COHEN and WOLF P.C.
ATTORNEYS AT LAW

RACHEL A. SCHWARTZMAN

Please Reply To: Bridgeport
Writer's Direct Dial: (203) 337-4110
E-Mail: rschwartzman@cohenandwolf.com

September 29, 2014

Attorney Melanie Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06501

Re: Notice of Exempt Modification
Cromwell Fire District/T-Mobile co-location
Site ID CT11059C
179 Shunpike Road, Cromwell, CT

Dear Attorney Bachman:

This office represents T-Mobile Northeast LLC ("T-Mobile") and has been retained to file exempt modification filings with the Connecticut Siting Council on its behalf.

In this case, the Cromwell Fire District owns the existing self-supporting lattice telecommunications tower and related facility at 179 Shunpike Road, Cromwell, Connecticut (41.623281/-72.679005). T-Mobile intends to add three (3) antennas and related equipment at this existing telecommunications facility in Cromwell ("Cromwell Facility"). Please accept this letter as notification, pursuant to R.C.S.A. §16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R. C.S.A. § 16-50j-73, a copy of this letter is being sent to the Town Manager, Jonathan Sistare, and the property owner, Cromwell Fire District.

The existing Cromwell Facility consists of a 170-foot self-supporting lattice tower.[1] T-Mobile plans to add three antennas mounted on pipe masts at a centerline of 125 feet. T-Mobile will also install three (3) remote radio units (RRUs) behind the proposed antennas.[2] (See the plans dated July 31, 2014, attached hereto as **Exhibit A**). The existing Cromwell Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated September 23, 2014, and attached hereto as **Exhibit B**.

---

[1] While the online docket for the Connecticut Siting Council does not provide a docket or petition number for approval of this structure, it does reference this structure in connection with a notices of intent captioned EM-CING-033-017-060728, EM-CING-033-070305, EM-VER-033-071005, EM-CING-033-080917, EM-POCKET-033-080919, EM-T-MOBILE-033-090429, EM-CLEARWIRE-033-100416, EM-CING-033-120705, EM-METROPCS-033-121231-MA, EM-SPRINT-033-130920, and EM-VER-033-140819.

[2] The modifications required by structural analysis dated September 23, 2014, as referenced above, will be implemented prior to installation of the proposed antennas and RRUS.

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

1. The proposed modification will not increase the height of the tower. T-Mobile's existing antennas are at a centerline of 125 feet; the additional antennas will be installed at the same 125-foot level. The enclosed tower drawing confirms that the proposed modification will not increase the height of the tower.

2. The proposed modifications will not require an extension on the site boundaries or lease area, as depicted on Sheet one of Exhibit A. T-Mobile's equipment will be located entirely within the existing compound area.

3. The proposed modification to the Facility will not increase the noise levels at the existing facility by six decibels or more.

4. The operation of the additional antennas and equipment will not increase the total radio frequency (RF) power density, measured at the base of the tower, to a level at or above the applicable standard. According to a Radio Frequency Emissions Analysis Report prepared by EBI dated September 25, 2014, T-Mobile's operations would add 8.52% of the FCC Standard. Therefore, the calculated "worst case" power density for the planned combined operation at the site including all of the proposed antennas would be 84.57% of the FCC Standard as calculated for a mixed frequency site as evidenced by the engineering exhibit attached hereto as **Exhibit C.**

For the foregoing reasons, T-Mobile respectfully submits that the proposed additional antennas and equipment at the Cromwell Facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Upon acknowledgement of this exempt modification, T-Mobile shall commence construction approximately sixty days from the receipt of the Council's decision.

Sincerely,

Rachel Schwartzman, Esq.

cc: Town of Cromwell, Town Manager Jonathan Sistare
Cromwell Fire District
Jamie Ford, EBI Consulting

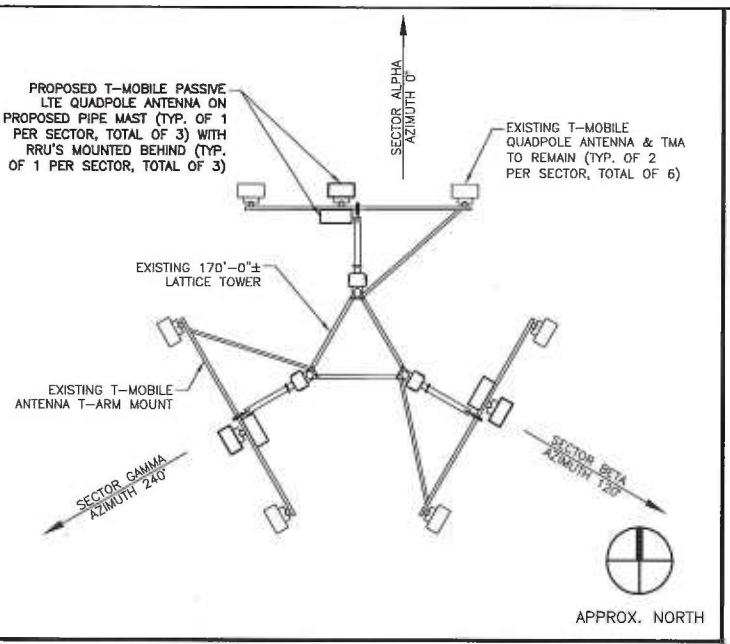
1115 Broad Street
P.O. Box 1821
Bridgeport, CT 06601-1821
Tel: (203) 368-0211
Fax: (203) 394-9901

158 Deer Hill Avenue
Danbury, CT 06810
Tel: (203) 792-2771
Fax: (203) 791-8149

320 Post Road West
Westport, CT 06880
Tel: (203) 222-1034
Fax: (203) 227-1373

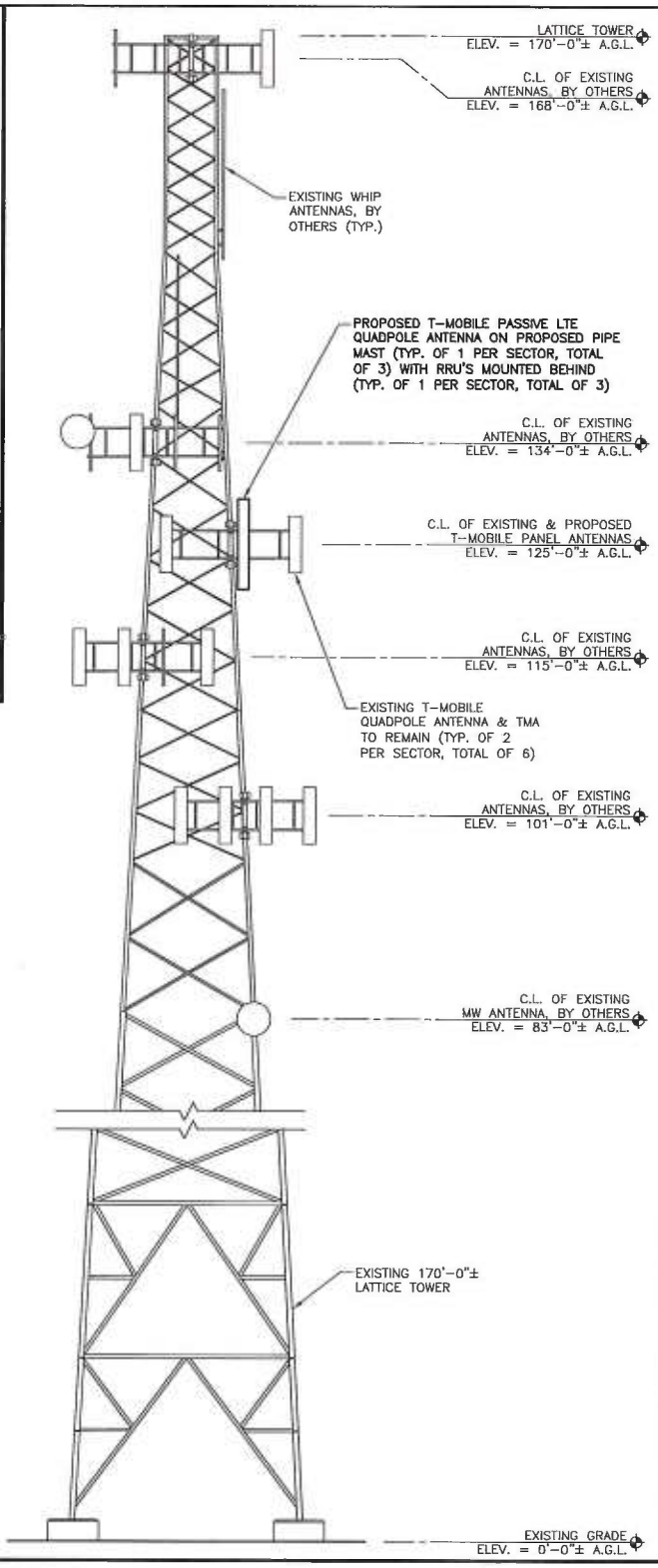
657 Orange Center Road
Orange, CT 06477
Tel: (203) 298-4066
Fax: (203) 298-4068

EXHIBIT A



ANTENNA CONFIGURATION

NTS



CONFIGURATION

702CU

NOTE:
ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE STRUCTURAL AND RF ENGINEERS.

TOWER ELEVATION

SCALE: 1/16" = 1'-0"

PREPARED BY:
EBI Consulting
environmental | engineering | due diligence
21 B Street | Burlington, MA 01803
Tel: (781) 273-2500 | Fax: (781) 273-3311
www.ebiconsulting.com
EBI JOB NO.: 81140789

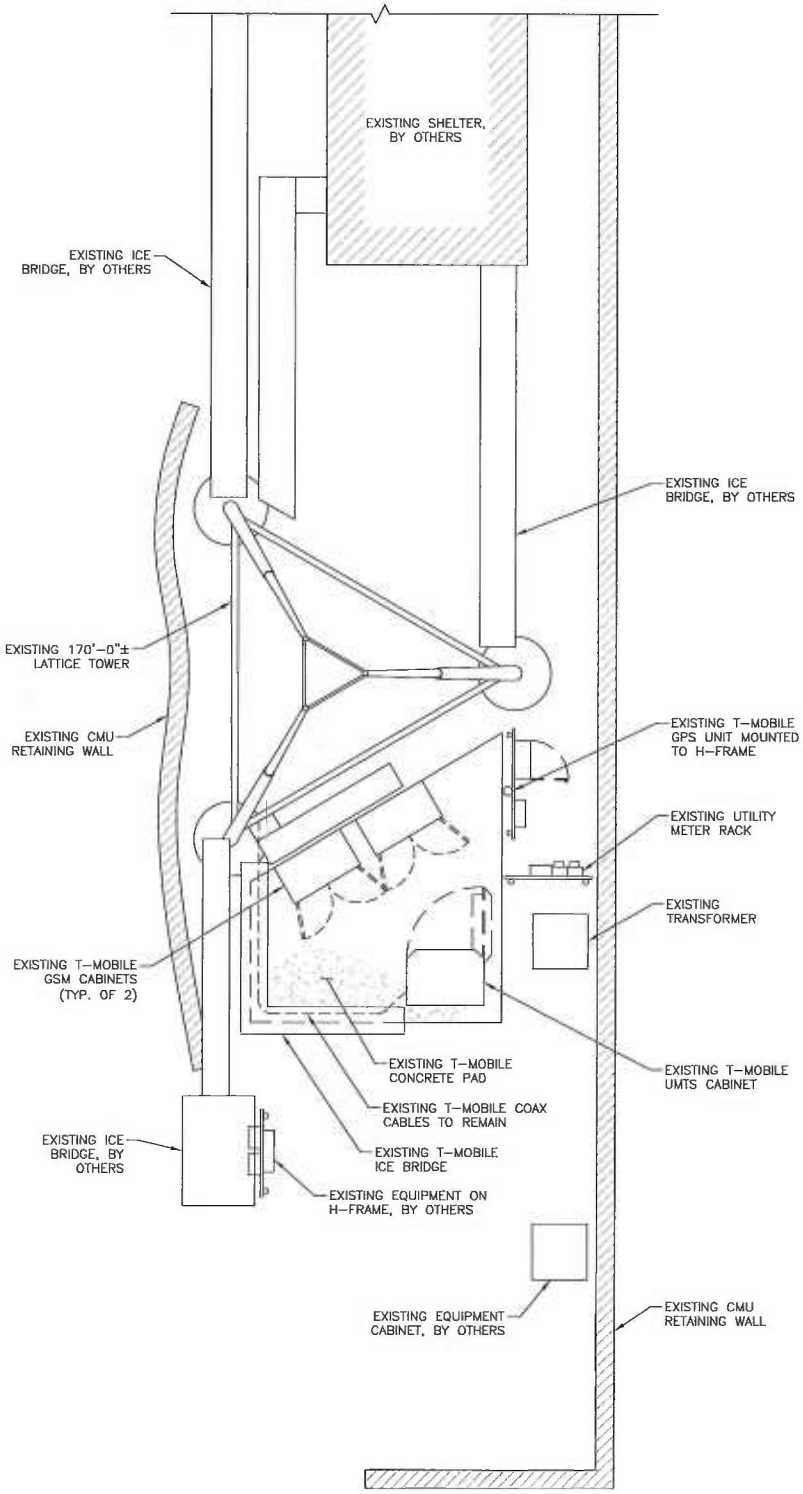
CLIENT:
T-Mobile Northeast, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
860.692.7100

SITE INFO:
CT11059C
ROCKYHILL/I-91/X23
179 SHUNPIKE ROAD
CROMWELL, CT 06416

SUBMITTALS			
NO.	DATE	DESCRIPTION	BY
A	07/31/14	FOR REVIEW	AC

DRAWN BY: AC
CHECKED BY: PM
DATE: 07/31/14

SHEET NO: LE-2



CONFIGURATION

702CU

APPROX. NORTH

NOTE:
ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE STRUCTURAL AND RF ENGINEERS.

SITE PLAN

SCALE: 1:10

PREPARED BY:
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environmental | engineering | due diligence
21 B Street | Burlington, MA 01803
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www.ebiconsulting.com
EBI JOB NO.: 81140789

CLIENT:
T-Mobile Northeast, LLC
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860.692.7100

SITE INFO:
CT11059C
ROCKYHILL/I-91/X23
179 SHUNPIKE ROAD
CROMWELL, CT 06416

SUBMITTALS			
NO.	DATE	DESCRIPTION	BY
A	07/31/14	FOR REVIEW	AC

DRAWN BY: AC
CHECKED BY: PM
DATE: 07/31/14

SHEET NO: LE-1

EXHIBIT B

DETAILED STRUCTURAL ANALYSIS AND REINFORCEMENT OF AN EXISTING 170' SELF SUPPORTING LATTICE TOWER AND FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENTS

Site ID:	**(Sprint)**	**CT60XC931**
	(T-Mobile)	**CT11059C**
Site Name:	**(Sprint)**	**Cromwell - Route 372**
	(T-Mobile)	**Rocky Hill / I-91 / X23**
Site Address:	**179 Shunpike Road**	
	Cromwell, CT	

prepared for

Sprint

Transcend Wireless
10 Industrial Ave.
Suite 3
Mahwah, NJ. 07430

T-Mobile

EBI Consulting
21 B Street
Burlington, MA 01803

prepared by

URS

URS CORPORATION
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CT 06067
TEL. 860-529-8882

36931260.00000
TWS-027 Rev. 1

September 23, 2014

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 170' self supporting lattice tower located at 179 Shunpike Road in Cromwell, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code which requires a three second gust wind speed of 100 mph which converts to an 80 mph fastest mile per 2003 IBC (Table 1609.3.1) and the TIA/EIA-222-F standard for a wind velocity of 85 mph (fastest mile). The wind speed from the Connecticut State Building Code governs the design at 85 mph (fastest mile) and 74 mph (fastest mile) concurrent with ½ " ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report.

The proposed Sprint and T-Mobile antenna modifications are listed below:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Install: **(3) RFS APXV9TM14-ALU-I20 Panel Antennas** **(3) TD-RRH8x20-25 RRH Units** **(1) 1 1/4" Hybrid Cable** **(27) 8' Jumper Cables** **(3) 8' AISG Cables**	**Sprint (Proposed)**	**@ 170'**
Install: **(3) Commscope LNX-6515DS-VTM Panel Antennas** **(3) Ericsson RRUS_11 RRH Unit** **(3) 6' Antenna Pipe Mount**	**T-Mobile (Proposed)**	**@ 125'**

The results of an initial analysis indicated the tower structure did not have sufficient capacity to support the proposed loadings without modification. The required modifications are shown in SK-1. **Once the modifications are performed, the tower, anchor bolts, and foundation are considered structurally adequate with the wind loading classification specified above and all the existing and proposed antenna loading. No installation of new antennas or equipment shall occur until the modifications have been completed.**

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, structural member sizes, and Foundation information taken from a tower report prepared by PiROD Inc., ENG. File No. A-116398, dated November 18, 1999.
3) Foundation modification drawings prepared by Tectonic, dated May 5, 2004.
4) Structural analysis and reinforcement performed by URS Corp. on behalf of Sprint and T-Mobile, project number 36922436, signed and sealed on September 9, 2013.
5) Structural analysis performed by URS Corp. on behalf of Verizon Wireless, project number VZ5-178 / 36917427, signed and sealed on August 12, 2014.
6) Structural analysis performed by URS Corp., on behalf of Sprint, project number TWS-027 / 36931260, signed and sealed on August 22, 2014.
7) T-Mobile RFDS dated July 17, 2014.
8) Previous structural analysis performed by URS Corporation, on behalf of T-Mobile, project number EBI-002 / 36931289, signed and sealed August 29, 2014.
9) Proposed additional antenna and mount configuration as specified in Section 2 of this report.

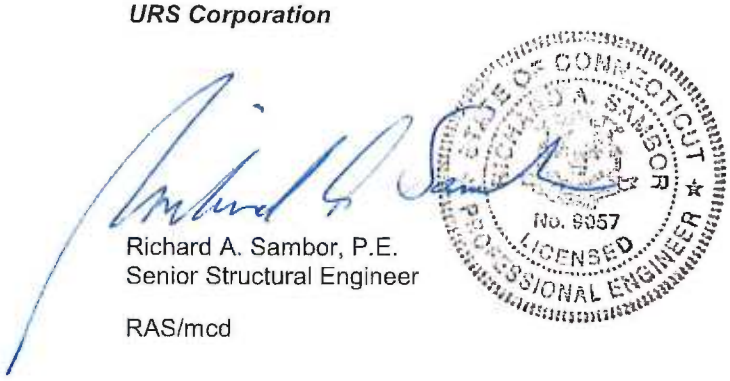
1. EXECUTIVE SUMMARY (continued)

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 assumption of the antenna and mount configuration as well as the physical condition of the tower and connections. 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 call.

Sincerely,

URS Corporation



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

RAS/mcd

2. INTRODUCTION

The subject tower is located at 179 Shunpike Road in Cromwell, Connecticut. The structure is a 170' self supporting lattice tower designed and manufactured by PiROD Inc.

The current inventory with proposed modification is summarized in the table below:

Antenna Type	***Carrier***	***Mount***	***Antenna Centerline Elevation***	***Cable***
(1) Tx Rx 101-90-08 antenna	Town (existing)	15' Mast pipe on 9 Arm Halo Mount	183'	(1) 7/8"
(1) 8 Bay Dipole (3" dia x 20')	Town (existing)	9 Arm Halo Mount	178'	(1) 7/8"
(1) 2 ½" dia x 20' Whip	Town (existing)	9 Arm Halo Mount	178'	(1) 1 1/2"
(3) 2 ½" dia x 15' Whip	Town (existing)	9 Arm Halo Mount	175'	(3) 7/8"
1 ½" dia x 12' Whip	Town (existing)	9 Arm Halo Mount	174'	(1) 7/8"
(3) RFS APXV9TM14-ALU-I20 Panel Antennas (3) TD-RRH8x20-25 RRH Units	**Sprint (Proposed)**	***See Mount Below***	**170'**	**(1) 1 1/4" Hybrid Cable (27) 8' Jumper Cables (3) 8' AISG Cables**
(3) RFS APXVSPP18-C-A20 Antennas (3) 1900 MHz RRH Units (3) 800 MHz RRH Units (3) 800 MHz Filters	Sprint (existing)	9 Arm Halo Mount	170'	(3) RFS HB114-1-0804-MSF Hybrid Cables
(1) Radiowaves HPD2-4.7 w/ Radome (1) Cambium PTP49600 Antenna	CPD (existing)	9 Arm Halo Mount	168'	(1) WB3176A – Copper Clad Outdoor Cable (2) 4' long 1/2" Jumper Cables
(1) SU-RA-HP-2.4 (1' x 1' Antenna)	Town (existing)	9 Arm Halo Mount	168'	(1) 3/8"
(3) APXV18-206517S	Unknown (existing)	Leg Mount	159'-6"	(6) 1 5/8"
(1) Sinclair SC420-HF1LDF Omni	CPD (existing)	Pipe mount	158'-6"	(1) 1 5/8" Low Density Foam Cable
(2) 3" dia x 20' Whip	Town (existing)	20' Platform	144'	(2) 7/8"
(1) 2 ½" x 20' Whip	Town (existing)	20' Platform	144'	(1) 1/2"
2" dia x 15' Whip	Town (existing)	20' Platform	141'	(1) 1/2"
(1) 1.5" dia x 10' Whip	Town (existing)	20' Platform	139'	(1) 1/2"
(1) 3.5" dia x 9' Whip	Town (existing)	20' Platform	138'-6"	---
(3) Argus LLPX310R antennas (3) Samsung Remote Radio Heads U-RAS	Clearwire (existing)	20' Platform	134'	(6) CAT 5 cable

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(3) Andrew VHLP2.5 dish (2.5' dia.) (1) Andrew VHLP2 dish (2' dia.) (Gamma Sector)	Clearwire (existing)	20' Platform	134'	(4) 1/2"
(3) Commscope LNX-6515DS-VTM Panel Antennas (3) Ericsson RRUS_11 RRH Unit	**T-Mobile (Proposed)**	**(3) Antenna Pipes attached with below**	**125'**	***See Below Cables***
(6) Ericsson AIR21 B4A|B2P Antennas (3) Twin PCS TMAs	T-Mobile (existing)	(3) Existing T-Frames	125'	(12) 1 5/8" (1) 1-5/8" Hybrid Cable
(6) Powerwave 7770 (12) TMA's (3) KMW AM-X-CD-16-65-00T-RET (6) RRU (1) Surge Suppressor	AT&T (existing)	(3) T-Frames	115'	(12) 1 5/8" (3) Optic Fiber & (6) DC Cables (Located within 3" dia Flex Conduit)
(1) HBX-6517DS-VTM_04DT_2110 Panel Antenna (Alpha Sector) (2) HBX-6517DS-VTM_02DT_2110 Panel Antennas (Beta & Gamma Sectors) (3) AWS RRH Units (1) DB-T1-6Z-8AB-0Z Distribution Box (1) LNX-6514DS-VTM_03DT_0850 Panel Antenna (Alpha Sector) (1) LNX-6514DS-VTM_04DT_0850 Panel Antenna (Beta Sector) (1) LNX-6514DS-VTM_05DT_0850 Panel Antenna (Gamma Sector) (2) SWCP 2x5514 antennas (Alpha & Gamma Sector) (1) BXA-70063-6CF-2 antenna (Beta Sector) (3) BXA-171063-12BF_2 antennas (6) FD9R6004/2C-3L Diplexers	Verizon (existing)	(3) T-Frames (PiROD part #800093)	101'	(1) 1 5/8" F.O Cable (12) 1 5/8"
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	Pipe Mount	87'	(2) CAT 5

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(1) 3' Dish (1) TMA	AT&T (existing)	3' Stand-off	83'	(2) CAT 5
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	3' Stand-off	80'	(2) CAT 5
(1) Camera	Unknown (existing)	Leg Mounted	30'	(2) 1/2" (estimated from photographs)
(1) 3' Yagi	Unknown (existing)	Leg Mounted	24'	(1) 1/2"

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

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done in accordance with the Connecticut State Building Code, TIA/EIA-222-F - Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, and the American Institute of Steel Construction (AISC) Manual of Steel Construction – Allowable Stress Design (ASD).

