/8" Coaxial Cables (*NOTE: (6) existing coaxial cables are planned to stay on the tower)***	**T-Mobile (existing)**	**@ 163'**
Install:		
(3) Ericsson AIR6449 B41 Panel Antennas **(3) RFS APXVAARR24_43-U-NA20 Panel Antennas** **(3) Ericsson Radio 4415 B25 RRH Units** **(3) Commscope SDX1926Q-43 Diplexer Units** **(3) Ericsson 6x12 HCS Hybrid Cables**	**T-Mobile (existing)**	**@ 163'**

The results of the structural analysis indicates that:

1. The existing steel tower structure IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
2. The existing tower foundation IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
3. The existing guy anchor and supporting/connected components ARE considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
4. The maximum structural capacity calculated herein is **95.1 %**

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

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

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

1. EXECUTIVE SUMMARY – continued

This analysis is based on:

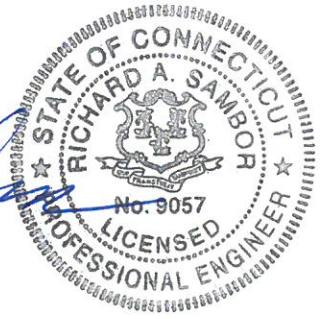
1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Original manufacturers drawings prepared by Charles Burns, P.E. on behalf of Mohawk Towers, dated December 1997.
3) Structural Analysis Report prepared by Bay State Design, Inc., on behalf of Clearwire, signed and sealed on April 7, 2010.
4) Revised Structural Analysis Report prepared by Hudson Design Group, on behalf of AT&T, signed and sealed on June 13, 2012. *NOTE: This analysis document includes a Tower Mapping Report performed by Hudson Design Group (included in Section 6 of Report), dated May 24, 2012.*
5) Tower Reinforcement and Structural Analysis, prepared by AECOM on behalf of Callahan Acres, project 60581585 / CAL-003, signed and sealed December 13, 2019.
6) Field site visit conducted on September 19, 2018.
7) Tower Climb and site measurements conducted by Northeast Site Solutions dated, October 1, 2018.
8) Update to site Geotechnical Engineering report provided by Terracon Consultants, Inc. dated October 10, 2018.
9) Tower Reinforcement and Structural Analysis, prepared by AECOM on behalf of Callahan Acres, project 60581585 / CAL-003, signed and sealed December 13, 2019.
10) Revised Radio Frequency Data Sheet (RFDS) on behalf of T-Mobile, dated July 6, 2020, obtained via e-mail dated July 13,2020.

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

If you should have any questions, please contact Michael Egan at (860) 263-5817.

Sincerely,

AECOM



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

RAS/mcd

cc: CF/Book – URS

2. INTRODUCTION

The subject tower is located at 99 Cedarwood Lane in Newington, CT. The structure is a 170' guyed tower structure designed by Charles Burns, P.E. (Mohawk Towers) and Rohn Industries.

The structural analysis was conducted in accordance with the following:

- TIA-222-G Standard for a wind velocity range of 90 mph to 105 mph (3-second gust) and 50 mph (3-second gust) concurrent with 1.00 ice thickness, considered to increase in thickness with height.
- 2015 International Building Code with 2018 Connecticut State Building Code Amendments for a wind speed of 97 mph (3-second gust)
- 2010 AISC Load Resistance Factor Design (LRFD)
- 2010 ASCE 7 Minimum Design loads for Buildings and Other Structures for the ice thickness referenced in the TIA-222-G Standard.

The inventory together with the previously proposed T-Mobile's antenna arrangement is summarized in the table below:

Antenna Type	***Carrier***	***Mount***	***Antenna Centerline Elevation***	***Cable***
(1) DS4C03F36U-D (2) SC473-HF1LDF (1) TXRX 430-83H-01-M-X7 TTA Unit	Wethersfield (existing)	(2) 5' Side Mount Standoffs & (1) 1' Side Mount Standoff @ 170'	175'	(2) 7/8" (1) 1 5/8" (1) 1/2"
(1) RFD SC2-W100BC Dish	Wethersfield (existing)	Leg Mounted	167'	(1) 1/2"
(3) Ericsson AIR6449 B41 Panel Antennas (3) RFS APXVARR24_43-C-NA20 Panel Antennas (3) Commscope SDX1926Q-43 Diplexer units (3) Ericsson Radio 4415 B25 RRH Units	**T-Mobile (Proposed)**	**See Below Mount**	**163'**	**(3) 6x12 Hybrid Cables**
(3) Ericsson AIR32 KRD901146-1-B2A Panel Antennas (3) Generic Style 1B TMA Units (AWS) (3) Ericsson Radio 4449 B71+B85 RRH Units	T-Mobile (existing)	(3) 12' T-Frame Sector Mounts	163'	(6) 1 5/8" (1) 6x12 Hybrid Cable System

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(3) Nokia MAA-AAHC Panel Antennas (1 Per Sector) (3) Commscope NNVV-65B-R4 Panel Antennas (1 Per Sector) (3) ALU 4x45-1900 RRH Units (6) ALU 2x50-800 RRH Units (4) Decibel 844G65VTZASX Panels (2 A & 2 C) (2)Decibel DB844H90E-XY Panels (2 B) (1) Junction Box Unit	Sprint (existing)	(3) 12' T-Frame Sector Mounts	140'	(4) Fiber Optic Cables (Analysis (3) applied 1-1/4" O.D. Cables & 1 7/8" O.D. Cable)
(3) Kathrein 800-10965 Panel Antennas (3) Ericsson RRUS-32 B66 RRH Units (3) Ericsson 4478 Radio Units (1) Raycap DC6-48-60-18-8F Surge Arrestor Unit (3) Quintel QS66512-2 Panel Antennas (3) Powerwave 7770.00 Panel Antennas (3) CCI OPA-65R-LCUU-H6 Panel Antennas (6) Powerwave LGP21401 TMA Units (6) CCI TPX-070821 Triplexer Units (3) Ericsson RRUS-32 RRH Units (3) Ericsson RRUS-11 RRH Units (3) Ericsson RRUS-32 B2 RRH Units (2) Raycap DC6-48-60-18-8F Surge Arrestor Units	AT&T (existing)	(3) Sabre 12' HD V-Boom Mount Assemblies (Part # C10857001C	120'	(12) 7/8" (2) 3/8" F.O. Cable (4) 3/4" DC Cables

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(2) GPS Units	Town (existing)	Leg Mounted	50’	(2) LMR-400

This structural analysis of the communications tower was performed by AECOM on behalf of the recent antenna upgrades of the T-Mobile service equipment. The purpose of this analysis was to investigate the existing tower structure and foundation components with existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the 2018 Connecticut State Building Code, TIA-222-G—Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, and the American Institute of Steel Construction (AISC) Manual of Steel Construction—Load Resistance Factor Design (LRFD).

The analysis was conducted using TNX tower version 8.0.5.0. and used the following conditions for this tower review (following the TIA-222-G Standard):

- Structure Class 2 – (Substantial Communications)
- Topographic Category 3 – (Tower location on top of hill – rolling wind conditions considered)
  - NOTE: The use of Google Earth Pro software (version 7.3.1.4505) along with Survey Topograpic maps were used for the following determinations
    - Crest Height used for analysis (approximate elevations listed below):
      - Tower Base elevation = 340'
      - Average elevation measured from 0.5 miles, 1.0 miles, 1.5 miles and 2 miles from tower (213 ft., 170 ft., 147 ft., 129 ft.)
        - Average elevation determined from above information = 165 feet
      - "H" = Average Elevation – Base Elevation = (340-165) = **175 feet**
- Exposure Class B – (Urban / Suburban areas; closely spaced obstructions)
- Load Conditions:
  - Two load conditions were evaluated as shown which were compared to design stresses according to AISC and TIA-222-G Standard.

Basic Wind Speed:

- TIA-222-G:
  - Hartford County (Wind Speed Range): V = 90 mph – 105 mph (3-second gust) [Annex of TIA-222-G 2006]
- IBC 2015 w/ 2018 CT State Building Code Amendment
  - (2012) IBC Section 1609.1.1 – Determination of Wind Loads – Exception 5 "Designs using TIA-222" applies for determination of Design Wind Load obtained as "V.ult" are to be converted to "V.asd" when applying the TIA-222-G design Standard (Under Section 1609.3) for Basic Wind Speed.
  - (2018) CT State Building Code Amendment to the IBC Section 1609.3 wind loads are obtained from Appendix N of the State Building Code.
    - V.asd = 97 mph (3-second Gust) Wind Design Parameter for the Town of Newington, Connecticut for Risk Category two (II) for Substantial (non-essential) communications.

Loading cases:

Load Condition 1 = 97 mph (3-second gust) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 50 mph (3-second gust) Wind load (with ice) + Ice Load + Tower Dead Load

The ice thickness used for this analysis is **1 inch** (assumed to start at the base of the tower) and is considered to increase in thickness with height. The initial ice thickness for design is referenced in the Annex of TIA-222-G and follows the same design criteria as the ASCE 7 Standard.

Seismic event consideration factors/values for design:

- S.s = 0.182 (2018 CT State Building Code – Location Specific Value)
- S.1 = 0.064 (2018 CT State Building Code – Location Specific Value)
- Site Classification = "C" (Reference: Terracon Geotechnical Report Page 4)
- Seismic Design Category = "B" (2015 International Building Code)
- F.a = 1.2 (Obtained from TIA-222-G Table 2-12 Considering above conditions)
- F.v = 1.7 (Obtained from TIA-222-G Table 2-13 Considering above conditions)

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS (continued)

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

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

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

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

Note 2: The “Load effects due to temperature” do not apply for structures that are self-sustaining (from the TIA-222-G Standard)

4. FINDINGS AND EVALUATION

Combined axial and bending stresses on the modified tower structure were evaluated to compare with strength above in accordance with AISC (LRFD). The results of the analysis indicates the existing tower structure, foundation, guy cable anchorage and guy cable components HAVE enough capacity to support the proposed loading conditions mentioned in the Executive Summary and Inventory sections of this analysis report.

Table 1: Tower Component Stress vs. Capacity Summary Table:

Component / Section No.	*Controlling Component / Elevation*	*Stress (% Capacity)*	*Pass/Fail*	*Comments*
Tower Leg (T8)	ROHN 2.5 STD Pipe / 80'-85'	95.1	Pass	Local Stress on Leg Rating
Diagonal (T5)	L1-3/4x1-3/4x1/4 / 120' – 130'	72.3	Pass	
Horizontal (T12)	SR 1 / 5' – 20'	18.9	Pass	
Secondary Horizontal (T3)	L1-3/4x1-3/4x1/4 / 120' – 140'	35.2	Pass	
Top Girt (T3)	L1-3/4x1-3/4x1/4 / 120' – 140'	39.9	Pass	
Bottom Girt (T12)	ROHN 1.5 XS / 5' – 20'	67.1	Pass	Connection Capacity Rating Controls
Guy @ 155'	EHS 1/2" (Existing Cables)	54.4	Pass	Notified via Tower Owner of Existing Cable Size
Guy @ 132'	EHS 7/8" (Existing Cables)	42.6	Pass	Notified via Tower Owner of Existing Cable Size
Guy @ 87.5'	EHS 1/2" (Anchor Relocation)	59.3	Pass	Notified via Tower Owner of Existing Cable Size
Guy @ 47.5'	EHS 9/16" (Proposed Cable)	63.2	Pass	Re-Located guy connection for assembly
Top Guy Pull-Off (T2)	L2x2x3/16 / 140' – 155'	56.0	Pass	
Torque Arm Top (T4)	C12x20.7 / 120' – 140'	56.2	Pass	
Connection Bolt	(1) 1/2" A325N Diagonal Member Bolt / 155'	72.3	Pass	Member Bearing on Connection
Tower Foundation	Bearing Capacity/Foundation Pad	73.1	Pass	
Anchor Uplift Resistance	Interior Anchors – Concrete Guy Anchor	40.6	Pass	Proposed Anchor for Cable Relocation
Anchor Shear Resistance	Interior Anchors – Concrete Guy Anchor	41.2	Pass	Proposed Anchor for Cable Relocation
Anchor Uplift Resistance	Exterior Anchors – Concrete Guy Anchor	46.1	Pass	See Below Note 2
Anchor Slide Resistance	Exterior Anchors – Concrete Guy Anchor	42.1	Pass	See Below Note 2

Component / Section No.	*Controlling Component / Elevation*	*Stress (% Capacity)*	*Pass/Fail*	*Comments*
Guy Anchor – Shackle	Shackle connected to Tower	73.8	Pass	
Guy Anchor – Turnbuckle	Turnbuckle Attachment connected to Tower / Anchor Fan-plate	62.7	Pass	7/8" Dia. Turnbuckle Assembly
Guy Anchor – Block Shear Check	Welded "Corner" plated to Tower Leg	39.6	Pass	Proposed newly installed Corner connection Plate
Guy Anchor – Plate connection on Tower	Bolted Bent Plate attached to Shackle	67.6	Pass	Proposed thicker plate and adjusted connection locations
Guy Anchor – Block Shear Check	Anchor Plate welded to Solid round anchor Bars	57.9	Pass	Proposed Anchor Fan Plate (see reference materials)
Guy Anchor – Anchor Rod Tension Check	Tension Yield of (1) 1-1/4" Solid Round Bar	47.7	Pass	Proposed Anchor (see reference materials) – Interior Radius of Anchros
Guy Anchor – Anchor Rod Tension Check	Tension Yield of (1) 1-3/4" Solid Round Bar	65.6	Pass	*Existing Anchor Diameter – Field Measured*

Structure Rating (Maximum from all components) =	**95.1 %**	**Pass**

Note 1: Connection bolts are assumed to be similar to that of ROHN Model 80 connection bolts as indicated in the Mohawk Towers Construction Plans, dated 1997.

Note 2: Existing guys anchor are assumed NOT to have been anchored to rock material and buried within a Glacial Till layer as indicated in the Terracon geotechnical report, dated August 24, 2012.

5. CONCLUSIONS

The results of the structural analysis indicates that:

1. The existing steel tower structure IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
2. The existing tower foundation IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
3. The existing guy anchor and supporting/connected components ARE considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
4. The maximum structural capacity calculated herein is **95.1 %**

Limitations/Assumptions:

This report is based on the following:

1. All tower connection bolts for diagonal and horizontal members follow ROHN design standards for ROHN Model 80 tower structures, unless noted otherwise.
2. Tower inventory as listed in this report.
3. Tower is properly installed and maintained.
4. All members are as specified in the original design documents and are in good condition.
5. All required members are in place.
6. All bolts are in place and are properly tightened.
7. Tower is in plumb condition.
8. All member protective coatings are in good condition.
9. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
10. Foundations are in good condition without defect and were properly constructed to support original design loads as specified in the original design documents
11. All coaxial cables are installed as specified in Section 6 of this report.

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

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

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

5. CONCLUSIONS (continued)

Ongoing and Periodic Inspection and Maintenance:

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

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

6. DRAWINGS AND DATA

AECOM Imagine it. Delivered.

Previous tower modifications - Calculation included as reference for this analysis

JOB TITLE Callahan Acres (Modification) Plate T-Beam B.A.
PROJECT/JOB NO. _____ CALCULATION NO. 1
COMPUTED BY McD DATE 12/13/2019
VERIFIED BY _____ DATE _____
SCALE N/A SHEET NO. _____ OF _____

Leg compression (Prior to Modification): Leg 2.5" EW (ROHN) 50KSI:

- TNX Calculated Capacity (factored) = 85,162.10 lbs → say 85,000 lbs (see following pg.)

* Consider inclusion of welded T-Plate material for (Member capacity) → 1.5" x 3/8" flange & 1 1/8" x 3/8" web:

- TNX Calculated Capacity (factored) = 114,972 lbs → say 115,000 lbs (TNX calc Pg 62 of 90)

* Assumption: Existing Leg full-Length weld Plate T-Beam Acts compositely & remove pipe capacity (calculated Above)

Δ = 115,000 lbs − 85,000 lbs = 30,000 lbs = Pdesign

* CHECK Base Plate Shear (Assumption: Plan are width fully bears on Base Plate)

(1.5" x 1"/8") (A flange Region) × 30,000 PSI (σ) × 0.6 × 0.9 (ϕ) = 40,500 lbs > 30,000 lbs design ∴ OK
(capacity)

* CHECK Base Plate flexure (check as cantilever end from PL flange to end of exist BasePlate)

d = 0.3568 in

m = Pu × d = 30,000 lbs × 0.3568 in = 10,704 lb·in (calculated)

* Apply 1" thick new BasePlate

σ = m/S → $m_{cap} = S \times \sigma = \left(\frac{1.5" \times 1"^2}{6}\right)$ (S) × 30,000 PSI (σ) × 0.9 (ϕ Flex) = 11,250 lbs·in > 10,704 lb ∴ OK

4x4 = 1 in

Compression Checks

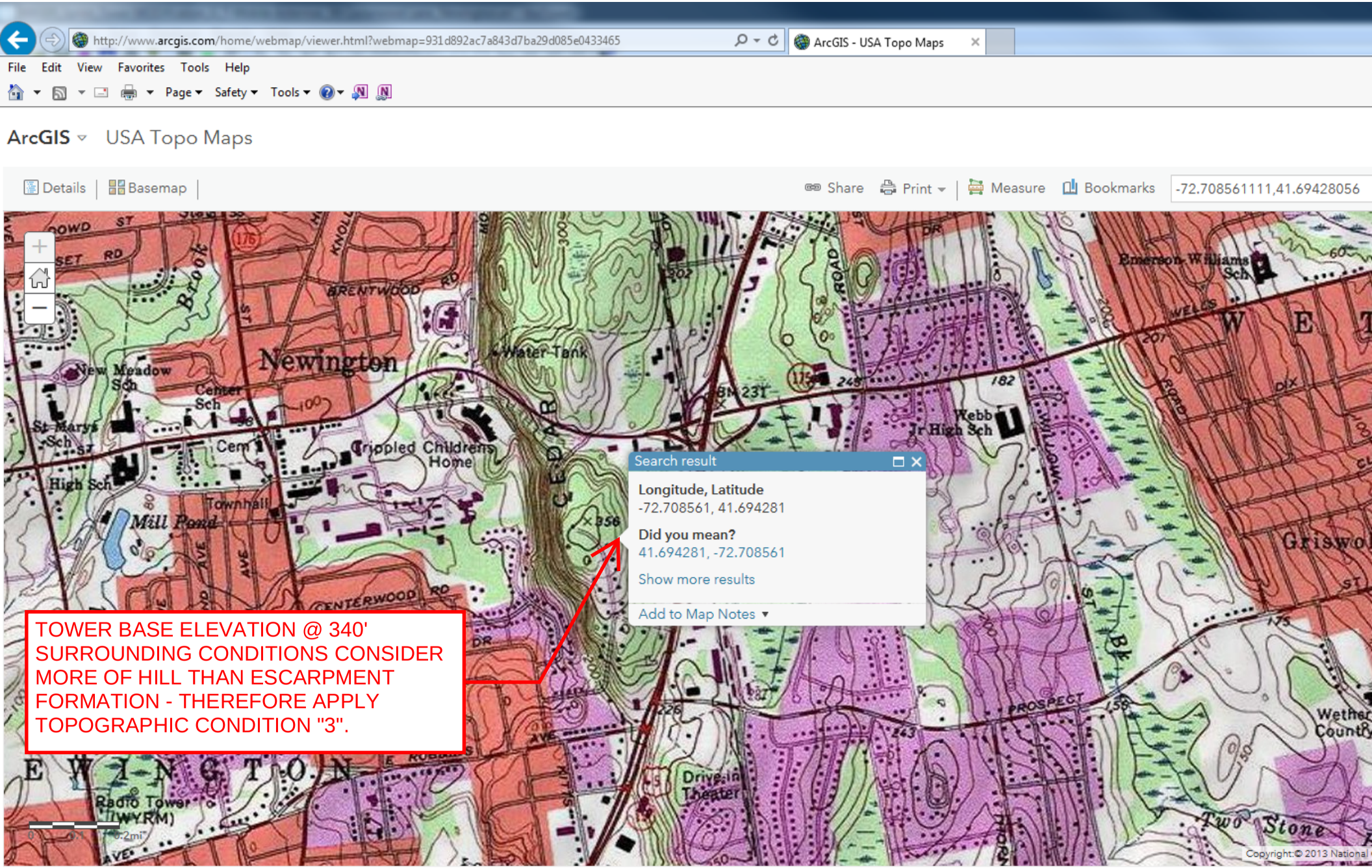
Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	Mast Stability Index	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	ROHN 2 STD	15.00	2.42	36.8 K=1.00	1.0745	1.00	-17501.80	43785.30	0.400 [1] ✓
T2	155 - 140	ROHN 2 STD	15.00	1.21	18.4 K=1.00	1.0745	1.00	-34714.10	47168.90	0.736 [1] ✓
T3	140 - 132.5	Offset SR1 Welded to Leg	7.50	1.24	23.9 K=1.00	1.8599	1.00	-57061.40	74091.40	0.770 [1] ✓
T4	132.5 - 130	Offset SR1 Welded to Leg	2.50	1.21	23.4 K=1.00	1.8599	0.98	-60214.50	73090.30	0.824 [1] ✓
T5	130 - 120	Offset SR1 Welded to Leg	10.00	1.24	24.0 K=1.00	1.8599	0.97	-53047.90	71932.40	0.737 [1] ✓
T6	120 - 100	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	20.00	2.46	31.4 K=1.00	2.4049	0.99	-61417.70	92550.20	0.664 [1] ✓
T7	100 - 85	ROHN 2.5 STD	15.00	2.46	31.1 K=1.00	1.7040	0.99	-66816.90	70830.50	0.943 [1] ✓
T8	85 - 80	ROHN 2.5 STD	5.00	1.19	7.5 K=0.50	1.7040	0.95	-70332.50	72279.20	0.973 [1] ✓
T9	80 - 60	ROHN 2 STD w/ 1/3rd pipe	20.00	1.22	19.4 K=1.00	1.8149	0.97	-73226.40	76819.80	0.953 [1] ✓
T10	60 - 40	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	20.00	2.44	31.1 K=1.00	2.4049	1.00	-81453.10	93298.40	0.873 [1] ✓
T11	40 - 20	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	20.00	2.44	31.1 K=1.00	2.4049	0.98	-88594.60	91847.00	0.965 [1] ✓
T12	20 - 5	ROHN 2.5 EH	15.00	2.42	31.4 K=1.00	2.2535	0.98	-88598.50	92884.30	0.954 [1] ✓
T13	5 - 0	ROHN 2.5 EH	5.38	1.88	48.9 K=2.00	2.2535	1.00	-96155.90	85162.10	1.129 [1] ✗
		4.8.1 (1.13 CR) - 555								

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5x16GA	4.19	1.97	46.5 K=1.00	0.2823	-2476.96	8159.74	0.304 [1] ✓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Page Safety Tools
ArcGIS USA Topo Maps
Details Basemap
Share Print Measure Bookmarks
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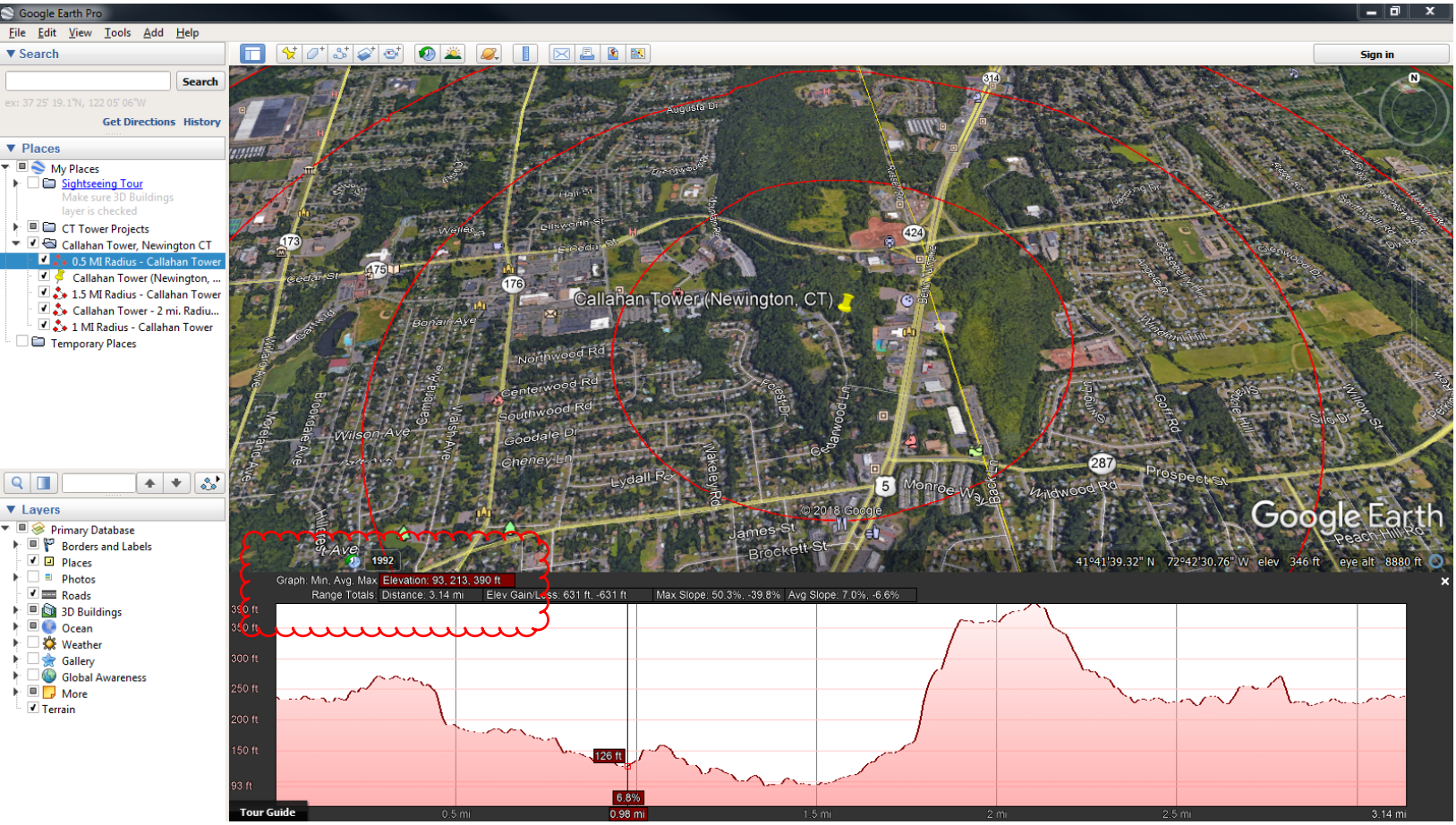
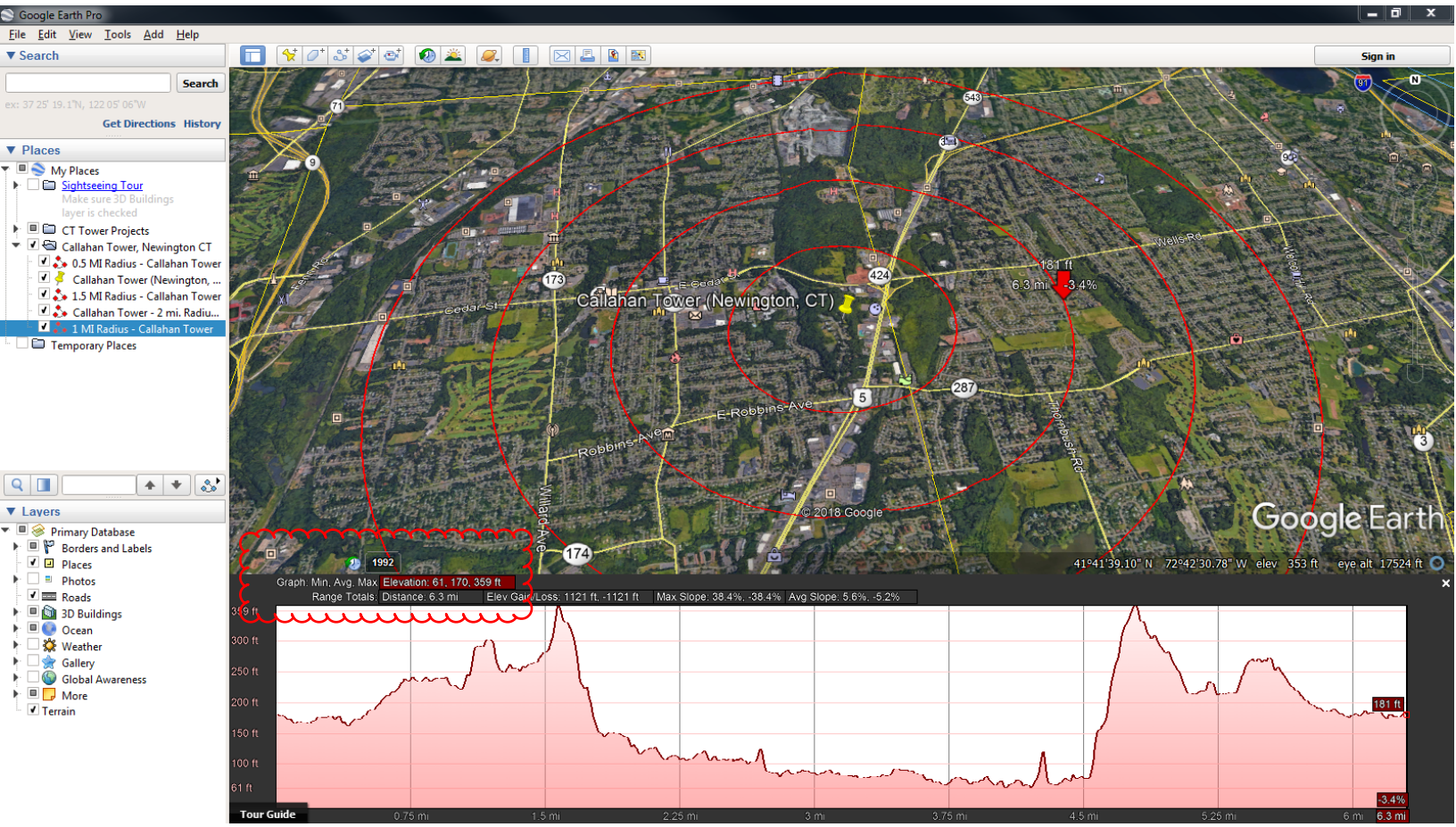
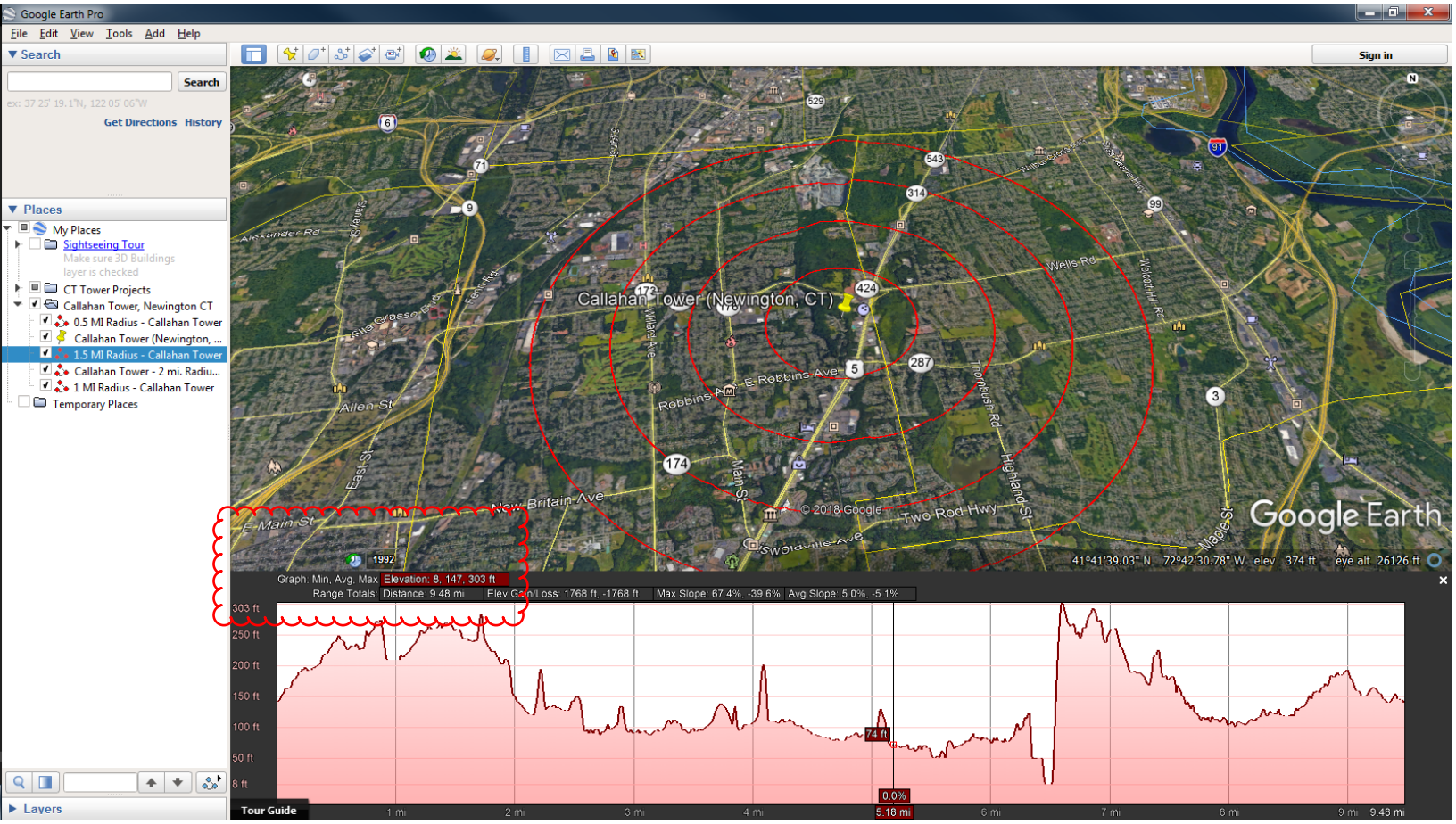
Search result
Longitude, Latitude
-72.708561, 41.694281
Did you mean?
41.694281, -72.708561
Show more results
Add to Map Notes
Newington
Water Tank
New Meadow Sch
Center Sch
St Marys Sch
High Sch
Cem
Crippled Childrens Home
Townhall
Mill Pond
BRENTWOOD RD
CENTERWOOD RD
Webb Jr High Sch
Emerson Williams Sch
PROSPECT
Drive-in Theater
Radio Tower (WYRM)
Two Stone
TOWER BASE ELEVATION @ 340'
SURROUNDING CONDITIONS CONSIDER
MORE OF HILL THAN ESCARPMENT
FORMATION - THEREFORE APPLY
TOPOGRAPHIC CONDITION "3".



ABOVE 0.5 MI RADIUS | BELOW 1.0 MI RADIUS





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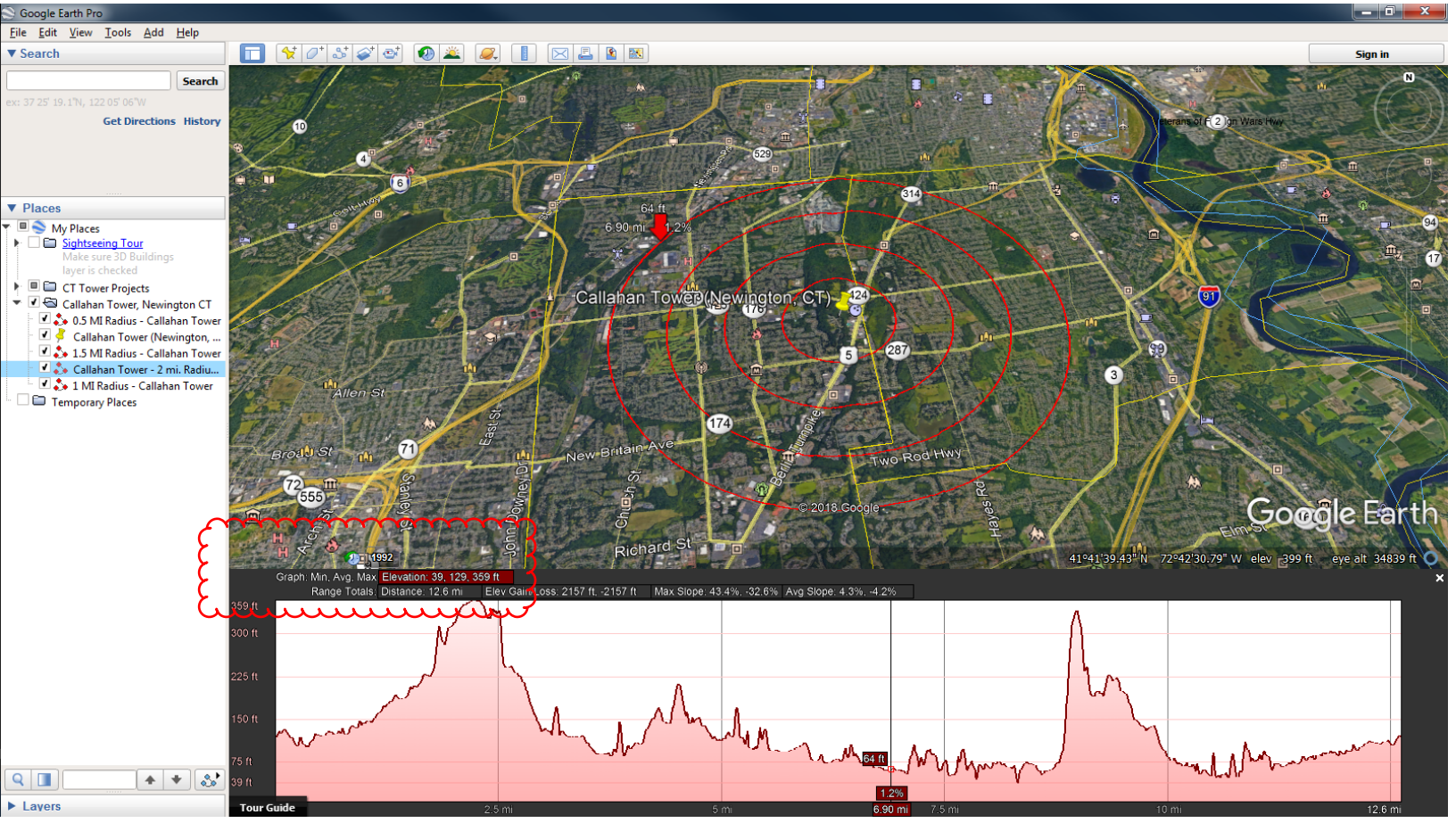


SEISMIC BASE SHEAR

Seismic (Vs) Base Shear Implementing ANSI/TIA–222-G, IBC 2015 & Connecticut State Building Code of 2018

Calculation of Seismic Base Shear Implementing ANSI/TIA-222-G, IBC 2015 & & CT State Building Code 2018.

Location: Newington, CT -Site Class "C"

$S_{DS} = \frac{2}{3} F_A S_S$, where $S_S = 0.182$ and $F_A = 1.2$ $S_{DS} = \frac{2}{3} F_A S_S = \frac{2}{3} * 1.2 * 0.182 = 0.146$

$S_{D1} = \frac{2}{3} F_V S_1$, where $S_1 = 0.064$ and $F_V = 1.7$ $S_{D1} = \frac{2}{3} F_V S_1 = \frac{2}{3} * 1.7 * 0.064 = 0.073$

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

1. Importance Factor "I" (tables 2-3 TIA-222-G) = 1.0 (Structure Class 2)

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

W=DL TOWER	= 10.501	Kips
W=Antennas/Mounts	= 10.626	Kips
W=Cables	= 3.760	Kips
	24.887	Kips = WT Total = "W"

$V_s = \frac{S_{DS} * W * I}{R} = \frac{0.146 * 24.887 kips * 1.0}{2.5} = 1.4534 \ kips,$ where R = 2.5 for Guyed Lattice Tower

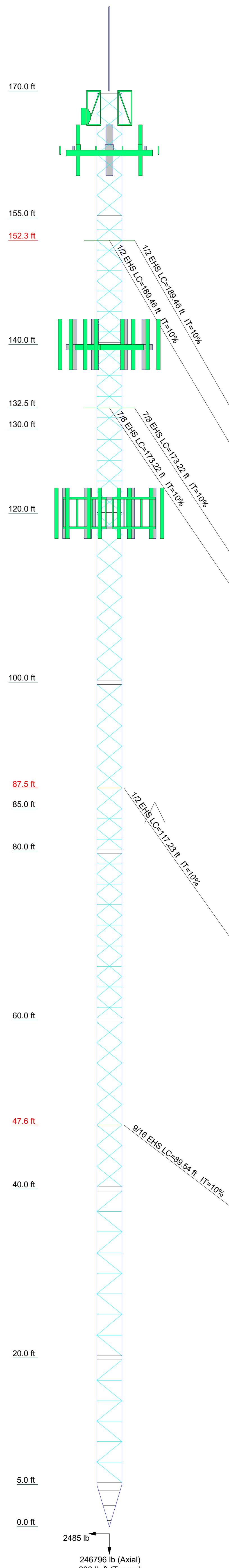
$V_{S.min} = \frac{0.5 * S_{D1} * W * I}{R} = \frac{0.5 * 0.073 * 24.887 kips * 1.0}{2.5} = 0.3634 \ kips$

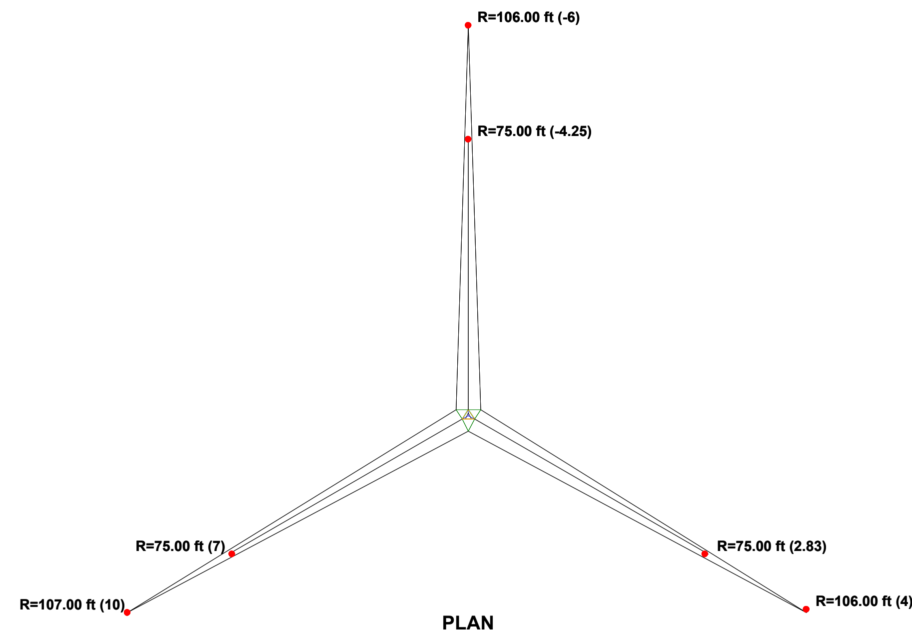
*By visual inspection, the above "Base Shear" value when considering the following Load Combination is less that the base shear of wind on structure.

$1.2 * DL + 1.0\ E < 1.2\ DL + 1.6\ W,$ (2.485 Kips), therefore seismic effect on structure Does NOT control Design.

TNX TOWER INPUT/OUTPUT SUMMARY

Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Mid Girts	Bottom Girts	Horizontals	Sec. Horizontals	Top Guy Pull-Offs	Face Width (ft)	# Panels @ (ft)	Weight (lb)
T1	ROHN 2 STD	A572-50	P1.5x16GA		P1.5x16GA		P1.5x16GA		N.A.	N.A.	3.42	12 @ 2.41667	329.0
T2			ROHN 1.5 STD						SR 1	L2x2x3/16			1219.1
T3			L1 3/4x1 3/4x1/4		L1 1/2x1 1/2x1/8		N.A.					3 @ 2.47222	450.1
T4	Offset SR1 Welded to Leg		C						L1 3/4x1 3/4x1/4			F	805.6
T5		A500-46	L1 3/4x1 3/4x1/4		N.A.					N.A.		4 @ 2.47917	593.5
T6	A				P1.5x16GA		P1.5x16GA	N.A.	N.A.			14 @ 2.45833	704.9
T7	ROHN 2.5 STD			A36		N.A.	N.A.			2x1/2			451.3
T8		A572-50			N.A.		D		SR 1			2 @ 2.375	199.7
T9	ROHN 2 STD w/ 1/3rd pipe		P1.5x16GA		L2 1/2x2 1/2x3/16		L2 1/2x2 1/2x3/16		L2 1/2x2 1/2x3/16	N.A.			879.1
T10	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	A500-46								2x1/2		24 @ 2.4375	914.9
T11					P1.5x16GA		P1.5x16GA	SR 1	N.A.	N.A.			975.2
T12	ROHN 2.5 EH	A500-50					E					6 @ 2.41667	601.7
T13	B		N.A.	N.A.	14x3/16	14x3/16	14x3/16	N.A.				3 @ 1.75	2377.3
													10501.3





PLAN

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DS4C03F36U-D 8' Omni (Town)	175	DC6-48-60-18-8F (Squid) Suppressor (ATT Equipment)	120
SC473-HF1LDF (Town)	175	DC6-48-60-18-8F (Squid) Suppressor (ATT Equipment)	120
SC473-HF1LDF (Town)	175	800-10965 Kathrien Panel w/ Pipe Mount (ATT Equipment - Proposed)	120
TTA 432-83H-01T (Town)	170	800-10965 Kathrien Panel w/ Pipe Mount (ATT Equipment - Proposed)	120
Pirod 4' Side Mount Standoff (1) (Town)	168	800-10965 Kathrien Panel w/ Pipe Mount (ATT Equipment - Proposed)	120
Pirod 4' Side Mount Standoff (1) (Town)	168	RRUS-32 B66 (ATT Equipment - Proposed)	120
Pirod 4' Side Mount Standoff (1) (Town)	168	RRUS-32 B66 (ATT Equipment - Proposed)	120
RFS SC2-W100BC	167	RRUS-32 B66 (ATT Equipment - Proposed)	120
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	163	4478 Radio Unit (4x40W) (ATT Equipment - Proposed)	120
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	163	4478 Radio Unit (4x40W) (ATT Equipment - Proposed)	120
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	163	4478 Radio Unit (4x40W) (ATT Equipment - Proposed)	120
APXVARR24_43-C-NA20 Panel Antenna w/ 96" Pipe (T-Mobile)	163	DC6-48-60-18-8F (Squid) Suppressor (ATT Equipment - Proposed)	120
APXVARR24_43-C-NA20 Panel Antenna w/ 96" Pipe (T-Mobile)	163	Sabre 12" HD V-Boom Antenna Mount (ATT Equipment - Proposed)	120
APXVARR24_43-C-NA20 Panel Antenna w/ 96" Pipe (T-Mobile)	163	Sabre 12" HD V-Boom Antenna Mount (ATT Equipment - Proposed)	120
Ericsson 6449 41 Panels (T-Mobile - Proposed)	163	Sabre 12" HD V-Boom Antenna Mount (ATT Equipment - Proposed)	120
Ericsson 6449 41 Panels (T-Mobile - Proposed)	163	RRUS-32 (ATT Equipment)	120
Ericsson 6449 41 Panels (T-Mobile - Proposed)	163	RRUS-32 (ATT Equipment)	120
AIR32 B66Aa/B2a Antenna Panel (T-Mobile)	163	RRUS-32 (ATT Equipment)	120
AIR32 B66Aa/B2a Antenna Panel (T-Mobile)	163	QS66512-2 Panel Antenna (ATT Equipment)	120
AIR32 B66Aa/B2a Antenna Panel (T-Mobile)	163	QS66512-2 Panel Antenna (ATT Equipment)	120
(2) Generic Twin TMA unit (T-Mobile)	163	QS66512-2 Panel Antenna (ATT Equipment)	120
(2) Generic Twin TMA unit (T-Mobile)	163	7770.00 (ATT Equipment)	120
(2) Generic Twin TMA unit (T-Mobile)	163	7770.00 (ATT Equipment)	120
Ericsson Radio 4415 B25 RRH Unit (T-Mobile - Proposed)	163	7770.00 (ATT Equipment)	120
Ericsson Radio 4415 B25 RRH Unit (T-Mobile - Proposed)	163	OPA-65R-LCUU-H6 Panel (ATT Equipment)	120
Ericsson Radio 4415 B25 RRH Unit (T-Mobile - Proposed)	163	OPA-65R-LCUU-H6 Panel (ATT Equipment)	120
4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	163	OPA-65R-LCUU-H6 Panel (ATT Equipment)	120
4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	163	(2) LGP214## TMA (ATT Equipment)	120
4449 B71 + B12 Radio Unit (T-Mobile - Proposed)	163	(2) LGP214## TMA (ATT Equipment)	120
Pirod 12' T-Frame Sector Mount (1) (Sprint)	140	(2) LGP214## TMA (ATT Equipment)	120
Pirod 12' T-Frame Sector Mount (1) (Sprint)	140	(2) TPX-070821 CCI Triplexer Unit (ATT Equipment)	120
Pirod 12' T-Frame Sector Mount (1) (Sprint)	140	(2) TPX-070821 CCI Triplexer Unit (ATT Equipment)	120
AAHC Panel Antenna (Sprint - Proposed)	140	(2) TPX-070821 CCI Triplexer Unit (ATT Equipment)	120
AAHC Panel Antenna (Sprint - Proposed)	140	RRUS-32 (ATT Equipment)	120
AAHC Panel Antenna (Sprint - Proposed)	140	RRUS-32 (ATT Equipment)	120
NNVV-65B-R4 Panel Antenna (Sprint - Proposed)	140	RRUS-32 (ATT Equipment)	120
NNVV-65B-R4 Panel Antenna (Sprint - Proposed)	140	RRUS-11 (ATT Equipment)	120
NNVV-65B-R4 Panel Antenna (Sprint - Proposed)	140	RRUS-11 (ATT Equipment)	120
ALU 4x45-1900 MHz RRH Unit (Sprint - Proposed)	140	RRUS-11 (ATT Equipment)	120
ALU 4x45-1900 MHz RRH Unit (Sprint - Proposed)	140	(2) GPS (Town)	50
ALU 4x45-1900 MHz RRH Unit (Sprint - Proposed)	140		
(2) ALU 800MHz 2x50W (Sprint - Proposed)	140		
(2) ALU 800MHz 2x50W (Sprint - Proposed)	140		
(2) ALU 800MHz 2x50W (Sprint - Proposed)	140		
844G65VTZASX w/Mount Pipe (Sprint)	140		
844G65VTZASX w/Mount Pipe (Sprint)	140		
844G65VTZASX w/Mount Pipe (Sprint)	140		
844G65VTZASX w/Mount Pipe (Sprint)	140		
DB844H90E-XY Panel Antenna (Sprint)	140		
DB844H90E-XY Panel Antenna (Sprint)	140		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	D	P1.5x16GA
B	T-Plate Welded to ROHN 2.5 EH (Callahan Acres MODification)	E	ROHN 1.5 SCH XS (Extra Strong)
C	L2x2x1/4	F	1 @ 2.41667

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A500-46	46 ksi	62 ksi
A36	36 ksi	58 ksi	A500-50	50 ksi	62 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 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 3 with Crest Height of 175.00 ft
8. ANALYSIS ASSUMPTIONS:
9. Previous Un-Modified Tower Dimensions are from Original Construction Plans developed by Charles L. Burns for Mohawk Towers (12/1997).
10. Tower diagonal and horizontal bolts are assumed to match ROHN specifications of 1/2" ASTM 325N (unless indicated otherwise).
11. Tower Bolt information obtained from Hudson Design Group Tower Mapping Report (Dated 05/11/2012).
12. Following Previous Tower Modifications are assumed to have been Constructed:
13. * Elevation Range 120' - 140' - U-bolted w/ welded ends of (1) SR to existing (vertical leg) - Designed by Bay State Design (04/07/2010
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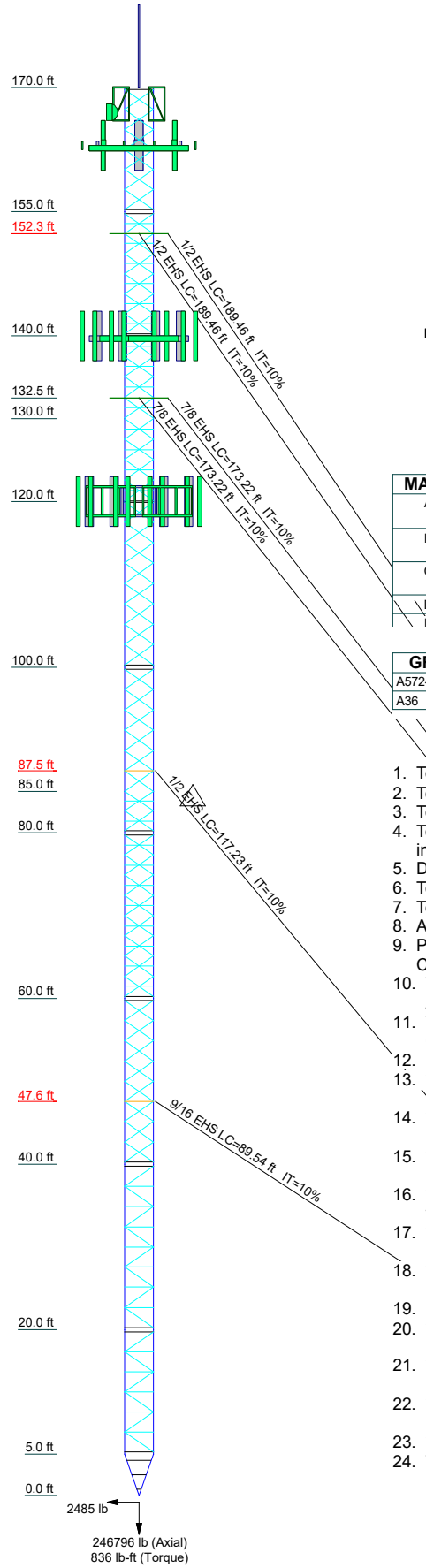
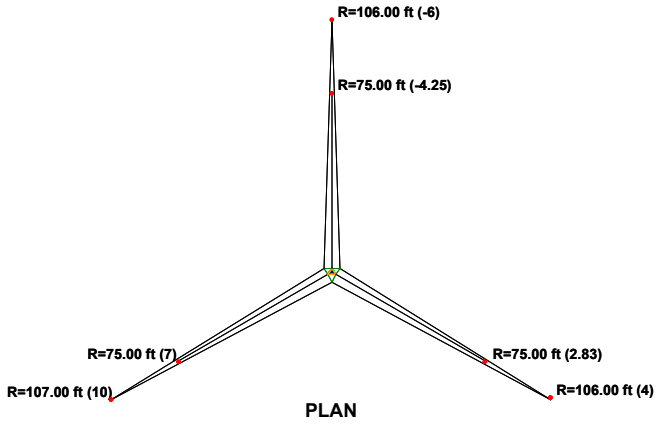
19. Proposed Modifications - Tower Legs:
20. *1/3rd HSS 2.8750x0.203 welded on Existing ROHN 2 STD Pipe. Overall Steel Grade reduced to Reinforcement Material (ASTM A500-Gr. C) (Cons.) (Elevation 100' to 120')
21. *1/3rd HSS 3.5x0.250 welded on Existing ROHN 2.5 STD Pipe. Overall Steel Grade Reduced to Reinforcement Material (ASTM A500-Gr. C) (Cons.) (Elevation 20' to 60')
22. * RFI #1 Request (1/31/2020) - Update 20' to 60' steel from 1/3rd HSS 3.5x0.250 to 1/3rd HSS 3.5x0.300 (Status of update: ???)

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
Phone: 860-263-5800
FAX: 860-812-2094

Job: ***170' Callahan Tower (Newington, CT)***			
Project: ***Structural Analysis - Callahan Tower / NSS-048***			
Client: T-Mobile Equipment Upgrade - Analysis	Drawn by: MCD	App'd:	
Code: TIA-222-G	Date: 08/10/20	Scale: NTS	
Path: C:\Users\michael.dalickas\Desktop\20200702_NewingtonCT_CAL_T-MO\TIA-222-G\20200713_RFI#1_Callahan Acres Tower.eri		Dwg No. E-1	

Section	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	C	ROHN 2.5 EH	B		ROHN 2 STD w/ 1/3rd pipe		ROHN 2.5 STD	A	Offset SR1 Welded to Leg			ROHN 2 STD	
Leg Grade		A500-50	A500-46		A572-50			A500-46				A572-50	
Diagonals	N.A.				P1.5x16GA				D	E	D	ROHN 1.5 STD	P1.5x16GA
Diagonal Grade	N.A.				A36								
Top Girts	G		P1.5x16GA		L2 1/2x2 1/2x3/16	N.A.	P1.5x16GA		N.A.		F		P1.5x16GA
Mid Girts	G						N.A.						
Bottom Girts	G	I	P1.5x16GA		L2 1/2x2 1/2x3/16	H	N.A.	P1.5x16GA			N.A.		P1.5x16GA
Horizontals	N.A.		SR 1				N.A.						
Sec. Horizontals			N.A.		L2 1/2x2 1/2x3/16	SR 1		N.A.	L1 3/4x1 3/4x1/4			SR 1	N.A.
Top Guy Pull-Offs			N.A.	2x1/2	N.A.		2x1/2	N.A.				L2x2x3/16	N.A.
Face Width (ft)													3.42
# Panels @ (ft)	L	6 @ 2.41667		24 @ 2.4375		K		14 @ 2.45833	4 @ 2.47917	J3 @ 2.47222		12 @ 2.41667	
Weight (lb)	10501.3	2377.3	601.7	975.2	914.9	879.1	199.7	451.3	704.9	593.5	805.6	450.1	1219.1	329.0





SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	G	14x3/16
B	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	H	P1.5x16GA
C	T-Plate Welded to ROHN 2.5 EH (Callahan Acres MODification)	I	ROHN 1.5 SCH XS (Extra Strong)
D	L1 3/4x1 3/4x1/4	J	1 @ 2.41667
F	L2x2x1/4	K	2 @ 2.375
		L	3 @ 1.75

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A500-46	46 ksi	62 ksi
A36	36 ksi	58 ksi	A500-50	50 ksi	62 ksi

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50 mph basic wind with 1.00 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 3 with Crest Height of 175.00 ft
8. ANALYSIS ASSUMPTIONS:
9. Previous Un-Modified Tower Dimensions are from Original Construction Plans developed by Charles L. Burns for Mohawk Towers (12/1997).
10. Tower diagonal and horizontal bolts are assumed to match ROHN specifications of 1/2" ASTM 325N (unless indicated otherwise).
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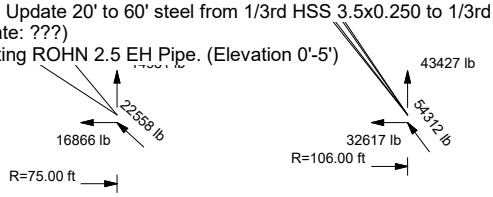
22. * RFI #1 Request (1/31/2020) - Update 20' to 60' steel from 1/3rd HSS 3.5x0.250 to 1/3rd HSS 3.5x0.300 (Status of update: ???)
23. *T-Plate Beam welded on Existing ROHN 2.5 EH Pipe. (Elevation 0'-5')
24. TOWER RATING: 95.1%



ALL REACTIONS ARE FACTORED

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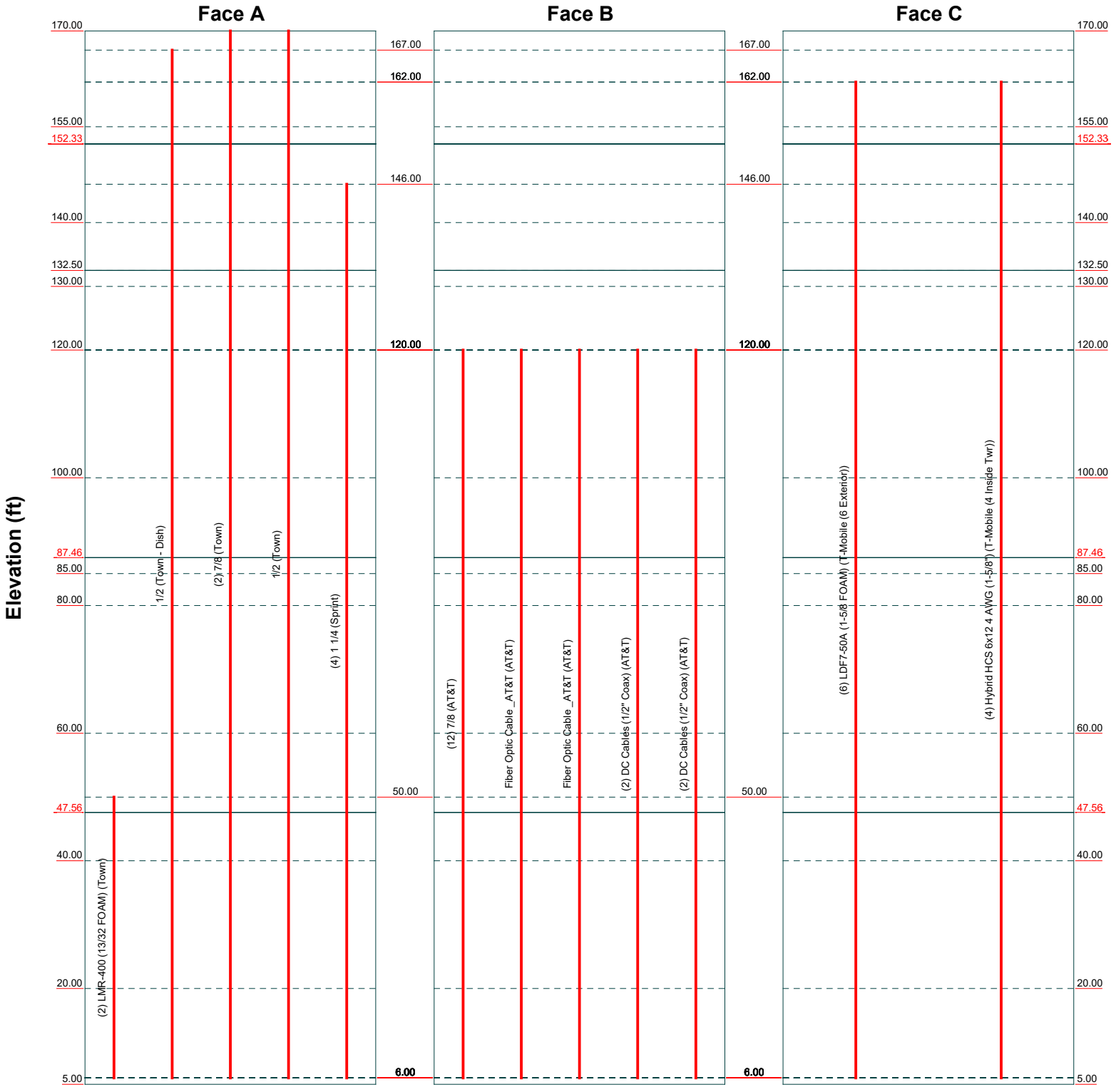
FAX: 860-812-2094

Job:	***170' Callahan Tower (Newington, CT)***		
Project:	***Structural Analysis - Callahan Tower / NSS-048***		
Client:	T-Mobile Equipment Upgrade - Analysis	Drawn by: MCD	App'd:
Code:	TIA-222-G	Date: 08/10/20	Scale: NTS
Path:	C:\Users\michael.dallickas\Desktop\20200702_NewingtonCT_CAL_T-MO\TIA-222-G\20200713_RFI#1_Callahan Acres Tower.eri		Dwg No. E-1

TNX TOWER FEEDLINE DISTRIBUTION CHART

Feed Line Distribution Chart
5' - 170'

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



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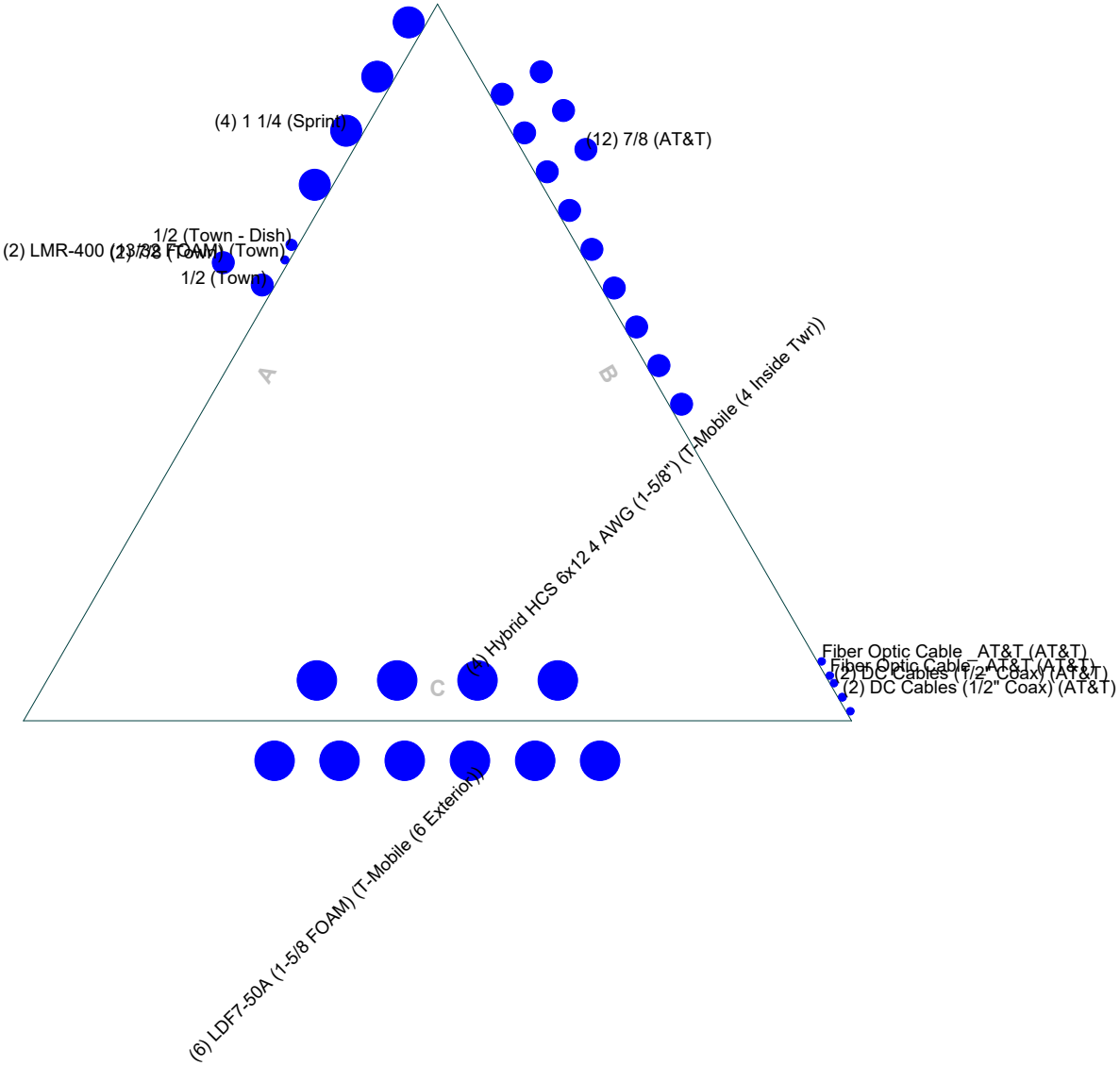
TNX TOWER FEEDLINE PLAN

Feed Line Plan

Round Flat App In Face App Out Face

NOTE:
Proposed location of cables assumed for installation of construction. The Engineer shall be notified of any differences of the tower cables installed and planned to install prior to the installation of the proposed antenna and coaxial/hybrid/fiber cables as shown below.



