10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

July 30, 2020

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

RE: Notice of Exempt Modification
80 Lonetown Road, Redding, CT 06896
Latitude: 41.31780001
Longitude: -73.38335001
T-Mobile Site#: CTFF600E – Anchor

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 92-foot level of the existing 100-foot lattice tower at 80 Lonetown Road, Redding, CT. The 100-foot lattice tower and property are owned by Andrew & Elizabeth Mound. T-Mobile now intends to add three (3) new 2500 MHz antennas. The new antennas will be installed at the same 92-foot level of the tower.

Planned Modifications:
Tower:

Remove
N/A

Remove and Replace:
(3) Commscope LNX-6513DS antennas for (3) RFS APXVARR18-43 600/700/1900/2100 MHz antennas
(3) RFS APXV18 antennas for (3) RFS APX16DWV-16DWVS 2100 MHz antennas
(3) Ericsson RRUS11 for (3) Ericsson Radio 4449 RRU

Install New:
(3) AIR 6449 B41 2500 MHz
(3) Ericsson Radio 4415 B25 RRU
(3) Radio 4424 RRU
(3) Commscope SDX1926Q-43
(3) 1-5/8" Hybrid

Existing to Remain:
(3) RRUS11
(1) 1-5/8" Hybrid

Ground:
Install New: 6160 Cabinet

This tower was originally approved by the Connecticut Siting Council in Petition No. 311 dated November 9, 1993, and Petition No. 1131 dated February 19, 2015. T-Mobile was approved for tower-sharing on May 30, 2017. The proposed modification complies with the previous approvals.

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 First Selectman -Julia Pemberton, Elected Official, and Aimee Pardee, Zoning Enforcement Officer for the Town of Redding, as well as the 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,

Kyle Richers
Transcend Wireless
Cell: 908-447-4716
Email: krichers@transcendwireless.com

Attachments
cc: Julia Pemberton – First Selectman of the Town of Redding
Aimee Pardee– Zoning Enforcement Officer for the Town of Redding
Andrew & Elizabeth Mound – Owner

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
   Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.
   Hand the package to any UPS driver in your area.

UPS Access Point™
MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY ,NJ 07446

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH ,NJ 07430

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY ,NJ 07446

FOLD HERE

NEIL GUERRIERO
3473040176
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 07430

1 LBS 1 OF 1

SHIP TO:
ANDREW AND ELIZABETH MOUND
80 LONETOWN ROAD
REDDING CT 06896-1415

CT 068 0-03

UPS GROUND
TRACKING #: 1Z V25 742 42 9621 0450

BILLING: P/P
SIGNATURE REQUIRED

Reference#1: CTFF600E CSC owner

UIS 22.0.11. WNTNV50 31.0A 07/2020

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

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   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.
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THE UPS STORE
115 FRANKLIN TPKE
MAHWAH ,NJ 07430

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY ,NJ 07446

FOLD HERE

1 LBS 1 OF 1

NEIL GUERRIERO
3473040176
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 07430

SHIP TO:
JULIA PEMBERTON
TOWN OF REDDING
100 HILL ROAD
REDDING CT 06896-2007

CT 068 0-03

UPS GROUND
TRACKING #: 1Z V25 742 42 9714 0462

BILLING: P/P
SIGNATURE REQUIRED

Reference#1: CTFF600E CSC EO

UIS 22.0.11. WNTNV50 31.0A 07/2020

UPS Internet Shipping: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

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UPS Access Point™
THE UPS STORE
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RAMSEY ,NJ 07446

FOLD HERE

NEIL GUERRIERO
3473040176
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 07430

1 LBS 1 OF 1

SHIP TO:
AIMEE PARDEE
TOWN OF REDDING
100 HILL ROAD
REDDING CT 06896-2007

CT 068 0-03

UPS GROUND
TRACKING #: 1Z V25 742 42 9809 0470

BILLING: P/P
SIGNATURE REQUIRED

Reference#1: CTFF600E CSC ZO

UIS 22.0.11. WNTNV50 31.0A 07/2020

80 LONETOWN RD

Location	80 LONETOWN RD
Mblu	14/ / 21/ C/
Acct#	1421C
Owner	MOUND ANDREW C & ELIZABETH C
Assessment	$252,000
Appraisal	$360,000
PID	100604
Building Count	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$0	$360,000	$360,000
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2017	$0	$252,000	$252,000

Owner of Record

Owner MOUND ANDREW C & ELIZABETH C
Co-Owner
Address 80 LONETOWN RD
REDDING, CT 06752

Sale Price $967,500
Certificate
Book & Page 0229/0721
Sale Date 05/04/1999
Instrument 00

Ownership History

Ownership History					
Owner	**Sale Price**	**Certificate**	**Book & Page**	**Instrument**	**Sale Date**
MOUND ANDREW C & ELIZABETH C	$967,500		0229/0721	00	05/04/1999
MOHAWK HILL TRUST	$0		0187/0735	XX	11/15/1994

Building Information

Building 1 : Section 1

Year Built:
Living Area: 0
Replacement Cost: $0
Building Percent Good:

Replacement Cost
Less Depreciation: $0

Building Attributes	
Field	**Description**
Style	Ranch
Model	
Grade:	
Stories	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms	
Full Bathrooms	
Half Bathrooms	
Total Xtra Fixtrs	
Total Rooms	
Bath Style:	
Kitchen Style:	
Fireplaces	
Cndtn	
Whirlpool Tubs	
Usrfld 104	
Fin Bsmt Area	
Fin Bsmt Qual	
Bsmt Garages	
Num Park	
Fireplaces	
Usrfld 108	
Usrfld 102	
Usrfld 100	

Building Photo

(http://images.vgsi.com/photos/ReddingCTPhotos//default.jpg)

Building Layout

Building Layout

Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Use Code 435
Description Cell Site Vac Lnd
Zone R-2
Neighborhood
Alt Land Appr No
Category

Land Line Valuation

Size (Acres) 0.00
Frontage
Depth
Assessed Value $252,000
Appraised Value $360,000

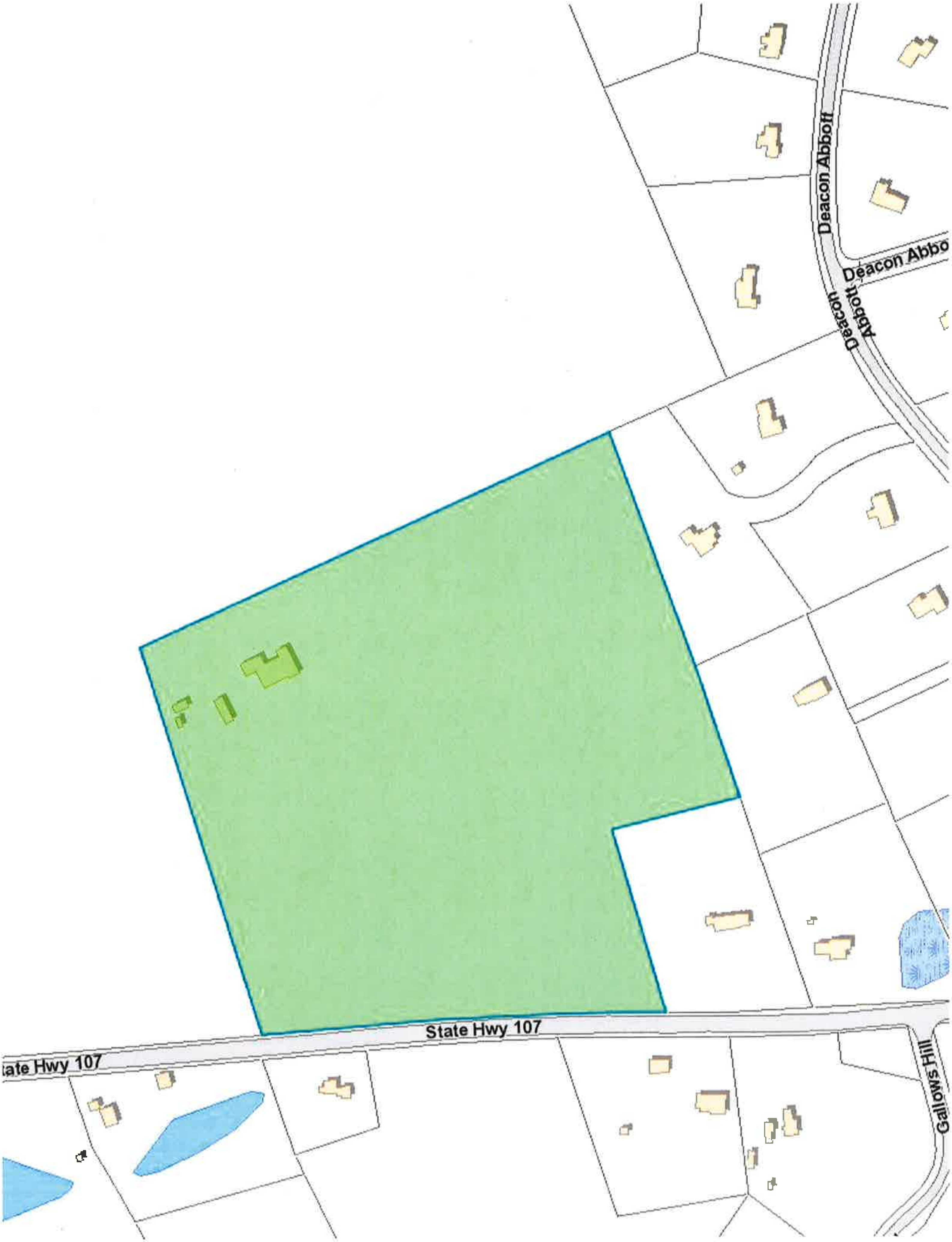
Outbuildings

Outbuildings	Legend
No Data for Outbuildings	

Valuation History

Appraisal			
Valuation Year	Improvements	Land	Total
2018	$0	$360,000	$360,000
2017	$0	$360,000	$360,000
2016	$0	$360,000	$360,000

Assessment			
Valuation Year	Improvements	Land	Total
2018	$0	$252,000	$252,000
2017	$0	$252,000	$252,000
2016	$0	$252,000	$252,000


Deacon Abbott
Deacon Abbo
Deacon Abbott
State Hwy 107
tate Hwy 107
Gallows Hill

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL
136 Main Street, Suite 401
New Britain, Connecticut 06051-4225
Phone: 827-7682

Petition No. 311
Metro Mobile CTS of Fairfield County, Inc.
Redding, Connecticut
Staff Report
November 9, 1993

Metro Mobile CTS of Fairfield County, Inc. (Metro Mobile) is petitioning the Connecticut Siting Council (Council) for a declaratory ruling that the proposed installation of cellular antennas on an existing 120-foot wind tower at 80 Lonetown Road in Redding, Connecticut would not have a substantial adverse environmental effect and therefore would not require a Certificate of Environmental Compatibility and Public Need from the Council. On November 8, 1993, Chairman Mortimer A. Gelston and Gloria Dibble Pond of the Council and Robert K. Erling of the Council staff reviewed this petition.

Metro Mobile proposes to install four whip type transmit/receive antennas, mounted on two side arms between 100 and 110 feet above ground level on the existing lattice tower. The attached antennas would not extend above the top of the tower. Metro Mobile would construct a 6-foot by 2.5-foot by 6-foot self-contained enclosure with radio equipment near the base of the existing tower. The enclosure would be surrounded by an eight-foot high security fence. A building permit would be obtained from the Town of Redding.

The wind power facility, constructed in the mid-1980s, produces power for the residence on the proposed site, with excess power being sold to Northeast Utilities. The proposed antennas would be mounted below the wooden blades of the wind power facility. Metro Mobile does not expect any interference with cellular communications from the operation of the wind-powered equipment.

Metro Mobile contends that this project would have no effect on the ecology of the site, maximum radio frequency power density levels would be well below state standards, the proposed installation would not increase noise levels at the site boundary by six decibels or more, and the boundaries of the site would not be extended by the project.

Robert K. Erling
Senior Siting Analyst

0270H

Petition No. 1131
Cellco Partnership d/b/a Verizon Wireless
80 Lonetown Road, Redding, Connecticut
Staff Report
February 19, 2015

On January 7, 2015, the Connecticut Siting Council (Council) received a petition from Cellco Partnership d/b/a Verizon Wireless (Cellco) for a declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the expansion of an existing compound at an existing telecommunications facility located at 80 Lonetown Road in Redding, Connecticut. Council member Dr. Barbara Bell, Council staff member Robert Mercier, and Kenneth Baldwin representing Cellco visited the site on February 11, 2015 to review the proposal.

Cellco notified the Town of Redding and abutting property owners of the proposed project. No abutters or Town officials attended the field review and no comments regarding the project were received.

The existing facility was constructed in 1993 and consists of a 100-foot lattice tower located approximately 100 feet northwest of an existing residence on the property. Cellco is located at the 90-foot level of the tower and has an equipment shelter within an approximate 810 square foot compound. Cellco currently does not have emergency backup power at the site. No other telecommunication carriers or entities are located on the facility.

Cellco proposes to expand the compound and lease area by 508 and 580 square feet respectively, to accommodate a new propane-fueled 100 kw generator and an associated 1,000 gallon propane tank. The existing 10-foot tall wood stockade fence would be expanded to enclose the new limits of the compound. The new generator would supply emergency power to Cellco's installation and the lessor's residence. One apple tree would be removed during construction.

Implementation of the emergency back-up power generator is consistent with the Council's Docket 432 feasibility study of back-up power requirements for telecommunications towers pursuant to Public Act 12-148 and complies with CTIA – The Wireless Associations' Business Continuity Network Recovery Program.

According to Regulations of Connecticut State Agencies §22a-69-1.8, noise created as a result of, or relating to, an emergency, such as an emergency backup generator, is exempt from the State Noise Control Regulations.

The proposed project would not have a substantial adverse environmental effect. Staff recommends approval.

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

CTFF600E

SITE ID: CTFF600E

80 LONETOWN ROAD
REDDING, CT 06896

T-MOBILE RF CONFIGURATION

67D5998C_1xAIR+1QP+1OP

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA–222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2017 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD–OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTON, PLUMBING, ELECTRICAL, AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS–BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MANUFACTURER'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND 'MISSED' ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE T–MOBILE CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON–SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUITS AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT 'CALL BEFORE YOU DIG' AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1–800–922–4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH THE OWNER'S ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

FROM: 35 GRIFFIN ROAD SOUTH, BLOOMFIELD, CT 06002

TO: 80 LONETOWN ROAD, REDDING, CT 06896

1.	HEAD NORTH ON GRIFFIN ROAD S. TOWARD HARTMAN RD.	
2.	TAKE THE 2ND RIGHT ONTO DAY HILL RD.	0.30 MI.
3.	TAKE THE 1ST RIGHT ONTO BLUE HILLS AVENUE EXT/CT–187. CONTINUE TO FOLLOW CT–187.	0.14 MI.
4.	STAY STRAIGHT TO GO ONTO BLUE HILLS AVE/CT–187.	0.64 MI.
5.	TURN LEFT ONTO OLD WINDSOR RD/CT–305. CONTINUE TO FOLLOW CT–305.	1.24 MI.
6.	MERGE ONTO I–91 S TOWARD HARTFORD.	5.66 MI.
7.	MERGE ONTO I–84 W VIA EXIT 32A TOWARD WATERBURY.	51.00 MI.
8.	TAKE THE CT–25 EXIT, EXIT 9, TOWARD BROOKFIELD.	0.31 MI.
9.	KEEP LEFT TO TAKE THE RAMP TOWARD NEWTOWN.	0.02 MI.
10.	TURN LEFT ONTO HAWLEYVILLE RD/CT–25.	0.51 MI.
11.	TURN RIGHT ONTO MOUNT PLEASANT RD/US–6 W. CONTINUE TO FOLLOW US–6 W.	1.44 MI.
12.	TURN LEFT ONTO OLD HAWLEYVILLE RD.	2.39 MI.
13.	TURN RIGHT ONTO DODGINGTOWN RD/CT–302. CONTINUE TO FOLLOW CT–302.	1.33 MI.
14.	TURN LEFT ONTO PUTNAM PARK RD/CT–58.	2.83 MI.
15.	TURN RIGHT ONTO PUTNAM PARK RD/CT–107.	0.84 MI.
16.	TURN LEFT ONTO LONETOWN RD/CT–107.	0.93 MI.
17.	80 LONETOWN RD, REDDING, CT 06896–1415, 80 LONETOWN RD IS ON THE LEFT.	

SITE COORDINATES: LATITUDE: 41°–19'–04.00" N
LONGITUDE: 73°–22'–59.99" W
GROUND ELEVATION: 799'± A.G.L.

COORDINATES AND GROUND ELEVATION ARE REFERENCED FROM GOOGLE EARTH

VICINITY MAP

NORTH

PROJECT SUMMARY

THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:

1. ADD (1) BB6630 FOR N600 TO EXISTING RBS6102 MU AC.
2. ADD (1) ENCLOSURE 6160.
3. ADD (1) BATTERY CABINET B160.
4. ADD (1) IXRE ROUTER TO NEW ENCLOSURE 6160.
5. ADD (1) BB6630 FOR L2500 TO NEW ENCLOSURE 6160.
6. ADD (1) BB6648 FOR N2500 TO NEW ENCLOSURE 6160.
7. ADD (3) 6X12 HCS
8. REPLACE MID–BAND DUAL IN POSITION 1 WITH (1) MID–BAND QUAD IN POSITION 1.
9. ADD (1) RADIO 4415 B66A FOR L2100 TO POSITION 1 AT ANTENNA
10. REPLACE LOW–BAND DUAL IN POSITION 2 WITH (1) LOW–BAND/MID–BAND OCTO IN NEW POSITION 2.
11. REPLACE RRUS11 B12 WITH (1) RADIO 4449 B71+B85
12. ADD (1) PCS/AWS 8:4 DIPLEXER TO NEW POSITION 2 AT ANTENNA
13. ADD (1) RADIO 4424 B25 FOR L1900
14. MOVE RRUS11 B4 FOR U2100 FROM POSITION 1 TO NEW POSITION 2
15. INSTALL (1) AIR6449 B41 FOR L2500 AND N2500 IN NEW POSITION 3.
16. INSTALL (6) DUAL SWIVEL MOUNTS, (2) PER SECTOR

PROJECT INFORMATION

SITE NAME:	CTFF600E
SITE ID:	CTFF600E
SITE ADDRESS:	80 LONETOWN ROAD REDDING, CT 06896
APPLICANT:	T–MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	DAN REID (PROJECT MANAGER) TRANSCEND WIRELESS, LLC (203) 592–8291
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63–2 NORTH BRANFORD RD. BRANFORD, CT 06405 CARLO F. CENTORE, PE (203) 488–0580 EXT. 122
PROJECT COORDINATES:	LATITUDE: 41°–19'–04.00" N LONGITUDE: 73°–22'–59.99" W GROUND ELEVATION: 799'± A.G.L. SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	07/20/20	KAWJR	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

T-Mobile · Transcend Wireless

CENTEK engineering
Centered on Solutions™
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
CTFF600E
SITE ID: CTFF600E
80 LONETOWN ROAD
REDDING, CT 06896

DATE:	07/14/20
SCALE:	AS NOTED
JOB NO.	20074.49

TITLE SHEET

T–1

NOTES AND SPECIFICATIONS

DESIGN BASIS:

GOVERNING CODE: 2015 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY THE 2018 CONNECTICUT STATE BUILDING CODE.

1. DESIGN CRITERIA:

- RISK CATEGORY III (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 93 MPH (Vasd) (EXPOSURE C/ IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–10).

SITE NOTES

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

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA–222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2017 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD–OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS–BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS, SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND IT'S COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS, ARE TO BE BROUGHT TO THE ATTENTION OF THE SITE OWNER'S CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO 'EXTRA' WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON–SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT "DIG SAFE" (DIAL 811) AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNER'S ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.
20. THE COUNTY/CITY/TOWN WILL MAKE PERIODIC FIELD OBSERVATION AND INSPECTIONS TO MONITOR THE INSTALLATION, MATERIALS, WORKMANSHIP AND EQUIPMENT INCORPORATED INTO THE PROJECT TO ENSURE COMPLIANCE WITH THE DESIGN PLANS, SPECIFICATIONS, CONTRACT DOCUMENTS AND APPROVED SHOP DRAWINGS.
21. THE COUNTY/CITY/TOWN MUST BE NOTIFIED (2) WORKING DAYS PRIOR TO CONCEALMENT/BURIAL OF ANY SYSTEM OR MATERIAL THAT WILL PREVENT THE DIRECT INSPECTION OF MATERIALS, METHODS OR WORKMANSHIP. EXAMPLES OF THESE PROCESSES ARE BACKFILLING A GROUND RING OR TOWER FOUNDATION, POURING TOWER FOUNDATIONS, BURYING GROUND RODS, PLATES OR GRIDS, ETC. THE CONTRACTOR MAY PROCEED WITH THE SCHEDULED PROCESS (2) WORKING DAYS AFTER PROVIDING NOTICE UNLESS NOTIFIED OTHERWISE BY THE COUNTY/CITY/TOWN.

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REDDING, CT 06896

DATE: 07/14/20
SCALE: AS NOTED
JOB NO. 20074.49

GENERAL NOTES AND SPECIFICATIONS

N–1

NOTE:
ALL COAX LENGTHS TO BE MEASURED AND VERIFIED IN FIELD BEFORE ORDERING

ANTENNA SCHEDULE

SECTOR	EXISTING/PROPOSED	ANTENNA	SIZE (INCHES) (L x W x D)	ANTENNA ℄ HEIGHT	AZIMUTH	(E/P) RRU (QTY)	(E/P) TMA (QTY)	(E/P) DIPLEXER (QTY)	(QTY) PROPOSED COAX (LENGTH)
A1	PROPOSED	RFS (APX16DWV-16DWVS-C)	55.9 x 13.3 x 3.15	92'	60°	(P) RADIO 4415 B66A (1)		(P) COMMSCOPE – SDX192 6Q-43 (E14F05P86) (1)	(1) 6x12 HYBRID CABLE (±120')
A2	PROPOSED	RFS (APXVAARR18_43-U-NA20)	72 x 19.7 x 8.5	92'	60°	(P) RADIO 4449 B71 (1), (P) RADIO 4424 B25 (1), (E) RRUS11 B4			
A3	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	92'	60°				
B1	PROPOSED	RFS (APX16DWV-16DWVS-C)	55.9 x 13.3 x 3.15	92'	180°	(P) RADIO 4415 B66A (1)		(P) COMMSCOPE – SDX192 6Q-43 (E14F05P86) (1)	(1) 6x12 HYBRID CABLE (±120')
B2	PROPOSED	RFS (APXVAARR18_43-U-NA20)	72 x 19.7 x 8.5	92'	180°	(P) RADIO 4449 B71 (1), (P) RADIO 4424 B25 (1), (E) RRUS11 B4			
B3	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	92'	180°				
C1	PROPOSED	RFS (APX16DWV-16DWVS-C)	55.9 x 13.3 x 3.15	92'	300°	(P) RADIO 4415 B66A (1)		(P) COMMSCOPE – SDX192 6Q-43 (E14F05P86) (1)	(1) 6x12 HYBRID CABLE (±120')
C2	PROPOSED	RFS (APXVAARR18_43-U-NA20)	72 x 19.7 x 8.5	92'	300°	(P) RADIO 4449 B71 (1), (P) RADIO 4424 B25 (1), (E) RRUS11 B4			
C3	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	92'	300°				

1 C-1 SITE LOCATION PLAN
SCALE: NOT TO SCALE
TRUE NORTH

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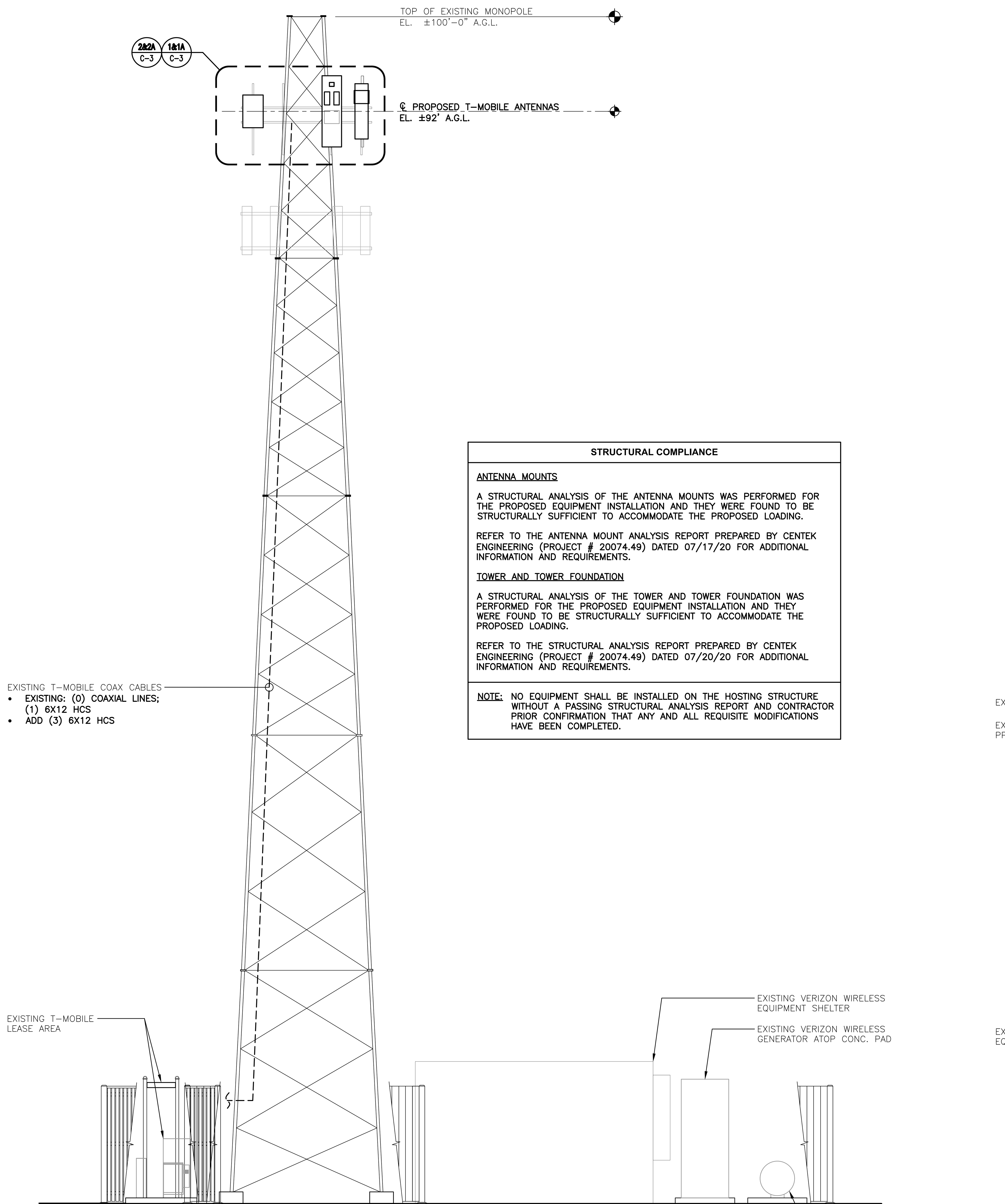
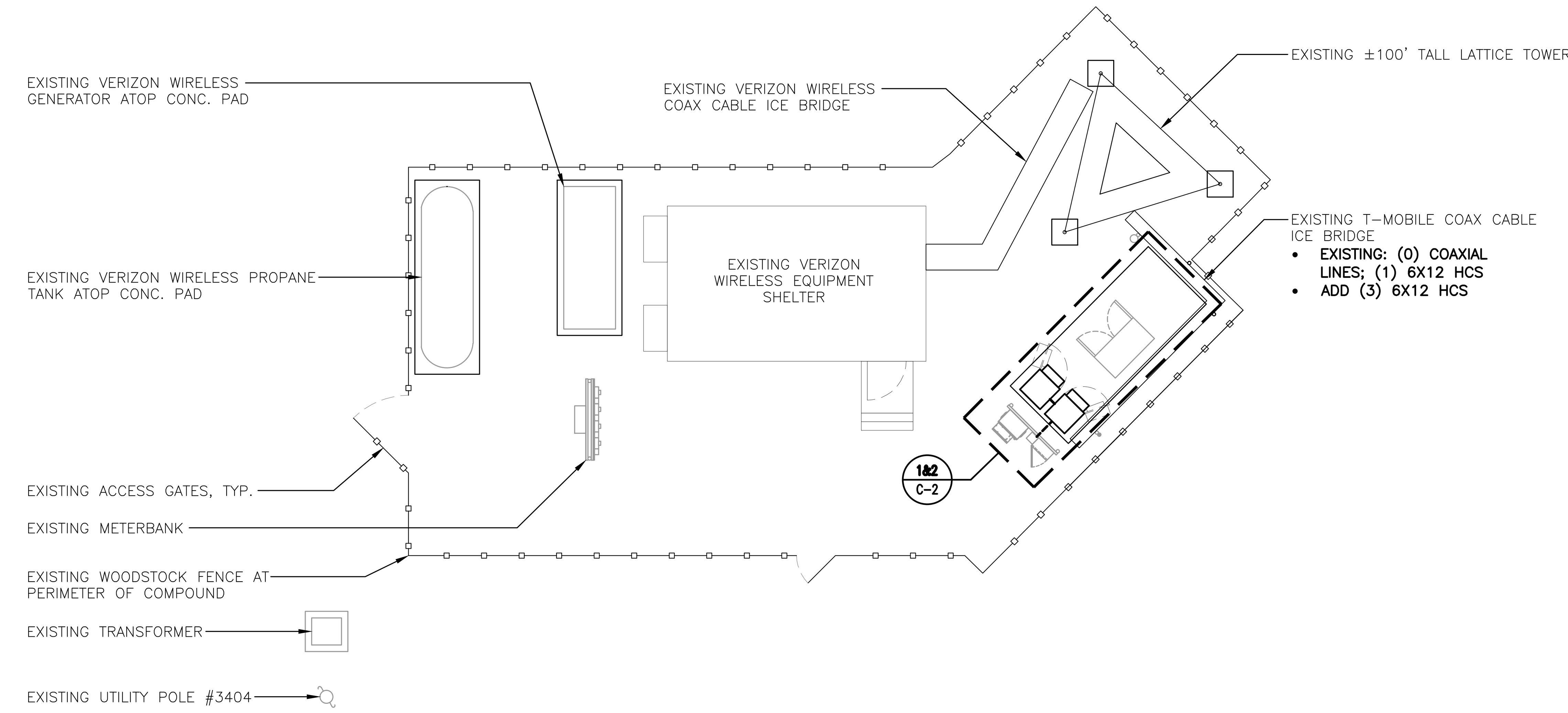
SITE LOCATION PLAN

