STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

October 4, 2013

Melanie Howlett
HPC Wireless Services
22 Shelter Rock Lane, Building C
Danbury, CT 06810

RE: **EM-SPRINT-033-130920** – Sprint Spectrum, L.P. notice of intent to modify an existing telecommunications facility located at 179 Shunpike Road, Cromwell, Connecticut.

Dear Ms. Howlett:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with the Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter;
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration;
- Prior to antenna installation, the tower modifications depicted on sheets SK-1 and SK-2 in Section 6 of the *Detailed Structural Analysis and Reinforcement of an Existing 170' Self Supporting Lattice Tower and Foundation for Proposed Antenna Arrangements* prepared by URS Corporation dated September 9, 2013, and stamped by Richard Sambor, shall be implemented; and
- Within 45 days following completion of the antenna installation, Sprint shall provide documentation certified by a professional engineer that its installation complied with the requirements of the structural analysis.

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated September 19, 2013. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require

explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/CDM/cm

c: The Honorable Mertie Terry, First Selectman, Town of Cromwell
Frederic Curtin, Zoning Enforcement Officer, Town of Cromwell
Cromwell Fire District

STATE OF CONNECTICUT

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August 10, 2015

Camille M. Mulligan
Alcatel-Lucent
1 Robbins Road
Westford, MA 01886

RE: **Compliance Extension Request**

EM-SPRINT-008-130130	93 Old Amity Road	Bethany
EM-SPRINT-009-131008	8 Sky Edge Drive	Bethel
EM-SPRINT-017-131008	371 Terryville Avenue	Bristol
EM-SPRINT-018-130322	39 Carmen Hill Road	Brookfield
EM-SPRINT-033-130920	179 Shunpike Road	Cromwell
EM-SPRINT-034-130920	41 Padanaram Road	Danbury
EM-SPRINT-069-130409	246 East Franklin Street	Danielson
EM-SPRINT-035-130322	126 Ledge Road	Darien
EM-SPRINT-043-130311	310 Prestige Park Road	East Hartford
EM-SPRINT-047-131008	232 South Main Street	East Windsor
EM-SPRINT-051-130606	280 Morehouse Drive	Fairfield
EM-SPRINT-052-130606	45 Maple Ridge Road	Farmington
EM-SPRINT-057-120122	363 Riversville Road	Greenwich
EM-SPRINT-057-131127	9 Sound Shore Dr., a/k/a 12 Sound Shore Drive	Greenwich
EM-SPRINT-059-130819	99 Briar Road	Groton
EM-SPRINT-062-130509	Talmadge Road	Hamden
EM-SPRINT-068-121226	136 Bulls Bridge Road	Kent
EM-SPRINT-076-130819	135 New Road	Madison
EM-SPRINT-077-130828	Olcott Street a/k/a 250 Olcott Street	Manchester
EM-SPRINT-080-131024	21 West Peak Drive	Meriden
EM-SPRINT-081-130716	1 Service Road	Middlebury
EM-SPRINT-084-130124	528 Wheeler's Farm Rd.	Milford
EM-SPRINT-091-130606	302 Ball Pond Road	New Fairfield
EM-SPRINT-095-131008	26 Washinton Street	New London
EM-SPRINT-097-131008	8 Ferris Road	Newtown
EM-SPRINT-097-131129	201 South Main St.	Newtown
EM-SPRINT-103-121226	173/177 West Rocks Road	Norwalk
EM-SPRINT-104-131112	2 Hinkley Hill Road	Norwich
EM-SPRINT-108-130215	20 Great Oak Road	Oxford
EM-SPRINT-108-130401	133 Coppermine Road	Oxford
EM-SPRINT-108-130712	338 Oxford Road	Oxford
EM-SPRINT-119-130314	47 Inwood Road	Rocky Hill

EM-SPRINT-119-130819	52 New Britain Avenue	Rocky Hill
EM-SPRINT-120-130828	Lower County Road a/k/a 35 Lower County Road	Roxbury
EM-SPRINT-126-130325	219 Nells Rock Road	Shelton
EM-SPRINT-126-130515	70 Platt Road	Shelton
EM-SPRINT-128-131112	22 Wintonbury Road (aka 49a and 53 Wintonbury Road)	Simsbury
EM-SPRINT-130-130531	1432 Old Waterbury Road	Southbury
EM-SPRINT-135-130128	69 Guinea Road	Stamford
EM-SPRINT-135-131112	366 Old Long Ridge Road	Stamford
EM-SPRINT-143-130712	350 Burr Mountain Road	Torrington
EM-SPRINT-151-131209	184 Garden Circle	Waterbury
EM-SPRINT-155-130828	345 North Main Street a/k/a 333 North Main Street	West Hartford
EM-SPRINT-157-130701	56 Norfield Road	Weston
EM-SPRINT-164-130920	Windsor Avenue a/k/a 494 Windsor Avenue	Windsor
EM-SPRINT-NEXTEL-166-130116	164 County Road	Wolcott

Dear Ms. Mulligan:

The Connecticut Siting Council (Council) is in receipt of your letter dated August 10, 2015, submitted on behalf of Sprint, requesting an extension of time to submit notices of completion of construction and associated post modification inspection reports for the above-referenced exempt modifications that were approved in 2013.

Please be advised that Council approval of these exempt modifications has expired. Therefore, any additional changes to these facilities will require explicit notice to the Council pursuant to Regulations of Connecticut State Agencies Section 16-50j-73 and a filing fee.

Thank you for your attention to this matter.

Sincerely,

Melanie A. Bachman
Acting Executive Director

MAB/cm

1 Robbins Road
Westford, MA 01886

August 10, 2015

State of Connecticut
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: CSC compliance extension (Sprint)

Carriann Mulcahy,

Thank you for taking my call this morning. Attached is the list of sites which would require extension and due to staff changes I am unsure if these have been addressed with formal request to the Siting Council.

Can you please advise if you have received? If not – will you please accept as formal request for extension as these are investigated for closure?

Sincerely,

EM/TS #	Address	Town	Council Additional Conditions	Notice of Completion Received	Decision Date	CSC Extension Granted
EM-SPRINT-148-140116	1605 Durham Hill Road	Wallingford	Yes		2/7/2014	
EM-SPRINT-049-140124	188 Moody Road	Enfield	Yes		2/14/2014	
EM-SPRINT-132-140124	151 Sand Hill Road	South Windsor	Yes		2/14/2014	
EM-SPRINT-011-140127	1021 Blue Hills Avenue	Bloomfield	Yes		2/14/2014	
EM-SPRINT-044-140127	60 Commerce Street	East Haven	Yes		2/14/2014	
EM-SPRINT-093-140127	389 Forbes Avenue	New Haven	Yes		2/14/2014	
EM-SPRINT-131-140124	705 Andrews Street	Southington	No		2/14/2014	
EM-SPRINT-144-140124	100 Quarry Road (aka 200 Quarry Road)	Trumbull	No		2/14/2014	
EM-SPRINT-056-140207	15 North Granby Road	Granby	Yes		2/21/2014	
EM-SPRINT-088-140218	37 Peach Orchard Road	Naugatuck	Yes		3/7/2014	

EM/TS #	Address	Town	Council Additional Conditions	Compliance with Council Additional Conditions Received	Notice of Completion Received	Decision Date
EM-SPRINT-008-130130	93 Old Amity Road	Bethany	Yes	No	No	2/20/2013
EM-SPRINT-009-131008	8 Sky Edge Drive	Bethel	Yes	No	No	10/25/2013
EM-SPRINT-NEXTEL-014-130313	150 North Main Street	Branford	Yes	No	No	4/5/2013
EM-SPRINT-017-131008	371 Terryville Avenue	Bristol	Yes	No	No	10/25/2013
EM-SPRINT-018-130322	39 Carmen Hill Road	Brookfield	Yes	No	No	4/5/2013
EM-SPRINT-NEXTEL-025-130313	1119 Summit Road	Cheshire	Yes	No	No	4/5/2013
EM-SPRINT-033-130920	179 Shunpike Road	Cromwell	Yes	No	No	10/4/2013
EM-SPRINT-034-130920	41 Padanaram Road	Danbury	Yes	No	No	10/4/2013
EM-SPRINT-069-130409	246 East Franklin Street	Danielson	Yes	No	No	4/26/2013
EM-SPRINT-035-130322	126 Ledge Road	Darien	Yes	No	No	4/5/2013
EM-SPRINT-043-130311	310 Prestige Park Road	East Hartford	Yes	No	No	4/5/2013
EM-SPRINT-047-131008	232 South Main Street	East Windsor	Yes	No	No	10/25/2013
EM-SPRINT-NEXTEL-049-130201	4 Oliver Road	Enfield	Yes	No	No	3/1/2013
EM-SPRINT-051-130606	280 Morehouse Drive	Fairfield	Yes	No	No	6/28/2013
EM-SPRINT-052-130606	45 Maple Ridge Road	Farmington	N/A	N/A	No	6/28/2013
EM-SPRINT-057-120122	363 Riversville Road	Greenwich	Yes	No	No	2/14/2013
EM-SPRINT-057-131127	9 Sound Shore Dr., a/k/a 12 Sound Shore Drive	Greenwich	N/A	N/A	No	12/16/2013
EM-SPRINT-059-130819	99 Briar Road	Groton	Yes	No	No	9/6/2013
EM-SPRINT-062-130509	Talmadge Road	Hamden	Yes	No	No	5/24/2013
EM-SPRINT-068-121226	136 Bulls Bridge Road	Kent	Yes	No	No	1/11/2013
EM-SPRINT-076-130819	135 New Road	Madison	Yes	No	No	9/6/2013
EM-SPRINT-077-130828	Olcott Street a/k/a 250 Olcott Street	Manchester	Yes	No	No	9/13/2013
EM-SPRINT-080-131024	21 West Peak Drive	Meriden	Yes	No	No	11/8/2013
EM-SPRINT-081-130716	1 Service Road	Middlebury	Yes	No	No	8/2/2013
EM-SPRINT-084-130124	528 Wheeler's Farm Rd.	Milford	Yes	No	No	2/13/2013
EM-SPRINT-086-130306	71 Moxley Hill Road	Montville	Yes	No	No	4/10/2013
EM-SPRINT-091-130606	302 Ball Pond Road	New Fairfield	N/A	N/A	No	6/28/2013
EM-SPRINT-NEXTEL-092-130313	115 Industrial Park Access Road	New Hartford	Yes	No	No	4/5/2013
EM-SPRINT-095-131008	26 Washinton Street	New London	Yes	No	No	10/25/2013
EM-SPRINT-097-131008	8 Ferris Road	Newtown	Yes	No	No	10/25/2013
EM-SPRINT-097-131129	201 South Main St.	Newtown	Yes	No	No	12/16/2013
EM-SPRINT-103-121226	173/177 West Rocks Road	Norwalk	Yes	No	No	1/11/2013
EM-SPRINT-104-131112	2 Hinkley Hill Road	Norwich	N/A	N/A	No	11/29/2013
EM-SPRINT-108-130215	20 Great Oak Road	Oxford	Yes	No	No	3/1/2013

EM-SPRINT-108-130401	133 Coppermine Road	Oxford	Yes	No	No	4/19/2013
EM-SPRINT-108-130712	338 Oxford Road	Oxford	Yes	No	No	7/26/2013
EM-SPRINT-109-130506	47-51 Unity Street	Plainfield	Yes	No	No	5/24/2013
EM-SPRINT-119-130314	47 Inwood Road	Rocky Hill	Yes	No	No	4/5/2013
EM-SPRINT-119-130819	52 New Britain Avenue	Rocky Hill	Yes	No	No	9/6/2013
EM-SPRINT-120-130828	Lower County Road a/k/a 35 Lower County Road	Roxbury	Yes	No	No	9/13/2013
EM-SPRINT-126-130325	219 Nells Rock Road	Shelton	Yes	No	No	4/15/2013
EM-SPRINT-126-130515	70 Platt Road	Shelton	Yes	No	No	5/31/2013
EM-SPRINT-128-131112	22 Wintonbury Road (aka 49a and 53 Wintonbury Road)	Simsbury	Yes	No	No	11/29/2013
EM-SPRINT-130-130531	1432 Old Waterbury Road	Southbury	Yes	No	No	6/21/2013
EM-SPRINT-135-130128	69 Guinea Road	Stamford	Yes	No	No	2/20/2013
EM-SPRINT-135-131112	366 Old Long Ridge Road	Stamford	Yes	No	No	11/29/2013
EM-SPRINT-143-130712	350 Burr Mountain Road	Torrington	Yes	No	No	7/26/2013
EM-SPRINT-151-131209	184 Garden Circle	Waterbury	N/A	N/A	No	1/21/2014
EM-SPRINT-155-130828	345 North Main Street a/k/a 333 North Main Street	West Hartford	Yes	No	No	9/13/2013
EM-SPRINT-157-130701	56 Norfield Road	Weston	Yes	No	No	7/22/2013
EM-SPRINT-164-130920	Windsor Avenue a/k/a 494 Windsor Avenue	Windsor	N/A	N/A	No	10/4/2013
EM-SPRINT-NEXTEL-166-130116	164 County Road	Wolcott	Yes	No	No	2/14/2013
EM-SPRINT-NEXTEL-167-130222	1116 Johnson Road	Woodbridge	Yes	No	No	3/18/2013

HPC Wireless Services
22 Shelter Rock Lane.
Building C
Danbury, CT, 06810
P.: 203.797.1112

HPC
WIRELESS SERVICES

September 19, 2013

VIA OVERNIGHT COURIER

Connecticut Siting Council
10 Franklin Square
New Britain, Connecticut 06051
Attn: Ms. Melanie Bachman, Acting Executive Director

Re: Sprint Spectrum, L.P. – Exempt Modification
179 Shunpike Road, Cromwell, Connecticut

Dear Ms. Bachman:

This letter and attachments are submitted on behalf of Sprint Spectrum, L.P. ("Sprint"). Sprint is undertaking modifications to certain existing sites in its Connecticut system in order to implement updated technology. Please accept this letter and attachments as notification, pursuant to R.C.S.A. Section 16-50j-73, of construction that constitutes an exempt modification pursuant to R.C.S.A. Section 16-50j-72(b)(2). In compliance with R.C.S.A. Section 16-50j-73, a copy of this letter and attachments is being sent to the First Selectman of the Town of Cromwell.

Sprint plans to modify the existing wireless communications facility owned by the Town of Cromwell Fire District and located at 179 Shunpike Road, Cromwell, (coordinates 41°-37'-23.63" N, 72°-40'-44.5" W). Attached are plan and elevation drawings depicting the planned changes, and documentation of the structural sufficiency of the structure to accommodate the revised antenna configuration subject to modifications detailed in the attached structural documentation. Also included is a power density report reflecting the modification to Sprint's operations at the site.

The changes to the facility do not constitute a modification as defined in Connecticut General Statutes ("C.G.S.") Section 16-50i(d) because the general physical characteristics of the facility will not be significantly changed. Rather, the planned changes to the facility fall squarely within those activities explicitly provided for in R.C.S.A. Section 16-50j-72(b)(2).

1. Sprint will remove the existing six (6) CMDA antennas and add three (3) dual-band panel LTE antennas on the existing frame, at a centerline height of approximately 170'. Sprint will also install six (6) RRUs (remote radio heads) and three (3) Notch Filters on proposed tower mounts behind the antennas and attached to the existing frame, also at a centerline height of approximately 170'. During an interim period of up to one

year, the six (6) existing CDMA antennas will remain. Sprint will also install three (3) hybriflex cables along the existing coaxial cable run, and will remove the coaxial cable at the end of the interim period. The proposed modifications will not extend the height of the approximately 170' structure.

2. Sprint will replace related equipment, and place a new fiber/power junction box on a proposed H-frame, in the existing Equipment Room. The existing GPS antenna on the existing Ice Bridge Post will be replaced by another GPS antenna. These changes will have no effect on the site boundaries.

3. The proposed changes will not increase the noise level at the existing facility by six decibels or more. The incremental effect of the proposed changes will be negligible.

4. The changes to the facility will not increase the calculated "worst case" power density for the combined operations at the site to a level at or above the applicable standard for uncontrolled environments as calculated for a mixed frequency site. As indicated on the attached report prepared by EBI Consulting, Sprint's operations at the site will result in a power density of approximately 13.881%; the combined site operations will result in a total power density of approximately 58.321%.

Please contact me by phone at (203) 610-1071 or by e-mail at mjhowlett@optonline.net with questions concerning this matter. Thank you for your consideration.

Respectfully yours,

Melanie J. Howlett

Attachments

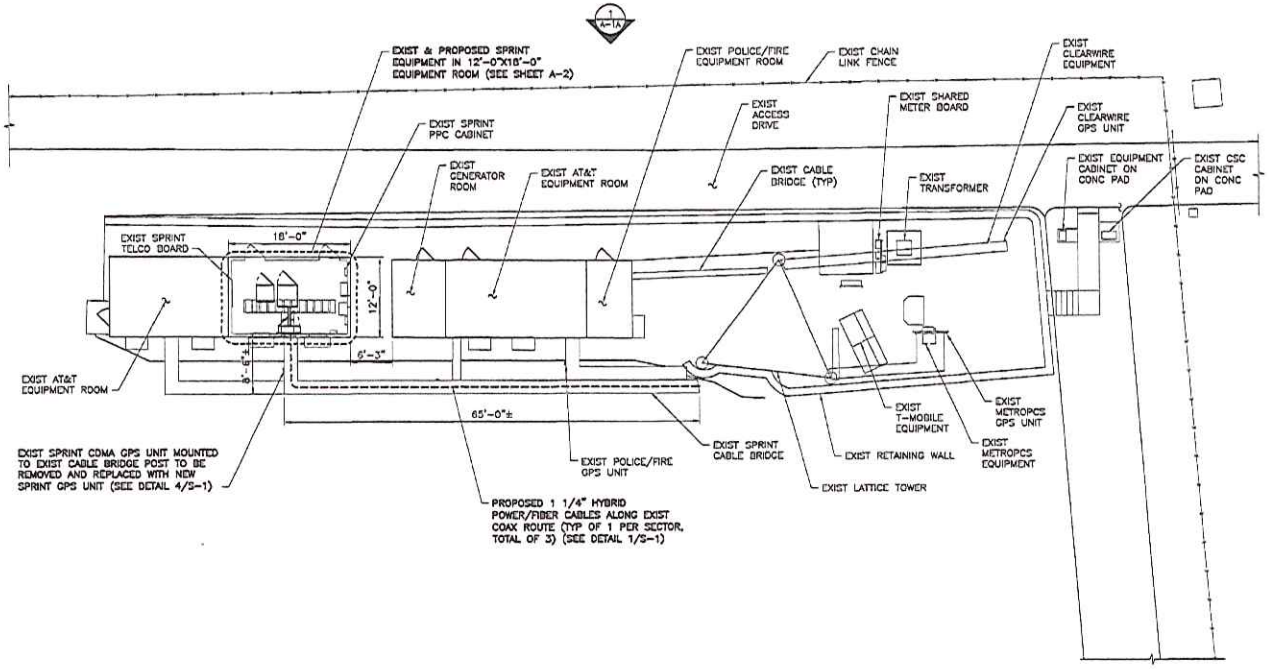
cc: Honorable Mertie Terry, First Selectman, Town of Cromwell
Town of Cromwell Fire District (underlying property owner)

N

TRUE

NORTH NOTE:

NORTH SHOWN HAS BEEN ESTABLISHED USING THE USGS QUADRANGLE 7.5 MINUTE MAPS AND IS APPROXIMATE. VERIFY TRUE NORTH PRIOR TO INSTALLATION OF ANTENNAS.



1 / A-1 SITE PLAN

SCALE: 1/8" = 1'-0"

Sprint
NETWORK VISION MEETS LAUNCH
1 INTERNATIONAL BLVD., SUITE 800
MAHWAH, NJ 07495
OFFICE:(201)684-4000
FAX:(201)648-4223

Alcatel-Lucent
1 ROBBINS ROAD
WESTFORD, MA 01886
TEL:(978) 952-7600

HPC
WIRELESS SERVICES

TECTONIC
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-4656
Fax: (845) 567-8703
www.tectonicengineering.com

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SUBMITTALS

PROJECT NO: 6318.60-931

NO	DATE	DESCRIPTION	BY
0	9/27/12	FOR COMMENT	SL
1	12/05/12	PER COMMENTS	MJR
2	01/10/13	PER COMMENTS	DAC

SEAL

SITE NUMBER:
CT60XC931

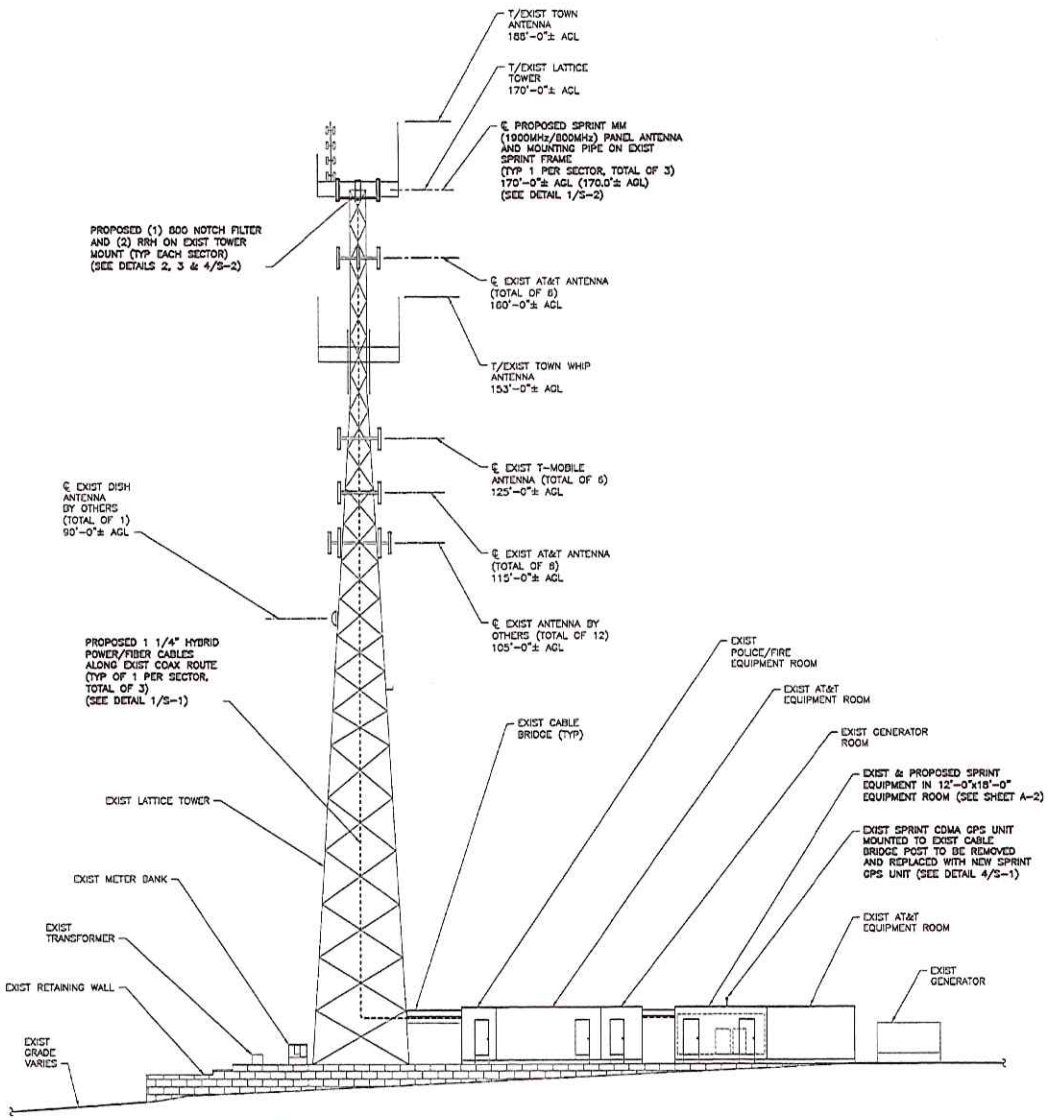
SITE NAME:
CROMWELL - RT. 372

SITE ADDRESS:
179 SHUNPIKE ROAD
CROMWELL, CT 06416

SHEET TITLE:
SITE PLAN

SHEET NO:
A-1

THE PROPOSED INSTALLATION & EXISTING LATTICE TOWER SHALL BE ANALYZED BY URS CORPORATION (TO BE COORDINATED BY OTHERS).