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TNX TOWER ANCHOR REACTIONS

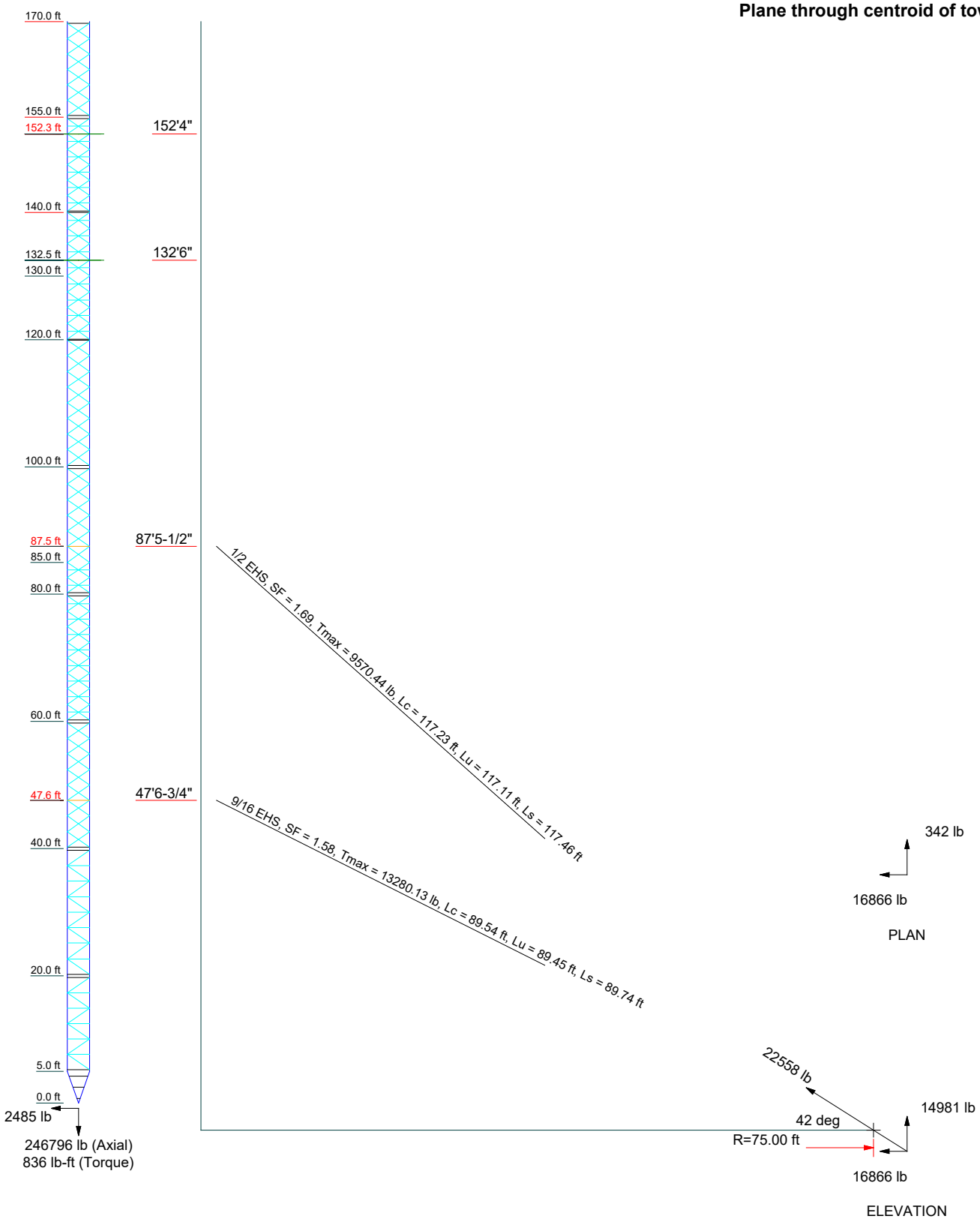
Guy Tensions and Tower Reactions

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B

Maximum Values

Anchor 'A'@75 ft Azimuth 0 deg Elev -4.25 ft

Plane through centroid of tower



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Rocky Hill, CT	Client: T-Mobile Equipment Upgrade - Analysis	Drawn by: MCD	App'd:
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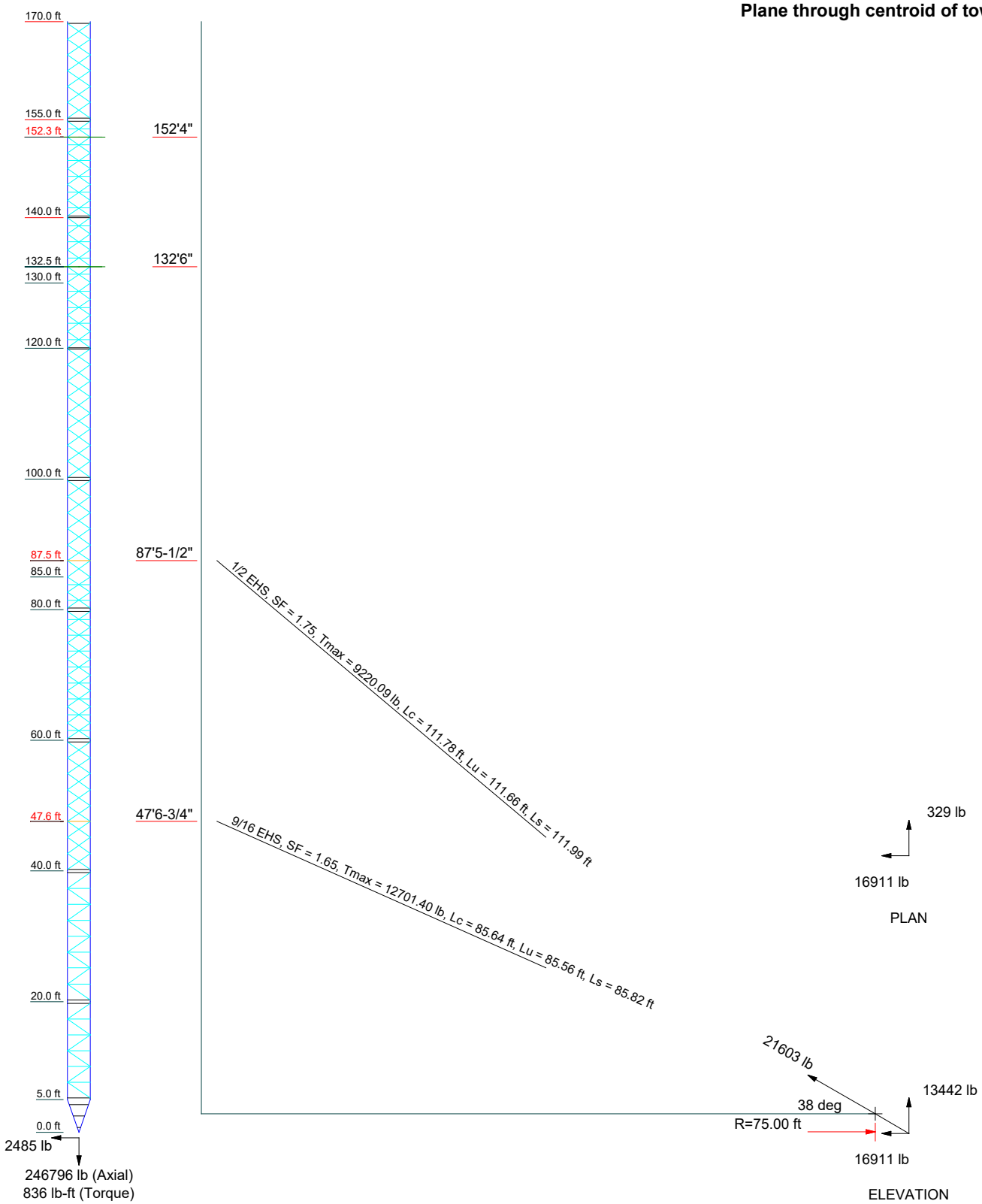
Guy Tensions and Tower Reactions

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B

Maximum Values

Anchor 'B'@75 ft Azimuth 120 deg Elev 2.83 ft

Plane through centroid of tower



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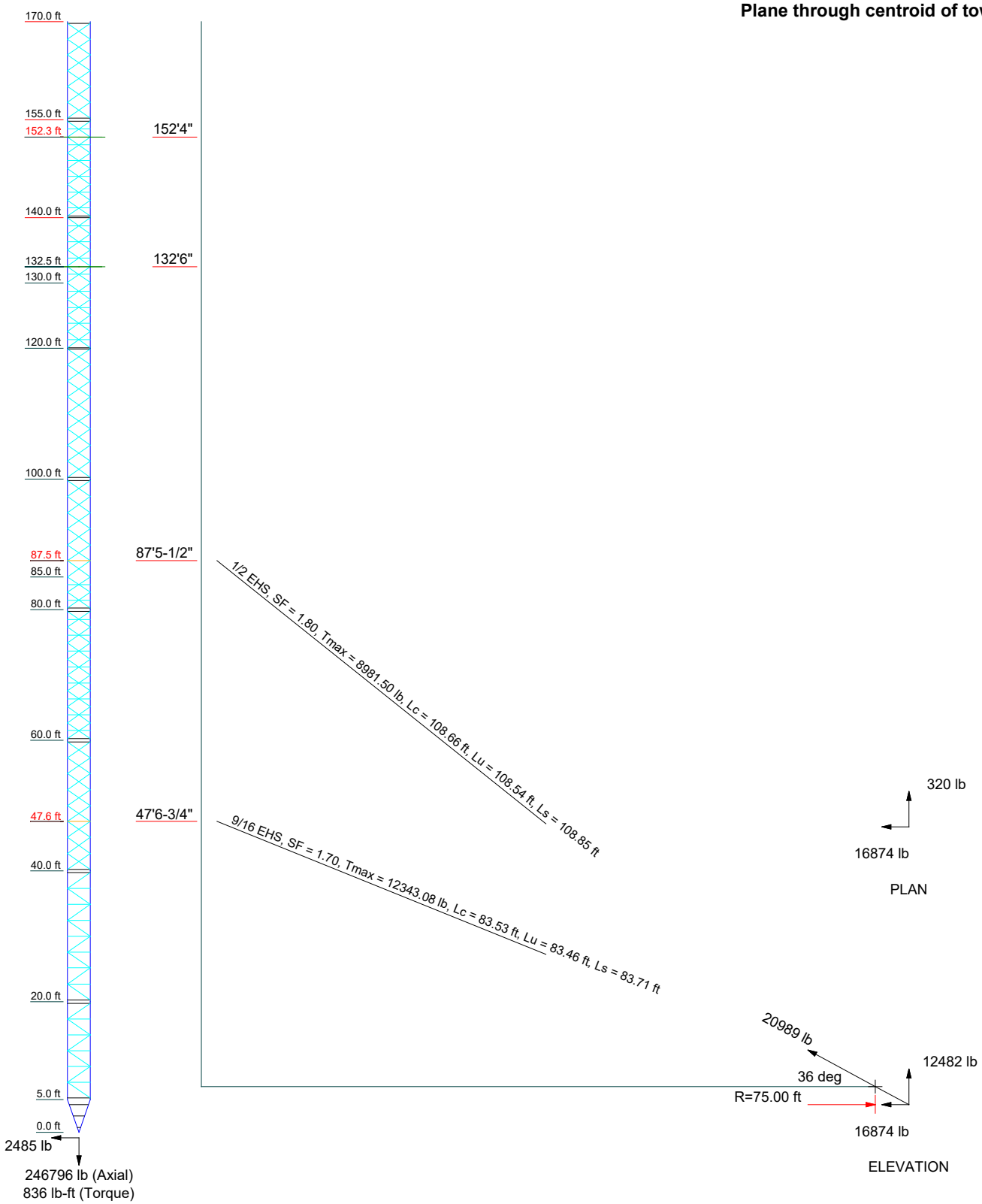
Guy Tensions and Tower Reactions

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B

Maximum Values

Anchor 'C'@75 ft Azimuth 240 deg Elev 7 ft

Plane through centroid of tower



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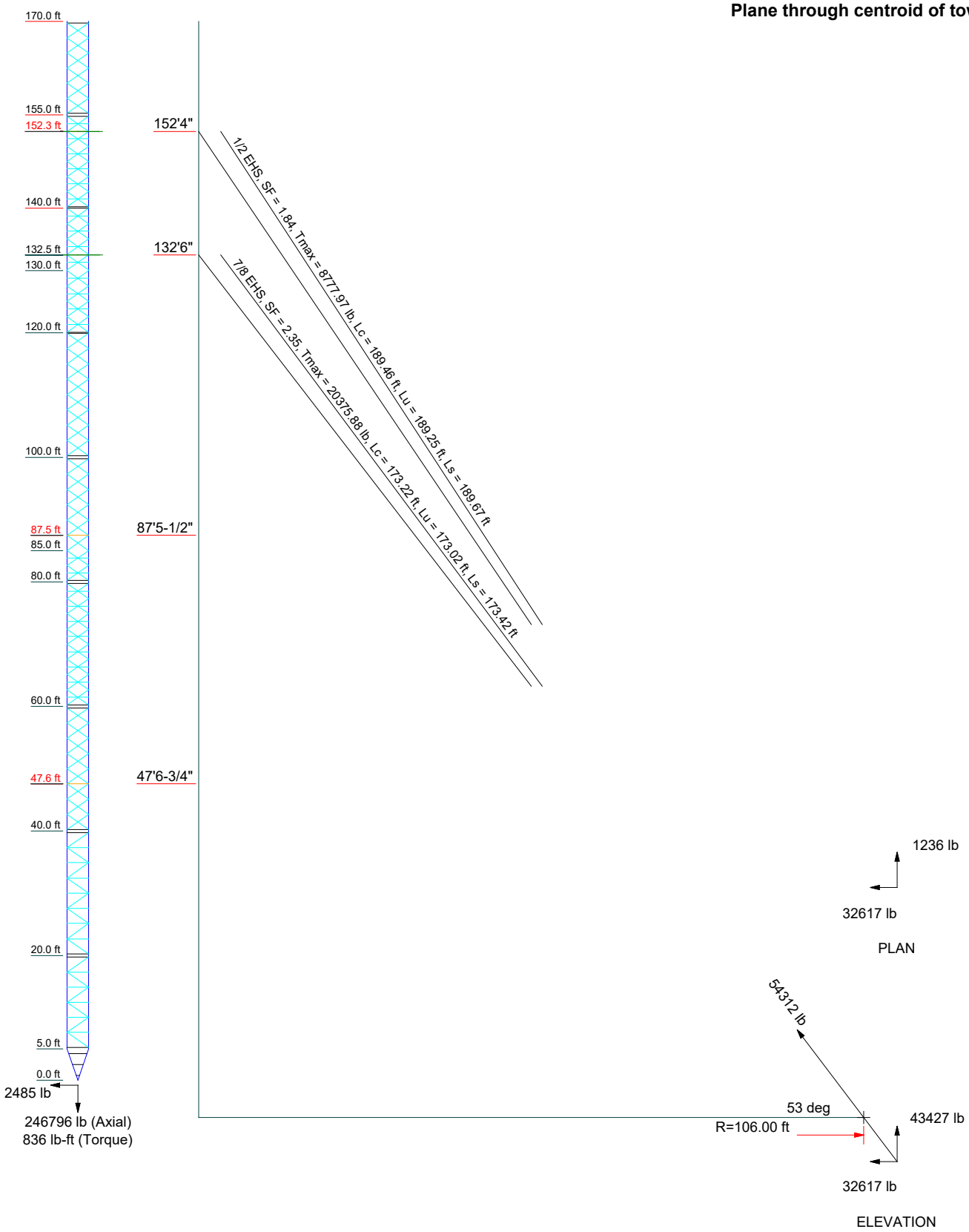
Guy Tensions and Tower Reactions

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B

Maximum Values

Anchor 'A'@106 ft Azimuth 0 deg Elev -6 ft

Plane through centroid of tower



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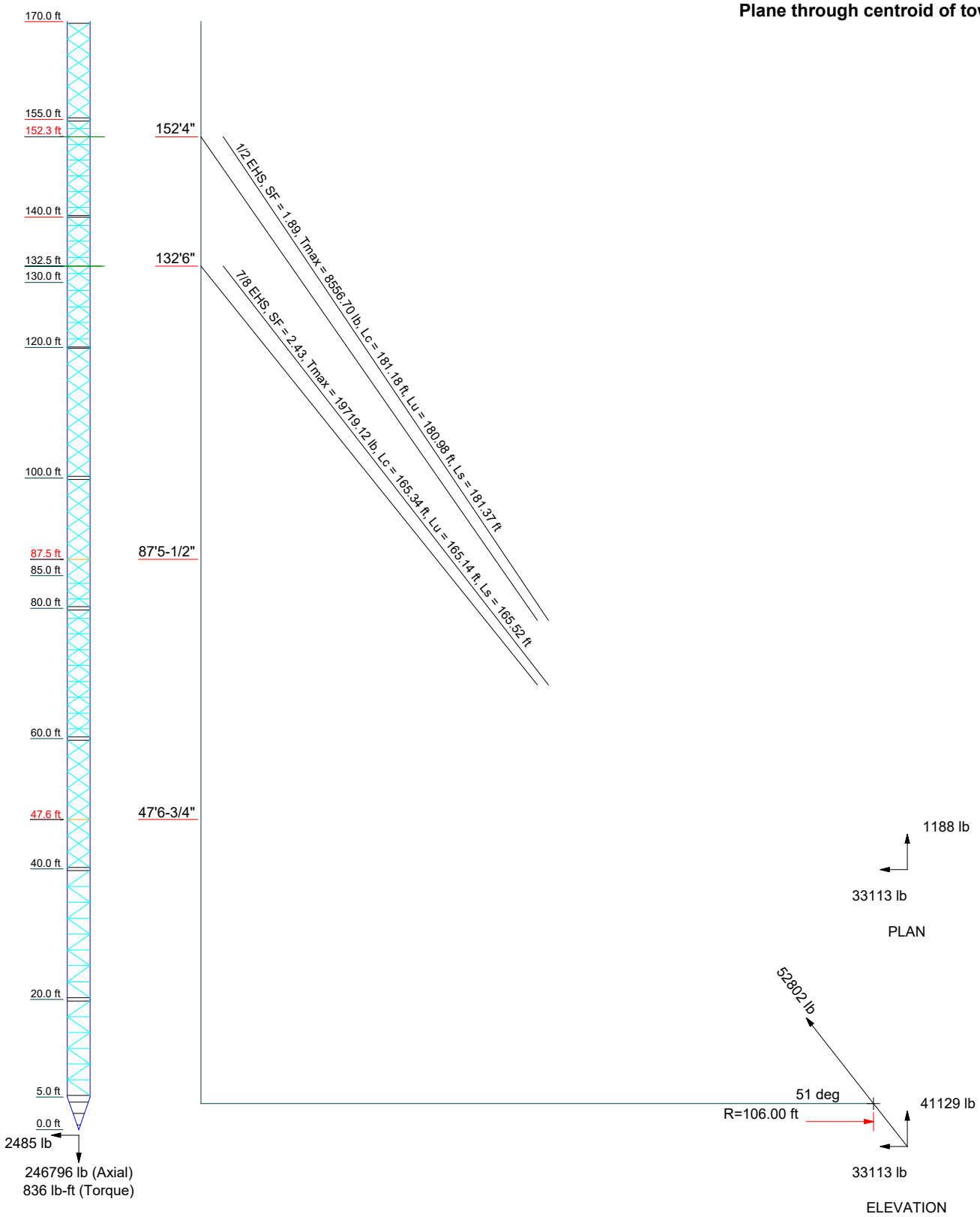
Guy Tensions and Tower Reactions

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B

Maximum Values

Anchor 'B'@106 ft Azimuth 120 deg Elev 4 ft

Plane through centroid of tower



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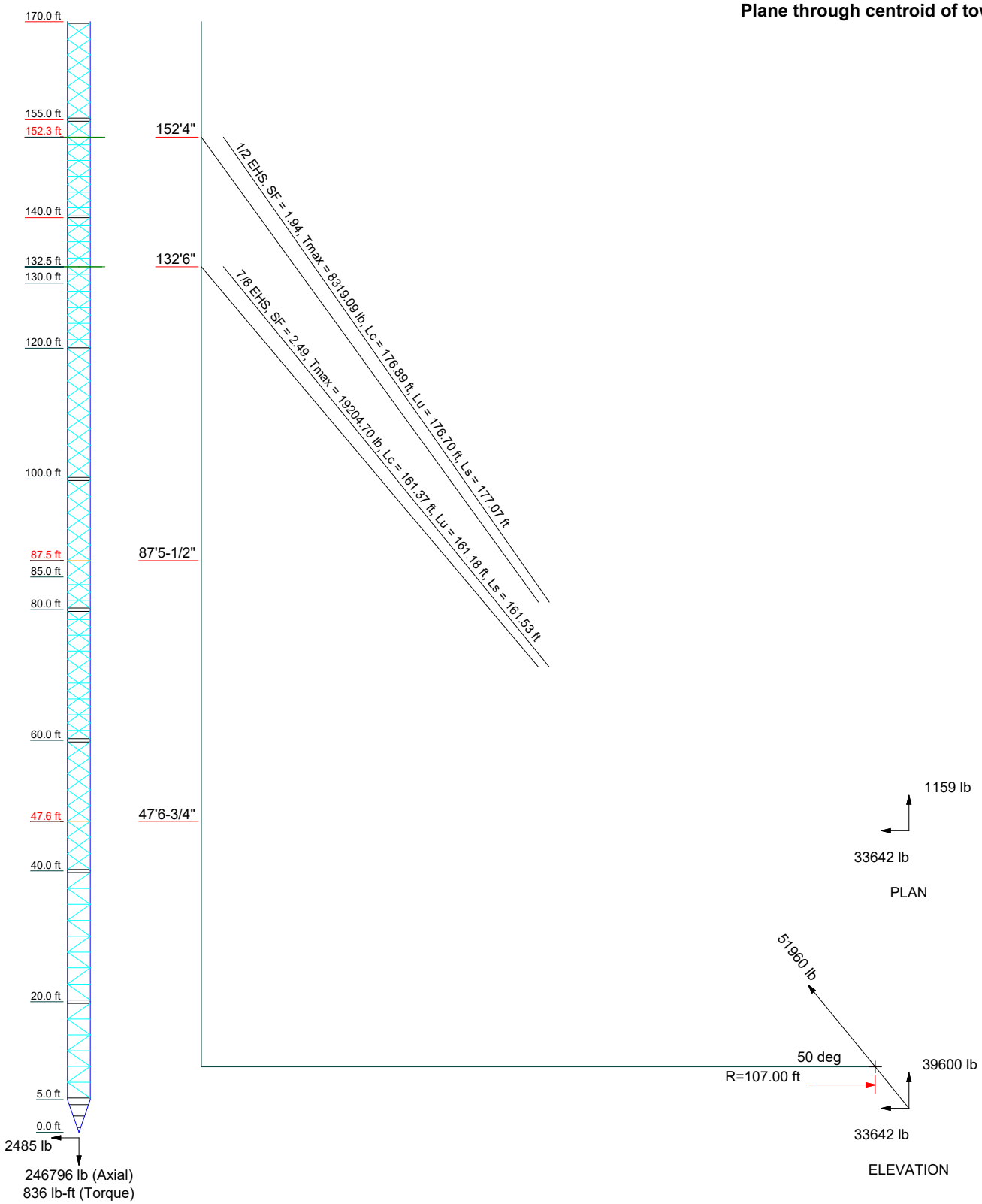
Guy Tensions and Tower Reactions

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure B

Maximum Values

Anchor 'C'@107 ft Azimuth 240 deg Elev 10 ft

Plane through centroid of tower



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TNX TOWER DETAILED OUTPUT

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 170.00 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 3.42 ft at the top and tapered at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Hartford County, Connecticut.
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category B.
Topographic Category 3.
Crest Height 175.00 ft.
Nominal ice thickness of 1.0000 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.
ANALYSIS ASSUMPTIONS:.
Previous Un-Modified Tower Dimensions are from Original Construction Plans developed by Charles L. Burns for Mohawk Towers (12/1997)..
Tower diagonal and horizontal bolts are assumed to match ROHN specifications of 1/2" ASTM 325N (unless indicated otherwise)..
Tower Bolt information obtained from Hudson Design Group Tower Mapping Report (Dated 05/11/2012)..
Following Previous Tower Modifications are assumed to have been Constructed:.
* Elevation Range 120' - 140' - U-bolted w/ welded ends of (1) SR to existing (vertical leg) - Designed by Bay State Design (04/07/2010.
* Elevation Range 60' - 80' (Addition of 1/3 HSS/Pipe U-Bolted to existing Tower leg) - Designed by Hudson Design Group - Implemented by URS Corporation (dated 08/18/2014).
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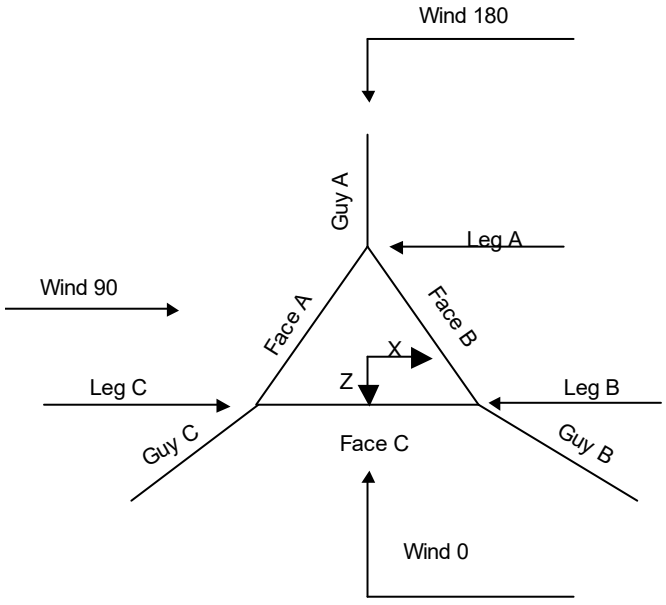
* RFI #1 Request (1/31/2020) - Update 20' to 60' steel from 1/3rd HSS 3.5x0.250 to 1/3rd HSS 3.5x0.300 (Status of update: ???).
*T-Plate Beam welded on Existing ROHN 2.5 EH Pipe. (Elevation 0'-5').
Pressures are calculated at each section.
Safety factor used in guy design is 1.
Stress ratio used in tower member design is 1.

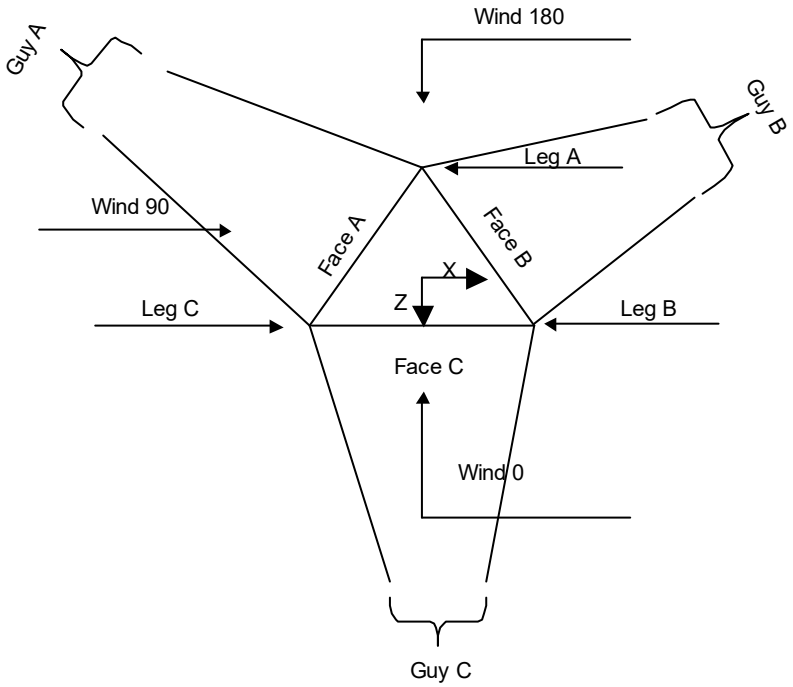
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

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		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Corner & Starmount Guyed Tower



Face Guyed

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	170.00-155.00			3.42	1	15.00
T2	155.00-140.00			3.42	1	15.00
T3	140.00-132.50			3.42	1	7.50
T4	132.50-130.00			3.42	1	2.50
T5	130.00-120.00			3.42	1	10.00
T6	120.00-100.00			3.42	1	20.00
T7	100.00-85.00			3.42	1	15.00
T8	85.00-80.00			3.42	1	5.00
T9	80.00-60.00			3.42	1	20.00
T10	60.00-40.00			3.42	1	20.00
T11	40.00-20.00			3.42	1	20.00
T12	20.00-5.00			3.42	1	15.00
T13	5.00-0.00			3.42	1	5.00

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	170.00-155.00	2.42	X Brace	No	No	3.0000	3.0000
T2	155.00-140.00	2.42	X Brace	No	Yes	3.0000	3.0000
T3	140.00-132.50	2.47	X Brace	No	Yes	0.0000	1.0000
T4	132.50-130.00	2.42	X Brace	No	Yes	0.0000	1.0000
T5	130.00-120.00	2.48	X Brace	No	Yes	0.0000	1.0000
T6	120.00-100.00	2.46	X Brace	No	Yes	1.0000	3.0000
T7	100.00-85.00	2.46	X Brace	No	Yes	3.0000	0.0000
T8	85.00-80.00	2.38	X Brace	No	Yes	0.0000	3.0000
T9	80.00-60.00	2.44	X Brace	No	Yes	3.0000	3.0000
T10	60.00-40.00	2.44	X Brace	No	Yes	3.0000	3.0000
T11	40.00-20.00	2.44	K Brace Right	No	Yes	3.0000	3.0000
T12	20.00-5.00	2.42	K Brace Right	No	Yes	3.0000	3.0000
T13	5.00-0.00	1.75	K Brace Right	No	Yes	9.0000	9.0000

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 170.00-155.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T2 155.00-140.00	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	ROHN 1.5 STD	A36 (36 ksi)
T3 140.00-132.50	Arbitrary Shape	Offset SR1 Welded to Leg	A500-46 (46 ksi)	Equal Angle	L1 3/4x1 3/4x1/4	A36 (36 ksi)
T4 132.50-130.00	Arbitrary Shape	Offset SR1 Welded to Leg	A500-46 (46 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T5 130.00-120.00	Arbitrary Shape	Offset SR1 Welded to Leg	A500-46 (46 ksi)	Equal Angle	L1 3/4x1 3/4x1/4	A36 (36 ksi)
T6 120.00-100.00	Arbitrary Shape	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	A500-46 (46 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T7 100.00-85.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T8 85.00-80.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T9 80.00-60.00	Arbitrary Shape	ROHN 2 STD w/ 1/3rd pipe	A572-50 (50 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T10 60.00-40.00	Arbitrary Shape	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	A500-46 (46 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T11 40.00-20.00	Arbitrary Shape	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	A500-46 (46 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T12 20.00-5.00	Pipe	ROHN 2.5 EH	A500-50 (50 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T13 5.00-0.00	Arbitrary Shape	T-Plate Welded to ROHN 2.5 EH (Callahan Acres MODification)	A500-50 (50 ksi)	Pipe		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 170.00-155.00	Pipe	P1.5x16GA	A36 (36 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T2 155.00-140.00	Pipe	P1.5x16GA	A36 (36 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T3 140.00-132.50	Equal Angle	L1 1/2x1 1/2x1/8	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T5 130.00-120.00	Solid Round		A36 (36 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T6 120.00-100.00	Pipe	P1.5x16GA	A36 (36 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T7 100.00-85.00	Pipe	P1.5x16GA	A36 (36 ksi)	Pipe		A36 (36 ksi)
T8 85.00-80.00	Solid Round		A36 (36 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T9 80.00-60.00	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T10 60.00-40.00	Pipe	P1.5x16GA	A36 (36 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T11 40.00-20.00	Pipe	P1.5x16GA	A36 (36 ksi)	Pipe	P1.5x16GA	A36 (36 ksi)
T12 20.00-5.00	Pipe	P1.5x16GA	A36 (36 ksi)	Pipe	ROHN 1.5 SCH XS (Extra Strong)	A36 (36 ksi)
T13 5.00-0.00	Flat Bar	14x3/16	A36 (36 ksi)	Flat Bar	14x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T11 40.00-20.00	None	Flat Bar		A36 (36 ksi)	Solid Round	1	A36 (36 ksi)
T12 20.00-5.00	None	Flat Bar		A36 (36 ksi)	Solid Round	1	A36 (36 ksi)
T13 5.00-0.00	1	Flat Bar	14x3/16	A36 (36 ksi)	Flat Bar		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T2 155.00-140.00	Solid Round	1	A36 (36 ksi)	Solid Round		A572-50 (50 ksi)
T3 140.00-132.50	Equal Angle	L1 3/4x1 3/4x1/4	A36	Solid Round		A572-50

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T4 132.50-130.00	Equal Angle	L1 3/4x1 3/4x1/4	(36 ksi) A36 (36 ksi)	Solid Round		(50 ksi) A572-50 (50 ksi)
T5 130.00-120.00	Equal Angle	L1 3/4x1 3/4x1/4	(36 ksi) A36 (36 ksi)	Solid Round		(50 ksi) A572-50 (50 ksi)
T8 85.00-80.00	Solid Round	1	(36 ksi) A36 (36 ksi)	Solid Round		(50 ksi) A572-50 (50 ksi)
T9 80.00-60.00	Equal Angle	L2 1/2x2 1/2x3/16	(36 ksi) A36 (36 ksi)	Solid Round		(50 ksi) 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 170.00-155.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 155.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 140.00-132.50	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 132.50-130.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 130.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 100.00-85.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 85.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T10 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T11 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T12 20.00-5.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T13 5.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	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

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	No	No	1	1	1	1	1	1	1	1
170.00-155.00				1	1	1	1	1	1	1
T2	No	No	1	1	1	1	1	1	1	1
155.00-140.00				1	1	1	1	1	1	1
T3	No	No	1	1	1	1	1	1	1	1
140.00-132.50				1	1	1	1	1	1	1
T4	No	No	1	1	1	1	1	1	1	1
132.50-130.00				1	1	1	1	1	1	1
T5	No	No	1	1	1	1	1	1	1	1
130.00-120.00				1	1	1	1	1	1	1
T6	No	No	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T7	No	No	1	1	1	1	1	1	1	1
100.00-85.00				1	1	1	1	1	1	1
T8	No	No	0.5	1	1	1	1	1	1	1
85.00-80.00				1	1	1	1	1	1	1
T9	No	No	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T10	No	No	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T11	No	No	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T12	No	No	1	1	1	1	1	1	1	1
20.00-5.00				1	1	1	1	1	1	1
T13 5.00-0.00	No	No	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 Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal 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
170.00-155.00														
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
155.00-140.00														
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
140.00-132.50														
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
132.50-130.00														
T5	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
130.00-120.00														
T6	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
120.00-100.00														
T7	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
100.00-85.00														
T8 85.00-80.00	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
T9 80.00-60.00	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

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
T10 60.00-40.00	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
T11 40.00-20.00	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
T12 20.00-5.00	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
T13 5.00-0.00	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 170.00-155.00	Flange	0.7500 A325N	0	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T2 155.00-140.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T3 140.00-132.50	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.0000 A325N	0	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T4 132.50-130.00	Flange	0.7500 A325N	0	0.6250 A325N	1	0.5000 A325N	1	0.0000 A325N	0	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T5 130.00-120.00	Flange	0.7500 A325N	0	0.5000 A325N	1	0.5000 A325N	1	0.0000 A325N	0	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T6 120.00-100.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	1
T7 100.00-85.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.0000 A325N	0	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T8 85.00-80.00	Flange	0.7500 A325N	0	0.5000 A325N	1	0.5000 A325N	1	0.0000 A325N	0	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T9 80.00-60.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T10 60.00-40.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T11 40.00-20.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T12 20.00-5.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.5000 A325N	1	0.6250 A490N	1	0.5000 A325N	1	0.5000 A325N	1	0.5000 A325N	1
T13 5.00-0.00	Flange	0.7500 A490N	3	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0

Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %

152.333	EHS	A	1/2	2690.00	10%	21000	0.517	189.29	106.00	0.0000	-6.00	100%
		B	1/2	2690.00	10%	21000	0.517	181.03	106.00	0.0000	4.00	100%
		C	1/2	2690.00	10%	21000	0.517	176.74	107.00	0.0000	10.00	100%
132.5	EHS	A	7/8	7970.00	10%	19000	1.581	173.07	106.00	0.0000	-6.00	100%
		B	7/8	7970.00	10%	19000	1.581	165.19	106.00	0.0000	4.00	100%
		C	7/8	7970.00	10%	19000	1.581	161.22	107.00	0.0000	10.00	100%
87.4583	EHS	A	1/2	2690.00	10%	21000	0.517	117.13	75.00	0.0000	-4.25	100%
		B	1/2	2690.00	10%	21000	0.517	111.68	75.00	0.0000	2.83	100%
		C	1/2	2690.00	10%	21000	0.517	108.56	75.00	0.0000	7.00	100%
47.5625	EHS	A	9/16	3500.00	10%	21000	0.671	89.46	75.00	0.0000	-4.25	100%
		B	9/16	3500.00	10%	21000	0.671	85.56	75.00	0.0000	2.83	100%
		C	9/16	3500.00	10%	21000	0.671	83.46	75.00	0.0000	7.00	100%

Guy Data*(cont'd)*

Guy Elevation ft	*Mount Type*	*Torque-Arm Spread ft*	*Torque-Arm Leg Angle °*	*Torque-Arm Style*	*Torque-Arm Grade*	*Torque-Arm Type*	*Torque-Arm Size*
152.333	Torque Arm	7.00	0.0000	Channel	A36 (36 ksi)	Channel	C12x20.7
132.5	Torque Arm	7.00	0.0000	Channel	A36 (36 ksi)	Arbitrary Shape	C12x20.7 w/ 8"x3/8" plate
87.4583	Corner						
47.5625	Corner						

Guy Data *(cont'd)*

Guy Elevation ft	*Diagonal Grade*	*Diagonal Type*	*Upper Diagonal Size*	*Lower Diagonal Size*	*Is Strap.*	*Pull-Off Grade*	*Pull-Off Type*	*Pull-Off Size*
152.33	A572-50 (50 ksi)	Solid Round			No	A36 (36 ksi)	Equal Angle	L2x2x3/16
132.50	A572-50 (50 ksi)	Solid Round				A572-50 (50 ksi)	Equal Angle	
87.46	A572-50 (50 ksi)	Solid Round			No	A529-50 (50 ksi)	Flat Bar	2x1/2
47.56	A572-50 (50 ksi)	Solid Round			No	A529-50 (50 ksi)	Flat Bar	2x1/2

Guy Data *(cont'd)*

Guy Elevation ft	*Cable Weight A lb*	*Cable Weight B lb*	*Cable Weight C lb*	*Cable Weight D lb*	*Tower Intercept A ft*	*Tower Intercept B ft*	*Tower Intercept C ft*	*Tower Intercept D ft*
152.333	97.87	93.59	91.38		3.39 3.2 sec/pulse	3.11 3.0 sec/pulse	2.96 3.0 sec/pulse	
132.5	273.62	261.16	254.89		2.93 3.0 sec/pulse	2.67 2.8 sec/pulse	2.55 2.8 sec/pulse	

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
87.4583	60.56	57.74	56.13		1.31 2.0 sec/pulse	1.19 1.9 sec/pulse	1.12 1.8 sec/pulse	
47.5625	60.03	57.41	56.00		0.76 1.5 sec/pulse	0.70 1.4 sec/pulse	0.67 1.4 sec/pulse	

Guy Data *(cont'd)*

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm K_x	Torque Arm K_y	Pull Off K_x	Pull Off K_y	Diagonal K_x	Diagonal K_y
152.333	No	No	1	1	1	1	1	1
132.5	No	No	1	1	1	1	1	1
87.4583	No	No			1	1	1	1
47.5625	No	No			1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
152.333	0.7500 A325N	8	0.0000	1	0.7500 A325N	1	0.0000	1	0.0000 A325N	0	0.0000	1
132.5	0.7500 A325N	8	0.0000	1	0.7500 A325N	1	0.0000	1	0.0000 A325N	0	0.0000	1
87.4583	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	1	0.0000 A325N	0	0.0000	1
47.5625	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	1	0.0000 A325N	0	0.0000	1

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
152.333	A	73.17	27	7	2.4702
	B	78.17	27	7	2.4700
	C	81.17	27	7	2.4698
132.5	A	63.25	27	7	2.4694
	B	68.25	27	7	2.4701
	C	71.25	27	7	2.4702
87.4583	A	41.60	26	7	2.4549
	B	45.14	27	7	2.4593
	C	47.23	27	7	2.4614
47.5625	A	21.66	27	7	2.3932
	B	25.20	26	7	2.4114
	C	27.28	26	7	2.4201

Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
ft		°	lb	lb	lb	lb	lb-ft	lb-ft	lb-ft
152.333	A	56.6918	2771.79 2690.00	-50.44	2331.17	-1498.63	-4710.66	5347.14	-8159.11
	A	56.6918	2771.79 2690.00	50.44	2331.17	-1498.63	-4710.66	-5347.14	8159.11
	B	54.9549	2766.62 2690.00	1382.20	2280.41	737.16	9216.19	5586.11	0.00
	B	54.9549	2766.62 2690.00	1329.51	2280.41	828.44	-4608.09	-5586.11	-7981.45
	C	53.5738	2763.52 2690.00	-1374.31	2239.65	855.75	-4525.71	5772.23	7838.76
	C	53.5738	2763.52 2690.00	-1428.26	2239.65	762.31	9051.42	-5772.23	0.00
			Sum:	**-90.86**	13702.47	**186.41**	**-287.52**	0.00	**-142.69**
132.5	A	53.0869	8188.76 7970.00	-163.23	6596.50	-4849.27	-13329.72	17302.29	-23087.75
	A	53.0869	8188.76 7970.00	163.23	6596.50	-4849.27	-13329.72	-17302.29	23087.75
	B	51.0051	8172.97 7970.00	4481.01	6403.65	2389.83	25880.04	18109.77	0.00
	B	51.0051	8172.97 7970.00	4310.16	6403.65	2685.75	-12940.02	-18109.77	-22412.77
	C	49.3886	8163.49 7970.00	-4456.91	6251.14	2775.21	-12631.84	18719.45	21878.98
	C	49.3886	8163.49 7970.00	-4631.86	6251.14	2472.19	25263.68	-18719.45	0.00
			Sum:	**-297.61**	38502.57	**624.45**	**-1087.57**	-0.00	**-533.79**
87.4583	A	51.4704	2737.37 2690.00	0.00	2153.14	-1690.32	-4251.46	0.00	0.00
	B	49.2092	2733.72 2690.00	1534.23	2082.00	885.79	2055.50	0.00	-3560.22
	C	47.7725	2731.56 2690.00	-1577.70	2035.33	910.88	2009.42	-0.00	3480.42
			Sum:	**-43.47**	6270.48	**106.35**	**-186.54**	-0.00	**-79.80**
47.5625	A	35.3562	3534.74 3500.00	0.00	2065.34	-2868.57	-4078.10	0.00	0.00
	B	31.4900	3529.99 3500.00	2595.71	1864.74	1498.63	1841.00	0.00	-3188.70
	C	29.0503	3527.19 3500.00	-2659.98	1734.10	1535.74	1712.02	-0.00	2965.30
			Sum:	**-64.28**	5664.18	**165.80**	**-525.09**	-0.00	**-223.40**

Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
ft		°	lb	lb	lb	lb	lb-ft	lb-ft	lb-ft
152.333	A	56.6918	7392.01	-121.86	6443.72	-3620.16	-13020.98	12916.80	-22553.00

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
ft		°	lb	lb	lb	lb	lb-ft	lb-ft	lb-ft
			5893.56						
	A	56.6918	7392.01	121.86	6443.72	-3620.16	-13020.98	-12916.80	22553.00
			5893.56						
	B	54.9549	7340.41	3341.67	6287.97	1782.20	25412.54	13505.21	0.00
			5936.79						
	B	54.9549	7340.41	3214.27	6287.97	2002.87	-12706.27	-13505.21	-22007.90
			5936.79						
	C	53.5738	7338.35	-3338.70	6195.37	2078.93	-12519.14	14022.83	21683.79
			5991.75						
	C	53.5738	7338.35	-3469.75	6195.37	1851.93	25038.28	-14022.83	0.00
			5991.75						
			Sum:	**-252.51**	37854.11	**475.61**	**-816.56**	0.00	**-324.12**
132.5	A	53.0869	14464.48	-275.35	11925.93	-8180.32	-24099.04	29187.53	-41740.76
			12850.06						
	A	53.0869	14464.48	275.35	11925.93	-8180.32	-24099.04	-29187.53	41740.76
			12850.06						
	B	51.0051	14399.64	7563.94	11569.91	4034.04	46759.25	30569.29	0.00
			12901.19						
	B	51.0051	14399.64	7275.55	11569.91	4533.54	-23379.63	-30569.29	-40494.70
			12901.19						
	C	49.3886	14396.90	-7546.04	11324.75	4698.73	-22884.22	31694.04	39636.63
			12968.31						
	C	49.3886	14396.90	-7842.24	11324.75	4185.69	45768.44	-31694.04	0.00
			12968.31						
			Sum:	**-548.79**	69641.19	**1091.37**	**-1934.24**	0.00	**-858.07**
87.4583	A	51.4704	6083.08	0.00	4969.34	-3508.50	-9812.15	0.00	0.00
			5224.18						
	B	49.2092	6056.38	3190.45	4807.06	1842.01	4745.86	0.00	-8220.06
			5261.33						
	C	47.7725	6039.63	-3283.97	4700.83	1896.00	4640.99	-0.00	8038.42
			5282.64						
			Sum:	**-93.52**	14477.23	**229.51**	**-425.30**	-0.00	**-181.64**
47.5625	A	35.3562	6858.69	0.00	4244.30	-5387.73	-8380.52	0.00	0.00
			6376.79						
	B	31.4900	6856.53	4899.64	3873.42	2828.81	3824.11	0.00	-6623.55
			6435.15						
	C	29.0503	6851.35	-5033.25	3628.07	2905.95	3581.88	-0.00	6204.00
			6466.94						
			Sum:	**-133.61**	11745.79	**347.03**	**-974.54**	-0.00	**-419.54**

Guy-Mast Forces (Excluding Wind) - Service

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
ft		°	lb	lb	lb	lb	lb-ft	lb-ft	lb-ft
152.333	A	56.6918	2771.79	-50.44	2331.17	-1498.63	-4710.66	5347.14	-8159.11
			2690.00						
	A	56.6918	2771.79	50.44	2331.17	-1498.63	-4710.66	-5347.14	8159.11
			2690.00						
	B	54.9549	2766.62	1382.20	2280.41	737.16	9216.19	5586.11	0.00
			2690.00						
	B	54.9549	2766.62	1329.51	2280.41	828.44	-4608.09	-5586.11	-7981.45

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top / Bottom	F_x	F_y	F_z	M_x	M_y	M_z
ft		°	lb	lb	lb	lb	lb-ft	lb-ft	lb-ft
			2690.00						
	C	53.5738	2763.52	-1374.31	2239.65	855.75	-4525.71	5772.23	7838.76
			2690.00						
	C	53.5738	2763.52	-1428.26	2239.65	762.31	9051.42	-5772.23	0.00
			2690.00						
			Sum:	**-90.86**	13702.47	**186.41**	**-287.52**	0.00	**-142.69**
132.5	A	53.0869	8188.76	-163.23	6596.50	-4849.27	-13329.72	17302.29	-23087.75
			7970.00						
	A	53.0869	8188.76	163.23	6596.50	-4849.27	-13329.72	-17302.29	23087.75
			7970.00						
	B	51.0051	8172.97	4481.01	6403.65	2389.83	25880.04	18109.77	0.00
			7970.00						
	B	51.0051	8172.97	4310.16	6403.65	2685.75	-12940.02	-18109.77	-22412.77
			7970.00						
	C	49.3886	8163.49	-4456.91	6251.14	2775.21	-12631.84	18719.45	21878.98
			7970.00						
	C	49.3886	8163.49	-4631.86	6251.14	2472.19	25263.68	-18719.45	0.00
			7970.00						
			Sum:	**-297.61**	38502.57	**624.45**	**-1087.57**	-0.00	**-533.79**
87.4583	A	51.4704	2737.37	0.00	2153.14	-1690.32	-4251.46	0.00	0.00
			2690.00						
	B	49.2092	2733.72	1534.23	2082.00	885.79	2055.50	0.00	-3560.22
			2690.00						
	C	47.7725	2731.56	-1577.70	2035.33	910.88	2009.42	-0.00	3480.42
			2690.00						
			Sum:	**-43.47**	6270.48	**106.35**	**-186.54**	-0.00	**-79.80**
47.5625	A	35.3562	3534.74	0.00	2065.34	-2868.57	-4078.10	0.00	0.00
			3500.00						
	B	31.4900	3529.99	2595.71	1864.74	1498.63	1841.00	0.00	-3188.70
			3500.00						
	C	29.0503	3527.19	-2659.98	1734.10	1535.74	1712.02	-0.00	2965.30
			3500.00						
			Sum:	**-64.28**	5664.18	**165.80**	**-525.09**	-0.00	**-223.40**

Guy-Tensioning Information

Guy Elevation		H	V	Temperature At Time Of Tensioning: 0 F Initial Tension	0 F Intercept	20 F Initial Tension	20 F Intercept	40 F Initial Tension	40 F Intercept	60 F Initial Tension	60 F Intercept	80 F Initial Tension	80 F Intercept	100 F Initial Tension	100 F Intercept	120 F Initial Tension	120 F Intercept
ft		ft	ft	lb	ft	lb	ft	lb	ft	lb	ft	lb	ft	lb	ft	lb	ft
152.333	A	104.04	158.33	3049	3.00	2929	3.12	2809	3.25	2690	3.39	2571	3.55	2453	3.72	2336	3.90
	B	104.04	148.33	3083	2.72	2951	2.84	2820	2.97	2690	3.11	2560	3.26	2431	3.43	2303	3.62
	C	105.04	142.33	3110	2.57	2969	2.69	2829	2.82	2690	2.96	2552	3.12	2414	3.30	2278	3.49
132.5	A	104.04	138.50	9163	2.55	8764	2.67	8366	2.80	7970	2.93	7576	3.08	7185	3.25	6799	3.43
	B	104.04	128.50	9279	2.30	8841	2.41	8404	2.54	7970	2.67	7538	2.83	7110	2.99	6685	3.18
	C	105.04	122.50	9371	2.17	8902	2.28	8435	2.41	7970	2.55	7509	2.70	7051	2.88	6598	3.07
87.4583	A	73.03	91.71	3159	1.11	3003	1.17	2846	1.24	2690	1.31	2534	1.39	2380	1.48	2226	1.58
	B	73.03	84.63	3207	1.00	3034	1.06	2862	1.12	2690	1.19	2519	1.27	2349	1.36	2180	1.47
	C	73.03	80.46	3237	0.94	3054	0.99	2872	1.05	2690	1.12	2509	1.21	2329	1.30	2150	1.41
47.5625	A	73.03	51.81	4546	0.59	4196	0.64	3848	0.70	3500	0.76	3154	0.85	2812	0.95	2473	1.08
	B	73.03	44.73	4644	0.53	4262	0.57	3880	0.63	3500	0.70	3122	0.78	2748	0.89	2379	1.03
	C	73.03	40.56	4703	0.50	4301	0.54	3899	0.60	3500	0.67	3103	0.75	2710	0.86	2325	1.00

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
LMR-400 (13/32 FOAM) (Town)	A	No	No	Ar (CaAa)	50.00 - 6.00	0.0000	0.15	2	2	0.4100	0.4100		0.07
1/2 (Town - Dish)	A	No	No	Ar (CaAa)	167.00 - 6.00	0.0000	0.16	1	1	0.5800	0.5800		0.25
7/8 (Town)	A	No	No	Ar (CaAa)	170.00 - 6.00	0.0000	0.1	2	1	1.1100	1.1100		0.54
1/2 (Town)	A	No	No	Ar (CaAa)	170.00 - 6.00	0.0000	0.1	1	1	0.5800	0.5800		0.25
1 1/4 (Sprint)	A	No	No	Ar (CaAa)	146.00 - 6.00	0.0000	0.35	4	4	1.5500	1.5500		0.66
7/8 (AT&T)	B	No	No	Ar (CaAa)	120.00 - 6.00	0.0000	-0.15	12	9	1.1100	1.1100		0.54
Fiber Optic Cable _AT&T (AT&T)	B	No	No	Ar (CaAa)	120.00 - 6.00	0.0000	0.44	1	1	0.4000	0.4000		1.00
Fiber Optic Cable _AT&T (AT&T)	B	No	No	Ar (CaAa)	120.00 - 6.00	0.0000	0.42	1	1	0.4000	0.4000		1.00
DC Cables (1/2" Coax) (AT&T)	B	No	No	Ar (CaAa)	120.00 - 6.00	0.0000	0.46	2	2	0.4000	0.4000		0.11
DC Cables (1/2" Coax) (AT&T)	B	No	No	Ar (CaAa)	120.00 - 6.00	0.0000	0.48	2	2	0.4000	0.4000		0.11
LDF7-50A (1-5/8 FOAM) (T-Mobile (6 Exterior))	C	No	No	Ar (CaAa)	162.00 - 6.00	1.0000	0	6	6	1.2500	1.9800		0.82
Hybrid HCS 6x12 4 AWG (1-5/8") (T-Mobile (4 Inside Twr))	C	No	No	Ar (CaAa)	162.00 - 6.00	-1.0000	0	4	4	1.9900	1.9900		1.90

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 lb
T1	170.00-155.00	A	0.000	0.000	4.896	0.000	22.95
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	13.888	0.000	87.64
T2	155.00-140.00	A	0.000	0.000	8.790	0.000	39.54
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	29.760	0.000	187.80
T3	140.00-132.50	A	0.000	0.000	7.185	0.000	31.65
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	14.880	0.000	93.90
T4	132.50-130.00	A	0.000	0.000	2.395	0.000	10.55
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	4.960	0.000	31.30

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 lb
T5	130.00-120.00	A	0.000	0.000	9.580	0.000	42.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	19.840	0.000	125.20
T6	120.00-100.00	A	0.000	0.000	19.160	0.000	84.40
		B	0.000	0.000	31.440	0.000	178.40
		C	0.000	0.000	39.680	0.000	250.40
T7	100.00-85.00	A	0.000	0.000	14.370	0.000	63.30
		B	0.000	0.000	23.580	0.000	133.80
		C	0.000	0.000	29.760	0.000	187.80
T8	85.00-80.00	A	0.000	0.000	4.790	0.000	21.10
		B	0.000	0.000	7.860	0.000	44.60
		C	0.000	0.000	9.920	0.000	62.60
T9	80.00-60.00	A	0.000	0.000	19.160	0.000	84.40
		B	0.000	0.000	31.440	0.000	178.40
		C	0.000	0.000	39.680	0.000	250.40
T10	60.00-40.00	A	0.000	0.000	19.980	0.000	85.80
		B	0.000	0.000	31.440	0.000	178.40
		C	0.000	0.000	39.680	0.000	250.40
T11	40.00-20.00	A	0.000	0.000	20.800	0.000	87.20
		B	0.000	0.000	31.440	0.000	178.40
		C	0.000	0.000	39.680	0.000	250.40
T12	20.00-5.00	A	0.000	0.000	14.560	0.000	61.04
		B	0.000	0.000	22.008	0.000	124.88
		C	0.000	0.000	27.776	0.000	175.28
T13	5.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	170.00-155.00	A	2.467	0.000	0.000	34.080	0.000	594.18
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	38.649	0.000	737.10
T2	155.00-140.00	A	2.465	0.000	0.000	48.510	0.000	837.57
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	82.804	0.000	1578.54
T3	140.00-132.50	A	2.465	0.000	0.000	33.847	0.000	580.49
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	41.400	0.000	789.14
T4	132.50-130.00	A	2.465	0.000	0.000	11.282	0.000	193.50
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	13.800	0.000	263.05
T5	130.00-120.00	A	2.465	0.000	0.000	45.132	0.000	774.09
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	55.202	0.000	1052.28
T6	120.00-100.00	A	2.466	0.000	0.000	90.291	0.000	1549.28
		B		0.000	0.000	124.947	0.000	2066.87
		C		0.000	0.000	110.419	0.000	2105.56
T7	100.00-85.00	A	2.468	0.000	0.000	67.756	0.000	1163.49
		B		0.000	0.000	93.760	0.000	1551.90
		C		0.000	0.000	82.837	0.000	1580.53
T8	85.00-80.00	A	2.470	0.000	0.000	22.592	0.000	388.10
		B		0.000	0.000	31.262	0.000	517.61
		C		0.000	0.000	27.616	0.000	527.09
T9	80.00-60.00	A	2.470	0.000	0.000	90.379	0.000	1552.86

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 lb
		B		0.000	0.000	125.064	0.000	2070.97
		C		0.000	0.000	110.471	0.000	2108.75
T10	60.00-40.00	A	2.464	0.000	0.000	100.426	0.000	1651.66
		B		0.000	0.000	124.880	0.000	2064.54
		C		0.000	0.000	110.390	0.000	2103.75
T11	40.00-20.00	A	2.430	0.000	0.000	109.638	0.000	1721.78
		B		0.000	0.000	123.909	0.000	2030.77
		C		0.000	0.000	109.959	0.000	2077.38
T12	20.00-5.00	A	2.312	0.000	0.000	74.407	0.000	1124.64
		B		0.000	0.000	84.404	0.000	1341.84
		C		0.000	0.000	75.938	0.000	1391.39
T13	5.00-0.00	A	2.017	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	170.00-155.00	-0.9032	2.4155	-0.7435	0.2687
T2	155.00-140.00	-0.7769	3.1542	-0.0169	0.0178
T3	140.00-132.50	-0.7120	1.3305	-0.2155	0.0114
T4	132.50-130.00	-0.7102	1.3273	-0.3831	0.0203
T5	130.00-120.00	-0.7203	1.3422	-0.2671	0.0141
T6	120.00-100.00	1.4305	-0.6210	1.8880	-0.1660
T7	100.00-85.00	1.6020	-0.6693	1.4601	-0.1245
T8	85.00-80.00	1.5642	-0.6514	0.2321	-0.0198
T9	80.00-60.00	1.3096	-0.5755	0.6439	-0.0574
T10	60.00-40.00	1.3550	-0.6688	1.6633	-0.3346
T11	40.00-20.00	1.3495	-0.7503	1.8561	-0.6131
T12	20.00-5.00	1.5232	-0.8099	1.6561	-0.5377
T13	5.00-0.00	0.0000	0.0000	0.0000	0.0000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	1/2	155.00 - 167.00	0.6000	0.2205
T1	4	7/8	155.00 - 170.00	0.6000	0.2205
T1	5	1/2	155.00 - 170.00	0.6000	0.2205
T1	14	LDF7-50A (1-5/8 FOAM)	155.00 - 162.00	0.6000	0.2205
T1	15	Hybrid HCS 6x12 4 AWG (1-5/8")	155.00 - 162.00	0.6000	0.2205
T2	2	1/2	140.00 - 155.00	0.6000	0.0059
T2	4	7/8	140.00 -	0.6000	0.0059

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	5	1/2	140.00 - 155.00	0.6000	0.0059
T2	7	1 1/4	140.00 - 146.00	0.6000	0.0059
T2	14	LDF7-50A (1-5/8 FOAM)	140.00 - 155.00	0.6000	0.0059
T2	15	Hybrid HCS 6x12 4 AWG (1-5/8")	140.00 - 155.00	0.6000	0.0059
T3	2	1/2	132.50 - 140.00	0.6000	0.0610
T3	4	7/8	132.50 - 140.00	0.6000	0.0610
T3	5	1/2	132.50 - 140.00	0.6000	0.0610
T3	7	1 1/4	132.50 - 140.00	0.6000	0.0610
T3	14	LDF7-50A (1-5/8 FOAM)	132.50 - 140.00	0.6000	0.0610
T3	15	Hybrid HCS 6x12 4 AWG (1-5/8")	132.50 - 140.00	0.6000	0.0610
T4	2	1/2	130.00 - 132.50	0.6000	0.1047
T4	4	7/8	130.00 - 132.50	0.6000	0.1047
T4	5	1/2	130.00 - 132.50	0.6000	0.1047
T4	7	1 1/4	130.00 - 132.50	0.6000	0.1047
T4	14	LDF7-50A (1-5/8 FOAM)	130.00 - 132.50	0.6000	0.1047
T4	15	Hybrid HCS 6x12 4 AWG (1-5/8")	130.00 - 132.50	0.6000	0.1047
T5	2	1/2	120.00 - 130.00	0.6000	0.0746
T5	4	7/8	120.00 - 130.00	0.6000	0.0746
T5	5	1/2	120.00 - 130.00	0.6000	0.0746
T5	7	1 1/4	120.00 - 130.00	0.6000	0.0746
T5	14	LDF7-50A (1-5/8 FOAM)	120.00 - 130.00	0.6000	0.0746
T5	15	Hybrid HCS 6x12 4 AWG (1-5/8")	120.00 - 130.00	0.6000	0.0746
T6	2	1/2	100.00 - 120.00	0.6000	0.2979
T6	4	7/8	100.00 - 120.00	0.6000	0.2979
T6	5	1/2	100.00 - 120.00	0.6000	0.2979
T6	7	1 1/4	100.00 - 120.00	0.6000	0.2979
T6	8	7/8	100.00 - 120.00	0.6000	0.2979
T6	9	Fiber Optic Cable _AT&T	100.00 - 120.00	0.6000	0.2979
T6	10	Fiber Optic Cable _AT&T	100.00 - 120.00	0.6000	0.2979
T6	11	DC Cables (1/2" Coax)	100.00 - 120.00	0.6000	0.2979
T6	12	DC Cables (1/2" Coax)	100.00 -	0.6000	0.2979

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
			120.00		
T6	14	LDF7-50A (1-5/8 FOAM)	100.00 - 120.00	0.6000	0.2979
T6	15	Hybrid HCS 6x12 4 AWG (1-5/8")	100.00 - 120.00	0.6000	0.2979
T7	2	1/2	85.00 - 100.00	0.6000	0.2093
T7	4	7/8	85.00 - 100.00	0.6000	0.2093
T7	5	1/2	85.00 - 100.00	0.6000	0.2093
T7	7	1 1/4	85.00 - 100.00	0.6000	0.2093
T7	8	7/8	85.00 - 100.00	0.6000	0.2093
T7	9	Fiber Optic Cable _AT&T	85.00 - 100.00	0.6000	0.2093
T7	10	Fiber Optic Cable _AT&T	85.00 - 100.00	0.6000	0.2093
T7	11	DC Cables (1/2" Coax)	85.00 - 100.00	0.6000	0.2093
T7	12	DC Cables (1/2" Coax)	85.00 - 100.00	0.6000	0.2093
T7	14	LDF7-50A (1-5/8 FOAM)	85.00 - 100.00	0.6000	0.2093
T7	15	Hybrid HCS 6x12 4 AWG (1-5/8")	85.00 - 100.00	0.6000	0.2093
T8	2	1/2	80.00 - 85.00	0.6000	0.0333
T8	4	7/8	80.00 - 85.00	0.6000	0.0333
T8	5	1/2	80.00 - 85.00	0.6000	0.0333
T8	7	1 1/4	80.00 - 85.00	0.6000	0.0333
T8	8	7/8	80.00 - 85.00	0.6000	0.0333
T8	9	Fiber Optic Cable _AT&T	80.00 - 85.00	0.6000	0.0333
T8	10	Fiber Optic Cable _AT&T	80.00 - 85.00	0.6000	0.0333
T8	11	DC Cables (1/2" Coax)	80.00 - 85.00	0.6000	0.0333
T8	12	DC Cables (1/2" Coax)	80.00 - 85.00	0.6000	0.0333
T8	14	LDF7-50A (1-5/8 FOAM)	80.00 - 85.00	0.6000	0.0333
T8	15	Hybrid HCS 6x12 4 AWG (1-5/8")	80.00 - 85.00	0.6000	0.0333
T9	2	1/2	60.00 - 80.00	0.6000	0.0916
T9	4	7/8	60.00 - 80.00	0.6000	0.0916
T9	5	1/2	60.00 - 80.00	0.6000	0.0916
T9	7	1 1/4	60.00 - 80.00	0.6000	0.0916
T9	8	7/8	60.00 - 80.00	0.6000	0.0916
T9	9	Fiber Optic Cable _AT&T	60.00 - 80.00	0.6000	0.0916
T9	10	Fiber Optic Cable _AT&T	60.00 - 80.00	0.6000	0.0916
T9	11	DC Cables (1/2" Coax)	60.00 - 80.00	0.6000	0.0916
T9	12	DC Cables (1/2" Coax)	60.00 - 80.00	0.6000	0.0916
T9	14	LDF7-50A (1-5/8 FOAM)	60.00 - 80.00	0.6000	0.0916
T9	15	Hybrid HCS 6x12 4 AWG (1-5/8")	60.00 - 80.00	0.6000	0.0916
T10	1	LMR-400 (13/32 FOAM)	40.00 - 50.00	0.6000	0.2838
T10	2	1/2	40.00 - 60.00	0.6000	0.2838
T10	4	7/8	40.00 - 60.00	0.6000	0.2838
T10	5	1/2	40.00 - 60.00	0.6000	0.2838
T10	7	1 1/4	40.00 - 60.00	0.6000	0.2838
T10	8	7/8	40.00 - 60.00	0.6000	0.2838
T10	9	Fiber Optic Cable _AT&T	40.00 - 60.00	0.6000	0.2838
T10	10	Fiber Optic Cable _AT&T	40.00 - 60.00	0.6000	0.2838
T10	11	DC Cables (1/2" Coax)	40.00 - 60.00	0.6000	0.2838
T10	12	DC Cables (1/2" Coax)	40.00 - 60.00	0.6000	0.2838
T10	14	LDF7-50A (1-5/8 FOAM)	40.00 - 60.00	0.6000	0.2838
T10	15	Hybrid HCS 6x12 4 AWG (1-5/8")	40.00 - 60.00	0.6000	0.2838
T11	1	LMR-400 (13/32 FOAM)	20.00 - 40.00	0.6000	0.3787
T11	2	1/2	20.00 - 40.00	0.6000	0.3787
T11	4	7/8	20.00 - 40.00	0.6000	0.3787
T11	5	1/2	20.00 - 40.00	0.6000	0.3787
T11	7	1 1/4	20.00 - 40.00	0.6000	0.3787
T11	8	7/8	20.00 - 40.00	0.6000	0.3787
T11	9	Fiber Optic Cable _AT&T	20.00 - 40.00	0.6000	0.3787
T11	10	Fiber Optic Cable _AT&T	20.00 - 40.00	0.6000	0.3787

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T11	11	DC Cables (1/2" Coax)	20.00 - 40.00	0.6000	0.3787
T11	12	DC Cables (1/2" Coax)	20.00 - 40.00	0.6000	0.3787
T11	14	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.3787
T11	15	Hybrid HCS 6x12 4 AWG (1-5/8")	20.00 - 40.00	0.6000	0.3787
T12	1	LMR-400 (13/32 FOAM)	6.00 - 20.00	0.6000	0.3163
T12	2	1/2	6.00 - 20.00	0.6000	0.3163
T12	4	7/8	6.00 - 20.00	0.6000	0.3163
T12	5	1/2	6.00 - 20.00	0.6000	0.3163
T12	7	1 1/4	6.00 - 20.00	0.6000	0.3163
T12	8	7/8	6.00 - 20.00	0.6000	0.3163
T12	9	Fiber Optic Cable _AT&T	6.00 - 20.00	0.6000	0.3163
T12	10	Fiber Optic Cable _AT&T	6.00 - 20.00	0.6000	0.3163
T12	11	DC Cables (1/2" Coax)	6.00 - 20.00	0.6000	0.3163
T12	12	DC Cables (1/2" Coax)	6.00 - 20.00	0.6000	0.3163
T12	14	LDF7-50A (1-5/8 FOAM)	6.00 - 20.00	0.6000	0.3163
T12	15	Hybrid HCS 6x12 4 AWG (1-5/8")	6.00 - 20.00	0.6000	0.3163

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
DS4C03F36U-D 8' Omni	A	From Leg	1.00	0.0000	175.00	No Ice	2.56	2.56	30.00
(Town)			0.00			1/2" Ice	3.28	3.28	48.53
			0.00			1" Ice	3.76	3.76	72.43
SC473-HF1LDF	B	From Leg	1.00	0.0000	175.00	No Ice	1.44	1.44	17.00
(Town)			0.00			1/2" Ice	1.74	1.74	29.43
			0.00			1" Ice	2.05	2.05	45.34
SC473-HF1LDF	C	From Leg	1.00	0.0000	175.00	No Ice	1.44	1.44	17.00
(Town)			0.00			1/2" Ice	1.74	1.74	29.43
			0.00			1" Ice	2.05	2.05	45.34
TTA 432-83H-01T	A	None		0.0000	170.00	No Ice	1.63	0.95	25.00
(Town)						1/2" Ice	1.81	1.09	37.44
						1" Ice	1.99	1.24	52.22
Pirod 4' Side Mount Standoff	A	From Leg	0.50	0.0000	168.00	No Ice	2.72	2.72	50.00
(1)			0.00			1/2" Ice	4.91	4.91	89.00
(Town)			0.00			1" Ice	7.10	7.10	128.00
Pirod 4' Side Mount Standoff	B	From Leg	0.50	0.0000	168.00	No Ice	2.72	2.72	50.00
(1)			0.00			1/2" Ice	4.91	4.91	89.00
(Town)			0.00			1" Ice	7.10	7.10	128.00
Pirod 4' Side Mount Standoff	C	From Leg	0.50	0.0000	168.00	No Ice	2.72	2.72	50.00
(1)			0.00			1/2" Ice	4.91	4.91	89.00
(Town)			0.00			1" Ice	7.10	7.10	128.00
(2) GPS	C	None		0.0000	50.00	No Ice	1.00	1.00	10.00
(Town)						1/2" Ice	1.50	1.50	15.00
						1" Ice	2.00	2.00	20.00
***AT&T Inventory - from Centek 05/25/2018									
QS66512-2 Panel Antenna	A	From Leg	3.00	0.0000	120.00	No Ice	8.40	8.22	132.90

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* *lb*
(AT&T Equipment)			6.00			1/2" Ice	8.95	9.19	205.99
			0.00			1" Ice	9.51	10.09	287.01
QS66512-2 Panel Antenna	B	From Leg	3.00	0.0000	120.00	No Ice	8.40	8.22	132.90
(AT&T Equipment)			6.00			1/2" Ice	8.95	9.19	205.99
			0.00			1" Ice	9.51	10.09	287.01
QS66512-2 Panel Antenna	C	From Leg	3.00	0.0000	120.00	No Ice	8.40	8.22	132.90
(AT&T Equipment)			6.00			1/2" Ice	8.95	9.19	205.99
			0.00			1" Ice	9.51	10.09	287.01
7770.00	A	From Leg	3.00	0.0000	120.00	No Ice	5.90	4.01	52.03
(AT&T Equipment)			-6.00			1/2" Ice	6.34	4.64	97.08
			0.00			1" Ice	6.78	5.28	148.33
7770.00	B	From Leg	3.00	0.0000	120.00	No Ice	5.90	4.01	52.03
(AT&T Equipment)			-6.00			1/2" Ice	6.34	4.64	97.08
			0.00			1" Ice	6.78	5.28	148.33
7770.00	C	From Leg	3.00	0.0000	120.00	No Ice	5.90	4.01	52.03
(AT&T Equipment)			-6.00			1/2" Ice	6.34	4.64	97.08
			0.00			1" Ice	6.78	5.28	148.33
OPA-65R-LCUU-H6 Panel	A	From Leg	3.00	0.0000	120.00	No Ice	10.12	5.49	64.00
(AT&T Equipment)			-3.00			1/2" Ice	10.69	5.94	121.33
			0.00			1" Ice	11.26	6.41	184.95
OPA-65R-LCUU-H6 Panel	B	From Leg	3.00	0.0000	120.00	No Ice	10.12	5.49	64.00
(AT&T Equipment)			-3.00			1/2" Ice	10.69	5.94	121.33
			0.00			1" Ice	11.26	6.41	184.95
OPA-65R-LCUU-H6 Panel	C	From Leg	3.00	0.0000	120.00	No Ice	10.12	5.49	64.00
(AT&T Equipment)			-3.00			1/2" Ice	10.69	5.94	121.33
			0.00			1" Ice	11.26	6.41	184.95
(2) LGP214## TMA	A	From Leg	3.00	0.0000	120.00	No Ice	1.29	0.23	14.10
(AT&T Equipment)			-6.00			1/2" Ice	1.45	0.31	21.26
			0.00			1" Ice	1.61	0.40	30.32
(2) LGP214## TMA	A	From Leg	3.00	0.0000	120.00	No Ice	1.29	0.23	14.10
(AT&T Equipment)			-6.00			1/2" Ice	1.45	0.31	21.26
			0.00			1" Ice	1.61	0.40	30.32
(2) LGP214## TMA	A	From Leg	3.00	0.0000	120.00	No Ice	1.29	0.23	14.10
(AT&T Equipment)			-6.00			1/2" Ice	1.45	0.31	21.26
			0.00			1" Ice	1.61	0.40	30.32
(2) TPX-070821 CCI	A	From Leg	3.00	0.0000	120.00	No Ice	0.55	0.12	7.50
Triplexer Unit			-3.00			1/2" Ice	0.65	0.17	10.95
(AT&T Equipment)			0.00			1" Ice	0.76	0.24	15.73
(2) TPX-070821 CCI	B	From Leg	3.00	0.0000	120.00	No Ice	0.55	0.12	7.50
Triplexer Unit			-3.00			1/2" Ice	0.65	0.17	10.95
(AT&T Equipment)			0.00			1" Ice	0.76	0.24	15.73
(2) TPX-070821 CCI	C	From Leg	3.00	0.0000	120.00	No Ice	0.55	0.12	7.50
Triplexer Unit			-3.00			1/2" Ice	0.65	0.17	10.95
(AT&T Equipment)			0.00			1" Ice	0.76	0.24	15.73
RRUS-32	A	From Leg	3.00	0.0000	120.00	No Ice	3.20	1.85	60.00
(AT&T Equipment)			6.00			1/2" Ice	3.46	2.08	81.11
			0.00			1" Ice	3.73	2.31	105.42
RRUS-32	B	From Leg	3.00	0.0000	120.00	No Ice	3.20	1.85	60.00
(AT&T Equipment)			6.00			1/2" Ice	3.46	2.08	81.11
			0.00			1" Ice	3.73	2.31	105.42
RRUS-32	C	From Leg	3.00	0.0000	120.00	No Ice	3.20	1.85	60.00
(AT&T Equipment)			6.00			1/2" Ice	3.46	2.08	81.11
			0.00			1" Ice	3.73	2.31	105.42
RRUS-11	A	From Leg	3.00	0.0000	120.00	No Ice	2.99	1.25	50.00
(AT&T Equipment)			6.00			1/2" Ice	3.23	1.41	69.57
			0.00			1" Ice	3.47	1.59	92.08
RRUS-11	B	From Leg	3.00	0.0000	120.00	No Ice	2.99	1.25	50.00

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 lb
(AT&T Equipment)			6.00			1/2" Ice	3.23	1.41	69.57
			0.00			1" Ice	3.47	1.59	92.08
RRUS-11	C	From Leg	3.00	0.0000	120.00	No Ice	2.99	1.25	50.00
(AT&T Equipment)			6.00			1/2" Ice	3.23	1.41	69.57
			0.00			1" Ice	3.47	1.59	92.08
RRUS-32	A	From Leg	3.00	0.0000	120.00	No Ice	3.20	1.85	60.00
(AT&T Equipment)			6.00			1/2" Ice	3.46	2.08	81.11
			0.00			1" Ice	3.73	2.31	105.42
RRUS-32	B	From Leg	3.00	0.0000	120.00	No Ice	3.20	1.85	60.00
(AT&T Equipment)			6.00			1/2" Ice	3.46	2.08	81.11
			0.00			1" Ice	3.73	2.31	105.42
RRUS-32	C	From Leg	3.00	0.0000	120.00	No Ice	3.20	1.85	60.00
(AT&T Equipment)			6.00			1/2" Ice	3.46	2.08	81.11
			0.00			1" Ice	3.73	2.31	105.42
DC6-48-60-18-8F (Squid)	A	From Leg	3.00	0.0000	120.00	No Ice	1.27	1.27	20.00
Suppressor			0.00			1/2" Ice	1.46	1.46	35.12
(AT&T Equipment)			0.00			1" Ice	1.66	1.66	52.57
DC6-48-60-18-8F (Squid)	B	From Leg	3.00	0.0000	120.00	No Ice	1.27	1.27	20.00
Suppressor			0.00			1/2" Ice	1.46	1.46	35.12
(AT&T Equipment)			0.00			1" Ice	1.66	1.66	52.57
*** AT&T Proposed from Centek Analysis									
800-10965 Kathrien Panel w/	A	From Leg	3.00	0.0000	120.00	No Ice	15.33	7.42	133.33
Pipe Mount			3.00			1/2" Ice	15.98	8.56	227.49
(AT&T Equipment - Proposed)			0.00			1" Ice	16.64	9.46	330.50
800-10965 Kathrien Panel w/	B	From Leg	3.00	0.0000	120.00	No Ice	15.33	7.42	133.33
Pipe Mount			3.00			1/2" Ice	15.98	8.56	227.49
(AT&T Equipment - Proposed)			0.00			1" Ice	16.64	9.46	330.50
800-10965 Kathrien Panel w/	C	From Leg	3.00	0.0000	120.00	No Ice	15.33	7.42	133.33
Pipe Mount			3.00			1/2" Ice	15.98	8.56	227.49
(AT&T Equipment - Proposed)			0.00			1" Ice	16.64	9.46	330.50
RRUS-32 B66	A	From Leg	3.00	0.0000	120.00	No Ice	3.20	1.85	60.00
(AT&T Equipment - Proposed)			3.00			1/2" Ice	3.46	2.08	81.11
			0.00			1" Ice	3.73	2.31	105.42
RRUS-32 B66	B	From Leg	3.00	0.0000	120.00	No Ice	3.20	1.85	60.00
(AT&T Equipment - Proposed)			3.00			1/2" Ice	3.46	2.08	81.11
			0.00			1" Ice	3.73	2.31	105.42
RRUS-32 B66	C	From Leg	3.00	0.0000	120.00	No Ice	3.20	1.85	60.00
(AT&T Equipment - Proposed)			3.00			1/2" Ice	3.46	2.08	81.11
			0.00			1" Ice	3.73	2.31	105.42
4478 Radio Unit (4x40W)	A	From Leg	3.00	0.0000	120.00	No Ice	1.26	1.26	60.00
(AT&T Equipment - Proposed)			3.00			1/2" Ice	1.42	1.42	73.78
			0.00			1" Ice	1.58	1.58	89.96
4478 Radio Unit (4x40W)	B	From Leg	3.00	0.0000	120.00	No Ice	1.26	1.26	60.00
(AT&T Equipment - Proposed)			3.00			1/2" Ice	1.42	1.42	73.78
			0.00			1" Ice	1.58	1.58	89.96
4478 Radio Unit (4x40W)	C	From Leg	3.00	0.0000	120.00	No Ice	1.26	1.26	60.00
(AT&T Equipment - Proposed)			3.00			1/2" Ice	1.42	1.42	73.78
			0.00			1" Ice	1.58	1.58	89.96
DC6-48-60-18-8F (Squid)	C	From Leg	3.00	0.0000	120.00	No Ice	1.27	1.27	20.00
Suppressor			0.00			1/2" Ice	1.46	1.46	35.12
(AT&T Equipment - Proposed)			0.00			1" Ice	1.66	1.66	52.57
Sabre 12" HD V-Boom	A	From Leg	2.00	0.0000	120.00	No Ice	9.12	8.00	600.00

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 lb
Antenna Mount			0.00			1/2" Ice	11.00	9.60	750.00
(AT&T Equipment - Proposed)			0.00			1" Ice	12.88	11.20	900.00
Sabre 12" HD V-Boom	B	From Leg	2.00	0.0000	120.00	No Ice	9.12	8.00	600.00
Antenna Mount			0.00			1/2" Ice	11.00	9.60	750.00
(AT&T Equipment - Proposed)			0.00			1" Ice	12.88	11.20	900.00
Sabre 12" HD V-Boom	C	From Leg	2.00	0.0000	120.00	No Ice	9.12	8.00	600.00
Antenna Mount			0.00			1/2" Ice	11.00	9.60	750.00
(AT&T Equipment - Proposed)			0.00			1" Ice	12.88	11.20	900.00
*** AT&T Proposed from Centek Analysis ***AT&T Inventory - from Centek 05/25/2018 ***T-Mobile Inventory from Destek 05/22/2018 ***Sprint Inventory from Cherundolo Consulting									
Pirod 12' T-Frame Sector Mount (1)	A	From Leg	0.00	0.0000	140.00	No Ice	13.60	13.60	465.00
			0.00			1/2" Ice	18.40	18.40	600.00
(Sprint)			0.00			1" Ice	23.20	23.20	735.00
Pirod 12' T-Frame Sector Mount (1)	B	From Leg	0.00	0.0000	140.00	No Ice	13.60	13.60	465.00
			0.00			1/2" Ice	18.40	18.40	600.00
(Sprint)			0.00			1" Ice	23.20	23.20	735.00
Pirod 12' T-Frame Sector Mount (1)	C	From Leg	0.00	0.0000	140.00	No Ice	13.60	13.60	465.00
			0.00			1/2" Ice	18.40	18.40	600.00
(Sprint)			0.00			1" Ice	23.20	23.20	735.00
AAHC Panel Antenna	A	From Leg	3.00	0.0000	140.00	No Ice	4.90	2.40	104.00
(Sprint - Proposed)			-2.00			1/2" Ice	5.20	2.63	136.31
			0.00			1" Ice	5.51	2.87	172.37
AAHC Panel Antenna	B	From Leg	3.00	0.0000	140.00	No Ice	4.90	2.40	104.00
(Sprint - Proposed)			-2.00			1/2" Ice	5.20	2.63	136.31
			0.00			1" Ice	5.51	2.87	172.37
AAHC Panel Antenna	C	From Leg	3.00	0.0000	140.00	No Ice	4.90	2.40	104.00
(Sprint - Proposed)			-2.00			1/2" Ice	5.20	2.63	136.31
			0.00			1" Ice	5.51	2.87	172.37
NNVV-65B-R4 Panel Antenna	A	From Leg	3.00	0.0000	140.00	No Ice	13.72	5.75	85.00
			-5.00			1/2" Ice	14.32	6.21	157.14
(Sprint - Proposed)			0.00			1" Ice	14.92	6.67	235.92
NNVV-65B-R4 Panel Antenna	B	From Leg	3.00	0.0000	140.00	No Ice	13.72	5.75	85.00
			-5.00			1/2" Ice	14.32	6.21	157.14
(Sprint - Proposed)			0.00			1" Ice	14.92	6.67	235.92
NNVV-65B-R4 Panel Antenna	C	From Leg	3.00	0.0000	140.00	No Ice	13.72	5.75	85.00
			-5.00			1/2" Ice	14.32	6.21	157.14
(Sprint - Proposed)			0.00			1" Ice	14.92	6.67	235.92
ALU 4x45-1900 MHz RRH Unit	A	From Leg	3.00	0.0000	140.00	No Ice	2.92	2.92	69.50
			0.00			1/2" Ice	3.16	3.16	95.23
(Sprint - Proposed)			0.00			1" Ice	3.41	3.41	124.33
ALU 4x45-1900 MHz RRH Unit	B	From Leg	3.00	0.0000	140.00	No Ice	2.92	2.92	69.50
			0.00			1/2" Ice	3.16	3.16	95.23
(Sprint - Proposed)			0.00			1" Ice	3.41	3.41	124.33
ALU 4x45-1900 MHz RRH Unit	C	From Leg	3.00	0.0000	140.00	No Ice	2.92	2.92	69.50
			0.00			1/2" Ice	3.16	3.16	95.23
(Sprint - Proposed)			0.00			1" Ice	3.41	3.41	124.33
(2) ALU 800MHz 2x50W	A	From Leg	3.00	0.0000	140.00	No Ice	2.40	2.25	64.00
(Sprint - Proposed)			0.00			1/2" Ice	2.61	2.46	86.12