C-1

Sheet No. 3 of 7



4 C-2 **SOUTH ELEVATION - PROPOSED**
SCALE: 3/16" = 1'-0"



3 C-2 **COMPOUND PLAN - PROPOSED**
SCALE: 1/8" = 1' - 0"
APPROXIMATE NORTH

STRUCTURAL COMPLIANCE

ANTENNA MOUNTS

A STRUCTURAL ANALYSIS OF THE ANTENNA MOUNTS WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 20074.49) DATED 07/17/20 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

TOWER AND TOWER FOUNDATION

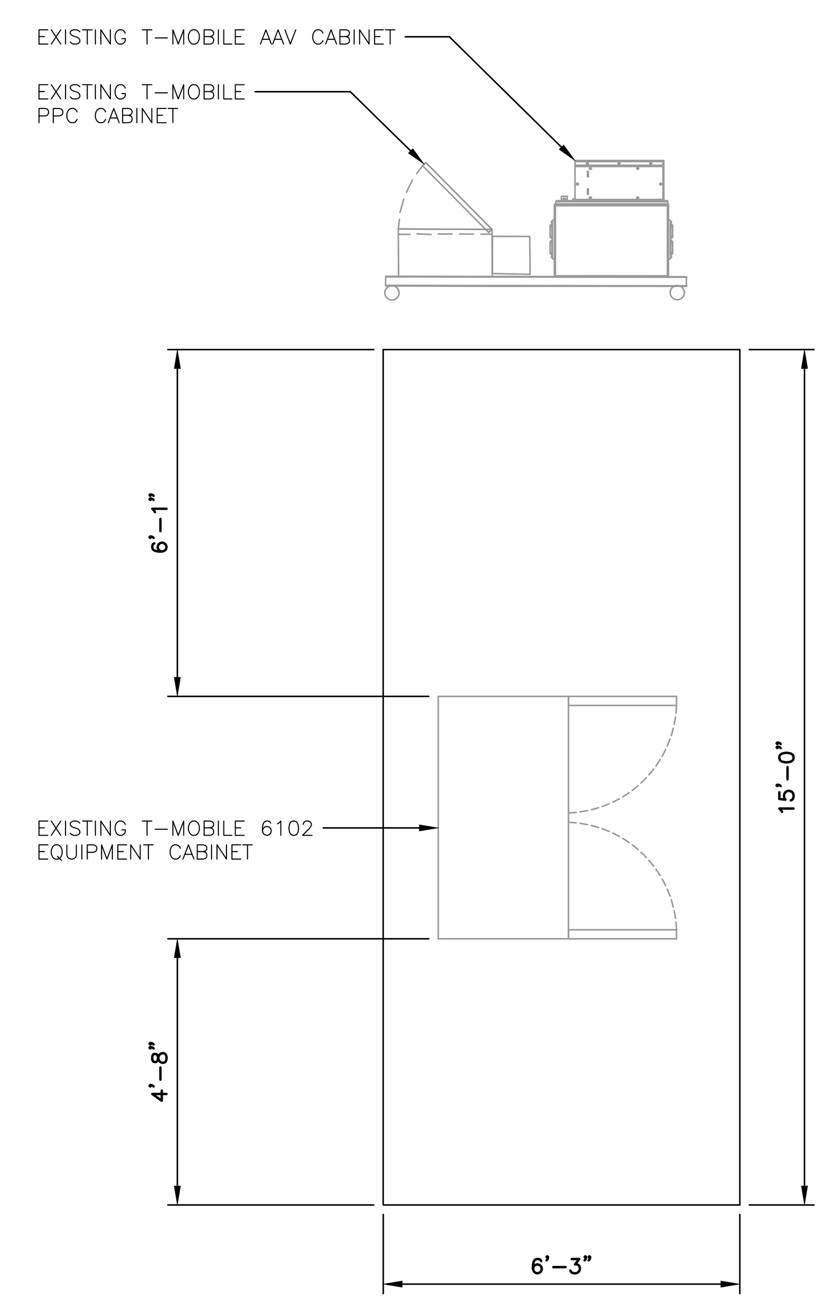
A STRUCTURAL ANALYSIS OF THE TOWER AND TOWER FOUNDATION WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 20074.49) DATED 07/20/20 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

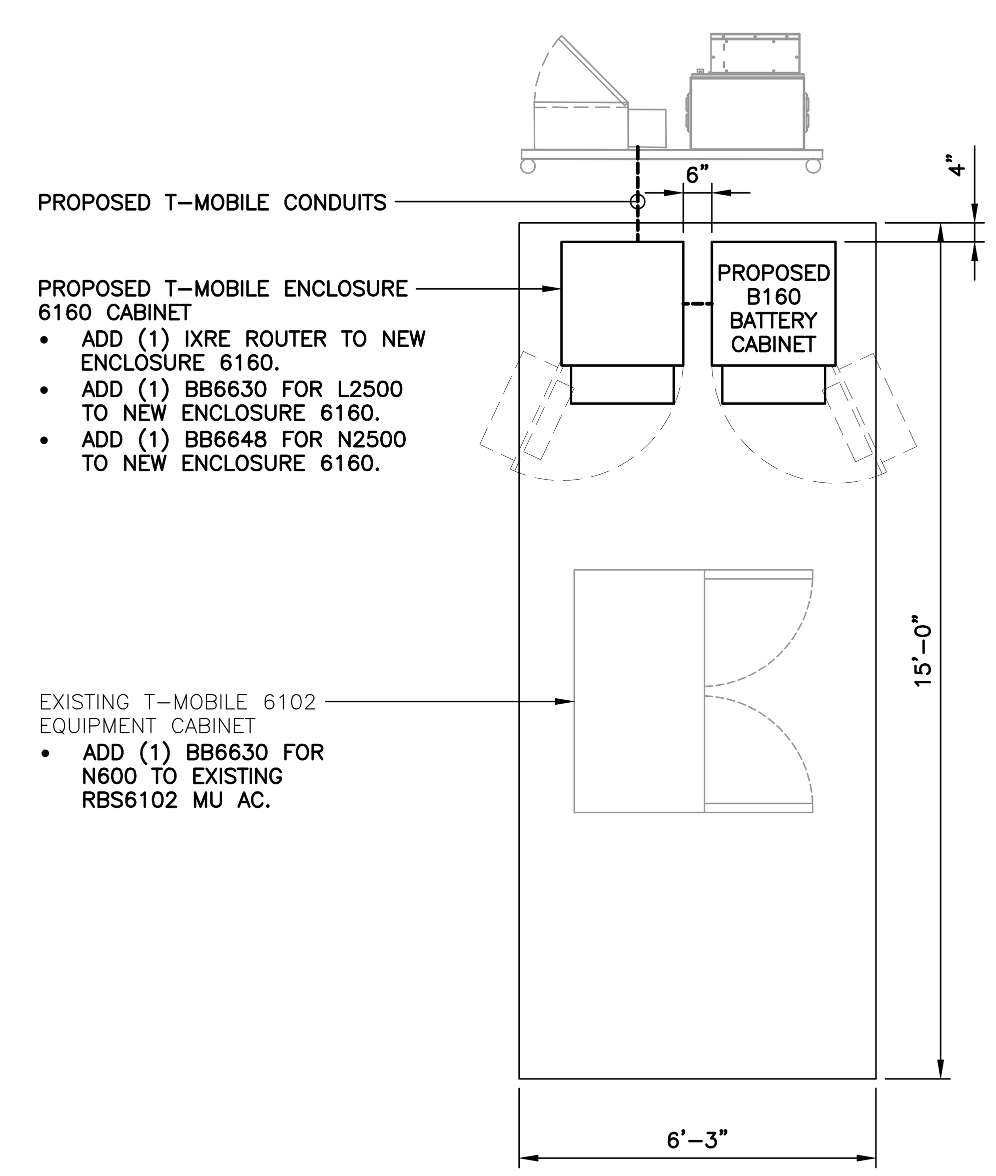
NOTE: NO EQUIPMENT SHALL BE INSTALLED ON THE HOSTING STRUCTURE WITHOUT A PASSING STRUCTURAL ANALYSIS REPORT AND CONTRACTOR PRIOR CONFIRMATION THAT ANY AND ALL REQUISITE MODIFICATIONS HAVE BEEN COMPLETED.

LEGEND

W.P. DENOTES WORKING POINT.



1 C-2 **EXISTING EQUIPMENT PLAN**
SCALE: 3/8" = 1'
APPROXIMATE NORTH



2 C-2 **PROPOSED EQUIPMENT PLAN**
SCALE: 3/8" = 1'
APPROXIMATE NORTH

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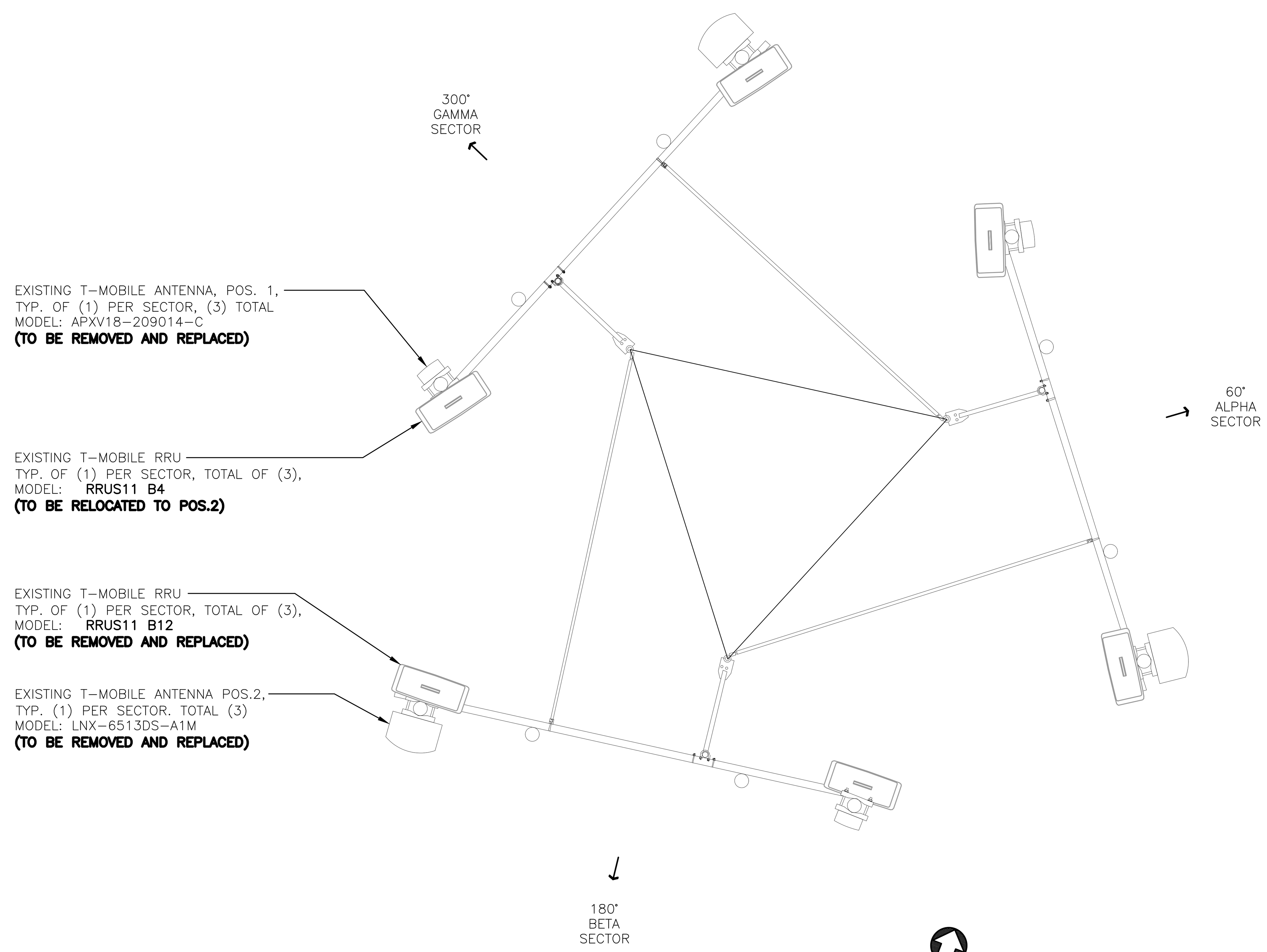
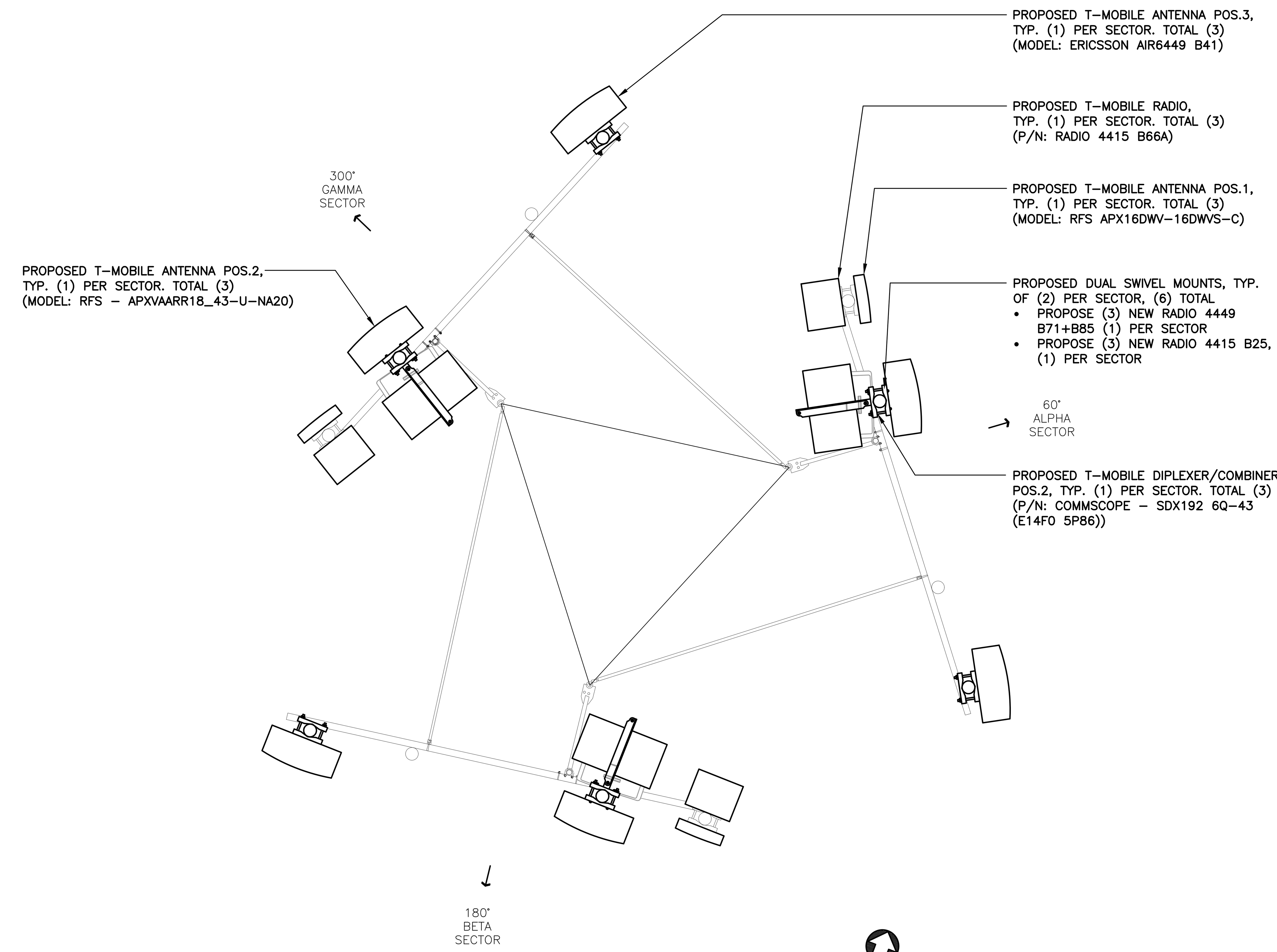
COMPOUND PLAN, EQUIPMENT PLAN, AND ELEVATION

C-2

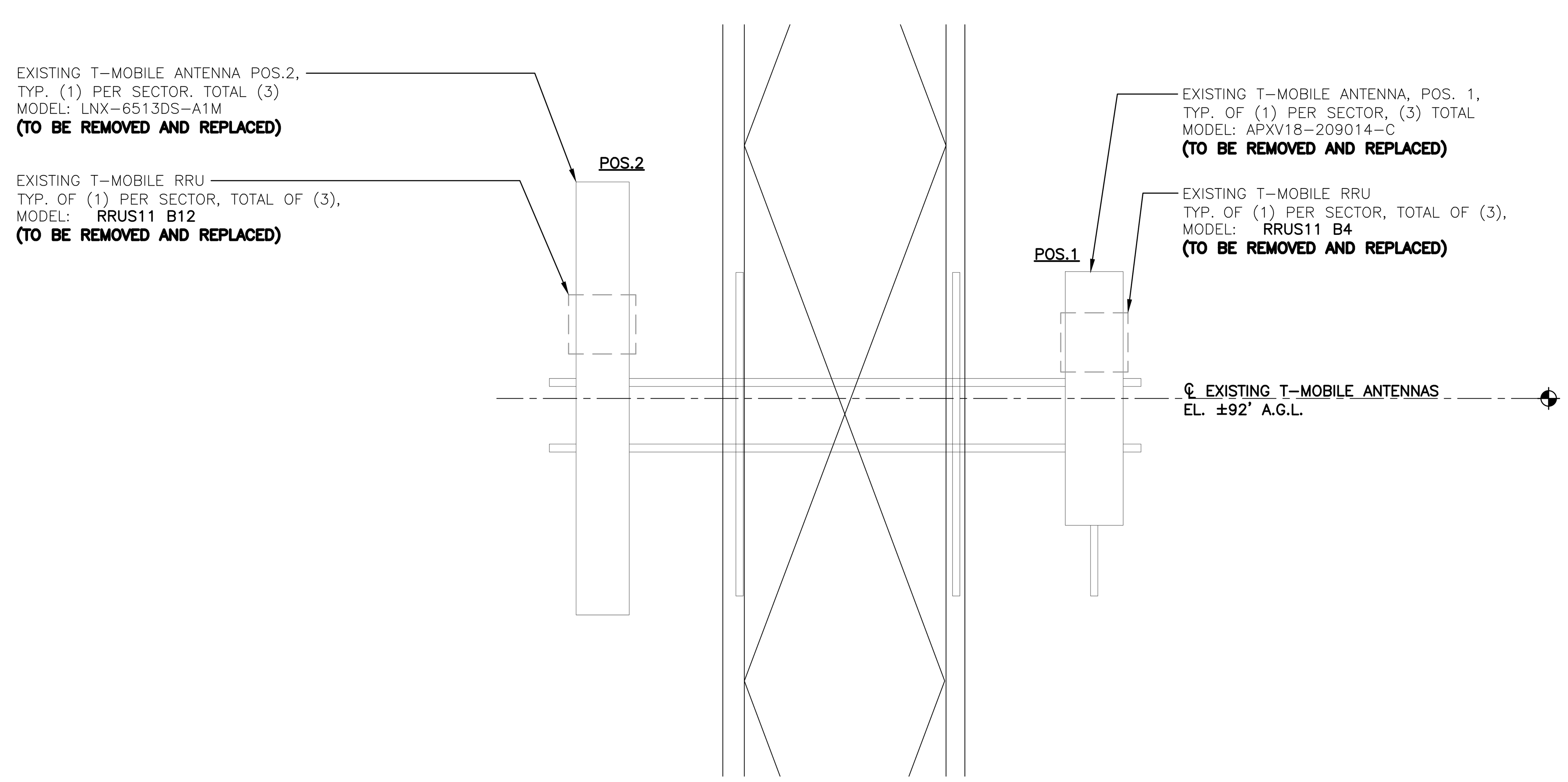
Sheet No. 4 of 7



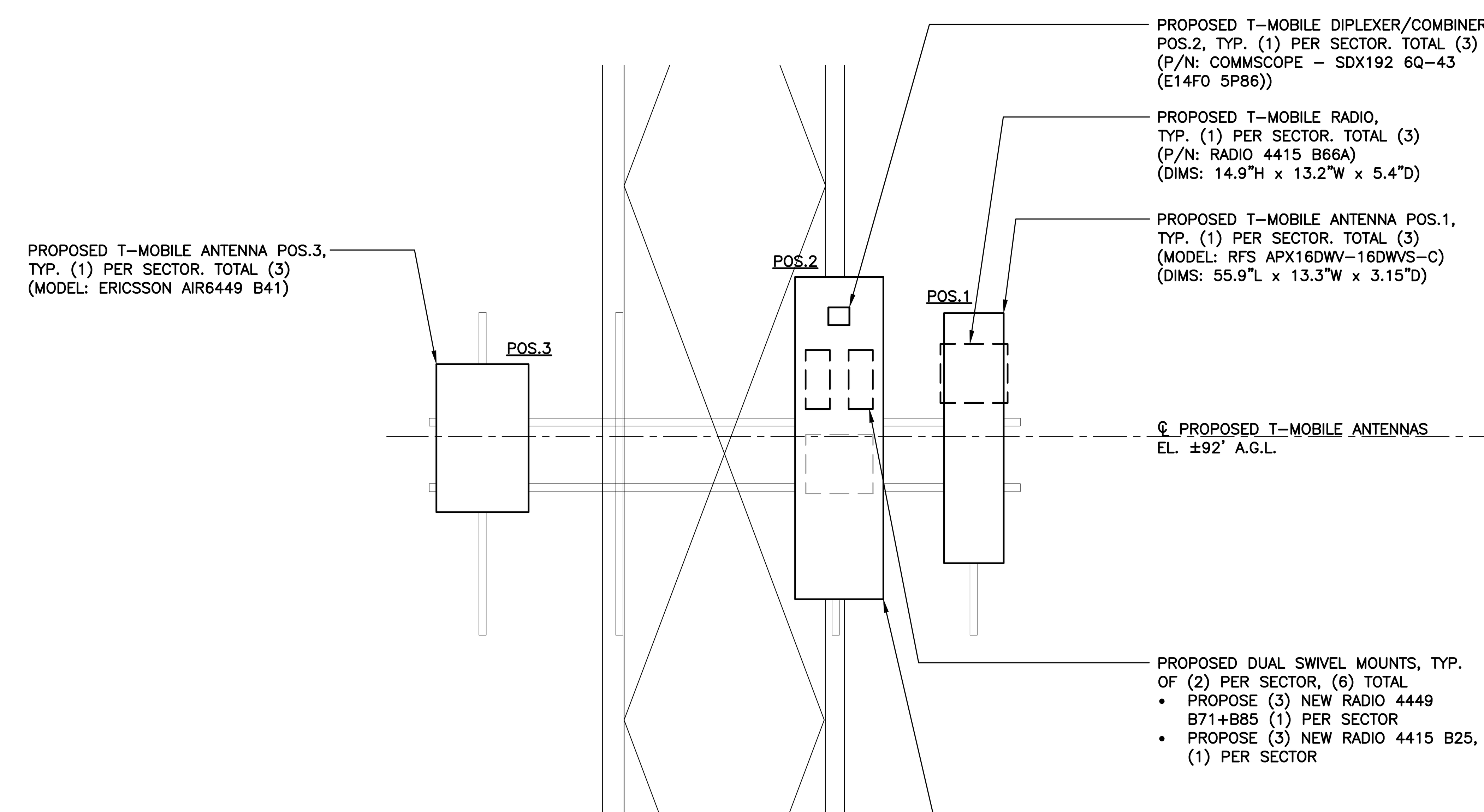
1 / C-3 **ANTENNA PLAN - EXISTING**
SCALE: 1/2" = 1'



2 / C-3 **ANTENNA PLAN - PROPOSED**
SCALE: 1/2" = 1'



1A / C-3 **ANTENNA ELEVATION - EXISTING**
SCALE: 1/2" = 1'



2A / C-3 **ANTENNA ELEVATION - PROPOSED**
SCALE: 1/2" = 1'

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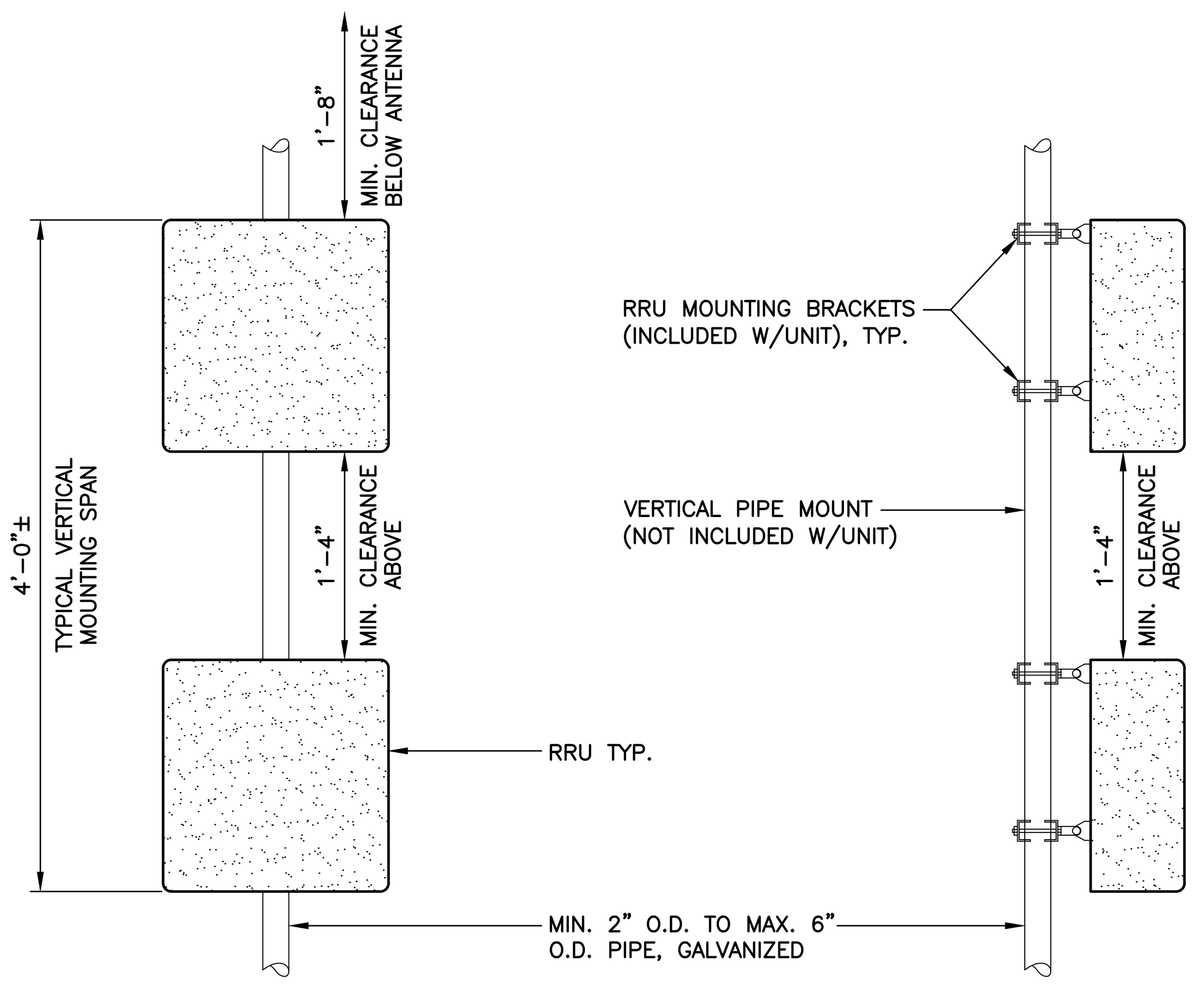
ANTENNA PLANS

C-3

Sheet No. 5 of 7



NOTES:

1. T-MOBILE SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

1 (C-4) TYPICAL RRUS MOUNTING DETAILS
SCALE: NOT TO SCALE


RFS APXVARR18


ERICSSON AIR6449 B41


RFS APX16DWV

ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: AIR6449 B41	33.1"L x 20.6"W x 8.6"D	±104 LBS.
MAKE: RFS MODEL: APX16DWV-16DWVS-C	55.9"L x 13.3"W x 3.15"D	±39.6 LBS.
MAKE: RFS MODEL: APXVARR18_43-C-NA20	77.8"L x 22"W x 16.2"D	±114.2 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

2 (C-4) PROPOSED ANTENNA DETAIL
SCALE: NOT TO SCALE


RADIO 4449 B71


RADIO 4415 B25


RADIO 4424 B25

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4449 B71	14.9"L x 13.18"W x 9.2"D	±74 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.
MAKE: ERICSSON MODEL: RADIO 4415 B66A	14.9"L x 13.2"W x 5.4"D	±46 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.
MAKE: ERICSSON MODEL: RADIO 4424 B25	16.5"L x 13.5"W x 9.6"D	±88 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 (C-4) PROPOSED RADIO DETAILS
SCALE: NOT TO SCALE

EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: ENCLOSURE 6160	62.0"H x 26.0"W x 26.0"D	±1200 LBS

4 (C-4) ENCLOSURE 6160 (OUTDOOR)
SCALE: NOT TO SCALE

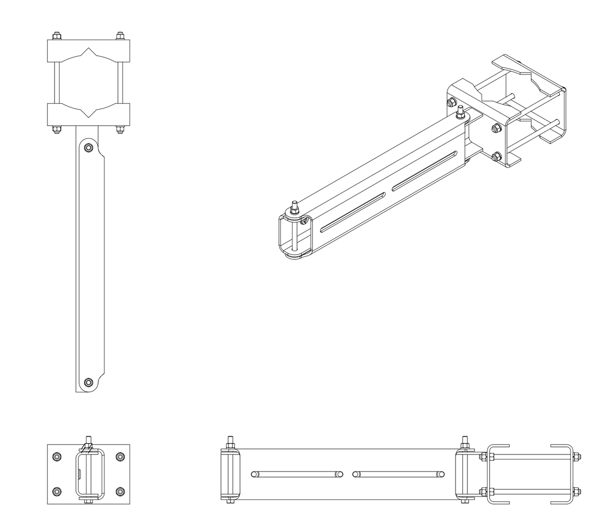
EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: BATTERY CABINET B160	62.0"H x 26.0"W x 26.0"D	±1883 LBS

5 (C-4) BATTERY CABINET DETAIL
NOT TO SCALE

DIPLEXER		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: SDZ1926Q-43(E14F05P86)	4.2"L x 7.0"W x 3.0"D	–

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

6 (C-4) PROPOSED DIPLEXER DETAIL
SCALE: NOT TO SCALE



RRU DUAL SWIVEL MOUNT		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: SITE PRO 1 PART NO.: RRUDSM	27.75"L x 6.5"W x 4.7"D	39.4 LBS.