1 A-1A ELEVATION
SCALE: 3/32" = 1'-0"

Sprint
NETWORK VISION MEETS LAUNCH
1 INTERNATIONAL BLVD., SUITE 800
MAHWAH, NJ 07495
OFFICE:(201)684-4000
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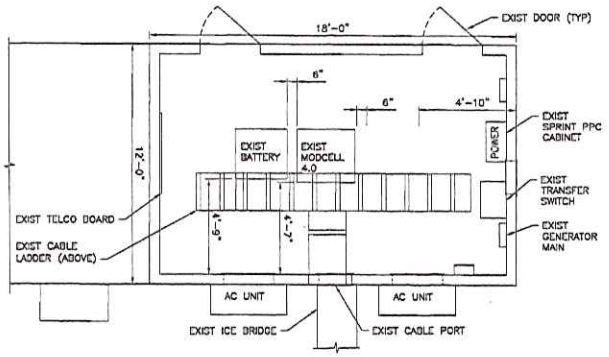
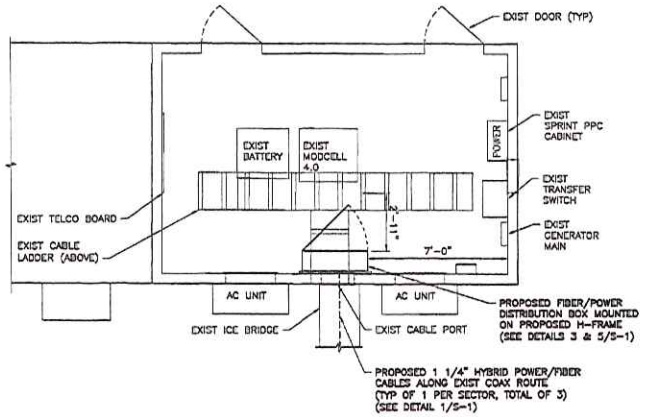
SHEET TITLE:
ELEVATION

SHEET NO:
A-1A



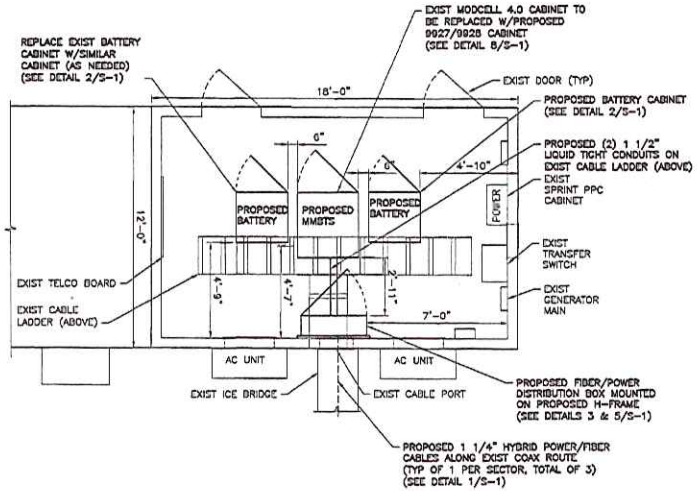
1 A-2 ENLARGED EQUIPMENT LAYOUT PLAN (EXIST)

SCALE: 3/8" = 1'-0"



2 A-2 ENLARGED EQUIPMENT LAYOUT PLAN (INTERIM)

SCALE: 3/8" = 1'-0"



3 A-2 ENLARGED EQUIPMENT LAYOUT PLAN (FINAL)

SCALE: 3/8" = 1'-0"

Sprint
NETWORK VISION MONTH LAUNCH
1 INTERNATIONAL BLVD., SUITE 800
MAHWAH, NJ 07495
OFFICE:(201)684-4000
FAX:(201)648-4223

Alcatel·Lucent
1 ROBBINS ROAD
WESTFORD, MA 01886
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Phone: (845) 567-3100
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SEAL

SITE NUMBER
CT60XC931

SITE NAME
CROMWELL – RT. 372

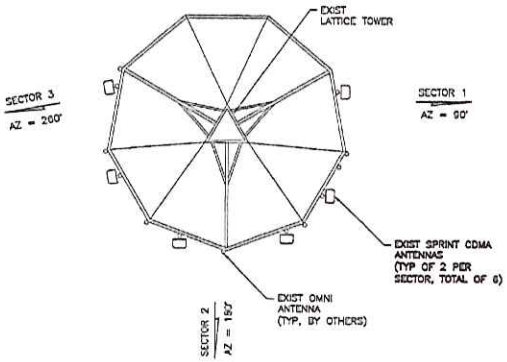
SITE ADDRESS
179 SHUNPIKE ROAD
CROMWELL, CT 06416

SHEET TITLE:
ENLARGED EQUIPMENT LAYOUT PLANS

SHEET NO:
A-2

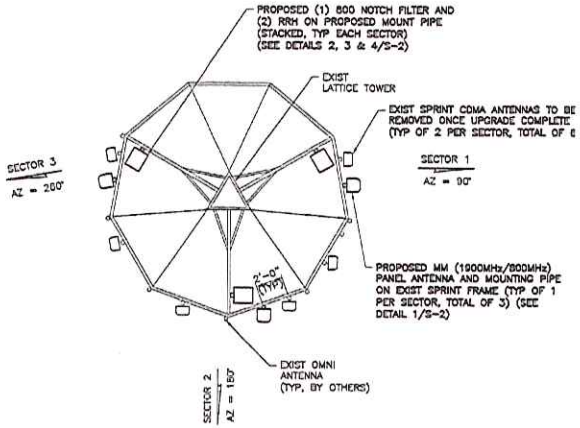
N

TRUE



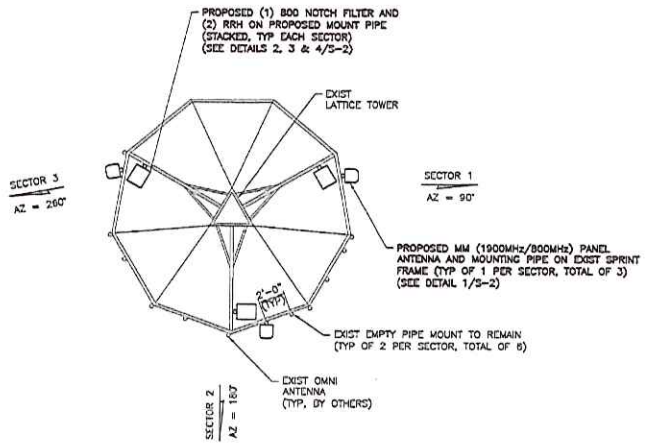
1 / A-3 ANTENNA LAYOUT PLAN (EXIST)

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



2 / A-3 ANTENNA LAYOUT PLAN (INTERIM)

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



3 / A-3 ANTENNA LAYOUT PLAN (FINAL)

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

THE PROPOSED INSTALLATION & EXISTING LATTICE TOWER SHALL BE ANALYZED BY URS CORPORATION (TO BE COORDINATED BY OTHERS).

Sprint
NETWORK VISION MAKES IT LAUNCH
1 INTERNATIONAL BLVD., SUITE 600
MAHWAH, NJ 07495
OFFICE:(201)684-4000
FAX:(201)648-4223

Alcatel·Lucent
1 RIDGEDALE ROAD
WESTBORO, MA 01886
TEL:(978) 952-1000

HPC
WIRELESS SERVICES

TECTONIC
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-3255
Fax: (845) 567-2703
www.tectonicengineering.com

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SUBMITTALS

PROJECT NO: 6316.60-931

NO	DATE	DESCRIPTION	BY
0	9/27/12	FOR COMMENT	SL
1	12/05/12	PER COMMENTS	MJR
2	01/10/13	PER COMMENTS	DAC

SEAL

SITE NUMBER:
CT60XC931

SITE NAME:
CROMWELL – RT. 372

SITE ADDRESS:
179 SHUNPIKE ROAD
CROMWELL, CT 06416

SHEET TITLE:
ANTENNA LAYOUT PLANS

SHEET NO:
A-3

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

Sprint Site ID: CT60XC931
T-Mobile Site ID: CT11059C
Site Name: Cromwell - Route 372
Site Address: 179 Shunpike Road
Cromwell, CT

prepared for

Sprint

1 International Blvd.
Suite 800
Mahwah, NJ. 07495

T-Mobile

Northeast Site Solutions/T-Mobile
54 Main Street
Sturbridge, MA 01566

prepared by

URS

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

36922436
HPC-060 Rev. 1

September 9, 2013

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis and reinforcement 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.

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove:		
(3) RFS APX16DWV-16DWVS-A20 Antennas		
(3) RFS APX16DWV-16DWV-S Antennas	**T-Mobile**	**@ 125'**
(3) Andrew Twin AWS TMA's	**(Existing)**	
(3) CDMA Antennas	**Sprint**	**@ 170'**
	(Existing)	
Install:		
(6) Ericsson AIR21 B4A/B2P Antennas	**T-Mobile**	**@ 125'**
(1) 1 5/8 Hybrid Cable	**(Existing)**	
(3) APXVSPP18-C-A20 Antennas	**Sprint**	
(6) RRH's mounted behind Antennas	**(Proposed)**	**@ 170'**
(3) 800MHz Filter		
(3) RFS HB114-1-0804-MSF Hybrid Cables		

The results of the analysis with modification indicates that the tower has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate once the modifications indicated on sheets SK-1 & SK-2 in Section 6 of this report are performed with the wind load classification specified above and the proposed antenna loading.**

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) Existing inventory taken from a tower mapping and inventory prepared by Northeast Towers, Inc performed on February 9, 2012.
5) Structural analysis performed by URS Corp, project number CFD-006 / 36922435 signed and sealed April 10, 2012.
6) Structural analysis performed by URS Corp, project number CFD-003 / 36924489 signed and sealed May 29, 2012.
7) Structural analysis performed by URS Corp., project number HPC-060 / 36922436 signed and sealed on April 11, 2013.
8) Structural analysis performed by URS Corp., project number VZ5-133 (Rev. 2) / 36922291.00000 signed and sealed on May 20, 2013.
9) Structural analysis and tower modification performed by URS Corp. project number CFD-007 / 36928659, signed and sealed July 8, 2013.
10) 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 APXVSPP18-C-A20 Antennas (6) RRU RRH's (3) 800 MHz Filters	**Sprint (Proposed)**	9 Arm Halo Mount	**170'**	**(3) RFS HB114-1-0804-MSF Hybrid Cables**
(1) Radiowaves HPD2-4.7 w/ Radome (1) Cambium PTP49600 Antenna	CFD (existing)	Leg Mounted	168'	(1) WB3176A – Copper Clad Outdoor Cable (2) 4' 1/2" Jumper Cables
(1) SU-RA-HP-2.4 (1' x 1' Antenna)	Town (existing)	9 Arm Halo Mount	168'	(1) 3/8"
(6) Decibel 950G65VTZE-M antennas	Sprint (existing)	9 Arm Halo Mount	168'	(6) 1 5/8"
(3) APXV18-206517S	Unknown (existing)	Leg Mount	159'-6"	(6) 1 5/8"
(1) Sinclair SC420-HF1LDF Omni	CFD (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"
(1) 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 (3) Andrew VHLP2.5 Dish (2.5 dia) (1) Andrew VHLP2 dish (2' dia) Gamma Sector	Clearwire (existing)	20' Platform	134'	(6) CAT 5 Cable (4) 1/2"
(6) Ericsson AIR21 B4A/B2P Antennas	**T-Mobile (Proposed)**	Same as Below	**125'**	**(1) 1 5/8" Hybrid Cable**
(3) Twin PCS TMA's	T-Mobile (existing)	(3) T-Frames	125'	(18) 1 5/8"
(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)

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(2) SWCP 2x5514 antennas, (1) BXA-70063-6CF-2 Antenna (Beta Sector) (6) SC-E 6014 Rev 2 antennas, (3) BXA-171063-12BF _2 antennas, (6) FD9R6004/2C-3L Diplexers	Verizon (existing)	(3) T-Frames (PiROD part #800093)	101'	(12) 1 5/8"
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	Pipe Mount	87'	(2) CAT 5
(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 modified 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 6.0. 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

Stresses on the tower structure and foundation were evaluated to compare with allowable stresses in accordance with AISC. The results of the analysis indicate that the calculated stresses on the structure with the proposed loading are within the allowable stresses. Additionally, the anchor bolts were found to be within the allowable limits.

TABLE 1: Tower Component Stress vs. Capacity Summary:

Component/ (Section No.)	Existing Component Size	Controlling Component/Elevation	Percent Capacity	Pass/Fail
Tower Leg (T8)	PiROD Truss Leg	Compression 40' – 60'	**97.1%**	**Pass**
Diagonal (T4)	L3x3x3/16	Compression 100' – 120'	**96.0%**	**Pass**
Top Girt (T2)	L3x3x3/16	Compression 140'-150'	**2.0%**	**Pass**
Bottom Girt (T1)	7/8" SR	Compression 150'-170'	**4.6%**	**Pass**
Mid Girt (T4)	L3x3x3/16	Compression 100'-120'	**30.1%**	**Pass**
Bolt Checks				
Anchor Bolts	(6) 1-1/4"	Tension	**84.0%**	**Pass**

TABLE 2: Foundation Summary

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments:
Drilled Concrete Caisson	Uplift	97.9%/2.04	**Pass**	Min. F.O.S of 2.0 req'd per IBC 2003 Section 3108.4.2

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicate that the modified tower structure has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate once the modifications indicated on sheets SK-1 & SK-2 in Section 6 of this report are performed with the wind load classification specified above and the proposed antenna loading.**

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

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

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.

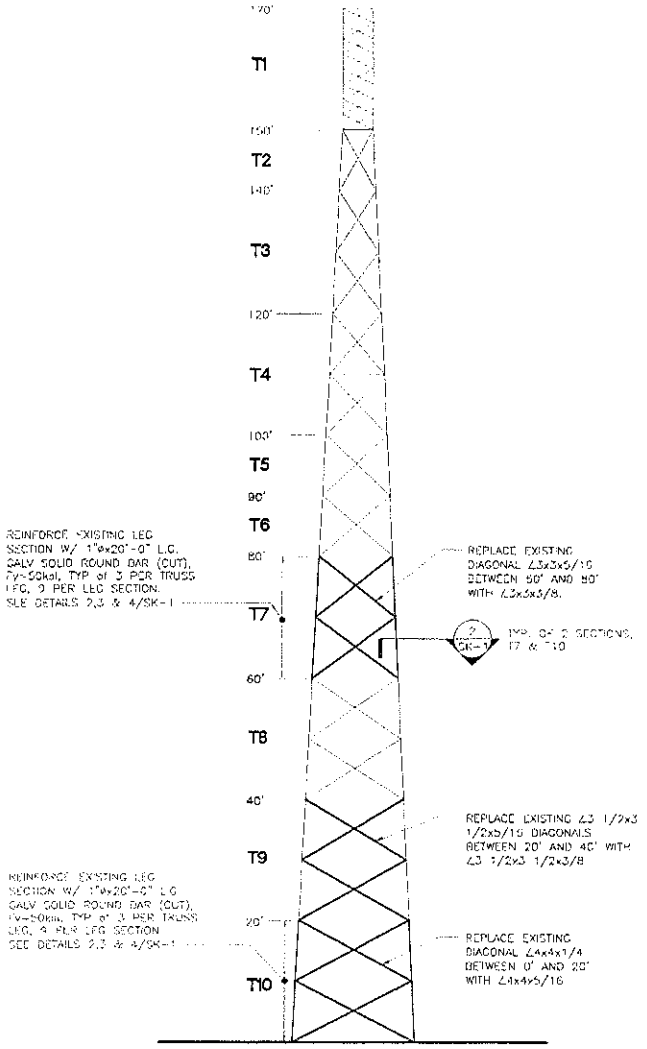
Ongoing and Periodic Inspection and Maintenance:

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.

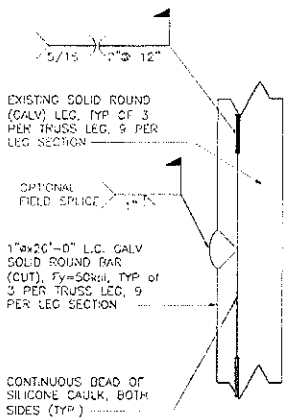
The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire 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

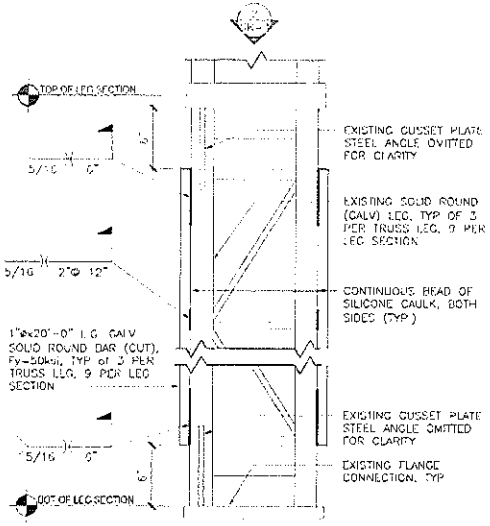
TOWER REINFORCEMEDNT DRAWING SK-1 & SK-2



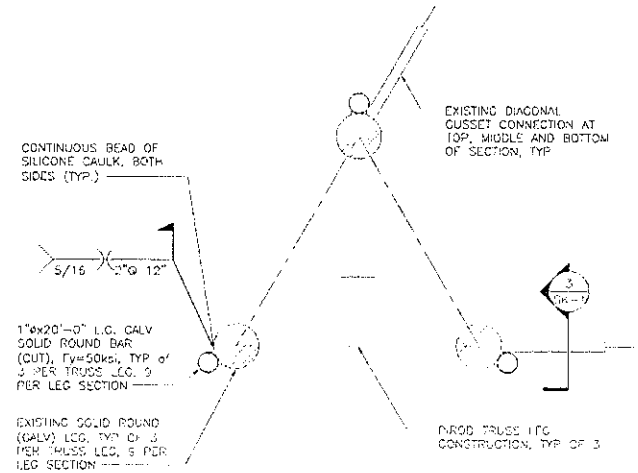
1 SK-1 **TOWER REINFORCEMENT**
SCALE: 1" = 10' 0"



4 SK-1 **SPLICE DETAIL**
SCALE: NTS



3 SK-1 **TRUSS LEG REINFORCEMENT**
SCALE: 1 1/2" = 1'-0"



2 SK-1 **TRUSS LEG REINFORCEMENT**
SCALE: NTS

ORS CORPORATION AES
500 ENTERPRISE DRIVE
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

Sprint
1 INTERNATIONAL BLVD
SUITE 800
MAHWAH, NJ 07495

T-Mobile
NORTHEAST SITE SOLUTIONS - MOBILE
54 MAIN STREET
STURBRIDGE, MA 01566

ORS PROJECT NUMBER: 36925004 (NPC-050)
DRAWN BY: MCD

NO.	DATE	ISSUED FOR
3	8/8/13	NPC-050 MOD

CT60XC931
CT11059C

179 SHUNPIKE ROAD
CROMWELL, CT

REINFORCEMENT DETAILS

SK-1

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 A572 GRADE 50
SOLID ROUND (S.R.)		ASTM A572 GRADE 50
PIPE COLUMNS		ASTM A53 GRADE B
TUBE COLUMNS	F=46 KSI	ASTM A500
BOLTS		ASTM 325-X (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-11030B, 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 REPLACEMENT OF TOWER MEMBERS SHALL BE DONE ONE AT A TIME AND SHALL BE DONE WITH LESS THAN 15 MPH WIND PRESENT. NO MEMBER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY.

