Transcend Wireless

10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

July 3, 2019

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

RE: Notice of Exempt Modification
15 Old Hartford Road, Colchester, CT 06415
Latitude: 41.5789910000
Longitude: -72.3387060000
T-Mobile Site#: CT11249A – L600

Dear Ms. Bachman:

T-Mobile currently maintains three (3) antennas at the 95-foot level of the existing 100-foot lattice tower at 15 Old Hartford Road, Colchester, CT. The 100-foot lattice tower and property are owned by the State of Connecticut State Police. T-Mobile now intends to replace the three (3) existing antennas with three (3) new 600/700/1900/2100 MHz antennas. The new antennas will be installed at the same 95-foot level of the tower. The modification includes a mount replacement to accommodate the proposed equipment, as detailed on the enclosed mount analysis.

Planned Modifications:
Tower:
Remove
(3) TMAs

Remove and Replace:
(3) EMS RR90-17-00DP (REMOVE) - (3) RFS APXVAARR24_43 Antenna 600/700/1900/2100 (REPLACE)
(3) Existing Pipe Masts (REMOVE) - (3) Pipe 2.5 STD ×9-ft long (REPLACE)

Install New:
(3) Radio 4449 B71+B12 RRHs
(3) Radio 4415 B25 RRHs
(3) Radio 4415 B66a RRHs
(3) 1-3/8" Hybrid Cables

Existing to Remain: N/A

Ground:
Replace: Existing 6201 cabinet with new 6102 cabinet

This tower facility was approved by the Connecticut Siting Council on July 6, 1989. This modification complies with the original approval. A copy of this approval is enclosed.

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 -Art Shilosky, Elected Official, and Kamey Cavanaugh, Land Use Assistant for the Town of Colchester.

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: Art Shilosky - Town of Colchester First Selectman
Kamey Cavanaugh – Town of Colchester Land Use Assistant
Connecticut State Police (Brian Benito) – Tower and Property Owner

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Tuesday, July 2, 2019 4:31 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT11249A CSC ZO

You have a package coming.

Scheduled Delivery Date: Wednesday, 07/03/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424297937665
Ship To:	Kamey Cavanaugh Town of Colchester 127 Norwich Avenue COLCHESTER, CT 064151230 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	07/03/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT11249A CSC ZO

Download the UPS mobile app

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Tuesday, July 2, 2019 4:33 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT11249A CSC EO

You have a package coming.

Scheduled Delivery Date: Wednesday, 07/03/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424298657680
Ship To:	Art Shilosky Town of Colchester 127 Norwich Avenue COLCHESTER, CT 064151230 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	07/03/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT11249A CSC EO

Download the UPS mobile app

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Tuesday, July 2, 2019 4:35 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CT11249A CSC Owner

You have a package coming.

Scheduled Delivery Date: Wednesday, 07/03/2019

This message was sent to you at the request of TRANSCEND WIRELESS to notify you that the shipment information below has been transmitted to UPS. The physical package may or may not have actually been tendered to UPS for shipment. To verify the actual transit status of your shipment, click on the tracking link below.

Shipment Details

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424299047695
Ship To:	Brian Benito Connecticut State Police 1111 Country Club Road MIDDLETOWN, CT 064572389 US
UPS Service:	UPS GROUND
Number of Packages:	1
Scheduled Delivery:	07/03/2019
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CT11249A CSC Owner

Download the UPS mobile app

Town of Colchester, CT

Property Listing Report

Map Block Lot	15-00/045-000	Account	C0518400	PID	5623

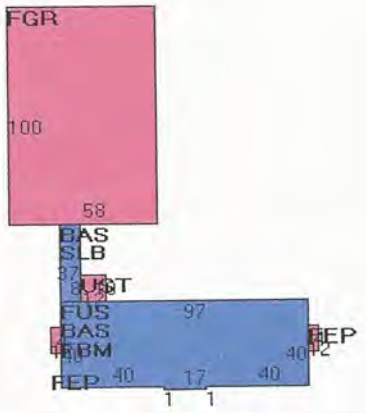
Property Information

Property Location	15 OLD HARTFORD RD
Owner	CONNECTICUT STATE OF
Co-Owner	STATE POLICE BARRACKS
Mailing Address	15 OLD HARTFORD RD COLCHESTER CT 06415
Land Use	9010 State MDL-96
Land Class	E
Zoning Code	R30
Census Tract	
Sub Lot	

Neighborhood	3000
Acreage	2.8
Utilities	Public Water,Public Sewer
Lot Setting/Desc	Bus. District Level
Survey Map	
Additional Info	

Photo

Sketch



Primary Construction Details

Year Built	1932
Stories	2
Building Style	Other State
Building Use	Commercial
Building Condition	B+
Floors	Carpet
Total Rooms	

Bedrooms	
Full Bathrooms	0
Half Bathrooms	
Bath Style	
Kitchen Style	
Roof Style	Gable
Roof Cover	Asphalt

Exterior Walls	Brick/Masonry
Interior Walls	Plywood Panel
Heating Type	Hot Water
Heating Fuel	Oil
AC Type	Central
Gross Bldg Area	18003
Total Living Area	8090

Report Created On 5/10/2018

Town of Colchester, CT

Property Listing Report | Map Block Lot 15-00/045-000 | Account C0518400

Valuation Summary

(Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	1035500	724900
Extras	0	0
Outbuildings	255000	178500
Land	411600	288100
Total	1702100	1191500

Outbuilding and Extra Items

Type	Description
Cell Tower	1.00 SITES
Paving Asphalt	24000.00 S.F.

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Upper Story, Finished	3897	3897
Slab	0	0
Utility, Storage, Unfinished	120	0
First Floor	4193	4193
Enclosed Porch	96	0
Basement, Finished	3897	0
Garage	5800	0
Total Area	18003	8090

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
CONNECTICUT STATE OF	0059/0087		0

Report Created On 5/10/2018

Town of Colchester, CT

Property Listing Report | Map Block Lot 15-00/045-000 | Account C0518400

Photo

Sketch

Primary Construction Details

Year Built	1990
Stories	1
Building Style	Service Shop
Building Use	Serv Station
Building Condition	B+
Floors	Concrete Slab
Total Rooms	
Bedrooms	
Bathrooms	0
Bath Style	
Half Bath	

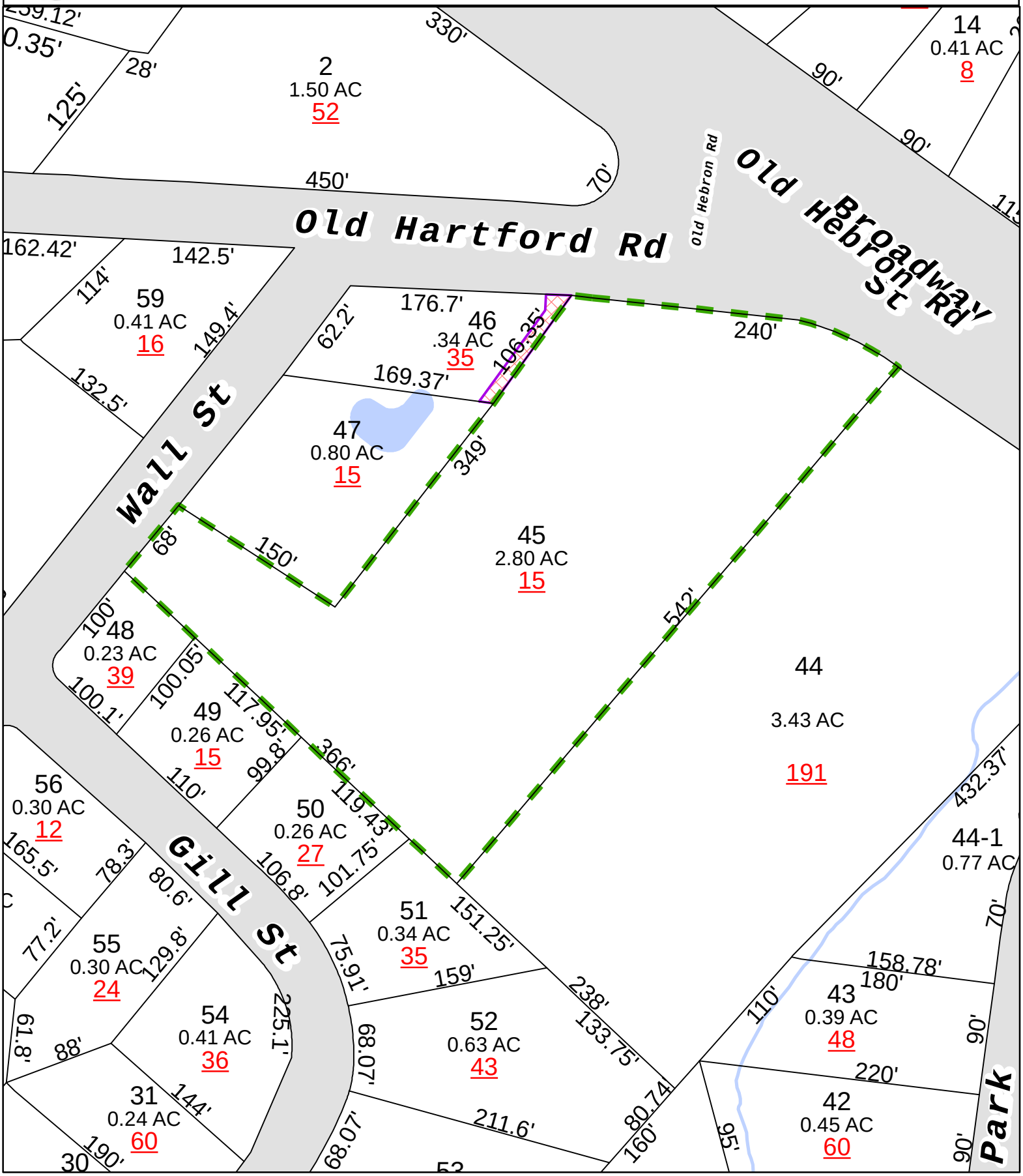
Kitchen Style	
Roof Style	Flat
Roof Cover	T&G/Rubber
Exterior Walls	Concr/Cinder
Interior Walls	Minimum
Heating Type	Forced Air-Duc
Heating Fuel	Oil
AC Type	None
Gross Bldg Area	
Total Living Area	

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
First Floor	5000	5000
Slab	5000	0
Total Area		

Report Created On 5/10/2018

Town of Colchester, Connecticut - Assessment Parcel Map
Parcel: 15-00-045-000
Address: 15 OLD HARTFORD RD



Approximate Scale: 1 inch = 100 feet
0 50 100 150 200 Feet

Map Produced: July 2017 / Grand List: 2016

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

136 Main Street, Suite 401
New Britain, Connecticut 06051
Phone : 827-7682

FILE COPY

July 11, 1989

Captain Ronald P. Milkulka
Deputy Commanding Officer
Police Support Services
Department of Public Safety
Division of State Police
294 Colony Street
Meriden, CT 06450-2098

RE: State Police notice pursuant to Regulations of State Agencies 16-50j-73 of intent to erect an exempt telecommunications tower and associated equipment at Troop K, 15 Old Hartford Road, Colchester, Connecticut.

Dear Captain Milkula:

At a meeting on July 6, 1989, the Connecticut Siting Council acknowledged your notice of intent to erect an exempt telecommunications tower and associated equipment at Troop K, 15 Old Hartford Road, Colchester, pursuant to Section 16-50j-73 of the Regulations of State Agencies (RSA).

The proposed modification is to be implemented as specified in your notice dated May 11, 1989. As proposed, the modification is in compliance with the exception criteria specified in RSA 16-50j-72 for changes to an existing facility site that do not increase the tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by 6 decibels, and add radio frequency sending or receiving capability which increases the total radio frequency electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to Section 22a-162 of the Connecticut General Statutes.

The Council is pleased to note that the shared use of an existing tower meets the Council's long-term goal and the public interest to avoid proliferation of additional tower structures.

Please notify the Council upon completion of construction.

Enclosed for your information is a copy of the staff report on this project.

Very truly yours,

Gloria Dibble Pond/R

Gloria Dibble Pond
Chairperson

GDP/JMR/go

Enclosure

cc: Peter Seaha
Robert F. Vacchelli

3253E

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

136 Main Street, Suite 401
New Britain, Connecticut 06051
Phone: 827-7682

Staff Report
State Police - Exempt Modification Proposal
for Troop K, Colchester, Connecticut
June 5, 1989
Revised July 6, 1989

Pursuant to section 16-50j-73 of the Regulations of State Agencies, the Connecticut State Police have provided notice of its intent to erect an exempt telecommunications tower and associated equipment at Trook K, 15 Old Hartford Road, Colchester, Connecticut.

The State Police propose to replace an existing 100-foot lattice tower owned and operated by the Colchester Emergency Communications, Inc. (CEC) with a stronger 100-foot lattice tower to be owned and operated by the State Police, relocate equipment from a room in the Troop K barracks to a new 15-foot by 25-foot equipment shelter, fence the site, and remove the old tower.

The existing tower presently holds six whip antennas. The proposed tower would hold ten whip antennas and one four foot diameter dish antenna.

The project is part of a State Police effort to upgrade its state-wide system. The tower would be shared by the State Police, CEC, and the State Office of Emergency Management.

The State Police contend that because the replacement tower 1) would be no higher than the existing tower; 2) would not extend beyond the boundaries of the existing site; 3) would not increase noise levels at the existing facility by six decibels or more; and 4) would not increase the total radio frequency electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the Department of Environmental Protection, the project is in compliance with exemption criteria for changes to an existing facility pursuant to RSA 16-50j-72(b).

At a Council meeting held June 5, 1989, the Council tabled this item pending the submittal of information regarding the sharing of the State Police tower on Windham Avenue in Colchester.

On June 9, 1989, the State Police responded by explaining the different uses of the two towers and how each tower would fit into the statewide communications network to be used by the State Police.

The 100-foot Troop K tower will primarily be used as a dispatch center for the State Police, Office of Emergency Management (OEM), Colchester Emergency Communications (CEC) and as part of a communications network for the Nuclear Emergency Communications System (NEC).

From the Troop K Dispatch Center, the State Police and the OEM would, via microwave, use the 320-foot Windham Avenue tower for their main transmission. The CEC would use, via microwave, a tower on Buckley Hill in Colchester for their main transmission.

The State Police, OEM, and CEC would, however, maintain back-up antennas at the Troop K facility.

JMR/ktq

3179E

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

COLCHESTER-2-STATE PD_1

SITE ID: CT11249A

15 OLD HARTFORD ROAD

COLCHESTER, CT 06415

T-MOBILE RF CONFIGURATION

67D97C

PROJECT SUMMARY

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

   A. REMOVE (3) EXISTING ANTENNAS, TYP. (1) PER SECTOR
   B. REMOVE (3) EXISTING TMA'S, TYP. (1) PER SECTOR
   C. INSTALL (3) PROPOSED ANTENNAS, TYP. (1) PER SECTOR
   D. INSTALL (9) PROPOSED RRUS, TYP. (3) PER SECTOR
   E. UPGRADE 100 AMP TO 200 AMP MAIN
   F. INSTALL NEW 125 BREAKER
   G. INSTALL (3) NEW 6x12 HYBRID CABLE
   H. DECOMMISSION AND REMOVE (1) EXISTING EQUIPMENT CABINET
   I. INSTALL (1) NEW RBS 6102 MU AC EQUIPMENT CABINET WITH (1) DUG20 AND (2) BB6630

PROJECT INFORMATION

SITE NAME:	COLCHESTER-2-STATE PD_1
SITE ID:	CT11249A
SITE ADDRESS:	15 OLD HARTFORD ROAD COLCHESTER, CT 06415
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:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-34'-44.48" N LONGITUDE: 72°-20'-19.96" W GROUND ELEVATION: 427'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

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." 2018 CONNECTICUT FIRE SAFETY CODE, 2017 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 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 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 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 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 "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 OWNERS 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

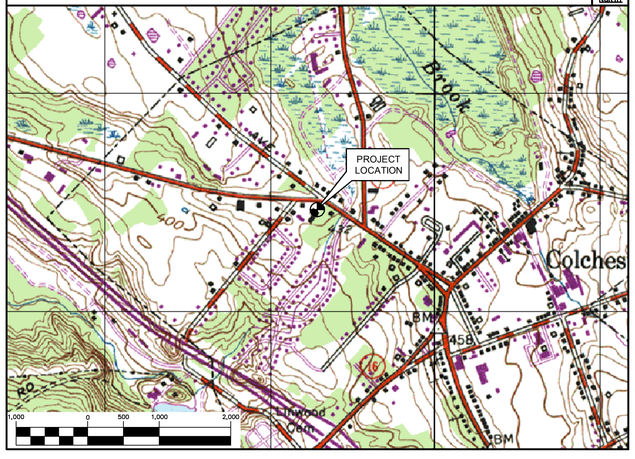
FROM: 35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

TO: 15 OLD HARTFORD ROAD
COLCHESTER, CT 06415

1.	HEAD NORTH ON GRIFFIN ROAD S. TOWARD HARTMAN RD.	0.21 MI.
2.	TAKE THE 2ND RIGHT ONTO DAY HILL RD.	0.14 MI.
3.	TAKE THE 1ST RIGHT ONTO BLUE HILLS AVENUE EXT/CT-187	1.89 MI.
4.	TURN LEFT ONTO CT-305/OLD WINDSOR RD.	2.32 MI.
5.	STAY STRAIGHT TO GO ONTO BLOOMFIELD AVE/CT-305.	0.01 MI.
6.	MERGE ONTO I-91 S TOWARD HARTFORD	5.66 MI.
7.	MERGE ONTO I-84 W via EXIT 32A TOWARD WATERBURY	13.29 MI.
8.	KEEP LEFT TO TAKE I-84 TOWARD WATERBURY	40.69 MI.
9.	MERGE ONTO NEWTOWN RD via EXIT 8 TOWARD BETHEL	1.68 MI.
10.	TURN LEFT ONTO OLD SHELTER ROCK RD	0.14 MI.
11.	TAKE THE 1ST LEFT ONTO WOODSIDE AVE	0.02 MI.
12.	TAKE THE 1ST RIGHT ONTO TOPSTONE DR.	0.17 MI.
13.	TAKE THE 1ST RIGHT TO STAY ON TOPSTONE DR.	0.17 MI.
14.	TAKE THE 1ST RIGHT ONTO WESTVIEW DR.	0.06 MI.

VICINITY MAP

SCALE: 1" = 1000'



SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS AND SITE NOTES	0
C-1	SITE LOCATION PLAN	0
C-2	COMPOUND PLAN AND ELEVATION	0
C-3	ANTENNA MOUNTING CONFIGURATION	0
E-1	TYPICAL ELECTRICAL DETAILS	0
E-2	TYPICAL ELECTRICAL DETAILS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	07/03/19	KAW/JR	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT · CHRISTOPHER A. GAUDIOSO · 27517 · REGISTERED PROFESSIONAL ENGINEER

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
COLCHESTER-2-STATE PD_1
SITE ID: CT11249A
15 OLD HARTFORD ROAD
COLCHESTER, CT 06415

DATE: 04/20/19
SCALE: AS NOTED
JOB NO. 19027.06

TITLE SHEET

T-1

Sheet No. 1 of 7

DESIGN BASIS:

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

1. DESIGN CRITERIA:

- WIND LOAD: PER TIA 222 G (ANTENNA MOUNTS): 105–120 MPH (3 SECOND GUST)
- RISK CATEGORY: II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 101 MPH (Vasd) (EXPOSURE B/IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–10) PER 2015 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2018 CONNECTICUT STATE BUILDING CODE.
- SEISMIC LOAD (DOES NOT CONTROL): PER ASCE 7–10 MINIMUM DESIGN LOADS FOR BUILDING AND OTHER STRUCTURES.

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN COMPLIANCE WITH THE GOVERNING BUILDING CODE.
2. 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.
3. BEFORE BEGINNING THE WORK, THE CONTRACTOR IS RESPONSIBLE FOR MAKING SUCH INVESTIGATIONS CONCERNING PHYSICAL CONDITIONS (SURFACE AND SUBSURFACE) AT OR CONTIGUOUS TO THE SITE WHICH MAY AFFECT PERFORMANCE AND COST OF THE WORK.
4. DIMENSIONS AND DETAILS SHALL BE CHECKED AGAINST EXISTING FIELD CONDITIONS.
5. THE CONTRACTOR SHALL VERIFY AND COORDINATE THE SIZE AND LOCATION OF ALL OPENINGS, SLEEVES AND ANCHOR BOLTS AS REQUIRED BY ALL TRADES.
6. ALL DIMENSIONS, ELEVATIONS, AND OTHER REFERENCES TO EXISTING STRUCTURES, SURFACE, AND SUBSURFACE CONDITIONS ARE APPROXIMATE. NO GUARANTEE IS MADE FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS, ELEVATIONS, ANGLES WITH EXISTING CONDITIONS AND WITH ARCHITECTURAL AND SITE DRAWINGS BEFORE PROCEEDING WITH ANY WORK.
7. AS THE WORK PROGRESSES, THE CONTRACTOR SHALL NOTIFY THE OWNER OF ANY CONDITIONS WHICH ARE IN CONFLICT OR OTHERWISE NOT CONSISTENT WITH THE CONSTRUCTION DOCUMENTS AND SHALL NOT PROCEED WITH SUCH WORK UNTIL THE CONFLICT IS SATISFACTORILY RESOLVED.
8. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SAFETY CODES AND REGULATIONS DURING ALL PHASES OF CONSTRUCTION. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING AND MAINTAINING ADEQUATE SHORING, BRACING, AND BARRICADES AS MAY BE REQUIRED FOR THE PROTECTION OF EXISTING PROPERTY, CONSTRUCTION WORKERS, AND FOR PUBLIC SAFETY.
9. 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. MAINTAIN EXISTING SITE OPERATIONS, COORDINATE WORK WITH NORTHEAST UTILITIES
10. THE STRUCTURE IS DESIGNED TO BE SELF–SUPPORTING AND STABLE AFTER FOUNDATION REMEDIATION WORK IS COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIEDOWNS, WHICH MIGHT BE NECESSARY.
11. 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.
12. SHOP DRAWINGS, CONCRETE MIX DESIGNS, TEST REPORTS, AND OTHER SUBMITTALS PERTAINING TO STRUCTURAL WORK SHALL BE FORWARDED TO THE OWNER FOR REVIEW BEFORE FABRICATION AND/OR INSTALLATION IS MADE. SHOP DRAWINGS SHALL INCLUDE ERECTION DRAWINGS AND COMPLETE DETAILS OF CONNECTIONS AS WELL AS MANUFACTURER'S SPECIFICATION DATA WHERE APPROPRIATE. SHOP DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND BEAR THE CHECKER'S INITIALS BEFORE BEING SUBMITTED FOR REVIEW.
13. NO DRILLING WELDING OR TAPING ON EVERSOURCE OWNED EQUIPMENT.
14. REFER TO DRAWING T1 FOR ADDITIONAL NOTES AND REQUIREMENTS.

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.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
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WIRELESS COMMUNICATIONS FACILITY
COLCHESTER-2-STATE PD_1
SITE ID: CT11249A
15 OLD HARTFORD ROAD
COLCHESTER, CT 06415

DATE: 04/20/19
SCALE: AS NOTED
JOB NO. 19027.06

DESIGN BASIS AND SITE NOTES

N-1

Sheet No. 2 of 7

1 / C-1 **SITE LOCATION PLAN**

SCALE: NONE

APPROX. NORTH

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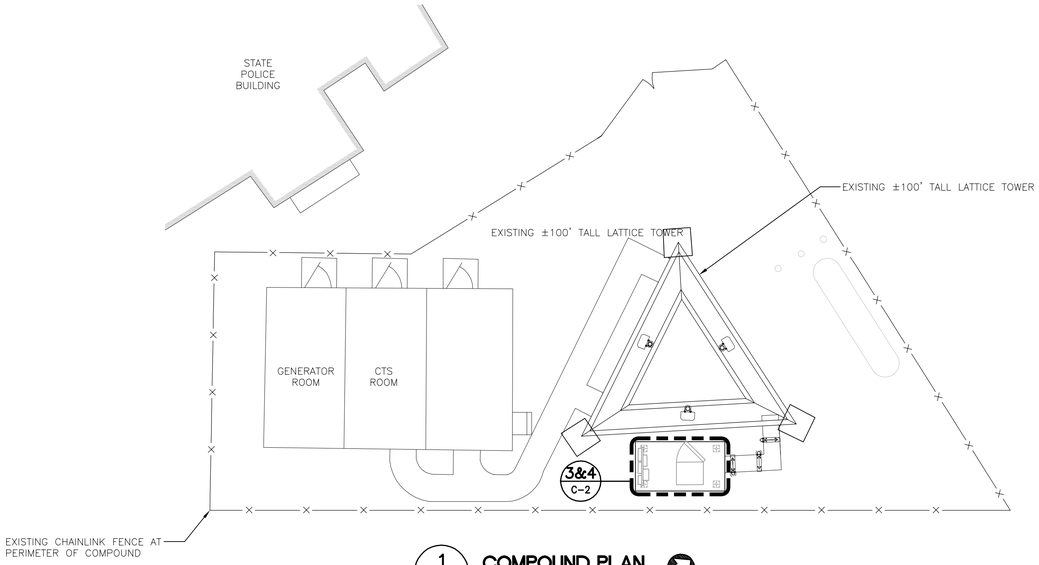
SITE LOCATION PLAN

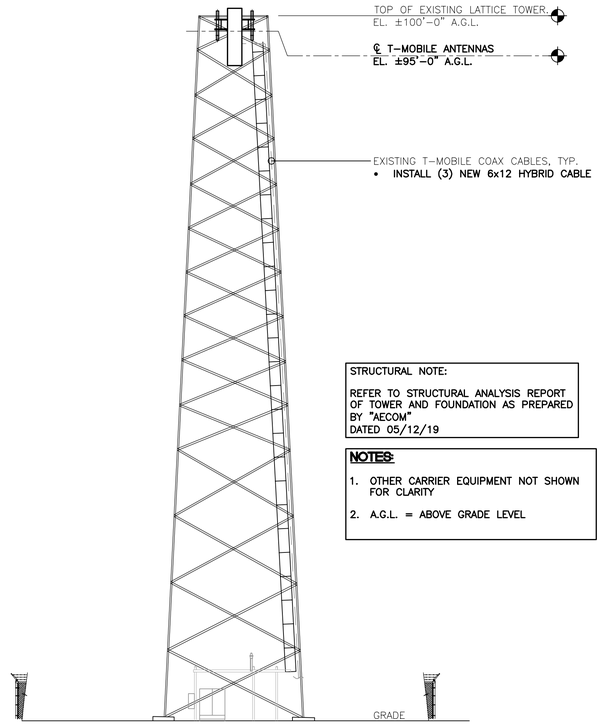
C-1

Sheet No. 3 of 7



1 C-2 **COMPOUND PLAN**
SCALE: 1/8" = 1'

TRUE NORTH



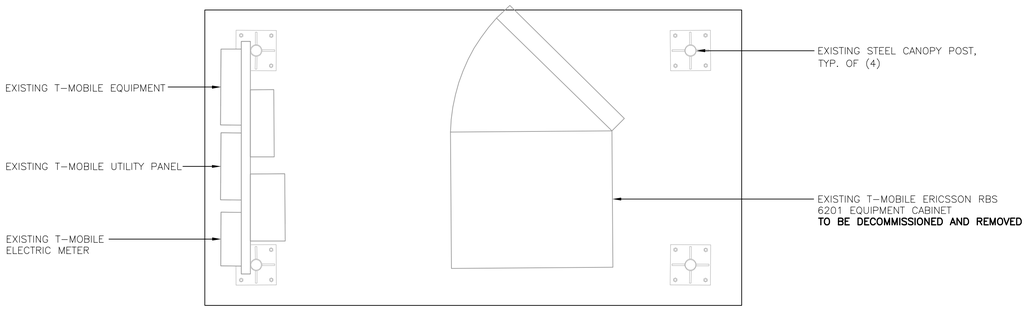
STRUCTURAL NOTE:

REFER TO STRUCTURAL ANALYSIS REPORT OF TOWER AND FOUNDATION AS PREPARED BY "AECOM" DATED 05/12/19

NOTES:

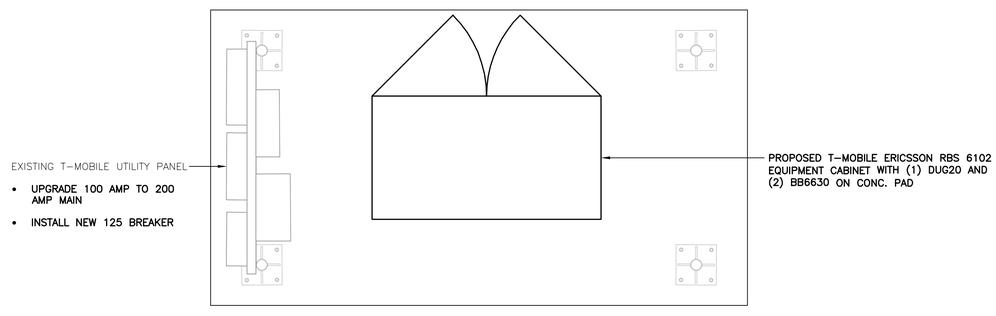
1. OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY
2. A.G.L. = ABOVE GRADE LEVEL

2 C-2 **TOWER ELEVATION - PROPOSED**
SCALE: 1" = 10'



3 C-2 **EQUIPMENT PLAN - EXISTING**
SCALE: 3/4" = 1'

TRUE NORTH



4 C-2 **EQUIPMENT PLAN - PROPOSED**
SCALE: 3/4" = 1'

TRUE NORTH

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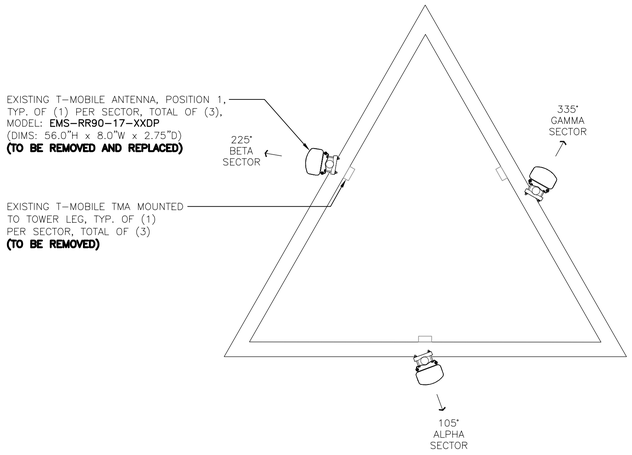
COMPOUND PLAN, AND ELEVATION

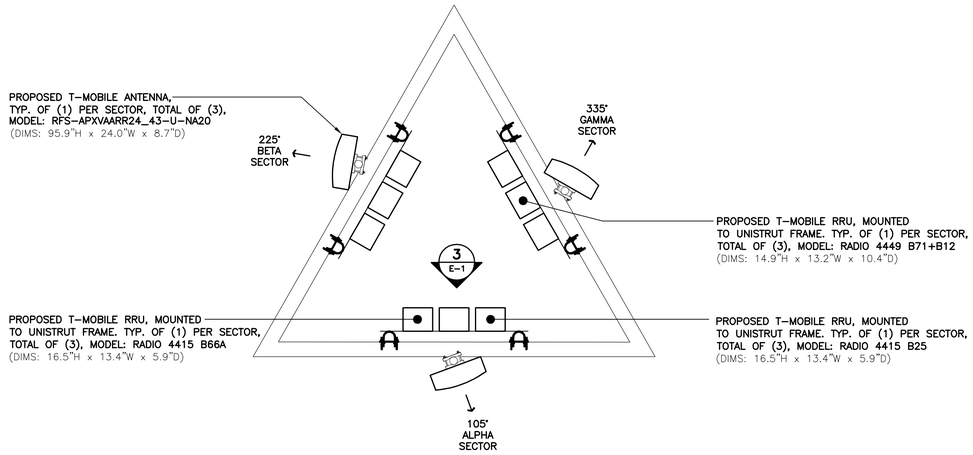
C-2

Sheet No. 4 of 7

T-MOBILE RAN TEMPLATE: 67D97C
T-MOBILE RF CONFIGURATION: CUSTOM



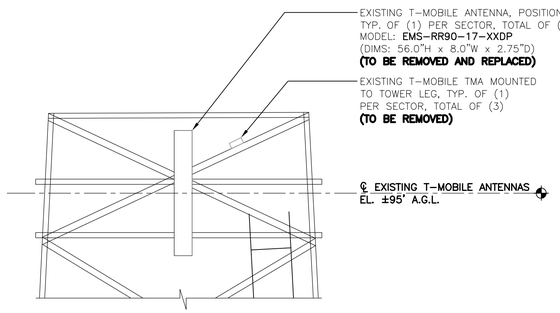
1 C-3 **EXISTING ANTENNA MOUNTING CONFIGURATION TYP.**
SCALE: 3/8" = 1' **95'-0" ELEVATION**



2 C-3 **PROPOSED ANTENNA MOUNTING CONFIGURATION TYP.**
SCALE: 3/8" = 1' **95'-0" ELEVATION**

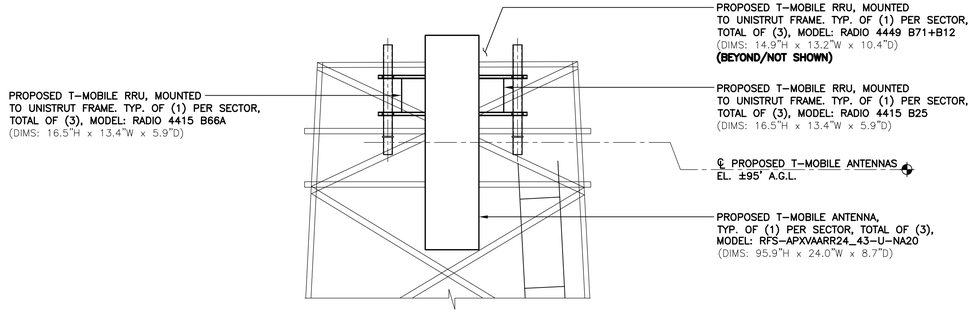
ADDITIONAL ANTENNA MAST NOTE:

REPLACE EXISTING PIPE MAST WITH 2" STD (O.D = 2.375") x 9'-0" LONG PIPE @ RFS APXVAARR24_43-U-NA20



TYPICAL SECTOR

3 C-3 **ANTENNA ELEVATION - EXISTING**
SCALE: 3/8" = 1'



TYPICAL SECTOR

4 C-3 **ANTENNA ELEVATION - PROPOSED**
SCALE: 3/8" = 1'

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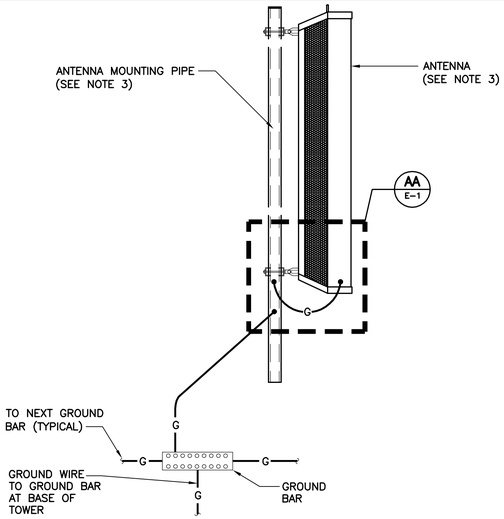
ANTENNA MOUNTING CONFIGURATION

C-3

Sheet No. 5 of 7

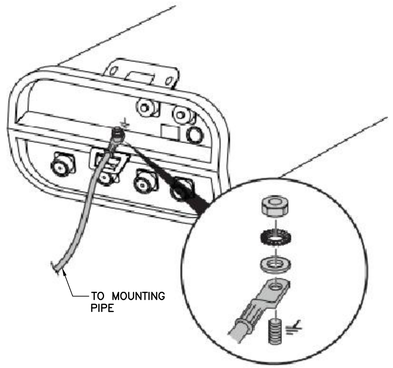


NOTES:

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.

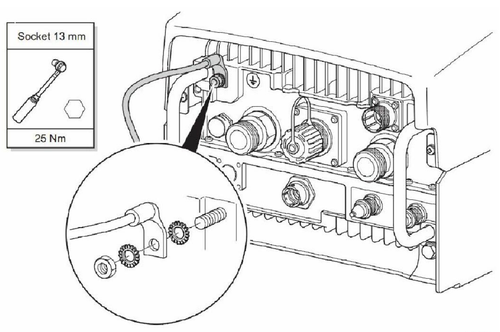
1 E-1 TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NONE



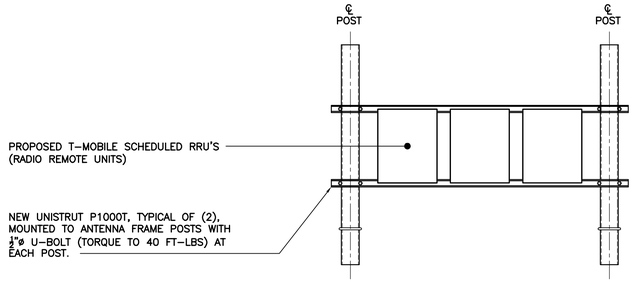
AA E-1 TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NONE



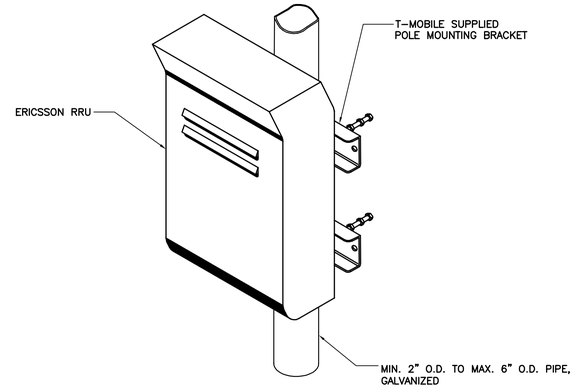
2 E-1 TYPICAL RRU GROUNDING DETAIL

NOT TO SCALE



3 E-1 TYPICAL APPURTENANCE FRAME DETAIL

SCALE: 3/4" = 1'-0"



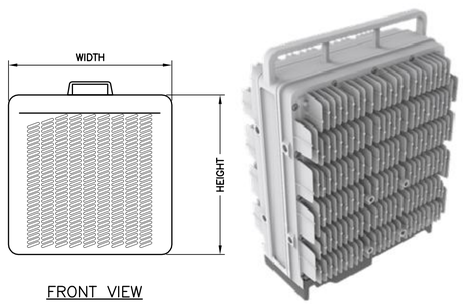
ISOMETRIC VIEW

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.

4 E-1 TYPICAL RRUS MOUNTING DETAILS

SCALE: NOT TO SCALE

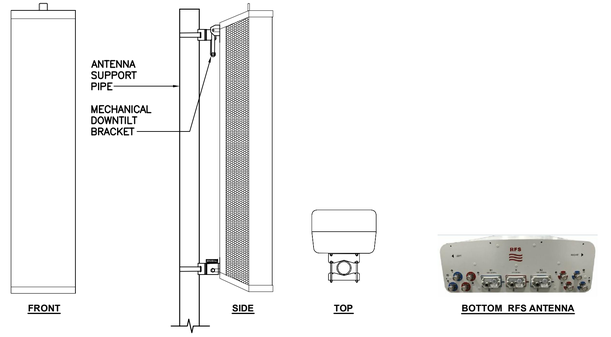


FRONT VIEW

RRH (REMOTE RADIO HEAD)			
EQUIPMENT		DIMENSIONS	WEIGHT
MAKE: MODEL:	ERICSSON RRU 4449 B71+B12	14.9"H x 13.2"W x 10.4"D	±74 LBS
MAKE: MODEL:	ERICSSON RRU 4415 B25	16.5"H x 13.4"W x 5.9"D	±46 LBS
MAKE: MODEL:	ERICSSON RRU 4415 B66A	16.5"H x 13.4"W x 5.9"D	±46 LBS

5 E-1 REMOTE RADIO HEAD (RRH) DETAIL (TYP)

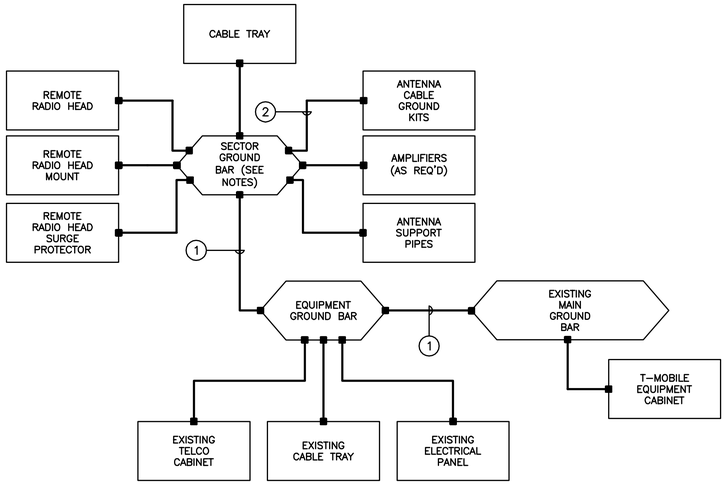
SCALE: NOT TO SCALE



ALPHA/BETA/GAMMA ANTENNA			
EQUIPMENT		DIMENSIONS	WEIGHT
MAKE: MODEL:	RFS APXVAARR24_43-U-NA20	95.9"L x 24"W x 8.7"D	153 LBS.