7 (C-4) RRH DUAL SWIVEL MOUNT DETAIL
SCALE: NOT TO SCALE

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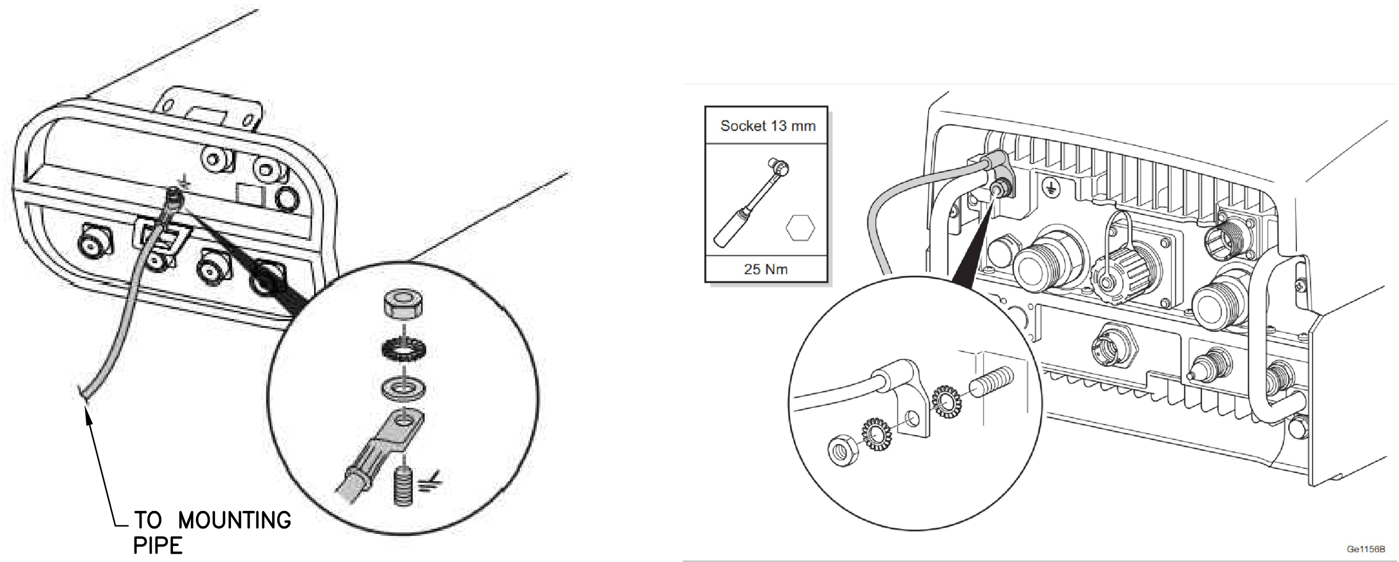
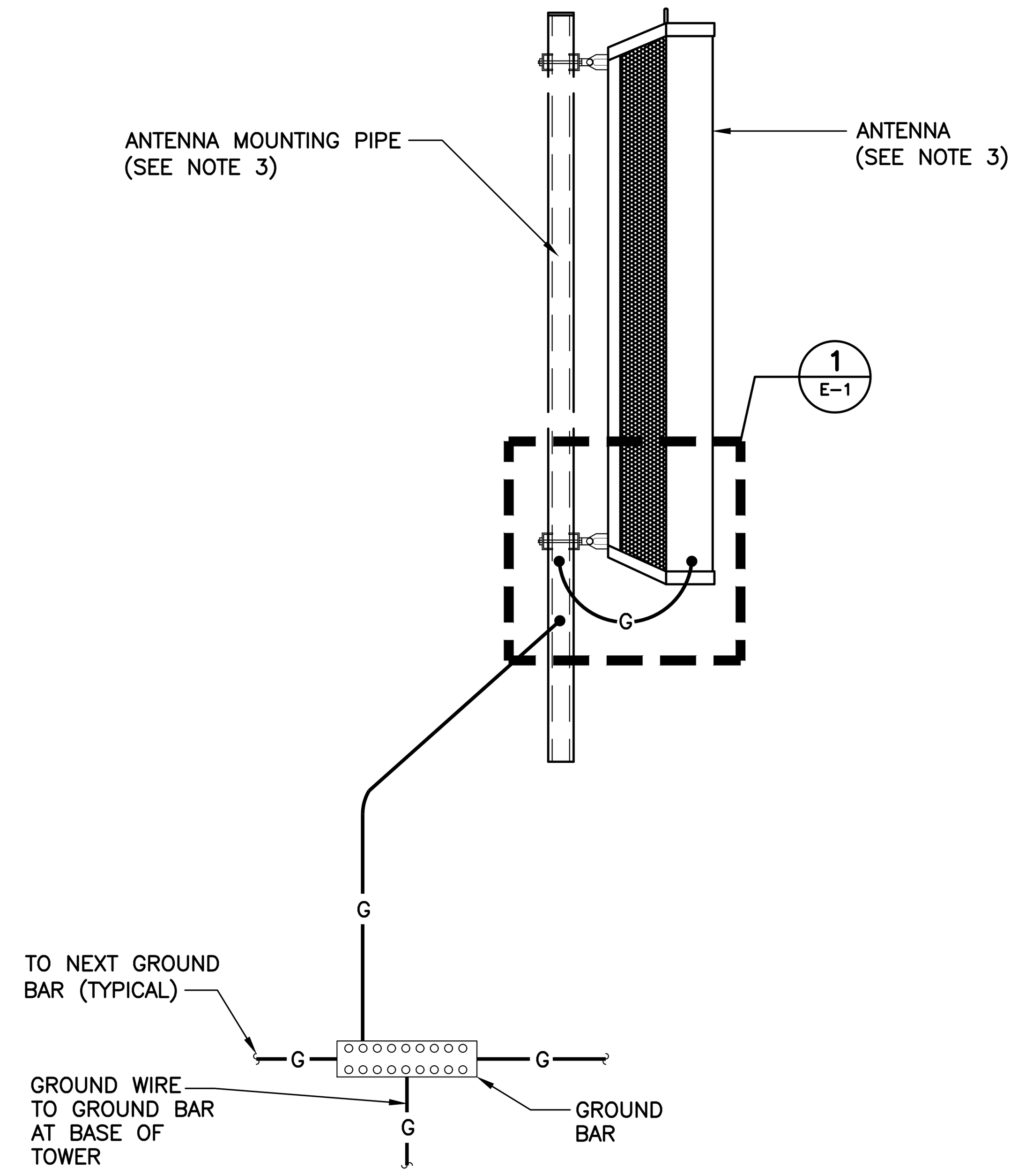
TYPICAL EQUIPMENT DETAILS

C-4

Sheet No. 6 of 7



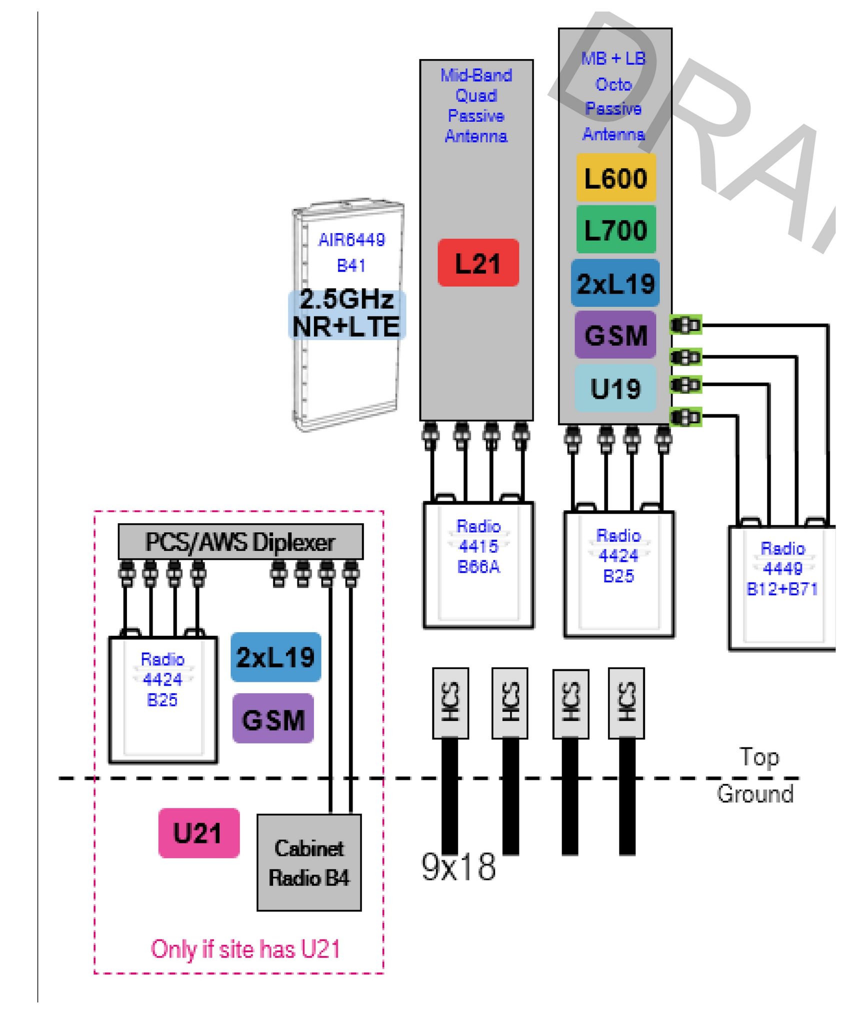
1 TYPICAL ANTENNA/RRU GROUNDING DETAILS
E-1
SCALE: NOT TO SCALE



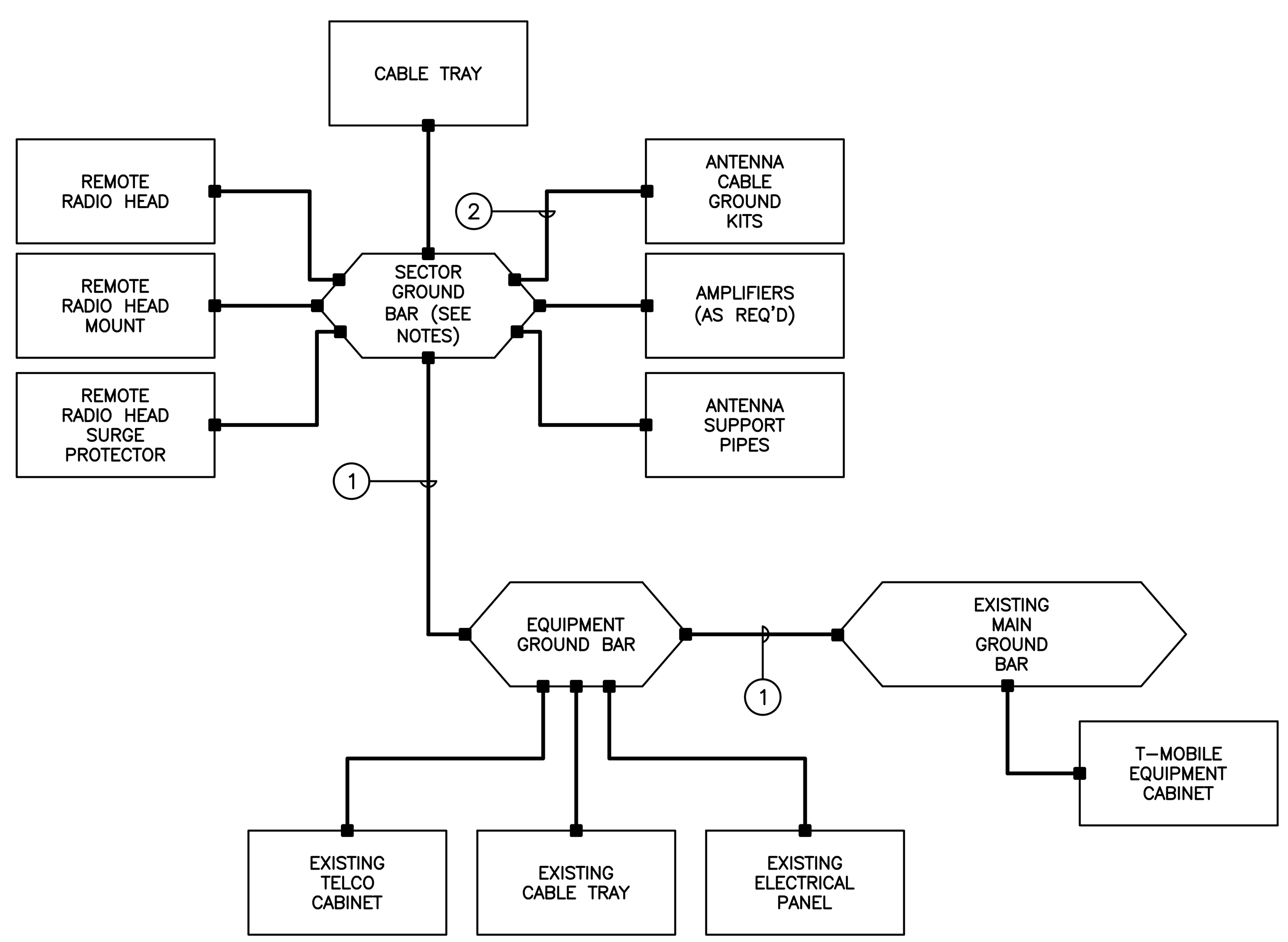
NOTES:

1. BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
2. BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
3. DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.

2 TYPICAL ANTENNA GROUNDING DETAIL
E-1
SCALE: NOT TO SCALE



3 PROPOSED PLUMBING DIAGRAM
E-1
SCALE: NOT TO SCALE



GROUNDING SCHEMATIC NOTES

1. #2 AWG
2. #6 AWG

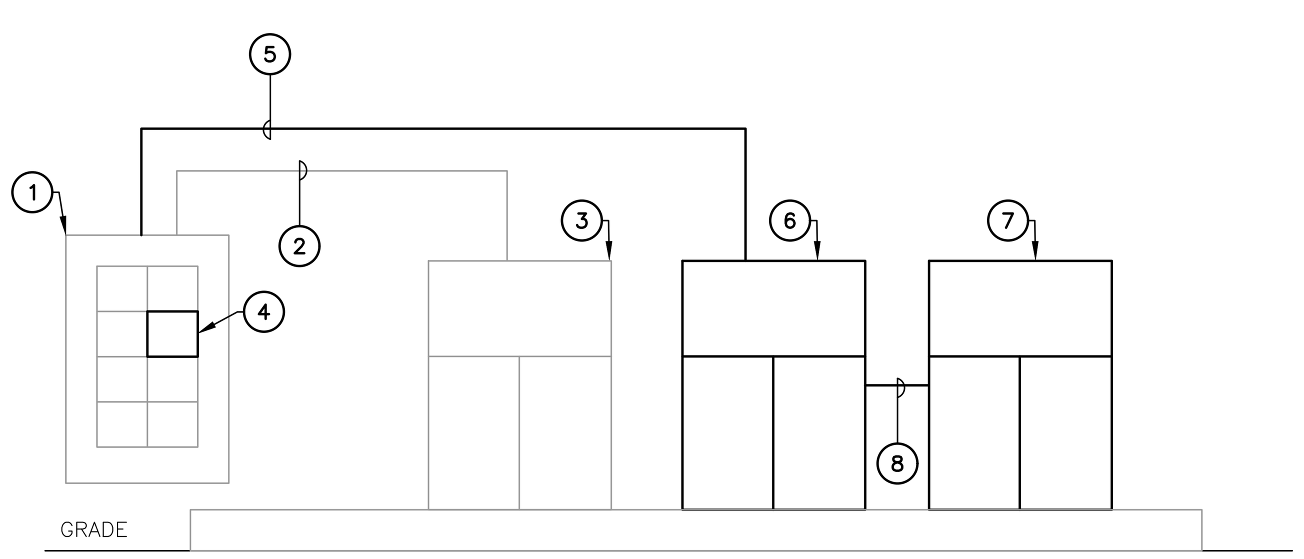
GENERAL NOTES:

1. ALL SURGE SUPPRESSION EQUIPMENT SHALL BE BONDED TO GROUND PER MANUFACTURER'S SPECIFICATIONS
2. UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, GROUND CONDUCTORS SHOWN SHALL BE #2 AWG (SOLID TINNED BCW – EXTERIOR; STRANDED GREEN INSULATED – INTERIOR).
3. ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
4. BOND ALL EQUIPMENT CABINETS AND BATTERY CABINETS TO GROUND PER MANUFACTURER'S SPECIFICATIONS.
5. COORDINATE ALL ROOF MOUNTED EQUIPMENT WITH OWNER.
6. ALL ROOF MOUNTED AMPLIFIERS AND ASSOCIATED EQUIPMENT SHALL BE BONDED TO THE SECTOR GROUND BAR PER MANUFACTURER'S SPECIFICATIONS.
7. ALL GROUNDING SHALL BE IN ACCORDANCE WITH NEC AND OWNER'S REQUIREMENTS.

4 TYPICAL GROUNDING SCHEMATIC DETAIL
E-1
SCALE: NOT TO SCALE

RISER DIAGRAM NOTES

1. EXISTING 200A, PPC CABINET TO REMAIN.
2. EXISTING CONDUITS AND CONDUCTORS TO REMAIN.
3. EXISTING EQUIPMENT CABINET TO REMAIN.
4. NEW 100A/2P CIRCUIT BREAKER TO SERVE NEW EQUIPMENT CABINET.
5. (3) #1 AWG, (1) #8 AWG GROUND, 1-1/4" CONDUIT.
6. NEW RADIO EQUIPMENT CABINET.
7. NEW BATTERY CABINET.
8. DC CONDUIT AND CONDUCTORS FOR BATTERY CABINET CONNECTION PER MANUFACTURERS SPECIFICATIONS.



5 ELECTRICAL POWER RISER DIAGRAM
E-1
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	07/20/20	KAWJR	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

T-Mobile
Transcend Wireless

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T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
CTFF600E
SITE ID: CTFF600E
80 LONETOWN ROAD
REDDING, CT 06896

DATE: 07/14/20
SCALE: AS NOTED
JOB NO. 20074.49

TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 7 of 7

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

100-ft Existing Lattice Tower

Proposed T-Mobile
Antenna Upgrade

T-Mobile Site Ref: CTFF600E

80 Lonetown Road
Redding, CT

CENTEK Project No. 20074.49

~~Date: July 17, 2020~~
Rev 1: July 20, 2020

Max Stress Ratio = 91.1%

Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by T-Mobile on the existing lattice (tower) located in Redding, CT.

The host tower is a 100-ft three-legged, tapered steel self-support lattice tower originally designed and manufactured by ROHN. The tower geometry, structure member sizes and foundation system information were taken from a structural analysis report prepared by Hudson Design Group dated May 23, 2017.

Antenna and appurtenance information were obtained from the aforementioned Hudson structural analysis report and a T-Mobile RF sheet.

The tower is made up of five (5) steel sections consisting of A572-50 pipe legs. Diagonal lateral support bracing consists of A36 steel angle construction. The vertical tower sections are connected by bolted flange plates while the solid legs and bracing are connected by bolted and welded gusset connections. The tower face width is 2.5-ft at the top and 12.71-ft at the bottom.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- VERIZON (EXISTING TO REMAIN):
  Antennas: Four (4) Antel BXA-80063-6CF panel antennas, two (2) Antel BXA-80080-4CF panel antenna, four (4) Andrew SBNHH-1D45B panel antennas, two (2) Andrew SBNHH-1D65B panel antennas, three (3) RRH2x60-700 radio heads, three (3) RRH2x60-PCS radio heads, three (3) RRH4x45 radio heads, six (6) RFS FD9R6004/2C-3L diplexers and two (2) main distribution boxes mounted on three (3) 12-ft Lightweight T-Frames with a RAD center elevation of 82-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and two (2) 1-5/8" fiber cables mounted to the exterior of the existing tower.

- T-MOBILE (EXISTING TO REMAIN):
  Antennas: Three (3) Ericsson RRUS-11 remote radio units mounted on three (3) 12-ft V-Frames with a RAD center elevation of +/- 92-ft AGL.
  Cables: One (1) 6x12 fiber cable mounted on the exterior of the tower.

- **T-MOBILE (EXISTING TO REMOVE):**
  Antennas: Three (3) RFS APXV18-206516S panel antennas, three (3) Andrew LNX-6513DS panel antennas and three (3) Ericsson RRUS-11 remote radio heads mounted on three (3) 12-ft V-Frames with a RAD center elevation of +/- 92-ft AGL.

- **T-MOBILE (PROPOSED):**
  Antennas: Three (3) RFS APX16DWV-16DWVS panel antennas, three (3) RFS APXVAARR18-43 panel antennas, three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson 4449 remote radio units, three (3) Ericsson 4415 remote radio units, three (3) Ericsson 4424 remote radio units and three (3) Commscope SDX1926Q-43 diplexers mounted on three (3) 12-ft V-Frames with a RAD center elevation of +/- 92-ft AGL.
  Cables: Three (3) 6x12 fiber cables routed along the exterior of the tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower, and the model assumes that the tower members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-G-2005 entitled "Structural Standard for Antenna Support Structures and Antennas", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 0.75" radial ice on the tower structure and its components.

Basic Wind Speed:	Fairfield County; v = 90-100 mph (Nominal)	*[Annex B of TIA-222-G-2005]*
	Redding; v = 93 mph (Nominal)	*[Appendix N of the 2018 CT Building Code]*
Load Cases:	Load Case 1; 93 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2016 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 0.75" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

[1] The 2015 International Building Code as amended by the 2018 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits. This tower was found to be at **92.0%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T4)	20'-0"- 40'-0"	92.0%	**PASS**
Diagonal (T2)	60'-0"- 80'-0"	72.3%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 2-ft square x 1-ft long reinforced concrete piers on a 18.5-ft x 15.5-ft x 4.5-ft thick reinforced concrete mat bearing directly on existing sub grade. Tower legs are connected to the foundation by means of (4) 3/4"∅, ASTM A325 anchor bolts per leg, embedded into the concrete foundation structure.

- The tower reactions developed from the governing Load Case were used in the verification of the foundation and anchor bolts:

Leg Reactions	Vector	Proposed Tower Reactions
Leg	Shear	**9 kips**
	Compression	**82 kips**
	Uplift	**70 kips**
Base	Shear	**14 kips**
	Compression	**15 kips**
	Moment	**844 kip-ft**

- The anchor bolts were found to be within allowable limits.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	57.2%	**PASS**

- The foundation was found to be within allowable limits.

Foundation Type	Design Limit	Limit/FS	Proposed Loading	Result
Reinforced Concrete Maat and Piers (x3)	OTM	1.00 [(1)]	1.53	**PASS**

Note 1: Minimum required Factor of Safety (FS) of 1.0 required per TIA-222-G section 9.4

Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed antenna configuration.