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

NOTES:

1. ALL PROPOSED DIAGONAL MEMBERS SHALL BE INSTALLED WITH A325-X 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.

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

Sprint
1 INTERNATIONAL BLVD
SUITE 800
MAHWAH, NJ 07495

T-Mobile
NORTHEAST SITE SOLUTIONS/T-MOBILE
54 MAIN STREET
STURBRIDGE, MA 01566

RF ENGINEER

RFDS PROJECT NUMBER: 38926804 (MPC-060)
DRAWN BY: MCD

NO.	DATE	REVISION
0	8/29/13	MPC-060 MCD

RFDS APPROVED BY
DATE

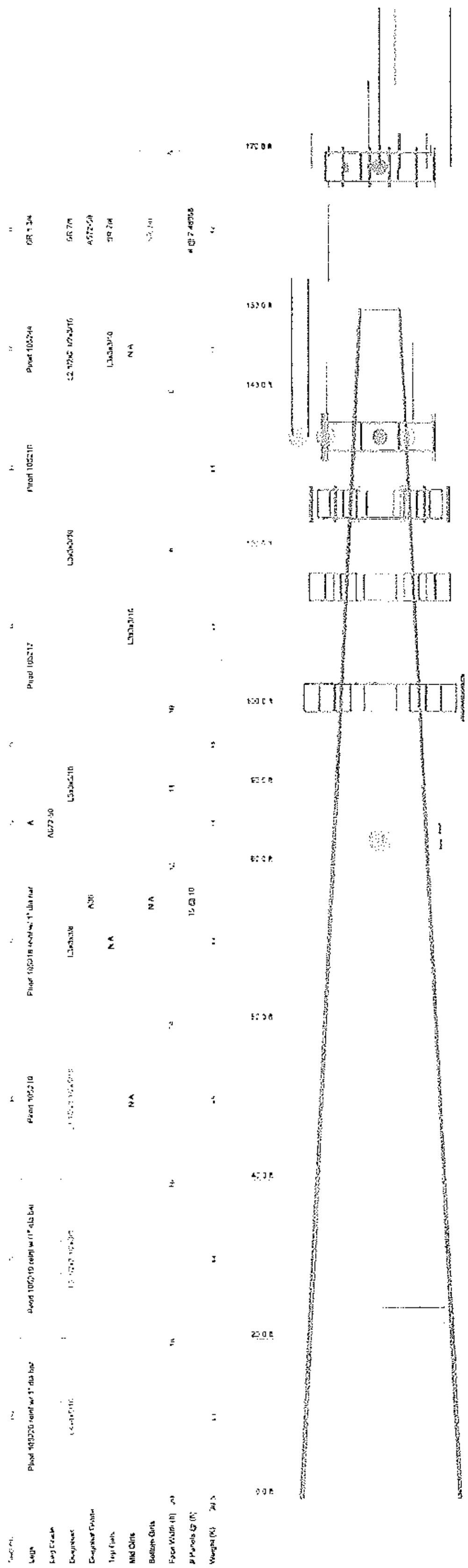
CT60XC931
CT11059C

179 SHUNPIKE ROAD
CROMWELL, CT

SHEET TITLE
REINFORCEMENT NOTES

SHEET NUMBER
SK-2

TNX TOWER INPUT/OUTPUT SUMMARY



MAX. CORNER REACTIONS AT BASE:
DOWN: 450 K
UPLIFT: -393 K
SHEAR: 52 K

AXIAL 90 K
SHEAR 78 K
MOMENT 7456 kip-ft
TORQUE 23 kip-ft
74 mph WIND - 0.5000 in ICE

AXIAL 53 K
SHEAR 65 K
MOMENT 6364 kip-ft
TORQUE 13 kip-ft
REACTIONS - 65 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
101-90-65-0-1 (Municipal)	181	Twin PCS TMA (T-Mobile)	125.5
15' Mount Pipe (Municipal)	179.75	Twin PCS TMA (T-Mobile)	125.5
3' Dia 20' Omni (Municipal)	178	PiROD 12' Lightweight T-Frame (T-Mobile)	125.5
2.5' x 20'6" Whip (Municipal)	175	PiROD 12' Lightweight T-Frame (T-Mobile)	125.5
2.5' x 14' Omni (Municipal)	175	PiROD 12' Lightweight T-Frame (T-Mobile)	125.5
2.5' x 14' Omni (Municipal)	175	(2) TMA (stacked) (ATT)	115
2.5' x 14' Omni (Municipal)	175	(2) TMA (stacked) (ATT)	115
1.5' x 12' Omni (Municipal)	174	(2) TMA (stacked) (ATT)	115
APXV18-209014-C-A20 (Sprint)	173	PiROD 12' Lightweight T-Frame (ATT)	115
APXV18-209014-C-A20 (Sprint)	173	(2) TMA (stacked) (ATT)	115
APXV18-209014-C-A20 (Sprint)	173	PiROD 12' Lightweight T-Frame (ATT)	115
(2) REMOTE RADIO HEAD (RRH) (Sprint)	173	7770.00 (ATT)	115
(2) REMOTE RADIO HEAD (RRH) (Sprint)	173	7770.00 (ATT)	115
(2) REMOTE RADIO HEAD (RRH) (Sprint)	173	7770.00 (ATT)	115
800 MHz Filter (Sprint)	170	7770.00 (ATT)	115
800 MHz Filter (Sprint)	170	7770.00 (ATT)	115
800 MHz Filter (Sprint)	170	7770.00 (ATT)	115
9 Arm Ring Mount (Municipal)	158	AM-X-CD-16-65-00T-RET (3) (ATT)	115
SU-RA-HP 24 Antenna (Municipal)	158	AM-X-CD-16-65-00T-RET (3) (ATT)	115
932DG65VTZE-M (Sprint)	158	AM-X-CD-16-65-00T-RET (3) (ATT)	115
932DG65VTZE-M (Sprint)	158	(2) REMOTE RADIO HEAD (RRH) (ATT)	115
932DG65VTZE-M (Sprint)	158	(2) REMOTE RADIO HEAD (RRH) (ATT)	115
932DG65VTZE-M (Sprint)	158	(2) REMOTE RADIO HEAD (RRH) (ATT)	115
932DG65VTZE-M (Sprint)	158	Surge Suppressor (ATT)	115
932DG65VTZE-M (Sprint)	158	(2) TMA (stacked) (ATT)	115
FT7-4-3520 (CPD)	158	PiROD 12' Lightweight T-Frame (ATT)	115
RFD24-7	158	(2) TMA (stacked) (ATT)	115
APXV18-206517S-C w/ mounting hardware	159.5	PiROD 12' Lightweight T-Frame (Verizon)	101
APXV18-206517S-C w/ mounting hardware	159.5	PiROD 12' Lightweight T-Frame (Verizon)	101
APXV18-206517S-C w/ mounting hardware	159.5	(2) Diplexer (Verizon)	101
ECA20-HF1-DF (Municipal)	155.5	(2) Diplexer (Verizon)	101
3' Dia 27' Omni (Municipal)	144	(2) Diplexer (Verizon)	101
3' Dia 27' Omni (Municipal)	144	SC-E 6014 rev2 (Verizon)	101
2.5' x 20'9" Whip (Municipal)	144	BXA-171063-12BF (Verizon)	101
2' Dia 15' Omni (Municipal)	141	SWCP 2x0514 (Verizon)	101
1.5' x 17' Omni (Municipal)	139	SC-E 6014 rev2 (Verizon)	101
9' Whip (Municipal)	138.5	SC-E 6014 rev2 (Verizon)	101
PiROD 23' Universal Platform (Municipal)	134	BXA-171063-12BF (Verizon)	101
Argus LLPX310R (Clearwire)	134	SC-E 6014 rev2 (Verizon)	101
Argus LLPX310R (Clearwire)	134	SC-E 6014 rev2 (Verizon)	101
Argus LLPX310R (Clearwire)	134	BXA-171063-12BF (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	BXA-70063-6CF (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	SWCP 2x0514 (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	SC-E 6014 rev2 (Verizon)	101
VHLP2.5-180 (Clearwire)	134	PiROD 12' Lightweight T-Frame (Verizon)	101
VHLP2.5-180 (Clearwire)	134	3'x2'x22" Panel	87
VHLP2.5-180 (Clearwire)	134	TMA	84.5
VHLP2-180 (Clearwire)	134	3' Stand-off	83.5
AIR B2A/B4P (T-Mobile)	125.5	3' Stand-off	83.5
AIR B2A/B4P (T-Mobile)	125.5	3' Dish	63
AIR B2A/B4P (T-Mobile)	125.5	TMA	81
AIR B2A/B4P (T-Mobile)	125.5	TMA	82.5
AIR B2A/B4P (T-Mobile)	125.5	3'x2'x22" Panel	80
AIR B2A/B4P (T-Mobile)	125.5	Camera	30
Twin PCS TMA (T-Mobile)	125.5	FC9118	26

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	Pirod 105217 (1 1/4" dia bar)		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	[illegible]	[illegible]	A36	[illegible]	[illegible]

TOWER DESIGN NOTES

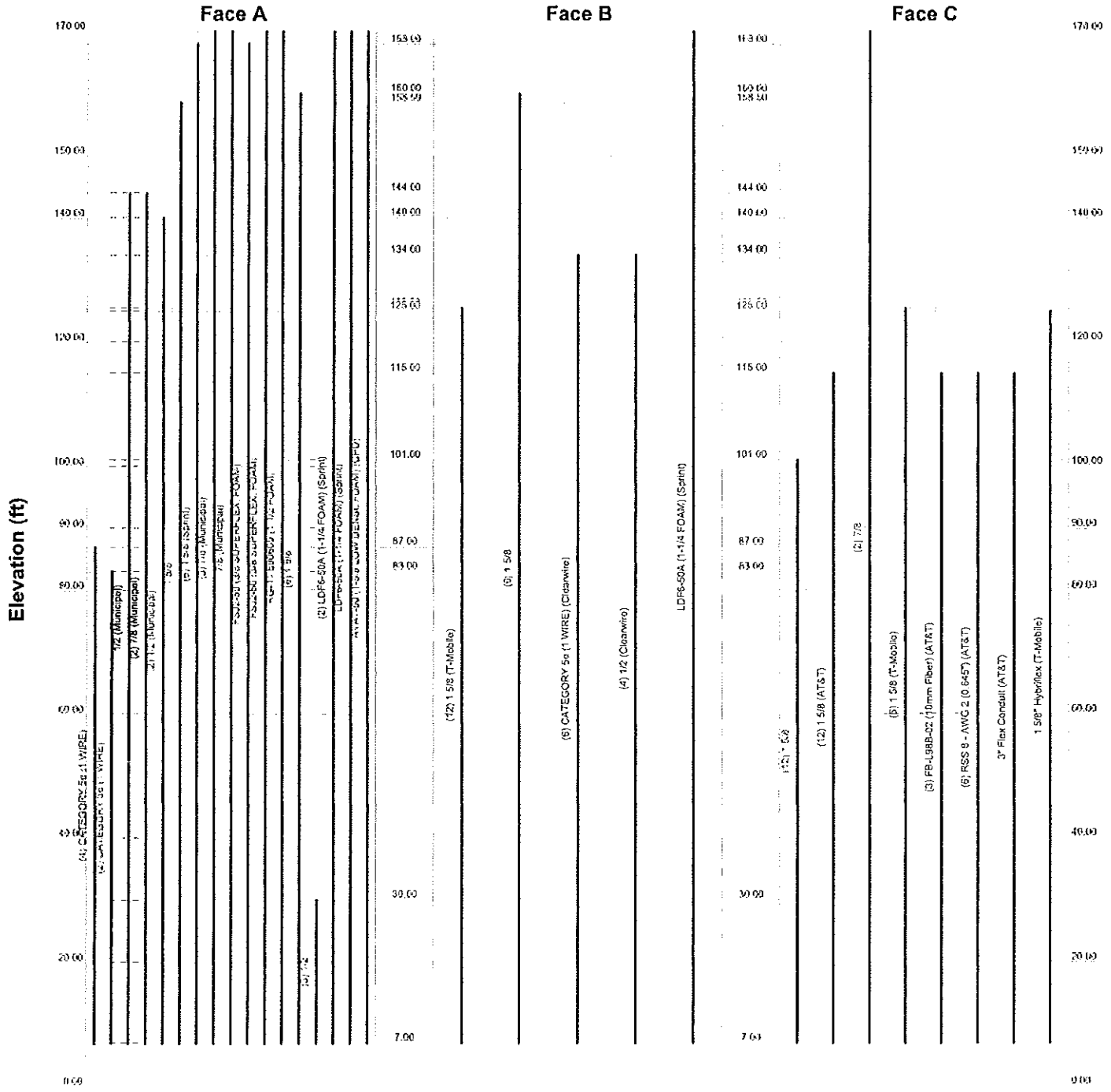
1. Tower designed for a 65 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, 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: 97.1%

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: **HPC-060 / Cromwell, CT Tower MOD** Client: Sprint / T-Mobile Drawn by: Michael_DeFekes App'd: Code: TIA/EIA-222-F Date: 03/09/13 Scale: NTS Path: Dwg No. E-1

TNX TOWER FEEDLINE DISTRIBUTION CHART

Feedline Distribution Chart
0' - 170'

Round Flat App In Face App Out Face Truss Leg



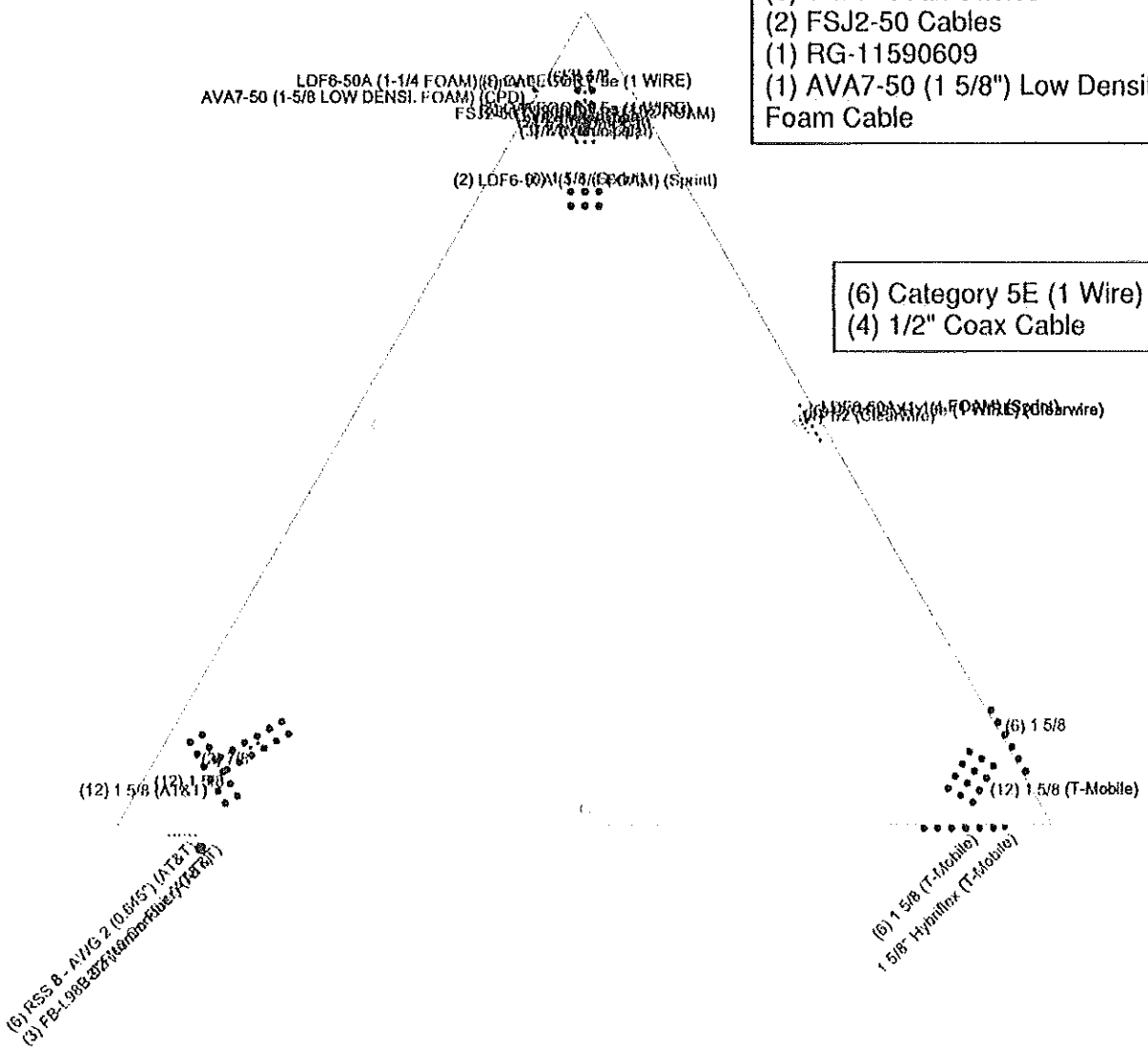
URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	Job: ***PiROD U20'-0"x170' Lattice Tower*** Project: ***HPC-060 / Cromwell, CT Tower MOD*** Client: Sprint / T-Mobile Drawn by: Michael Dalickas App'd: Code: TIA/EIA-222-F Date: 09/09/13 Scale: NTS Path: Dwg No. E-7

TNX TOWER FEEDLINE PLAN

Feedline Plan

Round Flat App In Face App Out Face Truss Leg

(6) Category 5E (1 Wire) Cables
(6) 7/8" Coax Cables
(4) 1/2" Coax Cables
(13) 1 5/8" Coax Cables
(3) 1 1/4" Coax Cables
(2) FSJ2-50 Cables
(1) RG-11590609
(1) AVA7-50 (1 5/8") Low Density Foam Cable



(6) RSS 8 - AWG 2 (0.645") Cables
(3) FB-L98B-02 (10mm Fiber) Cables
(1) 3" Flex Conduit
(24) 1 5/8" Coax Cables
(2) 7/8" Coax Cables

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

Site:	***PiROD U20'-0"x170' Lattice Tower***
Project:	***HPC-060 / Cromwell, CT Tower MOD***
Client: Sprint / T-Mobile	Drawn by: Michael Dalickas — App'd:
Code: TIA/EIA-222-F	Date: 09/09/13 — Scale: NTS
Path:	Dwg No: E-7

TNX TOWER DETAILED OUTPUT

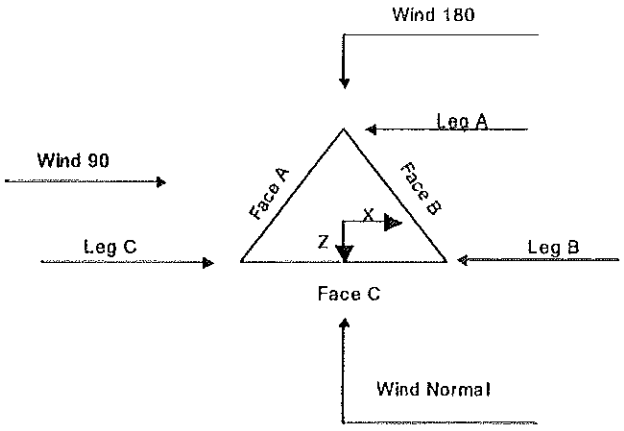
Tower Input Data

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, feedline 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		



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	L3x3x3/16	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_r	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	Legs	K Factors[1] X Brace Diags X	X Brace Diags Y	Single Diags X	Single Diags Y	Girts X	Girts Y	Horiz X	Horiz Y	Sec Horiz. X	Sec Horiz. Y	Inner Brace X	Inner Brace Y
T7	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
20.00-0.00				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	1	0.5	0.85	1	0.5	0.85
150.00-140.00						
T3	1	0.5	0.85	1	0.5	0.85
140.00-120.00						
T4	1	0.5	0.85	1	0.5	0.85
120.00-100.00						
T5	1	0.5	0.85	1	0.5	0.85
100.00-90.00						
T6	1	0.5	0.85	1	0.5	0.85
90.00-80.00						
T7	1	0.5	0.85	1	0.5	0.85
80.00-60.00						
T8	1	0.5	0.85	1	0.5	0.85
60.00-40.00						
T9	1	0.5	0.85	1	0.5	0.85
40.00-20.00						
T10	1	0.5	0.85	1	0.5	0.85
20.00-0.00						

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	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
170.00-150.00														

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	A	No	Ar (Leg)	87.00 - 7.00	0.0000	0.1	4	4	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	A	No	Ar (Leg)	83.00 - 7.00	0.0000	0.12	2	2	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
1 5/8	A	No	Ar (Leg)	158.50 - 7.00	0.0000	0.13	1	1	1.5000	1.9800		1.04
1 5/8 (Sprint)	A	No	Ar (Leg)	168.00 - 7.00	0.0000	0.2	6	2	1.5000	1.9800		1.04
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	B	Yes	Ar (CfAe)	160.00 - 7.00	0.0000	0.4	6	6	1.5000	1.9800		1.04
1 5/8	C	No	Ar (Leg)	101.00 - 7.00	0.0000	0.17	12	6	1.5000	1.9800		1.04
1 5/8 (AT&T)	C	No	Ar (Leg)	115.00 - 7.00	0.0000	0.12	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
1 5/8 (T-Mobile)	C	Yes	Ar (CfAe)	125.50 - 7.00	0.0000	-0.4	6	6	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
LDF6-50A (1-1/4 FOAM) (Sprint)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.2	2	2	1.5500	1.5500		0.66
LDF6-50A (1-1/4 FOAM) (Sprint)	B	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0	1	1	1.5500	1.5500		0.66
LDF6-50A (1-1/4 FOAM) (Sprint)	A	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0.4	1	1	1.5500	1.5500		0.66
AVA7-50 (1-5/8 LOW DENSI.	A	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0.38	1	1	1.5000	1.9800		0.72

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
FOAM) (CPD) 1 5/8" Hybriflex (T-Mobile)	C	Yes	Ar (CfAe)	125.00 - 7.00	0.0000	-0.45	1	1	1.5000	1.6250		0.21

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	170.00-150.00	A	50.341	0.000	0.000	0.000	0.30
		B	53.241	0.000	0.000	0.000	0.08
		C	3.700	0.000	0.000	0.000	0.02
T2	150.00-140.00	A	31.969	0.000	0.000	0.000	0.20
		B	38.369	0.000	0.000	0.000	0.07
		C	1.850	0.000	0.000	0.000	0.01
T3	140.00-120.00	A	68.672	0.000	0.000	0.000	0.43
		B	97.837	0.000	0.000	0.000	0.24
		C	16.480	0.000	0.000	0.000	0.06
T4	120.00-100.00	A	94.971	0.000	0.000	0.000	0.43
		B	119.551	0.000	0.000	0.000	0.43
		C	86.784	0.000	0.000	0.000	0.42
T5	100.00-90.00	A	67.210	0.000	0.000	0.000	0.21
		B	59.775	0.000	0.000	0.000	0.22
		C	64.794	0.000	0.000	0.000	0.37
T6	90.00-80.00	A	70.044	0.000	0.000	0.000	0.22
		B	62.609	0.000	0.000	0.000	0.22
		C	64.794	0.000	0.000	0.000	0.37
T7	80.00-60.00	A	144.420	0.000	0.000	0.000	0.45
		B	129.551	0.000	0.000	0.000	0.43
		C	129.588	0.000	0.000	0.000	0.75
T8	60.00-40.00	A	144.420	0.000	0.000	0.000	0.45
		B	129.551	0.000	0.000	0.000	0.43
		C	129.588	0.000	0.000	0.000	0.75
T9	40.00-20.00	A	145.870	0.000	0.000	0.000	0.46
		B	131.001	0.000	0.000	0.000	0.43
		C	129.588	0.000	0.000	0.000	0.75
T10	20.00-0.00	A	95.758	0.000	0.000	0.000	0.30
		B	86.093	0.000	0.000	0.000	0.28
		C	84.232	0.000	0.000	0.000	0.49

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
T1	170.00-150.00	A	0.500	71.366	3.517	0.000	0.000	0.80
		B		77.783	0.000	0.000	0.000	0.19
		C		3.517	3.517	0.000	0.000	0.07
T2	150.00-140.00	A	0.500	44.544	1.758	0.000	0.000	0.52
		B		55.203	0.000	0.000	0.000	0.17
		C		1.758	1.758	0.000	0.000	0.03
T3	140.00-120.00	A	0.500	99.455	3.517	0.000	0.000	1.13

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight K
		B		132.065	15.727	0.000	0.000	0.68
		C		19.922	3.517	0.000	0.000	0.16
T4	120.00-100.00	A	0.500	127.088	3.517	0.000	0.000	1.13
		B		152.617	22.467	0.000	0.000	1.20
		C		100.002	13.548	0.000	0.000	1.08
T5	100.00-90.00	A	0.500	84.269	1.758	0.000	0.000	0.57
		B		76.309	11.233	0.000	0.000	0.60
		C		72.192	8.446	0.000	0.000	0.94
T6	90.00-80.00	A	0.500	85.935	5.758	0.000	0.000	0.61
		B		77.975	15.233	0.000	0.000	0.60
		C		72.192	8.446	0.000	0.000	0.94
T7	80.00-60.00	A	0.500	175.204	16.850	0.000	0.000	1.29
		B		159.284	35.800	0.000	0.000	1.20
		C		144.384	16.891	0.000	0.000	1.88
T8	60.00-40.00	A	0.500	175.204	16.850	0.000	0.000	1.29
		B		159.284	35.800	0.000	0.000	1.20
		C		144.384	16.891	0.000	0.000	1.88
T9	40.00-20.00	A	0.500	178.454	16.850	0.000	0.000	1.32
		B		162.534	35.800	0.000	0.000	1.20
		C		144.384	16.891	0.000	0.000	1.88
T10	20.00-0.00	A	0.500	118.107	10.953	0.000	0.000	0.88
		B		107.760	23.270	0.000	0.000	0.78
		C		93.849	10.979	0.000	0.000	1.22

Feed Line Shielding

Section	Elevation ft	Face	A_R ft²	A_R Ice ft²	A_F ft²	A_F Ice ft²
T1	170.00-150.00	A	0.426	1.431	0.000	0.000
		B	0.904	2.973	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	150.00-140.00	A	0.000	0.198	0.328	0.513
		B	0.000	0.730	1.246	1.896
		C	0.000	0.000	0.000	0.000
T3	140.00-120.00	A	0.000	0.269	0.515	0.806
		B	0.000	1.573	2.807	4.720
		C	0.000	0.271	0.536	0.813
T4	120.00-100.00	A	0.000	0.268	0.514	0.805
		B	0.000	1.820	3.167	5.460
		C	0.000	1.544	2.846	4.631
T5	100.00-90.00	A	0.000	0.106	0.203	0.318
		B	0.000	0.719	1.251	2.157
		C	0.000	0.682	1.240	2.046
T6	90.00-80.00	A	0.000	0.102	0.195	0.305
		B	0.000	0.690	1.201	2.070
		C	0.000	0.655	1.190	1.964
T7	80.00-60.00	A	0.000	0.194	0.371	0.582
		B	0.000	1.315	2.288	3.944
		C	0.000	1.247	2.268	3.742
T8	60.00-40.00	A	0.000	0.185	0.413	0.646
		B	0.000	1.252	2.542	4.382
		C	0.000	1.188	2.520	4.158
T9	40.00-20.00	A	0.000	0.178	0.398	0.624
		B	0.000	1.209	2.454	4.230
		C	0.000	1.147	2.432	4.013