6 E-1 PROPOSED ANTENNA DETAIL

SCALE: NONE



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.

7 E-1 TYPICAL GROUNDING SCHEMATIC DETAIL

SCALE: NOT TO SCALE

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COLCHESTER, CT 06415

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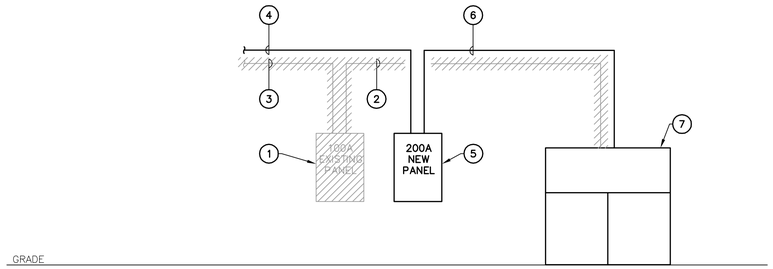
TYPICAL ELECTRICAL DETAILS

E-1

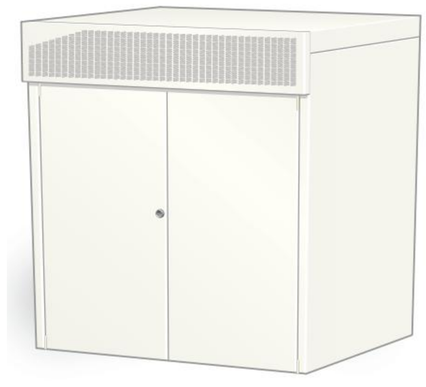
Sheet No. 6 of 7

RISER DIAGRAM NOTES

1. EXISTING T–MOBILE 100A DISTRIBUTION PANEL TO BE REMOVED AND REPLACED.
2. CONDUITS AND CONDUCTORS SERVING EXISTING RADIO EQUIPMENT CABINETS TO BE REMOVED.
3. CONDUITS AND CONDUCTORS FEEDING EXISTING 100A PANEL TO BE REMOVED.
4. (3) #3/0 AWG, (1) #6 AWG GROUND, 2 1/2" CONDUIT CONNECTED TO SOURCE PREVIOUSLY FEEDING REMOVED 100A PANEL. MAXIMUM CIRCUIT LENGTH OF 200FT. VERIFY LOCATION IN FIELD. COORDINATE ANY REQUIRED UPGRADES WITH BUILDING OWNER AND LOCAL UTILITY COMPANY.
5. NEW 200A, 240V, SINGLE PHASE, 30 POSITION, NEMA 3R PANEL WITH COPPER BUS, BOLT ON CIRCUIT BREAKERS AND 200A/2P MAIN CIRCUIT BREAKER.
6. (3) #1/0 AWG, (1) #6 AWG GROUND, 2" CONDUIT CONNECTED TO NEW 125A/2P CIRCUIT BREAKER AND ROUTED TO EXISTING T–MOBILE RADIO CABINET.
7. EXISTING T–MOBILE RADIO CABINET TO REMAIN.



1 / E-2 **ELECTRICAL POWER RISER DIAGRAM**
SCALE: NOT TO SCALE



EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: 6102 MU AC CABINET	57.09"H x 51.18"W x 27.56"D	727.53 LBS

2 / E-2 **ERICSSON RADIO CABINET DETAIL**
SCALE: NOT TO SCALE

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TYPICAL ELECTRICAL DETAILS

E-2

Sheet No. 7 of 7

AECOM

Submitted to
Transcend Wireless
35 Griffin Road South
Bloomfield, CT 06002

Submitted by
AECOM
500 Enterprise Drive,
Suite 3B
Rocky Hill, CT 06067
May 12, 2019

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 100' SELF SUPPORTING LATTICE TOWER AND FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENT

T-Mobile Site Name: CT11249A
Site Name : Colchester-2-State PD_1
Site Address: 15 Old Hartford Road
Colchester, Connecticut
CSP Tower # 51

60604313
TWM-017

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 100' self-supporting lattice tower located at 15 Old Hartford Road in Colchester, Connecticut.

The structural analysis was conducted in accordance with the 2018 Connecticut State Building Code which includes the TIA-222-G[1] Standard, 2015 International Building Code, the 2018 Connecticut State Building Code Amendments, the AISC[2] Load Resistance Factor Design (LRFD), the ASCE 7[3] design Code, and the Connecticut State Police Requirements which include the TIA/EIA-222-F[4].

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

The proposed T-Mobile antenna upgrades are listed below:

Antenna and Mount	Carrier	Antenna Center Elevation
Remove: **(3) EMS RR90-17-00DP Panel Antennas**	**T-Mobile (Existing)**	**@ 95'**
Install: **(3) RFS APXVAARR24_43-U-NA20 Panel Antennas** **(3) Ericsson Radio 4449 B71+B12 RRH Units** **(3) Ericsson Radio 4415 B25 RRH Units** **(3) Ericsson Radio 4415 B66A RRH Units** **(3) Ericsson 6x12 HCS Hybrid Cables** **(Analysis applied 4 Gage cables (AWG))**	**T-Mobile (Proposed)**	**@ 95'**

The results of an initial analysis indicate that:

1. The existing steel tower structure IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
2. The existing tower anchor bolts ARE considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
3. The existing foundation IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
4. The existing tower's sway (deflection) is 0.0955 degrees, and the existing tower's twist (rotation) is 0.0462. These figures combined ARE within the Connecticut State Police requirement of 0.75 degrees for combined twist (rotation) and sway (deflection) with the load classification specified herein.
5. The controlling structural capacity for all tower and foundation components for the proposed antenna loading is **89.6 %**

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

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

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

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

1. EXECUTIVE SUMMARY *(continued)*

This analysis is based on:

1) The tower structure's theoretical capacity not including any assessment of the condition of the tower.

2) Tower geometry and structural member sizes utilized in the preparation of this report obtained from the manufacturers original design documents prepared by Andrew Corporation, signed and sealed October 14, 1990.

3) Existing Department of Emergency Services and Public Protection (DESPP) / Connecticut State Police (CSP) antenna inventory, obtained via e-mail dated January 27, 2014.

4) Previous structural analysis of tower structure, performed by Destek Engineering on behalf of T-Mobile, project number 1875009, signed and sealed April 13, 2018.

5) Proposed T-Mobile antenna inventory from Radio Frequency Data Sheet (RFDS), dated April 23, 2019, obtained via e-mail dated May 3, 2019.

6) Antenna Mount frame capacity analysis performed by Centek Engineering, on behalf of T-Mobile, project 19027.06, signed and sealed on May 6, 2019.

7) Antenna and mount configuration as specified on the following page of this report.

8) Coaxial cable orientation as specified in Section 6 of this report.

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

If you should have any questions, please contact Naish Artaiz at (860) 990-6767.

Sincerely,

AECOM,

Richard A. Sambor, P.E.
Senior Structural Engineer
RAS/mcd

2. INTRODUCTION

The subject tower is located at 15 Old Hartford Road in Colchester, Connecticut. The structure is a 100' self-supporting lattice tower designed by Andrew Corporation.

The structural analysis was conducted in accordance with the following:

- TIA-222-G Standard for Standard for a wind velocity of range of 105 mph to 120 mph (3-second gust) and 50 mph (3-second gust) concurrent with 0.75" ice thickness, considered to increase in thickness with height
- 2015 International Building Code with 2018 Connecticut State Building Code Amendments for a wind speed of 108 mph (3-second gust)
- 2010 AISC Load Resistance Factor Design (LRFD)
- 2010 ASCE 7 Minimum Design Loads for Buildings and Other Structures for the ice thickness referenced in the TIA-222-G Standard
- Connecticut State Police Requirements for a wind velocity of 90 mph (fastest mile) and 90 mph (fastest mile) concurrent with 0.5" ice. Twist (rotation) and sway (deflection) were determined in accordance with Connecticut State Police Requirements for a wind velocity of 90 mph (fastest mile) concurrent with 0.5" ice, analyzed under the TIA/EIA-222-F design Standard.

The inventory together with the proposed T-Mobile antenna arrangement is summarized in the table below:

Antenna Type	***Carrier / CSP Ant #***	***Mount***	***Antenna Mounting Elevation***	***Cable***
(1) 22' Omni Antenna	CEC-16 (existing)	(1) Mount Pipe attached to (2) Horizontal 4" O.D. Pipes mounted to Tower Face	100'	(1) LDF4-50A Coax Cables
(1) 14' Omni Antenna	CEC-10 (existing)	(1) Mount Pipe shared with above mount	100'	(1) LDF4-50A Coax Cables
(1) 10' Omni Antenna	CSP-32 (existing)	(1) Mount Pipe shared with above mount	100'	(1) LDF5-50A Coax Cables
(1) 22' Omni Antenna	CEC-6 (existing)	(1) Mount Pipe shared with above mount	100'	(1) LDF5-50A Coax Cables
(1) 22' Omni Antenna	CEC (existing)	(1) Mount Pipe shared with above mount	100'	(1) LDF5-50A Coax Cables
(1) 22' Omni Antenna	CSP-12 (existing)	(1) Mount Pipe shared with above mount	100'	(1) LDF4-50A Coax Cables

Antenna Type	*Carrier / CSP Ant #*	*Mount*	*Antenna Mounting Elevation*	*Cable*
(1) 12’ Omni Antenna	CSP-7 (existing)	(1) Mount Pipe shared with above mount	100’	(1) LDF5-50A Coax Cables
(1) 10’ Omni Antenna	CEC-29 (existing)	(1) Mount Pipe shared with above mount	100’	(1) LDF5-50A Coax Cables
(1) Sinclair SC479-HF1LDF Omni Antenna (1) (inverted) SC479-HF1LDF Omni Antenna (1) Bird 432-83H-01T TTA Unit	CSP-36, 37, 38 (existing)	(1) Side-Arm Mount attached to tower leg	100’	(2) 1-5/8” Coax Cables (1) 1/2” Coax Cable
(1) Parabolic Grid Dish	Unknown (existing)	(1) Pipe Mounted to Tower leg	100’	(1) EW63
(4) Reflector Dishes (2’ Diameter or 2’x’2’ squares)	CEC-1,2,22,3 (existing)	(1) Side Mount Assembly	99’	(4) 7/8” Coaxial Cables
(3) RFS APXVAARR24_43-U-NA20 Panel Antennas (3) Ericsson Radio 4449 B71+B12 RRH Units (3) Ericsson Radio 4415 B25 RRH Units (3) Ericsson Radio 4415 B66A RRH Units	**T-Mobile (Proposed)**	Existing (2) Horizontal 4” O.D. pipes mounted to tower Face (Shared with above (100’) antennas	95’	**(3) Ericsson 6x12 HCS Hybrid Cables (Analysis applied 4 Gage cables (AWG))**
(3) Generic TMA Units (not connected to Cables)	T-Mobile (existing)	*Shared with above*	95’	(6) 1-1/4” Coax Cables (not connected to antenna equipment)
(1) 2’ Dish	CSP-14 (existing)	Pipe Mounted to Existing Tower	95’	(1) EW63
(1) 6’ Grid Dish	CEC-4 (existing)	Pipe Mounted to Existing Tower	94’	(1) LDF5-50A Coax Cable

Antenna Type	*Carrier / CSP Ant #*	*Mount*	*Antenna Mounting Elevation*	*Cable*
(1) 4’ Dish	Unknown (existing)	Pipe Mounted to Existing Tower	90’	(1) EW63
(1) Dipole Antenna (9’ height)	CSP-15 (existing)	(1) Side-Arm Mount	86’	(1) LDF4-50A Coax Cables
(1) Dipole Antenna (12’)	CSP-11 (existing)	(1) Side-Arm Mount	85’	(1) LDF4-50A Coax Cables
(1) 8’ Omni Antenna (2.5” O.D.)	DEHMS-18 (existing)	(1) Side-Arm Mount	80’	(1) LDF4-50A Coax Cables
(1) 12’ Omni Antenna (3” O.D.)	CSP (existing)	(1) Side-Arm Mount	70’	(1) LDF4-50A Coax Cables
(1) 22’ 4-Bay Dipole	CSP-18 (existing)	(1) Side-Arm Mount	60’	(1) LDF4-50A Coax Cables
(1) (inverted) 20’ Omni Antenna (3.5” O.D.)	CSP (existing)	*Shared with above Mount*	58’	(1) LDF4-50A Coax Cables
(1) DB-803 Omni Antenna	CSP-39 (existing)	(1) Side-Arm Mount	50’	(1) LDF4-50A Coax Cables
(1) (inverted) DB-803 Omni Antenna	DEHMS-19 (existing)	*Shared with above Mount*	50’	(1) LDF4-50A Coax Cables
(1) DB-803 Omni Antenna	CSP-20 (existing)	(1) Side-Arm Mount	30’	(1) LDF4-50A Coax Cables
(1) (inverted) (1) (inverted) DB-803 Omni Antenna	CSP-13 (existing)	*Shared with above Mount*	30’	(1) LDF4-50A Coax Cables

This structural analysis of the communications tower was performed by AECOM for T-Mobile. The purpose of this analysis was to investigate the structural integrity of the existing tower and foundation for existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect forces to the foundation of the tower resulting from existing and proposed antenna arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with, the TIA-222-G–Structural Standard for Antenna Towers and Antenna Supporting Structures and Antennas, the 2015 International Building Code with 2018 Connecticut State Building Code Amendments and the American Institute of Steel Construction (AISC) Manual of Steel Construction – Load Resistance Factor Design (LRFD)

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

- Structure Class 3 – (Essential Communications)
  - NOTE: ASCE 7 and CT State Building Code Applied Risk Category 4 for design wind loads (see below)
- Topographic Category 1 – (No abrupt changes in topography at Tower location – no accelerated wind conditions considered)
- Exposure Class C – (Open Terrain with scattered obstructions)
- Load Conditions:
  - Two load conditions were evaluated as shown which were compared to design stresses according to AISC and TIA/EIA-222-G Standard.

Basic Wind Speed:

- TIA-222-G:
  - New London County (Wind Speed Range): V = 105 mph - 120 mph (3-second gust) [Annex of TIA-222-G 2006]
- IBC 2015 w/ 2018 CT State Building Code Amendment:
  - (2015) IBC Section 1609.1.1 – Determination of Wind Loads – Exception 5 "Designs using TIA-222" applies for determination of Design Wind Load obtained as "V.ult" are to be converted to "V.asd" when applying the TIA-222-G design Standard (under Section 1609.3) for Basic Wind Speed.
  - (2018) CT State Building Code Amendment to the IBC Section 1609.3 wind loads are obtained from Appendix N of the State Building Code.
    - V.asd = 108 mph (3-Second Gust) Wind Design Parameter for the Town of Colchester, Connecticut for Risk Category four (IV) for essential communications (Connecticut State Police).

LOAD CONDITION 1 = 108 MPH (3-SECOND GUST) WIND LOAD (WITHOUT ICE) + TOWER DEAD LOAD
Load Condition 2 = 50 mph (3-second gust) Wind Load (with ice) + Ice Load + Tower Dead Load

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

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

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS (cont.)

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

Seismic event consideration factors/values for design:

- S.s = 0.174 (2018 CT State Building Code – Location Specific Value)
- S.1 = 0.061 (2018 CT State Building Code – Location Specific Value)
- Site Classification = "D"
- Seismic Design Category = "A" – (2015 International Building Code)
- F.a = 1.6 (Obtained from TIA-222-G Table 2-12 Considering above conditions)
- F.v = 2.4 (Obtained from TIA-222-G Table 2-13 Considering above conditions)

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

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

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

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

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

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

4. FINDINGS AND EVALUATION

The combined axial and bending stresses on the tower structure were evaluated to compare with the strength design in accordance with AISC (LRFD). The calculated stresses for the tower structure, anchor bolts and foundation are within the required design strength under the proposed configuration and loading (stated herein). Detailed analysis calculations for the proposed load condition are provided in Section 6 of this report.

The tower sway (deflection) is 0.0955 degrees and the tower twist (rotation) is 0.0462 degrees. These figures ARE within the Connecticut State Police specification of combined 0.75 degrees for sway (deflection) and twist (rotation).

Tower Base Reactions (TIA-222-G):

Description	Current (TIA-222-G)
Pier Compression (kips)	140
Pier Uplift (kips)	114
Overall Overturning (kip-ft)	2704
Overall Shear (kips)	45.8
Shear per Leg (kips)	26.4

Tower Component Stress vs. Capacity Summary:

Component / (Section No.)	Controlling Component/ Elevation	Stress (% capacity)	Pass/Fail	Comments:
Leg (T5)	10.8750 O.D. / 0' – 20'	33.1 %	**Pass**	
Diagonal (T5)	L5x5x5/16 / 0' – 20'	71.2 %	**Pass**	
Top Girt (T1)	L3-1/2x3x1/4 / 80' – 100'	14.0 %	**Pass**	
Connection Bolt (T5)	(1) 7/8" Dia. A325N / 0' – 20'	71.2 %	**Pass**	Member Bearing on Connection

Foundation Summary:

Component	Required	Computed	% Capacity	Pass/Fail
Tower Anchor Rod Capacity (TIA-222-G – 4.9.9)	Ratio < 1.0	0.599	59.9 %	**Pass**
(Soil) Bearing Pressure (TIA-222-G – 9.4)	4.80 ksf	1.58 ksf	32.9 %	**Pass**
Foundation Punching Shear	528.61 kips	252.57 kips	47..8%	**Pass**
Foundation Beam Shear	184.03 kips	82.02 kips	44.6 %	**Pass**
Foundation Bending / Flexure	1304 kip*ft	183.48 kip*ft	14.1 %	**Pass**
Foundation Uplift Resistance	161.72 kip	114 kip	70.5 %	**Pass**
Overturning Moment Check	810 kip*ft	725.51 kip*ft	89.6 %	**Pass**

Structure Rating (Maximum from all components) =	89.6 %	**Pass**

4. FINDINGS AND EVALUATION (cont.)

Maximum Deformations – Proposed Condition

TIA-222-G Section 2.8.2 - Limit State Deformations

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

Load Case Description	Current		Allowable	
	Sway (degree)	Displacement (Feet)	Sway (degree)	Displacement (Feet)
Service Wind Load	0.0693	0.103	4.0	3.0

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

Description	Current	Total	Allowable
Tower Twist (degrees)	0.0462	0.1417	0.750
Tower Sway (degrees)	0.0955		

5. CONCLUSIONS

The results of an initial analysis indicate that:

1. The existing steel tower structure IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
2. The existing tower anchor bolts ARE considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
3. The existing foundation IS considered structurally adequate for the proposed antenna loading with the wind classification specified herein.
4. The existing tower's sway (deflection) is 0.0955 degrees, and the existing tower's twist (rotation) is 0.0462. These figures combined ARE within the Connecticut State Police requirement of 0.75 degrees for combined twist (rotation) and sway (deflection) with the load classification specified herein.
5. The controlling structural capacity for all tower and foundation components for the proposed antenna loading is **89.6 %**

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.

2. Tower is properly installed and maintained.

3. All members are as specified in the original design documents and are in good condition.

4. All required members are in place.

5. All bolts are in place and are properly tightened.

6. Tower is in plumb condition.

7. All member protective coatings are in good condition.

8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.

9. Foundations are in good condition without defects and were properly constructed to support original design loads as specified in the original design documents.

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

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

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

Ongoing and Periodic Inspection and Maintenance:

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

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

6.) DRAWINGS AND DATA

SEISMIC BASE SHEAR ANALYSIS

AECOM

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

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

Location: Colchester, CT -Site Class "D"

$S_{DS} = \frac{2}{3} F_A S_S$, where $S_S = 0.174$ and $F_A = 1.6$ $S_{DS} = \frac{2}{3} F_A S_S = \frac{2}{3} * 1.6 * 0.174 = 0.1856$

$S_{D1} = \frac{2}{3} F_V S_1$, where $S_1 = 0.061$ and $F_V = 2.4$ $S_{D1} = \frac{2}{3} F_V S_1 = \frac{2}{3} * 2.4 * 0.061 = 0.0976$

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

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

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

W=DL TOWER	=	27.452	Kips
W=Antennas/Mounts	=	10.000	Kips
W=Cables	=	8.000	Kips
		45.452	Kips = WT Total = "W"

$$V_s = \frac{S_{DS} * W * I}{R} = \frac{0.1856 * 45.452 kips * 1.5}{3.0} = 4.218\ kips,$$ where R = 3.0 for Lattice Tower

$$V_{S.min} = \frac{0.5 * S_{D1} * W * I}{R} = \frac{0.5 * 0.0976 * 45.452 kips * 1.5}{3.0} = 1.1090 \quad kips$$

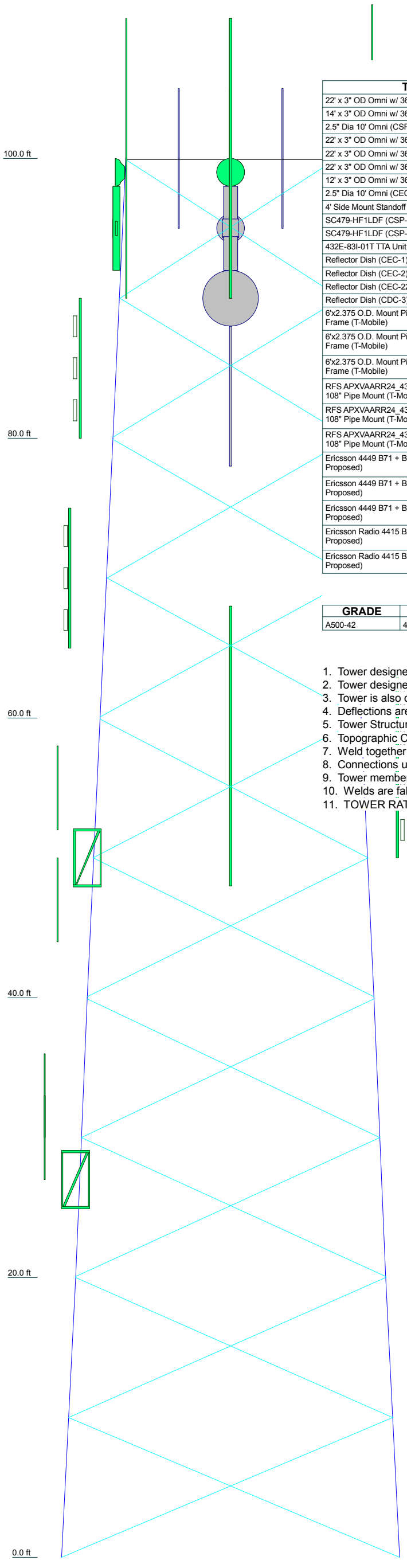
*By visual inspection, the above "Base Shear" value when considering the following Load Combination is less that the base shear of wind on structure.

$1.2 * DL + 1.0\ E < 1.2\ DL + 1.6\ W$, (46 Kips), therefore seismic effect on structure Does NOT control Design.

TNX TOWER INPUT / OUTPUT SUMMARY

T1	HSS8.625x.188	L3 1/2x3x1/4	L3 1/2x3x1/4	15		2497.2		
T2	HSS8.625x.25	L3 1/2x3 1/2x1/4		16.8333		2792.2		
T3	HSS8.625x.322	L4x4x1/4		18.6667	8 @ 9.91667	3510.4		
T4		L4x4x3/8		20.5		5318.7		
T5	P10x.375	L5x5x5/16		22.1667	2 @ 10	5713.2		
Section	Legs	Leg Grade	Diagonals	Diagonal Grade	Top Girts	Face Width (ft) 24.1667	# Panels @ (ft)	Weight (lb) 19831.7

N.A.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
22' x 3" OD Omni w/ 36" Mount Pipe (CEC-16)	100
14' x 3" OD Omni w/ 36" Mount Pipe (CEC-10)	100
2.5" Dia 10' Omni (CSP-32)	100
22' x 3" OD Omni w/ 36" Mount Pipe (CEC-6)	100
22' x 3" OD Omni w/ 36" Mount Pipe (CEC)	100
22' x 3" OD Omni w/ 36" Mount Pipe (CSP-12)	100
12' x 3" OD Omni w/ 36" Mount Pipe (CSP-7)	100
2.5" Dia 10' Omni (CEC-29)	100
4' Side Mount Standoff (1) (CSP-Troop K)	100
SC479-HF1LDF (CSP-36)	100
SC479-HF1LDF (CSP-37)	100
432E-83I-01T TTA Unit (CSP-38)	100
Reflector Dish (CEC-1)	99
Reflector Dish (CEC-2)	99
Reflector Dish (CEC-22)	99
Reflector Dish (CDC-3)	99
6'x2.375 O.D. Mount Pipe on existing Horizontal Frame (T-Mobile)	95
6'x2.375 O.D. Mount Pipe on existing Horizontal Frame (T-Mobile)	95
6'x2.375 O.D. Mount Pipe on existing Horizontal Frame (T-Mobile)	95
RFS APXVAARR24_43-U-NA20 Panel Antenna w/ 108" Pipe Mount (T-Mobile Proposed)	95
RFS APXVAARR24_43-U-NA20 Panel Antenna w/ 108" Pipe Mount (T-Mobile Proposed)	95
RFS APXVAARR24_43-U-NA20 Panel Antenna w/ 108" Pipe Mount (T-Mobile Proposed)	95
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile Proposed)	95
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile Proposed)	95
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile Proposed)	95
Ericsson Radio 4415 B25 RRH Unit (T-Mobile Proposed)	95
Ericsson Radio 4415 B25 RRH Unit (T-Mobile Proposed)	95

TYPE	ELEVATION
Ericsson Radio 4415 B25 RRH Unit (T-Mobile Proposed)	95
Ericsson Radio 4415 B66A RRH (T-Mobile Proposed)	95
Ericsson Radio 4415 B66A RRH (T-Mobile Proposed)	95
Ericsson Radio 4415 B66A RRH (T-Mobile Proposed)	95
Generic Twin TMA unit (T-Mobile - Left Unconnected)	95
Generic Twin TMA unit (T-Mobile - Left Unconnected)	95
Generic Twin TMA unit (T-Mobile - Left Unconnected)	95
2' Dish (CSP-14)	95
6' Grid Dish (CEC-4)	94
6'x2.375 O.D. Mount Pipe (CEC-4)	94
4 FT Dish	90
9' Dipole AF (CSP-15)	86
12' Dipole IK (CSP-11)	85
8' x 2.5" OD Omni - Ak (DEHMS-18)	83
Side Arm Mount [SO 311-1] (Mt for DEHME-18)	80
Side Arm Mount [SO 311-1] (Mt for CEC-4)	80
12' Dipole IK (CSP)	70
12' x 3" OD Omni w/ 36" Mount Pipe (CSP)	60
22' 4-Bay Dipole (CSP-18)	60
Side Arm Mount [SO 311-1] (CSP)	60
Side Arm Mount [SO 311-1] (Mt for CSP Antennas)	60
20' x 3.5" OD Omni w/ 36" Mount Pipe (CSP)	58
DB806M-Y (CSP-39)	50
4' Side Mount Standoff (1) (Mt for CSP/DEHMS)	50
DB803M-Y (DEHMS-19)	50
4' Side Mount Standoff (1) (CSP-20)	30
DB803M-Y (CSP-13)	30
DB803M-Y (Mt for CSP-13,20)	30

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi	A36	36 ksi	58 ksi

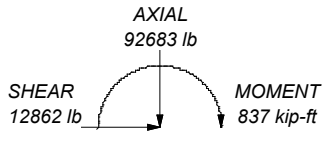
TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Weld together tower sections have flange connections.
8. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
10. Welds are fabricated with ER-70S-6 electrodes.
11. TOWER RATING: 71.2%

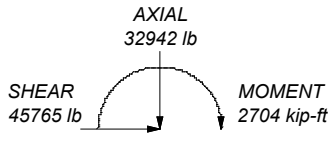
ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 140195 lb
SHEAR: 26354 lb

UPLIFT: -113694 lb
SHEAR: 22679 lb



TORQUE 21 kip-ft
50 mph WIND - 0.7500 in ICE

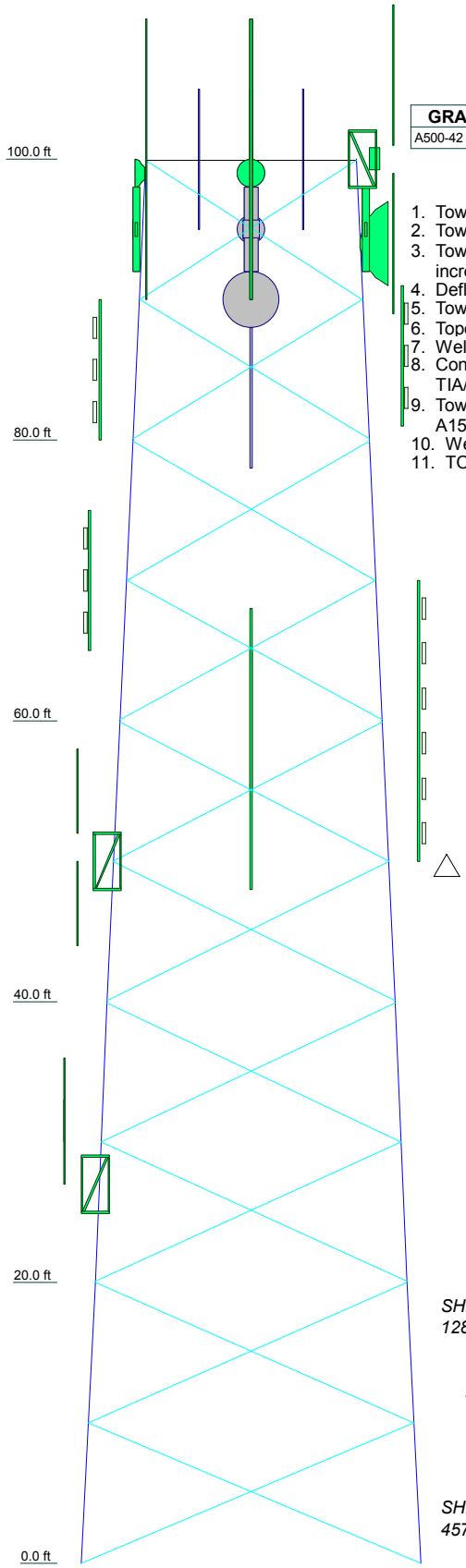


TORQUE 49 kip-ft
REACTIONS - 101 mph WIND

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
Phone: 860-529-8882
FAX: 860-529-3991

Job:	***100' Self Support Lattice - CSP #51 - Troop K***		
Project:	***Colchester, CT / S. Analysis***		
Client:	Transcend Wireless / T-Mobile / TWM-017	Drawn by: MCD	App'd:
Code:	TIA-222-G	Date: 05/11/19	Scale: NTS
Path:	P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51_Troop K\TIA-G\CSP#51_Troop K_Colchester_G_.eri		Dwg No. E-1

Section		T1	T2	T3	T4	T5	
Legs		HSS8.625x.188	HSS8.625x.25	HSS8.625x.322	P10x.375		
Leg Grade				A500-42			
Diagonals		L3 1/2x3x1/4	L3 1/2x3 1/2x1/4	L4x4x1/4	L4x4x3/8	L5x5x5/16	
Diagonal Grade				A36			
Top Girts		L3 1/2x3x1/4					
Face Width (ft)	15	16.8333		18.6667	20.5	22.1667	
# Panels @ (ft)	8 @ 9.91667					2 @ 10	
Weight (lb)	2497.2	2792.2		3510.4	5318.7	5713.2	19831.7



MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Weld together tower sections have flange connections.
8. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
9. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
10. Welds are fabricated with ER-70S-6 electrodes.
11. TOWER RATING: 71.2%

ALL REACTIONS ARE FACTORED

MAX. CORNER REACTIONS AT BASE:
DOWN: 140195 lb
SHEAR: 26354 lb

UPLIFT: -113694 lb
SHEAR: 22679 lb

AXIAL 92683 lb
SHEAR 12862 lb *MOMENT 837 kip-ft*

TORQUE 21 kip-ft
50 mph WIND - 0.7500 in ICE

AXIAL 32942 lb
SHEAR 45765 lb *MOMENT 2704 kip-ft*

TORQUE 49 kip-ft
REACTIONS - 101 mph WIND

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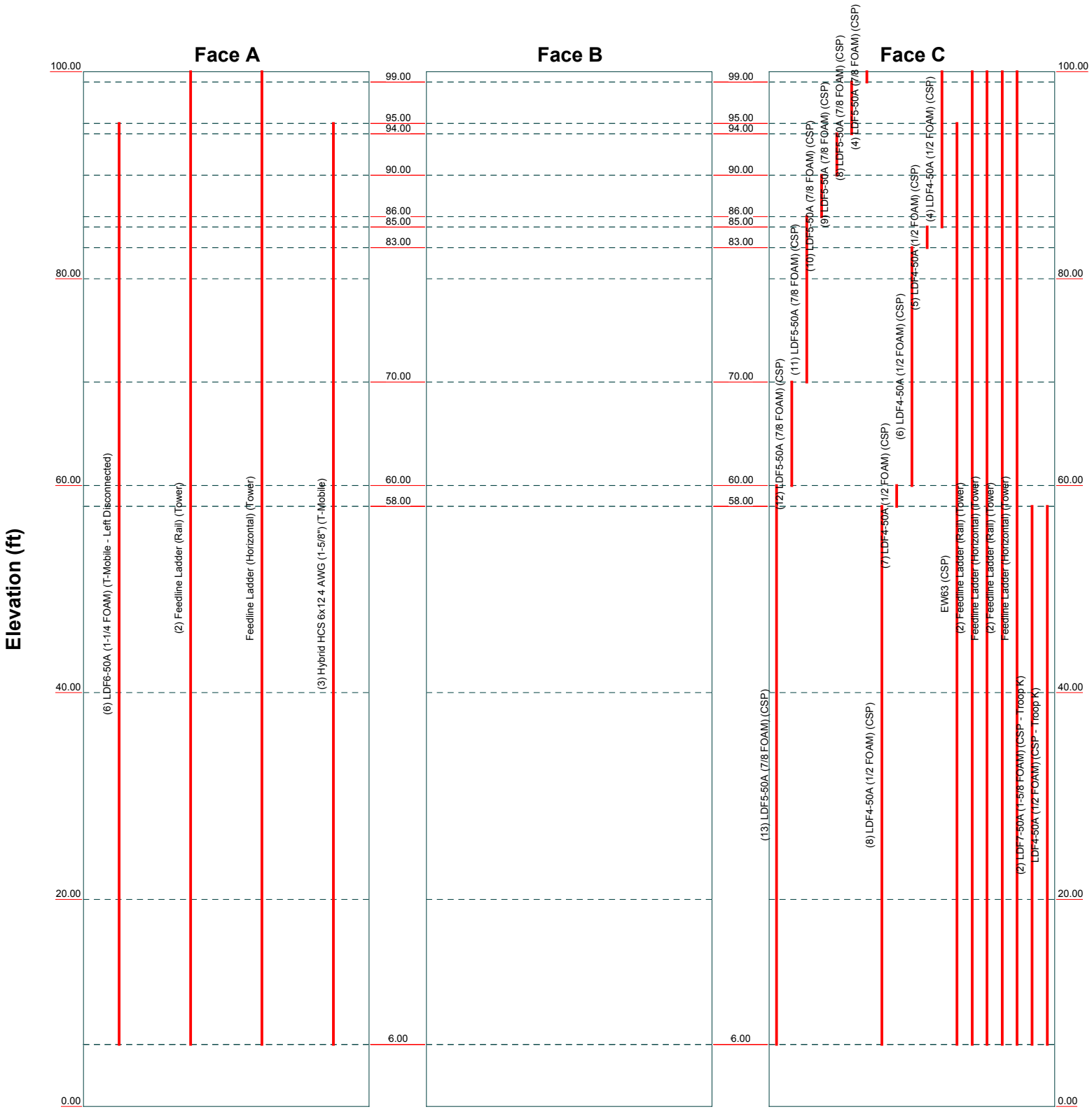
FAX: 860-529-3991

Job:	*100' Self Support Lattice - CSP #51 - Troop K*
Project:	*Colchester, CT / S. Analysis*
Client:	Transcend Wireless / T-Mobile / TWM-017
Drawn by:	MCD
App'd:	
Code:	TIA-222-G
Date:	05/11/19
Scale:	NTS
Path:	P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51 Troop K\TIA-G\CSP#51_Troop K_Colchester_G_.eri
Dwg No.	E-1

TNX TOWER FEEDLINE DISTRIBUTION

Feed Line Distribution Chart
0' - 100'

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



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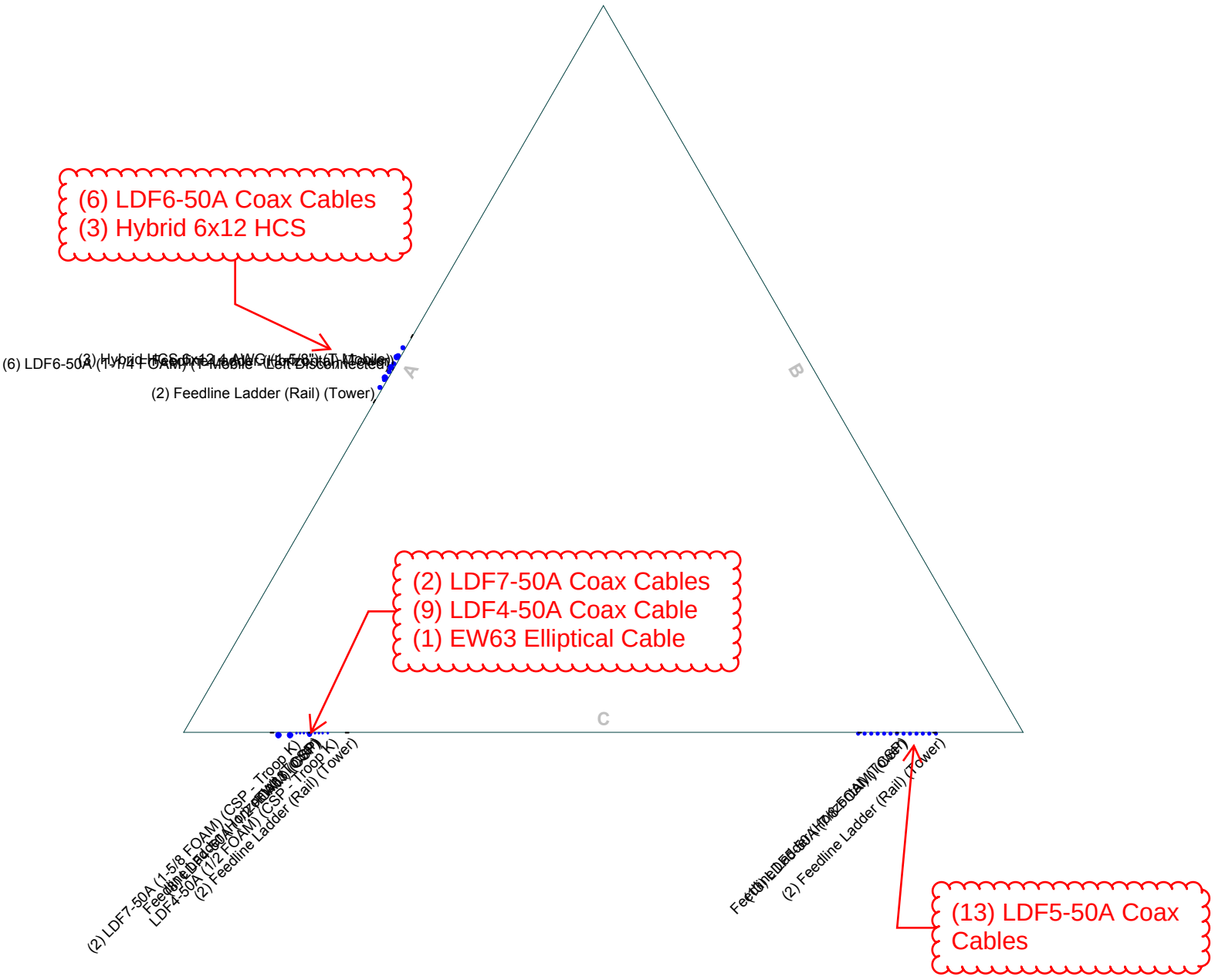
Client: Transcend Wireless / T-Mobile / TWM-017		Drawn by: MCD	App'd:
Code: TIA-222-G		Date: 05/11/19	Scale: NTS
Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51_Troop K\TIA-G\CSP#51_Troop K_Colchester_G_.eri			Dwg No. E-7