The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

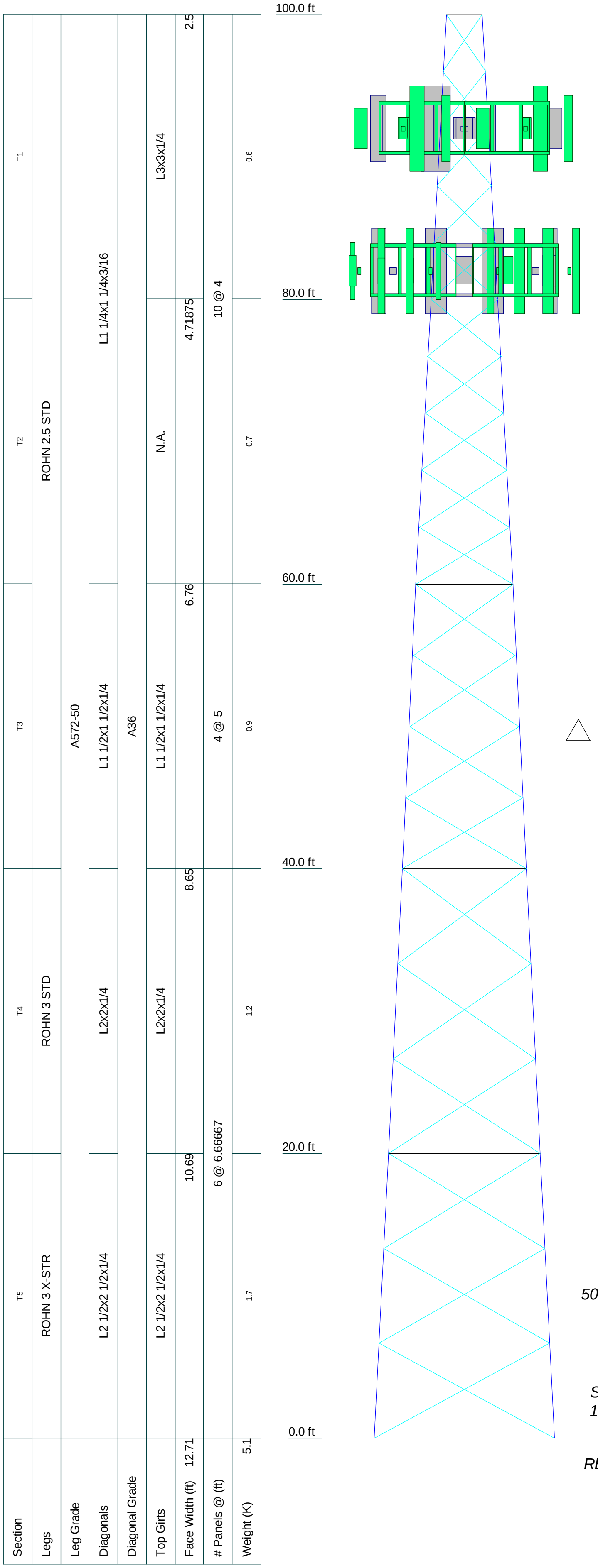
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided to Centek Engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the “as new” condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. Centek Engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly RISA Tower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	92	SitePro VFA12-HD (T-Mobile)	92
		SitePro VFA12-HD (T-Mobile)	92
APXVAARR18-43 (T-Mobile - Proposed)	92	12-ft Lightweight T-Frame (Verizon)	82
		12-ft Lightweight T-Frame (Verizon)	82
AIR6449 (T-Mobile - Proposed)	92	BXA-80063/6CF (Verizon)	82
APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	92	SBNHH-1D45B (Verizon)	82
		SBNHH-1D45B (Verizon)	82
APXVAARR18-43 (T-Mobile - Proposed)	92	BXA-80063/6CF (Verizon)	82
AIR6449 (T-Mobile - Proposed)	92	BXA-80063/6CF (Verizon)	82
APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	92	SBNHH-1D45B (Verizon)	82
		SBNHH-1D45B (Verizon)	82
APXVAARR18-43 (T-Mobile - Proposed)	92	BXA-80063/6CF (Verizon)	82
		BXA-80080-4CF (Verizon)	82
AIR6449 (T-Mobile - Proposed)	92	SBNHH-1D65B (Verizon)	82
RRUS-11 (T-Mobile)	92	SBNHH-1D65B (Verizon)	82
RRUS-11 (T-Mobile)	92	BXA-80080-4CF (Verizon)	82
RRUS-11 (T-Mobile)	92	RRH2x60-07-U (Verizon)	82
4415 B25 (T-Mobile - Proposed)	92	RRH2x60-07-U (Verizon)	82
4415 B25 (T-Mobile - Proposed)	92	RRH2x60-07-U (Verizon)	82
4415 B25 (T-Mobile - Proposed)	92	RRH2x60-PCS (Verizon)	82
4449 B12,B71 (T-Mobile - Proposed)	92	RRH2x60-PCS (Verizon)	82
4449 B12,B71 (T-Mobile - Proposed)	92	RRH2x60-PCS (Verizon)	82
4449 B12,B71 (T-Mobile - Proposed)	92	RRH4x45/2x90-AWS (Verizon)	82
4424 B25 (T-Mobile - Proposed)	92	RRH4x45/2x90-AWS (Verizon)	82
4424 B25 (T-Mobile - Proposed)	92	RRH4x45/2x90-AWS (Verizon)	82
4424 B25 (T-Mobile - Proposed)	92	RC2DC-3315-PF-48 (Verizon)	82
SDX1926Q-43 (T-Mobile - Proposed)	92	RC2DC-3315-PF-48 (Verizon)	82
SDX1926Q-43 (T-Mobile - Proposed)	92	(2) FD9R6004/2C-3L Diplexer (Verizon)	82
SDX1926Q-43 (T-Mobile - Proposed)	92	(2) FD9R6004/2C-3L Diplexer (Verizon)	82
SitePro VFA12-HD (T-Mobile)	92	(2) FD9R6004/2C-3L Diplexer (Verizon)	82
		12-ft Lightweight T-Frame (Verizon)	82

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-G Standard.
2. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 92%

ALL REACTIONS
ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 82 K
SHEAR: 9 K

UPLIFT: -70 K
SHEAR: 8 K

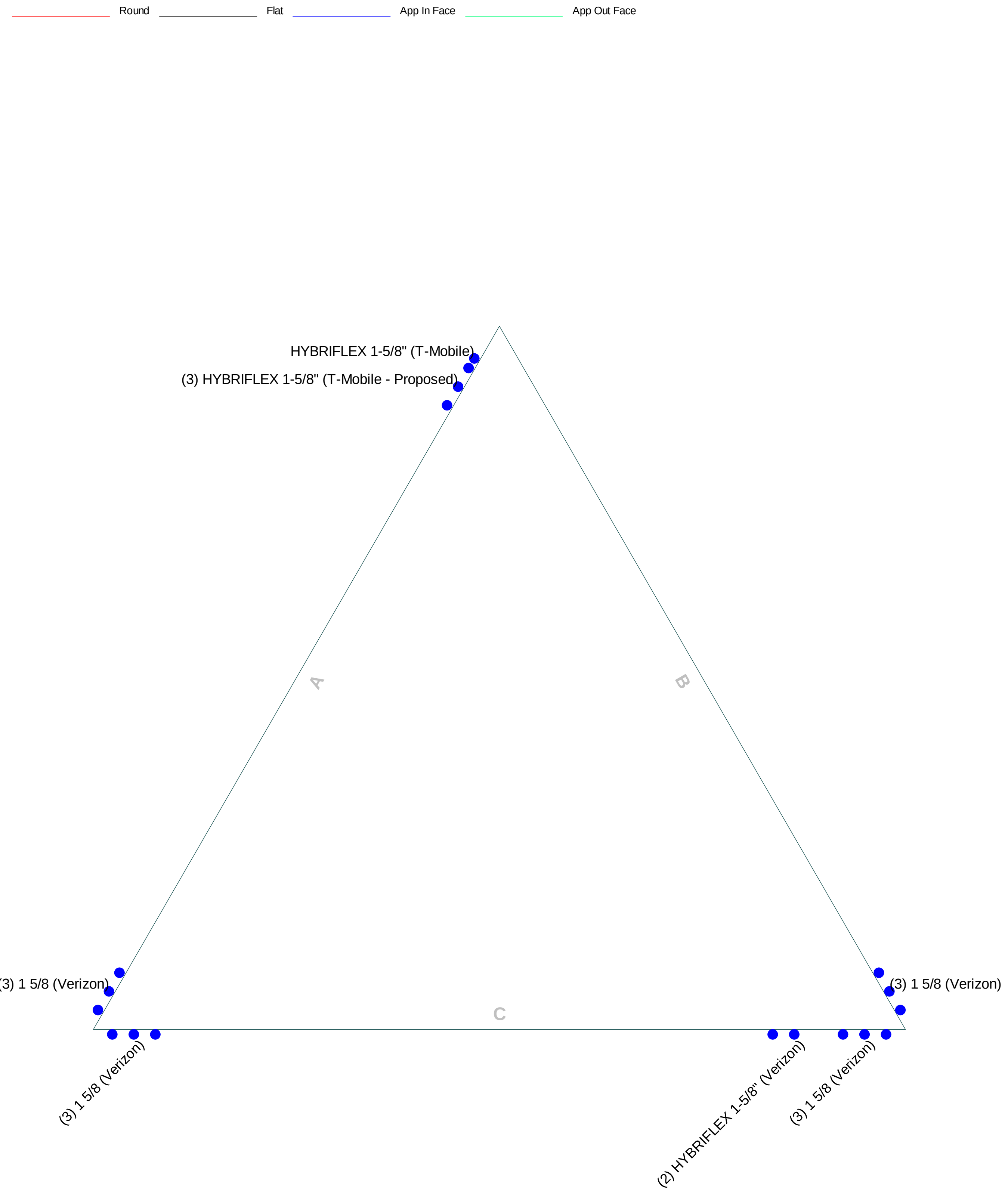
AXIAL 44 K
SHEAR 5 K
MOMENT 297 kip-ft
TORQUE 2 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL 15 K
SHEAR 14 K
MOMENT 844 kip-ft
TORQUE 3 kip-ft
REACTIONS - 93 mph WIND

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

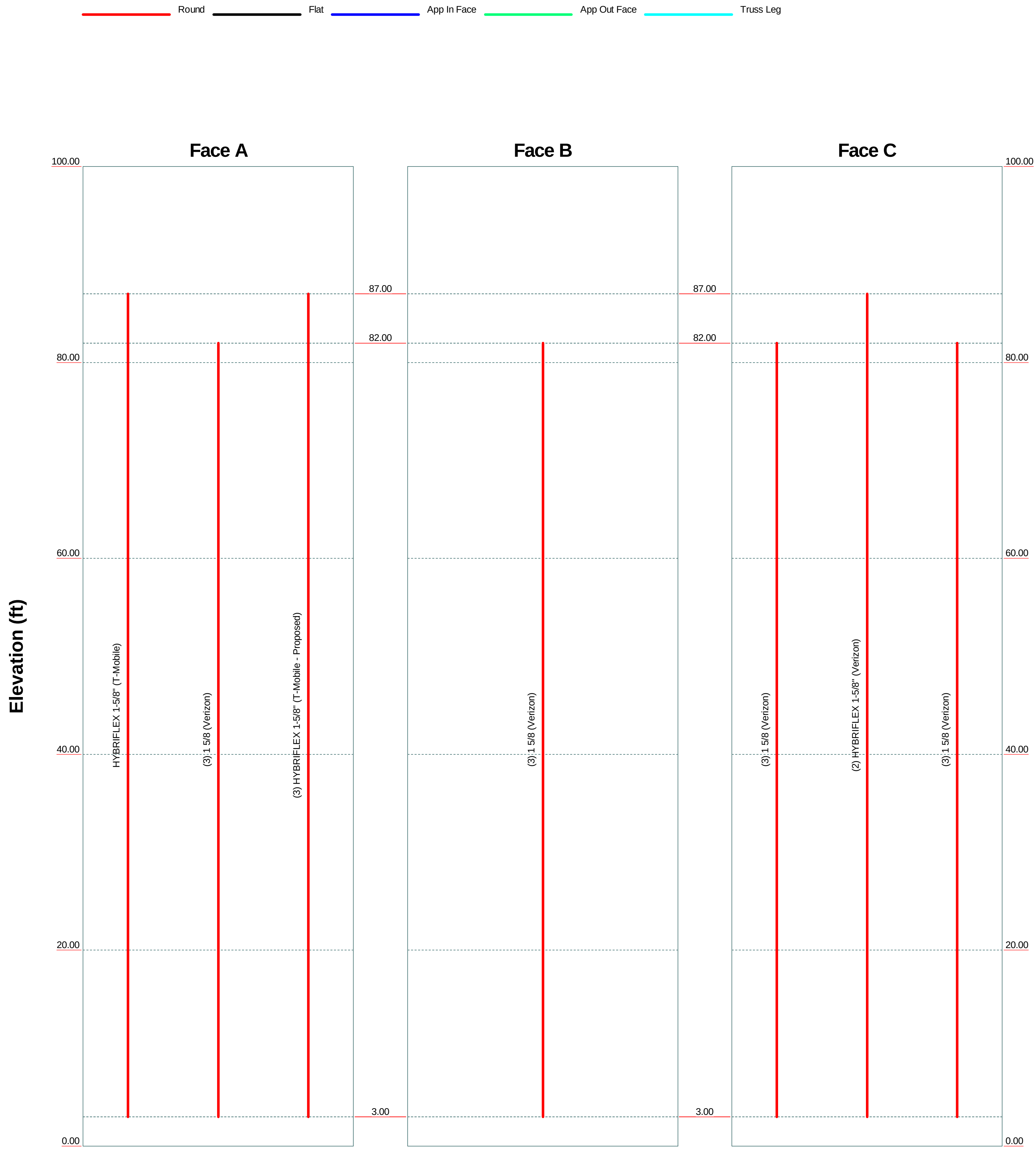
Job: **20074.49 - CTFF600E**		
Project: **100-ft Rohn Lattice Tower - 80 Lonetown Rd., Redding, CT**		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA-222-G	Date: 07/20/20	Scale: NTS
Path:		Dwg No. E-1

Feed Line Plan



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: 20074.49 - CTFF600E		
	Project: 100-ft Rohn Lattice Tower - 80 Lonetown Rd., Redding, CT		
	Client: T-Mobile	Drawn by: TJL	App'd:
	Code: TIA-222-G	Date: 07/20/20	Scale: NTS
	Path:		Dwg No. E-7

Feed Line Distribution Chart
0' - 100'



Centek Engineering Inc.	Job: 20074.49 - CTFF600E		
63-2 North Branford Rd.	Project: 100-ft Rohn Lattice Tower - 80 Lonetown Rd., Redding, CT		
Branford, CT 06405	Client: T-Mobile	Drawn by: TJL	App'd:
Phone: (203) 488-0580	Code: TIA-222-G	Date: 07/20/20	Scale: NTS
FAX: (203) 488-8587	Path:		Dwg No. E-7

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 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 2.50 ft at the top and 12.71 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

- Basic wind speed of 93 mph.
- Structure Class II.
- Exposure Category B.
- Topographic Category 1.
- Crest Height 0.00 ft.
- Nominal ice thickness of 0.7500 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in tower member design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

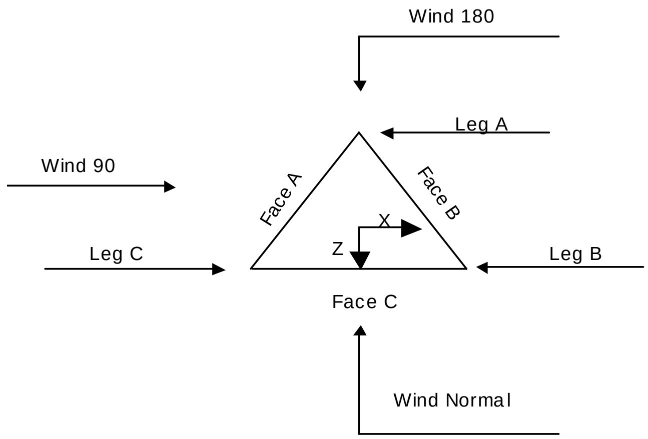
Consider Moments - Legs
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
√ Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
SR Members Have Cut Ends
SR Members Are Concentric

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
Retension Guys To Initial Tension
Bypass Mast Stability Checks
Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
Add IBC .6D+W Combination
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing
Treat Feed Line Bundles As Cylinder
Ignore KL/ry For 60 Deg. Angle Legs

Use ASCE 10 X-Brace Ly Rules
√ Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
√ SR Leg Bolts Resist Compression
√ All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feed Line Torque
Include Angle Block Shear Check
Use TIA-222-G Bracing Resist. Exemption
Use TIA-222-G Tension Splice Exemption

Poles

Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known



Triangular Tower

Tower Section Geometry

Tower Section	*Tower Elevation* *ft*	*Assembly Database*	*Description*	*Section Width* *ft*	*Number of Sections*	*Section Length* *ft*
T1	100.00-80.00		SSV 6N288 (1993)	2.50	1	20.00
T2	80.00-60.00		SSV 7N415 (1990)	4.72	1	20.00
T3	60.00-40.00		SSV 8N217 (1985)	6.76	1	20.00
T4	40.00-20.00		SSV 9N154 (1980)	8.65	1	20.00
T5	20.00-0.00		SSV 10N111 (1980)	10.69	1	20.00

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	100.00-80.00	4.00	X Brace	No	No	0.0000	0.0000
T2	80.00-60.00	4.00	X Brace	No	No	0.0000	0.0000
T3	60.00-40.00	5.00	X Brace	No	No	0.0000	0.0000
T4	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T5	20.00-0.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	*Leg Type*	*Leg Size*	*Leg Grade*	*Diagonal Type*	*Diagonal Size*	*Diagonal Grade*
T1 100.00-80.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T2 80.00-60.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 1/4x1 1/4x3/16	A36 (36 ksi)
T3 60.00-40.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle	L1 1/2x1 1/2x1/4	A36 (36 ksi)
T4 40.00-20.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T5 20.00-0.00	Pipe	ROHN 3 X-STR	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	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*
T3 60.00-40.00	Single Angle	L1 1/2x1 1/2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T4 40.00-20.00	Single Angle	L2x2x1/4	A36 (36 ksi)	Single Angle		A36 (36 ksi)
T5 20.00-0.00	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)	Single Angle		A36 (36 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 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T2 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T3 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T4 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000
T5 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000	36.0000

Tower Section Geometry *(cont'd)*

K Factors[1]

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	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 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 100.00-80.00	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
T2 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
T3 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
T4 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
T5 20.00-0.00	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 100.00-80.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 80.00-60.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 60.00-40.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 40.00-20.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 20.00-0.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Face or Leg*	*Allow Shield*	*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*
1 5/8 (Verizon)	B	No	No	Ar (CaAa)	82.00 - 3.00	0.0000	0.45	3	3	1.9800	1.9800		1.04
1 5/8 (Verizon)	C	No	No	Ar (CaAa)	82.00 - 3.00	0.0000	-0.45	3	3	1.9800	1.9800		1.04
HYBRIFLEX 1-5/8" (Verizon)	C	No	No	Ar (CaAa)	87.00 - 3.00	0.0000	-0.35	2	2	1.9800	1.9800		1.90
HYBRIFLEX 1-5/8" (T-Mobile)	A	No	No	Ar (CaAa)	87.00 - 3.00	0.0000	0.45	1	1	1.9800	1.9800		1.90
1 5/8 (Verizon)	A	No	No	Ar (CaAa)	82.00 - 3.00	0.0000	-0.45	3	3	1.9800	1.9800		1.04
1 5/8 (Verizon)	C	No	No	Ar (CaAa)	82.00 - 3.00	0.0000	0.45	3	3	1.9800	1.9800		1.04
HYBRIFLEX 1-5/8" (T-Mobile - Proposed)	A	No	No	Ar (CaAa)	87.00 - 3.00	0.0000	0.41	3	3	1.9800	1.9800		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 K*
T1	100.00-80.00	A	0.000	0.000	6.732	0.000	0.06
		B	0.000	0.000	1.188	0.000	0.01
		C	0.000	0.000	5.148	0.000	0.04
T2	80.00-60.00	A	0.000	0.000	27.720	0.000	0.21
		B	0.000	0.000	11.880	0.000	0.06
		C	0.000	0.000	31.680	0.000	0.20
T3	60.00-40.00	A	0.000	0.000	27.720	0.000	0.21
		B	0.000	0.000	11.880	0.000	0.06
		C	0.000	0.000	31.680	0.000	0.20
T4	40.00-20.00	A	0.000	0.000	27.720	0.000	0.21
		B	0.000	0.000	11.880	0.000	0.06
		C	0.000	0.000	31.680	0.000	0.20
T5	20.00-0.00	A	0.000	0.000	23.562	0.000	0.18
		B	0.000	0.000	10.098	0.000	0.05
		C	0.000	0.000	26.928	0.000	0.17

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	*Tower Elevation ft*	*Face or Leg*	*Ice Thickness in*	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	*Weight K*
T1	100.00-80.00	A	1.658	0.000	0.000	19.726	0.000	0.30
		B		0.000	0.000	3.560	0.000	0.05
		C		0.000	0.000	16.451	0.000	0.22
T2	80.00-60.00	A	1.617	0.000	0.000	81.086	0.000	1.19
		B		0.000	0.000	35.329	0.000	0.48

Tower Section	*Tower Elevation ft*	*Face or Leg*	*Ice Thickness in*	A_R ft^2	A_F ft^2	C_AA_A *In Face* ft^2	C_AA_A *Out Face* ft^2	*Weight K*
		C		0.000	0.000	97.039	0.000	1.31
T3	60.00-40.00	A	1.564	0.000	0.000	80.178	0.000	1.15
		B		0.000	0.000	34.982	0.000	0.46
		C		0.000	0.000	95.980	0.000	1.27
T4	40.00-20.00	A	1.486	0.000	0.000	78.859	0.000	1.11
		B		0.000	0.000	34.478	0.000	0.45
		C		0.000	0.000	94.442	0.000	1.22
T5	20.00-0.00	A	1.331	0.000	0.000	64.811	0.000	0.86
		B		0.000	0.000	28.460	0.000	0.35
		C		0.000	0.000	77.691	0.000	0.95

Feed Line Center of Pressure

Section	*Elevation ft*	CP_X *in*	CP_Z *in*	CP_X *Ice in*	CP_Z *Ice in*
T1	100.00-80.00	0.5498	-0.5736	0.7964	-0.4757
T2	80.00-60.00	1.0319	3.9222	1.4497	4.8856
T3	60.00-40.00	1.2792	4.7629	1.8636	6.1776
T4	40.00-20.00	1.4279	5.2599	2.2221	7.3549
T5	20.00-0.00	1.3300	4.9337	2.2435	7.5817

Shielding Factor Ka

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	K_a *No Ice*	K_a *Ice*
T1	1	1 5/8	80.00 - 82.00	0.6000	0.5024
T1	2	1 5/8	80.00 - 82.00	0.6000	0.5024
T1	3	HYBRIFLEX 1-5/8"	80.00 - 87.00	0.6000	0.5024
T1	4	HYBRIFLEX 1-5/8"	80.00 - 87.00	0.6000	0.5024
T1	5	1 5/8	80.00 - 82.00	0.6000	0.5024
T1	6	1 5/8	80.00 - 82.00	0.6000	0.5024
T1	7	HYBRIFLEX 1-5/8"	80.00 - 87.00	0.6000	0.5024
T2	1	1 5/8	60.00 - 80.00	0.6000	0.6000
T2	2	1 5/8	60.00 - 80.00	0.6000	0.6000
T2	3	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.6000
T2	4	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.6000
T2	5	1 5/8	60.00 - 80.00	0.6000	0.6000
T2	6	1 5/8	60.00 - 80.00	0.6000	0.6000
T2	7	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.6000
T3	1	1 5/8	40.00 - 60.00	0.6000	0.6000
T3	2	1 5/8	40.00 - 60.00	0.6000	0.6000
T3	3	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.6000
T3	4	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.6000
T3	5	1 5/8	40.00 - 60.00	0.6000	0.6000
T3	6	1 5/8	40.00 - 60.00	0.6000	0.6000
T3	7	HYBRIFLEX 1-5/8"	40.00 - 60.00	0.6000	0.6000
T4	1	1 5/8	20.00 - 40.00	0.6000	0.6000
T4	2	1 5/8	20.00 - 40.00	0.6000	0.6000
T4	3	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T4	4	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	5	1 5/8	20.00 - 40.00	0.6000	0.6000
T4	6	1 5/8	20.00 - 40.00	0.6000	0.6000
T4	7	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.6000
T5	1	1 5/8	3.00 - 20.00	0.6000	0.6000
T5	2	1 5/8	3.00 - 20.00	0.6000	0.6000
T5	3	HYBRIFLEX 1-5/8"	3.00 - 20.00	0.6000	0.6000
T5	4	HYBRIFLEX 1-5/8"	3.00 - 20.00	0.6000	0.6000
T5	5	1 5/8	3.00 - 20.00	0.6000	0.6000
T5	6	1 5/8	3.00 - 20.00	0.6000	0.6000
T5	7	HYBRIFLEX 1-5/8"	3.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-80063/6CF (Verizon)	A	From Leg	3.00 -6.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	7.58 8.03 8.48	4.05 4.49 4.93	0.02 0.06 0.10
SBNHH-1D45B (Verizon)	A	From Leg	3.00 -2.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	11.40 11.89 12.38	5.28 5.74 6.20	0.07 0.13 0.20
SBNHH-1D45B (Verizon)	A	From Leg	3.00 2.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	11.40 11.89 12.38	5.28 5.74 6.20	0.07 0.13 0.20
BXA-80063/6CF (Verizon)	A	From Leg	3.00 6.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	7.58 8.03 8.48	4.05 4.49 4.93	0.02 0.06 0.10
BXA-80063/6CF (Verizon)	B	From Leg	3.00 -6.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	7.58 8.03 8.48	4.05 4.49 4.93	0.02 0.06 0.10
SBNHH-1D45B (Verizon)	B	From Leg	3.00 -2.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	11.40 11.89 12.38	5.28 5.74 6.20	0.07 0.13 0.20
SBNHH-1D45B (Verizon)	B	From Leg	3.00 2.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	11.40 11.89 12.38	5.28 5.74 6.20	0.07 0.13 0.20
BXA-80063/6CF (Verizon)	B	From Leg	3.00 6.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	7.58 8.03 8.48	4.05 4.49 4.93	0.02 0.06 0.10
BXA-80080-4CF (Verizon)	C	From Leg	3.00 -6.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	3.57 3.87 4.18	2.79 3.10 3.41	0.01 0.04 0.07
SBNHH-1D65B (Verizon)	C	From Leg	3.00 -2.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	8.08 8.53 9.00	5.34 5.79 6.26	0.04 0.09 0.15
SBNHH-1D65B (Verizon)	C	From Leg	3.00 2.00 0.00	0.0000	82.00	No Ice 1/2" Ice 1" Ice	8.08 8.53 9.00	5.34 5.79 6.26	0.04 0.09 0.15
BXA-80080-4CF (Verizon)	C	From Leg	3.00 6.00	0.0000	82.00	No Ice 1/2" Ice	3.57 3.87	2.79 3.10	0.01 0.04

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		*C_AA_A Front* *ft²*	*C_AA_A Side* *ft²*	*Weight* *K*
			0.00			1" Ice	4.18	3.41	0.07
RRH2x60-07-U	A	From Leg	3.00	0.0000	82.00	No Ice	2.10	1.41	0.05
(Verizon)			-2.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-07-U	B	From Leg	3.00	0.0000	82.00	No Ice	2.10	1.41	0.05
(Verizon)			-2.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-07-U	C	From Leg	3.00	0.0000	82.00	No Ice	2.10	1.41	0.05
(Verizon)			-2.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-PCS	A	From Leg	3.00	0.0000	82.00	No Ice	2.15	1.35	0.06
(Verizon)			2.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	B	From Leg	3.00	0.0000	82.00	No Ice	2.15	1.35	0.06
(Verizon)			2.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH2x60-PCS	C	From Leg	3.00	0.0000	82.00	No Ice	2.15	1.35	0.06
(Verizon)			2.00			1/2" Ice	2.34	1.50	0.07
			0.00			1" Ice	2.54	1.67	0.09
RRH4x45/2x90-AWS	A	From Leg	3.00	0.0000	82.00	No Ice	2.58	1.69	0.08
(Verizon)			6.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH4x45/2x90-AWS	B	From Leg	3.00	0.0000	82.00	No Ice	2.58	1.69	0.08
(Verizon)			6.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RRH4x45/2x90-AWS	C	From Leg	3.00	0.0000	82.00	No Ice	2.58	1.69	0.08
(Verizon)			6.00			1/2" Ice	2.79	1.87	0.10
			0.00			1" Ice	3.01	2.06	0.12
RC2DC-3315-PF-48	A	From Leg	1.00	0.0000	82.00	No Ice	3.01	1.96	0.03
(Verizon)			0.00			1/2" Ice	3.23	2.15	0.05
			0.00			1" Ice	3.46	2.35	0.08
RC2DC-3315-PF-48	B	From Leg	1.00	0.0000	82.00	No Ice	3.01	1.96	0.03
(Verizon)			0.00			1/2" Ice	3.23	2.15	0.05
			0.00			1" Ice	3.46	2.35	0.08
(2) FD9R6004/2C-3L	A	From Leg	3.00	0.0000	82.00	No Ice	0.31	0.08	0.00
Diplexer			0.00			1/2" Ice	0.39	0.12	0.01
(Verizon)			0.00			1" Ice	0.47	0.17	0.01
(2) FD9R6004/2C-3L	B	From Leg	3.00	0.0000	82.00	No Ice	0.31	0.08	0.00
Diplexer			0.00			1/2" Ice	0.39	0.12	0.01
(Verizon)			0.00			1" Ice	0.47	0.17	0.01
(2) FD9R6004/2C-3L	C	From Leg	3.00	0.0000	82.00	No Ice	0.31	0.08	0.00
Diplexer			0.00			1/2" Ice	0.39	0.12	0.01
(Verizon)			0.00			1" Ice	0.47	0.17	0.01
12-ft Lightweight T-Frame	A	From Leg	1.50	0.0000	82.00	No Ice	10.20	10.20	0.25
(Verizon)			0.00			1/2" Ice	16.20	16.20	0.35
			0.00			1" Ice	22.20	22.20	0.46
12-ft Lightweight T-Frame	B	From Leg	1.50	0.0000	82.00	No Ice	10.20	10.20	0.25
(Verizon)			0.00			1/2" Ice	16.20	16.20	0.35
			0.00			1" Ice	22.20	22.20	0.46
12-ft Lightweight T-Frame	C	From Leg	1.50	0.0000	82.00	No Ice	10.20	10.20	0.25
(Verizon)			0.00			1/2" Ice	16.20	16.20	0.35
			0.00			1" Ice	22.20	22.20	0.46
APX16DWV-16DWVS-E-A	A	From Leg	3.00	0.0000	92.00	No Ice	6.46	2.15	0.04
20			-6.00			1/2" Ice	6.83	2.49	0.07
(T-Mobile - Proposed)			0.00			1" Ice	7.21	2.84	0.11
APXVAARR18-43	A	From Leg	3.00	0.0000	92.00	No Ice	14.67	6.16	0.13
(T-Mobile - Proposed)			-2.00			1/2" Ice	15.18	6.62	0.22