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T10	20.00-0.00	A	0.000	0.113	0.288	0.451
		B	0.000	0.765	1.775	3.060
		C	0.000	0.726	1.760	2.903

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	170.00-150.00	1.3324	-7.2845	1.3182	-6.8187
T2	150.00-140.00	1.9049	-5.9259	1.9386	-5.6571
T3	140.00-120.00	4.4527	-6.4949	4.2213	-6.5952
T4	120.00-100.00	3.6336	-1.2098	4.0419	-2.3544
T5	100.00-90.00	-0.2492	1.1393	1.1550	-0.5151
T6	90.00-80.00	-0.2466	0.4575	1.2266	-1.2953
T7	80.00-60.00	-0.2498	-0.0930	1.3587	-1.9306
T8	60.00-40.00	-0.3128	-0.1477	1.5068	-2.2240
T9	40.00-20.00	-0.3264	-0.4447	1.6868	-2.8982
T10	20.00-0.00	-0.3337	-0.6702	1.4855	-3.0289

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
PC9013N	A	From Leg	1.00 0.00 0.00	0.0000	24.00	No Ice 1/2" Ice	0.46 0.52	0.46 0.52	0.00 0.00
3"x2"x22" Panel	B	From Leg	2.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	0.65 0.81	0.47 0.61	0.05 0.05
TMA	B	From Leg	2.00 0.00 0.00	0.0000	82.50	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03
TMA	B	From Leg	2.00 0.00 0.00	0.0000	84.50	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03
3"x2"x22" Panel	B	From Leg	2.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice	0.65 0.81	0.47 0.61	0.05 0.05
3' Stand-off	B	From Leg	1.50 0.00 0.00	0.0000	83.50	No Ice 1/2" Ice	1.00 1.20	2.00 2.70	0.05 0.07
3' Stand-off	A	From Leg	1.50 0.00 0.00	0.0000	83.50	No Ice 1/2" Ice	1.00 1.20	2.00 2.70	0.05 0.07
TMA	A	From Leg	2.00 0.00	0.0000	83.00	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03

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						
SC-E 6014 rev2 (Verizon)	A	From Leg	4.00 6.00 0.00	0.0000	101.00	No Ice 1/2" Ice	3.55 3.89	3.34 3.68	0.02 0.04
BXA-171063-12BF (Verizon)	A	From Leg	4.00 0.00 0.00	0.0000	101.00	No Ice 1/2" Ice	4.73 5.18	3.57 4.01	0.02 0.04
SWCP 2x5514 (Verizon)	A	From Leg	4.00 -4.00 0.00	0.0000	101.00	No Ice 1/2" Ice	7.01 7.44	5.70 6.12	0.02 0.07
SC-E 6014 rev2 (Verizon)	A	From Leg	4.00 -6.00 0.00	0.0000	101.00	No Ice 1/2" Ice	3.55 3.89	3.34 3.68	0.02 0.04
SC-E 6014 rev2 (Verizon)	B	From Leg	4.00 6.00 0.00	0.0000	101.00	No Ice 1/2" Ice	3.55 3.89	3.34 3.68	0.02 0.04
BXA-171063-12BF (Verizon)	B	From Leg	4.00 0.00 0.00	0.0000	101.00	No Ice 1/2" Ice	4.73 5.18	3.57 4.01	0.02 0.04
SC-E 6014 rev2 (Verizon)	B	From Leg	4.00 -6.00 0.00	0.0000	101.00	No Ice 1/2" Ice	3.55 3.89	3.34 3.68	0.02 0.04
SC-E 6014 rev2 (Verizon)	C	From Leg	4.00 6.00 0.00	0.0000	101.00	No Ice 1/2" Ice	3.55 3.89	3.34 3.68	0.02 0.04
BXA-171063-12BF (Verizon)	C	From Leg	4.00 0.00 0.00	0.0000	101.00	No Ice 1/2" Ice	4.73 5.18	3.57 4.01	0.02 0.04
SWCP 2x5514 (Verizon)	C	From Leg	4.00 -4.00 0.00	0.0000	101.00	No Ice 1/2" Ice	7.01 7.44	5.70 6.12	0.02 0.07
SC-E 6014 rev2 (Verizon)	C	From Leg	4.00 -6.00 0.00	0.0000	101.00	No Ice 1/2" Ice	3.55 3.89	3.34 3.68	0.02 0.04
PiROD 12' Lightweight T-Frame (Verizon)	A	From Leg	2.00 0.00 0.00	0.0000	101.00	No Ice 1/2" Ice	10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T-Frame (Verizon)	B	From Leg	2.00 0.00 0.00	0.0000	101.00	No Ice 1/2" Ice	10.20 16.20	10.20 16.20	0.25 0.35
PiROD 12' Lightweight T-Frame (Verizon)	C	From Leg	2.00 0.00 0.00	0.0000	101.00	No Ice 1/2" Ice	10.20 16.20	10.20 16.20	0.25 0.35
(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 0.00	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)	B	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)	B	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)	C	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 Vert ft 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)	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						
PiROD 10' Lightweight	A	From Leg	2.00	0.0000	125.50	No Ice	9.30	9.30	0.25
T-Frame			0.00			1/2" Ice	14.50	14.50	0.34
(T-Mobile)			0.00						
PiROD 10' Lightweight	B	From Leg	2.00	0.0000	125.50	No Ice	9.30	9.30	0.25
T-Frame			0.00			1/2" Ice	14.50	14.50	0.34
(T-Mobile)			0.00						
PiROD 10' Lightweight	C	From Leg	2.00	0.0000	125.50	No Ice	9.30	9.30	0.25
T-Frame			0.00			1/2" Ice	14.50	14.50	0.34
(T-Mobile)			0.00						
3" Dia 20' Omni	C	From Face	6.00	0.0000	144.00	No Ice	6.00	6.00	0.06
(Municipal)			9.00			1/2" Ice	8.03	8.03	0.10
			0.00						
PiROD 20' Universal	C	None		0.0000	134.00	No Ice	33.10	33.10	2.27
Platform						1/2" Ice	47.10	47.10	2.70
(Municipal)									
3" Dia 20' Omni	A	From Face	6.00	0.0000	144.00	No Ice	6.00	6.00	0.06
(Municipal)			-9.00			1/2" Ice	8.03	8.03	0.10
			0.00						
9' Whip	A	From Face	6.00	0.0000	138.50	No Ice	5.85	5.85	0.12
(Municipal)			0.00			1/2" Ice	7.66	7.66	0.17
			0.00						
2.5" x 20'6" Whip	A	From Face	6.00	0.0000	144.00	No Ice	5.14	5.14	0.15
(Municipal)			9.00			1/2" Ice	7.24	7.24	0.19
			0.00						
2" Dia 15' Omni	B	From Face	6.00	0.0000	141.00	No Ice	3.20	3.20	0.04
(Municipal)			-5.00			1/2" Ice	4.83	4.83	0.06
			0.00						
1.5" x 10' Omni	B	From Face	6.00	0.0000	139.00	No Ice	1.50	1.50	0.06
(Municipal)			5.00			1/2" Ice	2.52	2.52	0.07
			0.00						
SC420-HF1LDF	A	From Face	6.00	0.0000	158.50	No Ice	2.14	2.14	0.02
(Municipal)			0.00			1/2" Ice	3.02	3.02	0.03
			0.00						
APXV18-206517S-C w/	A	From Leg	1.00	0.0000	159.50	No Ice	5.08	4.46	0.05
mounting hardware			0.00			1/2" Ice	5.53	5.39	0.09
			0.00						
APXV18-206517S-C w/	B	From Leg	1.00	0.0000	159.50	No Ice	5.08	4.46	0.05
mounting hardware			0.00			1/2" Ice	5.53	5.39	0.09
			0.00						
APXV18-206517S-C w/	C	From Leg	1.00	0.0000	159.50	No Ice	5.08	4.46	0.05
mounting hardware			0.00			1/2" Ice	5.53	5.39	0.09
			0.00						
9 Arm Halo Mount	C	None		0.0000	168.00	No Ice	62.60	62.60	3.60
(Municipal)						1/2" Ice	80.40	80.40	4.80

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
SU-RA-HP-2.4 Antenna	B	From Face	3.00	0.0000	168.00	No Ice	0.80	0.37	0.00
(Municipal)			2.50			1/2" Ice	0.93	0.47	0.01
			0.00						
950G65VTZE-M	B	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			1.25			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	B	From Leg	2.50	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			0.00			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	C	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			-1.25			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	C	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			1.25			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	C	From Leg	2.50	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			0.00			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	A	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			0.00			1/2" Ice	4.37	3.15	0.03
			0.00						
101-90-08-0-01	A	From Leg	2.50	0.0000	183.00	No Ice	3.33	3.33	0.04
(Municipal)			2.00			1/2" Ice	4.31	4.31	0.06
			0.00						
3" Dia 20' Omni	B	From Face	9.00	0.0000	178.00	No Ice	6.00	6.00	0.06
(Municipal)			0.00			1/2" Ice	8.03	8.03	0.10
			0.00						
2.5" x 20'6" Whip	C	From Face	0.00	0.0000	178.00	No Ice	5.14	5.14	0.15
(Municipal)			0.00			1/2" Ice	7.24	7.24	0.19
			0.00						
2.5" x 14' Omni	C	From Face	0.00	0.0000	175.00	No Ice	3.50	3.50	0.03
(Municipal)			0.00			1/2" Ice	4.93	4.93	0.06
			0.00						
2.5" x 14' Omni	C	From Face	0.00	0.0000	175.00	No Ice	3.50	3.50	0.03
(Municipal)			0.00			1/2" Ice	4.93	4.93	0.06
			0.00						
15' Mount Pipe	A	From Leg	2.50	0.0000	179.75	No Ice	4.50	4.50	0.09
(Municipal)			2.00			1/2" Ice	6.03	6.03	0.12
			0.00						
2.5" x 14' Omni	C	From Face	0.00	0.0000	175.00	No Ice	3.50	3.50	0.03
(Municipal)			0.00			1/2" Ice	4.93	4.93	0.06
			0.00						
1.5" x 12' Omni	A	From Face	2.50	0.0000	174.00	No Ice	1.50	1.50	0.06
(Municipal)			4.00			1/2" Ice	2.52	2.52	0.07
			0.00						
AIR B2A/B4P	A	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	B	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	C	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	A	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			-3.00			1/2" Ice	6.86	4.64	0.12
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
AIR B2A/B4P	B	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			-3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	C	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			-3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
Twin PCS TMA	A	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	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						
Argus LLPX310R	A	From Face	6.00	0.0000	134.00	No Ice	4.86	3.46	0.03
(Clearwire)			7.00			1/2" Ice	5.22	3.80	0.06
			0.00						
Argus LLPX310R	B	From Face	6.00	0.0000	134.00	No Ice	4.86	3.46	0.03
(Clearwire)			0.00			1/2" Ice	5.22	3.80	0.06
			0.00						
Argus LLPX310R	C	From Face	6.00	0.0000	134.00	No Ice	4.86	3.46	0.03
(Clearwire)			7.00			1/2" Ice	5.22	3.80	0.06
			0.00						
REMOTE RADIO HEAD	A	From Face	6.00	0.0000	134.00	No Ice	1.82	0.83	0.03
(RRH)			7.00			1/2" Ice	2.00	0.97	0.04
(Clearwire)			0.00						
REMOTE RADIO HEAD	B	From Face	6.00	0.0000	134.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(Clearwire)			0.00						
REMOTE RADIO HEAD	C	From Face	6.00	0.0000	134.00	No Ice	1.82	0.83	0.03
(RRH)			7.00			1/2" Ice	2.00	0.97	0.04
(Clearwire)			0.00						
7770.00	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						
7770.00	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						
7770.00	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						
7770.00	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						
7770.00	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						
7770.00	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						

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
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
(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						
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						
(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						
PTP49600	C	From Leg	2.00	0.0000	168.00	No Ice	2.04	0.53	0.01
(CPD)			0.00			1/2" Ice	2.24	0.65	0.02
			0.00						
APXV18-209014-C-A20	A	From Face	7.00	0.0000	170.00	No Ice	3.51	2.00	0.02
(Sprint)			-2.50			1/2" Ice	3.85	2.33	0.04
			0.00						
APXV18-209014-C-A20	B	From Face	7.00	0.0000	170.00	No Ice	3.51	2.00	0.02
(Sprint)			-2.50			1/2" Ice	3.85	2.33	0.04
			0.00						
APXV18-209014-C-A20	C	From Face	7.00	0.0000	170.00	No Ice	3.51	2.00	0.02
(Sprint)			-2.50			1/2" Ice	3.85	2.33	0.04
			0.00						
(2) REMOTE RADIO HEAD	A	From Face	6.00	0.0000	170.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(Sprint)			0.00						
(2) REMOTE RADIO HEAD	B	From Face	6.00	0.0000	170.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(Sprint)			0.00						
(2) REMOTE RADIO HEAD	C	From Face	6.00	0.0000	170.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(Sprint)			0.00						
800 MHz Filter	A	From Face	6.00	0.0000	170.00	No Ice	0.52	0.38	0.01
(Sprint)			0.00			1/2" Ice	0.65	0.50	0.01
			0.00						
800 MHz Filter	B	From Face	6.00	0.0000	170.00	No Ice	0.52	0.38	0.01
(Sprint)			0.00			1/2" Ice	0.65	0.50	0.01
			0.00						
800 MHz Filter	C	From Face	6.00	0.0000	170.00	No Ice	0.52	0.38	0.01
(Sprint)			0.00			1/2" Ice	0.65	0.50	0.01
			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
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						

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter		Aperture Area	Weight
				ft	°	°	ft	ft		ft^2	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	2.00	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	2697.7688	4300.8949	1.29	0.51	9.3673	14.9337	14.2843

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
w/ 1" dia bar							

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	62.782	5.833	9.29	0.000	0.000
170.00-150.00					B	0.000	65.204		8.95	0.000	0.000
					C	0.000	16.568		35.21	0.000	0.000
T2	145.00	1.526	28	66.055	A	5.148	43.874	11.905	24.28	0.000	0.000
150.00-140.00					B	4.229	50.274		21.84	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3	130.00	1.48	27	162.111	A	9.952	91.836	23.165	22.76	0.000	0.000
140.00-120.00					B	7.660	121.001		18.00	0.000	0.000
					C	9.931	39.645		46.72	0.000	0.000
T4	110.00	1.411	26	202.528	A	13.450	119.674	24.703	18.56	0.000	0.000
120.00-100.00					B	10.797	144.253		15.93	0.000	0.000
					C	11.118	111.486		20.15	0.000	0.000
T5	95.00	1.353	25	116.264	A	6.358	79.561	12.351	14.38	0.000	0.000
100.00-90.00					B	5.310	72.127		15.95	0.000	0.000
					C	5.321	77.145		14.98	0.000	0.000
T6 90.00-80.00	85.00	1.31	24	126.517	A	6.764	83.327	13.283	14.74	0.000	0.000
					B	5.758	75.892		16.27	0.000	0.000
					C	5.769	78.077		15.84	0.000	0.000
T7 80.00-60.00	70.00	1.24	23	283.450	A	14.773	172.545	28.124	15.01	0.000	0.000
					B	12.856	157.675		16.49	0.000	0.000
					C	12.876	157.712		16.49	0.000	0.000
T8 60.00-40.00	50.00	1.126	21	323.362	A	19.222	172.730	28.309	14.75	0.000	0.000
					B	17.092	157.860		16.18	0.000	0.000
					C	17.115	157.897		16.18	0.000	0.000
T9 40.00-20.00	30.00	1	18	363.756	A	21.262	175.677	29.807	15.14	0.000	0.000
					B	19.207	160.808		16.56	0.000	0.000
					C	19.229	159.395		16.69	0.000	0.000
T10 20.00-0.00	10.00	1	18	404.134	A	26.837	127.034	31.276	20.33	0.000	0.000
					B	25.350	117.369		21.91	0.000	0.000
					C	25.366	115.508		22.20	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.125$

Section Elevation	z	K_z	q_z	t_z	A_G	Face	A_F	A_R	A_{Leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
T1	160.00	1.57	22	0.5000	104.583	A	3.517	94.175	9.167	9.38	0.000	0.000
170.00-150.00						B	0.000	99.050		9.25	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	6.721	66.489	20.033	27.36	0.000	0.000

Section Elevation	z	K_z	q_z	t_z	A_G	Face	A_F	A_R	A_{Leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft²	e	ft²	ft²	ft²		ft²	ft²
150.00-140.00						B	3.579	76.615		24.98	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	13.177	141.599	38.924	25.15	0.000	0.000
140.00-120.00						B	21.474	172.905		20.02	0.000	0.000
						C	13.171	62.064		51.74	0.000	0.000
T4	110.00	1.411	20	0.5000	204.197	A	16.676	172.288	40.814	21.60	0.000	0.000
120.00-100.00						B	30.971	196.266		17.96	0.000	0.000
						C	22.881	143.927		24.47	0.000	0.000
T5 100.00-90.00	95.00	1.353	19	0.5000	117.098	A	8.001	106.756	20.407	17.78	0.000	0.000
						B	15.638	98.184		17.93	0.000	0.000
						C	12.961	94.104		19.06	0.000	0.000
T6 90.00-80.00	85.00	1.31	18	0.5000	127.351	A	12.412	109.762	21.609	17.69	0.000	0.000
						B	20.122	101.214		17.81	0.000	0.000
						C	13.441	95.465		19.84	0.000	0.000
T7 80.00-60.00	70.00	1.24	17	0.5000	285.119	A	31.412	225.361	45.303	17.64	0.000	0.000
						B	47.000	208.320		17.74	0.000	0.000
						C	28.294	193.488		20.43	0.000	0.000
T8 60.00-40.00	50.00	1.126	16	0.5000	325.031	A	35.838	226.333	45.704	17.43	0.000	0.000
						B	51.053	209.346		17.55	0.000	0.000
						C	32.368	194.510		20.14	0.000	0.000
T9 40.00-20.00	30.00	1	14	0.5000	365.425	A	37.887	232.248	47.784	17.69	0.000	0.000
						B	53.231	215.298		17.79	0.000	0.000
						C	34.539	197.210		20.62	0.000	0.000
T10 20.00-0.00	10.00	1	14	0.5000	405.803	A	37.626	174.638	49.862	23.49	0.000	0.000
						B	47.335	163.638		23.63	0.000	0.000
						C	35.201	149.767		26.96	0.000	0.000

Tower Pressure - Service

$G_H = 1.125$

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	ft²	e	ft²	ft²	ft²		ft²	ft²
T1	160.00	1.57	10	102.917	A	0.000	62.782	5.833	9.29	0.000	0.000
170.00-150.00					B	0.000	65.204		8.95	0.000	0.000
					C	0.000	16.568		35.21	0.000	0.000
T2	145.00	1.526	10	66.055	A	5.148	43.874	11.905	24.28	0.000	0.000
150.00-140.00					B	4.229	50.274		21.84	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3	130.00	1.48	9	162.111	A	9.952	91.836	23.165	22.76	0.000	0.000
140.00-120.00					B	7.660	121.001		18.00	0.000	0.000
					C	9.931	39.645		46.72	0.000	0.000
T4	110.00	1.411	9	202.528	A	13.450	119.674	24.703	18.56	0.000	0.000
120.00-100.00					B	10.797	144.253		15.93	0.000	0.000
					C	11.118	111.486		20.15	0.000	0.000
T5	95.00	1.353	9	116.264	A	6.358	79.561	12.351	14.38	0.000	0.000
100.00-90.00					B	5.310	72.127		15.95	0.000	0.000
					C	5.321	77.145		14.98	0.000	0.000
T6 90.00-80.00	85.00	1.31	8	126.517	A	6.764	83.327	13.283	14.74	0.000	0.000
					B	5.758	75.892		16.27	0.000	0.000
					C	5.769	78.077		15.84	0.000	0.000
T7 80.00-60.00	70.00	1.24	8	283.450	A	14.773	172.545	28.124	15.01	0.000	0.000
					B	12.856	157.675		16.49	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	12.876	157.712		16.49	0.000	0.000
T8 60.00-40.00	50.00	1.126	7	323.362	A	19.222	172.730	28.309	14.75	0.000	0.000
					B	17.092	157.860		16.18	0.000	0.000
					C	17.115	157.897		16.18	0.000	0.000
T9 40.00-20.00	30.00	1	6	363.756	A	21.262	175.677	29.807	15.14	0.000	0.000
					B	19.207	160.808		16.56	0.000	0.000
					C	19.229	159.395		16.69	0.000	0.000
T10 20.00-0.00	10.00	1	6	404.134	A	26.837	127.034	31.276	20.33	0.000	0.000
					B	25.350	117.369		21.91	0.000	0.000
					C	25.366	115.508		22.20	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	0.40	1.16	A	0.61	1.798	0.76	1	1	47.701	2.95	147.41	B
170.00-150.00			B	0.634	1.787	0.775	1	1	50.515			
			C	0.161	2.732	0.583	1	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	1	1	42.480	2.94	293.61	B
150.00-140.00			B	0.825	1.837	0.917	1	1	50.341			
			C	0.291	2.32	0.613	1	1	13.910			
T3	0.72	2.09	A	0.628	1.789	0.771	1	1	80.764	6.44	321.98	B
140.00-120.00			B	0.794	1.811	0.891	1	1	115.502			
			C	0.306	2.281	0.618	1	1	34.420			
T4	1.28	2.60	A	0.657	1.78	0.79	1	1	108.034	7.17	358.45	B
120.00-100.00			B	0.766	1.795	0.869	1	1	136.140			
			C	0.605	1.801	0.757	1	1	95.502			
T5	0.80	1.48	A	0.739	1.784	0.849	1	1	73.868	3.71	370.73	A
100.00-90.00			B	0.666	1.778	0.796	1	1	62.740			
			C	0.709	1.777	0.827	1	1	69.088			
T6	0.81	1.76	A	0.712	1.777	0.829	1	1	75.809	3.67	367.27	A
90.00-80.00			B	0.645	1.783	0.782	1	1	65.137			
			C	0.663	1.778	0.794	1	1	67.762			
T7	1.63	4.33	A	0.661	1.779	0.793	1	1	151.553	6.95	347.63	A
80.00-60.00			B	0.602	1.803	0.755	1	1	131.837			
			C	0.602	1.803	0.755	1	1	131.905			
T8	1.63	4.45	A	0.594	1.808	0.75	1	1	148.720	6.30	314.95	A
60.00-40.00			B	0.541	1.852	0.719	1	1	130.640			
			C	0.541	1.852	0.719	1	1	130.705			
T9	1.64	5.44	A	0.541	1.852	0.719	1	1	147.661	5.69	284.45	A
40.00-20.00			B	0.495	1.907	0.695	1	1	130.952			
			C	0.491	1.912	0.693	1	1	129.686			
T10	1.07	6.08	A	0.381	2.103	0.644	1	1	108.639	4.75	237.68	A
20.00-0.00			B	0.353	2.164	0.634	1	1	99.715			
			C	0.349	2.175	0.632	1	1	98.363			
Sum Weight:	10.27	30.51						OTM	4207.41 kip-ft	50.57		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl Face
ft	K	K							ft²	K	plf	
T1	0.40	1.16	A	0.61	1.798	0.76	0.825	1	47.701	2.95	147.41	B
170.00-150.00			B	0.634	1.787	0.775	0.825	1	50.515			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.825	1	41.579	2.89	289.29	B
150.00-140.00			B	0.825	1.837	0.917	0.825	1	49.601			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.72	2.09	A	0.628	1.789	0.771	0.825	1	79.023	6.36	318.25	B
140.00-120.00			B	0.794	1.811	0.891	0.825	1	114.161			
			C	0.306	2.281	0.618	0.825	1	32.682			
T4	1.28	2.60	A	0.657	1.78	0.79	0.825	1	105.680	7.07	353.48	B
120.00-100.00			B	0.766	1.795	0.869	0.825	1	134.251			
			C	0.605	1.801	0.757	0.825	1	93.557			
T5	0.80	1.48	A	0.739	1.784	0.849	0.825	1	72.755	3.65	365.15	A
100.00-90.00			B	0.666	1.778	0.796	0.825	1	61.811			
			C	0.709	1.777	0.827	0.825	1	68.157			
T6	0.81	1.76	A	0.712	1.777	0.829	0.825	1	74.625	3.62	361.54	A
90.00-80.00			B	0.645	1.783	0.782	0.825	1	64.129			
			C	0.663	1.778	0.794	0.825	1	66.752			
T7	1.63	4.33	A	0.661	1.779	0.793	0.825	1	148.968	6.83	341.70	A
80.00-60.00			B	0.602	1.803	0.755	0.825	1	129.587			
			C	0.602	1.803	0.755	0.825	1	129.651			
T8	1.63	4.45	A	0.594	1.808	0.75	0.825	1	145.356	6.16	307.83	A
60.00-40.00			B	0.541	1.852	0.719	0.825	1	127.648			
			C	0.541	1.852	0.719	0.825	1	127.710			
T9	1.64	5.44	A	0.541	1.852	0.719	0.825	1	143.940	5.55	277.28	A
40.00-20.00			B	0.495	1.907	0.695	0.825	1	127.591			
			C	0.491	1.912	0.693	0.825	1	126.321			
T10	1.07	6.08	A	0.381	2.103	0.644	0.825	1	103.942	4.55	227.41	A
20.00-0.00			B	0.353	2.164	0.634	0.825	1	95.279			
			C	0.349	2.175	0.632	0.825	1	93.924			
Sum Weight:	10.27	30.51						OTM	4148.53 kip-ft	49.63		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl Face
ft	K	K							ft²	K	plf	
T1	0.40	1.16	A	0.61	1.798	0.76	0.8	1	47.701	2.95	147.41	B
170.00-150.00			B	0.634	1.787	0.775	0.8	1	50.515			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.8	1	41.450	2.89	288.67	B
150.00-140.00			B	0.825	1.837	0.917	0.8	1	49.495			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.72	2.09	A	0.628	1.789	0.771	0.8	1	78.774	6.35	317.71	B
140.00-120.00			B	0.794	1.811	0.891	0.8	1	113.970			
			C	0.306	2.281	0.618	0.8	1	32.434			
T4	1.28	2.60	A	0.657	1.78	0.79	0.8	1	105.344	7.06	352.77	B
120.00-100.00			B	0.766	1.795	0.869	0.8	1	133.981			
			C	0.605	1.801	0.757	0.8	1	93.279			
T5	0.80	1.48	A	0.739	1.784	0.849	0.8	1	72.596	3.64	364.35	A
100.00-90.00			B	0.666	1.778	0.796	0.8	1	61.678			
			C	0.709	1.777	0.827	0.8	1	68.024			
T6	0.81	1.76	A	0.712	1.777	0.829	0.8	1	74.456	3.61	360.72	A
90.00-80.00			B	0.645	1.783	0.782	0.8	1	63.986			