The analysis was conducted using TNX Tower 6.1.3.1. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Basic Wind Speed:

- Middlesex County; v = **85** mph (fastest mile) [Section 16 of TIA/EIA-222-F-1996]
- Cromwell; v = 100mph (3 second gust) equivalent to 80mph (fastest mile) [Appendix K, 2005 Connecticut State Building Code Supplement]

Loading Cases:

Load Condition 1 = 85 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 74 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

The combined axial and bending stresses on the tower structure were evaluated to compare with the allowable stress in accordance with AISC. The results of an initial analysis indicated that the tower structure required modification. The required modifications are shown in SK-1 located in Section 6 of this report. This analysis indicated that once these modifications are performed, the tower, anchor bolts and foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading. The table below summarizes the critical members for each tower component.

TABLE 1: Tower Component Stress vs. Capacity Summary:

Component/ (Section No.)	Existing Component Size	Controlling Component/Elevation	Percent Capacity	Pass/Fail
Tower Leg (T5)	PiROD Truss Leg	Compression 90'-100'	**92.4 %**	**Pass**
Diagonal (T7)	L3x3x3/8	Compression 60'-80'	**88.5 %**	**Pass**
Top Girt (T1)	7/8" SR	Compression 150'-170'	**9.5 %**	**Pass**
Bottom Girt (T1)	7/8" SR	Compression 150'-170'	**4.4 %**	**Pass**
Mid Girt (T4)	L3x3x3/16	Compression 100'-120'	**34.8 %**	**Pass**
Bolt Checks				
Tower Bolts	(1) 1" A325N Bolt / 140'	Member Bearing on Bolt	**83.5 %**	**Pass**
Anchor Bolts	(6) 1-1/4"	Tension	**77.0 %**	**Pass**

TABLE 2: Foundation Summary

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments:
Previously Modified Drilled Concrete Caisson	Uplift	89.9 %/2.22	**Pass**	Min. F.O.S of 2.0 req'd per IBC 2003 Section 3108.4.2

5. CONCLUSIONS AND RECOMMENDATIONS

The results of an initial analysis indicated the tower structure did not have sufficient capacity to support the proposed loadings without modification. The required modifications are shown in SK-1. **Once the modifications are performed, the tower, anchor bolts, and foundation are considered structurally adequate with the wind loading classification specified above and all the existing and proposed antenna loading. No installation of new antennas or equipment shall occur until the modification have been completed.**

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 were properly constructed to support original design loads as specified in the original design documents.
10. All coaxial cable is installed as specified in Section 6 of this report.

URS is not responsible for any changes/alterations completed prior to or hereafter in which URS is not or was not directly involved. Changes/alterations include but are not limited to:

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

URS 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 URS. URS 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.

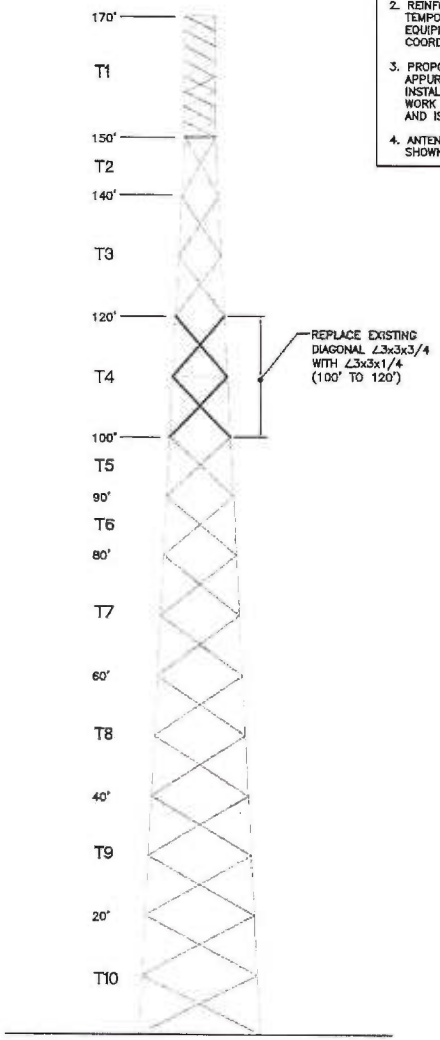
The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

TOWER REINFORCEMENT DRAWING SK-1

NOTES:

1. ALL PROPOSED DIAGONAL MEMBERS SHALL BE INSTALLED WITH A325-N BOLTS (THREADS EXCLUDED FROM SHEAR PLANE). SIZE SHALL MATCH EXISTING.
2. REINFORCEMENT MAY REQUIRE TEMPORARY REMOVAL OF EXISTING EQUIPMENT. CONTRACTOR SHALL COORDINATE WORK WITH OWNER.
3. PROPOSED ANTENNAS AND APPURTENANCES SHALL NOT BE INSTALLED UNTIL ALL REINFORCEMENT WORK HAS BEEN INSPECTED AND IS DEEMED COMPLETE.
4. ANTENNAS AND APPURTENANCES NOT SHOWN FOR CLARITY.



1 / SK-1 TOWER REINFORCEMENT
SCALE: 1" = 30'-0"

STRUCTURAL NOTES

TOWER DESIGN CRITERIA:

THIS TOWER IS DESIGNED AND REINFORCED IN ACCORDANCE WITH THE 2005 CONNECTICUT STATE BUILDING CODE, THE TIA/EIA-222-F FOR 90 MPH (FASTEST MILE) WIND SPEED CONCURRENT WITH 1/2" RADIAL ICE. ALLOWABLE STEEL STRESSES PER AISC ASD 9TH EDITION.

MATERIAL SPECIFICATIONS FOR REINFORCEMENT OF TOWER:

STRUCTURAL STEEL, PLATES, ANGLES		ASTM A36
SOLID ROUND (S.R.)		ASTM A572 GRADE 50
PIPE COLUMNS		ASTM A53 GRADE B
TUBE COLUMNS	F=46.KSI	ASTM A500
BOLTS		ASTM 325-N (UNLESS NOTED OTHERWISE)
WELDING ELECTRODE		ASTM E 70

SHOP AND ERECTION DRAWINGS SHALL BE SUBMITTED FOR ALL STRUCTURAL STEEL WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. SUBMIT 6 SETS OF PRINTS TO THE ARCHITECT FOR REVIEW.

THE OMISSION OF ANY MATERIAL THAT WAS SHOWN ON THE CONTRACT DRAWINGS SHALL NOT RELIEVE THE CONTRACTOR OF PROVIDING SAME.

STRUCTURAL STEEL SHALL CONFORM TO THE CURRENT "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", AND THE "AISC CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES".

ALL WELDING SHALL BE DONE BY A CERTIFIED WELDER IN ACCORDANCE WITH A.W.S. STANDARDS.

CONNECTIONS SHALL CONFORM TO ALL REQUIREMENTS OF THE "AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", LATEST EDITION, AND THE "SPECIFICATION FOR STRUCTURAL STEEL JOINTS USING ASTM A325 OR A490 BOLTS".

BOLT HOLES SHALL BE PUNCHED OR DRILLED. FLAME CUT HOLES ARE NOT ACCEPTABLE.

ALL A-325/A490 BOLTS ARE TO BE TIGHTENED TO A SNUG TIGHT CONDITION AS DEFINED BY AISC SPECIFICATION. USE LOCK NUT OR LOCKING DEVICE TO MATCH EXISTING.

ALL WELDING SHALL BE DONE USING E70XX ELECTRODES AND WELDING SHALL CONFORM TO AISC AND AWS D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN. PROVIDE THE MINIMUM SIZE PER TABLE J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION", 9TH EDITION. AT THE COMPLETION ALL WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

USE PRECAUTIONS & PROCEDURES PER AWS D1.1 WHEN WELDING GALVANIZED METALS.

TOUCH-UP ALL DAMAGED GALVANIZED STEEL WITH APPROVED COLD ZINC, "GALVANOX", "DRY GALV", "ZINC-IT", OR APPROVED EQUIVALENT, IN ACCORDANCE WITH MANUFACTURERS GUIDELINES. TOUCH-UP DAMAGED NON GALVANIZED STEEL WITH SAME PAINT APPLIED IN SHOP OR FIELD.

ALL STEEL WORK SHALL BE GALVANIZED AND IN ACCORDANCE WITH THE SPECIFICATION ASTM A123 UNLESS OTHERWISE NOTED. (AFTER FABRICATION)

COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

SPECIAL INSPECTIONS REQUIRED PER THE 2005 CONNECTICUT STATE BUILDING CODE FOR STRUCTURAL STEEL WORK.

INSPECTION AND TESTING OF ALL WELDING AND HIGH STRENGTH BOLTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY, BE PAID BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. THE INSPECTOR SHALL OBSERVE INSTALLATION OF BOLTS AND TEST NOT LESS THAN 20% OF THE BOLTS AND NOT LESS THAN TWO BOLTS, SELECTED AT RANDOM, IN EACH CONNECTION.

FOUR COPIES OF ALL INSPECTION TEST REPORTS SHALL BE SUBMITTED TO THE ENGINEER WITHIN TEN (10) WORKING DAYS OF THE DATE OF INSPECTION.

REINFORCEMENT NOTES:

EXISTING DIMENSIONS OF THE TOWER STRUCTURE WERE OBTAINED FROM MANUFACTURERS ORIGINAL DESIGN DOCUMENTS, PREPARED BY PIROD INC., ENG FILE No. A-116398, DATED NOVEMBER 18, 1999 AND ARE NOT GUARANTEED. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.

CONTRACTOR SHALL VISIT THE SITE PRIOR TO THE START OF WORK WITH SUFFICIENT RIGGING EQUIPMENT AND PERSONNEL TO OBTAIN DETAILED FABRICATION MEASUREMENTS OF EXISTING TOWER STEEL MEMBERS TO BE REPLACED.

TOWER REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS, TRANSMISSION LINES AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA

THE EXISTING COAXIAL CABLE AND ALL ACCESSORIES SHALL BE RELOCATED AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.

CONTRACTOR SHALL TAKE EXTREME CARE NOT TO DAMAGE THE EXISTING TOWER, THE EXISTING COMMUNICATION EQUIPMENT, COAXIAL CABLE AND THEIR COMPONENTS. IN THE EVENT THAT THE EXISTING COMMUNICATION EQUIPMENT IS DAMAGED DURING CONSTRUCTION THE CONTRACTOR SHALL REPAIR THE DAMAGE IMMEDIATELY (WITH THE APPROVAL OF THE COMMUNICATION CARRIER) AT NO ADDITIONAL COST TO THE CONTRACT

THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION. THE CONTRACTOR SHALL BE AWARE OF WEATHER & WIND CONDITIONS AND NOT PERFORM TOWER MEMBER REPLACEMENT IN THE WIND.

ALL REINFORCEMENT SHOWN FOR DIAGONALS AND HORIZONTALS APPLY TO ALL SIDES OF THE TOWER.

A&E FIRM
URS CORPORATION AES
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

Sprint
10 INTERNATIONAL AVENUE
SUITE 3
MAHWAH, NJ 07430

T-Mobile
EBI CONSULTING
21 B STREET
BURLINGTON, MA 01803

A&E SEAL

URS PROJECT NUMBER	DRAWN BY
39931260Z (TWS-027)	MD

NO.	DATE	ISSUED FOR
0	9/22/14	TWS-027 MOD

RELEASE BY | DATE

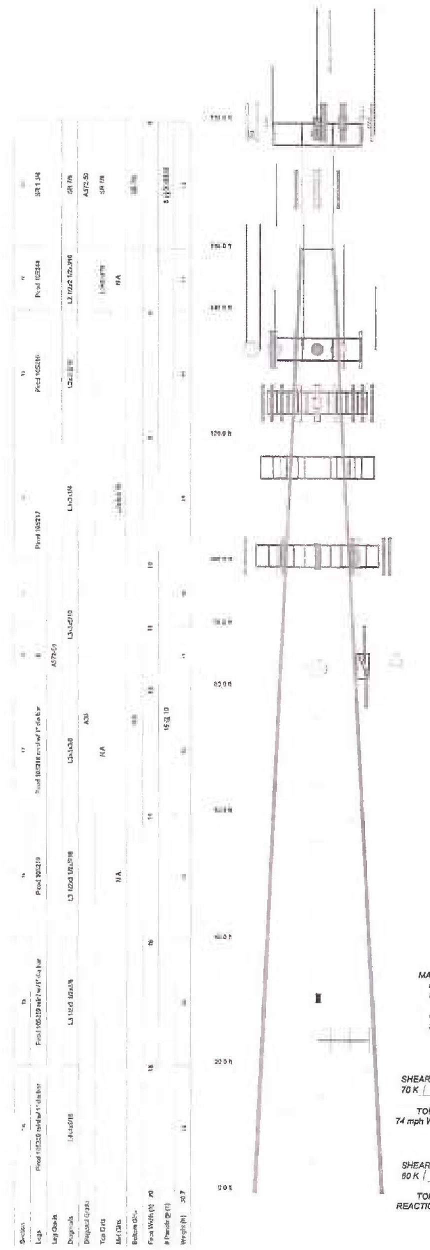
CT60XC931
CT11059C

179 SHUNPIKE ROAD
CROMWELL, CT

SHEET TITLE
REINFORCEMENT DETAILS & NOTES

SHEET NUMBER
SK-1

TNX TOWER INPUT/OUTPUT SUMMARY



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
[illegible] (Municipal)	[illegible]	[illegible] w/ 6' 2" sch 40 Pipe Mount (T-Mobile)	125.5
15' Mount Pipe (Municipal)	170.75	[illegible]DS-VTM w/ 6' 2" sch 40 Pipe Mount (T-Mobile)	125.5
3" Dia [illegible] Omni (Municipal)	178	[illegible]-11 (T-Mobile)	125.5
2.5" x 20'8" Whip (Municipal)	178	[illegible]-11 (T-Mobile)	125.5
2.5" x 14' Omni (Municipal)	175	[illegible]-11 (T-Mobile)	125.5
2.5" x 14' Omni (Municipal)	175	[illegible] (ATT)	115
2.5" x 14' Omni (Municipal)	175	[illegible] (ATT)	115
1.5" x 12' Omni (Municipal)	174	[illegible] (ATT)	115
APXVSPP18-C-A20 (Sprint)	170	[illegible] (ATT)	115
APXVSPP18-C-A20 (Sprint)	170	(2) TMA (shielded) (ATT)	115
APXVSPP18-C-A20 (Sprint)	170	(2) TMA (shielded) (ATT)	115
Panasonic RRH 1900MHZ (Sprint)	170	(2) TMA (shielded) (ATT)	115
Panasonic RRH 1900MHZ (Sprint)	170	(2) TMA (shielded) (ATT)	115
Panasonic RRH 1900MHZ (Sprint)	170	(2) TMA (shielded) (ATT)	115
Andrew [illegible] (Sprint)	170	(2) TMA (shielded) (ATT)	115
Andrew [illegible] (Sprint)	170	PiROD 12' Lightweight T-Frame (ATT)	115
Andrew [illegible] (Sprint)	170	PiROD 12' Lightweight T-Frame (ATT)	115
APXV[illegible] (Sprint)	170	PiROD 12' Lightweight T-Frame (ATT)	115
[illegible]-120 (Sprint)	170	[illegible] (ATT)	115
[illegible]-120 (Sprint)	170	[illegible] (ATT)	115
[illegible] (Sprint)	170	REMOTE RADIO HEAD (RRH) (ATT)	115
[illegible] (Sprint)	170	Surge Suppressor (ATT)	[illegible]
[illegible] (Sprint)	170	[illegible]-CD-16-65-00T-RET (ATT)	[illegible]
[illegible]	160	[illegible]-CD-16-65-00T-RET (ATT)	115
[illegible]	168	[illegible]-CD-16-65-00T-RET (ATT)	[illegible]
[illegible]	168	REMOTE RADIO HEAD (RRH) (ATT)	[illegible]
[illegible]	168	REMOTE RADIO HEAD (RRH) (ATT)	[illegible]
[illegible] hardware	159.5	PH_2X40-AWS (Verizon - AWS)	[illegible]
[illegible] hardware	159.5	[illegible] (Verizon - AWS)	[illegible]
[illegible] hardware	159.5	[illegible] (Verizon)	[illegible]
[illegible]	159.5	[illegible] (Verizon)	[illegible]
[illegible]	144	[illegible] (Verizon)	[illegible]
[illegible]	144	[illegible] (Verizon)	[illegible]
[illegible]	144	[illegible] (Verizon)	[illegible]
[illegible]	141	PiROD 12' Lightweight T-Frame (Verizon)	[illegible]
[illegible]	137	PiROD 12' Lightweight T-Frame (Verizon)	[illegible]
[illegible]	130.5	PiROD 12' Lightweight T-Frame (Verizon)	[illegible]
[illegible] (Clearwire)	134	[illegible] (Verizon)	101
[illegible] (Clearwire)	134	[illegible] (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	Diplexer (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	RXA-70063-6CF (Verizon)	101
PiROD 10' Universal Platform [illegible]	134	HBX-6517DS-VTM (Verizon - AWS)	101
[illegible] LLPX310R (Clearwire)	134	HBX-6517DS-VTM (Verizon - AWS)	101
VHLP2.5-180 (Clearwire)	134	HBX-6517DS-VTM (Verizon - AWS)	101
VHLP2.5-180 (Clearwire)	134	PH_2X40-AWS (Verizon - AWS)	101
VHLP2.5-180 (Clearwire)	134	DB-T1-6Z-8AB-0Z (Verizon - AWS)	101
VHLP2-180 (Clearwire)	134	LNX-6514DS-T4M (Verizon - 850)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	LNX-6514DS-T4M (Verizon - 850)	101
PiROD 15' Lightweight T-Frame (T-Mobile)	125.5	LNX-6514DS-T4M (Verizon - 850)	101
PiROD 15' Lightweight T-Frame (T-Mobile)	125.5	2'x2' 422' Frame	87
PiROD 15' Lightweight T-Frame (T-Mobile)	125.5	TMA	84.5
AIR B2A/B4P (T-Mobile)	125.5	Stand-off	83.5
AIR B2A/B4P (T-Mobile)	125.5	Stand-off	83.5
AIR B2A/B4P (T-Mobile)	125.5	Dish	83
AIR B2A/B4P (T-Mobile)	125.5	TMA	83
AIR B2A/B4P (T-Mobile)	125.5	TMA	82.5
AIR B2A/B4P (T-Mobile)	125.5	3'x2'x22' Panel	80
Twin PCS TMA (T-Mobile)	125.5	Camera	30
Twin PCS TMA (T-Mobile)	125.5	PC901 3N	24
Twin PCS TMA (T-Mobile)	125.5		
LNX-6515DS-VTM w/ 6' 2" sch 40 Pipe Mount (T-Mobile)	125.5		

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirod 105217 rand w/ 1" dia bar		

MATERIAL STRENGTH

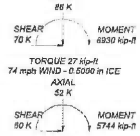
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	[illegible]

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 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.
8. TOWER RATING: 92.4%