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 lb
			0.00			1" Ice	2.83	2.68	111.30
(2) ALU 800MHz 2x50W (Sprint - Proposed)	B	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	64.00 86.12 111.30
(2) ALU 800MHz 2x50W (Sprint - Proposed)	C	From Leg	3.00 0.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	2.40 2.61 2.83	2.25 2.46 2.68	64.00 86.12 111.30
844G65VTZASX w/Mount Pipe (Sprint)	A	From Leg	3.00 2.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.96 6.60 7.12	5.46 6.49 7.24	41.55 98.42 161.84
844G65VTZASX w/Mount Pipe (Sprint)	A	From Leg	3.00 5.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.96 6.60 7.12	5.46 6.49 7.24	41.55 98.42 161.84
844G65VTZASX w/Mount Pipe (Sprint)	C	From Leg	3.00 2.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.96 6.60 7.12	5.46 6.49 7.24	41.55 98.42 161.84
844G65VTZASX w/Mount Pipe (Sprint)	C	From Leg	3.00 5.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	5.96 6.60 7.12	5.46 6.49 7.24	41.55 98.42 161.84
DB844H90E-XY Panel Antenna (Sprint)	B	From Leg	3.00 2.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	3.22 3.59 3.99	4.81 5.46 6.13	31.03 69.74 114.11
DB844H90E-XY Panel Antenna (Sprint)	B	From Leg	3.00 5.00 0.00	0.0000	140.00	No Ice 1/2" Ice 1" Ice	3.22 3.59 3.99	4.81 5.46 6.13	31.03 69.74 114.11
***Sprint Inventory from Cherundolo Consulting ***T-Mobile Existing Inventory from Destek 05/22/2018									
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	A	None		0.0000	163.00	No Ice 1/2" Ice 1" Ice	14.52 20.61 26.69	14.52 20.61 26.69	626.50 901.50 1176.50
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	B	None		0.0000	163.00	No Ice 1/2" Ice 1" Ice	14.52 20.61 26.69	14.52 20.61 26.69	626.50 901.50 1176.50
Pirod 12' T-Frame Sector Mount (1) (T-Mobile)	C	None		0.0000	163.00	No Ice 1/2" Ice 1" Ice	14.52 20.61 26.69	14.52 20.61 26.69	626.50 901.50 1176.50
APXVARR24_43-C-NA20 Panel Antenna w/ 96" Pipe (T-Mobile)	A	From Leg	3.00 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice 1" Ice	20.03 20.67 21.32	8.79 9.38 9.98	128.00 239.61 359.69
APXVARR24_43-C-NA20 Panel Antenna w/ 96" Pipe (T-Mobile)	B	From Leg	3.00 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice 1" Ice	20.03 20.67 21.32	8.79 9.38 9.98	128.00 239.61 359.69
APXVARR24_43-C-NA20 Panel Antenna w/ 96" Pipe (T-Mobile)	C	From Leg	3.00 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice 1" Ice	20.03 20.67 21.32	8.79 9.38 9.98	128.00 239.61 359.69
Ericsson 6449 41 Panels (T-Mobile - Proposed)	A	From Leg	3.00 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice 1" Ice	5.68 5.98 6.29	2.49 2.72 2.95	104.00 143.12 186.46
Ericsson 6449 41 Panels (T-Mobile - Proposed)	B	From Leg	3.00 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice 1" Ice	5.68 5.98 6.29	2.49 2.72 2.95	104.00 143.12 186.46
Ericsson 6449 41 Panels (T-Mobile - Proposed)	C	From Leg	3.00 0.00 0.00	0.0000	163.00	No Ice 1/2" Ice 1" Ice	5.68 5.98 6.29	2.49 2.72 2.95	104.00 143.12 186.46

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 lb
AIR32 B66Aa/B2a Antenna	A	From Leg	3.00	0.0000	163.00	No Ice	6.35	5.37	154.10
Panel			0.00			1/2" Ice	6.91	6.23	208.49
(T-Mobile)			0.00			1" Ice	7.44	6.97	269.17
AIR32 B66Aa/B2a Antenna	B	From Leg	3.00	0.0000	163.00	No Ice	6.35	5.37	154.10
Panel			0.00			1/2" Ice	6.91	6.23	208.49
(T-Mobile)			0.00			1" Ice	7.44	6.97	269.17
AIR32 B66Aa/B2a Antenna	C	From Leg	3.00	0.0000	163.00	No Ice	6.35	5.37	154.10
Panel			0.00			1/2" Ice	6.91	6.23	208.49
(T-Mobile)			0.00			1" Ice	7.44	6.97	269.17
(2) Generic Twin TMA unit	A	From Leg	3.00	0.0000	163.00	No Ice	0.37	0.96	25.00
(T-Mobile)			0.00			1/2" Ice	0.46	1.09	32.19
			0.00			1" Ice	0.55	1.22	41.21
(2) Generic Twin TMA unit	B	From Leg	3.00	0.0000	163.00	No Ice	0.37	0.96	25.00
(T-Mobile)			0.00			1/2" Ice	0.46	1.09	32.19
			0.00			1" Ice	0.55	1.22	41.21
(2) Generic Twin TMA unit	C	From Leg	3.00	0.0000	163.00	No Ice	0.37	0.96	25.00
(T-Mobile)			0.00			1/2" Ice	0.46	1.09	32.19
			0.00			1" Ice	0.55	1.22	41.21
Ericsson Radio 4415 B25	A	From Leg	3.00	0.0000	163.00	No Ice	1.86	0.83	50.00
RRH Unit			0.00			1/2" Ice	2.03	0.96	64.25
(T-Mobile - Proposed)			0.00			1" Ice	2.20	1.09	81.03
Ericsson Radio 4415 B25	B	From Leg	3.00	0.0000	163.00	No Ice	1.86	0.83	50.00
RRH Unit			0.00			1/2" Ice	2.03	0.96	64.25
(T-Mobile - Proposed)			0.00			1" Ice	2.20	1.09	81.03
Ericsson Radio 4415 B25	C	From Leg	3.00	0.0000	163.00	No Ice	1.86	0.83	50.00
RRH Unit			0.00			1/2" Ice	2.03	0.96	64.25
(T-Mobile - Proposed)			0.00			1" Ice	2.20	1.09	81.03
4449 B71 + B12 Radio Unit	A	From Leg	3.00	0.0000	163.00	No Ice	1.93	1.35	80.00
(T-Mobile - Proposed)			0.00			1/2" Ice	2.12	1.51	96.16
			0.00			1" Ice	2.32	1.68	114.94
4449 B71 + B12 Radio Unit	B	From Leg	3.00	0.0000	163.00	No Ice	1.93	1.35	80.00
(T-Mobile - Proposed)			0.00			1/2" Ice	2.12	1.51	96.16
			0.00			1" Ice	2.32	1.68	114.94
4449 B71 + B12 Radio Unit	C	From Leg	3.00	0.0000	163.00	No Ice	1.93	1.35	80.00
(T-Mobile - Proposed)			0.00			1/2" Ice	2.12	1.51	96.16
			0.00			1" Ice	2.32	1.68	114.94
***T-Mobile Existing Inventory from Destek 05/22/2018									

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
RFS SC2-W100BC	C	Paraboloid w/Shroud (HP)	From Leg	1.00	0.0000		167.00	2.00	No Ice	3.14	20.00
				0.00					1/2" Ice	3.41	37.50
				0.00					1" Ice	3.68	55.01

222-G Verification Constants

Constant	*Value*
Wind Importance Factor Without Ice	1
Wind Importance Factor With Ice Factor	1
Ice Importance Factor	1
K_d	0.85
Z_g	1200
α	7
K_{zmin}	0.7
K_e	0.9
K_t	0.53
f	2

222-G Section Verification ArRr By Element

Section Elevation *ft*	*Elem. Num.*	*Size*	*C*	*C w/Ice*	*Face*	*e*	*e w/Ice*	*A_r* *ft^2*	*A_r w/Ice* *ft^2*	*A_rR_r* *ft^2*	*A_rR_r w/Ice* *ft^2*
T1 170.00-155.00	1	ROHN 2 STD	21.979	34.861	C	0.233	0.779	2.969	9.135	1.725	7.945
	1	ROHN 2 STD	21.979	34.861	A	0.233	0.779	2.969	9.135	1.725	7.945
	2	ROHN 2 STD	21.979	34.861	C	0.233	0.779	2.969	9.135	1.725	7.945
	2	ROHN 2 STD	21.979	34.861	B	0.233	0.779	2.969	9.135	1.725	7.945
	3	ROHN 2 STD	21.979	34.861	B	0.233	0.779	2.969	9.135	1.725	7.945
	3	ROHN 2 STD	21.979	34.861	A	0.233	0.779	2.969	9.135	1.725	7.945
	4	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.403	1.727	0.234	1.502
	5	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.403	1.727	0.234	1.502
	6	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.403	1.727	0.234	1.502
	7	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.403	1.727	0.234	1.502
	8	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.403	1.727	0.234	1.502
	9	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.403	1.727	0.234	1.502
	10	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	11	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	12	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	13	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	14	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	15	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	16	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	17	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	18	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	19	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	20	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	21	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	22	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	23	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	24	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	25	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	26	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	27	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	28	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	29	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	30	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	31	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	32	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	33	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft^2	A_r w/Ice ft^2	A_rR_r ft^2	A_rR_r w/Ice ft^2
	34	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	35	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	36	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	37	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	38	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	39	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	40	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	41	P1.5x16GA	13.881	30.687	C	0.233	0.779	0.493	2.115	0.287	1.840
	42	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	43	P1.5x16GA	13.881	30.687	B	0.233	0.779	0.493	2.115	0.287	1.840
	44	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
	45	P1.5x16GA	13.881	30.687	A	0.233	0.779	0.493	2.115	0.287	1.840
					A		Sum:	12.661	47.106	7.357	40.969
					B			12.661	47.106	7.357	40.969
					C			12.661	47.106	7.357	40.969
T2	46	ROHN 2 STD	21.957	34.812	C	0.302	0.994	2.969	9.131	1.780	9.131
155.00-140.00											
	46	ROHN 2 STD	21.957	34.812	A	0.302	0.994	2.969	9.131	1.780	9.131
	47	ROHN 2 STD	21.957	34.812	C	0.302	0.994	2.969	9.131	1.780	9.131
	47	ROHN 2 STD	21.957	34.812	B	0.302	0.994	2.969	9.131	1.780	9.131
	48	ROHN 2 STD	21.957	34.812	B	0.302	0.994	2.969	9.131	1.780	9.131
	48	ROHN 2 STD	21.957	34.812	A	0.302	0.994	2.969	9.131	1.780	9.131
	49	P1.5x16GA	13.868	30.642	C	0.302	0.994	0.403	1.726	0.241	1.726
	50	P1.5x16GA	13.868	30.642	B	0.302	0.994	0.403	1.726	0.241	1.726
	51	P1.5x16GA	13.868	30.642	A	0.302	0.994	0.403	1.726	0.241	1.726
	52	P1.5x16GA	13.868	30.642	C	0.302	0.994	0.403	1.726	0.241	1.726
	53	P1.5x16GA	13.868	30.642	B	0.302	0.994	0.403	1.726	0.241	1.726
	54	P1.5x16GA	13.868	30.642	A	0.302	0.994	0.403	1.726	0.241	1.726
	55	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	56	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	57	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	58	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	59	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	60	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	61	1	9.245	28.26	C	0.302	0.994	0.269	1.592	0.161	1.592
	62	1	9.245	28.26	B	0.302	0.994	0.269	1.592	0.161	1.592
	63	1	9.245	28.26	A	0.302	0.994	0.269	1.592	0.161	1.592
	64	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	65	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	66	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	67	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	68	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	69	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	70	1	9.245	28.26	C	0.302	0.994	0.269	1.592	0.161	1.592
	71	1	9.245	28.26	B	0.302	0.994	0.269	1.592	0.161	1.592
	72	1	9.245	28.26	A	0.302	0.994	0.269	1.592	0.161	1.592
	73	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	74	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	75	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	76	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	77	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	78	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	79	1	9.245	28.26	C	0.302	0.994	0.269	1.592	0.161	1.592
	80	1	9.245	28.26	B	0.302	0.994	0.269	1.592	0.161	1.592
	81	1	9.245	28.26	A	0.302	0.994	0.269	1.592	0.161	1.592
	82	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	83	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	84	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	85	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	86	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
	87	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	88	1	9.245	28.26	C	0.302	0.994	0.269	1.592	0.161	1.592
	89	1	9.245	28.26	B	0.302	0.994	0.269	1.592	0.161	1.592
	90	1	9.245	28.26	A	0.302	0.994	0.269	1.592	0.161	1.592
	91	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	92	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	93	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	94	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	95	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	96	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	97	1	9.245	28.26	C	0.302	0.994	0.269	1.592	0.161	1.592
	98	1	9.245	28.26	B	0.302	0.994	0.269	1.592	0.161	1.592
	99	1	9.245	28.26	A	0.302	0.994	0.269	1.592	0.161	1.592
	100	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	101	ROHN 1.5 STD	17.566	32.549	C	0.302	0.994	0.625	2.246	0.375	2.246
	102	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	103	ROHN 1.5 STD	17.566	32.549	B	0.302	0.994	0.625	2.246	0.375	2.246
	104	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	105	ROHN 1.5 STD	17.566	32.549	A	0.302	0.994	0.625	2.246	0.375	2.246
	106	1	9.245	28.26	C	0.302	0.994	0.269	1.592	0.161	1.592
	107	1	9.245	28.26	B	0.302	0.994	0.269	1.592	0.161	1.592
	108	1	9.245	28.26	A	0.302	0.994	0.269	1.592	0.161	1.592
					A		Sum:	15.850	58.215	9.503	58.215
					B			15.850	58.215	9.503	58.215
					C			15.850	58.215	9.503	58.215
T3					A		Sum:	0.000	0.000	0.000	0.000
140.00-132.50					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000
T4					A		Sum:	0.000	0.000	0.000	0.000
132.50-130.00					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000
T5	157	P1.5x16GA	13.866	30.637	C	0.342	0.925	0.403	1.726	0.247	1.703
130.00-120.00											
	158	P1.5x16GA	13.866	30.637	B	0.342	0.925	0.403	1.726	0.247	1.703
	159	P1.5x16GA	13.866	30.637	A	0.342	0.925	0.403	1.726	0.247	1.703
					A		Sum:	0.403	1.726	0.247	1.703
					B			0.403	1.726	0.247	1.703
					C			0.403	1.726	0.247	1.703
T6	199	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.396	1.698	0.232	1.380
120.00-100.00											
	200	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.396	1.698	0.232	1.380
	201	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.396	1.698	0.232	1.380
	202	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.396	1.698	0.232	1.380
	203	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.396	1.698	0.232	1.380
	204	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.396	1.698	0.232	1.380
	205	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	206	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	207	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	208	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	209	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	210	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	211	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	212	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	213	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	214	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	215	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	216	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	217	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	218	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	219	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
	220	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	221	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	222	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	223	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	224	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	225	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	226	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	227	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	228	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	229	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	230	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	231	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	232	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	233	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	234	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	235	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	236	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	237	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	238	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	239	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	240	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	241	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	242	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	243	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	244	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	245	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	246	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	247	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	248	P1.5x16GA	13.877	30.672	C	0.252	0.702	0.488	2.091	0.286	1.699
	249	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	250	P1.5x16GA	13.877	30.672	B	0.252	0.702	0.488	2.091	0.286	1.699
	251	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
	252	P1.5x16GA	13.877	30.672	A	0.252	0.702	0.488	2.091	0.286	1.699
					A		Sum:	8.593	36.847	5.032	29.942
					B			8.593	36.847	5.032	29.942
					C			8.593	36.847	5.032	29.942
T7 100.00-85.00	253	ROHN 2.5 STD	26.633	37.302	C	0.255	0.791	3.594	9.765	2.107	8.577
	253	ROHN 2.5 STD	26.633	37.302	A	0.255	0.791	3.594	9.765	2.107	8.577
	254	ROHN 2.5 STD	26.633	37.302	C	0.255	0.791	3.594	9.765	2.107	8.577
	254	ROHN 2.5 STD	26.633	37.302	B	0.255	0.791	3.594	9.765	2.107	8.577
	255	ROHN 2.5 STD	26.633	37.302	B	0.255	0.791	3.594	9.765	2.107	8.577
	255	ROHN 2.5 STD	26.633	37.302	A	0.255	0.791	3.594	9.765	2.107	8.577
	256	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.398	1.706	0.233	1.498
	257	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.398	1.706	0.233	1.498
	258	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.398	1.706	0.233	1.498
	259	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	260	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	261	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	262	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	263	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	264	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	265	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	266	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	267	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	268	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	269	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	270	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	271	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	272	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	273	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
	274	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	275	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	276	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	277	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	278	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	279	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	280	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	281	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	282	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	283	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	284	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	285	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	286	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	287	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	288	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	289	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	290	P1.5x16GA	13.895	30.736	C	0.255	0.791	0.490	2.101	0.287	1.845
	291	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	292	P1.5x16GA	13.895	30.736	B	0.255	0.791	0.490	2.101	0.287	1.845
	293	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
	294	P1.5x16GA	13.895	30.736	A	0.255	0.791	0.490	2.101	0.287	1.845
					A		Sum:	13.460	46.447	7.891	40.797
					B			13.460	46.447	7.891	40.797
					C			13.460	46.447	7.891	40.797
T8 85.00-80.00	295	ROHN 2.5 STD	26.652	37.341	C	0.287	0.967	1.198	3.256	0.713	3.256
	295	ROHN 2.5 STD	26.652	37.341	A	0.287	0.967	1.198	3.256	0.713	3.256
	296	ROHN 2.5 STD	26.652	37.341	C	0.287	0.967	1.198	3.256	0.713	3.256
	296	ROHN 2.5 STD	26.652	37.341	B	0.287	0.967	1.198	3.256	0.713	3.256
	297	ROHN 2.5 STD	26.652	37.341	B	0.287	0.967	1.198	3.256	0.713	3.256
	297	ROHN 2.5 STD	26.652	37.341	A	0.287	0.967	1.198	3.256	0.713	3.256
	298	P1.5x16GA	13.905	30.77	C	0.287	0.967	0.398	1.707	0.237	1.707
	299	P1.5x16GA	13.905	30.77	B	0.287	0.967	0.398	1.707	0.237	1.707
	300	P1.5x16GA	13.905	30.77	A	0.287	0.967	0.398	1.707	0.237	1.707
	301	P1.5x16GA	13.905	30.77	C	0.287	0.967	0.484	2.078	0.288	2.078
	302	P1.5x16GA	13.905	30.77	C	0.287	0.967	0.484	2.078	0.288	2.078
	303	P1.5x16GA	13.905	30.77	B	0.287	0.967	0.484	2.078	0.288	2.078
	304	P1.5x16GA	13.905	30.77	B	0.287	0.967	0.484	2.078	0.288	2.078
	305	P1.5x16GA	13.905	30.77	A	0.287	0.967	0.484	2.078	0.288	2.078
	306	P1.5x16GA	13.905	30.77	A	0.287	0.967	0.484	2.078	0.288	2.078
	307	1	9.27	28.381	C	0.287	0.967	0.265	1.574	0.158	1.574
	308	1	9.27	28.381	B	0.287	0.967	0.265	1.574	0.158	1.574
	309	1	9.27	28.381	A	0.287	0.967	0.265	1.574	0.158	1.574
	310	P1.5x16GA	13.905	30.77	C	0.287	0.967	0.484	2.078	0.288	2.078
	311	P1.5x16GA	13.905	30.77	C	0.287	0.967	0.484	2.078	0.288	2.078
	312	P1.5x16GA	13.905	30.77	B	0.287	0.967	0.484	2.078	0.288	2.078
	313	P1.5x16GA	13.905	30.77	B	0.287	0.967	0.484	2.078	0.288	2.078
	314	P1.5x16GA	13.905	30.77	A	0.287	0.967	0.484	2.078	0.288	2.078
	315	P1.5x16GA	13.905	30.77	A	0.287	0.967	0.484	2.078	0.288	2.078
	316	1	9.27	28.381	C	0.287	0.967	0.265	1.574	0.158	1.574
	317	1	9.27	28.381	B	0.287	0.967	0.265	1.574	0.158	1.574
	318	1	9.27	28.381	A	0.287	0.967	0.265	1.574	0.158	1.574
					A		Sum:	5.259	19.678	3.130	19.678
					B			5.259	19.678	3.130	19.678
					C			5.259	19.678	3.130	19.678
T9 80.00-60.00	328	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	329	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	330	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	331	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	332	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	333	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
	337	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	338	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	339	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	340	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	341	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	342	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	346	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	347	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	348	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	349	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	350	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	351	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	355	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	356	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	357	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	358	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	359	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	360	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	364	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	365	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	366	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	367	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	368	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	369	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	373	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	374	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	375	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	376	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	377	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	378	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	382	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	383	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	384	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	385	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	386	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	387	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	391	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	392	P1.5x16GA	13.91	30.785	C	0.322	0.908	0.491	2.108	0.298	2.051
	393	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	394	P1.5x16GA	13.91	30.785	B	0.322	0.908	0.491	2.108	0.298	2.051
	395	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
	396	P1.5x16GA	13.91	30.785	A	0.322	0.908	0.491	2.108	0.298	2.051
					A		Sum:	7.857	33.734	4.762	32.809
					B			7.857	33.734	4.762	32.809
					C			7.857	33.734	4.762	32.809
T10 60.00-40.00	403	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.396	1.697	0.233	1.396
	404	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.396	1.697	0.233	1.396
	405	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.396	1.697	0.233	1.396
	406	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.396	1.697	0.233	1.396
	407	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.396	1.697	0.233	1.396
	408	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.396	1.697	0.233	1.396
	409	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	410	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	411	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	412	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	413	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	414	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	415	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	416	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	417	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
	418	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	419	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	420	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	421	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	422	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	423	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	424	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	425	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	426	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	427	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	428	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	429	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	430	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	431	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	432	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	433	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	434	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	435	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	436	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	437	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	438	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	439	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	440	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	441	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	442	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	443	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	444	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	445	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	446	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	447	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	448	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	449	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	450	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	451	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	452	P1.5x16GA	13.858	30.608	C	0.26	0.716	0.486	2.083	0.286	1.714
	453	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	454	P1.5x16GA	13.858	30.608	B	0.26	0.716	0.486	2.083	0.286	1.714
	455	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
	456	P1.5x16GA	13.858	30.608	A	0.26	0.716	0.486	2.083	0.286	1.714
					A		Sum:	8.571	36.726	5.036	30.213
					B			8.571	36.726	5.036	30.213
					C			8.571	36.726	5.036	30.213
T11 40.00-20.00	460	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.396	1.679	0.229	1.271
	461	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.396	1.679	0.229	1.271
	462	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.396	1.679	0.229	1.271
	463	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.396	1.679	0.229	1.271
	464	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.396	1.679	0.229	1.271
	465	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.396	1.679	0.229	1.271
	466	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.486	2.061	0.282	1.561
	467	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.486	2.061	0.282	1.561
	468	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.486	2.061	0.282	1.561
	469	1	9.056	27.352	C	0.226	0.621	0.264	1.547	0.153	1.171
	470	1	9.056	27.352	B	0.226	0.621	0.264	1.547	0.153	1.171
	471	1	9.056	27.352	A	0.226	0.621	0.264	1.547	0.153	1.171
	472	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.486	2.061	0.282	1.561
	473	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.486	2.061	0.282	1.561
	474	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.486	2.061	0.282	1.561
	475	1	9.056	27.352	C	0.226	0.621	0.264	1.547	0.153	1.171
	476	1	9.056	27.352	B	0.226	0.621	0.264	1.547	0.153	1.171
	477	1	9.056	27.352	A	0.226	0.621	0.264	1.547	0.153	1.171

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
	478	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.486	2.061	0.282	1.561
	479	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.486	2.061	0.282	1.561
	480	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.486	2.061	0.282	1.561
	481	1	9.056	27.352	C	0.226	0.621	0.264	1.547	0.153	1.171
	482	1	9.056	27.352	B	0.226	0.621	0.264	1.547	0.153	1.171
	483	1	9.056	27.352	A	0.226	0.621	0.264	1.547	0.153	1.171
	484	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.486	2.061	0.282	1.561
	485	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.486	2.061	0.282	1.561
	486	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.486	2.061	0.282	1.561
	487	1	9.056	27.352	C	0.226	0.621	0.264	1.547	0.153	1.171
	488	1	9.056	27.352	B	0.226	0.621	0.264	1.547	0.153	1.171
	489	1	9.056	27.352	A	0.226	0.621	0.264	1.547	0.153	1.171
	490	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.486	2.061	0.282	1.561
	491	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.486	2.061	0.282	1.561
	492	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.486	2.061	0.282	1.561
	493	1	9.056	27.352	C	0.226	0.621	0.264	1.547	0.153	1.171
	494	1	9.056	27.352	B	0.226	0.621	0.264	1.547	0.153	1.171
	495	1	9.056	27.352	A	0.226	0.621	0.264	1.547	0.153	1.171
	496	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.486	2.061	0.282	1.561
	497	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.486	2.061	0.282	1.561
	498	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.486	2.061	0.282	1.561
	499	1	9.056	27.352	C	0.226	0.621	0.264	1.547	0.153	1.171
	500	1	9.056	27.352	B	0.226	0.621	0.264	1.547	0.153	1.171
	501	1	9.056	27.352	A	0.226	0.621	0.264	1.547	0.153	1.171
	502	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.486	2.061	0.282	1.561
	503	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.486	2.061	0.282	1.561
	504	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.486	2.061	0.282	1.561
	505	1	9.056	27.352	C	0.226	0.621	0.264	1.547	0.153	1.171
	506	1	9.056	27.352	B	0.226	0.621	0.264	1.547	0.153	1.171
	507	1	9.056	27.352	A	0.226	0.621	0.264	1.547	0.153	1.171
	508	P1.5x16GA	13.585	29.686	C	0.226	0.621	0.486	2.061	0.282	1.561
	509	P1.5x16GA	13.585	29.686	B	0.226	0.621	0.486	2.061	0.282	1.561
	510	P1.5x16GA	13.585	29.686	A	0.226	0.621	0.486	2.061	0.282	1.561
					A		Sum:	6.529	30.672	3.784	23.231
					B			6.529	30.672	3.784	23.231
					C			6.529	30.672	3.784	23.231
T12 20.00-5.00	511	ROHN 2.5 EH	27.484	36.957	C	0.225	0.684	3.594	9.375	2.082	7.496
	511	ROHN 2.5 EH	27.484	36.957	A	0.225	0.684	3.594	9.375	2.082	7.496
	512	ROHN 2.5 EH	27.484	36.957	C	0.225	0.684	3.594	9.375	2.082	7.496
	512	ROHN 2.5 EH	27.484	36.957	B	0.225	0.684	3.594	9.375	2.082	7.496
	513	ROHN 2.5 EH	27.484	36.957	B	0.225	0.684	3.594	9.375	2.082	7.496
	513	ROHN 2.5 EH	27.484	36.957	A	0.225	0.684	3.594	9.375	2.082	7.496
	514	P1.5x16GA	14.339	30.181	C	0.225	0.684	0.398	1.623	0.230	1.298
	515	P1.5x16GA	14.339	30.181	B	0.225	0.684	0.398	1.623	0.230	1.298
	516	P1.5x16GA	14.339	30.181	A	0.225	0.684	0.398	1.623	0.230	1.298
	517	ROHN 1.5 SCH XS (Extra Strong)	18.163	32.152	C	0.225	0.684	0.504	1.729	0.292	1.383
	518	ROHN 1.5 SCH XS (Extra Strong)	18.163	32.152	B	0.225	0.684	0.504	1.729	0.292	1.383
	519	ROHN 1.5 SCH XS (Extra Strong)	18.163	32.152	A	0.225	0.684	0.504	1.729	0.292	1.383
	520	P1.5x16GA	14.339	30.181	C	0.225	0.684	0.487	1.988	0.282	1.589
	521	P1.5x16GA	14.339	30.181	B	0.225	0.684	0.487	1.988	0.282	1.589
	522	P1.5x16GA	14.339	30.181	A	0.225	0.684	0.487	1.988	0.282	1.589
	523	1	9.56	27.717	C	0.225	0.684	0.265	1.491	0.154	1.192
	524	1	9.56	27.717	B	0.225	0.684	0.265	1.491	0.154	1.192
	525	1	9.56	27.717	A	0.225	0.684	0.265	1.491	0.154	1.192
	526	P1.5x16GA	14.339	30.181	C	0.225	0.684	0.487	1.988	0.282	1.589
	527	P1.5x16GA	14.339	30.181	B	0.225	0.684	0.487	1.988	0.282	1.589
	528	P1.5x16GA	14.339	30.181	A	0.225	0.684	0.487	1.988	0.282	1.589

Section Elevation ft	Elem. Num.	Size	C	C w/Ice	Face	e	e w/Ice	A_r ft²	A_r w/Ice ft²	A_rR_r ft²	A_rR_r w/Ice ft²
	529	1	9.56	27.717	C	0.225	0.684	0.265	1.491	0.154	1.192
	530	1	9.56	27.717	B	0.225	0.684	0.265	1.491	0.154	1.192
	531	1	9.56	27.717	A	0.225	0.684	0.265	1.491	0.154	1.192
	532	P1.5x16GA	14.339	30.181	C	0.225	0.684	0.487	1.988	0.282	1.589
	533	P1.5x16GA	14.339	30.181	B	0.225	0.684	0.487	1.988	0.282	1.589
	534	P1.5x16GA	14.339	30.181	A	0.225	0.684	0.487	1.988	0.282	1.589
	535	1	9.56	27.717	C	0.225	0.684	0.265	1.491	0.154	1.192
	536	1	9.56	27.717	B	0.225	0.684	0.265	1.491	0.154	1.192
	537	1	9.56	27.717	A	0.225	0.684	0.265	1.491	0.154	1.192
	538	P1.5x16GA	14.339	30.181	C	0.225	0.684	0.487	1.988	0.282	1.589
	539	P1.5x16GA	14.339	30.181	B	0.225	0.684	0.487	1.988	0.282	1.589
	540	P1.5x16GA	14.339	30.181	A	0.225	0.684	0.487	1.988	0.282	1.589
	541	1	9.56	27.717	C	0.225	0.684	0.265	1.491	0.154	1.192
	542	1	9.56	27.717	B	0.225	0.684	0.265	1.491	0.154	1.192
	543	1	9.56	27.717	A	0.225	0.684	0.265	1.491	0.154	1.192
	544	P1.5x16GA	14.339	30.181	C	0.225	0.684	0.487	1.988	0.282	1.589
	545	P1.5x16GA	14.339	30.181	B	0.225	0.684	0.487	1.988	0.282	1.589
	546	P1.5x16GA	14.339	30.181	A	0.225	0.684	0.487	1.988	0.282	1.589
	547	1	9.56	27.717	C	0.225	0.684	0.265	1.491	0.154	1.192
	548	1	9.56	27.717	B	0.225	0.684	0.265	1.491	0.154	1.192
	549	1	9.56	27.717	A	0.225	0.684	0.265	1.491	0.154	1.192
	550	P1.5x16GA	14.339	30.181	C	0.225	0.684	0.487	1.988	0.282	1.589
	551	P1.5x16GA	14.339	30.181	B	0.225	0.684	0.487	1.988	0.282	1.589
	552	P1.5x16GA	14.339	30.181	A	0.225	0.684	0.487	1.988	0.282	1.589
					A		Sum:	12.335	41.483	7.145	33.169
					B			12.335	41.483	7.145	33.169
					C			12.335	41.483	7.145	33.169
T13 5.00-0.00					A		Sum:	0.000	0.000	0.000	0.000
					B			0.000	0.000	0.000	0.000
					C			0.000	0.000	0.000	0.000

222-G Section Verification Tables - No Ice

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft²
T1 170.00-155.00	162.50		1.135	6.405	1.154		27	A	0.233	7.357
								B	0.233	7.357
								C	0.233	7.357
T2 155.00-140.00	147.50		1.104	5.396	1.185		27	A	0.302	9.503
								B	0.302	9.503
								C	0.302	9.503
T3 140.00-132.50	136.25		1.08	4.745	1.211		27	A	0.346	0.000
								B	0.346	0.000
								C	0.346	0.000
T4 132.50-130.00	131.25		1.068	4.482	1.224		27	A	0.348	0.000
								B	0.348	0.000
								C	0.348	0.000
T5 130.00-120.00	125.00		1.053	4.173	1.242		27	A	0.342	0.247
								B	0.342	0.247
								C	0.342	0.247
T6 120.00-100.00	110.00		1.016	3.515	1.29		27	A	0.252	5.032

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft²
								B	0.252	5.032
								C	0.252	5.032
T7 100.00-85.00	92.50		0.966	2.878	1.359		27	A	0.255	7.891
								B	0.255	7.891
								C	0.255	7.891
T8 85.00-80.00	82.50		0.935	2.567	1.406		27	A	0.287	3.130
								B	0.287	3.130
								C	0.287	3.130
T9 80.00-60.00	70.00		0.892	2.226	1.475		27	A	0.322	4.762
								B	0.322	4.762
								C	0.322	4.762
T10 60.00-40.00	50.00		0.811	1.771	1.611		27	A	0.26	5.036
								B	0.26	5.036
								C	0.26	5.036
T11 40.00-20.00	30.00		0.701	1.409	1.792		26	A	0.226	3.784
								B	0.226	3.784
								C	0.226	3.784
T12 20.00-5.00	12.50		0.7	1.154	1.998		29	A	0.225	7.145
								B	0.225	7.145
								C	0.225	7.145
T13 5.00-0.00	2.50		0.7	1.029	2.142		31	A	0.865	0.000
								B	0.865	0.000
								C	0.865	0.000

222-G Section Verification Tables - Ice

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft²
T1 170.00-155.00	162.50	162.50	1.135	6.405	1.154	2.4666	7	A	0.779	40.969
								B	0.779	40.969
								C	0.779	40.969
T2 155.00-140.00	147.50	147.50	1.104	5.396	1.185	2.4649	7	A	0.994	59.538
								B	0.994	59.538
								C	0.994	59.538
T3 140.00-132.50	136.25	136.25	1.08	4.745	1.211	2.4645	7	A	0.939	15.064
								B	0.939	15.064
								C	0.939	15.064
T4 132.50-130.00	131.25	131.25	1.068	4.482	1.224	2.4645	7	A	0.895	4.390
								B	0.895	4.390
								C	0.895	4.390
T5 130.00-120.00	125.00	125.00	1.053	4.173	1.242	2.4648	7	A	0.925	19.832
								B	0.925	19.832
								C	0.925	19.832
T6 120.00-100.00	110.00	110.00	1.016	3.515	1.29	2.4660	7	A	0.702	29.942
								B	0.702	29.942
								C	0.702	29.942
T7 100.00-85.00	92.50	92.50	0.966	2.878	1.359	2.4684	7	A	0.791	41.946
								B	0.791	41.946
								C	0.791	41.946
T8 85.00-80.00	82.50	82.50	0.935	2.567	1.406	2.4696	7	A	0.967	19.678
								B	0.967	19.678
								C	0.967	19.678
T9 80.00-60.00	70.00	70.00	0.892	2.226	1.475	2.4702	7	A	0.908	45.619
								B	0.908	45.619
								C	0.908	45.619

Section Elevation	z_{wind}	z_{ice}	K_z	K_h	K_{zt}	t_z	q_z	Face	e	A_rR_r
ft	ft	ft				in	psf			ft^2
T10 60.00-40.00	50.00	50.00	0.811	1.771	1.611	2.4637	7	A	0.716	31.283
								B	0.716	31.283
								C	0.716	31.283
T11 40.00-20.00	30.00	30.00	0.701	1.409	1.792	2.4296	7	A	0.621	23.231
								B	0.621	23.231
								C	0.621	23.231
T12 20.00-5.00	12.50	12.50	0.7	1.154	1.998	2.3125	8	A	0.684	33.169
								B	0.684	33.169
								C	0.684	33.169
T13 5.00-0.00	2.50	2.50	0.7	1.029	2.142	2.0173	8	A	1	1.483
								B	1	1.483
								C	1	1.483

222-G Section Verification Tables - Service

Section Elevation	z_{wind}	z_{ice}	K_z	K_h	K_{zt}	t_z	q_z	Face	e	A_rR_r
ft	ft	ft				in	psf			ft^2
T1 170.00-155.00	162.50		1.135	6.405	1.154		10	A	0.233	7.357
								B	0.233	7.357
								C	0.233	7.357
T2 155.00-140.00	147.50		1.104	5.396	1.185		10	A	0.302	9.503
								B	0.302	9.503
								C	0.302	9.503
T3 140.00-132.50	136.25		1.08	4.745	1.211		10	A	0.346	0.000
								B	0.346	0.000
								C	0.346	0.000
T4 132.50-130.00	131.25		1.068	4.482	1.224		10	A	0.348	0.000
								B	0.348	0.000
								C	0.348	0.000
T5 130.00-120.00	125.00		1.053	4.173	1.242		10	A	0.342	0.247
								B	0.342	0.247
								C	0.342	0.247
T6 120.00-100.00	110.00		1.016	3.515	1.29		10	A	0.252	5.032
								B	0.252	5.032
								C	0.252	5.032
T7 100.00-85.00	92.50		0.966	2.878	1.359		10	A	0.255	7.891
								B	0.255	7.891
								C	0.255	7.891
T8 85.00-80.00	82.50		0.935	2.567	1.406		10	A	0.287	3.130
								B	0.287	3.130
								C	0.287	3.130
T9 80.00-60.00	70.00		0.892	2.226	1.475		10	A	0.322	4.762
								B	0.322	4.762
								C	0.322	4.762
T10 60.00-40.00	50.00		0.811	1.771	1.611		10	A	0.26	5.036
								B	0.26	5.036
								C	0.26	5.036
T11 40.00-20.00	30.00		0.701	1.409	1.792		10	A	0.226	3.784
								B	0.226	3.784
								C	0.226	3.784
T12 20.00-5.00	12.50		0.7	1.154	1.998		11	A	0.225	7.145
								B	0.225	7.145
								C	0.225	7.145
T13 5.00-0.00	2.50		0.7	1.029	2.142		12	A	0.865	0.000
								B	0.865	0.000

Section Elevation ft	z_{wind} ft	z_{ice} ft	K_z	K_h	K_{zt}	t_z in	q_z psf	Face	e	A_rR_r ft²
								C	0.865	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	110.59	329.04	A	0.233	2.489	27	1	1	7.357	674.68	44.98	C
170.00-155.00			B	0.233	2.489		1	1	7.357			
			C	0.233	2.489		1	1	7.357			
T2	227.34	783.84	A	0.302	2.291	27	1	1	10.040	1050.15	70.01	C
155.00-140.00		TA 435.22	B	0.302	2.291		1	1	10.040			
			C	0.302	2.291		1	1	10.040			
T3	125.55	450.06	A	0.346	2.181	27	1	1	9.509	773.17	103.09	C
140.00-132.50			B	0.346	2.181		1	1	9.509			
			C	0.346	2.181		1	1	9.509			
T4	41.85	156.03	A	0.348	2.176	27	1	1	3.191	258.39	103.36	C
132.50-130.00		TA 649.61	B	0.348	2.176		1	1	3.191			
			C	0.348	2.176		1	1	3.191			
T5	167.40	593.47	A	0.342	2.19	27	1	1	12.393	1019.37	101.94	C
130.00-120.00			B	0.342	2.19		1	1	12.393			
			C	0.342	2.19		1	1	12.393			
T6	513.20	704.89	A	0.252	2.43	27	1	1	15.209	2077.25	103.86	C
120.00-100.00			B	0.252	2.43		1	1	15.209			
			C	0.252	2.43		1	1	15.209			
T7	384.90	451.33	A	0.255	2.423	27	1	1	8.421	1394.89	92.99	C
100.00-85.00			B	0.255	2.423		1	1	8.421			
			C	0.255	2.423		1	1	8.421			
T8	128.30	199.66	A	0.287	2.33	27	1	1	3.130	476.89	95.38	C
85.00-80.00			B	0.287	2.33		1	1	3.130			
			C	0.287	2.33		1	1	3.130			
T9	513.20	879.07	A	0.322	2.239	27	1	1	20.263	2279.82	113.99	C
80.00-60.00			B	0.322	2.239		1	1	20.263			
			C	0.322	2.239		1	1	20.263			
T10	514.60	914.93	A	0.26	2.408	27	1	1	16.147	2126.34	106.32	C
60.00-40.00			B	0.26	2.408		1	1	16.147			
			C	0.26	2.408		1	1	16.147			
T11	516.00	975.15	A	0.226	2.511	26	1	1	14.367	1992.93	99.65	C
40.00-20.00			B	0.226	2.511		1	1	14.367			
			C	0.226	2.511		1	1	14.367			
T12	361.20	601.72	A	0.225	2.516	29	1	1	7.145	1377.11	91.81	C
20.00-5.00			B	0.225	2.516		1	1	7.145			
			C	0.225	2.516		1	1	7.145			
T13 5.00-0.00	0.00	2377.26	A	0.865	1.878	31	1	1	9.066	444.28	88.86	C
			B	0.865	1.878		1	1	9.066			
			C	0.865	1.878		1	1	9.066			
Sum Weight:	3604.13	10501.28								15945.29		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	110.59	329.04	A	0.233	2.489	27	0.8	1	7.357	674.68	44.98	C
170.00-155.00			B	0.233	2.489		0.8	1	7.357			
			C	0.233	2.489		0.8	1	7.357			
T2	227.34	783.84	A	0.302	2.291	27	0.8	1	9.932	1044.55	69.64	C
155.00-140.00		TA 435.22	B	0.302	2.291		0.8	1	9.932			
			C	0.302	2.291		0.8	1	9.932			
T3	125.55	450.06	A	0.346	2.181	27	0.8	1	7.607	678.78	90.50	C
140.00-132.50			B	0.346	2.181		0.8	1	7.607			
			C	0.346	2.181		0.8	1	7.607			
T4	41.85	156.03	A	0.348	2.176	27	0.8	1	2.553	226.80	90.72	C
132.50-130.00		TA 649.61	B	0.348	2.176		0.8	1	2.553			
			C	0.348	2.176		0.8	1	2.553			
T5	167.40	593.47	A	0.342	2.19	27	0.8	1	9.964	898.31	89.83	C
130.00-120.00			B	0.342	2.19		0.8	1	9.964			
			C	0.342	2.19		0.8	1	9.964			
T6	513.20	704.89	A	0.252	2.43	27	0.8	1	13.174	1964.50	98.22	C
120.00-100.00			B	0.252	2.43		0.8	1	13.174			
			C	0.252	2.43		0.8	1	13.174			
T7	384.90	451.33	A	0.255	2.423	27	0.8	1	8.315	1389.02	92.60	C
100.00-85.00			B	0.255	2.423		0.8	1	8.315			
			C	0.255	2.423		0.8	1	8.315			
T8	128.30	199.66	A	0.287	2.33	27	0.8	1	3.130	476.89	95.38	C
85.00-80.00			B	0.287	2.33		0.8	1	3.130			
			C	0.287	2.33		0.8	1	3.130			
T9	513.20	879.07	A	0.322	2.239	27	0.8	1	17.163	2120.82	106.04	C
80.00-60.00			B	0.322	2.239		0.8	1	17.163			
			C	0.322	2.239		0.8	1	17.163			
T10	514.60	914.93	A	0.26	2.408	27	0.8	1	13.925	2004.71	100.24	C
60.00-40.00			B	0.26	2.408		0.8	1	13.925			
			C	0.26	2.408		0.8	1	13.925			
T11	516.00	975.15	A	0.226	2.511	26	0.8	1	12.250	1876.82	93.84	C
40.00-20.00			B	0.226	2.511		0.8	1	12.250			
			C	0.226	2.511		0.8	1	12.250			
T12	361.20	601.72	A	0.225	2.516	29	0.8	1	7.145	1377.11	91.81	C
20.00-5.00			B	0.225	2.516		0.8	1	7.145			
			C	0.225	2.516		0.8	1	7.145			
T13 5.00-0.00	0.00	2377.26	A	0.865	1.878	31	0.8	1	7.253	355.42	71.08	C
			B	0.865	1.878		0.8	1	7.253			
			C	0.865	1.878		0.8	1	7.253			
Sum Weight:	3604.13	10501.28								15088.42		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	110.59	329.04	A	0.233	2.489	27	0.85	1	7.357	674.68	44.98	C
170.00-155.00			B	0.233	2.489		0.85	1	7.357			
			C	0.233	2.489		0.85	1	7.357			
T2	227.34	783.84	A	0.302	2.291	27	0.85	1	9.959	1045.95	69.73	C
155.00-140.00		TA 435.22	B	0.302	2.291		0.85	1	9.959			
			C	0.302	2.291		0.85	1	9.959			
T3	125.55	450.06	A	0.346	2.181	27	0.85	1	8.083	702.38	93.65	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
140.00-132.50			B	0.346	2.181		0.85	1	8.083			
			C	0.346	2.181		0.85	1	8.083			
T4	41.85	156.03	A	0.348	2.176	27	0.85	1	2.712	234.70	93.88	C
132.50-130.00		TA 649.61	B	0.348	2.176		0.85	1	2.712			
			C	0.348	2.176		0.85	1	2.712			
T5	167.40	593.47	A	0.342	2.19	27	0.85	1	10.571	928.58	92.86	C
130.00-120.00			B	0.342	2.19		0.85	1	10.571			
			C	0.342	2.19		0.85	1	10.571			
T6	513.20	704.89	A	0.252	2.43	27	0.85	1	13.682	1992.69	99.63	C
120.00-100.00			B	0.252	2.43		0.85	1	13.682			
			C	0.252	2.43		0.85	1	13.682			
T7	384.90	451.33	A	0.255	2.423	27	0.85	1	8.341	1390.49	92.70	C
100.00-85.00			B	0.255	2.423		0.85	1	8.341			
			C	0.255	2.423		0.85	1	8.341			
T8	128.30	199.66	A	0.287	2.33	27	0.85	1	3.130	476.89	95.38	C
85.00-80.00			B	0.287	2.33		0.85	1	3.130			
			C	0.287	2.33		0.85	1	3.130			
T9	513.20	879.07	A	0.322	2.239	27	0.85	1	17.938	2160.57	108.03	C
80.00-60.00			B	0.322	2.239		0.85	1	17.938			
			C	0.322	2.239		0.85	1	17.938			
T10	514.60	914.93	A	0.26	2.408	27	0.85	1	14.480	2035.12	101.76	C
60.00-40.00			B	0.26	2.408		0.85	1	14.480			
			C	0.26	2.408		0.85	1	14.480			
T11	516.00	975.15	A	0.226	2.511	26	0.85	1	12.780	1905.85	95.29	C
40.00-20.00			B	0.226	2.511		0.85	1	12.780			
			C	0.226	2.511		0.85	1	12.780			
T12	361.20	601.72	A	0.225	2.516	29	0.85	1	7.145	1377.11	91.81	C
20.00-5.00			B	0.225	2.516		0.85	1	7.145			
			C	0.225	2.516		0.85	1	7.145			
T13 5.00-0.00	0.00	2377.26	A	0.865	1.878	31	0.85	1	7.706	377.64	75.53	C
			B	0.865	1.878		0.85	1	7.706			
			C	0.865	1.878		0.85	1	7.706			
Sum Weight:	3604.13	10501.28								15302.64		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	1331.28	3032.95	A	0.779	1.802	7	1	1	40.969	544.69	36.31	C
170.00-155.00			B	0.779	1.802		1	1	40.969			
			C	0.779	1.802		1	1	40.969			
T2	2416.10	4472.38	A	0.994	2.088	7	1	1	60.076	763.34	50.89	C
155.00-140.00		TA	B	0.994	2.088		1	1	60.076			
		1372.56	C	0.994	2.088		1	1	60.076			
T3	1369.63	2545.87	A	0.939	1.985	7	1	1	28.680	371.86	49.58	C
140.00-132.50			B	0.939	1.985		1	1	28.680			
			C	0.939	1.985		1	1	28.680			
T4	456.55	831.29	A	0.895	1.917	7	1	1	8.950	119.63	47.85	C
132.50-130.00		TA	B	0.895	1.917		1	1	8.950			
		1350.52	C	0.895	1.917		1	1	8.950			
T5	1826.37	3323.32	A	0.925	1.962	7	1	1	37.455	489.75	48.97	C
130.00-120.00			B	0.925	1.962		1	1	37.455			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.925	1.962		1	1	37.455			
T6	5721.72	4384.86	A	0.702	1.776	7	1	1	51.079	1050.36*	52.52	C
120.00-100.00			B	0.702	1.776		1	1	51.079			
			C	0.702	1.776		1	1	51.079			
T7	4295.92	3253.99	A	0.791	1.809	7	1	1	42.476	777.31	51.82	C
100.00-85.00			B	0.791	1.809		1	1	42.476			
			C	0.791	1.809		1	1	42.476			
T8	1432.80	1377.70	A	0.967	2.034	7	1	1	19.678	259.90	51.98	C
85.00-80.00			B	0.967	2.034		1	1	19.678			
			C	0.967	2.034		1	1	19.678			
T9	5732.58	6021.36	A	0.908	1.936	7	1	1	72.098	1031.16	51.56	C
80.00-60.00			B	0.908	1.936		1	1	72.098			
			C	0.908	1.936		1	1	72.098			
T10	5819.95	4714.91	A	0.716	1.778	7	1	1	53.344	1064.22*	53.21	C
60.00-40.00			B	0.716	1.778		1	1	53.344			
			C	0.716	1.778		1	1	53.344			
T11	5829.93	4117.69	A	0.621	1.792	7	1	1	44.613	1021.29*	51.06	C
40.00-20.00			B	0.621	1.792		1	1	44.613			
			C	0.621	1.792		1	1	44.613			
T12	3857.87	2785.84	A	0.684	1.776	8	1	1	33.169	824.02*	54.93	C
20.00-5.00			B	0.684	1.776		1	1	33.169			
			C	0.684	1.776		1	1	33.169			
T13 5.00-0.00	0.00	3270.16	A	1	2.1	8	1	1	12.959	178.55*	35.71	C
			B	1	2.1		1	1	12.959			
			C	1	2.1		1	1	12.959			
Sum Weight:	40090.70	46855.39			*2.1A_g limit					8496.09		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	1331.28	3032.95	A	0.779	1.802	7	0.8	1	40.969	544.69	36.31	C
170.00-155.00			B	0.779	1.802		0.8	1	40.969			
			C	0.779	1.802		0.8	1	40.969			
T2	2416.10	4472.38	A	0.994	2.088	7	0.8	1	59.968	761.99	50.80	C
155.00-140.00		TA	B	0.994	2.088		0.8	1	59.968			
		1372.56	C	0.994	2.088		0.8	1	59.968			
T3	1369.63	2545.87	A	0.939	1.985	7	0.8	1	25.957	339.19	45.23	C
140.00-132.50			B	0.939	1.985		0.8	1	25.957			
			C	0.939	1.985		0.8	1	25.957			
T4	456.55	831.29	A	0.895	1.917	7	0.8	1	8.038	109.06	43.62	C
132.50-130.00		TA	B	0.895	1.917		0.8	1	8.038			
		1350.52	C	0.895	1.917		0.8	1	8.038			
T5	1826.37	3323.32	A	0.925	1.962	7	0.8	1	33.930	447.92	44.79	C
130.00-120.00			B	0.925	1.962		0.8	1	33.930			
			C	0.925	1.962		0.8	1	33.930			
T6	5721.72	4384.86	A	0.702	1.776	7	0.8	1	46.851	1050.36*	52.52	C
120.00-100.00			B	0.702	1.776		0.8	1	46.851			
			C	0.702	1.776		0.8	1	46.851			
T7	4295.92	3253.99	A	0.791	1.809	7	0.8	1	42.370	776.14	51.74	C
100.00-85.00			B	0.791	1.809		0.8	1	42.370			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.791	1.809		0.8	1	42.370			
T8	1432.80	1377.70	A	0.967	2.034	7	0.8	1	19.678	259.90	51.98	C
85.00-80.00			B	0.967	2.034		0.8	1	19.678			
			C	0.967	2.034		0.8	1	19.678			
T9	5732.58	6021.36	A	0.908	1.936	7	0.8	1	66.802	968.76	48.44	C
80.00-60.00			B	0.908	1.936		0.8	1	66.802			
			C	0.908	1.936		0.8	1	66.802			
T10	5819.95	4714.91	A	0.716	1.778	7	0.8	1	48.932	1064.22*	53.21	C
60.00-40.00			B	0.716	1.778		0.8	1	48.932			
			C	0.716	1.778		0.8	1	48.932			
T11	5829.93	4117.69	A	0.621	1.792	7	0.8	1	40.337	1021.29*	51.06	C
40.00-20.00			B	0.621	1.792		0.8	1	40.337			
			C	0.621	1.792		0.8	1	40.337			
T12	3857.87	2785.84	A	0.684	1.776	8	0.8	1	33.169	824.02*	54.93	C
20.00-5.00			B	0.684	1.776		0.8	1	33.169			
			C	0.684	1.776		0.8	1	33.169			
T13 5.00-0.00	0.00	3270.16	A	1	2.1	8	0.8	1	10.664	155.27	31.05	C
			B	1	2.1		0.8	1	10.664			
			C	1	2.1		0.8	1	10.664			
Sum Weight:	40090.70	46855.39			*2.1A_g limit					8322.81		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	1331.28	3032.95	A	0.779	1.802	7	0.85	1	40.969	544.69	36.31	C
170.00-155.00			B	0.779	1.802		0.85	1	40.969			
			C	0.779	1.802		0.85	1	40.969			
T2	2416.10	4472.38	A	0.994	2.088	7	0.85	1	59.995	762.33	50.82	C
155.00-140.00		TA	B	0.994	2.088		0.85	1	59.995			
		1372.56	C	0.994	2.088		0.85	1	59.995			
T3	1369.63	2545.87	A	0.939	1.985	7	0.85	1	26.638	347.36	46.31	C
140.00-132.50			B	0.939	1.985		0.85	1	26.638			
			C	0.939	1.985		0.85	1	26.638			
T4	456.55	831.29	A	0.895	1.917	7	0.85	1	8.266	111.70	44.68	C
132.50-130.00		TA	B	0.895	1.917		0.85	1	8.266			
		1350.52	C	0.895	1.917		0.85	1	8.266			
T5	1826.37	3323.32	A	0.925	1.962	7	0.85	1	34.811	458.38	45.84	C
130.00-120.00			B	0.925	1.962		0.85	1	34.811			
			C	0.925	1.962		0.85	1	34.811			
T6	5721.72	4384.86	A	0.702	1.776	7	0.85	1	47.908	1050.36*	52.52	C
120.00-100.00			B	0.702	1.776		0.85	1	47.908			
			C	0.702	1.776		0.85	1	47.908			
T7	4295.92	3253.99	A	0.791	1.809	7	0.85	1	42.397	776.43	51.76	C
100.00-85.00			B	0.791	1.809		0.85	1	42.397			
			C	0.791	1.809		0.85	1	42.397			
T8	1432.80	1377.70	A	0.967	2.034	7	0.85	1	19.678	259.90	51.98	C
85.00-80.00			B	0.967	2.034		0.85	1	19.678			
			C	0.967	2.034		0.85	1	19.678			
T9	5732.58	6021.36	A	0.908	1.936	7	0.85	1	68.126	984.36	49.22	C
80.00-60.00			B	0.908	1.936		0.85	1	68.126			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.908	1.936		0.85	1	68.126			
T10	5819.95	4714.91	A	0.716	1.778	7	0.85	1	50.035	1064.22*	53.21	C
60.00-40.00			B	0.716	1.778		0.85	1	50.035			
			C	0.716	1.778		0.85	1	50.035			
T11	5829.93	4117.69	A	0.621	1.792	7	0.85	1	41.406	1021.29*	51.06	C
40.00-20.00			B	0.621	1.792		0.85	1	41.406			
			C	0.621	1.792		0.85	1	41.406			
T12	3857.87	2785.84	A	0.684	1.776	8	0.85	1	33.169	824.02*	54.93	C
20.00-5.00			B	0.684	1.776		0.85	1	33.169			
			C	0.684	1.776		0.85	1	33.169			
T13 5.00-0.00	0.00	3270.16	A	1	2.1	8	0.85	1	11.238	163.62	32.72	C
			B	1	2.1		0.85	1	11.238			
			C	1	2.1		0.85	1	11.238			
Sum Weight:	40090.70	46855.39			*2.1A_g limit					8368.66		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	110.59	329.04	A	0.233	2.489	10	1	1	7.357	258.14	17.21	C
170.00-155.00			B	0.233	2.489		1	1	7.357			
			C	0.233	2.489		1	1	7.357			
T2	227.34	783.84	A	0.302	2.291	10	1	1	10.040	401.80	26.79	C
155.00-140.00		TA 435.22	B	0.302	2.291		1	1	10.040			
			C	0.302	2.291		1	1	10.040			
T3	125.55	450.06	A	0.346	2.181	10	1	1	9.509	295.82	39.44	C
140.00-132.50			B	0.346	2.181		1	1	9.509			
			C	0.346	2.181		1	1	9.509			
T4	41.85	156.03	A	0.348	2.176	10	1	1	3.191	98.86	39.55	C
132.50-130.00		TA 649.61	B	0.348	2.176		1	1	3.191			
			C	0.348	2.176		1	1	3.191			
T5	167.40	593.47	A	0.342	2.19	10	1	1	12.393	390.02	39.00	C
130.00-120.00			B	0.342	2.19		1	1	12.393			
			C	0.342	2.19		1	1	12.393			
T6	513.20	704.89	A	0.252	2.43	10	1	1	15.209	794.78	39.74	C
120.00-100.00			B	0.252	2.43		1	1	15.209			
			C	0.252	2.43		1	1	15.209			
T7	384.90	451.33	A	0.255	2.423	10	1	1	8.421	533.70	35.58	C
100.00-85.00			B	0.255	2.423		1	1	8.421			
			C	0.255	2.423		1	1	8.421			
T8	128.30	199.66	A	0.287	2.33	10	1	1	3.130	182.46	36.49	C
85.00-80.00			B	0.287	2.33		1	1	3.130			
			C	0.287	2.33		1	1	3.130			
T9	513.20	879.07	A	0.322	2.239	10	1	1	20.263	872.29	43.61	C
80.00-60.00			B	0.322	2.239		1	1	20.263			
			C	0.322	2.239		1	1	20.263			
T10	514.60	914.93	A	0.26	2.408	10	1	1	16.147	813.56	40.68	C
60.00-40.00			B	0.26	2.408		1	1	16.147			
			C	0.26	2.408		1	1	16.147			
T11	516.00	975.15	A	0.226	2.511	10	1	1	14.367	762.52	38.13	C
40.00-20.00			B	0.226	2.511		1	1	14.367			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.226	2.511		1	1	14.367			
T12	361.20	601.72	A	0.225	2.516	11	1	1	7.145	526.90	35.13	C
20.00-5.00			B	0.225	2.516		1	1	7.145			
			C	0.225	2.516		1	1	7.145			
T13 5.00-0.00	0.00	2377.26	A	0.865	1.878	12	1	1	9.066	169.99	34.00	C
			B	0.865	1.878		1	1	9.066			
			C	0.865	1.878		1	1	9.066			
Sum Weight:	3604.13	10501.28								6100.86		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	110.59	329.04	A	0.233	2.489	10	0.8	1	7.357	258.14	17.21	C
170.00-155.00			B	0.233	2.489		0.8	1	7.357			
			C	0.233	2.489		0.8	1	7.357			
T2	227.34	783.84	A	0.302	2.291	10	0.8	1	9.932	399.66	26.64	C
155.00-140.00		TA 435.22	B	0.302	2.291		0.8	1	9.932			
			C	0.302	2.291		0.8	1	9.932			
T3	125.55	450.06	A	0.346	2.181	10	0.8	1	7.607	259.71	34.63	C
140.00-132.50			B	0.346	2.181		0.8	1	7.607			
			C	0.346	2.181		0.8	1	7.607			
T4	41.85	156.03	A	0.348	2.176	10	0.8	1	2.553	86.78	34.71	C
132.50-130.00		TA 649.61	B	0.348	2.176		0.8	1	2.553			
			C	0.348	2.176		0.8	1	2.553			
T5	167.40	593.47	A	0.342	2.19	10	0.8	1	9.964	343.71	34.37	C
130.00-120.00			B	0.342	2.19		0.8	1	9.964			
			C	0.342	2.19		0.8	1	9.964			
T6	513.20	704.89	A	0.252	2.43	10	0.8	1	13.174	751.64	37.58	C
120.00-100.00			B	0.252	2.43		0.8	1	13.174			
			C	0.252	2.43		0.8	1	13.174			
T7	384.90	451.33	A	0.255	2.423	10	0.8	1	8.315	531.46	35.43	C
100.00-85.00			B	0.255	2.423		0.8	1	8.315			
			C	0.255	2.423		0.8	1	8.315			
T8	128.30	199.66	A	0.287	2.33	10	0.8	1	3.130	182.46	36.49	C
85.00-80.00			B	0.287	2.33		0.8	1	3.130			
			C	0.287	2.33		0.8	1	3.130			
T9	513.20	879.07	A	0.322	2.239	10	0.8	1	17.163	811.45	40.57	C
80.00-60.00			B	0.322	2.239		0.8	1	17.163			
			C	0.322	2.239		0.8	1	17.163			
T10	514.60	914.93	A	0.26	2.408	10	0.8	1	13.925	767.03	38.35	C
60.00-40.00			B	0.26	2.408		0.8	1	13.925			
			C	0.26	2.408		0.8	1	13.925			
T11	516.00	975.15	A	0.226	2.511	10	0.8	1	12.250	718.09	35.90	C
40.00-20.00			B	0.226	2.511		0.8	1	12.250			
			C	0.226	2.511		0.8	1	12.250			
T12	361.20	601.72	A	0.225	2.516	11	0.8	1	7.145	526.90	35.13	C
20.00-5.00			B	0.225	2.516		0.8	1	7.145			
			C	0.225	2.516		0.8	1	7.145			
T13 5.00-0.00	0.00	2377.26	A	0.865	1.878	12	0.8	1	7.253	135.99	27.20	C
			B	0.865	1.878		0.8	1	7.253			
			C	0.865	1.878		0.8	1	7.253			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
Sum Weight:	3604.13	10501.28								5773.02		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	110.59	329.04	A	0.233	2.489	10	0.85	1	7.357	258.14	17.21	C
170.00-155.00			B	0.233	2.489		0.85	1	7.357			
			C	0.233	2.489		0.85	1	7.357			
T2	227.34	783.84	A	0.302	2.291	10	0.85	1	9.959	400.19	26.68	C
155.00-140.00		TA 435.22	B	0.302	2.291		0.85	1	9.959			
			C	0.302	2.291		0.85	1	9.959			
T3	125.55	450.06	A	0.346	2.181	10	0.85	1	8.083	268.74	35.83	C
140.00-132.50			B	0.346	2.181		0.85	1	8.083			
			C	0.346	2.181		0.85	1	8.083			
T4	41.85	156.03	A	0.348	2.176	10	0.85	1	2.712	89.80	35.92	C
132.50-130.00		TA 649.61	B	0.348	2.176		0.85	1	2.712			
			C	0.348	2.176		0.85	1	2.712			
T5	167.40	593.47	A	0.342	2.19	10	0.85	1	10.571	355.28	35.53	C
130.00-120.00			B	0.342	2.19		0.85	1	10.571			
			C	0.342	2.19		0.85	1	10.571			
T6	513.20	704.89	A	0.252	2.43	10	0.85	1	13.682	762.43	38.12	C
120.00-100.00			B	0.252	2.43		0.85	1	13.682			
			C	0.252	2.43		0.85	1	13.682			
T7	384.90	451.33	A	0.255	2.423	10	0.85	1	8.341	532.02	35.47	C
100.00-85.00			B	0.255	2.423		0.85	1	8.341			
			C	0.255	2.423		0.85	1	8.341			
T8	128.30	199.66	A	0.287	2.33	10	0.85	1	3.130	182.46	36.49	C
85.00-80.00			B	0.287	2.33		0.85	1	3.130			
			C	0.287	2.33		0.85	1	3.130			
T9	513.20	879.07	A	0.322	2.239	10	0.85	1	17.938	826.66	41.33	C
80.00-60.00			B	0.322	2.239		0.85	1	17.938			
			C	0.322	2.239		0.85	1	17.938			
T10	514.60	914.93	A	0.26	2.408	10	0.85	1	14.480	778.66	38.93	C
60.00-40.00			B	0.26	2.408		0.85	1	14.480			
			C	0.26	2.408		0.85	1	14.480			
T11	516.00	975.15	A	0.226	2.511	10	0.85	1	12.780	729.20	36.46	C
40.00-20.00			B	0.226	2.511		0.85	1	12.780			
			C	0.226	2.511		0.85	1	12.780			
T12	361.20	601.72	A	0.225	2.516	11	0.85	1	7.145	526.90	35.13	C
20.00-5.00			B	0.225	2.516		0.85	1	7.145			
			C	0.225	2.516		0.85	1	7.145			
T13 5.00-0.00	0.00	2377.26	A	0.865	1.878	12	0.85	1	7.706	144.49	28.90	C
			B	0.865	1.878		0.85	1	7.706			
			C	0.865	1.878		0.85	1	7.706			
Sum Weight:	3604.13	10501.28								5854.98		

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Torques lb-ft
Leg Weight	3774.51			
Bracing Weight	6726.77			
Total Member Self-Weight	10501.28			
Guy Weight	2492.87			
Total Weight	27244.22			
Wind 0 deg - No Ice		78.62	-25030.99	294.61
Wind 30 deg - No Ice		12184.48	-21146.34	-11.20
Wind 60 deg - No Ice		20848.21	-12132.61	-317.41
Wind 90 deg - No Ice		24261.68	-61.94	-538.57
Wind 120 deg - No Ice		21550.70	12447.41	-612.02
Wind 150 deg - No Ice		12076.00	21098.01	-465.11
Wind 180 deg - No Ice		-61.55	24170.09	-263.49
Wind 210 deg - No Ice		-12170.82	21133.60	15.00
Wind 240 deg - No Ice		-21575.00	12552.22	317.41
Wind 270 deg - No Ice		-24243.81	56.48	534.77
Wind 300 deg - No Ice		-20796.60	-12031.74	580.90
Wind 330 deg - No Ice		-12089.58	-21090.17	465.11
Member Ice	36354.11			
Guy Ice	25145.35			
Total Weight Ice	152819.53			
Wind 0 deg - Ice		26.24	-12837.02	233.46
Wind 30 deg - Ice		6351.08	-11014.71	34.89
Wind 60 deg - Ice		10937.53	-6346.09	-199.69
Wind 90 deg - Ice		12667.61	-19.95	-386.26
Wind 120 deg - Ice		11076.10	6395.78	-445.86
Wind 150 deg - Ice		6316.08	10999.90	-397.63
Wind 180 deg - Ice		-19.80	12662.22	-259.77
Wind 210 deg - Ice		-6345.92	11009.90	-33.45
Wind 240 deg - Ice		-11081.82	6429.39	212.39
Wind 270 deg - Ice		-12660.86	17.88	384.83
Wind 300 deg - Ice		-10921.49	-6313.97	459.46
Wind 330 deg - Ice		-6321.21	-10996.94	397.63
Total Weight	27244.22			
Wind 0 deg - Service		30.08	-9577.17	112.72
Wind 30 deg - Service		4661.93	-8090.85	-4.28
Wind 60 deg - Service		7976.78	-4642.09	-121.45
Wind 90 deg - Service		9282.82	-23.70	-206.07
Wind 120 deg - Service		8245.56	4762.53	-234.17
Wind 150 deg - Service		4620.43	8072.36	-177.96
Wind 180 deg - Service		-23.55	9247.78	-100.82
Wind 210 deg - Service		-4656.71	8085.98	5.74
Wind 240 deg - Service		-8254.86	4802.63	121.45
Wind 270 deg - Service		-9275.98	21.61	204.61
Wind 300 deg - Service		-7957.04	-4603.49	222.26
Wind 330 deg - Service		-4625.62	-8069.36	177.96