TNX TOWER FEEDLINE PLAN

Feed Line Plan

Round Flat App In Face App Out Face



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Job:	***100' Self Support Lattice - CSP #51 - Troop K***		
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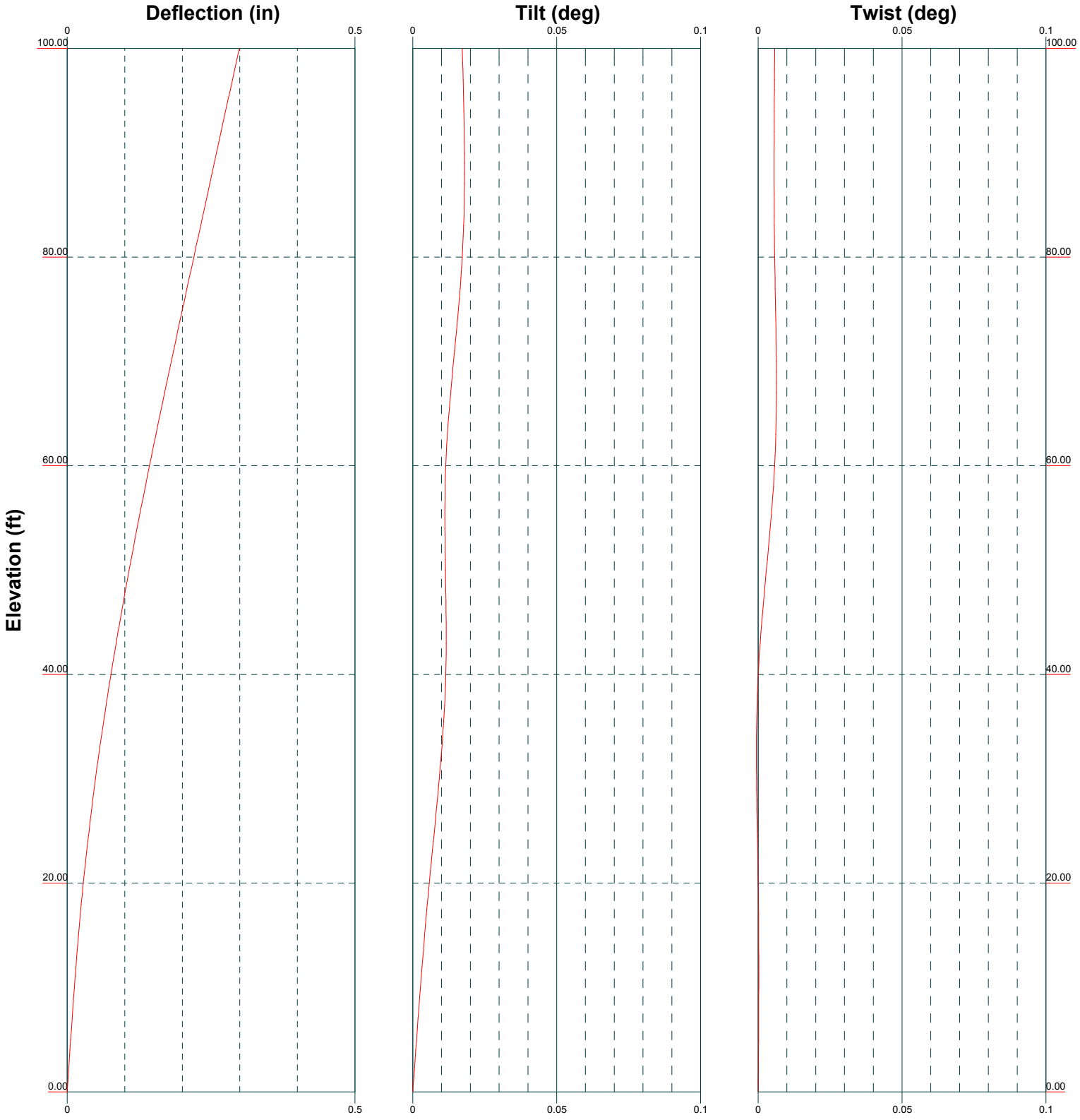
Client: Transcend Wireless / T-Mobile / TWM-017		Drawn by: MCD	App'd:
Code: TIA-222-G		Date: 05/11/19	Scale: NTS
Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51_Troop K\TIA-G\CSP#51_Troop K_Colchester_G_.eri			Dwg No. E-7

TNX TOWER TILT, TWIST AND DEFLECTION

TIA-222-G - Service - 60 mph

Maximum Values



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Job: ***100' Self Support Lattice - CSP #51 - Troop K***			
Project: ***Colchester, CT / S. Analysis***			
Client: Transcend Wireless / T-Mobile / TWM-017	Drawn by: MCD	App'd:	
Code: TIA-222-G	Date: 05/11/19	Scale: NTS	
Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51 Troop K\TIA-G\CSP#51_Troop K_Colchester_G_.eri		Dwg No. E-5	

TNX TOWER DETAILED OUTPUT

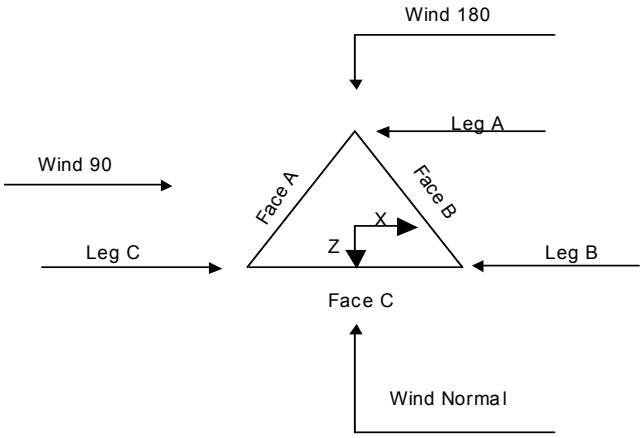
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 15.00 ft at the top and 24.17 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 101 mph.
Structure Class III.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	100.00-80.00			15.00	1	20.00
T2	80.00-60.00			16.83	1	20.00
T3	60.00-40.00			18.67	1	20.00
T4	40.00-20.00			20.50	1	20.00
T5	20.00-0.00			22.17	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	100.00-80.00	9.92	X Brace	No	No	1.0000	1.0000
T2	80.00-60.00	9.92	X Brace	No	No	1.0000	1.0000
T3	60.00-40.00	9.92	X Brace	No	No	1.0000	1.0000
T4	40.00-20.00	9.92	X Brace	No	No	1.0000	1.0000
T5	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 100.00-80.00	Pipe	HSS8.625x.188	A500-42 (42 ksi)	Single Angle	L3 1/2x3x1/4	A36 (36 ksi)
T2 80.00-60.00	Pipe	HSS8.625x.25	A500-42 (42 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T3 60.00-40.00	Pipe	HSS8.625x.322	A500-42 (42 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T4 40.00-20.00	Pipe	P10x.375	A500-42 (42 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)
T5 20.00-0.00	Pipe	P10x.375	A500-42 (42 ksi)	Equal Angle	L5x5x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 100.00-80.00	Single Angle	L3 1/2x3x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T2 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T3 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T4 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T5 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 100.00-80.00	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Single Diags X	K Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T2	No	No	1	1	1	1		1		1		1		1	
80.00-60.00				1	1	1		1		1		1		1	
T3	No	No	1	1	1	1		1		1		1		1	
60.00-40.00				1	1	1		1		1		1		1	
T4	No	No	1	1	1	1		1		1		1		1	
40.00-20.00				1	1	1		1		1		1		1	
T5 20.00-0.00	No	No	1	1	1	1		1		1		1		1	
				1	1	1		1		1		1		1	

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
100.00-80.00														
T2 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1	Flange	0.8750	5	0.7500	1	0.2500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0
100.00-80.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 80.00-60.00	Flange	1.0000	5	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 60.00-40.00	Flange	1.2500	5	0.8750	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 40.00-20.00	Flange	1.2500	5	0.8750	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 20.00-0.00	Flange	1.2500	5	0.8750	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
* "Existing Cable Information obtained from Destek Engineering Analysis													
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	60.00 - 6.00	0.0000	-0.35	13	13	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	70.00 - 60.00	0.0000	-0.35	12	12	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	86.00 - 70.00	0.0000	-0.35	11	11	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	90.00 - 86.00	0.0000	-0.35	10	10	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	94.00 - 90.00	0.0000	-0.35	9	9	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	99.00 - 94.00	0.0000	-0.35	8	8	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	100.00 - 99.00	0.0000	-0.35	4	4	1.0900	1.0900		0.33
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	58.00 - 6.00	0.0000	0.35	8	8	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	60.00 - 58.00	0.0000	0.35	7	7	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	83.00 - 60.00	0.0000	0.35	6	6	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	85.00 - 83.00	0.0000	0.35	5	5	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	100.00 - 85.00	0.0000	0.35	4	4	0.6300	0.6300		0.15
EW63 (CSP)	C	No	No	Ar (CaAa)	95.00 - 6.00	0.0000	0.35	1	1	1.5742	1.5742		0.51
LDF6-50A (1-1/4 FOAM) (T-Mobile - Left Disconnected)	A	No	No	Ar (CaAa)	95.00 - 6.00	0.0000	0	6	6	1.5500	1.5500		0.66
Feedline Ladder (Rail) (Tower)	A	No	No	Af (CaAa)	100.00 - 6.00	0.0000	0	2	2	24.0000 0.2500	1.2500		3.00
Feedline Ladder (Horizontal) (Tower)	A	No	No	Af (CaAa)	100.00 - 6.00	0.0000	0	1	1	0.0000	1.0000		3.40
Feedline Ladder (Rail)	C	No	No	Af (CaAa)	100.00 - 6.00	0.0000	-0.35	2	2	24.0000 0.2500	1.2500		3.00

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(Tower) Feedline Ladder (Horizontal)	C	No	No	Af (CaAa)	100.00 - 6.00	0.0000	-0.35	1	1	0.0000	1.0000		3.40
(Tower) Feedline Ladder (Rail)	C	No	No	Af (CaAa)	100.00 - 6.00	0.0000	0.35	2	2	24.0000 0.2500	1.2500		3.00
(Tower) Feedline Ladder (Horizontal)	C	No	No	Af (CaAa)	100.00 - 6.00	0.0000	0.35	1	1	0.0000	1.0000		3.40
(Tower) Hybrid HCS 6x12 4 AWG (1-5/8") (T-Mobile)	A	No	No	Ar (CaAa)	95.00 - 6.00	0.0000	0	3	3	1.9900	1.9900		1.90
LDF7-50A (1-5/8 FOAM) (CSP - Troop K)	C	No	No	Ar (CaAa)	58.00 - 6.00	0.0000	0.38	2	2	1.9800	1.9800		0.82
LDF4-50A (1/2 FOAM) (CSP - Troop K)	C	No	No	Ar (CaAa)	58.00 - 6.00	0.0000	0.328	1	1	0.6300	0.6300		0.15

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	100.00-80.00	A	0.000	0.000	34.572	0.000	332.90
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	51.513	0.000	458.23
T2	80.00-60.00	A	0.000	0.000	42.207	0.000	381.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	59.112	0.000	480.10
T3	60.00-40.00	A	0.000	0.000	42.207	0.000	381.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	73.038	0.000	527.92
T4	40.00-20.00	A	0.000	0.000	42.207	0.000	381.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	74.082	0.000	531.80
T5	20.00-0.00	A	0.000	0.000	29.545	0.000	266.84
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	51.857	0.000	372.26

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	100.00-80.00	A	2.073	0.000	0.000	106.518	0.000	1850.00
		:瘣		0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		C		0.000	0.000	167.109	0.000	2754.48
T2	80.00-60.00	A	2.021	0.000	0.000	128.573	0.000	2176.29
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	184.122	0.000	2985.92
T3	60.00-40.00	A	1.955	0.000	0.000	126.923	0.000	2105.19
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	229.070	0.000	3540.74
T4	40.00-20.00	A	1.857	0.000	0.000	124.525	0.000	2003.91
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	228.189	0.000	3398.97
T5	20.00-0.00	A	1.664	0.000	0.000	83.844	0.000	1267.39
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	152.860	0.000	2117.62

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	100.00-80.00	-4.3497	9.5987	-7.5575	13.8913
T2	80.00-60.00	-5.5659	11.2068	-9.2266	15.2598
T3	60.00-40.00	-2.5292	17.1399	-6.3026	23.1415
T4	40.00-20.00	-2.8668	17.9420	-6.8028	24.6315
T5	20.00-0.00	-2.1516	13.7651	-5.3055	21.1430

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	4	LDF5-50A (7/8 FOAM)	80.00 - 86.00	0.6000	0.6000
T1	5	LDF5-50A (7/8 FOAM)	86.00 - 90.00	0.6000	0.6000
T1	6	LDF5-50A (7/8 FOAM)	90.00 - 94.00	0.6000	0.6000
T1	7	LDF5-50A (7/8 FOAM)	94.00 - 99.00	0.6000	0.6000
T1	8	LDF5-50A (7/8 FOAM)	99.00 - 100.00	0.6000	0.6000
T1	11	LDF4-50A (1/2 FOAM)	80.00 - 83.00	0.6000	0.6000
T1	12	LDF4-50A (1/2 FOAM)	83.00 - 85.00	0.6000	0.6000
T1	13	LDF4-50A (1/2 FOAM)	85.00 - 100.00	0.6000	0.6000
T1	14	EW63	80.00 - 95.00	0.6000	0.6000
T1	15	LDF6-50A (1-1/4 FOAM)	80.00 - 95.00	0.6000	0.6000
T1	16	Feedline Ladder (Rail)	80.00 - 100.00	1.0000	1.0000
T1	17	Feedline Ladder (Horizontal)	80.00 - 100.00	1.0000	1.0000
T1	18	Feedline Ladder (Rail)	80.00 - 100.00	1.0000	1.0000
T1	19	Feedline Ladder (Horizontal)	80.00 - 100.00	1.0000	1.0000
T1	20	Feedline Ladder (Rail)	80.00 - 100.00	1.0000	1.0000
T1	21	Feedline Ladder (Horizontal)	80.00 - 100.00	1.0000	1.0000
T1	22	Hybrid HCS 6x12 4 AWG (1-5/8")	80.00 - 95.00	0.6000	0.6000
T2	3	LDF5-50A (7/8 FOAM)	60.00 - 70.00	0.6000	0.6000
T2	4	LDF5-50A (7/8 FOAM)	70.00 - 80.00	0.6000	0.6000
T2	11	LDF4-50A (1/2 FOAM)	60.00 - 80.00	0.6000	0.6000
T2	14	EW63	60.00 - 80.00	0.6000	0.6000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T2	15	LDF6-50A (1-1/4 FOAM)	60.00 - 80.00	0.6000	0.6000
T2	16	Feedline Ladder (Rail)	60.00 - 80.00	1.0000	1.0000
T2	17	Feedline Ladder (Horizontal)	60.00 - 80.00	1.0000	1.0000
T2	18	Feedline Ladder (Rail)	60.00 - 80.00	1.0000	1.0000
T2	19	Feedline Ladder (Horizontal)	60.00 - 80.00	1.0000	1.0000
T2	20	Feedline Ladder (Rail)	60.00 - 80.00	1.0000	1.0000
T2	21	Feedline Ladder (Horizontal)	60.00 - 80.00	1.0000	1.0000
T2	22	Hybrid HCS 6x12 4 AWG (1-5/8")	60.00 - 80.00	0.6000	0.6000
T3	2	LDF5-50A (7/8 FOAM)	40.00 - 60.00	1.0000	1.0000
T3	9	LDF4-50A (1/2 FOAM)	40.00 - 58.00	0.6000	0.6000
T3	10	LDF4-50A (1/2 FOAM)	58.00 - 60.00	0.6000	0.6000
T3	14	EW63	40.00 - 60.00	0.6000	0.6000
T3	15	LDF6-50A (1-1/4 FOAM)	40.00 - 60.00	0.6000	0.6000
T3	16	Feedline Ladder (Rail)	40.00 - 60.00	1.0000	1.0000
T3	17	Feedline Ladder (Horizontal)	40.00 - 60.00	1.0000	1.0000
T3	18	Feedline Ladder (Rail)	40.00 - 60.00	1.0000	1.0000
T3	19	Feedline Ladder (Horizontal)	40.00 - 60.00	1.0000	1.0000
T3	20	Feedline Ladder (Rail)	40.00 - 60.00	1.0000	1.0000
T3	21	Feedline Ladder (Horizontal)	40.00 - 60.00	1.0000	1.0000
T3	22	Hybrid HCS 6x12 4 AWG (1-5/8")	40.00 - 60.00	0.6000	0.6000
T3	23	LDF7-50A (1-5/8 FOAM)	40.00 - 58.00	0.6000	0.6000
T3	24	LDF4-50A (1/2 FOAM)	40.00 - 58.00	0.6000	0.6000
T4	2	LDF5-50A (7/8 FOAM)	20.00 - 40.00	1.0000	1.0000
T4	9	LDF4-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.6000
T4	14	EW63	20.00 - 40.00	0.6000	0.6000
T4	15	LDF6-50A (1-1/4 FOAM)	20.00 - 40.00	0.6000	0.6000
T4	16	Feedline Ladder (Rail)	20.00 - 40.00	1.0000	1.0000
T4	17	Feedline Ladder (Horizontal)	20.00 - 40.00	1.0000	1.0000
T4	18	Feedline Ladder (Rail)	20.00 - 40.00	1.0000	1.0000
T4	19	Feedline Ladder (Horizontal)	20.00 - 40.00	1.0000	1.0000
T4	20	Feedline Ladder (Rail)	20.00 - 40.00	1.0000	1.0000
T4	21	Feedline Ladder (Horizontal)	20.00 - 40.00	1.0000	1.0000
T4	22	Hybrid HCS 6x12 4 AWG (1-5/8")	20.00 - 40.00	0.6000	0.6000
T4	23	LDF7-50A (1-5/8 FOAM)	20.00 - 40.00	0.6000	0.6000
T4	24	LDF4-50A (1/2 FOAM)	20.00 - 40.00	0.6000	0.6000
T5	2	LDF5-50A (7/8 FOAM)	6.00 - 20.00	1.0000	1.0000
T5	9	LDF4-50A (1/2 FOAM)	6.00 - 20.00	0.6000	0.6000
T5	14	EW63	6.00 - 20.00	0.6000	0.6000
T5	15	LDF6-50A (1-1/4 FOAM)	6.00 - 20.00	0.6000	0.6000
T5	16	Feedline Ladder (Rail)	6.00 - 20.00	1.0000	1.0000
T5	17	Feedline Ladder (Horizontal)	6.00 - 20.00	1.0000	1.0000
T5	18	Feedline Ladder (Rail)	6.00 - 20.00	1.0000	1.0000
T5	19	Feedline Ladder (Horizontal)	6.00 - 20.00	1.0000	1.0000
T5	20	Feedline Ladder (Rail)	6.00 - 20.00	1.0000	1.0000
T5	21	Feedline Ladder (Horizontal)	6.00 - 20.00	1.0000	1.0000
T5	22	Hybrid HCS 6x12 4 AWG (1-5/8")	6.00 - 20.00	0.6000	0.6000
T5	23	LDF7-50A (1-5/8 FOAM)	6.00 - 20.00	0.6000	0.6000
T5	24	LDF4-50A (1/2 FOAM)	6.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
*** Existing antennas & CSP Antennas									
DB803M-Y	C	From Leg	3.00	0.0000	30.00	No Ice	0.50	0.50	4.30
(CSP-13)			0.00			1/2" Ice	0.68	0.68	8.98
			3.00			1" Ice	0.87	0.87	15.80
4' Side Mount Standoff (1)	C	From Leg	0.50	0.0000	30.00	No Ice	2.72	2.72	50.00
(CSP-20)			0.00			1/2" Ice	4.91	4.91	89.00
			-3.00			1" Ice	7.10	7.10	128.00
DB803M-Y	C	From Leg	3.00	0.0000	30.00	No Ice	0.50	0.50	4.30
(Mt for CSP-13,20)			0.00			1/2" Ice	0.68	0.68	8.98
			0.00			1" Ice	0.87	0.87	15.80
DB806M-Y	C	From Leg	3.00	0.0000	50.00	No Ice	1.58	1.58	8.00
(CSP-39)			0.00			1/2" Ice	2.40	2.40	20.29
			5.00			1" Ice	3.18	3.18	37.77
4' Side Mount Standoff (1)	C	From Leg	0.50	0.0000	50.00	No Ice	2.72	2.72	50.00
(Mt for CSP/DEHMS)			0.00			1/2" Ice	4.91	4.91	89.00
			0.00			1" Ice	7.10	7.10	128.00
DB803M-Y	C	From Leg	3.00	0.0000	50.00	No Ice	0.50	0.50	4.30
(DEHMS-19)			0.00			1/2" Ice	0.68	0.68	8.98
			-3.00			1" Ice	0.87	0.87	15.80
22' x 3" OD Omni w/ 36"	C	None		0.0000	100.00	No Ice	7.32	7.32	160.74
Mount Pipe						1/2" Ice	9.79	9.79	219.74
(CEC-16)						1" Ice	12.24	12.24	294.59
14' x 3" OD Omni w/ 36"	A	None		0.0000	100.00	No Ice	4.92	4.92	110.74
Mount Pipe						1/2" Ice	6.59	6.59	152.64
(CEC-10)						1" Ice	8.24	8.24	205.49
2.5" Dia 10' Omni	C	From Face	0.00	0.0000	100.00	No Ice	2.50	2.50	30.00
(CSP-32)			0.00			1/2" Ice	3.53	3.53	48.64
			0.00			1" Ice	4.58	4.58	73.79
22' x 3" OD Omni w/ 36"	C	None		0.0000	100.00	No Ice	7.32	7.32	160.74
Mount Pipe						1/2" Ice	9.79	9.79	219.74
(CEC-6)						1" Ice	12.24	12.24	294.59
22' x 3" OD Omni w/ 36"	C	From Face	0.00	0.0000	100.00	No Ice	7.32	7.32	160.74
Mount Pipe			0.00			1/2" Ice	9.79	9.79	219.74
(CEC)			0.00			1" Ice	12.24	12.24	294.59
22' x 3" OD Omni w/ 36"	C	From Leg	0.00	0.0000	100.00	No Ice	7.32	7.32	160.74
Mount Pipe			0.00			1/2" Ice	9.79	9.79	219.74
(CSP-12)			0.00			1" Ice	12.24	12.24	294.59
12' x 3" OD Omni w/ 36"	A	From Face	0.00	0.0000	100.00	No Ice	4.62	4.62	97.74
Mount Pipe			0.00			1/2" Ice	6.19	6.19	137.50
(CSP-7)			0.00			1" Ice	7.74	7.74	187.61
2.5" Dia 10' Omni	B	From Face	0.00	0.0000	100.00	No Ice	2.50	2.50	30.00
(CEC-29)			0.00			1/2" Ice	3.53	3.53	48.64
			0.00			1" Ice	4.58	4.58	73.79
6'x2.375 O.D. Mount Pipe	B	None		0.0000	94.00	No Ice	1.43	1.43	21.96
(CEC-4)						1/2" Ice	1.92	1.92	32.79
						1" Ice	2.29	2.29	47.67
9' Dipole AF	B	From Leg	3.00	0.0000	86.00	No Ice	2.00	2.00	20.00
(CSP-15)			0.00			1/2" Ice	3.02	3.02	35.50
			0.00			1" Ice	4.07	4.07	57.47
12' Dipole IK	C	From Leg	3.00	0.0000	85.00	No Ice	2.40	2.40	25.00
(CSP-11)			0.00			1/2" Ice	3.63	3.63	43.56
			0.00			1" Ice	4.87	4.87	69.80
8' x 2.5" OD Omni - Ak	A	From Leg	0.00	0.0000	83.00	No Ice	2.00	2.00	30.00
(DEHMS-18)			0.00			1/2" Ice	2.82	2.82	45.00
			0.00			1" Ice	3.64	3.64	69.80
Side Arm Mount [SO 311-1]	B	None		0.0000	80.00	No Ice	2.97	3.51	62.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(Mt for CEC-4)						1/2" Ice	4.39	5.33	94.35
						1" Ice	5.81	7.15	126.70
Side Arm Mount [SO 311-1]	A	None		0.0000	80.00	No Ice	2.97	3.51	62.00
(Mt for DEHME-18)						1/2" Ice	4.39	5.33	94.35
						1" Ice	5.81	7.15	126.70
12' Dipole IK	C	From Leg	3.00	0.0000	70.00	No Ice	2.40	2.40	25.00
(CSP)			0.00			1/2" Ice	3.63	3.63	43.56
			0.00			1" Ice	4.87	4.87	69.80
Side Arm Mount [SO 311-1]	C	None		0.0000	60.00	No Ice	2.97	3.51	62.00
(CSP)						1/2" Ice	4.39	5.33	94.35
						1" Ice	5.81	7.15	126.70
Side Arm Mount [SO 311-1]	B	None		0.0000	60.00	No Ice	2.97	3.51	62.00
(Mt for CSP Antennas)						1/2" Ice	4.39	5.33	94.35
						1" Ice	5.81	7.15	126.70
12' x 3" OD Omni w/ 36"	A	None		0.0000	60.00	No Ice	4.62	4.62	97.74
Mount Pipe						1/2" Ice	6.19	6.19	137.50
(CSP)						1" Ice	7.74	7.74	187.61
22' 4-Bay Dipole	B	From Leg	3.00	0.0000	60.00	No Ice	4.00	4.00	55.00
(CSP-18)			0.00			1/2" Ice	6.00	6.00	100.00
			0.00			1" Ice	8.00	8.00	145.00
20' x 3.5" OD Omni w/ 36"	A	None		0.0000	58.00	No Ice	4.20	4.20	75.00
Mount Pipe						1/2" Ice	6.33	6.33	107.30
(CSP)						1" Ice	8.47	8.47	152.78
*** T-Mobile Proposed Equipment									
6'x2.375 O.D. Mount Pipe on	A	From Leg	0.00	0.0000	95.00	No Ice	1.43	1.43	21.96
existing Horizontal Frame			0.00			1/2" Ice	1.92	1.92	32.79
(T-Mobile)			0.00			1" Ice	2.29	2.29	47.67
6'x2.375 O.D. Mount Pipe on	B	From Leg	0.00	0.0000	95.00	No Ice	1.43	1.43	21.96
existing Horizontal Frame			0.00			1/2" Ice	1.92	1.92	32.79
(T-Mobile)			0.00			1" Ice	2.29	2.29	47.67
6'x2.375 O.D. Mount Pipe on	C	From Leg	0.00	0.0000	95.00	No Ice	1.43	1.43	21.96
existing Horizontal Frame			0.00			1/2" Ice	1.92	1.92	32.79
(T-Mobile)			0.00			1" Ice	2.29	2.29	47.67
RFS	A	From Leg	0.50	0.0000	95.00	No Ice	20.48	11.03	186.15
APXVAARR24_43-U-NA20			0.00			1/2" Ice	21.23	12.55	322.45
Panel Antenna w/ 108" Pipe			0.00			1" Ice	21.99	14.10	469.56
Mount									
(T-Mobile Proposed)									
RFS	B	From Leg	0.50	0.0000	95.00	No Ice	20.48	11.03	186.15
APXVAARR24_43-U-NA20			0.00			1/2" Ice	21.23	12.55	322.45
Panel Antenna w/ 108" Pipe			0.00			1" Ice	21.99	14.10	469.56
Mount									
(T-Mobile Proposed)									
RFS	C	From Leg	0.50	0.0000	95.00	No Ice	20.48	11.03	186.15
APXVAARR24_43-U-NA20			0.00			1/2" Ice	21.23	12.55	322.45
Panel Antenna w/ 108" Pipe			0.00			1" Ice	21.99	14.10	469.56
Mount									
(T-Mobile Proposed)									
Ericsson 4449 B71 + B12	A	From Leg	0.50	0.0000	95.00	No Ice	1.66	1.16	80.00
Radio Unit			0.00			1/2" Ice	1.82	1.29	96.16
(T-Mobile Proposed)			0.00			1" Ice	1.98	1.44	114.94
Ericsson 4449 B71 + B12	B	From Leg	0.50	0.0000	95.00	No Ice	1.66	1.16	80.00
Radio Unit			0.00			1/2" Ice	1.82	1.29	96.16
(T-Mobile Proposed)			0.00			1" Ice	1.98	1.44	114.94
Ericsson 4449 B71 + B12	C	From Leg	0.50	0.0000	95.00	No Ice	1.66	1.16	80.00
Radio Unit			0.00			1/2" Ice	1.82	1.29	96.16

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(T-Mobile Proposed)			0.00			1" Ice	1.98	1.44	114.94
Ericsson Radio 4415 B25	A	From Leg	0.50	0.0000	95.00	No Ice	1.86	0.83	50.00
RRH Unit			0.00			1/2" Ice	2.03	0.96	64.25
(T-Mobile Proposed)			0.00			1" Ice	2.20	1.09	81.03
Ericsson Radio 4415 B25	B	From Leg	0.50	0.0000	95.00	No Ice	1.86	0.83	50.00
RRH Unit			0.00			1/2" Ice	2.03	0.96	64.25
(T-Mobile Proposed)			0.00			1" Ice	2.20	1.09	81.03
Ericsson Radio 4415 B25	C	From Leg	0.50	0.0000	95.00	No Ice	1.86	0.83	50.00
RRH Unit			0.00			1/2" Ice	2.03	0.96	64.25
(T-Mobile Proposed)			0.00			1" Ice	2.20	1.09	81.03
Ericsson Radio 4415 B66A	A	From Leg	0.50	0.0000	95.00	No Ice	1.64	1.35	72.00
RRH			0.00			1/2" Ice	1.80	1.50	89.60
(T-Mobile Proposed)			0.00			1" Ice	1.97	1.65	109.91
Ericsson Radio 4415 B66A	B	From Leg	0.50	0.0000	95.00	No Ice	1.64	1.35	72.00
RRH			0.00			1/2" Ice	1.80	1.50	89.60
(T-Mobile Proposed)			0.00			1" Ice	1.97	1.65	109.91
Ericsson Radio 4415 B66A	C	From Leg	0.50	0.0000	95.00	No Ice	1.64	1.35	72.00
RRH			0.00			1/2" Ice	1.80	1.50	89.60
(T-Mobile Proposed)			0.00			1" Ice	1.97	1.65	109.91
Generic Twin TMA unit	A	From Leg	0.50	0.0000	95.00	No Ice	0.37	0.96	25.00
(T-Mobile - Left			0.00			1/2" Ice	0.46	1.09	32.19
Unconnected)			0.00			1" Ice	0.55	1.22	41.21
Generic Twin TMA unit	B	From Leg	0.50	0.0000	95.00	No Ice	0.37	0.96	25.00
(T-Mobile - Left			0.00			1/2" Ice	0.46	1.09	32.19
Unconnected)			0.00			1" Ice	0.55	1.22	41.21
Generic Twin TMA unit	C	From Leg	0.50	0.0000	95.00	No Ice	0.37	0.96	25.00
(T-Mobile - Left			0.00			1/2" Ice	0.46	1.09	32.19
Unconnected)			0.00			1" Ice	0.55	1.22	41.21
** Troop K Antenna									
4' Side Mount Standoff (1)	B	From Leg	0.50	0.0000	100.00	No Ice	2.72	2.72	50.00
(CSP-Troop K)			0.00			1/2" Ice	4.91	4.91	89.00
			0.00			1" Ice	7.10	7.10	128.00
SC479-HF1LDF	B	From Leg	3.00	0.0000	100.00	No Ice	4.55	4.55	34.00
(CSP-36)			0.00			1/2" Ice	6.54	6.54	69.82
			6.00			1" Ice	8.04	8.04	114.98
SC479-HF1LDF	B	From Leg	3.00	0.0000	100.00	No Ice	4.55	4.55	34.00
(CSP-37)			0.00			1/2" Ice	6.54	6.54	69.82
			-6.00			1" Ice	8.04	8.04	114.98
432E-83I-01T TTA Unit	B	From Leg	1.50	0.0000	100.00	No Ice	2.85	0.97	25.00
(CSP-38)			0.00			1/2" Ice	3.06	1.11	44.70
			0.00			1" Ice	3.28	1.26	67.39

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
Reflector Dish	C	Passive Reflector	From	0.00	Worst		99.00	2.00	No Ice	3.14	10.00
(CEC-1)			Face	0.00					1/2" Ice	3.41	30.00

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight lb
				0.00					1" Ice	3.68	50.00
Reflector Dish (CEC-2)	A	Passive Reflector	From Leg	0.00 0.00	Worst		99.00	2.00	No Ice 1/2" Ice	3.14 3.41	10.00 30.00
				0.00					1" Ice	3.68	50.00
6' Grid Dish (CEC-4)	B	Grid	From Leg	0.00 0.00	Worst		94.00	6.00	No Ice 1/2" Ice	28.27 29.07	148.00 149.20
				0.00					1" Ice	29.86	198.40
4 FT Dish	A	Paraboloid w/Radome	From Leg	0.00 0.00	Worst		90.00	4.00	No Ice 1/2" Ice	12.56 13.09	170.00 237.19
				0.00					1" Ice	13.62	304.38
2' Dish (CSP-14)	A	Paraboloid w/Radome	From Leg	0.00 0.00	Worst		95.00	2.00	No Ice 1/2" Ice	3.14 3.41	30.00 47.50
				0.00					1" Ice	3.68	65.00
Reflector Dish (CEC-22)	C	Passive Reflector	From Leg	0.00 0.00	Worst		99.00	2.00	No Ice 1/2" Ice	3.14 3.41	30.00 47.50
				0.00					1" Ice	3.68	65.00
Reflector Dish (CDC-3)	C	Passive Reflector	From Leg	0.00 0.00	Worst		99.00	2.00	No Ice 1/2" Ice	3.14 3.41	30.00 47.50
				0.00					1" Ice	3.68	65.00

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg % %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	90.00	1.238	32	332.723	A	25.814	28.790	28.790	52.73	34.572	0.000
100.00-80.00					B	25.814	28.790		52.73	0.000	0.000
					C	25.814	28.790		52.73	51.513	0.000
T2 80.00-60.00	70.00	1.174	30	369.390	A	23.447	28.790	28.790	55.11	42.207	0.000
					B	23.447	28.790		55.11	0.000	0.000
					C	23.447	28.790		55.11	59.112	0.000
T3 60.00-40.00	50.00	1.094	28	406.057	A	29.043	28.790	28.790	49.78	42.207	0.000
					B	29.043	28.790		49.78	0.000	0.000
					C	29.043	28.790		49.78	73.038	0.000
T4 40.00-20.00	30.00	0.982	25	443.348	A	31.049	33.372	33.372	51.80	42.207	0.000
					B	31.049	33.372		51.80	0.000	0.000
					C	31.049	33.372		51.80	74.082	0.000
T5 20.00-0.00	10.00	0.85	22	480.021	A	41.762	33.389	33.389	44.43	29.545	0.000
					B	41.762	33.389		44.43	0.000	0.000
					C	41.762	33.389		44.43	51.857	0.000

Tower Pressure - With Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg % %	C_AA_A In Face ft²	C_AA_A Out Face ft²

