Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

August 11, 2020

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

RE: Notice of Exempt Modification
38 Spring Hill Lane, Bethel, CT 06801
Latitude: 41.36222100
Longitude: -73.39666800
T-Mobile Site#: CT11115F – Anchor

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 102-foot level of the existing 125-foot monopole tower at 38 Spring Hill Lane, Bethel, CT. The tower and property are owned by Blue Sky Towers. T-Mobile now intends to replace three (3) existing antennas with three (3) new 2500 MHz antennas. The new antennas will be installed at the same 102-foot level of the tower.

Planned Modifications:
Tower:

Remove
(1) 1-5/8" Hybrid Cable

Remove and Replace:
(3) AIR 21 for (3) AIR 6449 B41 2500 MHz Antennas

Install New:
(3) Radio 4415 RRU
(3) Commscope SDX1926Q-43 Diplexers
(1) 1-5/8" Hybrid Fiber Cable

Existing to Remain:
(3) AIR 32 1900/2100 MHz Antennas
(3) APXVARR24_43-UNA20 600/700/1900/2100 MHz Antennas
(3) Radio 4449 RRU
(3) TMA
(12) 1-5/8" Coax
(2) 1-5/8" Hybrid Cable

Ground:
Install New: 6160 Cabinet and B160 Battery Cabinet

This facility was approved by the Connecticut Siting Council on August 12, 2004 in Docket No. 288. The proposed modification complies with the conditions of that approval.

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 -Matthew Knickerbocker, Elected Official, and Beth Cavagna, Director/Town Planner for the Town of Bethel, 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: Matthew Knickerbocker – First Selectman of the Town of Bethel
Beth Cavagna– Director/Town Planner for the Town of Bethel
Blue Sky Towers- 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.

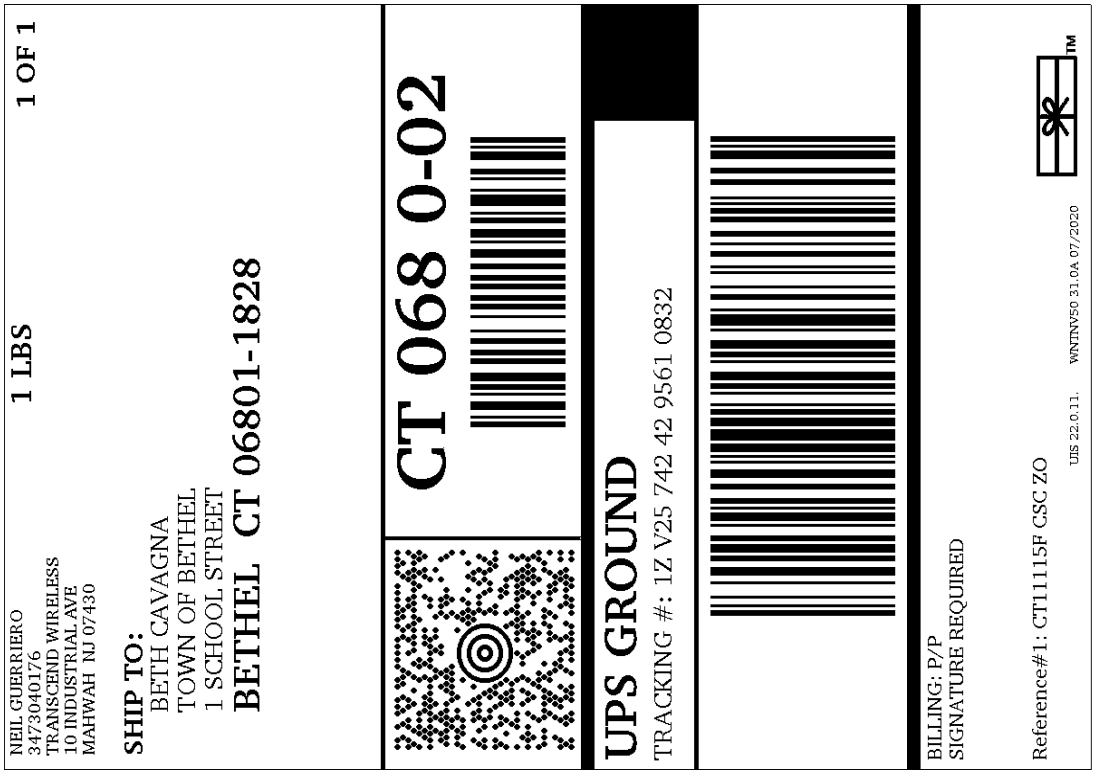
   Customers without a Daily Pickup
   Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To 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



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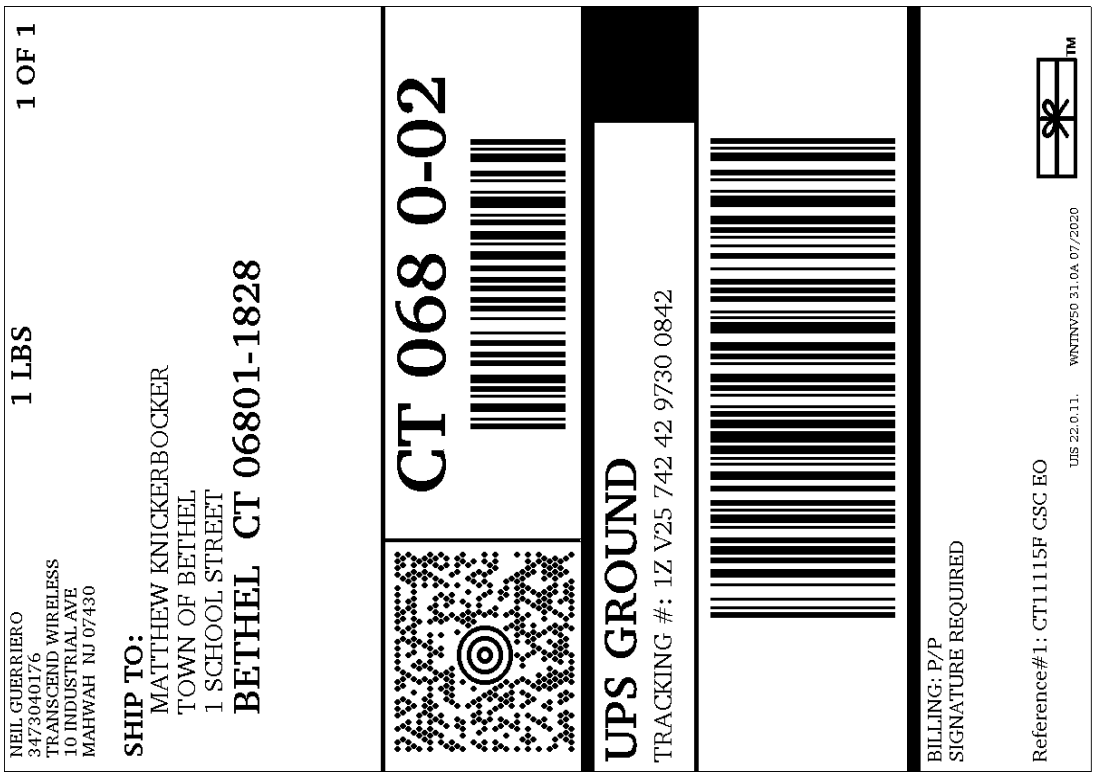

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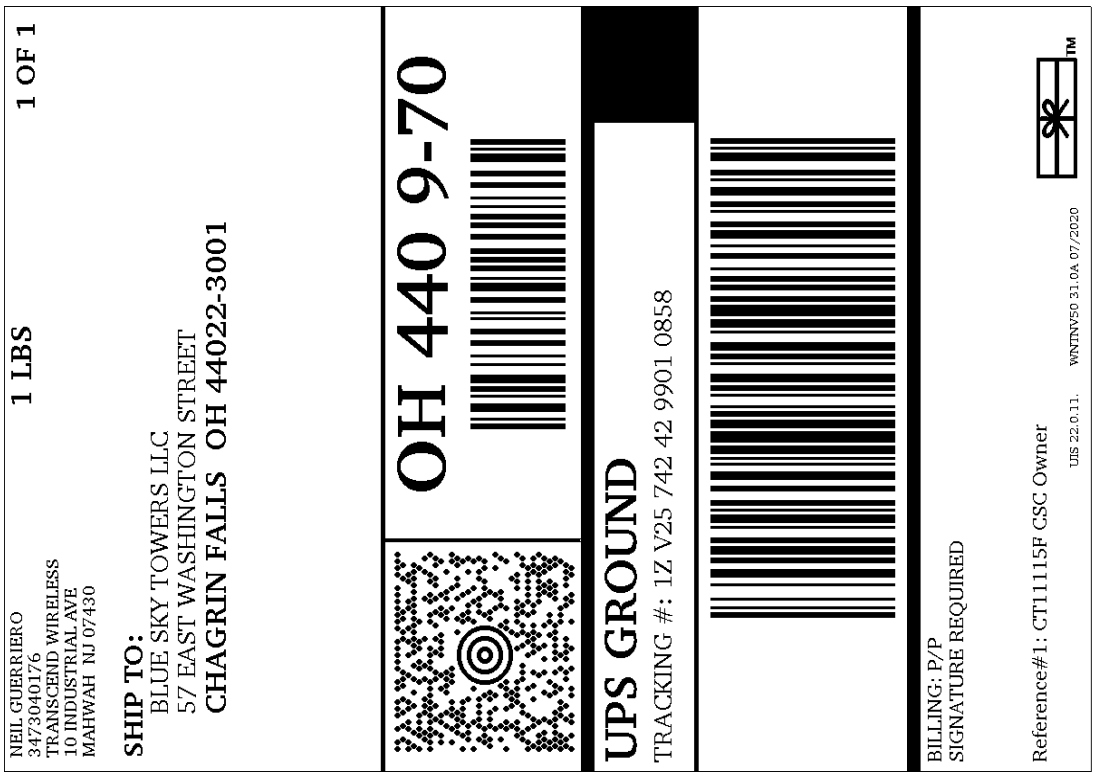


Bethel, CT : Assessor Database

Property Search:

Parcel ID:	Alternate ID:	Owner 1 Name:	Street Number:	Street Name:
			38	SPRING HILL LANE

Search Reset

Property Detail:

Parcel ID:	Alternate ID/Map Block Lot:	Card:	Card:	Street Name:	Street Number:	Zoning:	LUC:	Acres:
32 47A 121	R06064			SPRING HILL LANE	38U	R-40	PP FOR PUBLIC UTILITIES	1.63

Owner Information:

Owner 1 Name:	BLUE SKY TOWERS LLC
Owner 2 Name:	
Street 1:	57 EAST WASHINGTON STREET
Street 2:	
City:	CHAGRIN FALLS
State:	OH
Zip:	44022
Volume:	1051
Page:	496
Deed Date:	0000-00-00

Property Images:

Picture:

There is no picture available.

Sketch:

There is no sketch available.

Valuation:

Appraised Land:	$151,300.00
Appraised Land PA490:	$0.00
Appraised Bldg:	$648,700.00
Appraised Total:	$800,000.00
Total Assessment:	$560,000.00

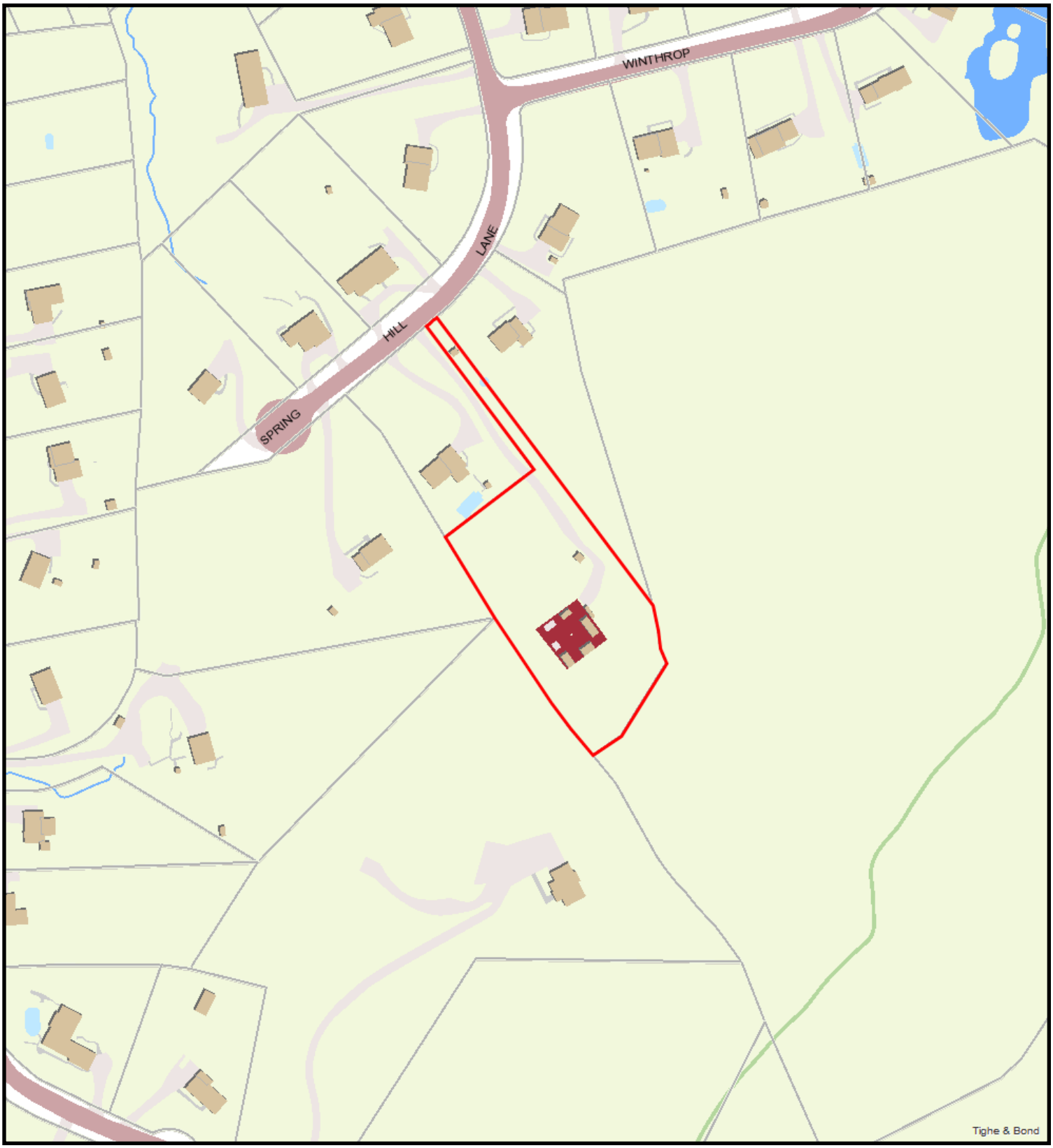
Sales History:

Book:	Page:	Sale Date:	Price:	Validity:	Sale Type:
1051	496	10/03/2014	220,720	23	2
979	229	10/02/2009	240,000	03	1
455	393	12/20/1988			

Out-Buildings:

Code:	Description:	Units:	Year Built:	Size1:	Size2:	Area:	Grade:	Condition:
RS1	FRAME UTILITY SHED	1	2006	8	15	120	B	GOOD (Comm)
TT4	TOWER CELLULAR	1	2011	1	120	120	A	GOOD (Comm)
RS1	FRAME UTILITY SHED	1	2006	9	23	207	B	GOOD (Comm)
RS1	FRAME UTILITY SHED	1	2006	9	12	108	B	GOOD (Comm)
RS1	FRAME UTILITY SHED	1	2006	10	12	120	B	GOOD (Comm)

The information delivered through this on-line database is provided in the spirit of open access to government information and is intended as an enhanced



8/11/2020 1:14:07 PM

Scale: 1"=200'

Scale is approximate

The information depicted on this map is for planning purposes only. It is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analyses.

Connecticut Siting Council(/CSC)

Decisions (/CSC/Decisions/Decisions)

Meetings and Minutes (/CSC/Common-Elements/v4-template/Council-Activity)

Pending Matters (/CSC/1_Applications-and-Other-Pending-Matters/Pending-Matters)

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DOCKET NO. 288 – AT&T Wireless PCS, LLC d/b/a AT&T Wireless and Valley Communications, Inc. application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of a wireless telecommunications facility at 38 Spring Hill Lane, Bethel, Connecticut.	}	Connecticut
	}	Siting
	}	Council
		August 12, 2004

Decision and Order

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, operation, and maintenance of a telecommunications facility including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate either alone or cumulatively with other effects when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes § 16-50k, be issued to

Valley Communications, Inc. for the construction, maintenance and operation of a wireless telecommunications facility at Site A, 38 Spring Hill Lane, Bethel, Connecticut. The Council denies certification of Site B, also located at 38 Spring Hill Lane, Bethel, Connecticut.

The facility shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The tower shall be constructed as a monopole, no taller than necessary to provide the proposed telecommunications services, sufficient to accommodate the antennas of AT&T Wireless PCS LLC, Sprint Spectrum L.P., Omnipoint Network Facilities Network 2 LLC, Nextel Communications, Inc., the Town of Bethel, Thomas Refuse, Utility Communications, Valley Communications, Inc. and other entities, both public and private, but such tower shall not exceed a height of 125 feet above ground level including appurtenances.

2. The Certificate Holder shall ensure that all tower users install the least visually obtrusive antennas and associated antenna mounts at the site while maintaining coverage objectives. Coverage objectives shall not be compromised by the use of such equipment.

3. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be served on the Town of Bethel, and all parties and intervenors as listed in the service list, and submitted to and approved by the Council prior to the commencement of facility construction. The D&M Plan shall include:

a. a final site plan(s) of site development to include specifications for the tower, tower foundation, antennas, equipment building, access road, utility line, and landscaping; and

b. construction plans for site clearing, water drainage, and erosion and sedimentation control consistent with the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control, as amended.

4. The Certificate Holder shall remove the existing 90-foot guyed lattice tower at the site parcel within 60-days of completion of the approved facility.

5. Prior to submission of the D&M plan to the Council, the Certificate Holder shall discuss site construction details with the Town. Items to be discussed shall include but not limited to site clearing, site grading, access road improvements, erosion and sedimentation controls, fencing, access gate improvements, landscaping, and construction work hours. The Town and Certificate Holder shall agree upon all construction details prior to submission of the D&M to the Council.

6. The Certificate Holder shall, prior to the commencement of operation, provide the Council worst-case

modeling of electromagnetic radio frequency power density of all proposed entities' antennas at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin No. 65, August 1997. The Certificate Holder shall ensure a recalculated report of electromagnetic radio frequency power density is submitted to the Council when circumstances in operation cause a change in power density above the levels calculated and provided pursuant to this Decision and Order.

7. Upon the establishment of any new State or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.

8. The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

9. The Certificate Holder shall provide reasonable space on the tower for no compensation for any municipal antennas, provided such antennas are compatible with the structural integrity of the tower.

10. If the facility does not initially provide wireless services within one year of completion of construction or ceases to provide wireless services for a period of one year, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made.

11. Any antenna that becomes obsolete and ceases to function shall be removed within 60 days after such antennas become obsolete and cease to function.

12. Unless otherwise approved by the Council, this Decision and Order shall be void if the facility authorized herein is not operational within one year of the effective date of this Decision and Order or within one year after all appeals to this Decision and Order have been resolved. Any request for extension of this period shall be filed with the Council no later than sixty days prior to expiration date of this Certificate and shall be served on all parties and intervenors, as listed in the service list. Any proposed modifications to this Decision and Order shall likewise be so served.

Pursuant to General Statutes § 16-50p, we hereby direct that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in the Hartford Courant, The Bethel Beacon, and the Danbury News Times.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors to this proceeding are:

Applicant	**Its Representative**
AT&T Wireless PCS, LLC d/b/a AT&T Wireless	Christopher B. Fisher, Esq. Cuddy & Feder LLP 90 Maple Avenue White Plains, New York 10601 Paul Zito Valley Communications, Inc. 155 Wooster Street Shelton, CT 06484
Intervenor	**Its Representative**
Sprint Spectrum, L.P. d/b/a/ Sprint PCS	Thomas J. Regan, Esquire Brown Rudnick Berlack Israels LLP CityPlace I, 38th Floor 185 Asylum Street Hartford, CT 06103-3402
Intervenor	**Its Representative**
Omnipoint Facilities Network 2 LLC d/b/a T-Mobile	Stephen J. Humes LeBoeuf, Lamb, Greene & MacRae, LLP Goodwin Square 25 Asylum Street Hartford, CT 06103
Intervenor	
William Huertas, Jr. 40 Spring Hill Lane Bethel, CT 06801	

Intervenor

James C. Kelleher
42 Spring Hill Lane
Bethel, CT 06801

Intervenor

Steven Mitchell
36 Spring Hill Lane
Bethel, CT 06801

Intervenor

Representative Hank Bielawa
P.O. Box 689
Redding, CT 06896

Intervenor

Alice M. Hutchinson
First Selectman
Town of Bethel
1 School Street
Bethel, CT 06801

WIRELESS COMMUNICATIONS FACILITY

CT115/SNET VALLEY_FT
SITE ID: CT11115F
38 SPRING HILL LANE
BETHEL, CT 06801

T-MOBILE RF CONFIGURATION

67D5997DB_2xAIR+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.

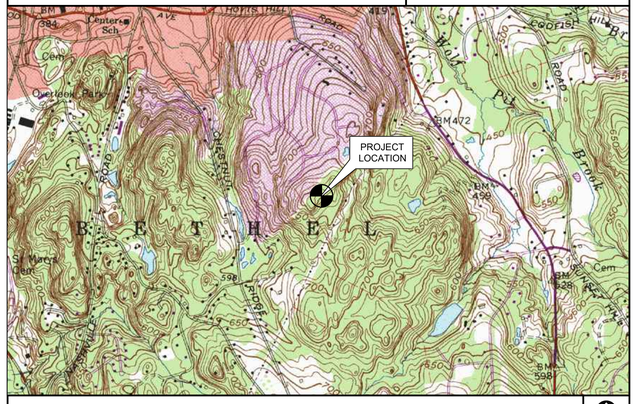
SITE DIRECTIONS

FROM: 35 GRIFFIN ROAD SOUTH, BLOOMFIELD, CT 06002 **TO:** 38 SPRING HILL LANE, BETHEL, CT 06801

1. HEAD NORTHEAST ON GRIFFIN RD S TOWARD W NEWBERRY RD	0.60 MI.
2. TURN RIGHT ONTO DAY HILL RD	4.00 MI.
3. MERGE ONTO I-91 S	6.90 MI.
4. TAKE EXIT 32A-32B FOR I-84W TOWARD WATERBURY	0.50 MI.
5. MERGE ONTO I-84	45.60 MI.
6. TAKE EXIT 11 TOWARD CT-34/DERBY/NEW HAVEN	0.90 MI.
7. TURN LEFT ONTO WASSERMAN WAY	1.00 MI.
8. CONTINUE ONTO MILE HILL ROAD	0.50 MI.
9. TURN RIGHT ONTO CT-25 N/S MAIN ST	0.70 MI.
10. TURN LEFT ONTO CT-302 W/SUGAR ST	6.40 MI.
11. TURN LEFT ONTO HIGHLAND AVE	0.30 MI.
12. CONTINUE ONTO GOVERNORS LN	0.10 MI.
13. TURN RIGHT ONTO SPRING HILL LN	0.60 MI.

SITE COORDINATES: LATITUDE: 41°-21'-44.11" N
LONGITUDE: 73°-23'-47.78" W
GROUND ELEVATION: 810'± AMSL

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. INSTALL (1) BB6630
2. INSTALL (1) BB6648
3. INSTALL (1) BATTERY CABINET B160
4. INSTALL (1) POWER ENCLOSURE 6160
5. REMOVE (1) 9x18 HYBRID CABLES
6. INSTALL (1) 6x12 HYBRID CABLES
7. INSTALL HAND RAIL KIT-HRK14
8. INSTALL 100A CIRCUIT BREAKER
9. INSTALL (1) T-MOBILE RRH 4415 B25 PER SECTOR. TOTAL (3).
10. INSTALL (1) COMMSCOPE DIPLEXER PER SECTOR. TOTAL (3).
11. REMOVE (1) AIR21 ANTENNA PER SECTOR. TOTAL (3)
12. INSTALL (1) AIR6449 B41 ANTENNA PER SECTOR. TOTAL (3)

PROJECT SUMMARY (STRUCTURAL)

FOR REQUIRED STRUCTURAL MODIFICATIONS, SEE SHEET(S) S-1 FOR ADDITIONAL DETAILS. HAND RAIL KIT NEEDED FOR ANTENNA FRAME MODIFICATION

PROJECT INFORMATION

SITE NAME:	CT115/SNET VALLEY_FT
SITE ID:	CT11115F
SITE ADDRESS:	38 SPRING HILL LANE BETHEL, CT 06801
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°-21'-44.11" N LONGITUDE: 73°-23'-47.78" W GROUND ELEVATION: 810'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	07/30/20	ANC	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
CT115/SNET VALLEY_FT
SITE ID: CT11115F
38 SPRING HILL LANE
BETHEL, CT 06801

DATE: 07/05/20
SCALE: AS NOTED
JOB NO. 20074.47

TITLE SHEET

T-1

Sheet No. 1 of 9

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.