MAX. CORNER REACTIONS AT BASE:
DOWN: 429 K
SHEAR: 38 K

UPLIFT: -366 K
SHEAR: 48 K

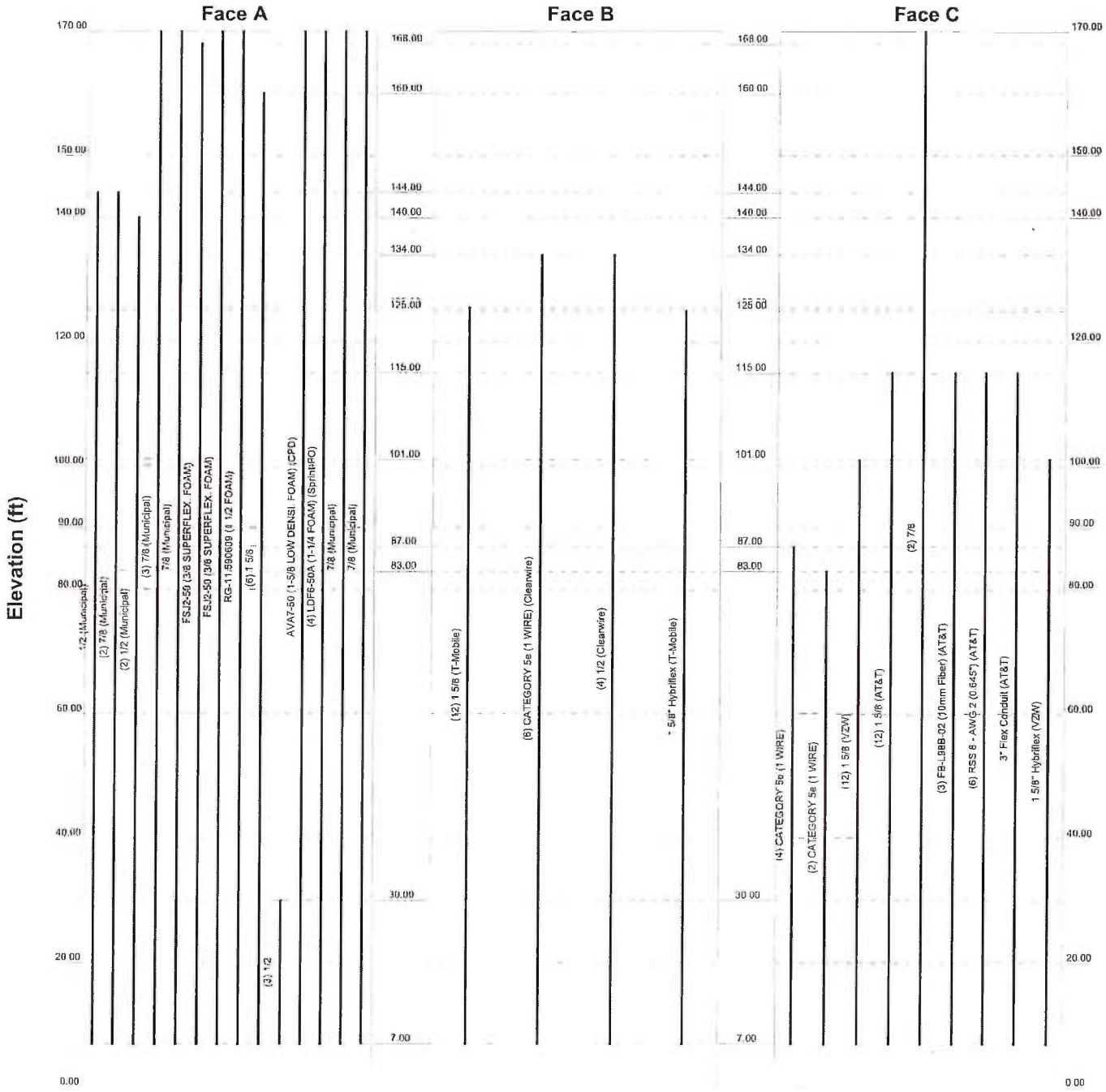


URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	Job: **PiROD U20'-0"x170' Lattice Tower** Project: **TWS-027 Rev. 1 / Cromwell, CT Tower** Client: Sprint / T-Mobile (TWS-027)(EBI-002) Drawn by: MCD App'd: Code: TIA/EIA-222-F Date: 09/23/14 Scale: NTS Path: Dwg No. E-1

TNX TOWER FEEDLINE DISTRIBUTION CHART

Feed Line Distribution Chart
0' - 170'

Round Flat App In Face App Out Face Truss Leg



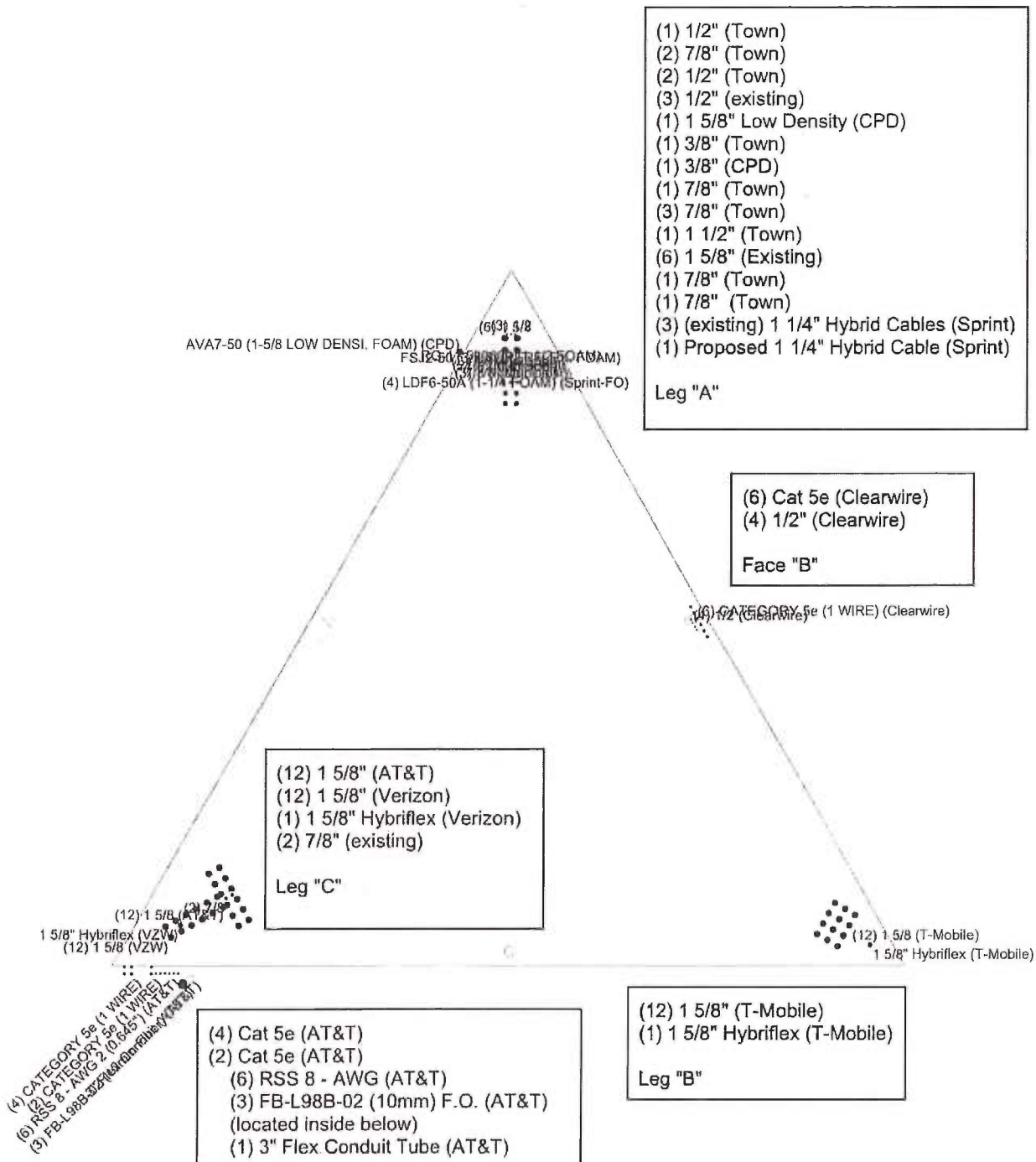
URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: 860-529-8882
FAX: 860-529-3991

Job:	*PiROD U20'-0"x170' Lattice Tower*
Project:	*TWS-027 Rev. 1 / Cromwell, CT Tower*
Client:	Sprint / T-Mobile (TWS-027)/(EBI-002)
Drawn by:	MCD
App'd:	
Code:	TIA/EIA-222-F
Date:	09/23/14
Scale:	NTS
Path:	
Dwg No.	E-7

TNX TOWER FEEDLINE PLAN

Feed Line Plan

Round Flat App In Face App Out Face Truss-Leg



(1) 1/2" (Town)
(2) 7/8" (Town)
(2) 1/2" (Town)
(3) 1/2" (existing)
(1) 1 5/8" Low Density (CPD)
(1) 3/8" (Town)
(1) 3/8" (CPD)
(1) 7/8" (Town)
(3) 7/8" (Town)
(1) 1 1/2" (Town)
(6) 1 5/8" (Existing)
(1) 7/8" (Town)
(1) 7/8" (Town)
(3) (existing) 1 1/4" Hybrid Cables (Sprint)
(1) Proposed 1 1/4" Hybrid Cable (Sprint)

Leg "A"

(6) Cat 5e (Clearwire)
(4) 1/2" (Clearwire)

Face "B"

(12) 1 5/8" (AT&T)
(12) 1 5/8" (Verizon)
(1) 1 5/8" Hybriflex (Verizon)
(2) 7/8" (existing)

Leg "C"

(12) 1 5/8" (T-Mobile)
(1) 1 5/8" Hybriflex (T-Mobile)

Leg "B"

(4) Cat 5e (AT&T)
(2) Cat 5e (AT&T)
(6) RSS 8 - AWG (AT&T)
(3) FB-L98B-02 (10mm) F.O. (AT&T)
(located inside below)
(1) 3" Flex Conduit Tube (AT&T)

Face "C"

URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: 860-529-8882
FAX: 860-529-3991

Job:	***PiROD U20'-0"x170' Lattice Tower***
Project:	***TWS-027 Rev. 1 / Cromwell, CT Tower***
Client:	Sprint / T-Mobile (TWS-027)/(EBI-002)
Drawn by:	MCD
App'd:	
Code:	TIA/EIA-222-F
Date:	09/23/14
Scale:	NTS
Path:	
Dwg No.	E-7

TNX TOWER DETAILED OUTPUT

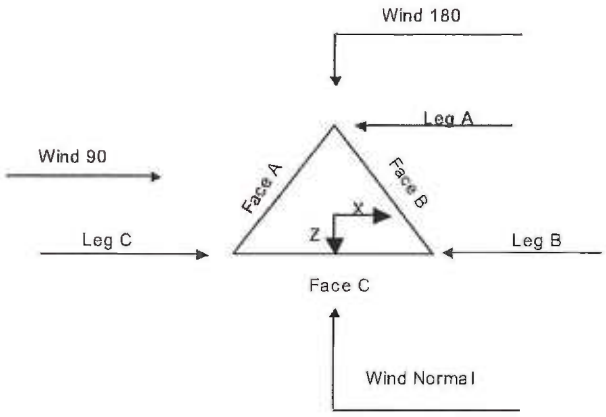
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 170.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.00 ft at the top and 20.00 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 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	√ Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	√ Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	√ SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	√ All Leg Panels Have Same Allowable
Escalate Ice	Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
√ Leg Bolts Are At Top Of Section	√ SR Members Have Cut Ends	Include Shear-Torsion Interaction
√ Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice Capacity Exemption	



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	170.00-150.00			5.00	1	20.00
T2	150.00-140.00		U6.0 105244	5.00	1	10.00
T3	140.00-120.00		U8.0 105216	6.00	1	20.00
T4	120.00-100.00		U10.0 105217 L3x3/16	8.00	1	20.00
T5	100.00-90.00		U12.0 105216	10.00	1	10.00
T6	90.00-80.00		U12.0 105216	11.00	1	10.00
T7	80.00-60.00		U14.0 105218	12.00	1	20.00
T8	60.00-40.00		U16.0 105219	14.00	1	20.00
T9	40.00-20.00		U18.0 105219	16.00	1	20.00
T10	20.00-0.00		U20.0 105219 L4x1/4	18.00	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	170.00-150.00	2.49	X Brace	No	No	0.0000	1.0000
T2	150.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T5	100.00-90.00	10.00	X Brace	No	No	0.0000	0.0000

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
T6	90.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T7	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T8	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T9	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T10	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 170.00-150.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 150.00-140.00	Truss Leg	Pirod 105244	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 140.00-120.00	Truss Leg	Pirod 105216	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T4 120.00-100.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T5 100.00-90.00	Truss Leg	Pirod 105217	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T6 90.00-80.00	Truss Leg	Pirod 105217 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T7 80.00-60.00	Truss Leg	Pirod 105218 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L3x3x3/8	A36 (36 ksi)
T8 60.00-40.00	Truss Leg	Pirod 105219	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T9 40.00-20.00	Truss Leg	Pirod 105219 reinf w /1" dia bar	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x3/8	A36 (36 ksi)
T10 20.00-0.00	Truss Leg	Pirod 105220 reinf w/ 1" dia bar	A572-50 (50 ksi)	Single Angle	L4x4x5/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 170.00-150.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)
T2 150.00-140.00	Single Angle	L3x3x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T4 120.00-100.00	1	Single Angle	L3x3x3/16	A36 (36 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_l	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T1 170.00-150.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T2 150.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T5 100.00-90.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T6 90.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T7 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T8 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T9 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	Mid-Pt	Mid-Pt
T10 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	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 Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1 170.00-150.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 150.00-140.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 140.00-120.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 120.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 100.00-90.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 90.00-80.00	Yes	Yes	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
T7 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T8 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T9 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T10 20.00-0.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Truss-Leg K Factors: Truss-Legs Used As Leg Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals	Truss-Legs Used As Inner Members — Leg Panels	X Brace Diagonals	Z Brace Diagonals
T2 150.00-140.00	1	0.5	0.85	1	0.5	0.85
T3 140.00-120.00	1	0.5	0.85	1	0.5	0.85
T4 120.00-100.00	1	0.5	0.85	1	0.5	0.85
T5 100.00-90.00	1	0.5	0.85	1	0.5	0.85
T6 90.00-80.00	1	0.5	0.85	1	0.5	0.85
T7 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T8 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T9 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T10 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	U	Diagonal Net Width Deduct in	U	Top Girt Net Width Deduct in	U	Bottom Girt Net Width Deduct in	U	Mid Girt Net Width Deduct in	U	Long Horizontal Net Width Deduct in	U	Short Horizontal Net Width Deduct in	U
T1 170.00-150.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T2 150.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 100.00-90.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 90.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T10 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 170.00-150.00	Flange	0.7500 A325N	0	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 150.00-140.00	Flange	1.0000 A325N	6	1.0000 A325N	1	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 140.00-120.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 120.00-100.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0
T5 100.00-90.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.0000 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 90.00-80.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 80.00-60.00	Flange	1.0000 A325N	6	1.0000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 60.00-40.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 40.00-20.00	Flange	1.2500 A325N	6	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 20.00-0.00	Flange	0.0000 A325N	0	1.2500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
CATEGORY	C	Yes	Ar (CfAe)	87.00 - 7.00	0.0000	0.48	4	2	1.0000	1.0000		0.21

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
5e (1 WIRE) CATEGORY	C	Yes	Ar (CfAe)	83.00 - 7.00	0.0000	0.45	2	1	1.0000	1.0000		0.21
5e (1 WIRE) 1/2 (Municipal)	A	No	Ar (Leg)	144.00 - 7.00	0.0000	0.125	1	1	0.5800	0.5800		0.25
7/8 (Municipal)	A	No	Ar (Leg)	144.00 - 7.00	0.0000	0.125	2	1	1.0000	1.1100		0.54
1/2 (Municipal)	A	No	Ar (Leg)	140.00 - 7.00	0.0000	0.13	2	1	0.5800	0.5800		0.25
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.14	3	1	1.0000	1.1100		0.54
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.14	1	1	1.1100	1.1100		0.54
FSJ2-50 (3/8 SUPERFLEX. FOAM)	A	No	Ar (Leg)	168.00 - 7.00	0.0000	0.12	1	1	0.4300	0.4300		0.08
FSJ2-50 (3/8 SUPERFLEX. FOAM)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.12	1	1	0.4300	0.4300		0.08
RG-11 590609 (1 1/2 FOAM)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.12	1	1	1.5000	1.5900		0.94
1 5/8 (T-Mobile)	B	No	Ar (Leg)	125.50 - 7.00	0.0000	0.1	12	3	1.5000	1.9800		1.04
1 5/8 (VZW)	C	No	Ar (Leg)	101.00 - 7.00	0.0000	0.12	12	6	1.5000	1.9800		1.04
1 5/8 (AT&T)	C	No	Ar (Leg)	115.00 - 7.00	0.0000	0.17	12	2	1.5000	1.9800		1.04
7/8	C	No	Ar (Leg)	170.00 - 7.00	0.0000	0.17	2	2	1.0000	1.1100		0.54
1 5/8	A	No	Ar (Leg)	160.00 - 7.00	0.0000	0.1	6	3	1.5000	1.9800		1.04
CATEGORY 5e (1 WIRE) (Clearwire)	B	Yes	Ar (CfAe)	134.00 - 7.00	-2.0000	0	6	6	1.0000	1.0000		0.21
1/2 (Clearwire)	B	Yes	Ar (CfAe)	134.00 - 7.00	-4.0000	0	4	4	0.5800	0.5800		0.25
FB-L98B-02 (10mm Fiber) (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	3.0000	0.4	3	3	0.3937	0.3937		0.03
RSS 8 - AWG 2 (0.645") (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	2.0000	0.43	6	6	0.6450	0.6450		0.30
3" Flex Conduit (AT&T)	C	Yes	Ar (CfAe)	115.00 - 7.00	4.0000	0.41	1	1	0.0000	3.0000		3.00
1/2	A	No	Ar (Leg)	30.00 - 7.00	0.0000	0.08	3	1	0.5800	0.5800		0.25
AVA7-50 (1-5/8 LOW DENSI. FOAM) (CPD)	A	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0.38	1	1	1.5000	1.9800		0.72
1 5/8" Hybriflex (T-Mobile)	B	No	Ar (Leg)	125.00 - 7.00	0.0000	0.05	1	1	1.6250	1.6250		0.21
1 5/8" Hybriflex (VZW)	C	No	Ar (Leg)	101.00 - 7.00	0.0000	0.1	1	1	1.6250	1.6250		0.21
LDF6-50A (1-1/4 FOAM) (Sprint-FO)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.16	4	2	1.5500	1.5500		0.66
7/8 (Municipal)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.132	1	1	1.1100	1.1100		0.54
7/8	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.132	1	1	1.1100	1.1100		0.54

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
(Municipal)												

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	170.00-150.00	A	40.136	0.000	0.000	0.000	0.22
		B	33.136	0.000	0.000	0.000	0.00
		C	3.700	0.000	0.000	0.000	0.02
T2	150.00-140.00	A	25.105	0.000	0.000	0.000	0.14
		B	21.605	0.000	0.000	0.000	0.00
		C	1.850	0.000	0.000	0.000	0.01
T3	140.00-120.00	A	54.943	0.000	0.000	0.000	0.32
		B	64.985	0.000	0.000	0.000	0.10
		C	11.035	0.000	0.000	0.000	0.02
T4	120.00-100.00	A	81.377	0.000	0.000	0.000	0.32
		B	88.730	0.000	0.000	0.000	0.30
		C	67.119	0.000	0.000	0.000	0.29
T5	100.00-90.00	A	61.700	0.000	0.000	0.000	0.16
		B	44.365	0.000	0.000	0.000	0.15
		C	56.248	0.000	0.000	0.000	0.31
T6	90.00-80.00	A	61.700	0.000	0.000	0.000	0.16
		B	44.365	0.000	0.000	0.000	0.15
		C	58.981	0.000	0.000	0.000	0.32
T7	80.00-60.00	A	123.400	0.000	0.000	0.000	0.32
		B	88.730	0.000	0.000	0.000	0.30
		C	122.210	0.000	0.000	0.000	0.65
T8	60.00-40.00	A	123.400	0.000	0.000	0.000	0.32
		B	88.730	0.000	0.000	0.000	0.30
		C	122.210	0.000	0.000	0.000	0.65
T9	40.00-20.00	A	124.850	0.000	0.000	0.000	0.32
		B	90.180	0.000	0.000	0.000	0.30
		C	122.210	0.000	0.000	0.000	0.65
T10	20.00-0.00	A	82.095	0.000	0.000	0.000	0.21
		B	59.559	0.000	0.000	0.000	0.19
		C	79.437	0.000	0.000	0.000	0.42

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	170.00-150.00	A	0.500	58.953	3.517	0.000	0.000	0.60
		B		50.470	0.000	0.000	0.000	0.00
		C		3.517	3.517	0.000	0.000	0.07
T2	150.00-140.00	A	0.500	36.013	1.758	0.000	0.000	0.39
		B		31.771	0.000	0.000	0.000	0.00
		C		1.758	1.758	0.000	0.000	0.03
T3	140.00-120.00	A	0.500	82.393	3.517	0.000	0.000	0.87
		B		86.296	15.727	0.000	0.000	0.34
		C		11.727	3.517	0.000	0.000	0.07
T4	120.00-100.00	A	0.500	110.244	3.517	0.000	0.000	0.87
		B		110.130	22.467	0.000	0.000	0.88