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
			0.00			1" Ice	15.71	7.09	0.31
AIR6449	A	From Leg	3.00	0.0000	92.00	No Ice	5.65	2.42	0.10
(T-Mobile - Proposed)			6.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
APX16DWV-16DWVS-E-A	B	From Leg	3.00	0.0000	92.00	No Ice	6.46	2.15	0.04
20			-6.00			1/2" Ice	6.83	2.49	0.07
(T-Mobile - Proposed)			0.00			1" Ice	7.21	2.84	0.11
APXVAARR18-43	B	From Leg	3.00	0.0000	92.00	No Ice	14.67	6.16	0.13
(T-Mobile - Proposed)			-2.00			1/2" Ice	15.18	6.62	0.22
			0.00			1" Ice	15.71	7.09	0.31
AIR6449	B	From Leg	3.00	0.0000	92.00	No Ice	5.65	2.42	0.10
(T-Mobile - Proposed)			6.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
APX16DWV-16DWVS-E-A	C	From Leg	3.00	0.0000	92.00	No Ice	6.46	2.15	0.04
20			-6.00			1/2" Ice	6.83	2.49	0.07
(T-Mobile - Proposed)			0.00			1" Ice	7.21	2.84	0.11
APXVAARR18-43	C	From Leg	3.00	0.0000	92.00	No Ice	14.67	6.16	0.13
(T-Mobile - Proposed)			-2.00			1/2" Ice	15.18	6.62	0.22
			0.00			1" Ice	15.71	7.09	0.31
AIR6449	C	From Leg	3.00	0.0000	92.00	No Ice	5.65	2.42	0.10
(T-Mobile - Proposed)			6.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
RRUS-11	A	From Leg	3.00	0.0000	92.00	No Ice	2.57	1.07	0.05
(T-Mobile)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-11	B	From Leg	3.00	0.0000	92.00	No Ice	2.57	1.07	0.05
(T-Mobile)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-11	C	From Leg	3.00	0.0000	92.00	No Ice	2.57	1.07	0.05
(T-Mobile)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
4415 B25	A	From Leg	3.00	0.0000	92.00	No Ice	1.84	0.82	0.05
(T-Mobile - Proposed)			0.00			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
4415 B25	B	From Leg	3.00	0.0000	92.00	No Ice	1.84	0.82	0.05
(T-Mobile - Proposed)			0.00			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
4415 B25	C	From Leg	3.00	0.0000	92.00	No Ice	1.84	0.82	0.05
(T-Mobile - Proposed)			0.00			1/2" Ice	2.01	0.94	0.06
			0.00			1" Ice	2.19	1.07	0.08
4449 B12,B71	A	From Leg	3.00	0.0000	92.00	No Ice	1.65	1.16	0.08
(T-Mobile - Proposed)			0.00			1/2" Ice	1.81	1.29	0.10
			0.00			1" Ice	1.98	1.44	0.11
4449 B12,B71	B	From Leg	3.00	0.0000	92.00	No Ice	1.65	1.16	0.08
(T-Mobile - Proposed)			0.00			1/2" Ice	1.81	1.29	0.10
			0.00			1" Ice	1.98	1.44	0.11
4449 B12,B71	C	From Leg	3.00	0.0000	92.00	No Ice	1.65	1.16	0.08
(T-Mobile - Proposed)			0.00			1/2" Ice	1.81	1.29	0.10
			0.00			1" Ice	1.98	1.44	0.11
4424 B25	A	From Leg	3.00	0.0000	92.00	No Ice	2.05	1.61	0.09
(T-Mobile - Proposed)			0.00			1/2" Ice	2.23	1.77	0.11
			0.00			1" Ice	2.42	1.94	0.13
4424 B25	B	From Leg	3.00	0.0000	92.00	No Ice	2.05	1.61	0.09
(T-Mobile - Proposed)			0.00			1/2" Ice	2.23	1.77	0.11
			0.00			1" Ice	2.42	1.94	0.13
4424 B25	C	From Leg	3.00	0.0000	92.00	No Ice	2.05	1.61	0.09
(T-Mobile - Proposed)			0.00			1/2" Ice	2.23	1.77	0.11

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft²*	*C_AA_A Side* *ft²*	*Weight* *K*
			0.00			1" Ice	2.42	1.94	0.13
SDX1926Q-43	A	From Leg	3.00	0.0000	92.00	No Ice	0.24	0.10	0.03
(T-Mobile - Proposed)			0.00			1/2" Ice	0.31	0.14	0.03
			0.00			1" Ice	0.38	0.19	0.04
SDX1926Q-43	B	From Leg	3.00	0.0000	92.00	No Ice	0.24	0.10	0.03
(T-Mobile - Proposed)			0.00			1/2" Ice	0.31	0.14	0.03
			0.00			1" Ice	0.38	0.19	0.04
SDX1926Q-43	C	From Leg	3.00	0.0000	92.00	No Ice	0.24	0.10	0.03
(T-Mobile - Proposed)			0.00			1/2" Ice	0.31	0.14	0.03
			0.00			1" Ice	0.38	0.19	0.04
SitePro VFA12-HD	A	From Leg	1.50	0.0000	92.00	No Ice	16.00	16.00	0.75
(T-Mobile)			0.00			1/2" Ice	19.20	19.20	0.90
			0.00			1" Ice	22.40	22.40	1.05
SitePro VFA12-HD	B	From Leg	1.50	0.0000	92.00	No Ice	16.00	16.00	0.75
(T-Mobile)			0.00			1/2" Ice	19.20	19.20	0.90
			0.00			1" Ice	22.40	22.40	1.05
SitePro VFA12-HD	C	From Leg	1.50	0.0000	92.00	No Ice	16.00	16.00	0.75
(T-Mobile)			0.00			1/2" Ice	19.20	19.20	0.90
			0.00			1" Ice	22.40	22.40	1.05

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation *ft*	*z* *ft*	*K_Z*	*q_z* *psf*	*A_G* *ft²*	*Face*	*A_F* *ft²*	*A_R* *ft²*	*A_{leg}* *ft²*	*Leg %*	*C_AA_A In Face* *ft²*	*C_AA_A Out Face* *ft²*
T1 100.00-80.00	90.00	0.959	18	76.987	A	5.820	9.603	9.603	62.27	6.732	0.000
					B	5.820	9.603		62.27	1.188	0.000
					C	5.820	9.603		62.27	5.148	0.000
T2 80.00-60.00	70.00	0.892	17	119.585	A	6.991	9.600	9.600	57.86	27.720	0.000
					B	6.991	9.600		57.86	11.880	0.000
					C	6.991	9.600		57.86	31.680	0.000
T3 60.00-40.00	50.00	0.811	15	158.897	A	9.720	9.598	9.598	49.68	27.720	0.000
					B	9.720	9.598		49.68	11.880	0.000
					C	9.720	9.598		49.68	31.680	0.000
T4 40.00-20.00	30.00	0.701	13	199.241	A	12.809	11.687	11.687	47.71	27.720	0.000
					B	12.809	11.687		47.71	11.880	0.000
					C	12.809	11.687		47.71	31.680	0.000
T5 20.00-0.00	10.00	0.7	13	239.841	A	18.584	11.686	11.686	38.61	23.562	0.000
					B	18.584	11.686		38.61	10.098	0.000
					C	18.584	11.686		38.61	26.928	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 100.00-80.00	90.00	0.959	5	1.6583	82.523	A	5.820	35.247	20.681	50.36	19.726	0.000
						B	5.820	35.247		50.36	3.560	0.000
						C	5.820	35.247		50.36	16.451	0.000
T2 80.00-60.00	70.00	0.892	5	1.6171	124.983	A	6.991	38.488	20.400	44.86	81.086	0.000
						B	6.991	38.488		44.86	35.329	0.000
						C	6.991	38.488		44.86	97.039	0.000
T3 60.00-40.00	50.00	0.811	4	1.5636	164.115	A	9.720	40.301	20.037	40.06	80.178	0.000
						B	9.720	40.301		40.06	34.982	0.000
						C	9.720	40.301		40.06	95.980	0.000
T4 40.00-20.00	30.00	0.701	4	1.4858	204.200	A	12.809	40.640	21.609	40.43	78.859	0.000
						B	12.809	40.640		40.43	34.478	0.000
						C	12.809	40.640		40.43	94.442	0.000
T5 20.00-0.00	10.00	0.7	4	1.3312	244.284	A	18.584	40.367	20.576	34.90	64.811	0.000
						B	18.584	40.367		34.90	28.460	0.000
						C	18.584	40.367		34.90	77.691	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 100.00-80.00	90.00	0.959	8	76.987	A	5.820	9.603	9.603	62.27	6.732	0.000
					B	5.820	9.603		62.27	1.188	0.000
					C	5.820	9.603		62.27	5.148	0.000
T2 80.00-60.00	70.00	0.892	7	119.585	A	6.991	9.600	9.600	57.86	27.720	0.000
					B	6.991	9.600		57.86	11.880	0.000
					C	6.991	9.600		57.86	31.680	0.000
T3 60.00-40.00	50.00	0.811	6	158.897	A	9.720	9.598	9.598	49.68	27.720	0.000
					B	9.720	9.598		49.68	11.880	0.000
					C	9.720	9.598		49.68	31.680	0.000
T4 40.00-20.00	30.00	0.701	5	199.241	A	12.809	11.687	11.687	47.71	27.720	0.000
					B	12.809	11.687		47.71	11.880	0.000
					C	12.809	11.687		47.71	31.680	0.000
T5 20.00-0.00	10.00	0.7	5	239.841	A	18.584	11.686	11.686	38.61	23.562	0.000
					B	18.584	11.686		38.61	10.098	0.000
					C	18.584	11.686		38.61	26.928	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.10	0.62	A	0.2	2.595	18	1	1	11.337	0.57	28.58	C
			B	0.2	2.595		1	1	11.337			
			C	0.2	2.595		1	1	11.337			
T2 80.00-60.00	0.48	0.66	A	0.139	2.813	17	1	1	12.429	1.11	55.49	C
			B	0.139	2.813		1	1	12.429			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.139	2.813		1	1	12.429			
T3 60.00-40.00	0.48	0.91	A	0.122	2.879	15	1	1	15.145	1.12	56.00	C
			B	0.122	2.879		1	1	15.145			
			C	0.122	2.879		1	1	15.145			
T4 40.00-20.00	0.48	1.21	A	0.123	2.874	13	1	1	19.416	1.10	55.23	C
			B	0.123	2.874		1	1	19.416			
			C	0.123	2.874		1	1	19.416			
T5 20.00-0.00	0.41	1.73	A	0.126	2.861	13	1	1	25.193	1.21	60.71	C
			B	0.126	2.861		1	1	25.193			
			C	0.126	2.861		1	1	25.193			
Sum Weight:	1.94	5.14						OTM	230.41 kip-ft	5.12		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.10	0.62	A	0.2	2.595	18	0.825	1	10.318	0.53	26.55	C
			B	0.2	2.595		0.825	1	10.318			
			C	0.2	2.595		0.825	1	10.318			
T2 80.00-60.00	0.48	0.66	A	0.139	2.813	17	0.825	1	11.206	1.06	53.04	C
			B	0.139	2.813		0.825	1	11.206			
			C	0.139	2.813		0.825	1	11.206			
T3 60.00-40.00	0.48	0.91	A	0.122	2.879	15	0.825	1	13.444	1.06	52.83	C
			B	0.122	2.879		0.825	1	13.444			
			C	0.122	2.879		0.825	1	13.444			
T4 40.00-20.00	0.48	1.21	A	0.123	2.874	13	0.825	1	17.175	1.03	51.62	C
			B	0.123	2.874		0.825	1	17.175			
			C	0.123	2.874		0.825	1	17.175			
T5 20.00-0.00	0.41	1.73	A	0.126	2.861	13	0.825	1	21.941	1.11	55.50	C
			B	0.126	2.861		0.825	1	21.941			
			C	0.126	2.861		0.825	1	21.941			
Sum Weight:	1.94	5.14						OTM	216.94 kip-ft	4.79		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.10	0.62	A	0.2	2.595	18	0.8	1	10.173	0.53	26.26	C
			B	0.2	2.595		0.8	1	10.173			
			C	0.2	2.595		0.8	1	10.173			
T2 80.00-60.00	0.48	0.66	A	0.139	2.813	17	0.8	1	11.031	1.05	52.68	C
			B	0.139	2.813		0.8	1	11.031			
			C	0.139	2.813		0.8	1	11.031			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T3 60.00-40.00	0.48	0.91	A	0.122	2.879	15	0.8	1	13.201	1.05	52.37	C
			B	0.122	2.879		0.8	1	13.201			
			C	0.122	2.879		0.8	1	13.201			
T4 40.00-20.00	0.48	1.21	A	0.123	2.874	13	0.8	1	16.854	1.02	51.11	C
			B	0.123	2.874		0.8	1	16.854			
			C	0.123	2.874		0.8	1	16.854			
T5 20.00-0.00	0.41	1.73	A	0.126	2.861	13	0.8	1	21.477	1.10	54.76	C
			B	0.126	2.861		0.8	1	21.477			
			C	0.126	2.861		0.8	1	21.477			
Sum Weight:	1.94	5.14						OTM	215.02 kip-ft	4.74		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.10	0.62	A	0.2	2.595	18	0.85	1	10.464	0.54	26.84	C
			B	0.2	2.595		0.85	1	10.464			
			C	0.2	2.595		0.85	1	10.464			
T2 80.00-60.00	0.48	0.66	A	0.139	2.813	17	0.85	1	11.381	1.07	53.39	C
			B	0.139	2.813		0.85	1	11.381			
			C	0.139	2.813		0.85	1	11.381			
T3 60.00-40.00	0.48	0.91	A	0.122	2.879	15	0.85	1	13.687	1.07	53.28	C
			B	0.122	2.879		0.85	1	13.687			
			C	0.122	2.879		0.85	1	13.687			
T4 40.00-20.00	0.48	1.21	A	0.123	2.874	13	0.85	1	17.495	1.04	52.14	C
			B	0.123	2.874		0.85	1	17.495			
			C	0.123	2.874		0.85	1	17.495			
T5 20.00-0.00	0.41	1.73	A	0.126	2.861	13	0.85	1	22.406	1.12	56.24	C
			B	0.126	2.861		0.85	1	22.406			
			C	0.126	2.861		0.85	1	22.406			
Sum Weight:	1.94	5.14						OTM	218.87 kip-ft	4.84		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.58	2.39	A	0.498	1.903	5	1	1	29.919	0.34	17.05	C
			B	0.498	1.903		1	1	29.919			
			C	0.498	1.903		1	1	29.919			
T2 80.00-60.00	2.98	2.60	A	0.364	2.14	5	1	1	30.906	0.80	40.07	C
			B	0.364	2.14		1	1	30.906			
			C	0.364	2.14		1	1	30.906			
T3	2.89	3.12	A	0.305	2.283	4	1	1	33.918	0.77	38.26	C

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
60.00-40.00			B	0.305	2.283		1	1	33.918			
			C	0.305	2.283		1	1	33.918			
T4	2.77	3.62	A	0.262	2.403	4	1	1	36.705	0.69	34.48	C
40.00-20.00			B	0.262	2.403		1	1	36.705			
			C	0.262	2.403		1	1	36.705			
T5 20.00-0.00	2.16	4.37	A	0.241	2.464	4	1	1	42.115	0.67	33.39	C
			B	0.241	2.464		1	1	42.115			
			C	0.241	2.464		1	1	42.115			
Sum Weight:	11.38	16.10						OTM	152.42 kip-ft	3.27		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1	0.58	2.39	A	0.498	1.903	5	0.825	1	28.901	0.33	16.62	C
100.00-80.00			B	0.498	1.903		0.825	1	28.901			
			C	0.498	1.903		0.825	1	28.901			
T2	2.98	2.60	A	0.364	2.14	5	0.825	1	29.683	0.79	39.53	C
80.00-60.00			B	0.364	2.14		0.825	1	29.683			
			C	0.364	2.14		0.825	1	29.683			
T3	2.89	3.12	A	0.305	2.283	4	0.825	1	32.217	0.75	37.53	C
60.00-40.00			B	0.305	2.283		0.825	1	32.217			
			C	0.305	2.283		0.825	1	32.217			
T4	2.77	3.62	A	0.262	2.403	4	0.825	1	34.463	0.67	33.61	C
40.00-20.00			B	0.262	2.403		0.825	1	34.463			
			C	0.262	2.403		0.825	1	34.463			
T5 20.00-0.00	2.16	4.37	A	0.241	2.464	4	0.825	1	38.863	0.64	32.10	C
			B	0.241	2.464		0.825	1	38.863			
			C	0.241	2.464		0.825	1	38.863			
Sum Weight:	11.38	16.10						OTM	149.38 kip-ft	3.19		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1	0.58	2.39	A	0.498	1.903	5	0.8	1	28.755	0.33	16.56	C
100.00-80.00			B	0.498	1.903		0.8	1	28.755			
			C	0.498	1.903		0.8	1	28.755			
T2	2.98	2.60	A	0.364	2.14	5	0.8	1	29.508	0.79	39.46	C
80.00-60.00			B	0.364	2.14		0.8	1	29.508			
			C	0.364	2.14		0.8	1	29.508			
T3	2.89	3.12	A	0.305	2.283	4	0.8	1	31.974	0.75	37.43	C
60.00-40.00			B	0.305	2.283		0.8	1	31.974			

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
			C	0.305	2.283		0.8	1	31.974			
T4 40.00-20.00	2.77	3.62	A	0.262	2.403	4	0.8	1	34.143	0.67	33.48	C
			B	0.262	2.403		0.8	1	34.143			
			C	0.262	2.403		0.8	1	34.143			
T5 20.00-0.00	2.16	4.37	A	0.241	2.464	4	0.8	1	38.399	0.64	31.91	C
			B	0.241	2.464		0.8	1	38.399			
			C	0.241	2.464		0.8	1	38.399			
Sum Weight:	11.38	16.10						OTM	148.94 kip-ft	3.18		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 100.00-80.00	0.58	2.39	A	0.498	1.903	5	0.85	1	29.046	0.33	16.68	C
			B	0.498	1.903		0.85	1	29.046			
			C	0.498	1.903		0.85	1	29.046			
T2 80.00-60.00	2.98	2.60	A	0.364	2.14	5	0.85	1	29.857	0.79	39.61	C
			B	0.364	2.14		0.85	1	29.857			
			C	0.364	2.14		0.85	1	29.857			
T3 60.00-40.00	2.89	3.12	A	0.305	2.283	4	0.85	1	32.460	0.75	37.64	C
			B	0.305	2.283		0.85	1	32.460			
			C	0.305	2.283		0.85	1	32.460			
T4 40.00-20.00	2.77	3.62	A	0.262	2.403	4	0.85	1	34.783	0.67	33.73	C
			B	0.262	2.403		0.85	1	34.783			
			C	0.262	2.403		0.85	1	34.783			
T5 20.00-0.00	2.16	4.37	A	0.241	2.464	4	0.85	1	39.328	0.65	32.28	C
			B	0.241	2.464		0.85	1	39.328			
			C	0.241	2.464		0.85	1	39.328			
Sum Weight:	11.38	16.10						OTM	149.81 kip-ft	3.20		

Tower Forces - Service - Wind Normal To Face

Section Elevation *ft*	*Add Weight* *K*	*Self Weight* *K*	*Face*	*e*	C_F	q_z *psf*	D_F	D_R	A_E ft^2	*F* *K*	*w* *plf*	*Ctrl. Face*
T1 100.00-80.00	0.10	0.62	A	0.2	2.595	8	1	1	11.337	0.24	11.90	C
			B	0.2	2.595		1	1	11.337			
			C	0.2	2.595		1	1	11.337			
T2 80.00-60.00	0.48	0.66	A	0.139	2.813	7	1	1	12.429	0.46	23.10	C
			B	0.139	2.813		1	1	12.429			
			C	0.139	2.813		1	1	12.429			
T3 60.00-40.00	0.48	0.91	A	0.122	2.879	6	1	1	15.145	0.47	23.31	C
			B	0.122	2.879		1	1	15.145			
			C	0.122	2.879		1	1	15.145			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T4 40.00-20.00	0.48	1.21	A	0.123	2.874	5	1	1	19.416	0.46	22.99	C
			B	0.123	2.874		1	1	19.416			
			C	0.123	2.874		1	1	19.416			
T5 20.00-0.00	0.41	1.73	A	0.126	2.861	5	1	1	25.193	0.51	25.27	C
			B	0.126	2.861		1	1	25.193			
			C	0.126	2.861		1	1	25.193			
Sum Weight:	1.94	5.14						OTM	95.91 kip-ft	2.13		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.10	0.62	A	0.2	2.595	8	0.825	1	10.318	0.22	11.05	C
			B	0.2	2.595		0.825	1	10.318			
			C	0.2	2.595		0.825	1	10.318			
T2 80.00-60.00	0.48	0.66	A	0.139	2.813	7	0.825	1	11.206	0.44	22.08	C
			B	0.139	2.813		0.825	1	11.206			
			C	0.139	2.813		0.825	1	11.206			
T3 60.00-40.00	0.48	0.91	A	0.122	2.879	6	0.825	1	13.444	0.44	21.99	C
			B	0.122	2.879		0.825	1	13.444			
			C	0.122	2.879		0.825	1	13.444			
T4 40.00-20.00	0.48	1.21	A	0.123	2.874	5	0.825	1	17.175	0.43	21.49	C
			B	0.123	2.874		0.825	1	17.175			
			C	0.123	2.874		0.825	1	17.175			
T5 20.00-0.00	0.41	1.73	A	0.126	2.861	5	0.825	1	21.941	0.46	23.10	C
			B	0.126	2.861		0.825	1	21.941			
			C	0.126	2.861		0.825	1	21.941			
Sum Weight:	1.94	5.14						OTM	90.30 kip-ft	1.99		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.10	0.62	A	0.2	2.595	8	0.8	1	10.173	0.22	10.93	C
			B	0.2	2.595		0.8	1	10.173			
			C	0.2	2.595		0.8	1	10.173			
T2 80.00-60.00	0.48	0.66	A	0.139	2.813	7	0.8	1	11.031	0.44	21.93	C
			B	0.139	2.813		0.8	1	11.031			
			C	0.139	2.813		0.8	1	11.031			
T3 60.00-40.00	0.48	0.91	A	0.122	2.879	6	0.8	1	13.201	0.44	21.80	C
			B	0.122	2.879		0.8	1	13.201			
			C	0.122	2.879		0.8	1	13.201			
T4	0.48	1.21	A	0.123	2.874	5	0.8	1	16.854	0.43	21.27	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
40.00-20.00			B	0.123	2.874		0.8	1	16.854			
			C	0.123	2.874		0.8	1	16.854			
T5 20.00-0.00	0.41	1.73	A	0.126	2.861	5	0.8	1	21.477	0.46	22.79	C
			B	0.126	2.861		0.8	1	21.477			
			C	0.126	2.861		0.8	1	21.477			
Sum Weight:	1.94	5.14						OTM	89.50 kip-ft	1.97		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1 100.00-80.00	0.10	0.62	A	0.2	2.595	8	0.85	1	10.464	0.22	11.17	C
			B	0.2	2.595		0.85	1	10.464			
			C	0.2	2.595		0.85	1	10.464			
T2 80.00-60.00	0.48	0.66	A	0.139	2.813	7	0.85	1	11.381	0.44	22.22	C
			B	0.139	2.813		0.85	1	11.381			
			C	0.139	2.813		0.85	1	11.381			
T3 60.00-40.00	0.48	0.91	A	0.122	2.879	6	0.85	1	13.687	0.44	22.18	C
			B	0.122	2.879		0.85	1	13.687			
			C	0.122	2.879		0.85	1	13.687			
T4 40.00-20.00	0.48	1.21	A	0.123	2.874	5	0.85	1	17.495	0.43	21.70	C
			B	0.123	2.874		0.85	1	17.495			
			C	0.123	2.874		0.85	1	17.495			
T5 20.00-0.00	0.41	1.73	A	0.126	2.861	5	0.85	1	22.406	0.47	23.41	C
			B	0.126	2.861		0.85	1	22.406			
			C	0.126	2.861		0.85	1	22.406			
Sum Weight:	1.94	5.14						OTM	91.10 kip-ft	2.01		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	2.12					
Bracing Weight	3.02					
Total Member Self-Weight	5.14			0.06	-1.14	
Total Weight	12.91			0.06	-1.14	
Wind 0 deg - No Ice		-0.07	-8.48	-522.99	4.51	0.72
Wind 30 deg - No Ice		4.00	-7.07	-440.09	-248.74	1.39
Wind 45 deg - No Ice		5.66	-5.72	-356.27	-352.86	1.60
Wind 60 deg - No Ice		6.92	-3.99	-248.87	-432.31	1.70
Wind 90 deg - No Ice		8.12	0.07	5.71	-506.12	1.54
Wind 120 deg - No Ice		7.31	4.30	266.48	-451.29	0.98
Wind 135 deg - No Ice		5.89	5.95	369.83	-366.29	0.58

Load Case	*Vertical Forces* *K*	*Sum of Forces X* *K*	*Sum of Forces Z* *K*	*Sum of Overturning Moments, M_x* *kip-ft*	*Sum of Overturning Moments, M_z* *kip-ft*	*Sum of Torques* *kip-ft*
Wind 150 deg - No Ice		4.12	7.14	445.86	-258.53	0.15
Wind 180 deg - No Ice		0.07	8.11	507.72	-6.79	-0.72
Wind 210 deg - No Ice		-4.00	7.07	440.21	246.45	-1.39
Wind 225 deg - No Ice		-5.66	5.72	356.40	350.58	-1.60
Wind 240 deg - No Ice		-7.24	4.18	256.70	443.36	-1.70
Wind 270 deg - No Ice		-8.12	-0.07	-5.59	503.84	-1.54
Wind 300 deg - No Ice		-6.99	-4.11	-258.66	435.67	-0.98
Wind 315 deg - No Ice		-5.76	-5.82	-364.26	358.57	-0.58
Wind 330 deg - No Ice		-4.12	-7.14	-445.74	256.24	-0.15
Member Ice	10.96					
Total Weight Ice	41.56			6.70	-4.64	
Wind 0 deg - Ice		-0.02	-4.79	-277.79	-2.97	0.57
Wind 30 deg - Ice		2.33	-4.08	-236.58	-143.17	1.23
Wind 45 deg - Ice		3.30	-3.32	-191.13	-201.11	1.45
Wind 60 deg - Ice		4.04	-2.33	-132.36	-245.50	1.56
Wind 90 deg - Ice		4.70	0.02	8.38	-284.59	1.47
Wind 120 deg - Ice		4.14	2.41	150.40	-250.18	0.99
Wind 135 deg - Ice		3.36	3.38	208.13	-204.71	0.63
Wind 150 deg - Ice		2.37	4.10	251.66	-146.07	0.24
Wind 180 deg - Ice		0.02	4.70	287.72	-6.32	-0.57
Wind 210 deg - Ice		-2.33	4.08	249.98	133.88	-1.23
Wind 225 deg - Ice		-3.30	3.32	204.53	191.82	-1.45
Wind 240 deg - Ice		-4.12	2.38	147.50	239.22	-1.56
Wind 270 deg - Ice		-4.70	-0.02	5.02	275.31	-1.47
Wind 300 deg - Ice		-4.06	-2.37	-135.26	237.89	-0.99
Wind 315 deg - Ice		-3.33	-3.35	-193.50	194.19	-0.63
Wind 330 deg - Ice		-2.37	-4.10	-238.26	136.78	-0.24
Total Weight	12.91			0.06	-1.14	
Wind 0 deg - Service		-0.03	-3.53	-217.99	1.87	0.30
Wind 30 deg - Service		1.67	-2.94	-183.48	-103.54	0.58
Wind 45 deg - Service		2.36	-2.38	-148.59	-146.88	0.67
Wind 60 deg - Service		2.88	-1.66	-103.89	-179.95	0.71
Wind 90 deg - Service		3.38	0.03	2.07	-210.67	0.64
Wind 120 deg - Service		3.04	1.79	110.61	-187.85	0.41
Wind 135 deg - Service		2.45	2.48	153.63	-152.47	0.24
Wind 150 deg - Service		1.72	2.97	185.28	-107.61	0.06
Wind 180 deg - Service		0.03	3.37	211.03	-2.83	-0.30
Wind 210 deg - Service		-1.67	2.94	182.93	102.58	-0.58
Wind 225 deg - Service		-2.36	2.38	148.04	145.92	-0.67
Wind 240 deg - Service		-3.02	1.74	106.54	184.53	-0.71
Wind 270 deg - Service		-3.38	-0.03	-2.63	209.71	-0.64
Wind 300 deg - Service		-2.91	-1.71	-107.97	181.34	-0.41
Wind 315 deg - Service		-2.40	-2.42	-151.92	149.24	-0.24
Wind 330 deg - Service		-1.72	-2.97	-185.84	106.65	-0.06