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD)

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI)
   C. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   D. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   E. PIPE---ASTM A53 (FY = 35 KSI)
   F. CONNECTION BOLTS---ASTM A325-N
   G. U-BOLTS---ASTM A36
   H. ANCHOR RODS-----ASTM F 1554
   I. WELDING ELECTRODE---ASTM E 70XX

2. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.
3. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.
4. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.
5. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.
6. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.
7. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.
8. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.
9. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".
10. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.
11. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.
12. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.
13. LOCK WASHER ARE NOT PERMITTED FOR A325 STEEL ASSEMBLIES.
14. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.
15. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.
16. FABRICATE BEAMS WITH MILL CAMBER UP.
17. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.
18. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.
19. INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY.
20. FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

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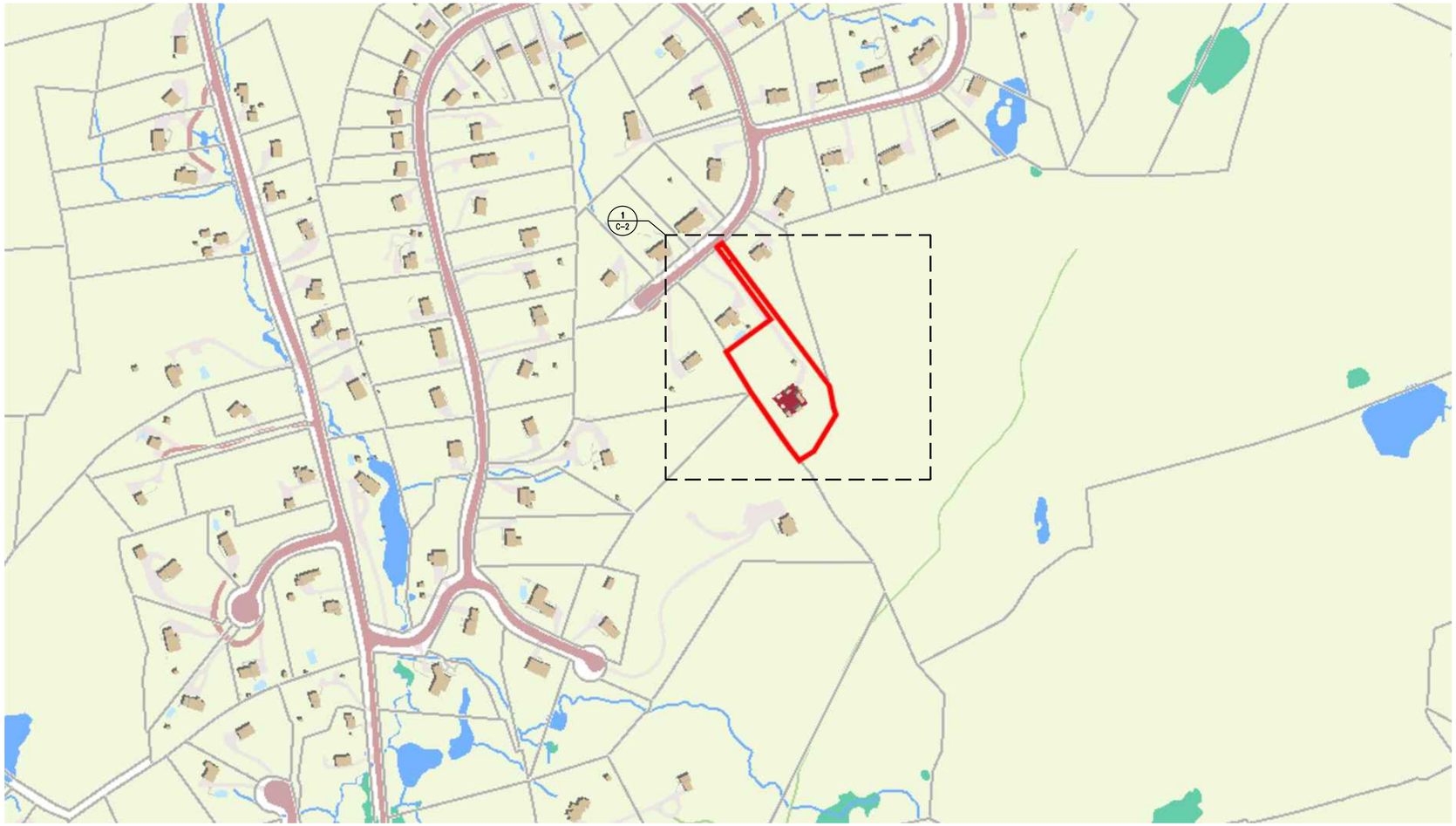
GENERAL NOTES AND SPECIFICATIONS

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)	(QTY) PROPOSED COAX (LENGTH)
A1	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	102'	60°			(1) 6x12 HYBRID CABLE (LENGTH TO MATCH EXISTING)
A2	EXISTING	RFS (APXVAARR24_43-U_NA20)	95.9 x 24 x 8.7	102'	60°	(E) RADIO 4449 B71 (1), (P) RADIO 4415 B25 (1)	(E) GENERIC TWIN STYLE 1B (1), (P) COMMSCOPE-SDX1926Q-43 (1)	
A3	EXISTING	ERICCSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.9 x 8.7	102'	60°			
B1	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	102'	180°			
B2	EXISTING	RFS (APXVAARR24_43-U_NA20)	95.9 x 24 x 8.7	102'	180°	(E) RADIO 4449 B71 (1), (P) RADIO 4415 B25 (1)	(E) GENERIC TWIN STYLE 1B (1), (P) COMMSCOPE-SDX1926Q-43 (1)	
B3	EXISTING	ERICCSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.9 x 8.7	102'	180°			
C1	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	102'	300°			
C2	EXISTING	RFS (APXVAARR24_43-U_NA20)	95.9 x 24 x 8.7	102'	300°	(E) RADIO 4449 B71 (1), (P) RADIO 4415 B25 (1)	(E) GENERIC TWIN STYLE 1B (1), (P) COMMSCOPE-SDX1926Q-43 (1)	
C3	EXISTING	ERICCSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.9 x 8.7	102'	300°			



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

TRUE NORTH

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SITE LOCATION PLAN

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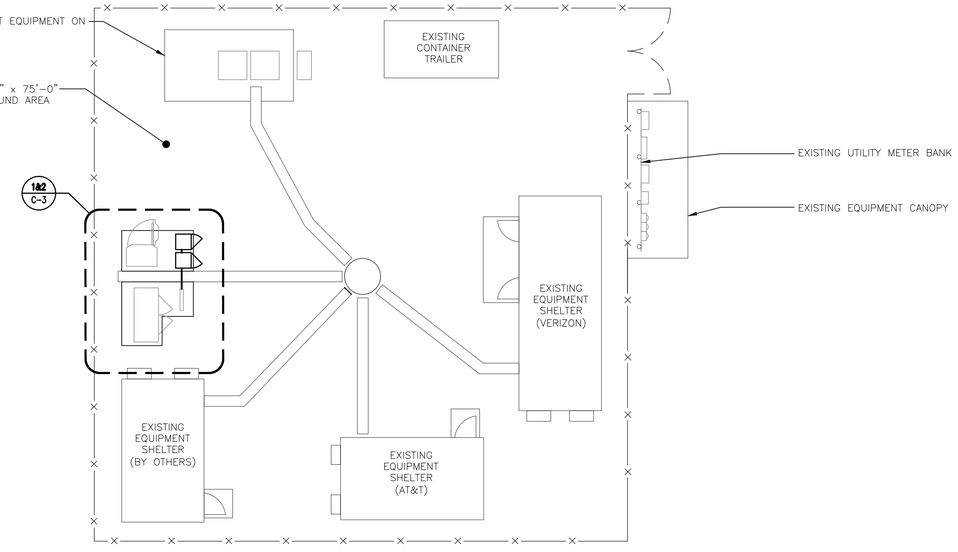
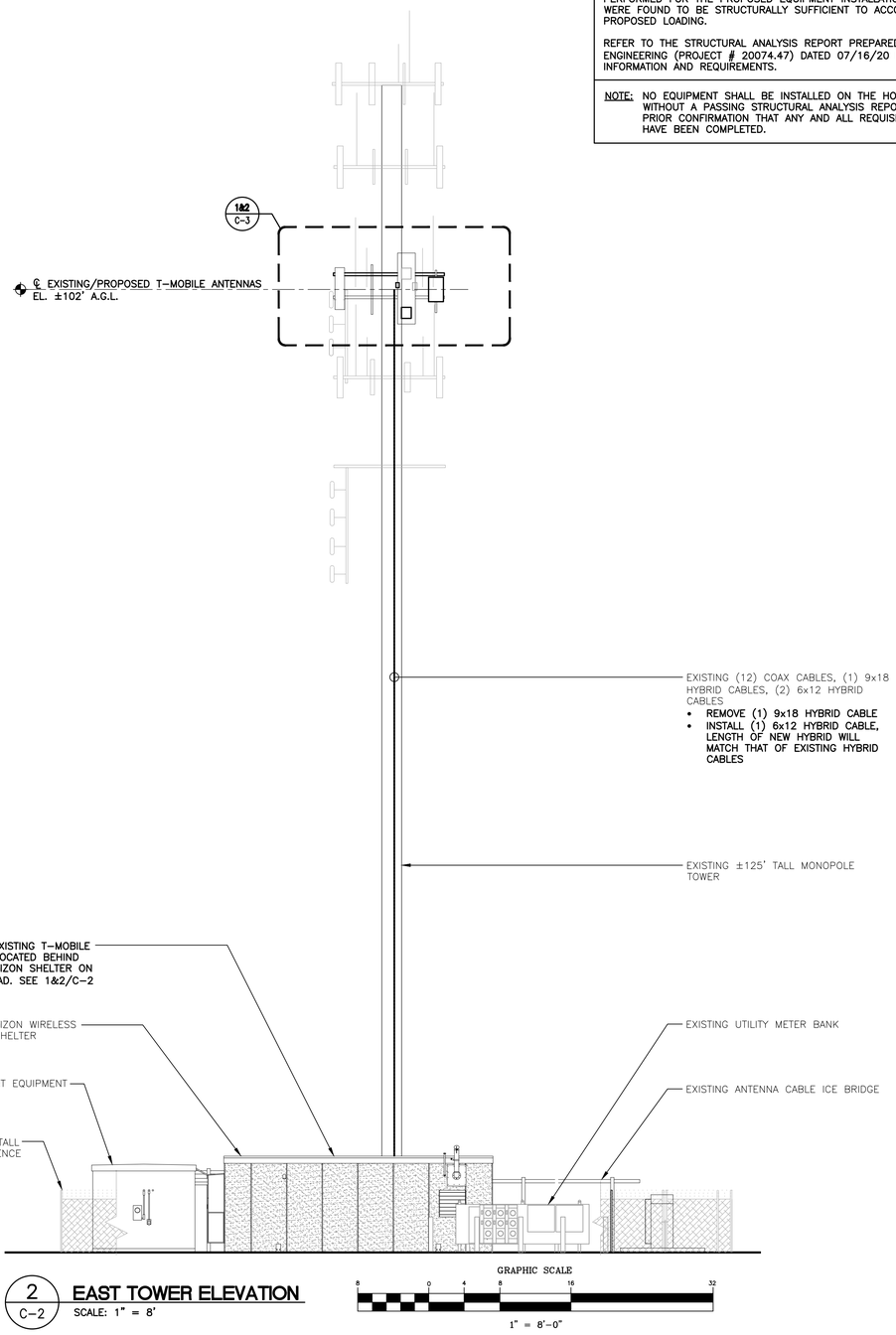
STRUCTURAL COMPLIANCE
ANTENNA MOUNTS A STRUCTURAL ANALYSIS OF THE ANTENNA MOUNTS WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY DEFICIENT AND WARRANTING MODIFICATION PRIOR TO INSTALLATION OF THE PROPOSED EQUIPMENT. FOR REQUIRED STRUCTURAL MODIFICATIONS, SEE SHEET(S) S-1 FOR ADDITIONAL DETAILS. REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 20074.47) DATED 07/15/20 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 # 20074.47) DATED 07/16/20 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.



1 C-2 **COMPOUND PLAN - PROPOSED**
SCALE: 1" = 10'

APPROXIMATE NORTH



2 C-2 **EAST TOWER ELEVATION**
SCALE: 1" = 8'

GRAPHIC SCALE
8 0 4 8 16 32
1" = 8'-0"

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COMPOUND PLAN, EQUIPMENT PLAN, AND ELEVATION

C-2

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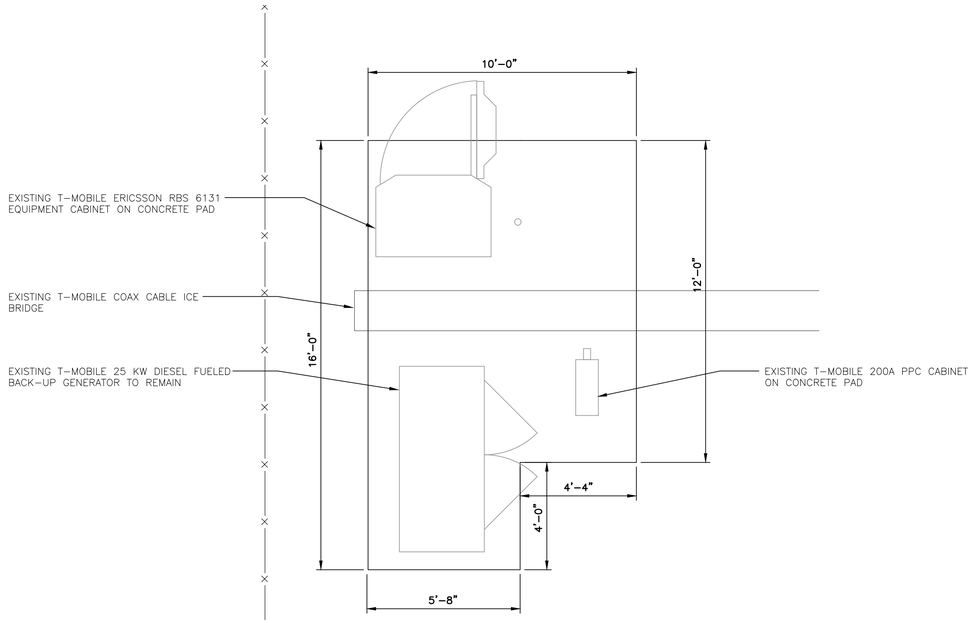
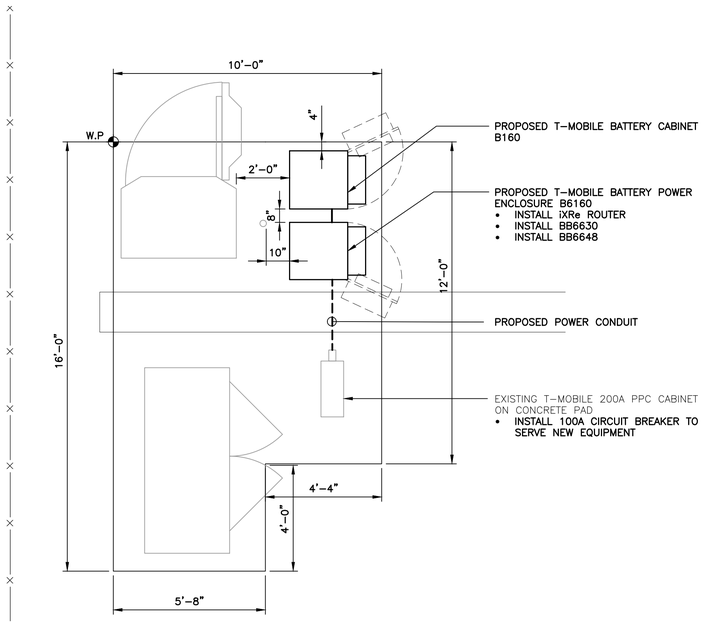


1 / C-3 **EXISTING EQUIPMENT PLAN**
SCALE: 3/8" = 1'

APPROXIMATE NORTH



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

APPROXIMATE NORTH

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EQUIPMENT PLAN

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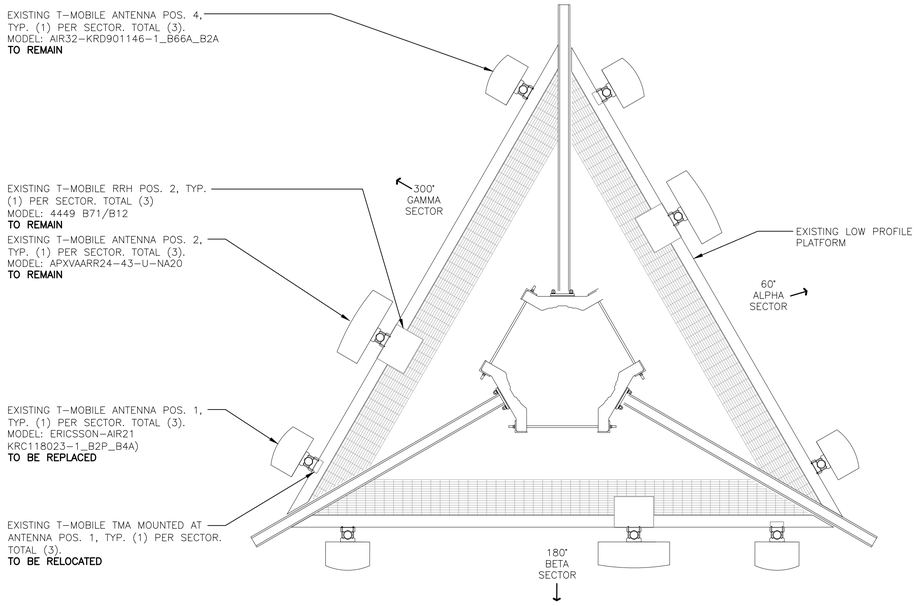
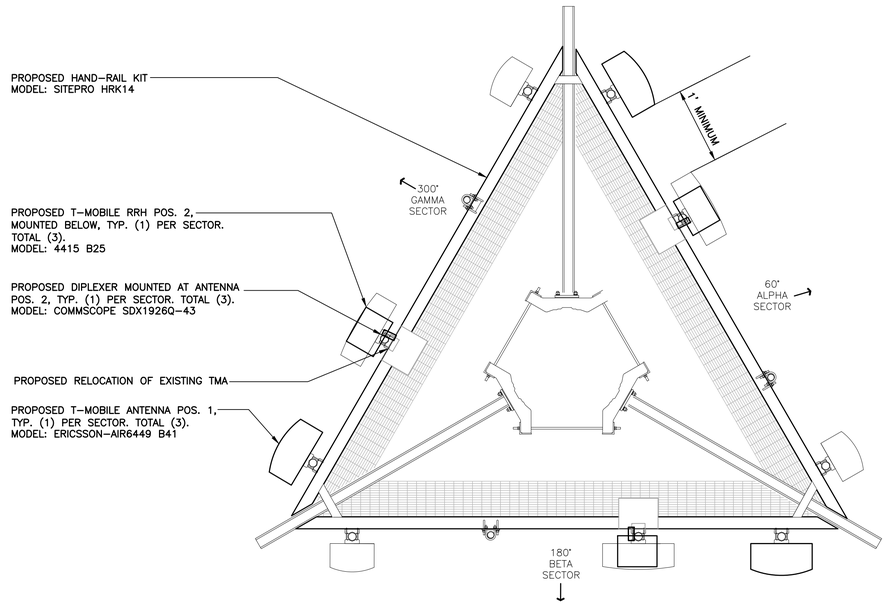
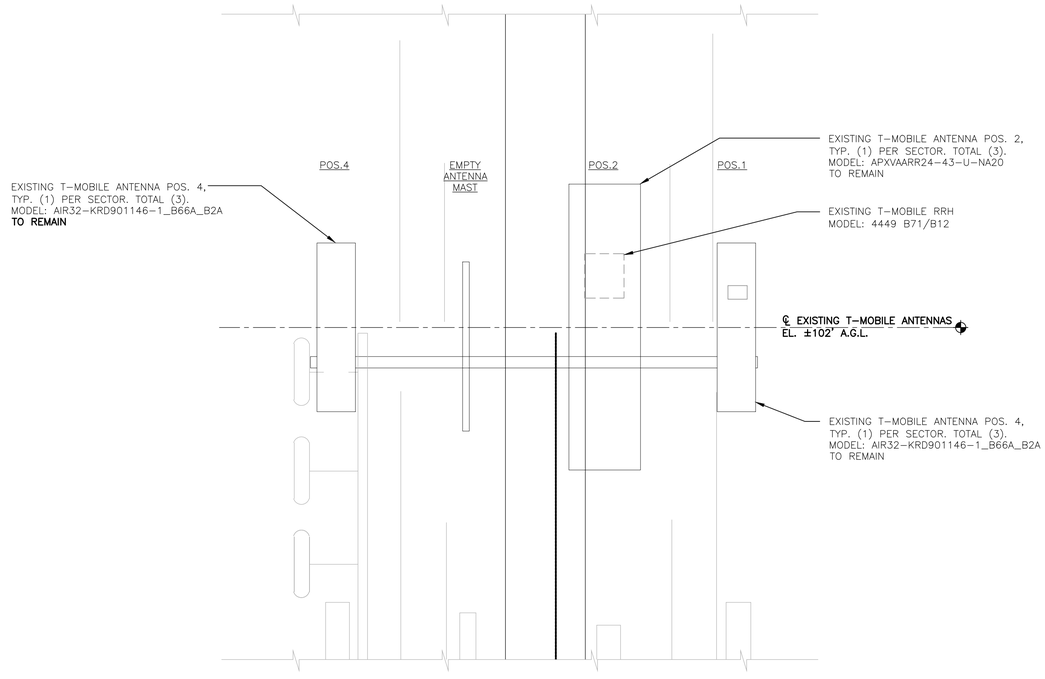


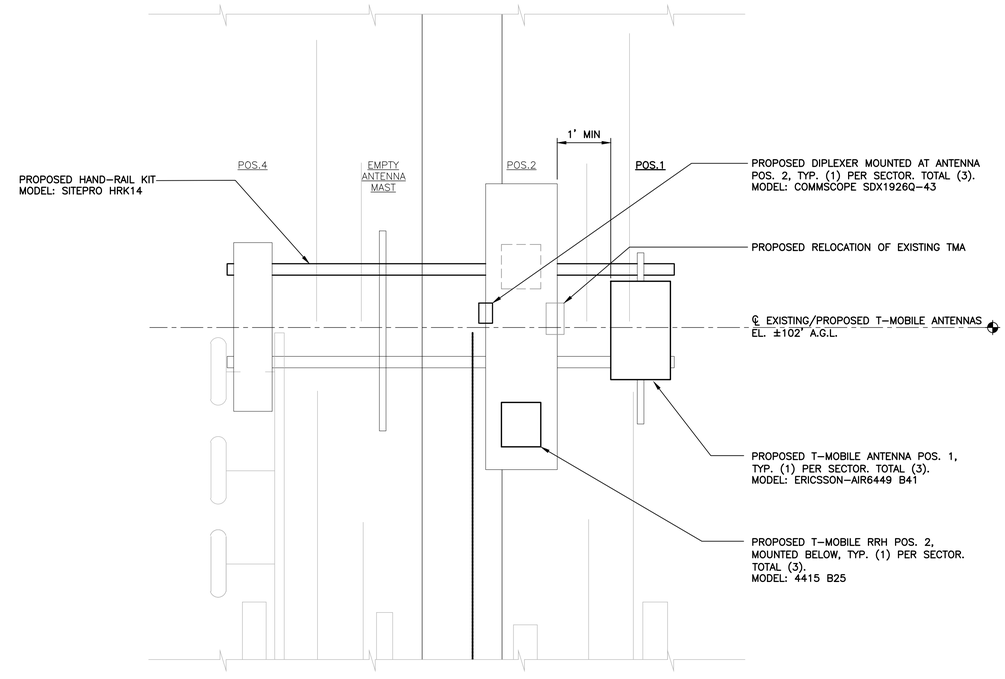
1 C-4 **EQUIPMENT AND ANTENNA PLAN - EXISTING**
SCALE: 1/2" = 1'



2 C-4 **EQUIPMENT AND ANTENNA PLAN - PROPOSED**
SCALE: 1/2" = 1'



1A C-4 **ANTENNA ELEVATION - EXISTING**
SCALE: 1/2" = 1'



2A C-4 **ANTENNA ELEVATION - PROPOSED**
SCALE: 1/2" = 1'

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ANTENNA PLANS

C-4

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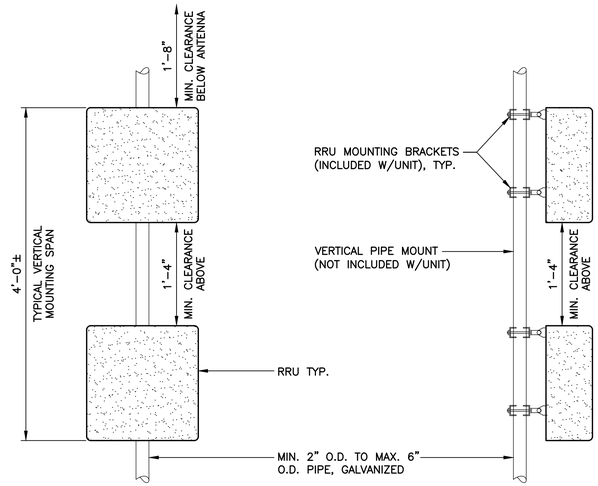
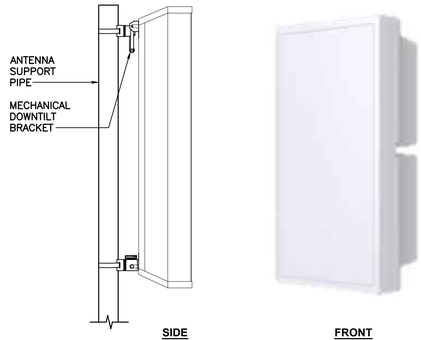


FRONT ELEVATION SIDE ELEVATION

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–5 **TYPICAL RRUS MOUNTING DETAILS**
SCALE: NOT TO SCALE

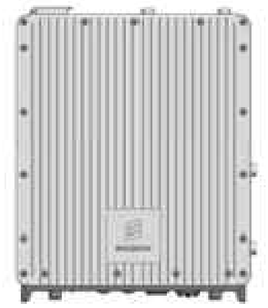


SIDE

FRONT

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

2 / C–5 **PROPOSED ANTENNA DETAIL**
SCALE: NOT TO SCALE



FRONT VIEW

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4415 B25	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.
NOTES: 1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T–MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.			