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C		70.420	13.548	0.000	0.000	0.75
T5	100.00-90.00	A	0.500	77.925	1.758	0.000	0.000	0.44
		B		55.065	11.233	0.000	0.000	0.44
		C		59.479	8.446	0.000	0.000	0.79
T6	90.00-80.00	A	0.500	77.925	1.758	0.000	0.000	0.44
		B		55.065	11.233	0.000	0.000	0.44
		C		61.646	10.096	0.000	0.000	0.83
T7	80.00-60.00	A	0.500	155.850	3.517	0.000	0.000	0.87
		B		110.130	22.467	0.000	0.000	0.88
		C		128.959	21.605	0.000	0.000	1.72
T8	60.00-40.00	A	0.500	155.850	3.517	0.000	0.000	0.87
		B		110.130	22.467	0.000	0.000	0.88
		C		128.959	21.605	0.000	0.000	1.72
T9	40.00-20.00	A	0.500	159.100	3.517	0.000	0.000	0.90
		B		113.380	22.467	0.000	0.000	0.88
		C		128.959	21.605	0.000	0.000	1.72
T10	20.00-0.00	A	0.500	105.527	2.286	0.000	0.000	0.60
		B		75.809	14.603	0.000	0.000	0.57
		C		83.823	14.043	0.000	0.000	1.12

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	170.00-150.00	A	0.239	0.771	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	150.00-140.00	A	0.000	0.106	0.184	0.277
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T3	140.00-120.00	A	0.000	0.145	0.289	0.435
		B	0.000	0.580	0.849	1.741
		C	0.000	0.000	0.000	0.000
T4	120.00-100.00	A	0.000	0.145	0.288	0.434
		B	0.000	0.828	1.212	2.484
		C	0.000	0.548	0.879	1.645
T5	100.00-90.00	A	0.000	0.057	0.114	0.171
		B	0.000	0.327	0.479	0.981
		C	0.000	0.289	0.463	0.867
T6	90.00-80.00	A	0.000	0.055	0.109	0.165
		B	0.000	0.314	0.459	0.942
		C	0.000	0.340	0.538	1.019
T7	80.00-60.00	A	0.000	0.105	0.208	0.314
		B	0.000	0.598	0.875	1.795
		C	0.000	0.739	1.163	2.216
T8	60.00-40.00	A	0.000	0.100	0.231	0.348
		B	0.000	0.570	0.973	1.994
		C	0.000	0.703	1.292	2.462
T9	40.00-20.00	A	0.000	0.096	0.223	0.336
		B	0.000	0.550	0.939	1.925
		C	0.000	0.679	1.247	2.377
T10	20.00-0.00	A	0.000	0.061	0.162	0.243
		B	0.000	0.348	0.679	1.393
		C	0.000	0.430	0.902	1.719

Feed Line Center of Pressure

Section	*Elevation* *ft*	CP_X *in*	CP_Z *in*	CP_X *Ice* *in*	CP_Z *Ice* *in*
T1	170.00-150.00	-0.7973	-8.0376	-0.4853	-7.4212
T2	150.00-140.00	-0.4988	-6.6293	-0.3283	-6.3594
T3	140.00-120.00	1.4194	-7.8403	1.2494	-8.0075
T4	120.00-100.00	-0.3302	-2.7146	-0.0626	-4.2227
T5	100.00-90.00	-5.2784	0.3685	-4.0917	-1.7690
T6	90.00-80.00	-6.3856	0.8722	-4.8612	-1.5653
T7	80.00-60.00	-7.6460	1.3464	-5.9655	-1.3222
T8	60.00-40.00	-8.5419	1.4777	-6.6864	-1.5207
T9	40.00-20.00	-9.4077	1.2998	-7.3405	-2.1935
T10	20.00-0.00	-8.2989	0.8730	-6.4327	-2.3698

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* °	*Placement* *ft*		C_AA_A *Front* ft^2	C_AA_A *Side* ft^2	*Weight* *K*
101-90-08-0-01 (Municipal)	A	From Leg	9.00 2.00 0.00	0.0000	183.00	No Ice 1/2" Ice	3.33 4.31	3.33 4.31	0.04 0.06
15' Mount Pipe (Municipal)	A	From Leg	9.00 2.00 0.00	0.0000	179.75	No Ice 1/2" Ice	4.50 6.03	4.50 6.03	0.09 0.12
3" Dia 20' Omni (Municipal)	B	From Face	9.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	0.06 0.10
2.5" x 20'6" Whip (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	178.00	No Ice 1/2" Ice	5.14 7.24	5.14 7.24	0.15 0.19
2.5" x 14' Omni (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	3.50 4.93	3.50 4.93	0.03 0.06
2.5" x 14' Omni (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	3.50 4.93	3.50 4.93	0.03 0.06
2.5" x 14' Omni (Municipal)	C	From Face	9.00 0.00 0.00	0.0000	175.00	No Ice 1/2" Ice	3.50 4.93	3.50 4.93	0.03 0.06
1.5" x 12' Omni (Municipal)	A	From Face	9.00 4.00 0.00	0.0000	174.00	No Ice 1/2" Ice	1.50 2.52	1.50 2.52	0.06 0.07
9 Arm Halo Mount (Municipal)	C	None		0.0000	168.00	No Ice 1/2" Ice	62.60 80.40	62.60 80.40	3.60 4.80
SU-RA-HP-2.4 Antenna (Municipal)	B	From Face	9.00 2.50 0.00	0.0000	168.00	No Ice 1/2" Ice	0.80 0.93	0.37 0.47	0.00 0.01
PTP49600 (CPD)	C	From Leg	9.00 0.00	0.0000	168.00	No Ice 1/2" Ice	2.04 2.24	0.53 0.65	0.01 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
APXV18-206517S-C w/ mounting hardware	A	From Leg	1.00 0.00 0.00	0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware	B	From Leg	1.00 0.00 0.00	0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
APXV18-206517S-C w/ mounting hardware	C	From Leg	1.00 0.00 0.00	0.0000	159.50	No Ice 1/2" Ice	5.08 5.53	4.46 5.39	0.05 0.09
SC420-HF1LDF (Municipal)	A	From Face	6.00 0.00 0.00	0.0000	158.50	No Ice 1/2" Ice	2.14 3.02	2.14 3.02	0.02 0.03
3" Dia 20' Omni (Municipal)	C	From Face	6.00 9.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	0.06 0.10
3" Dia 20' Omni (Municipal)	A	From Face	6.00 -9.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	0.06 0.10
2.5" x 20'6" Whip (Municipal)	A	From Face	6.00 9.00 0.00	0.0000	144.00	No Ice 1/2" Ice	5.14 7.24	5.14 7.24	0.15 0.19
2" Dia 15' Omni (Municipal)	B	From Face	6.00 -5.00 0.00	0.0000	141.00	No Ice 1/2" Ice	3.20 4.83	3.20 4.83	0.04 0.06
1.5" x 10' Omni (Municipal)	B	From Face	6.00 5.00 0.00	0.0000	139.00	No Ice 1/2" Ice	1.50 2.52	1.50 2.52	0.06 0.07
9' Whip (Municipal)	A	From Face	6.00 0.00 0.00	0.0000	138.50	No Ice 1/2" Ice	5.85 7.66	5.85 7.66	0.12 0.17
PiROD 20' Universal Platform (Municipal)	C	None		0.0000	134.00	No Ice 1/2" Ice	33.10 47.10	33.10 47.10	2.27 2.70
Argus LLPX310R (Clearwire)	A	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
Argus LLPX310R (Clearwire)	B	From Face	6.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
Argus LLPX310R (Clearwire)	C	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	4.86 5.22	3.46 3.80	0.03 0.06
REMOTE RADIO HEAD (RRH) (Clearwire)	A	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
REMOTE RADIO HEAD (RRH) (Clearwire)	B	From Face	6.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
REMOTE RADIO HEAD (RRH) (Clearwire)	C	From Face	6.00 7.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.82 2.00	0.83 0.97	0.03 0.04
(2) TMA (shielded) (AT&T)	A	From Leg	4.00 6.00 0.00	0.0000	115.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.01 0.01
(2) TMA (shielded) (AT&T)	A	From Leg	4.00 -6.00	0.0000	115.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.01 0.01

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
(2) TMA (shielded)	B	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
(2) TMA (shielded)	B	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			-6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
(2) TMA (shielded)	C	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
(2) TMA (shielded)	C	From Leg	4.00	0.0000	115.00	No Ice	0.00	0.00	0.01
(AT&T)			-6.00			1/2" Ice	0.00	0.00	0.01
			0.00						
PiROD 12' Lightweight	A	From Leg	2.00	0.0000	115.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(AT&T)			0.00						
PiROD 12' Lightweight	B	From Leg	2.00	0.0000	115.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(AT&T)			0.00						
PiROD 12' Lightweight	C	From Leg	2.00	0.0000	115.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(AT&T)			0.00						
7770	A	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	A	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			-6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	B	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	B	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			-6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	C	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
7770	C	From Leg	4.00	0.0000	115.00	No Ice	10.03	5.60	0.02
(AT&T)			-6.00			1/2" Ice	10.61	6.15	0.07
			0.00						
AM-X-CD-16-65-00T-RET	A	From Leg	4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(6')			0.00			1/2" Ice	8.81	5.09	0.10
(AT&T)			0.00						
AM-X-CD-16-65-00T-RET	B	From Leg	4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(6')			0.00			1/2" Ice	8.81	5.09	0.10
(AT&T)			0.00						
AM-X-CD-16-65-00T-RET	C	From Leg	4.00	0.0000	115.00	No Ice	8.26	4.64	0.05
(6')			0.00			1/2" Ice	8.81	5.09	0.10
(AT&T)			0.00						
(2) REMOTE RADIO HEAD	A	From Leg	0.00	0.0000	115.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(AT&T)			0.00						
(2) REMOTE RADIO HEAD	B	From Leg	0.00	0.0000	115.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(AT&T)			0.00						
(2) REMOTE RADIO HEAD	C	From Leg	0.00	0.0000	115.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(AT&T)			0.00						
Surge Suppressor	C	From Leg	0.00	0.0000	115.00	No Ice	0.80	0.80	0.03
(AT&T)			0.00			1/2" Ice	0.94	0.94	0.04
			0.00						
BXA-171063-12BF	A	From Leg	4.00	0.0000	101.00	No Ice	4.73	3.57	0.02
(Verizon)			0.00			1/2" Ice	5.18	4.01	0.04
			0.00						
SWCP 2x5514	A	From Leg	4.00	0.0000	101.00	No Ice	7.01	5.70	0.02
(Verizon)			-4.00			1/2" Ice	7.44	6.12	0.07
			0.00						
BXA-171063-12BF	B	From Leg	4.00	0.0000	101.00	No Ice	4.73	3.57	0.02
(Verizon)			0.00			1/2" Ice	5.18	4.01	0.04
			0.00						
BXA-171063-12BF	C	From Leg	4.00	0.0000	101.00	No Ice	4.73	3.57	0.02
(Verizon)			0.00			1/2" Ice	5.18	4.01	0.04
			0.00						
SWCP 2x5514	C	From Leg	4.00	0.0000	101.00	No Ice	7.01	5.70	0.02
(Verizon)			-4.00			1/2" Ice	7.44	6.12	0.07
			0.00						
PiROD 12' Lightweight	A	From Leg	2.00	0.0000	101.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(Verizon)			0.00						
PiROD 12' Lightweight	B	From Leg	2.00	0.0000	101.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(Verizon)			0.00						
PiROD 12' Lightweight	C	From Leg	2.00	0.0000	101.00	No Ice	10.20	10.20	0.25
T-Frame			0.00			1/2" Ice	16.20	16.20	0.35
(Verizon)			0.00						
(2) Diplexer	A	From Leg	4.00	0.0000	101.00	No Ice	0.23	0.17	0.01
(Verizon)			6.00			1/2" Ice	0.30	0.24	0.01
			0.00						
(2) Diplexer	B	From Leg	4.00	0.0000	101.00	No Ice	0.23	0.17	0.01
(Verizon)			6.00			1/2" Ice	0.30	0.24	0.01
			0.00						
(2) Diplexer	C	From Leg	4.00	0.0000	101.00	No Ice	0.23	0.17	0.01
(Verizon)			6.00			1/2" Ice	0.30	0.24	0.01
			0.00						
BXA-70063-6CF	B	From Leg	4.00	0.0000	101.00	No Ice	7.73	4.16	0.02
(Verizon)			-4.00			1/2" Ice	8.27	4.60	0.06
			0.00						
HBX-6517DS-VTM	A	From Leg	4.00	0.0000	101.00	No Ice	5.24	3.24	0.01
(Verizon - AWS)			6.00			1/2" Ice	5.71	3.69	0.04
			0.00						
HBX-6517DS-VTM	B	From Leg	4.00	0.0000	101.00	No Ice	5.24	3.24	0.01
(Verizon - AWS)			6.00			1/2" Ice	5.71	3.69	0.04
			0.00						
HBX-6517DS-VTM	C	From Leg	4.00	0.0000	101.00	No Ice	5.24	3.24	0.01
(Verizon - AWS)			6.00			1/2" Ice	5.71	3.69	0.04
			0.00						
RH_2X40-AWS	A	From Leg	4.00	0.0000	101.00	No Ice	2.52	1.59	0.04
(Verizon - AWS)			6.00			1/2" Ice	2.75	1.80	0.06
			0.00						
RH_2X40-AWS	B	From Leg	4.00	0.0000	101.00	No Ice	2.52	1.59	0.04
(Verizon - AWS)			6.00			1/2" Ice	2.75	1.80	0.06
			0.00						
RH_2X40-AWS	C	From Leg	4.00	0.0000	101.00	No Ice	2.52	1.59	0.04
(Verizon - AWS)			6.00			1/2" Ice	2.75	1.80	0.06

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert ft / ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
DB-T1-6Z-8AB-0Z	C	None		0.0000	101.00	No Ice	5.35	2.40	0.04
(Verizon - AWS)						1/2" Ice	5.75	2.72	0.07
LNX-6514DS-T4M	A	From Leg	4.00	0.0000	101.00	No Ice	8.38	5.41	0.04
(Verizon - 850)			-6.00			1/2" Ice	8.93	5.86	0.09
			0.00						
LNX-6514DS-T4M	B	From Leg	4.00	0.0000	101.00	No Ice	8.38	5.41	0.04
(Verizon - 850)			-6.00			1/2" Ice	8.93	5.86	0.09
			0.00						
LNX-6514DS-T4M	C	From Leg	4.00	0.0000	101.00	No Ice	8.38	5.41	0.04
(Verizon - 850)			-6.00			1/2" Ice	8.93	5.86	0.09
			0.00						
3"x2"x22" Panel	B	From Leg	2.00	0.0000	87.00	No Ice	0.65	0.47	0.05
			0.00			1/2" Ice	0.81	0.61	0.05
			0.00						
TMA	B	From Leg	2.00	0.0000	84.50	No Ice	1.06	0.45	0.02
			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
3' Stand-off	B	From Leg	1.50	0.0000	83.50	No Ice	1.00	2.00	0.05
			0.00			1/2" Ice	1.20	2.70	0.07
			0.00						
3' Stand-off	A	From Leg	1.50	0.0000	83.50	No Ice	1.00	2.00	0.05
			0.00			1/2" Ice	1.20	2.70	0.07
			0.00						
TMA	A	From Leg	2.00	0.0000	83.00	No Ice	1.06	0.45	0.02
			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
TMA	B	From Leg	2.00	0.0000	82.50	No Ice	1.06	0.45	0.02
			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
3"x2"x22" Panel	B	From Leg	2.00	0.0000	80.00	No Ice	0.65	0.47	0.05
			0.00			1/2" Ice	0.81	0.61	0.05
			0.00						
Camera	A	From Leg	0.00	0.0000	30.00	No Ice	0.50	0.50	0.01
			0.00			1/2" Ice	0.60	0.60	0.02
			0.00						
PC9013N	A	From Leg	1.00	0.0000	24.00	No Ice	0.46	0.46	0.00
			0.00			1/2" Ice	0.52	0.52	0.00
			0.00						
APXVSPP18-C-A20	A	From Face	9.00	0.0000	170.00	No Ice	8.40	5.28	0.06
(Sprint)			-1.00			1/2" Ice	8.95	5.74	0.11
			0.00						
APXVSPP18-C-A20	B	From Face	9.00	0.0000	170.00	No Ice	8.40	5.28	0.06
(Sprint)			-1.00			1/2" Ice	8.95	5.74	0.11
			0.00						
APXVSPP18-C-A20	C	From Face	9.00	0.0000	170.00	No Ice	8.40	5.28	0.06
(Sprint)			-1.00			1/2" Ice	8.95	5.74	0.11
			0.00						
Panasonic RRH 1900MHZ	A	From Face	8.00	0.0000	170.00	No Ice	2.49	3.06	0.09
(Sprint)			0.00			1/2" Ice	2.71	3.30	0.12
			0.00						
Panasonic RRH 1900MHZ	B	From Face	8.00	0.0000	170.00	No Ice	2.49	3.06	0.09
(Sprint)			0.00			1/2" Ice	2.71	3.30	0.12
			0.00						
Panasonic RRH 1900MHZ	C	From Face	8.00	0.0000	170.00	No Ice	2.49	3.06	0.09
(Sprint)			0.00			1/2" Ice	2.71	3.30	0.12
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	K
Andrew 800MHz RRH (Sprint)	A	From Face	8.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.36 2.57	1.97 2.17	0.06 0.08
Andrew 800MHz RRH (Sprint)	B	From Face	8.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.36 2.57	1.97 2.17	0.06 0.08
Andrew 800MHz RRH (Sprint)	C	From Face	8.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	2.36 2.57	1.97 2.17	0.06 0.08
APXV9TM14-120 (Sprint)	A	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	6.90 7.35	3.61 3.97	0.07 0.11
APXV9TM14-120 (Sprint)	B	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	6.90 7.35	3.61 3.97	0.07 0.11
APXV9TM14-120 (Sprint)	C	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	6.90 7.35	3.61 3.97	0.07 0.11
TD-RRH8x20-25 (Sprint)	A	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.32 4.60	1.41 1.61	0.07 0.09
TD-RRH8x20-25 (Sprint)	B	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.32 4.60	1.41 1.61	0.07 0.09
TD-RRH8x20-25 (Sprint)	C	From Face	9.00 -4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.32 4.60	1.41 1.61	0.07 0.09
PiROD 10' Lightweight T-Frame (T-Mobile)	A	From Leg	2.00 0.00 0.00	0.0000	125.50	No Ice 1/2" Ice	9.30 14.50	9.30 14.50	0.25 0.34
PiROD 10' Lightweight T-Frame (T-Mobile)	B	From Leg	2.00 0.00 0.00	0.0000	125.50	No Ice 1/2" Ice	9.30 14.50	9.30 14.50	0.25 0.34
PiROD 10' Lightweight T-Frame (T-Mobile)	C	From Leg	2.00 0.00 0.00	0.0000	125.50	No Ice 1/2" Ice	9.30 14.50	9.30 14.50	0.25 0.34
AIR B2A/B4P (T-Mobile)	A	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	B	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	C	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	A	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	B	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
AIR B2A/B4P (T-Mobile)	C	From Leg	4.00 -3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	6.42 6.86	4.22 4.64	0.08 0.12
Twin PCS TMA (T-Mobile)	A	From Leg	4.00 3.00 0.00	0.0000	125.50	No Ice 1/2" Ice	0.77 0.96	0.36 0.52	0.01 0.02

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Twin PCS TMA	B	From Leg	4.00	0.0000	125.50	No Ice	0.77	0.36	0.01
(T-Mobile)			3.00			1/2" Ice	0.96	0.52	0.02
			0.00						
Twin PCS TMA	C	From Leg	4.00	0.0000	125.50	No Ice	0.77	0.36	0.01
(T-Mobile)			3.00			1/2" Ice	0.96	0.52	0.02
			0.00						
LNX-6515DS-VTM w/ 6' 2"	A	From Leg	4.00	0.0000	125.50	No Ice	11.45	9.12	0.07
sch 40 Piipe Mount			0.00			1/2" Ice	12.06	10.21	0.15
(T-Mobile)			0.00						
LNX-6515DS-VTM w/ 6' 2"	B	From Leg	4.00	0.0000	125.50	No Ice	11.45	9.12	0.07
sch 40 Piipe Mount			0.00			1/2" Ice	12.06	10.21	0.15
(T-Mobile)			0.00						
LNX-6515DS-VTM w/ 6' 2"	C	From Leg	4.00	0.0000	125.50	No Ice	11.45	9.12	0.07
sch 40 Piipe Mount			0.00			1/2" Ice	12.06	10.21	0.15
(T-Mobile)			0.00						
RRUS-11	A	From Leg	4.00	0.0000	125.50	No Ice	3.26	1.38	0.05
(T-Mobile)			0.00			1/2" Ice	3.50	1.56	0.07
			0.00						
RRUS-11	B	From Leg	4.00	0.0000	125.50	No Ice	3.26	1.38	0.05
(T-Mobile)			0.00			1/2" Ice	3.50	1.56	0.07
			0.00						
RRUS-11	C	From Leg	4.00	0.0000	125.50	No Ice	3.26	1.38	0.05
(T-Mobile)			0.00			1/2" Ice	3.50	1.56	0.07
			0.00						

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 K
3' Dish	A	Paraboloid w/o Radome	From Leg	2.00	0.0000		83.00	3.00	No Ice	7.07	0.23
				0.00					1/2" Ice	7.47	0.27
				0.00							
VHLP2.5-180	A	Paraboloid w/o Radome	From Face	6.00	0.0000		134.00	2.50	No Ice	4.90	0.07
(Clearwire)				0.00					1/2" Ice	5.24	0.10
				0.00							
VHLP2.5-180	A	Paraboloid w/o Radome	From Face	6.00	0.0000		134.00	2.50	No Ice	4.90	0.07
(Clearwire)				-7.00					1/2" Ice	5.24	0.10
				0.00							
VHLP2.5-180	B	Paraboloid w/o Radome	From Face	6.00	0.0000		134.00	2.50	No Ice	4.90	0.07
(Clearwire)				-7.00					1/2" Ice	5.24	0.10
				0.00							
VHLP2-180	C	Paraboloid w/o Radome	From Face	6.00	0.0000		134.00	2.00	No Ice	3.14	0.03
(Clearwire)				0.00					1/2" Ice	3.41	0.04
				0.00							
HPD2-4.7	C	Paraboloid w/Radome	From Face	9.00	0.0000		168.00	2.00	No Ice	3.14	0.03
				0.00					1/2" Ice	3.41	0.04
				0.00							