Load Combinations

Comb. No.	Description
1	Dead Only

Comb. No.	Description
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
5	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
11	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
14	1.2 Dead+1.0 Ice+1.0 Temp+Guy
15	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
16	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
17	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
18	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
19	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
20	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
26	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	170 - 155	Leg	Max Tension	4	14758.41	359.27	-206.60
			Max. Compression	10	-18065.37	130.07	-74.17
			Max. Mx	5	-229.44	395.14	4.34
			Max. My	8	14563.23	-8.33	409.19
			Max. Vy	5	2122.30	-160.53	7.53
			Max. Vx	8	2281.97	4.83	-161.08
		Diagonal	Max Tension	5	2476.89	0.00	0.00
			Max. Compression	5	-2524.42	0.00	0.00
			Max. Mx	23	712.96	-12.56	0.22
			Max. My	9	-2218.47	0.79	3.80
			Max. Vy	23	17.22	-12.56	0.22
			Max. Vx	9	-1.81	0.79	3.80
		Top Girt	Max Tension	6	29.74	0.00	0.00
			Max. Compression	8	-41.83	0.00	0.00
			Max. Mx	19	-27.20	19.16	0.00
			Max. My	24	-31.76	0.00	-0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	19	-22.41	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Bottom Girt	Max Tension	4	869.77	0.00	0.00
			Max. Compression	10	-752.11	0.00	0.00
			Max. Mx	19	-73.68	19.16	0.00
			Max. My	24	230.79	0.00	-0.00
			Max. Vy	19	-22.41	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
T2	155 - 140	Leg	Max Tension	4	17309.80	-643.82	368.16
			Max. Compression	2	-34663.56	-4.17	293.76
			Max. Mx	5	14842.45	-692.36	97.78
			Max. My	8	14561.71	18.08	-732.87
			Max. Vy	6	2300.32	-263.82	-132.67
			Max. Vx	2	-2594.37	-4.17	293.76
		Diagonal	Max Tension	12	3054.49	0.00	0.00
			Max. Compression	6	-3404.81	24.41	7.77
			Max. Mx	22	-1102.48	-86.76	3.72
			Max. My	7	421.86	-68.20	16.02
			Max. Vy	22	55.48	-86.76	3.72
			Max. Vx	7	-7.65	0.00	0.00
		Secondary Horizontal	Max Tension	10	1229.20	0.00	0.00
			Max. Compression	8	-951.67	-0.92	-1.42
			Max. Mx	21	-420.89	-11.05	2.95
			Max. My	8	847.49	0.98	4.17
			Max. Vy	21	18.13	-11.05	2.95
			Max. Vx	6	2.44	0.00	0.00
		Top Girt	Max Tension	15	359.81	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	19	347.93	19.14	0.00
			Max. My	24	319.61	0.00	-0.00
			Max. Vy	19	-22.39	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Bottom Girt	Max Tension	15	646.43	0.00	0.00
			Max. Compression	8	-253.15	0.00	0.00
			Max. Mx	19	643.71	19.14	0.00
			Max. My	24	611.46	0.00	0.00
			Max. Vy	19	-22.39	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Guy A	Bottom Tension	21	7332.19		
			Top Tension	8	8777.97		
			Top Cable Vert	21	7707.48		
			Top Cable Norm	21	4200.89		
			Top Cable Tan	21	7.79		
			Bot Cable Vert	8	-6035.55		
			Bot Cable Norm	8	4163.31		
			Bot Cable Tan	8	5.43		
		Guy B	Bottom Tension	25	7237.86		
			Top Tension	12	8556.70		
			Top Cable Vert	25	7385.26		
			Top Cable Norm	25	4321.46		
			Top Cable Tan	25	6.90		
			Bot Cable Vert	12	-5836.10		
			Bot Cable Norm	12	4280.95		
			Bot Cable Tan	12	4.70		
		Guy C	Bottom Tension	17	7192.06		
			Top Tension	4	8319.09		
			Top Cable Vert	17	7083.98		
			Top Cable Norm	17	4361.70		
			Top Cable Tan	17	8.15		
			Bot Cable Vert	4	-5698.58		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Bot Cable Norm	4	4387.70		
			Bot Cable Tan	4	4.37		
		Top Guy Pull-Off	Max Tension	4	3883.50	0.00	0.00
			Max. Compression	10	-2940.64	0.00	0.00
			Max. Mx	19	-245.19	-27.58	0.00
			Max. My	24	1124.84	0.00	0.00
			Max. Vy	19	-32.25	0.00	0.00
			Max. Vx	24	-0.00	0.00	0.00
		Torque Arm Top	Max Tension	3	4101.21	0.00	0.00
			Max. Compression	9	-1512.26	0.00	0.00
			Max. Mx	21	813.81	-26838.87	0.00
			Max. My	24	1180.90	-21606.00	0.00
			Max. Vy	21	7789.22	-26838.87	0.00
			Max. Vx	24	0.00	-21606.00	0.00
T3	140 - 132.5	Leg	Max Tension	8	33349.94	63.84	-16.26
			Max. Compression	2	-54381.59	-1760.37	-15.19
			Max. Mx	2	-54381.59	-1760.37	-15.19
			Max. My	9	-9721.93	-719.86	2309.76
			Max. Vy	2	2338.39	1244.94	4.23
			Max. Vx	7	5989.96	-724.91	-2303.97
		Diagonal	Max Tension	7	5011.37	-112.74	-35.16
			Max. Compression	2	-5103.29	0.00	0.00
			Max. Mx	8	3924.99	-144.22	-0.02
			Max. My	3	-2939.98	-47.27	74.44
			Max. Vy	8	-71.19	0.00	0.00
			Max. Vx	3	35.29	0.00	0.00
		Secondary Horizontal	Max Tension	8	2676.96	-135.05	1.47
			Max. Compression	6	-1432.55	0.00	0.00
			Max. Mx	8	-538.11	-135.06	1.09
			Max. My	9	629.87	-5.38	18.29
			Max. Vy	8	81.82	0.00	0.00
			Max. Vx	9	10.70	-5.38	18.29
		Top Girt	Max Tension	2	1248.60	0.00	0.00
			Max. Compression	8	-906.42	0.00	0.00
			Max. Mx	19	848.60	-22.33	0.00
			Max. My	24	797.84	0.00	-0.00
			Max. Vy	19	26.12	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
T4	132.5 - 130	Leg	Max Tension	4	3949.57	1571.85	31.34
			Max. Compression	2	-56658.80	1166.31	-6.85
			Max. Mx	8	1294.23	1665.15	4.06
			Max. My	3	-25847.91	25.38	-1090.05
			Max. Vy	8	-7205.91	-1297.40	2.93
			Max. Vx	9	-1168.93	-482.36	-589.28
		Diagonal	Max Tension	10	5434.59	0.00	0.00
			Max. Compression	11	-6749.98	-130.50	64.49
			Max. Mx	8	3788.04	230.96	2.19
			Max. My	7	-5145.34	58.29	-120.51
			Max. Vy	8	-113.59	230.96	2.19
			Max. Vx	7	57.56	58.29	-120.51
		Secondary Horizontal	Max Tension	5	1918.42	120.00	-4.20
			Max. Compression	2	-981.36	73.91	-11.10
			Max. Mx	10	223.02	-142.50	-13.68
			Max. My	8	-656.81	-64.86	-19.23
			Max. Vy	10	-86.17	0.00	0.00
			Max. Vx	8	11.25	0.00	0.00
		Guy A	Bottom Tension	7	20158.62		
			Top Tension	7	20375.88		
			Top Cable Vert	7	16412.97		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Top Cable Norm	7	12074.14		
			Top Cable Tan	7	77.46		
			Bot Cable Vert	7	-15940.24		
			Bot Cable Norm	7	12339.29		
			Bot Cable Tan	7	143.75		
		Guy B	Bottom Tension	13	19517.47		
			Top Tension	13	19719.12		
			Top Cable Vert	13	15447.32		
			Top Cable Norm	13	12256.38		
			Top Cable Tan	13	71.50		
			Bot Cable Vert	13	-14996.20		
			Bot Cable Norm	13	12491.08		
			Bot Cable Tan	13	135.73		
		Guy C	Bottom Tension	3	19012.41		
			Top Tension	3	19204.70		
			Top Cable Vert	3	14701.95		
			Top Cable Norm	3	12355.90		
			Top Cable Tan	3	67.41		
			Bot Cable Vert	3	-14262.67		
			Bot Cable Norm	3	12571.03		
			Bot Cable Tan	3	131.82		
		Torque Arm Top	Max Tension	3	13544.10	-10222.09	0.00
			Max. Compression	9	-6400.86	0.00	0.00
			Max. Mx	8	-4396.44	-54156.25	0.00
			Max. My	9	-111.26	-53216.11	0.00
			Max. Vy	8	15536.84	-54156.25	0.00
			Max. Vx	9	0.00	-53216.11	0.00
T5	130 - 120	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-49540.94	7.66	-22.51
			Max. Mx	22	-46773.07	-1233.31	-29.70
			Max. My	9	-25499.18	-482.32	-589.27
			Max. Vy	8	-4032.50	-327.46	34.74
			Max. Vx	11	-1516.85	-64.79	-4.24
		Diagonal	Max Tension	4	4543.34	0.00	0.00
			Max. Compression	10	-5746.88	-0.14	-31.03
			Max. Mx	10	2612.47	90.61	-1.77
			Max. My	5	3431.08	13.37	-42.26
			Max. Vy	24	-49.10	70.80	-2.66
			Max. Vx	5	20.01	0.00	0.00
		Secondary Horizontal	Max Tension	18	1944.60	-1.60	-6.98
			Max. Compression	24	-847.70	0.00	0.00
			Max. Mx	10	-531.45	81.57	4.61
			Max. My	6	-536.77	-44.80	-16.62
			Max. Vy	10	-50.54	81.57	4.61
			Max. Vx	6	9.72	0.00	0.00
		Bottom Girt	Max Tension	10	1170.43	0.00	0.00
			Max. Compression	8	-410.11	0.00	0.00
			Max. Mx	21	768.19	19.14	0.00
			Max. My	18	465.06	0.00	-0.00
			Max. Vy	21	-22.39	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
T6	120 - 100	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-60193.79	295.85	1.57
			Max. Mx	8	-39871.65	323.02	50.96
			Max. My	7	-26875.06	-14.94	159.24
			Max. Vy	8	-4031.52	8.55	33.02
			Max. Vx	11	-1516.28	-8.71	122.02
		Diagonal	Max Tension	13	1273.00	0.00	0.00
			Max. Compression	2	-1645.72	0.00	0.00
			Max. Mx	20	-585.42	-25.07	0.28

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. My	2	-1101.67	10.03	-2.13
			Max. Vy	19	23.11	-25.07	0.12
			Max. Vx	2	-1.01	10.03	-2.13
		Top Girt	Max Tension	10	1247.53	0.00	0.00
			Max. Compression	8	-223.55	0.00	0.00
			Max. Mx	21	993.61	19.16	0.00
			Max. My	18	718.53	0.00	-0.00
			Max. Vy	21	-22.40	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
		Bottom Girt	Max Tension	19	602.54	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	23	593.37	19.16	0.00
			Max. My	18	527.86	0.00	-0.00
			Max. Vy	23	-22.40	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
T7	100 - 85	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-65486.14	-19.71	-701.24
			Max. Mx	26	-61765.42	-621.74	326.79
			Max. My	25	-59848.27	-18.01	-707.79
			Max. Vy	12	-438.95	-67.72	-78.85
			Max. Vx	15	474.34	-0.44	447.13
		Diagonal	Max Tension	8	1208.14	0.00	0.00
			Max. Compression	26	-1501.43	0.00	0.00
			Max. Mx	19	-725.78	-32.59	0.07
			Max. My	13	-469.93	9.57	-1.98
			Max. Vy	19	26.70	-32.59	0.07
			Max. Vx	13	-0.94	0.00	0.00
		Top Girt	Max Tension	19	689.45	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	17	642.61	19.18	0.00
			Max. My	18	588.13	0.00	-0.00
			Max. Vy	17	-22.44	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
		Guy A	Bottom Tension	7	9523.81		
			Top Tension	7	9570.44		
			Top Cable Vert	7	7517.99		
			Top Cable Norm	7	5922.23		
			Top Cable Tan	7	16.97		
			Bot Cable Vert	7	-7382.54		
			Bot Cable Norm	7	6016.30		
			Bot Cable Tan	7	71.78		
		Guy B	Bottom Tension	13	9177.02		
			Top Tension	13	9220.09		
			Top Cable Vert	13	7012.24		
			Top Cable Norm	13	5986.52		
			Top Cable Tan	13	15.90		
			Bot Cable Vert	13	-6883.15		
			Bot Cable Norm	13	6069.21		
			Bot Cable Tan	13	67.40		
		Guy C	Bottom Tension	3	8940.52		
			Top Tension	3	8981.50		
			Top Cable Vert	3	6682.61		
			Top Cable Norm	3	6000.81		
			Top Cable Tan	3	14.98		
			Bot Cable Vert	3	-6557.51		
			Bot Cable Norm	3	6076.83		
			Bot Cable Tan	3	65.06		
		Top Guy Pull-Off	Max Tension	19	4397.39	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	17	3240.70	25.94	0.00
			Max. My	6	2370.41	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	17	30.34	0.00	0.00
			Max. Vx	6	-0.00	0.00	0.00
T8	85 - 80	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	21	-68788.74	0.43	-216.56
			Max. Mx	17	-66027.28	944.13	-546.94
			Max. My	22	-67390.75	3.35	1110.98
			Max. Vy	16	1475.29	-806.06	442.19
			Max. Vx	22	1723.67	-22.77	-932.57
		Diagonal	Max Tension	13	714.11	4.10	0.04
			Max. Compression	26	-2128.80	0.00	0.00
			Max. Mx	22	18.87	-29.66	2.45
			Max. My	20	-132.37	-29.58	2.59
			Max. Vy	22	25.48	-29.66	2.45
			Max. Vx	20	-1.25	0.00	0.00
		Secondary Horizontal	Max Tension	19	1887.40	-8.30	3.23
			Max. Compression	21	-1168.12	-9.09	1.38
			Max. Mx	19	1241.54	-9.46	1.50
			Max. My	19	1887.40	-8.30	3.23
			Max. Vy	19	-17.22	-9.46	1.50
			Max. Vx	19	1.89	-8.30	3.23
		Bottom Girt	Max Tension	19	829.96	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	21	721.61	19.20	0.00
			Max. My	6	324.13	0.00	0.00
			Max. Vy	21	22.45	0.00	0.00
			Max. Vx	6	-0.00	0.00	0.00
T9	80 - 60	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-70250.17	-4.32	-0.58
			Max. Mx	22	-69923.68	-943.25	22.92
			Max. My	7	-38190.94	-53.24	169.17
			Max. Vy	10	-1638.50	85.55	-0.76
			Max. Vx	7	699.66	13.14	-5.56
		Diagonal	Max Tension	9	727.60	0.00	0.00
			Max. Compression	9	-2037.38	0.00	0.00
			Max. Mx	23	-1262.70	-33.80	3.70
			Max. My	15	-584.45	-17.85	-4.80
			Max. Vy	23	27.34	-33.80	3.70
			Max. Vx	15	2.30	0.00	0.00
		Secondary Horizontal	Max Tension	23	1518.48	0.00	0.00
			Max. Compression	22	-1211.11	106.49	-4.91
			Max. Mx	23	-1204.46	107.02	-5.03
			Max. My	19	1515.11	-51.79	-7.01
			Max. Vy	23	-81.23	107.02	-5.03
			Max. Vx	19	-4.10	-51.79	-7.01
		Top Girt	Max Tension	19	1110.04	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	21	987.30	-31.88	0.00
			Max. My	6	529.86	0.00	-0.00
			Max. Vy	21	37.29	0.00	0.00
			Max. Vx	6	0.00	0.00	0.00
		Bottom Girt	Max Tension	21	595.48	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	546.02	-31.88	0.00
			Max. My	6	342.60	0.00	-0.00
			Max. Vy	14	37.29	0.00	0.00
			Max. Vx	6	0.00	0.00	0.00
T10	60 - 40	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	23	-77234.90	150.05	284.51
			Max. Mx	2	-34837.30	526.29	107.70

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. My	13	-40195.30	86.94	369.28
			Max. Vy	10	-1641.41	495.50	-8.53
			Max. Vx	4	-709.96	376.20	-118.86
		Diagonal	Max Tension	9	1885.21	0.00	0.00
			Max. Compression	9	-1921.57	0.00	0.00
			Max. Mx	20	151.34	-23.42	0.87
			Max. My	24	-428.42	-23.06	1.16
			Max. Vy	20	22.33	-23.42	0.87
			Max. Vx	24	-0.56	-23.06	1.16
		Top Girt	Max Tension	23	801.58	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	691.37	19.13	0.00
			Max. My	24	695.31	0.00	-0.00
			Max. Vy	14	-22.37	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Bottom Girt	Max Tension	17	768.25	0.00	0.00
			Max. Compression	2	-21.20	0.00	0.00
			Max. Mx	14	628.35	19.13	0.00
			Max. My	24	517.78	0.00	-0.00
			Max. Vy	14	-22.37	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
		Guy A	Bottom Tension	7	13245.77		
			Top Tension	7	13280.13		
			Top Cable Vert	7	7711.67		
			Top Cable Norm	7	10811.66		
			Top Cable Tan	7	0.91		
			Bot Cable Vert	7	-7598.20		
			Bot Cable Norm	7	10849.58		
			Bot Cable Tan	7	66.30		
		Guy B	Bottom Tension	13	12671.71		
			Top Tension	13	12701.40		
			Top Cable Vert	13	6661.43		
			Top Cable Norm	13	10814.38		
			Top Cable Tan	13	1.80		
			Bot Cable Vert	13	-6559.05		
			Bot Cable Norm	13	10841.93		
			Bot Cable Tan	13	60.09		
		Guy C	Bottom Tension	3	12316.15		
			Top Tension	3	12343.08		
			Top Cable Vert	3	6020.22		
			Top Cable Norm	3	10775.37		
			Top Cable Tan	3	1.79		
			Bot Cable Vert	3	-5924.22		
			Bot Cable Norm	3	10797.59		
			Bot Cable Tan	3	56.20		
		Top Guy Pull-Off	Max Tension	10	5674.17	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	3854.58	25.88	0.00
			Max. My	6	3057.77	0.00	0.00
			Max. Vy	14	-30.27	0.00	0.00
			Max. Vx	6	-0.00	0.00	0.00
T11	40 - 20	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	21	-83665.55	17.26	583.94
			Max. Mx	11	-42260.56	333.78	-9.34
			Max. My	23	-80609.86	-3.37	639.71
			Max. Vy	6	1448.09	155.83	164.42
			Max. Vx	4	-706.58	102.07	58.32
		Diagonal	Max Tension	3	2021.97	0.00	0.00
			Max. Compression	5	-2813.33	0.00	0.00
			Max. Mx	20	-926.20	23.06	0.00
			Max. My	19	-1079.04	0.00	0.04

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	20	21.96	0.00	0.00
			Max. Vx	19	-0.04	0.00	0.00
		Horizontal	Max Tension	21	1435.72	0.00	0.00
			Max. Compression	21	-1435.72	0.00	0.00
			Max. Mx	21	1304.42	19.57	0.00
			Max. My	6	848.05	0.00	0.00
			Max. Vy	21	22.89	0.00	0.00
			Max. Vx	6	-0.00	0.00	0.00
		Top Girt	Max Tension	5	682.46	0.00	0.00
			Max. Compression	3	-434.00	0.00	0.00
			Max. Mx	14	267.52	18.74	0.00
			Max. My	22	444.74	0.00	-0.00
			Max. Vy	14	21.92	0.00	0.00
			Max. Vx	22	0.00	0.00	0.00
		Bottom Girt	Max Tension	17	473.79	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	14	432.60	18.74	0.00
			Max. My	22	435.71	0.00	-0.00
			Max. Vy	14	21.92	0.00	0.00
			Max. Vx	22	0.00	0.00	0.00
T12	20 - 5	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	21	-83673.47	-590.74	-10.36
			Max. Mx	24	-82671.63	3963.95	1887.88
			Max. My	21	-82853.98	-338.51	-4397.68
			Max. Vy	24	-15228.13	3963.95	1887.88
			Max. Vx	21	17569.65	-338.51	-4397.68
		Diagonal	Max Tension	7	1945.67	0.00	0.00
			Max. Compression	7	-2848.54	0.00	0.00
			Max. Mx	20	113.99	21.40	0.00
			Max. My	19	-786.10	0.00	0.04
			Max. Vy	20	-20.44	0.00	0.00
			Max. Vx	19	0.04	0.00	0.00
		Horizontal	Max Tension	21	1440.33	0.00	0.00
			Max. Compression	21	-1440.33	0.00	0.00
			Max. Mx	21	1371.59	18.37	0.00
			Max. My	6	837.82	0.00	0.00
			Max. Vy	21	21.49	0.00	0.00
			Max. Vx	6	0.00	0.00	0.00
		Top Girt	Max Tension	22	535.22	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	21	459.20	17.43	0.00
			Max. My	22	433.26	0.00	-0.00
			Max. Vy	21	-20.39	0.00	0.00
			Max. Vx	22	0.00	0.00	0.00
		Bottom Girt	Max Tension	24	10421.56	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	21	9842.65	23.78	0.00
			Max. My	6	4191.83	0.00	0.00
			Max. Vy	21	27.81	0.00	0.00
			Max. Vx	6	-0.00	0.00	0.00
T13	5 - 0	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	21	-89999.93	760.17	79.80
			Max. Mx	23	-78949.83	7271.38	294.27
			Max. My	6	-45176.39	3439.83	564.37
			Max. Vy	23	-14226.43	7137.87	265.84
			Max. Vx	8	-551.20	1441.22	208.75
		Top Girt	Max Tension	23	8782.72	-4285.60	-14.95
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	21	8632.09	-5044.80	-184.50
			Max. My	7	4144.72	-2380.58	-279.78
			Max. Vy	7	714.56	-2824.32	-87.90

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vx	6	219.89	-2503.79	-247.65
		Bottom Girt	Max Tension	10	1298.44	-962.62	-453.02
			Max. Compression	22	-5067.26	-2386.64	20.02
			Max. Mx	19	-4945.81	-2557.46	62.81
			Max. My	10	-3925.92	-1718.44	1035.73
			Max. Vy	6	2752.55	-1985.54	942.58
			Max. Vx	10	-3220.79	-812.53	-612.04
		Mid Girt	Max Tension	6	75.43	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	21	34.63	75.93	0.00
			Max. My	18	50.43	0.00	14.99
			Max. Vy	21	-177.62	0.00	0.00
			Max. Vx	18	-35.07	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Mast	Max. Vert	23	246795.62	642.48	-282.10
	Max. H_x	11	120808.13	2432.96	-24.26
	Max. H_z	2	126467.96	-5.01	2485.44
	Max. M_x	1	0.00	3.64	10.05
	Max. M_z	1	0.00	3.64	10.05
	Max. Torsion	7	836.34	-1215.64	-2036.42
	Min. Vert	1	88795.69	3.64	10.05
	Min. H_x	5	119380.47	-2441.32	-12.57
	Min. H_z	8	112192.04	5.70	-2315.92
	Min. M_x	1	0.00	3.64	10.05
	Min. M_z	1	0.00	3.64	10.05
	Min. Torsion	13	-745.89	1194.14	2084.87
Guy C @ 107 ft Elev 10 ft Azimuth 240 deg	Max. Vert	10	-2257.15	-1226.87	707.28
	Max. H_x	10	-2257.15	-1226.87	707.28
	Max. H_z	3	-38701.47	-28245.27	16840.57
	Min. Vert	4	-39599.53	-29131.03	16826.99
	Min. H_x	4	-39599.53	-29131.03	16826.99
	Min. H_z	10	-2257.15	-1226.87	707.28
Guy B @ 106 ft Elev 4 ft Azimuth 120 deg	Max. Vert	6	-2769.51	1450.63	835.75
	Max. H_x	12	-41129.22	28673.37	16562.75
	Max. H_z	13	-40504.71	27996.38	16711.05
	Min. Vert	12	-41129.22	28673.37	16562.75
	Min. H_x	6	-2769.51	1450.63	835.75
	Min. H_z	6	-2769.51	1450.63	835.75
Guy A @ 106 ft Elev -6 ft Azimuth 0 deg	Max. Vert	2	-3605.91	0.60	-2072.43
	Max. H_x	24	-24546.11	1235.87	-20250.86
	Max. H_z	2	-3605.91	0.60	-2072.43
	Min. Vert	8	-43427.11	0.45	-32617.42
	Min. H_x	18	-24565.07	-1230.37	-20266.18
	Min. H_z	8	-43427.11	0.45	-32617.42
Guy C @ 75 ft Elev 7 ft	Max. Vert	10	-202.45	-130.68	75.35

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Azimuth 240 deg					
	Max. H_x	10	-202.45	-130.68	75.35
	Max. H_z	3	-12481.73	-14553.04	8542.23
	Min. Vert	3	-12481.73	-14553.04	8542.23
	Min. H_x	3	-12481.73	-14553.04	8542.23
	Min. H_z	10	-202.45	-130.68	75.35
Guy B @ 75 ft Elev 2.83 ft	Max. Vert	6	-234.32	130.99	75.46
Azimuth 120 deg					
	Max. H_x	13	-13442.21	14581.73	8565.98
	Max. H_z	13	-13442.21	14581.73	8565.98
	Min. Vert	13	-13442.21	14581.73	8565.98
	Min. H_x	6	-234.32	130.99	75.46
	Min. H_z	6	-234.32	130.99	75.46
Guy A @ 75 ft Elev -4.25 ft	Max. Vert	2	-335.99	0.08	-214.55
Azimuth 0 deg					
	Max. H_x	24	-6955.29	342.40	-8627.90
	Max. H_z	2	-335.99	0.08	-214.55
	Min. Vert	7	-14980.75	-138.07	-16865.88
	Min. H_x	18	-7013.84	-341.48	-8695.53
	Min. H_z	7	-14980.75	-138.07	-16865.88

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	88795.69	-3.64	-10.05	0.00	0.00	-20.62
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	126467.96	5.01	-2485.44	0.00	0.00	692.58
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	119589.20	1197.63	-2100.43	0.00	0.00	443.68
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	111077.49	2052.29	-1187.87	0.00	0.00	-34.89
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	119380.47	2441.32	12.57	0.00	0.00	-539.48
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	127680.17	2162.97	1211.87	0.00	0.00	-804.27
1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy	121815.50	1215.64	2036.42	0.00	0.00	-836.34
1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy	112192.04	-5.70	2315.92	0.00	0.00	-728.40
1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy	122529.42	-1229.25	2034.29	0.00	0.00	-442.06
1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy	129302.31	-2156.55	1215.81	0.00	0.00	21.94
1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy	120808.13	-2432.96	24.26	0.00	0.00	464.24
1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy	111527.33	-2049.28	-1176.01	0.00	0.00	693.07
1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy	120349.21	-1194.14	-2084.87	0.00	0.00	745.89
1.2 Dead+1.0 Ice+1.0 Temp+Guy	242122.52	-66.15	-38.62	0.00	0.00	-58.36
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	244433.02	-60.06	-705.35	0.00	0.00	191.58

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	244239.18	245.75	-615.30	0.00	0.00	188.70
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	244464.11	486.83	-350.14	0.00	0.00	-29.95
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	245094.73	594.50	-17.70	0.00	0.00	-257.11
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	245843.07	516.00	277.86	0.00	0.00	-281.92
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	245796.83	280.59	487.33	0.00	0.00	-254.25
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	245869.66	-71.02	559.15	0.00	0.00	-313.29
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	246357.22	-417.28	488.02	0.00	0.00	-297.86
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	246795.62	-642.48	282.10	0.00	0.00	-77.08
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	245972.72	-717.87	-8.74	0.00	0.00	143.50
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	245075.71	-610.02	-338.89	0.00	0.00	176.46
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	244558.19	-368.27	-607.36	0.00	0.00	143.11
Dead+Wind 0 deg - Service+Guy	89494.10	-2.69	-648.20	0.00	0.00	155.05
Dead+Wind 30 deg - Service+Guy	89533.17	299.70	-534.41	0.00	0.00	91.15
Dead+Wind 60 deg - Service+Guy	89497.24	512.94	-306.64	0.00	0.00	-20.50
Dead+Wind 90 deg - Service+Guy	89317.07	605.38	-8.96	0.00	0.00	-132.30
Dead+Wind 120 deg - Service+Guy	89104.91	554.35	309.34	0.00	0.00	-196.08
Dead+Wind 150 deg - Service+Guy	88978.35	302.31	513.02	0.00	0.00	-211.82
Dead+Wind 180 deg - Service+Guy	88932.95	-4.66	582.60	0.00	0.00	-195.41
Dead+Wind 210 deg - Service+Guy	88897.33	-311.48	513.97	0.00	0.00	-131.98
Dead+Wind 240 deg - Service+Guy	88959.79	-563.08	311.87	0.00	0.00	-19.92
Dead+Wind 270 deg - Service+Guy	89140.41	-613.15	-6.44	0.00	0.00	91.79
Dead+Wind 300 deg - Service+Guy	89339.61	-519.97	-304.76	0.00	0.00	154.99
Dead+Wind 330 deg - Service+Guy	89438.35	-306.03	-533.39	0.00	0.00	170.98

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-27243.67	-0.00	-0.29	27243.66	1.44	0.005%
2	113.85	-32315.06	-44667.84	-113.91	32314.94	44666.16	0.003%
3	21780.44	-32133.41	-37819.67	-21780.55	32133.30	37817.60	0.004%
4	37313.19	-31965.41	-21711.25	-37312.51	31965.39	21711.04	0.001%
5	43383.02	-32171.41	-92.26	-43381.73	32171.32	93.21	0.003%
6	38449.41	-32382.29	22235.79	-38448.21	32382.19	-22234.92	0.003%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
7	21626.68	-32231.95	37762.96	-21624.97	32231.82	-37761.77	0.004%
8	-86.54	-32072.84	43290.40	86.79	32072.80	-43289.30	0.002%
9	-21758.58	-32254.49	37799.29	21757.50	32254.41	-37798.60	0.002%
10	-38476.06	-32422.49	22382.63	38474.32	32422.34	-22381.48	0.004%
11	-43354.44	-32216.49	83.52	43352.50	32216.36	-82.19	0.004%
12	-37242.86	-32005.61	-21570.72	37241.81	32005.57	21570.11	0.002%
13	-21648.41	-32155.95	-37750.41	21648.35	32155.82	37748.15	0.004%
14	0.00	-157763.44	0.00	-0.55	157763.42	3.49	0.002%
15	9.35	-157936.69	-19466.64	-9.49	157936.63	19463.82	0.002%
16	9631.69	-157678.12	-16736.14	-9632.02	157678.08	16732.75	0.002%
17	16616.37	-157438.69	-9646.72	-16613.07	157438.65	9647.65	0.002%
18	19219.20	-157731.61	-10.30	-19216.94	157731.55	12.51	0.002%
19	16772.16	-158031.40	9725.87	-16770.16	158031.33	-9724.38	0.002%
20	9624.66	-157816.93	16750.49	-9623.25	157816.89	-16749.70	0.001%
21	-2.91	-157590.21	19291.84	2.96	157590.17	-19289.50	0.001%
22	-9626.53	-157848.77	16731.32	9625.14	157848.74	-16730.62	0.001%
23	-16760.66	-158088.21	9730.03	16758.56	158088.15	-9728.59	0.002%
24	-19212.46	-157795.29	8.24	19211.32	157795.26	-7.16	0.001%
25	-16617.55	-157495.50	-9644.05	16616.03	157495.48	9644.51	0.001%
26	-9629.79	-157709.97	-16747.53	9629.88	157709.94	16745.81	0.001%
27	27.22	-27272.63	-10681.54	-27.31	27272.62	10680.64	0.003%
28	5208.42	-27229.19	-9043.92	-5207.48	27229.18	9041.79	0.008%
29	8922.81	-27189.02	-5191.87	-8920.75	27189.00	5190.89	0.008%
30	10374.30	-27238.28	-22.06	-10373.57	27238.27	22.33	0.003%
31	9194.51	-27288.70	5317.30	-9193.80	27288.70	-5316.53	0.004%
32	5171.65	-27252.75	9030.36	-5171.23	27252.75	-9029.22	0.004%
33	-20.69	-27214.71	10352.15	20.71	27214.70	-10350.78	0.005%
34	-5203.19	-27258.14	9039.05	5202.77	27258.14	-9037.95	0.004%
35	-9200.88	-27298.32	5352.42	9200.10	27298.31	-5351.70	0.004%
36	-10367.47	-27249.06	19.97	10366.64	27249.05	-19.81	0.003%
37	-8905.99	-27198.63	-5158.27	8903.42	27198.62	5157.03	0.010%
38	-5176.84	-27234.58	-9027.36	5176.40	27234.57	9026.60	0.003%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	10	0.00000001	0.00005587
2	Yes	18	0.00000001	0.00006294
3	Yes	17	0.00000001	0.00008522
4	Yes	13	0.00000001	0.00004369
5	Yes	18	0.00000001	0.00006668
6	Yes	19	0.00000001	0.00005351
7	Yes	18	0.00000001	0.00008029
8	Yes	14	0.00000001	0.00006733
9	Yes	19	0.00000001	0.00004922
10	Yes	19	0.00000001	0.00006927
11	Yes	18	0.00000001	0.00008914
12	Yes	13	0.00000001	0.00006907
13	Yes	17	0.00000001	0.00009124
14	Yes	12	0.00010000	0.00006029
15	Yes	15	0.00010000	0.00009110
16	Yes	14	0.00010000	0.00009730
17	Yes	13	0.00010000	0.00006855
18	Yes	15	0.00010000	0.00009844
19	Yes	16	0.00010000	0.00008242

20	Yes	16	0.00000001	0.00005543
21	Yes	14	0.00000001	0.00004369
22	Yes	16	0.00000001	0.00004789
23	Yes	16	0.00010000	0.00007904
24	Yes	16	0.00000001	0.00004971
25	Yes	14	0.00000001	0.00002521
26	Yes	15	0.00010000	0.00005860
27	Yes	10	0.00000001	0.00005608
28	Yes	9	0.00000001	0.00009389
29	Yes	9	0.00000001	0.00007236
30	Yes	10	0.00000001	0.00004242
31	Yes	10	0.00000001	0.00006388
32	Yes	10	0.00000001	0.00005659
33	Yes	10	0.00000001	0.00005090
34	Yes	10	0.00000001	0.00005334
35	Yes	10	0.00000001	0.00006574
36	Yes	10	0.00000001	0.00004265
37	Yes	9	0.00000001	0.00008789
38	Yes	10	0.00000001	0.00004460

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 155	1.556	33	0.1131	0.0063
T2	155 - 140	1.233	33	0.0953	0.0068
T3	140 - 132.5	1.050	33	0.0335	0.0087
T4	132.5 - 130	1.022	33	0.0126	0.0090
T5	130 - 120	1.034	33	0.0191	0.0094
T6	120 - 100	1.070	33	0.0226	0.0116
T7	100 - 85	1.071	33	0.0134	0.0246
T8	85 - 80	0.993	33	0.0294	0.0342
T9	80 - 60	0.960	33	0.0359	0.0369
T10	60 - 40	0.751	33	0.0574	0.0453
T11	40 - 20	0.517	33	0.0506	0.0446
T12	20 - 5	0.307	33	0.0612	0.0341
T13	5 - 0	0.080	33	0.0748	0.0215

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
175.00	DS4C03F36U-D 8' Omni	33	1.556	0.1131	0.0063	41035
170.00	TTA 432-83H-01T	33	1.556	0.1131	0.0063	41035
168.00	Pirod 4' Side Mount Standoff (1)	33	1.508	0.1120	0.0062	41035
167.00	RFS SC2-W100BC	33	1.485	0.1114	0.0062	41035
163.00	Pirod 12' T-Frame Sector Mount (1)	33	1.393	0.1084	0.0063	29311
152.33	Guy	33	1.189	0.0876	0.0071	15225
140.00	Pirod 12' T-Frame Sector Mount (1)	33	1.050	0.0335	0.0087	17219
132.50	Guy	33	1.022	0.0126	0.0090	8028
120.00	QS66512-2 Panel Antenna	33	1.070	0.0226	0.0116	66412
87.46	Guy	33	1.008	0.0264	0.0328	214309
50.00	(2) GPS	33	0.629	0.0550	0.0462	128132

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
47.56	Guy	33	0.601	0.0536	0.0461	97312

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 155	9.178	10	0.5411	0.0618
T2	155 - 140	7.805	10	0.4658	0.0637
T3	140 - 132.5	7.055	10	0.1902	0.0682
T4	132.5 - 130	6.976	10	0.0971	0.0676
T5	130 - 120	7.053	10	0.1060	0.0689
T6	120 - 100	7.331	10	0.1253	0.0759
T7	100 - 85	7.649	10	0.0584	0.1251
T8	85 - 80	7.416	10	0.1342	0.1547
T9	80 - 60	7.258	10	0.1879	0.1626
T10	60 - 40	5.995	10	0.3900	0.1790
T11	40 - 20	4.257	10	0.4179	0.1792
T12	20 - 5	2.404	10	0.5018	0.1420
T13	5 - 0	0.618	10	0.5791	0.0788

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
175.00	DS4C03F36U-D 8' Omni	10	9.178	0.5411	0.0618	9754
170.00	TTA 432-83H-01T	10	9.178	0.5411	0.0618	9754
168.00	Pirod 4' Side Mount Standoff (1)	10	8.978	0.5381	0.0618	9754
167.00	RFS SC2-W100BC	10	8.878	0.5364	0.0619	9754
163.00	Pirod 12' T-Frame Sector Mount (1)	10	8.488	0.5256	0.0621	6967
152.33	Guy	10	7.622	0.4286	0.0647	3529
140.00	Pirod 12' T-Frame Sector Mount (1)	10	7.055	0.1902	0.0682	3612
132.50	Guy	10	6.976	0.0971	0.0676	1750
120.00	QS66512-2 Panel Antenna	10	7.331	0.1253	0.0759	39033
87.46	Guy	10	7.479	0.1182	0.1507	8699
50.00	(2) GPS	10	5.142	0.4140	0.1821	36649
47.56	Guy	10	4.926	0.4144	0.1822	25741

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	170	Diagonal	A325N	0.5000	1	2476.89	4132.50	0.599 ✔	1	Member Bearing
		Top Girt	A325N	0.5000	1	29.74	4132.50	0.007 ✔	1	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
		Bottom Girt	A325N	0.5000	1	869.77	4132.50	0.210 ✔	1	Member Bearing
T2	155	Leg	A325N	0.7500	4	3689.08	29820.60	0.124 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	3404.81	7952.16	0.428 ✔	1	Bolt Shear
		Secondary Horizontal	A325N	0.5000	1	1229.20	7952.16	0.155 ✔	1	Bolt Shear
		Top Girt	A325N	0.5000	1	359.81	4132.50	0.087 ✔	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	646.43	4132.50	0.156 ✔	1	Member Bearing
		Top Guy Pull-Off@152.333	A325N	0.7500	1	3883.50	6932.81	0.560 ✔	1	Member Block Shear
		Torque Arm Top@152.333	A325N	0.7500	8	512.65	17892.40	0.029 ✔	1	Bolt Shear
T3	140	Leg	A325N	0.7500	4	5090.49	29820.60	0.171 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	5011.37	7612.50	0.658 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.5000	1	2676.96	7612.50	0.352 ✔	1	Member Block Shear
		Top Girt	A325N	0.5000	1	1248.60	3126.56	0.399 ✔	1	Member Block Shear
T4	132.5	Diagonal	A325N	0.6250	1	5434.59	9107.81	0.597 ✔	1	Member Block Shear
		Secondary Horizontal	A325N	0.5000	1	1918.42	7612.50	0.252 ✔	1	Member Block Shear
		Torque Arm Top@132.5	A325N	0.7500	8	1693.01	17892.40	0.095 ✔	1	Bolt Shear
T5	130	Diagonal	A325N	0.5000	1	5746.88	7952.16	0.723 ✔	1	Bolt Shear
		Secondary Horizontal	A325N	0.5000	1	1944.60	7612.50	0.255 ✔	1	Member Block Shear
T6	120	Leg	A325N	0.7500	4	4613.18	29820.60	0.155 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	1273.00	5220.00	0.244 ✔	1	Member Bearing
		Top Girt	A325N	0.6250	1	1247.53	5220.00	0.239 ✔	1	Member Bearing
		Bottom Girt	A325N	0.6250	1	602.54	5220.00	0.115 ✔	1	Member Bearing
T7	100	Leg	A325N	0.7500	4	5016.75	29820.60	0.168 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1208.14	4132.50	0.292 ✔	1	Member Bearing
		Top Girt	A325N	0.5000	1	689.45	4132.50	0.167 ✔	1	Member Bearing
T8	85	Diagonal	A325N	0.5000	1	2128.80	6960.00	0.306 ✔	1	Member Bearing
		Secondary Horizontal	A325N	0.5000	1	1887.40	7952.16	0.237 ✔	1	Bolt Shear
T9	80	Leg	A325N	0.7500	4	5732.96	29820.60	0.192 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2037.38	6960.00	0.293 ✔	1	Member Bearing
		Secondary Horizontal	A325N	0.5000	1	1518.48	6198.75	0.245 ✔	1	Member Bearing
		Top Girt	A325N	0.5000	1	1110.04	6198.75	0.179 ✔	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	595.48	6198.75	0.096 ✔	1	Member Bearing
T10	60	Leg	A325N	0.7500	4	5854.96	29820.60	0.196 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1885.21	4132.50	0.456 ✔	1	Member Bearing
		Top Girt	A325N	0.5000	1	801.58	4132.50	0.194 ✔	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	768.25	4132.50	0.186 ✔	1	Member Bearing

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T11	40	Leg	A325N	0.7500	4	6437.16	29820.60	0.216 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2021.97	4132.50	0.489 ✔	1	Member Bearing
		Horizontal	A325N	0.5000	1	1435.72	7952.16	0.181 ✔	1	Bolt Shear
		Top Girt	A325N	0.5000	1	682.46	4132.50	0.165 ✔	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	473.79	4132.50	0.115 ✔	1	Member Bearing
T12	20	Leg	A325N	0.7500	4	6972.79	29820.60	0.234 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1945.67	4132.50	0.471 ✔	1	Member Bearing
		Horizontal	A325N	0.5000	1	1440.33	7952.16	0.181 ✔	1	Bolt Shear
		Top Girt	A325N	0.5000	1	535.22	4132.50	0.130 ✔	1	Member Bearing
		Bottom Girt	A490N	0.6250	1	10421.60	15531.60	0.671 ✔	1	Bolt Shear
T13	5	Leg	A490N	0.7500	3	9280.98	37441.40	0.248 ✔	1	Bolt Tension

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T_u lb	Allowable ϕT_n lb	Required S.F.	Actual S.F.
T2	152.33 (A) (576)	1/2 EHS	2690.00	26900.04	8777.97	16140.00	1.000	1.839 ✔
	152.33 (A) (577)	1/2 EHS	2690.00	26900.04	8762.37	16140.00	1.000	1.842 ✔
	152.33 (B) (572)	1/2 EHS	2690.00	26900.04	8538.97	16140.00	1.000	1.890 ✔
	152.33 (B) (573)	1/2 EHS	2690.00	26900.04	8556.70	16140.00	1.000	1.886 ✔
	152.33 (C) (565)	1/2 EHS	2690.00	26900.04	8317.69	16140.00	1.000	1.940 ✔
	152.33 (C) (566)	1/2 EHS	2690.00	26900.04	8319.09	16140.00	1.000	1.940 ✔
T4	132.50 (A) (588)	7/8 EHS	7970.00	79699.84	20375.90	47820.00	1.000	2.347 ✔
	132.50 (A) (589)	7/8 EHS	7970.00	79699.84	20334.70	47820.00	1.000	2.352 ✔
	132.50 (B) (584)	7/8 EHS	7970.00	79699.84	19331.40	47820.00	1.000	2.474 ✔
	132.50 (B) (585)	7/8 EHS	7970.00	79699.84	19719.10	47820.00	1.000	2.425 ✔
	132.50 (C) (580)	7/8 EHS	7970.00	79699.84	19204.70	47820.00	1.000	2.490 ✔
	132.50 (C) (581)	7/8 EHS	7970.00	79699.84	18946.50	47820.00	1.000	2.524 ✔
T7	87.46 (A) (597)	1/2 EHS	2690.00	26900.04	9570.44	16140.00	1.000	1.686 ✔
	87.46 (B) (596)	1/2 EHS	2690.00	26900.04	9220.09	16140.00	1.000	1.751 ✔
	87.46 (C) (592)	1/2 EHS	2690.00	26900.04	8981.50	16140.00	1.000	1.797 ✔
T10	47.56 (A) (603)	9/16 EHS	3500.00	35000.04	13280.10	21000.00	1.000	1.581 ✔

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T_u lb	Allowable ϕT_n lb	Required S.F.	Actual S.F.
	47.56 (B) (602)	9/16 EHS	3500.00	35000.04	12701.40	21000.00	1.000	1.653 ✔
	47.56 (C) (598)	9/16 EHS	3500.00	35000.04	12343.10	21000.00	1.000	1.701 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	Mast Stability Index	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	ROHN 2 STD	15.00	2.42	36.8 K=1.00	1.0745	1.00	-18065.40	43785.30	0.413 [1] ✔
T2	155 - 140	ROHN 2 STD	15.00	1.21	18.4 K=1.00	1.0745	1.00	-34663.60	47168.90	0.735 [1] ✔
T3	140 - 132.5	Offset SR1 Welded to Leg	7.50	1.24	23.9 K=1.00	1.8599	1.00	-54381.60	74091.40	0.734 [1] ✔
T4	132.5 - 130	Offset SR1 Welded to Leg	2.50	1.21	23.4 K=1.00	1.8599	0.98	-56658.80	73016.20	0.776 [1] ✔
T5	130 - 120	Offset SR1 Welded to Leg	10.00	1.24	24.0 K=1.00	1.8599	0.97	-49540.90	71676.80	0.691 [1] ✔
T6	120 - 100	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	20.00	2.46	31.4 K=1.00	2.4049	0.99	-60193.80	92564.80	0.650 [1] ✔
T7	100 - 85	ROHN 2.5 STD	15.00	2.46	31.1 K=1.00	1.7040	0.99	-65486.10	70843.50	0.924 [1] ✔
T8	85 - 80	ROHN 2.5 STD	5.00	1.19	7.5 K=0.50	1.7040	0.95	-68788.70	72366.30	0.951 [1] ✔
T9	80 - 60	ROHN 2 STD w/ 1/3rd pipe	20.00	1.22	19.4 K=1.00	1.8149	0.97	-70250.20	76845.50	0.914 [1] ✔
T10	60 - 40	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	20.00	2.44	32.2 K=1.00	3.2655	1.00	-77234.90	126076.00	0.613 [1] ✔
T11	40 - 20	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	20.00	2.44	32.2 K=1.00	3.2655	0.99	-83665.50	124669.00	0.671 [1] ✔
T12	20 - 5	ROHN 2.5 EH	15.00	2.42	31.4 K=1.00	2.2535	0.98	-83673.50	92888.40	0.901 [1] ✔
T13	5 - 0	T-Plate Welded to ROHN 2.5 EH (Callahan Acres MODification)	5.38	1.88	57.0 K=2.00	3.2394	1.00	-89999.90	114972.00	0.783 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5x16GA	4.19	1.97	46.5 K=1.00	0.2823	-2524.43	8159.74	0.309 [1] ✔
T2	155 - 140	ROHN 1.5 STD	4.19	1.97	38.0 K=1.00	0.7995	-3404.81	24004.30	0.142 [1] ✔
T3	140 - 132.5	L1 3/4x1 3/4x1/4	4.22	1.99	69.9 K=1.00	0.8125	-5103.29	20357.20	0.251 [1] ✔
T4	132.5 - 130	L2x2x1/4	4.19	1.97	60.5 K=1.00	0.9380	-6749.98	25058.00	0.269 [1] ✔
T5	130 - 120	L1 3/4x1 3/4x1/4	4.22	1.99	69.9 K=1.00	0.8125	-5746.88	20347.10	0.282 [1] ✔
T6	120 - 100	P1.5x16GA	4.21	1.95	46.0 K=1.00	0.2823	-1645.72	8180.75	0.201 [1] ✔
T7	100 - 85	P1.5x16GA	4.21	1.96	46.2 K=1.00	0.2823	-1501.43	8173.15	0.184 [1] ✔
T8	85 - 80	P1.5x16GA	4.16	1.94	45.7 K=1.00	0.2823	-2128.80	8194.03	0.260 [1] ✔
T9	80 - 60	P1.5x16GA	4.20	1.96	46.3 K=1.00	0.2823	-2037.38	8167.69	0.249 [1] ✔
T10	60 - 40	P1.5x16GA	4.20	1.94	45.9 K=1.00	0.2823	-1921.57	8185.90	0.235 [1] ✔
T11	40 - 20	P1.5x16GA	4.20	3.89	91.8 K=1.00	0.2823	-2813.33	5871.06	0.479 [1] ✔
T12	20 - 5	P1.5x16GA	4.19	3.89	91.9 K=1.00	0.2823	-2848.54	5864.69	0.486 [1] ✔

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T11	40 - 20	1	3.42	3.17	152.0 K=1.00	0.7854	-1435.72	7676.07	0.187 [1] ✔
T12	20 - 5	1	3.42	3.18	152.7 K=1.00	0.7854	-1440.33	7613.41	0.189 [1] ✔

[1] $P_u / \phi P_n$ controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	1	3.42	3.22	154.7 K=1.00	0.7854	-951.67	7417.78	0.128 [1] ✔
T3	140 - 132.5	L1 3/4x1 3/4x1/4	3.42	3.22	73.1 K=1.00	0.8125	-1432.55	19866.90	0.072 [1] ✔
T4	132.5 - 130	L1 3/4x1 3/4x1/4	3.42	3.22	73.1 K=1.00	0.8125	-981.36	19866.90	0.049 [1] ✔
T5	130 - 120	L1 3/4x1 3/4x1/4	3.42	3.22	73.1 K=1.00	0.8125	-847.70	19866.90	0.043 [1] ✔
T8	85 - 80	1	3.42	3.18	152.7 K=1.00	0.7854	-1168.12	7613.41	0.153 [1] ✔
T9	80 - 60	L2 1/2x2 1/2x3/16	3.42	3.20	49.3 K=1.00	0.9020	-1211.11	25709.00	0.047 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5x16GA	3.42	3.22	76.0 K=1.00	0.2823	-41.83	6746.92	0.006 [1] ✔
T3	140 - 132.5	L1 1/2x1 1/2x1/8	3.42	3.22	130.5 K=1.00	0.3594	-906.42	4747.60	0.191 [1] ✔
T6	120 - 100	P1.5x16GA	3.42	3.17	74.7 K=1.00	0.2823	-223.55	6816.53	0.033 [1] ✔
T11	40 - 20	P1.5x16GA	3.42	3.17	74.7 K=1.00	0.2823	-434.00	6816.32	0.064 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5x16GA	3.42	3.22	76.0 K=1.00	0.2823	-752.11	6746.92	0.111 [1] ✔
T2	155 - 140	P1.5x16GA	3.42	3.22	76.0 K=1.00	0.2823	-253.15	6746.92	0.038 [1] ✔
T5	130 - 120	P1.5x16GA	3.42	3.22	76.0 K=1.00	0.2823	-410.11	6746.92	0.061 [1] ✔
T10	60 - 40	P1.5x16GA	3.42	3.17	74.7 K=1.00	0.2823	-21.20	6816.32	0.003 [1] ✔
T13	5 - 0	14x3/16	0.51	0.27	3.8 K=1.00	42.0000	-5067.26	1359770.00	0.004 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	L2x2x3/16	3.42	3.22	98.1 K=1.00	0.7150	-2940.64	13953.10	0.211 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T2	155 - 140	L2x2x3/16	0.00	1301.02	0.000	0.00	664.35	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140	L2x2x3/16	0.211	0.000	0.000	0.211 [1] ✔	1.000	4.8.1 ✔

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140 (567)	C12x20.7	3.50	3.40	51.1 K=1.00	6.0900	-1022.51	171988.00	0.006
T2	155 - 140 (568)	C12x20.7	3.50	3.40	51.1 K=1.00	6.0900	-1003.32	171988.00	0.006
T2	155 - 140 (574)	C12x20.7	3.50	3.40	51.1 K=1.00	6.0900	-976.25	171988.00	0.006
T2	155 - 140 (575)	C12x20.7	3.50	3.40	51.1	6.0900	-984.91	171988.00	0.006

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140 (578)	C12x20.7	3.50	3.40	K=1.00 51.1	6.0900	-977.20	171988.00	0.006
T2	155 - 140 (579)	C12x20.7	3.50	3.40	K=1.00 51.1	6.0900	-961.73	171988.00	0.006
T4	132.5 - 130 (582)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	K=1.00 61.6	9.0900	-4191.38	241128.00	0.017
T4	132.5 - 130 (583)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	K=1.00 61.6	9.0900	-4485.16	241128.00	0.019
T4	132.5 - 130 (586)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	K=1.00 61.6	9.0900	-4039.30	241128.00	0.017
T4	132.5 - 130 (587)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	K=1.00 61.6	9.0900	-4166.61	241128.00	0.017
T4	132.5 - 130 (590)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	K=1.00 61.6	9.0900	-4234.94	241128.00	0.018
T4	132.5 - 130 (591)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	K=1.00 61.6	9.0900	-4396.57	241128.00	0.018

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T2	155 - 140 (567)	C12x20.7	-20646.08	68355.42	0.302	-0.00	7006.50	0.000
T2	155 - 140 (568)	C12x20.7	-21687.42	68355.42	0.317	0.00	7006.50	0.000
T2	155 - 140 (574)	C12x20.7	-21040.75	68355.42	0.308	0.00	7006.50	0.000
T2	155 - 140 (575)	C12x20.7	-20631.33	68355.42	0.302	-0.00	7006.50	0.000
T2	155 - 140 (578)	C12x20.7	-21071.17	68355.42	0.308	-0.00	7006.50	0.000
T2	155 - 140 (579)	C12x20.7	-21701.00	68355.42	0.317	0.00	7006.50	0.000
T4	132.5 - 130 (582)	C12x20.7 w/ 8"x3/8" plate	-48836.75	97875.00	0.499	0.00	6916.18	0.000
T4	132.5 - 130 (583)	C12x20.7 w/ 8"x3/8" plate	-54127.83	97875.00	0.553	-0.00	6916.18	0.000
T4	132.5 - 130 (586)	C12x20.7 w/ 8"x3/8" plate	-48803.25	97875.00	0.499	-0.00	6916.18	0.000
T4	132.5 - 130 (587)	C12x20.7 w/ 8"x3/8" plate	-50898.25	97875.00	0.520	0.00	6916.18	0.000
T4	132.5 - 130 (590)	C12x20.7 w/ 8"x3/8" plate	-50962.50	97875.00	0.521	-0.00	6916.18	0.000
T4	132.5 - 130 (591)	C12x20.7 w/ 8"x3/8" plate	-54156.25	97875.00	0.553	0.00	6916.18	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140 (567)	C12x20.7	0.006	0.302	0.000	0.305 ✔	1.000	4.8.1 ✔
T2	155 - 140 (568)	C12x20.7	0.006	0.317	0.000	0.320 ✔	1.000	4.8.1 ✔

Section No.	Elevation ft	Size	Ratio $P_u / \phi P_n$	Ratio $M_{ux} / \phi M_{nx}$	Ratio $M_{uy} / \phi M_{ny}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140 (574)	C12x20.7	0.006	0.308	0.000	0.311 ✔	1.000	4.8.1 ✔
T2	155 - 140 (575)	C12x20.7	0.006	0.302	0.000	0.305 ✔	1.000	4.8.1 ✔
T2	155 - 140 (578)	C12x20.7	0.006	0.308	0.000	0.311 ✔	1.000	4.8.1 ✔
T2	155 - 140 (579)	C12x20.7	0.006	0.317	0.000	0.320 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (582)	C12x20.7 w/ 8"x3/8" plate	0.017	0.499	0.000	0.508 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (583)	C12x20.7 w/ 8"x3/8" plate	0.019	0.553	0.000	0.562 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (586)	C12x20.7 w/ 8"x3/8" plate	0.017	0.499	0.000	0.507 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (587)	C12x20.7 w/ 8"x3/8" plate	0.017	0.520	0.000	0.529 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (590)	C12x20.7 w/ 8"x3/8" plate	0.018	0.521	0.000	0.529 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (591)	C12x20.7 w/ 8"x3/8" plate	0.018	0.553	0.000	0.562 ✔	1.000	4.8.1 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $P_u / \phi P_n$
T1	170 - 155	ROHN 2 STD	15.00	2.42	36.8	1.0745	14758.40	48353.90	0.305 [1] ✔
T2	155 - 140	ROHN 2 STD	15.00	1.21	18.4	1.0745	17309.80	48353.90	0.358 [1] ✔
T3	140 - 132.5	Offset SR1 Welded to Leg	7.50	1.24	23.9	1.8599	33349.90	77000.30	0.433 [1] ✔
T4	132.5 - 130	Offset SR1 Welded to Leg	2.50	1.21	23.4	1.8599	3949.84	77000.30	0.051 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $P_u / \phi P_n$
T1	170 - 155	P1.5x16GA	4.19	1.97	46.5	0.2823	2476.89	9144.98	0.271 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	ROHN 1.5 STD	4.19	1.97	38.0	0.7995	3054.49	25902.40	0.118 [1]
T3	140 - 132.5	L1 3/4x1 3/4x1/4	4.22	1.99	45.1	0.4922	5011.37	21410.20	0.234 [1]
T4	132.5 - 130	L2x2x1/4	4.19	1.97	38.9	0.5629	5434.59	24485.10	0.222 [1]
T5	130 - 120	L1 3/4x1 3/4x1/4	4.22	1.99	45.2	0.4922	4543.34	21410.20	0.212 [1]
T6	120 - 100	P1.5x16GA	4.21	1.95	46.0	0.2823	1273.00	9144.98	0.139 [1]
T7	100 - 85	P1.5x16GA	4.21	1.96	46.2	0.2823	1208.14	9144.98	0.132 [1]
T8	85 - 80	P1.5x16GA	4.16	1.94	45.7	0.2823	714.11	9144.98	0.078 [1]
T9	80 - 60	P1.5x16GA	4.20	1.96	46.3	0.2823	727.60	9144.98	0.080 [1]
T10	60 - 40	P1.5x16GA	4.20	1.94	45.9	0.2823	1885.21	9144.98	0.206 [1]
T11	40 - 20	P1.5x16GA	4.20	3.89	91.8	0.2823	2021.97	9144.98	0.221 [1]
T12	20 - 5	P1.5x16GA	4.19	3.89	91.9	0.2823	1945.67	9144.98	0.213 [1]

[1] $P_u / \phi P_n$ controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T11	40 - 20	1	3.42	3.17	152.0	0.7854	1435.72	25446.90	0.056 [1]
T12	20 - 5	1	3.42	3.18	152.7	0.7854	1440.33	25446.90	0.057 [1]

[1] $P_u / \phi P_n$ controls

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	1	3.42	3.22	154.7	0.7854	1229.20	25446.90	0.048 [1]
T3	140 - 132.5	L1 3/4x1 3/4x1/4	3.42	3.22	73.1	0.4922	2676.96	21410.20	0.125 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T4	132.5 - 130	L1 3/4x1 3/4x1/4	3.42	3.22	73.1	0.4922	1918.42	21410.20	0.090 [1]
T5	130 - 120	L1 3/4x1 3/4x1/4	3.42	3.22	73.1	0.4922	1944.60	21410.20	0.091 [1]
T8	85 - 80	1	3.42	3.18	152.7	0.7854	1887.40	25446.90	0.074 [1]
T9	80 - 60	L2 1/2x2 1/2x3/16	3.42	3.20	49.3	0.5886	1518.48	25604.50	0.059 [1]

[1] $P_u / \phi P_n$ controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5x16GA	3.42	3.22	76.0	0.2823	29.74	9144.98	0.003 [1]
T2	155 - 140	P1.5x16GA	3.42	3.22	76.0	0.2823	359.81	9144.98	0.039 [1]
T3	140 - 132.5	L1 1/2x1 1/2x1/8	3.42	3.22	83.1	0.2109	1248.60	9175.78	0.136 [1]
T6	120 - 100	P1.5x16GA	3.42	3.17	74.7	0.2823	1247.53	9144.98	0.136 [1]
T7	100 - 85	P1.5x16GA	3.42	3.18	75.0	0.2823	689.45	9144.98	0.075 [1]
T9	80 - 60	L2 1/2x2 1/2x3/16	3.42	3.20	49.3	0.5886	1110.04	25604.50	0.043 [1]
T10	60 - 40	P1.5x16GA	3.42	3.17	74.7	0.2823	801.58	9144.98	0.088 [1]
T11	40 - 20	P1.5x16GA	3.42	3.17	74.7	0.2823	682.46	9144.98	0.075 [1]
T12	20 - 5	P1.5x16GA	3.42	3.18	75.0	0.2823	535.22	9144.98	0.059 [1]
T13	5 - 0	14x3/16	2.91	2.67	37.0	42.0000	8782.72	1360800.00	0.006 [1]

[1] $P_u / \phi P_n$ controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	170 - 155	P1.5x16GA	3.42	3.22	76.0	0.2823	869.77	9144.98	0.095 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	P1.5x16GA	3.42	3.22	76.0	0.2823	646.43	9144.98	0.071 [1]
T5	130 - 120	P1.5x16GA	3.42	3.22	76.0	0.2823	1170.43	9144.98	0.128 [1]
T6	120 - 100	P1.5x16GA	3.42	3.17	74.7	0.2823	602.54	9144.98	0.066 [1]
T8	85 - 80	P1.5x16GA	3.42	3.18	75.0	0.2823	829.96	9144.98	0.091 [1]
T9	80 - 60	L2 1/2x2 1/2x3/16	3.42	3.20	49.3	0.5886	595.48	25604.50	0.023 [1]
T10	60 - 40	P1.5x16GA	3.42	3.17	74.7	0.2823	768.25	9144.98	0.084 [1]
T11	40 - 20	P1.5x16GA	3.42	3.17	74.7	0.2823	473.79	9144.98	0.052 [1]
T12	20 - 5	ROHN 1.5 SCH XS (Extra Strong)	3.42	3.18	63.1	1.0681	10421.60	34607.80	0.301 [1]
T13	5 - 0	14x3/16	0.51	0.27	3.8	42.0000	1298.44	1360800.00	0.001 [1]

[1] P_u / ϕP_n controls

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T13	5 - 0	14x3/16	1.71	1.47	20.4	42.0000	75.43	1360800.00	0.000 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140	L2x2x3/16	3.42	3.22	62.7	0.7150	3883.50	23166.00	0.168 [1]
T7	100 - 85	2x1/2	3.42	3.18	264.4	1.0000	4397.39	45000.00	0.098 [1]
T10	60 - 40	2x1/2	3.42	3.17	263.3	1.0000	5674.17	45000.00	0.126 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T2	155 - 140	L2x2x3/16	0.00	1301.02	0.000	0.00	664.35	0.000
T7	100 - 85	2x1/2	0.00	1875.00	0.000	0.00	468.75	0.000
T10	60 - 40	2x1/2	0.00	1875.00	0.000	0.00	468.75	0.000

Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140	L2x2x3/16	0.168	0.000	0.000	0.168 [1] ✔	1.000	4.8.1 ✔
T7	100 - 85	2x1/2	0.098	0.000	0.000	0.098 [1] ✔	1.000	4.8.1 ✔
T10	60 - 40	2x1/2	0.126	0.000	0.000	0.126 [1] ✔	1.000	4.8.1 ✔

[1] $P_u / \phi P_n$ controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T2	155 - 140 (567)	C12x20.7	3.50	3.40	51.1	6.0900	656.38	197316.00	0.003
T2	155 - 140 (568)	C12x20.7	3.50	3.40	51.1	6.0900	821.12	197316.00	0.004
T2	155 - 140 (574)	C12x20.7	3.50	3.40	51.1	6.0900	779.76	197316.00	0.004
T2	155 - 140 (575)	C12x20.7	3.50	3.40	51.1	6.0900	741.33	197316.00	0.004
T2	155 - 140 (578)	C12x20.7	3.50	3.40	51.1	6.0900	682.08	197316.00	0.003
T2	155 - 140 (579)	C12x20.7	3.50	3.40	51.1	6.0900	813.81	197316.00	0.004
T4	132.5 - 130 (582)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	61.6	9.0900	5078.91	294516.00	0.017
T4	132.5 - 130 (583)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	61.6	9.0900	5025.40	294516.00	0.017
T4	132.5 - 130 (586)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	61.6	9.0900	169.97	294516.00	0.001
T4	132.5 - 130 (587)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	61.6	9.0900	93.35	294516.00	0.000
T4	132.5 - 130 (590)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	61.6	9.0900	931.85	294516.00	0.003
T4	132.5 - 130 (591)	C12x20.7 w/ 8"x3/8" plate	3.50	3.40	61.6	9.0900	5001.95	294516.00	0.017

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
T2	155 - 140 (567)	C12x20.7	-24781.00	68355.42	0.363	-0.00	7006.50	0.000
T2	155 - 140 (568)	C12x20.7	-26813.67	68355.42	0.392	0.00	7006.50	0.000
T2	155 - 140 (574)	C12x20.7	-25784.00	68355.42	0.377	0.00	7006.50	0.000
T2	155 - 140 (575)	C12x20.7	-24762.17	68355.42	0.362	-0.00	7006.50	0.000
T2	155 - 140 (578)	C12x20.7	-25828.92	68355.42	0.378	0.00	7006.50	0.000
T2	155 - 140 (579)	C12x20.7	-26838.83	68355.42	0.393	0.00	7006.50	0.000
T4	132.5 - 130 (582)	C12x20.7 w/ 8"x3/8" plate	-40123.08	97875.00	0.410	-0.00	6916.18	0.000
T4	132.5 - 130 (583)	C12x20.7 w/ 8"x3/8" plate	-46010.67	97875.00	0.470	-0.00	6916.18	0.000
T4	132.5 - 130 (586)	C12x20.7 w/ 8"x3/8" plate	-47932.92	97875.00	0.490	-0.00	6916.18	0.000
T4	132.5 - 130 (587)	C12x20.7 w/ 8"x3/8" plate	-50274.50	97875.00	0.514	0.00	6916.18	0.000
T4	132.5 - 130 (590)	C12x20.7 w/ 8"x3/8" plate	-42740.25	97875.00	0.437	-0.00	6916.18	0.000
T4	132.5 - 130 (591)	C12x20.7 w/ 8"x3/8" plate	-45869.00	97875.00	0.469	0.00	6916.18	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T2	155 - 140 (567)	C12x20.7	0.003	0.363	0.000	0.364 ✔	1.000	4.8.1 ✔
T2	155 - 140 (568)	C12x20.7	0.004	0.392	0.000	0.394 ✔	1.000	4.8.1 ✔
T2	155 - 140 (574)	C12x20.7	0.004	0.377	0.000	0.379 ✔	1.000	4.8.1 ✔
T2	155 - 140 (575)	C12x20.7	0.004	0.362	0.000	0.364 ✔	1.000	4.8.1 ✔
T2	155 - 140 (578)	C12x20.7	0.003	0.378	0.000	0.380 ✔	1.000	4.8.1 ✔
T2	155 - 140 (579)	C12x20.7	0.004	0.393	0.000	0.395 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (582)	C12x20.7 w/ 8"x3/8" plate	0.017	0.410	0.000	0.419 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (583)	C12x20.7 w/ 8"x3/8" plate	0.017	0.470	0.000	0.479 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (586)	C12x20.7 w/ 8"x3/8" plate	0.001	0.490	0.000	0.490 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (587)	C12x20.7 w/ 8"x3/8" plate	0.000	0.514	0.000	0.514 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (590)	C12x20.7 w/ 8"x3/8" plate	0.003	0.437	0.000	0.438 ✔	1.000	4.8.1 ✔
T4	132.5 - 130 (591)	C12x20.7 w/ 8"x3/8" plate	0.017	0.469	0.000	0.477 ✔	1.000	4.8.1 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	170 - 155	Leg	ROHN 2 STD	1	-18065.40	43785.30	41.3	Pass
		Leg	ROHN 2 STD	2	-17913.10	43785.30	40.9	Pass
		Leg	ROHN 2 STD	3	-17909.90	43785.30	40.9	Pass
T2	155 - 140	Leg	ROHN 2 STD	46	-34477.00	47168.90	73.1	Pass
		Leg	ROHN 2 STD	47	-34555.90	47168.90	73.3	Pass
		Leg	ROHN 2 STD	48	-34663.60	47168.90	73.5	Pass
T3	140 - 132.5	Leg	Offset SR1 Welded to Leg	109	-54161.40	74091.40	73.1	Pass
		Leg	Offset SR1 Welded to Leg	110	-54024.20	74091.40	72.9	Pass
		Leg	Offset SR1 Welded to Leg	111	-54381.60	74091.40	73.4	Pass
T4	132.5 - 130	Leg	Offset SR1 Welded to Leg	142	-55810.80	73082.30	76.4	Pass
		Leg	Offset SR1 Welded to Leg	143	-55907.60	73048.40	76.5	Pass
		Leg	Offset SR1 Welded to Leg	144	-56658.80	73016.20	77.6	Pass
T5	130 - 120	Leg	Offset SR1 Welded to Leg	154	-48919.90	71651.50	68.3	Pass
		Leg	Offset SR1 Welded to Leg	155	-48290.90	71661.20	67.4	Pass
		Leg	Offset SR1 Welded to Leg	156	-49540.90	71676.80	69.1	Pass
T6	120 - 100	Leg	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	196	-59086.00	92555.80	63.8	Pass
		Leg	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	197	-57862.10	92561.70	62.5	Pass
		Leg	CAL Leg Mod - 1/3HSS3.5x0.25 welded on ROHN 2.5 STD Pipe	198	-60193.80	92564.80	65.0	Pass
T7	100 - 85	Leg	ROHN 2.5 STD	253	-64065.60	70836.50	90.4	Pass
		Leg	ROHN 2.5 STD	254	-63692.90	70841.10	89.9	Pass
		Leg	ROHN 2.5 STD	255	-65486.10	70843.50	92.4	Pass
T8	85 - 80	Leg	ROHN 2.5 STD	295	-67511.20	72323.90	93.3	Pass
		Leg	ROHN 2.5 STD	296	-67236.00	72349.90	92.9	Pass
		Leg	ROHN 2.5 STD	297	-68788.70	72366.30	95.1	Pass
T9	80 - 60	Leg	ROHN 2 STD w/ 1/3rd pipe	319	-69807.50	76832.50	90.9	Pass
		Leg	ROHN 2 STD w/ 1/3rd pipe	320	-70111.20	76843.30	91.2	Pass
		Leg	ROHN 2 STD w/ 1/3rd pipe	321	-70250.20	76845.50	91.4	Pass
T10	60 - 40	Leg	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	400	-76225.60	126076.00	60.5	Pass
		Leg	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	401	-77234.90	126076.00	61.3	Pass
		Leg	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	402	-77226.40	126076.00	61.3	Pass
T11	40 - 20	Leg	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	457	-82626.20	124661.00	66.3	Pass
		Leg	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	458	-83384.50	124664.00	66.9	Pass
		Leg	CAL Leg Mod - 1/3HSS3.5x0.300 welded on ROHN 2.5 STD Pipe	459	-83665.50	124669.00	67.1	Pass
T12	20 - 5	Leg	ROHN 2.5 EH	511	-82627.10	92879.30	89.0	Pass
		Leg	ROHN 2.5 EH	512	-83393.60	92883.20	89.8	Pass
		Leg	ROHN 2.5 EH	513	-83673.50	92888.40	90.1	Pass
T13	5 - 0	Leg	T-Plate Welded to ROHN 2.5 EH (Callahan Acres MODification)	553	-89227.10	114972.00	77.6	Pass
		Leg	T-Plate Welded to ROHN 2.5	554	-89817.20	114972.00	78.1	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Leg	EH (Callahan Acres MODification) T-Plate Welded to ROHN 2.5 EH (Callahan Acres MODification)	555	-89999.90	114972.00	78.3	Pass
T1	170 - 155	Diagonal	P1.5x16GA	10	-2515.02	8159.74	30.8 59.9 (b)	Pass
		Diagonal	P1.5x16GA	11	-2524.43	8159.74	30.9 59.6 (b)	Pass
		Diagonal	P1.5x16GA	12	-2388.38	8159.74	29.3 56.6 (b)	Pass
		Diagonal	P1.5x16GA	13	-2389.38	8159.74	29.3 56.6 (b)	Pass
		Diagonal	P1.5x16GA	14	-2513.76	8159.74	30.8 59.3 (b)	Pass
		Diagonal	P1.5x16GA	15	-2503.18	8159.74	30.7 59.7 (b)	Pass
		Diagonal	P1.5x16GA	16	-2104.50	8159.74	25.8 51.8 (b)	Pass
		Diagonal	P1.5x16GA	17	-2115.72	8159.74	25.9 51.6 (b)	Pass
		Diagonal	P1.5x16GA	18	-2005.94	8159.74	24.6 49.2 (b)	Pass
		Diagonal	P1.5x16GA	19	-2007.03	8159.74	24.6 49.2 (b)	Pass
		Diagonal	P1.5x16GA	20	-2114.75	8159.74	25.9 51.6 (b)	Pass
		Diagonal	P1.5x16GA	21	-2102.33	8159.74	25.8 51.8 (b)	Pass
		Diagonal	P1.5x16GA	22	-2218.51	8159.74	27.2 53.2 (b)	Pass
		Diagonal	P1.5x16GA	23	-2228.34	8159.74	27.3 53.0 (b)	Pass
		Diagonal	P1.5x16GA	24	-2130.17	8159.74	26.1 50.8 (b)	Pass
		Diagonal	P1.5x16GA	25	-2131.04	8159.74	26.1 50.8 (b)	Pass
		Diagonal	P1.5x16GA	26	-2235.97	8159.74	27.4 53.1 (b)	Pass
		Diagonal	P1.5x16GA	27	-2225.29	8159.74	27.3 53.4 (b)	Pass
		Diagonal	P1.5x16GA	28	-856.04	8159.74	10.5 21.4 (b)	Pass
		Diagonal	P1.5x16GA	29	-897.29	8159.74	11.0 22.2 (b)	Pass
		Diagonal	P1.5x16GA	30	-814.76	8159.74	10.0 20.0 (b)	Pass
		Diagonal	P1.5x16GA	31	-806.05	8159.74	9.9 19.8 (b)	Pass
		Diagonal	P1.5x16GA	32	-906.71	8159.74	11.1 22.5 (b)	Pass
		Diagonal	P1.5x16GA	33	-874.11	8159.74	10.7 21.9 (b)	Pass
		Diagonal	P1.5x16GA	34	-335.95	8159.74	4.1 7.8 (b)	Pass
		Diagonal	P1.5x16GA	35	-325.55	8159.74	4.0 7.3 (b)	Pass
		Diagonal	P1.5x16GA	36	-266.69	8159.74	3.3 6.2 (b)	Pass
		Diagonal	P1.5x16GA	37	-268.17	8159.74	3.3 6.2 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	P1.5x16GA	38	-348.08	8159.74	4.3 7.8 (b)	Pass
		Diagonal	P1.5x16GA	39	-348.89	8159.74	4.3 8.2 (b)	Pass
		Diagonal	P1.5x16GA	40	-185.29	8159.74	2.3 4.7 (b)	Pass
		Diagonal	P1.5x16GA	41	-178.20	8159.74	2.2 4.6 (b)	Pass
		Diagonal	P1.5x16GA	42	-234.57	8159.74	2.9 5.8 (b)	Pass
		Diagonal	P1.5x16GA	43	-212.81	8159.74	2.6 5.3 (b)	Pass
		Diagonal	P1.5x16GA	44	-200.99	8159.74	2.5 5.1 (b)	Pass
		Diagonal	P1.5x16GA	45	-229.06	8159.74	2.8 5.8 (b)	Pass
T2	155 - 140	Diagonal	ROHN 1.5 STD	55	-2318.85	24004.30	9.7 29.2 (b)	Pass
		Diagonal	ROHN 1.5 STD	56	-2358.17	24004.30	9.8 29.7 (b)	Pass
		Diagonal	ROHN 1.5 STD	57	-2102.40	24004.30	8.8 26.4 (b)	Pass
		Diagonal	ROHN 1.5 STD	58	-2192.04	24004.30	9.1 27.6 (b)	Pass
		Diagonal	ROHN 1.5 STD	59	-2263.62	24004.30	9.4 28.5 (b)	Pass
		Diagonal	ROHN 1.5 STD	60	-2130.62	24004.30	8.9 26.8 (b)	Pass
		Diagonal	ROHN 1.5 STD	64	1264.39	25902.40	4.9 15.9 (b)	Pass
		Diagonal	ROHN 1.5 STD	65	1274.62	25902.40	4.9 16.0 (b)	Pass
		Diagonal	ROHN 1.5 STD	66	1055.36	25902.40	4.1 13.3 (b)	Pass
		Diagonal	ROHN 1.5 STD	67	1060.84	25902.40	4.1 13.3 (b)	Pass
		Diagonal	ROHN 1.5 STD	68	1138.22	25902.40	4.4 14.3 (b)	Pass
		Diagonal	ROHN 1.5 STD	69	1130.40	25902.40	4.4 14.2 (b)	Pass
		Diagonal	ROHN 1.5 STD	73	-1651.93	24004.30	6.9 20.8 (b)	Pass
		Diagonal	ROHN 1.5 STD	74	-1683.57	24004.30	7.0 21.2 (b)	Pass
		Diagonal	ROHN 1.5 STD	75	-1508.49	24004.30	6.3 19.0 (b)	Pass
		Diagonal	ROHN 1.5 STD	76	-1565.62	24004.30	6.5 19.7 (b)	Pass
		Diagonal	ROHN 1.5 STD	77	-1620.44	24004.30	6.8 20.4 (b)	Pass
		Diagonal	ROHN 1.5 STD	78	-1527.66	24004.30	6.4 19.2 (b)	Pass
		Diagonal	ROHN 1.5 STD	82	1035.70	25902.40	4.0 13.0 (b)	Pass
		Diagonal	ROHN 1.5 STD	83	1056.56	25902.40	4.1 13.3 (b)	Pass
		Diagonal	ROHN 1.5 STD	84	865.11	25902.40	3.3 10.9 (b)	Pass
		Diagonal	ROHN 1.5 STD	85	937.46	25902.40	3.6 11.8 (b)	Pass
		Diagonal	ROHN 1.5 STD	86	1022.27	25902.40	3.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	ROHN 1.5 STD	87	928.35	25902.40	12.9 (b) 3.6	Pass
		Diagonal	ROHN 1.5 STD	91	-1324.37	24004.30	11.7 (b) 5.5	Pass
		Diagonal	ROHN 1.5 STD	92	-1348.67	24004.30	16.7 (b) 5.6	Pass
		Diagonal	ROHN 1.5 STD	93	-1314.41	24004.30	17.0 (b) 5.5	Pass
		Diagonal	ROHN 1.5 STD	94	-1271.04	24004.30	16.5 (b) 5.3	Pass
		Diagonal	ROHN 1.5 STD	95	-1311.98	24004.30	16.0 (b) 5.5	Pass
		Diagonal	ROHN 1.5 STD	96	-1358.47	24004.30	16.5 (b) 5.7	Pass
		Diagonal	ROHN 1.5 STD	100	-3356.37	24004.30	17.1 (b) 14.0	Pass
		Diagonal	ROHN 1.5 STD	101	-3404.81	24004.30	42.2 (b) 14.2	Pass
		Diagonal	ROHN 1.5 STD	102	-3226.46	24004.30	42.8 (b) 13.4	Pass
		Diagonal	ROHN 1.5 STD	103	-3246.10	24004.30	40.6 (b) 13.5	Pass
		Diagonal	ROHN 1.5 STD	104	-3379.66	24004.30	40.8 (b) 14.1	Pass
		Diagonal	ROHN 1.5 STD	105	-3310.17	24004.30	42.5 (b) 13.8	Pass
T3	140 - 132.5	Diagonal	L1 3/4x1 3/4x1/4	115	-5092.95	20357.20	41.6 (b) 25.0	Pass
		Diagonal	L1 3/4x1 3/4x1/4	116	-5063.00	20357.20	65.8 (b) 24.9	Pass
		Diagonal	L1 3/4x1 3/4x1/4	117	-5040.79	20357.20	65.4 (b) 24.8	Pass
		Diagonal	L1 3/4x1 3/4x1/4	118	-4970.80	20357.20	65.1 (b) 24.4	Pass
		Diagonal	L1 3/4x1 3/4x1/4	119	-5002.36	20357.20	63.9 (b) 24.6	Pass
		Diagonal	L1 3/4x1 3/4x1/4	120	-5101.59	20357.20	64.1 (b) 25.1	Pass
		Diagonal	L1 3/4x1 3/4x1/4	124	-5087.70	20357.20	65.8 (b) 25.0	Pass
		Diagonal	L1 3/4x1 3/4x1/4	125	-5075.03	20357.20	64.0 (b) 24.9	Pass
		Diagonal	L1 3/4x1 3/4x1/4	126	-4999.53	20357.20	63.8 (b) 24.6	Pass
		Diagonal	L1 3/4x1 3/4x1/4	127	-5049.89	20357.20	62.9 (b) 24.8	Pass
		Diagonal	L1 3/4x1 3/4x1/4	128	-5103.29	20357.20	63.5 (b) 25.1	Pass
		Diagonal	L1 3/4x1 3/4x1/4	129	-5061.24	20357.20	64.2 (b) 24.9	Pass
		Diagonal	L1 3/4x1 3/4x1/4	133	-3791.36	20357.20	63.6 (b) 18.6	Pass
		Diagonal	L1 3/4x1 3/4x1/4	134	-3741.56	20357.20	47.7 (b) 18.4	Pass
		Diagonal	L1 3/4x1 3/4x1/4	135	-3765.71	20357.20	47.1 (b) 18.5	Pass
		Diagonal	L1 3/4x1 3/4x1/4	136	-3669.13	20357.20	47.4 (b) 18.0	Pass
		Diagonal	L1 3/4x1 3/4x1/4	137	-3721.27	20357.20	46.1 (b) 18.3	Pass
							46.8 (b)	