3 / C–5 **PROPOSED RRU DETAIL**
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–5 **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–5 **BATTERY CABINET DETAIL**
NOT TO SCALE

DIPLEXER		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: SDX1926Q–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–5 **PROPOSED DIPLEXER DETAIL**
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	07/30/20	ANC	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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T-Mobile
Transcend Wireless

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

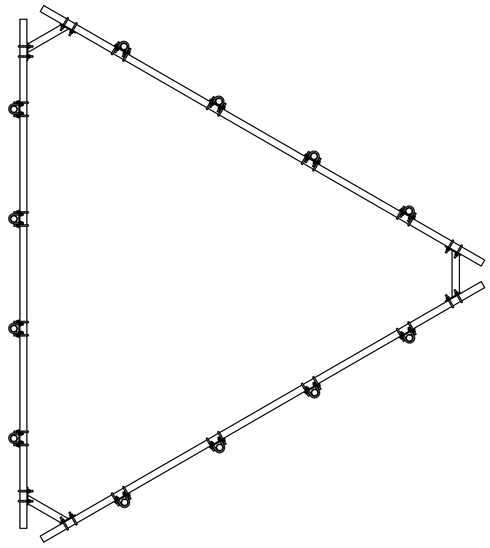
T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
CT115/SNET VALLEY_FT
SITE ID: CT11115F
38 SPRING HILL LANE
BETHEL, CT 06801

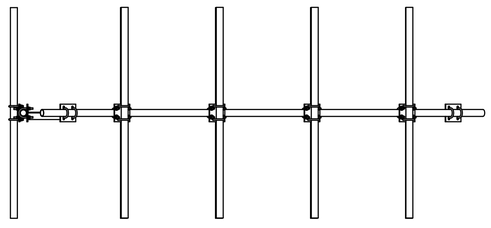
DATE: 07/05/20
SCALE: AS NOTED
JOB NO. 20074.47

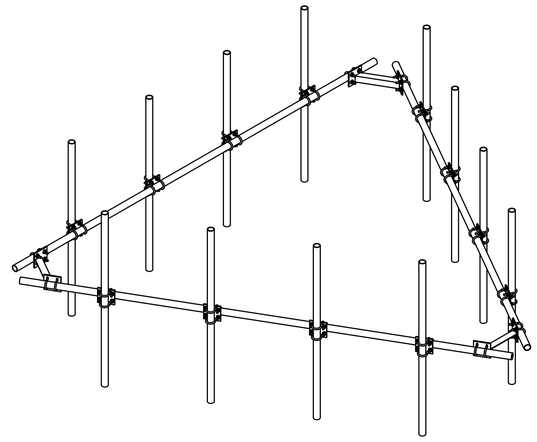
TYPICAL EQUIPMENT DETAILS

C-5

Sheet No. 7 of 9







1 / S-1 **HAND RAIL KIT DETAIL (P/N: HRK14)**

SITEPRO P/N: HRK14

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	07/30/20	ANC	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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38 SPRING HILL LANE
BETHEL, CT 06801

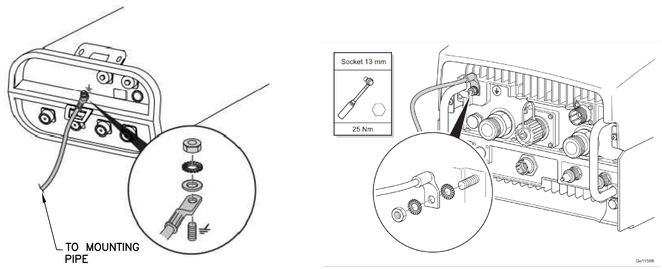
DATE: 07/05/20

SCALE: AS NOTED

JOB NO. 20074.47

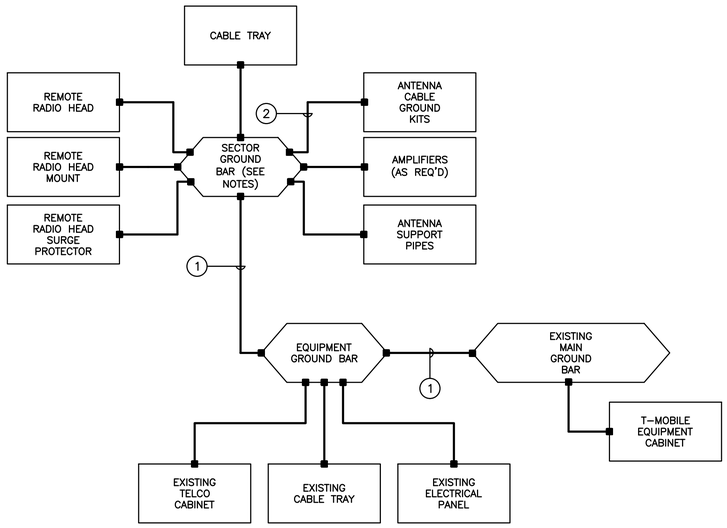
STRUCTURAL DETAILS

S-1



1 E-1 TYPICAL ANTENNA/RRU GROUNDING DETAILS

SCALE: NOT TO SCALE



GROUNDING SCHEMATIC NOTES

(1) #2 AWG

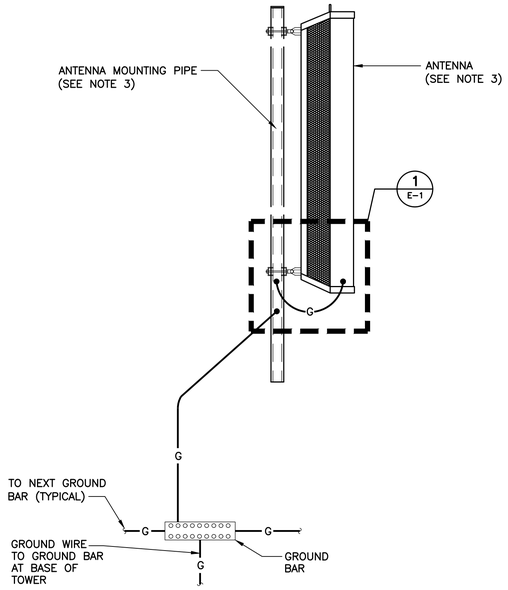
(2) #6 AWG

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 E-1 TYPICAL GROUNDING SCHEMATIC DETAIL

SCALE: NOT TO SCALE

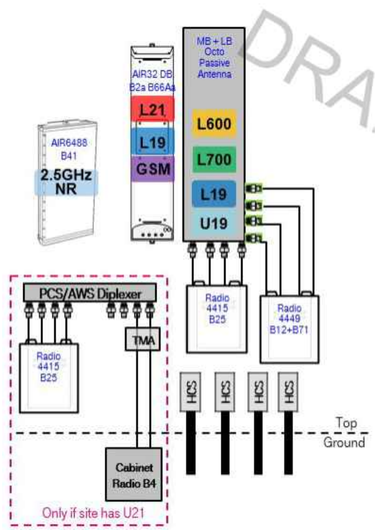


NOTES:

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 E-1 TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NOT TO SCALE

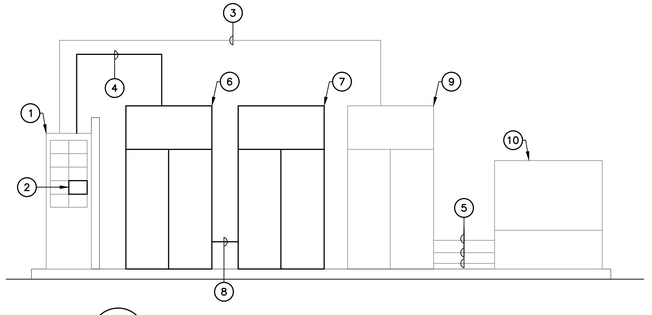


3 E-1 PROPOSED PLUMBING DIAGRAM

SCALE: NOT TO SCALE

RISER DIAGRAM NOTES

(1) EXISTING 200A, PPC CABINET TO REMAIN.
(2) NEW 100A/2P CIRCUIT BREAKER TO SERVE NEW EQUIPMENT CABINET.
(3) EXISTING CONDUITS AND CONDUCTORS TO REMAIN.
(4) (3) #1 AWG, (1) #8 AWG GROUND, 1-1/4" CONDUIT.
(5) EXISTING GENERATOR CONDUITS AND CONDUCTORS TO REMAIN.
(6) NEW T-MOBILE EQUIPMENT CABINET
(7) NEW T-MOBILE BATTERY CABINET
(8) DC CONDUIT AND CONDUCTORS FOR BATTERY CABINET CONNECTION PER MANUFACTURERS SPECIFICATIONS.
(9) EXISTING CABINET TO REMAIN.
(10) 25 KW DC GENERATOR TO REMAIN.



5 E-1 ELECTRICAL POWER RISER DIAGRAM

SCALE: NOT TO SCALE

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SCALE: AS NOTED
JOB NO. 20074.47

TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 9 of 9

CENTEK engineering

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Structural Analysis Report

125-ft Existing EEI Monopole

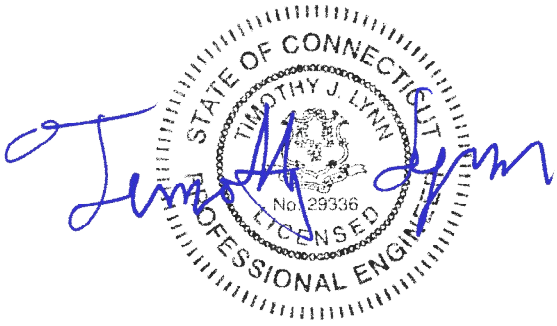
Proposed T-Mobile
Antenna Upgrade

Site Ref: CT11115F

38 Spring Hill Lane
Bethel, CT

CENTEK Project No. 20074.47

Date: July 16, 2020



Prepared for:

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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 monopole (tower) located in Bethel, CT.

The host tower is a 125-ft tall, three-section, eighteen sided, tapered monopole originally designed and manufactured by EEI job no; 14009-E01, dated March 9, 2006. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned tower design documents. Antenna and appurtenance information were obtained from a previous structural report prepared by Centek Engineering job no. 18058.27 dated May 18, 2018 and a RF data sheet.

The tower is made up of three (3) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 18.00-in at the top and 55.00-in at the base.

Antenna and Appurtenance Summary

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

- TOWN (EXISTING):
  Antennas: One (1) 18' x 4" Omni-directional whip antenna mounted on a 4-ft standoff with an elevation of 124-ft above existing grade.
  Coax Cables: Two (2) 1-5/8" ∅ coax cables running on the inside of the existing monopole.
- AT&T (EXISTING):
  Antennas: Three (3) Powerwave 7770 panel antennas, one (1) CCI HPA-65R-BUU-H8 panel antenna, two (2) CCI HPA-65R-BUU-H6 panel antennas, one (1) CCI TPA-65R-LCUUUU-H8 panel antenna, two (2) Quintel QS66512-2 panel antennas, two (2) Kathrein 80010965 panel antennas, one (1) Kathrein 80010966 panel antenna, six (6) Powerwave LGP21401 TMA's, three (3) Ericsson B14 4478 remote radio heads and six (6) Ericsson RRUS-32 mounted on a low profile platform with a RAD center elevation of 122-ft above existing grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing monopole.
- AT&T (EXISTING):
  Antennas: Six (6) Ericsson RRUS-11 and three (3) Raycap DC6-48-60-18-8F surge arrestors mounted to one (1) universal ring mount with a RAD center elevation of 120-ft above existing grade level.
  Coax Cables: Three (3) fiber cable and six (6) dc control cables running on the inside of the existing monopole.

- SPRINT (EXISTING):
  Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas and three (3) RFS APXVTM14 panel antennas mounted to a low profile platform with a RAD center elevation of 114-ft above the existing tower base plate. Six (3) ALU 1900 MHz RRH's, three (3) ALU 800 MHz RRH's and three (3) ALU TD-RRH-820 remote radio heads mounted on a universal tr-bracket below the existing low profile platform.
  Coax Cables: Four (4) 1-5/8" ∅ Hybriflex cables running on the inside of the existing tower.
- VERIZON (EXISTING):
  Antennas: One (1) JMA X7C-FRO-660 panel antenna, six (6) Antel WWX063X19G00 panel antennas, one (1) Antel BXA-80063-6CF panel antenna, two (2) Antel BXA-80080-6CF panel antenna, two (2) Kathrein 800-10736 panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Alcatel-Lucent RRH2x60-PCS remote radio heads, three (3) Alcatel-Lucent RRH4x45/2x90-AWS remote radio heads and two (2) Raycap RC2DC-3315-PF-48 main distribution boxes mounted on a low profile platform with a RAD center elevation of 95-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables and two (2) 1-5/8" ∅ fiber cables running inside the monopole.
- TOWN (EXISTING):
  Antennas: Two (2) 18' x 4" Omni-directional whip antennas mounted on the Verizon 13-ft low profile platform with an elevation of 92-ft above existing grade.
  Coax Cables: Two (2) 1-5/8" ∅ coax cables running on the inside of the existing monopole.
- EMPTY MOUNT (EXISTING):
  Mount: Low profile platform with an elevation of 82-ft above existing grade.
- TOWN (EXISTING):
  Antennas: One (1) 20' 4-bay dipole antenna mounted on a 13-ft low profile platform with an elevation of 72-ft above existing grade.
  Coax Cables: Two (2) 1-5/8" ∅ coax cables running on the inside of the existing monopole.
- T-MOBILE (EXISTING TO REMAIN):
  Antennas: Three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAARR24_43 panel antennas, three (3) Ericsson 4449 remote radio units and three (3) TMAs mounted on a low profile platform with a RAD center elevation of 102-ft above grade level.
  Cables: Twelve (12) 1-5/8" ∅ coax cables and two (2) 6x12 fiber cables running inside the monopole.

- **T-MOBILE (EXISTING TO REMOVE):**
  Antennas: Three (3) Ericsson AIR21 panel antennas mounted on a low profile platform with a RAD center elevation of 102-ft above grade level.
  Cables: One (1) 9x18 fiber line running inside the monopole.
- **T-MOBILE (PROPOSED):**
  Misc. Equipment: Three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson 4415 remote radio units and three (3) Commscope SDX1926Q-43 diplexers mounted on a low profile platform with a RAD center elevation of 102-ft above grade level. (Installation of one (1) SitePro handrail (p/n HRK12) is required)
  Cables: One (1) 6x12 fiber line running on the interior of the monopole.

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 or reinforcement drawings.
- 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.
- All coax cables to be installed as indicated in this report.

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; v = 90-110 mph	*[Annex B of TIA-222-G-2005]*
	Bethel; v = 93 mph	*[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 2018 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. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **98.6%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L2)	47.67'-96.04'	98.6%	**PASS**

Foundation and Anchors

The existing foundation consists of a 7-ft square x 1-ft long reinforced concrete pier on a 25.0-ft square x 4.5-ft thick reinforce concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned EEI design documents. The base of the tower is connected to the foundation by means of (12) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 5-ft into the concrete foundation structure.

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	37 kips
	Compression	44 kips
	Moment	3347 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Pad and Pier	OTM[2]	1.0	1.6	**PASS**

Note 1: FS denotes Factor of Safety.

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Shear	69.3%	**PASS**
Base Plate	Bending	29.0%	**PASS**

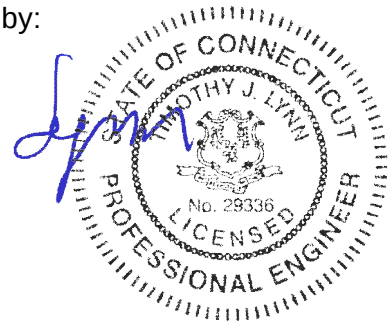
Conclusion

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

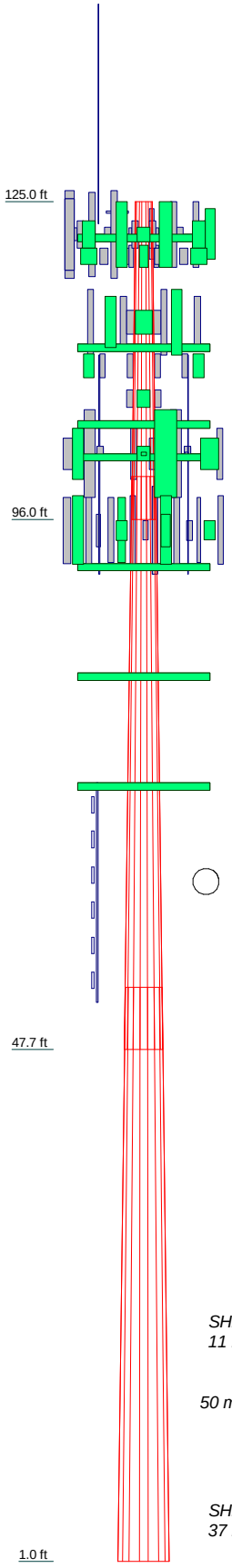
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, 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.

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	28.96	18	0.1875	3.92	18.0000	26.9000	A572-65	1.3
2	52.29	18	0.2500	5.67	25.3212	41.2800		4.7
3	52.33	18	0.3125		39.0504	55.0000		8.3
								14.2



ALL REACTIONS ARE FACTORED

AXIAL 78 K

SHEAR 11 K

MC 10(

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

AXIAL 44 K

SHEAR 37 K

MOMENT 3347 kip-ft

TORQUE 14 kip-ft
REACTIONS - 93 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
18' x 4" Dia Omni (Town - Existing)	124	AIR32 (T-Mobile - Existing)	102
4-ft Standoff (Town - Existing)	124	AIR6449 (T-Mobile - Proposed)	102
7770.00 (ATI)	122	APXVAARR24-43 (T-Mobile - Existing)	102
HPA-65R-BUU-H8 (ATI)	122	AIR32 (T-Mobile - Existing)	102
TPA-65R-LCUUUU-H8 (ATI)	122	KRY 112 TMA (T-Mobile - Existing)	102
80010966 (ATI)	122	KRY 112 TMA (T-Mobile - Existing)	102
7770.00 (ATI)	122	KRY 112 TMA (T-Mobile - Existing)	102
HPA-65R-BUU-H6 (ATI)	122	Radio 4449 B71 B12 (T-Mobile - Existing)	102
QS66512-2 (ATI)	122		
80010965 (ATI)	122	Radio 4449 B71 B12 (T-Mobile - Existing)	102
7770.00 (ATI)	122		
HPA-65R-BUU-H6 (ATI)	122	Radio 4449 B71 B12 (T-Mobile - Existing)	102
QS66512-2 (ATI)	122		
80010965 (ATI)	122	4415 B25 (T-Mobile - Proposed)	102
(2) LGP21401 TMA (ATI)	122	4415 B25 (T-Mobile - Proposed)	102
(2) LGP21401 TMA (ATI)	122	4415 B25 (T-Mobile - Proposed)	102
(2) LGP21401 TMA (ATI)	122	SDX1926Q-43 (T-Mobile - Proposed)	102
(2) RRUS-32 (ATI)	122	SDX1926Q-43 (T-Mobile - Proposed)	102
(2) RRUS-32 (ATI)	122	SDX1926Q-43 (T-Mobile - Proposed)	102
(2) RRUS-32 (ATI)	122	AIR6449 (T-Mobile - Proposed)	102
B14 4478 (ATI)	122	EEI 14-ft Low Profile Platform (T-Mobile - Existing)	102
B14 4478 (ATI)	122	X7C-FRO-660-VRO (Verizon)	95
B14 4478 (ATI)	122	WWX063X19G00 (Verizon)	95
EEI 14-ft Low Profile Platform (ATI)	122	BXA-80063-6CF (Verizon)	95
(2) RRUS-11 (ATI)	120	WWX063X19G00 (Verizon)	95
(2) RRUS-11 (ATI)	120	800-10736 (Verizon)	95
DC6-48-60-18-8F Surge Arrestor (ATI)	120	WWX063X19G00 (Verizon)	95
DC6-48-60-18-8F Surge Arrestor (ATI)	120	BXA-80080-6CF (Verizon)	95
DC6-48-60-18-8F Surge Arrestor (ATI)	120	WWX063X19G00 (Verizon)	95
Valmont Uni-Tri Bracket (ATI)	120	800-10736 (Verizon)	95
(2) RRUS-11 (ATI)	120	WWX063X19G00 (Verizon)	95
APXVSPP18-C-A20 (Sprint)	114	BXA-80080-6CF (Verizon)	95
APXVTM14 (Sprint)	114	WWX063X19G00 (Verizon)	95
APXVSPP18-C-A20 (Sprint)	114	RRH2x60-07-U (Verizon)	95
APXVTM14 (Sprint)	114	RRH2x60-07-U (Verizon)	95
APXVSPP18-C-A20 (Sprint)	114	RRH2x60-07-U (Verizon)	95
APXVTM14 (Sprint)	114	RRH2x60-AWS (Verizon)	95
TD-RRH8x20-25 (Sprint)	114	RRH2x60-AWS (Verizon)	95
TD-RRH8x20-25 (Sprint)	114	RRH2x60-AWS (Verizon)	95
TD-RRH8x20-25 (Sprint)	114	RRH2x60-PCS (Verizon)	95
EEI 14-ft Low Profile Platform (Sprint)	112	RRH2x60-PCS (Verizon)	95
(2) FD-RRH 4x45 1900 (Sprint)	110	RRH2x60-PCS (Verizon)	95
(2) FD-RRH 4x45 1900 (Sprint)	110	DB-T1-6Z-8AB-0Z (Verizon)	95
(2) FD-RRH 4x45 1900 (Sprint)	110	DB-T1-6Z-8AB-0Z (Verizon)	95
FD-RRH 2x50 800 (Sprint)	107	EEI 14-ft Low Profile Platform (Verizon)	92
FD-RRH 2x50 800 (Sprint)	107	18' x 4" Dia Omni (Town - Existing)	92
FD-RRH 2x50 800 (Sprint)	107	18' x 4" Dia Omni (Town - Existing)	92
SitePro 12' Handrail Kit HRK12 (T-Mobile - Proposed)	105	EEI 14-ft Low Profile Platform (Town - Existing)	82
APXVAARR24-43 (T-Mobile - Existing)	102	EEI 14-ft Low Profile Platform (Town - Existing)	72
AIR32 (T-Mobile - Existing)	102		
AIR6449 (T-Mobile - Proposed)	102	ANT150D6-9 (Town - Existing)	72
APXVAARR24-43 (T-Mobile - Existing)	102		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 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 3 with Crest Height of 250.00 ft
7. TOWER RATING: 98.6%

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

Job:	***20074.47 - CT11115F***		
Project:	***125' EEI Monopole - 38 Sprill Hill Lane, Bethel, CT***		
Client: T-Mobile		Drawn by: TJL	App'd:
Code: TIA-222-G		Date: 07/16/20	Scale: NTS
Path: J:\Jobs\20074\00.WI\47_CT11115F\05_Structural\Tower Analysis\Backup Documentation\ER Files\125' EEI Monopole_Bethel_CT.eri			Dwg No. E-1

Tower Input Data

The tower is a monopole.
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 3.
Crest Height 250.00 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 pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification		Use Clear Spans For Wind Area		SR Leg Bolts Resist Compression
√	Use Code Stress Ratios		Use Clear Spans For KL/r		All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys		Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice	√	Bypass Mast Stability Checks		Consider Feed Line Torque
	Always Use Max Kz		Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
	Include Bolts In Member Capacity		Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component	√	Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	*Elevation* ft	*Section Length* ft	*Splice Length* ft	*Number of Sides*	*Top Diameter* in	*Bottom Diameter* in	*Wall Thickness* in	*Bend Radius* in	*Pole Grade*
L1	125.00-96.04	28.96	3.92	18	18.0000	26.9000	0.1875	0.7500	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L2	96.04-47.67	52.29	5.67	18	25.3212	41.2800	0.2500	1.0000	A572-65 (65 ksi)
L3	47.67-1.00	52.33		18	39.0504	55.0000	0.3125	1.2500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	18.2488	10.6007	424.9328	6.3234	9.1440	46.4712	850.4248	5.3013	2.8380	15.136
	27.2861	15.8973	1433.1421	9.4829	13.6652	104.8753	2868.1699	7.9501	4.4044	23.49
L2	26.8872	19.8940	1579.8327	8.9003	12.8632	122.8182	3161.7442	9.9489	4.0165	16.066
	41.8782	32.5573	6924.5082	14.5657	20.9702	330.2064	13858.1278	16.2817	6.8253	27.301
L3	41.3584	38.4232	7284.5741	13.7520	19.8376	367.2100	14578.7333	19.2153	6.3229	20.233
	55.8003	54.2432	20495.5041	19.4141	27.9400	733.5542	41017.9768	27.1267	9.1300	29.216

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
L1 125.00-96.04				1	1	1			
L2 96.04-47.67				1	1	1			
L3 47.67-1.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8 (AT&T)	C	No	Yes	Inside Pole	123.00 - 4.00	12	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
RG6-Fiber (AT&T)	C	No	Yes	Inside Pole	123.00 - 4.00	3	No Ice	0.00	1.00
							1/2" Ice	0.00	1.00
							1" Ice	0.00	1.00
#8 AWG Copper WIre (AT&T)	C	No	Yes	Inside Pole	123.00 - 4.00	6	No Ice	0.00	0.05
							1/2" Ice	0.00	0.05
							1" Ice	0.00	0.05
HYBRIFLEX 1-1/4" (Sprint - Existing)	C	No	Yes	Inside Pole	113.00 - 1.00	4	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
1 5/8 (T-Mobile)	C	No	Yes	Inside Pole	103.00 - 4.00	12	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
HYBRIFLEX 1-5/8" (T-Mobile)	C	No	Yes	Inside Pole	103.00 - 4.00	3	No Ice	0.00	1.90
							1/2" Ice	0.00	1.90
							1" Ice	0.00	1.90
1 5/8 (Verizon)	C	No	Yes	Inside Pole	93.00 - 1.00	12	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
							1" Ice	0.00	1.04
HYBRIFLEX 1-5/8" (Verizon)	C	No	Yes	Inside Pole	93.00 - 1.00	2	No Ice	0.00	1.90
							1/2" Ice	0.00	1.90
							1" Ice	0.00	1.90
1 5/8 (Town - Existing)	C	No	Yes	Inside Pole	123.00 - 4.00	2	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1 5/8 (Town - Existing)	C	No	Yes	Inside Pole	93.00 - 4.00	2	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1 5/8 (Town - Existing)	C	No	Yes	Inside Pole	73.00 - 4.00	2	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04