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 100.00-80.00	90.00	1.238	7	2.0729	339.640	A	25.814	72.315	42.629	43.44	106.518	0.000
						B	25.814	72.315		43.44	0.000	0.000
						C	25.814	72.315		43.44	167.109	0.000
T2 80.00-60.00	70.00	1.174	6	2.0214	376.135	A	23.447	68.580	42.285	45.95	128.573	0.000
						B	23.447	68.580		45.95	0.000	0.000
						C	23.447	68.580		45.95	184.122	0.000
T3 60.00-40.00	50.00	1.094	6	1.9546	412.579	A	29.043	69.395	41.839	42.50	126.923	0.000
						B	29.043	69.395		42.50	0.000	0.000
						C	29.043	69.395		42.50	229.070	0.000
T4 40.00-20.00	30.00	0.982	5	1.8572	449.544	A	31.049	73.760	45.768	43.67	124.525	0.000
						B	31.049	73.760		43.67	0.000	0.000
						C	31.049	73.760		43.67	228.189	0.000
T5 20.00-0.00	10.00	0.85	5	1.6640	485.574	A	41.762	71.488	44.501	39.29	83.844	0.000
						B	41.762	71.488		39.29	0.000	0.000
						C	41.762	71.488		39.29	152.860	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	90.00	1.238	10	332.723	A	25.814	28.790	28.790	52.73	34.572	0.000
100.00-80.00					B	25.814	28.790		52.73	0.000	0.000
					C	25.814	28.790		52.73	51.513	0.000
T2 80.00-60.00	70.00	1.174	9	369.390	A	23.447	28.790	28.790	55.11	42.207	0.000
					B	23.447	28.790		55.11	0.000	0.000
					C	23.447	28.790		55.11	59.112	0.000
T3 60.00-40.00	50.00	1.094	9	406.057	A	29.043	28.790	28.790	49.78	42.207	0.000
					B	29.043	28.790		49.78	0.000	0.000
					C	29.043	28.790		49.78	73.038	0.000
T4 40.00-20.00	30.00	0.982	8	443.348	A	31.049	33.372	33.372	51.80	42.207	0.000
					B	31.049	33.372		51.80	0.000	0.000
					C	31.049	33.372		51.80	74.082	0.000
T5 20.00-0.00	10.00	0.85	7	480.021	A	41.762	33.389	33.389	44.43	29.545	0.000
					B	41.762	33.389		44.43	0.000	0.000
					C	41.762	33.389		44.43	51.857	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.164	2.72	32	1	1	38.079	4545.44	227.27	C
100.00-80.00			B	0.164	2.72		1	1	38.079			
			C	0.164	2.72		1	1	38.079			
T2	861.30	2792.19	A	0.141	2.803	30	1	1	35.377	4431.71	221.59	C
80.00-60.00			B	0.141	2.803		1	1	35.377			
			C	0.141	2.803		1	1	35.377			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T3	909.12	3510.42	A	0.142	2.8	28	1	1	40.988	4965.59	248.28	C
60.00-40.00			B	0.142	2.8		1	1	40.988			
			C	0.142	2.8		1	1	40.988			
T4	913.00	5318.65	A	0.145	2.789	25	1	1	44.942	4698.35	234.92	C
40.00-20.00			B	0.145	2.789		1	1	44.942			
			C	0.145	2.789		1	1	44.942			
T5 20.00-0.00	639.10	5713.24	A	0.157	2.748	22	1	1	55.854	4058.20	202.91	C
			B	0.157	2.748		1	1	55.854			
			C	0.157	2.748		1	1	55.854			
Sum Weight:	4113.65	19831.70						OTM	1149.12 kip-ft	22699.29		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.164	2.72	32	0.825	1	33.561	4215.38	210.77	C
100.00-80.00			B	0.164	2.72		0.825	1	33.561			
			C	0.164	2.72		0.825	1	33.561			
T2	861.30	2792.19	A	0.141	2.803	30	0.825	1	31.274	4138.68	206.93	C
80.00-60.00			B	0.141	2.803		0.825	1	31.274			
			C	0.141	2.803		0.825	1	31.274			
T3	909.12	3510.42	A	0.142	2.8	28	0.825	1	35.905	4627.91	231.40	C
60.00-40.00			B	0.142	2.8		0.825	1	35.905			
			C	0.142	2.8		0.825	1	35.905			
T4	913.00	5318.65	A	0.145	2.789	25	0.825	1	39.509	4375.39	218.77	C
40.00-20.00			B	0.145	2.789		0.825	1	39.509			
			C	0.145	2.789		0.825	1	39.509			
T5 20.00-0.00	639.10	5713.24	A	0.157	2.748	22	0.825	1	48.546	3687.86	184.39	C
			B	0.157	2.748		0.825	1	48.546			
			C	0.157	2.748		0.825	1	48.546			
Sum Weight:	4113.65	19831.70						OTM	1068.63 kip-ft	21045.22		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.164	2.72	32	0.8	1	32.916	4168.23	208.41	C
100.00-80.00			B	0.164	2.72		0.8	1	32.916			
			C	0.164	2.72		0.8	1	32.916			
T2	861.30	2792.19	A	0.141	2.803	30	0.8	1	30.687	4096.82	204.84	C
80.00-60.00			B	0.141	2.803		0.8	1	30.687			
			C	0.141	2.803		0.8	1	30.687			
T3	909.12	3510.42	A	0.142	2.8	28	0.8	1	35.179	4579.66	228.98	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
60.00-40.00			B	0.142	2.8		0.8	1	35.179			
			C	0.142	2.8		0.8	1	35.179			
T4	913.00	5318.65	A	0.145	2.789	25	0.8	1	38.733	4329.25	216.46	C
40.00-20.00			B	0.145	2.789		0.8	1	38.733			
			C	0.145	2.789		0.8	1	38.733			
T5 20.00-0.00	639.10	5713.24	A	0.157	2.748	22	0.8	1	47.502	3634.95	181.75	C
			B	0.157	2.748		0.8	1	47.502			
			C	0.157	2.748		0.8	1	47.502			
Sum Weight:	4113.65	19831.70						OTM	1057.13 kip-ft	20808.92		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.164	2.72	32	0.85	1	34.207	4262.53	213.13	C
100.00-80.00			B	0.164	2.72		0.85	1	34.207			
			C	0.164	2.72		0.85	1	34.207			
T2	861.30	2792.19	A	0.141	2.803	30	0.85	1	31.860	4180.54	209.03	C
80.00-60.00			B	0.141	2.803		0.85	1	31.860			
			C	0.141	2.803		0.85	1	31.860			
T3	909.12	3510.42	A	0.142	2.8	28	0.85	1	36.631	4676.15	233.81	C
60.00-40.00			B	0.142	2.8		0.85	1	36.631			
			C	0.142	2.8		0.85	1	36.631			
T4	913.00	5318.65	A	0.145	2.789	25	0.85	1	40.285	4421.53	221.08	C
40.00-20.00			B	0.145	2.789		0.85	1	40.285			
			C	0.145	2.789		0.85	1	40.285			
T5 20.00-0.00	639.10	5713.24	A	0.157	2.748	22	0.85	1	49.590	3740.76	187.04	C
			B	0.157	2.748		0.85	1	49.590			
			C	0.157	2.748		0.85	1	49.590			
Sum Weight:	4113.65	19831.70						OTM	1080.13 kip-ft	21281.52		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	4604.48	8696.16	A	0.289	2.326	7	1	1	68.881	2107.72	105.39	C
100.00-80.00			B	0.289	2.326		1	1	68.881			
			C	0.289	2.326		1	1	68.881			
T2	5162.21	8573.16	A	0.245	2.454	6	1	1	63.477	2098.12	104.91	C
80.00-60.00			B	0.245	2.454		1	1	63.477			
			C	0.245	2.454		1	1	63.477			
T3	5645.93	9816.54	A	0.239	2.472	6	1	1	69.451	2321.42	116.07	C
60.00-40.00			B	0.239	2.472		1	1	69.451			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.239	2.472		1	1	69.451			
T4	5402.88	11748.35	A	0.233	2.489	5	1	1	73.908	2124.11	106.21	C
40.00-20.00			B	0.233	2.489		1	1	73.908			
			C	0.233	2.489		1	1	73.908			
T5 20.00-0.00	3385.02	12515.83	A	0.233	2.489	5	1	1	83.302	1562.50	78.13	C
			B	0.233	2.489		1	1	83.302			
			C	0.233	2.489		1	1	83.302			
Sum Weight:	24200.51	51350.04						OTM	531.98 kip-ft	10213.87		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	4604.48	8696.16	A	0.289	2.326	7	0.825	1	64.364	2047.58	102.38	C
100.00-80.00			B	0.289	2.326		0.825	1	64.364			
			C	0.289	2.326		0.825	1	64.364			
T2	5162.21	8573.16	A	0.245	2.454	6	0.825	1	59.374	2043.47	102.17	C
80.00-60.00			B	0.245	2.454		0.825	1	59.374			
			C	0.245	2.454		0.825	1	59.374			
T3	5645.93	9816.54	A	0.239	2.472	6	0.825	1	64.369	2257.87	112.89	C
60.00-40.00			B	0.239	2.472		0.825	1	64.369			
			C	0.239	2.472		0.825	1	64.369			
T4	5402.88	11748.35	A	0.233	2.489	5	0.825	1	68.475	2062.69	103.13	C
40.00-20.00			B	0.233	2.489		0.825	1	68.475			
			C	0.233	2.489		0.825	1	68.475			
T5 20.00-0.00	3385.02	12515.83	A	0.233	2.489	5	0.825	1	75.994	1491.01	74.55	C
			B	0.233	2.489		0.825	1	75.994			
			C	0.233	2.489		0.825	1	75.994			
Sum Weight:	24200.51	51350.04						OTM	517.01 kip-ft	9902.61		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	4604.48	8696.16	A	0.289	2.326	7	0.8	1	63.718	2038.99	101.95	C
100.00-80.00			B	0.289	2.326		0.8	1	63.718			
			C	0.289	2.326		0.8	1	63.718			
T2	5162.21	8573.16	A	0.245	2.454	6	0.8	1	58.788	2035.66	101.78	C
80.00-60.00			B	0.245	2.454		0.8	1	58.788			
			C	0.245	2.454		0.8	1	58.788			
T3	5645.93	9816.54	A	0.239	2.472	6	0.8	1	63.643	2248.79	112.44	C
60.00-40.00			B	0.239	2.472		0.8	1	63.643			
			C	0.239	2.472		0.8	1	63.643			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T4	5402.88	11748.35	A	0.233	2.489	5	0.8	1	67.698	2053.91	102.70	C
40.00-20.00			B	0.233	2.489		0.8	1	67.698			
			C	0.233	2.489		0.8	1	67.698			
T5 20.00-0.00	3385.02	12515.83	A	0.233	2.489	5	0.8	1	74.950	1480.80	74.04	C
			B	0.233	2.489		0.8	1	74.950			
			C	0.233	2.489		0.8	1	74.950			
Sum Weight:	24200.51	51350.04						OTM	514.87 kip-ft	9858.15		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	4604.48	8696.16	A	0.289	2.326	7	0.85	1	65.009	2056.17	102.81	C
100.00-80.00			B	0.289	2.326		0.85	1	65.009			
			C	0.289	2.326		0.85	1	65.009			
T2	5162.21	8573.16	A	0.245	2.454	6	0.85	1	59.960	2051.28	102.56	C
80.00-60.00			B	0.245	2.454		0.85	1	59.960			
			C	0.245	2.454		0.85	1	59.960			
T3	5645.93	9816.54	A	0.239	2.472	6	0.85	1	65.095	2266.95	113.35	C
60.00-40.00			B	0.239	2.472		0.85	1	65.095			
			C	0.239	2.472		0.85	1	65.095			
T4	5402.88	11748.35	A	0.233	2.489	5	0.85	1	69.251	2071.46	103.57	C
40.00-20.00			B	0.233	2.489		0.85	1	69.251			
			C	0.233	2.489		0.85	1	69.251			
T5 20.00-0.00	3385.02	12515.83	A	0.233	2.489	5	0.85	1	77.038	1501.23	75.06	C
			B	0.233	2.489		0.85	1	77.038			
			C	0.233	2.489		0.85	1	77.038			
Sum Weight:	24200.51	51350.04						OTM	519.15 kip-ft	9947.08		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.164	2.72	10	1	1	38.079	1394.88	69.74	C
100.00-80.00			B	0.164	2.72		1	1	38.079			
			C	0.164	2.72		1	1	38.079			
T2	861.30	2792.19	A	0.141	2.803	9	1	1	35.377	1359.98	68.00	C
80.00-60.00			B	0.141	2.803		1	1	35.377			
			C	0.141	2.803		1	1	35.377			
T3	909.12	3510.42	A	0.142	2.8	9	1	1	40.988	1523.82	76.19	C
60.00-40.00			B	0.142	2.8		1	1	40.988			
			C	0.142	2.8		1	1	40.988			
T4	913.00	5318.65	A	0.145	2.789	8	1	1	44.942	1441.81	72.09	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
40.00-20.00			B	0.145	2.789		1	1	44.942			
			C	0.145	2.789		1	1	44.942			
T5 20.00-0.00	639.10	5713.24	A	0.157	2.748	7	1	1	55.854	1245.36	62.27	C
			B	0.157	2.748		1	1	55.854			
			C	0.157	2.748		1	1	55.854			
Sum Weight:	4113.65	19831.70						OTM	352.64 kip-ft	6965.85		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.164	2.72	10	0.825	1	33.561	1293.60	64.68	C
100.00-80.00			B	0.164	2.72		0.825	1	33.561			
			C	0.164	2.72		0.825	1	33.561			
T2	861.30	2792.19	A	0.141	2.803	9	0.825	1	31.274	1270.06	63.50	C
80.00-60.00			B	0.141	2.803		0.825	1	31.274			
			C	0.141	2.803		0.825	1	31.274			
T3	909.12	3510.42	A	0.142	2.8	9	0.825	1	35.905	1420.19	71.01	C
60.00-40.00			B	0.142	2.8		0.825	1	35.905			
			C	0.142	2.8		0.825	1	35.905			
T4	913.00	5318.65	A	0.145	2.789	8	0.825	1	39.509	1342.70	67.13	C
40.00-20.00			B	0.145	2.789		0.825	1	39.509			
			C	0.145	2.789		0.825	1	39.509			
T5 20.00-0.00	639.10	5713.24	A	0.157	2.748	7	0.825	1	48.546	1131.71	56.59	C
			B	0.157	2.748		0.825	1	48.546			
			C	0.157	2.748		0.825	1	48.546			
Sum Weight:	4113.65	19831.70						OTM	327.94 kip-ft	6458.26		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.164	2.72	10	0.8	1	32.916	1279.13	63.96	C
100.00-80.00			B	0.164	2.72		0.8	1	32.916			
			C	0.164	2.72		0.8	1	32.916			
T2	861.30	2792.19	A	0.141	2.803	9	0.8	1	30.687	1257.21	62.86	C
80.00-60.00			B	0.141	2.803		0.8	1	30.687			
			C	0.141	2.803		0.8	1	30.687			
T3	909.12	3510.42	A	0.142	2.8	9	0.8	1	35.179	1405.39	70.27	C
60.00-40.00			B	0.142	2.8		0.8	1	35.179			
			C	0.142	2.8		0.8	1	35.179			
T4	913.00	5318.65	A	0.145	2.789	8	0.8	1	38.733	1328.54	66.43	C
40.00-20.00			B	0.145	2.789		0.8	1	38.733			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.145	2.789		0.8	1	38.733			
T5 20.00-0.00	639.10	5713.24	A	0.157	2.748	7	0.8	1	47.502	1115.48	55.77	C
			B	0.157	2.748		0.8	1	47.502			
			C	0.157	2.748		0.8	1	47.502			
Sum Weight:	4113.65	19831.70						OTM	324.41 kip-ft	6385.74		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	q_z psf	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.164	2.72	10	0.85	1	34.207	1308.07	65.40	C
100.00-80.00			B	0.164	2.72		0.85	1	34.207			
			C	0.164	2.72		0.85	1	34.207			
T2	861.30	2792.19	A	0.141	2.803	9	0.85	1	31.860	1282.91	64.15	C
80.00-60.00			B	0.141	2.803		0.85	1	31.860			
			C	0.141	2.803		0.85	1	31.860			
T3	909.12	3510.42	A	0.142	2.8	9	0.85	1	36.631	1434.99	71.75	C
60.00-40.00			B	0.142	2.8		0.85	1	36.631			
			C	0.142	2.8		0.85	1	36.631			
T4	913.00	5318.65	A	0.145	2.789	8	0.85	1	40.285	1356.86	67.84	C
40.00-20.00			B	0.145	2.789		0.85	1	40.285			
			C	0.145	2.789		0.85	1	40.285			
T5 20.00-0.00	639.10	5713.24	A	0.157	2.748	7	0.85	1	49.590	1147.95	57.40	C
			B	0.157	2.748		0.85	1	49.590			
			C	0.157	2.748		0.85	1	49.590			
Sum Weight:	4113.65	19831.70						OTM	331.46 kip-ft	6530.77		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	8863.38					
Bracing Weight	10968.32					
Total Member Self-Weight	19831.70			10.78	8.18	
Total Weight	27451.72			10.78	8.18	
Wind 0 deg - No Ice		-22.31	-28564.72	-1670.07	10.41	-5.32
Wind 30 deg - No Ice		13567.03	-23498.79	-1384.01	-797.10	10.56
Wind 45 deg - No Ice		19031.15	-19012.93	-1119.26	-1123.68	17.68
Wind 60 deg - No Ice		23111.83	-13317.85	-781.72	-1368.92	23.60
Wind 90 deg - No Ice		27172.71	22.31	13.01	-1606.25	30.32
Wind 120 deg - No Ice		24771.24	14301.68	853.13	-1450.82	28.91
Wind 135 deg - No Ice		19731.05	19712.83	1176.49	-1159.36	25.20
Wind 150 deg - No Ice		13605.68	23521.10	1407.79	-800.97	19.76

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 180 deg - No Ice		22.31	26674.36	1599.62	5.95	5.32
Wind 210 deg - No Ice		-13567.03	23498.79	1405.56	813.46	-10.56
Wind 225 deg - No Ice		-19031.15	19012.93	1140.81	1140.04	-17.68
Wind 240 deg - No Ice		-24748.93	14263.04	849.26	1464.94	-23.60
Wind 270 deg - No Ice		-27172.71	-22.31	8.54	1622.60	-30.32
Wind 300 deg - No Ice		-23134.14	-13356.50	-785.58	1387.51	-28.91
Wind 315 deg - No Ice		-19062.70	-19044.48	-1122.42	1143.19	-25.20
Wind 330 deg - No Ice		-13605.68	-23521.10	-1386.24	817.32	-19.76
Member Ice	31518.34					
Total Weight Ice	87192.96			68.90	39.98	
Wind 0 deg - Ice		-5.52	-12852.45	-695.64	40.54	-4.63
Wind 30 deg - Ice		6291.23	-10896.74	-581.82	-335.71	6.34
Wind 45 deg - Ice		8868.56	-8864.06	-460.73	-490.10	11.36
Wind 60 deg - Ice		10825.24	-6243.58	-304.34	-607.58	15.61
Wind 90 deg - Ice		12592.03	5.52	69.45	-712.36	20.70
Wind 120 deg - Ice		11138.83	6431.01	451.65	-622.95	20.24
Wind 135 deg - Ice		9002.14	8997.63	605.36	-496.93	17.91
Wind 150 deg - Ice		6300.80	10902.26	720.17	-336.67	14.36
Wind 180 deg - Ice		5.52	12496.72	816.33	39.43	4.63
Wind 210 deg - Ice		-6291.23	10896.74	719.62	415.68	-6.34
Wind 225 deg - Ice		-8868.56	8864.06	598.53	570.07	-11.36
Wind 240 deg - Ice		-11133.31	6421.44	450.69	702.37	-15.61
Wind 270 deg - Ice		-12592.03	-5.52	68.35	792.33	-20.70
Wind 300 deg - Ice		-10830.76	-6253.14	-305.29	688.10	-20.24
Wind 315 deg - Ice		-8876.37	-8871.87	-461.51	570.85	-17.91
Wind 330 deg - Ice		-6300.80	-10902.26	-582.37	416.63	-14.36
Total Weight	27451.72			10.78	8.18	
Wind 0 deg - Service		-6.85	-8765.81	-513.45	1.16	-1.63
Wind 30 deg - Service		4163.39	-7211.20	-425.67	-246.64	3.24
Wind 45 deg - Service		5840.19	-5834.60	-344.42	-346.86	5.43
Wind 60 deg - Service		7092.45	-4086.92	-240.84	-422.12	7.24
Wind 90 deg - Service		8338.63	6.85	3.04	-494.95	9.30
Wind 120 deg - Service		7601.68	4388.83	260.85	-447.25	8.87
Wind 135 deg - Service		6054.97	6049.38	360.09	-357.81	7.73
Wind 150 deg - Service		4175.25	7218.05	431.07	-247.83	6.06
Wind 180 deg - Service		6.85	8185.70	489.94	-0.21	1.63
Wind 210 deg - Service		-4163.39	7211.20	430.38	247.60	-3.24
Wind 225 deg - Service		-5840.19	5834.60	349.14	347.82	-5.43
Wind 240 deg - Service		-7594.84	4376.97	259.67	447.52	-7.24
Wind 270 deg - Service		-8338.63	-6.85	1.67	495.90	-9.30
Wind 300 deg - Service		-7099.30	-4098.78	-242.03	423.76	-8.87
Wind 315 deg - Service		-5849.87	-5844.28	-345.39	348.79	-7.73
Wind 330 deg - Service		-4175.25	-7218.05	-426.35	248.78	-6.06

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	100 - 80	Leg	Max Tension	19	12051.17	596.63	-89.13
			Max. Compression	24	-16809.01	49.41	7.69
			Max. Mx	28	229.45	2690.10	129.17
			Max. My	4	-1673.47	-64.38	3108.79
			Max. Vy	12	-7416.61	56.33	-90.95
			Max. Vx	4	2300.87	26.50	-203.08
		Diagonal	Max Tension	10	5428.98	0.00	0.00
			Max. Compression	26	-5480.94	0.00	0.00
			Max. Mx	44	774.64	241.28	-27.79
			Max. My	46	-1701.02	237.63	29.74
			Max. Vy	44	123.82	241.28	-27.79
			Max. Vx	46	-6.10	0.00	0.00
		Top Girt	Max Tension	13	470.33	0.00	0.00
			Max. Compression	28	-591.42	0.00	0.00
			Max. Mx	34	-191.16	-664.54	0.00
			Max. My	34	-195.17	0.00	17.58
			Max. Vy	34	177.12	0.00	0.00
			Max. Vx	34	-4.69	0.00	0.00
T2	80 - 60	Leg	Max Tension	19	32267.29	247.03	-44.90
			Max. Compression	24	-40823.03	641.50	61.80
			Max. Mx	12	-21840.14	683.32	-113.72
			Max. My	14	5089.60	-123.27	-593.38
			Max. Vy	12	-10240.05	646.91	-110.20
			Max. Vx	15	3431.47	-130.94	-593.31
		Diagonal	Max Tension	10	7455.99	0.00	0.00
			Max. Compression	10	-7537.93	0.00	0.00
			Max. Mx	43	1527.61	297.95	-34.78
			Max. My	47	-2435.05	292.33	36.04
			Max. Vy	43	142.11	297.95	-34.78
			Max. Vx	47	-6.84	0.00	0.00
T3	60 - 40	Leg	Max Tension	19	57290.64	-193.06	-27.43
			Max. Compression	24	-70804.50	1434.43	152.90
			Max. Mx	38	-3365.37	-1807.62	-67.49
			Max. My	14	10081.24	-278.92	-1068.49
			Max. Vy	12	-13546.43	1440.64	-185.72
			Max. Vx	15	4851.70	-295.69	-1068.34
		Diagonal	Max Tension	10	9923.42	0.00	0.00
			Max. Compression	10	-10030.78	0.00	0.00
			Max. Mx	43	2288.19	372.23	-44.04
			Max. My	47	-3001.57	361.30	46.07
			Max. Vy	43	168.24	372.23	-44.04
			Max. Vx	47	-8.04	0.00	0.00
T4	40 - 20	Leg	Max Tension	19	85736.87	-417.12	-12.28
			Max. Compression	24	-105686.69	2036.33	111.22
			Max. Mx	43	4977.40	-5538.89	-20.79
			Max. My	14	11527.66	-543.06	-1473.35
			Max. Vy	12	-16842.76	2038.99	-136.51
			Max. Vx	15	5753.30	-377.53	-651.68
		Diagonal	Max Tension	10	12194.43	0.00	0.00
			Max. Compression	10	-12331.64	0.00	0.00
			Max. Mx	43	1327.71	489.94	46.61
			Max. My	39	3321.06	413.74	-52.90
			Max. Vy	43	198.64	442.13	-50.99
			Max. Vx	39	8.64	0.00	0.00
T5	20 - 0	Leg	Max Tension	19	106514.21	-637.95	-8.96
			Max. Compression	24	-131360.80	0.00	-0.02
			Max. Mx	46	-69389.24	5838.41	-15.11
			Max. My	16	-9846.30	-161.68	-1647.32

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	38	-1163.83	-5526.49	-47.11
			Max. Vx	14	-352.08	-304.58	-1640.98
		Diagonal	Max Tension	10	13157.88	0.00	0.00
			Max. Compression	10	-13312.56	0.00	0.00
			Max. Mx	43	-839.81	699.77	-67.31
			Max. My	40	6595.11	375.41	-78.69
			Max. Vy	43	233.28	699.77	-67.31
			Max. Vx	40	11.84	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	24	140194.53	23264.74	-12380.69
	Max. H_x	24	140194.53	23264.74	-12380.69
	Max. H_z	5	-97858.44	-16138.10	11749.74
	Min. Vert	9	-112694.48	-20074.12	10549.93
	Min. H_x	9	-112694.48	-20074.12	10549.93
	Min. H_z	20	118325.74	17909.95	-12761.37
Leg B	Max. Vert	12	139677.97	-23387.65	-12210.01
	Max. H_x	29	-113598.97	20212.48	10406.04
	Max. H_z	33	-98808.63	16357.11	11477.43
	Min. Vert	29	-113598.97	20212.48	10406.04
	Min. H_x	12	139677.97	-23387.65	-12210.01
	Min. H_z	14	132741.99	-21391.92	-12761.95
Leg A	Max. Vert	2	138861.81	-209.26	26313.17
	Max. H_x	27	7942.75	3850.86	876.65
	Max. H_z	2	138861.81	-209.26	26313.17
	Min. Vert	19	-113694.02	193.80	-22678.43
	Min. H_x	10	10192.29	-3866.32	1119.82
	Min. H_z	19	-113694.02	193.80	-22678.43

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	27451.72	-0.00	0.00	10775.00	8176.65	-0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	32942.06	-35.70	-45703.55	-2676417.22	13382.25	-8506.04
0.9 Dead+1.6 Wind 0 deg - No Ice	24706.55	-35.70	-45703.55	-2679649.72	10929.25	-8506.04
1.2 Dead+1.6 Wind 30 deg - No Ice	32942.06	21707.25	-37598.06	-2218726.55	-1278635.52	16887.50
0.9 Dead+1.6 Wind 30 deg - No Ice	24706.55	21707.25	-37598.06	-2221959.05	-1281088.52	16887.50
1.2 Dead+1.6 Wind 45 deg - No Ice	32942.06	30449.83	-30420.68	-1795133.24	-1801166.36	28285.59
0.9 Dead+1.6 Wind 45 deg - No Ice	24706.55	30449.83	-30420.68	-1798365.74	-1803619.36	28285.59
1.2 Dead+1.6 Wind 60 deg - No Ice	32942.06	36978.93	-21308.57	-1255057.73	-2193547.71	37756.06

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
0.9 Dead+1.6 Wind 60 deg - No Ice	24706.55	36978.93	-21308.57	-1258290.23	-2196000.71	37756.06
1.2 Dead+1.6 Wind 90 deg - No Ice	32942.06	43476.34	35.70	16500.26	-2573266.91	48507.91
0.9 Dead+1.6 Wind 90 deg - No Ice	24706.55	43476.34	35.70	13267.76	-2575719.90	48507.91
1.2 Dead+1.6 Wind 120 deg - No Ice	32942.06	39633.99	22882.70	1360695.54	-2324586.42	46262.10
0.9 Dead+1.6 Wind 120 deg - No Ice	24706.55	39633.99	22882.70	1357463.04	-2327039.42	46262.10
1.2 Dead+1.6 Wind 135 deg - No Ice	32942.06	31569.68	31540.52	1878081.13	-1858254.26	40314.95
0.9 Dead+1.6 Wind 135 deg - No Ice	24706.55	31569.68	31540.52	1874848.63	-1860707.25	40314.95
1.2 Dead+1.6 Wind 150 deg - No Ice	32942.06	21769.09	37633.77	2248156.80	-1284819.40	31620.40
0.9 Dead+1.6 Wind 150 deg - No Ice	24706.55	21769.09	37633.77	2244924.30	-1287272.40	31620.40
1.2 Dead+1.6 Wind 180 deg - No Ice	32942.06	35.70	42678.97	2555089.33	6241.72	8506.04
0.9 Dead+1.6 Wind 180 deg - No Ice	24706.55	35.70	42678.97	2551856.83	3788.72	8506.04
1.2 Dead+1.6 Wind 210 deg - No Ice	32942.06	-21707.25	37598.06	2244586.54	1298259.49	-16887.50
0.9 Dead+1.6 Wind 210 deg - No Ice	24706.55	-21707.25	37598.06	2241354.04	1295806.50	-16887.50
1.2 Dead+1.6 Wind 225 deg - No Ice	32942.06	-30449.83	30420.68	1820993.23	1820790.34	-28285.59
0.9 Dead+1.6 Wind 225 deg - No Ice	24706.55	-30449.83	30420.68	1817760.74	1818337.34	-28285.59
1.2 Dead+1.6 Wind 240 deg - No Ice	32942.06	-39598.29	22820.86	1354511.66	2340640.13	-37756.06
0.9 Dead+1.6 Wind 240 deg - No Ice	24706.55	-39598.29	22820.86	1351279.16	2338187.13	-37756.06
1.2 Dead+1.6 Wind 270 deg - No Ice	32942.06	-43476.34	-35.70	9359.73	2592890.88	-48507.91
0.9 Dead+1.6 Wind 270 deg - No Ice	24706.55	-43476.34	-35.70	6127.23	2590437.88	-48507.91
1.2 Dead+1.6 Wind 300 deg - No Ice	32942.06	-37014.63	-21370.41	-1261241.61	2216741.95	-46262.10
0.9 Dead+1.6 Wind 300 deg - No Ice	24706.55	-37014.63	-21370.41	-1264474.11	2214288.95	-46262.10
1.2 Dead+1.6 Wind 315 deg - No Ice	32942.06	-30500.32	-30471.17	-1800182.36	1825839.45	-40314.95
0.9 Dead+1.6 Wind 315 deg - No Ice	24706.55	-30500.32	-30471.17	-1803414.86	1823386.46	-40314.95
1.2 Dead+1.6 Wind 330 deg - No Ice	32942.06	-21769.09	-37633.77	-2222296.81	1304443.37	-31620.40
0.9 Dead+1.6 Wind 330 deg - No Ice	24706.55	-21769.09	-37633.77	-2225529.31	1301990.38	-31620.40
1.2 Dead+1.0 Ice+1.0 Temp	92683.31	-0.00	0.00	71052.50	41620.06	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	92683.31	-5.52	-12852.45	-693486.80	42172.32	-4630.61
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	92683.31	6291.23	-10896.74	-579666.80	-334072.90	6339.43
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	92683.31	8868.56	-8864.06	-458579.97	-488463.33	11362.29
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	92683.31	10825.24	-6243.58	-302182.53	-605946.49	15610.83
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	92683.31	12592.03	5.52	71604.76	-710722.40	20699.31

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	92683.31	11138.83	6431.01	453800.42	-621318.79	20241.43
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	92683.31	9002.14	8997.63	607516.24	-495294.59	17910.96
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	92683.31	6300.80	10902.26	722324.06	-335029.44	14359.88
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	92683.31	5.52	12496.72	818479.10	41067.80	4630.61
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	92683.31	-6291.23	10896.74	721771.80	417313.02	-6339.43
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	92683.31	-8868.56	8864.06	600684.98	571703.45	-11362.29
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	92683.31	-11133.31	6421.44	452843.89	704006.65	-15610.83
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	92683.31	-12592.03	-5.52	70500.24	793962.52	-20699.31
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	92683.31	-10830.76	-6253.14	-303139.06	689738.86	-20241.43
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	92683.31	-8876.37	-8871.87	-459360.98	572484.46	-17910.96
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	92683.31	-6300.80	-10902.26	-580219.06	418269.56	-14359.88
Dead+Wind 0 deg - Service	27451.72	-6.85	-8765.81	-505033.88	8861.42	-1631.43
Dead+Wind 30 deg - Service	27451.72	4163.39	-7211.20	-417250.15	-238943.78	3238.97
Dead+Wind 45 deg - Service	27451.72	5840.19	-5834.60	-336006.21	-339163.66	5425.09
Dead+Wind 60 deg - Service	27451.72	7092.45	-4086.92	-232421.31	-414421.24	7241.50
Dead+Wind 90 deg - Service	27451.72	8338.63	6.85	11459.76	-487250.27	9303.67
Dead+Wind 120 deg - Service	27451.72	7601.68	4388.83	269272.46	-439554.08	8872.93
Dead+Wind 135 deg - Service	27451.72	6054.97	6049.38	368505.49	-350112.95	7732.29
Dead+Wind 150 deg - Service	27451.72	4175.25	7218.05	439484.91	-240129.83	6064.70
Dead+Wind 180 deg - Service	27451.72	6.85	8185.70	498353.66	7491.89	1631.43
Dead+Wind 210 deg - Service	27451.72	-4163.39	7211.20	438800.14	255297.09	-3238.97
Dead+Wind 225 deg - Service	27451.72	-5840.19	5834.60	357556.20	355516.97	-5425.09
Dead+Wind 240 deg - Service	27451.72	-7594.84	4376.97	268086.41	455222.62	-7241.50
Dead+Wind 270 deg - Service	27451.72	-8338.63	-6.85	10090.23	503603.58	-9303.67
Dead+Wind 300 deg - Service	27451.72	-7099.30	-4098.78	-233607.36	431459.32	-8872.93
Dead+Wind 315 deg - Service	27451.72	-5849.87	-5844.28	-336974.61	356485.37	-7732.29
Dead+Wind 330 deg - Service	27451.72	-4175.25	-7218.05	-417934.92	256483.14	-6064.70

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	0.00	-27451.72	0.00	0.00	27451.72	-0.00	0.000%
2	-35.70	-32942.06	-45703.55	35.70	32942.06	45703.55	0.000%
3	-35.70	-24706.55	-45703.55	35.70	24706.55	45703.55	0.000%
4	21707.25	-32942.06	-37598.06	-21707.25	32942.06	37598.06	0.000%
5	21707.25	-24706.55	-37598.06	-21707.25	24706.55	37598.06	0.000%
6	30449.83	-32942.06	-30420.68	-30449.83	32942.06	30420.68	0.000%
7	30449.83	-24706.55	-30420.68	-30449.83	24706.55	30420.68	0.000%
8	36978.92	-32942.06	-21308.57	-36978.93	32942.06	21308.57	0.000%
9	36978.92	-24706.55	-21308.57	-36978.93	24706.55	21308.57	0.000%
10	43476.34	-32942.06	35.70	-43476.34	32942.06	-35.70	0.000%
11	43476.34	-24706.55	35.70	-43476.34	24706.55	-35.70	0.000%
12	39633.99	-32942.06	22882.70	-39633.99	32942.06	-22882.70	0.000%
13	39633.99	-24706.55	22882.70	-39633.99	24706.55	-22882.70	0.000%
14	31569.68	-32942.06	31540.52	-31569.68	32942.06	-31540.52	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
15	31569.68	-24706.55	31540.52	-31569.68	24706.55	-31540.52	0.000%
16	21769.09	-32942.06	37633.77	-21769.09	32942.06	-37633.77	0.000%
17	21769.09	-24706.55	37633.77	-21769.09	24706.55	-37633.77	0.000%
18	35.70	-32942.06	42678.97	-35.70	32942.06	-42678.97	0.000%
19	35.70	-24706.55	42678.97	-35.70	24706.55	-42678.97	0.000%
20	-21707.25	-32942.06	37598.06	21707.25	32942.06	-37598.06	0.000%
21	-21707.25	-24706.55	37598.06	21707.25	24706.55	-37598.06	0.000%
22	-30449.83	-32942.06	30420.68	30449.83	32942.06	-30420.68	0.000%
23	-30449.83	-24706.55	30420.68	30449.83	24706.55	-30420.68	0.000%
24	-39598.29	-32942.06	22820.86	39598.29	32942.06	-22820.86	0.000%
25	-39598.29	-24706.55	22820.86	39598.29	24706.55	-22820.86	0.000%
26	-43476.34	-32942.06	-35.70	43476.34	32942.06	35.70	0.000%
27	-43476.34	-24706.55	-35.70	43476.34	24706.55	35.70	0.000%
28	-37014.63	-32942.06	-21370.41	37014.63	32942.06	21370.41	0.000%
29	-37014.63	-24706.55	-21370.41	37014.63	24706.55	21370.41	0.000%
30	-30500.32	-32942.06	-30471.17	30500.32	32942.06	30471.17	0.000%
31	-30500.32	-24706.55	-30471.17	30500.32	24706.55	30471.17	0.000%
32	-21769.09	-32942.06	-37633.77	21769.09	32942.06	37633.77	0.000%
33	-21769.09	-24706.55	-37633.77	21769.09	24706.55	37633.77	0.000%
34	0.00	-92683.31	0.00	0.00	92683.31	-0.00	0.000%
35	-5.52	-92683.31	-12852.45	5.52	92683.31	12852.45	0.000%
36	6291.23	-92683.31	-10896.74	-6291.23	92683.31	10896.74	0.000%
37	8868.56	-92683.31	-8864.06	-8868.56	92683.31	8864.06	0.000%
38	10825.24	-92683.31	-6243.58	-10825.24	92683.31	6243.58	0.000%
39	12592.03	-92683.31	5.52	-12592.03	92683.31	-5.52	0.000%
40	11138.83	-92683.31	6431.01	-11138.83	92683.31	-6431.01	0.000%
41	9002.14	-92683.31	8997.63	-9002.14	92683.31	-8997.63	0.000%
42	6300.80	-92683.31	10902.26	-6300.80	92683.31	-10902.26	0.000%
43	5.52	-92683.31	12496.72	-5.52	92683.31	-12496.72	0.000%
44	-6291.23	-92683.31	10896.74	6291.23	92683.31	-10896.74	0.000%
45	-8868.56	-92683.31	8864.06	8868.56	92683.31	-8864.06	0.000%
46	-11133.31	-92683.31	6421.44	11133.31	92683.31	-6421.44	0.000%
47	-12592.03	-92683.31	-5.52	12592.03	92683.31	5.52	0.000%
48	-10830.76	-92683.31	-6253.14	10830.76	92683.31	6253.14	0.000%
49	-8876.37	-92683.31	-8871.87	8876.37	92683.31	8871.87	0.000%
50	-6300.80	-92683.31	-10902.26	6300.80	92683.31	10902.26	0.000%
51	-6.85	-27451.72	-8765.81	6.85	27451.72	8765.81	0.000%
52	4163.39	-27451.72	-7211.20	-4163.39	27451.72	7211.20	0.000%
53	5840.19	-27451.72	-5834.60	-5840.19	27451.72	5834.60	0.000%
54	7092.45	-27451.72	-4086.92	-7092.45	27451.72	4086.92	0.000%
55	8338.63	-27451.72	6.85	-8338.63	27451.72	-6.85	0.000%
56	7601.68	-27451.72	4388.83	-7601.68	27451.72	-4388.83	0.000%
57	6054.97	-27451.72	6049.38	-6054.97	27451.72	-6049.38	0.000%
58	4175.25	-27451.72	7218.05	-4175.25	27451.72	-7218.05	0.000%
59	6.85	-27451.72	8185.70	-6.85	27451.72	-8185.70	0.000%
60	-4163.39	-27451.72	7211.20	4163.39	27451.72	-7211.20	0.000%
61	-5840.19	-27451.72	5834.60	5840.19	27451.72	-5834.60	0.000%
62	-7594.84	-27451.72	4376.97	7594.84	27451.72	-4376.97	0.000%
63	-8338.63	-27451.72	-6.85	8338.63	27451.72	6.85	0.000%
64	-7099.30	-27451.72	-4098.78	7099.30	27451.72	4098.78	0.000%
65	-5849.87	-27451.72	-5844.28	5849.87	27451.72	5844.28	0.000%
66	-4175.25	-27451.72	-7218.05	4175.25	27451.72	7218.05	0.000%

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	0.299	62	0.0170	0.0058
T2	80 - 60	0.220	62	0.0162	0.0049
T3	60 - 40	0.143	62	0.0135	0.0038
T4	40 - 20	0.076	62	0.0095	0.0025
T5	20 - 0	0.028	62	0.0054	0.0013

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	22' x 3" OD Omni w/ 36" Mount Pipe	62	0.299	0.0170	0.0058	Inf
99.00	Reflector Dish	62	0.295	0.0170	0.0057	Inf
95.00	2' Dish	62	0.279	0.0169	0.0056	Inf
94.00	6' Grid Dish	62	0.275	0.0169	0.0055	Inf
90.00	4 FT Dish	62	0.259	0.0168	0.0053	Inf
86.00	9' Dipole AF	62	0.244	0.0166	0.0052	Inf
85.00	12' Dipole IK	62	0.240	0.0165	0.0051	Inf
83.00	8' x 2.5" OD Omni - Ak	62	0.232	0.0164	0.0050	Inf
80.00	Side Arm Mount [SO 311-1]	62	0.220	0.0162	0.0049	Inf
70.00	12' Dipole IK	62	0.181	0.0151	0.0044	888019
60.00	Side Arm Mount [SO 311-1]	62	0.143	0.0135	0.0038	455536
58.00	20' x 3.5" OD Omni w/ 36" Mount Pipe	62	0.135	0.0131	0.0037	415571
50.00	DB806M-Y	62	0.107	0.0116	0.0032	309733
30.00	DB803M-Y	62	0.049	0.0076	0.0019	218435

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	1.530	24	0.0862	0.0301
T2	80 - 60	1.129	24	0.0823	0.0256
T3	60 - 40	0.734	24	0.0687	0.0201
T4	40 - 20	0.392	24	0.0486	0.0129
T5	20 - 0	0.147	13	0.0276	0.0066

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	22' x 3" OD Omni w/ 36" Mount Pipe	24	1.530	0.0862	0.0301	Inf
99.00	Reflector Dish	24	1.510	0.0861	0.0299	Inf
95.00	2' Dish	24	1.430	0.0857	0.0290	Inf
94.00	6' Grid Dish	24	1.410	0.0856	0.0288	Inf

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
90.00	4 FT Dish	24	1.329	0.0850	0.0279	Inf
86.00	9' Dipole AF	24	1.249	0.0842	0.0270	Inf
85.00	12' Dipole IK	24	1.229	0.0839	0.0267	Inf
83.00	8' x 2.5" OD Omni - Ak	24	1.189	0.0834	0.0263	954608
80.00	Side Arm Mount [SO 311-1]	24	1.129	0.0823	0.0256	941353
70.00	12' Dipole IK	24	0.928	0.0768	0.0230	188442
60.00	Side Arm Mount [SO 311-1]	24	0.734	0.0687	0.0201	91444
58.00	20' x 3.5" OD Omni w/ 36" Mount Pipe	24	0.697	0.0669	0.0194	83061
50.00	DB806M-Y	24	0.553	0.0590	0.0165	61123
30.00	DB803M-Y	24	0.255	0.0386	0.0097	42922

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load per Bolt lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	100	Leg	A325N	0.8750	5	123.68	40589.10	0.003 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	5428.98	12615.00	0.430 ✔	1	Member Bearing
		Top Girt	A325N	0.2500	1	591.42	1988.04	0.297 ✔	1	Bolt Shear
T2	80	Leg	A325N	1.0000	5	2403.70	53014.40	0.045 ✔	1	Bolt Tension
		Diagonal	A325N	0.7500	1	7455.99	12615.00	0.591 ✔	1	Member Bearing
T3	60	Leg	A325N	1.2500	5	6453.23	82835.00	0.078 ✔	1	Bolt Tension
		Diagonal	A325N	0.8750	1	9923.42	14790.00	0.671 ✔	1	Member Bearing
T4	40	Leg	A325N	1.2500	5	11445.90	82835.00	0.138 ✔	1	Bolt Tension
		Diagonal	A325N	0.8750	1	12194.40	22185.00	0.550 ✔	1	Member Bearing
T5	20	Leg	A325N	1.2500	5	18460.40	82835.00	0.223 ✔	1	Bolt Tension
		Diagonal	A325N	0.8750	1	13157.90	18487.50	0.712 ✔	1	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	HSS8.625x.188	20.03	9.93	39.9 K=1.00	4.6196	-16809.00	158375.00	0.106 [1] ✔
T2	80 - 60	HSS8.625x.25	20.03	9.93	40.1 K=1.00	6.1429	-40823.00	210314.00	0.194 [1] ✔
T3	60 - 40	HSS8.625x.322	20.03	9.93	40.5	7.8461	-70804.50	268213.00	0.264 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T4	40 - 20	P10x.375	20.02	9.93	K=1.00 35.0	11.3392	-105687.00	397584.00	0.266 [1] ✔
T5	20 - 0	P10x.375	20.03	10.02	K=1.00 35.3	11.3392	-131361.00	397049.00	0.331 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L3 1/2x3x1/4	19.14	9.42	179.1 K=1.00	1.5600	-5480.94	10989.20	0.499 [1] ✔
T2	80 - 60	L3 1/2x3 1/2x1/4	20.73	10.22	176.6 K=1.00	1.6900	-7537.93	12236.60	0.616 [1] ✔
T3	60 - 40	L4x4x1/4	22.36	11.03	166.5 K=1.00	1.9400	-10030.80	15805.10	0.635 [1] ✔
T4	40 - 20	L4x4x3/8	23.90	11.72	178.5 K=1.00	2.8600	-12331.60	20282.80	0.608 [1] ✔
T5	20 - 0	L5x5x5/16	25.69	12.67	152.9 K=1.00	3.0300	-13312.60	29275.20	0.455 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L3 1/2x3x1/4	15.01	14.29	271.7 K=1.00	1.5600	-591.42	4772.70	0.124 [1] ✔
		KL/R > 200 (C) - 6							