Truss-Leg Properties

Section Designation	Area	Area Ice	Self Weight	Ice Weight	Equiv. Diameter	Equiv. Diameter Ice	Leg Area
	in^2	in^2	K	K	in	in	in^2
Pirod 105244	1026.8606	1727.9786	0.56	0.21	7.1310	11.9999	3.6816
Pirod 105216	1998.0891	3357.4497	0.51	0.43	6.9378	11.6578	3.6816
Pirod 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirod 105217	2130.7479	3520.4599	0.62	0.44	7.3984	12.2238	5.3014
Pirod 105217 reinf w/ 1" dia bar	2291.5652	3727.7657	0.79	0.46	7.9568	12.9436	7.6570
Pirod 105218 reinf w/ 1" dia bar	2425.8928	3907.6826	0.95	0.48	8.4232	13.5683	9.9280
Pirod 105219	2441.8688	3942.2854	0.94	0.49	8.4787	13.6885	9.4248
Pirod 105219 reinf w /1" dia bar	2571.0468	4121.6676	1.11	0.50	8.9272	14.3113	11.7803
Pirod 105220 reinf w/ 1" dia bar	2697.7688	4300.8949	1.29	0.51	9.3673	14.9337	14.2843

Tower Pressures - No Ice

$G_H = 1.125$

Section Elevation	z	K_z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1	160.00	1.57	29	102.917	A	0.000	52.765	5.833	11.06	0.000	0.000
170.00-150.00					B	0.000	46.004		12.68	0.000	0.000
					C	0.000	16.568		35.21	0.000	0.000
T2	145.00	1.526	28	66.055	A	5.292	37.009	11.905	28.14	0.000	0.000
150.00-140.00					B	5.476	33.509		30.54	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3	130.00	1.48	27	162.111	A	10.178	78.107	23.165	26.24	0.000	0.000
140.00-120.00					B	9.618	88.149		23.69	0.000	0.000
					C	10.467	34.200		51.86	0.000	0.000
T4	110.00	1.411	26	202.528	A	13.676	106.080	24.703	20.63	0.000	0.000
120.00-100.00					B	12.753	113.432		19.58	0.000	0.000
					C	13.085	91.822		23.55	0.000	0.000
T5	95.00	1.353	25	116.264	A	6.447	74.051	12.351	15.34	0.000	0.000
100.00-90.00					B	6.082	56.716		19.67	0.000	0.000
					C	6.098	68.599		16.54	0.000	0.000
T6 90.00-80.00	85.00	1.31	24	126.517	A	6.849	74.983	13.283	16.23	0.000	0.000
					B	6.499	57.648		20.71	0.000	0.000
					C	6.420	72.265		16.88	0.000	0.000
T7 80.00-60.00	70.00	1.24	23	283.450	A	14.936	151.524	28.124	16.90	0.000	0.000
					B	14.269	116.854		21.45	0.000	0.000
					C	13.982	150.334		17.12	0.000	0.000
T8 60.00-40.00	50.00	1.126	21	323.362	A	19.403	151.709	28.309	16.54	0.000	0.000
					B	18.662	117.039		20.86	0.000	0.000
					C	18.343	150.519		16.76	0.000	0.000
T9 40.00-20.00	30.00	1	18	363.756	A	21.437	154.657	29.807	16.93	0.000	0.000
					B	20.722	119.987		21.18	0.000	0.000
					C	20.414	152.017		17.29	0.000	0.000
T10 20.00-0.00	10.00	1	18	404.134	A	26.964	113.371	31.276	22.29	0.000	0.000

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
					B	26.446	90.836		26.67	0.000	0.000
					C	26.223	110.713		22.84	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.125$

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	160.00	1.57	22	0.5000	104.583	A	3.517	82.422	9.167	10.67	0.000	0.000
170.00-150.00						B	0.000	74.710		12.27	0.000	0.000
						C	3.517	27.757		29.31	0.000	0.000
T2	145.00	1.526	21	0.5000	66.890	A	6.957	58.049	20.033	30.82	0.000	0.000
150.00-140.00						B	5.476	53.914		33.73	0.000	0.000
						C	7.234	23.901		64.34	0.000	0.000
T3	130.00	1.48	21	0.5000	163.780	A	13.549	124.661	38.924	28.16	0.000	0.000
140.00-120.00						B	24.452	128.129		25.51	0.000	0.000
						C	13.984	54.140		57.14	0.000	0.000
T4	110.00	1.411	20	0.5000	204.197	A	17.047	155.568	40.814	23.64	0.000	0.000
120.00-100.00						B	33.947	154.770		21.63	0.000	0.000
						C	25.867	115.341		28.90	0.000	0.000
T5 100.00-90.00	95.00	1.353	19	0.5000	117.098	A	8.148	100.462	20.407	18.79	0.000	0.000
						B	16.813	77.332		21.68	0.000	0.000
						C	14.140	81.784		21.27	0.000	0.000
T6 90.00-80.00	85.00	1.31	18	0.5000	127.351	A	8.553	101.798	21.609	19.58	0.000	0.000
						B	17.250	78.679		22.53	0.000	0.000
						C	16.035	85.234		21.34	0.000	0.000
T7 80.00-60.00	70.00	1.24	17	0.5000	285.119	A	18.347	206.096	45.303	20.18	0.000	0.000
						B	35.816	159.883		23.15	0.000	0.000
						C	34.534	178.571		21.26	0.000	0.000
T8 60.00-40.00	50.00	1.126	16	0.5000	325.031	A	22.803	207.064	45.704	19.88	0.000	0.000
						B	40.107	160.874		22.74	0.000	0.000
						C	38.778	179.569		20.93	0.000	0.000
T9 40.00-20.00	30.00	1	14	0.5000	365.425	A	24.841	212.976	47.784	20.09	0.000	0.000
						B	42.203	166.803		22.86	0.000	0.000
						C	40.890	182.252		21.41	0.000	0.000
T10 20.00-0.00	10.00	1	14	0.5000	405.803	A	29.168	162.109	49.862	26.07	0.000	0.000
						B	40.336	132.104		28.92	0.000	0.000
						C	39.449	140.036		27.78	0.000	0.000

Tower Pressure - Service

$G_H = 1.125$

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	160.00	1.57	10	102.917	A	0.000	52.765	5.833	11.06	0.000	0.000
170.00-150.00					B	0.000	46.004		12.68	0.000	0.000