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
L1	125.00-96.04	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.70
L2	96.04-47.67	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2.88
L3	47.67-1.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	2.76

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
L1	125.00-96.04	A	1.920	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.70
L2	96.04-47.67	A	1.914	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2.88
L3	47.67-1.00	A	1.827	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	2.76

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

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
18' x 4" Dia Omni	A	From Face	4.00	0.0000	124.00	No Ice	6.16	6.16	0.05
(Town - Existing)			0.00			1/2" Ice	9.04	9.04	0.10
			9.00			1" Ice	10.90	10.90	0.16
4-ft Standoff	A	From Face	2.00	0.0000	124.00	No Ice	1.20	0.07	0.03
(Town - Existing)			0.00			1/2" Ice	1.49	0.11	0.04
			0.00			1" Ice	1.78	0.16	0.06
7770.00	A	From Face	3.50	0.0000	122.00	No Ice	5.51	2.93	0.04
(AT&T)			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
HPA-65R-BUU-H8	A	From Face	3.50	0.0000	122.00	No Ice	12.98	7.52	0.07
(AT&T)			-2.00			1/2" Ice	13.56	8.09	0.14
			0.00			1" Ice	14.15	8.67	0.22
TPA-65R-LCUUUU-H8	A	From Face	3.50	0.0000	122.00	No Ice	13.30	8.82	0.08
(AT&T)			2.00			1/2" Ice	13.90	9.42	0.15
			0.00			1" Ice	14.50	10.03	0.24
80010966	A	From Face	3.50	0.0000	122.00	No Ice	17.36	7.50	0.13
(AT&T)			-6.00			1/2" Ice	17.99	8.09	0.22
			0.00			1" Ice	18.63	8.69	0.32
7770.00	B	From Face	3.50	0.0000	122.00	No Ice	5.51	2.93	0.04
(AT&T)			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
HPA-65R-BUU-H6	B	From Face	3.50	0.0000	122.00	No Ice	9.66	6.45	0.05
(AT&T)			-2.00			1/2" Ice	10.13	6.91	0.11
			0.00			1" Ice	10.61	7.38	0.18
QS66512-2	B	From Face	3.50	0.0000	122.00	No Ice	8.13	6.80	0.11
(AT&T)			2.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
80010965	A	From Face	3.50	0.0000	122.00	No Ice	13.81	5.83	0.11
(AT&T)			-6.00			1/2" Ice	14.35	6.32	0.19
			0.00			1" Ice	14.89	6.82	0.27
7770.00	C	From Face	3.50	0.0000	122.00	No Ice	5.51	2.93	0.04
(AT&T)			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
HPA-65R-BUU-H6	C	From Face	3.50	0.0000	122.00	No Ice	9.66	6.45	0.05
(AT&T)			-2.00			1/2" Ice	10.13	6.91	0.11
			0.00			1" Ice	10.61	7.38	0.18
QS66512-2	C	From Face	3.50	0.0000	122.00	No Ice	8.13	6.80	0.11
(AT&T)			2.00			1/2" Ice	8.59	7.27	0.17
			0.00			1" Ice	9.05	7.72	0.23
80010965	A	From Face	3.50	0.0000	122.00	No Ice	13.81	5.83	0.11
(AT&T)			-6.00			1/2" Ice	14.35	6.32	0.19
			0.00			1" Ice	14.89	6.82	0.27
(2) LGP21401 TMA	A	From Face	3.50	0.0000	122.00	No Ice	0.82	0.35	0.02
(AT&T)			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	B	From Face	3.50	0.0000	122.00	No Ice	0.82	0.35	0.02
(AT&T)			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA	C	From Face	3.50	0.0000	122.00	No Ice	0.82	0.35	0.02
(AT&T)			0.00			1/2" Ice	0.94	0.44	0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	1.06	0.54	0.03
(2) RRUS-32	A	From Face	3.00	0.0000	122.00	No Ice	3.31	2.42	0.08
(AT&T)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
(2) RRUS-32	B	From Face	3.00	0.0000	122.00	No Ice	3.31	2.42	0.08
(AT&T)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
(2) RRUS-32	C	From Face	3.00	0.0000	122.00	No Ice	3.31	2.42	0.08
(AT&T)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
B14 4478	A	From Face	3.00	0.0000	122.00	No Ice	1.84	1.06	0.06
(AT&T)			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
B14 4478	B	From Face	3.00	0.0000	122.00	No Ice	1.84	1.06	0.06
(AT&T)			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
B14 4478	C	From Face	3.00	0.0000	122.00	No Ice	1.84	1.06	0.06
(AT&T)			0.00			1/2" Ice	2.01	1.20	0.08
			0.00			1" Ice	2.19	1.34	0.09
(2) RRUS-11	A	From Face	0.50	0.0000	120.00	No Ice	2.57	1.07	0.05
(AT&T)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
(2) RRUS-11	B	From Face	0.50	0.0000	120.00	No Ice	2.57	1.07	0.05
(AT&T)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
(2) RRUS-11	C	From Face	0.50	0.0000	120.00	No Ice	2.57	1.07	0.05
(AT&T)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
DC6-48-60-18-8F Surge	A	From Face	0.50	0.0000	120.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	B	From Face	0.50	0.0000	120.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T)			0.00			1" Ice	2.29	2.29	0.06
DC6-48-60-18-8F Surge	C	From Face	0.50	0.0000	120.00	No Ice	1.91	1.91	0.02
Arrestor			0.00			1/2" Ice	2.10	2.10	0.04
(AT&T)			0.00			1" Ice	2.29	2.29	0.06
Valmont Uni-Tri Bracket	C	None		0.0000	120.00	No Ice	1.75	1.75	0.29
(AT&T)						1/2" Ice	1.94	1.94	0.31
						1" Ice	2.13	2.13	0.32
EEI 14-ft Low Profile	C	None		0.0000	122.00	No Ice	16.50	16.50	1.55
Platform						1/2" Ice	20.00	20.00	1.80
(AT&T)						1" Ice	23.50	23.50	2.05
APXVSPP18-C-A20	A	From Face	3.00	0.0000	114.00	No Ice	8.02	5.28	0.06
(Sprint)			-3.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
APXVTM14	A	From Face	3.00	0.0000	114.00	No Ice	6.34	3.61	0.06
(Sprint)			3.00			1/2" Ice	6.72	3.97	0.10
			0.00			1" Ice	7.10	4.33	0.14
APXVSPP18-C-A20	B	From Face	3.00	0.0000	114.00	No Ice	8.02	5.28	0.06
(Sprint)			-3.00			1/2" Ice	8.48	5.74	0.11
			0.00			1" Ice	8.94	6.20	0.16
APXVTM14	B	From Face	3.00	0.0000	114.00	No Ice	6.34	3.61	0.06
(Sprint)			3.00			1/2" Ice	6.72	3.97	0.10
			0.00			1" Ice	7.10	4.33	0.14
APXVSPP18-C-A20	C	From Face	3.00	0.0000	114.00	No Ice	8.02	5.28	0.06
(Sprint)			-3.00			1/2" Ice	8.48	5.74	0.11

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	8.94	6.20	0.16
APXVTM14	C	From Face	3.00	0.0000	114.00	No Ice	6.34	3.61	0.06
(Sprint)			3.00			1/2" Ice	6.72	3.97	0.10
			0.00			1" Ice	7.10	4.33	0.14
TD-RRH8x20-25	A	From Face	0.50	0.0000	114.00	No Ice	4.05	1.53	0.07
(Sprint)			0.00			1/2" Ice	4.30	1.71	0.10
			0.00			1" Ice	4.56	1.90	0.13
TD-RRH8x20-25	B	From Face	0.50	0.0000	114.00	No Ice	4.05	1.53	0.07
(Sprint)			0.00			1/2" Ice	4.30	1.71	0.10
			0.00			1" Ice	4.56	1.90	0.13
TD-RRH8x20-25	C	From Face	0.50	0.0000	114.00	No Ice	4.05	1.53	0.07
(Sprint)			0.00			1/2" Ice	4.30	1.71	0.10
			0.00			1" Ice	4.56	1.90	0.13
(2) FD-RRH 4x45 1900	A	From Face	0.50	0.0000	110.00	No Ice	2.32	2.38	0.06
(Sprint)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
(2) FD-RRH 4x45 1900	B	From Face	0.50	0.0000	110.00	No Ice	2.32	2.38	0.06
(Sprint)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
(2) FD-RRH 4x45 1900	C	From Face	0.50	0.0000	110.00	No Ice	2.32	2.38	0.06
(Sprint)			0.00			1/2" Ice	2.52	2.59	0.08
			0.00			1" Ice	2.74	2.80	0.11
FD-RRH 2x50 800	A	From Face	0.50	0.0000	107.00	No Ice	2.06	1.93	0.06
(Sprint)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	B	From Face	0.50	0.0000	107.00	No Ice	2.06	1.93	0.06
(Sprint)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
FD-RRH 2x50 800	C	From Face	0.50	0.0000	107.00	No Ice	2.06	1.93	0.06
(Sprint)			0.00			1/2" Ice	2.24	2.11	0.09
			0.00			1" Ice	2.43	2.29	0.11
EEI 14-ft Low Profile	C	None		0.0000	112.00	No Ice	16.50	16.50	1.55
Platform						1/2" Ice	20.00	20.00	1.80
(Sprint)						1" Ice	23.50	23.50	2.05
AIR6449	A	From Face	3.50	0.0000	102.00	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
APXVAARR24-43	A	From Face	3.50	0.0000	102.00	No Ice	20.24	8.89	0.15
(T-Mobile - Existing)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	A	From Face	3.50	0.0000	102.00	No Ice	6.51	4.71	0.13
(T-Mobile - Existing)			6.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR6449	B	From Face	3.50	0.0000	102.00	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
APXVAARR24-43	B	From Face	3.50	0.0000	102.00	No Ice	20.24	8.89	0.15
(T-Mobile - Existing)			-2.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
AIR32	B	From Face	3.50	0.0000	102.00	No Ice	6.51	4.71	0.13
(T-Mobile - Existing)			6.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR6449	C	From Face	3.50	0.0000	102.00	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
APXVAARR24-43	C	From Face	3.50	0.0000	102.00	No Ice	20.24	8.89	0.15
(T-Mobile - Existing)			-2.00			1/2" Ice	20.89	9.49	0.27

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	21.54	10.09	0.39
AIR32	C	From Face	3.50	0.0000	102.00	No Ice	6.51	4.71	0.13
(T-Mobile - Existing)			6.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
KRY 112 TMA	A	From Face	3.50	0.0000	102.00	No Ice	0.78	0.49	0.03
(T-Mobile - Existing)			0.00			1/2" Ice	0.90	0.59	0.03
			0.00			1" Ice	1.03	0.70	0.04
KRY 112 TMA	B	From Face	3.50	0.0000	102.00	No Ice	0.78	0.49	0.03
(T-Mobile - Existing)			0.00			1/2" Ice	0.90	0.59	0.03
			0.00			1" Ice	1.03	0.70	0.04
KRY 112 TMA	C	From Face	3.50	0.0000	102.00	No Ice	0.78	0.49	0.03
(T-Mobile - Existing)			0.00			1/2" Ice	0.90	0.59	0.03
			0.00			1" Ice	1.03	0.70	0.04
Radio 4449 B71 B12	A	From Face	3.50	0.0000	102.00	No Ice	1.64	1.29	0.07
(T-Mobile - Existing)			0.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	B	From Face	3.50	0.0000	102.00	No Ice	1.64	1.29	0.07
(T-Mobile - Existing)			0.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	C	From Face	3.50	0.0000	102.00	No Ice	1.64	1.29	0.07
(T-Mobile - Existing)			0.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
4415 B25	A	From Face	3.50	0.0000	102.00	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 Face	3.50	0.0000	102.00	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 Face	3.50	0.0000	102.00	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
SDX1926Q-43	A	From Face	3.50	0.0000	102.00	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 Face	3.50	0.0000	102.00	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 Face	3.50	0.0000	102.00	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 12' Handrail Kit	C	None		0.0000	105.00	No Ice	5.00	5.00	0.27
HRK12						1/2" Ice	8.00	8.00	0.35
(T-Mobile - Proposed)						1" Ice	11.00	11.00	0.44
EEI 14-ft Low Profile	C	None		0.0000	102.00	No Ice	16.50	16.50	1.55
Platform						1/2" Ice	20.00	20.00	1.80
(T-Mobile - Existing)						1" Ice	23.50	23.50	2.05
X7C-FRO-660-VRO	A	From Face	3.50	0.0000	95.00	No Ice	9.55	5.87	0.04
(Verizon)			-6.00			1/2" Ice	10.02	6.32	0.09
			0.00			1" Ice	10.50	6.79	0.16
WWX063X19G00	A	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			-2.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
BXA-80063-6CF	A	From Face	3.50	0.0000	95.00	No Ice	7.57	4.16	0.02
(Verizon)			2.00			1/2" Ice	8.02	4.60	0.06
			0.00			1" Ice	8.47	5.04	0.11
WWX063X19G00	A	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			6.00			1/2" Ice	9.07	6.03	0.09

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00			1" Ice	9.55	6.50	0.15
800-10736	B	From Face	3.50	0.0000	95.00	No Ice	11.39	5.17	0.04
(Verizon)			-6.00			1/2" Ice	12.01	5.74	0.10
			0.00			1" Ice	12.63	6.32	0.16
WWX063X19G00	B	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			-2.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
BXA-80080-6CF	B	From Face	3.50	0.0000	95.00	No Ice	5.77	4.56	0.02
(Verizon)			2.00			1/2" Ice	6.22	5.00	0.05
			0.00			1" Ice	6.68	5.45	0.10
WWX063X19G00	B	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			6.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
800-10736	B	From Face	3.50	0.0000	95.00	No Ice	11.39	5.17	0.04
(Verizon)			-6.00			1/2" Ice	12.01	5.74	0.10
			0.00			1" Ice	12.63	6.32	0.16
WWX063X19G00	C	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			-2.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
BXA-80080-6CF	C	From Face	3.50	0.0000	95.00	No Ice	5.77	4.56	0.02
(Verizon)			2.00			1/2" Ice	6.22	5.00	0.05
			0.00			1" Ice	6.68	5.45	0.10
WWX063X19G00	C	From Face	3.50	0.0000	95.00	No Ice	8.60	5.56	0.04
(Verizon)			6.00			1/2" Ice	9.07	6.03	0.09
			0.00			1" Ice	9.55	6.50	0.15
RRH2x60-07-U	A	From Face	2.50	0.0000	95.00	No Ice	2.10	1.41	0.05
(Verizon)			-6.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-07-U	B	From Face	2.50	0.0000	95.00	No Ice	2.10	1.41	0.05
(Verizon)			-6.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-07-U	C	From Face	2.50	0.0000	95.00	No Ice	2.10	1.41	0.05
(Verizon)			-6.00			1/2" Ice	2.29	1.56	0.07
			0.00			1" Ice	2.48	1.74	0.09
RRH2x60-AWS	A	From Face	2.50	0.0000	95.00	No Ice	3.36	2.03	0.06
(Verizon)			-2.00			1/2" Ice	3.61	2.26	0.08
			0.00			1" Ice	3.88	2.50	0.11
RRH2x60-AWS	B	From Face	2.50	0.0000	95.00	No Ice	3.36	2.03	0.06
(Verizon)			-2.00			1/2" Ice	3.61	2.26	0.08
			0.00			1" Ice	3.88	2.50	0.11
RRH2x60-AWS	C	From Face	2.50	0.0000	95.00	No Ice	3.36	2.03	0.06
(Verizon)			-2.00			1/2" Ice	3.61	2.26	0.08
			0.00			1" Ice	3.88	2.50	0.11
RRH2x60-PCS	A	From Face	2.50	0.0000	95.00	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 Face	2.50	0.0000	95.00	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 Face	2.50	0.0000	95.00	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
DB-T1-6Z-8AB-0Z	B	From Face	0.50	0.0000	95.00	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08
			0.00			1" Ice	5.35	2.39	0.12
DB-T1-6Z-8AB-0Z	C	From Face	0.50	0.0000	95.00	No Ice	4.80	2.00	0.04
(Verizon)			0.00			1/2" Ice	5.07	2.19	0.08

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	5.35	2.39	0.12
EEI 14-ft Low Profile Platform (Verizon)	C	None		0.0000	92.00	No Ice	16.50	16.50	1.55
						1/2" Ice	20.00	20.00	1.80
						1" Ice	23.50	23.50	2.05
18' x 4" Dia Omni (Town - Existing)	A	From Face	3.50	0.0000	92.00	No Ice	6.16	6.16	0.05
			0.00			1/2" Ice	9.04	9.04	0.10
			9.00			1" Ice	10.90	10.90	0.16
18' x 4" Dia Omni (Town - Existing)	B	From Face	3.50	0.0000	92.00	No Ice	6.16	6.16	0.05
			0.00			1/2" Ice	9.04	9.04	0.10
			9.00			1" Ice	10.90	10.90	0.16
EEI 14-ft Low Profile Platform (Town - Existing)	C	None		0.0000	82.00	No Ice	16.50	16.50	1.55
						1/2" Ice	20.00	20.00	1.80
						1" Ice	23.50	23.50	2.05
EEI 14-ft Low Profile Platform (Town - Existing)	C	None		0.0000	72.00	No Ice	16.50	16.50	1.55
						1/2" Ice	20.00	20.00	1.80
						1" Ice	23.50	23.50	2.05
ANT150D6-9 (Town - Existing)	A	From Face	3.50	0.0000	72.00	No Ice	4.00	4.00	0.03
			0.00			1/2" Ice	4.60	4.60	0.03
			-10.00			1" Ice	5.20	5.20	0.04

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 125.00-96.04	109.56	1.014	31	54.945	A	0.000	54.945	54.945	100.00	0.000	0.000
					B	0.000	54.945		100.00	0.000	0.000
					C	0.000	54.945		100.00	0.000	0.000
L2 96.04-47.67	70.19	0.893	30	138.600	A	0.000	138.600	138.600	100.00	0.000	0.000
					B	0.000	138.600		100.00	0.000	0.000
					C	0.000	138.600		100.00	0.000	0.000
L3 47.67-1.00	22.86	0.7	29	188.921	A	0.000	188.921	188.921	100.00	0.000	0.000
					B	0.000	188.921		100.00	0.000	0.000
					C	0.000	188.921		100.00	0.000	0.000

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg % %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 125.00-96.04	109.56	1.014	9	1.9198	64.212	A	0.000	64.212	64.212	100.00	0.000	0.000

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
						B	0.000	64.212		100.00	0.000	0.000
						C	0.000	64.212		100.00	0.000	0.000
L2 96.04-47.67	70.19	0.893	9	1.9143	154.078	A	0.000	154.078	154.078	100.00	0.000	0.000
						B	0.000	154.078		100.00	0.000	0.000
						C	0.000	154.078		100.00	0.000	0.000
L3 47.67-1.00	22.86	0.7	9	1.8275	203.810	A	0.000	203.810	203.810	100.00	0.000	0.000
						B	0.000	203.810		100.00	0.000	0.000
						C	0.000	203.810		100.00	0.000	0.000

Tower Pressure - Service

G_H = 1.100

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
L1	109.56	1.014	11	54.945	A	0.000	54.945	54.945	100.00	0.000	0.000
125.00-96.04					B	0.000	54.945		100.00	0.000	0.000
					C	0.000	54.945		100.00	0.000	0.000
L2 96.04-47.67	70.19	0.893	11	138.600	A	0.000	138.600	138.600	100.00	0.000	0.000
					B	0.000	138.600		100.00	0.000	0.000
					C	0.000	138.600		100.00	0.000	0.000
L3 47.67-1.00	22.86	0.7	11	188.921	A	0.000	188.921	188.921	100.00	0.000	0.000
					B	0.000	188.921		100.00	0.000	0.000
					C	0.000	188.921		100.00	0.000	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
L1	0.70	1.31	A	1	0.65	31	1	1	54.945	1.20	41.58	C
125.00-96.04			B	1	0.65		1	1	54.945			
			C	1	0.65		1	1	54.945			
L2	2.88	4.67	A	1	0.65	30	1	1	138.600	3.00	62.12	C
96.04-47.67			B	1	0.65		1	1	138.600			
			C	1	0.65		1	1	138.600			
L3 47.67-1.00	2.76	8.25	A	1	0.65	29	1	1	188.921	3.98	85.23	C
			B	1	0.65		1	1	188.921			
			C	1	0.65		1	1	188.921			
Sum Weight:	6.33	14.22						OTM	425.57 kip-ft	8.19		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	31	1	1	54.945	1.20	41.58	C
125.00-96.04			B	1	0.65		1	1	54.945			
			C	1	0.65		1	1	54.945			
L2	2.88	4.67	A	1	0.65	30	1	1	138.600	3.00	62.12	C
96.04-47.67			B	1	0.65		1	1	138.600			
			C	1	0.65		1	1	138.600			
L3 47.67-1.00	2.76	8.25	A	1	0.65	29	1	1	188.921	3.98	85.23	C
			B	1	0.65		1	1	188.921			
			C	1	0.65		1	1	188.921			
Sum Weight:	6.33	14.22						OTM	425.57 kip-ft	8.19		

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 ft^2	F K	w plf	Ctrl. Face
L1	0.70	1.31	A	1	0.65	31	1	1	54.945	1.20	41.58	C
125.00-96.04			B	1	0.65		1	1	54.945			
			C	1	0.65		1	1	54.945			
L2	2.88	4.67	A	1	0.65	30	1	1	138.600	3.00	62.12	C
96.04-47.67			B	1	0.65		1	1	138.600			
			C	1	0.65		1	1	138.600			
L3 47.67-1.00	2.76	8.25	A	1	0.65	29	1	1	188.921	3.98	85.23	C
			B	1	0.65		1	1	188.921			
			C	1	0.65		1	1	188.921			
Sum Weight:	6.33	14.22						OTM	425.57 kip-ft	8.19		

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
L1	0.70	1.31	A	1	0.65	31	1	1	54.945	1.20	41.58	C
125.00-96.04			B	1	0.65		1	1	54.945			
			C	1	0.65		1	1	54.945			
L2	2.88	4.67	A	1	0.65	30	1	1	138.600	3.00	62.12	C
96.04-47.67			B	1	0.65		1	1	138.600			
			C	1	0.65		1	1	138.600			
L3 47.67-1.00	2.76	8.25	A	1	0.65	29	1	1	188.921	3.98	85.23	C
			B	1	0.65		1	1	188.921			
			C	1	0.65		1	1	188.921			
Sum Weight:	6.33	14.22						OTM	425.57 kip-ft	8.19		

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
L1	0.70	2.98	A	1	1.2	9	1	1	64.212	0.75	25.93	C
125.00-96.04			B	1	1.2		1	1	64.212			
			C	1	1.2		1	1	64.212			
L2	2.88	8.76	A	1	1.2	9	1	1	154.078	1.78	36.85	C
96.04-47.67			B	1	1.2		1	1	154.078			
			C	1	1.2		1	1	154.078			
L3 47.67-1.00	2.76	13.48	A	1	1.2	9	1	1	203.810	2.29	49.07	C
			B	1	1.2		1	1	203.810			
			C	1	1.2		1	1	203.810			
Sum Weight:	6.33	25.22						OTM	254.91 kip-ft	4.82		

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
L1	0.70	2.98	A	1	1.2	9	1	1	64.212	0.75	25.93	C
125.00-96.04			B	1	1.2		1	1	64.212			
			C	1	1.2		1	1	64.212			
L2	2.88	8.76	A	1	1.2	9	1	1	154.078	1.78	36.85	C
96.04-47.67			B	1	1.2		1	1	154.078			
			C	1	1.2		1	1	154.078			
L3 47.67-1.00	2.76	13.48	A	1	1.2	9	1	1	203.810	2.29	49.07	C
			B	1	1.2		1	1	203.810			
			C	1	1.2		1	1	203.810			
Sum Weight:	6.33	25.22						OTM	254.91 kip-ft	4.82		

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
L1	0.70	2.98	A	1	1.2	9	1	1	64.212	0.75	25.93	C
125.00-96.04			B	1	1.2		1	1	64.212			
			C	1	1.2		1	1	64.212			
L2	2.88	8.76	A	1	1.2	9	1	1	154.078	1.78	36.85	C
96.04-47.67			B	1	1.2		1	1	154.078			
			C	1	1.2		1	1	154.078			

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
L3 47.67-1.00	2.76	13.48	A	1	1.2	9	1	1	203.810	2.29	49.07	C
			B	1	1.2		1	1	203.810			
			C	1	1.2		1	1	203.810			
Sum Weight:	6.33	25.22						OTM	254.91 kip-ft	4.82		

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
L1	0.70	2.98	A	1	1.2	9	1	1	64.212	0.75	25.93	C
125.00-96.04			B	1	1.2		1	1	64.212			
			C	1	1.2		1	1	64.212			
L2	2.88	8.76	A	1	1.2	9	1	1	154.078	1.78	36.85	C
96.04-47.67			B	1	1.2		1	1	154.078			
			C	1	1.2		1	1	154.078			
L3 47.67-1.00	2.76	13.48	A	1	1.2	9	1	1	203.810	2.29	49.07	C
			B	1	1.2		1	1	203.810			
			C	1	1.2		1	1	203.810			
Sum Weight:	6.33	25.22						OTM	254.91 kip-ft	4.82		

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
L1	0.70	1.31	A	1	0.65	11	1	1	54.945	0.45	15.48	C
125.00-96.04			B	1	0.65		1	1	54.945			
			C	1	0.65		1	1	54.945			
L2	2.88	4.67	A	1	0.65	11	1	1	138.600	1.12	23.13	C
96.04-47.67			B	1	0.65		1	1	138.600			
			C	1	0.65		1	1	138.600			
L3 47.67-1.00	2.76	8.25	A	1	0.65	11	1	1	188.921	1.48	31.74	C
			B	1	0.65		1	1	188.921			
			C	1	0.65		1	1	188.921			
Sum Weight:	6.33	14.22						OTM	158.49 kip-ft	3.05		