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	HSS8.625x.188	20.03	9.93	39.9	4.6196	12051.20	174622.00	0.069 [1] ✔
T2	80 - 60	HSS8.625x.25	20.03	9.93	40.1	6.1429	32267.30	232200.00	0.139 [1] ✔
T3	60 - 40	HSS8.625x.322	20.03	9.93	40.5	7.8461	57290.60	296584.00	0.193 [1] ✔
T4	40 - 20	P10x.375	20.02	9.93	35.0	11.3392	85736.90	428621.00	0.200 [1] ✔
T5	20 - 0	P10x.375	20.03	10.02	35.3	11.3392	106514.00	428621.00	0.249 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L3 1/2x3x1/4	19.14	9.42	123.8	1.0059	5428.98	43758.30	0.124 [1] ✔
T2	80 - 60	L3 1/2x3 1/2x1/4	20.73	10.22	112.5	1.1034	7455.99	47999.50	0.155 [1] ✔
T3	60 - 40	L4x4x1/4	22.36	11.03	105.9	1.2675	9923.42	55136.30	0.180 [1] ✔
T4	40 - 20	L4x4x3/8	23.90	11.72	114.3	1.8637	12194.40	81073.10	0.150 [1] ✔
T5	20 - 0	L5x5x5/16	25.69	12.67	96.8	2.0381	13157.90	88658.40	0.148 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
T1	100 - 80	L3 1/2x3x1/4	15.01	14.29	187.8	1.0997	470.33	47836.40	0.010 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
T1	100 - 80	Leg	HSS8.625x.188	1	-16809.00	158375.00	10.6	Pass
		Leg	HSS8.625x.188	2	-16804.80	158375.00	10.6	Pass
		Leg	HSS8.625x.188	3	-16469.80	158375.00	10.4	Pass
T2	80 - 60	Leg	HSS8.625x.25	19	-40823.00	210314.00	19.4	Pass
		Leg	HSS8.625x.25	20	-40678.30	210314.00	19.3	Pass
		Leg	HSS8.625x.25	21	-40224.90	210314.00	19.1	Pass
T3	60 - 40	Leg	HSS8.625x.322	34	-70804.50	268213.00	26.4	Pass
		Leg	HSS8.625x.322	35	-70535.20	268213.00	26.3	Pass
		Leg	HSS8.625x.322	36	-69885.50	268213.00	26.1	Pass
T4	40 - 20	Leg	P10x.375	49	-105687.00	397584.00	26.6	Pass
		Leg	P10x.375	50	-105219.00	397584.00	26.5	Pass
		Leg	P10x.375	51	-104462.00	397584.00	26.3	Pass
T5	20 - 0	Leg	P10x.375	64	-131361.00	397049.00	33.1	Pass
		Leg	P10x.375	65	-130819.00	397049.00	32.9	Pass
		Leg	P10x.375	66	-130002.00	397049.00	32.7	Pass
T1	100 - 80	Diagonal	L3 1/2x3x1/4	7	-5480.94	10989.20	49.9	Pass
		Diagonal	L3 1/2x3x1/4	8	-5480.52	10989.20	49.9	Pass
		Diagonal	L3 1/2x3x1/4	9	-5022.04	10989.20	45.7	Pass
		Diagonal	L3 1/2x3x1/4	10	-5035.45	10989.20	45.8	Pass
		Diagonal	L3 1/2x3x1/4	11	-4749.35	10989.20	43.2	Pass
		Diagonal	L3 1/2x3x1/4	12	-4739.42	10989.20	43.1	Pass
		Diagonal	L3 1/2x3x1/4	13	-3036.88	11936.50	25.4	Pass
		Diagonal	L3 1/2x3x1/4	14	-3012.31	11936.50	25.2	Pass
		Diagonal	L3 1/2x3x1/4	15	-2502.68	11936.50	21.0	Pass
		Diagonal	L3 1/2x3x1/4	16	-2750.12	11936.50	23.0	Pass
		Diagonal	L3 1/2x3x1/4	17	-2654.55	11936.50	22.2	Pass
		Diagonal	L3 1/2x3x1/4	18	-2385.66	11936.50	20.0	Pass
T2	80 - 60	Diagonal	L3 1/2x3 1/2x1/4	22	-7529.16	12236.60	61.5	Pass
		Diagonal	L3 1/2x3 1/2x1/4	23	-7537.93	12236.60	61.6	Pass
		Diagonal	L3 1/2x3 1/2x1/4	24	-6639.07	12236.60	54.3	Pass
		Diagonal	L3 1/2x3 1/2x1/4	25	-6649.21	12236.60	54.3	Pass
		Diagonal	L3 1/2x3 1/2x1/4	26	-6716.09	12236.60	54.9	Pass
		Diagonal	L3 1/2x3 1/2x1/4	27	-6697.18	12236.60	54.7	Pass
		Diagonal	L3 1/2x3 1/2x1/4	28	-6445.02	13236.80	48.7 51.0 (b)	Pass
		Diagonal	L3 1/2x3 1/2x1/4	29	-6450.77	13236.80	48.7 51.0 (b)	Pass
		Diagonal	L3 1/2x3 1/2x1/4	30	-5791.88	13236.80	43.8 46.0 (b)	Pass
		Diagonal	L3 1/2x3 1/2x1/4	31	-5800.66	13236.80	43.8 45.9 (b)	Pass
		Diagonal	L3 1/2x3 1/2x1/4	32	-5704.18	13236.80	43.1 45.0 (b)	Pass
		Diagonal	L3 1/2x3 1/2x1/4	33	-5689.64	13236.80	43.0 45.2 (b)	Pass
T3	60 - 40	Diagonal	L4x4x1/4	37	-10015.60	15805.10	63.4 67.1 (b)	Pass
		Diagonal	L4x4x1/4	38	-10030.80	15805.10	63.5 67.0 (b)	Pass
		Diagonal	L4x4x1/4	39	-8599.82	15805.10	54.4 57.6 (b)	Pass
		Diagonal	L4x4x1/4	40	-8614.07	15805.10	54.5 57.5 (b)	Pass
		Diagonal	L4x4x1/4	41	-8803.84	15805.10	55.7 58.6 (b)	Pass
		Diagonal	L4x4x1/4	42	-8774.39	15805.10	55.5 58.8 (b)	Pass
		Diagonal	L4x4x1/4	43	-8899.50	17026.40	52.3 60.1 (b)	Pass
		Diagonal	L4x4x1/4	44	-8908.61	17026.40	52.3 60.1 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
		Diagonal	L4x4x1/4	45	-7790.41	17026.40	45.8 52.7 (b)	Pass
		Diagonal	L4x4x1/4	46	-7804.43	17026.40	45.8 52.6 (b)	Pass
		Diagonal	L4x4x1/4	47	-7846.30	17026.40	46.1 52.8 (b)	Pass
		Diagonal	L4x4x1/4	48	-7823.17	17026.40	45.9 53.0 (b)	Pass
T4	40 - 20	Diagonal	L4x4x3/8	52	-12309.80	20282.80	60.7	Pass
		Diagonal	L4x4x3/8	53	-12331.60	20282.80	60.8	Pass
		Diagonal	L4x4x3/8	54	-10434.60	20282.80	51.4	Pass
		Diagonal	L4x4x3/8	55	-10448.30	20282.80	51.5	Pass
		Diagonal	L4x4x3/8	56	-10792.00	20282.80	53.2	Pass
		Diagonal	L4x4x3/8	57	-10756.40	20282.80	53.0	Pass
		Diagonal	L4x4x3/8	58	-11405.40	21638.50	52.7	Pass
		Diagonal	L4x4x3/8	59	-11421.30	21638.50	52.8	Pass
		Diagonal	L4x4x3/8	60	-9745.25	21638.50	45.0	Pass
		Diagonal	L4x4x3/8	61	-9760.31	21638.50	45.1	Pass
		Diagonal	L4x4x3/8	62	-9997.76	21638.50	46.2	Pass
		Diagonal	L4x4x3/8	63	-9966.77	21638.50	46.1	Pass
T5	20 - 0	Diagonal	L5x5x5/16	67	-13283.20	29275.20	45.4 71.2 (b)	Pass
		Diagonal	L5x5x5/16	68	-13312.60	29275.20	45.5 71.0 (b)	Pass
		Diagonal	L5x5x5/16	69	-11232.30	29275.20	38.4 60.1 (b)	Pass
		Diagonal	L5x5x5/16	70	-11249.00	29275.20	38.4 60.0 (b)	Pass
		Diagonal	L5x5x5/16	71	-11662.60	29275.20	39.8 61.9 (b)	Pass
		Diagonal	L5x5x5/16	72	-11585.60	29275.20	39.6 62.1 (b)	Pass
		Diagonal	L5x5x5/16	73	-12562.90	31508.60	39.9 67.8 (b)	Pass
		Diagonal	L5x5x5/16	74	-12589.90	31508.60	40.0 67.7 (b)	Pass
		Diagonal	L5x5x5/16	75	-10559.40	31508.60	33.5 56.9 (b)	Pass
		Diagonal	L5x5x5/16	76	-10578.80	31508.60	33.6 56.8 (b)	Pass
		Diagonal	L5x5x5/16	77	-10948.20	31508.60	34.7 58.7 (b)	Pass
		Diagonal	L5x5x5/16	78	-10901.80	31508.60	34.6 58.9 (b)	Pass
T1	100 - 80	Top Girt	L3 1/2x3x1/4	4	-581.50	4772.70	12.2 29.3 (b)	Pass
		Top Girt	L3 1/2x3x1/4	5	-579.94	4772.70	12.2 29.2 (b)	Pass
		Top Girt	L3 1/2x3x1/4	6	-591.42	4772.70	12.4 29.7 (b)	Pass
							Summary	
							Leg (T5) 33.1	Pass
							Diagonal (T5) 71.2	Pass
							Top Girt (T1) 29.7	Pass
							Bolt Checks 71.2	Pass
							RATING = 71.2	**Pass**

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ANCHOR BOLT ANALYSIS

ANCHOR BOLT ANALYSIS

Input Data

Tower Reactions:

Uplift:	Uplift := 113.694kips	*user input*
Shear:	Shear := 26.354kips	*user input*
Compression:	Compression := 140.195kips	*user input*

Anchor Bolt Data:

Use ASTM A36 (actual material strength unknown therefore assume min design values)

Number of Anchor Bolts = N	N := 6	*user input*	
Bolt Ultimate Strength:	$F_u := 58 \cdot ksi$	*user input*	
Bolt Yield Strength:	Fy := 36·ksi	*user input*	
Bolt Modulus:	E := 29000ksi	*user input*	
Thickness of Anchor Bolts	D := 1.25in	*user input*	
Threads per Inch:	n := 7	*user input*	
Coefficient of Friction:	$\mu := 0.55$	*user input*	(for baseplate with grout ASCE 10-15)
Length from top of pier to bottom of leveling nut:	$L_{ar} := 0in$	*user input*	
Bolt Modulus:	E := 29000·ksi	*user input*	

Anchor Bolt Section Properties:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4}\cdot D^2 \qquad A_g = 1.23\cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\cdot in}{n}\right)^2 \qquad A_n = 0.97\cdot in^2$$

Net Diameter:

$$D_n := D - \frac{0.9743 in}{n} \qquad D_n = 1.11\cdot in$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \qquad r = 0.28\cdot in$$

Plastic Section Modulus of Bolt:

$$Z_x := \frac{D_n^3}{6} \qquad Z_x = 0.23\cdot in^3$$

Forces:

Tension Force:

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

$T_u = 18.95\cdot kip$

$T_{ub} := T_u$

Shear Force:

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

$V_u = 4.39\cdot kip$ $\qquad V_{ub} := V_u$

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

$\phi_f := 0.9$

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

$\phi_b := 0.80$

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

$\phi_t := 0.75$

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

$\phi_v := 0.75$

ANSI/TIA-222-G 4.7.1 Flexural Members:

Nominal Flexure Strength, Mn:

$M_n := Fy \cdot Z_x$

$M_n = 0.69 \cdot ft \cdot kip$

$\phi_f \cdot M_n = 0.62 \cdot ft \cdot kip$

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

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

$M_u = 0 \cdot ft \cdot kip$

Flexure Check:

$FlexureCheck := if(M_u \le \phi_f \cdot M_n, "OK", "NO GOOD")$

FlexureCheck = "OK"

$\frac{M_u}{\phi_f \cdot M_n} = 0 \cdot \%$

ANSI/TIA-222-G 4.9.6.1 Tensile Strength:

Design Tensile Strength, Rnt:

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

$R_{nt} = 56.21 \cdot ft \cdot kip$

$\phi_t \cdot R_{nt} = 42.16 \cdot ft \cdot kip$

Tension Check:

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

TensionCheck = "OK"

$\frac{T_u}{\phi_t \cdot R_{nt}} = 44.95 \cdot \%$

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

Design Shear Strength, Rnv:

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

$R_{nv} = 32.03 \cdot ft \cdot kip$

$\phi_v \cdot R_{nv} = 24.02 \cdot ft \cdot kip$

Shear Check:

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

ShearCheck = "OK"

$\frac{V_u}{\phi_v \cdot R_{nv}} = 18.28 \cdot \%$

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

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

$$\left[\frac{V_{ub}}{(\phi_v \cdot R_{nv})}\right]^2 + \left[\frac{T_{ub}}{(\phi_t \cdot R_{nt})}\right]^2 = 0.24$$

Combined Shear and Tension Check:

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

ShearAndTensionCheck = "OK"

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

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

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

$$\frac{\left[T_u + \left(\frac{V_u}{\eta}\right)\right]}{\phi_b \cdot F_u \cdot A_n} = 0.599$$

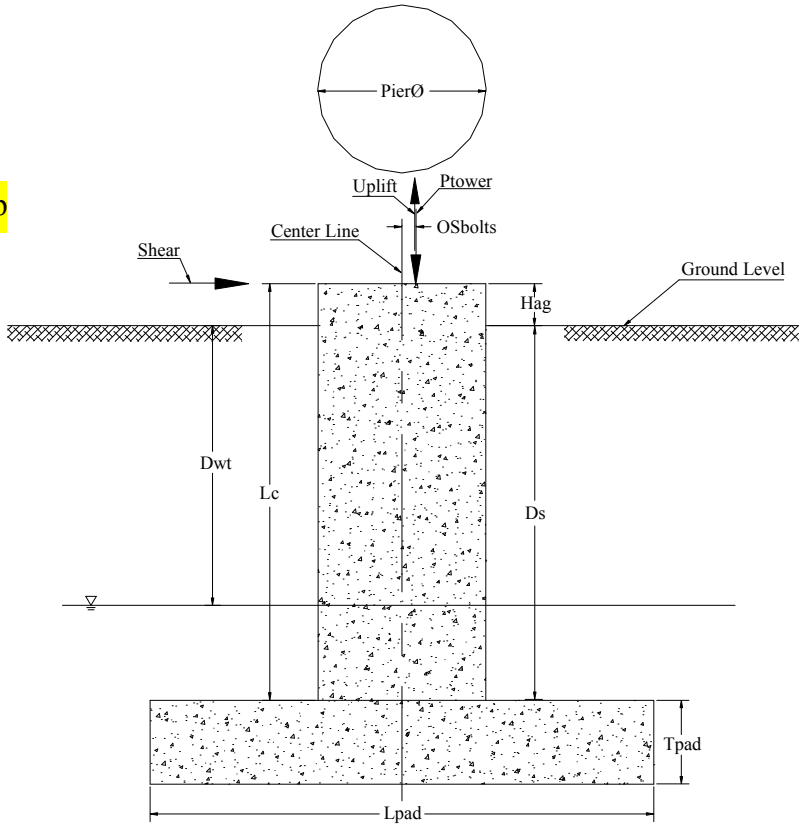
Capacity Check:

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

CapacityCheck = "OK"

FOUNDATION ANALYSIS

DEFINE VARIABLES



Max Compressive Force of Tower: $f'_c := 3 \cdot ksi$

$f_y := 60 \cdot ksi$

$P_{Tower} := 140.2 \cdot kip$

Max Uplift Force of Tower: $Uplift := 113.7 \cdot kip$

Max Shear at Base of Tower: $Shear := 26.4 \cdot kip$

Diameter of Pier: $Pier\phi := 2.6 \cdot ft$

Length of Pier: $L_c := 8 \cdot ft$

Height of Pier Above Grade: $H_{ag} := 1.0 \cdot ft$

Length of Pad: $L_{Pad} := 9.3333 \cdot ft$

Thickness of Pad: $T_{Pad} := 2.0 \cdot ft$

Distance to Water Table: $D_{wt} := 5 \cdot ft$

Eccentricity of Anchor Bolts from Center Line of Pier: $OS_{bolts} := 9 \cdot in$

Diameter of Reinforcing Bars in Pad: $d_{bar} := 1.00 \cdot in$

Soil Internal Friction Angle: $\phi := 30 \cdot deg$

Ultimate Soil Pressure: $q_u := 8.0 \cdot ksf$

$\gamma_s := 110 \cdot \frac{lb}{ft^3}$ $\gamma_c := 150 \cdot \frac{lb}{ft^3}$ $\gamma_w := 62.4 \cdot \frac{lb}{ft^3}$

NOTE: Pressure is assumed and obtained from CT State Building Code Table 1806.2 (2018) (allowable) and apply Factor of Safety increase (TIA-222-G Section 9.4)

Active Pressure of Soil Acting along Length of Pier: $K_a := \frac{1 - \sin(\phi)}{1 + \sin(\phi)}$ $P_{Active} := \frac{1}{2} \cdot (L_c + T_{Pad})^2 \cdot Pier\phi \cdot \gamma_s \cdot K_a$ $P_{Active} = 4.77 \cdot kip$

Passive Pressure of Soil Acting along Length of Pier: $K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)}$ $P_{Passive} := \frac{1}{2} \cdot (L_c + T_{Pad})^2 \cdot Pier\phi \cdot \gamma_s \cdot K_p$ $P_{Passive} = 42.9 \cdot kip$

Distance from Grade to Bottom of Pier: $D_s := L_c - H_{ag}$ $D_s = 7\,ft$

Area and Volume of Pier: $A_c := \frac{\pi \cdot Pier\phi^2}{4}$ $V_c := A_c \cdot L_c$ $V_c = 42.47\,ft^3$

Area and Volume of Pad: $A_p := L_{Pad}^2$ $V_p := T_{Pad} \cdot A_p$ $V_p = 174.22\,ft^3$

ULTIMATE SOIL PRESSURE

$D_{wtp} := if\left[\left(D_s + T_{Pad}\right) > D_{wt}, T_{Pad}, 0\cdot ft\right]$ $D_{wtp} = 2\,ft$

$W_p := \left(V_p\cdot\gamma_c\right) - D_{wtp}\cdot A_p\cdot\gamma_w$ $W_p = 15.26\cdot kip$

$D_{wtc} := if\left[D_s < D_{wt}, 0\cdot ft, \left(D_s - D_{wt}\right)\right]$ $D_{wtc} = 2\,ft$

$W_c := \left(V_c\cdot\gamma_c\right) - D_{wtc}\cdot A_c\cdot\gamma_w$ $W_c = 5.71\cdot kip$

$W_s := \left[\left(D_s\right)\cdot\left(A_p - A_c\right)\cdot\gamma_s\right]$ $W_s = 62.99\cdot kip$

$P_{Total} := W_p + W_c + W_s + P_{Tower}$ $P_{Total} = 224.16\cdot kip$

$q_{gr} := \frac{P_{Total}}{A_p}$ $q_{gr} = 2.57\cdot ksf$

$q_n := q_{gr} - \left(D_s + T_{Pad}\right)\cdot\gamma_s$ $q_n = 1.58\cdot ksf$

$SoilPressure := if\left(q_n < q_u\cdot 0.60, \text{"Okay"}, \text{"No Good"}\right)$

ANSI/TIA-222-G Reduction Factor
(Section 9.4.1(c)) (0.60 - Bearing)

$SoilPressure = \text{"Okay"}$

PUNCHING SHEAR

Critical section is located at a distance d/2 from the face of Pier

$$p_u := \left(\frac{P_{Tower} + V_c\cdot\gamma_c}{L_{Pad}^{\,2}}\right) + \left[\frac{Shear\cdot\left(L_c + T_{Pad}\right) + P_{Tower}\cdot OS_{bolts} + \left(P_{Active} - P_{Passive}\right)\cdot\frac{L_c + T_{Pad}}{3}}{\frac{1}{6}\cdot L_{Pad}^{\,3}}\right]$$

$p_u = 3.47\cdot ksf$

$d := T_{Pad} - \left(3\cdot in + d_{bar}\right)$ $d = 1.67\,ft$

$b_o := (Pier\phi + d)\cdot\pi$ $b_o = 13.4\,ft$

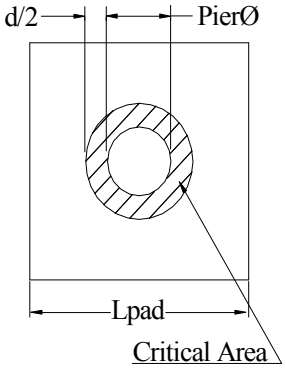
$$Aout_{bo} := L_{Pad}^{\,2} - \frac{\pi\cdot(Pier\phi + d)^2}{4}$$

$Aout_{bo} = 72.81\,ft^2$

$V_u := Aout_{bo}\cdot p_u$ $V_u = 252.57\cdot kip$

$$\phi V_c := 0.75\cdot 4\cdot\sqrt{f'_c\cdot\frac{lb}{in^2}}\cdot b_o\cdot d \quad \phi V_c = 528.61\cdot kip$$

$PunchingShear := if\left(V_u < \phi V_c, \text{"Okay"}, \text{"No Good "}\right)$ $PunchingShear = \text{"Okay"}$

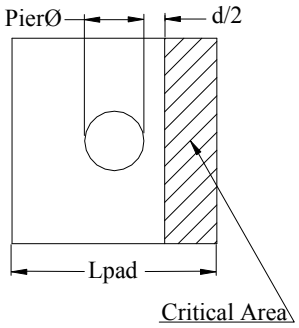


BEAM SHEAR

Critical section is located at a distance d/2 from the face of the Pier

$V_u := p_u \cdot L_{Pad} \cdot \left(\frac{L_{Pad} - Pier\phi}{2} - \frac{d}{2} \right)$ $V_u = 82.02 \cdot kip$

$\phi V_c := 0.75 \cdot 2 \cdot \sqrt{f'_c \cdot \frac{lb}{in^2}} \cdot L_{Pad} \cdot d$ $\phi V_c = 184.03 \cdot kip$



$BeamShear := if\left(V_u < \phi V_c, "Okay", "No\ Good"\right)$

$BeamShear = "Okay"$

ACI 2011 Reduction Factor (0.75) for Beam Shear and Punching Shear - Permissible by TIA-222-G Standard Section 9.4.2.

BENDING

Critical section extends across width of footing at the face of Pier

$A_{bar} := 0.79 \cdot in^2$ $NoOfBar := 20$

$As_{provided} := NoOfBar \cdot A_{bar}$ $As_{provided} = 15.8 \cdot in^2$

$M_{Req} := p_u \cdot L_{Pad} \cdot \left(\frac{L_{Pad} - Pier\phi}{2} \right)^2 \cdot \frac{1}{2}$

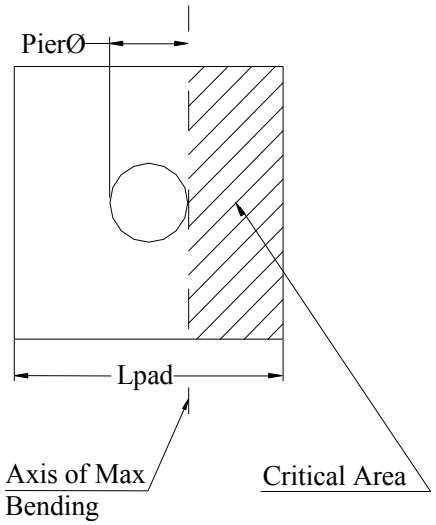
$M_{Req} = 183.48 \cdot kip \cdot ft$

$a := \frac{As_{provided} \cdot f_y}{0.85 \cdot f'_c \cdot L_{Pad}}$

$a = 3.32 \cdot in$

$M_{Avail} := 0.9 \cdot As_{provided} \cdot f_y \cdot \left(d - \frac{a}{2} \right)$

$M_{Avail} = 1304 \cdot kip \cdot ft$



$Bending := if\left(M_{Avail} > M_{Req}, "Okay", "No\ Good"\right)$

$Bending = "Okay"$

ACI 2011 Reduction Factor (0.75) for Concrete Bending Moment) - Permissible by TIA-222-G Standard Section 9.4.2.

UPLIFT

$$Soil_1 := \left[\left(D_s\right)\cdot\left(L_{Pad}{}^2 - A_c\right)\cdot\gamma_s\right]$$

$$Soil_2 := 4\cdot\left[\left(D_s + T_{Pad}\right)^2\cdot L_{Pad}\cdot\frac{\tan(\phi)}{2}\right]\cdot\gamma_s$$

$$Soil_3 := 4\cdot\left[\left(D_s + T_{Pad}\right)^3\cdot\frac{\tan(\phi)^2}{3}\right]\cdot\gamma_s$$

$$WT_{soil} := Soil_1 + Soil_2 + Soil_3 \qquad WT_{soil} = 194.65\cdot kip$$

$$WT_{conc} := W_p + W_c \qquad WT_{conc} = 20.97\cdot kip$$

$$Uplift_{Res} := \left(WT_{soil} + WT_{conc}\right)\cdot 0.75 \qquad Uplift_{Res} = 161.72\cdot kip$$

ANSI/TIA-222-G Reduction Factor (0.75) (Section 9.4.1(c))

$$UpLiftCapacity_{Ult} := \frac{Uplift}{Uplift_{Res}} \qquad UpLiftCapacity_{Ult} = 0.703$$

$$UpliftCheck := if\left(Uplift < Uplift_{Res}, "Okay", "No Good"\right)$$

$UpliftCheck = "Okay"$

CHECK OVERTURNING MOMENT - FACTORED LOAD CONDITIONS

$$OTM := Shear\cdot\left(L_c + T_{Pad}\right) + Uplift\cdot\left(\frac{L_{Pad}}{2} - OS_{bolts}\right) + P_{Active}\cdot\frac{L_c + T_{Pad}}{3} \qquad OTM = 725.21\cdot kip\cdot ft$$

$$RM := P_{Tower}\cdot\left(\frac{L_{Pad}}{2} - OS_{bolts}\right) + \left(WT_{conc} + Soil_1\right)\cdot\frac{L_{Pad}}{2} + P_{Passive}\cdot\frac{L_c + T_{Pad}}{3} \qquad RM = 1.08\times 10^3\cdot kip\cdot ft$$

$$Foundation_{OT} := \frac{OTM}{RM\cdot 0.75} \qquad Foundation_{OT} = 0.89$$

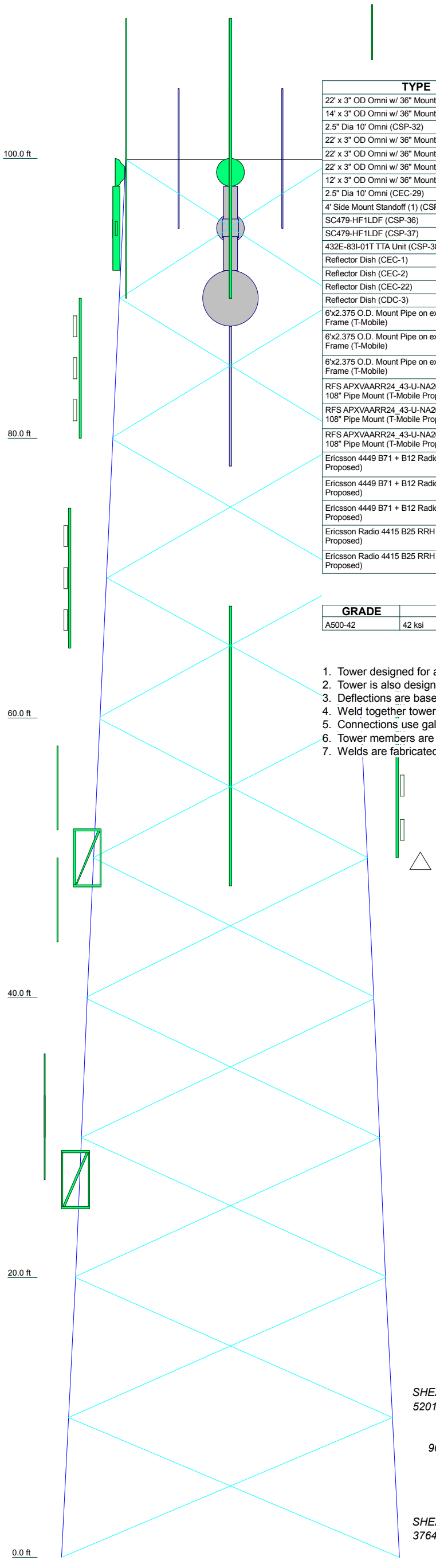
ANSI/TIA-222-G Reduction Factor (0.75) (Section 9.4.1(c))

$$OTMCheck := if\left(Foundation_{OT} < 1.0, "Okay", "No Good"\right)$$

$OTMCheck = "Okay"$

ANALYSIS UNDER TIA-222-F DESIGN CRITERIA (DESPP / CSP)

Section	T1	T2	T3	T4	T5
Legs	HSS8.625x.188	HSS8.625x.25	HSS8.625x.322	P10x.375	
Leg Grade	A500-42				
Diagonals	L3 1/2x3x1/4	L3 1/2x3 1/2x1/4	L4x4x1/4	L4x4x3/8	L5x5x5/16
Diagonal Grade	A36				
Top Girts	N.A.				
Face Width (ft) 24.1667	15	16.8333	18.6667	20.5	22.1667
# Panels @ (ft)	8 @ 9.91667				2 @ 10
Weight (lb) 19831.7	2497.2	2792.2	3510.4	5318.7	5713.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION
22' x 3" OD Omni w/ 36" Mount Pipe (CEC-16)	100
14' x 3" OD Omni w/ 36" Mount Pipe (CEC-10)	100
2.5" Dia 10' Omni (CSP-32)	100
22' x 3" OD Omni w/ 36" Mount Pipe (CEC-6)	100
22' x 3" OD Omni w/ 36" Mount Pipe (CEC)	100
22' x 3" OD Omni w/ 36" Mount Pipe (CSP-12)	100
12' x 3" OD Omni w/ 36" Mount Pipe (CSP-7)	100
2.5" Dia 10' Omni (CEC-29)	100
4' Side Mount Standoff (1) (CSP-Troop K)	100
SC479-HF1LDF (CSP-36)	100
SC479-HF1LDF (CSP-37)	100
432E-83I-01T TTA Unit (CSP-38)	100
Reflector Dish (CEC-1)	99
Reflector Dish (CEC-2)	99
Reflector Dish (CEC-22)	99
Reflector Dish (CDC-3)	99
6'x2.375 O.D. Mount Pipe on existing Horizontal Frame (T-Mobile)	95
6'x2.375 O.D. Mount Pipe on existing Horizontal Frame (T-Mobile)	95
6'x2.375 O.D. Mount Pipe on existing Horizontal Frame (T-Mobile)	95
RFS APXVAARR24_43-U-NA20 Panel Antenna w/ 108" Pipe Mount (T-Mobile Proposed)	95
RFS APXVAARR24_43-U-NA20 Panel Antenna w/ 108" Pipe Mount (T-Mobile Proposed)	95
RFS APXVAARR24_43-U-NA20 Panel Antenna w/ 108" Pipe Mount (T-Mobile Proposed)	95
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile Proposed)	95
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile Proposed)	95
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile Proposed)	95
Ericsson Radio 4415 B25 RRH Unit (T-Mobile Proposed)	95
Ericsson Radio 4415 B25 RRH Unit (T-Mobile Proposed)	95

TYPE	ELEVATION
Ericsson Radio 4415 B25 RRH Unit (T-Mobile Proposed)	95
Ericsson Radio 4415 B66A RRH (T-Mobile Proposed)	95
Ericsson Radio 4415 B66A RRH (T-Mobile Proposed)	95
Ericsson Radio 4415 B66A RRH (T-Mobile Proposed)	95
Generic Twin TMA unit (T-Mobile - Left Unconnected)	95
Generic Twin TMA unit (T-Mobile - Left Unconnected)	95
Generic Twin TMA unit (T-Mobile - Left Unconnected)	95
2' Dish (CSP-14)	95
6' Grid Dish (CEC-4)	94
6'x2.375 O.D. Mount Pipe (CEC-4)	94
4 FT Dish	90
9' Dipole AF (CSP-15)	86
12' Dipole IK (CSP-11)	85
8' x 2.5" OD Omni - Ak (DEHMS-18)	83
Side Arm Mount [SO 311-1] (Mt for DEHME-18)	80
Side Arm Mount [SO 311-1] (Mt for CEC-4)	80
12' Dipole IK (CSP)	70
12' x 3" OD Omni w/ 36" Mount Pipe (CSP)	60
22' 4-Bay Dipole (CSP-18)	60
Side Arm Mount [SO 311-1] (CSP)	60
Side Arm Mount [SO 311-1] (Mt for CSP Antennas)	60
20' x 3.5" OD Omni w/ 36" Mount Pipe (CSP)	58
DB806M-Y (CSP-39)	50
4' Side Mount Standoff (1) (Mt for CSP/DEHMS)	50
DB803M-Y (DEHMS-19)	50
4' Side Mount Standoff (1) (CSP-20)	30
DB803M-Y (CSP-13)	30
DB803M-Y (Mt for CSP-13,20)	30

MATERIAL STRENGTH

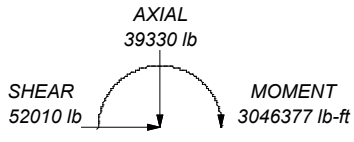
GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

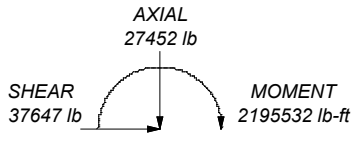
1. Tower designed for a 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 90 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 90 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.

MAX. CORNER REACTIONS AT BASE:
DOWN: 158667 lb
SHEAR: 23139 lb

UPLIFT: -124569 lb
SHEAR: 32462 lb



TORQUE 71806 lb-ft
90 mph WIND - 0.5000 in ICE

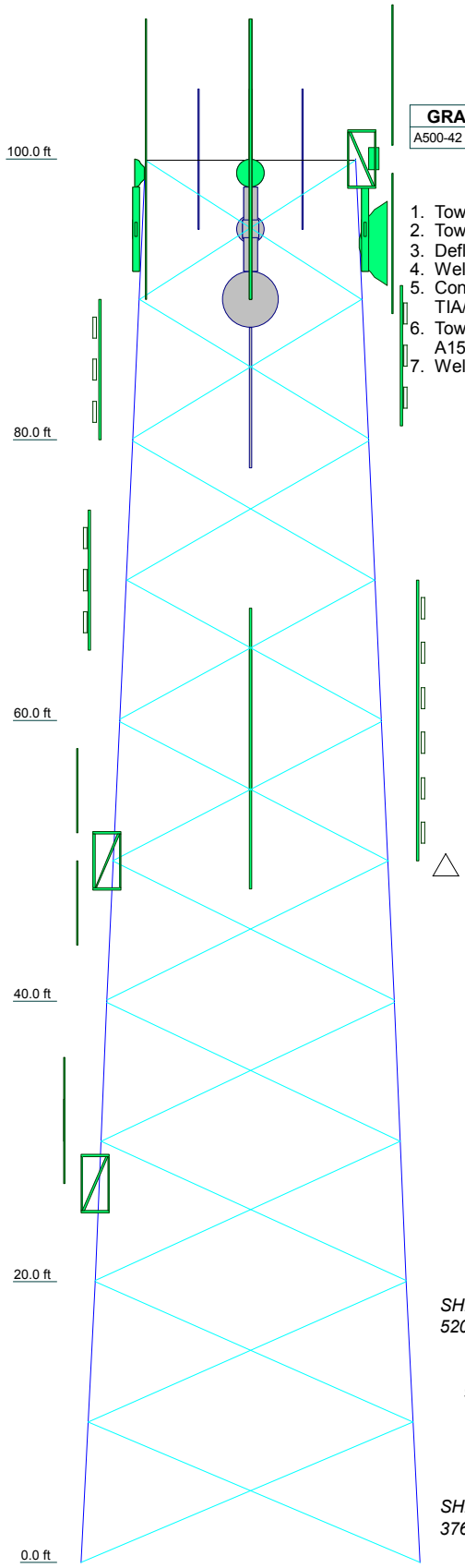


TORQUE 36521 lb-ft
REACTIONS - 90 mph WIND

AECOM
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
Phone: 860-529-8882
FAX: 860-529-3991

Job:	***100' Self Support Lattice - CSP #51***		
Project:	***(Troop K) Colchester, CT / DESPP/CSP Design Loading***		
Client: Transcend Wireless / T-Mobile / TWM-017		Drawn by: MCD	App'd:
Code: TIA/EIA-222-F		Date: 05/11/19	Scale: NTS
Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51_Troop K\TIA-F\DESPP_CSP_Troop K_Colchester.eri			Dwg No. E-1

Section		T1	T2	T3	T4	T5	
Legs		HSS8.625x.188	HSS8.625x.25	HSS8.625x.322	P10x.375		
Leg Grade				A500-42			
Diagonals		L3 1/2x3x1/4	L3 1/2x3 1/2x1/4	L4x4x1/4	L4x4x3/8	L5x5x5/16	
Diagonal Grade				A36			
Top Girts		L3 1/2x3x1/4					
Face Width (ft)	15	16.8333		18.6667	20.5	22.1667	
# Panels @ (ft)	8 @ 9.91667					2 @ 10	
Weight (lb)	2497.2	2792.2		3510.4	5318.7	5713.2	19831.7



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GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

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3. Deflections are based upon a 90 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
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SHEAR: 23139 lb

UPLIFT: -124569 lb
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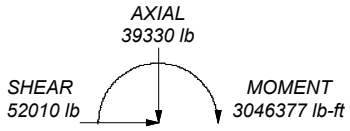
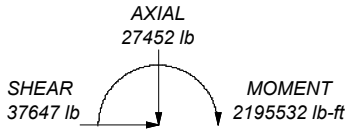


TORQUE 71806 lb-ft
90 mph WIND - 0.5000 in ICE



TORQUE 36521 lb-ft
REACTIONS - 90 mph WIND

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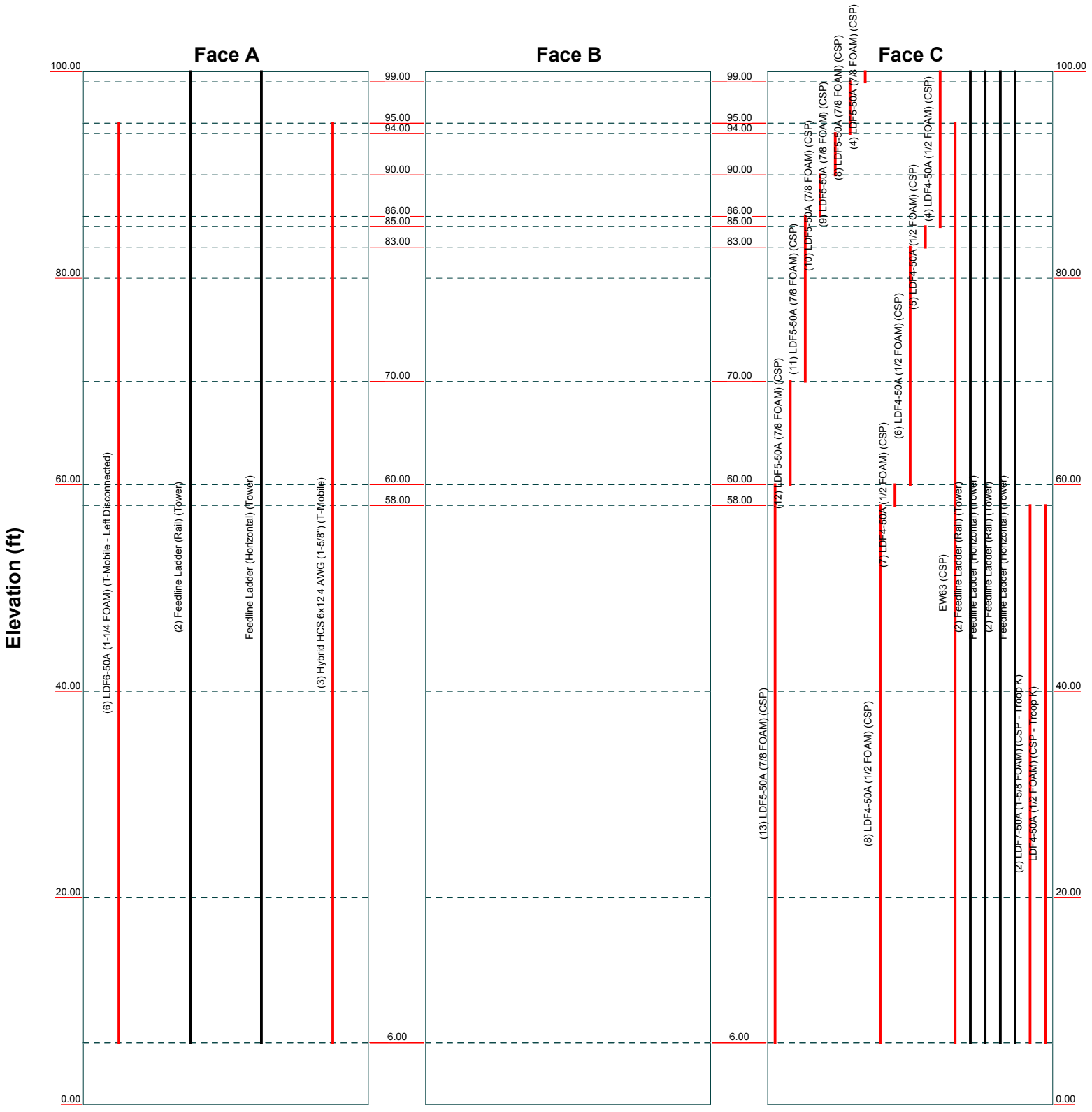
Client: Transcend Wireless / T-Mobile / TWM-017		Drawn by: MCD	App'd:
Code: TIA/EIA-222-F		Date: 05/11/19	Scale: NTS
Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51_Troop K\TIA-F\DESPP_CSP_Troop K_Colchester.eri			Dwg No. E-1

Feed Line Distribution Chart
0' - 100'