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	0.663	1.778	0.794	0.8	1	66.608			
T7	1.63	4.33	A	0.661	1.779	0.793	0.8	1	148.599	6.82	340.85	A
80.00-60.00			B	0.602	1.803	0.755	0.8	1	129.266			
			C	0.602	1.803	0.755	0.8	1	129.329			
T8	1.63	4.45	A	0.594	1.808	0.75	0.8	1	144.875	6.14	306.81	A
60.00-40.00			B	0.541	1.852	0.719	0.8	1	127.221			
			C	0.541	1.852	0.719	0.8	1	127.282			
T9	1.64	5.44	A	0.541	1.852	0.719	0.8	1	143.408	5.53	276.26	A
40.00-20.00			B	0.495	1.907	0.695	0.8	1	127.111			
			C	0.491	1.912	0.693	0.8	1	125.840			
T10	1.07	6.08	A	0.381	2.103	0.644	0.8	1	103.271	4.52	225.94	A
20.00-0.00			B	0.353	2.164	0.634	0.8	1	94.645			
			C	0.349	2.175	0.632	0.8	1	93.290			
Sum Weight:	10.27	30.51						OTM	4140.12 kip-ft	49.49		

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	0.40	1.16	A	0.61	1.798	0.76	0.85	1	47.701	2.95	147.41	B
170.00-150.00			B	0.634	1.787	0.775	0.85	1	50.515			
			C	0.161	2.732	0.583	0.85	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.85	1	41.708	2.90	289.91	B
150.00-140.00			B	0.825	1.837	0.917	0.85	1	49.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.72	2.09	A	0.628	1.789	0.771	0.85	1	79.272	6.38	318.78	B
140.00-120.00			B	0.794	1.811	0.891	0.85	1	114.353			
			C	0.306	2.281	0.618	0.85	1	32.930			
T4	1.28	2.60	A	0.657	1.78	0.79	0.85	1	106.017	7.08	354.19	B
120.00-100.00			B	0.766	1.795	0.869	0.85	1	134.521			
			C	0.605	1.801	0.757	0.85	1	93.835			
T5	0.80	1.48	A	0.739	1.784	0.849	0.85	1	72.914	3.66	365.95	A
100.00-90.00			B	0.666	1.778	0.796	0.85	1	61.943			
			C	0.709	1.777	0.827	0.85	1	68.290			
T6	0.81	1.76	A	0.712	1.777	0.829	0.85	1	74.794	3.62	362.36	A
90.00-80.00			B	0.645	1.783	0.782	0.85	1	64.273			
			C	0.663	1.778	0.794	0.85	1	66.896			
T7	1.63	4.33	A	0.661	1.779	0.793	0.85	1	149.338	6.85	342.54	A
80.00-60.00			B	0.602	1.803	0.755	0.85	1	129.908			
			C	0.602	1.803	0.755	0.85	1	129.973			
T8	1.63	4.45	A	0.594	1.808	0.75	0.85	1	145.836	6.18	308.85	A
60.00-40.00			B	0.541	1.852	0.719	0.85	1	128.076			
			C	0.541	1.852	0.719	0.85	1	128.138			
T9	1.64	5.44	A	0.541	1.852	0.719	0.85	1	144.471	5.57	278.30	A
40.00-20.00			B	0.495	1.907	0.695	0.85	1	128.071			
			C	0.491	1.912	0.693	0.85	1	126.801			
T10	1.07	6.08	A	0.381	2.103	0.644	0.85	1	104.613	4.58	228.88	A
20.00-0.00			B	0.353	2.164	0.634	0.85	1	95.913			
			C	0.349	2.175	0.632	0.85	1	94.558			
Sum Weight:	10.27	30.51						OTM	4156.94 kip-ft	49.76		

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	1.06	1.49	A	0.934	1.976	1	1	1	97.692	4.85	242.43	B
170.00-150.00			B	0.947	1.998	1	1	1	99.050			
			C	0.299	2.299	0.616	1	1	20.604			
T2	0.73	1.64	A	1	2.1	1	1	1	73.210	3.19*	318.60	B
150.00-140.00			B	1	2.1	1	1	1	80.194			
			C	0.465	1.949	0.68	1	1	23.498			
T3	1.97	3.77	A	0.945	1.995	1	1	1	154.777	7.56*	378.07	B
140.00-120.00			B	1	2.1	1	1	1	194.378			
			C	0.459	1.958	0.678	1	1	55.227			
T4	3.41	4.44	A	0.925	1.962	1	1	1	188.964	8.99*	449.40	B
120.00-100.00			B	1	2.1	1	1	1	227.237			
			C	0.817	1.829	0.91	1	1	153.901			
T5	2.10	2.39	A	0.98	2.059	1	1	1	114.758	4.94*	494.28	A
100.00-90.00			B	0.972	2.044	1	1	1	113.821			
			C	0.914	1.945	0.996	1	1	106.720			
T6	2.15	2.70	A	0.959	2.02	1	1	1	122.173	5.05	504.63	A
90.00-80.00			B	0.953	2.008	1	1	1	121.336			
			C	0.855	1.867	0.943	1	1	103.462			
T7	4.37	6.30	A	0.901	1.925	0.984	1	1	253.085	9.42	471.11	A
80.00-60.00			B	0.895	1.918	0.979	1	1	250.939			
			C	0.778	1.801	0.879	1	1	198.288			
T8	4.37	6.58	A	0.807	1.821	0.902	1	1	239.948	7.68	383.84	A
60.00-40.00			B	0.801	1.817	0.897	1	1	238.907			
			C	0.698	1.776	0.818	1	1	191.573			
T9	4.40	7.67	A	0.739	1.784	0.849	1	1	234.995	6.54	327.07	B
40.00-20.00			B	0.735	1.782	0.845	1	1	235.243			
			C	0.634	1.787	0.775	1	1	187.400			
T10	2.88	8.52	A	0.523	1.872	0.71	1	1	161.538	4.77	238.73	B
20.00-0.00			B	0.52	1.875	0.708	1	1	163.165			
			C	0.456	1.964	0.676	1	1	136.437			
Sum Weight:	27.45	45.51			*$2A_g$ limit			OTM	5395.28 kip-ft	62.99		

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	1.06	1.49	A	0.934	1.976	1	0.825	1	97.076	4.85	242.43	B
170.00-150.00			B	0.947	1.998	1	0.825	1	99.050			
			C	0.299	2.299	0.616	0.825	1	19.988			
T2	0.73	1.64	A	1	2.1	1	0.825	1	72.033	3.19*	318.60	B
150.00-140.00			B	1	2.1	1	0.825	1	79.568			
			C	0.465	1.949	0.68	0.825	1	22.232			
T3	1.97	3.77	A	0.945	1.995	1	0.825	1	152.471	7.56*	378.07	B
140.00-120.00			B	1	2.1	1	0.825	1	190.620			
			C	0.459	1.958	0.678	0.825	1	52.922			
T4	3.41	4.44	A	0.925	1.962	1	0.825	1	186.046	8.99*	449.40	B
120.00-100.00			B	1	2.1	1	0.825	1	221.817			

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	0.817	1.829	0.91	0.825	1	149.897			
T5	2.10	2.39	A	0.98	2.059	1	0.825	1	113.358	4.93	492.69	A
100.00-90.00			B	0.972	2.044	1	0.825	1	111.085			
			C	0.914	1.945	0.996	0.825	1	104.452			
T6	2.15	2.70	A	0.959	2.02	1	0.825	1	120.001	4.96	495.65	A
90.00-80.00			B	0.953	2.008	1	0.825	1	117.814			
			C	0.855	1.867	0.943	0.825	1	101.109			
T7	4.37	6.30	A	0.901	1.925	0.984	0.825	1	247.588	9.22	460.88	A
80.00-60.00			B	0.895	1.918	0.979	0.825	1	242.714			
			C	0.778	1.801	0.879	0.825	1	193.336			
T8	4.37	6.58	A	0.807	1.821	0.902	0.825	1	233.677	7.48	373.81	A
60.00-40.00			B	0.801	1.817	0.897	0.825	1	229.973			
			C	0.698	1.776	0.818	0.825	1	185.908			
T9	4.40	7.67	A	0.739	1.784	0.849	0.825	1	228.365	6.35	317.75	A
40.00-20.00			B	0.735	1.782	0.845	0.825	1	225.927			
			C	0.634	1.787	0.775	0.825	1	181.356			
T10	2.88	8.52	A	0.523	1.872	0.71	0.825	1	154.954	4.53	226.61	B
20.00-0.00			B	0.52	1.875	0.708	0.825	1	154.881			
			C	0.456	1.964	0.676	0.825	1	130.277			
Sum Weight:	27.45	45.51			$^{*}2A_g$ limit			OTM	5353.77 kip-ft	62.05		

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	1.06	1.49	A	0.934	1.976	1	0.8	1	96.988	4.85	242.43	B
170.00-150.00			B	0.947	1.998	1	0.8	1	99.050			
			C	0.299	2.299	0.616	0.8	1	19.901			
T2	0.73	1.64	A	1	2.1	1	0.8	1	71.865	3.19*	318.60	B
150.00-140.00			B	1	2.1	1	0.8	1	79.478			
			C	0.465	1.949	0.68	0.8	1	22.051			
T3	1.97	3.77	A	0.945	1.995	1	0.8	1	152.141	7.56*	378.07	B
140.00-120.00			B	1	2.1	1	0.8	1	190.084			
			C	0.459	1.958	0.678	0.8	1	52.593			
T4	3.41	4.44	A	0.925	1.962	1	0.8	1	185.629	8.99*	449.40	B
120.00-100.00			B	1	2.1	1	0.8	1	221.043			
			C	0.817	1.829	0.91	0.8	1	149.325			
T5	2.10	2.39	A	0.98	2.059	1	0.8	1	113.157	4.92	491.82	A
100.00-90.00			B	0.972	2.044	1	0.8	1	110.694			
			C	0.914	1.945	0.996	0.8	1	104.128			
T6	2.15	2.70	A	0.959	2.02	1	0.8	1	119.691	4.94	494.37	A
90.00-80.00			B	0.953	2.008	1	0.8	1	117.311			
			C	0.855	1.867	0.943	0.8	1	100.773			
T7	4.37	6.30	A	0.901	1.925	0.984	0.8	1	246.803	9.19	459.42	A
80.00-60.00			B	0.895	1.918	0.979	0.8	1	241.539			
			C	0.778	1.801	0.879	0.8	1	192.629			
T8	4.37	6.58	A	0.807	1.821	0.902	0.8	1	232.781	7.45	372.38	A
60.00-40.00			B	0.801	1.817	0.897	0.8	1	228.696			
			C	0.698	1.776	0.818	0.8	1	185.099			
T9	4.40	7.67	A	0.739	1.784	0.849	0.8	1	227.418	6.33	316.43	A
40.00-20.00			B	0.735	1.782	0.845	0.8	1	224.597			
			C	0.634	1.787	0.775	0.8	1	180.493			
T10	2.88	8.52	A	0.523	1.872	0.71	0.8	1	154.013	4.50	224.89	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	0.52	1.875	0.708	0.8	1	153.698			
			C	0.456	1.964	0.676	0.8	1	129.397			
Sum Weight:	27.45	45.51			*2Ag limit			OTM	5347.24 kip-ft	61.91		

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	1.06	1.49	A	0.934	1.976	1	0.85	1	97.164	4.85	242.43	B
170.00-150.00			B	0.947	1.998	1	0.85	1	99.050			
			C	0.299	2.299	0.616	0.85	1	20.076			
T2	0.73	1.64	A	1	2.1	1	0.85	1	72.202	3.19*	318.60	B
150.00-140.00			B	1	2.1	1	0.85	1	79.657			
			C	0.465	1.949	0.68	0.85	1	22.413			
T3	1.97	3.77	A	0.945	1.995	1	0.85	1	152.800	7.56*	378.07	B
140.00-120.00			B	1	2.1	1	0.85	1	191.157			
			C	0.459	1.958	0.678	0.85	1	53.252			
T4	3.41	4.44	A	0.925	1.962	1	0.85	1	186.462	8.99*	449.40	B
120.00-100.00			B	1	2.1	1	0.85	1	222.592			
			C	0.817	1.829	0.91	0.85	1	150.469			
T5	2.10	2.39	A	0.98	2.059	1	0.85	1	113.558	4.94	493.56	A
100.00-90.00			B	0.972	2.044	1	0.85	1	111.476			
			C	0.914	1.945	0.996	0.85	1	104.776			
T6	2.15	2.70	A	0.959	2.02	1	0.85	1	120.312	4.97	496.94	A
90.00-80.00			B	0.953	2.008	1	0.85	1	118.318			
			C	0.855	1.867	0.943	0.85	1	101.445			
T7	4.37	6.30	A	0.901	1.925	0.984	0.85	1	248.373	9.25	462.34	A
80.00-60.00			B	0.895	1.918	0.979	0.85	1	243.889			
			C	0.778	1.801	0.879	0.85	1	194.044			
T8	4.37	6.58	A	0.807	1.821	0.902	0.85	1	234.573	7.50	375.24	A
60.00-40.00			B	0.801	1.817	0.897	0.85	1	231.249			
			C	0.698	1.776	0.818	0.85	1	186.717			
T9	4.40	7.67	A	0.739	1.784	0.849	0.85	1	229.312	6.38	319.07	A
40.00-20.00			B	0.735	1.782	0.845	0.85	1	227.258			
			C	0.634	1.787	0.775	0.85	1	182.219			
T10	2.88	8.52	A	0.523	1.872	0.71	0.85	1	155.894	4.57	228.34	B
20.00-0.00			B	0.52	1.875	0.708	0.85	1	156.065			
			C	0.456	1.964	0.676	0.85	1	131.157			
Sum Weight:	27.45	45.51			*2Ag limit			OTM	5360.30 kip-ft	62.19		

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	0.40	1.16	A	0.61	1.798	0.76	1	1	47.701	1.02	51.01	B

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	0.634	1.787	0.775	1	1	50.515			
			C	0.161	2.732	0.583	1	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	1	1	42.480	1.02	101.59	B
150.00-140.00			B	0.825	1.837	0.917	1	1	50.341			
			C	0.291	2.32	0.613	1	1	13.910			
T3	0.72	2.09	A	0.628	1.789	0.771	1	1	80.764	2.23	111.41	B
140.00-120.00			B	0.794	1.811	0.891	1	1	115.502			
			C	0.306	2.281	0.618	1	1	34.420			
T4	1.28	2.60	A	0.657	1.78	0.79	1	1	108.034	2.48	124.03	B
120.00-100.00			B	0.766	1.795	0.869	1	1	136.140			
			C	0.605	1.801	0.757	1	1	95.502			
T5	0.80	1.48	A	0.739	1.784	0.849	1	1	73.868	1.28	128.28	A
100.00-90.00			B	0.666	1.778	0.796	1	1	62.740			
			C	0.709	1.777	0.827	1	1	69.088			
T6	0.81	1.76	A	0.712	1.777	0.829	1	1	75.809	1.27	127.08	A
90.00-80.00			B	0.645	1.783	0.782	1	1	65.137			
			C	0.663	1.778	0.794	1	1	67.762			
T7	1.63	4.33	A	0.661	1.779	0.793	1	1	151.553	2.41	120.29	A
80.00-60.00			B	0.602	1.803	0.755	1	1	131.837			
			C	0.602	1.803	0.755	1	1	131.905			
T8	1.63	4.45	A	0.594	1.808	0.75	1	1	148.720	2.18	108.98	A
60.00-40.00			B	0.541	1.852	0.719	1	1	130.640			
			C	0.541	1.852	0.719	1	1	130.705			
T9	1.64	5.44	A	0.541	1.852	0.719	1	1	147.661	1.97	98.42	A
40.00-20.00			B	0.495	1.907	0.695	1	1	130.952			
			C	0.491	1.912	0.693	1	1	129.686			
T10	1.07	6.08	A	0.381	2.103	0.644	1	1	108.639	1.64	82.24	A
20.00-0.00			B	0.353	2.164	0.634	1	1	99.715			
			C	0.349	2.175	0.632	1	1	98.363			
Sum Weight:	10.27	30.51						OTM	1455.85 kip-ft	17.50		

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	0.40	1.16	A	0.61	1.798	0.76	0.825	1	47.701	1.02	51.01	B
170.00-150.00			B	0.634	1.787	0.775	0.825	1	50.515			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.825	1	41.579	1.00	100.10	B
150.00-140.00			B	0.825	1.837	0.917	0.825	1	49.601			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.72	2.09	A	0.628	1.789	0.771	0.825	1	79.023	2.20	110.12	B
140.00-120.00			B	0.794	1.811	0.891	0.825	1	114.161			
			C	0.306	2.281	0.618	0.825	1	32.682			
T4	1.28	2.60	A	0.657	1.78	0.79	0.825	1	105.680	2.45	122.31	B
120.00-100.00			B	0.766	1.795	0.869	0.825	1	134.251			
			C	0.605	1.801	0.757	0.825	1	93.557			
T5	0.80	1.48	A	0.739	1.784	0.849	0.825	1	72.755	1.26	126.35	A
100.00-90.00			B	0.666	1.778	0.796	0.825	1	61.811			
			C	0.709	1.777	0.827	0.825	1	68.157			
T6	0.81	1.76	A	0.712	1.777	0.829	0.825	1	74.625	1.25	125.10	A
90.00-80.00			B	0.645	1.783	0.782	0.825	1	64.129			
			C	0.663	1.778	0.794	0.825	1	66.752			

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	1.63	4.33	A	0.661	1.779	0.793	0.825	1	148.968	2.36	118.23	A
80.00-60.00			B	0.602	1.803	0.755	0.825	1	129.587			
			C	0.602	1.803	0.755	0.825	1	129.651			
T8	1.63	4.45	A	0.594	1.808	0.75	0.825	1	145.356	2.13	106.52	A
60.00-40.00			B	0.541	1.852	0.719	0.825	1	127.648			
			C	0.541	1.852	0.719	0.825	1	127.710			
T9	1.64	5.44	A	0.541	1.852	0.719	0.825	1	143.940	1.92	95.94	A
40.00-20.00			B	0.495	1.907	0.695	0.825	1	127.591			
			C	0.491	1.912	0.693	0.825	1	126.321			
T10	1.07	6.08	A	0.381	2.103	0.644	0.825	1	103.942	1.57	78.69	A
20.00-0.00			B	0.353	2.164	0.634	0.825	1	95.279			
			C	0.349	2.175	0.632	0.825	1	93.924			
Sum Weight:	10.27	30.51						OTM	1435.48 kip-ft	17.17		

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	0.40	1.16	A	0.61	1.798	0.76	0.8	1	47.701	1.02	51.01	B
170.00-150.00			B	0.634	1.787	0.775	0.8	1	50.515			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.8	1	41.450	1.00	99.89	B
150.00-140.00			B	0.825	1.837	0.917	0.8	1	49.495			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.72	2.09	A	0.628	1.789	0.771	0.8	1	78.774	2.20	109.93	B
140.00-120.00			B	0.794	1.811	0.891	0.8	1	113.970			
			C	0.306	2.281	0.618	0.8	1	32.434			
T4	1.28	2.60	A	0.657	1.78	0.79	0.8	1	105.344	2.44	122.06	B
120.00-100.00			B	0.766	1.795	0.869	0.8	1	133.981			
			C	0.605	1.801	0.757	0.8	1	93.279			
T5	0.80	1.48	A	0.739	1.784	0.849	0.8	1	72.596	1.26	126.07	A
100.00-90.00			B	0.666	1.778	0.796	0.8	1	61.678			
			C	0.709	1.777	0.827	0.8	1	68.024			
T6	0.81	1.76	A	0.712	1.777	0.829	0.8	1	74.456	1.25	124.82	A
90.00-80.00			B	0.645	1.783	0.782	0.8	1	63.986			
			C	0.663	1.778	0.794	0.8	1	66.608			
T7	1.63	4.33	A	0.661	1.779	0.793	0.8	1	148.599	2.36	117.94	A
80.00-60.00			B	0.602	1.803	0.755	0.8	1	129.266			
			C	0.602	1.803	0.755	0.8	1	129.329			
T8	1.63	4.45	A	0.594	1.808	0.75	0.8	1	144.875	2.12	106.16	A
60.00-40.00			B	0.541	1.852	0.719	0.8	1	127.221			
			C	0.541	1.852	0.719	0.8	1	127.282			
T9	1.64	5.44	A	0.541	1.852	0.719	0.8	1	143.408	1.91	95.59	A
40.00-20.00			B	0.495	1.907	0.695	0.8	1	127.111			
			C	0.491	1.912	0.693	0.8	1	125.840			
T10	1.07	6.08	A	0.381	2.103	0.644	0.8	1	103.271	1.56	78.18	A
20.00-0.00			B	0.353	2.164	0.634	0.8	1	94.645			
			C	0.349	2.175	0.632	0.8	1	93.290			
Sum Weight:	10.27	30.51						OTM	1432.57 kip-ft	17.13		