Load Combinations

Comb. No.	*Description*
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice

Comb. No.	*Description*
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Axial K*	*Major Axis Moment kip-ft*	*Minor Axis Moment kip-ft*
T1	100 - 80	Leg	Max Tension	29	7.51	-0.33	-0.02
			Max. Compression	2	-11.72	0.27	-0.02
			Max. Mx	18	6.30	0.65	0.02
			Max. My	26	-2.64	-0.02	0.64
			Max. Vy	18	-1.05	-0.03	0.00
			Max. Vx	10	0.88	0.01	-0.13
		Diagonal	Max Tension	31	1.85	0.00	0.00
			Max. Compression	14	-1.95	0.00	0.00
			Max. Mx	36	0.29	0.01	0.00
			Max. My	16	-1.52	0.00	0.00
			Max. Vy	38	0.01	0.01	-0.00
			Max. Vx	16	-0.00	0.00	0.00
		Top Girt	Max Tension	13	0.14	0.00	0.00
			Max. Compression	18	-0.16	0.00	0.00
			Max. Mx	34	-0.03	-0.01	0.00
			Max. My	38	-0.01	0.00	0.00
			Max. Vy	34	0.02	0.00	0.00
			Max. Vx	38	-0.00	0.00	0.00
T2	80 - 60	Leg	Max Tension	19	28.19	-0.04	0.00
			Max. Compression	12	-34.14	0.13	-0.00
			Max. Mx	28	11.10	-0.33	-0.02
			Max. My	4	-2.63	-0.04	-0.33
			Max. Vy	28	-0.11	-0.33	-0.02
			Max. Vx	4	-0.11	-0.04	-0.33
		Diagonal	Max Tension	16	2.50	0.00	0.00
			Max. Compression	16	-2.48	0.00	0.00
			Max. Mx	41	0.40	0.02	0.00
			Max. My	39	0.35	0.01	-0.00
			Max. Vy	39	0.02	0.01	0.00
			Max. Vx	39	0.00	0.00	0.00
T3	60 - 40	Leg	Max Tension	19	44.17	-0.04	0.00
			Max. Compression	12	-51.54	0.16	-0.01
			Max. Mx	2	-51.47	0.16	-0.00
			Max. My	16	-3.43	-0.02	-0.18
			Max. Vy	2	-0.05	0.16	-0.00
			Max. Vx	4	0.07	-0.02	-0.18
		Diagonal	Max Tension	32	2.27	0.00	0.00
			Max. Compression	32	-2.33	0.00	0.00
			Max. Mx	41	0.58	0.03	0.00
			Max. My	16	-2.32	-0.00	0.00
			Max. Vy	42	0.03	0.03	-0.00
			Max. Vx	38	0.00	0.00	0.00
		Top Girt	Max Tension	18	0.47	0.00	0.00
			Max. Compression	13	-0.43	0.00	0.00
			Max. Mx	34	0.15	-0.06	0.00
			Max. My	38	0.08	0.00	0.00
			Max. Vy	34	-0.03	0.00	0.00
			Max. Vx	38	-0.00	0.00	0.00
T4	40 - 20	Leg	Max Tension	19	56.45	-0.11	0.00
			Max. Compression	12	-65.24	0.16	-0.01
			Max. Mx	2	-65.14	0.16	-0.00
			Max. My	4	-3.50	-0.01	-0.19
			Max. Vy	2	0.03	0.16	-0.00
			Max. Vx	4	0.06	-0.01	-0.19
		Diagonal	Max Tension	24	2.66	0.00	0.00
			Max. Compression	24	-2.83	0.00	0.00
			Max. Mx	41	0.03	0.06	0.01
			Max. My	46	0.05	0.05	0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	42	0.04	0.06	-0.01
			Max. Vx	46	-0.00	0.00	0.00
		Top Girt	Max Tension	18	1.07	0.00	0.00
			Max. Compression	13	-0.95	0.00	0.00
			Max. Mx	34	0.37	-0.11	0.00
			Max. My	38	0.20	0.00	0.00
			Max. Vy	34	-0.05	0.00	0.00
			Max. Vx	38	-0.00	0.00	0.00
T5	20 - 0	Leg	Max Tension	19	68.21	-0.13	0.00
			Max. Compression	12	-79.15	0.00	0.00
			Max. Mx	35	-36.37	0.24	-0.00
			Max. My	4	-4.19	-0.01	-0.20
			Max. Vy	48	-0.07	-0.21	0.00
			Max. Vx	4	-0.06	-0.01	-0.20
		Diagonal	Max Tension	24	2.78	0.00	0.00
			Max. Compression	24	-3.00	0.00	0.00
			Max. Mx	40	0.08	0.09	-0.01
			Max. My	37	-1.65	0.07	-0.01
			Max. Vy	43	0.05	0.09	0.01
			Max. Vx	37	0.00	0.00	0.00
		Top Girt	Max Tension	18	1.75	0.00	0.00
			Max. Compression	13	-1.45	0.00	0.00
			Max. Mx	34	-0.37	-0.18	0.00
			Max. My	46	-0.13	0.00	0.01
			Max. Vy	34	0.07	0.00	0.00
			Max. Vx	46	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	24	80.16	7.81	-4.37
	Max. H_x	24	80.16	7.81	-4.37
	Max. H_z	9	-68.94	-6.71	3.73
	Min. Vert	9	-68.94	-6.71	3.73
	Min. H_x	9	-68.94	-6.71	3.73
	Min. H_z	24	80.16	7.81	-4.37
Leg B	Max. Vert	12	81.81	-7.90	-4.48
	Max. H_x	29	-70.20	6.80	3.84
	Max. H_z	31	-68.16	6.54	3.86
	Min. Vert	29	-70.20	6.80	3.84
	Min. H_x	12	81.81	-7.90	-4.48
	Min. H_z	12	81.81	-7.90	-4.48
Leg A	Max. Vert	2	81.69	0.05	9.08
	Max. H_x	27	4.69	0.35	0.46
	Max. H_z	2	81.69	0.05	9.08
	Min. Vert	19	-70.29	-0.05	-7.81
	Min. H_x	13	-35.05	-0.36	-3.95
	Min. H_z	19	-70.29	-0.05	-7.81

Tower Mast Reaction Summary

Load Combination	*Vertical* *K*	*Shear$_x$* *K*	*Shear$_z$* *K*	*Overturning Moment, M_x* *kip-ft*	*Overturning Moment, M_z* *kip-ft*	*Torque* *kip-ft*
Dead Only	12.91	0.00	0.00	0.06	-1.14	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	15.49	-0.11	-13.57	-842.36	7.72	1.16
0.9 Dead+1.6 Wind 0 deg - No Ice	11.62	-0.11	-13.57	-840.97	8.05	1.16
1.2 Dead+1.6 Wind 30 deg - No Ice	15.49	6.40	-11.31	-708.85	-400.18	2.24
0.9 Dead+1.6 Wind 30 deg - No Ice	11.62	6.40	-11.31	-707.69	-399.16	2.24
1.2 Dead+1.6 Wind 45 deg - No Ice	15.49	9.06	-9.15	-573.85	-567.89	2.56
0.9 Dead+1.6 Wind 45 deg - No Ice	11.62	9.06	-9.15	-572.91	-566.59	2.56
1.2 Dead+1.6 Wind 60 deg - No Ice	15.49	11.07	-6.39	-400.87	-695.85	2.72
0.9 Dead+1.6 Wind 60 deg - No Ice	11.62	11.07	-6.39	-400.22	-694.34	2.72
1.2 Dead+1.6 Wind 90 deg - No Ice	15.49	13.00	0.11	9.18	-814.73	2.47
0.9 Dead+1.6 Wind 90 deg - No Ice	11.62	13.00	0.11	9.15	-813.02	2.47
1.2 Dead+1.6 Wind 120 deg - No Ice	15.49	11.70	6.88	429.18	-726.39	1.55
0.9 Dead+1.6 Wind 120 deg - No Ice	11.62	11.70	6.88	428.44	-724.84	1.56
1.2 Dead+1.6 Wind 135 deg - No Ice	15.49	9.43	9.52	595.64	-589.51	0.92
0.9 Dead+1.6 Wind 135 deg - No Ice	11.62	9.43	9.52	594.62	-588.18	0.93
1.2 Dead+1.6 Wind 150 deg - No Ice	15.49	6.59	11.42	718.11	-415.94	0.23
0.9 Dead+1.6 Wind 150 deg - No Ice	11.62	6.59	11.42	716.89	-414.90	0.23
1.2 Dead+1.6 Wind 180 deg - No Ice	15.49	0.11	12.97	817.75	-10.50	-1.16
0.9 Dead+1.6 Wind 180 deg - No Ice	11.62	0.11	12.97	816.36	-10.13	-1.16
1.2 Dead+1.6 Wind 210 deg - No Ice	15.49	-6.40	11.31	709.01	397.39	-2.24
0.9 Dead+1.6 Wind 210 deg - No Ice	11.62	-6.40	11.31	707.81	397.08	-2.24
1.2 Dead+1.6 Wind 225 deg - No Ice	15.49	-9.06	9.15	574.01	565.10	-2.57
0.9 Dead+1.6 Wind 225 deg - No Ice	11.62	-9.06	9.15	573.03	564.51	-2.56
1.2 Dead+1.6 Wind 240 deg - No Ice	15.49	-11.59	6.69	413.41	714.52	-2.72
0.9 Dead+1.6 Wind 240 deg - No Ice	11.62	-11.59	6.69	412.70	713.68	-2.72
1.2 Dead+1.6 Wind 270 deg - No Ice	15.49	-13.00	-0.11	-9.03	811.96	-2.47
0.9 Dead+1.6 Wind 270 deg - No Ice	11.62	-13.00	-0.11	-9.03	810.95	-2.47
1.2 Dead+1.6 Wind 300 deg - No Ice	15.49	-11.18	-6.58	-416.65	702.19	-1.56
0.9 Dead+1.6 Wind 300 deg - No Ice	11.62	-11.18	-6.58	-415.97	701.36	-1.56
1.2 Dead+1.6 Wind 315 deg - No Ice	15.49	-9.21	-9.30	-586.74	577.99	-0.92
0.9 Dead+1.6 Wind 315 deg - No Ice	11.62	-9.21	-9.30	-585.77	577.37	-0.93

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
1.2 Dead+1.6 Wind 330 deg - No Ice	15.49	-6.59	-11.42	-717.96	413.18	-0.23
0.9 Dead+1.6 Wind 330 deg - No Ice	11.62	-6.59	-11.42	-716.78	412.83	-0.23
1.2 Dead+1.0 Ice+1.0 Temp	44.14	-0.00	-0.00	6.79	-4.99	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	44.14	-0.02	-4.79	-282.37	-3.28	0.59
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	44.14	2.33	-4.08	-240.49	-145.79	1.25
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	44.14	3.30	-3.32	-194.29	-204.69	1.46
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	44.14	4.04	-2.33	-134.55	-249.82	1.57
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	44.14	4.70	0.02	8.50	-289.55	1.48
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	44.14	4.14	2.41	152.86	-254.57	0.99
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	44.14	3.36	3.38	211.54	-208.35	0.63
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	44.14	2.37	4.10	255.79	-148.75	0.23
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	44.14	0.02	4.70	292.45	-6.70	-0.59
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	44.14	-2.33	4.08	254.09	135.81	-1.25
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	44.14	-3.30	3.32	207.89	194.70	-1.46
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	44.14	-4.12	2.38	149.90	242.87	-1.57
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	44.14	-4.70	-0.02	5.09	279.57	-1.48
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	44.14	-4.06	-2.37	-137.51	241.54	-0.99
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	44.14	-3.33	-3.35	-196.71	197.12	-0.63
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	44.14	-2.37	-4.10	-242.20	138.77	-0.23
Dead+Wind 0 deg - Service	12.91	-0.03	-3.53	-218.86	1.21	0.30
Dead+Wind 30 deg - Service	12.91	1.67	-2.94	-184.16	-104.78	0.58
Dead+Wind 45 deg - Service	12.91	2.36	-2.38	-149.08	-148.36	0.67
Dead+Wind 60 deg - Service	12.91	2.88	-1.66	-104.13	-181.62	0.71
Dead+Wind 90 deg - Service	12.91	3.38	0.03	2.43	-212.51	0.64
Dead+Wind 120 deg - Service	12.91	3.04	1.79	111.57	-189.56	0.41
Dead+Wind 135 deg - Service	12.91	2.45	2.48	154.83	-153.98	0.24
Dead+Wind 150 deg - Service	12.91	1.72	2.97	186.65	-108.88	0.06
Dead+Wind 180 deg - Service	12.91	0.03	3.37	212.54	-3.52	-0.30
Dead+Wind 210 deg - Service	12.91	-1.67	2.94	184.28	102.48	-0.58
Dead+Wind 225 deg - Service	12.91	-2.36	2.38	149.21	146.06	-0.67
Dead+Wind 240 deg - Service	12.91	-3.02	1.74	107.47	184.89	-0.71
Dead+Wind 270 deg - Service	12.91	-3.38	-0.03	-2.30	210.20	-0.64
Dead+Wind 300 deg - Service	12.91	-2.91	-1.71	-108.23	181.68	-0.41
Dead+Wind 315 deg - Service	12.91	-2.40	-2.42	-152.42	149.40	-0.24
Dead+Wind 330 deg - Service	12.91	-1.72	-2.97	-186.53	106.57	-0.06

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-12.91	0.00	0.00	12.91	0.00	0.000%
2	-0.11	-15.49	-13.57	0.11	15.49	13.57	0.000%
3	-0.11	-11.62	-13.57	0.11	11.62	13.57	0.000%
4	6.40	-15.49	-11.31	-6.40	15.49	11.31	0.000%
5	6.40	-11.62	-11.31	-6.40	11.62	11.31	0.000%
6	9.06	-15.49	-9.15	-9.06	15.49	9.15	0.000%
7	9.06	-11.62	-9.15	-9.06	11.62	9.15	0.000%
8	11.07	-15.49	-6.39	-11.07	15.49	6.39	0.000%
9	11.07	-11.62	-6.39	-11.07	11.62	6.39	0.000%
10	13.00	-15.49	0.11	-13.00	15.49	-0.11	0.000%
11	13.00	-11.62	0.11	-13.00	11.62	-0.11	0.000%
12	11.70	-15.49	6.88	-11.70	15.49	-6.88	0.000%
13	11.70	-11.62	6.88	-11.70	11.62	-6.88	0.000%
14	9.43	-15.49	9.52	-9.43	15.49	-9.52	0.000%
15	9.43	-11.62	9.52	-9.43	11.62	-9.52	0.000%
16	6.59	-15.49	11.42	-6.59	15.49	-11.42	0.000%
17	6.59	-11.62	11.42	-6.59	11.62	-11.42	0.000%
18	0.11	-15.49	12.97	-0.11	15.49	-12.97	0.000%
19	0.11	-11.62	12.97	-0.11	11.62	-12.97	0.000%
20	-6.40	-15.49	11.31	6.40	15.49	-11.31	0.000%
21	-6.40	-11.62	11.31	6.40	11.62	-11.31	0.000%
22	-9.06	-15.49	9.15	9.06	15.49	-9.15	0.000%
23	-9.06	-11.62	9.15	9.06	11.62	-9.15	0.000%
24	-11.59	-15.49	6.69	11.59	15.49	-6.69	0.000%
25	-11.59	-11.62	6.69	11.59	11.62	-6.69	0.000%
26	-13.00	-15.49	-0.11	13.00	15.49	0.11	0.000%
27	-13.00	-11.62	-0.11	13.00	11.62	0.11	0.000%
28	-11.18	-15.49	-6.58	11.18	15.49	6.58	0.000%
29	-11.18	-11.62	-6.58	11.18	11.62	6.58	0.000%
30	-9.21	-15.49	-9.30	9.21	15.49	9.30	0.000%
31	-9.21	-11.62	-9.30	9.21	11.62	9.30	0.000%
32	-6.59	-15.49	-11.42	6.59	15.49	11.42	0.000%
33	-6.59	-11.62	-11.42	6.59	11.62	11.42	0.000%
34	0.00	-44.14	0.00	0.00	44.14	0.00	0.000%
35	-0.02	-44.14	-4.79	0.02	44.14	4.79	0.000%
36	2.33	-44.14	-4.08	-2.33	44.14	4.08	0.000%
37	3.30	-44.14	-3.32	-3.30	44.14	3.32	0.000%
38	4.04	-44.14	-2.33	-4.04	44.14	2.33	0.000%
39	4.70	-44.14	0.02	-4.70	44.14	-0.02	0.000%
40	4.14	-44.14	2.41	-4.14	44.14	-2.41	0.000%
41	3.36	-44.14	3.38	-3.36	44.14	-3.38	0.000%
42	2.37	-44.14	4.10	-2.37	44.14	-4.10	0.000%
43	0.02	-44.14	4.70	-0.02	44.14	-4.70	0.000%
44	-2.33	-44.14	4.08	2.33	44.14	-4.08	0.000%
45	-3.30	-44.14	3.32	3.30	44.14	-3.32	0.000%
46	-4.12	-44.14	2.38	4.12	44.14	-2.38	0.000%
47	-4.70	-44.14	-0.02	4.70	44.14	0.02	0.000%
48	-4.06	-44.14	-2.37	4.06	44.14	2.37	0.000%
49	-3.33	-44.14	-3.35	3.33	44.14	3.35	0.000%
50	-2.37	-44.14	-4.10	2.37	44.14	4.10	0.000%
51	-0.03	-12.91	-3.53	0.03	12.91	3.53	0.000%
52	1.67	-12.91	-2.94	-1.67	12.91	2.94	0.000%
53	2.36	-12.91	-2.38	-2.36	12.91	2.38	0.000%
54	2.88	-12.91	-1.66	-2.88	12.91	1.66	0.000%
55	3.38	-12.91	0.03	-3.38	12.91	-0.03	0.000%
56	3.04	-12.91	1.79	-3.04	12.91	-1.79	0.000%
57	2.45	-12.91	2.48	-2.45	12.91	-2.48	0.000%
58	1.72	-12.91	2.97	-1.72	12.91	-2.97	0.000%
59	0.03	-12.91	3.37	-0.03	12.91	-3.37	0.000%
60	-1.67	-12.91	2.94	1.67	12.91	-2.94	0.000%
61	-2.36	-12.91	2.38	2.36	12.91	-2.38	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
62	-3.02	-12.91	1.74	3.02	12.91	-1.74	0.000%
63	-3.38	-12.91	-0.03	3.38	12.91	0.03	0.000%
64	-2.91	-12.91	-1.71	2.91	12.91	1.71	0.000%
65	-2.40	-12.91	-2.42	2.40	12.91	2.42	0.000%
66	-1.72	-12.91	-2.97	1.72	12.91	2.97	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000001
20	Yes	4	0.00000001	0.00000001
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00000001
23	Yes	4	0.00000001	0.00000001
24	Yes	4	0.00000001	0.00000001
25	Yes	4	0.00000001	0.00000001
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00001286
36	Yes	4	0.00000001	0.00001312
37	Yes	4	0.00000001	0.00001329
38	Yes	4	0.00000001	0.00001339
39	Yes	4	0.00000001	0.00001325
40	Yes	4	0.00000001	0.00001312
41	Yes	4	0.00000001	0.00001317
42	Yes	4	0.00000001	0.00001329
43	Yes	4	0.00000001	0.00001341
44	Yes	4	0.00000001	0.00001307
45	Yes	4	0.00000001	0.00001283
46	Yes	4	0.00000001	0.00001274

47	Yes	4	0.00000001	0.00001287
48	Yes	4	0.00000001	0.00001311
49	Yes	4	0.00000001	0.00001308
50	Yes	4	0.00000001	0.00001297
51	Yes	4	0.00000001	0.00000001
52	Yes	4	0.00000001	0.00000001
53	Yes	4	0.00000001	0.00000001
54	Yes	4	0.00000001	0.00000001
55	Yes	4	0.00000001	0.00000001
56	Yes	4	0.00000001	0.00000001
57	Yes	4	0.00000001	0.00000001
58	Yes	4	0.00000001	0.00000001
59	Yes	4	0.00000001	0.00000001
60	Yes	4	0.00000001	0.00000001
61	Yes	4	0.00000001	0.00000001
62	Yes	4	0.00000001	0.00000001
63	Yes	4	0.00000001	0.00000001
64	Yes	4	0.00000001	0.00000001
65	Yes	4	0.00000001	0.00000001
66	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
T1	100 - 80	2.285	56	0.1851	0.0043
T2	80 - 60	1.508	56	0.1774	0.0042
T3	60 - 40	0.817	56	0.1378	0.0029
T4	40 - 20	0.339	56	0.0819	0.0018
T5	20 - 0	0.083	56	0.0352	0.0008

Critical Deflections and Radius of Curvature - Service Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
92.00	APX16DWV-16DWVS-E-A20	56	1.970	0.1845	0.0044	172914
82.00	BXA-80063/6CF	56	1.584	0.1794	0.0042	75746

Maximum Tower Deflections - Design Wind

Section No.	*Elevation* *ft*	*Horz. Deflection* *in*	*Gov. Load Comb.*	*Tilt* °	*Twist* °
T1	100 - 80	8.758	12	0.7089	0.0167
T2	80 - 60	5.781	12	0.6797	0.0160
T3	60 - 40	3.133	12	0.5282	0.0111
T4	40 - 20	1.302	12	0.3139	0.0068
T5	20 - 0	0.319	12	0.1349	0.0030

Critical Deflections and Radius of Curvature - Design Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* *°*	*Twist* *°*	*Radius of Curvature* *ft*
92.00	APX16DWV-16DWVS-E-A20	12	7.553	0.7066	0.0169	46528
82.00	BXA-80063/6CF	12	6.071	0.6873	0.0164	20362

Bolt Design Data

Section No.	*Elevation* *ft*	*Component Type*	*Bolt Grade*	*Bolt Size* *in*	*Number Of Bolts*	*Maximum Load per Bolt* *K*	*Allowable Load per Bolt* *K*	*Ratio Load / Allowable*	*Allowable Ratio*	*Criteria*
T1	100	Leg	A325N	0.6250	4	1.88	20.71	0.091 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1.85	6.20	0.298 ✔	1	Member Bearing
T2	80	Leg	A325N	0.6250	4	7.05	20.71	0.340 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2.50	6.20	0.403 ✔	1	Member Bearing
T3	60	Leg	A325N	0.6250	4	11.04	20.71	0.533 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2.33	7.95	0.293 ✔	1	Bolt Shear
T4	40	Leg	A325N	0.6250	4	14.11	20.71	0.681 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2.83	7.95	0.356 ✔	1	Bolt Shear
T5	20	Leg	A325N	0.7500	4	17.05	29.82	0.572 ✔	1	Bolt Tension
		Diagonal	A325N	0.5000	1	3.00	7.95	0.378 ✔	1	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	*Elevation* *ft*	*Size*	*L* *ft*	L_u *ft*	*Kl/r*	*A* in^2	P_u *K*	ϕP_n *K*	*Ratio* $\frac{P_u}{\phi P_n}$
T1	100 - 80	ROHN 2.5 STD	20.04	4.01	50.8 K=1.00	1.7040	-11.72	63.51	0.184 [1] ✔
T2	80 - 60	ROHN 2.5 STD	20.03	4.01	50.8 K=1.00	1.7040	-34.14	63.52	0.537 [1] ✔
T3	60 - 40	ROHN 2.5 STD	20.03	5.01	63.4 K=1.00	1.7040	-51.54	57.14	0.902 [1] ✔
T4	40 - 20	ROHN 3 STD	20.03	6.68	68.9 K=1.00	2.2285	-65.24	70.89	0.920 [1] ✔
T5	20 - 0	ROHN 3 X-STR	20.03	6.68	70.5 K=1.00	3.0159	-79.15	94.34	0.839 [1] ✔

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

[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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L1 1/4x1 1/4x3/16	6.02	2.89	142.5 K=1.00	0.4336	-1.95	4.82	0.404 [1] ✓
T2	80 - 60	L1 1/4x1 1/4x3/16	7.68	3.72	183.0 K=1.00	0.4336	-2.11	2.93	0.723 [1] ✓
T3	60 - 40	L1 1/2x1 1/2x1/4	9.79	4.79	196.8 K=1.00	0.6875	-2.30	4.01	0.573 [1] ✓
T4	40 - 20	L2x2x1/4	12.31	6.08	186.6 K=1.00	0.9380	-2.79	6.08	0.459 [1] ✓
T5	20 - 0	L2 1/2x2 1/2x1/4	14.06	6.95	169.8 K=1.00	1.1900	-3.00	9.32	0.322 [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 K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L3x3x1/4	2.50	2.26	82.9 K=1.81	1.4400	-0.16	32.49	0.005 [1] ✓
T3	60 - 40	L1 1/2x1 1/2x1/4 KL/R > 200 (C) - 75	6.76	6.52	211.0 K=0.79	0.6875	-0.43	3.49	0.122 [1] ✓
T4	40 - 20	L2x2x1/4 KL/R > 200 (C) - 105	8.65	8.41	204.9 K=0.79	0.9380	-0.95	5.05	0.188 [1] ✓
T5	20 - 0	L2 1/2x2 1/2x1/4 KL/R > 200 (C) - 129	10.69	10.40	202.5 K=0.80	1.1900	-1.45	6.56	0.221 [1] ✓

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	ROHN 2.5 STD	20.04	4.01	50.8	1.7040	7.51	76.68	0.098 [1] ✔
T2	80 - 60	ROHN 2.5 STD	20.03	4.01	50.8	1.7040	28.19	76.68	0.368 [1] ✔
T3	60 - 40	ROHN 2.5 STD	20.03	5.01	63.4	1.7040	44.17	76.68	0.576 [1] ✔
T4	40 - 20	ROHN 3 STD	20.03	6.68	68.9	2.2285	56.45	100.28	0.563 [1] ✔
T5	20 - 0	ROHN 3 X-STR	20.03	6.68	70.5	3.0159	68.20	135.72	0.503 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L1 1/4x1 1/4x3/16	6.02	2.89	95.5	0.2373	1.85	10.32	0.179 [1] ✔
T2	80 - 60	L1 1/4x1 1/4x3/16	6.34	3.06	100.8	0.2373	2.50	10.32	0.242 [1] ✔
T3	60 - 40	L1 1/2x1 1/2x1/4	8.99	4.39	120.2	0.3984	2.27	17.33	0.131 [1] ✔
T4	40 - 20	L2x2x1/4	11.75	5.80	116.4	0.5863	2.66	25.50	0.104 [1] ✔
T5	20 - 0	L2 1/2x2 1/2x1/4	13.47	6.66	105.5	0.7753	2.78	33.73	0.082 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L3x3x1/4	2.50	2.26	29.2	1.4400	0.14	46.66	0.003 [1] ✔
T3	60 - 40	L1 1/2x1 1/2x1/4	6.76	6.52	174.3	0.6875	0.47	22.27	0.021 [1] ✔
T4	40 - 20	L2x2x1/4	8.65	8.41	165.7	0.9380	1.07	30.39	0.035 [1] ✔
T5	20 - 0	L2 1/2x2 1/2x1/4	10.69	10.40	162.3	1.1900	1.75	38.56	0.046 [1] ✔

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

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$øP_{allow}$ K	% Capacity	Pass Fail
T1	100 - 80	Leg	ROHN 2.5 STD	3	-11.72	63.51	18.4	Pass
T2	80 - 60	Leg	ROHN 2.5 STD	38	-34.14	63.52	53.7	Pass
T3	60 - 40	Leg	ROHN 2.5 STD	71	-51.54	57.14	90.2	Pass
T4	40 - 20	Leg	ROHN 3 STD	101	-65.24	70.89	92.0	Pass
T5	20 - 0	Leg	ROHN 3 X-STR	125	-79.15	94.34	83.9	Pass
T1	100 - 80	Diagonal	L1 1/4x1 1/4x3/16	9	-1.95	4.82	40.4	Pass
T2	80 - 60	Diagonal	L1 1/4x1 1/4x3/16	43	-2.11	2.93	72.3	Pass
T3	60 - 40	Diagonal	L1 1/2x1 1/2x1/4	76	-2.30	4.01	57.3	Pass
T4	40 - 20	Diagonal	L2x2x1/4	106	-2.79	6.08	45.9	Pass
T5	20 - 0	Diagonal	L2 1/2x2 1/2x1/4	130	-3.00	9.32	32.2 37.8 (b)	Pass
T1	100 - 80	Top Girt	L3x3x1/4	4	-0.16	32.49	0.5	Pass
T3	60 - 40	Top Girt	L1 1/2x1 1/2x1/4	75	-0.43	3.49	12.2	Pass
T4	40 - 20	Top Girt	L2x2x1/4	105	-0.95	5.05	18.8	Pass
T5	20 - 0	Top Girt	L2 1/2x2 1/2x1/4	129	-1.45	6.56	22.1	Pass
							Summary	
						Leg (T4)	92.0	Pass
						Diagonal (T2)	72.3	Pass
						Top Girt (T5)	22.1	Pass
						Bolt Checks	68.1	Pass
						RATING =	**92.0**	**Pass**

Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 844 \cdot ft \cdot kips$	(User Input from tnxTower)
Shear Force =	$S_t := 14 \cdot kip$	(User Input from tnxTower)
Axial Force =	$WT_t := 15 \cdot kip$	(User Input from tnxTower)
Max Compression Force =	$C_t := 82 \cdot kip$	(User Input from tnxTower)
Max Uplift Force =	$U_t := 70 \cdot kip$	(User Input from tnxTower)
Tower Height =	$H_t := 100 \cdot ft$	(User Input)
Tower Width =	$W_t := 12.7 \cdot ft$	(User Input)
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 1$	(User Input)

Footing Data:

Overall Depth of Footing =	$D_f := 4 \cdot ft$	(User Input)
Thickness of Footing =	$T_f := 4.5 \cdot ft$	(User Input)
Width of Footing =	$W_{f1} := 18.5 \cdot ft$	(User Input)
Width of Footing =	$W_{f2} := 15.5 \cdot ft$	(User Input)
Length of Pier =	$L_p := 1 \cdot ft$	(User Input)
Extension of Pier Above Grade =	$L_{pag} := 1 \cdot ft$	(User Input)
Diameter of Pier =	$d_p := 2 \cdot ft$	(User Input)

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_u := 8000 \cdot psf$		
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Calculated Factors:

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$

Load Factor = $LF := 1 = 1$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := \text{if}(\text{Bouyancy} = 1, \gamma_{conc} - 62.4\text{pcf}, \gamma_{conc}) = 150 \cdot \text{pcf}$

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}) = 100 \cdot \text{pcf}$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = -0.177 \cdot \text{ksf}$