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	L1 3/4x1 3/4x1/4	138	-3862.13	20357.20	19.0 48.6 (b)	Pass
T4	132.5 - 130	Diagonal	L2x2x1/4	145	-6586.10	25058.00	26.3 58.5 (b)	Pass
		Diagonal	L2x2x1/4	146	-6632.08	25058.00	26.5 58.5 (b)	Pass
		Diagonal	L2x2x1/4	147	-6749.98	25058.00	26.9 59.1 (b)	Pass
		Diagonal	L2x2x1/4	148	-6713.50	25058.00	26.8 58.7 (b)	Pass
		Diagonal	L2x2x1/4	149	-6729.00	25058.00	26.9 59.0 (b)	Pass
		Diagonal	L2x2x1/4	150	-6691.58	25058.00	26.7 59.7 (b)	Pass
T5	130 - 120	Diagonal	L1 3/4x1 3/4x1/4	160	-4316.95	20347.10	21.2 54.3 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	161	-4318.58	20347.10	21.2 54.3 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	162	-4669.33	20347.10	22.9 58.7 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	163	-4684.73	20347.10	23.0 58.9 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	164	-4613.01	20347.10	22.7 58.0 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	165	-4565.49	20347.10	22.4 57.4 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	169	-3941.61	20347.10	19.4 49.6 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	170	-3928.95	20347.10	19.3 49.4 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	171	-4066.18	20347.10	20.0 51.1 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	172	-4128.81	20347.10	20.3 51.9 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	173	-4153.48	20347.10	20.4 52.2 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	174	-4076.81	20347.10	20.0 51.3 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	178	-4478.41	20347.10	22.0 56.3 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	179	-4448.39	20347.10	21.9 55.9 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	180	-4728.35	20347.10	23.2 59.5 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	181	-4624.80	20347.10	22.7 58.2 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	182	-4621.59	20347.10	22.7 58.1 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	183	-4730.99	20347.10	23.3 59.5 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	187	-5561.09	20347.10	27.3 69.9 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	188	-5549.02	20347.10	27.3 69.8 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	189	-5674.53	20347.10	27.9 71.4 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	190	-5712.87	20347.10	28.1 71.8 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	191	-5746.88	20347.10	28.2 72.3 (b)	Pass
		Diagonal	L1 3/4x1 3/4x1/4	192	-5692.36	20347.10	28.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
							71.6 (b)	
T6	120 - 100	Diagonal	P1.5x16GA	205	-797.57	8180.75	9.7	Pass
		Diagonal	P1.5x16GA	206	-608.39	8180.75	7.4	Pass
		Diagonal	P1.5x16GA	207	-659.28	8180.75	8.1	Pass
		Diagonal	P1.5x16GA	208	-603.78	8180.75	7.4	Pass
		Diagonal	P1.5x16GA	209	-638.58	8180.75	7.8	Pass
		Diagonal	P1.5x16GA	210	-840.00	8180.75	10.3	Pass
		Diagonal	P1.5x16GA	211	367.67	9144.98	4.0	Pass
							7.0 (b)	
		Diagonal	P1.5x16GA	212	541.53	9144.98	5.9	Pass
							10.4 (b)	
		Diagonal	P1.5x16GA	213	386.96	9144.98	4.2	Pass
							7.4 (b)	
		Diagonal	P1.5x16GA	214	441.60	9144.98	4.8	Pass
							8.5 (b)	
		Diagonal	P1.5x16GA	215	565.35	9144.98	6.2	Pass
							10.8 (b)	
		Diagonal	P1.5x16GA	216	306.17	9144.98	3.3	Pass
							5.9 (b)	
		Diagonal	P1.5x16GA	217	-294.65	8180.75	3.6	Pass
							6.2 (b)	
		Diagonal	P1.5x16GA	218	-507.65	8180.75	6.2	Pass
		Diagonal	P1.5x16GA	219	-548.80	8180.75	6.7	Pass
							7.0 (b)	
		Diagonal	P1.5x16GA	220	-494.80	8180.75	6.0	Pass
							7.4 (b)	
		Diagonal	P1.5x16GA	221	-403.38	8180.75	4.9	Pass
							5.2 (b)	
		Diagonal	P1.5x16GA	222	-300.41	8180.75	3.7	Pass
							4.2 (b)	
		Diagonal	P1.5x16GA	223	475.93	9144.98	5.2	Pass
							9.1 (b)	
		Diagonal	P1.5x16GA	224	-539.90	8180.75	6.6	Pass
		Diagonal	P1.5x16GA	225	-651.48	8180.75	8.0	Pass
							11.7 (b)	
		Diagonal	P1.5x16GA	226	-600.43	8180.75	7.3	Pass
							12.1 (b)	
		Diagonal	P1.5x16GA	227	-433.67	8180.75	5.3	Pass
							5.7 (b)	
		Diagonal	P1.5x16GA	228	369.37	9144.98	4.0	Pass
							7.1 (b)	
		Diagonal	P1.5x16GA	229	625.81	9144.98	6.8	Pass
							12.0 (b)	
		Diagonal	P1.5x16GA	230	-660.33	8180.75	8.1	Pass
							9.4 (b)	
		Diagonal	P1.5x16GA	231	-816.60	8180.75	10.0	Pass
							15.3 (b)	
		Diagonal	P1.5x16GA	232	-779.22	8180.75	9.5	Pass
							15.7 (b)	
		Diagonal	P1.5x16GA	233	-533.51	8180.75	6.5	Pass
							7.3 (b)	
		Diagonal	P1.5x16GA	234	498.52	9144.98	5.5	Pass
							9.6 (b)	
		Diagonal	P1.5x16GA	235	-708.31	8180.75	8.7	Pass
							13.8 (b)	
		Diagonal	P1.5x16GA	236	-891.74	8180.75	10.9	Pass
							11.5 (b)	
		Diagonal	P1.5x16GA	237	-1057.03	8180.75	12.9	Pass
							17.6 (b)	
		Diagonal	P1.5x16GA	238	-1033.76	8180.75	12.6	Pass
							18.0 (b)	

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	P1.5x16GA	239	-764.07	8180.75	9.3	Pass
		Diagonal	P1.5x16GA	240	-595.21	8180.75	7.3 11.3 (b)	Pass
		Diagonal	P1.5x16GA	241	1057.67	9144.98	11.6 20.3 (b)	Pass
		Diagonal	P1.5x16GA	242	-827.80	8180.75	10.1 17.4 (b)	Pass
		Diagonal	P1.5x16GA	243	1256.85	9144.98	13.7 24.1 (b)	Pass
		Diagonal	P1.5x16GA	244	1273.00	9144.98	13.9 24.4 (b)	Pass
		Diagonal	P1.5x16GA	245	793.54	9144.98	8.7 15.2 (b)	Pass
		Diagonal	P1.5x16GA	246	928.97	9144.98	10.2 17.8 (b)	Pass
		Diagonal	P1.5x16GA	247	-1248.67	8180.75	15.3 16.9 (b)	Pass
		Diagonal	P1.5x16GA	248	-1453.64	8180.75	17.8	Pass
		Diagonal	P1.5x16GA	249	-1645.72	8180.75	20.1 22.8 (b)	Pass
		Diagonal	P1.5x16GA	250	-1614.91	8180.75	19.7 23.2 (b)	Pass
		Diagonal	P1.5x16GA	251	-1341.48	8180.75	16.4	Pass
		Diagonal	P1.5x16GA	252	-1151.38	8180.75	14.1 14.3 (b)	Pass
T7	100 - 85	Diagonal	P1.5x16GA	259	-1452.40	8173.15	17.8 20.9 (b)	Pass
		Diagonal	P1.5x16GA	260	-1424.07	8173.15	17.4 20.5 (b)	Pass
		Diagonal	P1.5x16GA	261	-1501.43	8173.15	18.4 21.6 (b)	Pass
		Diagonal	P1.5x16GA	262	-1446.45	8173.15	17.7 20.8 (b)	Pass
		Diagonal	P1.5x16GA	263	-1401.56	8173.15	17.1 20.1 (b)	Pass
		Diagonal	P1.5x16GA	264	-1426.29	8173.15	17.5 20.5 (b)	Pass
		Diagonal	P1.5x16GA	265	-1328.31	8173.15	16.3 19.1 (b)	Pass
		Diagonal	P1.5x16GA	266	-1233.60	8173.15	15.1 17.8 (b)	Pass
		Diagonal	P1.5x16GA	267	-1091.83	8173.15	13.4 15.7 (b)	Pass
		Diagonal	P1.5x16GA	268	-1059.18	8173.15	13.0 15.2 (b)	Pass
		Diagonal	P1.5x16GA	269	-1327.89	8173.15	16.2 19.1 (b)	Pass
		Diagonal	P1.5x16GA	270	-1391.87	8173.15	17.0 20.0 (b)	Pass
		Diagonal	P1.5x16GA	271	1018.82	9144.98	11.1 24.7 (b)	Pass
		Diagonal	P1.5x16GA	272	1146.34	9144.98	12.5 27.7 (b)	Pass
		Diagonal	P1.5x16GA	273	832.38	9144.98	9.1 20.1 (b)	Pass
		Diagonal	P1.5x16GA	274	856.72	9144.98	9.4 20.7 (b)	Pass
		Diagonal	P1.5x16GA	275	1208.14	9144.98	13.2 29.2 (b)	Pass
		Diagonal	P1.5x16GA	276	1111.86	9144.98	12.2 26.9 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	P1.5x16GA	277	-948.42	8173.15	11.6 13.6 (b)	Pass
		Diagonal	P1.5x16GA	278	-836.19	8173.15	10.2 16.9 (b)	Pass
		Diagonal	P1.5x16GA	279	-655.82	8173.15	8.0 9.4 (b)	Pass
		Diagonal	P1.5x16GA	280	-625.01	8173.15	7.6 9.3 (b)	Pass
		Diagonal	P1.5x16GA	281	-931.43	8173.15	11.4 18.4 (b)	Pass
		Diagonal	P1.5x16GA	282	-1009.47	8173.15	12.4 15.3 (b)	Pass
		Diagonal	P1.5x16GA	283	709.73	9144.98	7.8 17.2 (b)	Pass
		Diagonal	P1.5x16GA	284	917.45	9144.98	10.0 22.2 (b)	Pass
		Diagonal	P1.5x16GA	285	574.80	9144.98	6.3 13.9 (b)	Pass
		Diagonal	P1.5x16GA	286	587.45	9144.98	6.4 14.2 (b)	Pass
		Diagonal	P1.5x16GA	287	977.75	9144.98	10.7 23.7 (b)	Pass
		Diagonal	P1.5x16GA	288	808.07	9144.98	8.8 19.6 (b)	Pass
		Diagonal	P1.5x16GA	289	-980.36	8173.15	12.0 14.1 (b)	Pass
		Diagonal	P1.5x16GA	290	-783.87	8173.15	9.6 11.3 (b)	Pass
		Diagonal	P1.5x16GA	291	-781.86	8173.15	9.6 11.2 (b)	Pass
		Diagonal	P1.5x16GA	292	-701.20	8173.15	8.6 10.1 (b)	Pass
		Diagonal	P1.5x16GA	293	-854.72	8173.15	10.5 12.3 (b)	Pass
		Diagonal	P1.5x16GA	294	-1054.44	8173.15	12.9 15.2 (b)	Pass
T8	85 - 80	Diagonal	P1.5x16GA	301	-2097.55	8194.03	25.6 30.1 (b)	Pass
		Diagonal	P1.5x16GA	302	-2038.13	8194.03	24.9 29.3 (b)	Pass
		Diagonal	P1.5x16GA	303	-2128.80	8194.03	26.0 30.6 (b)	Pass
		Diagonal	P1.5x16GA	304	-2067.24	8194.03	25.2 29.7 (b)	Pass
		Diagonal	P1.5x16GA	305	-2012.09	8194.03	24.6 28.9 (b)	Pass
		Diagonal	P1.5x16GA	306	-2073.15	8194.03	25.3 29.8 (b)	Pass
		Diagonal	P1.5x16GA	310	-761.95	8194.03	9.3 14.5 (b)	Pass
		Diagonal	P1.5x16GA	311	-780.22	8194.03	9.5 13.3 (b)	Pass
		Diagonal	P1.5x16GA	312	-935.76	8194.03	11.4 16.6 (b)	Pass
		Diagonal	P1.5x16GA	313	-907.31	8194.03	11.1 17.3 (b)	Pass
		Diagonal	P1.5x16GA	314	-704.64	8194.03	8.6 11.5 (b)	Pass
		Diagonal	P1.5x16GA	315	-695.00	8194.03	8.5 12.4 (b)	Pass
T9	80 - 60	Diagonal	P1.5x16GA	328	-1951.89	8167.69	23.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	P1.5x16GA	329	-1905.10	8167.69	28.0 (b) 23.3	Pass
		Diagonal	P1.5x16GA	330	-1939.92	8167.69	27.4 (b) 23.8	Pass
		Diagonal	P1.5x16GA	331	-1884.58	8167.69	27.9 (b) 23.1	Pass
		Diagonal	P1.5x16GA	332	-1967.91	8167.69	27.1 (b) 24.1	Pass
		Diagonal	P1.5x16GA	333	-2037.38	8167.69	28.3 (b) 24.9	Pass
		Diagonal	P1.5x16GA	337	-1176.92	8167.69	29.3 (b) 14.4	Pass
		Diagonal	P1.5x16GA	338	-1136.80	8167.69	16.9 (b) 13.9	Pass
		Diagonal	P1.5x16GA	339	-1145.67	8167.69	16.3 (b) 14.0	Pass
		Diagonal	P1.5x16GA	340	-1090.75	8167.69	16.5 (b) 13.4	Pass
		Diagonal	P1.5x16GA	341	-1186.01	8167.69	15.7 (b) 14.5	Pass
		Diagonal	P1.5x16GA	342	-1252.59	8167.69	17.6 (b) 15.3	Pass
		Diagonal	P1.5x16GA	346	-1243.12	8167.69	18.0 (b) 15.2	Pass
		Diagonal	P1.5x16GA	347	-1200.66	8167.69	17.9 (b) 14.7	Pass
		Diagonal	P1.5x16GA	348	-1248.97	8167.69	17.3 (b) 15.3	Pass
		Diagonal	P1.5x16GA	349	-1164.46	8167.69	17.9 (b) 14.3	Pass
		Diagonal	P1.5x16GA	350	-1226.80	8167.69	16.7 (b) 15.0	Pass
		Diagonal	P1.5x16GA	351	-1288.40	8167.69	17.6 (b) 15.8	Pass
		Diagonal	P1.5x16GA	355	-967.76	8167.69	18.5 (b) 11.8	Pass
		Diagonal	P1.5x16GA	356	-916.03	8167.69	13.9 (b) 11.2	Pass
		Diagonal	P1.5x16GA	357	-961.34	8167.69	13.2 (b) 11.8	Pass
		Diagonal	P1.5x16GA	358	-886.40	8167.69	13.8 (b) 10.9	Pass
		Diagonal	P1.5x16GA	359	-945.59	8167.69	12.7 (b) 11.6	Pass
		Diagonal	P1.5x16GA	360	-1011.93	8167.69	13.6 (b) 12.4	Pass
		Diagonal	P1.5x16GA	364	-956.14	8167.69	14.5 (b) 11.7	Pass
		Diagonal	P1.5x16GA	365	-884.44	8167.69	13.7 (b) 10.8	Pass
		Diagonal	P1.5x16GA	366	-936.45	8167.69	12.7 (b) 11.5	Pass
		Diagonal	P1.5x16GA	367	-874.50	8167.69	13.5 (b) 10.7	Pass
		Diagonal	P1.5x16GA	368	-917.32	8167.69	12.6 (b) 11.2	Pass
		Diagonal	P1.5x16GA	369	-994.88	8167.69	13.2 (b) 12.2	Pass
		Diagonal	P1.5x16GA	373	-1053.49	8167.69	14.3 (b) 12.9 15.1 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	P1.5x16GA	374	-947.75	8167.69	11.6 13.6 (b)	Pass
		Diagonal	P1.5x16GA	375	-1037.26	8167.69	12.7 14.9 (b)	Pass
		Diagonal	P1.5x16GA	376	-983.04	8167.69	12.0 14.1 (b)	Pass
		Diagonal	P1.5x16GA	377	-984.51	8167.69	12.1 14.1 (b)	Pass
		Diagonal	P1.5x16GA	378	-1084.62	8167.69	13.3 15.6 (b)	Pass
		Diagonal	P1.5x16GA	382	-692.34	8167.69	8.5 9.9 (b)	Pass
		Diagonal	P1.5x16GA	383	-633.86	8167.69	7.8 9.1 (b)	Pass
		Diagonal	P1.5x16GA	384	-695.37	8167.69	8.5 10.0 (b)	Pass
		Diagonal	P1.5x16GA	385	-636.62	8167.69	7.8 9.1 (b)	Pass
		Diagonal	P1.5x16GA	386	-593.84	8167.69	7.3 8.5 (b)	Pass
		Diagonal	P1.5x16GA	387	-698.27	8167.69	8.5 10.0 (b)	Pass
		Diagonal	P1.5x16GA	391	-1406.63	8167.69	17.2 20.2 (b)	Pass
		Diagonal	P1.5x16GA	392	-1313.42	8167.69	16.1 18.9 (b)	Pass
		Diagonal	P1.5x16GA	393	-1417.90	8167.69	17.4 20.4 (b)	Pass
		Diagonal	P1.5x16GA	394	-1343.99	8167.69	16.5 19.3 (b)	Pass
		Diagonal	P1.5x16GA	395	-1278.61	8167.69	15.7 18.4 (b)	Pass
		Diagonal	P1.5x16GA	396	-1405.04	8167.69	17.2 20.2 (b)	Pass
T10	60 - 40	Diagonal	P1.5x16GA	409	-1661.88	8185.90	20.3 30.1 (b)	Pass
		Diagonal	P1.5x16GA	410	-1881.11	8185.90	23.0 29.9 (b)	Pass
		Diagonal	P1.5x16GA	411	-1621.17	8185.90	19.8 28.6 (b)	Pass
		Diagonal	P1.5x16GA	412	-1824.45	8185.90	22.3 28.6 (b)	Pass
		Diagonal	P1.5x16GA	413	-1598.72	8185.90	19.5 30.5 (b)	Pass
		Diagonal	P1.5x16GA	414	-1897.89	8185.90	23.2 27.8 (b)	Pass
		Diagonal	P1.5x16GA	415	1633.24	9144.98	17.9 39.5 (b)	Pass
		Diagonal	P1.5x16GA	416	1594.81	9144.98	17.4 38.6 (b)	Pass
		Diagonal	P1.5x16GA	417	1604.97	9144.98	17.6 38.8 (b)	Pass
		Diagonal	P1.5x16GA	418	1583.09	9144.98	17.3 38.3 (b)	Pass
		Diagonal	P1.5x16GA	419	1644.12	9144.98	18.0 39.8 (b)	Pass
		Diagonal	P1.5x16GA	420	1545.64	9144.98	16.9 37.4 (b)	Pass
		Diagonal	P1.5x16GA	421	-1604.12	8185.90	19.6 29.9 (b)	Pass
		Diagonal	P1.5x16GA	422	-1600.36	8185.90	19.6	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	P1.5x16GA	423	-1599.48	8185.90	31.2 (b) 19.5	Pass
		Diagonal	P1.5x16GA	424	-1580.90	8185.90	29.3 (b) 19.3	Pass
		Diagonal	P1.5x16GA	425	-1549.86	8185.90	30.9 (b) 18.9	Pass
		Diagonal	P1.5x16GA	426	-1608.89	8185.90	30.2 (b) 19.7	Pass
		Diagonal	P1.5x16GA	427	-1859.45	8185.90	29.4 (b) 22.7	Pass
		Diagonal	P1.5x16GA	428	-1822.78	8185.90	39.3 (b) 22.3	Pass
		Diagonal	P1.5x16GA	429	-1916.44	8185.90	40.3 (b) 23.4	Pass
		Diagonal	P1.5x16GA	430	-1864.55	8185.90	40.4 (b) 22.8	Pass
		Diagonal	P1.5x16GA	431	-1852.96	8185.90	41.8 (b) 22.6	Pass
		Diagonal	P1.5x16GA	432	-1921.57	8185.90	41.6 (b) 23.5	Pass
		Diagonal	P1.5x16GA	433	-1729.80	8185.90	40.2 (b) 21.1	Pass
		Diagonal	P1.5x16GA	434	-1694.28	8185.90	43.2 (b) 20.7	Pass
		Diagonal	P1.5x16GA	435	-1779.59	8185.90	44.2 (b) 21.7	Pass
		Diagonal	P1.5x16GA	436	-1726.18	8185.90	43.9 (b) 21.1	Pass
		Diagonal	P1.5x16GA	437	-1725.52	8185.90	45.3 (b) 21.1	Pass
		Diagonal	P1.5x16GA	438	-1793.64	8185.90	45.6 (b) 21.9	Pass
		Diagonal	P1.5x16GA	439	-1644.22	8185.90	44.1 (b) 20.1	Pass
		Diagonal	P1.5x16GA	440	-1603.66	8185.90	36.5 (b) 19.6	Pass
		Diagonal	P1.5x16GA	441	-1677.16	8185.90	37.3 (b) 20.5	Pass
		Diagonal	P1.5x16GA	442	-1620.17	8185.90	36.8 (b) 19.8	Pass
		Diagonal	P1.5x16GA	443	-1641.52	8185.90	38.1 (b) 20.1	Pass
		Diagonal	P1.5x16GA	444	-1706.08	8185.90	38.9 (b) 20.8	Pass
		Diagonal	P1.5x16GA	445	1459.66	9144.98	37.3 (b) 16.0	Pass
		Diagonal	P1.5x16GA	446	1497.32	9144.98	35.3 (b) 16.4	Pass
		Diagonal	P1.5x16GA	447	1461.67	9144.98	36.2 (b) 16.0	Pass
		Diagonal	P1.5x16GA	448	1513.90	9144.98	35.4 (b) 16.6	Pass
		Diagonal	P1.5x16GA	449	1559.70	9144.98	36.6 (b) 17.1	Pass
		Diagonal	P1.5x16GA	450	-1347.93	8185.90	37.7 (b) 16.5	Pass
		Diagonal	P1.5x16GA	451	-1651.90	8185.90	36.3 (b) 20.2	Pass
		Diagonal	P1.5x16GA	452	-1607.38	8185.90	29.1 (b) 19.6 30.2 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	P1.5x16GA	453	-1653.19	8185.90	20.2 28.6 (b)	Pass
		Diagonal	P1.5x16GA	454	-1591.30	8185.90	19.4 30.1 (b)	Pass
		Diagonal	P1.5x16GA	455	-1654.64	8185.90	20.2 31.9 (b)	Pass
		Diagonal	P1.5x16GA	456	-1729.27	8185.90	21.1 30.1 (b)	Pass
T11	40 - 20	Diagonal	P1.5x16GA	466	-1098.45	5871.06	18.7	Pass
		Diagonal	P1.5x16GA	467	-1248.85	5871.06	21.3	Pass
		Diagonal	P1.5x16GA	468	-1299.44	5871.06	22.1	Pass
		Diagonal	P1.5x16GA	472	-1364.92	5871.06	23.2	Pass
		Diagonal	P1.5x16GA	473	-1224.67	5871.06	20.9	Pass
		Diagonal	P1.5x16GA	474	-1270.68	5871.06	21.6	Pass
		Diagonal	P1.5x16GA	478	-1355.28	5871.06	23.1	Pass
		Diagonal	P1.5x16GA	479	-1293.49	5871.06	22.0	Pass
		Diagonal	P1.5x16GA	480	-1423.73	5871.06	24.2	Pass
		Diagonal	P1.5x16GA	484	-1598.45	5871.06	27.2	Pass
		Diagonal	P1.5x16GA	485	-1459.31	5871.06	24.9	Pass
		Diagonal	P1.5x16GA	486	-1603.10	5871.06	27.3	Pass
		Diagonal	P1.5x16GA	490	-1868.46	5871.06	31.8	Pass
		Diagonal	P1.5x16GA	491	-1642.94	5871.06	28.0	Pass
		Diagonal	P1.5x16GA	492	-1873.48	5871.06	31.9	Pass
		Diagonal	P1.5x16GA	496	-2216.84	5871.06	37.8	Pass
		Diagonal	P1.5x16GA	497	-2050.27	5871.06	34.9	Pass
		Diagonal	P1.5x16GA	498	-2112.38	5871.06	36.0	Pass
		Diagonal	P1.5x16GA	502	-2472.05	5871.06	42.1	Pass
		Diagonal	P1.5x16GA	503	-2307.84	5871.06	39.3	Pass
		Diagonal	P1.5x16GA	504	-2505.38	5871.06	42.7	Pass
		Diagonal	P1.5x16GA	508	-2813.33	5871.06	47.9 48.0 (b)	Pass
		Diagonal	P1.5x16GA	509	-2706.28	5871.06	46.1	Pass
		Diagonal	P1.5x16GA	510	-2696.23	5871.06	45.9 48.9 (b)	Pass
T12	20 - 5	Diagonal	P1.5x16GA	520	-2183.78	5864.69	37.2	Pass
		Diagonal	P1.5x16GA	521	-2721.94	5864.69	46.4 47.1 (b)	Pass
		Diagonal	P1.5x16GA	522	-2437.15	5864.69	41.6	Pass
		Diagonal	P1.5x16GA	526	-2461.87	5864.69	42.0	Pass
		Diagonal	P1.5x16GA	527	-2848.54	5864.69	48.6	Pass
		Diagonal	P1.5x16GA	528	-2229.73	5864.69	38.0	Pass
		Diagonal	P1.5x16GA	532	-1937.84	5864.69	33.0	Pass
		Diagonal	P1.5x16GA	533	-2415.74	5864.69	41.2	Pass
		Diagonal	P1.5x16GA	534	-2254.22	5864.69	38.4	Pass
		Diagonal	P1.5x16GA	538	-2007.99	5864.69	34.2	Pass
		Diagonal	P1.5x16GA	539	-2195.68	5864.69	37.4	Pass
		Diagonal	P1.5x16GA	540	-1779.54	5864.69	30.3	Pass
		Diagonal	P1.5x16GA	544	-1591.42	5864.69	27.1	Pass
		Diagonal	P1.5x16GA	545	-1791.32	5864.69	30.5	Pass
		Diagonal	P1.5x16GA	546	-1794.60	5864.69	30.6	Pass
		Diagonal	P1.5x16GA	550	-1517.18	5864.69	25.9	Pass
		Diagonal	P1.5x16GA	551	-1521.78	5864.69	25.9	Pass
		Diagonal	P1.5x16GA	552	-1301.89	5864.69	22.2	Pass
T11	40 - 20	Horizontal	1	469	-1430.28	7676.07	18.6	Pass
		Horizontal	1	470	-1435.72	7676.07	18.7	Pass
		Horizontal	1	471	-1435.72	7676.07	18.7	Pass
		Horizontal	1	475	-1430.28	7676.07	18.6	Pass
		Horizontal	1	476	-1435.72	7676.07	18.7	Pass
		Horizontal	1	477	-1435.72	7676.07	18.7	Pass
		Horizontal	1	481	-1430.28	7676.07	18.6	Pass
		Horizontal	1	482	-1435.72	7676.07	18.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Horizontal	1	483	-1435.72	7676.07	18.7	Pass
		Horizontal	1	487	-1430.28	7676.07	18.6	Pass
		Horizontal	1	488	-1435.72	7676.07	18.7	Pass
		Horizontal	1	489	-1435.72	7676.07	18.7	Pass
		Horizontal	1	493	-1430.28	7676.07	18.6	Pass
		Horizontal	1	494	-1435.72	7676.07	18.7	Pass
		Horizontal	1	495	-1435.72	7676.07	18.7	Pass
		Horizontal	1	499	-1430.28	7676.07	18.6	Pass
		Horizontal	1	500	-1435.72	7676.07	18.7	Pass
		Horizontal	1	501	-1435.72	7676.07	18.7	Pass
		Horizontal	1	505	-1430.28	7676.07	18.6	Pass
		Horizontal	1	506	-1435.72	7676.07	18.7	Pass
		Horizontal	1	507	-1435.72	7676.07	18.7	Pass
T12	20 - 5	Horizontal	1	523	-1435.53	7613.41	18.9	Pass
		Horizontal	1	524	-1440.33	7613.41	18.9	Pass
		Horizontal	1	525	-1440.33	7613.41	18.9	Pass
		Horizontal	1	529	-1435.53	7613.41	18.9	Pass
		Horizontal	1	530	-1440.33	7613.41	18.9	Pass
		Horizontal	1	531	-1440.33	7613.41	18.9	Pass
		Horizontal	1	535	-1435.53	7613.41	18.9	Pass
		Horizontal	1	536	-1440.33	7613.41	18.9	Pass
		Horizontal	1	537	-1440.33	7613.41	18.9	Pass
		Horizontal	1	541	-1435.53	7613.41	18.9	Pass
		Horizontal	1	542	-1440.33	7613.41	18.9	Pass
		Horizontal	1	543	-1440.33	7613.41	18.9	Pass
		Horizontal	1	547	-1435.53	7613.41	18.9	Pass
		Horizontal	1	548	-1440.33	7613.41	18.9	Pass
		Horizontal	1	549	-1440.33	7613.41	18.9	Pass
T2	155 - 140	Secondary Horizontal	1	61	-553.16	7417.78	7.5 10.0 (b)	Pass
		Secondary Horizontal	1	62	-555.09	7417.78	7.5 9.9 (b)	Pass
		Secondary Horizontal	1	63	-555.09	7417.78	7.5 10.0 (b)	Pass
		Secondary Horizontal	1	70	-553.16	7417.78	7.5 10.1 (b)	Pass
		Secondary Horizontal	1	71	-555.09	7417.78	7.5 10.1 (b)	Pass
		Secondary Horizontal	1	72	-555.09	7417.78	7.5 10.1 (b)	Pass
		Secondary Horizontal	1	79	-553.16	7417.78	7.5 7.8 (b)	Pass
		Secondary Horizontal	1	80	-555.09	7417.78	7.5 7.9 (b)	Pass
		Secondary Horizontal	1	81	-555.09	7417.78	7.5 7.9 (b)	Pass
		Secondary Horizontal	1	88	-553.16	7417.78	7.5 8.8 (b)	Pass
		Secondary Horizontal	1	89	-555.09	7417.78	7.5 8.9 (b)	Pass
		Secondary Horizontal	1	90	-555.09	7417.78	7.5 8.9 (b)	Pass
		Secondary Horizontal	1	97	-553.16	7417.78	7.5	Pass
		Secondary Horizontal	1	98	-555.09	7417.78	7.5	Pass
		Secondary Horizontal	1	99	-555.09	7417.78	7.5	Pass
		Secondary Horizontal	1	106	-928.92	7417.78	12.5 15.5 (b)	Pass
		Secondary Horizontal	1	107	-917.44	7417.78	12.4 15.0 (b)	Pass
		Secondary Horizontal	1	108	-951.67	7417.78	12.8 15.4 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T3	140 - 132.5	Secondary Horizontal	L1 3/4x1 3/4x1/4	121	2676.96	21410.20	12.5 35.2 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	122	2590.41	21410.20	12.1 34.0 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	123	2619.53	21410.20	12.2 34.4 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	130	1103.99	21410.20	5.2 14.5 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	131	1075.58	21410.20	5.0 14.1 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	132	1110.15	21410.20	5.2 14.6 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	139	1151.40	21410.20	5.4 15.1 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	140	1163.90	21410.20	5.4 15.3 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	141	1163.63	21410.20	5.4 15.3 (b)	Pass
T4	132.5 - 130	Secondary Horizontal	L1 3/4x1 3/4x1/4	151	1774.16	21410.20	8.3 23.3 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	152	1918.42	21410.20	9.0 25.2 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	153	1862.91	21410.20	8.7 24.5 (b)	Pass
T5	130 - 120	Secondary Horizontal	L1 3/4x1 3/4x1/4	166	1340.69	21410.20	6.3 17.6 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	167	1347.04	21410.20	6.3 17.7 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	168	1354.37	21410.20	6.3 17.8 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	175	1925.47	21410.20	9.0 25.3 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	176	1939.93	21410.20	9.1 25.5 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	177	1944.60	21410.20	9.1 25.5 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	184	1840.16	21410.20	8.6 24.2 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	185	1848.74	21410.20	8.6 24.3 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	186	1853.48	21410.20	8.7 24.3 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	193	1812.24	21410.20	8.5 23.8 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	194	1828.38	21410.20	8.5 24.0 (b)	Pass
		Secondary Horizontal	L1 3/4x1 3/4x1/4	195	1829.65	21410.20	8.5 24.0 (b)	Pass
T8	85 - 80	Secondary Horizontal	1	307	-1144.10	7613.41	15.0 15.7 (b)	Pass
		Secondary Horizontal	1	308	-1168.12	7613.41	15.3 15.8 (b)	Pass
		Secondary Horizontal	1	309	-1168.12	7613.41	15.3 15.8 (b)	Pass
		Secondary Horizontal	1	316	-1144.10	7613.41	15.0 23.2 (b)	Pass
		Secondary Horizontal	1	317	-1168.12	7613.41	15.3 23.6 (b)	Pass
		Secondary Horizontal	1	318	-1168.12	7613.41	15.3 23.7 (b)	Pass
T9	80 - 60	Secondary Horizontal	L2 1/2x2 1/2x3/16	334	1203.53	25604.50	4.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Secondary Horizontal	L2 1/2x2 1/2x3/16	335	1211.11	25604.50	19.4 (b) 4.7	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	336	1211.11	25604.50	19.5 (b) 4.7	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	343	1497.77	25604.50	19.5 (b) 5.8	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	344	1518.48	25604.50	24.2 (b) 5.9	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	345	1515.11	25604.50	24.5 (b) 5.9	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	352	1343.37	25604.50	24.4 (b) 5.2	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	353	1362.92	25604.50	21.7 (b) 5.3	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	354	1361.56	25604.50	22.0 (b) 5.3	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	361	1407.78	25604.50	22.0 (b) 5.5	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	362	1429.53	25604.50	22.7 (b) 5.6	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	363	1428.84	25604.50	23.1 (b) 5.6	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	370	1397.76	25604.50	23.1 (b) 5.5	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	371	1420.12	25604.50	22.5 (b) 5.5	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	372	1421.07	25604.50	22.9 (b) 5.6	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	379	1330.98	25604.50	22.9 (b) 5.2	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	380	1353.14	25604.50	21.5 (b) 5.3	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	381	1354.52	25604.50	21.8 (b) 5.3	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	388	1459.65	25604.50	21.9 (b) 5.7	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	389	1484.14	25604.50	23.5 (b) 5.8	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	390	1488.16	25604.50	23.9 (b) 5.8	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	397	1203.53	25604.50	24.0 (b) 4.7	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	398	1211.11	25604.50	19.4 (b) 4.7	Pass
		Secondary Horizontal	L2 1/2x2 1/2x3/16	399	1211.11	25604.50	19.5 (b) 4.7	Pass
T1	170 - 155	Top Girt	P1.5x16GA	4	-41.83	6746.92	19.5 (b) 0.6	Pass
		Top Girt	P1.5x16GA	5	-36.57	6746.92	0.7 (b) 0.5	Pass
		Top Girt	P1.5x16GA	6	-41.71	6746.92	0.7 (b) 0.6	Pass
T2	155 - 140	Top Girt	P1.5x16GA	49	359.81	9144.98	0.7 (b) 3.9	Pass
		Top Girt	P1.5x16GA	50	327.88	9144.98	8.7 (b) 3.6	Pass
		Top Girt	P1.5x16GA	51	347.93	9144.98	7.9 (b) 3.8	Pass
T3	140 - 132.5	Top Girt	L1 1/2x1 1/2x1/8	112	-906.42	4747.60	8.4 (b) 19.1 39.9 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Top Girt	L1 1/2x1 1/2x1/8	113	-887.57	4747.60	18.7 39.9 (b)	Pass
		Top Girt	L1 1/2x1 1/2x1/8	114	-880.19	4747.60	18.5 39.4 (b)	Pass
T6	120 - 100	Top Girt	P1.5x16GA	199	1241.46	9144.98	13.6 23.8 (b)	Pass
		Top Girt	P1.5x16GA	200	1247.53	9144.98	13.6 23.9 (b)	Pass
		Top Girt	P1.5x16GA	201	1237.05	9144.98	13.5 23.7 (b)	Pass
T7	100 - 85	Top Girt	P1.5x16GA	256	668.06	9144.98	7.3 16.2 (b)	Pass
		Top Girt	P1.5x16GA	257	677.04	9144.98	7.4 16.4 (b)	Pass
		Top Girt	P1.5x16GA	258	689.45	9144.98	7.5 16.7 (b)	Pass
T9	80 - 60	Top Girt	L2 1/2x2 1/2x3/16	322	1080.38	25604.50	4.2 17.4 (b)	Pass
		Top Girt	L2 1/2x2 1/2x3/16	323	1105.34	25604.50	4.3 17.8 (b)	Pass
		Top Girt	L2 1/2x2 1/2x3/16	324	1110.04	25604.50	4.3 17.9 (b)	Pass
T10	60 - 40	Top Girt	P1.5x16GA	403	785.44	9144.98	8.6 19.0 (b)	Pass
		Top Girt	P1.5x16GA	404	801.58	9144.98	8.8 19.4 (b)	Pass
		Top Girt	P1.5x16GA	405	798.84	9144.98	8.7 19.3 (b)	Pass
T11	40 - 20	Top Girt	P1.5x16GA	460	682.46	9144.98	7.5 16.5 (b)	Pass
		Top Girt	P1.5x16GA	461	657.39	9144.98	7.2 15.9 (b)	Pass
		Top Girt	P1.5x16GA	462	655.78	9144.98	7.2 15.9 (b)	Pass
T12	20 - 5	Top Girt	P1.5x16GA	514	508.92	9144.98	5.6 12.3 (b)	Pass
		Top Girt	P1.5x16GA	515	535.22	9144.98	5.9 13.0 (b)	Pass
		Top Girt	P1.5x16GA	516	517.87	9144.98	5.7 12.5 (b)	Pass
T13	5 - 0	Top Girt	14x3/16	556	8687.36	1360800.00	0.6	Pass
		Top Girt	14x3/16	557	8782.72	1360800.00	0.6	Pass
		Top Girt	14x3/16	558	8739.74	1360800.00	0.6	Pass
T1	170 - 155	Bottom Girt	P1.5x16GA	7	-746.55	6746.92	11.1 20.9 (b)	Pass
		Bottom Girt	P1.5x16GA	8	-752.11	6746.92	11.1 21.0 (b)	Pass
		Bottom Girt	P1.5x16GA	9	-747.01	6746.92	11.1 20.9 (b)	Pass
T2	155 - 140	Bottom Girt	P1.5x16GA	52	646.43	9144.98	7.1 15.6 (b)	Pass
		Bottom Girt	P1.5x16GA	53	636.91	9144.98	7.0 15.4 (b)	Pass
		Bottom Girt	P1.5x16GA	54	643.71	9144.98	7.0 15.6 (b)	Pass
T5	130 - 120	Bottom Girt	P1.5x16GA	157	1168.56	9144.98	12.8	Pass
		Bottom Girt	P1.5x16GA	158	1170.43	9144.98	12.8	Pass
		Bottom Girt	P1.5x16GA	159	1161.32	9144.98	12.7	Pass
T6	120 - 100	Bottom Girt	P1.5x16GA	202	590.71	9144.98	6.5 11.3 (b)	Pass
		Bottom Girt	P1.5x16GA	203	593.37	9144.98	6.5	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
							11.4 (b)	
		Bottom Girt	P1.5x16GA	204	602.54	9144.98	6.6	Pass
							11.5 (b)	
T8	85 - 80	Bottom Girt	P1.5x16GA	298	821.63	9144.98	9.0	Pass
		Bottom Girt	P1.5x16GA	299	827.10	9144.98	9.0	Pass
		Bottom Girt	P1.5x16GA	300	829.96	9144.98	9.1	Pass
T9	80 - 60	Bottom Girt	L2 1/2x2 1/2x3/16	325	595.48	25604.50	2.3	Pass
							9.6 (b)	
		Bottom Girt	L2 1/2x2 1/2x3/16	326	580.65	25604.50	2.3	Pass
							9.4 (b)	
		Bottom Girt	L2 1/2x2 1/2x3/16	327	584.07	25604.50	2.3	Pass
							9.4 (b)	
T10	60 - 40	Bottom Girt	P1.5x16GA	406	768.25	9144.98	8.4	Pass
							18.6 (b)	
		Bottom Girt	P1.5x16GA	407	755.91	9144.98	8.3	Pass
							18.3 (b)	
		Bottom Girt	P1.5x16GA	408	755.92	9144.98	8.3	Pass
							18.3 (b)	
T11	40 - 20	Bottom Girt	P1.5x16GA	463	469.62	9144.98	5.1	Pass
							11.4 (b)	
		Bottom Girt	P1.5x16GA	464	464.25	9144.98	5.1	Pass
							11.2 (b)	
		Bottom Girt	P1.5x16GA	465	473.79	9144.98	5.2	Pass
							11.5 (b)	
T12	20 - 5	Bottom Girt	ROHN 1.5 SCH XS (Extra Strong)	517	10313.50	34607.80	29.8	Pass
							66.4 (b)	
		Bottom Girt	ROHN 1.5 SCH XS (Extra Strong)	518	10421.60	34607.80	30.1	Pass
							67.1 (b)	
		Bottom Girt	ROHN 1.5 SCH XS (Extra Strong)	519	10374.90	34607.80	30.0	Pass
							66.8 (b)	
T13	5 - 0	Bottom Girt	14x3/16	559	-4983.81	1359770.00	0.5	Pass
		Bottom Girt	14x3/16	560	-5050.95	1359770.00	0.5	Pass
		Bottom Girt	14x3/16	561	-5067.26	1359770.00	0.5	Pass
T13	5 - 0	Mid Girt	14x3/16	562	74.55	1360800.00	0.0	Pass
		Mid Girt	14x3/16	563	74.76	1360800.00	0.0	Pass
		Mid Girt	14x3/16	564	75.43	1360800.00	0.0	Pass
T2	155 - 140	Guy A@152.333	1/2	576	8777.97	16140.00	54.4	Pass
		Guy A@152.333	1/2	577	8762.37	16140.00	54.3	Pass
T4	132.5 - 130	Guy A@132.5	7/8	588	20375.90	47820.00	42.6	Pass
		Guy A@132.5	7/8	589	20334.70	47820.00	42.5	Pass
T7	100 - 85	Guy A@87.4583	1/2	597	9570.44	16140.00	59.3	Pass
T10	60 - 40	Guy A@47.5625	9/16	603	13280.10	21000.00	63.2	Pass
T2	155 - 140	Guy B@152.333	1/2	572	8538.97	16140.00	52.9	Pass
		Guy B@152.333	1/2	573	8556.70	16140.00	53.0	Pass
T4	132.5 - 130	Guy B@132.5	7/8	584	19331.40	47820.00	40.4	Pass
		Guy B@132.5	7/8	585	19719.10	47820.00	41.2	Pass
T7	100 - 85	Guy B@87.4583	1/2	596	9220.09	16140.00	57.1	Pass
T10	60 - 40	Guy B@47.5625	9/16	602	12701.40	21000.00	60.5	Pass
T2	155 - 140	Guy C@152.333	1/2	565	8317.69	16140.00	51.5	Pass
		Guy C@152.333	1/2	566	8319.09	16140.00	51.5	Pass
T4	132.5 - 130	Guy C@132.5	7/8	580	19204.70	47820.00	40.2	Pass
		Guy C@132.5	7/8	581	18946.50	47820.00	39.6	Pass
T7	100 - 85	Guy C@87.4583	1/2	592	8981.50	16140.00	55.6	Pass
T10	60 - 40	Guy C@47.5625	9/16	598	12343.10	21000.00	58.8	Pass
T2	155 - 140	Top Guy Pull-Off@152.333	L2x2x3/16	569	-2930.01	13953.10	21.0	Pass
							53.9 (b)	
		Top Guy Pull-Off@152.333	L2x2x3/16	570	-2940.64	13953.10	21.1	Pass
							56.0 (b)	
		Top Guy Pull-Off@152.333	L2x2x3/16	571	-2915.54	13953.10	20.9	Pass
							54.7 (b)	
T7	100 - 85	Top Guy	2x1/2	593	4339.67	45000.00	9.6	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Pull-Off@87.4583						
		Top Guy	2x1/2	594	4360.95	45000.00	9.7	Pass
		Pull-Off@87.4583						
		Top Guy	2x1/2	595	4397.39	45000.00	9.8	Pass
		Pull-Off@87.4583						
T10	60 - 40	Top Guy	2x1/2	599	5656.55	45000.00	12.6	Pass
		Pull-Off@47.5625						
		Top Guy	2x1/2	600	5674.17	45000.00	12.6	Pass
		Pull-Off@47.5625						
		Top Guy	2x1/2	601	5656.92	45000.00	12.6	Pass
		Pull-Off@47.5625						
T2	155 - 140	Torque Arm Top@152.333	C12x20.7	567	-1022.51	171988.00	36.4	Pass
		Torque Arm Top@152.333	C12x20.7	568	-1003.32	171988.00	39.4	Pass
		Torque Arm Top@152.333	C12x20.7	574	-976.25	171988.00	37.9	Pass
		Torque Arm Top@152.333	C12x20.7	575	-984.91	171988.00	36.4	Pass
		Torque Arm Top@152.333	C12x20.7	578	-977.20	171988.00	38.0	Pass
		Torque Arm Top@152.333	C12x20.7	579	-961.73	171988.00	39.5	Pass
T4	132.5 - 130	Torque Arm Top@132.5	C12x20.7 w/ 8"x3/8" plate	582	-4191.38	241128.00	50.8	Pass
		Torque Arm Top@132.5	C12x20.7 w/ 8"x3/8" plate	583	-4485.16	241128.00	56.2	Pass
		Torque Arm Top@132.5	C12x20.7 w/ 8"x3/8" plate	586	-4039.30	241128.00	50.7	Pass
		Torque Arm Top@132.5	C12x20.7 w/ 8"x3/8" plate	587	-4166.61	241128.00	52.9	Pass
		Torque Arm Top@132.5	C12x20.7 w/ 8"x3/8" plate	590	-4234.94	241128.00	52.9	Pass
		Torque Arm Top@132.5	C12x20.7 w/ 8"x3/8" plate	591	-4396.57	241128.00	56.2	Pass

Summary		
Leg (T8)	95.1	Pass
Diagonal (T5)	72.3	Pass
Horizontal (T12)	18.9	Pass
Secondary Horizontal (T3)	35.2	Pass
Top Girt (T3)	39.9	Pass
Bottom Girt (T12)	67.1	Pass
Mid Girt (T13)	0.0	Pass
Guy A (T10)	63.2	Pass
Guy B (T10)	60.5	Pass
Guy C (T10)	58.8	Pass
Top Guy Pull-Off (T2)	56.0	Pass
Torque Arm Top (T4)	56.2	Pass
Bolt Checks	72.3	Pass
RATING =	**95.1**	**Pass**

FOUNDATION ANALYSIS

AECOM

				Page	of
Job	170' Guyed Lattice Tower - Newington, CT	Project No.	NSS-048	Sheet 1	of 2
Description	Spread Footing w/ Pier Analysis - TIA Req	Computed by	MCD	Date	08/10/20
	TIA-222-G Standard - Foundation Pad Check	Checked by		Date	

FOUNDATION ANALYSIS

TOWER FORCES:

Moment Caused by Tower	$M_t := 0 \cdot ft \cdot kips$
Factored Shear at Base of Tower	$S_t := 2480 lbf$
Factored Max Compressive Force	$C_t := 247610 lbf$
Height of Tower	$H_t := 170 \cdot ft$

FOOTING DIMENSIONS:

Overall Depth of Footing	$D_f := 4.5 ft$
Length of Pier	$L_p := 1.75 \cdot ft$
Extension of Pier Above Grade	$L_{pag} := 0.5 \cdot ft$
Diameter of Pier	$d_p := 2 \cdot ft$
Thickness of Footing	$T_f := 2.75 \cdot ft$
Width of Footing:	$W_f := 9.5 ft$

Dimensions of footing indicated above assume the construction of Foundation designed by URS Corportation (project 36912533.00012 / VS1-002) for thickness of 2.75' and footing width of 9.5'.

PROPERTIES:

Internal Friction Angle of Soil	$\phi_s := 30 \cdot deg$
Allowable Bearing Capacity	$q_s := 4000 \cdot psf$
Ultimate Bearing Capacity	$U_{q.s} := 2 \cdot q_s$
Design Bearing Capacity: "0.6" TIA-222-G Red. Factor	$D_{q.s} := 0.6 \cdot U_{q.s} = 4.8 \cdot ksf$
Unit Weight of Soil	$\gamma_s := 130 \cdot pcf$
Unit Weight of Concrete	$\gamma_c := 150 \cdot pcf$
Depth to Neglect	$n := 0 ft$
Cohesion of Clay Type Soil Note: Use 0 for Sandy Soil	$c := 0 \cdot ksf$
Seismic Zone Factor: UBC Fig 23-2	$Z := 2$
Coefficient of Friction between Concrete:	$\mu := 0.45$

STABILITY OF FOOTING

Coefficient of Lateral Soil Pressure:

$$K_p := \frac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)} \qquad K_p = 3$$

Passive Pressure:

$$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} \qquad P_{pn} = 0 \cdot ksf$$

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} \qquad P_{pt} = 0.6825 ksf$$

$$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] \qquad P_{top} = 0.6825 ksf$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} \qquad P_{bot} = 1.755 \cdot ksf$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} \qquad P_{ave} = 1.2188 ksf$$

$$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] \qquad T_p = 2.75 \cdot ft$$

$$A_p := W_f \cdot T_p \qquad A_p = 26.125 \cdot ft^2$$

Ultimate Shear:

$$S_u := P_{ave} \cdot A_p \qquad S_u = 31.8398 \cdot kip$$

AECOM

Job	170' Guyed Lattice Tower - Newington, CT	Project No.	NSS-048	Page / Sheet	of / 2 of 2
Description	Spread Footing w/ Pier Analysis - TIA Req	Computed by	MCD	Date	08/10/20
	TIA-222-G Standard - Foundation Pad Check	Checked by		Date	

Weight of Concrete Pad:

$$WT_c := \left[\left[\left(W_f^2 \cdot T_f\right) + d_p^2 L_p\right] \cdot \gamma_c\right] \cdot 0.9 \qquad WT_c = 34.4503 \cdot kip$$

Weight of Soil: above Footing:

$$WT_{s1} := \left[\left[W_f^2 \cdot \left(\left|L_p - L_{pag}\right|\right) - \frac{d_p^2 \cdot \pi}{4} \cdot \left(\left|L_p - L_{pag}\right|\right)\right] \cdot \gamma_s\right] \cdot 0.9 \qquad WT_{s1} = 12.7396 \cdot kip$$

Weight of Soil Wedge at back face:

$$WT_{s2} := \left[\left(\frac{D_f^2 \cdot \tan\left(\phi_s\right)}{2} \cdot W_f\right) \cdot \gamma_s\right] \cdot 0.9 \qquad WT_{s2} = 6.4975 \cdot kip$$

Total Weight:

$$WT_{tot.0.9} := WT_c + WT_{s1} + C_t \qquad WT_{tot.0.9} = 294.7999 \cdot kip$$

Resisting Moment:

$$M_r := \left(WT_{tot.0.9}\right) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \cdot \left(W_f + \frac{D_f \cdot \tan\left(\phi_s\right)}{3}\right) \qquad M_r = 1496.839 \cdot kip \cdot ft$$

Overturning Moment:

$$M_{ot} := M_t + S_t \cdot \left(L_p + T_f\right) \qquad M_{ot} = 11.16 \cdot kip \cdot ft$$

Factor of Safety:

$$FS := \frac{M_r}{M_{ot}} \qquad FS = 134.13$$

$$SafetyCheck := \text{if}\left(M_r > M_{ot}, \text{"Okay"}, \text{"No Good"}\right) \qquad SafetyCheck = \text{"Okay"}$$

BEARING PRESSURE CAUSED BY FOOTING

$$WT_{tot.1.2} := WT_c \cdot \frac{4}{3} + WT_{s1} \cdot \frac{4}{3} + C_t$$

NOTE: The "4/3" value multiplier is the multiplied value of increasing the above DL*0.9 to equal DL*1.2, per TIA-222-G design Standards (Section 9.4 - Foundation Design) for additional factored Dead Load of Foundation/Soil.

$$A_{mat} := W_f^2 \qquad A_{mat} = 90.25 \cdot ft^2$$

$$S := \frac{W_f^3}{6} \qquad S = 142.8958 \cdot ft^3$$

$$P_{max} := \frac{WT_{tot.1.2}}{A_{mat}} + \frac{M_{ot}}{S} \qquad P_{max} = 3.5189 \cdot ksf$$

$$P_{min} := \frac{WT_{tot.1.2}}{A_{mat}} - \frac{M_{ot}}{S} \qquad P_{min} = 3.3627 \cdot ksf$$

$$MaxPressure := \text{if}\left(P_{max} < D_{q.s}, \text{"Okay"}, \text{"No Good"}\right) \qquad MaxPressure = \text{"Okay"}$$

$$MinPressure := \text{if}\left[\left(P_{min} \geq 0\right) \cdot \left(P_{min} < D_{q.s}\right), \text{"Okay"}, \text{"No Good"}\right] \qquad MinPressure = \text{"Okay"}$$

$$\frac{P_{max}}{D_{q.s}} = 73.31 \cdot \% \qquad \frac{P_{min}}{D_{q.s}} = 70.06 \cdot \%$$

ANCHOR DETAILS

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	1 of 2
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	
	Anchor Block A - Interior Ring	**Checked by:**		**Date**	8/10/20
				Date	

CHECK UPLIFT RESISTANCE

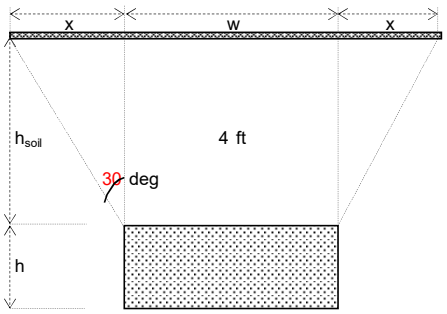
RESULTS FROM COMPUTER ANALYSIS:

(Factored)	Uplift =	14.981	kips
(Factored)	Sliding =	16.866	kips

CONCRETE PARAMETERS:

	γ_{conc} =	150	pcf
	w =	4	ft
	h =	2	ft
	d =	10	ft
	Vol. =	*80*	ft^3
0.9 *	Wc =	*10.80*	kips

*See Note 1 Below for 0.9*DL Explanation*



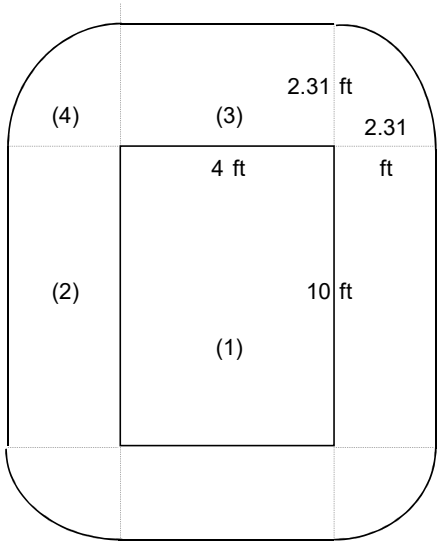
Foundation Section

SOIL PARAMETERS:

	γ_{soil} =	130	pcf
	h_{soil} =	4	ft
	x =	*2.31*	ft

Soil Weight (Wr):

0.9 *	(1) =	18.72	kips
	(2) =	12.01	kips
	(3) =	4.80	kips
	(4) =	2.90	kips
*(5) Anchor Reinf. =		0	kips
R_n =	Total =	38.44	kips
	φs =	0.75	*TIA-222-G Red. Factor*
	$\phi s*R_n$ =	36.93	kips



Foundation Plan View

CHECK UPLIFT (PER TIA-222-G STANDARD):

36.93 **>** *14.981* ***OK*** **40.6%**

(Reduced Resistance) (Factored Uplift)

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

NOTES: ***Note 1 -*** **0.9xDL of concrete and soil directly above foundation (Section 2.3.2 - Note 2)**

Note 2 - Soil not directly above guy anchor treated as "nominal resistance" multiplied by TIAA-222-G Section 9 Reduction Factor for Uplift resistance

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	of
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	2 of 2
	Anchor Block A - Interior Ring	**Checked by:**		**Date**	8/10/20
				Date	

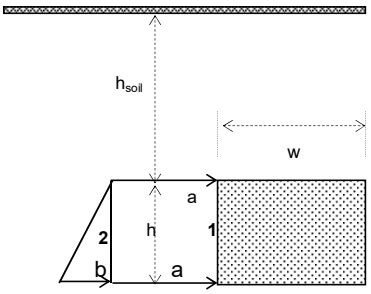
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

$\gamma soil$ =	130	pcf
h_{soil} =	4	ft
h =	2	ft
ϕ =	30	degrees

ANCHOR PARAMETERS

w =	4.0	ft
h =	2.0	ft
d =	10.0	ft



Foundation Elevation View

K_a = 0.33

K_p = 3.00

Δ = 2.67

HORIZONTAL FORCES

1 =		1.56	ksf
2 =		2.34	ksf
Average of Soil Pressure on Anchor Block =		1.95	ksf
RESIST TO SLIDING =		39.00	k
SOIL & CONCRETE WEIGHT * 0.9(DL) =	Wr + Wc =	46.18	k
UPLIFT REACTIONS =		-14.981	k
SUM =		31.20	k
COEF. OF FRICTION, (0.5) =		15.60	k
RESIST TO SLIDING =		39.00	k
SUM =		54.60	k
Applied Reduction Factor (0.75) per TIA-222-G =		40.95	kips

SF AGAINST SLIDING

SF = ***40.95*** ***>*** ***16.9*** ***OK*** **41.2%**

(Reduced Resistance) (Factored Shear/Slide Force)

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

NOTES: Note 1 - "Soil and Concrete Weight shown applies 0.9xDL for Soil above Concrete & Concrete DL
Note 2 - TIA-222-G States "when determinimg a soil nominal resistance that is a function of soil wt. a factor of 1.0 applies to th weight of soil and the resulting nominal strength shall be multiplied by the appropiate resistance factor" (0.75 - TIA-222-G Section 9) "to determine soil design str."

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	___ of ___
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	1 of 2
	Anchor Block B - Interior Ring	**Checked by:**		**Date**	8/10/20
				Date	

CHECK UPLIFT RESISTANCE

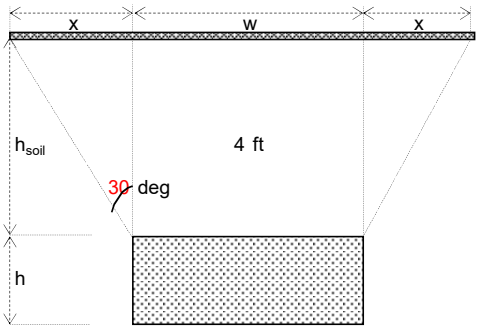
RESULTS FROM COMPUTER ANALYSIS:

(Factored)	Uplift =	13.442	kips
(Factored)	Sliding =	16.911	kips

CONCRETE PARAMETERS:

γ_{conc} =	150	pcf
w =	4	ft
h =	2	ft
d =	10	ft
Vol. =	*80*	ft^3
0.9 * Wc =	*10.80*	kips

*See Note 1 Below for 0.9*DL Explanation*



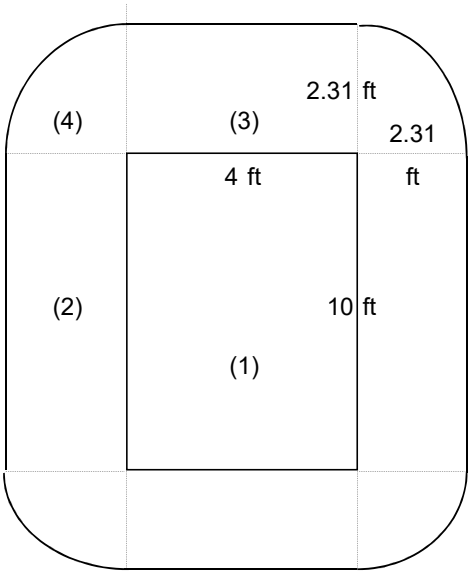
Foundation Section

SOIL PARAMETERS:

γ_{soil} =	130	pcf
h_{soil} =	4	ft
x =	*2.31*	ft

Soil Weight (Wr):

0.9 * (1) =	18.72	kips
(2) =	12.01	kips
(3) =	4.80	kips
(4) =	2.90	kips
*(5) Anchor Reinf. =	0	kips
R_n = Total =	38.44	kips
φs =	0.75	*TIA-222-G Red. Factor*
$\phi s*R_n$ =	36.93	kips



Foundation Plan View

CHECK UPLIFT (PER TIA-222-G STANDARD):

36.93 **>** *13.442* ***OK*** **36.4%**

(Reduced Resistance) (Factored Uplift)

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

NOTES: ***Note 1 -*** **0.9xDL of concrete and soil directly above foundation (Section 2.3.2 - Note 2**

Note 2 - Soil not directly above guy anchor treated as "nominal resistance" multiplied by TIAA-222-G Section 9 Reduction Factor for Uplift resistance

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	___ of ___
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	2 of 2
	Anchor Block B - Interior Ring	**Checked by:**		**Date**	8/10/20
				Date	

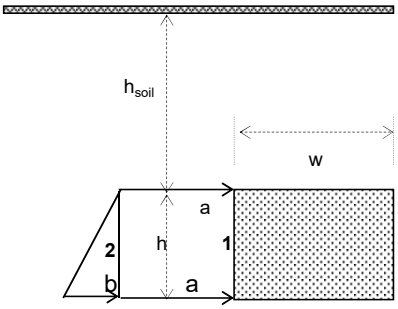
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

$\gamma soil$ =	130	pcf
h_{soil} =	4	ft
h =	2	ft
ϕ =	30	degrees

ANCHOR PARAMETERS

w =	4.0	ft
h =	2.0	ft
d =	10.0	ft



Foundation Elevation View

K_a = 0.33

K_p = 3.00

Δ = 2.67

HORIZONTAL FORCES

1 =		1.56	ksf
2 =		2.34	ksf
Average of Soil Pressure on Anchor Block =		1.95	ksf
RESIST TO SLIDING =		39.00	k
SOIL & CONCRETE WEIGHT * 0.9(DL) =	Wr + Wc =	46.18	k
UPLIFT REACTIONS =		-13.442	k
SUM =		32.74	k
COEF. OF FRICTION, (0.5) =		16.37	k
RESIST TO SLIDING =		39.00	k
SUM =		55.37	k
Applied Reduction Factor (0.75) per TIA-222-G =		41.53	kips

SF AGAINST SLIDING

SF = ***41.53*** ***>*** ***16.9*** ***OK*** **40.7%**

(Reduced Resistance) (Factored Shear/Slide Force)

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

NOTES: Note 1 - "Soil and Concrete Weight shown applies 0.9xDL for Soil above Concrete & Concrete DL
Note 2 - TIA-222-G States "when determinimg a soil nominal resistance that is a function of soil wt. a factor of 1.0 applies to th weight of soil and the resulting nominal strength shall be multiplied by the appropiate resistance factor" (0.75 - TIA-222-G Section 9) "to determine soil design str.'

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	___ of ___
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	1 of 2
	Anchor Block C - Interior Ring	**Checked by:**		**Date**	8/10/20
				Date	

CHECK UPLIFT RESISTANCE

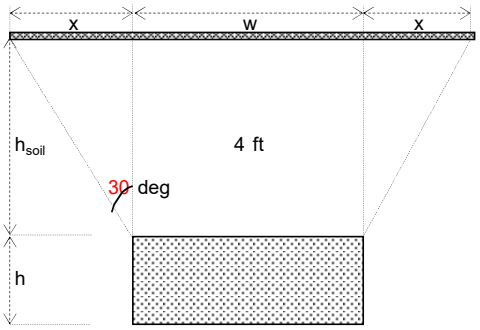
RESULTS FROM COMPUTER ANALYSIS:

(Factored)	Uplift =	12.482	kips
(Factored)	Sliding =	16.874	kips

CONCRETE PARAMETERS:

γ_{conc} =	150	pcf
w =	4	ft
h =	2	ft
d =	10	ft
Vol. =	*80*	ft^3
0.9 * Wc =	*10.80*	kips

*See Note 1 Below for 0.9*DL Explanation*



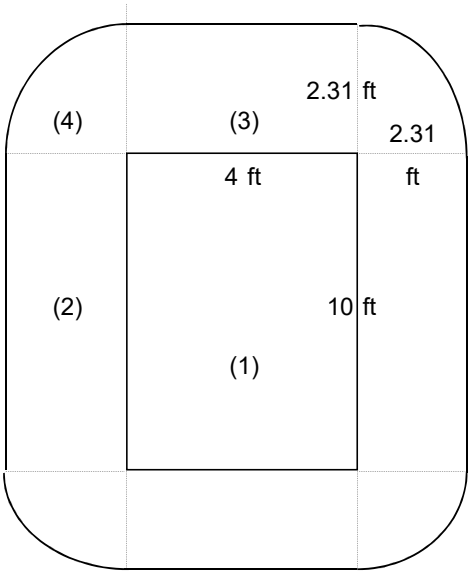
Foundation Section

SOIL PARAMETERS:

γ_{soil} =	130	pcf
h_{soil} =	4	ft
x =	*2.31*	ft

Soil Weight (Wr):

0.9 * (1) =	18.72	kips
(2) =	12.01	kips
(3) =	4.80	kips
(4) =	2.90	kips
*(5) Anchor Reinf. =	0	kips
R_n = Total =	38.44	kips
φs =	0.75	*TIA-222-G Red. Factor*
$\phi s*R_n$ =	36.93	kips



FORCE ←

Foundation Plan View

CHECK UPLIFT (PER TIA-222-G STANDARD):

36.93 **>** *12.482* ***OK*** **33.8%**

(Reduced Resistance) (Factored Uplift)

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

NOTES: ***Note 1 -*** **0.9xDL of concrete and soil directly above foundation (Section 2.3.2 - Note 2**

Note 2 - Soil not directly above guy anchor treated as "nominal resistance" multiplied by TIAA-222-G Section 9 Reduction Factor for Uplift resistance

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	___ of ___
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	2 of 2
	Anchor Block C - Interior Ring	**Checked by:**		**Date**	8/10/20
				Date	

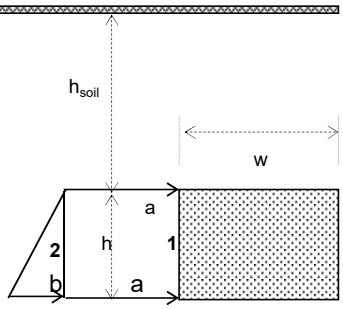
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

$\gamma soil$ =	130	pcf
h_{soil} =	4	ft
h =	2	ft
ϕ =	30	degrees

ANCHOR PARAMETERS

w =	4.0	ft
h =	2.0	ft
d =	10.0	ft



Foundation Elevation View

K_a = 0.33

K_p = 3.00

Δ = 2.67

HORIZONTAL FORCES

1 =		1.56	ksf
2 =		2.34	ksf
Average of Soil Pressure on Anchor Block =		1.95	ksf
RESIST TO SLIDING =		39.00	k
SOIL & CONCRETE WEIGHT * 0.9(DL) =	Wr + Wc =	46.18	k
UPLIFT REACTIONS =		-12.482	k
SUM =		33.70	k
COEF. OF FRICTION, (0.5) =		16.85	k
RESIST TO SLIDING =		39.00	k
SUM =		55.85	k
Applied Reduction Factor (0.75) per TIA-222-G =		41.89	kips

SF AGAINST SLIDING

SF = ***41.89*** ***>*** ***16.9*** ***OK*** **40.3%**

(Reduced Resistance) (Factored Shear/Slide Force)

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

NOTES: Note 1 - "Soil and Concrete Weight shown applies 0.9xDL for Soil above Concrete & Concrete DL
Note 2 - TIA-222-G States "when determinimg a soil nominal resistance that is a function of soil wt. a factor of 1.0 applies to th weight of soil and the resulting nominal strength shall be multiplied by the appropiate resistance factor" (0.75 - TIA-222-G Section 9) "to determine soil design str.'

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	1 of 2
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	
	Anchor Block A - Exterior Ring	**Checked by:**		**Date**	8/10/20
				Date	

CHECK UPLIFT RESISTANCE

** Concrete Parameter dimensions field confirmed from KM Physical Assessment. (3/30/2009) (CSC Reference: EM-T-Mobile-094-090416)*

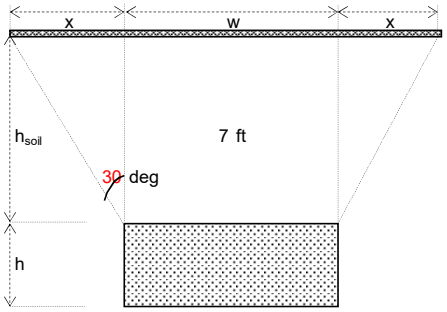
RESULTS FROM COMPUTER ANALYSIS:

(Factored)	Uplift =	43.427	kips
(Factored)	Sliding =	32.617	kips

CONCRETE PARAMETERS:

	γ_{conc} =	150	pcf
	w =	4	ft
	h =	1.833333	ft
	d =	12	ft
	Vol. =	*87.999984*	ft^3
0.9 *	Wc =	*11.88*	kips

*See Note 1 Below for 0.9*DL Explanation*



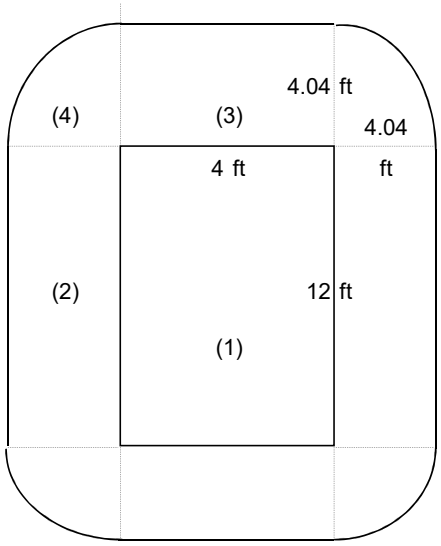
Foundation Section

SOIL PARAMETERS:

	γ_{soil} =	130	pcf
	h_{soil} =	7	ft
	x =	*4.04*	ft

Soil Weight (Wr):

0.9 *	(1) =	39.31	kips
	(2) =	44.13	kips
	(3) =	14.71	kips
	(4) =	15.56	kips
*(5) Anchor Reinf. =		0	kips
R_n =	Total =	113.72	kips
	φs =	0.75	*TIA-222-G Red. Factor*
	$\phi s * R_n$ =	94.20	kips



Foundation Plan View

CHECK UPLIFT (PER TIA-222-G STANDARD):

94.20	>	*43.427*	***OK***	**46.1%**
(Reduced Resistance)		(Factored Uplift)		

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

NOTES: ***Note 1 -*** **0.9xDL of concrete and soil directly above foundation (Section 2.3.2 - Note 2)**
Note 2 - Soil not directly above guy anchor treated as "nominal resistance" multiplied by TIAA-222-G Section 9 Reduction Factor for Uplift resistance

AECOM

Job :	Calahan Tower - Newington, CT	Project No.:	NSS-048	Page / Sheet	2 of 2
Description:	Anchor Block Evaluation - TIA-222-G	Computed by:	MCD	Date	8/10/20
	Anchor Block A - Exterior Ring	Checked by:		Date	

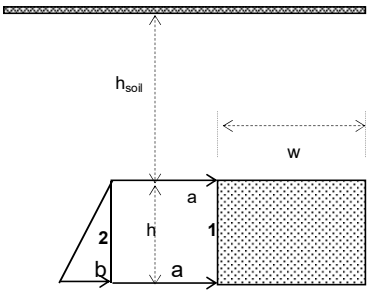
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

$\gamma soil$ = 130 pcf
h_{soil} = 7 ft
h = 1.833333 ft
ϕ = 30 degrees

ANCHOR PARAMETERS

w = 4.0 ft
h = 1.8 ft
d = 12.0 ft



Foundation Elevation View

K_a = 0.33

K_p = 3.00

Δ = 2.67

HORIZONTAL FORCES

1 =		2.73	ksf
2 =		3.44	ksf
Average of Soil Pressure on Anchor Block =		3.09	ksf
RESIST TO SLIDING =		67.92	k
SOIL & CONCRETE WEIGHT * 0.9(DL) =	Wr + Wc =	116.97	k
UPLIFT REACTIONS =		-43.427	k
SUM =		73.54	k
COEF. OF FRICTION, (0.5) =		36.77	k
RESIST TO SLIDING =		67.92	k
SUM =		104.70	k
Applied Reduction Factor (0.75) per TIA-222-G =		78.52	kips

SF AGAINST SLIDING

SF = ***78.52*** ***>*** ***32.6*** ***OK*** **41.5%**
(Reduced Resistance) (Factored Shear/Slide Force)

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

NOTES: Note 1 - "Soil and Concrete Weight shown applies 0.9xDL for Soil above Concrete & Concrete DL
Note 2 - TIA-222-G States "when determinimg a soil nominal resistance that is a function of soil wt. a factor of 1.0 applies to th weight of soil and the resulting nominal strength shall be multiplied by the appropiate resistance factor" (0.75 - TIA-222-G Section 9) "to determine soil design str."