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	0.40	1.16	A	0.61	1.798	0.76	0.85	1	47.701	1.02	51.01	B
170.00-150.00			B	0.634	1.787	0.775	0.85	1	50.515			
			C	0.161	2.732	0.583	0.85	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.85	1	41.708	1.00	100.31	B
150.00-140.00			B	0.825	1.837	0.917	0.85	1	49.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.72	2.09	A	0.628	1.789	0.771	0.85	1	79.272	2.21	110.30	B
140.00-120.00			B	0.794	1.811	0.891	0.85	1	114.353			
			C	0.306	2.281	0.618	0.85	1	32.930			
T4	1.28	2.60	A	0.657	1.78	0.79	0.85	1	106.017	2.45	122.56	B
120.00-100.00			B	0.766	1.795	0.869	0.85	1	134.521			
			C	0.605	1.801	0.757	0.85	1	93.835			
T5	0.80	1.48	A	0.739	1.784	0.849	0.85	1	72.914	1.27	126.62	A
100.00-90.00			B	0.666	1.778	0.796	0.85	1	61.943			
			C	0.709	1.777	0.827	0.85	1	68.290			
T6	0.81	1.76	A	0.712	1.777	0.829	0.85	1	74.794	1.25	125.38	A
90.00-80.00			B	0.645	1.783	0.782	0.85	1	64.273			
			C	0.663	1.778	0.794	0.85	1	66.896			
T7	1.63	4.33	A	0.661	1.779	0.793	0.85	1	149.338	2.37	118.53	A
80.00-60.00			B	0.602	1.803	0.755	0.85	1	129.908			
			C	0.602	1.803	0.755	0.85	1	129.973			
T8	1.63	4.45	A	0.594	1.808	0.75	0.85	1	145.836	2.14	106.87	A
60.00-40.00			B	0.541	1.852	0.719	0.85	1	128.076			
			C	0.541	1.852	0.719	0.85	1	128.138			
T9	1.64	5.44	A	0.541	1.852	0.719	0.85	1	144.471	1.93	96.30	A
40.00-20.00			B	0.495	1.907	0.695	0.85	1	128.071			
			C	0.491	1.912	0.693	0.85	1	126.801			
T10	1.07	6.08	A	0.381	2.103	0.644	0.85	1	104.613	1.58	79.20	A
20.00-0.00			B	0.353	2.164	0.634	0.85	1	95.913			
			C	0.349	2.175	0.632	0.85	1	94.558			
Sum Weight:	10.27	30.51						OTM	1438.39 kip-ft	17.22		

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	10.77					
Total Member Self-Weight	30.51			-3.19	-0.23	
Total Weight	52.73			-3.19	-0.23	
Wind 0 deg - No Ice		-0.03	-66.24	-6320.60	1.91	0.02
Wind 30 deg - No Ice		32.62	-56.61	-5426.03	-3124.00	-6.21
Wind 45 deg - No Ice		46.30	-46.02	-4412.00	-4446.65	-8.16
Wind 60 deg - No Ice		56.64	-32.40	-3106.01	-5445.22	-9.43
Wind 90 deg - No Ice		65.46	0.23	24.99	-6276.05	-11.11
Wind 120 deg - No Ice		57.44	33.40	3179.32	-5484.67	-9.95
Wind 135 deg - No Ice		46.31	46.30	4428.72	-4447.53	-8.13
Wind 150 deg - No Ice		32.90	56.74	5425.74	-3161.19	-5.44

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 180 deg - No Ice		0.21	65.38	6270.38	-25.58	2.23
Wind 210 deg - No Ice		-32.71	56.66	5417.67	3138.89	6.45
Wind 225 deg - No Ice		-46.18	46.20	4418.30	4432.82	8.77
Wind 240 deg - No Ice		-57.32	33.29	3169.14	5470.84	11.29
Wind 270 deg - No Ice		-65.39	0.09	10.16	6266.11	13.34
Wind 300 deg - No Ice		-56.55	-32.58	-3127.08	5430.54	11.97
Wind 315 deg - No Ice		-46.24	-46.15	-4426.77	4435.11	9.88
Wind 330 deg - No Ice		-32.68	-56.68	-5433.35	3127.72	6.25
Member Ice	15.00					
Total Weight Ice	89.90			-8.37	-3.22	
Wind 0 deg - Ice		-0.02	-77.82	-7402.73	-1.84	7.32
Wind 30 deg - Ice		38.44	-66.66	-6378.41	-3675.42	-4.39
Wind 45 deg - Ice		54.47	-54.24	-5194.64	-5219.54	-9.45
Wind 60 deg - Ice		66.63	-38.23	-3664.13	-6391.37	-13.76
Wind 90 deg - Ice		77.05	0.18	13.88	-7369.77	-20.27
Wind 120 deg - Ice		67.45	39.13	3707.34	-6417.58	-21.56
Wind 135 deg - Ice		54.47	54.46	5195.55	-5219.87	-19.66
Wind 150 deg - Ice		38.66	66.75	6365.93	-3704.78	-16.32
Wind 180 deg - Ice		0.16	76.91	7356.57	-23.23	-5.43
Wind 210 deg - Ice		-38.51	66.70	6359.78	3681.38	4.58
Wind 225 deg - Ice		-54.37	54.39	5187.65	5202.45	9.95
Wind 240 deg - Ice		-67.36	39.05	3699.73	6400.73	15.33
Wind 270 deg - Ice		-76.99	0.07	2.63	7355.71	22.00
Wind 300 deg - Ice		-66.55	-38.37	-3680.46	6373.18	23.02
Wind 315 deg - Ice		-54.42	-54.34	-5206.02	5203.74	21.05
Wind 330 deg - Ice		-38.48	-66.71	-6383.96	3671.75	16.96
Total Weight	52.73			-3.19	-0.23	
Wind 0 deg - Service		-0.01	-22.92	-2191.37	1.67	0.01
Wind 30 deg - Service		11.29	-19.59	-1881.83	-1079.96	-2.15
Wind 45 deg - Service		16.02	-15.92	-1530.95	-1537.62	-2.82
Wind 60 deg - Service		19.60	-11.21	-1079.05	-1883.14	-3.26
Wind 90 deg - Service		22.65	0.08	4.34	-2170.63	-3.85
Wind 120 deg - Service		19.87	11.56	1095.80	-1896.80	-3.44
Wind 135 deg - Service		16.02	16.02	1528.12	-1537.92	-2.81
Wind 150 deg - Service		11.38	19.63	1873.11	-1092.82	-1.88
Wind 180 deg - Service		0.07	22.62	2165.37	-7.84	0.77
Wind 210 deg - Service		-11.32	19.61	1870.32	1087.14	2.23
Wind 225 deg - Service		-15.98	15.99	1524.51	1534.86	3.04
Wind 240 deg - Service		-19.83	11.52	1092.28	1894.04	3.91
Wind 270 deg - Service		-22.63	0.03	-0.79	2169.22	4.62
Wind 300 deg - Service		-19.57	-11.27	-1086.34	1880.09	4.14
Wind 315 deg - Service		-16.00	-15.97	-1536.06	1535.65	3.42
Wind 330 deg - Service		-11.31	-19.61	-1884.36	1083.27	2.16

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

Comb. No	Description
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	30.59	-0.37	0.26
			Max. Compression	19	-36.45	0.02	0.48
			Max. Mx	30	-35.39	0.39	-0.27
			Max. My	19	-36.45	0.02	0.48
			Max. Vy	30	-4.12	0.39	-0.27
			Max. Vx	19	-4.90	0.02	0.48
		Diagonal	Max Tension	34	3.98	0.00	0.00
			Max. Compression	34	-4.04	0.00	0.00
			Max. Mx	19	3.23	-0.00	0.00
			Max. My	33	-3.67	-0.00	0.00
			Max. Vy	19	0.01	-0.00	0.00

Section No	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	33	0.00	0.00	0.00
		Top Girt	Max Tension	21	0.02	0.00	0.00
			Max. Compression	32	-0.04	0.00	0.00
			Max. Mx	18	-0.02	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	22	0.15	0.00	0.00
			Max. Compression	19	-0.16	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
T2	150 - 140	Leg	Max Tension	22	36.47	-0.45	0.04
			Max. Compression	19	-43.02	2.92	0.23
			Max. Mx	22	35.93	-3.40	0.27
			Max. My	31	-4.37	-0.23	-4.03
			Max. Vy	27	0.61	-3.35	-0.27
			Max. Vx	31	0.82	-0.23	-4.03
		Diagonal	Max Tension	32	6.01	0.00	0.00
			Max. Compression	24	-6.58	0.00	0.00
			Max. Mx	22	4.42	0.05	0.00
			Max. My	33	-5.34	-0.02	-0.03
			Max. Vy	22	0.02	0.05	0.00
			Max. Vx	33	0.01	0.00	0.00
		Top Girt	Max Tension	22	0.42	0.00	0.00
			Max. Compression	19	-0.36	0.00	0.00
			Max. Mx	18	0.03	-0.02	0.00
			Max. My	31	0.03	0.00	0.00
			Max. Vy	18	-0.02	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	32	74.29	-3.66	-0.22
			Max. Compression	19	-88.00	3.11	-0.05
			Max. Mx	32	73.24	-3.90	-0.14
			Max. My	23	-8.84	-0.36	5.81
			Max. Vy	27	0.65	-3.61	-0.10
			Max. Vx	23	-0.73	-0.36	5.81
		Diagonal	Max Tension	28	9.38	0.00	0.00
			Max. Compression	29	-9.90	0.00	0.00
			Max. Mx	19	6.51	0.12	0.00
			Max. My	22	-6.98	-0.03	0.03
			Max. Vy	19	-0.03	0.12	0.00
			Max. Vx	22	-0.01	0.00	0.00
T4	120 - 100	Leg	Max Tension	22	123.12	-5.18	-0.00
			Max. Compression	19	-143.19	4.24	-0.05
			Max. Mx	19	-114.35	6.10	-0.02
			Max. My	31	-11.61	-0.43	-8.10
			Max. Vy	19	-0.89	6.10	-0.02
			Max. Vx	31	1.60	-0.43	-8.10
		Diagonal	Max Tension	33	11.92	0.00	0.00
			Max. Compression	25	-12.75	0.00	0.00
			Max. Mx	19	7.76	0.10	-0.01
			Max. My	33	-11.33	-0.03	-0.04
			Max. Vy	22	0.03	0.10	0.00
			Max. Vx	33	0.01	0.00	0.00
		Mid Girt	Max Tension	22	3.48	0.00	0.00
			Max. Compression	19	-2.77	0.00	0.00
			Max. Mx	22	3.48	-0.07	0.00
			Max. My	31	0.29	0.00	0.00
			Max. Vy	22	0.03	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T5	100 - 90	Leg	Max Tension	22	151.92	-5.08	0.16
			Max. Compression	19	-175.67	4.40	-0.01
			Max. Mx	22	151.92	-5.08	0.16
			Max. My	31	-12.86	-0.43	-8.10
			Max. Vy	32	-0.25	-5.08	-0.29
			Max. Vx	31	-0.54	-0.43	-8.10
		Diagonal	Max Tension	26	13.77	0.00	0.00
			Max. Compression	26	-14.14	0.00	0.00
			Max. Mx	19	10.70	0.18	-0.01
			Max. My	31	-7.12	0.04	-0.02
			Max. Vy	19	-0.05	0.18	-0.01
			Max. Vx	31	0.00	0.00	0.00
T6	90 - 80	Leg	Max Tension	22	181.44	-4.27	-0.04
			Max. Compression	19	-208.57	6.08	-0.04
			Max. Mx	24	-207.61	6.08	0.12
			Max. My	23	-14.78	0.02	4.72
			Max. Vy	27	0.45	-6.03	0.05
			Max. Vx	31	0.28	0.03	-4.72
		Diagonal	Max Tension	26	13.84	0.00	0.00
			Max. Compression	26	-14.20	0.00	0.00
			Max. Mx	19	10.99	0.15	-0.01
			Max. My	24	-0.59	0.08	0.02
			Max. Vy	19	-0.05	0.15	-0.01
			Max. Vx	24	0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	22	237.84	-5.21	-0.01
			Max. Compression	19	-272.12	5.78	-0.01
			Max. Mx	24	-238.83	6.08	0.12
			Max. My	20	-15.62	-0.09	-5.39
			Max. Vy	27	-0.25	-6.03	0.05
			Max. Vx	23	-0.22	-0.08	5.38
		Diagonal	Max Tension	26	14.95	0.00	0.00
			Max. Compression	26	-15.37	0.00	0.00
			Max. Mx	19	11.86	0.15	-0.01
			Max. My	32	-13.31	0.03	-0.02
			Max. Vy	22	0.05	0.15	0.01
			Max. Vx	32	0.00	0.00	0.00
T8	60 - 40	Leg	Max Tension	22	291.49	-5.31	-0.02
			Max. Compression	19	-333.64	5.84	-0.03
			Max. Mx	22	290.77	-7.34	0.03
			Max. My	20	-20.47	0.05	-6.29
			Max. Vy	32	0.33	-7.33	-0.08
			Max. Vx	23	-0.22	0.06	6.29
		Diagonal	Max Tension	26	15.42	0.00	0.00
			Max. Compression	26	-15.82	0.00	0.00
			Max. Mx	24	11.77	0.22	0.01
			Max. My	32	-13.64	0.02	-0.03
			Max. Vy	24	-0.06	0.22	0.01
			Max. Vx	32	0.00	0.00	0.00
T9	40 - 20	Leg	Max Tension	22	340.44	-3.43	-0.02
			Max. Compression	24	-393.52	0.11	-0.01
			Max. Mx	22	339.63	-11.99	-0.02
			Max. My	23	-21.98	-0.76	6.21
			Max. Vy	32	0.97	-11.98	0.00
			Max. Vx	23	0.27	2.47	6.10
		Diagonal	Max Tension	26	16.85	0.00	0.00
			Max. Compression	26	-16.46	0.00	0.00
			Max. Mx	24	12.00	0.23	0.02
			Max. My	32	-12.73	0.07	-0.03
			Max. Vy	22	0.08	0.22	0.02
			Max. Vx	32	0.00	0.00	0.00
T10	20 - 0	Leg	Max Tension	22	382.86	3.30	-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	24	-450.01	-0.00	-0.00
			Max. Mx	24	-418.77	15.85	0.00
			Max. My	23	-31.42	9.51	10.65
			Max. Vy	24	1.65	15.85	0.00
			Max. Vx	23	1.16	9.51	10.65
		Diagonal	Max Tension	33	20.64	0.00	0.00
			Max. Compression	26	-18.39	0.00	0.00
			Max. Mx	22	9.02	0.30	0.02
			Max. My	32	-16.89	0.14	-0.04
			Max. Vy	22	0.09	0.30	0.02
			Max. Vx	32	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	459.35	36.70	-21.71
	Max. H_x	30	459.35	36.70	-21.71
	Max. H_z	21	-383.47	-43.35	26.59
	Min. Vert	22	-397.97	-45.19	26.55
	Min. H_x	22	-397.97	-45.19	26.55
	Min. H_z	30	459.35	36.70	-21.71
Leg B	Max. Vert	24	460.42	-36.68	-21.91
	Max. H_x	32	-397.53	45.04	26.78
	Max. H_z	33	-383.01	43.17	26.88
	Min. Vert	32	-397.53	45.04	26.78
	Min. H_x	24	460.42	-36.68	-21.91
	Min. H_z	24	460.42	-36.68	-21.91
Leg A	Max. Vert	19	459.92	0.21	42.63
	Max. H_x	31	29.81	4.65	-5.01
	Max. H_z	19	459.92	0.21	42.63
	Min. Vert	27	-397.35	-0.16	-52.44
	Min. H_x	23	29.15	-4.59	-5.08
	Min. H_z	27	-397.35	-0.16	-52.44

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	52.67	0.00	0.00	-3.20	-0.23	-0.00
Dead+Wind 0 deg - No Ice	52.67	-0.03	-66.24	-6345.33	1.91	0.02
Dead+Wind 30 deg - No Ice	52.67	32.62	-56.61	-5447.36	-3136.24	-6.23
Dead+Wind 45 deg - No Ice	52.67	46.30	-46.02	-4429.38	-4464.09	-8.20
Dead+Wind 60 deg - No Ice	52.67	56.64	-32.40	-3118.28	-5466.59	-9.49
Dead+Wind 90 deg - No Ice	52.67	65.46	0.23	24.98	-6300.66	-11.20
Dead+Wind 120 deg - No Ice	52.67	57.44	33.40	3191.62	-5506.13	-10.02
Dead+Wind 135 deg - No Ice	52.67	46.31	46.30	4445.97	-4464.99	-8.17
Dead+Wind 150 deg - No Ice	52.67	32.90	56.74	5446.93	-3173.60	-5.46
Dead+Wind 180 deg - No Ice	52.67	0.21	65.38	6294.94	-25.66	2.23
Dead+Wind 210 deg - No Ice	52.67	-32.71	56.66	5438.83	3151.24	6.46
Dead+Wind 225 deg - No Ice	52.67	-46.18	46.20	4435.51	4450.25	8.81

Load Combination	Vertical	Shear$_x$	Shear$_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 240 deg - No Ice	52.67	-57.32	33.29	3181.40	5492.27	11.36
Dead+Wind 270 deg - No Ice	52.67	-65.39	0.09	10.09	6290.67	13.43
Dead+Wind 300 deg - No Ice	52.67	-56.55	-32.58	-3139.43	5451.84	12.04
Dead+Wind 315 deg - No Ice	52.67	-46.24	-46.15	-4444.19	4452.49	9.91
Dead+Wind 330 deg - No Ice	52.67	-32.68	-56.68	-5454.69	3139.96	6.27
Dead+Ice+Temp	89.84	-0.00	0.00	-8.43	-3.23	-0.00
Dead+Wind 0 deg+Ice+Temp	89.84	-0.02	-77.82	-7447.38	-1.89	7.35
Dead+Wind 30 deg+Ice+Temp	89.84	38.44	-66.66	-6417.03	-3697.63	-4.41
Dead+Wind 45 deg+Ice+Temp	89.84	54.47	-54.24	-5226.16	-5251.10	-9.52
Dead+Wind 60 deg+Ice+Temp	89.84	66.63	-38.23	-3686.45	-6430.04	-13.88
Dead+Wind 90 deg+Ice+Temp	89.84	77.05	0.18	13.74	-7414.31	-20.46
Dead+Wind 120 deg+Ice+Temp	89.84	67.45	39.13	3729.43	-6456.29	-21.71
Dead+Wind 135 deg+Ice+Temp	89.84	54.47	54.46	5226.73	-5251.47	-19.77
Dead+Wind 150 deg+Ice+Temp	89.84	38.66	66.75	6404.21	-3727.22	-16.39
Dead+Wind 180 deg+Ice+Temp	89.84	0.16	76.91	7400.96	-23.40	-5.46
Dead+Wind 210 deg+Ice+Temp	89.84	-38.51	66.70	6398.05	3703.64	4.60
Dead+Wind 225 deg+Ice+Temp	89.84	-54.37	54.39	5218.81	5233.92	10.01
Dead+Wind 240 deg+Ice+Temp	89.84	-67.36	39.05	3721.80	6439.32	15.45
Dead+Wind 270 deg+Ice+Temp	89.84	-76.99	0.07	2.42	7400.14	22.25
Dead+Wind 300 deg+Ice+Temp	89.84	-66.55	-38.37	-3702.91	6411.69	23.17
Dead+Wind 315 deg+Ice+Temp	89.84	-54.42	-54.34	-5237.63	5235.14	21.16
Dead+Wind 330 deg+Ice+Temp	89.84	-38.48	-66.71	-6422.62	3693.88	17.03
Dead+Wind 0 deg - Service	52.67	-0.01	-22.92	-2197.80	0.51	0.01
Dead+Wind 30 deg - Service	52.67	11.29	-19.59	-1887.06	-1085.38	-2.17
Dead+Wind 45 deg - Service	52.67	16.02	-15.92	-1534.80	-1544.86	-2.84
Dead+Wind 60 deg - Service	52.67	19.60	-11.21	-1081.12	-1891.75	-3.28
Dead+Wind 90 deg - Service	52.67	22.65	0.08	6.54	-2180.36	-3.86
Dead+Wind 120 deg - Service	52.67	19.87	11.56	1102.29	-1905.43	-3.47
Dead+Wind 135 deg - Service	52.67	16.02	16.02	1536.33	-1545.16	-2.84
Dead+Wind 150 deg - Service	52.67	11.38	19.63	1882.68	-1098.30	-1.90
Dead+Wind 180 deg - Service	52.67	0.07	22.62	2176.11	-9.03	0.77
Dead+Wind 210 deg - Service	52.67	-11.32	19.61	1879.88	1090.27	2.25
Dead+Wind 225 deg - Service	52.67	-15.98	15.99	1532.71	1539.77	3.06
Dead+Wind 240 deg - Service	52.67	-19.83	11.52	1098.76	1900.34	3.93
Dead+Wind 270 deg - Service	52.67	-22.63	0.03	1.39	2176.61	4.64
Dead+Wind 300 deg - Service	52.67	-19.57	-11.27	-1088.44	1886.35	4.17
Dead+Wind 315 deg - Service	52.67	-16.00	-15.97	-1539.93	1540.55	3.44
Dead+Wind 330 deg - Service	52.67	-11.31	-19.61	-1889.60	1086.37	2.18

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-52.67	0.00	0.00	52.67	0.00	0.000%
2	-0.03	-52.67	-66.24	0.03	52.67	66.24	0.000%
3	32.62	-52.67	-56.61	-32.62	52.67	56.61	0.000%
4	46.30	-52.67	-46.02	-46.30	52.67	46.02	0.000%
5	56.64	-52.67	-32.40	-56.64	52.67	32.40	0.000%
6	65.46	-52.67	0.23	-65.46	52.67	-0.23	0.000%
7	57.44	-52.67	33.40	-57.44	52.67	-33.40	0.000%
8	46.31	-52.67	46.30	-46.31	52.67	-46.30	0.000%
9	32.90	-52.67	56.74	-32.90	52.67	-56.74	0.000%
10	0.21	-52.67	65.38	-0.21	52.67	-65.38	0.000%
11	-32.71	-52.67	56.66	32.71	52.67	-56.66	0.000%
12	-46.18	-52.67	46.20	46.18	52.67	-46.20	0.000%
13	-57.32	-52.67	33.29	57.32	52.67	-33.29	0.000%
14	-65.39	-52.67	0.09	65.39	52.67	-0.09	0.000%