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
L1	0.70	1.31	A	1	0.65	11	1	1	54.945	0.45	15.48	C
125.00-96.04			B	1	0.65		1	1	54.945			
			C	1	0.65		1	1	54.945			
L2	2.88	4.67	A	1	0.65	11	1	1	138.600	1.12	23.13	C
96.04-47.67			B	1	0.65		1	1	138.600			
			C	1	0.65		1	1	138.600			
L3 47.67-1.00	2.76	8.25	A	1	0.65	11	1	1	188.921	1.48	31.74	C
			B	1	0.65		1	1	188.921			
			C	1	0.65		1	1	188.921			
Sum Weight:	6.33	14.22						OTM	158.49 kip-ft	3.05		

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
L1	0.70	1.31	A	1	0.65	11	1	1	54.945	0.45	15.48	C
125.00-96.04			B	1	0.65		1	1	54.945			
			C	1	0.65		1	1	54.945			
L2	2.88	4.67	A	1	0.65	11	1	1	138.600	1.12	23.13	C
96.04-47.67			B	1	0.65		1	1	138.600			
			C	1	0.65		1	1	138.600			
L3 47.67-1.00	2.76	8.25	A	1	0.65	11	1	1	188.921	1.48	31.74	C
			B	1	0.65		1	1	188.921			
			C	1	0.65		1	1	188.921			
Sum Weight:	6.33	14.22						OTM	158.49 kip-ft	3.05		

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
L1	0.70	1.31	A	1	0.65	11	1	1	54.945	0.45	15.48	C
125.00-96.04			B	1	0.65		1	1	54.945			
			C	1	0.65		1	1	54.945			
L2	2.88	4.67	A	1	0.65	11	1	1	138.600	1.12	23.13	C
96.04-47.67			B	1	0.65		1	1	138.600			
			C	1	0.65		1	1	138.600			
L3 47.67-1.00	2.76	8.25	A	1	0.65	11	1	1	188.921	1.48	31.74	C
			B	1	0.65		1	1	188.921			
			C	1	0.65		1	1	188.921			
Sum Weight:	6.33	14.22						OTM	158.49 kip-ft	3.05		

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	14.22					
Bracing Weight	0.00					
Total Member Self-Weight	14.22			0.26	2.90	
Total Weight	36.50			0.26	2.90	
Wind 0 deg - No Ice		-0.27	-22.47	-1921.41	38.73	-9.21
Wind 30 deg - No Ice		11.32	-19.32	-1646.05	-963.37	-7.84
Wind 45 deg - No Ice		16.15	-15.69	-1333.24	-1382.15	-6.33
Wind 60 deg - No Ice		19.88	-11.00	-929.55	-1706.55	-4.38
Wind 90 deg - No Ice		23.11	0.27	36.08	-1991.68	0.26
Wind 120 deg - No Ice		20.15	11.47	992.12	-1742.37	4.83
Wind 135 deg - No Ice		16.54	16.08	1384.42	-1432.81	6.69
Wind 150 deg - No Ice		11.79	19.59	1682.39	-1025.41	8.10
Wind 180 deg - No Ice		0.27	22.47	1921.94	-32.92	9.21
Wind 210 deg - No Ice		-11.32	19.32	1646.57	969.17	7.84
Wind 225 deg - No Ice		-16.15	15.69	1333.76	1387.96	6.33
Wind 240 deg - No Ice		-19.88	11.00	930.08	1712.35	4.38
Wind 270 deg - No Ice		-23.11	-0.27	-35.56	1997.49	-0.26
Wind 300 deg - No Ice		-20.15	-11.47	-991.60	1748.18	-4.83
Wind 315 deg - No Ice		-16.54	-16.08	-1383.90	1438.62	-6.69
Wind 330 deg - No Ice		-11.79	-19.59	-1681.87	1031.22	-8.10
Member Ice	11.00					
Total Weight Ice	69.54			-1.88	13.09	
Wind 0 deg - Ice		-0.08	-10.87	-886.18	23.94	-3.52
Wind 30 deg - Ice		5.46	-9.37	-762.27	-430.59	-3.36
Wind 45 deg - Ice		7.76	-7.63	-619.49	-619.99	-2.93
Wind 60 deg - Ice		9.54	-5.36	-434.62	-766.25	-2.30
Wind 90 deg - Ice		11.06	0.08	8.98	-893.08	-0.63
Wind 120 deg - Ice		9.62	5.50	449.67	-777.11	1.22
Wind 135 deg - Ice		7.88	7.74	631.09	-635.35	2.05
Wind 150 deg - Ice		5.60	9.45	769.38	-449.40	2.74
Wind 180 deg - Ice		0.08	10.87	882.42	2.23	3.52
Wind 210 deg - Ice		-5.46	9.37	758.52	456.77	3.36
Wind 225 deg - Ice		-7.76	7.63	615.74	646.17	2.93
Wind 240 deg - Ice		-9.54	5.36	430.87	792.42	2.30
Wind 270 deg - Ice		-11.06	-0.08	-12.74	919.25	0.63
Wind 300 deg - Ice		-9.62	-5.50	-453.43	803.28	-1.22
Wind 315 deg - Ice		-7.88	-7.74	-634.85	661.52	-2.05
Wind 330 deg - Ice		-5.60	-9.45	-773.13	475.57	-2.74
Total Weight	36.50			0.26	2.90	
Wind 0 deg - Service		-0.10	-8.37	-715.41	16.24	-3.43
Wind 30 deg - Service		4.22	-7.20	-612.86	-356.95	-2.92
Wind 45 deg - Service		6.02	-5.84	-496.36	-512.92	-2.36
Wind 60 deg - Service		7.40	-4.10	-346.02	-633.73	-1.63
Wind 90 deg - Service		8.61	0.10	13.60	-739.92	0.10
Wind 120 deg - Service		7.51	4.27	369.65	-647.07	1.80
Wind 135 deg - Service		6.16	5.99	515.75	-531.78	2.49
Wind 150 deg - Service		4.39	7.30	626.72	-380.06	3.02
Wind 180 deg - Service		0.10	8.37	715.93	-10.44	3.43
Wind 210 deg - Service		-4.22	7.20	613.38	362.76	2.92
Wind 225 deg - Service		-6.02	5.84	496.88	518.72	2.36
Wind 240 deg - Service		-7.40	4.10	346.54	639.54	1.63
Wind 270 deg - Service		-8.61	-0.10	-13.08	745.73	-0.10
Wind 300 deg - Service		-7.51	-4.27	-369.13	652.88	-1.80

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 315 deg - Service		-6.16	-5.99	-515.23	537.59	-2.49
Wind 330 deg - Service		-4.39	-7.30	-626.20	385.87	-3.02

Load Combinations

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

Comb. No.	Description
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
L1	125 - 96.04	Pole	Max Tension	39	0.00	0.00	0.00
			Max. Compression	34	-30.32	12.87	-3.44
			Max. Mx	26	-12.41	263.77	13.40
			Max. My	18	-12.57	-11.39	-245.58
			Max. Vy	26	-18.69	263.77	13.40
			Max. Vx	18	17.93	-11.39	-245.58
			Max. Torque	17			-12.67
L2	96.04 - 47.667	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-57.11	16.04	1.99
			Max. Mx	26	-27.99	1545.67	36.44
			Max. My	18	-28.10	-33.29	-1476.60
			Max. Vy	26	-31.32	1545.67	36.44
			Max. Vx	18	30.23	-33.29	-1476.60
			Max. Torque	3			14.55
L3	47.667 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-77.81	16.47	2.05
			Max. Mx	26	-43.76	3326.28	59.96
			Max. My	18	-43.77	-56.69	-3201.29
			Max. Vy	26	-37.03	3326.28	59.96
			Max. Vx	18	35.99	-56.69	-3201.29
			Max. Torque	3			14.52

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	48	77.81	9.62	5.50
	Max. H_x	26	43.80	36.98	0.43
	Max. H_z	2	43.80	0.43	35.95
	Max. M_x	2	3200.60	0.43	35.95
	Max. M_z	10	3318.79	-36.98	-0.43

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. Torsion	3	14.49	0.43	35.95
	Min. Vert	23	32.85	25.84	-25.11
	Min. H_x	10	43.80	-36.98	-0.43
	Min. H_z	18	43.80	-0.43	-35.95
	Min. M_x	18	-3201.29	-0.43	-35.95
	Min. M_z	26	-3326.28	36.98	0.43
	Min. Torsion	19	-14.48	-0.43	-35.95

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	36.50	-0.00	0.00	0.28	3.06	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	43.80	-0.43	-35.95	-3200.60	63.92	-14.47
0.9 Dead+1.6 Wind 0 deg - No Ice	32.85	-0.43	-35.95	-3166.69	62.15	-14.49
1.2 Dead+1.6 Wind 30 deg - No Ice	43.80	18.12	-30.91	-2741.64	-1605.69	-12.34
0.9 Dead+1.6 Wind 30 deg - No Ice	32.85	18.12	-30.91	-2712.70	-1589.63	-12.36
1.2 Dead+1.6 Wind 45 deg - No Ice	43.80	25.84	-25.11	-2220.38	-2303.43	-9.95
0.9 Dead+1.6 Wind 45 deg - No Ice	32.85	25.84	-25.11	-2197.02	-2279.90	-9.97
1.2 Dead+1.6 Wind 60 deg - No Ice	43.80	31.81	-17.60	-1547.79	-2843.85	-6.89
0.9 Dead+1.6 Wind 60 deg - No Ice	32.85	31.81	-17.60	-1531.60	-2814.53	-6.90
1.2 Dead+1.6 Wind 90 deg - No Ice	43.80	36.98	0.43	60.63	-3318.79	0.39
0.9 Dead+1.6 Wind 90 deg - No Ice	32.85	36.98	0.43	59.72	-3284.34	0.39
1.2 Dead+1.6 Wind 120 deg - No Ice	43.80	32.25	18.35	1652.66	-2903.74	7.55
0.9 Dead+1.6 Wind 120 deg - No Ice	32.85	32.25	18.35	1634.90	-2873.62	7.57
1.2 Dead+1.6 Wind 135 deg - No Ice	43.80	26.46	25.72	2305.95	-2388.33	10.48
0.9 Dead+1.6 Wind 135 deg - No Ice	32.85	26.46	25.72	2281.28	-2363.67	10.50
1.2 Dead+1.6 Wind 150 deg - No Ice	43.80	18.87	31.35	2802.22	-1709.91	12.70
0.9 Dead+1.6 Wind 150 deg - No Ice	32.85	18.87	31.35	2772.30	-1692.45	12.72
1.2 Dead+1.6 Wind 180 deg - No Ice	43.80	0.43	35.95	3201.29	-56.70	14.46
0.9 Dead+1.6 Wind 180 deg - No Ice	32.85	0.43	35.95	3167.19	-56.84	14.48
1.2 Dead+1.6 Wind 210 deg - No Ice	43.80	-18.12	30.91	2742.45	1613.00	12.33
0.9 Dead+1.6 Wind 210 deg - No Ice	32.85	-18.12	30.91	2713.29	1594.99	12.35
1.2 Dead+1.6 Wind 225 deg - No Ice	43.80	-25.84	25.11	2221.20	2310.81	9.96
0.9 Dead+1.6 Wind 225 deg -	32.85	-25.84	25.11	2197.62	2285.32	9.97

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
No Ice						
1.2 Dead+1.6 Wind 240 deg - No Ice	43.80	-31.81	17.60	1548.58	2851.29	6.90
0.9 Dead+1.6 Wind 240 deg - No Ice	32.85	-31.81	17.60	1532.18	2819.99	6.91
1.2 Dead+1.6 Wind 270 deg - No Ice	43.80	-36.98	-0.43	-59.96	3326.28	-0.38
0.9 Dead+1.6 Wind 270 deg - No Ice	32.85	-36.98	-0.43	-59.24	3289.84	-0.38
1.2 Dead+1.6 Wind 300 deg - No Ice	43.80	-32.25	-18.35	-1652.12	2911.14	-7.55
0.9 Dead+1.6 Wind 300 deg - No Ice	32.85	-32.25	-18.35	-1634.50	2879.06	-7.56
1.2 Dead+1.6 Wind 315 deg - No Ice	43.80	-26.46	-25.72	-2305.42	2395.66	-10.48
0.9 Dead+1.6 Wind 315 deg - No Ice	32.85	-26.46	-25.72	-2280.89	2369.05	-10.50
1.2 Dead+1.6 Wind 330 deg - No Ice	43.80	-18.87	-31.35	-2801.66	1717.19	-12.71
0.9 Dead+1.6 Wind 330 deg - No Ice	32.85	-18.87	-31.35	-2771.90	1697.79	-12.73
1.2 Dead+1.0 Ice+1.0 Temp	77.81	-0.00	-0.00	-2.05	16.47	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	77.81	-0.08	-10.87	-966.37	28.67	-3.43
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	77.81	5.46	-9.37	-831.09	-467.22	-3.27
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	77.81	7.76	-7.63	-675.32	-673.88	-2.85
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	77.81	9.54	-5.36	-473.67	-833.49	-2.23
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	77.81	11.06	0.08	10.12	-972.00	-0.60
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	77.81	9.62	5.50	490.63	-845.65	1.20
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	77.81	7.88	7.74	688.42	-691.08	2.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	77.81	5.60	9.45	839.14	-488.29	2.67
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	77.81	0.08	10.87	962.27	4.33	3.43
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	77.81	-5.46	9.37	827.00	500.22	3.27
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	77.81	-7.76	7.63	671.23	706.89	2.85
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	77.81	-9.54	5.36	469.57	866.50	2.23
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	77.81	-11.06	-0.08	-14.22	1005.02	0.60
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	77.81	-9.62	-5.50	-494.75	878.66	-1.20
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	77.81	-7.88	-7.74	-692.54	724.09	-2.01
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	77.81	-5.60	-9.45	-843.26	521.29	-2.67
Dead+Wind 0 deg - Service	36.50	-0.10	-8.37	-740.56	17.06	-3.41
Dead+Wind 30 deg - Service	36.50	4.22	-7.20	-634.33	-369.35	-2.91
Dead+Wind 45 deg - Service	36.50	6.02	-5.84	-513.71	-530.85	-2.35
Dead+Wind 60 deg - Service	36.50	7.40	-4.10	-358.06	-655.96	-1.62
Dead+Wind 90 deg - Service	36.50	8.61	0.10	14.23	-765.96	0.10
Dead+Wind 120 deg - Service	36.50	7.51	4.27	382.78	-669.90	1.79
Dead+Wind 135 deg - Service	36.50	6.16	5.99	534.00	-550.56	2.48

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 150 deg - Service	36.50	4.39	7.30	648.85	-393.50	3.00
Dead+Wind 180 deg - Service	36.50	0.10	8.37	741.14	-10.83	3.41
Dead+Wind 210 deg - Service	36.50	-4.22	7.20	634.92	375.59	2.91
Dead+Wind 225 deg - Service	36.50	-6.02	5.84	514.29	537.09	2.35
Dead+Wind 240 deg - Service	36.50	-7.40	4.10	358.64	662.20	1.62
Dead+Wind 270 deg - Service	36.50	-8.61	-0.10	-13.65	772.21	-0.10
Dead+Wind 300 deg - Service	36.50	-7.51	-4.27	-382.21	676.14	-1.79
Dead+Wind 315 deg - Service	36.50	-6.16	-5.99	-533.43	556.80	-2.48
Dead+Wind 330 deg - Service	36.50	-4.39	-7.30	-648.28	399.74	-3.00

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-36.50	0.00	0.00	36.50	0.00	0.000%
2	-0.43	-43.80	-35.95	0.43	43.80	35.95	0.000%
3	-0.43	-32.85	-35.95	0.43	32.85	35.95	0.000%
4	18.12	-43.80	-30.91	-18.12	43.80	30.91	0.000%
5	18.12	-32.85	-30.91	-18.12	32.85	30.91	0.000%
6	25.84	-43.80	-25.11	-25.84	43.80	25.11	0.000%
7	25.84	-32.85	-25.11	-25.84	32.85	25.11	0.000%
8	31.81	-43.80	-17.60	-31.81	43.80	17.60	0.000%
9	31.81	-32.85	-17.60	-31.81	32.85	17.60	0.000%
10	36.98	-43.80	0.43	-36.98	43.80	-0.43	0.000%
11	36.98	-32.85	0.43	-36.98	32.85	-0.43	0.000%
12	32.25	-43.80	18.35	-32.25	43.80	-18.35	0.000%
13	32.25	-32.85	18.35	-32.25	32.85	-18.35	0.000%
14	26.46	-43.80	25.72	-26.46	43.80	-25.72	0.000%
15	26.46	-32.85	25.72	-26.46	32.85	-25.72	0.000%
16	18.87	-43.80	31.35	-18.87	43.80	-31.35	0.000%
17	18.87	-32.85	31.35	-18.87	32.85	-31.35	0.000%
18	0.43	-43.80	35.95	-0.43	43.80	-35.95	0.000%
19	0.43	-32.85	35.95	-0.43	32.85	-35.95	0.000%
20	-18.12	-43.80	30.91	18.12	43.80	-30.91	0.000%
21	-18.12	-32.85	30.91	18.12	32.85	-30.91	0.000%
22	-25.84	-43.80	25.11	25.84	43.80	-25.11	0.000%
23	-25.84	-32.85	25.11	25.84	32.85	-25.11	0.000%
24	-31.81	-43.80	17.60	31.81	43.80	-17.60	0.000%
25	-31.81	-32.85	17.60	31.81	32.85	-17.60	0.000%
26	-36.98	-43.80	-0.43	36.98	43.80	0.43	0.000%
27	-36.98	-32.85	-0.43	36.98	32.85	0.43	0.000%
28	-32.25	-43.80	-18.35	32.25	43.80	18.35	0.000%
29	-32.25	-32.85	-18.35	32.25	32.85	18.35	0.000%
30	-26.46	-43.80	-25.72	26.46	43.80	25.72	0.000%
31	-26.46	-32.85	-25.72	26.46	32.85	25.72	0.000%
32	-18.87	-43.80	-31.35	18.87	43.80	31.35	0.000%
33	-18.87	-32.85	-31.35	18.87	32.85	31.35	0.000%
34	0.00	-77.81	0.00	0.00	77.81	0.00	0.000%
35	-0.08	-77.81	-10.87	0.08	77.81	10.87	0.000%
36	5.46	-77.81	-9.37	-5.46	77.81	9.37	0.000%
37	7.76	-77.81	-7.63	-7.76	77.81	7.63	0.000%
38	9.54	-77.81	-5.36	-9.54	77.81	5.36	0.000%
39	11.06	-77.81	0.08	-11.06	77.81	-0.08	0.000%
40	9.62	-77.81	5.50	-9.62	77.81	-5.50	0.000%
41	7.88	-77.81	7.74	-7.88	77.81	-7.74	0.000%
42	5.60	-77.81	9.45	-5.60	77.81	-9.45	0.000%
43	0.08	-77.81	10.87	-0.08	77.81	-10.87	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
44	-5.46	-77.81	9.37	5.46	77.81	-9.37	0.000%
45	-7.76	-77.81	7.63	7.76	77.81	-7.63	0.000%
46	-9.54	-77.81	5.36	9.54	77.81	-5.36	0.000%
47	-11.06	-77.81	-0.08	11.06	77.81	0.08	0.000%
48	-9.62	-77.81	-5.50	9.62	77.81	5.50	0.000%
49	-7.88	-77.81	-7.74	7.88	77.81	7.74	0.000%
50	-5.60	-77.81	-9.45	5.60	77.81	9.45	0.000%
51	-0.10	-36.50	-8.37	0.10	36.50	8.37	0.000%
52	4.22	-36.50	-7.20	-4.22	36.50	7.20	0.000%
53	6.02	-36.50	-5.84	-6.02	36.50	5.84	0.000%
54	7.40	-36.50	-4.10	-7.40	36.50	4.10	0.000%
55	8.61	-36.50	0.10	-8.61	36.50	-0.10	0.000%
56	7.51	-36.50	4.27	-7.51	36.50	-4.27	0.000%
57	6.16	-36.50	5.99	-6.16	36.50	-5.99	0.000%
58	4.39	-36.50	7.30	-4.39	36.50	-7.30	0.000%
59	0.10	-36.50	8.37	-0.10	36.50	-8.37	0.000%
60	-4.22	-36.50	7.20	4.22	36.50	-7.20	0.000%
61	-6.02	-36.50	5.84	6.02	36.50	-5.84	0.000%
62	-7.40	-36.50	4.10	7.40	36.50	-4.10	0.000%
63	-8.61	-36.50	-0.10	8.61	36.50	0.10	0.000%
64	-7.51	-36.50	-4.27	7.51	36.50	4.27	0.000%
65	-6.16	-36.50	-5.99	6.16	36.50	5.99	0.000%
66	-4.39	-36.50	-7.30	4.39	36.50	7.30	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	5	0.00000001	0.00074281
3	Yes	5	0.00000001	0.00033533
4	Yes	5	0.00000001	0.00099390
5	Yes	5	0.00000001	0.00041805
6	Yes	6	0.00000001	0.00006688
7	Yes	5	0.00000001	0.00057106
8	Yes	6	0.00000001	0.00006506
9	Yes	5	0.00000001	0.00055444
10	Yes	5	0.00000001	0.00026123
11	Yes	5	0.00000001	0.00011588
12	Yes	6	0.00000001	0.00008118
13	Yes	5	0.00000001	0.00069503
14	Yes	6	0.00000001	0.00007715
15	Yes	5	0.00000001	0.00066143
16	Yes	6	0.00000001	0.00005602
17	Yes	5	0.00000001	0.00048020
18	Yes	5	0.00000001	0.00059907
19	Yes	5	0.00000001	0.00027248
20	Yes	6	0.00000001	0.00007653
21	Yes	5	0.00000001	0.00065709
22	Yes	6	0.00000001	0.00006520
23	Yes	5	0.00000001	0.00055471
24	Yes	6	0.00000001	0.00005285
25	Yes	5	0.00000001	0.00044533
26	Yes	5	0.00000001	0.00013181
27	Yes	5	0.00000001	0.00005962
28	Yes	6	0.00000001	0.00005396

29	Yes	5	0.00000001	0.00045588
30	Yes	6	0.00000001	0.00007412
31	Yes	5	0.00000001	0.00063402
32	Yes	6	0.00000001	0.00008731
33	Yes	5	0.00000001	0.00075098
34	Yes	4	0.00000001	0.00010620
35	Yes	5	0.00000001	0.00048391
36	Yes	5	0.00000001	0.00047897
37	Yes	5	0.00000001	0.00056852
38	Yes	5	0.00000001	0.00053823
39	Yes	5	0.00000001	0.00029783
40	Yes	5	0.00000001	0.00059185
41	Yes	5	0.00000001	0.00062010
42	Yes	5	0.00000001	0.00052166
43	Yes	5	0.00000001	0.00046445
44	Yes	5	0.00000001	0.00067466
45	Yes	5	0.00000001	0.00064023
46	Yes	5	0.00000001	0.00052386
47	Yes	5	0.00000001	0.00032169
48	Yes	5	0.00000001	0.00057080
49	Yes	5	0.00000001	0.00069836
50	Yes	5	0.00000001	0.00073066
51	Yes	4	0.00000001	0.00090418
52	Yes	4	0.00000001	0.00056253
53	Yes	4	0.00000001	0.00065186
54	Yes	4	0.00000001	0.00056745
55	Yes	4	0.00000001	0.00028289
56	Yes	4	0.00000001	0.00098037
57	Yes	4	0.00000001	0.00098932
58	Yes	4	0.00000001	0.00081999
59	Yes	4	0.00000001	0.00086356
60	Yes	4	0.00000001	0.00090723
61	Yes	4	0.00000001	0.00064955
62	Yes	4	0.00000001	0.00035922
63	Yes	4	0.00000001	0.00024755
64	Yes	4	0.00000001	0.00062299
65	Yes	4	0.00000001	0.00097138
66	Yes	5	0.00000001	0.00005646

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125 - 96.04	20.994	64	1.5437	0.0509
L2	99.957 - 47.667	13.254	64	1.3447	0.0218
L3	53.334 - 1	3.396	64	0.6172	0.0050

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
124.00	18' x 4" Dia Omni	64	20.673	1.5374	0.0495	21050
122.00	7770.00	64	20.031	1.5247	0.0467	21050
120.00	(2) RRUS-11	64	19.391	1.5118	0.0440	21050

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
114.00	APXVSPP18-C-A20	64	17.488	1.4707	0.0359	9568
112.00	EEI 14-ft Low Profile Platform	64	16.863	1.4558	0.0334	8096
110.00	(2) FD-RRH 4x45 1900	64	16.243	1.4401	0.0311	7016
107.00	FD-RRH 2x50 800	64	15.327	1.4148	0.0281	5847
105.00	SitePro 12' Handrail Kit HRK12	64	14.726	1.3965	0.0262	5262
102.00	AIR6449	64	13.843	1.3668	0.0235	4604
95.00	X7C-FRO-660-VRO	64	11.876	1.2847	0.0181	4064
92.00	EEI 14-ft Low Profile Platform	64	11.077	1.2445	0.0162	3984
82.00	EEI 14-ft Low Profile Platform	64	8.613	1.0936	0.0113	3741
72.00	EEI 14-ft Low Profile Platform	64	6.470	0.9269	0.0082	3525

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	125 - 96.04	90.050	28	6.5922	0.2207
L2	99.957 - 47.667	56.999	28	5.7798	0.0946
L3	53.334 - 1	14.633	28	2.6606	0.0215