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	___ of ___
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	1 of 2
	Anchor Block B - Exterior Ring	**Checked by:**		**Date**	8/10/20
				Date	

CHECK UPLIFT RESISTANCE

RESULTS FROM COMPUTER ANALYSIS:

(Factored)	Uplift =	41.129	kips
(Factored)	Sliding =	33.113	kips

CONCRETE PARAMETERS:

γ_{conc} =	150	pcf
w =	4	ft
h =	1.833333	ft
d =	12	ft
Vol. =	*87.999984*	ft^3
0.9 * Wc =	*11.88*	kips

*See Note 1 Below for 0.9*DL Explanation*

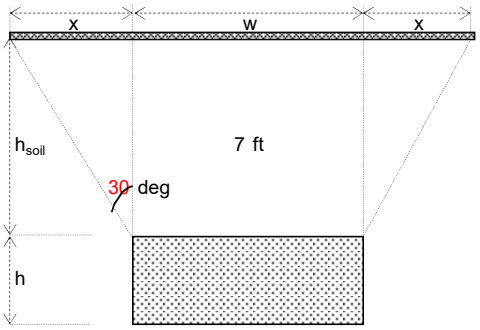
SOIL PARAMETERS:

γ_{soil} =	130	pcf
h_{soil} =	7	ft
x =	*4.04*	ft

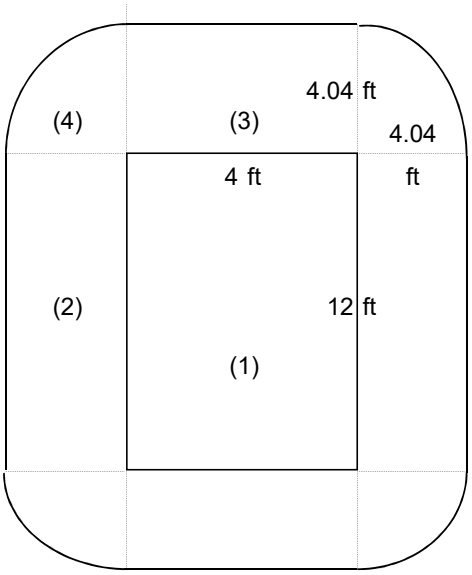
Soil Weight (Wr):

0.9 *	(1) =	39.31	kips
	(2) =	44.13	kips
	(3) =	14.71	kips
	(4) =	15.56	kips
*(5) Anchor Reinf. =		0	kips
R_n =	Total =	113.72	kips
	φs =	0.75	*TIA-222-G Red. Factor*
	$\phi s*R_n$ =	94.20	kips

* *Concrete Parameter dimensions field confirmed from KM Physical Assessment. (3/30/2009) (CSC Reference: EM-T-Mobile-094-090416)*



Foundation Section



FORCE ←

Foundation Plan View

CHECK UPLIFT (PER TIA-222-G STANDARD):

94.20 (Reduced Resistance) **>** *41.129* (Factored Uplift) ***OK*** **43.7%**

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

NOTES: ***Note 1 -*** **0.9xDL of concrete and soil directly above foundation (Section 2.3.2 - Note 2**
Note 2 - Soil not directly above guy anchor treated as "nominal resistance" multiplied by TIAA-222-G Section 9 Reduction Factor for Uplift resistance

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	___ of ___
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	2 of 2
	Anchor Block B - Exterior Ring	**Checked by:**		**Date**	8/10/20
				Date	

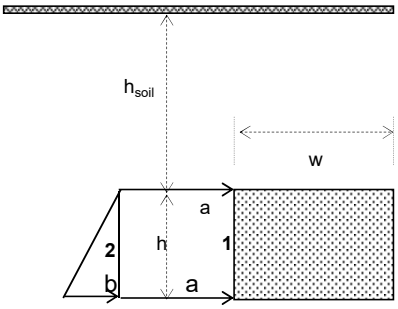
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

$\gamma soil$ =	130	pcf
h_{soil} =	7	ft
h =	1.833333	ft
ϕ =	30	degrees

ANCHOR PARAMETERS

w =	4.0	ft
h =	1.8	ft
d =	12.0	ft



Foundation Elevation View

K_a = 0.33

K_p = 3.00

Δ = 2.67

HORIZONTAL FORCES

1 =		2.73	ksf
2 =		3.44	ksf
Average of Soil Pressure on Anchor Block =		3.09	ksf
RESIST TO SLIDING =		67.92	k
SOIL & CONCRETE WEIGHT * 0.9(DL) =	Wr + Wc =	116.97	k
UPLIFT REACTIONS =		-41.129	k
SUM =		75.84	k
COEF. OF FRICTION, (0.5) =		37.92	k
RESIST TO SLIDING =		67.92	k
SUM =		105.85	k
Applied Reduction Factor (0.75) per TIA-222-G =		79.38	kips

SF AGAINST SLIDING

SF = ***79.38*** ***>*** ***33.1*** ***OK*** **41.7%**

(Reduced Resistance) (Factored Shear/Slide Force)

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

NOTES: Note 1 - "Soil and Concrete Weight shown applies 0.9xDL for Soil above Concrete & Concrete DL
Note 2 - TIA-222-G States "when determinimg a soil nominal resistance that is a function of soil wt. a factor of 1.0 applies to th weight of soil and the resulting nominal strength shall be multiplied by the appropiate resistance factor" (0.75 - TIA-222-G Section 9) "to determine soil design str.'

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	___ of ___
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	1 of 2
	Anchor Block C - Exterior Ring	**Checked by:**		**Date**	8/10/20
				Date	

CHECK UPLIFT RESISTANCE

RESULTS FROM COMPUTER ANALYSIS:

(Factored)	Uplift =	39.600	kips
(Factored)	Sliding =	33.642	kips

CONCRETE PARAMETERS:

γ_{conc} =	150	pcf
w =	4	ft
h =	1.833333	ft
d =	12	ft
Vol. =	*87.999984*	ft^3
0.9 * Wc =	*11.88*	kips

*See Note 1 Below for 0.9*DL Explanation*

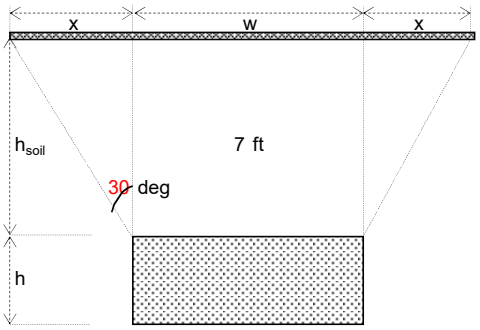
SOIL PARAMETERS:

γ_{soil} =	130	pcf
h_{soil} =	7	ft
x =	*4.04*	ft

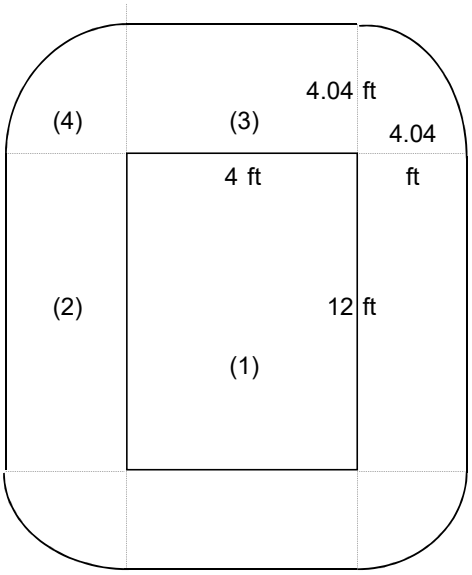
Soil Weight (Wr):

0.9 *	(1) =	39.31	kips
	(2) =	44.13	kips
	(3) =	14.71	kips
	(4) =	15.56	kips
*(5) Anchor Reinf. =		0	kips
R_n =	Total =	113.72	kips
	φs =	0.75	*TIA-222-G Red. Factor*
	$\phi s*R_n$ =	94.20	kips

* *Concrete Parameter dimensions field confirmed from KM Physical Assessment. (3/30/2009) (CSC Reference: EM-T-Mobile-094-090416)*



Foundation Section



FORCE ←

Foundation Plan View

CHECK UPLIFT (PER TIA-222-G STANDARD):

94.20 (Reduced Resistance) **>** *39.6* (Factored Uplift) ***OK*** **42.0%**

→ ***GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE***

NOTES: ***Note 1 -*** **0.9xDL of concrete and soil directly above foundation (Section 2.3.2 - Note 2**
Note 2 - Soil not directly above guy anchor treated as "nominal resistance" multiplied by TIAA-222-G Section 9 Reduction Factor for Uplift resistance

AECOM

Job :	Calahan Tower - Newington, CT	**Project No.:**	NSS-048	**Page**	___ of ___
Description:	Anchor Block Evaluation - TIA-222-G	**Computed by:**	MCD	**Sheet**	2 of 2
	Anchor Block C - Exterior Ring	**Checked by:**		**Date**	8/10/20
				Date	

CHECK SLIDING RESISTANCE

SOIL PARAMETERS

$\gamma soil$ = 130 pcf

h_{soil} = 7 ft

h = 1.833333 ft

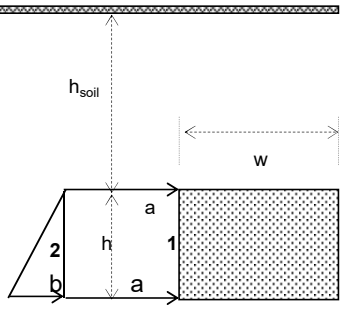
ϕ = 30 degrees

ANCHOR PARAMETERS

w = 4.0 ft

h = 1.8 ft

d = 12.0 ft



Foundation Elevation View

K_a = 0.33

K_p = 3.00

Δ = 2.67

HORIZONTAL FORCES

1 =		2.73	ksf
2 =		3.44	ksf
Average of Soil Pressure on Anchor Block =		3.09	ksf
RESIST TO SLIDING =		67.92	k
SOIL & CONCRETE WEIGHT * 0.9(DL) =	Wr + Wc =	116.97	k
UPLIFT REACTIONS =		-39.6	k
SUM =		77.37	k
COEF. OF FRICTION, (0.5) =		38.69	k
RESIST TO SLIDING =		67.92	k
SUM =		106.61	k
Applied Reduction Factor (0.75) per TIA-222-G =		79.96	kips

SF AGAINST SLIDING

SF = ***79.96*** ***>*** ***33.6*** ***OK*** **42.1%**

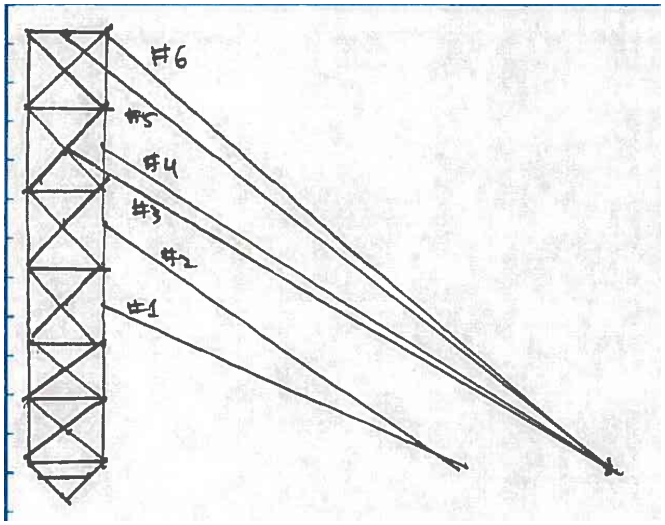
(Reduced Resistance) (Factored Shear/Slide Force)

→ ***GUY ANCHORS AGAINST SLIDING ARE ADEQUATE***

NOTES: Note 1 - "Soil and Concrete Weight shown applies 0.9xDL for Soil above Concrete & Concrete DL
Note 2 - TIA-222-G States "when determinimg a soil nominal resistance that is a function of soil wt. a factor of 1.0 applies to th weight of soil and the resulting nominal strength shall be multiplied by the appropiate resistance factor" (0.75 - TIA-222-G Section 9) "to determine soil design str.'

MISCELLANEOUS GUY ANCHOR COMPONENTS

Job	170' Guyed Lattice Tower - Newington, CT	Project No.	NSS-048	Sheet	1 of ___
Description	Guy Anchor Components Analysis with TIA-222-G	Computed by	MCD	Date	08/10/20
	Standard Design Parameters - Analysis Design	Checked by		Date	



Cable #	Maximum Tension Force EHS Guy Cables (lbf) TNX Analysis Program
# 6	8777.97 lbf
# 5	8762.37 lbf
# 4	20376 lbf
# 3	20335 lbf
# 2	9570 lbf
# 1	13280 lbf

- Check Shackle / Turnbuckle Assemblies:

Existing **Turnbuckle** @ Guy Anchor Base:

Cable #	Turnbuckle Diameter		Braking Force (lbf)	TIA-222-G Sect 7.6.2 ϕ = 0.5					Capacity Ratio (%)	Connecting Plate Hole Diameter	Pin Diameter	CHECK
# 1	7/8	--------->	36000	0.5	=	18000	>	13280.1 OK	73.8%	1.125	0.75	OK
# 2	7/8	--------->	36000	0.5	=	18000	>	9570.44 OK	53.2%	1.125	0.75	OK
# 3	1 1/4	--------->	76000	0.5	=	38000	>	20334.7 OK	53.5%	1.125	0.88	OK
# 4	1 1/4	--------->	76000	0.5	=	38000	>	20375.9 OK	53.6%	1.125	0.88	OK
# 5	1	--------->	50000	0.5	=	25000	>	8762.37 OK	35.0%	1.125	0.88	OK
# 6	1	--------->	50000	0.5	=	25000	>	8777.97 OK	35.1%	1.125	0.88	OK

* NOTE: "Braking Force is in reference to the Breaking Capacity of the Turnbuckle referenced from SitePro1 product catalog"

Existing **Shackle** @ Guy Tower Connection:

Cable #	Shackle Diameter		Braking Force (lbf)	TIA-222-G Sect 7.6.2 ϕ = 0.5					Capacity Ratio (%)
# 1	3/4	--------->	47500	0.5	=	23750	>	13280.1 OK	55.9%
# 2	3/4	--------->	47500	0.5	=	23750	>	9570.44 OK	40.3%
# 3	7/8	--------->	65000	0.5	=	32500	>	20334.7 OK	62.6%
# 4	7/8	--------->	65000	0.5	=	32500	>	20375.9 OK	62.7%
# 5	3/4	--------->	47500	0.5	=	23750	>	8762.37 OK	36.9%
# 6	3/4	--------->	47500	0.5	=	23750	>	8777.97 OK	37.0%

* NOTE: "Braking Force is in reference to the Breaking Capacity of the Turnbuckle referenced from SitePro1 product catalog"

- CHECK Guy Connection on Topwer for Cables 1 & 2 (Interior Anchor Ring):
*** Calculations are considering modified connection corner plate for capacity design criteria
TIA-222-G Section 4.9.6.2 - Bolt Bearing on Plate

$$R_n = 1.2 * \left(L_c + \frac{d_{bolt}}{4}\right) * t_{plate} * F_{u.steel} \leq 2.4 * d_{bolt} * t_{plate} * F_{u.steel} \qquad \theta = 0.80$$

Edge Distance =	1.25 in	d.bolt =	0.88 in
Hole =	1.0625 in	t.plate =	0.5 in
Lc =	1.25 in	F.u.Plate =	65 ksi
ϕ =	0.8		

Rn =	57330 (lbf)	<	68640 (lbf)	NOTE: Lower value Governs Design

Rn =	57330				
ϕ * Rn =	45864	>	13280.1	OK	29.0% Cable #1
	45864	>	9570.44	OK	20.9% Cable #2

TIA-222-G Section 4.9.6.5 - Connecting Elements

- Tension Yielding - Plate

$$R_n = F_{y.steel} * A_{gross.t} \qquad \theta = 0.90$$

Fy. Steel =	50 ksi		
A.gross.t =	1.8125 in2		
ϕ =	0.9		
Rn =	90625 lbf		
ϕ * Rn =	81562.5 lbf		

- Tension Rupture - Plate

$$R_n = F_{u.steel} * A_{n.tension} \qquad \theta = 0.75$$

Fy. Steel =	65 ksi		
A.net.t	1.28125 in2		
ϕ =	0.75		
Rn =	83281 lbf		
ϕ * Rn =	62461 lbf		

- Shear Yield - Plate

$$R_n = 0.6 * F_{y.steel} * A_{gross.v} \qquad \theta = 1.00$$

Fy. Steel =	50 ksi		
A.gross.v =	1.28125 in2	<---	3-5/8*7/16
ϕ =	1		
Rn =	38437.5 lbf		
ϕ * Rn =	38437.5 lbf		

- Shear Rupture - Plate

$$R_n = 0.6 * F_{u.steel} * A_{net.v} \qquad \theta = 0.75$$

Fy. Steel =	65 ksi		
A.net.v	1.28125 in2	<---	(3-5/8-17/16)*7/16
ϕ =	0.75		
Rn =	49968.75 lbf		
ϕ * Rn =	37476.56 lbf		

- Block Shear - Plate

$$R_n = 0.6 * F_{u.steel} * A_{nv} + U_{bs} * F_{u.steel} * A_{nt} \leq 0.6 * F_{y.steel} * A_{gross.v} + U_{bs} * F_{u.steel} * A_{nt} \qquad \theta = 0.75$$

F.y.steel =	50 ksi
F.u.steel =	65 ksi
A.gross =	1.8125 in2
A.nv =	0.625 in2
A.nt =	0.625 in2
U.bs =	0.5
ϕ =	0.75

* NOTE: Plate area is minimal break-out of plate w/ smallest dimensions

Rn =	44.6875 kip	<	74.6875 kip	NOTE: Lower value Governs Design

Rn =	44687.5 lbf
ϕ * Rn =	33515.63 lbf

GOVERNING Design Resistance Check (4.9.6.3)

- Tension Yielding - Plate	81562.5 lbf
- Tension Rupture - Plate	62461 lbf
- Shear Yielding - Plate	38437.5 lbf
- Shear Rupture - Plate	37477 lbf
- Block Shear - Plate	33516 lbf
Governing Resistance	33516 lbf

ϕ * Rn =	33516 lbf	>	13280.1 lbf	39.6%
	33516 lbf	>	9570.44 lbf	28.6%

- CHECK Guy Connection on Tower for Cables 3 & 4 (Exterior Anchor Ring): **Existing Condition**

TIA-222-G Section 4.9.6.2 - Bolt Bearing on Plate

$$R_n = 1.2 * \left(L_c + \frac{d_{bolt}}{4}\right) * t_{plate} * F_{u.steel} \leq 2.4 * d_{bolt} * t_{plate} * F_{u.steel} \qquad \theta = 0.80$$

Edge Distance =	1.625 in	d.bolt =	1.125 in	(reference: NE Tower Climb (2018)
Hole =	1.25 in	t.plate =	0.5625 in	
Lc =	1 in	F.u.Plate =	65 ksi	
ϕ =	0.8			

Rn =	56214.84 (lbf)	<	98718.75 (lbf)	NOTE: Lower value Governs Design

Rn =	56214.84			
ϕ * Rn =	44971.88	>	20334.7 OK	45.2% Cable #3
	44971.88	>	20375.9 OK	45.3% Cable #4

TIA-222-G Section 4.9.6.5 - Connecting Elements

- Tension Yielding - Plate

$$R_n = F_{y.steel} * A_{gross.t} \qquad \theta = 0.90$$

Fy. Steel =	50 ksi
A.gross.t =	2.25 in2
ϕ =	0.9
Rn =	112500 lbf
ϕ * Rn =	101250 lbf

- Tension Rupture - Plate

$$R_n = F_{u.steel} * A_{n.tension} \qquad \theta = 0.75$$

Fu. Steel =	65 ksi	(ASTM A529-GR50)
A.net.t	1.546875 in2	
ϕ =	0.75	
Rn =	100547 lbf	
ϕ * Rn =	75410 lbf	

- Shear Yield - Plate

$$R_n = 0.6 * F_{y.steel} * A_{.gross.v} \qquad \theta = 1.00$$

Fy. Steel =	50 ksi
A.gross.v =	2.25 in2
ϕ =	1
Rn =	67500 lbf
ϕ * Rn =	67500 lbf

- Shear Rupture - Plate

$$R_n = 0.6 * F_{u.steel} * A_{net.v} \qquad \theta = 0.75$$

Fy. Steel =	65 ksi	(ASTM A529-GR50)
A.net.v	1.546875 in2	
ϕ =	0.75	
Rn =	60328.13 lbf	
ϕ * Rn =	45246.09 lbf	

- Block Shear - Plate

$$R_n = 0.6 * F_{u.steel} * A_{nv} + U_{bs} * F_{u.steel} * A_{nt} \leq 0.6 * F_{y.steel} * A_{gross.v} + U_{bs} * F_{u.steel} * A_{nt} \qquad \theta = 0.75$$

F.y.steel =	50 ksi
F.u.steel =	65 ksi
A.gross =	2.25 in2
A.nv =	0.5625 in2
A.nt =	0.5625 in2
U.bs =	0.5
ϕ =	0.75

* NOTE: Plate area is minimal break-out of plate w/ smallest dimensions

Rn =	40.21875 (lbf)	<	85.78125 (lbf)	NOTE: Lower value Governs Design

Rn =	40218.75 lbf
ϕ * Rn =	30164.06 lbf

GOVERNING Design Resistance Check (4.9.6.3)

- Tension Yielding - Plate	101250 lbf
- Tension Rupture - Plate	75410 lbf
- Shear Yielding - Plate	67500 lbf
- Shear Rupture - Plate	45246 lbf
- Block Shear - Plate	30164 lbf
Governing Resistance	30164 lbf

ϕ * Rn =	30164 lbf	>	20335 lbf	67.4%	(Include Attachment Details for this location)
	30164 lbf	>	20376 lbf	67.6%	

- CHECK Guy Connection on Tower for Cables 5 & 6 (Exterior Anchor Ring):

TIA-222-G Section 4.9.6.2 - Bolt Bearing on Plate

$$R_n = 1.2 * \left(L_c + \frac{d_{bolt}}{4}\right) * t_{plate} * F_{u.steel} \le 2.4 * d_{bolt} * t_{plate} * F_{u.steel} \qquad \theta = 0.80$$

Edge Distance =	1.5 in	d.bolt =	0.875 in	(for 7/8" shackle pin diameter)
Hole =	1.5 in	t.plate =	0.75 in	
Lc =	0.75 in	F.u.Plate =	50 ksi	
ϕ =	0.8			

Rn = 43593.75 (lbf) < 78750 (lbf) NOTE: Lower value Governs Design

Rn = 43593.75

ϕ * Rn = 34875 > 13280.1 OK 38.1% Cable #5

34875 > 9570.44 OK 27.4% Cable #6

TIA-222-G Section 4.9.6.3 - Connecting Elements

- Tension Yielding - Plate

$R_n = F_{y.steel} * A_{gross.t}$ $\theta = 0.90$

Fy. Steel =	36	ksi	
A.gross.t =	2.25	in2	
ϕ =	0.9		
Rn =	81000	lbf	
ϕ * Rn =	72900	lbf	

- Tension Rupture - Plate

$R_n = F_{u.steel} * A_{n.tension}$ $\theta = 0.75$

Fy. Steel =	58	ksi	
A.net.t	1.125	in2	
ϕ =	0.75		
Rn =	65250	lbf	
ϕ * Rn =	48938	lbf	

- Shear Yield - Plate

$R_n = 0.6 * F_{y.steel} * A_{gross.v}$ $\theta = 1.00$

Fy. Steel =	36	ksi	
A.gross.v =	2.25	in2	
ϕ =	1		
Rn =	48600	lbf	
ϕ * Rn =	48600	lbf	

- Shear Rupture - Plate

$R_n = 0.6 * F_{u.steel} * A_{net.v}$ $\theta = 0.75$

Fy. Steel =	58	ksi	
A.net.v	1.125	in2	
ϕ =	0.75		
Rn =	39150	lbf	
ϕ * Rn =	29362.5	lbf	

- Block Shear - Plate

$$R_n = 0.6 * F_{u.steel} * A_{nv} + U_{bs} * F_{u.steel} * A_{nt} \le 0.6 * F_{y.steel} * A_{gross.v} + U_{bs} * F_{u.steel} * A_{nt} \qquad \theta = 0.75$$

F.y.steel =	36	ksi	* NOTE: Plate area is minimal break-out of plate w/ smallest dimensions
F.u.steel =	50	ksi	
A.gross =	1.125	in2	=1.50 x 3/4
A.nv =	0.5625	in2	=3/4 x 3/4
A.nt =	0.5625	in2	=3/4 x 3/4
U.bs =	0.5		
ϕ =	0.75		

Rn = 30.9375 (lbf) < 38.3625 (lbf) NOTE: Lower value Governs Design

Rn = 30937.5 lbf

ϕ * Rn = 23203.13 lbf

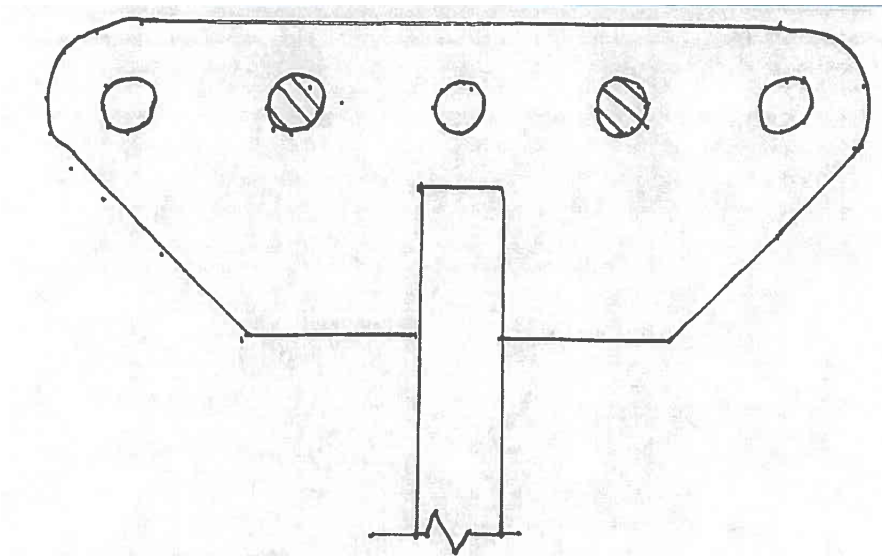
GOVERNING Design Resistance Check (4.9.6.3)

- Tension Yielding - Plate	72900 lbf
- Tension Rupture - Plate	48938 lbf
- Shear Yielding - Plate	48600 lbf
- Shear Rupture - Plate	29363 lbf
- Block Shear - Plate	23203 lbf
Governing Resistance	23203 lbf

ϕ * Rn = 23203 lbf > 8762.37 lbf 37.8%

23203 lbf > 8777.97 lbf 37.8%

Job	170' Guyed Lattice Tower - Newington, CT	Project No.	NSS-048	Sheet	1 of
Description	Guy Anchor Components Analysis with TIA-222-G	Computed by	MCD	Date	08/10/20
	Standard Design Parameters - Analysis Design	Checked by		Date	



Check Guy Connection Fan Plate - Interior Anchorage Ring

F. Design 13280 lbf (max) Maximum cable force for cables #1 & 2

Block Shear Plate - (Plate reference ROHN Product/Part # GAC5655TOP)

- Block Shear - Plate

$$R_n = 0.6 * F_{u.steel} * A_{nv} + U_{bs} * F_{u.steel} * A_{nt} \leq 0.6 * F_{y.steel} * A_{gross.v} + U_{bs} * F_{u.steel} * A_{nt} \qquad \theta = 0.75$$

F.y.steel =	50	ksi	* NOTE: Plate area is minimal break-out of plate w/ smallest dimensions
F.u.steel =	65	ksi	
A.gross =	0.625	in2	=1.25 x 1/2
A.nv =	0.4375	in2	=7/8 x 1/2
A.nt =	0.4375	in2	=7/8 x 1/2
U.bs =	0.5		
ϕ =	0.75		

Rn = 31.28125 (lbf) < 32.96875 (lbf) NOTE: Lower value Governs Design

Rn = 31281.25 lbf

ϕ * Rn = 23460.94 lbf > 13280 lbf 56.6%

- CHECK Guy Connection - Solid Rod welded to Fan Plate: (TIA-222-G Section 4.6.3)

F.Design 22558 lbf (max) Maximum Tension Force - Interior Anchor Ring (TNX Tower Results) - Manual Entry

Qty =	1	ea
A.gross =	1.227	in2
F.y.steel =	50	ksi
F.u.steel =	65	ksi
ϕ =	0.8	

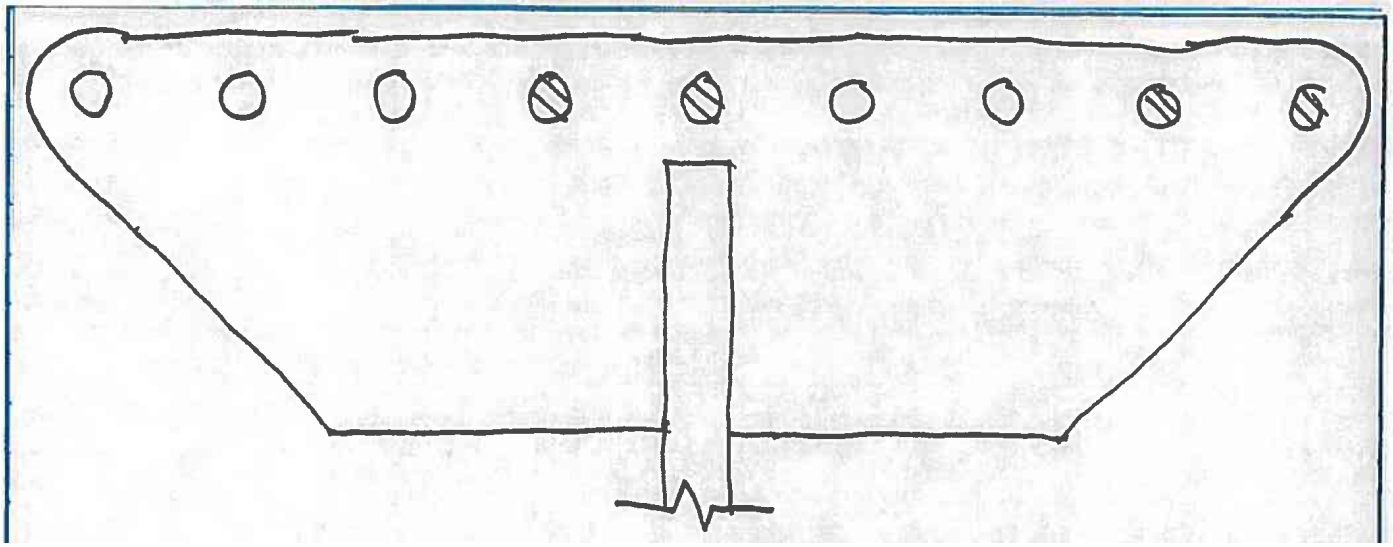
Rn = 59121.99 lbf

ϕ * Rn = 47297.59 lbf > 22558 lbf 47.7%

ϕ = 0.65

Rn = 76858.58 lbf

ϕ * Rn = 49958.08 lbf > 22558 lbf 45.2%



Check Guy Connection Fan Plate - Exterior Anchorage Ring

F. Design 20376 lbf (max) — Maximum cable force for cables #3,4,5 & 6

Block Shear Plate - (Plate reference ROHN Product/Part # GAC5755TOP) Along with Field Measurements from NE Towers (2018)

- Block Shear - Plate

$$R_n = 0.6 * F_{u.steel} * A_{nv} + U_{bs} * F_{u.steel} * A_{nt} \leq 0.6 * F_{y.steel} * A_{gross.v} + U_{bs} * F_{u.steel} * A_{nt} \qquad \theta = 0.75$$

F.y.steel =	50	ksi	* NOTE: Plate area is minimal break-out of plate w/ smallest dimensions
F.u.steel =	65	ksi	
A.gross =	0.9375	in2	=1.25 x 3/4
A.nv =	0.65625	in2	=7/8 x 3/4
A.nt =	0.65625	in2	=7/8 x 3/4
U.bs =	0.5		
ϕ =	0.75		

Rn = 46.92188 (lbf) < 49.45313 (lbf) NOTE: Lower value Governs Design

Rn = 46921.88 lbf

ϕ * Rn = 35191.41 lbf > 20376 lbf 57.9%

- CHECK Guy Connection - Solid Rod welded to Fan Plate: (TIA-222-G Section 4.6.3)

F.Design 54312 lbf (max) — Maximum Tension Force - Exterior Anchor Ring (TNX Tower Results) - Manual Entry

Qty =	1	ea	
A.gross =	1.622952	in2	
F.y.steel =	50	ksi	* Application of 50 ksi steel from Original Construction Dwgs from Mohawk Towers
F.u.steel =	65	ksi	*Diameter assumed to be similar to ROHN Product GAC5755TOP Assembly*
ϕ =	0.8		(NOTE: TIA-222-G use of 0.8 is larger than AISC Tension reduction of 0.9)

Rn = 103435.8 lbf

ϕ * Rn = 82748.68 lbf > 54312 lbf 65.6%

ϕ = 0.65

Rn = 134466.6 lbf

ϕ * Rn = 87403.29 lbf > 54312 lbf 62.1%

DESIGN REFERENCES / INFORMATION

RAN Template:	A&L Template:
67D5A997DB Hybrid	67D5997DB_2xAIR+1OP (U21 Market)

CT11174A_Anchor_7_draft

Print Name: Standard
PORs: Anchor_Phase 3

Section 1 - Site Information

Site ID: CT11174A
Status: Draft
Version: 7
Project Type: Anchor
Approved: Not Approved
Approved By: Not Approved
Last Modified: 7/1/2020 10:26:33 AM
Last Modified By: Hansraj.Rana4@T-Mobile.com

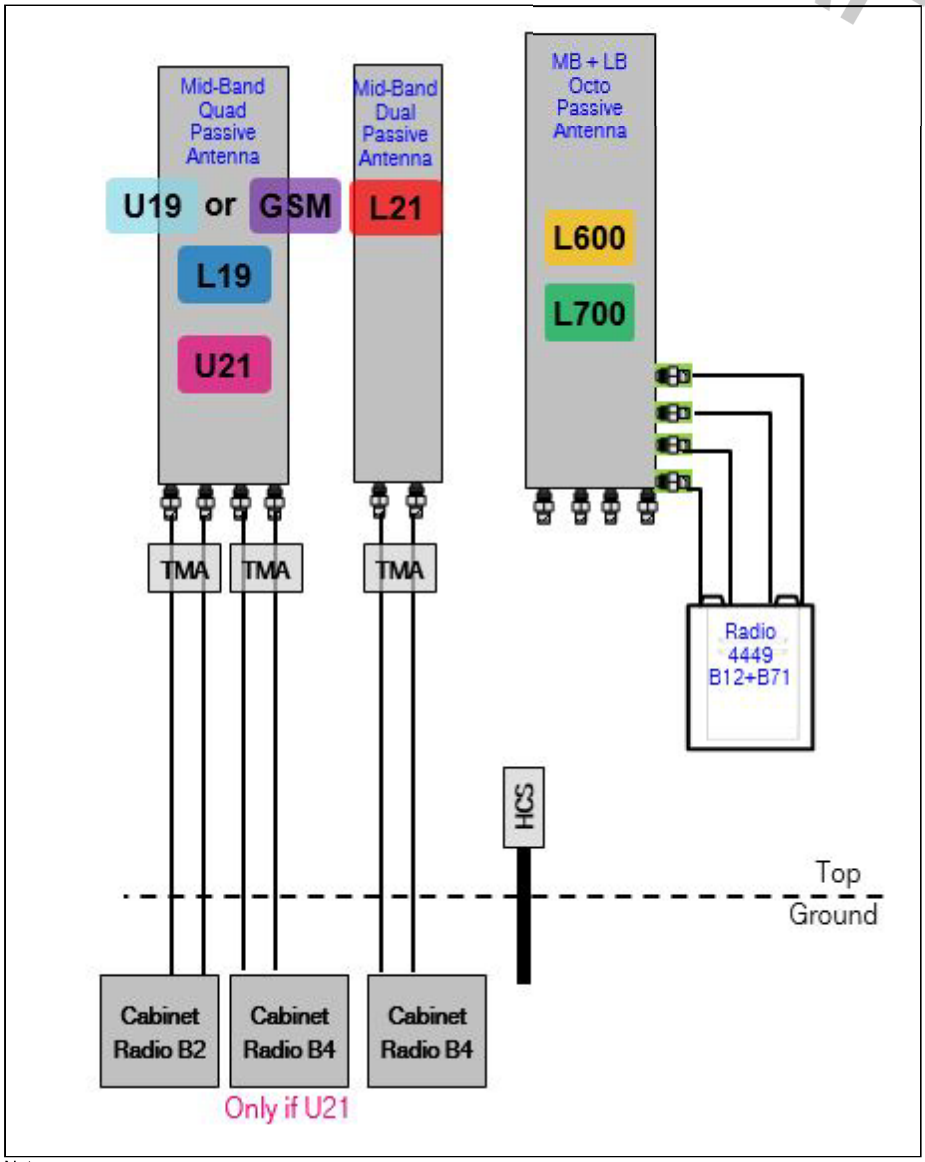
Site Name: Callahan Tower_1
Site Class: Guyed Tower
Site Type: Structure Non Building
Plan Year: 2020
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: Not Specified

Latitude: 41.69428000
Longitude: -72.70856000
Address: 99 Cedarwood Lane (Berlin Tpke)
City, State: Newington, CT
Region: NORTHEAST

RAN Template: 67D5A997DB Hybrid			AL Template: 67D5997DB_2xAIR+1OP (U21 Market)	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 6	**TMA Count:** 3	**RRU Count:** 6

Section 2 - Existing Template Images

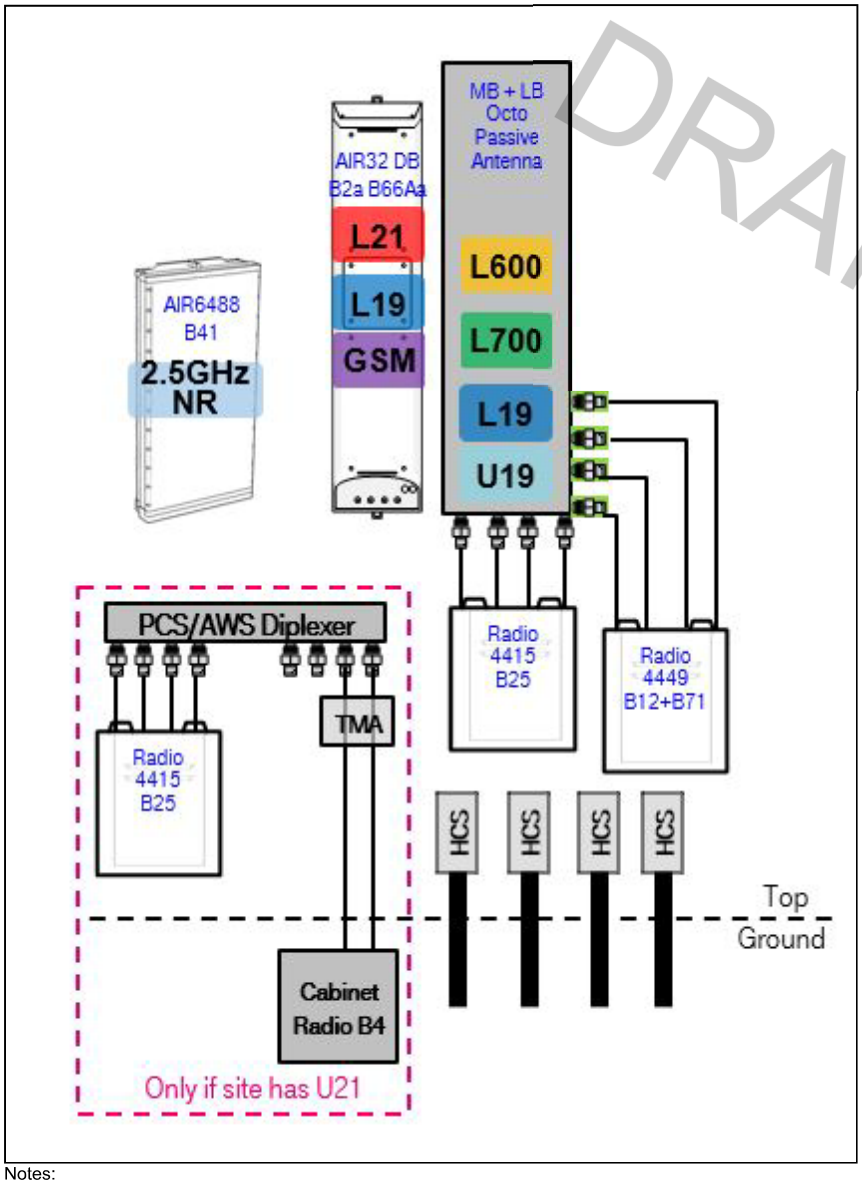
67D94B_1DP+1QP+1OP.JPG



Notes:

Section 3 - Proposed Template Images

67D5997DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

----- This section is intentionally blank. -----

RAN Template:	A&L Template:
67D5A997DB Hybrid	67D5997DB_2xAIR+1OP (U21 Market)

CT11174A_Anchor_7_draft

Print Name: Standard
PORs: Anchor_Phase 3

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 67D94B Outdoor

Enclosure	1	2
Enclosure Type	RBS 6102	Ancillary Equipment (Ericsson)
Baseband	DUW30 (U2100); DUW30 (U1900 (DECOMMISSIONED)); DUG20 (G1900); BB 6630 (L2100, L1900, L700, L600); BB 6630 (N600)	
Hybrid Cable System		Ericsson 6x12 HCS *Select Length & AWG*
Radio	RUS01 B2 **(x 3)** (L1900); RUS01 B2 **(x 3)** (L1900, U1900 (DECOMMISSIONED)); RUS01 B4 **(x 6)** (L2100)	

Proposed RAN Equipment

Template: 67D5A997DB Hybrid

Enclosure	1	2	3
Enclosure Type	RBS 6102	Enclosure 6160	B160
Baseband	DUW30 (U2100); DUG20 (G1900); BB 6630 (L2100, L1900, L700, L600); BB 6630 (N600)	BB 6630 (L2500); BB 6648 (N2500)	
Hybrid Cable System	Ericsson 6x12 HCS *Select Length & AWG*	PSU 4813 Ericsson 6x12 HCS *Select AWG & Length* **(x 2)**	
Radio	RUS01 B4 **(x 6)** (U2100)		

RAN Scope of Work:

Add (1) Enclosure 6160.

Add (1) Battery Cabinet B160.

Add (1) iXRe Router to new Enclosure 6160.

Add (1) BB6630 for L2500 to new Enclosure 6160.

Add (1) BB6648 for N2500 to new Enclosure 6160.

Add (1) PSU 4813 Power Booster

Remove (6) RUS01 B2 radios from cabinet. (Not in use)

Existing: (19) 1-5/8" coax lines & (1) 6x12 HCS

Existing (6) Coax lines will be used for U2100.

Add (2) 6X12 HCS. Length of new HCS will match that of existing HCS.

Remove (13) unconnected coaxial lines.

Remove (3) unconnected PCS TMAs.

RAN Template:	A&L Template:
67D5A997DB Hybrid	67D5997DB_2xAIR+1OP (U21 Market)

CT11174A_Anchor_7_draft

Print Name: Standard
PORs: Anchor_Phase 3

Section 6 - A&L Equipment

Existing Template: 67D94B_1DP+1QP+1OP
Proposed Template: 67D5997DB_2xAIR+1OP (U21 Market)

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	RFS - APX16DWV-16DWV-S-E-A20 (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	60		60				60			
M. Tilt	0		0				0			
Height	163		163				163			
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**
Active Tech.	G1900	U2100	L2100	L1900				L700 L600 N600	L700 L600 N600	
Dark Tech.										
Restricted Tech.										
Decomm. Tech.	U1900									
E. Tilt	6	6	6	6				2		
Cables	1-5/8" Coax - 192 ft. **(x2)**	1-5/8" Coax - 192 ft. **(x2)**						Coax Jumper **(x2)**	Coax Jumper **(x2)**	
TMAs	Generic Twin Style 1A - PCS (AtAntenna)	Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio								Radio 4449 B71+B85 (At Antenna)		
Sector Equipment										

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:
67D5A997DB Hybrid	67D5997DB_2xAIR+1OP (U21 Market)

CT11174A_Anchor_7_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	60		60				60			
M. Tilt	0		0				0			
Height	163		163				163			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L2100	L2100	L1900 G1900	L1900 G1900	L700 L600 N600	L700 L600 N600	L1900	L1900 U2100
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	0	0								
Cables	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	1-5/8" Coax - 192 ft. **(x2)** Coax Jumper **(x2)**
TMAs										Generic Twin Style 1B - AWS (AtAntenna)
Diplexers / Combiners									Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)
Radio							Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4415 B25 (At Antenna)	SHARED Radio 4415 B25 (At Antenna)
Sector Equipment										

Unconnected Equipment:

Scope of Work:

** L600 SOW ***

Swap LNX antenna in P3 with Octo port antenna for L600/L700.

Remove RRUS11 B12 (L700) Radios from Ground and Add Radio 4449 B71+B85 at top (behind Octo antenna at P3).

*** Anchor SOW ***

Swap P1 RFS-APX16DWV antenna with (1) AIR6449 B41 for L2500/N2500.

Move GSM to AIR32-DB antenna with L19-C1 in Mixed mode.

Add (1) 8x4 diplexer Commscope - SDX1926Q-43 with P3 Octo antenna.

Add (1) Radio 4415 B25 for L1900 2nd Carrier to P3 Octo antenna, and connect its ports to the four PCS input ports of the diplexer.

Move U21 to P3 Octo antenna with existing (2) Coax lines and AWS TMA. Connect two coax lines/jumper from AWS TMA to the AWS input ports of the diplexer.

U21 will be diplexed with L1900 C2 using 8x4 diplexer Commscope - SDX1926Q-43 on Octo antenna as shown in diagram.

Make sure to place metal caps on the unused ports of the diplexer.

Ensure RET control is enabled for all technology layers according to the Design Documents.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67D5A997DB Hybrid	67D5997DB_2xAIR+1OP (U21 Market)

CT11174A_Anchor_7_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 2 (Existing) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	RFS - APX16DWV-16DWV-S-E-A20 (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	200		200				200			
M. Tilt	0		0				0			
Height	163		163				163			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	G1900	U2100	L2100	L1900				L700 L600 N600	L700 L600 N600	
Dark Tech.										
Restricted Tech.										
Decomm. Tech.	U1900									
E. Tilt	6	6	6	6				2		
Cables	1-5/8" Coax - 192 ft. **(x2)**	1-5/8" Coax - 192 ft. **(x2)**						Coax Jumper **(x2)**	Coax Jumper **(x2)**	
TMAs	Generic Twin Style 1A - PCS (AtAntenna)	Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio								Radio 4449 B71+B85 (At Antenna)		
Sector Equipment										

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:
67D5A997DB Hybrid	67D5997DB_2xAIR+1OP (U21 Market)

CT11174A_Anchor_7_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	200		200				200			
M. Tilt	0		0				0			
Height	163		163				163			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L2100	L2100	L1900 G1900	L1900 G1900	L700 L600 N600	L700 L600 N600	L1900	L1900 U2100
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	0	0	0	0				0		
Cables	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	1-5/8" Coax - 192 ft. **(x2)** Coax Jumper **(x2)**
TMAs										Generic Twin Style 1B - AWS (AtAntenna)
Diplexers / Combiners									Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)
Radio							Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4415 B25 (At Antenna)	SHARED Radio 4415 B25 (At Antenna)
Sector Equipment										

Unconnected Equipment:

Scope of Work:

** L600 SOW ***

Swap LNX antenna in P3 with Octo port antenna for L600/L700.

Remove RRUS11 B12 (L700) Radios from Ground and Add Radio 4449 B71+B85 at top (behind Octo antenna at P3).

*** Anchor SOW ***

Swap P1 RFS-APX16DWV antenna with (1) AIR6449 B41 for L2500/N2500.

Move GSM to AIR32-DB antenna with L19-C1 in Mixed mode.

Add (1) 8x4 diplexer Commscope - SDX1926Q-43 with P3 Octo antenna.

Add (1) Radio 4415 B25 for L1900 2nd Carrier to P3 Octo antenna, and connect its ports to the four PCS input ports of the diplexer.

Move U21 to P3 Octo antenna with existing (2) Coax lines and AWS TMA. Connect two coax lines/jumper from AWS TMA to the AWS input ports of the diplexer.

U21 will be diplexed with L1900 C2 using 8x4 diplexer Commscope - SDX1926Q-43 on Octo antenna as shown in diagram.

Make sure to place metal caps on the unused ports of the diplexer.

Ensure RET control is enabled for all technology layers according to the Design Documents.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67D5A997DB Hybrid	67D5997DB_2xAIR+1OP (U21 Market)

CT11174A_Anchor_7_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 3 (Existing) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	RFS - APX16DWV-16DWV-S-E-A20 (Quad)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	310		310				310			
M. Tilt	0		0				0			
Height	163		163				163			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	G1900	U2100	L2100	L1900				L700 L600 N600	L700 L600 N600	
Dark Tech.										
Restricted Tech.										
Decomm. Tech.	U1900									
E. Tilt	6	6	6	6				2		
Cables	1-5/8" Coax - 192 ft. **(x2)**	1-5/8" Coax - 192 ft. **(x2)**						Coax Jumper **(x2)**	Coax Jumper **(x2)**	
TMAs	Generic Twin Style 1A - PCS (AtAntenna)	Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio										
Sector Equipment										

Unconnected Equipment:

Sector Equipment: Radio 4449 B71+B85

Scope of Work:

RAN Template:	A&L Template:
67D5A997DB Hybrid	67D5997DB_2xAIR+1OP (U21 Market)

CT11174A_Anchor_7_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	310		310				310			
M. Tilt	0		0				0			
Height	163		163				163			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L2100	L2100	L1900 G1900	L1900 G1900	L700 L600 N600	L700 L600 N600	L1900	L1900 U2100
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	0	0	0	0				0		
Cables	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	1-5/8" Coax - 192 ft. **(x2)** Coax Jumper **(x2)**
TMAs										Generic Twin Style 1B - AWS (AtAntenna)
Diplexers / Combiners									Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)
Radio							Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4415 B25 (At Antenna)	SHARED Radio 4415 B25 (At Antenna)
Sector Equipment										

Unconnected Equipment:

Scope of Work:

** L600 SOW ***

Swap LNX antenna in P3 with Octo port antenna for L600/L700.

Remove RRUS11 B12 (L700) Radios from Ground and Add Radio 4449 B71+B85 at top (behind Octo antenna at P3).

*** Anchor SOW ***

Swap P1 RFS-APX16DWV antenna with (1) AIR6449 B41 for L2500/N2500.

Move GSM to AIR32-DB antenna with L19-C1 in Mixed mode.

Add (1) 8x4 diplexer Commscope - SDX1926Q-43 with P3 Octo antenna.

Add (1) Radio 4415 B25 for L1900 2nd Carrier to P3 Octo antenna, and connect its ports to the four PCS input ports of the diplexer.

Move U21 to P3 Octo antenna with existing (2) Coax lines and AWS TMA. Connect two coax lines/jumper from AWS TMA to the AWS input ports of the diplexer.

U21 will be diplexed with L1900 C2 using 8x4 diplexer Commscope - SDX1926Q-43 on Octo antenna as shown in diagram.

Make sure to place metal caps on the unused ports of the diplexer.

Ensure RET control is enabled for all technology layers according to the Design Documents.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template:	A&L Template:
67D5A997DB Hybrid	67D5997DB_2xAIR+1OP (U21 Market)

CT11174A_Anchor_7_draft

Print Name: Standard
PORs: Anchor_Phase 3

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

----- This section is intentionally blank. -----

Proposed Power Systems Equipment

5/11/12

TOWER MAPPING REPORT

For

CT1145

NEWINGTON

99 Cedarwood Lane
Newington, CT 06111

Antennas Mounted to the Tower

Prepared for:

NEXLINK GLOBAL SERVICES
a UniTek GLOBAL SERVICES company
800 MARSHALL PHELPS ROAD UNIT#: 2A
WINDSOR, CT 06095

at&t
500 ENTERPRISE DRIVE, SUITE 3A
ROCKY HILL, CT 06067

Dated: May 24, 2012

Prepared by:

Hudson Design Group LLC
1600 Osgood Street Building 20 North, Suite 2-101
North Andover, MA 01845
Phone: (978) 557-5553
www.hudsondesigngroupllc.com

Hudson Design Group LLC

Guyed Tower Mapping Form

Guy anchor position:

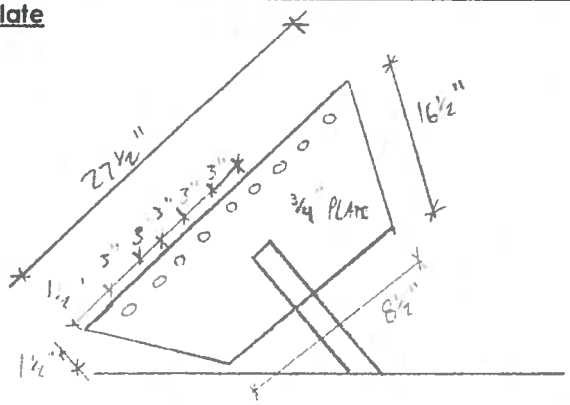
Inner Middle Outer

Guy Anchor Information

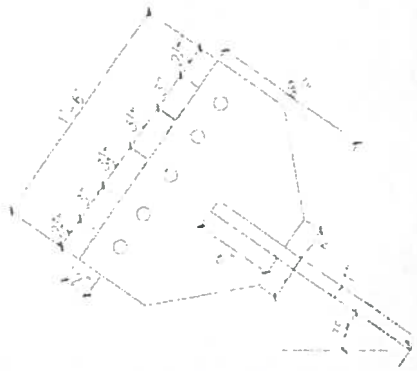
NOTE: All measurements must be to the nearest 1/16"
Repeat this sheet for each set of anchors.

Anchor	Azimuth	Anchor Radius Tower center to anchor	Elevation difference from Tower Base	Angle from Horizon
A	300°	107'	+10'	43°
B	60°	106'	-6'	47°
C	180°	106'	-4'	47°
D				

Sketch Guy Anchor Fan Plate



Example



Hole	Guy Level Number	Guy Elevation (on tower)	Guy Wire Diameter (nearest 16")	Guy Wire Type
1	1	50'	7/16"	(EHS) BS UHS
2	2	90'	7/16"	(EHS) BS UHS
3	3	133'	7/8"	(EHS) BS UHS
4	3	133'	7/8"	(EHS) BS UHS
5	4	155'	1/2	(EHS) BS UHS
6	4	155'	1/2"	(EHS) BS UHS
7				(EHS) BS UHS

Hole	Preform Color or Socket Size	Turnbuckle Size or Hairpin Diameter	Pin Diameter (nearest 1/16")	Hole Diameter (nearest 1/16")	Plate Hole to Edge Distance
1	—	1/8"	3/4"	1 1/8"	1 1/2"
2	—	7/8"	3/4"	1 1/8"	1 1/2"
3	GREEN	1 1/4"	1 1/8"	1 1/8"	1 1/2"
4	GREEN	1 1/4"	1 1/8"	1 1/8"	1 1/2"
5	BLUE	1 1/4"	27/32"	1 1/8"	1 1/2"
6	BLUE	1 1/4"	27/32"	1 1/8"	1 1/2"
7					

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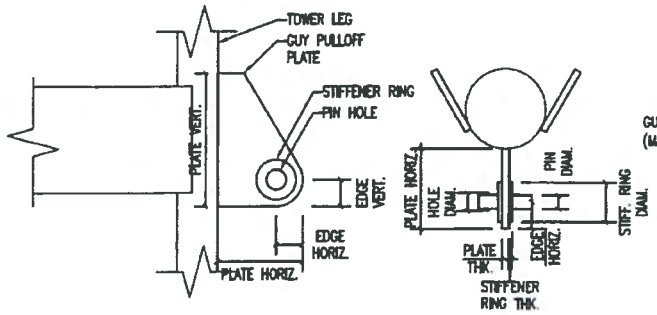
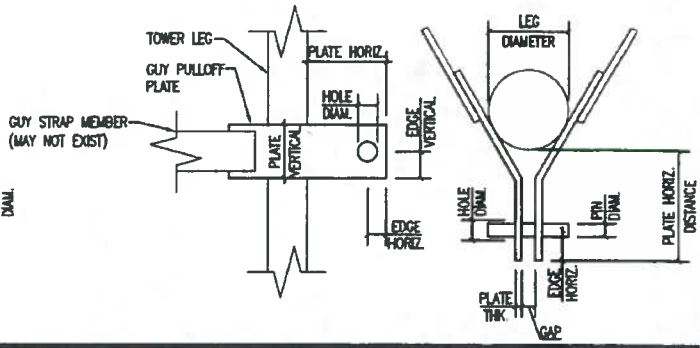




Hudson Design Group LLC

Guyed Tower Mapping Form

Guy Pulloff Information

Guy Number	Elevation	Plate Thickness	Plate Vertical	Plate Horizontal	Gap (if exists)	Edge Vertical
1	50'	3/8"	4½"	4"	0"	1½"
	Edge Horizontal	Shackle or Socket Size	Other Info	Section #	Bay #	Hole Diam.
Guy Elevation	1½"	3/4"	—	—	—	1"
50'-6"	Pin Diam.	Stiff. Ring. Thickness	Stiff. Ring Thickness	Stiff. Ring Diam.	Guy Strap Member Size	Connection to leg (Bolt Size and Grade/Weld Size)
	3/4"	-	—	—	2¾"x20"x3/8"	—
Guy Number	Elevation	Plate Thickness	Plate Vertical	Plate Horizontal	Gap (if exists)	Edge Vertical
2	90'	3/8"	4½"	4"	0"	1½"
	Edge Horizontal	Shackle or Socket Size	Other Info	Section #	Bay #	Hole Diam.
Guy Elevation	1½"	3/4"	-	-	-	1"
90'-7"	Pin Diam.	Stiff. Ring. Thickness	Stiff. Ring Thickness	Stiff. Ring Diam.	Guy Strap Member Size	Connection to leg (Bolt Size and Grade/Weld Size)
	3/4"				2¾ x20'x 3/8"	
Guy Number	Elevation	Plate Thickness	Plate Vertical	Plate Horizontal	Gap (if exists)	Edge Vertical
	Edge Horizontal	Shackle or Socket Size	Other Info	Section #	Bay #	Hole Diam.
Guy Elevation						
	Pin Diam.	Stiff. Ring. Thickness	Stiff. Ring Thickness	Stiff. Ring Diam.	Guy Strap Member Size	Connection to leg (Bolt Size and Grade/Weld Size)
Guy Number	Elevation	Plate Thickness	Plate Vertical	Plate Horizontal	Gap (if exists)	Edge Vertical
	Edge Horizontal	Shackle or Socket Size	Other Info	Section #	Bay #	Hole Diam.
Guy Elevation						
	Pin Diam.	Stiff. Ring. Thickness	Stiff. Ring Thickness	Stiff. Ring Diam.	Guy Strap Member Size	Connection to leg (Bolt Size and Grade/Weld Size)
Guy Number	Elevation	Plate Thickness	Plate Vertical	Plate Horizontal	Gap (if exists)	Edge Vertical
	Edge Horizontal	Shackle or Socket Size	Other Info	Section #	Bay #	Hole Diam.
Guy Elevation						
	Pin Diam.	Stiff. Ring. Thickness	Stiff. Ring Thickness	Stiff. Ring Diam.	Guy Strap Member Size	Connection to leg (Bolt Size and Grade/Weld Size)

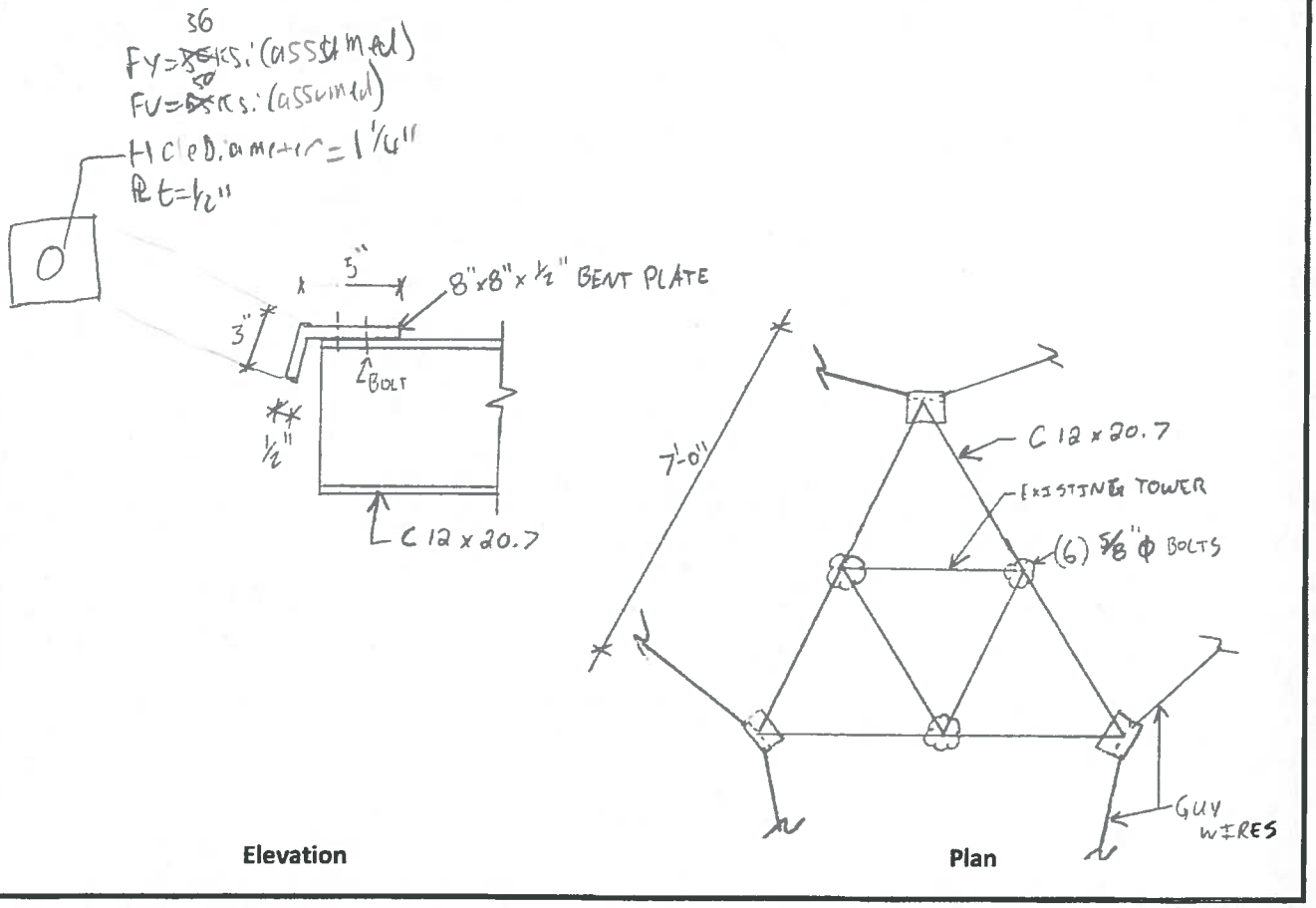
Hudson Design Group LLC

Guyed Tower Mapping Form

Torque Arm Information

- Sketch torque arm below.
- Show overall **height**, **spread** (hole to hole), **face width**, **member sizes**.
- Detail **pulloff plates** that guys are attached to.
- Measure to the nearest **1/16"** and to **hole/bolt center**.
- Repeat this sheet for each torque arm.

Elevation 132.5'	Pin Diameter 1"
Guy Level 3	Hole Diam. On Plate 1¼"
Section # Bay #	Plate Hole End Distance 1½"
Shackle or Socket Size 1"	Pulloff Plate Thickness ½"
Other Info	



Elevation **Plan**

p: 978.557.5553 f: 978.336.5586 a: 1600 Osgood Street, Building 20 North, Suite 2-101, N. Andover, MA 01845

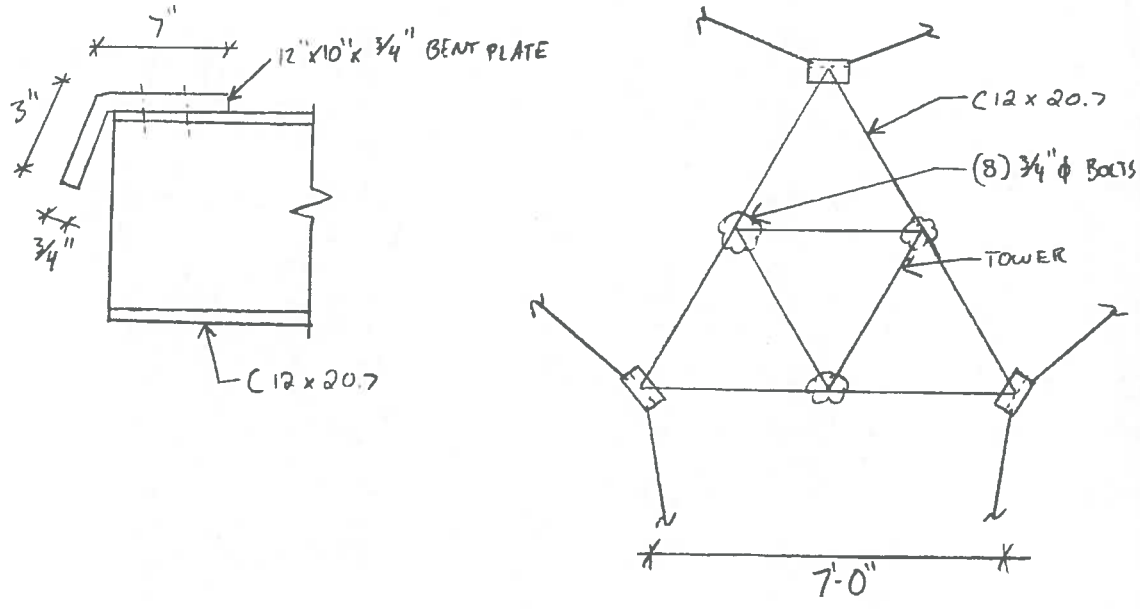
Hudson Design Group LLC

Guyed Tower Mapping Form

Torque Arm Information

- Sketch torque arm below.
- Show overall **height, spread** (hole to hole), **face width, member sizes.**
- Detail **pulloff plates** that guys are attached to.
- Measure to the nearest **1/16"** and to **hole/bolt center.**
- Repeat this sheet for each torque arm.

Elevation 152.5'	Pin Diameter 1"
Guy Level 4	Hole Diam. On Plate 1½"
Section # Bay #	Plate Hole End Distance 1½"
Shackle or Socket Size 1"	Pulloff Plate Thickness ¾"
Other Info	



Elevation **Plan**

p: 978.557.5553 f: 978.336.5586 a: 1600 Osgood Street, Building 20 North, Suite 2-101, N. Andover, MA 01845

October 10, 2018

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067

Attn: Mr. Michael Egan
P: (860) 529-8882
E: michael.egan@aecom.com

Re: Geotechnical Engineering Services
Callahan Tower
Newington, Connecticut
Terracon Proposal No. PJ2185155

Dear Mr. Egan:

Terracon Consultants, Inc. (Terracon) has completed our review of the above-referenced project, in accordance with our proposal dated September 26, 2018. Our scope of work included visiting the site to review existing site conditions and reviewing the results and recommendations provided in our August 24, 2012 Geotechnical Engineering Report. Based on our conversations, we understand the project consists of performing a structural assessment of the existing tower to evaluate the capacity to carry additional communications equipment.

Based on our review, we recommend proceeding with the analysis using the parameters provided and conditions summarized in our previous report. Seismic ground motion values should be updated to meet the Connecticut State Building Code version applicable to the design of this project.

We trust this letter meets your needs at this time. Please contact us if you have questions or require additional information.

Sincerely,
Terracon Consultants, Inc.

Brian D. Opp, P.E.
Senior Geotechnical Engineer

Stephen C. Lanne, P.E.
Geotechnical Department Manager

/scl/J2175053

October 10, 2018

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067

Attn: Mr. Michael Egan
P: (860) 529-8882
E: michael.egan@aecom.com

Re: Geotechnical Engineering Services
Callahan Tower
Newington, Connecticut
Terracon Proposal No. PJ2185155

Dear Mr. Egan:

Terracon Consultants, Inc. (Terracon) has completed our review of the above-referenced project, in accordance with our proposal dated September 26, 2018. Our scope of work included visiting the site to review existing site conditions and reviewing the results and recommendations provided in our August 24, 2012 Geotechnical Engineering Report. Based on our conversations, we understand the project consists of performing a structural assessment of the existing tower to evaluate the capacity to carry additional communications equipment.

Based on our review, we recommend proceeding with the analysis using the parameters provided and conditions summarized in our previous report. Seismic ground motion values should be updated to meet the Connecticut State Building Code version applicable to the design of this project.

We trust this letter meets your needs at this time. Please contact us if you have questions or require additional information.

Sincerely,
Terracon Consultants, Inc.

Brian D. Opp, P.E.
Senior Geotechnical Engineer

Stephen C. Lanne, P.E.
Geotechnical Department Manager

/scl/J2175053

Geotechnical Engineering Report

T-Mobile Site CT11174A Callahan Tower 1
Newington, Connecticut
August 24, 2012
Project No. J2125144

Prepared for:
Northeast Site Solutions, LLC
Farmington, Connecticut

Prepared by:
Terracon Consultants, Inc.
Rocky Hill, Connecticut

August 24, 2012

Northeast Site Solutions, LLC
199 Brickyard Road
Farmington, CT 06032

Attn: Mr. Scott Chase
P: (860) 677 1999
E: sscott@northeasttowers.com

Re: Geotechnical Engineering Report
T-Mobile Site CT11174A Callahan Tower 1
Newington, Connecticut
Terracon Project No. J2125144

Dear Mr. Chase:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal dated July 23, 2012. This report presents the findings of the subsurface exploration and provides geotechnical recommendations relative to soil design strength parameters to evaluate the existing tower foundation. An investigation of the configuration of existing tower foundation is not provided in this report.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Patrick D. Cameron
Project Manager

Ryan R. Roy, P.E.
Senior Principal/Division Manager

/pdc/J2125144

TABLE OF CONTENTS

GEOTECHNICAL ENGINEERING REPORT
T-MOBILE SITE CT11174A CALLAHAN TOWER 1
NEWINGTON, CONNECTICUT

Project No. J2125144
August 24, 2012

1.0 INTRODUCTION

A geotechnical engineering report has been completed for the existing approximately 170-foot high guyed tower located within wooded land at the end of Cedarwood Lane in Newington, Connecticut. Two test borings was advanced to a maximum depth of 15 feet below the existing ground surface to the north and the south of the existing fenced compound area. Three test probes were advanced proximal to the guy anchors to depths ranging from approximately 5.5 to 10 feet below the existing ground surface. Logs of the test boring and probes, along with a Site Location Map (Exhibit A-1) and an Exploration Location Diagram (Exhibit A-2) are included in Appendix A of this report.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- soil/rock design parameters
- seismic considerations

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Site layout	Appendix A, Exhibit A-2 - Exploration Location Diagram
Tower	Approximately 170-foot high guyed communications tower
Guyed tower: **Maximum allowable settlement**	Total Settlement: 1 inch
Grading	No change to grade anticipated.

2.2 Site Location and Description

Item	Description
Location	Existing compound surrounded by wooded land at the end of Cedarwood Lane in Newington, Connecticut.
Existing improvements	Approximately 170-foot high guyed communications tower with associated electrical appurtenances within a fenced compound area.
Current ground cover	Forest mat and gravel
Existing topography	Slopes down gradually to the east.

3.0 SUBSURFACE EXPLORATIONS AND CONDITIONS

3.1 Typical Profile

Based on the results of the explorations and observations at the time of drilling, subsurface conditions on the project site can be generalized as follows:

Description	Approximate Depth to Bottom of Stratum (feet)	Material Encountered [1]	Consistency / Relative Density
Glacial Till	5.5 to 10	Silty Sand, with gravel, occasional cobbles, red-brown	Medium Dense to Very Dense
Bedrock	> 15	Gray, fresh, hard, Basalt	N/A

1. Forest Mat or gravel (about 6 inches thick) was encountered at the ground surface

Because of site limitations, including existing underground electrical lines and site topography, B-1 was advanced just south and B-2 was advanced just north of the existing compound area. Competent bedrock was encountered at a depth of approximately 9.5 feet to 6.5 feet below the existing ground surface. Bedrock was cored to a depth of 15 feet with an NX-sized core barrel in B-1. The Rock Quality Designation (RQD) value was 78 percent from a depth of 10 to 15 feet, indicating good in-situ bedrock quality. Presumed bedrock was encountered at a depth of approximately 6.5 feet in B-2. Three additional probes (P-1, P-2, and P-3) were advanced proximal to the three guy anchor locations, to further identify subsurface conditions. The probes were terminated on auger refusal on competent bedrock at depths of approximately 5.5 to 10 feet below existing ground surface.

Conditions encountered at each exploration location are indicated on the test boring and test probe logs. Stratification boundaries on the exploration logs represent the approximate location of changes in soil types; *in situ*, the transition between materials may be gradual. Further details of the explorations can be found on the logs in Appendix A of this report.

3.2 Groundwater

Groundwater was not encountered in the explorations. However, fluctuations in groundwater level may occur because of seasonal variations in the amount of rainfall, runoff, and other factors. Additionally, groundwater may become perched in portions of the Glacial Till with elevated fines content or on bedrock. The possibility of groundwater level fluctuations should be considered.

4.0 RECOMMENDED SOIL/ROCK DESIGN PARAMETERS

Although our scope of work did not include an investigation of existing tower foundation configuration, we anticipate that the approximately 170-foot lattice telecommunications tower is supported on a mat foundation bearing on glacial till and the guy anchors are likely bearing in the glacial till or on bedrock. Based on our observations, we have tabulated our estimates of the soil/bedrock parameters below:

4.1 Soil/Rock Design Parameters

Description	Value
Net allowable bearing pressure (on glacial till) [1]	4 kips per square foot (ksf)
Net allowable bearing pressure (on bedrock) [1]	10 kips per square foot (ksf)
Total Unit Weight (Glacial Till) (γ)	130 pounds per cubic foot (pcf)
Total Unit Weight (Bedrock) (γ)	165 pcf
Angle of Internal Friction [2]**, φ (degrees)**	30 to 32
Coefficient of sliding friction [3]	0.5 (ultimate)

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation.
2. Angle of internal friction of the glacial till may be higher where there are more frequent gravel-sized particles.
3. A factor of safety of at least 1.5 should be applied to the sliding resistance.