Load Comb	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
15	-56.55	-52.67	-32.58	56.55	52.67	32.58	0.000%
16	-46.24	-52.67	-46.15	46.24	52.67	46.15	0.000%
17	-32.68	-52.67	-56.68	32.68	52.67	56.68	0.000%
18	0.00	-89.84	0.00	0.00	89.84	-0.00	0.000%
19	-0.02	-89.84	-77.82	0.02	89.84	77.82	0.000%
20	38.44	-89.84	-66.66	-38.44	89.84	66.66	0.000%
21	54.47	-89.84	-54.24	-54.47	89.84	54.24	0.000%
22	66.63	-89.84	-38.23	-66.63	89.84	38.23	0.000%
23	77.05	-89.84	0.18	-77.05	89.84	-0.18	0.000%
24	67.45	-89.84	39.13	-67.45	89.84	-39.13	0.000%
25	54.47	-89.84	54.46	-54.47	89.84	-54.46	0.000%
26	38.66	-89.84	66.75	-38.66	89.84	-66.75	0.000%
27	0.16	-89.84	76.91	-0.16	89.84	-76.91	0.000%
28	-38.51	-89.84	66.70	38.51	89.84	-66.70	0.000%
29	-54.37	-89.84	54.39	54.37	89.84	-54.39	0.000%
30	-67.36	-89.84	39.05	67.36	89.84	-39.05	0.000%
31	-76.99	-89.84	0.07	76.99	89.84	-0.07	0.000%
32	-66.55	-89.84	-38.37	66.55	89.84	38.37	0.000%
33	-54.42	-89.84	-54.34	54.42	89.84	54.34	0.000%
34	-38.48	-89.84	-66.71	38.48	89.84	66.71	0.000%
35	-0.01	-52.67	-22.92	0.01	52.67	22.92	0.000%
36	11.29	-52.67	-19.59	-11.29	52.67	19.59	0.000%
37	16.02	-52.67	-15.92	-16.02	52.67	15.92	0.000%
38	19.60	-52.67	-11.21	-19.60	52.67	11.21	0.000%
39	22.65	-52.67	0.08	-22.65	52.67	-0.08	0.000%
40	19.87	-52.67	11.56	-19.87	52.67	-11.56	0.000%
41	16.02	-52.67	16.02	-16.02	52.67	-16.02	0.000%
42	11.38	-52.67	19.63	-11.38	52.67	-19.63	0.000%
43	0.07	-52.67	22.62	-0.07	52.67	-22.62	0.000%
44	-11.32	-52.67	19.61	11.32	52.67	-19.61	0.000%
45	-15.98	-52.67	15.99	15.98	52.67	-15.99	0.000%
46	-19.83	-52.67	11.52	19.83	52.67	-11.52	0.000%
47	-22.63	-52.67	0.03	22.63	52.67	-0.03	0.000%
48	-19.57	-52.67	-11.27	19.57	52.67	11.27	0.000%
49	-16.00	-52.67	-15.97	16.00	52.67	15.97	0.000%
50	-11.31	-52.67	-19.61	11.31	52.67	19.61	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	0.00000069
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	0.00000071
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	0.00000076
20	Yes	4	0.00000001	0.00000117
21	Yes	4	0.00000001	0.00000112
22	Yes	4	0.00000001	0.00000114
23	Yes	4	0.00000001	0.00000139
24	Yes	4	0.00000001	0.00000113
25	Yes	4	0.00000001	0.00000109
26	Yes	4	0.00000001	0.00000114
27	Yes	4	0.00000001	0.00000108
28	Yes	4	0.00000001	0.00000116
29	Yes	4	0.00000001	0.00000106
30	Yes	4	0.00000001	0.00000110
31	Yes	4	0.00000001	0.00000141
32	Yes	4	0.00000001	0.00000118
33	Yes	4	0.00000001	0.00000111
34	Yes	4	0.00000001	0.00000114
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	6.283	35	0.3482	0.0543
T2	150 - 140	4.837	35	0.3199	0.0462
T3	140 - 120	4.171	35	0.3001	0.0388
T4	120 - 100	2.987	35	0.2457	0.0223
T5	100 - 90	2.010	35	0.1960	0.0113
T6	90 - 80	1.614	35	0.1660	0.0088
T7	80 - 60	1.275	40	0.1437	0.0070
T8	60 - 40	0.718	40	0.1064	0.0044
T9	40 - 20	0.325	40	0.0643	0.0025
T10	20 - 0	0.096	40	0.0293	0.0012

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	6.283	0.3482	0.0543	97724
179.75	15' Mount Pipe	35	6.283	0.3482	0.0543	97724
178.00	3" Dia 20' Omni	35	6.283	0.3482	0.0543	97724
175.00	2.5" x 14' Omni	35	6.283	0.3482	0.0543	97724
174.00	1.5" x 12' Omni	35	6.283	0.3482	0.0543	97724
170.00	APXV18-209014-C-A20	35	6.283	0.3482	0.0543	97724
168.00	HPD2-4.7	35	6.135	0.3456	0.0537	97724
159.50	APXV18-206517S-C w/ mounting hardware	35	5.511	0.3344	0.0509	46535
158.50	SC420-HF1LDF	35	5.439	0.3330	0.0505	42489
144.00	3" Dia 20' Omni	35	4.431	0.3088	0.0420	24224
141.00	2" Dia 15' Omni	35	4.235	0.3024	0.0396	24100
139.00	1.5" x 10' Omni	35	4.107	0.2977	0.0380	24079
138.50	9' Whip	35	4.075	0.2965	0.0376	24086
134.00	VHLP2.5-180	35	3.795	0.2847	0.0338	24267
125.50	PiROD 10' Lightweight T-Frame	35	3.293	0.2607	0.0266	24683
115.00	(2) TMA (shielded)	35	2.722	0.2333	0.0188	22714
101.00	SC-E 6014 rev2	35	2.053	0.1988	0.0116	18370
87.00	3"x2"x22" Panel	35	1.507	0.1584	0.0082	23284
84.50	TMA	40	1.422	0.1528	0.0078	25684
83.50	3' Stand-off	40	1.388	0.1507	0.0076	26774
83.00	3' Dish	40	1.372	0.1496	0.0075	27327
82.50	TMA	40	1.355	0.1486	0.0074	27876
80.00	3"x2"x22" Panel	40	1.275	0.1437	0.0070	30198
30.00	Camera	40	0.190	0.0457	0.0018	29689
24.00	PC9013N	40	0.129	0.0356	0.0014	30164

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 150	20.862	22	1.1416	0.2054
T2	150 - 140	16.116	22	1.0548	0.1712
T3	140 - 120	13.915	22	0.9913	0.1400
T4	120 - 100	9.998	19	0.8152	0.0836
T5	100 - 90	6.759	24	0.6527	0.0456
T6	90 - 80	5.443	24	0.5543	0.0373
T7	80 - 60	4.306	24	0.4810	0.0305
T8	60 - 40	2.433	24	0.3578	0.0202
T9	40 - 20	1.103	24	0.2171	0.0118
T10	20 - 0	0.326	24	0.0991	0.0057

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	22	20.862	1.1416	0.2054	32921
179.75	15' Mount Pipe	22	20.862	1.1416	0.2054	32921
178.00	3" Dia 20' Omni	22	20.862	1.1416	0.2054	32921
175.00	2.5" x 14' Omni	22	20.862	1.1416	0.2054	32921

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
174.00	1.5" x 12' Omni	22	20.862	1.1416	0.2054	32921
170.00	APXV18-209014-C-A20	22	20.862	1.1416	0.2054	32921
168.00	HPD2-4.7	22	20.378	1.1339	0.2030	32921
159.50	APXV18-206517S-C w/ mounting hardware	22	18.334	1.0999	0.1912	15677
158.50	SC420-HF1LDF	22	18.096	1.0956	0.1895	14313
144.00	3" Dia 20' Omni	22	14.777	1.0195	0.1531	7578
141.00	2" Dia 15' Omni	22	14.128	0.9988	0.1433	7337
139.00	1.5" x 10' Omni	22	13.704	0.9836	0.1368	7267
138.50	9' Whip	22	13.599	0.9796	0.1352	7262
134.00	VHLP2.5-180	22	12.672	0.9415	0.1214	7330
125.50	PiROD 10' Lightweight T-Frame	19	11.010	0.8639	0.0976	7522
115.00	(2) TMA (shielded)	19	9.119	0.7751	0.0718	6960
101.00	SC-E 6014 rev2	24	6.902	0.6621	0.0468	5600
87.00	3"x2"x22" Panel	24	5.085	0.5294	0.0352	7157
84.50	TMA	24	4.798	0.5109	0.0334	7879
83.50	3' Stand-off	24	4.687	0.5040	0.0328	8206
83.00	3' Dish	24	4.631	0.5006	0.0324	8371
82.50	TMA	24	4.576	0.4972	0.0321	8535
80.00	3"x2"x22" Panel	24	4.306	0.4810	0.0305	9222
30.00	Camera	24	0.646	0.1544	0.0086	8775
24.00	PC9013N	24	0.438	0.1205	0.0068	8891

Bolt Design Data

Section No.	Elevation	Component Type	Bolt Grade	Bolt Size	Number Of Bolts	Maximum Load per Bolt	Allowable Load	Ratio Load / Allowable	Allowable Ratio	Criteria
	ft			in		K	K			
T1	170	Diagonal	A325N	0.6250	1	4.04	6.44	0.627 ✓	1.333	Bolt Shear
T2	150	Leg	A325N	1.0000	6	6.08	34.56	0.176 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6.01	9.52	0.632 ✓	1.333	Member Bearing
		Top Girt	A325N	1.0000	1	0.42	9.52	0.044 ✓	1.333	Member Bearing
T3	140	Leg	A325N	1.0000	6	9.02	34.56	0.261 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9.38	9.52	0.985 ✓	1.333	Member Bearing
T4	120	Leg	A325N	1.0000	6	16.25	34.56	0.470 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	11.92	9.52	1.253 ✓	1.333	Member Bearing
		Mid Girt	A325N	1.0000	1	3.48	9.52	0.365 ✓	1.333	Member Bearing
T5	100	Leg	A325N	1.0000	6	25.32	34.56	0.733 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	13.77	15.86	0.868 ✓	1.333	Member Bearing
T6	90	Leg	A325N	1.0000	6	30.24	34.56	0.875 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	13.84	15.86	0.873 ✓	1.333	Member Bearing
T7	80	Leg	A325N	1.0000	6	34.93	34.56	1.011 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	15.37	16.49	0.932 ✓	1.333	Bolt Shear
T8	60	Leg	A325N	1.2500	6	44.21	54.00	0.819 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	15.42	20.39	0.756 ✓	1.333	Member Bearing
T9	40	Leg	A325N	1.2500	6	52.95	54.00	0.981 ✓	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	1.2500	1	16.85	24.47	0.689 ✓	1.333	Member Bearing
T10	20	Diagonal	A325N	1.2500	1	20.64	20.39	1.012 ✓	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 P / P_a
T1	170 - 150	1 3/4	20.00	2.49	68.3 K=1.00	21.253	2.4053	-36.45	51.12	0.713 ✓
T2	150 - 140	Pirod 105244	10.02	10.02	45.4 K=1.00	25.051	3.6816	-43.02	92.23	0.466 ✓
T3	140 - 120	Pirod 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-88.00	92.23	0.954 ✓
T4	120 - 100	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-143.19	138.54	1.034 ✓
T5	100 - 90	Pirod 105217	10.02	10.02	37.8 K=1.00	26.132	5.3014	-175.68	138.54	1.268 ✓
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5 K=1.00	26.968	7.6570	-208.57	206.49	1.010 ✓
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6 K=1.00	27.439	9.9280	-272.12	272.41	0.999 ✓
T8	60 - 40	Pirod 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-333.64	257.78	1.294 ✓
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4 K=1.00	27.705	11.7803	-393.52	326.37	1.206 ✓
T10	20 - 0	Pirod 105220 reinf w/ 1" dia bar	20.03	10.02	24.3 K=1.00	27.824	14.2843	-450.01	397.44	1.132 ✓

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	0.88	2.24	0.394 ✓
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.74	2.23	0.334 ✓
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.61	2.26	0.711 ✓
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.54	2.26	0.239

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
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.45	2.30	0.196 ✓
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.25	2.33	0.106 ✓
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.33	4.69	0.071 ✓
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.176 ✓
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.72	4.75	0.361 ✓

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	-4.04	7.22	0.559 ✓
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	121.3 K=1.00	10.097	0.9020	-6.58	9.11	0.722 ✓
T3	140 - 120	L3x3x3/16	12.50	5.65	115.3 K=1.01	10.840	1.0900	-9.90	11.82	0.838 ✓
T4	120 - 100	L3x3x3/16	13.80	6.35	127.8 K=1.00	9.141	1.0900	-12.75	9.96	1.279 ✓
T5	100 - 90	L3x3x5/16	14.50	6.72	136.9 K=1.00	7.969	1.7800	-14.14	14.19	0.997 ✓
T6	90 - 80	L3x3x5/16	15.24	7.10	144.7 K=1.00	7.132	1.7800	-14.20	12.69	1.119 ✓
T7	80 - 60	L3x3x3/8	16.80	7.90	161.6 K=1.00	5.721	2.1100	-15.37	12.07	1.273 ✓
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.70	151.3 K=1.00	6.527	2.0900	-15.82	13.64	1.160 ✓
T9	40 - 20	L3 1/2x3 1/2x3/8	20.16	9.56	167.0 K=1.00	5.353	2.4800	-15.16	13.28	1.142 ✓
T10	20 - 0	L4x4x5/16	21.03	10.01	151.8 K=1.00	6.477	2.4000	-18.39	15.54	1.183 ✓

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	-0.04	2.58	0.014 ✓
T2	150 - 140	L3x3x3/16	5.00	4.48	105.1 K=1.17	12.131	1.0900	-0.36	13.22	0.027 ✓

Section No	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio P / P_a
	ft		ft	ft		ksi	in^2	K	K	

Bottom Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow P_a	Ratio P / P_a
	ft		ft	ft		ksi	in^2	K	K	
T1	170 - 150	7/8	5.00	4.85	186.4 K=0.70	4.298	0.6013	-0.16	2.58	0.061 ✓

Mid Girt Design Data (Compression)

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow P_a	Ratio P / P_a
	ft		ft	ft		ksi	in^2	K	K	
T4	120 - 100	L3x3x3/16	9.00	7.63	153.5 K=1.00	6.336	1.0900	-2.77	6.91	0.401 ✓

Tension Checks

Leg Design Data (Tension)

Section No	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio P / P_a
	ft		ft	ft		ksi	in^2	K	K	
T1	170 - 150	1 3/4	20.00	2.49	68.3	30.000	2.4053	30.59	72.16	0.424 ✓
T2	150 - 140	Pirod 105244	10.02	10.02	45.4	30.000	3.6816	36.47	110.45	0.330 ✓
T3	140 - 120	Pirod 105216	20.03	10.02	45.4	30.000	3.6816	74.29	110.45	0.673 ✓
T4	120 - 100	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	123.12	159.04	0.774 ✓
T5	100 - 90	Pirod 105217	10.02	10.02	37.8	30.000	5.3014	151.92	159.04	0.955 ✓
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5	30.000	7.6570	181.44	229.71	0.790 ✓
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6	30.000	9.9280	237.84	297.84	0.799 ✓
T8	60 - 40	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	291.49	282.74	1.031 ✓
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4	30.000	11.7803	340.44	353.41	0.963 ✓
T10	20 - 0	Pirod 105220 reinf w/ 1" dia	20.03	10.02	24.3	30.000	14.2843	382.86	428.53	0.893

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 $\frac{P}{P_a}$
		bar								✓

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	0.88	2.24	0.394 ✓
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.74	2.23	0.334 ✓
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.61	2.26	0.711 ✓
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.54	2.26	0.239 ✓
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.45	2.30	0.196 ✓
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.25	2.33	0.106 ✓
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.33	4.69	0.071 ✓
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.176 ✓
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.72	4.75	0.361 ✓

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	3.98	18.04	0.221 ✓
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	80.1	21.600	0.9020	6.01	19.48	0.308 ✓
T3	140 - 120	L3x3x3/16	12.50	5.65	74.6	21.600	1.0900	9.38	23.54	0.398 ✓
T4	120 - 100	L3x3x3/16	13.80	6.35	83.5	21.600	1.0900	11.92	23.54	0.506 ✓
T5	100 - 90	L3x3x5/16	14.50	6.72	89.9	21.600	1.7800	13.77	38.45	0.358 ✓
T6	90 - 80	L3x3x5/16	15.24	7.10	94.9	21.600	1.7800	13.84	38.45	0.360 ✓
T7	80 - 60	L3x3x3/8	16.80	7.90	106.3	21.600	2.1100	14.95	45.58	0.328 ✓
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.70	99.2	21.600	2.0900	15.42	45.14	0.342 ✓

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 $\frac{P}{P_a}$
T9	40 - 20	L3 1/2x3 1/2x3/8	20.16	9.56	109.8	21.600	2.4800	16.85	53.57	0.315
T10	20 - 0	L4x4x5/16	21.92	10.45	103.3	21.600	2.4000	20.64	51.84	0.398

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 $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.02	18.04	0.001
T2	150 - 140	L3x3x3/16	5.00	4.48	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 $\frac{P}{P_a}$
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 $\frac{P}{P_a}$
T4	120 - 100	L3x3x3/16	9.00	7.63	102.2	21.600	1.0900	3.48	23.54	0.148

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	-36.45	68.14	53.5	Pass
T2	150 - 140	Leg	Pirod 105244	60	-43.02	122.94	35.0	Pass
T3	140 - 120	Leg	Pirod 105216	72	-88.00	122.94	71.6	Pass
T4	120 - 100	Leg	Pirod 105217	87	-143.19	184.67	77.5	Pass
T5	100 - 90	Leg	Pirod 105217	105	-175.68	184.67	95.1	Pass
T6	90 - 80	Leg	Pirod 105217 reinf w/ 1" dia bar	114	-208.57	275.26	75.8	Pass
T7	80 - 60	Leg	Pirod 105218 reinf w/ 1" dia bar	123	-272.12	363.13	74.9	Pass

tnxTower	Job	Page
	PiROD U20'-0"x170' Lattice Tower	43 of 43
URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: 860-529-8882 FAX: 860-529-3991	Project HPC-060 / Cromwell, CT Tower MOD	Date 13:13:23 09/09/13
	Client Sprint / T-Mobile	Designed by Michael_Dalickas

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T8	60 - 40	Leg	Pirod 105219	138	-333.64	343.62	97.1	Pass
T9	40 - 20	Leg	Pirod 105219 reinf w /1" dia bar	152	-393.52	435.06	90.5	Pass
T10	20 - 0	Leg	Pirod 105220 reinf w/ 1" dia bar	167	-450.01	529.79	84.9	Pass
T1	170 - 150	Diagonal	7/8	13	-4.04	9.62	42.0	Pass
T2	150 - 140	Diagonal	L2 1/2x2 1/2x3/16	66	-6.58	12.14	54.2	Pass
T3	140 - 120	Diagonal	L3x3x3/16	78	-9.90	15.75	62.9	Pass
T4	120 - 100	Diagonal	L3x3x3/16	93	-12.75	13.28	96.0	Pass
T5	100 - 90	Diagonal	L3x3x5/16	108	-14.14	18.91	74.8	Pass
T6	90 - 80	Diagonal	L3x3x5/16	117	-14.20	16.92	83.9	Pass
T7	80 - 60	Diagonal	L3x3x3/8	126	-15.37	16.09	95.5	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x5/16	141	-15.82	18.18	87.0	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x3/8	156	-15.16	17.70	85.6	Pass
T10	20 - 0	Diagonal	L4x4x5/16	177	-18.39	20.72	88.8	Pass
T1	170 - 150	Top Girt	7/8	6	-0.04	3.45	1.0	Pass
T2	150 - 140	Top Girt	L3x3x3/16	61	-0.36	17.63	2.0	Pass
T1	170 - 150	Bottom Girt	7/8	7	-0.16	3.45	4.6	Pass
T4	120 - 100	Mid Girt	L3x3x3/16	88	-2.77	9.21	30.1	Pass
							Summary	
						Leg (T8)	97.1	Pass
						Diagonal (T4)	96.0	Pass
						Top Girt (T2)	2.0	Pass
						Bottom Girt (T1)	4.6	Pass
						Mid Girt (T4)	30.1	Pass
						Bolt Checks	94.0	Pass
						RATING =	**97.1**	**Pass**

ANCHOR BOLT EVALUATION

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift:= 398 kips	*user input*
Shear:	Shear := 53 kips	*user input*
Compression:	Compression := 460 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 ksi	*user input*	
Bolt Yield Strength:	Fy := 105 ksi	*user input*	
Bolt Modulus:	E := 29000 ksi	*user input*	
Thickness of Anchor Bolts	D := 1.25in	*user input*	
Threads per Inch:	n := 7	*user input*	
Coefficient of Friction:	μ := 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):

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

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

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

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 66.3 \cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.82$$

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

$$Condition1 = "OK"$$

Check Anchor Bolt Area:

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

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 4.9 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 1.7 \cdot in^2$$

Provided Area:

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

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed"\right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.84$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed"\right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.30$$

Condition3 = "OK"

FOUNDATION EVALUATION

FOUNDATION ANALYSIS

Input Data

Maximum Pier Reactions:

Compression: $C_t := 460\,kips$ *user input*

Uplift: $U_t := 398\,kips$ *user input*

Material Properties:

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

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

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

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

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

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

Depth Neglected for Skin Friction at Top: $Depthunbond := 4\,ft$ *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:

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

$TotalDownLoad = 607.9\,kips$

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

$PierWeight = 256.8 \cdot kips$

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

$SoilShear = 556.6 \cdot kips$

Compression Capacity:

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

$TotalDownLoadCapacity = 699.1 \cdot kips$

$CheckDownLoadCapacity := if(TotalDownLoad < TotalDownLoadCapacity, "Okay", "No Good")$

$CheckDownLoadCapacity = "Okay"$

Tension Capacity:

$TotalUpLiftCapacity := SoilShear + PierWeight$

$TotalUpLiftCapacity = 813.4 \cdot kips$

$CheckUpLiftCapacity := if(U_t < TotalUpLiftCapacity, "Okay", "No Good")$

$CheckUpLiftCapacity = "Okay"$

$$SafetyFactor_{provided} := \frac{TotalUpLiftCapacity}{U_t}$$

$SafetyFactor_{provided} = 2.04$

Check Cone Failure:

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

$ConeFailureCapacity = 2997.25 \cdot kips$

$CheckConeFailureCapacity := if(U_t < ConeFailureCapacity, "Okay", "No Good")$

$CheckConeFailureCapacity = "Okay"$

$$ConeSafetyFactor_{provided} := \frac{ConeFailureCapacity}{U_t}$$

$ConeSafetyFactor_{provided} = 7.53$

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

Sprint Existing Facility

Site ID: CT60XC931

Cromwell Rt 372
179 Shunpike Road
Cromwell, CT 06416

November 12, 2012

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

EBI Consulting
environmental | engineering | due diligence

November 12, 2012

Sprint
Attn: RF Engineering Manager
1 International Boulevard, Suite 800
Mahwah, NJ 07495

Re: Emissions Values for Site: **CT60XC931 – Cromwell Rt 372**

EBI Consulting was directed to analyze the proposed upgrades to the existing Sprint facility located at 179 Shunpike Road, Cromwell, CT, for the purpose of determining whether the emissions from the proposed Sprint equipment upgrades 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 μW/cm2 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 cellular band is approximately 567 $\mu W/cm^2$, and the general population exposure limit for the PCS band 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 upgrades to the existing Sprint 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. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario. Actual values seen from this site will be dramatically less than those shown in this report. 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 emissions were calculated using the following assumptions:

1) 4 CDMA Carriers (1900 MHz) were considered for each sector of the proposed installation.
2) 1 CDMA Carrier (850 MHz) was considered for each sector of the proposed installation
3) 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.
4) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The actual gain in this direction was used per the manufactures supplied specifications.
5) The antenna used in this modeling is the APXVSPP18-C-A20. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.9 dBd gain value at its main lobe at 1900 MHz and 13.4 dBd at its main lobe for 850 MHz. All calculations were performed assuming the main lobe of the antenna was focused at the base of the tower to present a worst case scenario.