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
124.00	18' x 4" Dia Omni	28	88.680	6.5670	0.2146	5141
122.00	7770.00	28	85.944	6.5163	0.2026	5141
120.00	(2) RRUS-11	28	83.212	6.4648	0.1906	5141
114.00	APXVSPP18-C-A20	28	75.091	6.2996	0.1556	2335
112.00	EEI 14-ft Low Profile Platform	28	72.421	6.2392	0.1445	1975
110.00	(2) FD-RRH 4x45 1900	28	69.775	6.1752	0.1352	1711
107.00	FD-RRH 2x50 800	28	65.861	6.0713	0.1221	1425
105.00	SitePro 12' Handrail Kit HRK12	28	63.294	5.9958	0.1138	1282
102.00	AIR6449	28	59.516	5.8721	0.1020	1121
95.00	X7C-FRO-660-VRO	28	51.098	5.5271	0.0786	983
92.00	EEI 14-ft Low Profile Platform	28	47.674	5.3563	0.0702	960
82.00	EEI 14-ft Low Profile Platform	28	37.098	4.7122	0.0487	892
72.00	EEI 14-ft Low Profile Platform	28	27.881	3.9960	0.0350	832

Compression Checks

Pole Design Data

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

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	125 - 96.04 (1)	TP26.9x18x0.1875	28.96	0.00	0.0	15.1809	-12.36	1026.09	0.012
L2	96.04 - 47.667 (2)	TP41.28x25.3212x0.25	52.29	0.00	0.0	31.1849	-27.97	1984.91	0.014
L3	47.667 - 1 (3)	TP55x39.0504x0.3125	52.33	0.00	0.0	54.2432	-43.76	3272.70	0.013

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	125 - 96.04 (1)	TP26.9x18x0.1875	270.71	538.50	0.503	0.00	538.50	0.000
L2	96.04 - 47.667 (2)	TP41.28x25.3212x0.25	1560.25	1606.48	0.971	0.00	1606.48	0.000
L3	47.667 - 1 (3)	TP55x39.0504x0.3125	3347.28	3688.18	0.908	0.00	3688.18	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	125 - 96.04 (1)	TP26.9x18x0.1875	19.05	513.05	0.037	11.33	1079.52	0.010
L2	96.04 - 47.667 (2)	TP41.28x25.3212x0.25	31.45	992.46	0.032	7.57	3219.99	0.002
L3	47.667 - 1 (3)	TP55x39.0504x0.3125	37.15	1636.35	0.023	7.55	7391.77	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	125 - 96.04 (1)	0.012	0.503	0.000	0.037	0.010	0.517 ✔	1.000	4.8.2 ✔
L2	96.04 - 47.667 (2)	0.014	0.971	0.000	0.032	0.002	0.986 ✔	1.000	4.8.2 ✔
L3	47.667 - 1 (3)	0.013	0.908	0.000	0.023	0.001	0.922 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	125 - 96.04	Pole	TP26.9x18x0.1875	1	-12.36	1026.09	51.7	Pass
L2	96.04 - 47.667	Pole	TP41.28x25.3212x0.25	2	-27.97	1984.91	98.6	Pass
L3	47.667 - 1	Pole	TP55x39.0504x0.3125	3	-43.76	3272.70	92.2	Pass
							Summary	
						Pole (L2)	98.6	Pass
						RATING =	**98.6**	**Pass**

Program Version 8.0.5.0 - 11/28/2018 File:J:/Jobs/2007400.WI/47_CT11115F/05_Structural/Tower Analysis/Backup Documentation/ERI Files/125' EEI Monopole_Bethel_CT.eri

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Subject:	Anchor Bolt and Baseplate Analysis
Location:	125-FT EEI Monopole Bethel, CT
Rev. 0: 7/16/20	Prepared by: T.J.L. Checked by: C.F.C. Job No. 20074.47

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$M_u := 3347 \cdot ft \cdot kips$	(Input From tnxTower)
Shear Force =	$Shear := 37 \cdot kips$	(Input From tnxTower)
Axial Force =	$R_u := 44 \cdot kips$	(Input From tnxTower)

Anchor Bolt Data:

ASTMA615 Grade 75

Number of Anchor Bolts =	$N := 12$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 63 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)
Top of Concrete to Bot Leveling Nut =	$l_{ar} := 2 \cdot in$	(User Input)
Anchor Rod Force Correction Factor =	$n_c = 1.02$	Table 2-1 Addendum 3

Base Plate Data:

ASTMA572 Grade 60

Plate Yield Strength =	$F_{yf} := 60 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{TP} := 1.75 \cdot in$	(User Input)
Base Plate Diameter =	$D_{OD} := 69 \cdot in$	(User Input)
Outer Pole Diameter =	$D_T := 55 \cdot in$	(User Input)
Pole Wall Thickness =	$t_T := 0.3125 \cdot in$	(User Input)
Pole Design Yield Strength =	$F_{yp} := 65 \cdot ksi$	(User Input)
	$\eta := 0.5$	For Ungrouted Base Plate per TIA-222-G Section 4.9.9

Anchor Bolt Analysis:

Gross Area of Bolt = $A_g := \frac{\pi}{4}\cdot D^2 = 3.976\cdot in^2$

Net Area of Bolt = $A_n := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\cdot in}{n}\right)^2 = 3.248\cdot in^2$

Tensile Root Diameter = $d_{rt} := D - \frac{0.9743\cdot in}{n} = 2.033\cdot in$

Plastic Section Modulus = $Z := \frac{d_{rt}^3}{6} = 1.401\cdot in^3$

Maximum Anchor Rod Force = $P_u := \frac{n_c\cdot\pi\cdot M_u}{N\cdot D_{BC}} + \frac{R_u}{N} = 173.9\cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 3.1\cdot kips$

Design Tensile Strength = $\Phi R_{nt} := 0.8\cdot F_u\cdot A_n = 259.815\cdot k$

Bolt % of Capacity = $\frac{\left(P_u + \frac{V_u}{\eta}\right)}{\Phi R_{nt}}\cdot 100 = 69.3$

Condition1 = $Condition1 := if\left[\frac{\left(P_u + \frac{V_u}{\eta}\right)}{\Phi R_{nt}} \le 1.00, "OK", "Overstressed"\right]$

Condition1 = "OK"

Design Shear Strength = $\Phi R_{nv} := 0.75\cdot 0.45\cdot F_u\cdot A_g = 134.193\cdot k$

Design Flexural Strength = $\Phi R_{nm} := 0.9\cdot F_y\cdot Z = 94.597\cdot in\cdot k$

$M_u := \begin{cases} 0 & \text{if } l_{ar} < D \\ 0.65\cdot l_{ar}\cdot V_u & \text{otherwise} \end{cases} = 0\cdot in\cdot k$

Bolt % of Capacity = $\left[\left(\frac{V_u}{\Phi R_{nv}}\right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}}\right)^2\right]\cdot 100 = 44.9$

Condition2 = $Condition2 := if\left[\left(\frac{V_u}{\Phi R_{nv}}\right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}}\right)^2 \le 1.00, "OK", "Overstressed"\right]$

Condition2 = "OK"

Base Plate Analysis:

Strength Resistance Factor for Yielding due to Bending = $\phi_b := 0.9$

Strength Resistance Factor for Yielding due to Shear = $\phi_v := 1.0$

Outside Fillet Horizontal Leg Dimension = $w_1 := 0.25 \cdot in$

Effective Pole Outside Diameter = $D_e := D_T + w_1 = 55.25 \cdot in$

Effective Base Plate Outside Diameter = $D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \le \left(D_{BC} + 6 \cdot t_{TP}\right) \\ \left(D_{BC} + 6 \cdot t_{TP}\right) & \text{otherwise} \end{cases} = 69 \cdot in$

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Anchor Rods = $\theta_1 := \frac{\pi}{N} = 0.262$

Angle Defining Limiting Effective Base Plate Width Based on Plate Thickness = $\theta_2 := \operatorname{asin}\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.34$

Angle Defining Limiting Effective Base Plate Width Based on Distance Between Anchor Rod Bolt Circle and Effective Pole Outside Diameter = $\theta_3 := \operatorname{acos}\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.353$

Governing Angle Defining Effective Base Plate Width Resisting Bending = $\theta := \min\left(\theta_1, \theta_2, \theta_3\right) = 0.262$

Effective Moment Arm of Anchor Rod Force = $x := 0.5 \cdot \left(D_{BC} - D_e\right) = 3.875 \cdot in$

Effective Base Plate Width Resisting Bending from Transverse Bend Line = $B_{et} := D_{BC} \cdot \sin(\theta) = 16.306 \cdot in$

Effective Base Plate Width Resisting Bending from Radial Bend Lines = $B_{er} := \left(D_{oe} - D_e\right) \cdot \sin(\theta) = 3.559 \cdot in$

Total Effective Base Plate Width Resisting Bending = $B_{eff} := B_{et} + B_{er} = 19.864 \cdot in$

Required Base Plate Thickness = $t_{TP.Req} := \sqrt{\frac{4 \cdot P_u \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.585 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 90.6 \cdot \%$

Condition2 = $Condition3 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition3 = "Ok"

Required Base Plate Thickness = $t_{TP.Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.508 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 29.0 \cdot \%$

Condition2 = $Condition4 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 3347 \cdot ft \cdot kips$	(User Input)	
Shear Force =	$Shear := 37 \cdot kip$	(User Input)	
Axial Force =	$Axial := 44 \cdot kip$	(User Input)	
Tower Height =	$H_t := 125 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 4.5 \cdot ft$	(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 =	$d_p := 7.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 4.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 25 \cdot ft$	(User Input)	

Anchor Bolt Data:

Length of Anchor Bolts=	$L_{st} := 72 \cdot in$	(User Input)	
Projection of Anchor Bolts Above Pier =	$A_{BP} := 12.0 \cdot in$	(User Input)	
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)	
Base Plate Bolt Circle =	$MP := 63 \cdot in$	(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)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_u := 6000 \cdot psf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_a := \frac{q_u}{2} = 3000 \cdot psf$	(User Input)	
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)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 9$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.128 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 24$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 9$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.128 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 28$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 9$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.128 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 28$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.999 \cdot in^2$

Pad Top Reinforcement Bar Area = $A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.999 \cdot in^2$

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.999 \cdot in^2$

Coefficient of Lateral Soil Pressure = $K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3$

Stability of Footing:

Adjusted Concrete Unit Weight =

$\gamma_c := if\left(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}\right) = 150 \cdot pcf$

Adjusted Soil Unit Weight =

$\gamma_s := if\left(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}\right) = 100 \cdot pcf$

Passive Pressure =

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

$P_{pt} := K_p \cdot \gamma_s \cdot \left(D_f - T_f\right) + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

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

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.35 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.675 \cdot ksf$

$T_p := if\left[n < \left(D_f - T_f\right), T_f, \left(D_f - n\right)\right] = 4.5$

$A_p := W_f \cdot T_p = 112.5$

Ultimate Shear =

$S_u := P_{ave} \cdot A_p = 75.938 \cdot kip$

Weight of Concrete Pad =

$WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 L_p\right] \cdot \gamma_c = 429.225 \cdot kip$

Weight of Soil Above Footing =

$WT_{s1} := \left[\left(W_f^2 - d_p^2\right) \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 0 \cdot kip$

Weight of Soil Wedge at Back Face =

$WT_{s2} := \left(\frac{D_f^2 \cdot \tan\left(\Phi_s\right)}{2} \cdot W_f\right) \cdot \gamma_s = 14.614 \cdot kip$

Weight of Soil Wedge at back face Corners =

$WT_{s3} := 2 \cdot \left[\left(D_f\right)^3 \cdot \frac{\tan\left(\Phi_s\right)}{3}\right] \cdot \gamma_s = 3.507 \cdot kips$

Total Weight =

$WT_{tot} := WT_c + WT_{s1} + Axial = 473.225 \cdot kip$

Resisting Weight =

$WT_R := 0.9 \cdot WT_c + 0.75 \cdot WT_{s1} + 0.75 \cdot Axial = 419.303 \cdot kip$

Resisting Moment =

$M_r := \left(WT_R\right) \cdot \frac{W_f}{2} + 0.75 \cdot S_u \cdot \frac{T_f}{3} + 0.75 \cdot \left[\left(WT_{s2} + WT_{s3}\right) \cdot \left(W_f + \frac{D_f \cdot \tan\left(\Phi_s\right)}{3}\right)\right] = 5678 \cdot kip \cdot ft$

Overturning Moment =

$M_{ot} := OM + Shear \cdot \left(L_p + T_f\right) = 3551 \cdot kip \cdot ft$

Factor of Safety Actual =

$FS := \frac{M_r}{M_{ot}} = 1.6$

Factor of Safety Required =

$FS_{req} := 1$

$OverTurning\_Moment\_Check := if\left(FS \geq FS_{req}, "Okay", "No\ Good"\right)$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 288.889 \cdot kips$

$Shear\_Check := if(S_p > Shear, "Okay", "No Good")$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^2 = 625$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 2604.17 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.121 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < .75 \cdot q_u, "Okay", "No Good")$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.606 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < .75 \cdot q_u), "Okay", "No Good"]$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 6.481$

Distance to Kern = $X_k := \frac{W_f}{6} = 4.167$ Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 7.503$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.525 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 2.525 \cdot ksf$

$Pressure\_Check := if(q_{adj} < .75 \cdot q_u, "Okay", "No Good")$

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.225 \times 10^4 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > Axial, "Okay", "No Good")$

Bearing_Check = "Okay"

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 4.156$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$

$V_{req} := \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 35$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 97.7$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 527.3$

Guess Value = $v_u := 1ksf$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := \text{Find}(v_u) = 3.2 \cdot ksf$

$V_u := v_u \cdot d \cdot W_f = 337.6 \cdot kips$

Required Shear Strength = $V_{req} := V_u = 337.6 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 4510.3 \cdot kip$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$q_b := q_{adj} - d_1 \cdot Slope = 1.009 \cdot ksf$

Maximum Bending at Face of Pier = $M_n := \frac{1}{\phi_m} \cdot \left[\left(q_{adj} - q_b \right) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 2272.4 \cdot kip \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[\left[0.85 - \left[\left(\frac{f_c}{psi} - 4000 \right) \right] \cdot 0.5 \right] \right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$R_n := \frac{M_n}{W_f \cdot d^2} = 36.5 \cdot psi$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.0006$

$\rho_{min} := \rho = 0.00061$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases}$$ (ACI-2008 7.12.2.1)

Check Bottom Bars:

$$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 13.465 \cdot in^2$$

$As_{prov} := A_{bbot} \cdot NB_{bot} = 28 \cdot in^2$

$Pad\_Reinforcement\_Bot := if(As_{prov} > As, "Okay", "No Good")$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$As := \rho_{sh} \cdot \left(W_f \cdot \frac{d}{2}\right) = 13.5 \cdot in^2$

$As_{prov} := A_{btop} \cdot NB_{top} = 28 \cdot in^2$

$Pad\_Reinforcement\_Top := if(As_{prov} > As, "Okay", "No Good")$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 9.72 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3 \cdot in$$

Transverse Reinforcement Index =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 30.2 \cdot in$$

Minimum Development Length =

$L_{dbmin} := 12 \cdot in$ (ACI-2008 12.2.1)

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 105 \cdot in$$

$Lpad\_Check := if(L_{Pad} > L_{dbt}, "Okay", "No Good")$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := d_p^2 = 7056 \cdot in^2$

$A_{smin} := 0.0033 \cdot A_p = 23.28 \cdot in^2$

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 23.98 \cdot in^2$

$Steel\_Area\_Check := if\left(A_{sprov} > A_{smin}, "Okay", "No Good"\right)$

$Steel\_Area\_Check = "Okay"$

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 9.868 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 78 \cdot in$

Maximum Moment in Pier = $M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] = 40830 \cdot in \cdot kips$

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

$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) := \left(d_p \cdot 12 \;\; NB_{pier} \;\; BS_{pier} \;\; \frac{Axial \cdot 1.333}{kips} \;\; \frac{M_p}{in \cdot kips}\right)$

$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) = (84 \;\; 24 \;\; 9 \;\; 58.7 \;\; 40830)$

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

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

$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = (69.6 \;\; 48467.2 \;\; -60 \;\; 0)$

$Axial\_Load\_Check := if\left(\phi P_n \geq P_u, "Okay", "No Good"\right)$

$Axial\_Load\_Check = "Okay"$

$Bending\_Check := if\left(\phi M_{xn} \geq M_{xu}, "Okay", "No Good"\right)$

$Bending\_Check = "Okay"$

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 9 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 51 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 30.18 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 14.982 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right)$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 21.402 \cdot in$

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

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 21.402 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

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

CT11115F_Anchor_5_draft

Print Name: Standard
PORs: Anchor_Phase 3

Section 1 - Site Information

Site ID: CT11115F
Status: Draft
Version: 5
Project Type: Anchor
Approved: Not Approved
Approved By: Not Approved
Last Modified: 6/30/2020 4:11:43 PM
Last Modified By: Dominic.Kallas2@T-Mobile.com

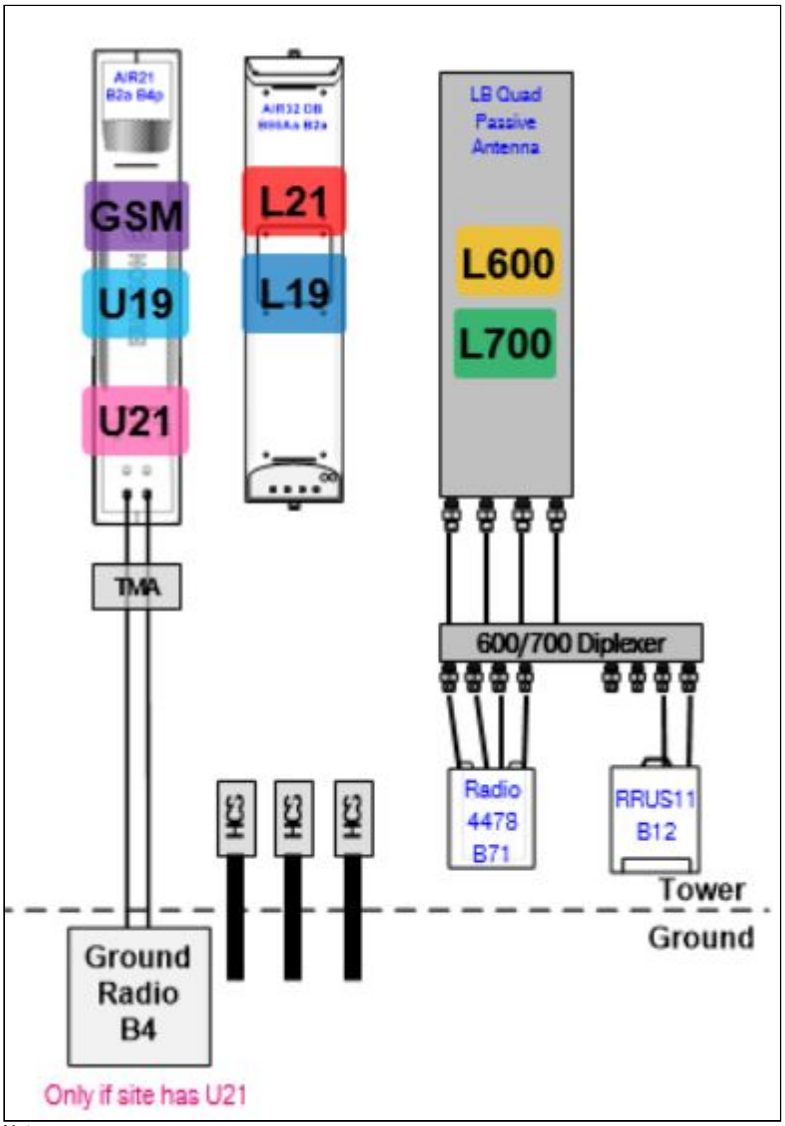
Site Name: CT115/SNET Valley_FT
Site Class: Monopole
Site Type: Structure Non Building
Plan Year: 2020
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: SNET

Latitude: 41.36222100
Longitude: -73.39666800
Address: 38 Spring Hill Lane
City, State: Bethel, CT
Region: NORTHEAST

RAN Template: 67D5A997DB Outdoor			**AL Template:** 67D5997DB_2xAIR+1OP (U21 Market)	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 12	**TMA Count:** 3	**RRU Count:** 6

Section 2 - Existing Template Images

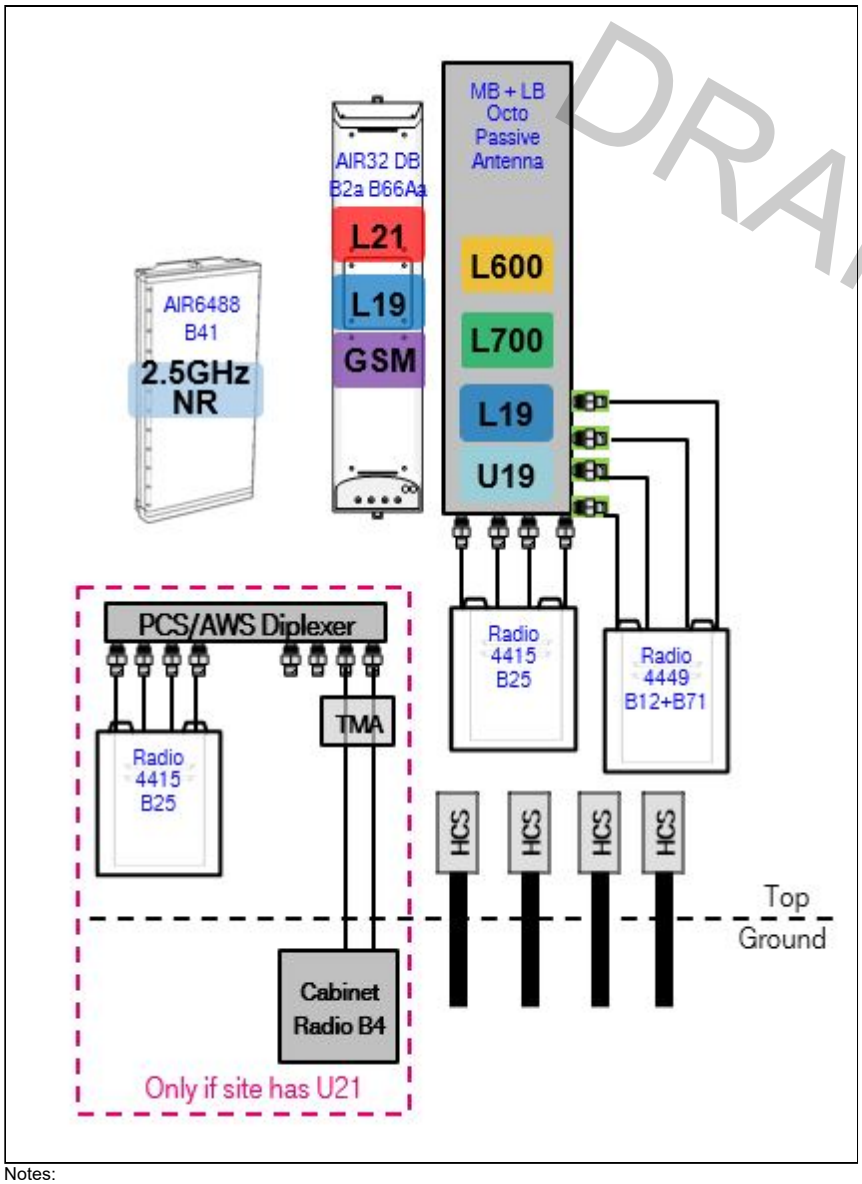
6792DB.JPG



Notes:

Section 3 - Proposed Template Images

67D5997DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

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

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

CT11115F_Anchor_5_draft

Print Name: Standard
PORs: Anchor_Phase 3

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 67D92DB Outdoor

Enclosure	1	2
Enclosure Type	RBS 6131	Ancillary Equipment (Ericsson)
Baseband	DUW30 (U1900 (DECOMMISSIONED)); DUW30 (U2100); DUG20 (G1900); BB 6630 (L700, L600, L2100, L1900); BB 6630 (N600)	
Hybrid Cable System		Ericsson 6x12 HCS 6AWG 50m **(x 2)**; Ericsson 9x18 HCS 50m
Radio	RU22 **(x 6)** (U2100)	

Proposed RAN Equipment

Template: 67D5A997DB Outdoor

Enclosure	1	2	3	4
Enclosure Type	RBS 6131	Ancillary Equipment (Ericsson)	Enclosure 6160	B160
Baseband	DUW30; DUW30 (U2100); DUG20 (G1900); BB 6630 (L700, L600, L2100, L1900); BB 6630 (N600)		BB 6630 (L2500); BB 6648 (N2500)	
Hybrid Cable System		Ericsson 6x12 HCS 6AWG 50m **(x 2)**	Ericsson 6x12 HCS *Select AWG & Length*	
Radio	RU22 **(x 6)** (U2100)			

RAN Scope of Work:

Add (1) Enclosure 6160.

Add (1) Battery Cabinet B160.

Add (1) iXRe Router to new Enclosure 6160.

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

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

Existing: (12) Coaxial Lines; (1) 9x18 & (2) 6x12 HCS

Remove (1) 9X18 HCS.

Add (1) 6X12 HCS for AIR6449. Length of new HCS will match that of existing HCS.

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

CT11115F_Anchor_5_draft

Print Name: Standard
PORs: Anchor_Phase 3

Section 6 - A&L Equipment

Existing Template: 6792DB_2xAIR+1QP
Proposed Template: 67D5997DB_2xAIR+1OP (U21 Market)

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro										
Antenna	1		2				3	4			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Empty Antenna Mount (Empty mount)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	60		60					60			
M. Tilt	0		0					0			
Height	102		102					102			
Ports	P1	P2	P3	P4	P5	P6		P7	P8	P9	P10
Active Tech.	G1900	U2100	L700 L600 N600	L700 L600 N600				L2100	L2100	L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.	U1900										
E. Tilt											
Cables		1 5/8In AVA COAX CABLE FIRE RETARDENT - 175 ft. **(x2)** JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**				Fiber Jumper		Fiber Jumper	
TMAs		Generic Twin Style 1B - AWS (AtAntenna)									
Diplexers / Combiners											
Radio			Radio 4449 B71+ B85 (At Antenna)								
Sector Equipment											

Unconnected Equipment:

Scope of Work:

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

CT11115F_Anchor_5_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 1 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1		2				3	4			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR24_43-U-NA20 (Octo)				Empty Antenna Mount (Empty mount)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	60		60					60			
M. Tilt	0		0					0			
Height	102		102					102			
Ports	P1	P2	P3	P4	P5	P6		P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	L1900	U2100 L1900		L2100	L2100	G1900 L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.											
E. Tilt											
Cables			JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** 1 5/8In AVA COAX CABLE FIRERETARDENT - 175 ft. **(x2)**		Fiber Jumper		Fiber Jumper	
TMAs						Generic Twin Style 1B - AWS (AtAntenna)					
Diplexers / Combiners					Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)					
Radio			Radio 4449	SHARED	Radio 4415	SHARED					

			B71 +B85 (Ant enna)	Radio 4449 B71 +B85 (Ant enna)	B25 (Ant enna)	Radio 4415 B25 (Ant enna)					
Sector Equipment											

Unconnected Equipment:

Cable: 1 5/8In AVA COAX CABLE FIRE RETARDENT | Cable: 1 5/8In AVA COAX CABLE FIRE RETARDENT

Scope of Work:

Add handrail kit.