$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 0 \cdot \text{ksf}$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.415 \cdot \text{ksf}$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.707 \cdot \text{ksf}$

$T_p := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] = 4$

$A_p := W_{f2} \cdot T_p = 62$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 43.86 \cdot \text{kip}$

Weight of Concrete Pad = $WT_{pad} := (W_{f1} \cdot W_{f2} \cdot T_f) \cdot \gamma_c = 193.556 \cdot \text{kip}$

Weight of Concrete Piers = $WT_{pier} := 3 \cdot \left[\left(L_p \cdot d_p^{\ 2}\right) \cdot \gamma_c\right] = 1.8 \cdot \text{kip}$

Total Weight of Concrete = $WT_c := WT_{pad} + WT_{pier} = 195 \cdot \text{kip}$

Weight of Soil Above Footing = $WT_{s1} := 0$

Weight of Soil Back Face = $WT_{s2} := 0$

Resisting Moment = $M_r := (0.9 \cdot WT_c + 0.75 \cdot WT_{s1}) \cdot \frac{W_{f2}}{2} + 0.75 \cdot S_u \cdot \frac{T_f}{3} + 0.75 \cdot WT_{s2} \cdot \left[W_{f2} + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3}\right] = 1412 \cdot \text{kip} \cdot \text{ft}$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 921 \cdot \text{kip} \cdot \text{ft}$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 1.53$

Factor of Safety Required = $FS_{req} := 1$

OverTurning_Moment_Check := if$(FS \geq FS_{req}$, "Okay" , "No Good")

OverTurning_Moment_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 210 \cdot kip$

Area of the Mat = $A_{mat} := W_{f1} \cdot W_{f2} = 286.75$

Section Modulus of Mat = $S := \frac{W_{f1} \cdot W_{f2}^2}{6} = 740.77 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.977 \cdot ksf$

Max_Pressure_Check := if$\left(P_{max} < 0.75 \cdot q_u, \text{"Okay"}, \text{"No Good"}\right)$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.51 \cdot ksf$

Min_Pressure_Check := if$\left[\left(P_{min} \geq 0\right) \cdot \left(P_{min} < 0.75 \cdot q_u\right), \text{"Okay"}, \text{"No Good"}\right]$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_{f2}}} \cdot \frac{1}{3} = 4.108$

Distance to Kern = $X_k := \frac{W_{f2}}{6} = 2.583$

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

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 4.378$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_{f1} \cdot \left(\frac{W_{f2}}{2} - e\right)} = 2.248 \cdot ksf$

$q_{adj} := \text{if}\left(P_{min} < 0, P_a, P_{max}\right) = 2.248 \cdot ksf$

Pressure_Check := if$\left(q_{adj} < 0.75 \cdot q_u, \text{"Okay"}, \text{"No Good"}\right)$

Pressure_Check = "Okay"

RAN Template: 67D5998C MUAC	**A&L Template:** 67D5998C_1xAIR+1QP+1OP (U21 Market)

CTFF600E_Anchor_3_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3
L1900 Capacity_Regional Capacity

Section 1 - Site Information

Site ID: CTFF600E
Status: Draft
Version: 3
Project Type: Anchor
Approved: Not Approved
Approved By: Not Approved
Last Modified: 6/30/2020 4:56:36 PM
Last Modified By: Dominic.Kallas2@T-Mobile.com

Site Name: CTFF600E
Site Class: Guyed Tower
Site Type: Structure Non Building
Plan Year: 2020
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: Andrew Mound

Latitude: 41.31780001
Longitude: -73.38335001
Address: 80 Lonetown Rd
City, State: Redding, CT
Region: NORTHEAST

RAN Template: 67D5998C MUAC			**AL Template:** 67D5998C_1xAIR+1QP+1OP (U21 Market)	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 0	**TMA Count:** 0	**RRU Count:** 12

Section 2 - Existing Template Images

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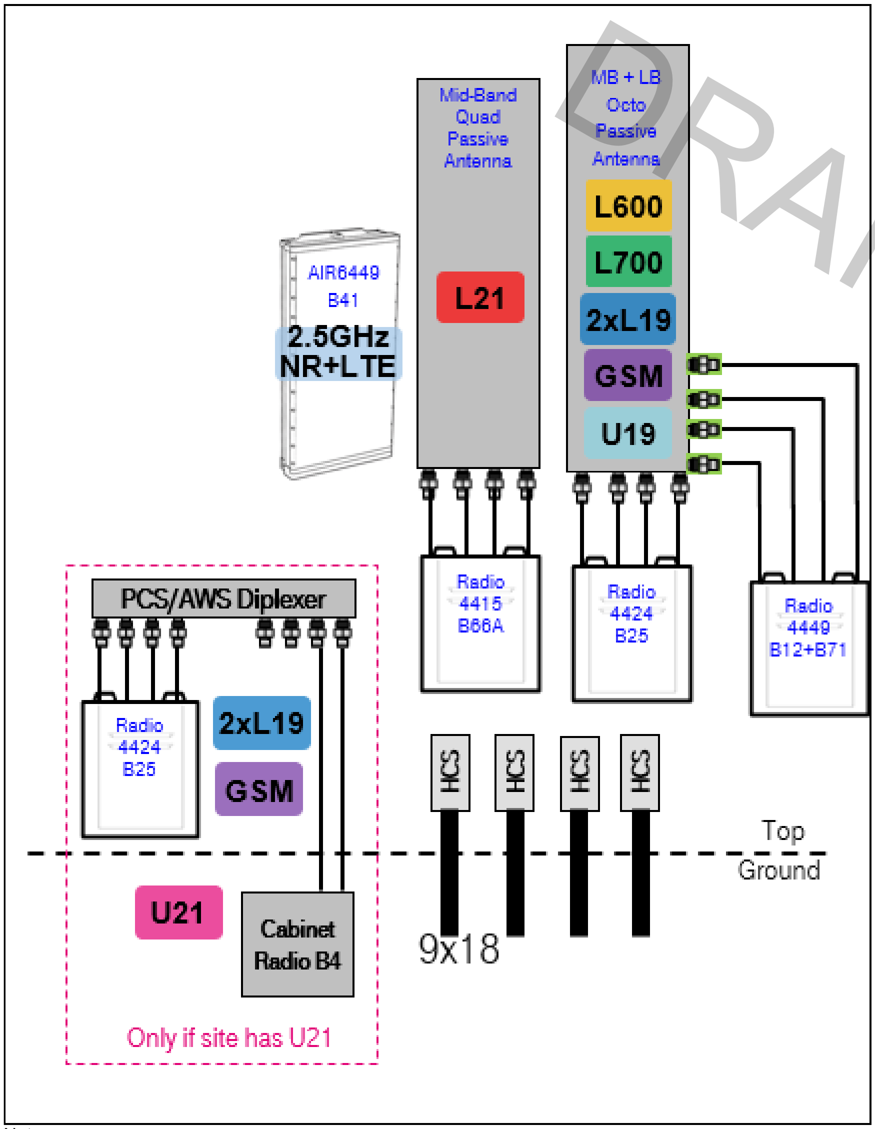
Section 3 - Proposed Template Images

67D5998C_1xAIR+1QP+1OP.PNG



Notes:

Section 4 - Siteplan Images

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

RAN Template:	A&L Template:
67D5998C MUAC	67D5998C_1xAIR+1QP+1OP (U21 Market)

CTFF600E_Anchor_3_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3
L1900 Capacity_Regional Capacity

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 707B V2 Tower 6102 MUAC

Enclosure	1
Enclosure Type	RBS 6102 MU AC
Baseband	DUW30 (U2100); BB 6630 (L2100, L700)
Hybrid Cable System	Ericsson 6x12 HCS *Select Length & AWG* **(x 2)**

Proposed RAN Equipment

Template: 67D5998C MUAC

Enclosure	1	2	3
Enclosure Type	RBS 6102 MU AC	Enclosure 6160	B160
Baseband	DUW30 (U2100); BB 6630 (L2100, L700); BB 6630 (N600)	BB 6630 (L2500); BB 6648 (N2500)	
Hybrid Cable System	Ericsson 6x12 HCS *Select Length & AWG*	Ericsson 6x12 HCS *Select AWG & Length* **(x 2)**	

RAN Scope of Work:

Add (1) BB6630 for N600 to existing RBS6102 MU AC.

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.

Existing: (0) Coaxial Lines; (1) 6x12 HCS

Add (2) 6X12 HCS ([1] for Radio 4449; [1] for Anchor A&L Equipment.) Length of new HCS will match that of existing HCS.

RAN Template: 67D5998C MUAC	A&L Template: 67D5998C_1xAIR+1QP+1OP (U21 Market)

CTFF600E_Anchor_3_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3
L1900 Capacity_Regional Capacity

Section 6 - A&L Equipment

Existing Template: 707B_Tower_2DP
Proposed Template: 67D5998C_1xAIR+1QP+1OP (U21 Market)

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro	
Antenna	**1**	**2**
Antenna Model	RFS - APXV18-206516S-C-A20 (Dual)	Andrew - LNX-6513DS-A1M (Dual)
Azimuth	60	60
M. Tilt	0	0
Height	92	92
Ports	**P1**	**P2**
Active Tech.	U2100 L2100	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables		
TMAs		
Diplexers / Combiners		
Radio	RRUS11 B4 (At Antenna)	RRUS11 B12 (At Antenna)
Sector Equipment		

Unconnected Equipment:

Scope of Work:

RAN Template: 67D5998C MUAC	**A&L Template:** 67D5998C_1xAIR+1QP+1OP (U21 Market)

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1		2				3	
Antenna Model	RFS - APX16DWV-16DWV-S-E-A20 (Quad)		RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)	
Azimuth	60		60				60	
M. Tilt	0		0				0	
Height	92		92				92	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.	L2100	L2100	L600 N600 L700	L600 N600 L700	L1900	L1900 U2100	L2500 N2500	L2500 N2500
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2	2	2	2	2	2	2	2
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**		
TMAs								
Diplexers / Combiners					Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)		
Radio	Radio 4415 B66A (At Antenna)	SHARED Radio 4415 B66A (At Antenna)	Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4424 B25 (At Antenna)	SHARED Radio 4424 B25 (At Antenna) RRUS11 B4 (At Antenna)		
Sector Equipment								

Unconnected Equipment:

Scope of Work:

Replace Mid-Band Dual in Position 1 with (1) Mid-Band Quad in Position 1.

Add (1) Radio 4415 B66A for L2100 to Position 1 at antenna, and connect its ports to the new Quad antenna.

Add new mount between existing Positions 1 and 2 for new Position 2.

Replace Low-Band Dual in Position 2 with (1) Low-Band/Mid-Band Octo in New Position 2.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in New Position 2 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

Add (1) PCS/AWS 8:4 diplexer to New Position 2 at antenna, and connect its four output ports to the Mid-Band ports of the Octo antenna.

Add (1) Radio 4424 B25 for L1900 (both carriers) to New Position 2 near antenna, and connect its ports to the four PCS input ports of the diplexer.

Move RRUS11 B4 for U2100 from Position 1 to New Position 2 near antenna, and connect its ports to two AWS input ports of the diplexer.

Make sure to install metal caps on all empty ports of AWS/PCS diplexer for load balancing.

Install (1) AIR6449 B41 for L2500 and N2500 in New Position 3.

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: 67D5998C MUAC	A&L Template: 67D5998C_1xAIR+1QP+1OP (U21 Market)

CTFF600E_Anchor_3_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3
L1900 Capacity_Regional Capacity

Sector 2 (Existing) view from behind

Coverage Type	A - Outdoor Macro	
Antenna	**1**	**2**
Antenna Model	RFS - APXV18-206516S-C-A20 (Dual)	Andrew - LNX-6513DS-A1M (Dual)
Azimuth	180	180
M. Tilt	0	0
Height	92	92
Ports	**P1**	**P2**
Active Tech.	U2100 L2100	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables		
TMAs		
Diplexers / Combiners		
Radio	RRUS11 B4 (At Antenna)	RRUS11 B12 (At Antenna)
Sector Equipment		

Unconnected Equipment:

Scope of Work:

RAN Template: 67D5998C MUAC	**A&L Template:** 67D5998C_1xAIR+1QP+1OP (U21 Market)

CTFF600E_Anchor_3_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3
L1900 Capacity_Regional Capacity

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1		2				3	
Antenna Model	RFS - APX16DWV-16DWV-S-E-A20 (Quad)		RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)	
Azimuth	180		180				180	
M. Tilt	0		0				0	
Height	92		92				92	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.	L2100	L2100	L600 N600 L700	L600 N600 L700	L1900	L1900 U2100	L2500 N2500	L2500 N2500
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2	2	2	2	2	2	2	2
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**		
TMAs								
Diplexers / Combiners					Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)		
Radio	Radio 4415 B66A (At Antenna)	SHARED Radio 4415 B66A (At Antenna)	Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4424 B25 (At Antenna)	SHARED Radio 4424 B25 (At Antenna) RRUS11 B4 (At Antenna)		
Sector Equipment								

Unconnected Equipment:

Scope of Work:

Replace Mid-Band Dual in Position 1 with (1) Mid-Band Quad in Position 1.

Add (1) Radio 4415 B66A for L2100 to Position 1 at antenna, and connect its ports to the new Quad antenna.

Add new mount between existing Positions 1 and 2 for new Position 2.

Replace Low-Band Dual in Position 2 with (1) Low-Band/Mid-Band Octo in New Position 2.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in New Position 2 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

Add (1) PCS/AWS 8:4 diplexer to New Position 2 at antenna, and connect its four output ports to the Mid-Band ports of the Octo antenna.

Add (1) Radio 4424 B25 for L1900 (both carriers) to New Position 2 near antenna, and connect its ports to the four PCS input ports of the diplexer.

Move RRUS11 B4 for U2100 from Position 1 to New Position 2 near antenna, and connect its ports to two AWS input ports of the diplexer.

Make sure to install metal caps on all empty ports of AWS/PCS diplexer for load balancing.

Install (1) AIR6449 B41 for L2500 and N2500 in New Position 3.

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: 67D5998C MUAC	A&L Template: 67D5998C_1xAIR+1QP+1OP (U21 Market)

CTFF600E_Anchor_3_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3
L1900 Capacity_Regional Capacity

Sector 3 (Existing) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	RFS - APXV18-206516S-C-A20 (Dual)	Andrew - LNX-6513DS-A1M (Dual)
Azimuth	300	300
M. Tilt	0	0
Height	92	92
Ports	P1	P2
Active Tech.	U2100 L2100	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables		
TMAs		
Diplexers / Combiners		
Radio	RRUS11 B4 (At Antenna)	RRUS11 B12 (At Antenna)
Sector Equipment		

Unconnected Equipment:

Scope of Work:

RAN Template: 67D5998C MUAC	A&L Template: 67D5998C_1xAIR+1QP+1OP (U21 Market)

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1		2				3	
Antenna Model	RFS - APX16DWV-16DWV-S-E-A20 (Quad)		RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)	
Azimuth	300		300				300	
M. Tilt	0		0				0	
Height	92		92				92	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L2100	L2100	L600 N600 L700	L600 N600 L700	L1900	L1900 U2100	L2500 N2500	L2500 N2500
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2	2	2	2	2	2	2	2
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**	Coax Jumper **(x2)**		
TMAs								
Diplexers / Combiners					Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)		
Radio	Radio 4415 B66A (At Antenna)	SHARED Radio 4415 B66A (At Antenna)	Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4424 B25 (At Antenna)	SHARED Radio 4424 B25 (At Antenna) RRUS11 B4 (At Antenna)		
Sector Equipment								

Unconnected Equipment:

Scope of Work:

Replace Mid-Band Dual in Position 1 with (1) Mid-Band Quad in Position 1.

Add (1) Radio 4415 B66A for L2100 to Position 1 at antenna, and connect its ports to the new Quad antenna.

Add new mount between existing Positions 1 and 2 for new Position 2.

Replace Low-Band Dual in Position 2 with (1) Low-Band/Mid-Band Octo in New Position 2.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in New Position 2 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

Add (1) PCS/AWS 8:4 diplexer to New Position 2 at antenna, and connect its four output ports to the Mid-Band ports of the Octo antenna.

Add (1) Radio 4424 B25 for L1900 (both carriers) to New Position 2 near antenna, and connect its ports to the four PCS input ports of the diplexer.

Move RRUS11 B4 for U2100 from Position 1 to New Position 2 near antenna, and connect its ports to two AWS input ports of the diplexer.

Make sure to install metal caps on all empty ports of AWS/PCS diplexer for load balancing.

Install (1) AIR6449 B41 for L2500 and N2500 in New Position 3.

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: 67D5998C MUAC	**A&L Template:** 67D5998C_1xAIR+1QP+1OP (U21 Market)

CTFF600E_Anchor_3_draft

Print Name: Standard (RFDS_for_Scoping)
PORs: Anchor_Phase 3
L1900 Capacity_Regional Capacity

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

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

Proposed Power Systems Equipment

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

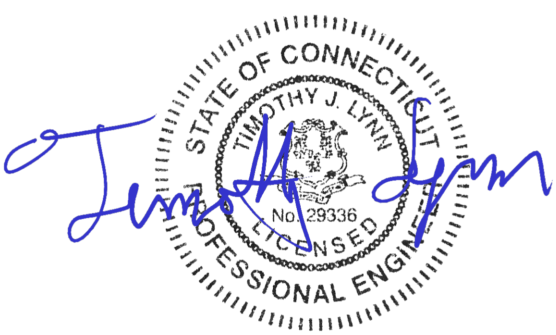
T-Mobile Site #: CTFF600E

80 Lonetown Road
Redding, CT

Centek Project No. 20074.49

Date: July 17, 2020

Max Stress Ratio = 75.6%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

CENTEK engineering

Centered on Solutions℠

July 17, 2020

Mr. Dan Reid
Transcend Wireless
10 Industrial Ave
Mahwah, NJ 07430

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CTFF600E
80 Lonetown Road
Redding, CT 06896

Centek Project No. 20074.49

Dear Mr. Reid,

Centek Engineering, Inc. has reviewed the T-Mobile antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the existing mount, consisting of three (3) 12-ft V-frames w/ stabilizers to support the proposed/existing equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

- T-Mobile:
  V-Frames: Three (3) RFS APX16DWV-16DWVS panel antennas, three (3) RFS APXVAARR18-43-panel antennas, three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson 4449 remote radio units, three (3) Ericsson 4415 remote radio units, three (3) Ericsson 4424 remote radio units, three (3) Ericsson RRUS-11 remote radio units and three (3) Commscope SDX1926Q-43 diplexers mounted on three (3) V-Frames with a RAD center elevation of 92-ft +/- AGL.

The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 93 mph for Redding as required in Appendix N of the 2018 Connecticut State Building Code.

A structural analysis of tower and foundation needs to be completed prior to any work.

Based on our review of the installation, it is our opinion that the subject antenna mount has sufficient capacity to support the aforementioned antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Timothy J. Lynn, PE
Structural Engineer

Section 2 - Calculations

Development of Design Heights, Exposure Coefficients, and Velocity Pressures Per TIA-222-G

Wind Speeds

Basic Wind Speed	$V := 93$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-G)

Input

Structure Type =	Structure_Type := Lattice		(User Input)
Structure Category =	SC := II		(User Input)
Exposure Category =	Exp := B		(User Input)
Structure Height =	$h := 100$	ft	(User Input)
Height to Center of Antennas =	$z_{Ant} := 92$	ft	(User Input)
Radial Ice Thickness =	$t_i := 0.75$	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	Id := 56.00	pcf	(User Input)
Topograpic Factor =	$K_{zt} := 1.0$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H = 0.85$		(User Input)

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 & \text{if Structure\_Type = Pole} \\ 0.85 & \text{if Structure\_Type = Lattice} \end{cases} = 0.85$$

(Per Table 2-2 of TIA-222-G)

Importance Factors =

$$I_{Wind} := \begin{cases} 0.87 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.15 & \text{if } SC = 3 \end{cases} = 1$$

(Per Table 2-3 of TIA-222-G)

$$I_{Wind\_w\_Ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.00 & \text{if } SC = 3 \end{cases} = 1$$

$$I_{ice} := \begin{cases} 0 & \text{if } SC = 1 \\ 1.00 & \text{if } SC = 2 \\ 1.25 & \text{if } SC = 3 \end{cases} = 1$$

$$K_{iz} := \left(\frac{z_{Ant}}{33}\right)^{0.1} = 1.108 \qquad t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.662$$

Velocity Pressure Coefficient Antennas =

$$Kz_{Ant} := 2.01\left(\left(\frac{z_{Ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 0.965$$

Velocity Pressure w/o Ice Antennas =

$$qz_{Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V^2 \cdot I_{Wind} = 18.161$$

Velocity Pressure with Ice Antennas =

$$qz_{ice.Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V_i^2 \cdot I_{Wind} = 5.249$$

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = RFSAPXVAARR18-43

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 72$ in (User Input)

Antenna Width = $W_{ant} := 24$ in (User Input)

Antenna Thickness = $T_{ant} := 8.5$ in (User Input)

Antenna Weight = $WT_{ant} := 132$ lbs (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 3.0$

Antenna Force Coefficient = $Ca_{ant} = 1.22$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 12$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 226$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 4.3$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 80$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 14.3$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 78$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 6.2$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 34$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 132$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1 \times 10^4$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 9647$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 313$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 313$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = RFS APX16DWV-16DWVS

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 55.9$ in (User Input)

Antenna Width = $W_{ant} := 13$ in (User Input)

Antenna Thickness = $T_{ant} := 3.15$ in (User Input)

Antenna Weight = $WT_{ant} := 45$ lbs (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$

Antenna Force Coefficient = $Ca_{ant} = 1.28$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 100$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.2$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 24$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.7$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 38$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 2.7$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 15$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 45$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 3970$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 129$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 129$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR6449		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 33.1$	in	(User Input)
Antenna Width =	$W_{ant} := 20.5$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.3$	in	(User Input)
Antenna Weight =	$WT_{ant} := 103$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.6$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 87$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.9$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 35$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 32$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 2.9$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 16$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 103$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5632$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4455$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 144$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 144$ lbs

Development of Wind & Ice Load on RRUS

RRUS Data:

RRUS Model =	Ericsson 4449		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 14.9$	in	(User Input)
RRUS Width =	$W_{RRUS} := 13.2$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 10.4$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 74$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		(User Input)
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.1$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.4$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 25$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 20$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.1$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 11$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.7$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 9$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 74$ lbs

Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2045$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 68$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 68$ lbs

Development of Wind & Ice Load on RRUS

RRUS Data:

RRUS Model =	Ericsson 4415		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 14.9$	in	(User Input)
RRUS Width =	$W_{RRUS} := 13.2$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 5.4$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 47$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		(User Input)

RRUS Aspect Ratio = $Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.1$

RRUS Force Coefficient = $Ca_{RRUS} = 1.2$

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.4$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 25$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 0.6$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 10$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.1$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 11$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.1$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 6$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 47$ lbs

Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 1062$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 1565$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 51$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 51$ lbs

Development of Wind & Ice Load on RRUS

RRUS Data:

RRUS Model = Ericsson 4424

RRUS Shape = Flat (User Input)

RRUS Height = $L_{RRUS} := 16.5$ in (User Input)

RRUS Width = $W_{RRUS} := 13.5$ in (User Input)

RRUS Thickness = $T_{RRUS} := 9.6$ in (User Input)

RRUS Weight = $WT_{RRUS} := 88$ lbs (User Input)

Number of RRUS's = $N_{RRUS} := 1$ (User Input)

RRUS Aspect Ratio = $Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.2$

RRUS Force Coefficient = $Ca_{RRUS} = 1.2$

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.5$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 29$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 20$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.3$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 12$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.8$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 10$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 88$ lbs

Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2138$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2172$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 70$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 70$ lbs

Development of Wind & Ice Load on RRUS

RRUS Data:

RRUS Model =	Ericsson RRUS-11		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 17.8$	in	(User Input)
RRUS Width =	$W_{RRUS} := 17.3$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 7.2$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 50$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		(User Input)
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 2.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 40$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 0.9$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 16$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 3$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 16$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.5$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 8$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 50$ lbs

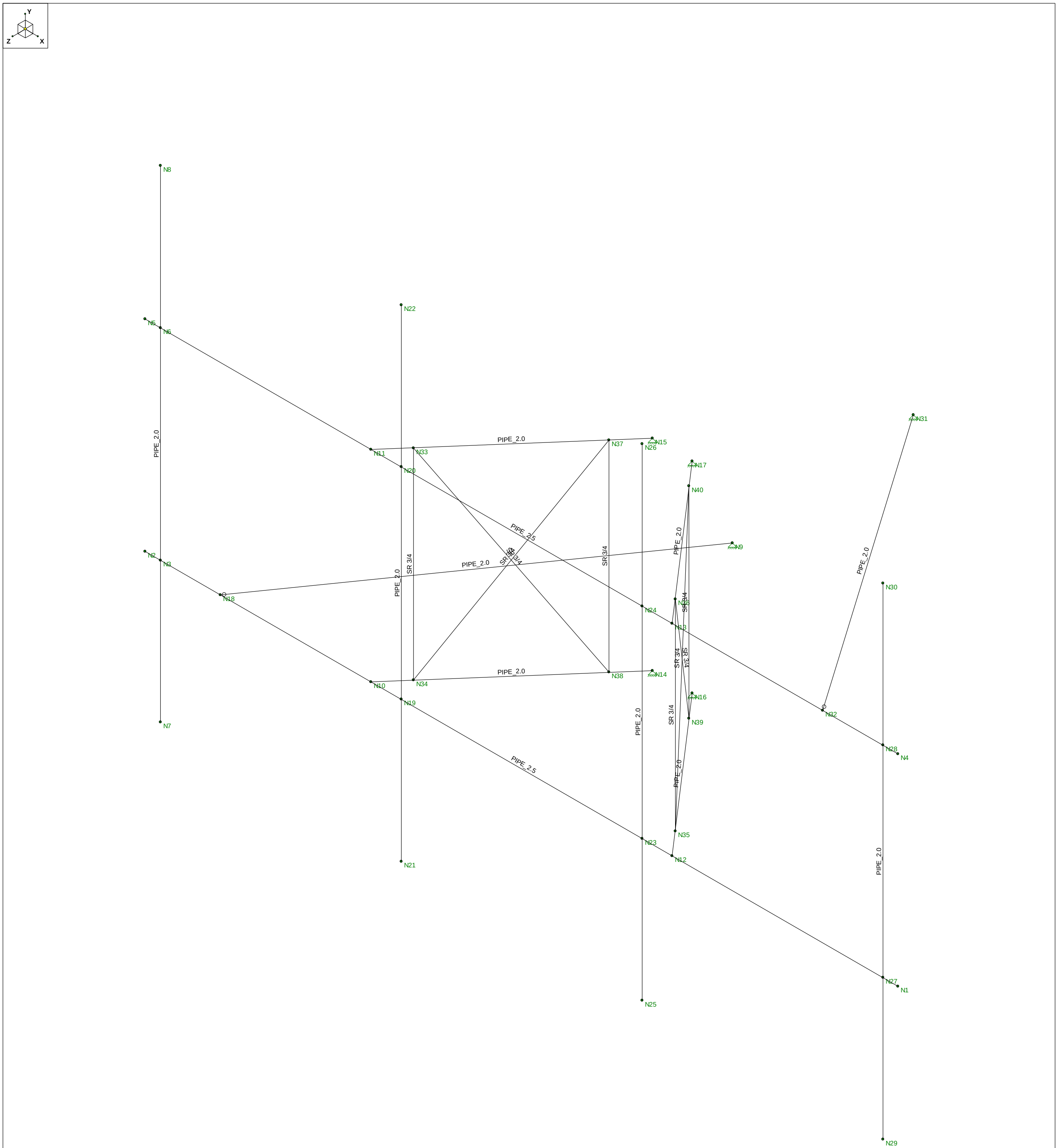
Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2217$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2368$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 77$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 77$ lbs



Envelope Only Solution

Centek	CTFF600E - Mount Member Framing	
TJL		July 17, 2020 at 10:17 AM
20074.49		Mount.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Grade B	29000	11154	.3	.65	.49	35	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
2	Horz	PIPE_2.5	Beam	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89
3	Outrigger	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Stabilizer	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
5	.75" Bar	SR 3/4	Column	BAR	A36 Gr.36	Typical	.442	.016	.016	.031