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



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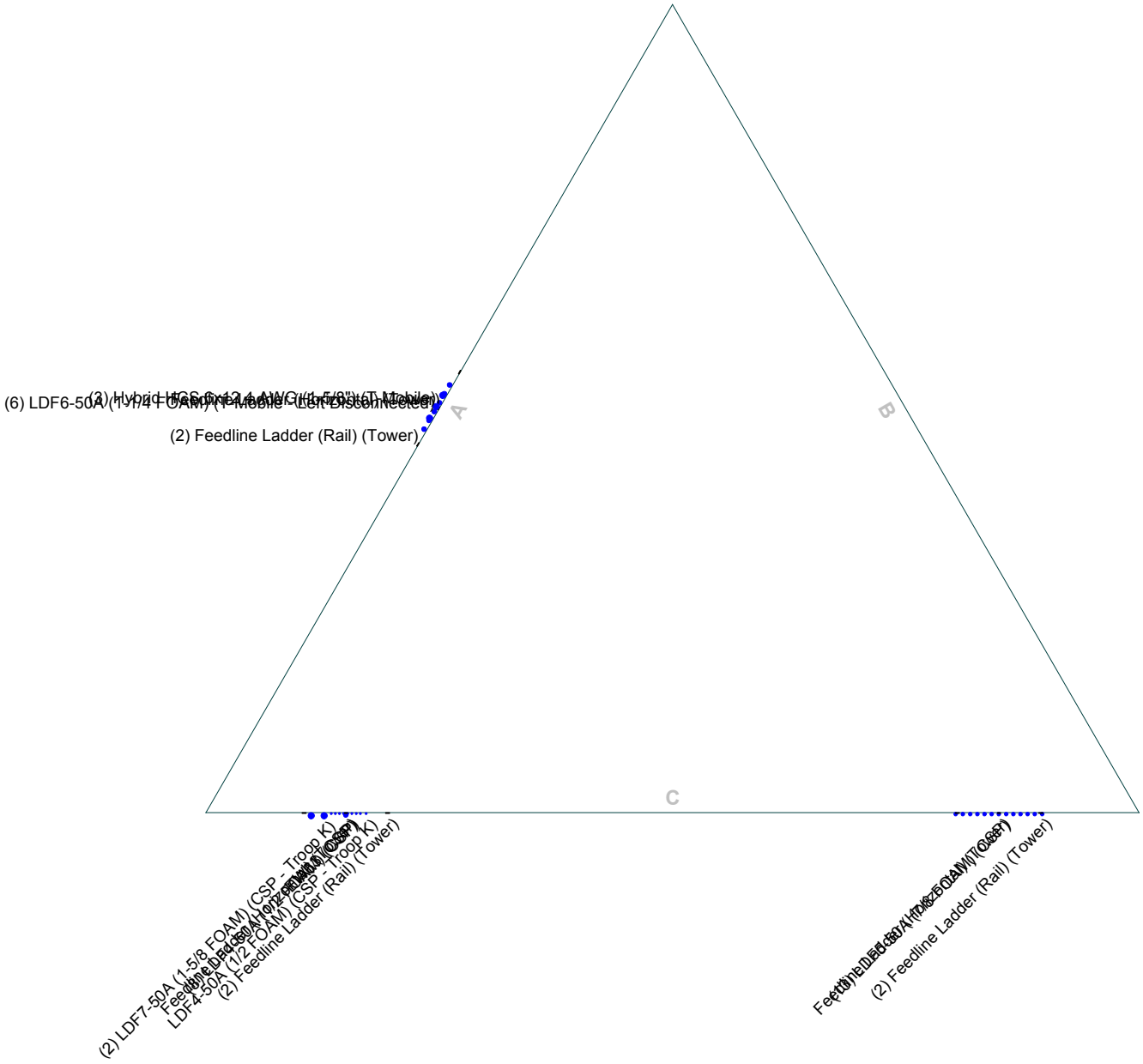
Code:	TIA/EIA-222-F	Date: 05/11/19	Scale: NTS
Path:	P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51_Troop K\TIA-F\DESPP_CSP_Troop K_Colchester.eri		Dwg No. E-7

Feed Line Plan

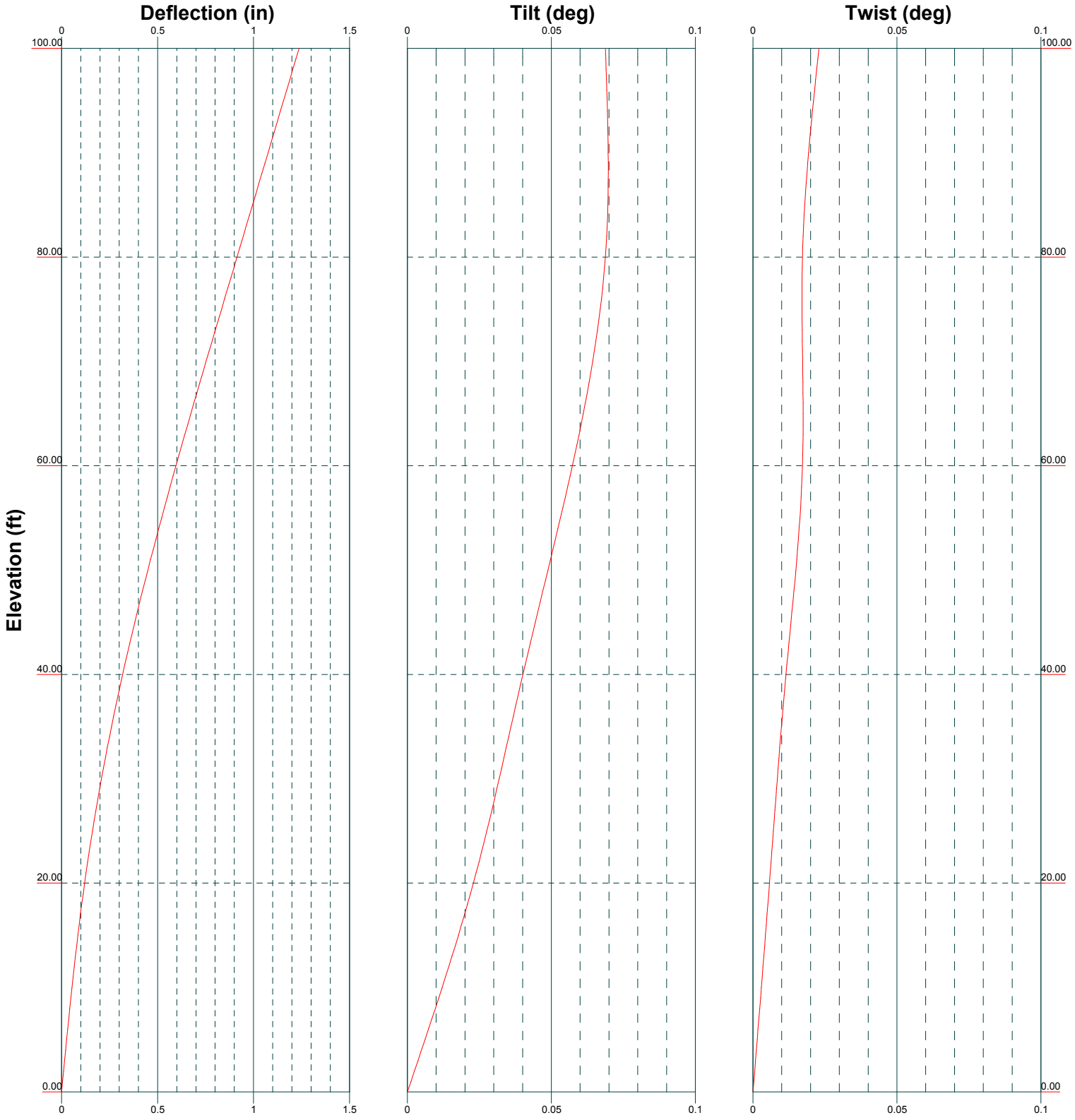
Round Flat App In Face App Out Face



AECOM 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: 860-529-8882 FAX: 860-529-3991	Job: ***100' Self Support Lattice - CSP #51***		
	Project: ***(Troop K) Colchester, CT / DESPP/CSP Design Loading***		
	Client: Transcend Wireless / T-Mobile / TWM-017	Drawn by: MCD	App'd:
	Code: TIA/EIA-222-F	Date: 05/11/19	Scale: NTS
	Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51_Troop K\TIA-F\DESPP_CSP_Troop K_Colchester.eri		Dwg No. E-7

TIA/EIA-222-F - Service - 90 mph

Maximum Values



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Code: TIA/EIA-222-F		Date: 05/11/19	Scale: NTS
Path: P:\Projects\Telcom\StructuralsByLocation\Connecticut\Colchester #51_Troop K\TIA-F\DESPP_CSP_Troop K_Colchester.eri			Dwg No. E-5

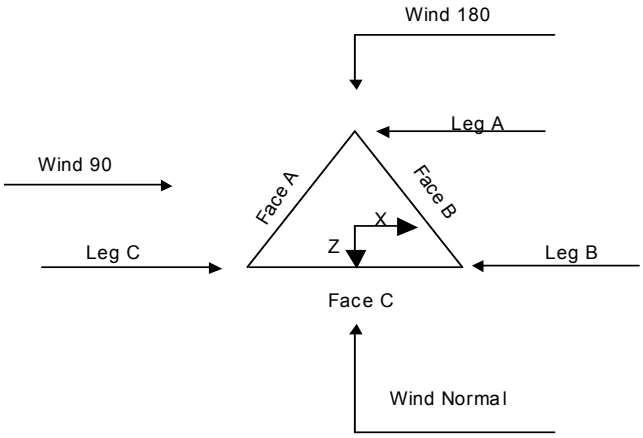
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 15.00 ft at the top and 24.17 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 90 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 90 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 90 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	100.00-80.00			15.00	1	20.00
T2	80.00-60.00			16.83	1	20.00
T3	60.00-40.00			18.67	1	20.00
T4	40.00-20.00			20.50	1	20.00
T5	20.00-0.00			22.17	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	100.00-80.00	9.92	X Brace	No	No	1.0000	1.0000
T2	80.00-60.00	9.92	X Brace	No	No	1.0000	1.0000
T3	60.00-40.00	9.92	X Brace	No	No	1.0000	1.0000
T4	40.00-20.00	9.92	X Brace	No	No	1.0000	1.0000
T5	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 100.00-80.00	Pipe	HSS8.625x.188	A500-42 (42 ksi)	Single Angle	L3 1/2x3x1/4	A36 (36 ksi)
T2 80.00-60.00	Pipe	HSS8.625x.25	A500-42 (42 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T3 60.00-40.00	Pipe	HSS8.625x.322	A500-42 (42 ksi)	Equal Angle	L4x4x1/4	A36 (36 ksi)
T4 40.00-20.00	Pipe	P10x.375	A500-42 (42 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)
T5 20.00-0.00	Pipe	P10x.375	A500-42 (42 ksi)	Equal Angle	L5x5x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 100.00-80.00	Single Angle	L3 1/2x3x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T2 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T3 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T4 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt
T5 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1.03	1	1.05	Mid-Pt	Mid-Pt	Mid-Pt

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X	X Brace Diags Y	K Brace Diags X	K Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz. X	Horiz. Y	Sec. Horiz. X	Sec. Horiz. Y	Inner Brace X	Inner Brace Y
T1 100.00-80.00	No	No	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T2	No	No	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T3	No	No	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T4	No	No	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T5 20.00-0.00	No	No	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
100.00-80.00														
T2 80.00-60.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 60.00-40.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 40.00-20.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 20.00-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1	Flange	0.8750	5	0.7500	1	0.2500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0
100.00-80.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 80.00-60.00	Flange	1.0000	5	0.7500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 60.00-40.00	Flange	1.2500	5	0.8750	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 40.00-20.00	Flange	1.2500	5	0.8750	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 20.00-0.00	Flange	1.2500	5	0.8750	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
* "Existing Cable Information obtained from Destek Engineering Analysis													
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	60.00 - 6.00	0.0000	-0.35	13	13	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	70.00 - 60.00	0.0000	-0.35	12	12	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	86.00 - 70.00	0.0000	-0.35	11	11	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	90.00 - 86.00	0.0000	-0.35	10	10	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	94.00 - 90.00	0.0000	-0.35	9	9	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	99.00 - 94.00	0.0000	-0.35	8	8	1.0900	1.0900		0.33
LDF5-50A (7/8 FOAM) (CSP)	C	No	No	Ar (CaAa)	100.00 - 99.00	0.0000	-0.35	4	4	1.0900	1.0900		0.33
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	58.00 - 6.00	0.0000	0.35	8	8	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	60.00 - 58.00	0.0000	0.35	7	7	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	83.00 - 60.00	0.0000	0.35	6	6	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	85.00 - 83.00	0.0000	0.35	5	5	0.6300	0.6300		0.15
LDF4-50A (1/2 FOAM) (CSP)	C	No	No	Ar (CaAa)	100.00 - 85.00	0.0000	0.35	4	4	0.6300	0.6300		0.15
EW63 (CSP)	C	No	No	Ar (CaAa)	95.00 - 6.00	0.0000	0.35	1	1	1.5742	1.5742		0.51
LDF6-50A (1-1/4 FOAM) (T-Mobile - Left Disconnected)	A	No	No	Ar (CaAa)	95.00 - 6.00	0.0000	0	6	6	1.5500	1.5500		0.66
Feedline Ladder (Rail) (Tower)	A	No	No	Af (CfAe)	100.00 - 6.00	0.0000	0	2	2	24.0000 0.2500	1.2500	3.0000	3.00
Feedline Ladder (Horizontal) (Tower)	A	No	No	Af (CfAe)	100.00 - 6.00	0.0000	0	1	1	0.0000	1.0000	2.5000	3.40
Feedline Ladder (Rail)	C	No	No	Af (CfAe)	100.00 - 6.00	0.0000	-0.35	2	2	24.0000 0.2500	1.2500	3.0000	3.00

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(Tower) Feedline Ladder (Horizontal)	C	No	No	Af (CfAe)	100.00 - 6.00	0.0000	-0.35	1	1	0.0000	1.0000	2.5000	3.40
(Tower) Feedline Ladder (Rail)	C	No	No	Af (CfAe)	100.00 - 6.00	0.0000	0.35	2	2	24.0000 0.2500	1.2500	3.0000	3.00
(Tower) Feedline Ladder (Horizontal)	C	No	No	Af (CfAe)	100.00 - 6.00	0.0000	0.35	1	1	0.0000	1.0000	2.5000	3.40
(Tower) Hybrid HCS 6x12 4 AWG (1-5/8") (T-Mobile)	A	No	No	Ar (CaAa)	95.00 - 6.00	0.0000	0	3	3	1.9900	1.9900		1.90
LDF7-50A (1-5/8 FOAM) (CSP - Troop K)	C	No	No	Ar (CaAa)	58.00 - 6.00	0.0000	0.38	2	2	1.9800	1.9800		0.82
LDF4-50A (1/2 FOAM) (CSP - Troop K)	C	No	No	Ar (CaAa)	58.00 - 6.00	0.0000	0.328	1	1	0.6300	0.6300		0.15

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	100.00-80.00	A	0.000	5.833	22.905	0.000	332.90
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	11.667	28.179	0.000	458.23
T2	80.00-60.00	A	0.000	5.833	30.540	0.000	381.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	11.667	35.778	0.000	480.10
T3	60.00-40.00	A	0.000	5.833	30.540	0.000	381.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	11.667	49.704	0.000	527.92
T4	40.00-20.00	A	0.000	5.833	30.540	0.000	381.20
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	11.667	50.748	0.000	531.80
T5	20.00-0.00	A	0.000	4.083	21.378	0.000	266.84
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	8.167	35.524	0.000	372.26

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	100.00-80.00	A	0.500	0.000	9.167	36.405	0.000	569.19
		B		0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		C		0.000	18.333	60.275	0.000	828.04
T2	80.00-60.00	A	0.500	0.000	9.167	48.540	0.000	677.87
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	18.333	77.478	0.000	920.66
T3	60.00-40.00	A	0.500	0.000	9.167	48.540	0.000	677.87
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	18.333	105.390	0.000	1090.33
T4	40.00-20.00	A	0.500	0.000	9.167	48.540	0.000	677.87
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	18.333	107.328	0.000	1103.00
T5	20.00-0.00	A	0.500	0.000	6.417	33.978	0.000	474.51
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	12.833	75.130	0.000	772.10

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	100.00-80.00	-2.9871	7.9231	-3.1985	11.8652
T2	80.00-60.00	-4.3078	9.4191	-5.0658	14.3417
T3	60.00-40.00	-6.9463	13.4722	-8.8406	19.7831
T4	40.00-20.00	-7.5264	14.1830	-9.6993	21.0251
T5	20.00-0.00	-5.7670	11.0303	-7.9936	17.5576

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
*** Existing antennas & CSP Antennas									
DB803M-Y	C	From Leg	3.00	0.0000	30.00	No Ice	0.50	0.50	4.30
(CSP-13)			0.00			1/2" Ice	0.68	0.68	8.98
			3.00						
4' Side Mount Standoff (1)	C	From Leg	0.50	0.0000	30.00	No Ice	2.72	2.72	50.00
(CSP-20)			0.00			1/2" Ice	4.91	4.91	89.00
			-3.00						
DB803M-Y	C	From Leg	3.00	0.0000	30.00	No Ice	0.50	0.50	4.30
(Mt for CSP-13,20)			0.00			1/2" Ice	0.68	0.68	8.98
			0.00						
DB806M-Y	C	From Leg	3.00	0.0000	50.00	No Ice	1.58	1.58	8.00
(CSP-39)			0.00			1/2" Ice	2.40	2.40	20.29
			5.00						
4' Side Mount Standoff (1)	C	From Leg	0.50	0.0000	50.00	No Ice	2.72	2.72	50.00
(Mt for CSP/DEHMS)			0.00			1/2" Ice	4.91	4.91	89.00
			0.00						
DB803M-Y	C	From Leg	3.00	0.0000	50.00	No Ice	0.50	0.50	4.30

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(DEHMS-19)			0.00 -3.00			1/2" Ice	0.68	0.68	8.98
22' x 3" OD Omni w/ 36" Mount Pipe (CEC-16)	C	None		0.0000	100.00	No Ice 1/2" Ice	7.32 9.79	7.32 9.79	160.74 219.74
14' x 3" OD Omni w/ 36" Mount Pipe (CEC-10)	A	None		0.0000	100.00	No Ice 1/2" Ice	4.92 6.59	4.92 6.59	110.74 152.64
2.5" Dia 10' Omni (CSP-32)	C	From Face	0.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	30.00 48.64
22' x 3" OD Omni w/ 36" Mount Pipe (CEC-6)	C	None		0.0000	100.00	No Ice 1/2" Ice	7.32 9.79	7.32 9.79	160.74 219.74
22' x 3" OD Omni w/ 36" Mount Pipe (CEC)	C	From Face	0.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.32 9.79	7.32 9.79	160.74 219.74
22' x 3" OD Omni w/ 36" Mount Pipe (CSP-12)	C	From Leg	0.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	7.32 9.79	7.32 9.79	160.74 219.74
12' x 3" OD Omni w/ 36" Mount Pipe (CSP-7)	A	From Face	0.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.62 6.19	4.62 6.19	97.74 137.50
2.5" Dia 10' Omni (CEC-29)	B	From Face	0.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	2.50 3.53	2.50 3.53	30.00 48.64
6'x2.375 O.D. Mount Pipe (CEC-4)	B	None		0.0000	94.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	21.96 32.79
9' Dipole AF (CSP-15)	B	From Leg	3.00 0.00 0.00	0.0000	86.00	No Ice 1/2" Ice	2.00 3.02	2.00 3.02	20.00 35.50
12' Dipole IK (CSP-11)	C	From Leg	3.00 0.00 0.00	0.0000	85.00	No Ice 1/2" Ice	2.40 3.63	2.40 3.63	25.00 43.56
8' x 2.5" OD Omni - Ak (DEHMS-18)	A	From Leg	0.00 0.00 0.00	0.0000	83.00	No Ice 1/2" Ice	2.00 2.82	2.00 2.82	30.00 45.00
Side Arm Mount [SO 311-1] (Mt for CEC-4)	B	None		0.0000	80.00	No Ice 1/2" Ice	2.97 4.39	3.51 5.33	62.00 94.35
Side Arm Mount [SO 311-1] (Mt for DEHME-18)	A	None		0.0000	80.00	No Ice 1/2" Ice	2.97 4.39	3.51 5.33	62.00 94.35
12' Dipole IK (CSP)	C	From Leg	3.00 0.00 0.00	0.0000	70.00	No Ice 1/2" Ice	2.40 3.63	2.40 3.63	25.00 43.56
Side Arm Mount [SO 311-1] (CSP)	C	None		0.0000	60.00	No Ice 1/2" Ice	2.97 4.39	3.51 5.33	62.00 94.35
Side Arm Mount [SO 311-1] (Mt for CSP Antennas)	B	None		0.0000	60.00	No Ice 1/2" Ice	2.97 4.39	3.51 5.33	62.00 94.35
12' x 3" OD Omni w/ 36" Mount Pipe (CSP)	A	None		0.0000	60.00	No Ice 1/2" Ice	4.62 6.19	4.62 6.19	97.74 137.50
22' 4-Bay Dipole (CSP-18)	B	From Leg	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	4.00 6.00	4.00 6.00	55.00 100.00
20' x 3.5" OD Omni w/ 36" Mount Pipe (CSP)	A	None		0.0000	58.00	No Ice 1/2" Ice	4.20 6.33	4.20 6.33	75.00 107.30

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
*** T-Mobile Proposed Equipment									
6'x2.375 O.D. Mount Pipe on existing Horizontal Frame (T-Mobile)	A	From Leg	0.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	21.96 32.79
6'x2.375 O.D. Mount Pipe on existing Horizontal Frame (T-Mobile)	B	From Leg	0.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	21.96 32.79
6'x2.375 O.D. Mount Pipe on existing Horizontal Frame (T-Mobile)	C	From Leg	0.00 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.43 1.92	1.43 1.92	21.96 32.79
RFS APXVAARR24_43-U-NA20 Panel Antenna w/ 108" Pipe Mount (T-Mobile Proposed)	A	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	20.48 21.23	11.03 12.55	186.15 322.45
RFS APXVAARR24_43-U-NA20 Panel Antenna w/ 108" Pipe Mount (T-Mobile Proposed)	B	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	20.48 21.23	11.03 12.55	186.15 322.45
RFS APXVAARR24_43-U-NA20 Panel Antenna w/ 108" Pipe Mount (T-Mobile Proposed)	C	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	20.48 21.23	11.03 12.55	186.15 322.45
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile Proposed)	A	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.66 1.82	1.16 1.29	80.00 96.16
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile Proposed)	B	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.66 1.82	1.16 1.29	80.00 96.16
Ericsson 4449 B71 + B12 Radio Unit (T-Mobile Proposed)	C	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.66 1.82	1.16 1.29	80.00 96.16
Ericsson Radio 4415 B25 RRH Unit (T-Mobile Proposed)	A	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.86 2.03	0.83 0.96	50.00 64.25
Ericsson Radio 4415 B25 RRH Unit (T-Mobile Proposed)	B	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.86 2.03	0.83 0.96	50.00 64.25
Ericsson Radio 4415 B25 RRH Unit (T-Mobile Proposed)	C	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.86 2.03	0.83 0.96	50.00 64.25
Ericsson Radio 4415 B66A RRH (T-Mobile Proposed)	A	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.64 1.80	1.35 1.50	72.00 89.60
Ericsson Radio 4415 B66A RRH (T-Mobile Proposed)	B	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.64 1.80	1.35 1.50	72.00 89.60
Ericsson Radio 4415 B66A RRH (T-Mobile Proposed)	C	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	1.64 1.80	1.35 1.50	72.00 89.60
Generic Twin TMA unit (T-Mobile - Left Unconnected)	A	From Leg	0.50 0.00 0.00	0.0000	95.00	No Ice 1/2" Ice	0.37 0.46	0.96 1.09	25.00 32.19
Generic Twin TMA unit	B	From Leg	0.50	0.0000	95.00	No Ice	0.37	0.96	25.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(T-Mobile - Left Unconnected)			0.00 0.00			1/2" Ice	0.46	1.09	32.19
Generic Twin TMA unit	C	From Leg	0.50 0.00	0.0000	95.00	No Ice 1/2" Ice	0.37 0.46	0.96 1.09	25.00 32.19
(T-Mobile - Left Unconnected)			0.00						
** Troop K Antenna									
4' Side Mount Standoff (1)	B	From Leg	0.50	0.0000	100.00	No Ice	2.72	2.72	50.00
(CSP-Troop K)			0.00 0.00			1/2" Ice	4.91	4.91	89.00
SC479-HF1LDF	B	From Leg	3.00	0.0000	100.00	No Ice	4.55	4.55	34.00
(CSP-36)			0.00 6.00			1/2" Ice	6.54	6.54	69.82
SC479-HF1LDF	B	From Leg	3.00	0.0000	100.00	No Ice	4.55	4.55	34.00
(CSP-37)			0.00 -6.00			1/2" Ice	6.54	6.54	69.82
432E-83I-01T TTA Unit	B	From Leg	1.50	0.0000	100.00	No Ice	2.85	0.97	25.00
(CSP-38)			0.00 0.00			1/2" Ice	3.06	1.11	44.70

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight lb
Reflector Dish	C	Passive Reflector	From	0.00	Worst		99.00	2.00	No Ice	3.14	10.00
(CEC-1)			Face	0.00 0.00					1/2" Ice	3.41	30.00
Reflector Dish	A	Passive Reflector	From	0.00	Worst		99.00	2.00	No Ice	3.14	10.00
(CEC-2)			Leg	0.00 0.00					1/2" Ice	3.41	30.00
6' Grid Dish	B	Grid	From	0.00	Worst		94.00	6.00	No Ice	28.27	148.00
(CEC-4)			Leg	0.00 0.00					1/2" Ice	29.07	149.20
4 FT Dish	A	Paraboloid w/Radome	From Leg	0.00 0.00 0.00	Worst		90.00	4.00	No Ice 1/2" Ice	12.56 13.09	170.00 237.19
2' Dish	A	Paraboloid	From	0.00	Worst		95.00	2.00	No Ice	3.14	30.00
(CSP-14)		w/Radome	Leg	0.00 0.00					1/2" Ice	3.41	47.50
Reflector Dish	C	Passive Reflector	From	0.00	Worst		99.00	2.00	No Ice	3.14	30.00
(CEC-22)			Leg	0.00 0.00					1/2" Ice	3.41	47.50
Reflector Dish	C	Passive Reflector	From	0.00	Worst		99.00	2.00	No Ice	3.14	30.00
(CDC-3)			Leg	0.00 0.00					1/2" Ice	3.41	47.50

Tower Pressures - No Ice

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	90.00	1.332	28	332.723	A	31.647	28.790	28.790	47.64	22.905	0.000
100.00-80.00					B	25.814	28.790		52.73	0.000	0.000
					C	37.480	28.790		43.44	28.179	0.000
T2 80.00-60.00	70.00	1.24	26	369.390	A	29.280	28.790	28.790	49.58	30.540	0.000
					B	23.447	28.790		55.11	0.000	0.000
					C	35.113	28.790		45.05	35.778	0.000
T3 60.00-40.00	50.00	1.126	23	406.057	A	34.876	28.790	28.790	45.22	30.540	0.000
					B	29.043	28.790		49.78	0.000	0.000
					C	40.710	28.790		41.42	49.704	0.000
T4 40.00-20.00	30.00	1	21	443.348	A	36.882	33.372	33.372	47.50	30.540	0.000
					B	31.049	33.372		51.80	0.000	0.000
					C	42.715	33.372		43.86	50.748	0.000
T5 20.00-0.00	10.00	1	21	480.021	A	45.846	33.389	33.389	42.14	21.378	0.000
					B	41.762	33.389		44.43	0.000	0.000
					C	49.929	33.389		40.07	35.524	0.000

Tower Pressure - With Ice

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 100.00-80.00	90.00	1.332	28	0.5000	334.392	A	34.980	39.289	32.128	43.26	36.405	0.000
						B	25.814	39.289		49.35	0.000	0.000
						C	44.147	39.289		38.51	60.275	0.000
T2 80.00-60.00	70.00	1.24	26	0.5000	371.059	A	32.613	38.632	32.128	45.10	48.540	0.000
						B	23.447	38.632		51.75	0.000	0.000
						C	41.780	38.632		39.95	77.478	0.000
T3 60.00-40.00	50.00	1.126	23	0.5000	407.725	A	38.210	39.177	32.128	41.52	48.540	0.000
						B	29.043	39.177		47.09	0.000	0.000
						C	47.376	39.177		37.12	105.390	0.000
T4 40.00-20.00	30.00	1	21	0.5000	445.016	A	40.215	44.245	36.709	43.46	48.540	0.000
						B	31.049	44.245		48.75	0.000	0.000
						C	49.382	44.245		39.21	107.328	0.000
T5 20.00-0.00	10.00	1	21	0.5000	481.690	A	48.179	44.837	36.728	39.49	33.978	0.000
						B	41.762	44.837		42.41	0.000	0.000
						C	54.596	44.837		36.94	75.130	0.000

Tower Pressure - Service

$G_H = 1.162$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	90.00	1.332	28	332.723	A	31.647	28.790	28.790	47.64	22.905	0.000
100.00-80.00					B	25.814	28.790		52.73	0.000	0.000
					C	37.480	28.790		43.44	28.179	0.000
T2 80.00-60.00	70.00	1.24	26	369.390	A	29.280	28.790	28.790	49.58	30.540	0.000
					B	23.447	28.790		55.11	0.000	0.000
					C	35.113	28.790		45.05	35.778	0.000
T3 60.00-40.00	50.00	1.126	23	406.057	A	34.876	28.790	28.790	45.22	30.540	0.000
					B	29.043	28.790		49.78	0.000	0.000
					C	40.710	28.790		41.42	49.704	0.000
T4 40.00-20.00	30.00	1	21	443.348	A	36.882	33.372	33.372	47.50	30.540	0.000
					B	31.049	33.372		51.80	0.000	0.000
					C	42.715	33.372		43.86	50.748	0.000
T5 20.00-0.00	10.00	1	21	480.021	A	45.846	33.389	33.389	42.14	21.378	0.000
					B	41.762	33.389		44.43	0.000	0.000
					C	49.929	33.389		40.07	35.524	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.182	2.658	0.587	1	1	48.542	6183.45	309.17	C
100.00-80.00			B	0.164	2.72	0.584	1	1	42.620			
			C	0.199	2.599	0.59	1	1	54.473			
T2	861.30	2792.19	A	0.157	2.745	0.583	1	1	46.053	6154.81	307.74	C
80.00-60.00			B	0.141	2.803	0.58	1	1	40.151			
			C	0.173	2.689	0.585	1	1	51.963			
T3	909.12	3510.42	A	0.157	2.747	0.583	1	1	51.648	6386.31	319.32	C
60.00-40.00			B	0.142	2.8	0.58	1	1	45.751			
			C	0.171	2.695	0.585	1	1	57.550			
T4	913.00	5318.65	A	0.158	2.741	0.583	1	1	56.331	5998.62	299.93	C
40.00-20.00			B	0.145	2.789	0.581	1	1	50.430			
			C	0.172	2.694	0.585	1	1	62.239			
T5 20.00-0.00	639.10	5713.24	A	0.165	2.717	0.584	1	1	65.341	5869.04	293.45	C
			B	0.157	2.748	0.583	1	1	61.211			
			C	0.174	2.687	0.585	1	1	69.474			
Sum Weight:	4113.65	19831.70						OTM	1545311.4 4 lb-ft	30592.23		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.182	2.658	0.587	0.825	1	43.004	5636.34	281.82	C
100.00-80.00			B	0.164	2.72	0.584	0.825	1	38.102			
			C	0.199	2.599	0.59	0.825	1	47.914			
T2	861.30	2792.19	A	0.157	2.745	0.583	0.825	1	40.929	5661.26	283.06	C
80.00-60.00			B	0.141	2.803	0.58	0.825	1	36.048			
			C	0.173	2.689	0.585	0.825	1	45.818			
T3	909.12	3510.42	A	0.157	2.747	0.583	0.825	1	45.544	5865.29	293.26	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
60.00-40.00			B	0.142	2.8	0.58	0.825	1	40.669			
			C	0.171	2.695	0.585	0.825	1	50.426			
T4	913.00	5318.65	A	0.158	2.741	0.583	0.825	1	49.877	5513.43	275.67	C
40.00-20.00			B	0.145	2.789	0.581	0.825	1	44.997			
			C	0.172	2.694	0.585	0.825	1	54.764			
T5 20.00-0.00	639.10	5713.24	A	0.165	2.717	0.584	0.825	1	57.318	5303.36	265.17	C
			B	0.157	2.748	0.583	0.825	1	53.903			
			C	0.174	2.687	0.585	0.825	1	60.736			
Sum Weight:	4113.65	19831.70						OTM	1415259.24 lb-ft	27979.67		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.182	2.658	0.587	0.8	1	42.213	5558.18	277.91	C
100.00-80.00			B	0.164	2.72	0.584	0.8	1	37.457			
			C	0.199	2.599	0.59	0.8	1	46.977			
T2	861.30	2792.19	A	0.157	2.745	0.583	0.8	1	40.197	5590.75	279.54	C
80.00-60.00			B	0.141	2.803	0.58	0.8	1	35.461			
			C	0.173	2.689	0.585	0.8	1	44.940			
T3	909.12	3510.42	A	0.157	2.747	0.583	0.8	1	44.672	5790.86	289.54	C
60.00-40.00			B	0.142	2.8	0.58	0.8	1	39.943			
			C	0.171	2.695	0.585	0.8	1	49.408			
T4	913.00	5318.65	A	0.158	2.741	0.583	0.8	1	48.955	5444.11	272.21	C
40.00-20.00			B	0.145	2.789	0.581	0.8	1	44.220			
			C	0.172	2.694	0.585	0.8	1	53.696			
T5 20.00-0.00	639.10	5713.24	A	0.165	2.717	0.584	0.8	1	56.172	5222.54	261.13	C
			B	0.157	2.748	0.583	0.8	1	52.859			
			C	0.174	2.687	0.585	0.8	1	59.488			
Sum Weight:	4113.65	19831.70						OTM	1396680.35 lb-ft	27606.44		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.182	2.658	0.587	0.85	1	43.795	5714.50	285.72	C
100.00-80.00			B	0.164	2.72	0.584	0.85	1	38.748			
			C	0.199	2.599	0.59	0.85	1	48.851			
T2	861.30	2792.19	A	0.157	2.745	0.583	0.85	1	41.661	5731.76	286.59	C
80.00-60.00			B	0.141	2.803	0.58	0.85	1	36.634			
			C	0.173	2.689	0.585	0.85	1	46.696			
T3	909.12	3510.42	A	0.157	2.747	0.583	0.85	1	46.416	5939.72	296.99	C
60.00-40.00			B	0.142	2.8	0.58	0.85	1	41.395			
			C	0.171	2.695	0.585	0.85	1	51.444			
T4	913.00	5318.65	A	0.158	2.741	0.583	0.85	1	50.799	5582.74	279.14	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
40.00-20.00			B	0.145	2.789	0.581	0.85	1	45.773			
			C	0.172	2.694	0.585	0.85	1	55.831			
T5 20.00-0.00	639.10	5713.24	A	0.165	2.717	0.584	0.85	1	58.464	5384.17	269.21	C
			B	0.157	2.748	0.583	0.85	1	54.947			
			C	0.174	2.687	0.585	0.85	1	61.984			
Sum Weight:	4113.65	19831.70						OTM	1433838.13 lb-ft	28352.89		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	1397.23	3618.00	A	0.222	2.524	0.595	1	1	58.364	8409.97	420.50	C
100.00-80.00			B	0.195	2.614	0.589	1	1	48.968			
			C	0.25	2.439	0.602	1	1	67.789			
T2	1598.53	3884.56	A	0.192	2.623	0.589	1	1	55.360	8678.06	433.90	C
80.00-60.00			B	0.167	2.709	0.584	1	1	46.018			
			C	0.217	2.541	0.594	1	1	64.726			
T3	1768.20	4765.51	A	0.19	2.63	0.588	1	1	61.261	9073.13	453.66	C
60.00-40.00			B	0.167	2.709	0.584	1	1	51.934			
			C	0.212	2.555	0.593	1	1	70.608			
T4	1780.88	6690.09	A	0.19	2.63	0.588	1	1	66.248	8422.89	421.14	C
40.00-20.00			B	0.169	2.702	0.585	1	1	56.915			
			C	0.21	2.562	0.593	1	1	75.601			
T5 20.00-0.00	1246.61	7391.98	A	0.193	2.619	0.589	1	1	74.589	7662.66	383.13	C
			B	0.18	2.665	0.586	1	1	68.058			
			C	0.206	2.575	0.592	1	1	81.127			
Sum Weight:	7791.45	26350.14						OTM	2147331.02 lb-ft	42246.70		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1	1397.23	3618.00	A	0.222	2.524	0.595	0.825	1	52.242	7805.17	390.26	C
100.00-80.00			B	0.195	2.614	0.589	0.825	1	44.451			
			C	0.25	2.439	0.602	0.825	1	60.063			
T2	1598.53	3884.56	A	0.192	2.623	0.589	0.825	1	49.653	8123.02	406.15	C
80.00-60.00			B	0.167	2.709	0.584	0.825	1	41.915			
			C	0.217	2.541	0.594	0.825	1	57.414			
T3	1768.20	4765.51	A	0.19	2.63	0.588	0.825	1	54.574	8498.21	424.91	C
60.00-40.00			B	0.167	2.709	0.584	0.825	1	46.851			
			C	0.212	2.555	0.593	0.825	1	62.317			
T4	1780.88	6690.09	A	0.19	2.63	0.588	0.825	1	59.210	7889.42	394.47	C
40.00-20.00			B	0.169	2.702	0.585	0.825	1	51.481			
			C	0.21	2.562	0.593	0.825	1	66.959			
T5 20.00-0.00	1246.61	7391.98	A	0.193	2.619	0.589	0.825	1	66.157	7069.88	353.49	C

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			B	0.18	2.665	0.586	0.825	1	60.750			
			C	0.206	2.575	0.592	0.825	1	71.573			
Sum Weight:	7791.45	26350.14						OTM	2003369.2 0 lb-ft	39385.71		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	1397.23	3618.00	A	0.222	2.524	0.595	0.8	1	51.367	7718.77	385.94	C
100.00-80.00			B	0.195	2.614	0.589	0.8	1	43.805			
			C	0.25	2.439	0.602	0.8	1	58.960			
T2	1598.53	3884.56	A	0.192	2.623	0.589	0.8	1	48.837	8043.73	402.19	C
80.00-60.00			B	0.167	2.709	0.584	0.8	1	41.329			
			C	0.217	2.541	0.594	0.8	1	56.370			
T3	1768.20	4765.51	A	0.19	2.63	0.588	0.8	1	53.619	8416.08	420.80	C
60.00-40.00			B	0.167	2.709	0.584	0.8	1	46.125			
			C	0.212	2.555	0.593	0.8	1	61.133			
T4	1780.88	6690.09	A	0.19	2.63	0.588	0.8	1	58.205	7813.21	390.66	C
40.00-20.00			B	0.169	2.702	0.585	0.8	1	50.705			
			C	0.21	2.562	0.593	0.8	1	65.724			
T5 20.00-0.00	1246.61	7391.98	A	0.193	2.619	0.589	0.8	1	64.953	6985.20	349.26	C
			B	0.18	2.665	0.586	0.8	1	59.706			
			C	0.206	2.575	0.592	0.8	1	70.208			
Sum Weight:	7791.45	26350.14						OTM	1982803.2 3 lb-ft	38977.00		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	1397.23	3618.00	A	0.222	2.524	0.595	0.85	1	53.116	7891.57	394.58	C
100.00-80.00			B	0.195	2.614	0.589	0.85	1	45.096			
			C	0.25	2.439	0.602	0.85	1	61.167			
T2	1598.53	3884.56	A	0.192	2.623	0.589	0.85	1	50.468	8202.32	410.12	C
80.00-60.00			B	0.167	2.709	0.584	0.85	1	42.501			
			C	0.217	2.541	0.594	0.85	1	58.459			
T3	1768.20	4765.51	A	0.19	2.63	0.588	0.85	1	55.529	8580.35	429.02	C
60.00-40.00			B	0.167	2.709	0.584	0.85	1	47.577			
			C	0.212	2.555	0.593	0.85	1	63.501			
T4	1780.88	6690.09	A	0.19	2.63	0.588	0.85	1	60.216	7965.63	398.28	C
40.00-20.00			B	0.169	2.702	0.585	0.85	1	52.257			
			C	0.21	2.562	0.593	0.85	1	68.193			
T5 20.00-0.00	1246.61	7391.98	A	0.193	2.619	0.589	0.85	1	67.362	7154.56	357.73	C
			B	0.18	2.665	0.586	0.85	1	61.794			
			C	0.206	2.575	0.592	0.85	1	72.938			
Sum Weight:	7791.45	26350.14						OTM	2023935.1	39794.42		