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
					C	0.000	16.568		35.21	0.000	0.000
T2 150.00-140.00	145.00	1.526	10	66.055	A	5.292	37.009	11.905	28.14	0.000	0.000
					B	5.476	33.509		30.54	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3 140.00-120.00	130.00	1.48	9	162.111	A	10.178	78.107	23.165	26.24	0.000	0.000
					B	9.618	88.149		23.69	0.000	0.000
					C	10.467	34.200		51.86	0.000	0.000
T4 120.00-100.00	110.00	1.411	9	202.528	A	13.676	106.080	24.703	20.63	0.000	0.000
					B	12.753	113.432		19.58	0.000	0.000
					C	13.085	91.822		23.55	0.000	0.000
T5 100.00-90.00	95.00	1.353	9	116.264	A	6.447	74.051	12.351	15.34	0.000	0.000
					B	6.082	56.716		19.67	0.000	0.000
					C	6.098	68.599		16.54	0.000	0.000
T6 90.00-80.00	85.00	1.31	8	126.517	A	6.849	74.983	13.283	16.23	0.000	0.000
					B	6.499	57.648		20.71	0.000	0.000
					C	6.420	72.265		16.88	0.000	0.000
T7 80.00-60.00	70.00	1.24	8	283.450	A	14.936	151.524	28.124	16.90	0.000	0.000
					B	14.269	116.854		21.45	0.000	0.000
					C	13.982	150.334		17.12	0.000	0.000
T8 60.00-40.00	50.00	1.126	7	323.362	A	19.403	151.709	28.309	16.54	0.000	0.000
					B	18.662	117.039		20.86	0.000	0.000
					C	18.343	150.519		16.76	0.000	0.000
T9 40.00-20.00	30.00	1	6	363.756	A	21.437	154.657	29.807	16.93	0.000	0.000
					B	20.722	119.987		21.18	0.000	0.000
					C	20.414	152.017		17.29	0.000	0.000
T10 20.00-0.00	10.00	1	6	404.134	A	26.964	113.371	31.276	22.29	0.000	0.000
					B	26.446	90.836		26.67	0.000	0.000
					C	26.223	110.713		22.84	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
T1 170.00-150.00	0.24	1.16	A	0.513	1.884	0.704	1	1	37.149	2.29	114.29	A
			B	0.447	1.978	0.672	1	1	30.910			
			C	0.161	2.732	0.583	1	1	9.663			
T2 150.00-140.00	0.16	1.12	A	0.64	1.785	0.779	□塊1	1	34.128	1.93	193.38	A
			B	0.59	1.81	0.748	1	1	30.529			
			C	0.291	2.32	0.613	1	1	13.910			
T3 140.00-120.00	0.44	2.09	A	0.545	1.849	0.721	1	1	66.514	4.23	211.37	B
			B	0.603	1.802	0.755	1	1	76.214			
			C	0.276	2.363	0.609	1	1	31.285			
T4 120.00-100.00	0.91	2.80	A	0.591	1.81	0.748	1	1	93.057	5.25	262.50	B
			B	0.623	1.792	0.768	1	1	99.866			
			C	0.518	1.878	0.707	1	1	77.988			
T5 100.00-90.00	0.62	1.48	A	0.692	1.776	0.814	1	1	66.761	3.34	333.60	A
			B	0.54	1.853	0.719	1	1	46.850			
			C	0.642	1.784	0.781	1	1	59.641			
T6 90.00-80.00	0.63	1.76	A	0.647	1.782	0.783	1	1	65.589	3.19	318.69	A
			B	0.507	1.891	0.701	1	1	46.917			
			C	0.622	1.792	0.767	1	1	61.867			
T7 80.00-60.00	1.26	4.33	A	0.587	1.812	0.746	1	1	127.956	5.98	299.04	A
			B	0.463	1.953	0.679	1	1	93.629			
			C	0.58	1.818	0.741	1	1	125.437			
T8	1.26	4.45	A	0.529	1.865	0.713	1	1	127.543	5.57	278.60	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
60.00-40.00			B	0.42	2.026	0.66	1	1	95.887			
			C	0.522	1.873	0.709	1	1	125.073			
T9	1.27	5.44	A	0.484	1.922	0.69	1	1	128.076	5.12	255.98	A
40.00-20.00			B	0.387	2.091	0.646	1	1	98.271			
			C	0.474	1.936	0.685	1	1	124.485			
T10	0.83	6.08	A	0.347	2.178	0.631	1	1	98.557	4.47	223.27	A
20.00-0.00			B	0.29	2.322	0.613	1	1	82.124			
			C	0.339	2.198	0.629	1	1	95.812			
Sum Weight:	7.61	30.71						OTM	3256.52 kip-ft	41.36		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.825	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	0.825	1	30.910			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.825	1	33.202	1.88	188.14	A
150.00-140.00			B	0.59	1.81	0.748	0.825	1	29.570			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.44	2.09	A	0.545	1.849	0.721	0.825	1	64.733	4.13	206.70	B
140.00-120.00			B	0.603	1.802	0.755	0.825	1	74.531			
			C	0.276	2.363	0.609	0.825	1	29.454			
T4	0.91	2.80	A	0.591	1.81	0.748	0.825	1	90.664	5.13	256.63	B
120.00-100.00			B	0.623	1.792	0.768	0.825	1	97.634			
			C	0.518	1.878	0.707	0.825	1	75.698			
T5	0.62	1.48	A	0.692	1.776	0.814	0.825	1	65.632	3.28	327.96	A
100.00-90.00			B	0.54	1.853	0.719	0.825	1	45.785			
			C	0.642	1.784	0.781	0.825	1	58.574			
T6	0.63	1.76	A	0.647	1.782	0.783	0.825	1	64.390	3.13	312.87	A
90.00-80.00			B	0.507	1.891	0.701	0.825	1	45.780			
			C	0.622	1.792	0.767	0.825	1	60.743			
T7	1.26	4.33	A	0.587	1.812	0.746	0.825	1	125.342	5.86	292.93	A
80.00-60.00			B	0.463	1.953	0.679	0.825	1	91.132			
			C	0.58	1.818	0.741	0.825	1	122.990			
T8	1.26	4.45	A	0.529	1.865	0.713	0.825	1	124.147	5.42	271.18	A
60.00-40.00			B	0.42	2.026	0.66	0.825	1	92.621			
			C	0.522	1.873	0.709	0.825	1	121.863			
T9	1.27	5.44	A	0.484	1.922	0.69	0.825	1	124.325	4.97	248.49	A
40.00-20.00			B	0.387	2.091	0.646	0.825	1	94.645			
			C	0.474	1.936	0.685	0.825	1	120.912			
T10	0.83	6.08	A	0.347	2.178	0.631	0.825	1	93.838	4.25	212.58	A
20.00-0.00			B	0.29	2.322	0.613	0.825	1	77.496			
			C	0.339	2.198	0.629	0.825	1	91.223			
Sum Weight:	7.61	30.71						OTM	3190.95 kip-ft	40.35		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.8	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	0.8	1	30.910			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.8	1	33.069	1.87	187.39	A
150.00-140.00			B	0.59	1.81	0.748	0.8	1	29.433			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.44	2.09	A	0.545	1.849	0.721	0.8	1	64.478	4.12	206.03	B
140.00-120.00			B	0.603	1.802	0.755	0.8	1	74.291			
			C	0.276	2.363	0.609	0.8	1	29.192			
T4	0.91	2.80	A	0.591	1.81	0.748	0.8	1	90.322	5.12	255.80	B
120.00-100.00			B	0.623	1.792	0.768	0.8	1	97.316			
			C	0.518	1.878	0.707	0.8	1	75.371			
T5	0.62	1.48	A	0.692	1.776	0.814	0.8	1	65.471	3.27	327.16	A
100.00-90.00			B	0.54	1.853	0.719	0.8	1	45.633			
			C	0.642	1.784	0.781	0.8	1	58.421			
T6	0.63	1.76	A	0.647	1.782	0.783	0.8	1	64.219	3.12	312.03	A
90.00-80.00			B	0.507	1.891	0.701	0.8	1	45.617			
			C	0.622	1.792	0.767	0.8	1	60.583			
T7	1.26	4.33	A	0.587	1.812	0.746	0.8	1	124.968	5.84	292.06	A
80.00-60.00			B	0.463	1.953	0.679	0.8	1	90.775			
			C	0.58	1.818	0.741	0.8	1	122.641			
T8	1.26	4.45	A	0.529	1.865	0.713	0.8	1	123.662	5.40	270.13	A
60.00-40.00			B	0.42	2.026	0.66	0.8	1	92.154			
			C	0.522	1.873	0.709	0.8	1	121.404			
T9	1.27	5.44	A	0.484	1.922	0.69	0.8	1	123.789	4.95	247.41	A
40.00-20.00			B	0.387	2.091	0.646	0.8	1	94.127			
			C	0.474	1.936	0.685	0.8	1	120.402			
T10	0.83	6.08	A	0.347	2.178	0.631	0.8	1	93.164	4.22	211.05	A
20.00-0.00			B	0.29	2.322	0.613	0.8	1	76.835			
			C	0.339	2.198	0.629	0.8	1	90.567			
Sum Weight:	7.61	30.71						OTM	3181.59 kip-ft	40.20		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.85	1	37.149	2.29	114.29	A
170.00-150.00			B	0.447	1.978	0.672	0.85	1	30.910			
			C	0.161	2.732	0.583	0.85	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.85	1	33.334	1.89	188.89	A
150.00-140.00			B	0.59	1.81	0.748	0.85	1	29.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.44	2.09	A	0.545	1.849	0.721	0.85	1	64.987	4.15	207.37	B
140.00-120.00			B	0.603	1.802	0.755	0.85	1	74.772			
			C	0.276	2.363	0.609	0.85	1	29.715			
T4	0.91	2.80	A	0.591	1.81	0.748	0.85	1	91.006	5.15	257.47	B
120.00-100.00			B	0.623	1.792	0.768	0.85	1	97.953			
			C	0.518	1.878	0.707	0.85	1	76.025			
T5	0.62	1.48	A	0.692	1.776	0.814	0.85	1	65.794	3.29	328.77	A
100.00-90.00			B	0.54	1.853	0.719	0.85	1	45.937			
			C	0.642	1.784	0.781	0.85	1	58.726			
T6	0.63	1.76	A	0.647	1.782	0.783	0.85	1	64.561	3.14	313.70	A
90.00-80.00			B	0.507	1.891	0.701	0.85	1	45.942			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
			C	0.622	1.792	0.767	0.85	1	60.904			
T7	1.26	4.33	A	0.587	1.812	0.746	0.85	1	125.715	5.88	293.80	A
80.00-60.00			B	0.463	1.953	0.679	0.85	1	91.488			
			C	0.58	1.818	0.741	0.85	1	123.340			
T8	1.26	4.45	A	0.529	1.865	0.713	0.85	1	124.632	5.44	272.24	A
60.00-40.00			B	0.42	2.026	0.66	0.85	1	93.087			
			C	0.522	1.873	0.709	0.85	1	122.322			
T9	1.27	5.44	A	0.484	1.922	0.69	0.85	1	124.860	4.99	249.56	A
40.00-20.00			B	0.387	2.091	0.646	0.85	1	95.163			
			C	0.474	1.936	0.685	0.85	1	121.422			
T10	0.83	6.08	A	0.347	2.178	0.631	0.85	1	94.512	4.28	214.10	A
20.00-0.00			B	0.29	2.322	0.613	0.85	1	78.157			
			C	0.339	2.198	0.629	0.85	1	91.878			
Sum Weight:	7.61	30.71						OTM	3200.32 kip-ft	40.49		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.67	1.49	A	0.822	1.834	0.914	1	1	78.881	3.54	177.15	A
170.00-150.00			B	0.714	1.778	0.83	1	1	62.028			
			C	0.299	2.299	0.616	1	1	20.604			
T2	0.43	1.64	A	0.972	2.044	1	1	1	65.006	3.16	316.37	A
150.00-140.00			B	0.888	1.907	0.972	1	1	57.882			
			C	0.465	1.949	0.68	1	1	23.498			
T3	1.28	3.77	A	0.844	1.855	0.933	1	1	129.881	6.95	347.34	B
140.00-120.00			B	0.932	1.972	1	1	1	152.582			
			C	0.416	2.033	0.658	1	1	49.621			
T4	2.50	4.64	A	0.845	1.857	0.934	1	1	162.417	8.14	407.09	B
120.00-100.00			B	0.924	1.96	1	1	1	188.717			
			C	0.692	1.776	0.814	1	1	119.741			
T5	1.67	2.39	A	0.928	1.966	1	1	1	108.610	4.51	450.57	A
100.00-90.00			B	0.804	1.819	0.9	1	1	86.385			
			C	0.819	1.831	0.912	1	1	88.747			
T6	1.71	2.70	A	0.867	1.88	0.953	1	1	105.559	4.06	405.79	A
90.00-80.00			B	0.753	1.789	0.859	1	1	84.866			
			C	0.795	1.813	0.892	1	1	92.106			
T7	3.48	6.30	A	0.787	1.807	0.886	1	1	200.955	7.02	351.19	A
80.00-60.00			B	0.686	1.776	0.81	1	1	165.364			
			C	0.747	1.786	0.855	1	1	187.195			
T8	3.48	6.58	A	0.707	1.777	0.825	1	1	193.648	6.04	302.22	A
60.00-40.00			B	0.618	1.794	0.765	1	1	163.176			
			C	0.672	1.777	0.8	1	1	182.461			
T9	3.51	7.67	A	0.651	1.781	0.786	1	1	192.241	5.34	267.14	A
40.00-20.00			B	0.572	1.824	0.737	1	1	165.109			
			C	0.611	1.798	0.76	1	1	179.432			
T10	2.30	8.52	A	0.471	1.94	0.683	1	1	139.939	4.24	211.79	A
20.00-0.00			B	0.425	2.017	0.662	1	1	127.801			
			C	0.442	1.986	0.67	1	1	133.241			
Sum Weight:	21.02	45.71						OTM	4593.81 kip-ft	53.01		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
T1	0.67	1.49	A	0.822	1.834	0.914	0.825	1	78.265	3.52	175.77	A
170.00-150.00			B	0.714	1.778	0.83	0.825	1	62.028			
			C	0.299	2.299	0.616	0.825	1	19.988			
T2	0.43	1.64	A	0.972	2.044	1	0.825	1	63.789	3.10	310.45	A
150.00-140.00			B	0.888	1.907	0.972	0.825	1	56.923			
			C	0.465	1.949	0.68	0.825	1	22.232			
T3	1.28	3.77	A	0.844	1.855	0.933	0.825	1	127.510	6.75	337.60	B
140.00-120.00			B	0.932	1.972	1	0.825	1	148.302			
			C	0.416	2.033	0.658	0.825	1	47.174			
T4	2.50	4.64	A	0.845	1.857	0.934	0.825	1	159.433	7.89	394.28	B
120.00-100.00			B	0.924	1.96	1	0.825	1	182.776			
			C	0.692	1.776	0.814	0.825	1	115.214			
T5	1.67	2.39	A	0.928	1.966	1	0.825	1	107.184	4.45	444.65	A
100.00-90.00			B	0.804	1.819	0.9	0.825	1	83.443			
			C	0.819	1.831	0.912	0.825	1	86.273			
T6	1.71	2.70	A	0.867	1.88	0.953	0.825	1	104.062	4.00	400.04	A
90.00-80.00			B	0.753	1.789	0.859	0.825	1	81.847			
			C	0.795	1.813	0.892	0.825	1	89.300			
T7	3.48	6.30	A	0.787	1.807	0.886	0.825	1	197.745	6.91	345.58	A
80.00-60.00			B	0.686	1.776	0.81	0.825	1	159.096			
			C	0.747	1.786	0.855	0.825	1	181.152			
T8	3.48	6.58	A	0.707	1.777	0.825	0.825	1	189.657	5.92	295.99	A
60.00-40.00			B	0.618	1.794	0.765	0.825	1	156.157			
			C	0.672	1.777	0.8	0.825	1	175.675			
T9	3.51	7.67	A	0.651	1.781	0.786	0.825	1	187.894	5.22	261.10	A
40.00-20.00			B	0.572	1.824	0.737	0.825	1	157.723			
			C	0.611	1.798	0.76	0.825	1	172.276			
T10	2.30	8.52	A	0.471	1.94	0.683	0.825	1	134.834	4.08	204.06	A
20.00-0.00			B	0.425	2.017	0.662	0.825	1	120.742			
			C	0.442	1.986	0.67	0.825	1	126.338			
Sum Weight:	21.02	45.71						OTM	4497.51 kip-ft	51.84		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
T1	0.67	1.49	A	0.822	1.834	0.914	0.8	1	78.177	3.51	175.57	A
170.00-150.00			B	0.714	1.778	0.83	0.8	1	62.028			
			C	0.299	2.299	0.616	0.8	1	19.901			
T2	0.43	1.64	A	0.972	2.044	1	0.8	1	63.615	3.10	309.60	A
150.00-140.00			B	0.888	1.907	0.972	0.8	1	56.786			
			C	0.465	1.949	0.68	0.8	1	22.051			
T3	1.28	3.77	A	0.844	1.855	0.933	0.8	1	127.171	6.72	336.21	B
140.00-120.00			B	0.932	1.972	1	0.8	1	147.691			
			C	0.416	2.033	0.658	0.8	1	46.824			
T4	2.50	4.64	A	0.845	1.857	0.934	0.8	1	159.007	7.85	392.45	B
120.00-100.00			B	0.924	1.96	1	0.8	1	181.928			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
			C	0.692	1.776	0.814	0.8	1	114.568			
T5	1.67	2.39	A	0.928	1.966	1	0.8	1	106.980	4.44	443.81	A
100.00-90.00			B	0.804	1.819	0.9	0.8	1	83.022			
			C	0.819	1.831	0.912	0.8	1	85.919			
T6	1.71	2.70	A	0.867	1.88	0.953	0.8	1	103.848	3.99	399.21	A
90.00-80.00			B	0.753	1.789	0.859	0.8	1	81.415			
			C	0.795	1.813	0.892	0.8	1	88.899			
T7	3.48	6.30	A	0.787	1.807	0.886	0.8	1	197.286	6.90	344.78	A
80.00-60.00			B	0.686	1.776	0.81	0.8	1	158.201			
			C	0.747	1.786	0.855	0.8	1	180.289			
T8	3.48	6.58	A	0.707	1.777	0.825	0.8	1	189.087	5.90	295.10	A
60.00-40.00			B	0.618	1.794	0.765	0.8	1	155.155			
			C	0.672	1.777	0.8	0.8	1	174.705			
T9	3.51	7.67	A	0.651	1.781	0.786	0.8	1	187.273	5.20	260.23	A
40.00-20.00			B	0.572	1.824	0.737	0.8	1	156.668			
			C	0.611	1.798	0.76	0.8	1	171.254			
T10	2.30	8.52	A	0.471	1.94	0.683	0.8	1	134.105	4.06	202.96	A
20.00-0.00			B	0.425	2.017	0.662	0.8	1	119.734			
			C	0.442	1.986	0.67	0.8	1	125.352			
Sum Weight:	21.02	45.71						OTM	4483.75 kip-ft	51.67		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
T1	0.67	1.49	A	0.822	1.834	0.914	0.85	1	78.353	3.52	175.96	A
170.00-150.00			B	0.714	1.778	0.83	0.85	1	62.028			
			C	0.299	2.299	0.616	0.85	1	20.076			
T2	0.43	1.64	A	0.972	2.044	1	0.85	1	63.963	3.11	311.30	A
150.00-140.00			B	0.888	1.907	0.972	0.85	1	57.060			
			C	0.465	1.949	0.68	0.85	1	22.413			
T3	1.28	3.77	A	0.844	1.855	0.933	0.85	1	127.849	6.78	338.99	B
140.00-120.00			B	0.932	1.972	1	0.85	1	148.914			
			C	0.416	2.033	0.658	0.85	1	47.523			
T4	2.50	4.64	A	0.845	1.857	0.934	0.85	1	159.860	7.92	396.11	B
120.00-100.00			B	0.924	1.96	1	0.85	1	183.625			
			C	0.692	1.776	0.814	0.85	1	115.861			
T5	1.67	2.39	A	0.928	1.966	1	0.85	1	107.387	4.45	445.50	A
100.00-90.00			B	0.804	1.819	0.9	0.85	1	83.863			
			C	0.819	1.831	0.912	0.85	1	86.626			
T6	1.71	2.70	A	0.867	1.88	0.953	0.85	1	104.276	4.01	400.86	A
90.00-80.00			B	0.753	1.789	0.859	0.85	1	82.278			
			C	0.795	1.813	0.892	0.85	1	89.701			
T7	3.48	6.30	A	0.787	1.807	0.886	0.85	1	198.203	6.93	346.38	A
80.00-60.00			B	0.686	1.776	0.81	0.85	1	159.991			
			C	0.747	1.786	0.855	0.85	1	182.015			
T8	3.48	6.58	A	0.707	1.777	0.825	0.85	1	190.227	5.94	296.88	A
60.00-40.00			B	0.618	1.794	0.765	0.85	1	157.160			
			C	0.672	1.777	0.8	0.85	1	176.644			
T9	3.51	7.67	A	0.651	1.781	0.786	0.85	1	188.515	5.24	261.96	A
40.00-20.00			B	0.572	1.824	0.737	0.85	1	158.778			
			C	0.611	1.798	0.76	0.85	1	173.298			
T10	2.30	8.52	A	0.471	1.94	0.683	0.85	1	135.564	4.10	205.17	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
20.00-0.00			B	0.425	2.017	0.662	0.85	1	121.751			
			C	0.442	1.986	0.67	0.85	1	127.324			
Sum Weight:	21.02	45.71						OTM	4511.26 kip-ft	52.01		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
T1	0.24	1.16	A	0.513	1.884	0.704	1	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	1	1	30.910			
			C	0.161	2.732	0.583	1	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	1	1	34.128	0.67	66.92	A
150.00-140.00			B	0.59	1.81	0.748	1	1	30.529			
			C	0.291	2.32	0.613	1	1	13.910			
T3	0.44	2.09	A	0.545	1.849	0.721	1	1	66.514	1.46	73.14	B
140.00-120.00			B	0.603	1.802	0.755	1	1	76.214			
			C	0.276	2.363	0.609	1	1	31.285			
T4	0.91	2.80	A	0.591	1.81	0.748	1	1	93.057	1.82	90.83	B
120.00-100.00			B	0.623	1.792	0.768	1	1	99.866			
			C	0.518	1.878	0.707	1	1	77.988			
T5	0.62	1.48	A	0.692	1.776	0.814	1	1	66.761	1.15	115.43	A
100.00-90.00			B	0.54	1.853	0.719	1	1	46.850			
			C	0.642	1.784	0.781	1	1	59.641			
T6	0.63	1.76	A	0.647	1.782	0.783	1	1	65.589	1.10	110.27	A
90.00-80.00			B	0.507	1.891	0.701	1	1	46.917			
			C	0.622	1.792	0.767	1	1	61.867			
T7	1.26	4.33	A	0.587	1.812	0.746	1	1	127.956	2.07	103.47	A
80.00-60.00			B	0.463	1.953	0.679	1	1	93.629			
			C	0.58	1.818	0.741	1	1	125.437			
T8	1.26	4.45	A	0.529	1.865	0.713	1	1	127.543	1.93	96.40	A
60.00-40.00			B	0.42	2.026	0.66	1	1	95.887			
			C	0.522	1.873	0.709	1	1	125.073			
T9	1.27	5.44	A	0.484	1.922	0.69	1	1	128.076	1.77	88.58	A
40.00-20.00			B	0.387	2.091	0.646	1	1	98.271			
			C	0.474	1.936	0.685	1	1	124.485			
T10	0.83	6.08	A	0.347	2.178	0.631	1	1	98.557	1.55	77.25	A
20.00-0.00			B	0.29	2.322	0.613	1	1	82.124			
			C	0.339	2.198	0.629	1	1	95.812			
Sum Weight:	7.61	30.71						OTM	1126.82 kip-ft	14.31		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.825	1	37.149	0.79	39.55	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
170.00-150.00			B	0.447	1.978	0.672	0.825	1	30.910			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.825	1	33.202	0.65	65.10	A
150.00-140.00			B	0.59	1.81	0.748	0.825	1	29.570			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.44	2.09	A	0.545	1.849	0.721	0.825	1	64.733	1.43	71.52	B
140.00-120.00			B	0.603	1.802	0.755	0.825	1	74.531			
			C	0.276	2.363	0.609	0.825	1	29.454			
T4	0.91	2.80	A	0.591	1.81	0.748	0.825	1	90.664	1.78	88.80	B
120.00-100.00			B	0.623	1.792	0.768	0.825	1	97.634			
			C	0.518	1.878	0.707	0.825	1	75.698			
T5	0.62	1.48	A	0.692	1.776	0.814	0.825	1	65.632	1.13	113.48	A
100.00-90.00			B	0.54	1.853	0.719	0.825	1	45.785			
			C	0.642	1.784	0.781	0.825	1	58.574			
T6	0.63	1.76	A	0.647	1.782	0.783	0.825	1	64.390	1.08	108.26	A
90.00-80.00			B	0.507	1.891	0.701	0.825	1	45.780			
			C	0.622	1.792	0.767	0.825	1	60.743			
T7	1.26	4.33	A	0.587	1.812	0.746	0.825	1	125.342	2.03	101.36	A
80.00-60.00			B	0.463	1.953	0.679	0.825	1	91.132			
			C	0.58	1.818	0.741	0.825	1	122.990			
T8	1.26	4.45	A	0.529	1.865	0.713	0.825	1	124.147	1.88	93.84	A
60.00-40.00			B	0.42	2.026	0.66	0.825	1	92.621			
			C	0.522	1.873	0.709	0.825	1	121.863			
T9	1.27	5.44	A	0.484	1.922	0.69	0.825	1	124.325	1.72	85.98	A
40.00-20.00			B	0.387	2.091	0.646	0.825	1	94.645			
			C	0.474	1.936	0.685	0.825	1	120.912			
T10	0.83	6.08	A	0.347	2.178	0.631	0.825	1	93.838	1.47	73.56	A
20.00-0.00			B	0.29	2.322	0.613	0.825	1	77.496			
			C	0.339	2.198	0.629	0.825	1	91.223			
Sum Weight:	7.61	30.71						OTM	1104.14 kip-ft	13.96		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.8	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	0.8	1	30.910			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.8	1	33.069	0.65	64.84	A
150.00-140.00			B	0.59	1.81	0.748	0.8	1	29.433			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.44	2.09	A	0.545	1.849	0.721	0.8	1	64.478	1.43	71.29	B
140.00-120.00			B	0.603	1.802	0.755	0.8	1	74.291			
			C	0.276	2.363	0.609	0.8	1	29.192			
T4	0.91	2.80	A	0.591	1.81	0.748	0.8	1	90.322	1.77	88.51	B
120.00-100.00			B	0.623	1.792	0.768	0.8	1	97.316			
			C	0.518	1.878	0.707	0.8	1	75.371			
T5	0.62	1.48	A	0.692	1.776	0.814	0.8	1	65.471	1.13	113.20	A
100.00-90.00			B	0.54	1.853	0.719	0.8	1	45.633			
			C	0.642	1.784	0.781	0.8	1	58.421			
T6	0.63	1.76	A	0.647	1.782	0.783	0.8	1	64.219	1.08	107.97	A
90.00-80.00			B	0.507	1.891	0.701	0.8	1	45.617			
			C	0.622	1.792	0.767	0.8	1	60.583			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl Face
T7	1.26	4.33	A	0.587	1.812	0.746	0.8	1	124.968	2.02	101.06	A
80.00-60.00			B	0.463	1.953	0.679	0.8	1	90.775			
			C	0.58	1.818	0.741	0.8	1	122.641			
T8	1.26	4.45	A	0.529	1.865	0.713	0.8	1	123.662	1.87	93.47	A
60.00-40.00			B	0.42	2.026	0.66	0.8	1	92.154			
			C	0.522	1.873	0.709	0.8	1	121.404			
T9	1.27	5.44	A	0.484	1.922	0.69	0.8	1	123.789	1.71	85.61	A
40.00-20.00			B	0.387	2.091	0.646	0.8	1	94.127			
			C	0.474	1.936	0.685	0.8	1	120.402			
T10	0.83	6.08	A	0.347	2.178	0.631	0.8	1	93.164	1.46	73.03	A
20.00-0.00			B	0.29	2.322	0.613	0.8	1	76.835			
			C	0.339	2.198	0.629	0.8	1	90.567			
Sum Weight:	7.61	30.71						OTM	1100.90 kip-ft	13.91		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.24	1.16	A	0.513	1.884	0.704	0.85	1	37.149	0.79	39.55	A
170.00-150.00			B	0.447	1.978	0.672	0.85	1	30.910			
			C	0.161	2.732	0.583	0.85	1	9.663			
T2	0.16	1.12	A	0.64	1.785	0.779	0.85	1	33.334	0.65	65.36	A
150.00-140.00			B	0.59	1.81	0.748	0.85	1	29.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.44	2.09	A	0.545	1.849	0.721	0.85	1	64.987	1.44	71.75	B
140.00-120.00			B	0.603	1.802	0.755	0.85	1	74.772			
			C	0.276	2.363	0.609	0.85	1	29.715			
T4	0.91	2.80	A	0.591	1.81	0.748	0.85	1	91.006	1.78	89.09	B
120.00-100.00			B	0.623	1.792	0.768	0.85	1	97.953			
			C	0.518	1.878	0.707	0.85	1	76.025			
T5	0.62	1.48	A	0.692	1.776	0.814	0.85	1	65.794	1.14	113.76	A
100.00-90.00			B	0.54	1.853	0.719	0.85	1	45.937			
			C	0.642	1.784	0.781	0.85	1	58.726			
T6	0.63	1.76	A	0.647	1.782	0.783	0.85	1	64.561	1.09	108.55	A
90.00-80.00			B	0.507	1.891	0.701	0.85	1	45.942			
			C	0.622	1.792	0.767	0.85	1	60.904			
T7	1.26	4.33	A	0.587	1.812	0.746	0.85	1	125.715	2.03	101.66	A
80.00-60.00			B	0.463	1.953	0.679	0.85	1	91.488			
			C	0.58	1.818	0.741	0.85	1	123.340			
T8	1.26	4.45	A	0.529	1.865	0.713	0.85	1	124.632	1.88	94.20	A
60.00-40.00			B	0.42	2.026	0.66	0.85	1	93.087			
			C	0.522	1.873	0.709	0.85	1	122.322			
T9	1.27	5.44	A	0.484	1.922	0.69	0.85	1	124.860	1.73	86.35	A
40.00-20.00			B	0.387	2.091	0.646	0.85	1	95.163			
			C	0.474	1.936	0.685	0.85	1	121.422			
T10	0.83	6.08	A	0.347	2.178	0.631	0.85	1	94.512	1.48	74.08	A
20.00-0.00			B	0.29	2.322	0.613	0.85	1	78.157			
			C	0.339	2.198	0.629	0.85	1	91.878			
Sum Weight:	7.61	30.71						OTM	1107.38 kip-ft	14.01		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	19.74					
Bracing Weight	10.97					
Total Member Self-Weight	30.71			-2.00	10.22	
Total Weight	51.55			-2.00	10.22	
Wind 0 deg - No Ice		-0.03	-59.60	-5708.32	12.35	-22.92
Wind 30 deg - No Ice		29.27	-50.81	-4890.66	-2805.15	-22.82
Wind 45 deg - No Ice		41.56	-41.28	-3973.98	-3999.37	-20.02
Wind 60 deg - No Ice		50.83	-29.04	-2795.45	-4898.94	-15.82
Wind 90 deg - No Ice		58.77	0.23	26.18	-5648.79	-5.72
Wind 120 deg - No Ice		51.69	30.08	2874.97	-4945.01	6.21
Wind 135 deg - No Ice		41.56	41.56	3993.08	-4000.25	11.52
Wind 150 deg - No Ice		29.55	50.94	4892.75	-2842.34	16.76
Wind 180 deg - No Ice		0.21	58.66	5652.84	-15.14	24.54
Wind 210 deg - No Ice		-29.36	50.86	4884.68	2840.92	23.16
Wind 225 deg - No Ice		-41.43	41.46	3982.65	4006.43	20.78
Wind 240 deg - No Ice		-51.57	29.98	2864.78	4952.07	18.07
Wind 270 deg - No Ice		-58.70	0.09	11.35	5659.73	7.95
Wind 300 deg - No Ice		-50.74	-29.22	-2816.52	4905.15	-3.95
Wind 315 deg - No Ice		-41.50	-41.41	-3988.74	4008.72	-9.92
Wind 330 deg - No Ice		-29.33	-50.88	-4897.98	2829.75	-16.05
Member Ice	15.00					
Total Weight Ice	85.61			-2.54	25.10	
Wind 0 deg - Ice		-0.02	-69.88	-6864.28	26.49	-19.54
Wind 30 deg - Ice		34.37	-59.62	-5870.13	-3357.00	-25.65
Wind 45 deg - Ice		48.70	-48.47	-4773.44	-4775.85	-25.79
Wind 60 deg - Ice		59.54	-34.13	-3360.98	-5848.07	-24.11
Wind 90 deg - Ice		68.91	0.18	19.71	-6761.26	-17.16
Wind 120 deg - Ice		60.58	35.16	3446.86	-5927.99	-5.57
Wind 135 deg - Ice		48.70	48.69	4786.02	-4776.18	1.27
Wind 150 deg - Ice		34.59	59.71	5869.30	-3386.36	8.22
Wind 180 deg - Ice		0.16	68.72	6767.76	5.09	20.94
Wind 210 deg - Ice		-34.44	59.65	5863.16	3419.61	25.93
Wind 225 deg - Ice		-48.60	48.61	4778.12	4815.41	26.40
Wind 240 deg - Ice		-60.49	35.08	3439.26	5967.79	26.20
Wind 270 deg - Ice		-68.86	0.07	8.47	6803.85	18.94
Wind 300 deg - Ice		-59.46	-34.27	-3377.31	5886.54	7.00
Wind 315 deg - Ice		-48.65	-48.57	-4784.82	4816.70	0.01
Wind 330 deg - Ice		-34.41	-59.67	-5875.67	3409.98	-7.66
Total Weight	51.55			-2.00	10.22	
Wind 0 deg - Service		-0.01	-20.62	-1978.70	2.07	-7.93
Wind 30 deg - Service		10.13	-17.58	-1695.77	-972.85	-7.90
Wind 45 deg - Service		14.38	-14.28	-1378.58	-1386.07	-6.93
Wind 60 deg - Service		17.59	-10.05	-970.79	-1697.34	-5.47
Wind 90 deg - Service		20.33	0.08	5.56	-1956.81	-1.98
Wind 120 deg - Service		17.89	10.41	991.30	-1713.28	2.15
Wind 135 deg - Service		14.38	14.38	1378.19	-1386.38	3.99
Wind 150 deg - Service		10.23	17.63	1689.49	-985.71	5.80
Wind 180 deg - Service		0.07	20.30	1952.50	-7.45	8.49
Wind 210 deg - Service		-10.16	17.60	1686.70	980.81	8.01
Wind 225 deg - Service		-14.34	14.35	1374.58	1384.10	7.19
Wind 240 deg - Service		-17.85	10.37	987.77	1711.31	6.25
Wind 270 deg - Service		-20.31	0.03	0.42	1956.18	2.75
Wind 300 deg - Service		-17.56	-10.11	-978.08	1695.07	-1.37
Wind 315 deg - Service		-14.36	-14.33	-1383.69	1384.89	-3.43
Wind 330 deg - Service		-10.15	-17.61	-1698.30	976.95	-5.55