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Horz	12.5			Lbyy						Lateral
2	M2	Horz	12.5			Lbyy						Lateral
3	M3	Antenna Mast	8			Lbyy						Lateral
4	M5	Stabilizer	6.103			Lbyy						Lateral
5	M6	Outrigger	3.312	Segment	Segment	Lbyy						Lateral
6	M7	Outrigger	3.312	Segment	Segment	Lbyy						Lateral
7	M8	Outrigger	3.312	Segment	Segment	Lbyy						Lateral
8	M9	Outrigger	3.312	Segment	Segment	Lbyy						Lateral
9	M9A	Antenna Mast	8			Lbyy						Lateral
10	M10	Antenna Mast	8			Lbyy						Lateral
11	M11	Antenna Mast	8			Lbyy						Lateral
12	M12	Stabilizer	6.103			Lbyy						Lateral
13	M13	.75" Bar	4.055									Lateral
14	M14	.75" Bar	4.055									Lateral
15	M15	.75" Bar	4.055									Lateral
16	M16	.75" Bar	4.055									Lateral
17	M17	.75" Bar	3.34									Lateral
18	M18	.75" Bar	3.34									Lateral
19	M19	.75" Bar	3.34									Lateral
20	M20	.75" Bar	3.34									Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N2	N1			Horz	Beam	Pipe	A53 Gra...	Typical
2	M2	N5	N4			Horz	Beam	Pipe	A53 Gra...	Typical
3	M3	N8	N7			Antenna Mast	Column	Pipe	A53 Gra...	Typical
4	M5	N18	N9			Stabilizer	Beam	Pipe	A53 Gra...	Typical
5	M6	N11	N15			Outrigger	Beam	Pipe	A53 Gra...	Typical
6	M7	N10	N14			Outrigger	Beam	Pipe	A53 Gra...	Typical
7	M8	N12	N16			Outrigger	Beam	Pipe	A53 Gra...	Typical
8	M9	N13	N17			Outrigger	Beam	Pipe	A53 Gra...	Typical
9	M9A	N22	N21			Antenna Mast	Column	Pipe	A53 Gra...	Typical
10	M10	N26	N25			Antenna Mast	Column	Pipe	A53 Gra...	Typical
11	M11	N30	N29			Antenna Mast	Column	Pipe	A53 Gra...	Typical
12	M12	N32	N31			Stabilizer	Beam	Pipe	A53 Gra...	Typical
13	M13	N33	N38			.75" Bar	Column	BAR	A36 Gr.36	Typical
14	M14	N34	N37			.75" Bar	Column	BAR	A36 Gr.36	Typical
15	M15	N39	N36			.75" Bar	Column	BAR	A36 Gr.36	Typical
16	M16	N35	N40			.75" Bar	Column	BAR	A36 Gr.36	Typical
17	M17	N34	N33			.75" Bar	Column	BAR	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
18	M18	N38	N37			.75" Bar	Column	BAR	A36 Gr.36	Typical
19	M19	N39	N40			.75" Bar	Column	BAR	A36 Gr.36	Typical
20	M20	N35	N36			.75" Bar	Column	BAR	A36 Gr.36	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	6.25	-1.67	2.5	0	
2	N2	-6.25	-1.67	2.5	0	
3	N3	-6	-1.67	2.5	0	
4	N4	6.25	1.67	2.5	0	
5	N5	-6.25	1.67	2.5	0	
6	N6	-6	1.67	2.5	0	
7	N7	-6	-4	2.5	0	
8	N8	-6	4	2.5	0	
9	N9	-1.5	-1.67	-2.5	0	
10	N10	-2.5	-1.67	2.5	0	
11	N11	-2.5	1.67	2.5	0	
12	N12	2.5	-1.67	2.5	0	
13	N13	2.5	1.67	2.5	0	
14	N14	-0.328125	-1.67	0	0	
15	N15	-0.328125	1.67	0	0	
16	N16	0.328125	-1.67	0	0	
17	N17	0.328125	1.67	0	0	
18	N18	-5	-1.67	2.5	0	
19	N19	-2	-1.67	2.5	0	
20	N20	-2	1.67	2.5	0	
21	N21	-2	-4	2.5	0	
22	N22	-2	4	2.5	0	
23	N23	2	-1.67	2.5	0	
24	N24	2	1.67	2.5	0	
25	N25	2	-4	2.5	0	
26	N26	2	4	2.5	0	
27	N27	6	-1.67	2.5	0	
28	N28	6	1.67	2.5	0	
29	N29	6	-4	2.5	0	
30	N30	6	4	2.5	0	
31	N31	1.5	1.67	-2.5	0	
32	N32	5	1.67	2.5	0	
33	N33	-2.172086	1.67	2.122545	0	
34	N34	-2.172086	-1.67	2.122545	0	
35	N35	2.172086	-1.67	2.122545	0	
36	N36	2.172086	1.67	2.122545	0	
37	N37	-0.663681	1.67	0.386252	0	
38	N38	-0.663681	-1.67	0.386252	0	
39	N39	0.663681	-1.67	0.386252	0	
40	N40	0.663681	1.67	0.386252	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N9	Reaction	Reaction	Reaction			
2	N14	Reaction	Reaction	Reaction			
3	N15	Reaction	Reaction	Reaction			
4	N16	Reaction	Reaction	Reaction			
5	N17	Reaction	Reaction	Reaction			
6	N31	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M11	Y	-.023	.5
2	M11	Y	-.023	5.5
3	M10	Y	-.067	.5
4	M10	Y	-.067	5.5
5	M3	Y	-.052	.5
6	M3	Y	-.052	3.5
7	M11	Y	-.047	%50
8	M10	Y	-.05	7
9	M10	Y	-.074	%50
10	M10	Y	-.047	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M11	Y	-.065	.5
2	M11	Y	-.065	5.5
3	M10	Y	-.157	.5
4	M10	Y	-.157	5.5
5	M3	Y	-.072	.5
6	M3	Y	-.072	3.5
7	M11	Y	-.051	%50
8	M10	Y	-.077	7
9	M10	Y	-.068	%50
10	M10	Y	-.051	%50

Member Point Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M11	X	.008	.5
2	M11	X	.008	5.5
3	M10	X	.017	.5
4	M10	X	.017	5.5
5	M3	X	.008	.5
6	M3	X	.008	3.5
7	M11	X	.006	%50
8	M10	X	.008	7
9	M10	X	.011	%50

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M11	X	.012	.5

Member Point Loads (BLC 5 : Wind X) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
2	M11	X	.012	5.5
3	M10	X	.04	.5
4	M10	X	.04	5.5
5	M3	X	.018	.5
6	M3	X	.018	3.5
7	M11	X	.01	%50
8	M10	X	.016	7
9	M10	X	.025	%50

Member Point Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M11	Z	.019	.5
2	M11	Z	.019	5.5
3	M10	Z	.039	.5
4	M10	Z	.039	5.5
5	M3	Z	.016	.5
6	M3	Z	.016	3.5
7	M10	Z	.016	7

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M11	Z	.05	.5
2	M11	Z	.05	5.5
3	M10	Z	.113	.5
4	M10	Z	.113	5.5
5	M3	Z	.044	.5
6	M3	Z	.044	3.5
7	M10	Z	.04	7

Member Distributed Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M6	X	.001	.001	0	0
2	M7	X	.001	.001	0	0
3	M8	X	.001	.001	0	0
4	M9	X	.001	.001	0	0
5	M3	X	.002	.002	0	0
6	M5	X	.002	.002	0	0
7	M9A	X	.002	.002	0	0
8	M10	X	.002	.002	0	0
9	M11	X	.002	.002	0	0
10	M12	X	.002	.002	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M6	X	.003	.003	0	0
2	M7	X	.003	.003	0	0
3	M8	X	.003	.003	0	0
4	M9	X	.003	.003	0	0
5	M3	X	.006	.006	0	0

Member Distributed Loads (BLC 5 : Wind X) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
6	M5	X	.006	.006	0	0
7	M9A	X	.006	.006	0	0
8	M10	X	.006	.006	0	0
9	M11	X	.006	.006	0	0
10	M12	X	.006	.006	0	0

Member Distributed Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.002	.002	0	0
2	M2	Z	.002	.002	0	0
3	M6	Z	.001	.001	0	0
4	M7	Z	.001	.001	0	0
5	M8	Z	.001	.001	0	0
6	M9	Z	.001	.001	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.006	.006	0	0
2	M2	Z	.006	.006	0	0
3	M6	Z	.003	.003	0	0
4	M7	Z	.003	.003	0	0
5	M8	Z	.003	.003	0	0
6	M9	Z	.003	.003	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	DL		-1						
2	Dead Load	None					10			
3	Ice Load	None					10			
4	Wind with Ice X	None					9	10		
5	Wind X	None					9	10		
6	Wind with Ice Z	None					7	6		
7	Wind Z	None					7	6		

Load Combinations

	Description	Solve	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
1	1.2D + 1.6W (X-direc...	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W (X-direc...	Yes	Y		1	.9	2	.9	5	1.6														
3	1.2D + 1.0Di + 1.0Wi...	Yes	Y		1	1.2	2	1.2	3	1	4	1												
4	1.2D + 1.6W (Z-direc...	Yes	Y		1	1.2	2	1.2	7	1.6														
5	0.9D + 1.6W (Z-direc...	Yes	Y		1	.9	2	.9	7	1.6														
6	1.2D + 1.0Di + 1.0Wi...	Yes	Y		1	1.2	2	1.2	3	1	6	1												

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N9	max	.201	1	.013	1	-.004	6	0	6	0	6	0	6
2		min	.003	6	.01	5	-.332	1	0	1	0	1	0	1
3	N14	max	-.044	5	.271	3	.686	1	0	6	0	6	0	6
4		min	-.678	1	.114	5	.075	5	0	1	0	1	0	1
5	N15	max	.519	4	.273	6	-.061	2	0	6	0	6	0	6
6		min	.015	2	.128	2	-.555	4	0	1	0	1	0	1
7	N16	max	.818	3	.658	3	.944	3	0	6	0	6	0	6
8		min	.148	5	.247	5	.155	5	0	1	0	1	0	1
9	N17	max	-.347	5	.671	6	-.437	5	0	6	0	6	0	6
10		min	-.953	3	.266	2	-1.068	3	0	1	0	1	0	1
11	N31	max	.205	2	.013	4	.334	2	0	6	0	6	0	6
12		min	-.23	4	.009	2	-.329	4	0	1	0	1	0	1
13	Totals:	max	0	6	1.894	6	0	3						
14		min	-.814	1	.795	2	-1.043	4						

Envelope Joint Displacements

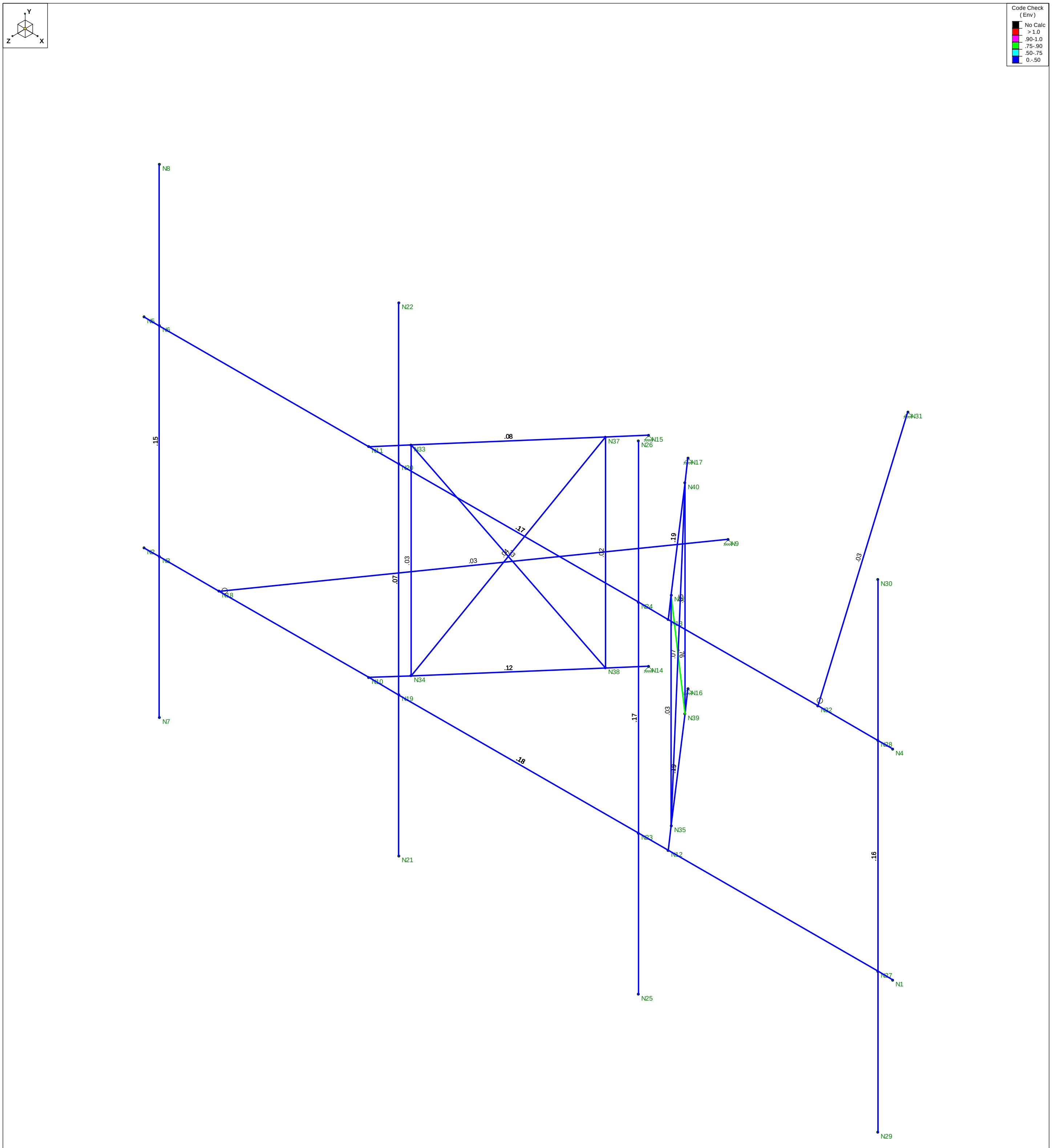
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
1	N1	max	.11	1	-.058	2	.089	5	1.87e-03	1	8.103e-04	1	-7.456e-04	2
2		min	-.04	5	-.139	3	-.167	1	-1.555e-03	5	-1.173e-03	5	-1.786e-03	6
3	N2	max	.111	1	-.038	5	.065	1	1.957e-03	1	1.123e-03	5	1.423e-03	3
4		min	-.039	5	-.105	3	-.012	5	4.496e-04	6	-8.349e-04	1	3.813e-04	5
5	N3	max	.111	1	-.037	5	.067	1	1.957e-03	1	1.123e-03	5	1.423e-03	3
6		min	-.039	5	-.101	3	-.015	5	4.496e-04	6	-8.349e-04	1	3.812e-04	5
7	N4	max	.114	1	-.058	5	.029	5	1.896e-03	1	-1.475e-04	6	-8.028e-04	5
8		min	-.027	5	-.139	3	-.067	1	2.096e-04	5	-8.871e-04	2	-1.775e-03	3
9	N5	max	.114	1	-.038	5	.169	1	2.256e-03	4	2.73e-03	4	1.414e-03	6
10		min	-.027	5	-.105	3	.022	6	5.788e-04	3	2.367e-04	3	3.508e-04	2
11	N6	max	.114	1	-.037	5	.167	1	2.256e-03	4	2.73e-03	4	1.414e-03	6
12		min	-.027	5	-.101	3	.02	6	5.788e-04	3	2.367e-04	3	3.508e-04	2
13	N7	max	.137	1	-.037	5	.013	1	1.957e-03	1	1.123e-03	5	1.458e-03	3
14		min	-.028	5	-.101	3	-.055	5	4.496e-04	6	-8.349e-04	1	3.812e-04	5
15	N8	max	.118	2	-.037	5	.222	1	3.426e-03	4	2.73e-03	4	1.417e-03	6
16		min	-.044	4	-.101	3	.044	6	5.799e-04	3	2.367e-04	3	-3.354e-04	2
17	N9	max	0	6	0	6	0	6	7.539e-04	1	2.623e-03	1	2.146e-03	6
18		min	0	1	0	1	0	1	2.655e-04	6	-6.497e-04	5	2.786e-04	2
19	N10	max	.11	1	-.007	5	.094	1	4.862e-04	1	1.437e-03	1	1.191e-03	3
20		min	-.039	5	-.014	3	-.034	5	2.093e-04	6	-5.768e-04	5	3.646e-04	5
21	N11	max	.114	1	-.008	5	.099	1	8.153e-04	4	2.961e-03	1	1.197e-03	3
22		min	-.027	5	-.014	3	-.022	5	2.348e-04	3	1.394e-04	6	3.864e-04	5
23	N12	max	.11	1	-.012	5	.034	5	5.122e-04	1	2.893e-03	1	-5.79e-04	2
24		min	-.039	5	-.031	3	-.096	1	-3.891e-04	5	-1.131e-03	5	-1.454e-03	3
25	N13	max	.114	1	-.013	5	.024	4	1.005e-03	4	1.499e-03	1	-6.369e-04	5
26		min	-.027	5	-.031	3	-.097	2	4.536e-04	3	-1.666e-04	5	-1.496e-03	3
27	N14	max	0	6	0	6	0	6	3.878e-04	1	4.756e-03	1	1.128e-03	3
28		min	0	1	0	1	0	1	2.868e-04	5	-1.633e-03	5	2.613e-04	5
29	N15	max	0	6	0	6	0	6	5.286e-04	4	4.229e-03	1	1.128e-03	3
30		min	0	1	0	1	0	1	2.786e-04	2	-1.397e-03	5	9.668e-05	5
31	N16	max	0	6	0	6	0	6	1.642e-03	3	4.092e-03	1	-7.892e-04	2
32		min	0	1	0	1	0	1	3.999e-04	5	-1.436e-03	5	-2.388e-03	6
33	N17	max	0	6	0	6	0	6	1.692e-03	6	4.893e-03	1	-6.033e-04	5

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
34		min	0	1	0	1	0	1	6.493e-04	2	-1.306e-03	5	-2.323e-03	3
35	N18	max	.11	1	-.03	5	.079	1	1.537e-03	1	8.384e-04	5	2.241e-03	3
36		min	-.039	5	-.078	3	-.027	5	3.81e-04	6	-1.156e-03	1	7.677e-04	5
37	N19	max	.11	1	-.006	2	.083	1	3.235e-04	1	2.191e-03	1	5.757e-04	3
38		min	-.039	5	-.009	6	-.03	5	1.674e-04	6	-8.067e-04	5	9.825e-05	5
39	N20	max	.114	1	-.006	2	.08	1	7.388e-04	4	3.292e-03	1	5.821e-04	3
40		min	-.027	5	-.009	6	-.022	5	1.944e-04	3	-3.152e-04	5	1.907e-04	5
41	N21	max	.123	1	-.006	2	.074	1	3.235e-04	1	2.191e-03	1	6.105e-04	3
42		min	-.036	5	-.009	6	-.036	4	1.673e-04	6	-8.067e-04	5	9.824e-05	5
43	N22	max	.111	2	-.006	2	.09	1	7.389e-04	4	3.292e-03	1	5.703e-04	6
44		min	-.035	4	-.009	6	-.001	5	1.945e-04	3	-3.152e-04	5	3.28e-05	2
45	N23	max	.11	1	-.01	5	.028	5	3.093e-04	1	3.212e-03	1	-2.773e-04	5
46		min	-.039	5	-.025	3	-.078	1	-5.102e-04	5	-1.111e-03	5	-8.538e-04	3
47	N24	max	.114	1	-.01	5	.023	4	1.329e-03	4	2.267e-03	1	-4.938e-04	5
48		min	-.027	5	-.024	3	-.085	2	3.022e-04	3	-4.638e-04	5	-9.241e-04	3
49	N25	max	.111	2	-.01	5	.055	5	3.09e-04	1	3.212e-03	1	1.24e-04	2
50		min	-.05	4	-.025	3	-.086	1	-1.07e-03	5	-1.111e-03	5	-8.424e-04	6
51	N26	max	.159	1	-.01	5	.122	4	4.33e-03	4	2.267e-03	1	-4.942e-04	5
52		min	-.013	5	-.025	3	-.077	2	3.032e-04	3	-4.638e-04	5	-1.921e-03	1
53	N27	max	.11	1	-.056	5	.086	5	1.87e-03	1	8.103e-04	1	-7.455e-04	2
54		min	-.04	5	-.133	3	-.164	1	-1.555e-03	5	-1.173e-03	5	-1.786e-03	6
55	N28	max	.114	1	-.056	5	.027	5	1.896e-03	1	-1.475e-04	6	-8.028e-04	5
56		min	-.027	5	-.133	3	-.069	1	2.096e-04	5	-8.871e-04	2	-1.775e-03	3
57	N29	max	.093	2	-.056	5	.129	5	1.87e-03	1	8.103e-04	1	-5.368e-04	2
58		min	-.07	4	-.133	3	-.216	1	-1.555e-03	5	-1.173e-03	5	-1.786e-03	6
59	N30	max	.154	1	-.056	5	.062	4	1.897e-03	1	-1.475e-04	6	-8.031e-04	5
60		min	-.005	5	-.133	3	-.017	2	5.611e-04	6	-8.871e-04	2	-1.945e-03	3
61	N31	max	0	6	0	6	0	6	8.103e-04	1	2.686e-03	1	-5.429e-04	2
62		min	0	1	0	1	0	1	3.607e-04	5	-4.679e-04	5	-2.655e-03	6
63	N32	max	.114	1	-.044	5	.021	5	1.514e-03	1	-5.641e-05	6	-1.071e-03	2
64		min	-.027	5	-.106	3	-.082	1	3.327e-04	6	-1.206e-03	2	-2.634e-03	3
65	N33	max	.1	1	-.004	5	.087	1	4.931e-04	5	3.292e-03	1	9.168e-04	3
66		min	-.027	5	-.009	3	-.022	5	-1.361e-05	3	-2.491e-04	5	1.165e-04	5
67	N34	max	.101	1	-.004	5	.087	1	2.901e-04	5	2.347e-03	1	9.127e-04	6
68		min	-.036	5	-.009	3	-.031	5	-1.806e-05	3	-8.952e-04	5	2.576e-04	5
69	N35	max	.096	1	-.009	2	.03	5	2.574e-04	1	3.204e-03	1	-4.01e-04	2
70		min	-.034	5	-.023	6	-.084	1	-2.272e-04	5	-1.191e-03	5	-1.198e-03	6
71	N36	max	.105	1	-.009	5	.023	4	4.736e-04	4	2.437e-03	1	-2.09e-04	5
72		min	-.026	5	-.023	3	-.089	2	1.457e-04	3	-4.712e-04	5	-1.17e-03	3
73	N37	max	.02	2	-.002	5	.017	1	3.578e-04	4	4.194e-03	1	8.981e-04	3
74		min	-.007	5	-.006	3	-.005	5	1.152e-04	3	-1.363e-03	5	-1.157e-05	5
75	N38	max	.022	1	-.002	5	.019	1	2.162e-04	1	4.671e-03	1	8.978e-04	3
76		min	-.008	5	-.006	3	-.007	5	1.157e-04	6	-1.611e-03	5	1.651e-04	5
77	N39	max	.019	1	-.006	2	.006	5	9.951e-04	3	4.059e-03	1	-5.739e-04	2
78		min	-.007	5	-.016	6	-.017	1	1.587e-04	5	-1.423e-03	5	-1.828e-03	6
79	N40	max	.023	1	-.006	2	.005	4	1.039e-03	6	4.808e-03	1	-3.608e-04	5
80		min	-.006	5	-.016	6	-.019	2	3.902e-04	2	-1.276e-03	5	-1.759e-03	3

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	Cb	Eqn
1	M15	SR 3/4	.756	4....	3	.007	4....		1	1.482	14.314	.179	.179	2.0...	H1-...
2	M13	SR 3/4	.330	0	3	.005	0		1	1.482	14.314	.179	.179	2.3...	H1-...
3	M9	PIPE_2.0	.193	2....	3	.072	.483		3	32.029	32.13	1.872	1.872	1.62	H1-...
4	M8	PIPE_2.0	.190	2....	3	.078	.483		6	32.029	32.13	1.872	1.872	1.62	H1-...
5	M1	PIPE_2.5	.175	3....	1	.053	8....		6	14.559	50.715	3.596	3.596	1.8...	H1-...
6	M10	PIPE_2.0	.172	2.25	4	.027	2....		1	14.916	32.13	1.872	1.872	3.9...	H1-...
7	M2	PIPE_2.5	.169	8....	1	.060	8....		5	14.559	50.715	3.596	3.596	1.7...	H1-...
8	M11	PIPE_2.0	.161	2....	3	.043	2....		1	14.916	32.13	1.872	1.872	4.5...	H1-...
9	M3	PIPE_2.0	.149	5....	6	.041	5....		1	14.916	32.13	1.872	1.872	4.9...	H1-...
10	M7	PIPE_2.0	.116	0	1	.033	.483		6	32.034	32.13	1.872	1.872	1.9...	H1-...
11	M6	PIPE_2.0	.082	.483	4	.031	.483		3	32.034	32.13	1.872	1.872	1.9...	H1-...
12	M16	SR 3/4	.071	0	6	.006	0		1	1.482	14.314	.179	.179	2.0...	H1-...
13	M9A	PIPE_2.0	.067	2....	6	.027	5....		1	14.916	32.13	1.872	1.872	4.9...	H1-...
14	M19	SR 3/4	.052	0	6	.004	0		1	2.184	14.314	.179	.179	2.2...	H1-...
15	M14	SR 3/4	.039	0	6	.007	0		1	1.482	14.314	.179	.179	2.4	H1-...
16	M12	PIPE_2.0	.033	3....	1	.003	0		1	20.556	32.13	1.872	1.872	1.1...	H1-...
17	M5	PIPE_2.0	.029	3....	1	.003	6....		1	20.556	32.13	1.872	1.872	1.1...	H1-...
18	M20	SR 3/4	.029	0	3	.004	0		1	2.184	14.314	.179	.179	2.27	H1-...
19	M17	SR 3/4	.026	0	6	.005	0		1	2.184	14.314	.179	.179	2.27	H1-...
20	M18	SR 3/4	.024	0	6	.003	0		1	2.184	14.314	.179	.179	2.2...	H1-...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek	CTFF600E - Mount	
TJL		July 17, 2020 at 10:17 AM
20074.49	Unity Check	Mount.r3d

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: CTFF600E

80 Lonetown Road
Redding, Connecticut 06896

July 28, 2020

EBI Project Number: 6220003455

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**19.66%**

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

July 28, 2020

T-Mobile
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, Connecticut 06002

Emissions Analysis for Site: CTFF600E

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **80 Lonetown Road** in **Redding, 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.

<u>General population/uncontrolled exposure</u> 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 80 Lonetown Road in Redding, 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) 2 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.

5) 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.

6) 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.

7) 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.

8) 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.

9) 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.

10) 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.

11) The antennas used in this modeling are the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAARR18_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector A, the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAARR18_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz channel(s) in Sector B, the RFS APX16DWV-16DWV-S-E-A20 for the 2100 MHz channel(s), the RFS APXVAARR18_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 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.

12) The antenna mounting height centerline of the proposed antennas is 92 feet above ground level (AGL).

13) 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.

14) 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:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20	Make / Model:	RFS APX16DWV-16DWV-S-E-A20
Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz	Frequency Bands:	2100 MHz
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	92 feet	Height (AGL):	92 feet	Height (AGL):	92 feet
Channel Count:	2	Channel Count:	2	Channel Count:	2
Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE %:	**1.98%**	Antenna B1 MPE %:	**1.98%**	Antenna C1 MPE %:	**1.98%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAARR18_43-U-NA20	Make / Model:	RFS APXVAARR18_43-U-NA20	Make / Model:	RFS APXVAARR18_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:	11.95 dBd / 11.95 dBd / 12.35 dBd / 14.85 dBd / 15.55 dBd	Gain:	11.95 dBd / 11.95 dBd / 12.35 dBd / 14.85 dBd / 15.55 dBd	Gain:	11.95 dBd / 11.95 dBd / 12.35 dBd / 14.85 dBd / 15.55 dBd
Height (AGL):	92 feet	Height (AGL):	92 feet	Height (AGL):	92 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):	9,043.63	ERP (W):	9,043.63	ERP (W):	9,043.63
Antenna A2 MPE %:	**5.74%**	Antenna B2 MPE %:	**5.74%**	Antenna C2 MPE %:	**5.74%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
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):	92 feet	Height (AGL):	92 feet	Height (AGL):	92 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 A3 MPE %:	**10.90%**	Antenna B3 MPE %:	**10.90%**	Antenna C3 MPE %:	**10.90%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	18.62%
Verizon	1.04%
Site Total MPE % :	19.66%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	18.62%
T-Mobile Sector B Total:	18.62%
T-Mobile Sector C Total:	18.62%
Site Total MPE % :	19.66%

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 2100 MHz LTE	2	2334.27	92.0	19.83	2100 MHz LTE	1000	1.98%
T-Mobile 600 MHz LTE	2	470.03	92.0	3.99	600 MHz LTE	400	1.00%
T-Mobile 600 MHz NR	1	1253.40	92.0	5.32	600 MHz NR	400	1.33%
T-Mobile 700 MHz LTE	2	515.37	92.0	4.38	700 MHz LTE	467	0.94%
T-Mobile 1900 MHz LTE	2	1832.95	92.0	15.57	1900 MHz LTE	1000	1.56%
T-Mobile 2100 MHz UMTS	2	1076.77	92.0	9.15	2100 MHz UMTS	1000	0.91%
T-Mobile 2500 MHz LTE	2	6412.98	92.0	54.48	2500 MHz LTE	1000	5.45%
T-Mobile 2500 MHz LTE	2	6412.98	92.0	54.48	2500 MHz LTE	1000	5.45%
						Total:	**18.62%**

• 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:	18.62%
Sector B:	18.62%
Sector C:	18.62%
T-Mobile Maximum MPE % (Sector A):	18.62%
Site Total:	19.66%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **19.66%** 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.