Remove AIR21 B2A/B4P from Position 1.

Install AIR6449 B41 for L2500 and N2500 in Position 1.

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

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

Move coaxial lines and AWS TMA for U2100 to Position 2, and connect them 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.

Move GSM to AIR32 DB in Position 4. GSM will share B2 Radios with L1900 1st Carrier.

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

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

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

CT11115F_Anchor_5_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 2 (Existing) view from behind

Coverage Type	A - Outdoor Macro										
Antenna	1		2				3	4			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Empty Antenna Mount (Empty mount)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	180		180				180	180			
M. Tilt	0		0					0			
Height	102		102					102			
Ports	P1	P2	P3	P4	P5	P6		P7	P8	P9	P10
Active Tech.	G1900	U2100	L700 L600 N600	L700 L600 N600				L2100	L2100	L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.	U1900										
E. Tilt											
Cables		1 5/8In AVA COAX CABLE FIRE RETARDENT - 175 ft. **(x2)** JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**				Fiber Jumper		Fiber Jumper	
TMAs		Generic Twin Style 1B - AWS (AtAntenna)									
Diplexers / Combiners											
Radio			Radio 4449 B71+B85 (At Antenna)								
Sector Equipment											

Unconnected Equipment:

Scope of Work:

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

CT11115F_Anchor_5_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 2 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1		2				3	4			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR24_43-U-NA20 (Octo)				Empty Antenna Mount (Empty mount)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	180		180				180	180			
M. Tilt	0		0					0			
Height	102		102					102			
Ports	P1	P2	P3	P4	P5	P6		P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	L1900	U2100 L1900		L2100	L2100	G1900 L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.											
E. Tilt											
Cables			JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** 1 5/8In AVA COAX CABLE FIRERETARDENT - 175 ft. **(x2)**		Fiber Jumper		Fiber Jumper	
TMAs						Generic Twin Style 1B - AWS (AtAntenna)					
Diplexers / Combiners					Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)					
Radio			Radio 4449	SHARED	Radio 4415	SHARED					

			B71 +B85 (Antenna)	Radio 4449 B71 +B85 (Antenna)	B25 (Antenna)	Radio 4415 B25 (Antenna)					
Sector Equipment											

Unconnected Equipment:

Cable: 1 5/8In AVA COAX CABLE FIRE RETARDENT | Cable: 1 5/8In AVA COAX CABLE FIRE RETARDENT

Scope of Work:

Add handrail kit.

Remove AIR21 B2A/B4P from Position 1.

Install AIR6449 B41 for L2500 and N2500 in Position 1.

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

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

Move coaxial lines and AWS TMA for U2100 to Position 2, and connect them 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.

Move GSM to AIR32 DB in Position 4. GSM will share B2 Radios with L1900 1st Carrier.

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

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

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

CT11115F_Anchor_5_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 3 (Existing) view from behind

Coverage Type	A - Outdoor Macro										
Antenna	1		2				3	4			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Empty Antenna Mount (Empty mount)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	300		300					300			
M. Tilt	0		0					0			
Height	102		102					102			
Ports	P1	P2	P3	P4	P5	P6		P7	P8	P9	P10
Active Tech.	G1900	U2100	L700 L600 N600	L700 L600 N600				L2100	L2100	L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.	U1900										
E. Tilt											
Cables		1 5/8In AVA COAX CABLE FIRE RETARDENT - 175 ft. **(x2)** JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**				Fiber Jumper		Fiber Jumper	
TMAs		Generic Twin Style 1B - AWS (AtAntenna)									
Diplexers / Combiners											
Radio			Radio 4449 B71+B85 (At Antenna)								
Sector Equipment											

Unconnected Equipment:

Scope of Work:

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

CT11115F_Anchor_5_draft

Print Name: Standard
PORs: Anchor_Phase 3

Sector 3 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1		2				3	4			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR24_43-U-NA20 (Octo)				Empty Antenna Mount (Empty mount)	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	300		300					300			
M. Tilt	0		0					0			
Height	102		102					102			
Ports	P1	P2	P3	P4	P5	P6		P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	L1900	U2100 L1900		L2100	L2100	G1900 L1900	L1900
Dark Tech.											
Restricted Tech.											
Decomm. Tech.											
E. Tilt											
Cables			JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** 1 5/8In AVA COAX CABLE FIRERETARDENT - 175 ft. **(x2)**		Fiber Jumper		Fiber Jumper	
TMAs						Generic Twin Style 1B - AWS (AtAntenna)					
Diplexers / Combiners					Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)					
Radio			Radio 4449	SHARED	Radio 4415	SHARED					

			B71 +B85 (Antenna)	Radio 4449 B71 +B85 (Antenna)	B25 (Antenna)	Radio 4415 B25 (Antenna)					
Sector Equipment											

Unconnected Equipment:

Cable: 1 5/8In AVA COAX CABLE FIRE RETARDENT - 175 ft.

Cable: 1 5/8In AVA COAX CABLE FIRE RETARDENT - 175 ft.

Scope of Work:

Add handrail kit.

Remove AIR21 B2A/B4P from Position 1.

Install AIR6449 B41 for L2500 and N2500 in Position 1.

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

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

Move coaxial lines and AWS TMA for U2100 to Position 2, and connect them 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.

Move GSM to AIR32 DB in Position 4. GSM will share B2 Radios with L1900 1st Carrier.

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

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

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

CT11115F_Anchor_5_draft

Print Name: Standard
PORs: Anchor_Phase 3

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

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

Proposed Power Systems Equipment

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

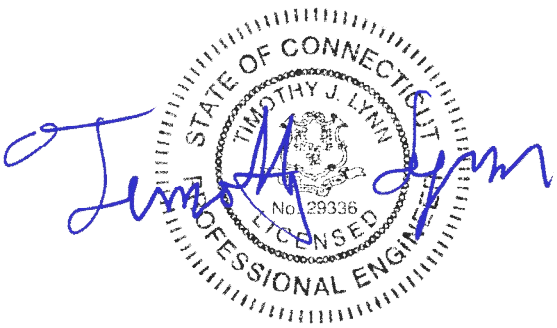
T-Mobile Site #: CT11115F

38 Spring Hill Lane
Bethel, CT

Centek Project No. 20074.47

Date: July 15, 2020

Max Stress Ratio = 50.8%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

CENTEK engineering

Centered on Solutions℠

July 15, 2020

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

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CT11115F
38 Spring Hill Lane
Bethel, CT 06801

Centek Project No. 20074.47

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 one (1) 13-ft low profile platform to support the 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:
  Platform: Three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAARR24-43-NA20 panel antennas, three (3) KRY112 TMAs, three (3) Ericsson 4449 remote radio units, three (3) Ericsson 4415 remote radio units and three (3) Commscope SDX1926Q-43 diplexers mounted on one (1) low profile platform with a RAD center elevation of 102-ft +/- AGL.

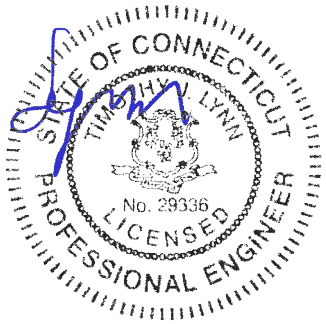
The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 93 mph for Bethel as required in Appendix N of the 2018 Connecticut State Building Code.

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

Based on our review of the equipment upgrade, it is our opinion that the existing antenna platform with the installation of one (1) SitePro handrail (p/n HRK12), is structurally adequate to support the proposed antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer



Section 2 - Calculations

CENTEK engineering
Centered on Solutions℠ www.centekeng.com
63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: TIA-222-G Loads

Location: Bethel, CT

Rev. 0: 7/15/20

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 20074.47

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 := Pole (User Input)

Structure Category = SC := II (User Input)

Exposure Category = Exp := B (User Input)

Structure Height = $h := 125$ ft (User Input)

Height to Center of Antennas = $z_{ant} := 102$ 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 = $G_H = 1.1$ (User Input)

Output

Wind Direction Probability Factor =

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

(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)

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

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

$$K_{iz} := \left(\frac{z_{ant}}{33}\right)^{0.1} = 1.119$$

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.679$$

Velocity Pressure Coefficient Antennas =

$$Kz_{ant} := 2.01\left(\left(\frac{z_{ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 0.994$$

Velocity Pressure w/o Ice Antennas = $qz_{ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot V^2 \cdot I_{Wind} = 20.905$

Velocity Pressure with Ice Antennas = $qz_{ice.ant} := 0.00256 \cdot K_d \cdot Kz_{ant} \cdot V_i^2 \cdot I_{Wind} = 6.043$

CENTEK engineering
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63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject:	TIA-222-G Loads
Location:	Bethel, CT
Rev. 0: 7/15/20	Prepared by: T.J.L. Checked by: C.F.C. Job No. 20074.47

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR32		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 56.6$	in	(User Input)
Antenna Width =	$W_{ant} := 12.9$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 133$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.4$		
Antenna Force Coefficient =	$Ca_{ant} = 1.28$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.1$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 150$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.4$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 101$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.8$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 58$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 43$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 133$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6352$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5403$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 175$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 175$	lbs

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Branford, CT 06405 F: (203) 488-8587

Subject: TIA-222-G Loads

Location: Bethel, CT

Rev. 0: 7/15/20

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 20074.47

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 =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 130$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.9$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 53$	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 =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 48$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 3$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 24$	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 =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4509$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 146$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 146$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPXVAARR24-43		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 24$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 153$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.0$		
Antenna Force Coefficient =	$Ca_{ant} = 1.27$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 465$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 169$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 18.9$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 159$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.3$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 70$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 153$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \times 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \times 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 412$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 412$	lbs

Development of Wind & Ice Load on TMA's

TMA Data:

TMA Model = Ericsson KRY112 TMA

TMA Shape = Flat (User Input)

TMA Height = $L_{TMA} := 7.7$ in (User Input)

TMA Width = $W_{TMA} := 7.5$ in (User Input)

TMA Thickness = $T_{TMA} := 3.4$ in (User Input)

TMA Weight = $WT_{TMA} := 11$ lbs (User Input)

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

TMA Aspect Ratio = $Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1$

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

Wind Load (without ice)

Surface Area for One TMA = $SA_{TMAF} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.4$ sf

Total TMA Wind Force = $F_{TMA} := qz_{ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAF} = 11$ lbs

Surface Area for One TMA = $SA_{TMAS} := \frac{L_{TMA} \cdot T_{TMA}}{144} = 0.2$ sf

Total TMA Wind Force = $F_{TMA} := qz_{ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAS} = 5$ lbs

Wind Load (with ice)

Surface Area for One TMA w/ Ice = $SA_{ICETMAF} := \frac{\left(L_{TMA} + 2 \cdot t_{iz}\right) \cdot \left(W_{TMA} + 2 \cdot t_{iz}\right)}{144} = 0.8$ sf

Total TMA Wind Force w/ Ice = $Fi_{TMA} := qz_{ice.ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAF} = 7$ lbs

Surface Area for One TMA w/ Ice = $SA_{ICETMAS} := \frac{\left(L_{TMA} + 2 \cdot t_{iz}\right) \cdot \left(T_{TMA} + 2 \cdot t_{iz}\right)}{144} = 0.5$ sf

Total TMA Wind Force w/ Ice = $Fi_{TMA} := qz_{ice.ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAS} = 4$ lbs

Gravity Load (without ice)

Weight of All TMAs = $WT_{TMA} \cdot N_{TMA} = 11$ lbs

Gravity Loads (ice only)

Volume of Each TMA = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 196$ cu in

Volume of Ice on Each TMA = $V_{ice} := \left(L_{TMA} + 2 \cdot t_{iz}\right)\left(W_{TMA} + 2 \cdot t_{iz}\right) \cdot \left(T_{TMA} + 2 \cdot t_{iz}\right) - V_{TMA} = 615$ cu in

Weight of Ice on Each TMA = $W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 20$ lbs

Weight of Ice on All TMAs = $W_{ICETMA} \cdot N_{TMA} = 20$ lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model = Ericsson 4449 B71B12

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 = $F_{RRUS} := qz_{ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 38$ lbs

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

Total RRUS Wind Force = $F_{RRUS} := qz_{ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 30$ 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 = $Fi_{RRUS} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 17$ 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 = $Fi_{RRUS} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 14$ 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 = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2114$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 69$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 69$ lbs

Development of Wind & Ice Load on RRUS

RRUS Data:

RRUS Model = Ericsson 4415 B25

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 = $F_{RRUS} := qz_{ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 38$ lbs

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

Total RRUS Wind Force = $F_{RRUS} := qz_{ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 15$ 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 = $Fi_{RRUS} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 17$ 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 = $Fi_{RRUS} := qz_{ice.ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 9$ lbs

Gravity Load (without ice)

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

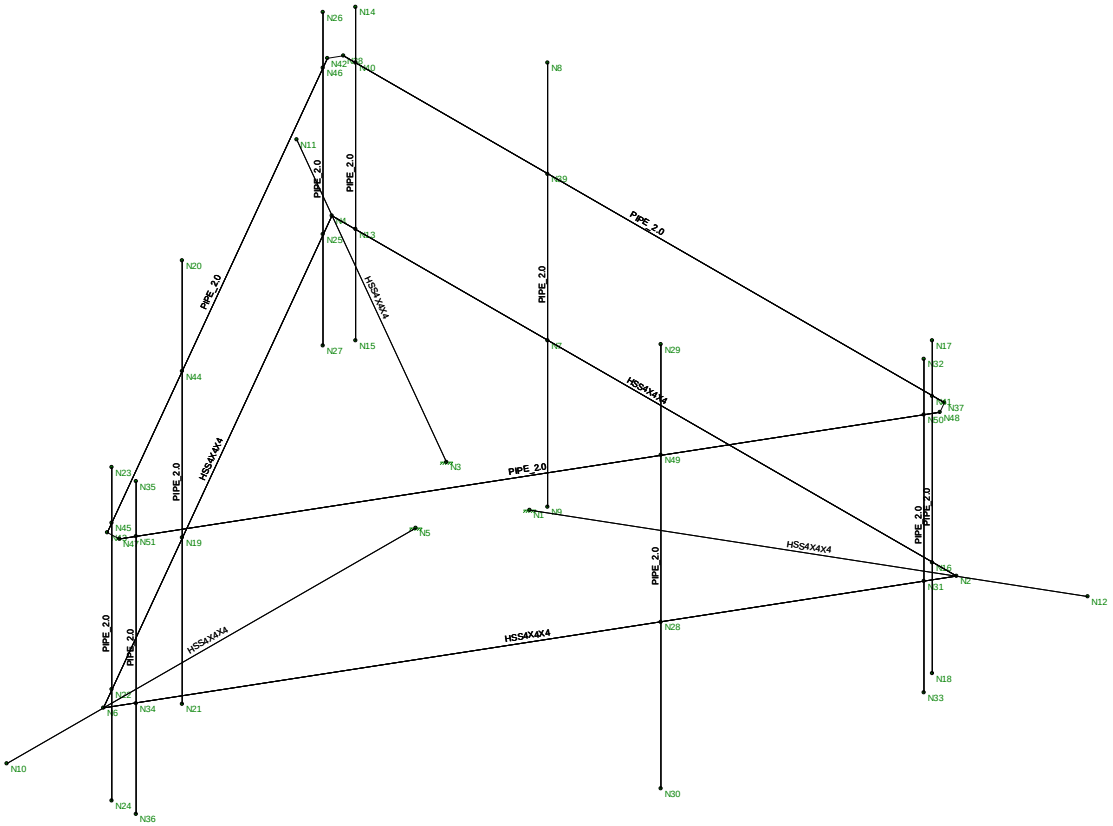
Gravity Loads (ice only)

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

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 1586$ 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



Envelope Only Solution

Centek		
TJL	CT11115F - Mount	July 15, 2020 at 5:01 PM
20074.47	Member Framing	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	4
Cd X	4
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	Outrigger	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
2	Horz	HSS4X4X4	Beam	Pipe	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
3	Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Handrail	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25

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	Outrigger	8.5			Lbyy						Lateral
2	M2	Outrigger	8.5			Lbyy						Lateral
3	M3	Outrigger	8.5			Lbyy						Lateral
4	M4	Horz	12.99			Lbyy						Lateral
5	M5	Horz	12.99			Lbyy						Lateral
6	M6	Horz	12.99			Lbyy						Lateral
7	M7	Antenna Mast	8			Lbyy						Lateral
8	M8	Antenna Mast	6			Lbyy						Lateral
9	M9	Antenna Mast	6			Lbyy						Lateral
10	M10	Antenna Mast	8			Lbyy						Lateral
11	M11	Antenna Mast	6			Lbyy						Lateral
12	M12	Antenna Mast	6			Lbyy						Lateral
13	M13	Antenna Mast	8			Lbyy						Lateral
14	M14	Antenna Mast	6			Lbyy						Lateral
15	M15	Antenna Mast	6			Lbyy						Lateral
16	M16	Handrail	12.5			Lbyy						Lateral
17	M17	Handrail	12.5			Lbyy						Lateral
18	M18	Handrail	12.5			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N1	N12			Outrigger	Beam	Tube	A500 Gr...	Typical
2	M2	N3	N11			Outrigger	Beam	Tube	A500 Gr...	Typical
3	M3	N5	N10			Outrigger	Beam	Tube	A500 Gr...	Typical
4	M4	N4	N2			Horz	Beam	Pipe	A500 Gr...	Typical
5	M5	N6	N4			Horz	Beam	Pipe	A500 Gr...	Typical
6	M6	N2	N6			Horz	Beam	Pipe	A500 Gr...	Typical
7	M7	N9	N8			Antenna Mast	Column	Pipe	A53 Gra...	Typical
8	M8	N15	N14			Antenna Mast	Column	Pipe	A53 Gra...	Typical
9	M9	N18	N17			Antenna Mast	Column	Pipe	A53 Gra...	Typical
10	M10	N21	N20			Antenna Mast	Column	Pipe	A53 Gra...	Typical
11	M11	N24	N23			Antenna Mast	Column	Pipe	A53 Gra...	Typical
12	M12	N27	N26			Antenna Mast	Column	Pipe	A53 Gra...	Typical
13	M13	N30	N29			Antenna Mast	Column	Pipe	A53 Gra...	Typical
14	M14	N33	N32			Antenna Mast	Column	Pipe	A53 Gra...	Typical
15	M15	N36	N35			Antenna Mast	Column	Pipe	A53 Gra...	Typical
16	M16	N38	N37			Handrail	Beam	Pipe	A53 Gra...	Typical
17	M17	N43	N42			Handrail	Beam	Pipe	A53 Gra...	Typical
18	M18	N48	N47			Handrail	Beam	Pipe	A53 Gra...	Typical
19	M19	N42	N38			RIGID	None	None	RIGID	Typical
20	M20	N43	N47			RIGID	None	None	RIGID	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
21	M21	N48	N37			RIGID	None	None	RIGID	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	0.866025	0	-.5	0	
2	N2	6.495191	0	-3.75	0	
3	N3	-0.866025	0	-.5	0	
4	N4	-6.495191	0	-3.75	0	
5	N5	0.	0	1	0	
6	N6	0.	0	7.5	0	
7	N7	-2	0	-3.75	0	
8	N8	-2	5	-3.75	0	
9	N9	-2	-3	-3.75	0	
10	N10	0.	0	9.5	0	
11	N11	-8.227241	0	-4.75	0	
12	N12	8.227241	0	-4.75	0	
13	N13	-6	0	-3.75	0	
14	N14	-6	4	-3.75	0	
15	N15	-6	-2	-3.75	0	
16	N16	6	0	-3.75	0	
17	N17	6	4	-3.75	0	
18	N18	6	-2	-3.75	0	
19	N19	-2.247595	0	3.607051	0	
20	N20	-2.247595	5	3.607051	0	
21	N21	-2.247595	-3	3.607051	0	
22	N22	-0.247595	0	7.071152	0	
23	N23	-0.247595	4	7.071152	0	
24	N24	-0.247595	-2	7.071152	0	
25	N25	-6.247595	0	-3.321152	0	
26	N26	-6.247595	4	-3.321152	0	
27	N27	-6.247595	-2	-3.321152	0	
28	N28	4.247595	0	0.142949	0	
29	N29	4.247595	5	0.142949	0	
30	N30	4.247595	-3	0.142949	0	
31	N31	6.247595	0	-3.321152	0	
32	N32	6.247595	4	-3.321152	0	
33	N33	6.247595	-2	-3.321152	0	
34	N34	0.247595	0	7.071152	0	
35	N35	0.247595	4	7.071152	0	
36	N36	0.247595	-2	7.071152	0	
37	N37	6.25	3	-3.75	0	
38	N38	-6.25	3	-3.75	0	
39	N39	-2	3	-3.75	0	
40	N40	-6	3	-3.75	0	
41	N41	6	3	-3.75	0	
42	N42	-6.372595	3	-3.537659	0	
43	N43	-0.122595	3	7.287659	0	
44	N44	-2.247595	3	3.607051	0	
45	N45	-0.247595	3	7.071152	0	
46	N46	-6.247595	3	-3.321152	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
47	N47	0.122595	3	7.287659	0	
48	N48	6.372595	3	-3.537659	0	
49	N49	4.247595	3	0.142949	0	
50	N50	6.247595	3	-3.321152	0	
51	N51	0.247595	3	7.071152	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	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N3	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N5	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M8	Y	-.052	2.5
2	M11	Y	-.052	2.5
3	M14	Y	-.052	2.5
4	M8	Y	-.052	5.5
5	M11	Y	-.052	5.5
6	M14	Y	-.052	5.5
7	M9	Y	-.067	1
8	M12	Y	-.067	1
9	M15	Y	-.067	1
10	M9	Y	-.067	5
11	M12	Y	-.067	5
12	M15	Y	-.067	5
13	M7	Y	-.077	1
14	M10	Y	-.077	1
15	M13	Y	-.077	1
16	M7	Y	-.077	7
17	M10	Y	-.077	7
18	M13	Y	-.077	7
19	M7	Y	-.074	%50
20	M10	Y	-.074	%50
21	M13	Y	-.074	%50
22	M7	Y	-.047	6
23	M10	Y	-.047	6
24	M13	Y	-.047	6

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M8	Y	-.073	2.5
2	M11	Y	-.073	2.5
3	M14	Y	-.073	2.5
4	M8	Y	-.073	5.5
5	M11	Y	-.073	5.5
6	M14	Y	-.073	5.5
7	M9	Y	-.088	1

Member Point Loads (BLC 3 : Ice Load) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
8	M12	Y	-.088	1
9	M15	Y	-.088	1
10	M9	Y	-.088	5
11	M12	Y	-.088	5
12	M15	Y	-.088	5
13	M7	Y	-.206	1
14	M10	Y	-.206	1
15	M13	Y	-.206	1
16	M7	Y	-.206	7
17	M10	Y	-.206	7
18	M13	Y	-.206	7
19	M7	Y	-.069	%50
20	M10	Y	-.069	%50
21	M13	Y	-.069	%50
22	M7	Y	-.051	6
23	M10	Y	-.051	6
24	M13	Y	-.051	6

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M8	X	.012	2.5
2	M8	X	.012	5.5
3	M11	X	.024	2.5
4	M14	X	.024	2.5
5	M11	X	.024	5.5
6	M14	X	.024	5.5
7	M9	X	.022	1
8	M9	X	.022	5
9	M12	X	.029	1
10	M15	X	.029	1
11	M12	X	.029	5
12	M15	X	.029	5
13	M7	X	.035	1
14	M7	X	.035	7
15	M10	X	.08	1
16	M13	X	.08	1
17	M10	X	.08	7
18	M13	X	.08	7
19	M7	X	.014	%50
20	M7	X	.009	6

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M8	X	.027	2.5
2	M8	X	.027	5.5
3	M11	X	.065	2.5
4	M14	X	.065	2.5
5	M11	X	.065	5.5
6	M14	X	.065	5.5
7	M9	X	.051	1
8	M9	X	.051	5

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
9	M12	X	.075	1
10	M15	X	.075	1
11	M12	X	.075	5
12	M15	X	.075	5
13	M7	X	.085	1
14	M7	X	.085	7
15	M10	X	.233	1
16	M13	X	.233	1
17	M10	X	.233	7
18	M13	X	.233	7
19	M7	X	.03	%50
20	M7	X	.015	6

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M8	Z	.024	2.5
2	M8	Z	.024	5.5
3	M11	Z	.012	2.5
4	M14	Z	.012	2.5
5	M11	Z	.012	5.5
6	M14	Z	.012	5.5
7	M9	Z	.029	1
8	M9	Z	.029	5
9	M12	Z	.022	1
10	M15	Z	.022	1
11	M12	Z	.022	5
12	M15	Z	.022	5
13	M7	Z	.08	1
14	M7	Z	.08	7
15	M10	Z	.035	1
16	M13	Z	.035	1
17	M10	Z	.035	7
18	M13	Z	.035	7
19	M10	Z	.014	%50
20	M13	Z	.014	%50
21	M10	Z	.009	6
22	M13	Z	.009	6

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M8	Z	.065	2.5
2	M8	Z	.065	5.5
3	M11	Z	.027	2.5
4	M14	Z	.027	2.5
5	M11	Z	.027	5.5
6	M14	Z	.027	5.5
7	M9	Z	.075	1
8	M9	Z	.075	5
9	M12	Z	.051	1
10	M15	Z	.051	1
11	M12	Z	.051	5