4.2 Seismic Considerations

Description	Value
Code Used	Connecticut State Building Code (CBC) [1]
Site Class	C[2]
Maximum considered earthquake ground motions (5 percent damping)	0.064g (1.0 second spectral response acceleration, S_1)
	0.240g (0.2 second spectral response acceleration, S_s)
Liquefaction potential in event of an earthquake	Not susceptible

1. The CBC incorporates the Seismic Design Category approach from the 2003 International Building Code.
2. The CBC requires a site soil profile determination extending a depth of 100 feet for seismic site classification. The current scope requested does not include the required 100-foot soil profile determination; the borings performed for this report extended to a maximum depth of 15 feet. However, we expect soil at least as dense as encountered above a depth of 10 feet or bedrock will extend to a depth of 100 feet.

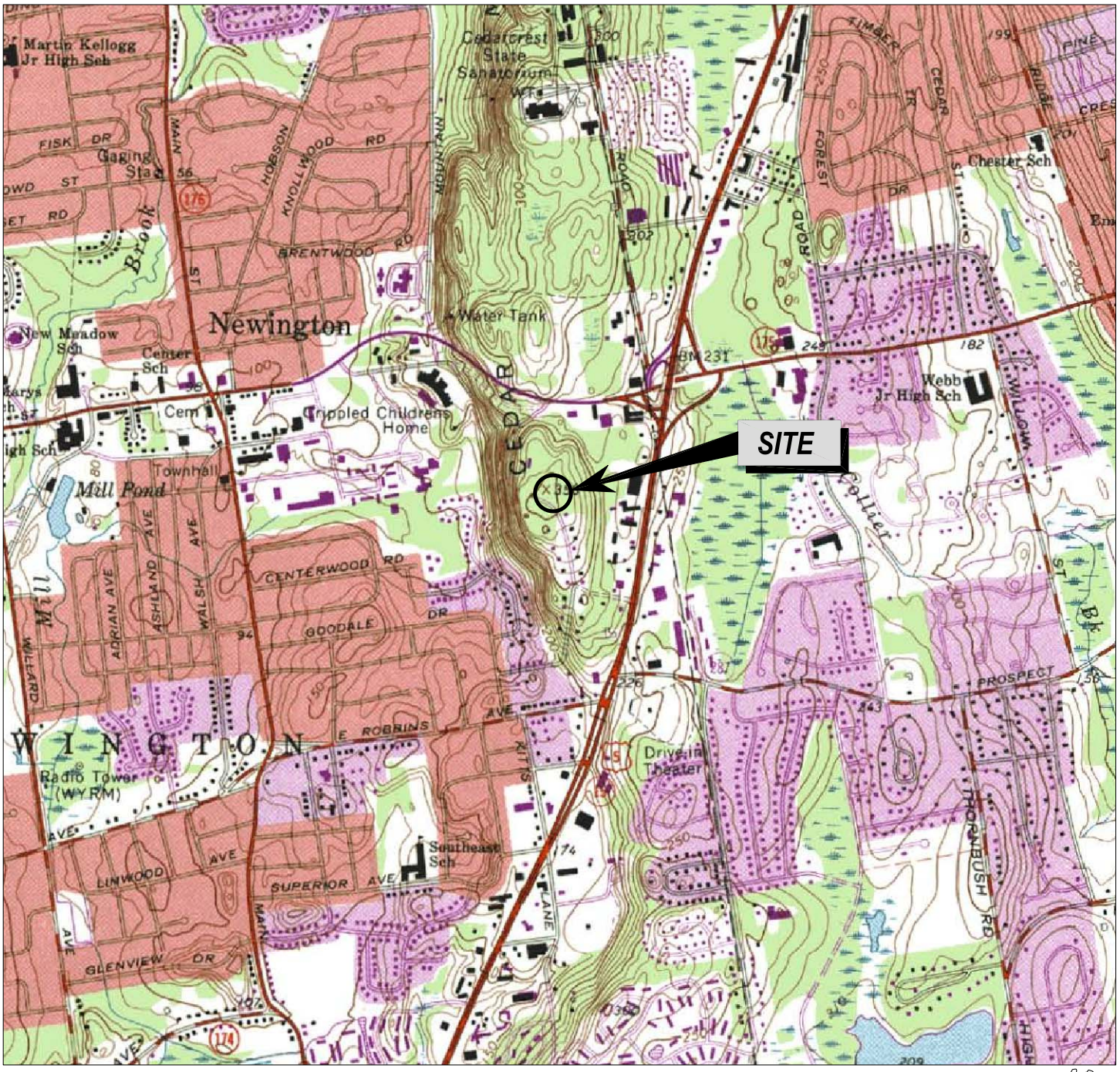
5.0 GENERAL COMMENTS

The analysis and recommendations presented in this report are based upon the data obtained from the explorations performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between explorations, across the site, or due to the modifying effects of weather. The nature and extent of such variations would not become evident without excavation to the bedrock surface.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION



SCALE: 1:24 000

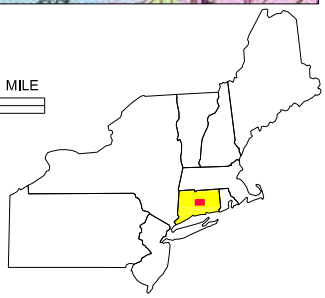
1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

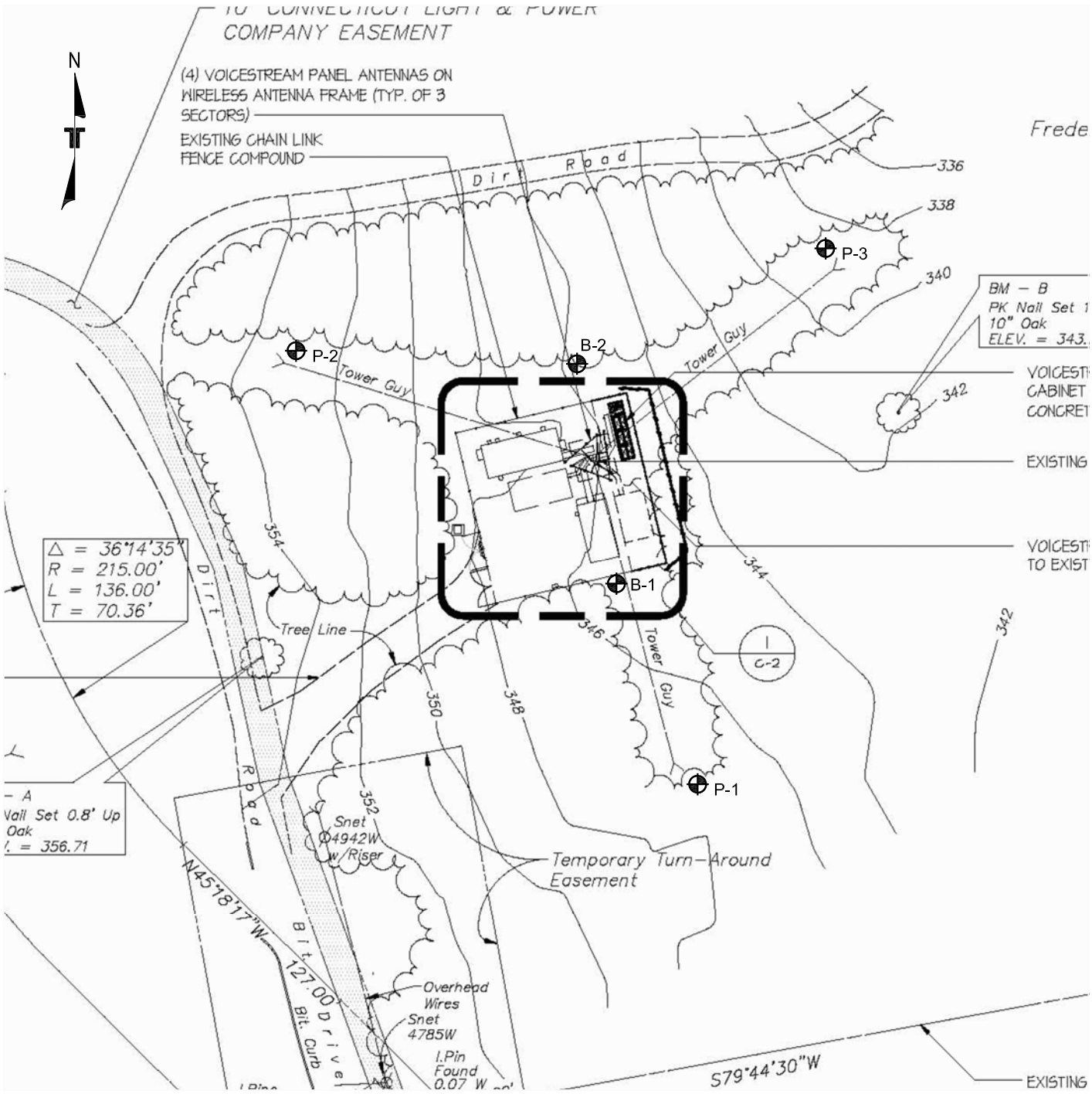
CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

N



QUADRANGLE LOCATION
SOURCE:
USGS HARTFORD SOUTH, CT
1992

Project Mngr: PDC	Project No. J2125144	Terracon	SITE LOCATION MAP
Drawn By: MCR	Scale: AS SHOWN	201 Hammer Mill Road Rocky Hill, Connecticut 06067	T MOBILE SITE CT11174A CALLAHAN TOWER 1 NEWINGTON, CT
Checked By: PDC	File No. J2125144.dwg	PH. (860)721-1900 FAX.(860)721-1939	EXHIBIT A-1
Approved By: RRR	Date: August 2012		



NOTES:

1. THIS EXHIBIT WAS PREPARED FROM A PLAN ENTITLED: SITE PLAN AND NOTES, No. C-1, CALLAHAN TOWER 1, 2111 BERLIN TURNPIKE, NEWINGTON, CT, PREPARED BY URS CORPORATION AES OF ROCKY HILL, CT.

2. TEST BORINGS B-1 AND B-2 AND TEST PROBES P-1, P-2, AND P-3 WERE ADVANCED ON AUGUST 13, 2012 UNDER THE DIRECTION OF TERRACON WITH EQUIPMENT OWNED AND OPERATED BY NEW ENGLAND BORING CONTRACTORS, OF GLASTONBURY, CT.

3. THE APPROXIMATE LOCATIONS OF THE TEST BORINGS WERE LOCATED BY TAPE MEASUREMENT REFERENCING EXISTING SITE FEATURES. THE LOCATIONS SHOULD BE CONSIDERED ACCURATE TO THE DEGREE IMPLIED BY THE METHOD USED.

4. USE OF THIS PLAN IS LIMITED TO THE ILLUSTRATION OF THE APPROXIMATE LOCATION OF THE TEST BORINGS, TEST PROBES AND OTHER PERTINENT SITE FEATURES. OTHER USE OF THIS PLAN WITHOUT PERMISSION FROM TERRACON IS PROHIBITED.

LEGEND

B-1 APPROXIMATE TEST BORING LOCATION (TYP)

P-1 APPROXIMATE TEST PROBE LOCATION (TYP)

GRAPHIC SCALE
0 25 50
(IN FEET)

Project Mngr: PDC	Project No. J2125144	Terracon	EXPLORATION LOCATION DIAGRAM
Drawn By: MCR	Scale: 1" = 50'		T MOBILE SITE CT11174A CALLAHAN TOWER 1 NEWINGTON, CT
Checked By: PDC	File No. J2125144.dwg		EXHIBIT A-2
Approved By: RRR	Date: August 2012	201 Hammer Mill Road Rocky Hill, Connecticut 06067 PH. (860)721-1900 FAX.(860)721-1939	

BORING NO. B-1

CLIENT	**Northeast Site Solutions**
SITE LOCATION	**Callahan Tower 1** **Newington, Connecticut**
PROJECT NAME	**T Mobile Site CT11174A**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	SAMPLES: USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - Blows per 6" RQD (%)	TESTS: WATER CONTENT,%	ORGANIC CONTENT, %	PID (ppm)	OTHER TESTS
	Approx. Surface Elev.:										
	0.5 Trap rock gravel			1	SS	10	10-12 14-17				
	SILTY SAND, with gravel, occasional cobbles, red-brown, medium dense to very dense.			2	SS	10	12-18 15-16				
		5		3	SS	0	50/0"				
				4	SS	6	59-53 59				
	9.5 **(GLACIAL TILL)**						Coring rate				RQD (%)
	10 **(WEATHERED BEDROCK)**	10		1	CORE	60	4.5 4.0 4.0 4.5 4.5				78.3
	BASALT, hard, fresh, gray. **(BEDROCK)**										
	15 BORING TERMINATED AT 15.0 ft	15									

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

Auger Type: HSA, Auger Dia: 3.25" O.D.
Core Barrel: NX
Hammer Type: Auto, Hammer weight 140 lbs.
Drop Method: Winch

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL	Not encountered	

Terracon

BORING STARTED	8-13-12		
BORING COMPLETED	8-13-12		
RIG	B-53	FOREMAN	Tim C.
LOGGED BY:	MK	JOB #	J2125144

BORING NO. B-2

CLIENT	**Northeast Site Solutions**
SITE LOCATION	**Callahan Tower 1** **Newington, Connecticut**
PROJECT NAME	**T Mobile Site CT11174A**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	SAMPLES: USCS SYMBOL	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: RECOVERY, in.	SAMPLES: SPT - Blows per 6" RQD (%)	TESTS: WATER CONTENT,%	TESTS: ORGANIC CONTENT, %	TESTS: PID (ppm)	TESTS: OTHER TESTS
	Approx. Surface Elev.:										
	0.2 Forest mat			1	SS	16	11-11 12-14				
	SILTY SAND, with gravel, occasional cobbles, red-brown, medium dense to very dense.			2	SS	12	13-17 17-21				
		5		3	SS	10	38-42 50/2"				
	6.5 Refusal at 6', offset boring 5' east, refusal at 7'. **(GLACIAL TILL)**										
	BORING TERMINATED AT 7.0 ft on presumed bedrock										

Auger Type: HSA, Auger Dia: 3.25" O.D.
Hammer Type: Auto, Hammer weight 140 lbs.
Drop Method: Winch

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL	Not encountered	

Terracon

BORING STARTED			8-13-12
BORING COMPLETED			8-13-12
RIG	B-53	FOREMAN	Tim C.
LOGGED BY:	MK	JOB #	J2125144

PROBE NO. P-1

CLIENT **Northeast Site Solutions**	
SITE LOCATION **Callahan Tower 1 Newington, Connecticut**	PROJECT NAME **T Mobile Site CT11174A**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - Blows per 6"	TESTS WATER CONTENT, %	TESTS pH	TESTS UNCONFINED STRENGTH, psf	TESTS OTHER TESTS
	Approx. Surface Elev.:										
	0.5 Forest mat										
	SILTY SAND, with gravel, occasional cobbles, red-brown.										
	5.5 Refusal at 5.5', offest 5' south, refusal at 4.5'. **(GLACIAL TILL)**	5									
	BORING TERMINATED AT 5.5 ft										

Auger Type: SSA, Auger Dia: 4" O.D.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL	Not encountered	

Terracon

BORING STARTED			8-13-12
BORING COMPLETED			8-13-12
RIG	B-53	FOREMAN	Tim C.
LOGGED BY:	MK	JOB #	J2125144

PROBE LOG J2125144.GPJ TERRACON 20080217.GDT 8/24/12

PROBE NO. P-2

CLIENT **Northeast Site Solutions**	
SITE LOCATION **Callahan Tower 1 Newington, Connecticut**	PROJECT NAME **T Mobile Site CT11174A**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - Blows per 6"	TESTS WATER CONTENT, %	TESTS pH	TESTS UNCONFINED STRENGTH, psf	TESTS OTHER TESTS
	Approx. Surface Elev.:										
	0.5 Forest mat										
	SILTY SAND, with gravel, occasional cobbles, red-brown.	5									
	6 Refusal at 6', offest 5' east, refusal at 6.5'. **(GLACIAL TILL)**										
	BORING TERMINATED AT 6 ft										

Auger Type: SSA, Auger Dia: 4" O.D.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL	Not encountered	

Terracon

BORING STARTED			8-13-12
BORING COMPLETED			8-13-12
RIG	B-53	FOREMAN	Tim C.
LOGGED BY:	MK	JOB #	J2125144

PROBE LOG J2125144.GPJ TERRACON 20080217.GDT 8/24/12

PROBE NO. P-3

CLIENT **Northeast Site Solutions**	
SITE LOCATION **Callahan Tower 1 Newington, Connecticut**	PROJECT NAME **T Mobile Site CT11174A**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY, in.	SAMPLES SPT - Blows per 6"	TESTS WATER CONTENT, %	TESTS pH	TESTS UNCONFINED STRENGTH, psf	TESTS OTHER TESTS
	Approx. Surface Elev.:										
	0.5 Forest mat										
	SILTY SAND, with gravel, occasional cobbles, red-brown.	5									
	10 **(GLACIAL TILL)**	10									
	BORING TERMINATED AT 10 ft										

Auger Type: SSA, Auger Dia: 4" O.D.

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	▽	▼
WL	▼	▽
WL	Not encountered	

Terracon

BORING STARTED			8-13-12
BORING COMPLETED			8-13-12
RIG	B-53	FOREMAN	Tim C.
LOGGED BY:	MK	JOB #	J2125144

PROBE LOG J2125144.GPJ TERRACON 20080217.GDT 8/24/12

Field Exploration Description

The site has an existing tower within a fenced compound area. Terracon monitored the advancement of two test borings (B-1 and B-2) in the vicinity of the existing tower compound area and three test probes (P-1, P-2, and P-3) proximal to the guy anchors on August 13, 2012. The explorations were advanced using a Mobile B-53 all-terrain vehicle-mounted rotary drill rig, owned and operated by New England Boring Contractors Inc. of Glastonbury, Connecticut. B-1 and B-2 was advanced using 3 1/4-inch inside diameter hollow-stem augers (HSA) to a maximum depth of about 10 feet below existing grade and terminated at refusal on competent bedrock. Bedrock was then cored to a depth of 15 feet with an NX-sized core barrel.

The soil samples were placed in labeled glass jars and taken, along with the rock core in a wooden core box, to our Rocky Hill (Hartford), Connecticut office for further review by a Terracon geotechnical engineer. Information provided on the boring log attached to this report includes soil and rock descriptions, relative density and/or consistency evaluations, boring depths, sampling intervals, and groundwater conditions. The boring was backfilled with auger cuttings prior to the drill crew leaving the site.

P-1, P-2, and P-3 were advanced with 4-inch diameter solid stem augers (SSA) to further evaluate the subsurface conditions in the vicinity of the existing tower compound area. P-1 and P-2 were terminated on auger refusal at depths ranging from approximately 5.5 to 6.5 feet. P-3 was terminated at a depth of approximately 10 feet. The probes were backfilled with auger cuttings prior to the drill crew leaving the site.

Field logs of the boring and probes were prepared by a Terracon field engineer. These logs included visual classifications of the materials encountered during drilling as well as interpretation by our field engineer of the subsurface conditions between samples. Final exploration logs included with this report represent further interpretation by the geotechnical engineer of the field logs and incorporate, where appropriate, modifications based on laboratory classification of the samples.

The approximate exploration locations, which are shown on Exhibit A-2, were measured by taping from existing features in the field and by estimating right angles. The locations of the explorations should be considered accurate only to the degree implied by the method used to define them. Ground elevations at the exploration locations were not available.

APPENDIX B
SUPPORTING DOCUMENTS

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon – 1-$^3/_8$" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube - 2" O.D., unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) typically the middle 12 inches of the total 24-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling		
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR:	After Casing Removal		

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-value (SS) Blows/Ft.	Consistency
< 500	<2	Very Soft
500 – 1,000	2-3	Soft
1,001 – 2,000	4-6	Medium Stiff
2,001 – 4,000	7-12	Stiff
4,001 – 8,000	13-26	Very Stiff
8,000+	26+	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Ring Sampler (RS) Blows/Ft.	Relative Density
0 – 3	0-6	Very Loose
4 – 9	7-18	Loose
10 – 29	19-58	Medium Dense
30 – 49	59-98	Dense
50+	99+	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other Constituents	Percent of Dry Weight
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other Constituents	Percent of Dry Weight
Trace	< 5
With	5 – 12
Modifiers	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1-10
Medium	11-30
High	30+

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines Classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.

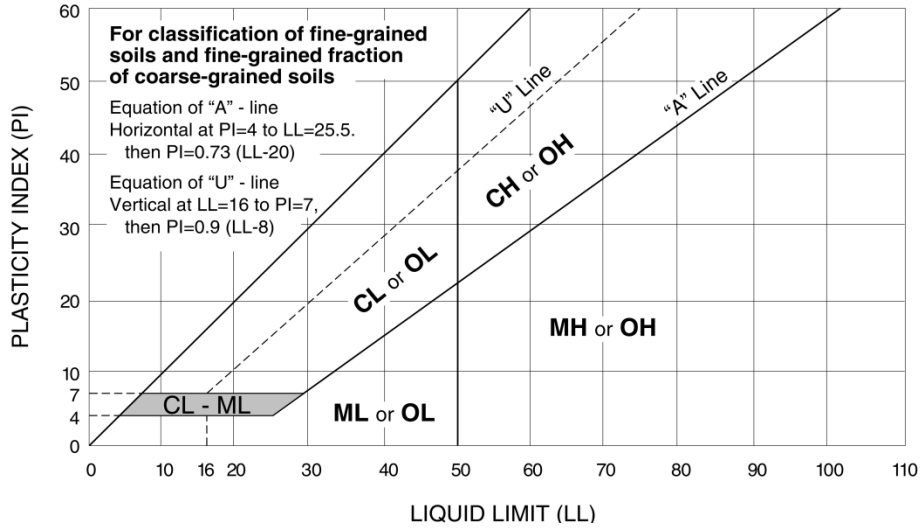


Exhibit B-2

DESCRIPTION OF ROCK PROPERTIES

WEATHERING

Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.
Very slight	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slight	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 in. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.
Moderately severe	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick.
Severe	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very severe	All rock except quartz discolored or stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.
Complete	Rock reduced to "soil". Rock "fabric" not discernible or discernible only in small, scattered locations. Quartz may be present as dikes or stringers.

HARDNESS (for engineering description of rock – not to be confused with Moh's scale for minerals)

Very hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately hard	Can be scratched with knife or pick. Gouges or grooves to ¼ in. deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 in. deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1-in. maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1-in. or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

Joint, Bedding and Foliation Spacing in Rock[a]

Spacing	Joints	Bedding/Foliation
Less than 2 in.	Very close	Very thin
2 in. – 1 ft.	Close	Thin
1 ft. – 3 ft.	Moderately close	Medium
3 ft. – 10 ft.	Wide	Thick
More than 10 ft.	Very wide	Very thick

Rock Quality Designator (RQD)[b]		Joint Openness Descriptors	
RQD, as a percentage	Diagnostic description	Openness	Descriptor
Exceeding 90	Excellent	No Visible Separation	Tight
90 – 75	Good	Less than 1/32 in.	Slightly Open
75 – 50	Fair	1/32 to 1/8 in.	Moderately Open
50 – 25	Poor	1/8 to 3/8 in.	Open
Less than 25	Very poor	3/8 in. to 0.1 ft.	Moderately Wide
		Greater than 0.1 ft.	Wide

a. Spacing refers to the distance normal to the planes, of the described feature, which are parallel to each other or nearly so.
b. RQD (given as a percentage) = length of core in pieces 4 in. and longer/length of run.

References: American Society of Civil Engineers. Manuals and Reports on Engineering Practice - No. 56. Subsurface Investigation for Design and Construction of Foundations of Buildings. New York: American Society of Civil Engineers, 1976.
U.S. Department of the Interior, Bureau of Reclamation, Engineering Geology Field Manual.

Exhibit E

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
www.aecom.com

860.529.8882 tel
860.529.3991 fax

August 11, 2020

Mr. Sheldon Freincle
Northeast Site Solutions
420 Main Street
Sturbridge, MA 01566

Reference: **Analysis of Antenna Mount:**
T-Mobile Site ID: CT11174A
99 Cedarwood Lane, Newington, Connecticut
AECOM Project Number: NSS-048

Dear Mr. Freincle,

AECOM has been authorized by T-Mobile to conduct a structural evaluation of the proposed antenna modification to the existing antenna mount frame attached to an existing transmission tower structure located at 99 Cedarwood Lane, Newington, Connecticut. The results of our independent structural analysis has determined that the proposed antenna upgrades to the existing antenna frame mounts are in compliance with the Codes and Standards stated herein.

The proposed antenna modification will consist of the removal of three (3) RFS-APX16DWV-16DWV-S-E-A20 Panel Antennas, three (3) DB Andrew LNX-6515DS-A1M Panel Antennas and three (3) Generic Twin Style 1A - PCS TMAs, with the installation of three (3) Ericsson AIR6449 B41 Panel Antennas, three (3) RFS APXVAARR24_43-U-NA20 Panel Antennas, three (3) Radio 4415 B25 RRH Units, three (3) CommScope SDX1926Q-43(E14F05P86) TMAs, and three (3) Ericsson 6x12 HCS Hybrid Cables on three (3) existing antenna mounts with one (1) support/tie-back arm connected to tower structure at 163 feet above the tower base. The existing mount applied for analysis was considered as three (3) Rohn 15-ft. Gate Boom Frame assemblies, with three (3) antenna mount pipes (measurements from mount mapping).

An independent structural analysis was conducted considering the antenna pipe mounted frame mounted to the existing tower structure for its strength design. This analysis did not consider the loading of the proposed antenna mounting frame attached to the tower structure.

Two load conditions were evaluated as shown below which were compared to ultimate stresses according to AISC and TIA-222-G.

Load Condition 1 = 97 mph (3-second gust) Wind Load (without ice) + (Antenna + Mount) Dead Load
Load Condition 2 = 50 mph (3-second gust) Wind Load (with ice) + 1.0” Ice Load + (Antenna + Mount) Dead Load

NOTE: The 1.0” Ice load thickness obtained from the TIA-222-G and the ASCE 7-10 Standard are considered to increase in thickness with the height of the Antenna and Mount assembly.

The independent structural analysis also considered the following site conditions (following the TIA-222-G Standard):

- Structure Class 2 – (Substantial Communications)
- Topographic Category 3 – (Tower location on top of hill – rolling wind conditions considered)
    - NOTE: The use of Google Earth Pro software (version 7.3.1.4505) along with Survey Topographic maps were used for the following determinations
        - Crest Height used for analysis (approximate elevations listed below):
            - Tower Base Elevation = 340'
            - Average elevation measured from 0.5 miles, 1.0 miles, 1.5 miles, and 2 miles from tower (213 ft., 170 ft., 147 ft., 129 ft.)
                - Average elevation determined from above information = 165 feet.
            - "H" = Average Elevation – Base Elevation = (340-165) = **175 feet**
- Exposure Class B – (Urban/Suburban areas; closely spaced obstructions)

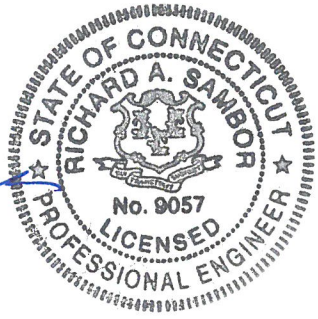
The independent structural analysis was conducted using the STAAD.Pro V8i software design program to assess the strength design of the antenna mount frame. The analysis was conducted in compliance with the Codes and Standards of the TIA-222-Revision G with Addendum 2, the ASCE 7-2010 Minimum Design Loads Standard, the 2015 International Building Code, and the 2018 State of Connecticut Building code. The results of our independent structural analysis has determined that the proposed antenna upgrades to the existing antenna pipe mounts are in compliance with the Codes and Standards previously mentioned.

Per the included mount analysis, the controlling stress for the design mount is noted ***at 63.7%*** structural capacity rating.

Should there be any questions, please contact Michael Egan at (860) 263-5817.

Sincerely,

AECOM



Richard Sambor, P.E.
Senior Structural Engineer

Callahan, CT - 175' Self-SupportingTower - Antenna Strength Design Analysis Calculations (Antenna Mount)

- **Design Criteria used for Proposed Antenna Assessment**
  - 2018 International Building Code (IBC) with 2018 State of Connecticut Building Code
  - Telecommunications Industry Association Design Standard TIA-222-G (Structural Standard for Antenna Supporting Structures and Antennas) with Addendum 2 (December 2009)

- **Design Calculation Applied for Antenna Assessment of Stress and of the Mount Classification listing required for Bare and Iced Mounts.**
  - Topographical Category of Structure = "Category 3" - Structure located on upper half of hill - wind speed-up considered
  - Exposure Category of Structure = "Exposure B" - Wooded Areas
  - Antenna supporting stresses checked through STAAD design program considering forces obtained from TIA-222-G Standard (V.asd)
  - Antenna supporting stresses checked through STAAD design program considering forces obtained from ASCE 7 2010 (V.ultimate)
  - Antenna mount classification for iced considerations following design criteria (design thickness per ASCE 7 2010 and TIA-222-G Standards).

    - *NOTE:* Calculation referenced to the use Serviceable Loads in the STAAD design program (not currently approved deisgn Standard) applied as a design and loading guidance for Serviceability/Maintenance work on mount not specifically identified per the TIA-222-G design Standard. Maintenance loads consist of a 500 lbf vertical load @ antenna mount pipes and 250lbf vertical load @ end of horizontal cantilevered member (Load Combination #5 & 6 within analysis herein).

- **Antennas located in the Alpha/Beta Sector with an Antenna Centerline Elevation of 163'-0" Above Ground:**
  - 3 panel antennas per Sector on tower structure:
    - Antennas to remain (per Sector):
      - (3) Ericsson AIR32 KRD901146-1_B66A_B2A Panel Antennas (1 per Sector)
      - (3) Radio 4449 B71+B85 RRH Units (1 per Sector)
      - (3) Generic Twin Style 1B - PCS TMAs (1 per Sector)
    - Removed existing antennas (to be removed and/or swapped for Proposed Antennas):
      - (3) RFS-APX16DWV-16DWV-S-E-A20 Panel Antennas (1 per Sector)
      - (3) DB Andrew LNX-6515-VTM Panel Antenna (1 per Sector)
      - (3) Generic Twin Style 1A - PCS TMAs (1 per Sector)
    - Proposed antennas (to be installed):
      - (3) Ericsson AIR6449 B41 Antennas (1 per Sector)
      - (3) RFS-APXVAARR24_43-U-NA20 Panel Antennas (1 per Sector)
      - (3) Radio 4415 B25 RRH Units (1 per Sector)
      - (3) Commscope SDX1926Q-43(E14F05P86) TMAs

- **Antenna Mount Design consideration/conditions used for structural analysis and assessment of proposed antenna:**
  - Wind loading considered the worst case surface are of contact considering Bare and Iced Antenna conditions
  - Load Combinations are in reference to the TIA-222-G Section 2.3.2 for Strength Design Load Combinations.

- **Calculated Load Combinations for Consideration (LRFD):**
  - **LC#1: 1.2 * Dead Load + 1.6 * Wind w/o ice load**
  - **LC#2: 0.9 * Dead Load + 1.6 * Wind w/o ice load**
  - **LC#3: 1.2 * Dead Load + 1.0 Dead Load (ice) + 1.0 * Wind with ice load**
  - **LC#4: 1.4 * Dead Load**
  - **LC#5: 1.2 * Dead Load + 1.5 Maintenance Load (500 lbf) on Antenna Mounting Pipe + 1.0 * Wind w/o ice load**
  - **LC#6: 1.2 Dead Load + 1.5 Maintance Load (250 lbf) Cantilever end of Mount Pipe Assembly**

- **Determine Bare (no ice) Force Applied to Antenna (TIA-222-G Standard):**
  - TIA-222-G Section 2.6.6.2 - Design Wind Force on Appurtenances and Mount Frame:

$F_a := q_z \cdot G_h \cdot (EPA_A)$,where $q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

,where $K_z := 2.01 \cdot \left(\frac{z}{z_g}\right)^{\frac{2}{\alpha}}$ [TIA-222-G Section 2.6.5.2]

,where $z := 163ft$ Height above Ground Level (ft)

$z_g := 1200ft$ [TIA-222-G Table 2-4 - Exposure Category "B"]

$\alpha := 7.0$ [TIA-222-G Table 2-4 - Exposure Category "B"]

$K_z := 2.01 \cdot \left(\frac{z}{z_g}\right)^{\frac{2}{\alpha}} = 1.136$

$K_{zt} := \left(1 + \frac{K_e \cdot K_t}{K_h}\right)^2$ [TIA-222-G Section 2.6.5.2] ,where

$K_e := 0.9$ Terrain Constant - Exposure Category "B" [TIA-222-G Table 2-4]

$K_t := 0.53$ Topographic Constant - Topographic Category 3 [TIA-222-G Table 2-5]

$K_h := e^{\left(\frac{f \cdot z}{H}\right)}$,where

$f := 2.00$ Height Attenuation Factor [TIA-222-G; Table 2-5] Topographic Category 3

$H_t := 175ft$ Height of Crest above Surrounding Terrain

$K_h := e^{\left(\frac{f \cdot z}{H_t}\right)}$ $K_{zt} := \left(1 + \frac{K_e \cdot K_t}{K_h}\right)^2$

$K_{zt} = 1.15$

$K_d := 0.85$ [TIA-222-G Table 2-2]

$V :=$ Connecticut State Building Code 2018 - Appendix N

$V_{asd.1} := 97mph$

$I := 1$ Importance Factor - Structure Class 2 [TIA-222-G Table 2-3] $I_{Cat} := 2$

$G_h := 1.0$ Apply Gh = 1.0 for Antenna Mount Frames

$$q_z := \left(0.00256 \cdot \frac{psf}{mph^2}\right) \cdot K_z \cdot K_{zt} \cdot K_d \cdot V_{asd.1}{}^2 I$$

$q_z = 26.8 \cdot psf$

- Distributed Wind to Antenna Frame (design for lb / inch)

Effective Projected Area on Mount Pipe (Pound (force) per linear inch):

$F_a := q_z \cdot G_h \cdot (EPA_A)$ $EPA_A := C_a \cdot A_a$

$C_a := 0.8$ Round Surfaces (assuming Aspect Ratio = 7 (slightly Conservative))

$Antenna_{frame.OD} := 2.8750in$ $Antenna_{frame.Length} := 168in$

$A_a := Antenna_{frame.OD} \cdot Antenna_{frame.Length}$ $EPA_A := C_a \cdot A_a$

$$\omega_{frame.width} := \frac{q_z \cdot G_h \cdot (EPA_A)}{Antenna_{frame.Length}}$$

$\omega_{frame.width} = 5.14371236 \cdot \frac{lbf}{ft}$ $\omega_{frame.width} = 0.42864270 \cdot \frac{lbf}{in}$ Pounds (force) per foot - distributed load for STAAD input

- Distributed Wind to Antenna on Mount Frame (design for lb / inch)

$C_a := 1.4$ Flat Surfaces (assuming Aspect Ratio = 7 (slightly Conservative))

Antenna #1 - AIR6449 B41 - Antenna (Height = 33.1in x Width 20.5in)

$Antenna_{Height.1} := 33.1in$ $Antenna_{Width.1} := 20.5in$

$$Antenna_{No.1} := C_a \cdot (Antenna_{Height.1} \cdot Antenna_{Width.1})$$

$$\omega_{frame.width.1} := \frac{Antenna_{No.1} \cdot q_z \cdot G_h}{56in}$$

$$\omega_{frame.width.1} = 37.93767417 \cdot \frac{lbf}{ft}$$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #2 - AIR32 KRD901146-1_B66A_B2A - Antenna (Height = 56.6in x Width 12.9in)

$Antenna_{Height.2} := 56.6in$ $Antenna_{Width.2} := 12.9in$

$$Antenna_{No.2} := C_a \cdot (Antenna_{Height.2} \cdot Antenna_{Width.2})$$

$$\omega_{frame.width.2} := \frac{Antenna_{No.2} \cdot q_z \cdot G_h}{84in}$$

$$\omega_{frame.width.2} = 27.21471119 \cdot \frac{lbf}{ft}$$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3 - APXVAARR24_43-U-NA20 - Antenna (Height = 95.9in x Width 24in)

$Antenna_{Height.3} := 95.9in$ $Antenna_{Width.3} := 24in$

$$Antenna_{No.3} := C_a \cdot (Antenna_{Height.3} \cdot Antenna_{Width.3})$$

$$\omega_{frame.width.3} := \frac{Antenna_{No.3} \cdot q_z \cdot G_h}{120in}$$

$$\omega_{frame.width.3} = 60.05172364 \cdot \frac{lbf}{ft}$$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3rrh - Radio 4449 B71+B85 RRH Unit (Height = 14.9in x Width 13.2in)

$Antenna_{Height.4} := 14.9in$ $Antenna_{Width.4} := 13.2in$

$$Antenna_{No.4} := C_a \cdot (Antenna_{Height.4} \cdot Antenna_{Width.4})$$

$$\omega_{frame.width.4} := \frac{Antenna_{No.4} \cdot q_z \cdot G_h}{120in}$$

$$\omega_{frame.width.4} = 5.13163582 \cdot \frac{lbf}{ft}$$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3rrh - Radio 4415 B25 RRH Unit (Height = 16.5in x Width 13.4in)

$Antenna_{Height.5} := 16.5in$ $Antenna_{Width.5} := 13.4in$

$$Antenna_{No.5} := C_a \cdot (Antenna_{Height.5} \cdot Antenna_{Width.5})$$

$$\omega_{frame.width.5} := \frac{Antenna_{No.5} \cdot q_z \cdot G_h}{120in}$$

$$\omega_{frame.width.5} = 5.76878523 \cdot \frac{lbf}{ft}$$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3tma - Commscope SDX1926Q-43 (E14F05P86) TMA (Height = 4.173in x Width 6.929 in)

$Antenna_{Height.6} := 4.173in$ $Antenna_{Width.6} := 6.929in$

$Antenna_{No.6} := C_a \cdot (Antenna_{Height.6} \cdot Antenna_{Width.6})$

$\omega_{frame.width.6} := \frac{Antenna_{No.6} \cdot q_z \cdot G_h}{120in}$

$\omega_{frame.width.6} = 0.75442240 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Distribution on Pipe Mount #1: $\omega_{frame.width.1} = 37.937674 \cdot \frac{lbf}{ft}$

Distribution on Pipe Mount #2: $\omega_{frame.width.2} = 27.214711 \cdot \frac{lbf}{ft}$

Distribution on Pipe Mount #3: $\omega_{frame.width.3} + \omega_{frame.width.6} = 60.806146 \cdot \frac{lbf}{ft}$

- Dead Load of Antennas, Connection Frame and Mount Pipe

Antenna #1 - AIR6449 B41 - Antenna (Weight)	$Antenna_{Weight.1} := 103lbf$
Antenna #2 - AIR32 KRD901146-1_B66A_B2A-Antenna (Weight)	$Antenna_{Weight.2} := 132.2lbf$
Antenna #3 - APXVAARR24_43-U-NA20 (Weight)	$Antenna_{Weight.3} := 128lbf$
RRH Unit #4 - Radio 4449 B71+B85 Unit (Weight)	$Antenna_{Weight.4} := 74lbf$
RRH Unit #5 - Radio 4415 B25 Unit (Weight)	$Antenna_{Weight.5} := 46lbf$
TMA #6 - TMA SDX1926Q-43 (Weight)	$Antenna_{Weight.6} := 6.173lbf$

Distribution on Pipe Mount #1: $Antenna_{Weight.1} = 103.00 \cdot lbf$

Distribution on Pipe Mount #2: $Antenna_{Weight.2} = 132.20 \cdot lbf$

Distribution on Pipe Mount #3: $Antenna_{Weight.3} + Antenna_{Weight.4} + Antenna_{Weight.5} + Antenna_{Weight.6} = 254.17 \cdot lbf$

- **Determine Iced Forces Applied to Antenna (TIA-222-H Standard):**
  - TIA-222-G Section 2.6.6.2 - Design Wind Force on Appurtenances and Mount Frame:

$F_a := q_z \cdot G_h \cdot (EPA_A)$,where $q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

,where $K_z := 2.01 \cdot \left(\frac{z}{z_g}\right)^{\frac{2}{\alpha}}$ [TIA-222-G Section 2.6.5.2]

,where $z := 163ft$ Height above Ground Level (ft)

$z_g := 1200ft$ [TIA-222-G Table 2-4 - Exposure Category "B"]

$\alpha := 7.0$ [TIA-222-G Table 2-4 - Exposure Category "B"]

$K_{t.min} := 0.53$ [TIA-222-G Table 2-5 - Topographic Category 3]

$K_z := 2.01 \cdot \left(\frac{z}{z_g}\right)^{\frac{2}{\alpha}} =$ $K_z = 1.136$

$K_{zt} := \left(1 + \frac{K_e \cdot K_t}{K_h}\right)^2$ [TIA-222-G Section 2.6.5.2] ,where

$K_e := 0.9$ Terrain Constant - Exposure Category "B" [TIA-222-G Table 2-4]

$K_t := 0.53$ Topographic Constant - Topographic Category 3 [TIA-222-G Table 2-5]

$K_h := e^{\left(\frac{f \cdot z}{H}\right)}$,where

$f := 2.00$ Height Attenuation Factor [TIA-222-G; Table 2-5] Topographic Category 3

$H_t := 175ft$ Height of Crest above Surrounding Terrain

$K_h := e^{\left(\frac{f \cdot z}{H_t}\right)}$ $K_h = 6.442$ *NOTE: Values Manually input because of formula calculation inaccuracy*

$K_{zt} := \left(1 + \frac{K_e \cdot K_t}{K_h}\right)^2$ $K_{zt} = 1.15$

$K_d := 0.85$ [TIA-222-G Table 2-2]

$V_{asd.2} := 50mph$ mph Ice - TIA-222-G Appendix #

$I := 1.0$ Importance Factor - Structure Class 2 [TIA-222-G Table 2-3]

$G_h := 1.0$ Apply Gh = 1.0 for Antenna Mount Frames

$$q_z := \left(0.00256 \cdot \frac{psf}{mph^2}\right) \cdot K_z \cdot K_{zt} \cdot K_d \cdot V_{asd.2}{}^2 I$$

$q_z = 7.1 \cdot psf$

- Design Ice Thickness (TIA-222-G / ASCE 7):

$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}{}^{0.35}$,where $t_i := 1.0in$ inch

$I_{ice} := 1.0$ [TIA-222-G Table 2-3]

$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}{}^{0.35}$ $K_{iz} := \left(\frac{z}{33ft}\right)^{0.10} = 1.2$

$t_{iz} = 2.467 \cdot in$ inch

- Area of Design Ice Thickness - for Weight:

Horizontal / Vertical Pipes (2-7/8" O.D.) $D_c := 2.875in$ inch

$A_{iz} := \pi \cdot t_{iz} \cdot (D_c + t_{iz})$ $A_{iz} = 41.4 \cdot in^2$ $inch^2$

- Design Ice Thickness - Weight:

$WT_{ice} := A_{iz} \cdot 56pcf \cdot (Antenna_{frame.Length} + 2 \cdot t_{iz}) = 232.0 \cdot lbf$ Lbf NOTE: "56" is in reference to the unit weight of ice at 56 pcf

- Distributed Wind to Antenna Frame (design for lb / inch)

Effective Projected Area on Mount Pipe (Pound (force) per linear inch):

$F_a := q_z \cdot G_h \cdot (EPA_A)$ $EPA_A := C_a \cdot A_a$

$C_a := 0.8$ Round Surfaces (assuming Aspect Ratio = 7 (slightly Conservative))

$Antenna_{frame.OD} := 2.8750in + 2 \cdot t_{iz}$ (inch) $Antenna_{frame.Length} := 168in + 2 \cdot t_{iz}$ (inch)

$A_a := Antenna_{frame.OD} \cdot Antenna_{frame.Length}$ $EPA_A := C_a \cdot A_a$

$$\omega_{frame.width} := \frac{q_z \cdot G_h \cdot (EPA_A)}{Antenna_{frame.Length}}$$

$\omega_{frame.width} = 3.71189081 \cdot \frac{lbf}{ft}$ Pounds (force) per foot - distributed load for STAAD input

- Distributed Wind to Antenna on Mount Frame (design for lb / inch)

$C_a := 1.4$ Flat Surfaces (assuming Aspect Ratio = 7 (slightly Conservative))

Antenna #1 - AIR6449 B41 - Antenna (Height = 33.1 in x Width 20.5 in)

$Antenna_{Height.1} := 33.1in + 2 \cdot t_{iz}$ $Antenna_{Width.1} := 20.5in + 2 \cdot t_{iz}$ $Antenna_{No.1} := C_a \cdot (Antenna_{Height.1} \cdot Antenna_{Width.1})$

$\omega_{frame.width.1} := \frac{Antenna_{No.1} \cdot q_z \cdot G_h}{56in}$

$\omega_{frame.width} = 3.71189081 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #2 - AIR32 KRD901146-1_B66A_B2A - Antenna (Height = 56.6 in x Width 12.9 in)

$Antenna_{Height.2} := 56.6in + 2 \cdot t_i$ $Antenna_{Width.2} := 12.9in + 2 \cdot t_{iz}$ $Antenna_{No.2} := C_a \cdot (Antenna_{Height.2} \cdot Antenna_{Width.2})$

$\omega_{frame.width.2} := \frac{Antenna_{No.2} \cdot q_z \cdot G_h}{84in}$

$\omega_{frame.width} = 3.71189081 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3 - APXVAARR24_43-U-NA20 - Antenna (Height = 95.9in x Width 24in)

$Antenna_{Height.3} := 95.9in + 2 \cdot t_{iz}$ $Antenna_{Width.3} := 24in + 2 \cdot t_{iz}$

$\omega_{frame.width.3} := \frac{Antenna_{No.3} \cdot q_z \cdot G_h}{120in}$

$Antenna_{No.3} := C_a \cdot (Antenna_{Height.3} \cdot Antenna_{Width.3})$

$\omega_{frame.width} = 3.71189081 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3rrh - Radio 4449 B71+B85 RRH Unit (Height = 14.9in x Width 13.2in)

$Antenna_{Height.4} := 14.9in + 2 \cdot t_i$ $Antenna_{Width.4} := 13.2in + 2 \cdot t_{iz}$ $Antenna_{No.4} := C_a \cdot (Antenna_{Height.4} \cdot Antenna_{Width.4})$

$\omega_{frame.width.4} := \frac{Antenna_{No.4} \cdot q_z \cdot G_h}{120in}$

$\omega_{frame.width} = 3.71189081 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3rrh - Radio 4415 B25 RRH Unit (Height = 16.5in x Width 13.4in)

$Antenna_{Height.5} := 16.5in + 2 \cdot t_i$ $Antenna_{Width.5} := 13.4in + 2 \cdot t_{iz}$ $Antenna_{No.5} := C_a \cdot (Antenna_{Height.5} \cdot Antenna_{Width.5})$

$\omega_{frame.width.5} := \frac{Antenna_{No.5} \cdot q_z \cdot G_h}{120in}$

$\omega_{frame.width} = 3.71189081 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3tma - Commscope SDX1926Q-43 (E14F05P86) TMA (Height = 4.173in x Width 6.929 in)

$Antenna_{Height.6} := 4.12in + 2 \cdot t_{iz}$ $Antenna_{Width.6} := 6.929in + 2 \cdot t_{iz}$

$$\omega_{frame.width.6} := \frac{Antenna_{No.6} \cdot q_z \cdot G_h}{120in}$$

$$\omega_{frame.width.6} = 0.74451432 \cdot \frac{lbf}{ft}$$

$$Antenna_{No.6} := C_a \cdot (Antenna_{Height.6} \cdot Antenna_{Width.6})$$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Distribution on Pipe Mount #1: $\omega_{frame.width.1} = 14.369902 \cdot \frac{lbf}{ft}$

Distribution on Pipe Mount #2: $\omega_{frame.width.2} = 10.867707 \cdot \frac{lbf}{ft}$

Distribution on Pipe Mount #3: $\omega_{frame.width.3} + \omega_{frame.width.6} = 20.969829 \cdot \frac{lbf}{ft}$

NOTE; Above Distributions are considering wind applied to "design" ice thicknesses acting on exterior of appurtenances

- Design Ice Thickness - Weight: (Copied for Reference) (Antenna.frame.Length considering Ice build-up)

$WT_{ice} := A_{iz} \cdot 56pcf \cdot Antenna_{frame.Length}$ $WT_{ice} = 232.0 \cdot lbf$ Lbf

NOTE: "56" is in reference to the unit weight of ice at 56 pcf

"Point Load"

$$\omega_{WT.ice.frame.width} := \frac{WT_{ice}}{Antenna_{frame.Length}} = 16.097784 \cdot \frac{lbf}{ft}$$

Lbf / in Distributed load of Ice on Antenna Frame

- Design Ice Thickness - Weight: (Volume Comparison from Ice to Antenna):

Antenna #1 - AIR6449 B42 - Antenna (Height = 33.1in x Width 20.5in x Thickness 8.3in) (no ice)
Antenna (Height = 38.1in x Width 25.5in x Thickness 13.3in) (w/ ice)

$Antenna_{Ice.Volume.1} := 38.1in \cdot 25.5in \cdot 13.3in$ $Antenna_{No.Ice.Volume.1} := 33.1in \cdot 20.5in \cdot 8.3in$

$Weight_{Antenna.1} := (Antenna_{Ice.Volume.1} - Antenna_{No.Ice.Volume.1}) \cdot 56pcf = 236.2 \cdot lbf$ Lbf - "Point Load"

Antenna #2 - AIR32 KRD901146-1_B66A_B2A - Antenna (Height = 56.6in x Width 12.9in x Thickness 8.7in) (no ice)
Antenna (Height = 61.6in x Width 17.9in x Thickness 13.7in) (w/ ice)

$Antenna_{Ice.Volume.2} := 61.6in \cdot 17.9in \cdot 13.7in$ $Antenna_{No.Ice.Volume.2} := 56.6in \cdot 12.9in \cdot 8.7in$

$Weight_{Antenna.2} := (Antenna_{Ice.Volume.2} - Antenna_{No.Ice.Volume.2}) \cdot 56pcf = 283.7 \cdot lbf$ Lbf - "Point Load"

Antenna #3-APXVAARR24_43-U-NA20-Antenna (Height = 95.9in x Width 24in x Thickness 8.7in) (no ice)
Antenna (Height = 100.9in x Width 29in x Thickness 13.7in)(w/ ice)

$Antenna_{Ice.Volume.3} := 2563mm \cdot 736mm \cdot 349mm$ $Antenna_{No.Ice.Volume.3} := 2436mm \cdot 609mm \cdot 222mm$

$Weight_{Antenna.3} := (Antenna_{Ice.Volume.3} - Antenna_{No.Ice.Volume.3}) \cdot 56pcf = 650.6 \cdot lbf$ Lbf - "Point Load"

Antenna #3rrh - Radio 4449 B71+B85 Unit (Height = 14.9in x Width 13.2in x Thickness 9.3in) (no ice)
Unit (Height = 19.9in x Width 18.2in x Thickness 14.3in) (w/ ice)

$Antenna_{Ice.Volume.4} := 19.9in \cdot 18.2in \cdot 14.3in$ $Antenna_{No.Ice.Volume.4} := 14.9in \cdot 13.2in \cdot 9.3in$

$Weight_{Antenna.4} := (Antenna_{Ice.Volume.4} - Antenna_{No.Ice.Volume.4}) \cdot 56pcf = 108.6 \cdot lbf$ Lbf - "Point Load"

Antenna #3rrh - Radio 4415 B25 Unit(Height = 16.5in x Width 13.4in x Thickness 5.9in) (no ice)
Unit(Height = 21.5in x Width 18.4in x Thickness 10.9in) (w/ ice)

$Antenna_{Ice.Volume.5} := 21.5in \cdot 18.4in \cdot 10.9in$ $Antenna_{No.Ice.Volume.5} := 16.5in \cdot 13.4in \cdot 5.9in$

$Weight_{Antenna.5} := (Antenna_{Ice.Volume.5} - Antenna_{No.Ice.Volume.5}) \cdot 56pcf = 97.5 \cdot lbf$ Lbf - "Point Load"

- Design Ice Thickness - Weight: (Volume Comparison from Ice to Antenna Equipment - Applied to largest [point load - Conservative approach):

  Antenna #3tma-Commscope SDX1926Q-43(E14F05P86)(Height = 4.173in x Width 6.929in x Thickness 2.91in)(no ice)

  (Height = 9.173in x Width 11.929In x Thickness 7.91in) (w/ ice)

$Equipment_{Ice.Volume.6} := 9.173in \cdot 11.929in \cdot 7.91in$

$Equipment_{No.Ice.Volume.6} := 4.173in \cdot 6.929in \cdot 2.91in$

$Weight_{Equipment.6} := \left(Equipment_{Ice.Volume.6} - Equipment_{No.Ice.Volume.6}\right) \cdot 56pcf = 25.3 \cdot lbf$ Lbf - "Point Load"

- Ice Induced Dead Load of Antennas, Connection Frame and Mount Pipe

Antenna #1 - AIR6449 B42 - Antenna (Weight)	$Weight_{Antenna.1} = 236.2 \cdot lbf$
Antenna #2 - AIR32 KRD901146-1_B66A_B2A - Antenna (Weight)	$Weight_{Antenna.2} = 283.7 \cdot lbf$
Antenna #3 - APXVAARR24_43-U-NA20 Antenna (Weight)	$Weight_{Antenna.3} = 650.6 \cdot lbf$
Antenna #3rrh - Radio 4449 B71+B85 Unit (Weight)	$Weight_{Antenna.4} = 108.6 \cdot lbf$
Antenna #3rrh - Radio 4415 B25 Unit (Weight)	$Weight_{Antenna.5} = 97.5 \cdot lbf$
Antenna #3tma - Commscope SDX1926Q-43(Weight)	$Weight_{Equipment.6} = 25.3 \cdot lbf$

- Ice Induced Dead Load of Antennas, Connection Frame and Mount Pipe - on Mounting Pipe

Distribution on Pipe Mount #1: $Weight_{Antenna.1} = 236.238657 \cdot lbf$

Distribution on Pipe Mount #2: $Weight_{Antenna.2} = 283.692824 \cdot lbf$

Distribution on Pipe Mount #3: $Weight_{Antenna.3} + Weight_{Antenna.4} + Weight_{Antenna.5} + Weight_{Equipment.6} = 881.994 \cdot lbf$

- **Determine Service/Maintenance .Force Applied to Antenna (TIA-222-G Standard):**
  - TIA-222-G Section 2.6.6.2 - Design Wind Force on Appurtenances and Mount Frame:

$F_a := q_z \cdot G_h \cdot (EPA_A)$,where $q_z := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \cdot I$

,where $K_z := 2.01 \cdot \left(\frac{z}{z_g}\right)^{\frac{2}{\alpha}}$ [TIA-222-G Section 2.6.5.2]

,where $z := 163ft$ Height above Ground Level (ft)

$z_g := 1200ft$ [TIA-222-G Table 2-4 - Exposure Category "B"]

$\alpha = 7.0$ [TIA-222-G Table 2-4 - Exposure Category "B"]

$K_z := 2.01 \cdot \left(\frac{z}{z_g}\right)^{\frac{2}{\alpha}} = 1.136$

$K_{zt} := \left(1 + \frac{K_c \cdot K_t}{K_h}\right)^2$ [TIA-222-G Section 2.6.6.5.2] ,where

$K_c := 0.9$ Terrain Constant - Exposure Category "B" [TIA-222-G Table 2-4]

$K_t := 0.53$ Topographic Constant - Topographic Category 3 [TIA-222-G Table 2-5]

$K_h := e^{\left(\frac{f \cdot z}{H}\right)}$,where

$f := 2.00$ Height Attenuation Factor [TIA-222-G; Table 2-5] Topographic Category 3

$H_t := 175ft$ Height of Crest above Surrounding Terrain

$K_h := e^{\left(\frac{f \cdot z}{H_t}\right)}$ $K_h = 6.442$ *NOTE: Values Manually input because of formula calculation inaccuracy*

$K_{zt} := \left(1 + \frac{K_c \cdot K_t}{K_h}\right)^2$ $K_{zt} = 1.15$

$K_d := 0.85$ [TIA-222-G Table 2-2]

$V_{asd} := 60mph$ mph - Service Loading (TIA-222-G Section 2.8.3)

$I := 1.0$ Importance Factor - Structure Class 2 [TIA-222-G Table 2-3]

$G_h := 1.0$ Apply Gh = 1.0 for Antenna Mount Frames

$$q_z := \left(0.00256 \cdot \frac{psf}{mph^2}\right) \cdot K_z \cdot K_{zt} \cdot K_d \cdot V_{asd}^{\ 2} I$$

$q_z = 10.3 \cdot psf$ (psf)

- Distributed Wind to Antenna Frame (design for lb / inch)

Effective Projected Area on Mount Pipe (Pound (force) per linear inch):

$F_a := q_z \cdot G_h \cdot (EPA_A)$ $EPA_A := C_a \cdot A_a$

$C_a := 0.8$ Round Surfaces (assuming Aspect Ratio = 7 (slightly Conservative))

$Antenna_{frame.OD} := 2.8750in$ (inch) $Antenna_{frame.Length} := 168in$ (inch)

$A_a := Antenna_{frame.OD} \cdot Antenna_{frame.Length}$ $EPA_A := C_a \cdot A_a$

$$\omega_{frame.width} := \frac{q_z \cdot G_h \cdot (EPA_A)}{Antenna_{frame.Length}}$$

$\omega_{frame.width} = 1.96804809 \cdot \frac{lbf}{ft}$ Pounds (force) per inch - distributed load for STAAD input

Antenna #1 - AIR6449 B41 - Antenna (Height = 33.1in x Width 20.5in)

$Antenna_{Height.1} := 33.1in$ $Antenna_{Width.1} := 20.5in$

$Antenna_{No.1} := C_a \cdot (Antenna_{Height.1} \cdot Antenna_{Width.1})$

$\omega_{frame.width.1} := \frac{Antenna_{No.1} \cdot q_z \cdot G_h}{56in}$

$\omega_{frame.width.1} = 8.29452816 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #2 - AIR32 KRD901146-1_B66A_B2A- Antenna (Height = 56.6in x Width 12.9in)

$Antenna_{Height.2} := 56.6in$ $Antenna_{Width.2} := 12.9in$

$Antenna_{No.2} := C_a \cdot (Antenna_{Height.2} \cdot Antenna_{Width.2})$

$\omega_{frame.width.2} := \frac{Antenna_{No.2} \cdot q_z \cdot G_h}{84in}$

$\omega_{frame.width.2} = 5.95010615 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3 - APXVAARR24_43-U-NA20- Antenna (Height = 95.9in x Width 24in)

$Antenna_{Height.3} := 95.9in$ $Antenna_{Width.3} := 24in$

$Antenna_{No.3} := C_a \cdot (Antenna_{Height.3} \cdot Antenna_{Width.3})$

$\omega_{frame.width.3} := \frac{Antenna_{No.3} \cdot q_z \cdot G_h}{120in}$

$\omega_{frame.width.3} = 13.12944780 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3rrh - Radio 4449 B71+B85 Unit (Height = 14.9in x Width 13.2in)

$Antenna_{Height.4} := 14.9in$ $Antenna_{Width.4} := 13.2in$

$Antenna_{No.4} := C_a \cdot (Antenna_{Height.4} \cdot Antenna_{Width.4})$

$\omega_{frame.width.4} := \frac{Antenna_{No.4} \cdot q_z \cdot G_h}{120in}$

$\omega_{frame.width.4} = 1.12195855 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3rrh - Radio 4415 B25 Unit (Height = 16.5in x Width 13.4in)

$Antenna_{Height.5} := 16.5in$ $Antenna_{Width.5} := 13.4in$

$Antenna_{No.5} := C_a \cdot (Antenna_{Height.5} \cdot Antenna_{Width.5})$

$\omega_{frame.width.5} := \frac{Antenna_{No.5} \cdot q_z \cdot G_h}{120in}$

$\omega_{frame.width.5} = 1.26126213 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Antenna #3tma - Commscope SDX1926Q-43 (E14F05P86) TMA (Height = 4.173in x Width 6.929in)

$Antenna_{Height.6} := 4.173in$ $Antenna_{Width.6} := 6.929in$

$Antenna_{No.6} := C_a \cdot (Antenna_{Height.6} \cdot Antenna_{Width.6})$

$\omega_{frame.width.6} := \frac{Antenna_{No.6} \cdot q_z \cdot G_h}{120in}$

$\omega_{frame.width.6} = 0.16494363 \cdot \frac{lbf}{ft}$

Pounds (force) per foot - distributed load for STAAD input - pipe length assumed as 126" total length

Distribution on Pipe Mount #1: $\omega_{frame.width.1} = 8.294528 \cdot \frac{lbf}{ft}$

Distribution on Pipe Mount #2: $\omega_{frame.width.2} = 5.950106 \cdot \frac{lbf}{ft}$

Distribution on Pipe Mount #3: $\omega_{frame.width.3} + \omega_{frame.width.6} = 13.294391 \cdot \frac{lbf}{ft}$

- Dead Load of Antennas, Connection Frame and Mount Pipe

Antenna #1 - AIR6449 B41 - Antenna (Weight)	$Antenna_{Weight.1} := 103lbf$
Antenna #2 - AIR32 KRD901146-1_B66A_B2A-Antenna (Weight)	$Antenna_{Weight.2} := 132.2lbf$
Antenna #3 - APXVAARR24_43-U-NA20 (Weight)	$Antenna_{Weight.3} := 128lbf$
RRH Unit #4 - Radio 4449 B71+B85 Unit (Weight)	$Antenna_{Weight.4} := 74lbf$
RRH Unit #5 - Radio 4415 B25 Unit (Weight)	$Antenna_{Weight.5} := 46lbf$
TMA #6 - TMA SDX1926Q-43 (Weight)	$Antenna_{Weight.6} := 6.173lbf$

Distribution on Pipe Mount #1: $Antenna_{Weight.1} = 103.00 \cdot lbf$

Distribution on Pipe Mount #2: $Antenna_{Weight.2} = 132.20 \cdot lbf$

Distribution on Pipe Mount #3: $Antenna_{Weight.3} + Antenna_{Weight.4} + Antenna_{Weight.5} + Antenna_{Weight.6} = 254.17 \cdot lbf$

Job Information

	Engineer	Checked	Approved
Name:	CMC		
Date:	06-Aug-20		

Project ID	
Project Name	

Structure Type	SPACE FRAME

Number of Nodes	39	Highest Node	42
Number of Elements	52	Highest Beam	55

Number of Basic Load Cases	12
Number of Combination Load Cases	6

Included in this printout are data for:

All	The Whole Structure

Included in this printout are results for load cases:

Type	L/C	Name
Primary	1	SELFWEIGHT FRAME
Primary	2	ANTENNA WEIGHT (DL)
Primary	3	ICE WEIGHT - FRAME (IL)
Primary	4	ICE WEIGHT - ANTENNA (IL)
Primary	5	WIND LOAD - FRAME (WL)
Primary	6	WIND LOAD - ANTENNA (WL)
Primary	7	WIND ON ICE - FRAME (WLI)
Primary	8	WIND ON ICE - ANTENNA (WLI)
Primary	9	MAINTENANCE LOAD - ANTENNA PIPE
Primary	10	MAINTENANCE - FRAME PIPE (LM)
Primary	11	SERVICE LOAD - FRAME (WM)
Primary	12	SERVICE LOAD - ANTENNA (WM)
Combination	13	COMBINATION LOAD CASE 13
Combination	14	COMBINATION LOAD CASE 14
Combination	15	COMBINATION LOAD CASE 15
Combination	16	COMBINATION LOAD CASE 16
Combination	17	COMBINATION LOAD CASE 17
Combination	18	COMBINATION LOAD CASE 18

Nodes

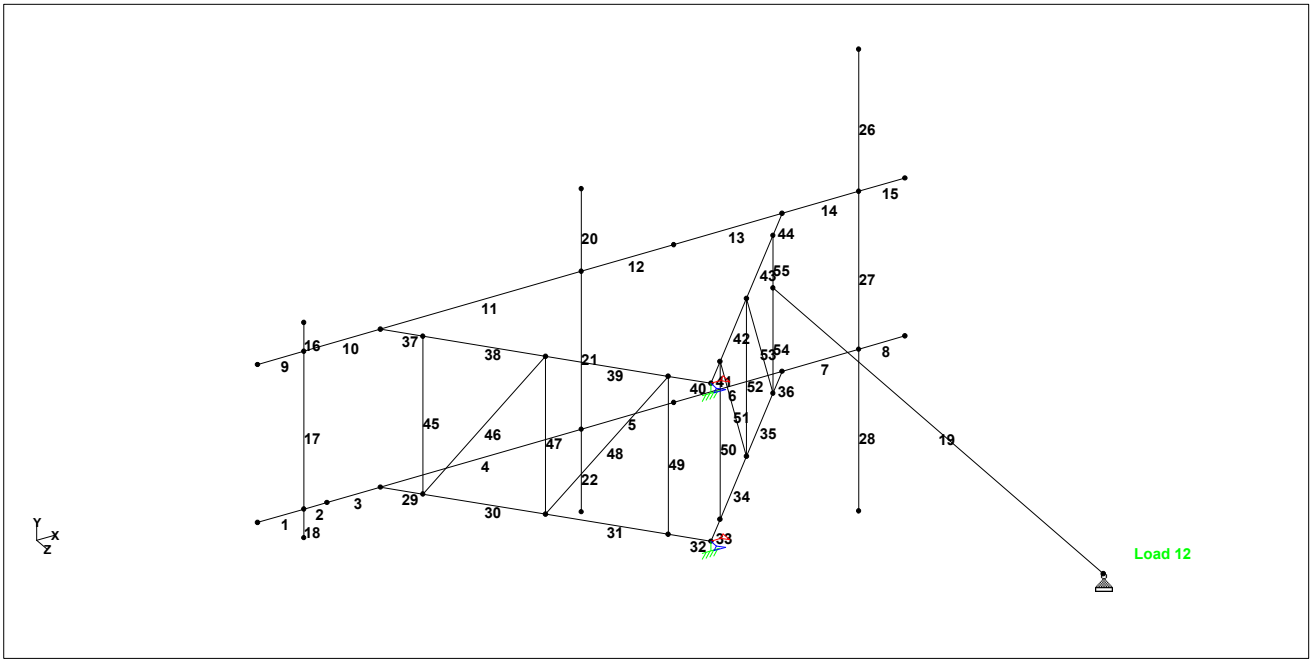
Node	X (ft)	Y (ft)	Z (ft)
1	0.000	0.000	0.000
2	1.000	0.000	0.000
3	2.656	0.000	0.000
4	7.000	0.000	0.000
5	9.000	0.000	0.000
6	11.344	0.000	0.000
7	13.000	0.000	0.000
8	14.000	0.000	0.000
9	0.000	3.420	0.000
10	1.000	3.420	0.000
11	2.656	3.420	0.000
12	7.000	3.420	0.000
13	9.000	3.420	0.000
14	11.344	3.420	0.000
15	13.000	3.420	0.000
16	14.000	3.420	0.000
17	1.500	0.000	0.000
18	3.213	0.000	0.626
19	4.828	0.000	2.427
20	6.440	0.000	4.228
21	7.000	0.000	4.854
22	7.560	0.000	4.228
23	9.172	0.000	2.427
24	10.783	0.000	0.626
25	3.213	3.420	0.626
26	4.828	3.420	2.427
27	6.440	3.420	4.228
28	7.000	3.420	4.854
29	7.560	3.420	4.228
30	9.172	3.420	2.427
31	10.783	3.420	0.626
33	10.783	2.280	13.000
34	1.000	-0.620	0.000
35	1.000	4.040	0.000
36	7.000	-1.790	0.000
37	7.000	5.210	0.000
40	13.000	-3.500	0.000
41	13.000	6.500	0.000
42	10.783	2.280	0.626

Beams

Beam	Node A	Node B	Length (ft)	Property	β (degrees)
1	1	2	1.000	1	0
2	2	17	0.500	1	0
3	17	3	1.156	1	0
4	3	4	4.344	1	0
5	4	5	2.000	1	0
6	5	6	2.344	1	0
7	6	7	1.656	1	0
8	7	8	1.000	1	0
9	9	10	1.000	1	0
10	10	11	1.656	1	0
11	11	12	4.344	1	0
12	12	13	2.000	1	0
13	13	14	2.344	1	0
14	14	15	1.656	1	0
15	15	16	1.000	1	0
16	35	10	0.620	2	0
17	10	2	3.420	2	0
18	2	34	0.620	2	0
19	42	33	12.374	2	0
20	37	12	1.790	2	0
21	12	4	3.420	2	0
22	4	36	1.790	2	0
26	41	15	3.080	2	0
27	15	7	3.420	2	0
28	7	40	3.500	2	0
29	3	18	0.838	2	0
30	18	19	2.419	2	0
31	19	20	2.417	2	0
32	20	21	0.840	2	0
33	21	22	0.840	2	0
34	22	23	2.417	2	0
35	23	24	2.417	2	0
36	24	6	0.840	2	0
37	11	25	0.838	2	0
38	25	26	2.419	2	0
39	26	27	2.417	2	0
40	27	28	0.840	2	0
41	28	29	0.840	2	0
42	29	30	2.417	2	0
43	30	31	2.417	2	0
44	31	14	0.840	2	0
45	18	25	3.420	3	0
46	18	26	4.189	3	0
47	19	26	3.420	3	0
48	19	27	4.188	3	0

Beams Cont...