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 Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	170 - 150	Leg	Max Tension	22	29.76	-0.04	0.05
			Max. Compression	19	-35.99	-0.00	0.45
			Max. Mx	24	-35.74	-0.38	-0.24
			Max. My	19	-35.99	-0.00	0.45
			Max. Vy	30	-3.91	0.05	-0.06
			Max. Vx	19	-4.53	-0.00	0.45
		Diagonal	Max Tension	26	3.41	0.00	0.00
			Max. Compression	26	-3.46	0.00	0.00
			Max. Mx	19	2.89	-0.00	0.00
			Max. My	22	-2.08	-0.00	0.00
			Max. Vy	19	0.01	-0.00	0.00
			Max. Vx	21	0.00	0.00	0.00
		Top Girt	Max Tension	7	0.30	0.00	0.00
			Max. Compression	15	-0.33	0.00	0.00
			Max. Mx	18	-0.01	0.01	0.00
			Max. My	31	0.01	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
		Bottom Girt	Max Tension	15	0.15	0.00	0.00
			Max. Compression	13	-0.15	0.00	0.00
			Max. Mx	18	-0.00	0.01	0.00
			Max. My	31	-0.01	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00
T2	150 - 140	Leg	Max Tension	22	35.03	-0.42	0.02
			Max. Compression	19	-41.87	2.80	0.28
			Max. Mx	22	34.40	-3.29	0.23
			Max. My	34	-3.47	-0.26	4.03
			Max. Vy	27	0.63	-3.27	-0.36
			Max. Vx	30	0.87	-1.76	-3.61
		Diagonal	Max Tension	22	4.91	0.00	0.00
			Max. Compression	30	-5.45	0.00	0.00
			Max. Mx	22	4.33	0.05	0.00
			Max. My	21	-4.23	-0.02	0.02
			Max. Vy	22	0.02	0.05	0.00
			Max. Vx	21	-0.00	0.00	0.00
		Top Girt	Max Tension	5	0.42	0.00	0.00
			Max. Compression	2	-0.37	0.00	0.00
			Max. Mx	18	0.04	-0.02	0.00
			Max. My	30	0.22	0.00	0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	32	70.49	-3.70	-0.17
			Max. Compression	19	-84.43	3.69	0.03
			Max. Mx	32	69.34	-4.52	-0.16
			Max. My	31	-8.47	-0.42	-6.63
			Max. Vy	27	0.69	-4.46	-0.05
			Max. Vx	23	-0.99	-0.41	6.59
		Diagonal	Max Tension	28	9.08	0.00	0.00
			Max. Compression	29	-9.44	0.00	0.00
			Max. Mx	19	5.84	0.11	0.01
			Max. My	29	-7.63	-0.06	-0.02
			Max. Vy	19	-0.03	0.11	0.01
			Max. Vx	21	-0.00	0.00	0.00
T4	120 - 100	Leg	Max Tension	32	117.19	-5.13	-0.02
			Max. Compression	19	-138.35	3.39	0.04
			Max. Mx	19	-109.85	6.13	0.00
			Max. My	31	-11.38	-0.47	-7.36
			Max. Vy	32	0.98	-4.27	-0.10
			Max. Vx	31	1.72	-0.47	-7.36

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
		Diagonal	Max Tension	21	11.55	0.00	0.00
			Max. Compression	29	-12.57	0.00	0.00
			Max. Mx	19	7.08	0.13	0.01
			Max. My	29	-12.53	-0.06	-0.05
			Max. Vy	32	0.04	0.12	-0.00
			Max. Vx	29	0.01	0.00	0.00
		Mid Girt	Max Tension	32	3.92	0.00	0.00
			Max. Compression	19	-3.17	0.00	0.00
			Max. Mx	18	0.41	-0.07	0.00
			Max. My	30	2.10	0.00	0.00
			Max. Vy	18	-0.03	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T5	100 - 90	Leg	Max Tension	32	144.94	-4.27	-0.10
			Max. Compression	19	-170.56	4.60	0.02
			Max. Mx	19	-170.56	4.60	0.02
			Max. My	31	-12.60	-0.47	-7.36
			Max. Vy	19	-0.25	4.60	0.02
			Max. Vx	31	-0.49	-0.47	-7.36
		Diagonal	Max Tension	28	13.49	0.00	0.00
			Max. Compression	28	-13.72	0.00	0.00
			Max. Mx	19	10.36	0.18	0.01
			Max. My	30	-0.61	0.09	-0.02
			Max. Vy	19	-0.05	0.18	0.01
			Max. Vx	30	-0.00	0.00	0.00
T6	90 - 80	Leg	Max Tension	32	173.18	-4.32	0.01
			Max. Compression	19	-202.06	5.78	0.05
			Max. Mx	30	-201.28	5.78	-0.12
			Max. My	31	-14.57	-0.00	-4.70
			Max. Vy	27	0.39	-5.71	-0.06
			Max. Vx	31	0.28	-0.00	-4.70
		Diagonal	Max Tension	28	13.38	0.00	0.00
			Max. Compression	28	-13.75	0.00	0.00
			Max. Mx	19	10.28	0.15	0.01
			Max. My	30	-0.77	0.08	-0.02
			Max. Vy	19	-0.05	0.15	0.01
			Max. Vx	30	0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	32	225.41	-5.01	0.02
			Max. Compression	19	-261.48	5.55	0.01
			Max. Mx	30	-230.77	5.78	-0.12
			Max. My	34	-15.61	-0.08	5.19
			Max. Vy	22	-0.22	-5.69	0.11
			Max. Vx	34	-0.21	-0.08	5.19
		Diagonal	Max Tension	28	13.78	0.00	0.00
			Max. Compression	28	-14.16	0.00	0.00
			Max. Mx	19	10.54	0.15	0.01
			Max. My	21	-13.53	0.02	0.02
			Max. Vy	32	0.05	0.15	-0.01
			Max. Vx	21	-0.00	0.00	0.00
T8	60 - 40	Leg	Max Tension	32	273.18	-5.02	0.02
			Max. Compression	30	-317.16	5.46	-0.09
			Max. Mx	32	272.62	-6.90	-0.01
			Max. My	34	-20.30	0.06	5.99
			Max. Vy	22	0.31	-6.89	0.07
			Max. Vx	26	0.22	0.05	-5.96
		Diagonal	Max Tension	28	13.88	0.00	0.00
			Max. Compression	28	-14.24	0.00	0.00
			Max. Mx	30	10.13	0.21	-0.01
			Max. My	21	-13.64	0.00	0.03
			Max. Vy	30	-0.06	0.21	-0.01
			Max. Vx	21	-0.00	0.00	0.00
T9	40 - 20	Leg	Max Tension	32	315.77	-3.05	0.03

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	30	-370.16	-0.26	0.02
			Max. Mx	32	315.12	-11.58	0.02
			Max. My	31	-21.23	-0.76	-5.82
			Max. Vy	22	0.97	-11.56	-0.01
			Max. Vx	34	0.25	2.49	5.73
		Diagonal	Max Tension	28	15.13	0.00	0.00
			Max. Compression	28	-14.76	0.00	0.00
			Max. Mx	30	10.20	0.23	-0.02
			Max. My	28	-13.32	0.04	-0.03
			Max. Vy	32	0.07	0.21	-0.02
			Max. Vx	21	-0.00	0.00	0.00
T10	20 - 0	Leg	Max Tension	32	352.05	3.77	0.03
			Max. Compression	30	-419.98	-0.00	-0.00
			Max. Mx	30	-391.92	15.47	0.01
			Max. My	31	-30.36	9.54	-9.86
			Max. Vy	22	-1.65	-11.56	-0.01
			Max. Vx	34	1.08	9.55	9.85
		Diagonal	Max Tension	21	18.81	0.00	0.00
			Max. Compression	20	-16.65	0.00	0.00
			Max. Mx	32	7.51	0.29	-0.02
			Max. My	21	-16.35	0.13	0.04
			Max. Vy	32	0.08	0.29	-0.02
			Max. Vx	21	-0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	428.62	32.54	-19.68
	Max. H_x	30	428.62	32.54	-19.68
	Max. H_z	21	-350.34	-39.23	24.55
	Min. Vert	22	-363.26	-40.90	24.42
	Min. H_x	22	-363.26	-40.90	24.42
	Min. H_z	30	428.62	32.54	-19.68
Leg B	Max. Vert	24	426.83	-32.87	-19.16
	Max. H_x	32	-365.67	41.18	24.03
	Max. H_z	32	-365.67	41.18	24.03
	Min. Vert	32	-365.67	41.18	24.03
	Min. H_x	7	348.76	-32.95	-18.84
	Min. H_z	24	426.83	-32.87	-19.16
Leg A	Max. Vert	19	427.25	-0.58	37.97
	Max. H_x	31	28.06	3.86	-5.11
	Max. H_z	19	427.25	-0.58	37.97
	Min. Vert	27	-364.57	0.59	-47.70
	Min. H_x	23	27.41	-3.86	-5.18
	Min. H_z	27	-364.57	0.59	-47.70

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	51.55	0.00	0.00	-2.00	10.22	-0.00
Dead+Wind 0 deg - No Ice	51.55	-0.03	-59.60	-5731.31	12.45	-22.98
Dead+Wind 30 deg - No Ice	51.55	29.27	-50.81	-4910.48	-2816.44	-22.88
Dead+Wind 45 deg - No Ice	51.55	41.56	-41.28	-3990.12	-4015.51	-20.09
Dead+Wind 60 deg - No Ice	51.55	50.83	-29.04	-2806.84	-4918.74	-15.89
Dead+Wind 90 deg - No Ice	51.55	58.77	0.23	26.20	-5671.60	-5.78
Dead+Wind 120 deg - No Ice	51.55	51.69	30.08	2886.46	-4964.91	6.19
Dead+Wind 135 deg - No Ice	51.55	41.56	41.56	4009.14	-4016.39	11.54
Dead+Wind 150 deg - No Ice	51.55	29.55	50.94	4912.46	-2853.77	16.79
Dead+Wind 180 deg - No Ice	51.55	0.21	58.66	5675.66	-15.12	24.59
Dead+Wind 210 deg - No Ice	51.55	-29.36	50.86	4904.32	2852.48	23.21
Dead+Wind 225 deg - No Ice	51.55	-41.43	41.46	3998.63	4022.68	20.84
Dead+Wind 240 deg - No Ice	51.55	-51.57	29.98	2876.19	4972.05	18.14
Dead+Wind 270 deg - No Ice	51.55	-58.70	0.09	11.33	5682.58	8.01
Dead+Wind 300 deg - No Ice	51.55	-50.74	-29.22	-2827.93	4924.98	-3.93
Dead+Wind 315 deg - No Ice	51.55	-41.50	-41.41	-4004.87	4024.93	-9.94
Dead+Wind 330 deg - No Ice	51.55	-29.33	-50.88	-4917.75	2841.20	-16.08
Dead+Ice+Temp	85.61	0.00	0.00	-2.59	25.14	0.00
Dead+Wind 0 deg+Ice+Temp	85.61	-0.02	-69.88	-6905.93	26.68	-19.68
Dead+Wind 30 deg+Ice+Temp	85.61	34.37	-59.62	-5905.89	-3377.35	-25.79
Dead+Wind 45 deg+Ice+Temp	85.61	48.70	-48.47	-4802.60	-4804.84	-25.94
Dead+Wind 60 deg+Ice+Temp	85.61	59.54	-34.13	-3381.60	-5883.60	-24.27
Dead+Wind 90 deg+Ice+Temp	85.61	68.91	0.18	19.61	-6802.32	-17.29
Dead+Wind 120 deg+Ice+Temp	85.61	60.58	35.16	3467.54	-5963.93	-5.59
Dead+Wind 135 deg+Ice+Temp	85.61	48.70	48.69	4814.91	-4805.18	1.31
Dead+Wind 150 deg+Ice+Temp	85.61	34.59	59.71	5904.80	-3406.90	8.32
Dead+Wind 180 deg+Ice+Temp	85.61	0.16	68.72	6808.78	5.20	21.08
Dead+Wind 210 deg+Ice+Temp	85.61	-34.44	59.65	5898.58	3440.45	26.07
Dead+Wind 225 deg+Ice+Temp	85.61	-48.60	48.61	4806.92	4844.71	26.55
Dead+Wind 240 deg+Ice+Temp	85.61	-60.49	35.08	3459.87	6003.99	26.35
Dead+Wind 270 deg+Ice+Temp	85.61	-68.86	0.07	8.33	6845.13	19.07
Dead+Wind 300 deg+Ice+Temp	85.61	-59.46	-34.27	-3397.94	5922.26	7.02
Dead+Wind 315 deg+Ice+Temp	85.61	-48.65	-48.57	-4813.96	4845.92	-0.04
Dead+Wind 330 deg+Ice+Temp	85.61	-34.41	-59.67	-5911.38	3430.67	-7.76
Dead+Wind 0 deg - Service	51.55	-0.01	-20.62	-1984.53	11.00	-7.95
Dead+Wind 30 deg - Service	51.55	10.13	-17.58	-1700.49	-967.87	-7.93
Dead+Wind 45 deg - Service	51.55	14.38	-14.28	-1382.01	-1382.78	-6.95
Dead+Wind 60 deg - Service	51.55	17.59	-10.05	-972.56	-1695.31	-5.50
Dead+Wind 90 deg - Service	51.55	20.33	0.08	7.75	-1955.82	-1.99
Dead+Wind 120 deg - Service	51.55	17.89	10.41	997.47	-1711.29	2.14
Dead+Wind 135 deg - Service	51.55	14.38	14.38	1385.94	-1383.08	3.98
Dead+Wind 150 deg - Service	51.55	10.23	17.63	1698.51	-980.78	5.80
Dead+Wind 180 deg - Service	51.55	0.07	20.30	1962.60	1.46	8.51
Dead+Wind 210 deg - Service	51.55	-10.16	17.60	1695.71	993.74	8.05
Dead+Wind 225 deg - Service	51.55	-14.34	14.35	1382.32	1398.66	7.22
Dead+Wind 240 deg - Service	51.55	-17.85	10.37	993.93	1727.18	6.28
Dead+Wind 270 deg - Service	51.55	-20.31	0.03	2.60	1973.05	2.76
Dead+Wind 300 deg - Service	51.55	-17.56	-10.11	-979.87	1710.89	-1.36
Dead+Wind 315 deg - Service	51.55	-14.36	-14.33	-1387.13	1399.44	-3.43
Dead+Wind 330 deg - Service	51.55	-10.15	-17.61	-1703.02	989.84	-5.55

Solution Summary

Load Comb	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-51.55	0.00	0.00	51.55	0.00	0.000%
2	-0.03	-51.55	-59.60	0.03	51.55	59.60	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
3	29.27	-51.55	-50.81	-29.27	51.55	50.81	0.000%
4	41.56	-51.55	-41.28	-41.56	51.55	41.28	0.000%
5	50.83	-51.55	-29.04	-50.83	51.55	29.04	0.000%
6	58.77	-51.55	0.23	-58.77	51.55	-0.23	0.000%
7	51.69	-51.55	30.08	-51.69	51.55	-30.08	0.000%
8	41.56	-51.55	41.56	-41.56	51.55	-41.56	0.000%
9	29.55	-51.55	50.94	-29.55	51.55	-50.94	0.000%
10	0.21	-51.55	58.66	-0.21	51.55	-58.66	0.000%
11	-29.36	-51.55	50.86	29.36	51.55	-50.86	0.000%
12	-41.43	-51.55	41.46	41.43	51.55	-41.46	0.000%
13	-51.57	-51.55	29.98	51.57	51.55	-29.98	0.000%
14	-58.70	-51.55	0.09	58.70	51.55	-0.09	0.000%
15	-50.74	-51.55	-29.22	50.74	51.55	29.22	0.000%
16	-41.50	-51.55	-41.41	41.50	51.55	41.41	0.000%
17	-29.33	-51.55	-50.88	29.33	51.55	50.88	0.000%
18	0.00	-85.61	0.00	-0.00	85.61	0.00	0.000%
19	-0.02	-85.61	-69.88	0.02	85.61	69.88	0.000%
20	34.37	-85.61	-59.62	-34.37	85.61	59.62	0.000%
21	48.70	-85.61	-48.47	-48.70	85.61	48.47	0.000%
22	59.54	-85.61	-34.13	-59.54	85.61	34.13	0.000%
23	68.91	-85.61	0.18	-68.91	85.61	-0.18	0.000%
24	60.58	-85.61	35.16	-60.58	85.61	-35.16	0.000%
25	48.70	-85.61	48.69	-48.70	85.61	-48.69	0.000%
26	34.59	-85.61	59.71	-34.59	85.61	-59.71	0.000%
27	0.16	-85.61	68.72	-0.16	85.61	-68.72	0.000%
28	-34.44	-85.61	59.65	34.44	85.61	-59.65	0.000%
29	-48.60	-85.61	48.61	48.60	85.61	-48.61	0.000%
30	-60.49	-85.61	35.08	60.49	85.61	-35.08	0.000%
31	-68.86	-85.61	0.07	68.86	85.61	-0.07	0.000%
32	-59.46	-85.61	-34.27	59.46	85.61	34.27	0.000%
33	-48.65	-85.61	-48.57	48.65	85.61	48.57	0.000%
34	-34.41	-85.61	-59.67	34.41	85.61	59.67	0.000%
35	-0.01	-51.55	-20.62	0.01	51.55	20.62	0.000%
36	10.13	-51.55	-17.58	-10.13	51.55	17.58	0.000%
37	14.38	-51.55	-14.28	-14.38	51.55	14.28	0.000%
38	17.59	-51.55	-10.05	-17.59	51.55	10.05	0.000%
39	20.33	-51.55	0.08	-20.33	51.55	-0.08	0.000%
40	17.89	-51.55	10.41	-17.89	51.55	-10.41	0.000%
41	14.38	-51.55	14.38	-14.38	51.55	-14.38	0.000%
42	10.23	-51.55	17.63	-10.23	51.55	-17.63	0.000%
43	0.07	-51.55	20.30	-0.07	51.55	-20.30	0.000%
44	-10.16	-51.55	17.60	10.16	51.55	-17.60	0.000%
45	-14.34	-51.55	14.35	14.34	51.55	-14.35	0.000%
46	-17.85	-51.55	10.37	17.85	51.55	-10.37	0.000%
47	-20.31	-51.55	0.03	20.31	51.55	-0.03	0.000%
48	-17.56	-51.55	-10.11	17.56	51.55	10.11	0.000%
49	-14.36	-51.55	-14.33	14.36	51.55	14.33	0.000%
50	-10.15	-51.55	-17.61	10.15	51.55	17.61	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001

4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000081
20	Yes	4	0.00000001	0.00000109
21	Yes	4	0.00000001	0.00000130
22	Yes	4	0.00000001	0.00000120
23	Yes	4	0.00000001	0.00000130
24	Yes	4	0.00000001	0.00000083
25	Yes	4	0.00000001	0.00000099
26	Yes	4	0.00000001	0.00000122
27	Yes	4	0.00000001	0.00000116
28	Yes	4	0.00000001	0.00000109
29	Yes	4	0.00000001	0.00000096
30	Yes	4	0.00000001	0.00000096
31	Yes	4	0.00000001	0.00000130
32	Yes	4	0.00000001	0.00000116
33	Yes	4	0.00000001	0.00000119
34	Yes	4	0.00000001	0.00000122
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz Deflection in	Gov Load Comb	Tilt °	Twist °
T1	170 - 150	5.771	35	0.3279	0.0280
T2	150 - 140	4.409	35	0.2984	0.0346
T3	140 - 120	3.790	35	0.2780	0.0332
T4	120 - 100	2.702	35	0.2252	0.0194
T5	100 - 90	1.823	46	0.1785	0.0127
T6	90 - 80	1.464	46	0.1509	0.0107
T7	80 - 60	1.155	46	0.1305	0.0089

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T8	60 - 40	0.649	46	0.0966	0.0064
T9	40 - 20	0.293	46	0.0583	0.0040
T10	20 - 0	0.086	46	0.0265	0.0020

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
183.00	101-90-08-0-01	35	5.771	0.3279	0.0280	88849
179.75	15' Mount Pipe	35	5.771	0.3279	0.0280	88849
178.00	3" Dia 20' Omni	35	5.771	0.3279	0.0280	88849
175.00	2.5" x 14' Omni	35	5.771	0.3279	0.0280	88849
174.00	1.5" x 12' Omni	35	5.771	0.3279	0.0280	88849
170.00	APXVSPP18-C-A20	35	5.771	0.3279	0.0280	88849
168.00	HPD2-4.7	35	5.631	0.3253	0.0289	88849
159.50	APXV18-206517S-C w/ mounting hardware	35	5.042	0.3135	0.0324	42309
158.50	SC420-HF1LDF	35	4.974	0.3121	0.0327	38630
144.00	3" Dia 20' Omni	35	4.032	0.2868	0.0343	23538
141.00	2" Dia 15' Omni	35	3.850	0.2803	0.0336	23984
139.00	1.5" x 10' Omni	35	3.731	0.2756	0.0327	24120
138.50	9' Whip	35	3.702	0.2743	0.0325	24128
134.00	VHLP2.5-180	35	3.443	0.2627	0.0298	23972
125.50	PiROD 10' Lightweight T-Frame	35	2.981	0.2396	0.0233	23558
115.00	(2) TMA (shielded)	46	2.463	0.2135	0.0167	22934
101.00	BXA-171063-12BF	46	1.862	0.1811	0.0129	22013
87.00	3"x2"x22" Panel	46	1.366	0.1440	0.0101	25066
84.50	TMA	46	1.288	0.1388	0.0097	27742
83.50	3' Stand-off	46	1.258	0.1369	0.0095	28975
83.00	3' Dish	46	1.243	0.1359	0.0094	29604
82.50	TMA	46	1.228	0.1350	0.0093	30229
80.00	3"x2"x22" Panel	46	1.155	0.1305	0.0089	32895
30.00	Camera	46	0.171	0.0414	0.0030	32720
24.00	PC9013N	46	0.116	0.0323	0.0024	33266

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 150	19.843	19	1.0972	0.1177
T2	150 - 140	15.281	19	1.0106	0.1336
T3	140 - 120	13.176	19	0.9488	0.1236
T4	120 - 100	9.436	30	0.7798	0.0756
T5	100 - 90	6.374	30	0.6219	0.0489
T6	90 - 80	5.118	30	0.5273	0.0403
T7	80 - 60	4.035	30	0.4569	0.0330
T8	60 - 40	2.263	30	0.3383	0.0223
T9	40 - 20	1.016	30	0.2040	0.0132
T10	20 - 0	0.296	30	0.0927	0.0064