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
									8 lb-ft			

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.182	2.658	0.587	1	1	48.542	6183.45	309.17	C
100.00-80.00			B	0.164	2.72	0.584	1	1	42.620			
			C	0.199	2.599	0.59	1	1	54.473			
T2	861.30	2792.19	A	0.157	2.745	0.583	1	1	46.053	6154.81	307.74	C
80.00-60.00			B	0.141	2.803	0.58	1	1	40.151			
			C	0.173	2.689	0.585	1	1	51.963			
T3	909.12	3510.42	A	0.157	2.747	0.583	1	1	51.648	6386.31	319.32	C
60.00-40.00			B	0.142	2.8	0.58	1	1	45.751			
			C	0.171	2.695	0.585	1	1	57.550			
T4	913.00	5318.65	A	0.158	2.741	0.583	1	1	56.331	5998.62	299.93	C
40.00-20.00			B	0.145	2.789	0.581	1	1	50.430			
			C	0.172	2.694	0.585	1	1	62.239			
T5 20.00-0.00	639.10	5713.24	A	0.165	2.717	0.584	1	1	65.341	5869.04	293.45	C
			B	0.157	2.748	0.583	1	1	61.211			
			C	0.174	2.687	0.585	1	1	69.474			
Sum Weight:	4113.65	19831.70						OTM	1545311.4 4 lb-ft	30592.23		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.182	2.658	0.587	0.825	1	43.004	5636.34	281.82	C
100.00-80.00			B	0.164	2.72	0.584	0.825	1	38.102			
			C	0.199	2.599	0.59	0.825	1	47.914			
T2	861.30	2792.19	A	0.157	2.745	0.583	0.825	1	40.929	5661.26	283.06	C
80.00-60.00			B	0.141	2.803	0.58	0.825	1	36.048			
			C	0.173	2.689	0.585	0.825	1	45.818			
T3	909.12	3510.42	A	0.157	2.747	0.583	0.825	1	45.544	5865.29	293.26	C
60.00-40.00			B	0.142	2.8	0.58	0.825	1	40.669			
			C	0.171	2.695	0.585	0.825	1	50.426			
T4	913.00	5318.65	A	0.158	2.741	0.583	0.825	1	49.877	5513.43	275.67	C
40.00-20.00			B	0.145	2.789	0.581	0.825	1	44.997			
			C	0.172	2.694	0.585	0.825	1	54.764			
T5 20.00-0.00	639.10	5713.24	A	0.165	2.717	0.584	0.825	1	57.318	5303.36	265.17	C
			B	0.157	2.748	0.583	0.825	1	53.903			
			C	0.174	2.687	0.585	0.825	1	60.736			
Sum Weight:	4113.65	19831.70						OTM	1415259.2 4 lb-ft	27979.67		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.182	2.658	0.587	0.8	1	42.213	5558.18	277.91	C
100.00-80.00			B	0.164	2.72	0.584	0.8	1	37.457			
			C	0.199	2.599	0.59	0.8	1	46.977			
T2	861.30	2792.19	A	0.157	2.745	0.583	0.8	1	40.197	5590.75	279.54	C
80.00-60.00			B	0.141	2.803	0.58	0.8	1	35.461			
			C	0.173	2.689	0.585	0.8	1	44.940			
T3	909.12	3510.42	A	0.157	2.747	0.583	0.8	1	44.672	5790.86	289.54	C
60.00-40.00			B	0.142	2.8	0.58	0.8	1	39.943			
			C	0.171	2.695	0.585	0.8	1	49.408			
T4	913.00	5318.65	A	0.158	2.741	0.583	0.8	1	48.955	5444.11	272.21	C
40.00-20.00			B	0.145	2.789	0.581	0.8	1	44.220			
			C	0.172	2.694	0.585	0.8	1	53.696			
T5 20.00-0.00	639.10	5713.24	A	0.165	2.717	0.584	0.8	1	56.172	5222.54	261.13	C
			B	0.157	2.748	0.583	0.8	1	52.859			
			C	0.174	2.687	0.585	0.8	1	59.488			
Sum Weight:	4113.65	19831.70						OTM	1396680.3 5 lb-ft	27606.44		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1	791.13	2497.20	A	0.182	2.658	0.587	0.85	1	43.795	5714.50	285.72	C
100.00-80.00			B	0.164	2.72	0.584	0.85	1	38.748			
			C	0.199	2.599	0.59	0.85	1	48.851			
T2	861.30	2792.19	A	0.157	2.745	0.583	0.85	1	41.661	5731.76	286.59	C
80.00-60.00			B	0.141	2.803	0.58	0.85	1	36.634			
			C	0.173	2.689	0.585	0.85	1	46.696			
T3	909.12	3510.42	A	0.157	2.747	0.583	0.85	1	46.416	5939.72	296.99	C
60.00-40.00			B	0.142	2.8	0.58	0.85	1	41.395			
			C	0.171	2.695	0.585	0.85	1	51.444			
T4	913.00	5318.65	A	0.158	2.741	0.583	0.85	1	50.799	5582.74	279.14	C
40.00-20.00			B	0.145	2.789	0.581	0.85	1	45.773			
			C	0.172	2.694	0.585	0.85	1	55.831			
T5 20.00-0.00	639.10	5713.24	A	0.165	2.717	0.584	0.85	1	58.464	5384.17	269.21	C
			B	0.157	2.748	0.583	0.85	1	54.947			
			C	0.174	2.687	0.585	0.85	1	61.984			
Sum Weight:	4113.65	19831.70						OTM	1433838.1 3 lb-ft	28352.89		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	8863.38					
Bracing Weight	10968.32					
Total Member Self-Weight	19831.70			10775.40	8176.63	
Total Weight	27451.72			10775.40	8176.63	
Wind 0 deg - No Ice		-26.88	-37600.63	-2171173.27	10864.45	-12398.63
Wind 30 deg - No Ice		17672.88	-30610.33	-1780964.94	-1026285.14	6604.87
Wind 45 deg - No Ice		24743.24	-24721.29	-1438233.93	-1443027.30	15105.37
Wind 60 deg - No Ice		29990.77	-17284.14	-1003555.67	-1754071.97	22387.27
Wind 90 deg - No Ice		35392.32	26.88	13463.22	-2065402.36	32916.43
Wind 120 deg - No Ice		32603.42	18823.59	1104077.46	-1885478.09	36507.37
Wind 135 deg - No Ice		24781.25	24759.30	1463585.89	-1446828.46	30955.17
Wind 150 deg - No Ice		17719.44	30637.21	1805203.57	-1030940.59	26311.56
Wind 180 deg - No Ice		26.88	34614.84	2044092.98	5488.80	11037.34
Wind 210 deg - No Ice		-17672.88	30610.33	1802515.74	1042638.40	-6604.87
Wind 225 deg - No Ice		-24743.24	24721.29	1459784.73	1459380.55	-15105.37
Wind 240 deg - No Ice		-32576.54	18777.04	1099422.01	1899143.51	-24108.73
Wind 270 deg - No Ice		-35392.32	-26.88	8087.58	2081755.61	-32916.43
Wind 300 deg - No Ice		-30017.65	-17330.70	-1008211.12	1773113.04	-33424.61
Wind 315 deg - No Ice		-24781.25	-24759.30	-1442035.09	1463181.71	-30955.17
Wind 330 deg - No Ice		-17719.44	-30637.21	-1783652.77	1047293.84	-26311.56
Member Ice	6518.44					
Total Weight Ice	39330.36			22013.21	13032.26	
Wind 0 deg - Ice		-27.91	-51962.08	-3000791.97	15823.09	-15302.31
Wind 30 deg - Ice		24746.84	-42862.79	-2487553.52	-1435866.76	23292.57
Wind 45 deg - Ice		34722.77	-34699.98	-2011663.04	-2022922.69	39892.80
Wind 60 deg - Ice		42182.79	-24322.02	-1404708.56	-2463703.98	53478.64
Wind 90 deg - Ice		49542.03	27.91	24804.04	-2889599.65	70647.15
Wind 120 deg - Ice		45042.34	26005.21	1535832.73	-2608980.06	71810.89
Wind 135 deg - Ice		34762.23	34739.45	2059636.29	-2026869.52	59206.99
Wind 150 deg - Ice		24795.18	42890.70	2534370.77	-1440700.62	47354.59
Wind 180 deg - Ice		27.91	48692.37	2880290.60	10241.44	13422.18
Wind 210 deg - Ice		-24746.84	42862.79	2531579.94	1461931.29	-23292.57
Wind 225 deg - Ice		-34722.77	34699.98	2055689.46	2048987.22	-39892.80
Wind 240 deg - Ice		-45014.43	25956.87	1530998.88	2632253.76	-56508.57
Wind 270 deg - Ice		-49542.03	-27.91	19222.38	2915664.17	-70647.15
Wind 300 deg - Ice		-42210.70	-24370.36	-1409542.41	2492559.34	-66900.82
Wind 315 deg - Ice		-34762.23	-34739.45	-2015609.87	2052934.04	-59206.99
Wind 330 deg - Ice		-24795.18	-42890.70	-2490344.35	1466765.15	-47354.59
Total Weight	27451.72			10775.40	8176.63	
Wind 0 deg - Service		-26.88	-37600.63	-2179591.81	3164.28	-12398.63
Wind 30 deg - Service		17672.88	-30610.33	-1789383.48	-1033985.31	6604.87
Wind 45 deg - Service		24743.24	-24721.29	-1446652.47	-1450727.47	15105.37
Wind 60 deg - Service		29990.77	-17284.14	-1011974.21	-1761772.13	22387.27
Wind 90 deg - Service		35392.32	26.88	5044.69	-2073102.52	32916.43
Wind 120 deg - Service		32603.42	18823.59	1095658.92	-1893178.25	36507.37
Wind 135 deg - Service		24781.25	24759.30	1455167.35	-1454528.62	30955.17
Wind 150 deg - Service		17719.44	30637.21	1796785.03	-1038640.75	26311.56
Wind 180 deg - Service		26.88	34614.84	2035674.45	-2211.36	11037.34
Wind 210 deg - Service		-17672.88	30610.33	1794097.21	1034938.23	-6604.87
Wind 225 deg - Service		-24743.24	24721.29	1451366.19	1451680.39	-15105.37
Wind 240 deg - Service		-32576.54	18777.04	1091003.47	1891443.35	-24108.73
Wind 270 deg - Service		-35392.32	-26.88	-330.96	2074055.45	-32916.43
Wind 300 deg - Service		-30017.65	-17330.70	-1016629.65	1765412.88	-33424.61
Wind 315 deg - Service		-24781.25	-24759.30	-1450453.62	1455481.55	-30955.17
Wind 330 deg - Service		-17719.44	-30637.21	-1792071.30	1039593.68	-26311.56

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	1.237	46	0.0693	0.0211
T2	80 - 60	0.914	46	0.0663	0.0178
T3	60 - 40	0.596	46	0.0555	0.0144
T4	40 - 20	0.318	46	0.0394	0.0095
T5	20 - 0	0.120	46	0.0223	0.0049

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	22' x 3" OD Omni w/ 36" Mount Pipe	46	1.237	0.0693	0.0211	Inf
99.00	Reflector Dish	46	1.221	0.0693	0.0210	Inf
95.00	2' Dish	46	1.156	0.0690	0.0203	Inf
94.00	6' Grid Dish	46	1.140	0.0689	0.0201	Inf
90.00	4 FT Dish	46	1.076	0.0684	0.0195	Inf
86.00	9' Dipole AF	46	1.011	0.0678	0.0188	Inf
85.00	12' Dipole IK	46	0.995	0.0676	0.0186	966430
83.00	8' x 2.5" OD Omni - Ak	46	0.963	0.0671	0.0183	875014
80.00	Side Arm Mount [SO 311-1]	46	0.914	0.0663	0.0178	Inf
70.00	12' Dipole IK	46	0.753	0.0619	0.0163	256990
60.00	Side Arm Mount [SO 311-1]	46	0.596	0.0555	0.0144	115418
58.00	20' x 3.5" OD Omni w/ 36" Mount Pipe	46	0.565	0.0541	0.0139	104194
50.00	DB806M-Y	46	0.449	0.0477	0.0120	75512
30.00	DB803M-Y	46	0.208	0.0312	0.0072	53144

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	1.709	30	0.0955	0.0462
T2	80 - 60	1.266	30	0.0915	0.0392
T3	60 - 40	0.827	30	0.0768	0.0300
T4	40 - 20	0.442	30	0.0546	0.0189
T5	20 - 0	0.167	30	0.0310	0.0096

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
100.00	22' x 3" OD Omni w/ 36" Mount Pipe	30	1.709	0.0955	0.0462	Inf
99.00	Reflector Dish	30	1.687	0.0954	0.0458	Inf
95.00	2' Dish	30	1.599	0.0950	0.0445	Inf
94.00	6' Grid Dish	30	1.577	0.0949	0.0442	Inf

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
90.00	4 FT Dish	30	1.488	0.0944	0.0429	914200
86.00	9' Dipole AF	30	1.400	0.0935	0.0415	653014
85.00	12' Dipole IK	30	1.378	0.0932	0.0411	609473
83.00	8' x 2.5" OD Omni - Ak	30	1.333	0.0926	0.0404	549920
80.00	Side Arm Mount [SO 311-1]	30	1.266	0.0915	0.0392	646941
70.00	12' Dipole IK	30	1.043	0.0855	0.0349	199557
60.00	Side Arm Mount [SO 311-1]	30	0.827	0.0768	0.0300	87166
58.00	20' x 3.5" OD Omni w/ 36" Mount Pipe	30	0.785	0.0748	0.0289	78254
50.00	DB806M-Y	30	0.623	0.0660	0.0244	55656
30.00	DB803M-Y	30	0.289	0.0433	0.0141	38282

(REFERENCE) STRUCTURAL ANALYSIS REPORT – ANTENNA MOUNT ANALYSIS WITH PROPOSED RDFS

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

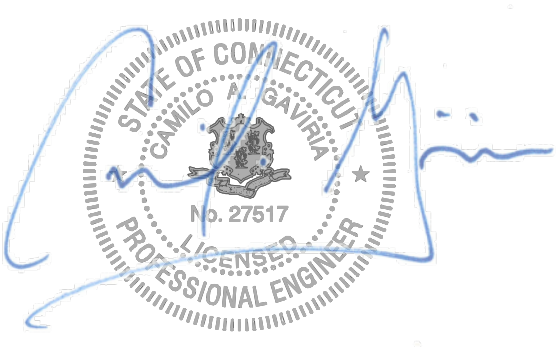
T-Mobile Site #: CT11249A

15 Old Hartford Road
Colchester, CT

Centek Project No. 19027.06

~~Date: April 29, 2019~~
Rev 1: May 6, 2019

Max Stress Ratio = 65.5%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

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CENTEK engineering

Centered on Solutions℠

May 6, 2019

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

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CT11249A
15 Old Hartford Road
Colchester, CT 06415

Centek Project No. 19027.06

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 antenna mount, and the proposed antenna masts that consist of three (3) Pipe 2.5 STD ×9-ft long. 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:**
  Antenna Mount: Three (3) RFS-APXVAARR24_43-U-NA20 panel antennas, three (3) Ericsson 4449 B71_B12, three (3) Ericsson 4415 B25, and three (3) Ericsson 4415 B66A remote radio units mounted on pipe masts with a RAD center elevation of 95-ft +/- AGL.
- **Appurtenances by Others:**
- **Antenna Mount: Four (4) 22-ft Whip antennas, one (1) 14-ft Whip antennas, two (2) 10-ft Whip antennas, one(1) 12-ft Whip antennas, four (4) 2-ft Corner Reflector, one (1) 2-ft Dish antenna, one (1) 6-ft mounted on pipe masts with a RAD center elevations of 100-ft, 99-ft, 95-ft and 94-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 108 mph for Colchester as required in Appendix N of the 2018 Connecticut State Building Code.

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

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

Respectfully Submitted by:

Camilo A. Gaviria, PE
Structural Engineer

STATE OF CONNECTICUT
CAMILO A. GAVIRIA
No. 27517
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

Fernando J. Palacios
Engineer

Section 2 - Calculations

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Subject: Loads on Equipment

Location: Colchester, CT

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

Wind Speeds

Basic Wind Speed	$V := 108$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-G)

Input

Structure Type =	$Structure\_Type := Lattice$		(User Input)
Structure Category =	$SC := III$		(User Input)
Exposure Category =	$Exp := B$		(User Input)
Structure Height =	$h := 100$	ft	(User Input)
Height to Center of Antennas =	$z := 95$	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 =	$G_H = 1.2$		(User Input)

Output

Wind Direction Probability Factor =

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

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

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

Importance Factors =

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

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

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

$$K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.112$$

Velocity Pressure Coefficient Antennas =

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.084$$

$$Kz := 2.01 \cdot \left(\left(\frac{z}{zg}\right)\right)^{\frac{2}{\alpha}} = 0.974$$

Velocity Pressure w/o Ice Antennas = $qz := 0.00256 \cdot K_d \cdot Kz \cdot V^2 \cdot I_{Wind} = 28.425$ psf

Velocity Pressure with Ice Antennas = $qz_{ice} := 0.00256 \cdot K_d \cdot Kz \cdot V_i^2 \cdot I_{Wind} = 6.092$ psf

Development of Wind & Ice Load on Antennas

T-Mobile Antenna Data:

Antenna Model =	RFS APXVAARR24_43		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 19.7$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 133.4$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.9$		
Antenna Force Coefficient =	$Ca_{ant} = 1.31$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 13.1$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 584$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 258$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 16.6$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 158$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.9$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 85$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \cdot 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \cdot 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 463$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 463$	lbs

Development of Wind & Ice Load on RRUS's

T-Mobile 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 =	$N_{RRUS} := 1$		
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 =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 56$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 44$	lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.3$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 20$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.9$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 17$	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 =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2779$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 90$	lbs
Weight of Ice on All RRUSs =	$W_{ICERRUS} \cdot N_{RRUS} = 90$	lbs

Development of Wind & Ice Load on RRUS's

T-Mobile RRUS Data:

RRUS Model =	Ericsson 4415 B25		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 16.5$	in	(User Input)
RRUS Width =	$W_{RRUS} := 13.4$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 5.9$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 46$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.2$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRUS =	$SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.5$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 63$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 0.7$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 28$	lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.5$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 22$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.4$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 13$	lbs

Gravity Load (without ice)

Weight of All RRUSs =	$WT_{RRUS} \cdot N_{RRUS} = 46$	lbs

Gravity Loads (ice only)

Volume of Each RRUS =	$V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 1304$	cu in
Volume of Ice on Each RRUS =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2351$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 76$	lbs
Weight of Ice on All RRUSs =	$W_{ICERRUS} \cdot N_{RRUS} = 76$	lbs

Development of Wind & Ice Load on RRUS's

T-Mobile RRUS Data:

RRUS Model =	Ericsson 4415 B66A		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 16.5$	in	(User Input)
RRUS Width =	$W_{RRUS} := 13.4$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 5.9$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 47.40$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.2$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRUS =	$SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.5$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 63$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 0.7$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 28$	lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.5$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 22$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.4$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 13$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each RRUS =	$V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 1304$	cu in
Volume of Ice on Each RRUS =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2351$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 76$	lbs
Weight of Ice on All RRUSs =	$W_{ICERRUS} \cdot N_{RRUS} = 76$	lbs

Development of Wind & Ice Load on TMA's

T-Mobile TMA Data:

TMA Model =	Ericsson KRY112 TMA		
TMA Shape =	Flat	in	(User Input)
TMA Height =	$L_{TMA} := 6.9$	in	(User Input)
TMA Width =	$W_{TMA} := 6.1$	in	(User Input)
TMA Thickness =	$T_{TMA} := 2.8$	lbs	(User Input)
TMA Weight =	$WT_{TMA} := 11$		(User Input)
Number of TMA's =	$N_{TMA} := 1$		(User Input)
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1.1$		
TMA Force Coefficient =	$Ca_{TMA} = 1.2$		

Wind Load (without ice)

Surface Area for One TMA =	$SA_{TMAF} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.3$	sf
Total TMA Wind Force =	$F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAF} = 12$	lbs
Surface Area for One TMA =	$SA_{TMAS} := \frac{L_{TMA} \cdot T_{TMA}}{144} = 0.1$	sf
Total TMA Wind Force =	$F_{TMA} := qz \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAS} = 5$	lbs

Wind Load (with ice)

Surface Area for One TMA w/ Ice =	$SA_{ICETMAF} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz})}{144} = 0.8$	sf
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qz_{ice} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAF} = 7$	lbs
Surface Area for One TMA w/ Ice =	$SA_{ICETMAS} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz})}{144} = 0.5$	sf
Total TMA Wind Force w/ Ice =	$Fi_{TMA} := qz_{ice} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAS} = 5$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each TMA =	$V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 118$	cu in
Volume of Ice on Each TMA =	$V_{ice} := (L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz}) - V_{TMA} = 674$	cu in
Weight of Ice on Each TMA =	$W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 22$	lbs
Weight of Ice on All TMAs =	$W_{ICETMA} \cdot N_{TMA} = 22$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Type=	22' Whip 3" Dia		(User Input)
Antenna Weight =	$WT_{ant} := 160.74$	lbs	(User Input)
Antenna Ice Weight =	$W_{ICEant} := 294.59$	lbs	(User Input)

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := 7.32$	sf	(User Input)
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antF} = 250$	lbs	
Surface Area for One Antenna =	$SA_{antS} := 7.32$	sf	(User Input)
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antS} = 250$	lbs	

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := 12.24$	sf	(User Input)
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantF} = 89$	lbs	
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := 12.24$	sf	(User Input)
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantS} = 89$	lbs	

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 161$	lbs

Gravity Loads (ice only)

Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 295$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Type=	14' Whip 3" Dia		(User Input)
Antenna Weight =	$WT_{ant} := 110.74$	lbs	(User Input)
Antenna Ice Weight =	$W_{ICEant} := 205.49$	lbs	(User Input)

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := 4.92$	sf	(User Input)
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antF} = 168$	lbs	
Surface Area for One Antenna =	$SA_{antS} := 4.92$	sf	(User Input)
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antS} = 168$	lbs	

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := 8.24$	sf	(User Input)
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantF} = 60$	lbs	
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := 8.24$	sf	(User Input)
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantS} = 60$	lbs	

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 111$	lbs

Gravity Loads (ice only)

Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 205$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Type=	12' Whip 3" Dia		(User Input)
Antenna Weight =	$WT_{ant} := 97.74$	lbs	(User Input)
Antenna Ice Weight =	$W_{ICEant} := 137.5$	lbs	(User Input)

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := 4.62$	sf	(User Input)
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antF} = 158$	lbs	
Surface Area for One Antenna =	$SA_{antS} := 4.62$	sf	(User Input)
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antS} = 158$	lbs	

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := 7.74$	sf	(User Input)
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantF} = 57$	lbs	
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := 7.74$	sf	(User Input)
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantS} = 57$	lbs	

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 98$	lbs

Gravity Loads (ice only)

Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 138$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Type=	6'- P2X0.154			(User Input)
Antenna Weight =	$WT_{ant} := 21.26$	lbs		(User Input)
Antenna Ice Weight =	$W_{ICEant} := 42.67$	lbs		(User Input)

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := 1.43$	sf	(User Input)
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antF} = 49$	lbs	
Surface Area for One Antenna =	$SA_{antS} := 1.43$	sf	(User Input)
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antS} = 49$	lbs	

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := 2.29$	sf	(User Input)
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantF} = 17$	lbs	
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := 2.29$	sf	(User Input)
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantS} = 17$	lbs	

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 21$	lbs

Gravity Loads (ice only)

Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 43$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Type=	10' X 2.5" dia Whip		(User Input)
Antenna Weight =	$WT_{ant} := 30$	lbs	(User Input)
Antenna Ice Weight =	$W_{ICEant} := 73.79$	lbs	(User Input)

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := 1.43$	sf	(User Input)
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antF} = 49$	lbs	
Surface Area for One Antenna =	$SA_{antS} := 1.43$	sf	(User Input)
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot K_a \cdot SA_{antS} = 49$	lbs	

Wind Load (with ice)

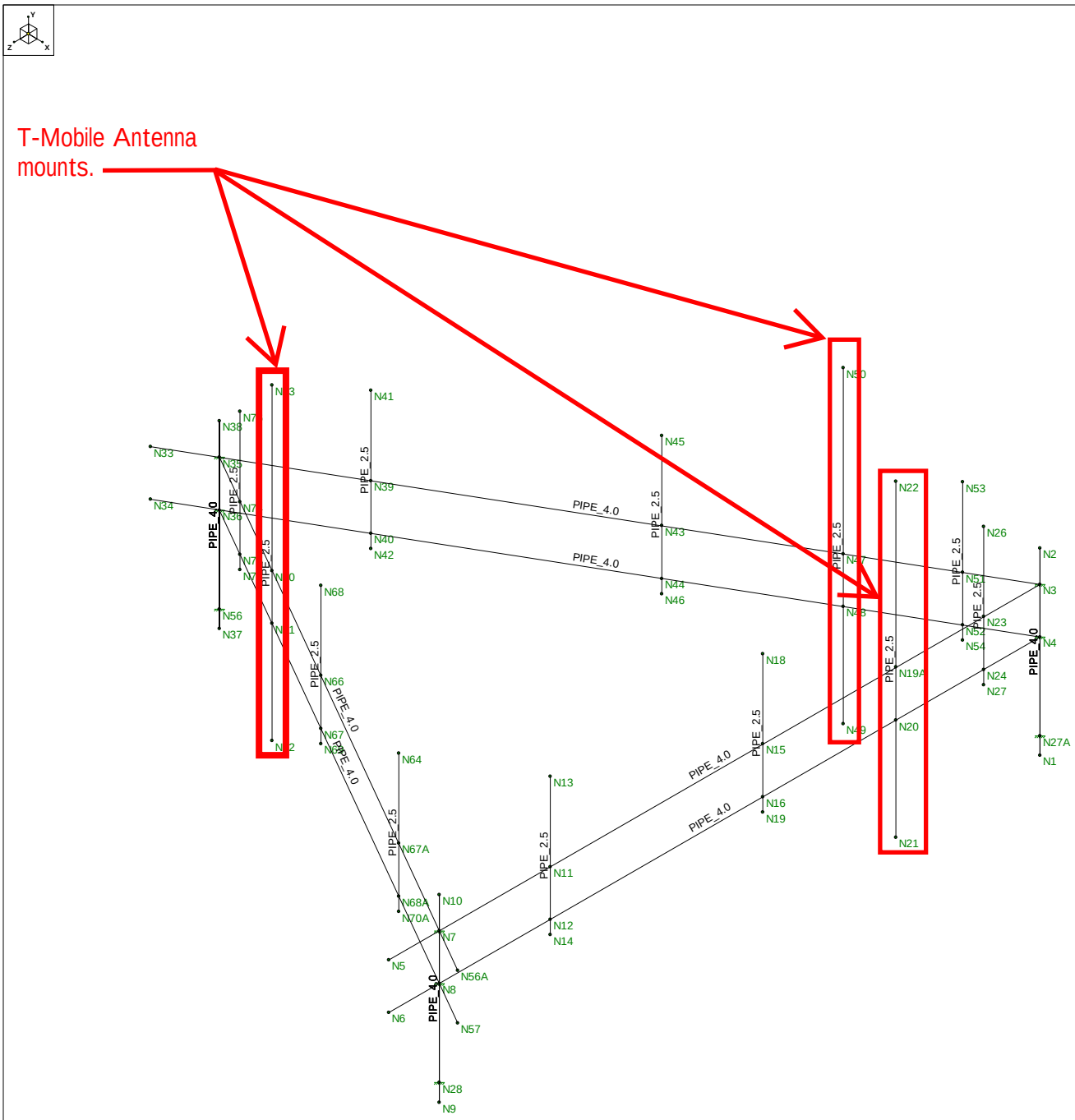
Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := 2.29$	sf	(User Input)
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantF} = 17$	lbs	
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := 2.29$	sf	(User Input)
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot K_a \cdot SA_{ICEantS} = 17$	lbs	

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 30$	lbs

Gravity Loads (ice only)

Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 74$	lbs



Envelope Only Solution

Centek		
FJP	CT11249A_AMA	May 6, 2019 at 6:41 AM
19027.06	Member Framing	CT11249A_AMA.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?	Yes
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	1
Cd X	1
Rho Z	1
Rho X	1

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	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 Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[..	Lcomp bot[..	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	(E) Vertical...	5.25									Lateral
2	3351	(E) Horizo...	19	Segment		Lbyy						Lateral
3	3351.1	(E) Horizo...	19	Segment		Lbyy						Lateral
4	M4	(E) Vertical...	5.25									Lateral
5	M5	(E) Antenn...	4	Segment		Lbyy						Lateral
6	M6	(E) Antenn...	4	Segment		Lbyy						Lateral
7	M7	(P) Antenn...	9	Segment		Lbyy						Lateral
8	M8	(E) Antenn...	4	Segment		Lbyy						Lateral
9	M12	(E) Vertical...	5.25									Lateral
10	M17	(E) Vertical...	5.25									Lateral
11	M11	(E) Vertical...	5.25									Lateral
12	M12A	(E) Horizo...	19	Segment		Lbyy						Lateral
13	M13	(E) Horizo...	19	Segment		Lbyy						Lateral
14	M14	(E) Vertical...	5.25									Lateral
15	M15	(E) Antenn...	4	Segment		Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[..	Lcomp bot[..	L-torq...	Kyy	Kzz	Cb	Functi...
16	M16	(E) Antenn...	4	Segment		Lbyy						Lateral
17	M17A	(P) Antenn...	9	Segment		Lbyy						Lateral
18	M18	(E) Antenn...	4	Segment		Lbyy						Lateral
19	M19	(E) Vertical...	5.25									Lateral
20	M20	(E) Vertical...	5.25									Lateral
21	M21	(E) Vertical...	5.25									Lateral
22	M22	(E) Horizo...	19	Segment		Lbyy						Lateral
23	M23	(E) Horizo...	19	Segment		Lbyy						Lateral
24	M24	(E) Vertical...	5.25									Lateral
25	M26	(E) Antenn...	4	Segment		Lbyy						Lateral
26	M27	(P) Antenn...	9	Segment		Lbyy						Lateral
27	M28	(E) Antenn...	4	Segment		Lbyy						Lateral
28	M29	(E) Vertical...	5.25									Lateral
29	M30	(E) Vertical...	5.25									Lateral
30	M31	(E) Vertical...	5.25									Lateral
31	M32	(E) Vertical...	5.25									Lateral
32	M32A	(E) Antenn...	4	Segment		Lbyy						Lateral

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Desig..	A [in2]	Iyy [i...	Izz [i...	J [in4]
1	(E) Antenna Mast Pip...	PIPE_2.5	Colu...	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89
2	(E) Vertical Pipe 4.0	PIPE_4.0	Colu...	Pipe	A53 Grade B	Typical	2.96	6.82	6.82	13.6
3	(E) Horizontal Pipe 4.0	PIPE_4.0	Colu...	Pipe	A53 Grade B	Typical	2.96	6.82	6.82	13.6
4	(P) Antenna Mast Pip...	PIPE_2.5	Colu...	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
2	3351	N5	N3			(E) Horizontal Pipe...	Column	Pipe	A53 Grad...	Typical
3	3351.1	N6	N4			(E) Horizontal Pipe...	Column	Pipe	A53 Grad...	Typical
4	M4	N9	N10			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
5	M5	N14	N13			(E) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
6	M6	N19	N18			(E) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
7	M7	N22	N21			(P) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
8	M8	N27	N26			(E) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
9	M12	N9	N10			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
10	M17	N1	N2			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
11	M11	N1	N2			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
12	M12A	N33	N3			(E) Horizontal Pipe...	Column	Pipe	A53 Grad...	Typical
13	M13	N34	N4			(E) Horizontal Pipe...	Column	Pipe	A53 Grad...	Typical
14	M14	N37	N38			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
15	M15	N42	N41			(E) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
16	M16	N46	N45			(E) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
17	M17A	N50	N49			(P) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
18	M18	N54	N53			(E) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
19	M19	N37	N38			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
20	M20	N1	N2			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
21	M21	N37	N38			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
22	M22	N56A	N35			(E) Horizontal Pipe...	Column	Pipe	A53 Grad...	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
23	M23	N57	N36			(E) Horizontal Pipe...	Column	Pipe	A53 Grad...	Typical
24	M24	N9	N10			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
25	M26	N69	N68			(E) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
26	M27	N73	N72			(P) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
27	M28	N77	N76			(E) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical
28	M29	N9	N10			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
29	M30	N37	N38			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
30	M31	N37	N38			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
31	M32	N37	N38			(E) Vertical Pipe 4.0	Column	Pipe	A53 Grad...	Typical
32	M32A	N70A	N64			(E) Antenna Mast ...	Column	Pipe	A53 Grad...	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
1	N1	0	0	0	0	
2	N2	0	5.25	0	0	
3	N3	0	4.333333	0	0	
4	N4	0	3	0	0	
5	N5	0	4.333333	19	0	
6	N6	0	3	19	0	
7	N7	0	4.333333	17.53125	0	
8	N8	0	3	17.53125	0	
9	N9	0	0	17.53125	0	
10	N10	0	5.25	17.53125	0	
11	N11	0	4.333333	14.291667	0	
12	N12	0	3	14.291667	0	
13	N13	0	6.614583	14.291667	0	
14	N14	0	2.614583	14.291667	0	
15	N15	0	4.333333	8.083333	0	
16	N16	0	3	8.083333	0	
17	N18	0	6.614583	8.083333	0	
18	N19	0	2.614583	8.083333	0	
19	N19A	0	4.333333	4.197917	0	
20	N20	0	3	4.197917	0	
21	N21	0	0.03125	4.197917	0	
22	N22	0	9.03125	4.197917	0	
23	N23	0	4.333333	1.645833	0	
24	N24	0	3	1.645833	0	
25	N26	0	6.614583	1.645833	0	
26	N27	0	2.614583	1.645833	0	
27	N27A	0	.5	0	0	
28	N28	0	.5	17.53125	0	
29	N33	-16.454483	4.333333	9.5	0	
30	N34	-16.454483	3	9.5	0	
31	N35	-15.182508	4.333333	8.765625	0	
32	N36	-15.182508	3	8.765625	0	
33	N37	-15.182508	0	8.765625	0	
34	N38	-15.182508	5.25	8.765625	0	
35	N39	-12.376946	4.333333	7.145833	0	
36	N40	-12.376946	3	7.145833	0	
37	N41	-12.376946	6.614583	7.145833	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diaphragm
38	N42	-12.376946	2.614583	7.145833	0	
39	N43	-7.000372	4.333333	4.041667	0	
40	N44	-7.000372	3	4.041667	0	
41	N45	-7.000372	6.614583	4.041667	0	
42	N46	-7.000372	2.614583	4.041667	0	
43	N47	-3.635502	4.333333	2.098958	0	
44	N48	-3.635502	3	2.098958	0	
45	N49	-3.635502	0.03125	2.098958	0	
46	N50	-3.635502	9.03125	2.098958	0	
47	N51	-1.425333	4.333333	0.822917	0	
48	N52	-1.425333	3	0.822917	0	
49	N53	-1.425333	6.614583	0.822917	0	
50	N54	-1.425333	2.614583	0.822917	0	
51	N56	-15.182508	.5	8.765625	0	
52	N56A	1.271975	4.333333	18.265625	0	
53	N57	1.271975	3	18.265625	0	
54	N64	-2.805561	6.614583	15.911458	0	
55	N66	-8.182136	4.333333	12.807292	0	
56	N67	-8.182136	3	12.807292	0	
57	N68	-8.182136	6.614583	12.807292	0	
58	N69	-8.182136	2.614583	12.807292	0	
59	N70	-11.547005	4.333333	10.864583	0	
60	N71	-11.547005	3	10.864583	0	
61	N72	-11.547005	0.03125	10.864583	0	
62	N73	-11.547005	9.03125	10.864583	0	
63	N74	-13.757174	4.333333	9.588542	0	
64	N75	-13.757174	3	9.588542	0	
65	N76	-13.757174	6.614583	9.588542	0	
66	N77	-13.757174	2.614583	9.588542	0	
67	N67A	-2.805561	4.333333	15.911458	0	
68	N68A	-2.805561	3	15.911458	0	
69	N70A	-2.805561	2.614583	15.911458	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	N3	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N4	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N5						
4	N6						
5	N7	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
6	N8	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
7	N11						
8	N12						
9	N13						
10	N14						
11	N15						
12	N16						
13	N18						
14	N19						
15	N19A						

Joint Boundary Conditions (Continued)

	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]
16	N20						
17	N21						
18	N22						
19	N23						
20	N24						
21	N26						
22	N27						
23	N27A	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
24	N28	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
25	N33						
26	N34						
27	N35	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
28	N36	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
29	N39						
30	N40						
31	N41						
32	N42						
33	N43						
34	N44						
35	N45						
36	N46						
37	N47						
38	N48						
39	N49						
40	N50						
41	N51						
42	N52						
43	N53						
44	N54						
45	N56	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
46	N56A						
47	N57						
48	N64						
49	N66						
50	N67						
51	N68						
52	N69						
53	N70						
54	N71						
55	N72						
56	N73						
57	N74						
58	N75						
59	N76						
60	N77						
61	N67A						
62	N68A						
63	N70A						

Member Point Loads (BLC 2 : Equipment Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	Y	-.067	1
2	M7	Y	-.067	7
3	M7	Y	-.074	1.25
4	M7	Y	-.046	2.667
5	M7	Y	-.047	3.833
6	M5	Y	-.021	1.052
7	M6	Y	-.021	1.052
8	M6	Y	-.161	2.859
9	M8	Y	-.161	2.859
10	M15	Y	-.161	2.859
11	M16	Y	-.021	1.052
12	M16	Y	-.322	2.859
13	M17A	Y	-.067	1
14	M17A	Y	-.067	7
15	M17A	Y	-.074	1.25
16	M17A	Y	-.046	2.667
17	M17A	Y	-.047	3.833
18	M18	Y	-.161	2.859
19	M26	Y	-.021	1.052
20	M26	Y	-.161	2.859
21	M27	Y	-.067	1
22	M27	Y	-.067	7
23	M27	Y	-.074	1.25
24	M27	Y	-.046	2.667
25	M27	Y	-.047	3.833
26	M28	Y	-.161	2.859
27	M32A	Y	-.161	2.859

Member Point Loads (BLC 3 : Ice Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	Y	-.232	1
2	M7	Y	-.232	7
3	M7	Y	-.09	1.25
4	M7	Y	-.076	2.667
5	M7	Y	-.076	3.833
6	M5	Y	-.043	1.052
7	M6	Y	-.043	1.052
8	M6	Y	-.295	2.859
9	M8	Y	-.295	2.859
10	M15	Y	-.295	2.859
11	M16	Y	-.043	1.052
12	M16	Y	-.59	2.859
13	M17A	Y	-.232	1
14	M17A	Y	-.232	7
15	M17A	Y	-.09	1.25
16	M17A	Y	-.076	2.667
17	M17A	Y	-.076	3.833
18	M18	Y	-.295	2.859
19	M26	Y	-.043	1.052
20	M26	Y	-.295	2.859

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
21	M27	Y	-.232	1
22	M27	Y	-.232	7
23	M27	Y	-.09	1.25
24	M27	Y	-.076	2.667
25	M27	Y	-.076	3.833
26	M28	Y	-.295	2.859
27	M32A	Y	-.295	2.859

Member Point Loads (BLC 4 : Wind w/ Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	X	.043	1
2	M7	X	.043	7
3	M7	X	.017	1.25
4	M7	X	.013	2.667
5	M7	X	.013	3.833
6	M5	X	.017	1.052
7	M6	X	.017	1.052
8	M6	X	.089	2.859
9	M8	X	.089	2.859
10	M15	X	.089	2.859
11	M16	X	.017	1.052
12	M16	X	.178	2.859
13	M17A	X	.043	1
14	M17A	X	.043	7
15	M17A	X	.017	1.25
16	M17A	X	.013	2.667
17	M17A	X	.013	3.833
18	M18	X	.089	2.859
19	M26	X	.017	1.052
20	M26	X	.089	2.859
21	M27	X	.043	1
22	M27	X	.043	7
23	M27	X	.017	1.25
24	M27	X	.013	2.667
25	M27	X	.013	3.833
26	M28	X	.089	2.859
27	M32A	X	.089	2.859

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	X	.129	1
2	M7	X	.129	7
3	M7	X	.044	1.25
4	M7	X	.028	2.667
5	M7	X	.028	3.833
6	M5	X	.049	1.052
7	M6	X	.049	1.052
8	M6	X	.25	2.859
9	M8	X	.25	2.859
10	M15	X	.25	2.859
11	M16	X	.049	1.052

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
12	M16	X	.5	2.859
13	M17A	X	.129	1
14	M17A	X	.129	7
15	M17A	X	.044	1.25
16	M17A	X	.028	2.667
17	M17A	X	.028	3.833
18	M18	X	.25	2.859
19	M26	X	.049	1.052
20	M26	X	.25	2.859
21	M27	X	.129	1
22	M27	X	.129	7
23	M27	X	.044	1.25
24	M27	X	.028	2.667
25	M27	X	.028	3.833
26	M28	X	.25	2.859
27	M32A	X	.25	2.859

Member Point Loads (BLC 6 : Wind w/ Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	Z	.079	1
2	M7	Z	.079	7
3	M7	Z	.02	1.25
4	M7	Z	.022	2.667
5	M7	Z	.022	3.833
6	M5	Z	.017	1.052
7	M6	Z	.017	1.052
8	M6	Z	.089	2.859
9	M8	Z	.089	2.859
10	M15	Z	.089	2.859
11	M16	Z	.017	1.052
12	M16	Z	.178	2.859
13	M17A	Z	.079	1
14	M17A	Z	.079	7
15	M17A	Z	.02	1.25
16	M17A	Z	.022	2.667
17	M17A	Z	.022	3.833
18	M18	Z	.089	2.859
19	M26	Z	.017	1.052
20	M26	Z	.089	2.859
21	M27	Z	.079	1
22	M27	Z	.079	7
23	M27	Z	.02	1.25
24	M27	Z	.022	2.667
25	M27	Z	.022	3.833
26	M28	Z	.089	2.859
27	M32A	Z	.089	2.859

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	Z	.292	1
2	M7	Z	.292	7

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
3	M7	Z	.056	1.25
4	M7	Z	.063	2.667
5	M7	Z	.063	3.833
6	M5	Z	.049	1.052
7	M6	Z	.049	1.052
8	M6	Z	.25	2.859
9	M8	Z	.25	2.859
10	M15	Z	.25	2.859
11	M16	Z	.049	1.052
12	M16	Z	.5	2.859
13	M17A	Z	.292	1
14	M17A	Z	.292	7
15	M17A	Z	.056	1.25
16	M17A	Z	.063	2.667
17	M17A	Z	.063	3.833
18	M18	Z	.25	2.859
19	M26	Z	.049	1.052
20	M26	Z	.25	2.859
21	M27	Z	.292	1
22	M27	Z	.292	7
23	M27	Z	.056	1.25
24	M27	Z	.063	2.667
25	M27	Z	.063	3.833
26	M28	Z	.25	2.859
27	M32A	Z	.25	2.859

Joint Loads and Enforced Displacements

Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (i...
No Data to Print ...			