Beam	Node A	Node B	Length (ft)	Property	β (degrees)
49	20	27	3.420	3	0
50	22	29	3.420	3	0
51	29	23	4.188	3	0
52	23	30	3.420	3	0
53	30	24	4.188	3	0
54	24	42	2.280	3	0
55	42	31	1.140	3	0



Beam Layout

Section Properties

Prop	Section	Area (in^2)	I_{yy} (in^4)	I_{zz} (in^4)	J (in^4)	Material
1	PIPS25	1.610	1.450	1.450	2.907	STEEL
2	PIPS20	1.020	0.627	0.627	1.262	STEEL
3	PIPS12	0.625	0.184	0.184	0.368	STEEL

Materials

Mat	Name	E (kip/in^2)	ν	Density (kip/in^3)	α (/°F)
1	STEEL	29E+3	0.300	0.000	6E -6
2	STAINLESSSTEEL	28E+3	0.300	0.000	10E -6
3	ALUMINUM	10E+3	0.330	0.000	13E -6
4	CONCRETE	3.15E+3	0.170	0.000	5E -6

Supports

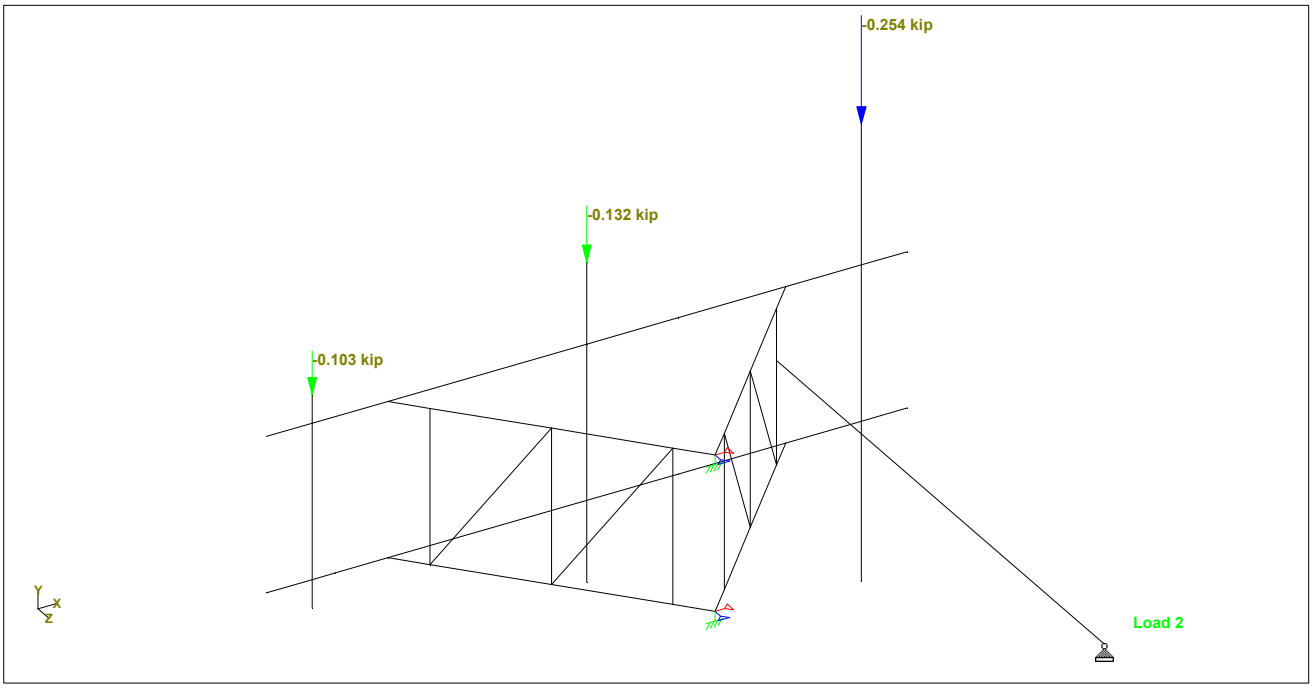
Node	X (kip/in)	Y (kip/in)	Z (kip/in)	rX (kip-ft/deg)	rY (kip-ft/deg)	rZ (kip-ft/deg)
21	Fixed	Fixed	Fixed	-	Fixed	-
28	Fixed	Fixed	Fixed	-	Fixed	-
33	Fixed	Fixed	Fixed	-	-	-

Primary Load Cases

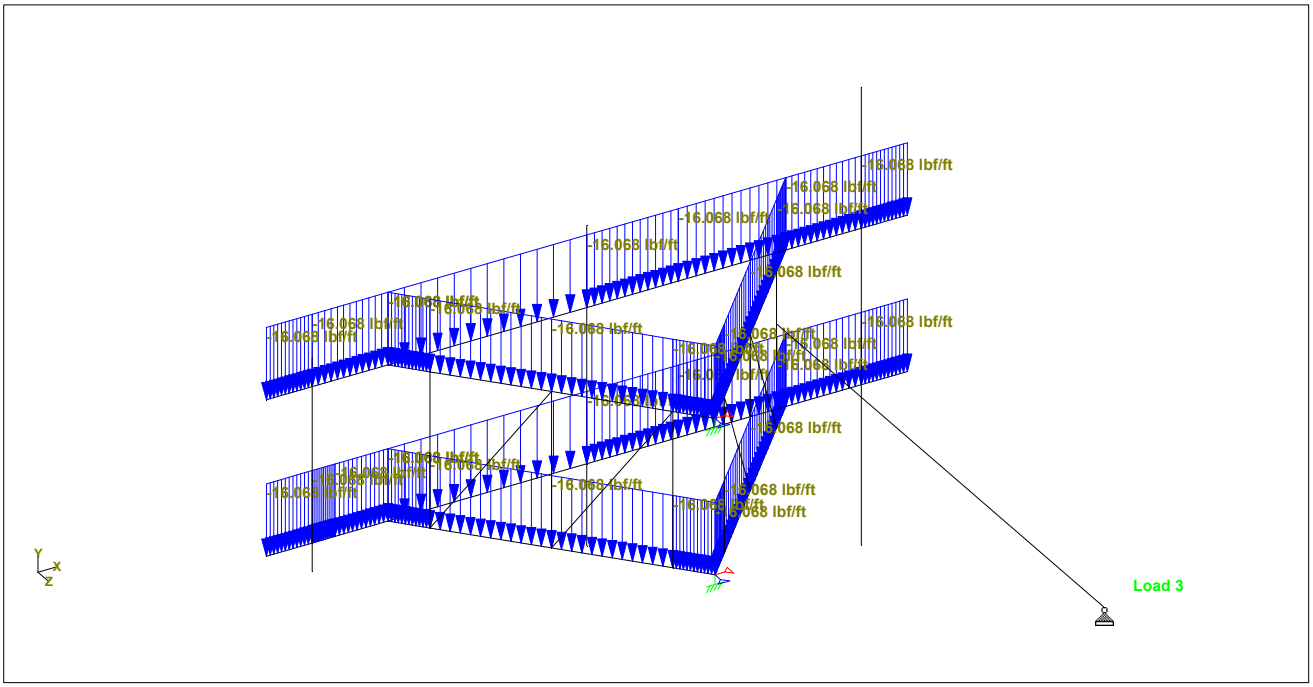
Number	Name	Type
1	SELFWEIGHT FRAME	None
2	ANTENNA WEIGHT (DL)	None
3	ICE WEIGHT - FRAME (IL)	None
4	ICE WEIGHT - ANTENNA (IL)	None
5	WIND LOAD - FRAME (WL)	None
6	WIND LOAD - ANTENNA (WL)	None
7	WIND ON ICE - FRAME (WLI)	None
8	WIND ON ICE - ANTENNA (WLI)	None
9	MAINTENANCE LOAD - ANTENNA PIPE (	None
10	MAINTENANCE - FRAME PIPE (LM)	None
11	SERVICE LOAD - FRAME (WM)	None
12	SERVICE LOAD - ANTENNA (WM)	None

Combination Load Cases

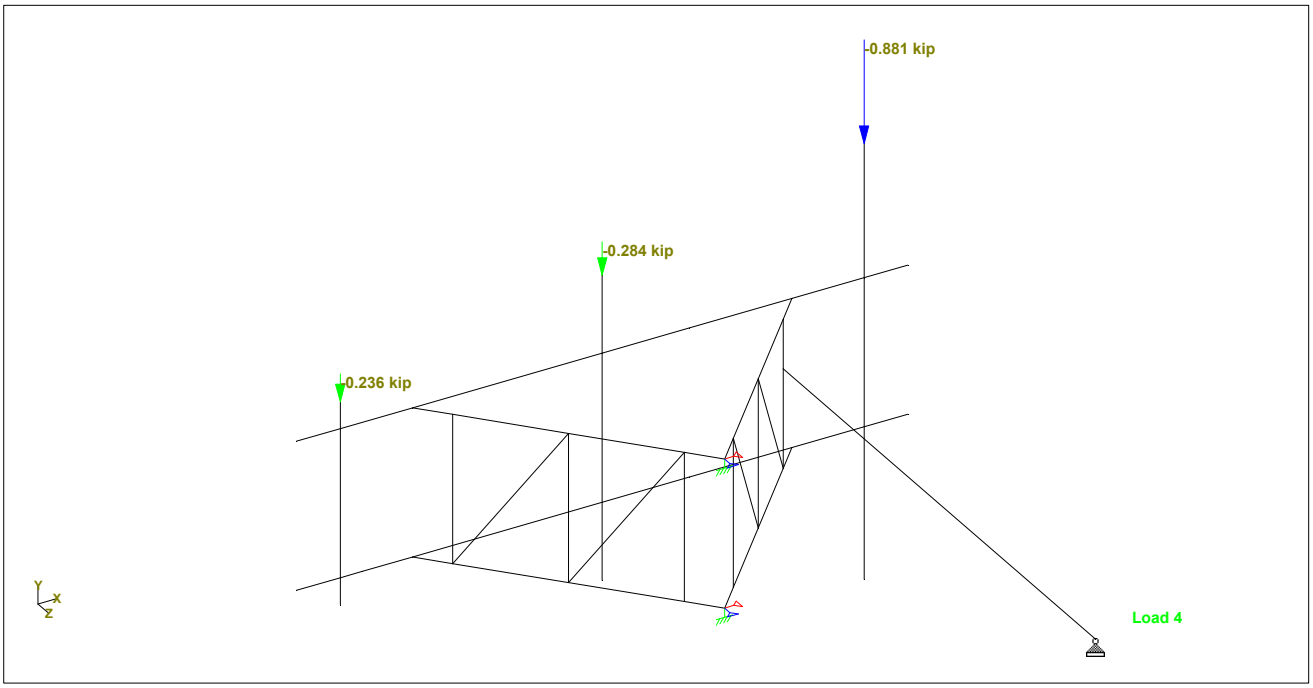
Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
13	COMBINATION LOAD CASE 13	1	SELFWEIGHT FRAME	1.20
		2	ANTENNA WEIGHT (DL)	1.20
		5	WIND LOAD - FRAME (WL)	1.60
		6	WIND LOAD - ANTENNA (WL)	1.60
14	COMBINATION LOAD CASE 14	1	SELFWEIGHT FRAME	0.90
		2	ANTENNA WEIGHT (DL)	0.90
		5	WIND LOAD - FRAME (WL)	1.60
		6	WIND LOAD - ANTENNA (WL)	1.60
15	COMBINATION LOAD CASE 15	1	SELFWEIGHT FRAME	1.20
		2	ANTENNA WEIGHT (DL)	1.20
		3	ICE WEIGHT - FRAME (IL)	1.00
		4	ICE WEIGHT - ANTENNA (IL)	1.00
		7	WIND ON ICE - FRAME (WLI)	1.00
		8	WIND ON ICE - ANTENNA (WLI)	1.00
16	COMBINATION LOAD CASE 16	1	SELFWEIGHT FRAME	1.40
		2	ANTENNA WEIGHT (DL)	1.40
17	COMBINATION LOAD CASE 17	1	SELFWEIGHT FRAME	1.20
		2	ANTENNA WEIGHT (DL)	1.20
		9	MAINTENANCE LOAD - ANTENNA PIPE (	1.50
		11	SERVICE LOAD - FRAME (WM)	1.00
18	COMBINATION LOAD CASE 18	1	SELFWEIGHT FRAME	1.20
		2	ANTENNA WEIGHT (DL)	1.20
		10	MAINTENANCE - FRAME PIPE (LM)	1.50



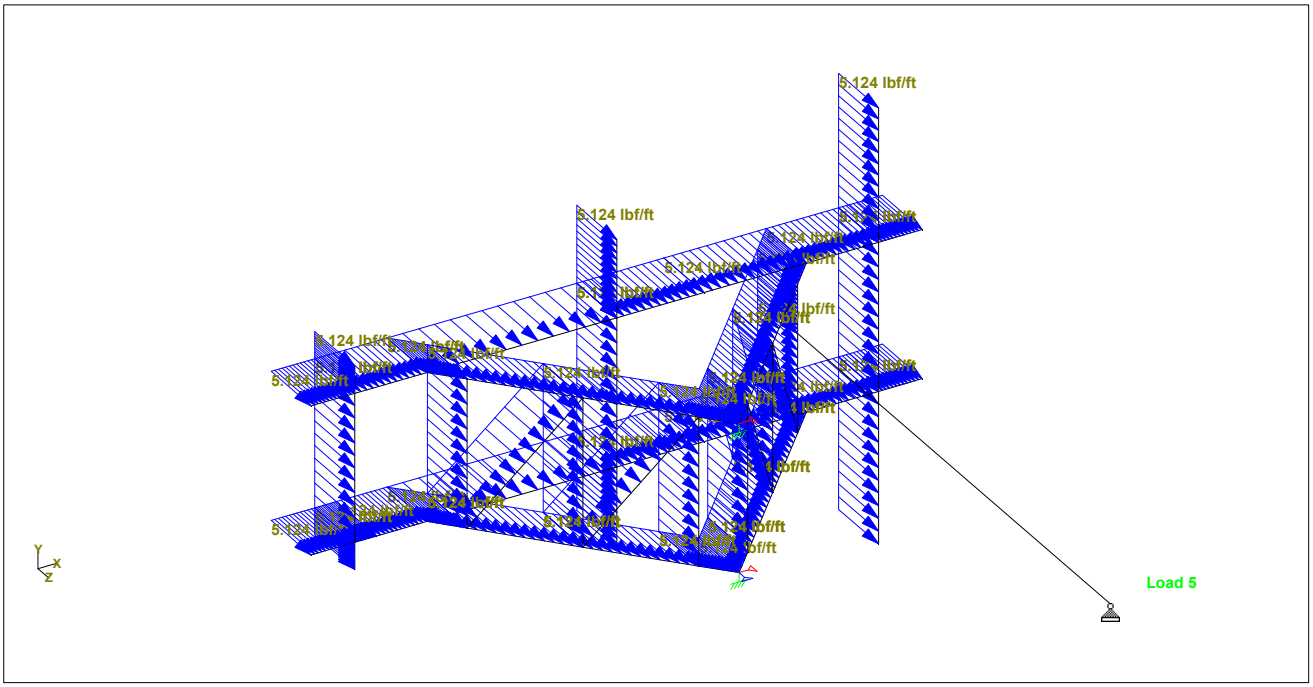
Antenna Weight



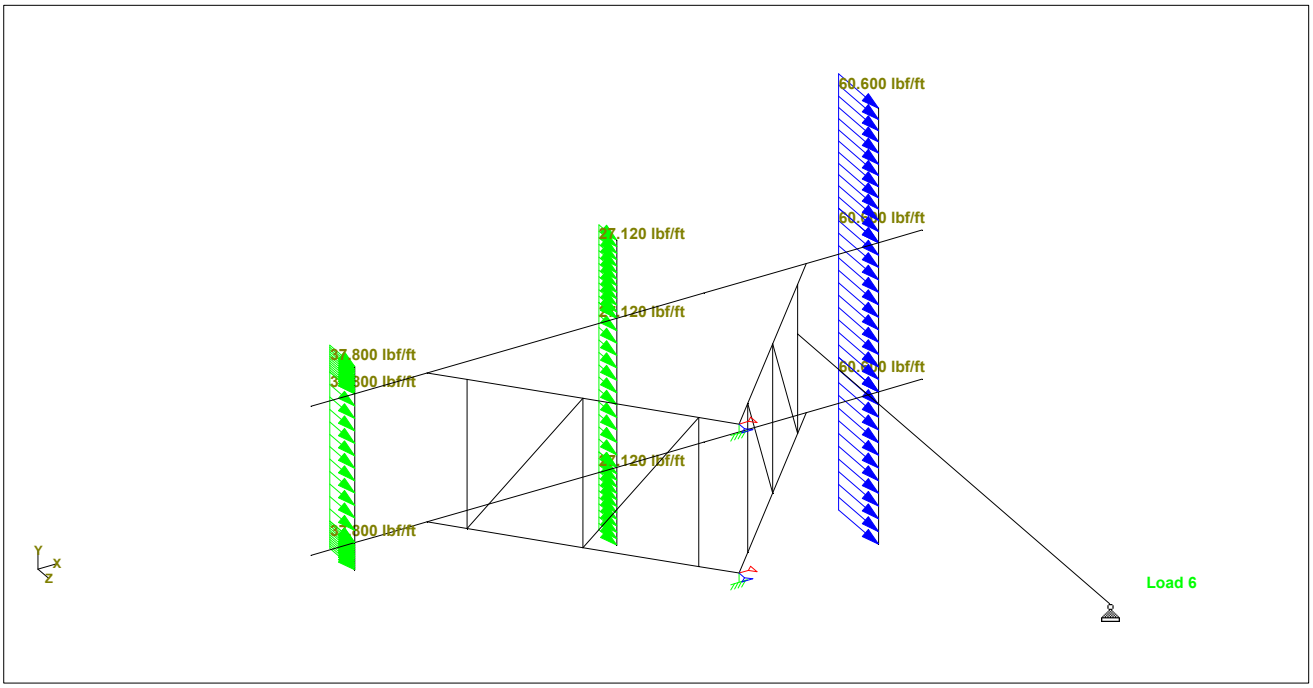
Ice Weight



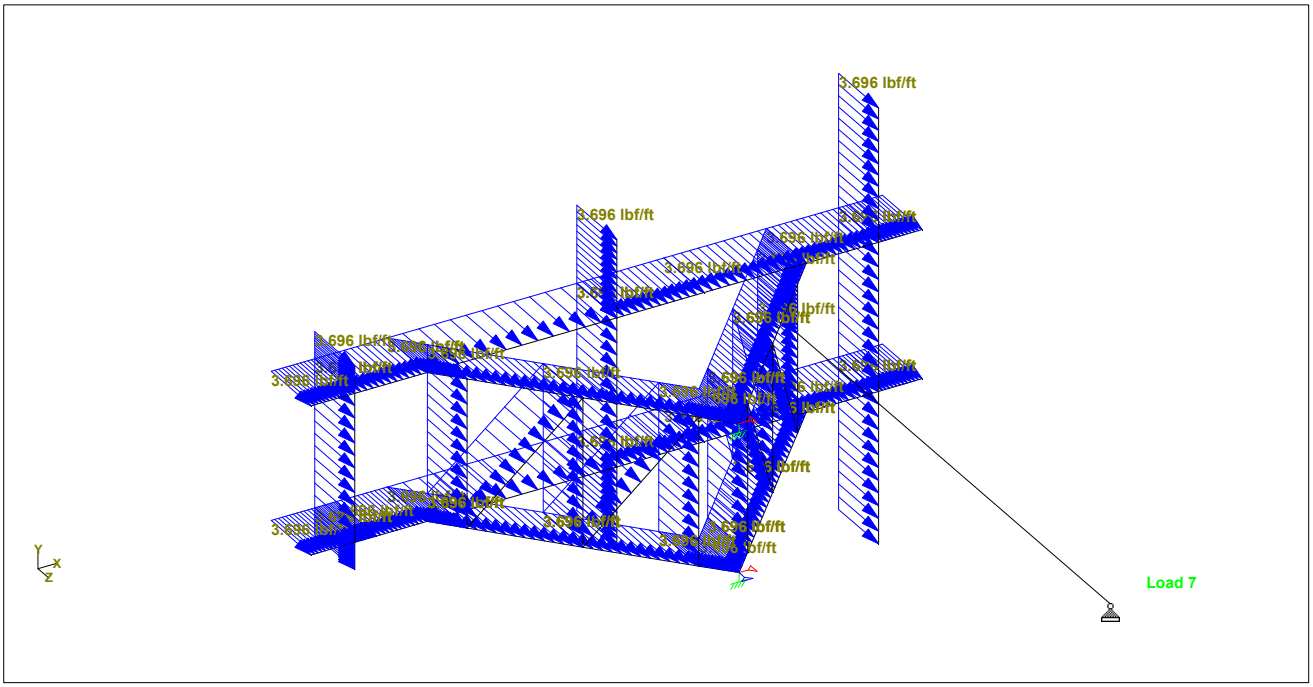
Antenna Ice Weight



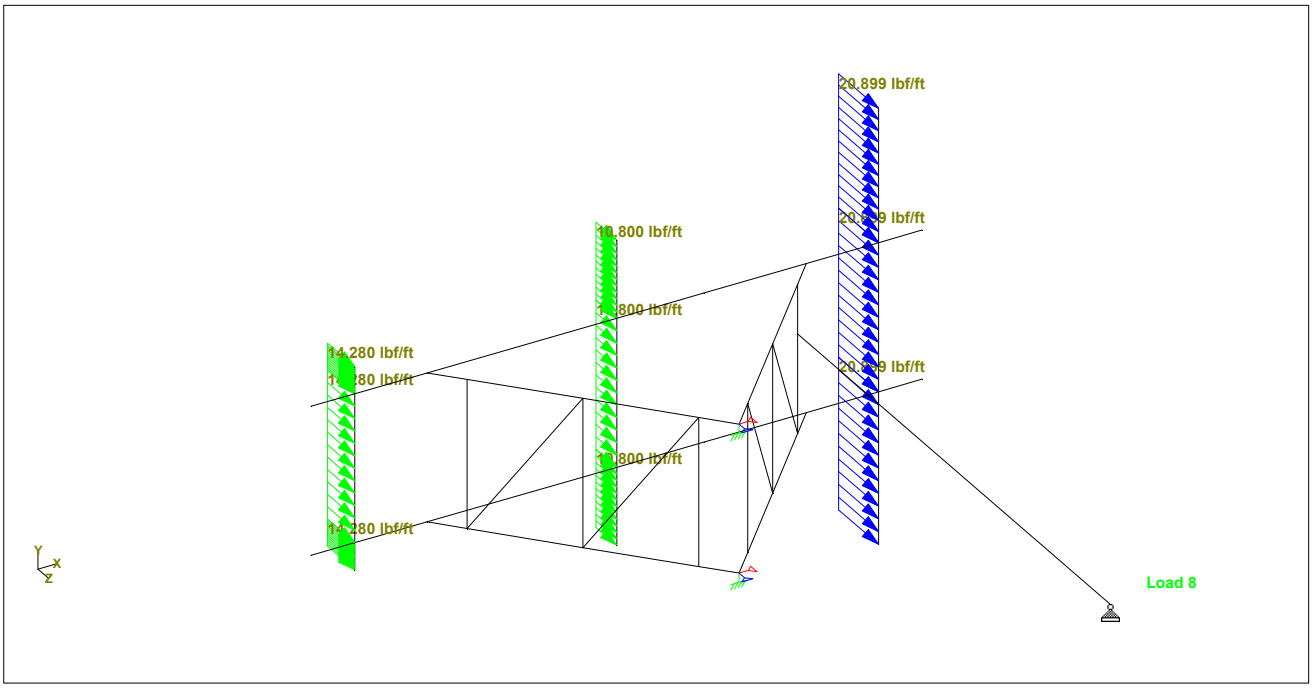
Wind Load



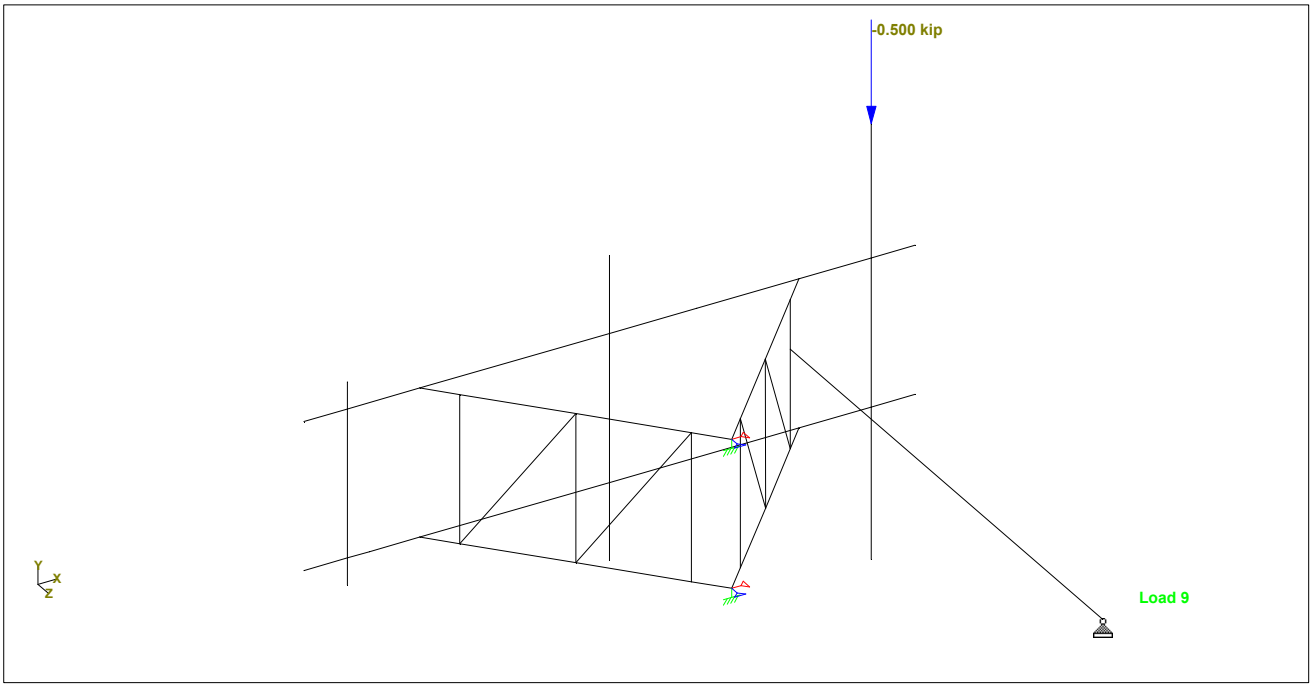
Antenna Wind Load



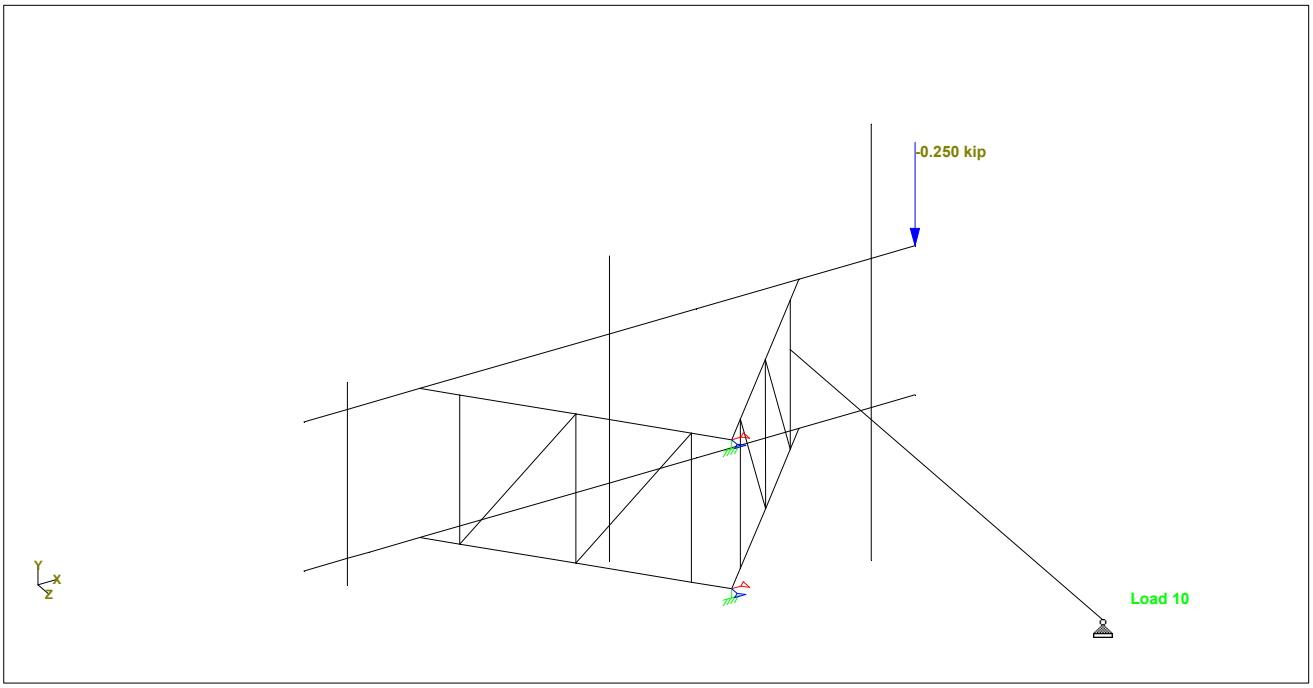
Wind on Ice



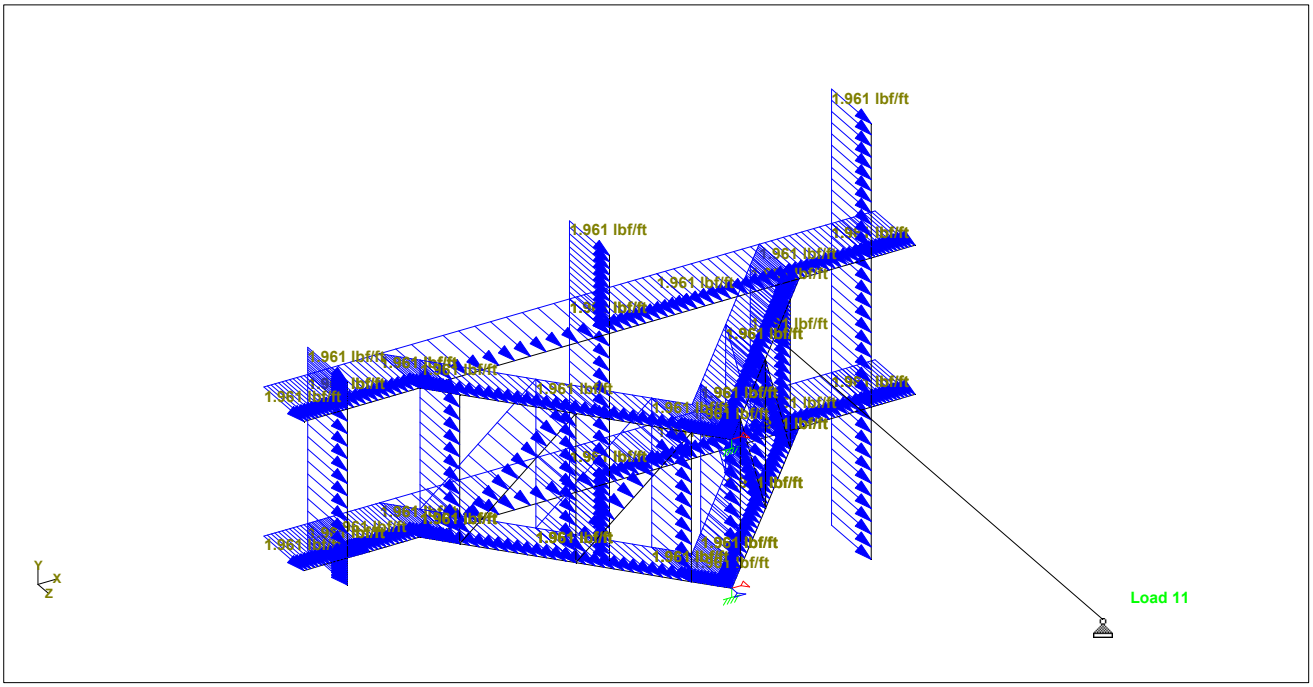
Antenna Wind on Ice



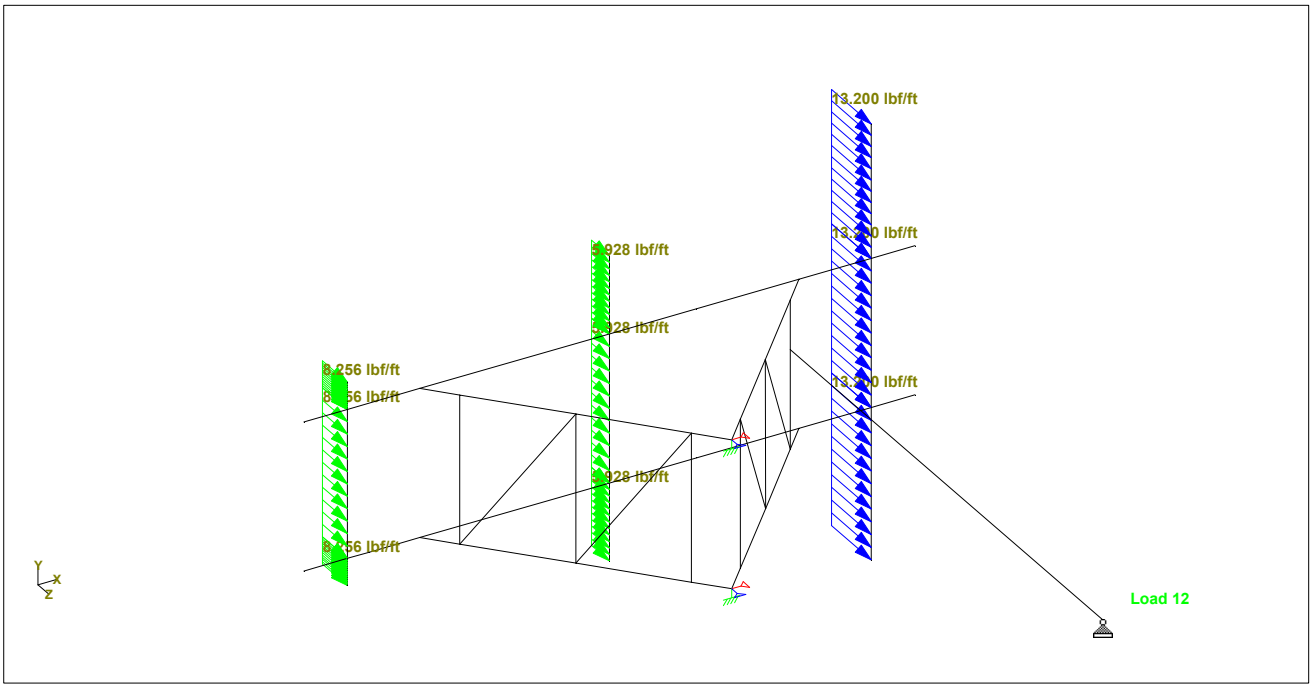
Maintenance Load 1



Maintenance Load 2



Service Load 1



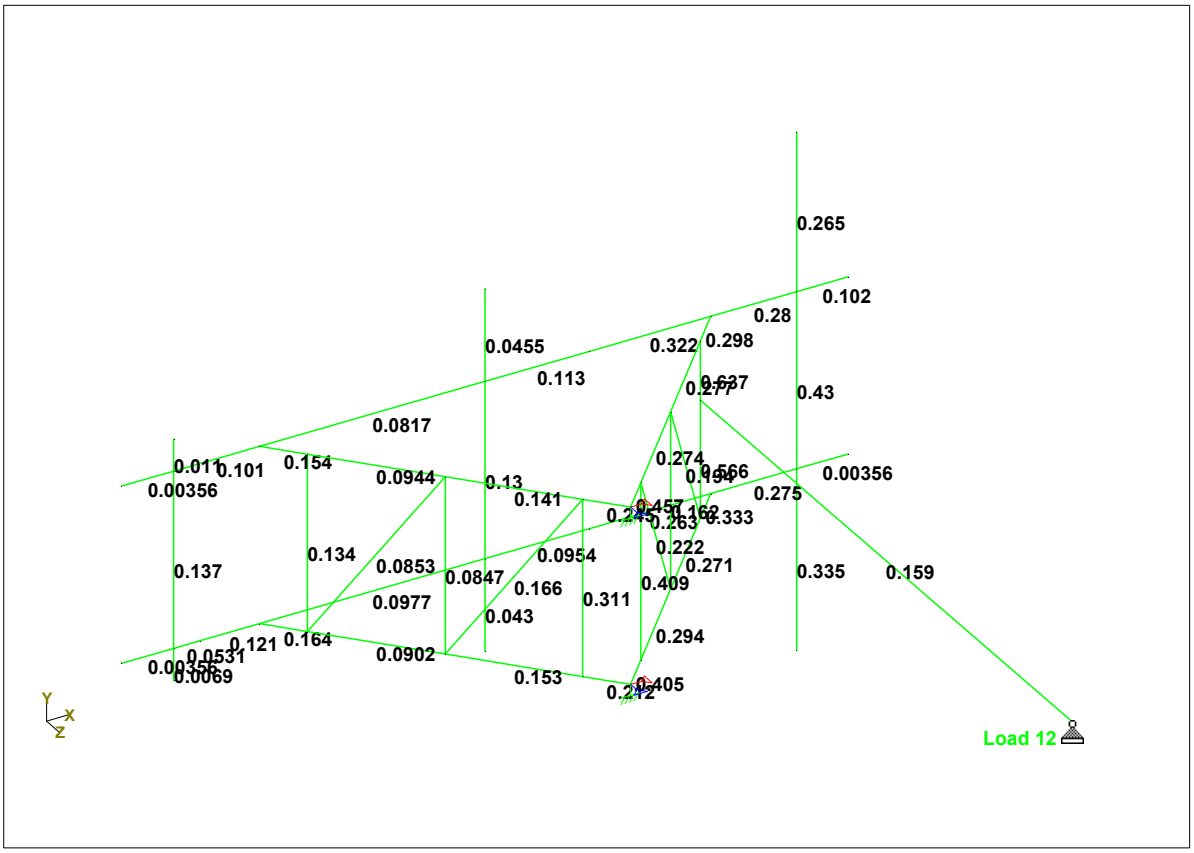
Service Load 2

Utilization Ratio

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (in^2)	Iz (in^4)	Iy (in^4)	Ix (in^4)
1	PIPS25	PIPS25	0.004	1.000	0.004	Eq. H1-1b	15	1.610	1.450	1.450	2.900
2	PIPS25	PIPS25	0.053	1.000	0.053	Eq. H1-1b	15	1.610	1.450	1.450	2.900
3	PIPS25	PIPS25	0.121	1.000	0.121	Eq. H1-1b	13	1.610	1.450	1.450	2.900
4	PIPS25	PIPS25	0.098	1.000	0.098	Eq. H1-1b	15	1.610	1.450	1.450	2.900
5	PIPS25	PIPS25	0.095	1.000	0.095	Eq. H1-1b	14	1.610	1.450	1.450	2.900
6	PIPS25	PIPS25	0.263	1.000	0.263	Eq. H1-1b	15	1.610	1.450	1.450	2.900
7	PIPS25	PIPS25	0.275	1.000	0.275	Eq. H1-1b	13	1.610	1.450	1.450	2.900
8	PIPS25	PIPS25	0.004	1.000	0.004	Eq. H1-1b	15	1.610	1.450	1.450	2.900
9	PIPS25	PIPS25	0.004	1.000	0.004	Eq. H1-1b	15	1.610	1.450	1.450	2.900
10	PIPS25	PIPS25	0.101	1.000	0.101	Eq. H1-1b	13	1.610	1.450	1.450	2.900
11	PIPS25	PIPS25	0.082	1.000	0.082	Eq. H1-1b	15	1.610	1.450	1.450	2.900
12	PIPS25	PIPS25	0.113	1.000	0.113	Eq. H1-1b	13	1.610	1.450	1.450	2.900
13	PIPS25	PIPS25	0.322	1.000	0.322	Eq. H1-1b	13	1.610	1.450	1.450	2.900
14	PIPS25	PIPS25	0.280	1.000	0.280	Eq. H1-1b	13	1.610	1.450	1.450	2.900
15	PIPS25	PIPS25	0.102	1.000	0.102	Eq. H1-1b	18	1.610	1.450	1.450	2.900
16	PIPS20	PIPS20	0.011	1.000	0.011	Sec. E1	15	1.020	0.627	0.627	1.254
17	PIPS20	PIPS20	0.137	1.000	0.137	Eq. H1-1b	15	1.020	0.627	0.627	1.254
18	PIPS20	PIPS20	0.007	1.000	0.007	Eq. H1-1b	13	1.020	0.627	0.627	1.254
19	PIPS20	PIPS20	0.159	1.000	0.159	Sec. E1	13	1.020	0.627	0.627	1.254
20	PIPS20	PIPS20	0.046	1.000	0.046	Eq. H1-1b	13	1.020	0.627	0.627	1.254
21	PIPS20	PIPS20	0.130	1.000	0.130	Eq. H1-1b	14	1.020	0.627	0.627	1.254
22	PIPS20	PIPS20	0.043	1.000	0.043	Eq. H1-1b	13	1.020	0.627	0.627	1.254

Utilization Ratio Cont...

Beam	Analysis Property	Design Property	Actual Ratio	Allowable Ratio	Ratio (Act./Allow.)	Clause	L/C	Ax (in^2)	Iz (in^4)	Iy (in^4)	Ix (in^4)
26	PIPS20	PIPS20	0.265	1.000	0.265	Eq. H1-1b	13	1.020	0.627	0.627	1.254
27	PIPS20	PIPS20	0.430	1.000	0.430	Eq. H1-1b	15	1.020	0.627	0.627	1.254
28	PIPS20	PIPS20	0.335	1.000	0.335	Eq. H1-1b	13	1.020	0.627	0.627	1.254
29	PIPS20	PIPS20	0.164	1.000	0.164	Eq. H1-1b	13	1.020	0.627	0.627	1.254
30	PIPS20	PIPS20	0.090	1.000	0.090	Eq. H1-1b	13	1.020	0.627	0.627	1.254
31	PIPS20	PIPS20	0.153	1.000	0.153	Eq. H1-1b	13	1.020	0.627	0.627	1.254
32	PIPS20	PIPS20	0.212	1.000	0.212	Eq. H1-1b	15	1.020	0.627	0.627	1.254
33	PIPS20	PIPS20	0.405	1.000	0.405	Eq. H1-1b	15	1.020	0.627	0.627	1.254
34	PIPS20	PIPS20	0.294	1.000	0.294	Eq. H1-1b	15	1.020	0.627	0.627	1.254
35	PIPS20	PIPS20	0.271	1.000	0.271	Eq. H1-1b	13	1.020	0.627	0.627	1.254
36	PIPS20	PIPS20	0.333	1.000	0.333	Eq. H1-1b	15	1.020	0.627	0.627	1.254
37	PIPS20	PIPS20	0.154	1.000	0.154	Eq. H1-1b	13	1.020	0.627	0.627	1.254
38	PIPS20	PIPS20	0.094	1.000	0.094	Eq. H1-1b	13	1.020	0.627	0.627	1.254
39	PIPS20	PIPS20	0.141	1.000	0.141	Eq. H1-1b	15	1.020	0.627	0.627	1.254
40	PIPS20	PIPS20	0.245	1.000	0.245	Eq. H1-1b	15	1.020	0.627	0.627	1.254
41	PIPS20	PIPS20	0.457	1.000	0.457	Eq. H1-1b	15	1.020	0.627	0.627	1.254
42	PIPS20	PIPS20	0.274	1.000	0.274	Eq. H1-1b	15	1.020	0.627	0.627	1.254
43	PIPS20	PIPS20	0.277	1.000	0.277	Eq. H1-1b	14	1.020	0.627	0.627	1.254
44	PIPS20	PIPS20	0.298	1.000	0.298	Eq. H1-1b	15	1.020	0.627	0.627	1.254
45	PIPS12	PIPS12	0.134	1.000	0.134	Eq. H1-1b	15	0.625	0.184	0.184	0.368
46	PIPS12	PIPS12	0.085	1.000	0.085	Eq. H1-1b	15	0.625	0.184	0.184	0.368
47	PIPS12	PIPS12	0.085	1.000	0.085	Eq. H1-1b	15	0.625	0.184	0.184	0.368
48	PIPS12	PIPS12	0.166	1.000	0.166	Eq. H1-1b	15	0.625	0.184	0.184	0.368
49	PIPS12	PIPS12	0.311	1.000	0.311	Eq. H1-1b	15	0.625	0.184	0.184	0.368
50	PIPS12	PIPS12	0.409	1.000	0.409	Eq. H1-1b	15	0.625	0.184	0.184	0.368
51	PIPS12	PIPS12	0.222	1.000	0.222	Eq. H1-1b	15	0.625	0.184	0.184	0.368
52	PIPS12	PIPS12	0.162	1.000	0.162	Sec. E1	15	0.625	0.184	0.184	0.368
53	PIPS12	PIPS12	0.194	1.000	0.194	Eq. H1-1b	13	0.625	0.184	0.184	0.368
54	PIPS12	PIPS12	0.566	1.000	0.566	Eq. H1-1b	13	0.625	0.184	0.184	0.368
55	PIPS12	PIPS12	0.637	1.000	0.637	Eq. H1-1b	13	0.625	0.184	0.184	0.368



Utility Ratio

Failed Members

There is no data of this type.

AIR-32 B4A/B2P & B2A/B66AA

ERICSSON ANTENNA INTEGRATED RADIO AIR-32

Radio		
	Single Band (B4a/B2p)	**Dual Band (B2a/B66Aa)**
Band 2 (1850-1910 / 1930-1990 MHz)	Passive frequency band	Active frequency band
Band 4 (1710-1755 / 2110-2155 MHz)	Active frequency band	Subset of Band 66A (AWS 1+3)
Band 66A (1710-1780 / 2110-2180 MHz)	N/A	Active frequency band
PA Output Power	4 x 30W	2 x (4 x 30) W
Downlink EIRP in bore-sight direction for each active band	4 x 62.5 dBmi	4 x 62.5 dBmi
Instantaneous bandwidth	45 MHz (W, L)	B2: 40 MHz (W, L) B2: 20 MHz (G) B66A: 70 MHz (W, L)
Capacity (single standard per unit)	6 GSM 6 WCDMA 2 x 20 MHz LTE	6 GSM (B2 only) 6 WCDMA per Active frequency band 2 x 20 MHz LTE per band
Multi-RAT capability	WCDMA and LTE on both PAs	WCDMA and GSM on both PAs (B2 only) WCDMA and LTE on both PAs (B2 and B4) GSM and LTE (B2 only)

Interfaces		
Optical CPRI	2 x 10 Gbps	2 x 10 Gbps per Active frequency band
DC Power	-48 VDC 3-wire or 2-wire	-48 VDC 3-wire or 2-wire (separate input for both radios)
AC power (Optional)	PSU-AC 08	PSU-AC 08
Passive antenna	4 RF connectors (7/16 female)	N/A
Environmental		
Operating Temperature Range	-40 to +55 °C	-40 to +55 °C
Solar Radiation	≤ 1,120 W/m²	≤ 1,120 W/m²
Relative Humidity	5 to 100%	5 to 100%
Absolute Humidity	0.26 to 40 g/m^3	0.26 to 40 g/m^3
Maximum temperature change	1.0°C/min	1.0°C/min
Antenna		
Electrical Tilt	2º – 12º (B4) 2º – 12º (B2)	2º – 12º (B66A) 2º – 12º (B2)
Bore-sight antenna gain	18 dBi (B4) 17.5 dBi (B2)	18 dBi (B66A) 17.5 dBi (B2)
Nominal beam-width, azimuth	65º (B4) 63º (B2)	65º (B66A) 63º (B2)
Nominal beam-width, elevation	6º (B4) 6º (B2)	6º (B66A) 6º (B2)
Mechanical		
Weight	48 Kg (105.8 lbs)	60 Kg (132.2 lbs)
Dimensions (H x W x D)	1439 x 327 x 220 mm (56.6” x 12.9” x 8.7”)	1439 x 327 x 220 mm (56.6” x 12.9” x 8.7”)
Wind load at 42 m/s (150 km/h) Front / Lateral / Rear	640N / 300N / 660N	640N / 300N / 660N

RADIO FREQUENCY SYSTEMS
The Clear Choice®

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600MHz, 700MHz, AWS & PCS applications.

- 24 Inch Width For Easier Zoning
- Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality
- Superior elevation pattern performance across the entire electrical down tilt range
- Includes three AISG RET motors - Includes 0.5m AISG jumper for optional daisy chain of two high band RET motors for one single AISG point of high band tilt control.
- Low band arrays driven by a single RET motor

Technical Features

LOW BAND LEFT ARRAY (617-746 MHZ) [R1]

Frequency Band	MHz	617-698	698-746
Gain Over All Tilts	dBi	15.1 +/- .3	15.5 +/- .3
Horizontal Beamwidth @3dB	Deg	65 +/- 4	62 +/- 2
Vertical Beamwidth @3dB	Deg	11.4 +/- .7	10.4 +/- .5
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	24
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

LOW BAND RIGHT ARRAY (617-746 MHZ) [R2]

Frequency Band	MHz	617-698	698-746
Gain Over All Tilts	dBi	14.8 +/- .2	15.1 +/- .2
Horizontal Beamwidth @3dB	Deg	65 +/- 4	62 +/- 2
Vertical Beamwidth @3dB	Deg	11.4 +/- .8	10.3 +/- .5
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	23
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

HIGH BAND LEFT ARRAY (1695-2200 MHZ) [B1]

Frequency Band	MHz	1695-1880	1850-1990	1920-2200
Gain Over All Tilts	dBi	17.3 +/- .7	17.8 +/- .4	18.5 +/- 1
Horizontal Beamwidth @3dB	Deg	66 +/- 7	59 +/- 4	59 +/- 6
Vertical Beamwidth @3dB	Deg	5.3 +/- .4	4.7 +/- .4	4.3 +/- .3
Electrical Downtilt Range	Deg	2-12	2-12	2-12
Upper Side Lobe Suppression 0 to +20	dB	15	15	15
Front-to-Back, at +/-30°, Copolar	dB	25	25	25
Cross Polar Discrimination (XPD) @ Boresight	dB	19	17	16
Cross Polar Discrimination (XPD) @ +/-60	dB	4	6	4
3rd Order PIM 2 x 43dBm	dBc	-153	-153	-153
VSWR	-	1.5:1	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25	25
Maximum Effective Power per Port	Watt	250	250	250

HIGH BAND RIGHT ARRAY (1695-2200 MHZ) [B2]

Frequency Band	MHz	1695-1880	1850-1990	1920-2200
Gain Over All Tilts	dBi	17.1 +/- .7	17.8 +/- .4	18.5 +/- 1
Horizontal Beamwidth @3dB	Deg	66 +/- 7	59 +/- 4	59 +/- 5
Vertical Beamwidth @3dB	Deg	5.2 +/- .4	4.7 +/- .4	4.3 +/- .3
Electrical Downtilt Range	Deg	2-12	2-12	2-12
Upper Side Lobe Suppression 0 to +20	dB	15	15	15
Front-to-Back, at +/-30°, Copolar	dB	25	24	25
Cross Polar Discrimination (XPD) @ Boresight	dB	20	17	16
Cross Polar Discrimination (XPD) @ +/-60	dB	4	6	5
3rd Order PIM 2 x 43dBm	dBc	-153	-153	-153
VSWR	-	1.5:1	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25	25
Maximum Effective Power per Port	Watt	250	250	250

RADIO FREQUENCY SYSTEMS
The Clear Choice®

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

ELECTRICAL SPECIFICATIONS

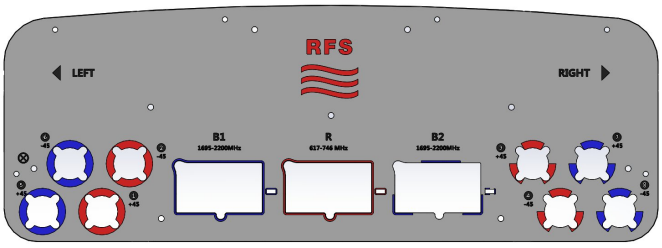
Impedance	Ohm	50.0
Polarization	Deg	±45°

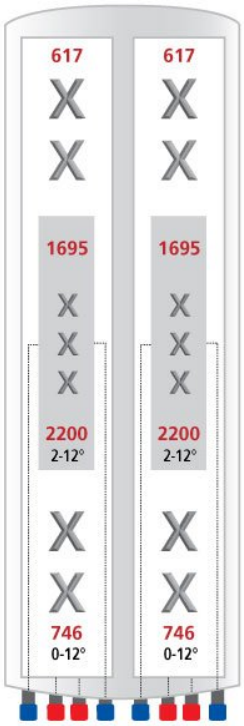
MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	2436 x 609 x 222 (95.9 x 24 x 8.7)
Weight (Antenna Only)	kg (lb)	58 (128)
Weight (Mounting Hardware only)	kg (lb)	11.5 (25.3)
Shipping Weight	kg (lb)	80 (176)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Mounting Hardware Material		Galvanized steel
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	241 (150)
Environmental		ETSI 300-019-2-4 Class 4.1E





ORDERING INFORMATION

Order No.	Configuration	Mounting Hardware	Mounting pipe Diameter	Shipping Weight
APXVAARR24_43-U-NA20	Field Replace RET included (3)	APM40-5E Beam tilt kit (included)	60-120mm	80 Kg

RADIO FREQUENCY SYSTEMS
The Clear Choice®

Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

External Document Links

APM40_Series_Installation_Instructions
Manual_Overdrive_Instructions
Global RFS Website

Notes

All electrical parameters are compliant with BASTA NGMN 9.6 requirements.

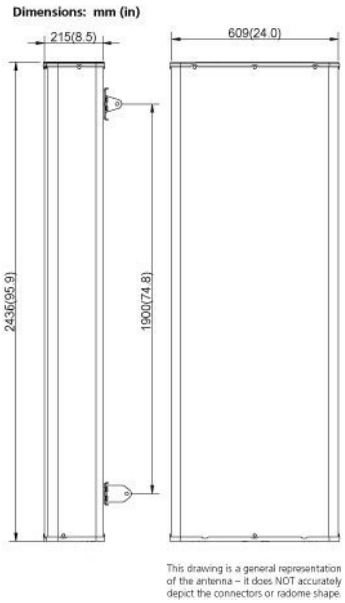
Available Configurations
APXVAARR24_43-U-NA20 -- External ACU is included -- shipping weight 80kg.

For additional mounting information please click "External Document Links".

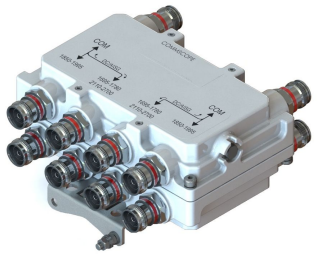
This data is provisional and subject to changes.

External Link Reference

Global RFS Website	http://www.rfsworld.com



SDX1926Q-43 | E14F05P86



Ultra Compact Quad-pack Diplexer PCS/AWS+WCS+BRS, DC AWS /WCS/BRS, 4.3-10

- Quad configuration, 4x4 MIMO ready
- Ideal for small cell applications
- BTS-to-feeder and feeder-to-antenna application
- DC/AISG pass on 1695-1780/2110-2700 MHz
- New 4.3-10 connectors for improved PIM performance and size reduction
- Industry leading PIM performance

Product Classification

Product Type	Diplexer

General Specifications

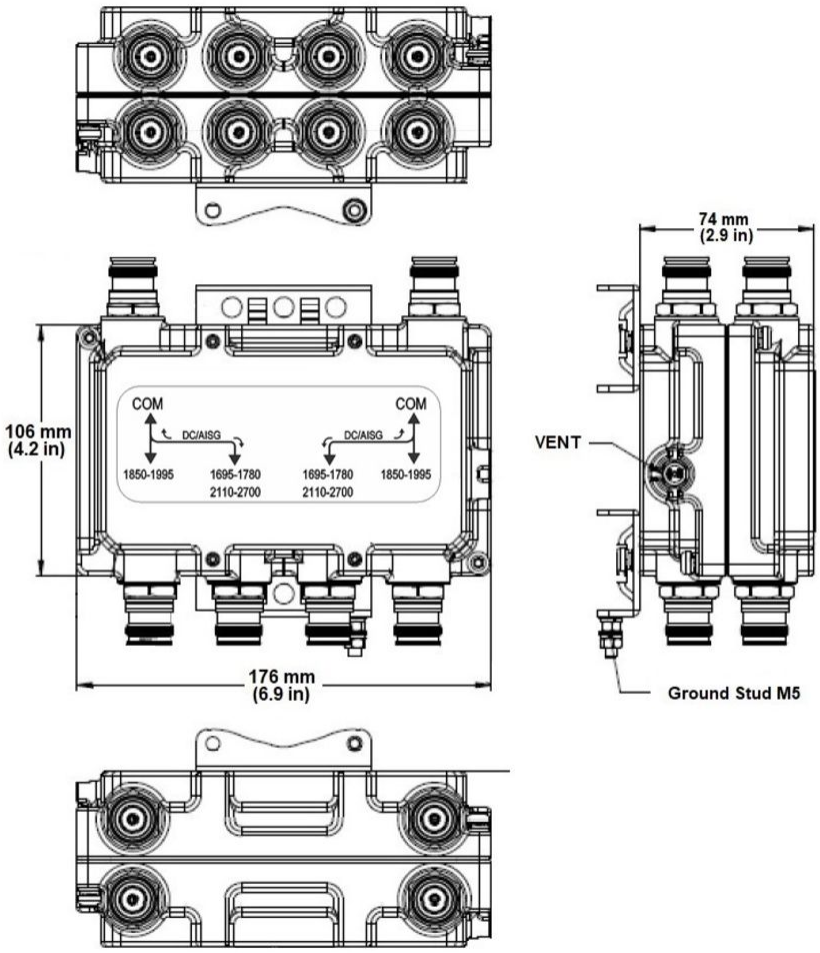
Color	Gray
Common Port Label	COMMON
Modularity	4-Quad
RF Connector Interface	4.3-10 Female
RF Connector Interface Body Style	Long neck

Dimensions

Height	106 mm | 4.173 in
Width	176 mm | 6.929 in
Depth	74 mm | 2.913 in

Outline Drawing

SDX1926Q-43 | E14F05P86



Electrical Specifications

Impedance	50 ohm
License Band, Band Pass	AWS 1700 | PCS 1900 | TDD 1900 | TDD 2300 | TDD 2600 | WCS 2300

Electrical Specifications, dc Power/Alarm

dc/AISG Pass-through Method	Factory set
dc/AISG Pass-through Path	Branch 2
dc/AISG Pass-through, combiner	Branch 2
dc/AISG Pass-through, demultiplexer	Branch 2
Lightning Surge Current	5 kA
Lightning Surge Current Waveform	8/20 waveform
Voltage	7–30 Vdc

Electrical Specifications, AISG

AISG Carrier	2.176 MHz ± 100 ppm

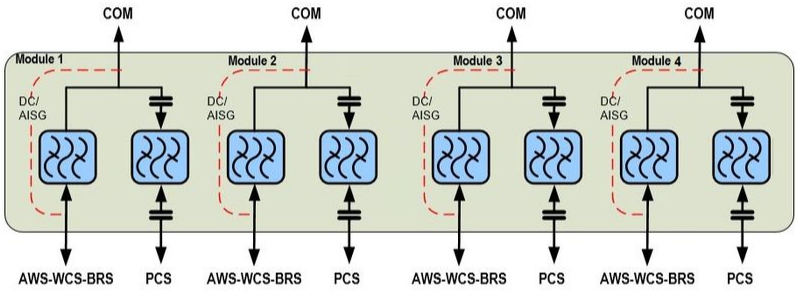
Electrical Specifications

Sub-module	**1 | 2**	**1 | 2**
Branch	1	2
Port Designation	PCS	AWS-WCS-BRS
License Band	PCS 1900, Band Pass	[2, 17]

Electrical Specifications, Band Pass

Frequency Range, MHz	**1850-1995**	**1695–1780 2110–2700**
Insertion Loss, typical, dB	0.2	0.15
Total Group Delay, maximum, ns	15	15
Return Loss, typical, dB	22	22
Isolation, typical, dB	42	42
Input Power, RMS, maximum, W	100	100
Input Power, PEP, maximum, W	1500	1500
3rd Order PIM, minimum, dBc	-161	-161
3rd Order PIM Test Method	2 x 20 W CW tones	2 x 20 W CW tones

Block Diagram



Mechanical Specifications

Wind Loading at Velocity, frontal	26.0 N @ 150 km/h
Wind Loading at Velocity, lateral	8.0 N @ 150 km/h

Environmental Specifications

Operating Temperature	-40 °C to +65 °C (-40 °F to +149 °F)
Relative Humidity	Up to 100%
Corrosion Test Method	IEC 60068-2-11, 30 days
Ingress Protection Test Method	IEC 60529:2001, IP67

Packaging and Weights

Mounting Hardware Weight	0.2 kg | 0.441 lb

Volume	1.4 L
Weight, without mounting hardware	2.8 kg | 6.173 lb

Regulatory Compliance/Certifications

Agency	Classification
CHINA-ROHS	Below maximum concentration value
REACH-SVHC	Compliant as per SVHC revision on www.commscope.com/ProductCompliance
ROHS	Compliant

Exhibit F

EBI Consulting

environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CT11174A

Callahan Tower_1
99 Cedarwood Lane
Newington, Connecticut 06111

October 26, 2020

EBI Project Number: 6220005523

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**24.42%**

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

October 26, 2020

T-Mobile
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, Connecticut 06002

Emissions Analysis for Site: CT11174A - Callahan Tower_1

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **99 Cedarwood Lane** in **Newington, Connecticut** for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 99 Cedarwood Lane in Newington, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

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

1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.

3) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

5) 4 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 2 UMTS channels (AWS Band - 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

7) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

8) 2 LTE channels (BRS Band - 2500 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

9) 2 NR channels (BRS Band - 2500 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

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

11) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

12) The antennas used in this modeling are the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s) in Sector A, the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s) in Sector B, the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value

is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

13) The antenna mounting height centerline of the proposed antennas is 163 feet above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449
Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz
Gain:	22.05 dBd / 22.05 dBd	Gain:	22.05 dBd / 22.05 dBd	Gain:	22.05 dBd / 22.05 dBd
Height (AGL):	163 feet	Height (AGL):	163 feet	Height (AGL):	163 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	160 Watts	Total TX Power (W):	160 Watts	Total TX Power (W):	160 Watts
ERP (W):	25,651.93	ERP (W):	25,651.93	ERP (W):	25,651.93
Antenna A1 MPE %:	**3.47%**	Antenna B1 MPE %:	**3.47%**	Antenna C1 MPE %:	**3.47%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32
Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz
Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd
Height (AGL):	163 feet	Height (AGL):	163 feet	Height (AGL):	163 feet
Channel Count:	6	Channel Count:	6	Channel Count:	6
Total TX Power (W):	300 Watts	Total TX Power (W):	300 Watts	Total TX Power (W):	300 Watts
ERP (W):	10,784.92	ERP (W):	10,784.92	ERP (W):	10,784.92
Antenna A2 MPE %:	**1.46%**	Antenna B2 MPE %:	**1.46%**	Antenna C2 MPE %:	**1.46%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz
Gain:	12.95 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd / 16.35 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd / 16.35 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.35 dBd / 15.65 dBd / 16.35 dBd
Height (AGL):	163 feet	Height (AGL):	163 feet	Height (AGL):	163 feet
Channel Count:	9	Channel Count:	9	Channel Count:	9
Total TX Power (W):	380 Watts	Total TX Power (W):	380 Watts	Total TX Power (W):	380 Watts
ERP (W):	11,055.53	ERP (W):	11,055.53	ERP (W):	11,055.53
Antenna A3 MPE %:	**2.26%**	Antenna B3 MPE %:	**2.26%**	Antenna C3 MPE %:	**2.26%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	7.19%
AT&T	8.02%
Clearwire	0.1%
Sprint	2.58%
Carbone's Auto Body	6.45%
Town of Wethersfield	0.08%
Site Total MPE % :	24.42%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	7.19%
T-Mobile Sector B Total:	7.19%
T-Mobile Sector C Total:	7.19%
Site Total MPE % :	24.42%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 2500 MHz LTE	2	6412.98	163.0	17.36	2500 MHz LTE	1000	1.74%
T-Mobile 2500 MHz NR	2	6412.98	163.0	17.36	2500 MHz NR	1000	1.74%
T-Mobile 1900 MHz GSM	2	1028.30	163.0	2.78	1900 MHz GSM	1000	0.28%
T-Mobile 1900 MHz LTE	2	2056.61	163.0	5.57	1900 MHz LTE	1000	0.56%
T-Mobile 2100 MHz LTE	2	2307.55	163.0	6.24	2100 MHz LTE	1000	0.62%
T-Mobile 600 MHz LTE	2	591.73	163.0	1.60	600 MHz LTE	400	0.40%
T-Mobile 600 MHz NR	1	1577.94	163.0	2.14	600 MHz NR	400	0.53%
T-Mobile 700 MHz LTE	2	648.82	163.0	1.76	700 MHz LTE	467	0.38%
T-Mobile 1900 MHz LTE	2	2203.69	163.0	5.96	1900 MHz LTE	1000	0.60%
T-Mobile 2100 MHz UMTS	2	1294.56	163.0	3.50	2100 MHz UMTS	1000	0.35%
						Total:	**7.19%**

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

Summary

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

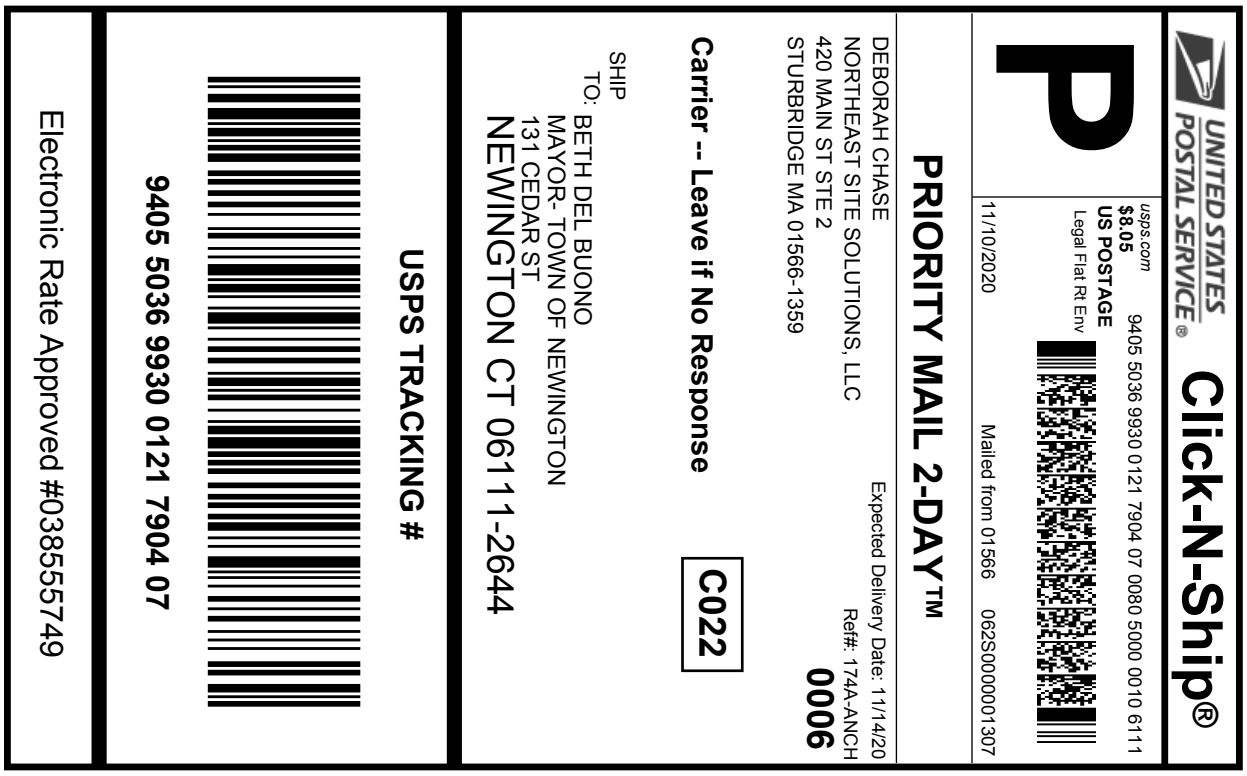
The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	7.19%
Sector B:	7.19%
Sector C:	7.19%
T-Mobile Maximum MPE % (Sector A):	7.19%
Site Total:	24.42%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **24.42%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Exhibit G



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Expected Delivery Date:	11/14/2020

Priority Mail® Postage:	**$8.05**
Total:	**$8.05**

From: DEBORAH CHASE Ref#: 174A-ANCH
NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST STE 2
STURBRIDGE MA 01566-1359

To: BETH DEL BUONO
MAYOR- TOWN OF NEWINGTON
131 CEDAR ST
NEWINGTON CT 06111-2644

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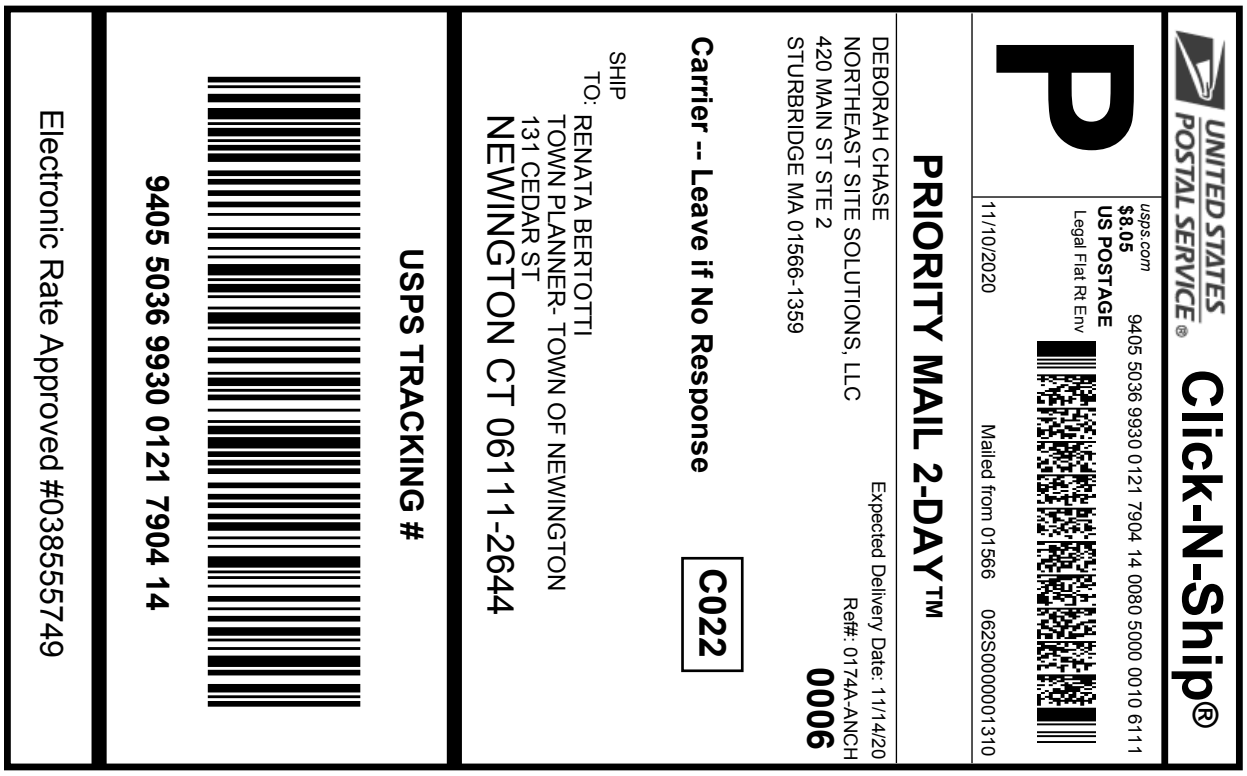

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Ship Date:	11/10/2020
Expected Delivery Date:	11/14/2020

Priority Mail® Postage:	**$8.05**
Total:	**$8.05**

From: DEBORAH CHASE Ref#: 0174A-ANCH
NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST STE 2
STURBRIDGE MA 01566-1359

To: RENATA BERTOTTI
TOWN PLANNER- TOWN OF NEWINGTON
131 CEDAR ST
NEWINGTON CT 06111-2644

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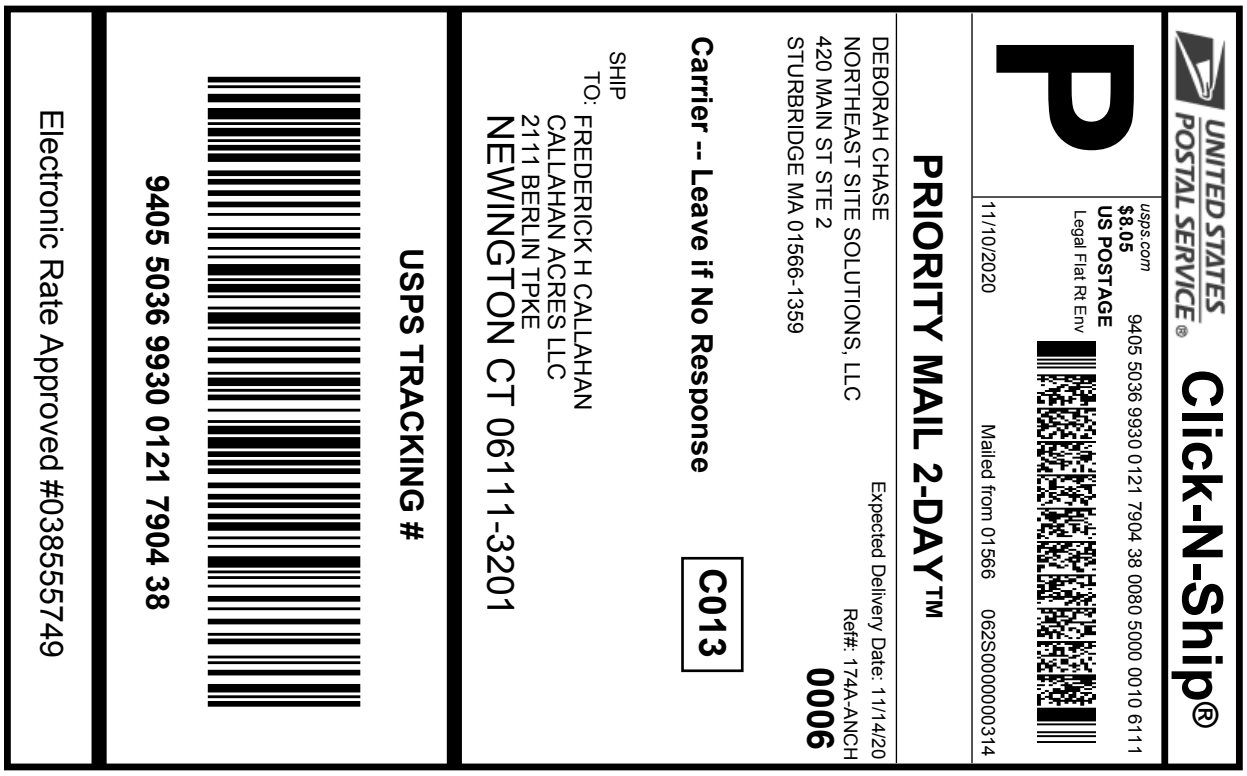

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Trans. #:	513453888
Print Date:	11/10/2020
Ship Date:	11/10/2020
Expected Delivery Date:	11/14/2020

Priority Mail® Postage:	**$8.05**
Total:	**$8.05**

From: DEBORAH CHASE Ref#: 174A-ANCH
NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST STE 2
STURBRIDGE MA 01566-1359

To: FREDERICK H CALLAHAN
CALLAHAN ACRES LLC
2111 BERLIN TPKE
NEWINGTON CT 06111-3201

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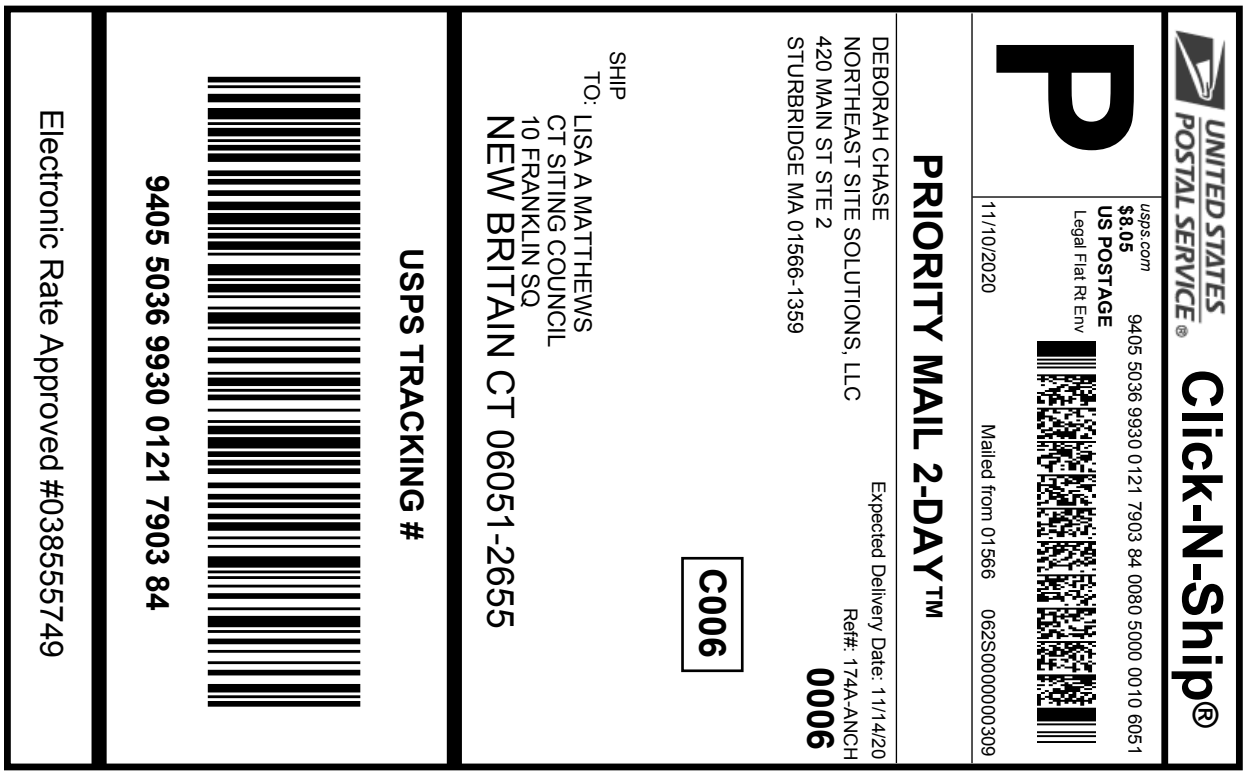

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Click-N-Ship® Label Record

USPS TRACKING # :
9405 5036 9930 0121 7903 84

Trans. #:	513453888
Print Date:	11/10/2020
Ship Date:	11/10/2020
Expected Delivery Date:	11/14/2020

Priority Mail® Postage:	**$8.05**
Total:	**$8.05**

From: DEBORAH CHASE Ref#: 174A-ANCH
NORTHEAST SITE SOLUTIONS, LLC
420 MAIN ST STE 2
STURBRIDGE MA 01566-1359

To: LISA A MATTHEWS
CT SITING COUNCIL
10 FRANKLIN SQ
NEW BRITAIN CT 06051-2655

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Exhibit H

Deborah Chase

From: Deborah Chase
Sent: Tuesday, November 10, 2020 12:09 PM
To: 'bdelbuono@newingtonct.gov'; 'RBertotti@newingtonct.gov'
Cc: 'bowlingcop@aol.com'
Subject: 99 CEDARWOOD LANE (BERLIN TPK) NEWINGTON CT 06111 T0MOBILE EM APPLICATION (CT11174A-ANCHOR)
Attachments: 99 CEDARWOOD LANE (BERLIN TPK) NEWINGTON CT 06111 T-MOBILE EM APPLICATION (CT11174A-Anchor).pdf

Good afternoon
On behalf of our client, (T-Mobile), I am forwarding copies of T-Mobiles Exempt Modification Request to collocate on a wireless telecommunications facility located at 99 Cedarwood Lane (Berlin Tpk), Newington
Hard copies will be sent as well for your records.
Please do not hesitate to contact me with any questions regarding T-Mobile's Exempt Modification Request.
Thank you very much

Deborah Chase
Senior Project Coordinator & Analyst
Mobile: 860-490-8839

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SITE SOLUTIONS
Turnkey Wireless Development
www.northeastsitesolutions.com

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