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
183.00	101-90-08-0-01	19	19.843	1.0972	0.1177	30835
179.75	15' Mount Pipe	19	19.843	1.0972	0.1177	30835
178.00	3" Dia 20' Omni	19	19.843	1.0972	0.1177	30835
175.00	2.5" x 14' Omni	19	19.843	1.0972	0.1177	30835
174.00	1.5" x 12' Omni	19	19.843	1.0972	0.1177	30835
170.00	APXVSPP18-C-A20	19	19.843	1.0972	0.1177	30835
168.00	HPD2-4.7	19	19.377	1.0895	0.1203	30835
159.50	APXV18-206517S-C w/ mounting hardware	19	17.410	1.0553	0.1299	14683
158.50	SC420-HF1LDF	19	17.181	1.0510	0.1308	13406
144.00	3" Dia 20' Omni	19	14.000	0.9760	0.1294	8016
141.00	2" Dia 15' Omni	19	13.380	0.9560	0.1253	8024
139.00	1.5" x 10' Omni	19	12.974	0.9414	0.1218	7973
138.50	9' Whip	19	12.874	0.9376	0.1208	7953
134.00	VHLP2.5-180	30	11.986	0.9011	0.1107	7714
125.50	PiROD 10' Lightweight T-Frame	30	10.400	0.8266	0.0887	7254
115.00	(2) TMA (shielded)	30	8.604	0.7409	0.0663	6817
101.00	BXA-171063-12BF	30	6.510	0.6310	0.0498	6415
87.00	3"x2"x22" Panel	30	4.777	0.5034	0.0380	7279
84.50	TMA	30	4.504	0.4856	0.0361	8017
83.50	3' Stand-off	30	4.397	0.4789	0.0354	8355
83.00	3' Dish	30	4.345	0.4757	0.0350	8527
82.50	TMA	30	4.292	0.4724	0.0347	8697
80.00	3"x2"x22" Panel	30	4.035	0.4569	0.0330	9417
30.00	Camera	30	0.592	0.1447	0.0096	9288
24.00	PC9013N	30	0.399	0.1128	0.0077	9439

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	170	Diagonal	A325N	0.6250	1	3.46	6.44	0.537 ✓	1.333	Bolt Shear
T2	150	Leg	A325N	1.0000	6	5.84	34.56	0.169 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	4.91	8.16	0.602 ✓	1.333	Member Bearing
		Top Girt	A325N	1.0000	1	0.42	8.16	0.052 ✓	1.333	Member Bearing
T3	140	Leg	A325N	1.0000	6	8.57	34.56	0.248 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9.08	8.16	1.114 ✓	1.333	Member Bearing
T4	120	Leg	A325N	1.0000	6	15.41	34.56	0.446 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	11.55	10.88	1.062 ✓	1.333	Member Bearing
		Mid Girt	A325N	1.0000	1	3.92	8.16	0.480 ✓	1.333	Member Bearing
T5	100	Leg	A325N	1.0000	6	24.16	34.56	0.699 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	13.49	13.59	0.992 ✓	1.333	Member Bearing
T6	90	Leg	A325N	1.0000	6	28.86	34.56	0.835 ✓	1.333	Bolt Tension

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
		Diagonal	A325N	1.0000	1	13.38	13.59	0.984 ✓	1.333	Member Bearing
T7	80	Leg	A325N	1.0000	6	33.26	34.56	0.963 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	14.16	16.49	0.859 ✓	1.333	Bolt Shear
T8	60	Leg	A325N	1.2500	6	41.67	54.00	0.772 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	13.88	16.99	0.817 ✓	1.333	Member Bearing
T9	40	Leg	A325N	1.2500	6	49.37	54.00	0.914 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	15.13	20.39	0.742 ✓	1.333	Member Bearing
T10	20	Diagonal	A325N	1.2500	1	18.81	16.99	1.107 ✓	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	1 3/4	20.00	2.49	68.3 K=1.00	21.253	2.4053	-35.99	51.12	0.704 ✓
T2	150 - 140	Pirod 105244	10.02	10.02	45.4 K=1.00	25.051	3.6816	-41.87	92.23	0.454 ✓
T3	140 - 120	Pirod 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-84.43	92.23	0.915 ✓
T4	120 - 100	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-138.35	138.54	0.999 ✓
T5	100 - 90	Pirod 105217	10.02	10.02	37.8 K=1.00	26.132	5.3014	-170.56	138.54	1.231 ✓
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5 K=1.00	26.968	7.6570	-202.06	206.49	0.979 ✓
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6 K=1.00	27.439	9.9280	-261.48	272.41	0.960 ✓
T8	60 - 40	Pirod 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-317.16	257.78	1.230 ✓
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4 K=1.00	27.705	11.7803	-370.16	326.37	1.134 ✓
T10	20 - 0	Pirod 105220 reinf w/ 1" dia bar	20.03	10.02	24.3 K=1.00	27.824	14.2843	-419.98	397.44	1.057 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T2	150 - 140	0.5	1.48	121.0	10.193	0.1963	0.94	2.24	0.418 ✓
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.99	2.23	0.446 ✓
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.73	2.26	0.764 ✓
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.50	2.26	0.219 ✓
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.39	2.30	0.172 ✓
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.23	2.33	0.097 ✓
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.32	4.69	0.067 ✓
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.175 ✓
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.71	4.75	0.360 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.59	2.71	111.6 K=0.75	12.001	0.6013	-3.46	7.22	0.480 ✓
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.02	121.8 K=1.00	10.024	0.9020	-5.45	9.04	0.602 ✓
T3	140 - 120	L3x3x3/16	12.50	5.67	115.6 K=1.01	10.799	1.0900	-9.44	11.77	0.802 ✓
T4	120 - 100	L3x3x1/4	13.80	6.37	129.1 K=1.00	8.961	1.4400	-12.57	12.90	0.974 ✓
T5	100 - 90	L3x3x5/16	14.50	6.74	137.3 K=1.00	7.920	1.7800	-13.72	14.10	0.973 ✓
T6	90 - 80	L3x3x5/16	15.24	7.12	145.1 K=1.00	7.090	1.7800	-13.75	12.62	1.090 ✓
T7	80 - 60	L3x3x3/8	16.80	7.92	162.0 K=1.00	5.691	2.1100	-14.16	12.01	1.179 ✓
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.73	151.8 K=1.00	6.480	2.0900	-14.22	13.54	1.050 ✓
T9	40 - 20	L3 1/2x3 1/2x3/8	19.30	9.17	160.1 K=1.00	5.825	2.4800	-14.76	14.45	1.021 ✓
T10	20 - 0	L4x4x5/16	21.03	10.04	152.3 K=1.00	6.437	2.4000	-16.65	15.45	1.078 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.33	2.58	0.127 ✓
T2	150 - 140	L3x3x3/16	5.00	4.52	105.5 K=1.16	12.079	1.0900	-0.37	13.17	0.028 ✓

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.15	2.58	0.059 ✓

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T4	120 - 100	L3x3x3/16	9.00	7.67	154.4 K=1.00	6.267	1.0900	-3.17	6.83	0.464 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	1 3/4	20.00	2.49	68.3	30.000	2.4053	29.76	72.16	0.412 ✓
T2	150 - 140	Pirod 105244	10.02	10.02	45.4	30.000	3.6816	35.03	110.45	0.317 ✓
T3	140 - 120	Pirod 105216	20.03	10.02	45.4	30.000	3.6816	70.49	110.45	0.638 ✓
T4	120 - 100	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	117.19	159.04	0.737 ✓
T5	100 - 90	Pirod 105217	10.02	10.02	37.8	30.000	5.3014	144.94	159.04	0.911 ✓
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5	30.000	7.6570	173.18	229.71	0.754 ✓
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6	30.000	9.9280	225.41	297.84	0.757 ✓
T8	60 - 40	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	273.19	282.74	0.966

Section No.	Elevation ft	Size	L ft	L_b ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow P_a K	Ratio $\frac{P}{P_a}$
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4	30.000	11.7803	315.77	353.41	0.894
T10	20 - 0	Pirod 105220 reinf w/ 1" dia bar	20.03	10.02	24.3	30.000	14.2843	352.06	428.53	0.822

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L_d ft	Kl/r	F_a ksi	A in^2	Actual V K	Allow. V_a K	Stress Ratio
T2	150 - 140	0.5	1.48	121.0	10.193	0.1963	0.94	2.24	0.418
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.99	2.23	0.446
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.73	2.26	0.764
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.50	2.26	0.219
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.39	2.30	0.172
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.23	2.33	0.097
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.32	4.69	0.067
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.175
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.71	4.75	0.360

Diagonal Design Data (Tension)

Section No	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	170 - 150	7/8	5.59	2.71	148.7	30.000	0.6013	3.41	18.04	0.189
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.02	80.1	21.600	0.9020	4.91	19.48	0.252
T3	140 - 120	L3x3x3/16	12.50	5.67	74.6	21.600	1.0900	9.08	23.54	0.386
T4	120 - 100	L3x3x1/4	13.80	6.37	84.3	21.600	1.4400	11.55	31.10	0.371
T5	100 - 90	L3x3x5/16	14.50	6.74	89.9	21.600	1.7800	13.49	38.45	0.351
T6	90 - 80	L3x3x5/16	15.24	7.12	94.9	21.600	1.7800	13.38	38.45	0.348

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T7	80 - 60	L3x3x3/8	16.01	7.54	101.2	21.600	2.1100	13.78	45.58	0.302 ✓
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.73	99.2	21.600	2.0900	13.88	45.14	0.307 ✓
T9	40 - 20	L3 1/2x3 1/2x3/8	20.16	9.59	109.8	21.600	2.4800	15.13	53.57	0.282 ✓
T10	20 - 0	L4x4x5/16	21.92	10.48	103.3	21.600	2.4000	18.81	51.84	0.363 ✓

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.30	18.04	0.016 ✓
T2	150 - 140	L3x3x3/16	5.00	4.52	62.0	21.600	1.0900	0.42	23.54	0.018 ✓

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.15	18.04	0.008 ✓

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio P / P_a
T4	120 - 100	L3x3x3/16	9.00	7.67	102.2	21.600	1.0900	3.92	23.54	0.166 ✓

Section Capacity Table

Section No	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	170 - 150	Leg	1 3/4	3	-35.99	68.14	52.8	Pass
T2	150 - 140	Leg	Pirod 105244	60	-41.87	122.94	34.1	Pass
T3	140 - 120	Leg	Pirod 105216	72	-84.43	122.94	68.7	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P_{allow} K	% Capacity	Pass Fail
T4	120 - 100	Leg	Pirod 105217	87	-138.35	184.67	74.9	Pass
T5	100 - 90	Leg	Pirod 105217	105	-170.56	184.67	92.4	Pass
T6	90 - 80	Leg	Pirod 105217 reinf w/ 1" dia bar	114	-202.06	275.26	73.4	Pass
T7	80 - 60	Leg	Pirod 105218 reinf w/ 1" dia bar	123	-261.48	363.13	72.0	Pass
T8	60 - 40	Leg	Pirod 105219	136	-317.16	343.62	92.3	Pass
T9	40 - 20	Leg	Pirod 105219 reinf w /1" dia bar	151	-370.16	435.06	85.1	Pass
T10	20 - 0	Leg	Pirod 105220 reinf w/ 1" dia bar	166	-419.98	529.79	79.3	Pass
T1	170 - 150	Diagonal	7/8	12	-3.46	9.62	36.0	Pass
T2	150 - 140	Diagonal	L2 1/2x2 1/2x3/16	69	-5.45	12.05	45.2	Pass
T3	140 - 120	Diagonal	L3x3x3/16	78	-9.44	15.69	60.2	Pass
T4	120 - 100	Diagonal	L3x3x1/4	96	-12.57	17.20	73.1	Pass
T5	100 - 90	Diagonal	L3x3x5/16	111	-13.72	18.79	73.0	Pass
T6	90 - 80	Diagonal	L3x3x5/16	120	-13.75	16.82	81.7	Pass
T7	80 - 60	Diagonal	L3x3x3/8	129	-14.16	16.01	88.5	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x5/16	144	-14.22	18.05	78.8	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x3/8	165	-14.76	19.26	76.6	Pass
T10	20 - 0	Diagonal	L4x4x5/16	179	-16.65	20.59	80.9	Pass
T1	170 - 150	Top Girt	7/8	6	-0.33	3.45	9.5	Pass
T2	150 - 140	Top Girt	L3x3x3/16	61	-0.37	17.55	2.1	Pass
T1	170 - 150	Bottom Girt	7/8	8	-0.15	3.45	4.4	Pass
T4	120 - 100	Mid Girt	L3x3x3/16	88	-3.17	9.11	34.8	Pass
							Summary	
						Leg (T5)	92.4	Pass
						Diagonal (T7)	88.5	Pass
						Top Girt (T1)	9.5	Pass
						Bottom Girt (T1)	4.4	Pass
						Mid Girt (T4)	34.8	Pass
						Bolt Checks	83.5	Pass
						RATING =	**92.4**	**Pass**

ANCHOR BOLT EVALUATION

URS

Job	170' Self-Supporting Lattice Tower - Cromwell, CT	Project No.	TWS-027 Rev. 1	Page / Sheet	of / 1 of 3
Description	Anchor Bolt Analysis	Computed by	MCD	Date	09/23/14
		Checked by		Date	

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	$Uplift := 366 \cdot kips$	*user input*
Shear:	$Shear := 48 \cdot kips$	*user input*
Compression:	$Compression := 429 \cdot kips$	*user input*

Anchor Bolt Data:

Use ASTM A687 Grade

Number of Anchor Bolts = N	$N := 6$	*user input*	
Bolt Ultimate Strength:	$F_u := 150 \cdot ksi$	*user input*	
Bolt Yield Strength:	$Fy := 105 \cdot ksi$	*user input*	
Bolt Modulus:	$E := 29000 \cdot ksi$	*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 10-97)

Anchor Bolt Area:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 1.227 \cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n} \right)^2 \qquad A_n = 0.969 \cdot in^2$$

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$AllowableTension := 1.33 \cdot \left(0.33 \cdot A_g \cdot F_u \right) \qquad AllowableTension = 80.8 \cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.33 \cdot \left(0.60 \cdot A_n \cdot Fy \right) \qquad F_{net.area} = 81.2 \cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 61.0 \cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.75$$

$$Condition1 := if\left(\frac{MaxTension}{F_{net.area}} \le 1.00, "OK", "Overstressed" \right)$$

Condition1 = "OK"

Check Anchor Bolt Area:

Based on the ASCE 10-97 Design of Latticed Stell Transmission Structures

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 4.5 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 1.6 \cdot in^2$$

Provided Area:

$$A_{sprovided} := A_n \cdot N \qquad A_{sprovided} = 5.8 \cdot in^2$$

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.77$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.28$$

Condition3 = "OK"

FOUNDATION EVALUATION

FOUNDATION ANALYSIS

Input Data

Maximum Pier Reactions:

Compression: $C_t := 429\,kips$ *user input*

Uplift: $U_t := 366\,kips$ *user input*

Material Properties:

Unit Weight of Concrete: $\gamma c := 150pcf$ *user input*

Unit Weight of Water: $\gamma w := 62.4pcf$ *user input*

Unit Weight of Soil: $\gamma s := 100pcf$ *user input*

Allowable Soil Bearing Capacity (Allowable Bearing Pressure at Depth 41'): $q_s := 6\cdot ksf$ *user input*

Water Table Below Grade: $Wd := 41\cdot ft$ *user input*

Average Allowable Shear: $fl := 859\,psf$ *user input*

Depth Neglected for Skin Friction at Top: $Depthunbond := 4\cdot ft$ *user input*

Foundation Dimensions:

Drilled Caisson Length: $C_{Length} := 41.5\,ft$ *user input*

Diameter of Pier: $d_p := 5.5ft$ *user input*

Extension of Pier Above Grade: $L_{pag} := 0.5ft$ *user input*

Additional Concrete $Conc_{addl} := 5ft\cdot\left(13ft\cdot 13ft - \frac{\pi\cdot d_p^{\,2}}{4}\right)$

$Conc_{addl} = 726.2\,ft^3$

Foundation reinforcement per drawings by Tectonic, dated May 5, 2004

Loading:

$$TotalDownLoad := C_t + \pi\cdot\frac{d_p^{\,2}}{4}\cdot\left[L_{pag}\,\gamma c + \left[\gamma c\cdot\left(C_{Length} - L_{pag}\right)\right]\right]$$

$TotalDownLoad = 576.9\,kips$

$$PierWeight := \pi\cdot\frac{d_p^{\,2}}{4}\cdot\left[\left(Wd + L_{pag}\right)\cdot\gamma c + \left(C_{Length} - Wd - L_{pag}\right)\cdot(\gamma c - \gamma w)\right] + Conc_{addl}\,\gamma c$$

$PierWeight = 256.8\cdot kips$

$SoilShear := \pi\, d_p\cdot\left[fl\cdot\left(C_{Length} - Depthunbond\right)\right]$

$SoilShear = 556.6\cdot kips$

Compression Capacity:

$$\text{TotalDownLoadCapacity} := \text{SoilShear} + q_s \cdot \left(\pi \cdot \frac{d_p^{\,2}}{4} \right)$$

$\text{TotalDownLoadCapacity} = 699.1 \cdot \text{kips}$

$\text{CheckDownLoadCapacity} := \text{if}(\text{TotalDownLoad} < \text{TotalDownLoadCapacity}, \text{"Okay"}, \text{"No Good"})$

$\text{CheckDownLoadCapacity} = \text{"Okay"}$

Tension Capacity:

$\text{TotalUpLiftCapacity} := \text{SoilShear} + \text{PierWeight}$

$\text{TotalUpLiftCapacity} = 813.4 \cdot \text{kips}$

$\text{CheckUpLiftCapacity} := \text{if}\left(U_t < \text{TotalUpLiftCapacity}, \text{"Okay"}, \text{"No Good"}\right)$

$\text{CheckUpLiftCapacity} = \text{"Okay"}$

$$\text{SafetyFactor}_{\text{provided}} := \frac{\text{TotalUpLiftCapacity}}{U_t}$$

$\boxed{\text{SafetyFactor}_{\text{provided}} = 2.22}$

Check Cone Failure:

$$\text{ConeFailureCapacity} := \frac{\left[\left(C_{\text{Length}} - L_{\text{pag}}\right) \cdot \tan(30\text{deg}) \cdot 2 + d_p\right]^2 \cdot \pi}{4} \cdot \frac{C_{\text{Length}} - L_{\text{pag}}}{3} \cdot \gamma_s$$

$\text{ConeFailureCapacity} = 2997.25 \cdot \text{kips}$

$\text{CheckConeFailureCapacity} := \text{if}\left(U_t < \text{ConeFailureCapacity}, \text{"Okay"}, \text{"No Good"}\right)$

$\text{CheckConeFailureCapacity} = \text{"Okay"}$

$$\text{ConeSafetyFactor}_{\text{provided}} := \frac{\text{ConeFailureCapacity}}{U_t}$$

$\text{ConeSafetyFactor}_{\text{provided}} = 8.19$

EXHIBIT C

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RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11059C

Rocky Hill / I-91 / X23
179 Shunpike Road
Cromwell, CT 06416

September 25, 2014

EBI Project Number: 62145201

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general public allowable limit:	84.57 %

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

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September 25, 2014

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

Emissions Analysis for Site: **CT11059C – Rocky Hill / I-91 / X23**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **179 Shunpike Road, Cromwell, CT**, 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 (μW/cm2). 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 public 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 public 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 limit for the 700 MHz Band is 467 $\mu W/cm^2$, and the general population exposure limit for the PCS and AWS 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 **179 Shunpike Road, Cromwell, CT**, 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 manufactures supplied specifications, minus 10 dB, 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 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

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

3) 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.

4) 1 LTE channel (700 MHz Band) was considered for each sector of the proposed installation. This channel has a transmit power of 30 Watts.

5) 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.

6) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB 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.

7) The antennas used in this modeling are the **Ericsson AIR21 B4A/B2P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **Commscope LNX-6515DS-VTM** for 700 MHz channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B4A/B2P** has a maximum gain of **15.9 dBd** at its main lobe. The **Commscope LNX-6515DS-VTM** has a maximum gain of **14.6 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, 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.

8) The antenna mounting height centerline of the proposed antennas is **125 feet** above ground level (AGL).

9) 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.

All calculations were done with respect to uncontrolled / general public threshold limits.

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	125	Height (AGL):	125	Height (AGL):	125
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	2	Channel Count	2	# PCS Channels:	2
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	1,906.06	ERP (W):	1,906.06	ERP (W):	1,906.06
Antenna A1 MPE%	1.19	Antenna B1 MPE%	1.19	Antenna C1 MPE%	1.19
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	125	Height (AGL):	125	Height (AGL):	125
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power:	120	Total TX Power:	120	Total TX Power:	120
ERP (W):	1,906.06	ERP (W):	1,906.06	ERP (W):	1,906.06
Antenna A2 MPE%	1.19	Antenna B2 MPE%	1.19	Antenna C2 MPE%	1.19
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM	Make / Model:	Commscope LNX-6515DS-VTM
Gain:	14.6 dBd	Gain:	14.6 dBd	Gain:	14.6 dBd
Height (AGL):	125	Height (AGL):	125	Height (AGL):	125
Frequency Bands	700 Mhz	Frequency Bands	700 Mhz	Frequency Bands	700 Mhz
Channel Count	1	Channel Count	1	Channel Count	1
Total TX Power:	30	Total TX Power:	30	Total TX Power:	30
ERP (W):	445.37	ERP (W):	445.37	ERP (W):	445.37
Antenna A3 MPE%	0.47	Antenna B3 MPE%	0.47	Antenna C3 MPE%	0.47

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**8.52**
AT&T	24.31 %
CR Police Dept	2.13 %
CR Fire Dept	2.18 %
CR Fire Alarm	3.63 %
Clearwire	1.04 %
Sprint	4.31 %
Verizon Wireless	38.45 %
Site Total MPE %:	**84.57 %**

T-Mobile Sector 1 Total:	2.84 %
T-Mobile Sector 2 Total:	2.84 %
T-Mobile Sector 3 Total:	2.84 %
Site Total:	84.57 %

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Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public 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 public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector 1:	2.84 %
Sector 2:	2.84 %
Sector 3 :	2.84 %
T-Mobile Total:	8.52 %
Site Total:	84.57 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **84.57%** of the allowable FCC established general public 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.

Scott Heffernan
RF Engineering Director

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