Member Distributed Loads (BLC 3 : Ice Weight)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M1	Y	0	0	0	0
2	M11	Y	0	0	0	0
3	M21	Y	0	0	0	0
4	M31	Y	0	0	0	0

Member Distributed Loads (BLC 4 : Wind w/ Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.002	.002	0	0
2	M4	X	.002	.002	0	0
3	3351	X	.002	.002	0	0
4	3351.1	X	.002	.002	0	0
5	M5	X	.001	.001	0	0
6	M6	X	.001	.001	0	0
7	M8	X	.001	.001	0	0
8	M11	X	.002	.002	0	0
9	M12A	X	.002	.002	0	0

Member Distributed Loads (BLC 4 : Wind w/ Ice X) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
10	M13	X	.002	.002	0	0
11	M14	X	.002	.002	0	0
12	M15	X	.001	.001	0	0
13	M16	X	.001	.001	0	0
14	M18	X	.001	.001	0	0
15	M21	X	.002	.002	0	0
16	M22	X	.002	.002	0	0
17	M23	X	.002	.002	0	0
18	M24	X	.002	.002	0	0
19	M26	X	.001	.001	0	0
20	M28	X	.001	.001	0	0
21	M31	X	.002	.002	0	0
22	M32A	X	.001	.001	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.011	.011	0	0
2	M4	X	.011	.011	0	0
3	3351	X	.011	.011	0	0
4	3351.1	X	.011	.011	0	0
5	M5	X	.007	.007	0	0
6	M6	X	.007	.007	0	0
7	M8	X	.007	.007	0	0
8	M11	X	.011	.011	0	0
9	M12A	X	.011	.011	0	0
10	M13	X	.011	.011	0	0
11	M14	X	.011	.011	0	0
12	M15	X	.007	.007	0	0
13	M16	X	.007	.007	0	0
14	M18	X	.007	.007	0	0
15	M21	X	.011	.011	0	0
16	M22	X	.011	.011	0	0
17	M23	X	.011	.011	0	0
18	M24	X	.011	.011	0	0
19	M26	X	.007	.007	0	0
20	M28	X	.007	.007	0	0
21	M31	X	.011	.011	0	0
22	M32A	X	.007	.007	0	0

Member Distributed Loads (BLC 6 : Wind w/ Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.002	.002	0	0
2	M4	Z	.002	.002	0	0
3	M5	Z	.001	.001	0	0
4	M6	Z	.001	.001	0	0
5	M8	Z	.001	.001	0	0
6	M11	Z	.002	.002	0	0
7	M14	Z	.002	.002	0	0
8	M15	Z	.001	.001	0	0
9	M16	Z	.001	.001	0	0
10	M18	Z	.001	.001	0	0

Member Distributed Loads (BLC 6 : Wind w/ Ice Z) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
11	M21	Z	.002	.002	0	0
12	M24	Z	.002	.002	0	0
13	M26	Z	.001	.001	0	0
14	M28	Z	.001	.001	0	0
15	M31	Z	.002	.002	0	0
16	M32A	Z	.001	.001	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	.011	.011	0	0
2	M4	Z	.011	.011	0	0
3	M5	Z	.007	.007	0	0
4	M6	Z	.007	.007	0	0
5	M8	Z	.007	.007	0	0
6	M11	Z	.011	.011	0	0
7	M14	Z	.011	.011	0	0
8	M15	Z	.007	.007	0	0
9	M16	Z	.007	.007	0	0
10	M18	Z	.007	.007	0	0
11	M21	Z	.011	.011	0	0
12	M24	Z	.011	.011	0	0
13	M26	Z	.007	.007	0	0
14	M28	Z	.007	.007	0	0
15	M31	Z	.011	.011	0	0
16	M32A	Z	.007	.007	0	0

Basic Load Cases

	BLC Description	Category	X Gr...	Y Gr...	Z Gr...	Joint	Point	Distri...	Area(...	Surface(Plate/Wall)
1	Self Weight	None		-1						
2	Equipment Weight	None					27			
3	Ice Weight	None					27	4		
4	Wind w/ Ice X	None					27	22		
5	Wind X	None					27	22		
6	Wind w/ Ice Z	None					27	16		
7	Wind Z	None					27	16		

Load Combinations

	Description	Solve	P...	SR...	BLC	F...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-direction)	Yes	Y		1	1...	2	1.2	5	1.6																
2	0.9D + 1.6W (X-direction)	Yes	Y		1	.9	2	.9	5	1.6																
3	1.2D + 1.0Di + 1.0Wi (X...	Yes	Y		1	1...	2	1.2	3	1	4	1														
4	1.2D + 1.6W (X-direction)	Yes	Y		1	1...	2	1.2	7	1.6																
5	0.9D + 1.6W (X-direction)	Yes	Y		1	.9	2	.9	7	1.6																
6	1.2D + 1.0Di + 1.0Wi (X...	Yes	Y		1	1...	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	N3	max	2.6	6	2.392	3	-1.19	2	-1.418	2	-.716	6	.654	2
2		min	-2.124	2	.778	5	-5.568	4	-2.932	6	-4.548	1	-1.605	6
3	N4	max	-1.078	5	2.354	3	3.715	6	-1.109	2	-.302	6	-.087	2
4		min	-2.614	3	.694	5	1.164	2	-2.768	6	-2.272	2	-1.677	6
5	N7	max	.446	6	.968	6	.69	3	1.399	3	2.582	1	.023	2
6		min	-1.25	2	.528	2	-.937	5	.163	5	-1.717	4	-1.06	6
7	N8	max	-.121	5	.97	6	-.196	2	1.36	3	1.787	2	-.067	2
8		min	-.858	1	.441	2	-.806	4	.394	5	-.89	5	-1.016	6
9	N27A	max	0	6	.085	6	0	3	0	3	0	6	.014	2
10		min	-.062	1	.063	2	-.062	4	-.014	4	0	1	0	4
11	N28	max	0	6	.085	6	0	3	0	3	0	6	.014	2
12		min	-.062	1	.063	2	-.062	4	-.014	4	0	1	0	4
13	N35	max	-.914	5	1.82	6	-.249	2	-.048	2	5.211	4	2.743	3
14		min	-3.845	1	.513	2	-2.977	4	-1.819	4	-.158	1	.847	5
15	N36	max	2.606	6	1.812	6	.829	3	-.147	2	2.434	5	2.697	3
16		min	.515	2	.68	5	-.123	5	-.821	4	.019	3	1.037	5
17	N56	max	0	6	.127	6	0	3	0	3	0	6	.021	2
18		min	-.092	1	.095	2	-.092	4	-.021	4	0	1	0	4
19	Totals:	max	0	6	10.542	6	0	3						
20		min	-8.688	1	4.2	2	-8.64	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
1	N1	max	0	2	0	5	0	5	0	3	0	6	1.669e-07	2
2		min	0	4	0	1	0	1	-1.669e-07	4	0	1	0	4
3	N2	max	0	2	0	5	0	5	1.028e-06	5	0	6	0	6
4		min	0	4	0	1	0	1	0	1	0	1	-1.028e-06	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	0	6	0	6	0	6	0	6	0	6	0	6
8		min	0	1	0	1	0	1	0	1	0	1	0	1
9	N5	max	0	2	0	5	0	6	5.809e-06	6	8.459e-06	2	0	6
10		min	0	4	0	1	0	1	4.357e-06	2	0	4	0	1
11	N6	max	0	2	0	5	0	6	5.809e-06	6	8.459e-06	2	0	6
12		min	0	4	0	1	0	1	4.357e-06	2	0	4	0	1
13	N7	max	0	6	0	6	0	6	0	6	0	6	0	6
14		min	0	1	0	1	0	1	0	1	0	1	0	1
15	N8	max	0	6	0	6	0	6	0	6	0	6	0	6
16		min	0	1	0	1	0	1	0	1	0	1	0	1
17	N9	max	0	2	0	5	0	5	0	3	0	6	1.669e-07	2
18		min	0	4	0	1	0	1	-1.669e-07	4	0	1	0	4
19	N10	max	0	2	0	5	0	5	1.028e-06	5	0	6	0	6
20		min	0	4	0	1	0	1	0	1	0	1	-1.028e-06	1
21	N11	max	.063	1	-.011	2	0	5	-3.207e-04	2	0	6	0	6
22		min	0	4	-.027	6	0	3	-8.561e-04	6	-2.544e-03	1	-1.006e-03	1
23	N12	max	.05	2	-.011	2	0	6	-3.205e-04	2	0	6	0	6
24		min	0	4	-.027	6	0	2	-8.533e-04	6	-2.094e-03	2	-7.382e-04	1
25	N13	max	.093	1	-.011	2	-.009	2	-3.208e-04	2	0	6	0	6
26		min	0	4	-.027	6	-.023	6	-8.477e-04	6	-2.544e-03	1	-1.101e-03	1

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
27	N14	max	.046	2	-.011	2	.004	6	-3.205e-04	2	0	6	0	6
28		min	0	4	-.027	6	.002	2	-8.533e-04	6	-2.094e-03	2	-7.378e-04	1
29	N15	max	.205	1	-.037	2	.001	4	8.925e-05	4	5.717e-05	2	0	6
30		min	0	4	-.106	6	0	2	-3.7e-05	3	-6.394e-06	3	-3.285e-03	1
31	N16	max	.16	2	-.037	2	0	2	1.085e-04	4	1.895e-04	1	0	6
32		min	0	4	-.106	6	0	6	-3.657e-05	3	0	4	-1.956e-03	1
33	N18	max	.323	1	-.037	2	.032	4	1.299e-03	4	5.717e-05	2	0	6
34		min	0	4	-.106	6	0	3	-3.71e-05	3	-6.394e-06	3	-4.498e-03	1
35	N19	max	.151	2	-.037	2	0	2	1.081e-04	4	1.895e-04	1	0	6
36		min	0	4	-.106	6	0	4	-3.657e-05	3	0	4	-1.956e-03	1
37	N19A	max	.127	1	-.023	2	.002	4	1.604e-03	4	2.928e-03	1	0	6
38		min	0	4	-.069	6	0	2	4.251e-04	2	0	4	-3.338e-03	1
39	N20	max	.09	2	-.023	2	0	2	1.191e-03	6	2.444e-03	2	0	6
40		min	0	4	-.069	6	0	6	4.253e-04	2	0	4	-1.316e-03	1
41	N21	max	.057	2	-.023	2	.011	5	1.165e-03	3	2.444e-03	2	0	6
42		min	0	4	-.069	6	-.042	3	-4.198e-04	5	0	4	-9.008e-04	1
43	N22	max	.67	1	-.023	2	.816	4	1.871e-02	4	2.928e-03	1	0	6
44		min	0	4	-.069	6	.024	2	4.275e-04	2	0	4	-1.171e-02	1
45	N23	max	.032	1	-.006	2	0	4	1.238e-03	6	2.628e-03	1	0	6
46		min	0	4	-.018	6	0	2	4.156e-04	2	0	4	-1.48e-03	1
47	N24	max	.019	2	-.006	2	0	2	1.239e-03	6	1.764e-03	2	0	6
48		min	0	4	-.018	6	0	6	4.143e-04	2	0	4	-5.412e-04	1
49	N26	max	.101	1	-.006	2	.049	4	1.933e-03	4	2.628e-03	1	0	6
50		min	0	4	-.018	6	.012	2	4.16e-04	2	0	4	-2.692e-03	1
51	N27	max	.016	2	-.006	2	-.002	2	1.239e-03	6	1.764e-03	2	0	6
52		min	0	4	-.018	6	-.006	6	4.143e-04	2	0	4	-5.407e-04	1
53	N27A	max	0	6	0	6	0	6	0	6	0	6	0	6
54		min	0	1	0	1	0	1	0	1	0	1	0	1
55	N28	max	0	6	0	6	0	6	0	6	0	6	0	6
56		min	0	1	0	1	0	1	0	1	0	1	0	1
57	N33	max	0	2	0	5	0	2	2.904e-06	6	4.229e-06	2	5.031e-06	6
58		min	0	4	0	1	0	4	2.178e-06	2	0	4	3.773e-06	2
59	N34	max	0	2	0	5	0	2	2.904e-06	6	4.229e-06	2	5.031e-06	6
60		min	0	4	0	1	0	4	2.178e-06	2	0	4	3.773e-06	2
61	N35	max	0	6	0	6	0	6	0	6	0	6	0	6
62		min	0	1	0	1	0	1	0	1	0	1	0	1
63	N36	max	0	6	0	6	0	6	0	6	0	6	0	6
64		min	0	1	0	1	0	1	0	1	0	1	0	1
65	N37	max	0	2	0	5	0	5	0	3	0	6	1.669e-07	2
66		min	0	4	0	1	0	1	-1.669e-07	4	0	1	0	4
67	N38	max	0	2	0	5	0	5	1.028e-06	5	0	6	0	6
68		min	0	4	0	1	0	1	0	1	0	1	-1.028e-06	1
69	N39	max	.042	4	-.014	2	.073	5	1.927e-03	5	-3.897e-04	3	-1.072e-03	2
70		min	.006	3	-.044	6	.009	3	-4.039e-04	3	-3.265e-03	4	-1.77e-03	4
71	N40	max	.026	5	-.014	2	.046	4	1.034e-03	5	-2.859e-04	3	-6.999e-04	2
72		min	.003	3	-.044	6	.006	3	-4.819e-04	3	-2.331e-03	5	-1.357e-03	4
73	N41	max	.091	4	-.014	2	.154	5	3.138e-03	5	-3.897e-04	3	-1.368e-03	6
74		min	.046	3	-.045	6	-.002	3	-4.051e-04	3	-3.265e-03	4	-2.416e-03	1
75	N42	max	.021	5	-.014	2	.041	4	1.033e-03	5	-2.859e-04	3	-6.995e-04	2
76		min	-.002	3	-.044	6	.008	3	-4.819e-04	3	-2.331e-03	5	-1.357e-03	4
77	N43	max	.131	5	-.04	2	.229	4	5.157e-03	4	2.145e-04	1	-2.501e-04	3
78		min	.015	3	-.148	6	.026	3	5.539e-04	3	-1.766e-05	4	-2.744e-03	5

Envelope Joint Displacements (Continued)

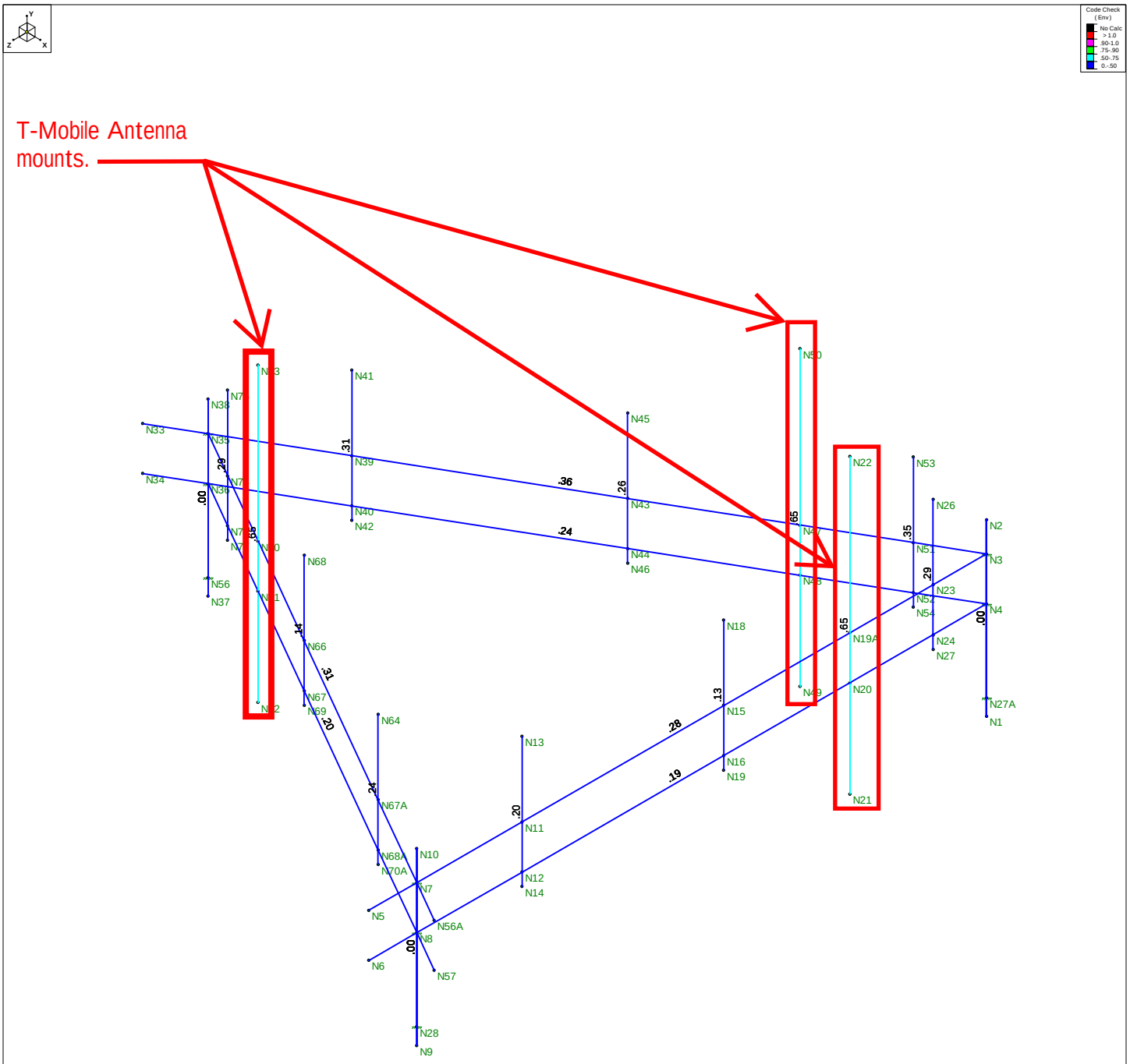
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
79	N44	max	.093	4	-.04	2	.161	5	3.022e-03	4	1.905e-04	1	-8.248e-05	3
80		min	.011	3	-.147	6	.018	3	3.772e-04	3	2.608e-05	6	-1.614e-03	5
81	N45	max	.207	5	-.04	2	.425	4	7.495e-03	4	2.145e-04	1	-4.713e-04	6
82		min	.033	3	-.148	6	.041	3	5.569e-04	3	-1.766e-05	4	-3.894e-03	2
83	N46	max	.086	4	-.04	2	.147	5	3.021e-03	4	1.905e-04	1	-8.244e-05	3
84		min	.011	3	-.147	6	.017	3	3.772e-04	3	2.608e-05	6	-1.614e-03	5
85	N47	max	.083	5	-.024	2	.146	4	5.5e-03	4	3.805e-03	4	1.118e-03	3
86		min	.008	3	-.086	6	.016	3	1.206e-03	3	4.253e-04	3	-1.893e-03	5
87	N48	max	.054	4	-.024	2	.092	5	2.239e-03	4	2.901e-03	5	1.306e-03	3
88		min	.007	3	-.086	6	.01	3	1.024e-03	3	3.326e-04	3	-5.364e-04	5
89	N49	max	.056	3	-.024	2	.046	5	1.299e-03	4	2.901e-03	5	1.387e-03	3
90		min	.035	5	-.086	6	-.027	3	1.021e-03	3	3.326e-04	3	-5.36e-04	5
91	N50	max	.448	2	-.024	2	1.182	4	2.264e-02	4	3.805e-03	4	9.739e-04	6
92		min	-.039	6	-.087	6	.085	3	1.228e-03	3	4.253e-04	3	-9.259e-03	2
93	N51	max	.021	5	-.006	2	.037	4	2.261e-03	4	3.457e-03	4	1.179e-03	3
94		min	.001	3	-.021	6	.004	3	9.129e-04	3	3.529e-04	3	-5.931e-04	5
95	N52	max	.011	4	-.006	2	.019	5	1.12e-03	4	2.093e-03	5	1.239e-03	3
96		min	.002	3	-.021	6	.002	3	5.589e-04	2	2.254e-04	3	8.913e-05	5
97	N53	max	.042	2	-.007	2	.127	4	3.473e-03	4	3.457e-03	4	1.099e-03	6
98		min	-.027	6	-.021	6	.029	3	9.154e-04	3	3.529e-04	3	-1.33e-03	2
99	N54	max	.012	4	-.006	2	.014	5	1.119e-03	4	2.093e-03	5	1.239e-03	3
100		min	.007	2	-.021	6	-.002	3	5.589e-04	2	2.254e-04	3	8.913e-05	5
101	N56	max	0	6	0	6	0	6	0	6	0	6	0	6
102		min	0	1	0	1	0	1	0	1	0	1	0	1
103	N56A	max	0	2	0	5	0	6	2.904e-06	6	4.229e-06	2	-3.773e-06	5
104		min	0	4	0	1	0	1	2.178e-06	2	0	4	-5.031e-06	1
105	N57	max	0	2	0	5	0	6	2.904e-06	6	4.229e-06	2	-3.773e-06	5
106		min	0	4	0	1	0	1	2.178e-06	2	0	4	-5.031e-06	1
107	N64	max	.056	2	-.015	2	.129	5	2.813e-03	5	2.496e-03	4	1.429e-03	4
108		min	-.072	4	-.036	6	-.064	1	-1.068e-03	1	-1.493e-03	1	-1.476e-03	2
109	N66	max	.057	1	-.049	2	.175	4	3.83e-03	4	1.604e-04	4	2.147e-03	5
110		min	-.1	5	-.111	3	-.096	2	-1.573e-03	2	2.01e-05	6	-1.072e-03	1
111	N67	max	.043	2	-.049	2	.124	5	2.261e-03	4	1.396e-04	1	1.211e-03	5
112		min	-.072	4	-.111	3	-.074	1	-9.7e-04	2	-6.036e-06	6	-6.448e-04	1
113	N68	max	.114	1	-.049	2	.308	4	5.044e-03	4	1.604e-04	4	2.149e-03	5
114		min	-.159	5	-.111	3	-.139	2	-1.574e-03	2	2.01e-05	6	-2.283e-03	1
115	N69	max	.04	2	-.049	2	.114	5	2.261e-03	4	1.396e-04	1	1.211e-03	5
116		min	-.066	4	-.111	3	-.07	1	-9.7e-04	2	-6.036e-06	6	-6.443e-04	1
117	N70	max	.035	1	-.029	2	.119	4	4.84e-03	4	1.572e-03	1	1.651e-03	5
118		min	-.068	5	-.07	3	-.058	2	-1.114e-03	2	-2.906e-03	4	-1.757e-03	1
119	N71	max	.023	2	-.029	2	.074	5	1.719e-03	4	1.297e-03	2	3.993e-04	5
120		min	-.043	4	-.07	3	-.041	1	-4.035e-04	2	-2.245e-03	5	-1.17e-03	3
121	N72	max	.008	2	-.029	2	.045	5	7.801e-04	4	1.297e-03	2	3.99e-04	5
122		min	-.041	6	-.07	3	-.029	1	-4.032e-04	2	-2.245e-03	5	-1.081e-03	3
123	N73	max	.488	1	-.029	2	1.117	4	2.197e-02	4	1.572e-03	1	1.66e-03	5
124		min	-.161	5	-.071	3	-.121	2	-1.12e-03	2	-2.906e-03	4	-1.012e-02	1
125	N74	max	.009	1	-.007	5	.031	4	2.019e-03	4	1.378e-03	1	5.44e-04	5
126		min	-.017	5	-.018	3	-.014	2	-3.926e-04	2	-2.877e-03	4	-1.187e-03	3
127	N75	max	.005	2	-.007	5	.015	5	9.248e-04	4	9.158e-04	2	-1.155e-04	5
128		min	-.009	4	-.018	3	-.009	1	4.244e-07	2	-1.695e-03	5	-1.125e-03	3
129	N76	max	.064	1	-.007	5	.114	4	3.231e-03	4	1.378e-03	1	5.445e-04	5
130		min	-.032	5	-.018	3	-.025	2	-3.93e-04	2	-2.877e-03	4	-2.208e-03	1

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
131	N77	max	.002	2	-.007	5	.011	5	9.243e-04	4	9.158e-04	2	-1.155e-04	5
132		min	-.01	4	-.018	3	-.009	1	4.244e-07	2	-1.695e-03	5	-1.125e-03	3
133	N67A	max	.02	2	-.015	2	.057	5	1.602e-03	5	2.496e-03	4	1.428e-03	4
134		min	-.033	4	-.036	6	-.035	1	-1.067e-03	1	-1.493e-03	1	-2.665e-04	2
135	N68A	max	.014	1	-.015	2	.035	4	8.019e-04	5	1.779e-03	5	1.088e-03	4
136		min	-.02	5	-.036	6	-.024	2	-7.75e-04	1	-1.147e-03	2	9.609e-05	2
137	N70A	max	.015	1	-.015	2	.032	4	8.014e-04	5	1.779e-03	5	1.088e-03	4
138		min	-.016	5	-.036	6	-.02	2	-7.75e-04	1	-1.147e-03	2	9.655e-05	2

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

	Me...	Shape	Code C...	Loc...	LC	Shear C...	Loc[ft]	Dir	LC	phi*Pn...	phi*P...	phi*Mn...	phi*...	Cb	Eqn
1	M17A	PIPE_2.5	.655	4.6...	4	.146	4.781		6	26.137	50.715	3.596	3.596	4.985	H1-1b
2	M27	PIPE_2.5	.655	4.6...	4	.110	4.781		6	26.137	50.715	3.596	3.596	1.68	H1-1b
3	M7	PIPE_2.5	.654	4.6...	4	.102	4.781		6	26.137	50.715	3.596	3.596	1	H1-1b
4	M12A	PIPE_4.0	.362	19	4	.205	19		4	29.638	93.24	10.631	10.631	1.841	H1-1b
5	M18	PIPE_2.5	.351	1.7...	6	.140	1.708		6	44.491	50.715	3.596	3.596	2.182	H1-1b
6	M22	PIPE_4.0	.310	19	4	.184	19		4	29.638	93.24	10.631	10.631	1.935	H1-1b
7	M15	PIPE_2.5	.308	1.7...	6	.121	.417		6	44.491	50.715	3.596	3.596	4.647	H1-1b
8	M28	PIPE_2.5	.294	1.7...	3	.119	1.708		4	44.491	50.715	3.596	3.596	4.104	H1-1b
9	M8	PIPE_2.5	.286	1.7...	6	.110	1.708		3	44.491	50.715	3.596	3.596	1	H1-1b
10	3351	PIPE_4.0	.278	19	1	.148	19		1	29.638	93.24	10.631	10.631	2.626	H1-1b
11	M16	PIPE_2.5	.260	1.75	4	.054	1.75		4	44.491	50.715	3.596	3.596	2.958	H1-1b
12	M13	PIPE_4.0	.241	19	6	.082	17.219		4	29.638	93.24	10.631	10.631	2.548	H1-1b
13	M32A	PIPE_2.5	.236	1.7...	6	.092	.417		6	44.491	50.715	3.596	3.596	2.272	H1-1b
14	M5	PIPE_2.5	.204	1.7...	6	.075	1.708		3	44.491	50.715	3.596	3.596	1	H1-1b
15	M23	PIPE_4.0	.201	19	6	.065	17.219		4	29.638	93.24	10.631	10.631	2.779	H1-1b
16	335...	PIPE_4.0	.195	19	6	.056	19		1	29.638	93.24	10.631	10.631	2.597	H1-1b
17	M26	PIPE_2.5	.135	.417	4	.028	1.75		4	44.491	50.715	3.596	3.596	1.357	H1-1b
18	M6	PIPE_2.5	.134	1.75	1	.028	1.75		1	44.491	50.715	3.596	3.596	1.758	H1-1b
19	M4	PIPE_4.0	.001	.547	4	.001	2.953		5	85.371	93.24	10.631	10.631	1	H1-1b
20	M24	PIPE_4.0	.001	.547	4	.001	2.953		5	85.371	93.24	10.631	10.631	1	H1-1b
21	M14	PIPE_4.0	.001	.547	4	.001	2.953		5	85.371	93.24	10.631	10.631	1	H1-1b
22	M21	PIPE_4.0	.001	.547	4	.001	2.953		5	85.371	93.24	10.631	10.631	1	H1-1b
23	M31	PIPE_4.0	.001	.547	4	.001	2.953		5	85.371	93.24	10.631	10.631	1	H1-1b
24	M1	PIPE_4.0	.001	.547	4	.001	2.953		5	85.371	93.24	10.631	10.631	1	H1-1b
25	M11	PIPE_4.0	.001	.547	4	.001	2.953		5	85.371	93.24	10.631	10.631	1	H1-1b
26	M12	PIPE_4.0	.000	4.3...	4	.000	4.375		5	85.371	93.24	10.631	10.631	1	H1-1b
27	M19	PIPE_4.0	.000	4.3...	4	.000	4.375		5	85.371	93.24	10.631	10.631	1	H1-1b
28	M29	PIPE_4.0	.000	4.3...	4	.000	4.375		5	85.371	93.24	10.631	10.631	1	H1-1b
29	M30	PIPE_4.0	.000	4.3...	4	.000	4.375		5	85.371	93.24	10.631	10.631	1	H1-1b
30	M32	PIPE_4.0	.000	4.3...	4	.000	4.375		5	85.371	93.24	10.631	10.631	1	H1-1b
31	M17	PIPE_4.0	.000	4.3...	4	.000	4.375		5	85.371	93.24	10.631	10.631	1	H1-1b
32	M20	PIPE_4.0	.000	4.3...	4	.000	4.375		5	85.371	93.24	10.631	10.631	1	H1-1b



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
FJP	CT11249A_AMA	May 6, 2019 at 6:41 AM
19027.06	Member Unity Check	CT11249A_AMA.R3D

RAN Template:	A&L Template:	Power System Template:
67D97C	Custom	Custom

CT11249A_L600_2.1_draft

Section 1 - Site Information

Site ID: CT11249A
Status: Draft
Version: 2.1
Project Type: L600
Approved: Not Approved
Approved By: Not Approved
Last Modified: 4/17/2019 11:48:34 AM
Last Modified By: GSM1900\MLow1

Site Name: Colchester-2-State PD_1
Site Class: Self Support Tower
Site Type: Structure Non Building
Plan Year: 2019
Market: CONNECTICUT
Vendor: Ericsson
Landlord: <undefined>

Latitude: 41.5789910000
Longitude: -72.3387060000
Address: 15 Old Hartford Rd
City, State: Colchester, CT
Region: NORTHEAST

RAN Template: 67D97C			AL Template: Custom	
Sector Count: 3	**Antenna Count:** 3	**Coax Line Count:** 3	**TMA Count:** 3	**RRU Count:** 9

Section 2 - Existing Template Images

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

Section 3 - Proposed Template Images

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

Section 4 - Siteplan Images

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RAN Template:	A&L Template:	Power System Template:
67D97C	Custom	Custom

CT11249A_L600_2.1_draft

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 4G

Enclosure	1
Enclosure Type	RBS 6201 ODE
Baseband	DUG20 (G1900); DUS41 (L1900)
Radio	RUS02 B2 (x3) (L1900); RUS02 B2 (x3) (G1900)

Proposed RAN Equipment

Template: 67D97C

Enclosure	1
Enclosure Type	RBS 6102 MU AC
Baseband	DUG20 (G1900); BB 6630 (N600 (DARK)); BB 6630 (L2100, L1900, L700, L600)
Hybrid Cable System	Ericsson 6x12 HCS *Select Length & AWG* (x3)

RAN Scope of Work:

4G to 67D93D4.
Swap existing cabinet RBS 6201 ODE with (1) RBS 6102 MU AC equipped with (1) DUG20, (2) BB 6630.

Swap (3) EMS antennas with (3) LB/MB Octa 8' antennas, Add (3) Radio 4449, add (3) Radio 4415 B25 and add (3) Radio 4415 B66.

RAN Template:	A&L Template:	Power System Template:
67D97C	Custom	Custom

CT11249A_L600_2.1_draft

Section 6 - A&L Equipment

Existing Template: 4G
Proposed Template: Custom

Sector 1 (Existing) view from behind	
Coverage Type	A - Outdoor Macro
Antenna	1
Antenna Model	EMS - RR90-17-XXDP (Dual)
Azimuth	105
M. Tilt	0
Height	95
Ports	P1
Active Tech.	L1900 G1900
Dark Tech.	
Restricted Tech.	
Decomm. Tech.	
E. Tilt	2
Cables	1-1/4" Coax - 160 ft. **(x2)**
TMAs	Generic Twin Style 1A - PCS (AtAntenna)
Diplexers / Combiners	
Radio	
Sector Equipment	

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D97C	Custom	Custom

CT11249A_L600_2.1_draft

Sector 1 (Proposed) view from behind				
Coverage Type	A - Outdoor Macro			
Antenna	1			
Antenna Model	RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	105			
M. Tilt	0			
Height	95			
Ports	P1	P2	P3	P4
Active Tech.	L700 L600	L700 L600	L1900 G1900	L2100
Dark Tech.				
Restricted Tech.				
Decomm. Tech.				
E. Tilt	2	2	2	2
Cables				
TMAs				
Diplexers / Combiners				
Radio	Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)	Radio 4415 B25 (At Antenna)	Radio 4415 B66A (At Antenna)
Sector Equipment				

Unconnected Equipment:

Cable: 1-1/4" Coax - 160 ft.

TMA: Generic Twin Style 1A - PCS

Scope of Work:

Swap (1) EMS antenna with (1) LB/MB Octa 8' antenna, Add (1) Radio 4449, add (1) Radio 4415 B25 and add (1) Radio 4415 B66.

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

RAN Template:	A&L Template:	Power System Template:
67D97C	Custom	Custom

CT11249A_L600_2.1_draft

Sector 2 (Existing) view from behind	
Coverage Type	A - Outdoor Macro
Antenna	1
Antenna Model	EMS - RR90-17-XXDP (Dual)
Azimuth	225
M. Tilt	0
Height	95
Ports	P1
Active Tech.	L1900 G1900
Dark Tech.	
Restricted Tech.	
Decomm. Tech.	
E. Tilt	2
Cables	1-1/4" Coax - 160 ft. (x2)
TMAs	Generic Twin Style 1A - PCS (AtAntenna)
Diplexers / Combiners	
Radio	
Sector Equipment	

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D97C	Custom	Custom

CT11249A_L600_2.1_draft

Sector 2 (Proposed) view from behind				
Coverage Type	A - Outdoor Macro			
Antenna	1			
Antenna Model	RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	225			
M. Tilt	0			
Height	95			
Ports	**P1**	**P2**	**P3**	**P4**
Active Tech.	L700 L600	L700 L600	L1900 G1900	L2100
Dark Tech.				
Restricted Tech.				
Decomm. Tech.				
E. Tilt	2	2	2	2
Cables				
TMAs				
Diplexers / Combiners				
Radio	Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)	Radio 4415 B25 (At Antenna)	Radio 4415 B66A (At Antenna)
Sector Equipment				

Unconnected Equipment:

Cable: 1-1/4" Coax - 160 ft.

TMA: Generic Twin Style 1A - PCS

Scope of Work:

Swap (1) EMS antenna with (1) LB/MB Octa 8' antenna, Add (1) Radio 4449, add (1) Radio 4415 B25 and add (1) Radio 4415 B66.

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

RAN Template:	A&L Template:	Power System Template:
67D97C	Custom	Custom

CT11249A_L600_2.1_draft

Sector 3 (Existing) view from behind	
Coverage Type	A - Outdoor Macro
Antenna	1
Antenna Model	EMS - RR90-17-XXDP (Dual)
Azimuth	335
M. Tilt	0
Height	95
Ports	P1
Active Tech.	L1900 G1900
Dark Tech.	
Restricted Tech.	
Decomm. Tech.	
E. Tilt	2
Cables	1-1/4" Coax - 160 ft. (x2)
TMAs	Generic Twin Style 1A - PCS (AtAntenna)
Diplexers / Combiners	
Radio	
Sector Equipment	

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:	Power System Template:
67D97C	Custom	Custom

CT11249A_L600_2.1_draft

Sector 3 (Proposed) view from behind				
Coverage Type	A - Outdoor Macro			
Antenna	1			
Antenna Model	RFS - APXVAARR24_43-U-NA20 (Octo)			
Azimuth	335			
M. Tilt	0			
Height	95			
Ports	**P1**	**P2**	**P3**	**P4**
Active Tech.	L700 L600	L700 L600	L1900 G1900	L2100
Dark Tech.				
Restricted Tech.				
Decomm. Tech.				
E. Tilt	2	2	2	2
Cables				
TMAs				
Diplexers / Combiners				
Radio	Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)	Radio 4415 B25 (At Antenna)	Radio 4415 B66A (At Antenna)
Sector Equipment				

Unconnected Equipment:

Cable: 1-1/4" Coax - 160 ft.

TMA: Generic Twin Style 1A - PCS

Scope of Work:

Swap (1) EMS antenna with (1) LB/MB Octa 8' antenna, Add (1) Radio 4449, add (1) Radio 4415 B25 and add (1) Radio 4415 B66.

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

RAN Template:	A&L Template:	Power System Template:
67D97C	Custom	Custom

CT11249A_L600_2.1_draft

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

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

Proposed Power Systems Equipment

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: CT11249A

Colchester-2-State PD_1
15 Old Hartford Road
Colchester, Connecticut 06415

May 20, 2019

EBI Project Number: 6219001679

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**8.45%**

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

May 20, 2019

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

Emissions Analysis for Site: CT11249A - Colchester-2-State PD_1

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **15 Old Hartford Road** in **Colchester, 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 15 Old Hartford Road in Colchester, 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) 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.

3) 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.

4) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

5) 2 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.

6) 1 microwave backhaul channel (5 GHz) was considered for the proposed facility. This channel has a transmit power of 1 Watt.

7) 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.

8) 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.

9) The antennas used in this modeling are the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector A, the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector B, the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector C. Modeling also included calculations for the proposed 5 GHz microwave backhaul antenna. 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.

10) The antenna mounting height centerline of the proposed antennas (both panel antennas and microwave dish) is 95 feet above ground level (AGL).

11) 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.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Frequency Bands:	600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 700 MHz / 1900 MHz / 1900 MHz / 2100 MHz
Gain:	12.95 dBd / 13.35 dBd / 15.65 dBd / 15.65 dBd / 16.35 dBd	Gain:	12.95 dBd / 13.35 dBd / 15.65 dBd / 15.65 dBd / 16.35 dBd	Gain:	12.95 dBd / 13.35 dBd / 15.65 dBd / 15.65 dBd / 16.35 dBd
Height (AGL):	95 feet	Height (AGL):	95 feet	Height (AGL):	95 feet
Channel Count:	12	Channel Count:	12	Channel Count:	12
Total TX Power (W):	480 Watts	Total TX Power (W):	480 Watts	Total TX Power (W):	480 Watts
ERP (W):	16,474.09	ERP (W):	16,474.09	ERP (W):	16,474.09
Antenna A1 MPE %:	**7.86%**	Antenna B1 MPE %:	**7.86%**	Antenna C1 MPE %:	**7.86%**

Microwave Backhaul Data									
Sector	Antenna Make	Antenna Model	Frequency (MHz)	Transmitter Power (W)	Channel Count	Antenna Centerline (feet) AGL	Gain (dBd)	Total ERP (W)	MPE %
A	Unknown	Unknown	5000	1	1	95.0	10.57	11.40	0.045%

Site Composite MPE %	
Carrier	MPE %
T-Mobile (Max at Sector A):	7.86%
CEC	0.31%
CSP	0.16%
NEC	0.0001%
OEM	0.12%
Site Total MPE % :	8.45%

T-Mobile Sector A Total:	7.86%
T-Mobile Sector B Total:	7.86%
T-Mobile Sector C Total:	7.86%
Site Total:	8.45%

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 600 MHz LTE	2	591.73	95.0	4.71	600 MHz LTE	400	1.18%
T-Mobile 700 MHz LTE	2	648.82	95.0	5.17	700 MHz LTE	467	1.11%
T-Mobile 1900 MHz LTE PCS	2	2203.69	95.0	17.56	1900 MHz LTE PCS	1000	1.76%
T-Mobile 1900 MHz GSM	4	1101.85	95.0	17.56	1900 MHz GSM	1000	1.76%
T-Mobile 2100 MHz LTE AWS	2	2589.11	95.0	20.63	2100 MHz LTE AWS	1000	2.06%
T-Mobile 5 GHz Microwave	1	11.40	95.0	0.0454	5 GHz	1000	0.045%
						Total:	**7.86%**

Summary

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

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general population exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector A:	7.86%
Sector B:	7.86%
Sector C:	7.86%
T-Mobile Maximum MPE % (Sector A):	7.86%
Site Total:	8.45%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **8.45%** 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.

STATE OF CONNECTICUT

DEPARTMENT OF EMERGENCY SERVICES AND PUBLIC PROTECTION

May 20, 2019

Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Letter of Authorization** – Co-location on Connecticut State Police tower
Property address: 15 Old Hartford Road, Colchester, CT
Latitude: 41.578991000 Longitude: -73.338706000

To Whom It May Concern:

T-Mobile Northeast LLC (T-Mobile) has an Agreement with the Connecticut Department of Emergency Services and Public Protection (DESPP) to co-locate its communications equipment on the DESPP tower located at 15 Old Hartford Road, Colchester, CT.

T-Mobile shall be required by the terms of the agreement to seek and obtain all necessary permits and approvals. As a duly authorized representative of the DESPP, permission is hereby granted to T-Mobile and agents thereof, for the purpose of consummating any applications necessary to gain the required approvals from the State of Connecticut.

Any fees or charges associated with all applications or permits and any conditions placed on the applicant shall be the sole responsibility of T-Mobile.

Yours truly,

Brian Benito
Planning Specialist
State Of Connecticut
Department of Emergency Services and Public Protection
CTS Unit
860-685-8297
brian.benito@ct.gov