Member Point Loads (BLC 7 : Wind Z) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
12	M15	Z	.051	5
13	M7	Z	.233	1
14	M7	Z	.233	7
15	M10	Z	.085	1
16	M13	Z	.085	1
17	M10	Z	.085	7
18	M13	Z	.085	7
19	M10	Z	.03	%50
20	M13	Z	.03	%50
21	M10	Z	.015	6
22	M13	Z	.015	6

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	M5	X	.002	.002	0	0
2	M8	X	.002	.002	0	0
3	M7	X	.002	.002	0	0
4	M9	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	M5	X	.007	.007	0	0
2	M8	X	.007	.007	0	0
3	M7	X	.007	.007	0	0
4	M9	X	.007	.007	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	M4	Z	.002	.002	0	0
2	M12	Z	.002	.002	0	0
3	M10	Z	.002	.002	0	0
4	M11	Z	.002	.002	0	0
5	M15	Z	.002	.002	0	0
6	M13	Z	.002	.002	0	0
7	M14	Z	.002	.002	0	0
8	M16	Z	.002	.002	0	0
9	M17	Z	.002	.002	0	0
10	M18	Z	.002	.002	0	0
11	M16	Z	.002	.002	0	12.5

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	M4	Z	.007	.007	0	0
2	M12	Z	.007	.007	0	0
3	M10	Z	.007	.007	0	0
4	M11	Z	.007	.007	0	0
5	M15	Z	.007	.007	0	0
6	M13	Z	.007	.007	0	0
7	M14	Z	.007	.007	0	0

Member Distributed Loads (BLC 7 : Wind Z) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
8	M16	Z	.007	.007	0	0
9	M17	Z	.007	.007	0	0
10	M18	Z	.007	.007	0	0
11	M16	Z	.007	.007	0	12.5

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					24			
3	Ice Load	None					24			
4	Wind with Ice X	None					20	4		
5	Wind X	None					20	4		
6	Wind with Ice Z	None					22	11		
7	Wind Z	None					22	11		

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..	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	N1	max	.863	4	1.967	3	.779	2	3.515	3	.284	5	6.344	3
2		min	-1.466	2	.57	5	-.706	4	.337	5	-.109	1	1.821	5
3	N3	max	-.284	6	1.851	6	-.243	6	3.416	3	-.027	3	-1.097	2
4		min	-1.531	1	.506	2	-.87	1	.366	5	-.837	5	-5.833	6
5	N5	max	-.004	6	1.998	6	.131	3	-2.845	2	-.028	6	.53	2
6		min	-.37	1	.779	2	-1.987	5	-7.404	6	-1.06	2	-.067	6
7	Totals:	max	0	6	5.702	3	0	3						
8		min	-3.35	2	2.355	5	-3.534	5						

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	0	6	0	6	0	6	0	6	0	6	0	6
2		min	0	1	0	1	0	1	0	1	0	1	0	1
3	N2	max	-.002	6	-.112	5	-.003	6	3.611e-03	5	1.561e-03	2	-1.86e-03	5
4		min	-.022	2	-.622	3	-.042	2	-1.764e-03	3	2.898e-04	3	-5.253e-03	1
5	N3	max	0	6	0	6	0	6	0	6	0	6	0	6
6		min	0	1	0	1	0	1	0	1	0	1	0	1
7	N4	max	-.002	6	-.074	2	.042	2	3.37e-03	5	1.279e-03	2	3.658e-03	6
8		min	-.022	2	-.559	6	.004	6	-2.618e-03	3	-1.143e-03	4	-1.572e-03	2
9	N5	max	0	6	0	6	0	6	0	6	0	6	0	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
10		min	0	1	0	1	0	1	0	1	0	1	0	1
11	N6	max	.054	2	-.244	2	.002	5	6.482e-03	4	4.907e-04	5	4.42e-04	6
12		min	.004	6	-.64	6	0	3	1.987e-03	2	-7.377e-04	1	-3.478e-03	2
13	N7	max	-.002	6	-.084	5	.125	4	4.145e-03	5	1.55e-04	2	1.347e-04	4
14		min	-.022	2	-.543	3	.004	3	-1.92e-03	3	-1.036e-03	4	-1.915e-03	2
15	N8	max	.271	2	-.084	5	1.061	5	1.951e-02	4	-5.498e-05	3	2.501e-04	4
16		min	-.019	5	-.544	3	-.03	3	-1.477e-04	3	-3.712e-03	5	-4.861e-03	2
17	N9	max	.002	3	-.084	5	.193	4	-7.819e-04	2	1.55e-04	2	1.294e-03	1
18		min	-.008	5	-.543	3	.038	2	-3.498e-03	4	-1.036e-03	4	1.701e-06	6
19	N10	max	.036	2	-.292	2	.002	5	6.497e-03	4	4.907e-04	5	4.42e-04	6
20		min	.004	3	-.767	6	0	3	1.998e-03	2	-7.377e-04	1	-3.478e-03	2
21	N11	max	.001	6	-.055	2	.069	2	3.364e-03	5	1.279e-03	2	3.671e-03	6
22		min	-.038	2	-.655	6	-.001	6	-2.625e-03	3	-1.143e-03	4	-1.562e-03	2
23	N12	max	-.006	6	-.108	5	-.009	6	3.606e-03	5	1.561e-03	2	-1.869e-03	5
24		min	-.041	2	-.742	3	-.075	2	-1.771e-03	3	2.898e-04	3	-5.265e-03	1
25	N13	max	-.002	6	-.085	2	.035	2	3.656e-03	5	1.094e-03	2	2.559e-03	6
26		min	-.022	2	-.54	6	.006	3	-2.438e-03	3	-1.617e-03	4	-1.957e-03	2
27	N14	max	.216	1	-.085	2	.376	5	7.622e-03	4	2.084e-03	1	-8.562e-04	5
28		min	-.003	5	-.54	6	-.004	3	2.837e-04	3	-5.47e-03	5	-4.917e-03	1
29	N15	max	.059	6	-.085	2	.067	1	3.656e-03	5	1.094e-03	2	2.559e-03	6
30		min	-.066	2	-.54	6	-.054	5	-2.438e-03	3	-1.617e-03	4	-1.809e-03	2
31	N16	max	-.002	6	-.102	5	0	6	3.775e-03	5	1.85e-03	5	-1.534e-03	5
32		min	-.022	2	-.597	3	-.033	2	-1.665e-03	3	2.715e-04	3	-4.595e-03	1
33	N17	max	.21	2	-.101	5	.323	4	6.945e-03	4	5.199e-03	4	8.128e-04	4
34		min	-.022	4	-.598	3	-.027	2	1.123e-04	2	6.329e-04	3	-4.345e-03	2
35	N18	max	-.048	5	-.102	5	.035	3	3.179e-03	5	1.85e-03	5	-1.533e-03	5
36		min	-.122	1	-.597	3	-.085	5	-1.662e-03	3	2.715e-04	3	-4.039e-03	1
37	N19	max	.104	1	-.145	2	.03	5	3.742e-03	4	1.009e-03	5	1.996e-03	4
38		min	-.023	5	-.571	6	-.03	1	-2.607e-04	2	-3.202e-04	1	-2.246e-03	2
39	N20	max	.745	2	-.146	2	.484	4	7.788e-03	4	2.566e-03	4	2.973e-03	4
40		min	-.165	4	-.572	6	-.192	2	-3.736e-03	2	-1.209e-03	2	-1.386e-02	1
41	N21	max	.24	1	-.145	2	-.01	5	8.493e-04	6	1.009e-03	5	5.354e-03	1
42		min	.04	5	-.571	6	-.036	3	-2.602e-04	2	-3.202e-04	1	1.765e-03	5
43	N22	max	.059	2	-.224	2	.004	5	5.897e-03	4	7.103e-04	5	8.797e-04	6
44		min	.004	6	-.618	6	-.003	1	1.535e-03	2	-1.05e-03	1	-3.426e-03	2
45	N23	max	.329	2	-.222	2	.303	5	5.724e-03	5	1.198e-03	4	3.788e-04	6
46		min	-.016	6	-.618	6	-.029	1	-1.459e-03	1	-3.795e-03	2	-5.458e-03	2
47	N24	max	.031	4	-.224	2	-.04	2	5.749e-03	4	7.103e-04	5	8.797e-04	6
48		min	-.024	2	-.618	6	-.135	4	1.535e-03	2	-1.05e-03	1	-3.426e-03	2
49	N25	max	-.002	3	-.074	2	.038	2	3.571e-03	5	1.541e-03	2	3.133e-03	6
50		min	-.019	5	-.543	6	.005	6	-1.881e-03	3	-1.076e-03	5	-1.786e-03	2
51	N26	max	.238	1	-.073	2	.344	5	6.228e-03	4	2.566e-03	1	-2.224e-04	5
52		min	-.036	5	-.544	6	-.004	3	1.326e-04	3	-4.556e-03	4	-5.692e-03	1
53	N27	max	.072	6	-.074	2	.066	1	3.018e-03	5	1.541e-03	2	3.127e-03	6
54		min	-.046	2	-.543	6	-.047	5	-1.877e-03	3	-1.076e-03	5	-1.192e-03	2
55	N28	max	.075	2	-.253	5	.013	2	3.861e-03	4	1.542e-03	2	-1.927e-03	6
56		min	.007	6	-.573	3	.002	6	1.098e-03	2	5.271e-05	6	-3.705e-03	1
57	N29	max	.737	1	-.254	5	.475	4	7.888e-03	5	3.436e-03	1	-9.323e-04	6
58		min	.069	6	-.574	3	.062	3	8.817e-04	3	1.614e-04	6	-1.38e-02	1
59	N30	max	.158	2	-.253	5	-.026	2	1.222e-03	1	1.542e-03	2	3.904e-03	2
60		min	-.062	6	-.573	3	-.038	3	5.495e-04	5	5.271e-05	6	-2.191e-03	4
61	N31	max	0	6	-.127	5	-.002	6	3.96e-03	5	1.883e-03	2	-1.709e-03	5

Envelope Joint Displacements (Continued)

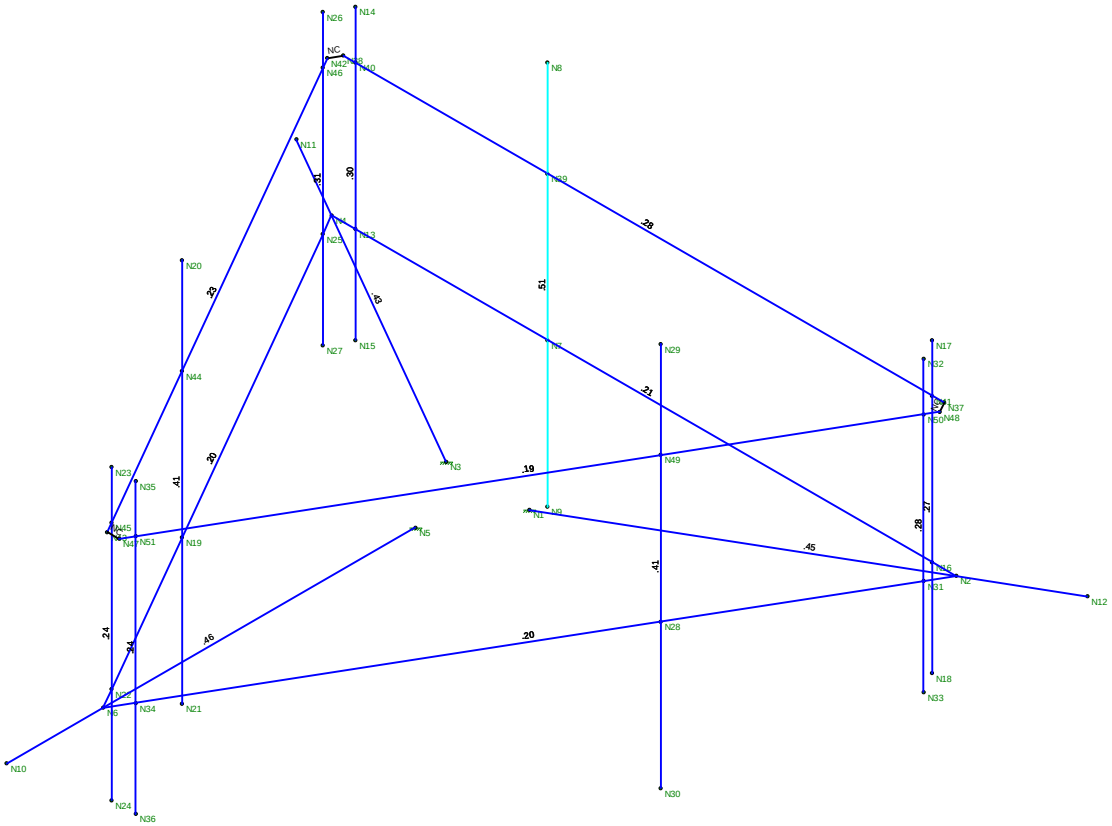
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
62		min	-.013	1	-.603	3	-.037	2	-8.672e-04	3	2.838e-04	6	-4.952e-03	1
63	N32	max	.243	2	-.128	5	.296	4	6.003e-03	4	4.483e-03	4	5.86e-04	6
64		min	.004	6	-.603	3	-.035	2	3.164e-04	2	1.015e-03	3	-5.347e-03	2
65	N33	max	-.044	5	-.127	5	.015	3	3.812e-03	5	1.883e-03	2	-1.709e-03	5
66		min	-.132	1	-.603	3	-.105	5	-8.671e-04	3	2.838e-04	6	-4.951e-03	1
67	N34	max	.058	2	-.246	2	.002	2	5.862e-03	4	2.754e-04	4	1.631e-05	6
68		min	.004	6	-.615	6	0	6	1.682e-03	2	-8.578e-04	2	-3.67e-03	1
69	N35	max	.324	2	-.247	2	.298	5	5.653e-03	5	3.575e-04	4	4.487e-04	6
70		min	-.016	6	-.615	6	-.01	3	-1.042e-03	3	-3.597e-03	1	-5.031e-03	2
71	N36	max	.015	5	-.246	2	-.038	2	5.306e-03	4	2.754e-04	4	1.628e-05	6
72		min	-.018	1	-.615	6	-.129	4	1.681e-03	2	-8.578e-04	2	-3.074e-03	1
73	N37	max	.159	1	-.098	5	.224	4	6.087e-03	4	4.878e-03	4	7.029e-04	6
74		min	-.013	5	-.599	3	-.039	2	-2.883e-05	2	8.38e-04	3	-4.625e-03	2
75	N38	max	.158	1	-.071	2	.27	5	6.307e-03	4	2.343e-03	1	-8.401e-04	5
76		min	-.014	5	-.536	6	-.006	3	1.857e-04	3	-5.054e-03	5	-5.195e-03	1
77	N39	max	.158	1	-.084	5	.6	5	1.764e-02	5	-5.498e-05	3	2.498e-04	4
78		min	-.013	5	-.543	3	-.027	3	-1.473e-04	3	-3.712e-03	5	-4.037e-03	2
79	N40	max	.158	1	-.085	2	.286	5	7.492e-03	4	2.084e-03	1	-8.561e-04	5
80		min	-.014	5	-.54	6	-.008	3	2.836e-04	3	-5.47e-03	5	-4.844e-03	1
81	N41	max	.159	1	-.101	5	.239	4	6.945e-03	4	5.199e-03	4	8.128e-04	4
82		min	-.013	5	-.598	3	-.029	2	1.123e-04	2	6.329e-04	3	-4.326e-03	2
83	N42	max	.164	1	-.064	2	.262	5	6.307e-03	4	2.343e-03	1	-8.401e-04	5
84		min	-.026	5	-.538	6	-.005	3	1.857e-04	3	-5.054e-03	5	-5.195e-03	1
85	N43	max	.254	2	-.226	2	.233	4	5.638e-03	5	7.834e-04	4	4.654e-04	6
86		min	-.01	6	-.618	6	-.006	2	-1.105e-03	3	-3.711e-03	2	-4.593e-03	2
87	N44	max	.419	2	-.146	2	.3	4	6.959e-03	4	2.566e-03	4	2.97e-03	4
88		min	-.094	4	-.572	6	-.102	2	-3.733e-03	2	-1.209e-03	2	-1.2e-02	1
89	N45	max	.263	2	-.222	2	.235	4	5.652e-03	5	1.198e-03	4	3.787e-04	6
90		min	-.011	6	-.618	6	-.012	2	-1.459e-03	1	-3.795e-03	2	-5.329e-03	2
91	N46	max	.17	1	-.073	2	.27	5	6.209e-03	4	2.566e-03	1	-2.224e-04	5
92		min	-.039	5	-.544	6	-.006	3	1.326e-04	3	-4.556e-03	4	-5.692e-03	1
93	N47	max	.254	2	-.24	2	.231	5	5.638e-03	5	7.834e-04	4	4.654e-04	6
94		min	-.01	6	-.617	6	.002	3	-1.105e-03	3	-3.711e-03	2	-4.593e-03	2
95	N48	max	.169	1	-.113	5	.217	4	6.087e-03	4	4.878e-03	4	7.029e-04	6
96		min	0	5	-.602	3	-.045	2	-2.883e-05	2	8.38e-04	3	-4.625e-03	2
97	N49	max	.412	1	-.253	5	.289	4	7.061e-03	5	3.436e-03	1	-9.294e-04	6
98		min	.046	6	-.573	3	.041	3	8.791e-04	3	1.614e-04	6	-1.195e-02	1
99	N50	max	.179	1	-.128	5	.224	4	5.93e-03	4	4.483e-03	4	5.858e-04	6
100		min	.011	6	-.603	3	-.039	2	3.164e-04	2	1.015e-03	3	-5.218e-03	2
101	N51	max	.263	2	-.247	2	.23	5	5.635e-03	5	3.575e-04	4	4.487e-04	6
102		min	-.01	6	-.615	6	.003	3	-1.042e-03	3	-3.597e-03	1	-5.031e-03	2

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	M7	PIPE_2.0	.508	3	4	.091	6		5	14.916	32.13	1.872	1.872	1.98	H1-...
2	M3	HSS4X4X4	.461	0	6	.065	0	y	1	103....	139....	16.181	16.181	1.9..	H1-...
3	M1	HSS4X4X4	.449	0	3	.068	0	y	4	103....	139....	16.181	16.181	1.9..	H1-...
4	M2	HSS4X4X4	.426	0	6	.065	0	y	4	103....	139....	16.181	16.181	1.9..	H1-...
5	M10	PIPE_2.0	.414	3	1	.066	3		5	14.916	32.13	1.872	1.872	1.5..	H1-...
6	M13	PIPE_2.0	.407	3	1	.076	6		1	14.916	32.13	1.872	1.872	1.6..	H1-...

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

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	Cb	Eqn
7	M12	PIPE_2.0	.307	2	4	.096	2		4	20.867	32.13	1.872	1.872	2.1...	H1-...
8	M8	PIPE_2.0	.298	2	4	.106	2		4	20.867	32.13	1.872	1.872	2.1...	H1-...
9	M16	PIPE_2.0	.284	0	5	.411	0		4	6.295	32.13	1.872	1.872	3.4...	H3-6
10	M14	PIPE_2.0	.275	2	4	.088	2		4	20.867	32.13	1.872	1.872	2.5	H1-...
11	M9	PIPE_2.0	.270	2	4	.089	2		4	20.867	32.13	1.872	1.872	2.4...	H1-...
12	M11	PIPE_2.0	.245	2	1	.082	2		1	20.867	32.13	1.872	1.872	2.5...	H1-...
13	M15	PIPE_2.0	.236	2	1	.074	2		1	20.867	32.13	1.872	1.872	2.0...	H1-...
14	M17	PIPE_2.0	.228	0	2	.351	0		1	6.295	32.13	1.872	1.872	2.2...	H3-6
15	M4	HSS4X4X4	.205	0	6	.068	0	z	4	68.852	139....	16.181	16.181	3.2...	H1-...
16	M6	HSS4X4X4	.202	0	3	.050	0	y	6	68.852	139....	16.181	16.181	3.33	H1-...
17	M5	HSS4X4X4	.200	0	3	.048	0	z	1	68.852	139....	16.181	16.181	3.2...	H1-...
18	M18	PIPE_2.0	.191	.26	4	.284	12...		2	6.295	32.13	1.872	1.872	2.5...	H1-...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
TJL	CT11115F - Mount	July 15, 2020 at 5:01 PM
20074.47	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: CT11115F

CT115/SNET Valley_FT
38 Spring Hill Lane
Bethel, Connecticut 06801

July 27, 2020

EBI Project Number: 6220003395

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**40.01%**

July 27, 2020

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

Emissions Analysis for Site: CT11115F - CT115/SNET Valley_FT

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **38 Spring Hill Lane** in **Bethel, Connecticut** for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

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

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

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

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at 38 Spring Hill Lane in Bethel, Connecticut using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

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

1) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

2) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.

3) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

4) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

5) 4 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 2 UMTS channels (AWS Band - 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

7) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

8) 2 LTE channels (BRS Band - 2500 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

9) 2 NR channels (BRS Band - 2500 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

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

11) For the following calculations, the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

12) The antennas used in this modeling are the Ericsson AIR6449 B41 for the 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR24_43-UNA20 for the 700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 2100 MHz / 1900 MHz / 1900 MHz channel(s) in Sector A, the Ericsson AIR6449 B41 for the 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR24_43-UNA20 for the 700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 2100 MHz / 1900 MHz / 1900 MHz channel(s) in Sector B, the Ericsson AIR6449 B41 for the 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR24_43-UNA20 for the 700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 2100 MHz / 1900 MHz / 1900 MHz channel(s) in Sector C. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was used for all calculations. This value

is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

13) The antenna mounting height centerline of the proposed antennas is 102 feet above ground level (AGL).

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

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR6449 B41	Make / Model:	Ericsson AIR6449 B41	Make / Model:	Ericsson AIR6449 B41
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):	102 feet	Height (AGL):	102 feet	Height (AGL):	102 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	160 Watts	Total TX Power (W):	160 Watts	Total TX Power (W):	160 Watts
ERP (W):	25,651.93	ERP (W):	25,651.93	ERP (W):	25,651.93
Antenna A1 MPE %:	**8.86%**	Antenna B1 MPE %:	**8.86%**	Antenna C1 MPE %:	**8.86%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAARR24_43-UNA20	Make / Model:	RFS APXVAARR24_43-UNA20	Make / Model:	RFS APXVAARR24_43-UNA20
Frequency Bands:	700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz
Gain:	13.35 dBd / 12.95 dBd / 12.95 dBd / 15.65 dBd / 16.35 dBd	Gain:	13.35 dBd / 12.95 dBd / 12.95 dBd / 15.65 dBd / 16.35 dBd	Gain:	13.35 dBd / 12.95 dBd / 12.95 dBd / 15.65 dBd / 16.35 dBd
Height (AGL):	102 feet	Height (AGL):	102 feet	Height (AGL):	102 feet
Channel Count:	9	Channel Count:	9	Channel Count:	9
Total TX Power (W):	380 Watts	Total TX Power (W):	380 Watts	Total TX Power (W):	380 Watts
ERP (W):	11,055.53	ERP (W):	11,055.53	ERP (W):	11,055.53
Antenna A2 MPE %:	**5.76%**	Antenna B2 MPE %:	**5.76%**	Antenna C2 MPE %:	**5.76%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32
Frequency Bands:	2100 MHz / 1900 MHz / 1900 MHz	Frequency Bands:	2100 MHz / 1900 MHz / 1900 MHz	Frequency Bands:	2100 MHz / 1900 MHz / 1900 MHz
Gain:	15.85 dBd / 15.35 dBd / 15.35 dBd	Gain:	15.85 dBd / 15.35 dBd / 15.35 dBd	Gain:	15.85 dBd / 15.35 dBd / 15.35 dBd
Height (AGL):	102 feet	Height (AGL):	102 feet	Height (AGL):	102 feet
Channel Count:	8	Channel Count:	8	Channel Count:	8
Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts
ERP (W):	12,841.53	ERP (W):	12,841.53	ERP (W):	12,841.53
Antenna A3 MPE %:	**4.44%**	Antenna B3 MPE %:	**4.44%**	Antenna C3 MPE %:	**4.44%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	19.06%
Sprint	4.5%
AT&T	8.27%
Nextel	2.44%
Verizon	5.74%
Bethel PD	0%
Thomas Refuse	0%
Utility Cmcns	0%
Valley Cmcns	0%
Yankee Gas	0%
Site Total MPE % :	40.01%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	19.06%
T-Mobile Sector B Total:	19.06%
T-Mobile Sector C Total:	19.06%
Site Total MPE % :	40.01%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 2500 MHz LTE	2	6412.98	102.0	44.32	2500 MHz LTE	1000	4.43%
T-Mobile 2500 MHz NR	2	6412.98	102.0	44.32	2500 MHz NR	1000	4.43%
T-Mobile 700 MHz LTE	2	648.82	102.0	4.48	700 MHz LTE	467	0.96%
T-Mobile 600 MHz LTE	2	591.73	102.0	4.09	600 MHz LTE	400	1.02%
T-Mobile 600 MHz NR	1	1577.94	102.0	5.45	600 MHz NR	400	1.36%
T-Mobile 1900 MHz LTE	2	2203.69	102.0	15.23	1900 MHz LTE	1000	1.52%
T-Mobile 2100 MHz UMTS	2	1294.56	102.0	8.95	2100 MHz UMTS	1000	0.89%
T-Mobile 2100 MHz LTE	2	2307.55	102.0	15.95	2100 MHz LTE	1000	1.59%
T-Mobile 1900 MHz GSM	4	1028.30	102.0	14.21	1900 MHz GSM	1000	1.42%
T-Mobile 1900 MHz LTE	2	2056.61	102.0	14.21	1900 MHz LTE	1000	1.42%
						Total:	**19.06%**

• 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:	19.06%
Sector B:	19.06%
Sector C:	19.06%
T-Mobile Maximum MPE % (Sector A):	19.06%
Site Total:	40.01%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **40.01%** 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.