6) The antenna mounting height centerline of the proposed antennas is **170 feet** above ground level (AGL)
7) 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 calculation were done with respect to uncontrolled / general public threshold limits

Site ID	CT60XC931 - Cromwell Rt 372
Site Addresss	179 Shunpike Road, Cromwell, CT, 06416
Site Type	Self Support Tower

Sector 1

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	4	80	15.9	170	164	1/2 "	0.5	0	2773.8948	37.07731	3.70773%
1a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	170	164	1/2 "	0.5	0	389.96892	5.212527	0.91932%
														Sector total Power Density Value:		4.627%	

Sector 2

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
2a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	4	80	15.9	170	164	1/2 "	0.5	0	2773.8948	37.07731	3.70773%
2a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	170	164	1/2 "	0.5	0	389.96892	5.212527	0.91932%
														Sector total Power Density Value:		4.627%	

Sector 3

Antenna Number	Antenna Make	Antenna Model	Radio Type	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
3a	RFS	APXVSPP18-C-A20	RRH	1900 MHz	CDMA / LTE	20	4	80	15.9	170	164	1/2 "	0.5	0	2773.8948	37.07731	3.70773%
3a	RFS	APXVSPP18-C-A20	RRH	850 MHz	CDMA / LTE	20	1	20	13.4	170	164	1/2 "	0.5	0	389.96892	5.212527	0.91932%
														Sector total Power Density Value:		4.627%	

Site Composite MPE %	
Carrier	MPE %
Sprint	13.881%
AT&T	6.930%
Pocket	2.660%
T-Mobile	5.820%
CR Fire	7.950%
Clearwire	1.040%
Verizon Wireless	20.040%
Total Site MPE %	58.321%

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Summary

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

The anticipated Maximum Composite contributions from the Sprint facility are **13.881 % (4.627 % from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously sampled at the ground level.

The anticipated composite MPE value for this site assuming all carriers present is **58.321 %** 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

EBI Consulting
21 B Street
Burlington, MA 01803

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

Sprint Site ID: CT60XC931
T-Mobile Site ID: CT11059C
Site Name: Cromwell - Route 372
Site Address: 179 Shunpike Road
Cromwell, CT

prepared for

Sprint

1 International Blvd.
Suite 800
Mahwah, NJ. 07495

T-Mobile

Northeast Site Solutions/T-Mobile
54 Main Street
Sturbridge, MA 01566

prepared by

URS

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

36922436
HPC-060 Rev. 1

September 9, 2013

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis and reinforcement 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.

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove:		
(3) RFS APX16DWV-16DWVS-A20 Antennas **(3) RFS APX16DWV-16DWV-S Antennas** **(3) Andrew Twin AWS TMA's**	**T-Mobile (Existing)**	**@ 125'**
(3) CDMA Antennas	**Sprint (Existing)**	**@ 170'**
Install:		
(6) Ericsson AIR21 B4A/B2P Antennas **(1) 1 5/8 Hybrid Cable**	**T-Mobile (Existing)**	**@ 125'**
(3) APXVSPP18-C-A20 Antennas **(6) RRH's mounted behind Antennas** **(3) 800MHz Filter** **(3) RFS HB114-1-0804-MSF Hybrid Cables**	**Sprint (Proposed)**	**@ 170'**

The results of the analysis with modification indicates that the tower has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate once the modifications indicated on sheets SK-1 & SK-2 in Section 6 of this report are performed with the wind load classification specified above and the proposed antenna loading.**

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) Existing inventory taken from a tower mapping and inventory prepared by Northeast Towers, Inc performed on February 9, 2012.
5) Structural analysis performed by URS Corp, project number CFD-006 / 36922435 signed and sealed April 10, 2012.
6) Structural analysis performed by URS Corp, project number CFD-003 / 36924489 signed and sealed May 29, 2012.
7) Structural analysis performed by URS Corp., project number HPC-060 / 36922436 signed and sealed on April 11, 2013.
8) Structural analysis performed by URS Corp., project number VZ5-133 (Rev. 2) / 36922291.00000 signed and sealed on May 20, 2013.
9) Structural analysis and tower modification performed by URS Corp. project number CFD-007 / 36928659, signed and sealed July 8, 2013.
10) 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 APXVSPP18-C-A20 Antennas (6) RRU RRH's (3) 800 MHz Filters	**Sprint (Proposed)**	9 Arm Halo Mount	**170'**	**(3) RFS HB114-1-0804-MSF Hybrid Cables**
(1) Radiowaves HPD2-4.7 w/ Radome (1) Cambium PTP49600 Antenna	CFD (existing)	Leg Mounted	168'	(1) WB3176A – Copper Clad Outdoor Cable (2) 4' 1/2" Jumper Cables
(1) SU-RA-HP-2.4 (1' x 1' Antenna)	Town (existing)	9 Arm Halo Mount	168'	(1) 3/8"
(6) Decibel 950G65VTZE-M antennas	Sprint (existing)	9 Arm Halo Mount	168'	(6) 1 5/8"
(3) APXV18-206517S	Unknown (existing)	Leg Mount	159'-6"	(6) 1 5/8"
(1) Sinclair SC420-HF1LDF Omni	CFD (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"
(1) 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 (3) Andrew VHLP2.5 Dish (2.5 dia) (1) Andrew VHLP2 dish (2' dia) Gamma Sector	Clearwire (existing)	20' Platform	134'	(6) CAT 5 Cable (4) 1/2"
(6) Ericsson AIR21 B4A/B2P Antennas	**T-Mobile (Proposed)**	Same as Below	**125'**	**(1) 1 5/8" Hybrid Cable**
(3) Twin PCS TMA's	T-Mobile (existing)	(3) T-Frames	125'	(18) 1 5/8"
(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)

Antenna Type	Carrier	Mount	Antenna Centerline Elevation	Cable
(2) SWCP 2x5514 antennas, (1) BXA-70063-6CF-2 Antenna (Beta Sector) (6) SC-E 6014 Rev 2 antennas, (3) BXA-171063-12BF _2 antennas, (6) FD9R6004/2C-3L Diplexers	Verizon (existing)	(3) T-Frames (PiROD part #800093)	101'	(12) 1 5/8"
(1) 3" x 2" x 22" Panel (1) TMA	AT&T (existing)	Pipe Mount	87'	(2) CAT 5
(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 modified 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 6.0. 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

Stresses on the tower structure and foundation were evaluated to compare with allowable stresses in accordance with AISC. The results of the analysis indicate that the calculated stresses on the structure with the proposed loading are within the allowable stresses. Additionally, the anchor bolts were found to be within the allowable limits.

TABLE 1: Tower Component Stress vs. Capacity Summary:

Component/ (Section No.)	Existing Component Size	Controlling Component/Elevation	Percent Capacity	Pass/Fail
Tower Leg (T8)	PiROD Truss Leg	Compression 40' – 60'	**97.1%**	**Pass**
Diagonal (T4)	L3x3x3/16	Compression 100' – 120'	**96.0%**	**Pass**
Top Girt (T2)	L3x3x3/16	Compression 140'-150'	**2.0%**	**Pass**
Bottom Girt (T1)	7/8" SR	Compression 150'-170'	**4.6%**	**Pass**
Mid Girt (T4)	L3x3x3/16	Compression 100'-120'	**30.1%**	**Pass**
Bolt Checks				
Anchor Bolts	(6) 1-1/4"	Tension	**84.0%**	**Pass**

TABLE 2: Foundation Summary

Foundation	Component	Stress (% capacity/FOS)	Pass/Fail	Comments:
Drilled Concrete Caisson	Uplift	97.9%/2.04	**Pass**	Min. F.O.S of 2.0 req'd per IBC 2003 Section 3108.4.2

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicate that the modified tower structure has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate once the modifications indicated on sheets SK-1 & SK-2 in Section 6 of this report are performed with the wind load classification specified above and the proposed antenna loading.**

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

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

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.

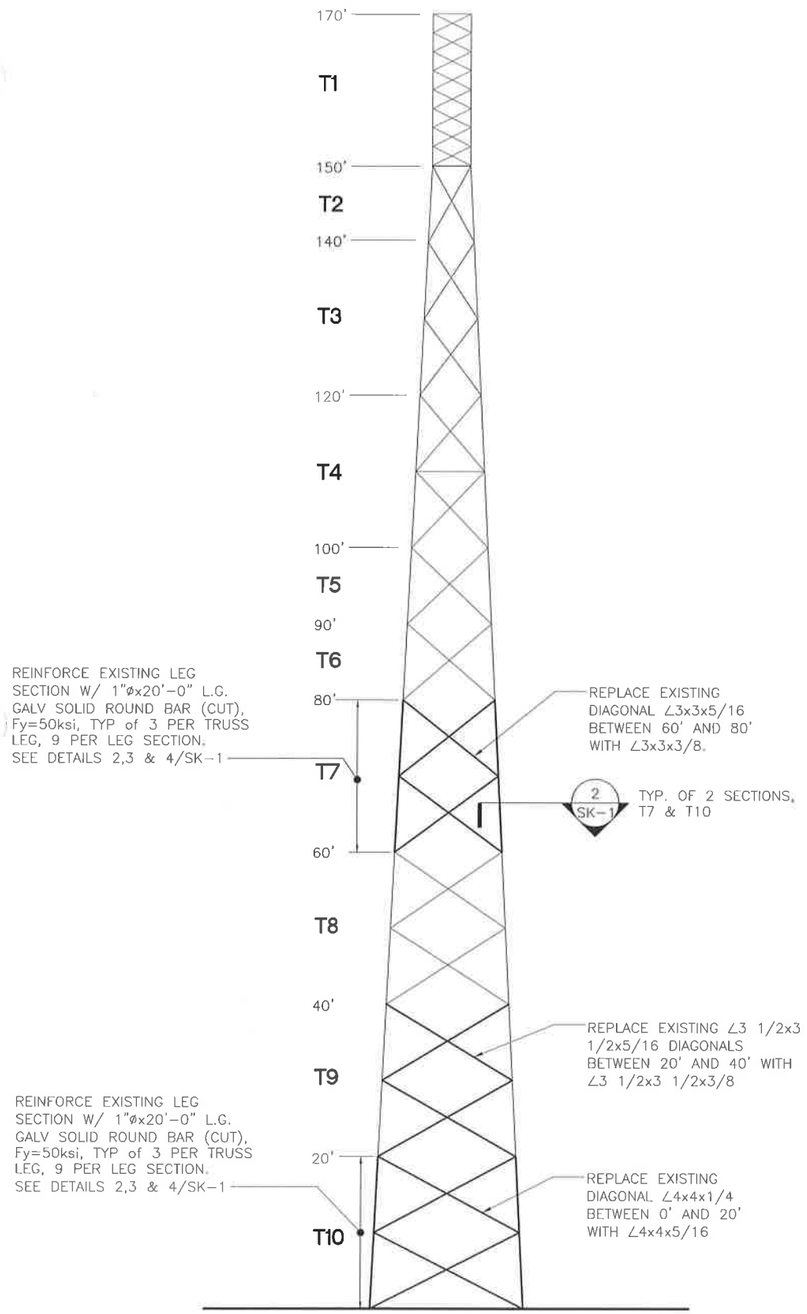
Ongoing and Periodic Inspection and Maintenance:

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.

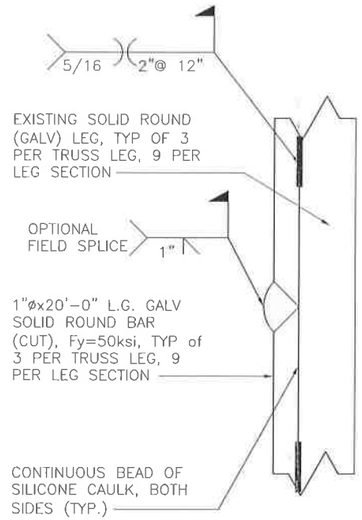
The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire 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

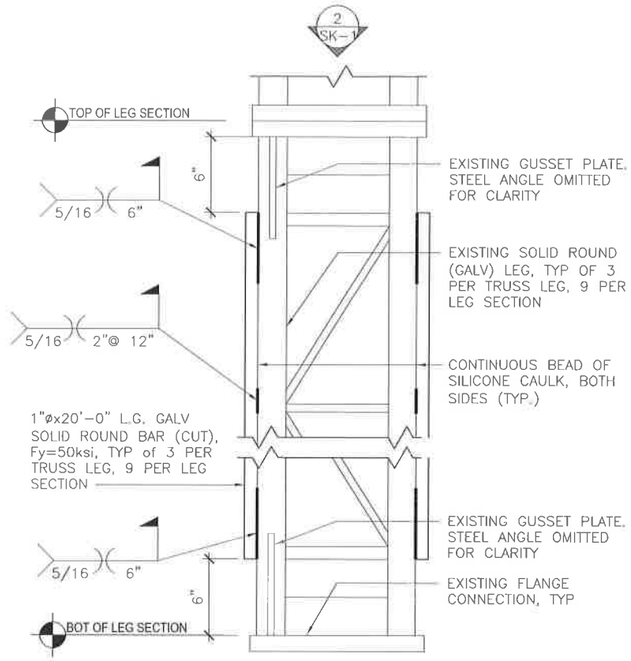
TOWER REINFORCEMEDNT DRAWING SK-1 & SK-2



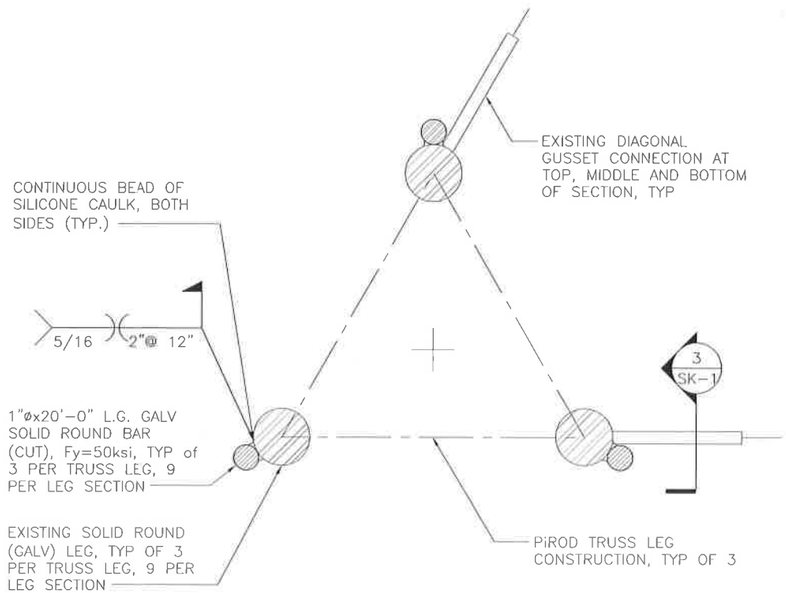
1 SK-1 **TOWER REINFORCEMENT**
SCALE: 1" = 10'-0"



4 SK-1 **SPLICE DETAIL**
SCALE: NTS



3 SK-1 **TRUSS LEG REINFORCEMENT**
SCALE: 1 1/2" = 1'-0"



2 SK-1 **TRUSS LEG REINFORCEMENT**
SCALE: NTS

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

Sprint
1 INTERNATIONAL BLVD.
SUITE 800
MAHWAH, NJ 07495

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NORTHEAST SITE SOLUTIONS/T-MOBILE
54 MAIN STREET
STURBRIDGE, MA 01566

A&E SEAL

URS PROJECT NUMBER: 36928664 (HPC-060)
DRAWN BY: MCD

NO.	DATE	ISSUED FOR
0	9/9/13	HPC-060 MOD

RELEASE BY | DATE

CT60XC931
CT11059C

179 SHUNPIKE ROAD
CROMWELL, CT

SHEET TITLE
REINFORCEMENT DETAILS

SHEET NUMBER
SK-1

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 A572 GRADE 50
SOLID ROUND (S.R.)		ASTM A572 GRADE 50
PIPE COLUMNS		ASTM A53 GRADE B
TUBE COLUMNS	F=46.KSI	ASTM A500
BOLTS		ASTM 325-X (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 REPLACEMENT OF TOWER MEMBERS SHALL BE DONE ONE AT A TIME AND SHALL BE DONE WITH LESS THAN 15 MPH WIND PRESENT. NO MEMBER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY.

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

NOTES:

1. ALL PROPOSED DIAGONAL MEMBERS SHALL BE INSTALLED WITH A325-X 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.

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

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1 INTERNATIONAL BLVD.
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STURBRIDGE, MA 01566

A&E SEAL

URS PROJECT NUMBER: 36928664 (HPC-060)
DRAWN BY: MCD

NO.	DATE	ISSUED FOR
0	9/9/13	HPC-060 MOD

RELEASE BY
DATE

CT60XC931
CT11059C

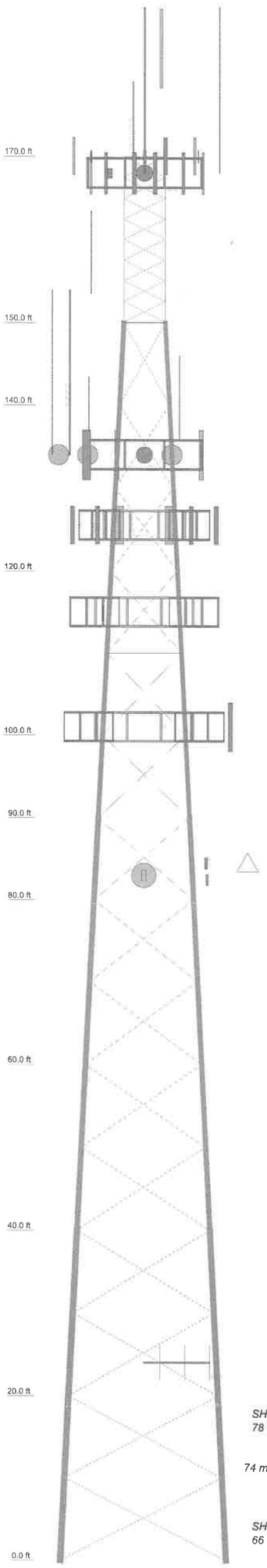
179 SHUNPIKE ROAD
CROMWELL, CT

SHEET TITLE
REINFORCEMENT NOTES

SHEET NUMBER
SK-2

TNX TOWER INPUT/OUTPUT SUMMARY

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9
Legs	SR 1 3/4	Pirod 105244	Pirod 105216	Pirod 105217	A		Pirod 105218 reinf w/ 1" dia bar	Pirod 105219 reinf w/ 1" dia bar	Pirod 105220 reinf w/ 1" dia bar
Leg Grade	A572-50								
Diagonals	SR 7/8	L2 1/2x2 1/2x3/16	L3x3x3/16	L3x3x5/16			L3x3x3/8	L3 1/2x3 1/2x5/16	L4x4x5/16
Diagonal Grade	A572-50						A36		
Top Girts	SR 7/8	L3x3x3/16					N.A.		
Mid Girts	N.A.			L3x3x3/16				N.A.	
Bottom Girts	SR 7/8						N.A.		
Face Width (ft)	5		6	8	10	11	12	14	16
# Panels @ (ft)	8 @ 2.48656						15 @ 10		
Weight (K)	12	11	21	26	15	18	43	45	54



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
101-90-08-0-01 (Municipal)	183	Twin PCS TMA (T-Mobile)	125.5
15' Mount Pipe (Municipal)	179.75	Twin PCS TMA (T-Mobile)	125.5
3" Dia 20' Omni (Municipal)	178	PiROD 10' Lightweight T-Frame (T-Mobile)	125.5
2.5" x 20'6" Whip (Municipal)	178	PiROD 10' Lightweight T-Frame (T-Mobile)	125.5
2.5" x 14' Omni (Municipal)	175	PiROD 10' Lightweight T-Frame (T-Mobile)	125.5
2.5" x 14' Omni (Municipal)	175	(2) TMA (shielded) (ATI)	115
2.5" x 14' Omni (Municipal)	175	(2) TMA (shielded) (ATI)	115
1.5" x 12' Omni (Municipal)	174	(2) TMA (shielded) (ATI)	115
APXV18-209014-C-A20 (Sprint)	170	PiROD 12' Lightweight T-Frame (ATI)	115
APXV18-209014-C-A20 (Sprint)	170	(2) TMA (shielded) (ATI)	115
APXV18-209014-C-A20 (Sprint)	170	PiROD 12' Lightweight T-Frame (ATI)	115
(2) REMOTE RADIO HEAD (RRH) (Sprint)	170	7770.00 (ATI)	115
(2) REMOTE RADIO HEAD (RRH) (Sprint)	170	7770.00 (ATI)	115
(2) REMOTE RADIO HEAD (RRH) (Sprint)	170	7770.00 (ATI)	115
800 MHz Filter (Sprint)	170	7770.00 (ATI)	115
800 MHz Filter (Sprint)	170	7770.00 (ATI)	115
800 MHz Filter (Sprint)	170	7770.00 (ATI)	115
9 Arm Halo Mount (Municipal)	168	AM-X-CD-16-65-00T-RET (6') (ATI)	115
SU-RA-HP-2.4 Antenna (Municipal)	168	AM-X-CD-16-65-00T-RET (6') (ATI)	115
950G65VTZE-M (Sprint)	168	AM-X-CD-16-65-00T-RET (6') (ATI)	115
950G65VTZE-M (Sprint)	168	(2) REMOTE RADIO HEAD (RRH) (ATI)	115
950G65VTZE-M (Sprint)	168	(2) REMOTE RADIO HEAD (RRH) (ATI)	115
950G65VTZE-M (Sprint)	168	(2) REMOTE RADIO HEAD (RRH) (ATI)	115
950G65VTZE-M (Sprint)	168	Surge Suppressor (ATI)	115
950G65VTZE-M (Sprint)	168	(2) TMA (shielded) (ATI)	115
PTP49600 (CPD)	168	PiROD 12' Lightwaight T-Frame (ATI)	115
HPD2-4.7	168	(2) TMA (shielded) (ATI)	115
APXV18-206517S-C w/ mounting hardware	159.5	PiROD 12' Lightweight T-Frame (Verizon)	101
APXV18-206517S-C w/ mounting hardware	159.5	PiROD 12' Lightweight T-Frame (Verizon)	101
APXV18-206517S-C w/ mounting hardware	159.5	(2) Diplexer (Verizon)	101
SC420-HF1LDF (Municipal)	158.5	(2) Diplexer (Verizon)	101
3" Dia 20' Omni (Municipal)	144	(2) Diplexer (Verizon)	101
3" Dia 20' Omni (Municipal)	144	SC-E 6014 rev2 (Verizon)	101
2.5" x 20'6" Whip (Municipal)	144	BXA-171063-12BF (Verizon)	101
2" Dia 15' Omni (Municipal)	141	SWCP 2x5514 (Verizon)	101
1.5" x 10' Omni (Municipal)	139	SC-E 6014 rev2 (Verizon)	101
9' Whip (Municipal)	138.5	SC-E 6014 rev2 (Verizon)	101
PIROD 20' Universal Platform (Municipal)	134	BXA-171063-12BF (Verizon)	101
Argus LLPX310R (Clearwire)	134	SC-E 6014 rev2 (Verizon)	101
Argus LLPX310R (Clearwire)	134	SC-E 6014 rev2 (Verizon)	101
Argus LLPX310R (Clearwire)	134	BXA-171063-12BF (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	BXA-70063-6CF (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	SWCP 2x5514 (Verizon)	101
REMOTE RADIO HEAD (RRH) (Clearwire)	134	SC-E 6014 rev2 (Verizon)	101
VHLP2.5-180 (Clearwire)	134	PiROD 12' Lightweight T-Frame (Verizon)	101
VHLP2.5-180 (Clearwire)	134	3"x2"x22" Panel	87
VHLP2.5-180 (Clearwire)	134	TMA	84.5
VHLP2-180 (Clearwire)	134	3' Stand-off	83.5
AIR B2A/B4P (T-Mobile)	125.5	3' Stand-off	83.5
AIR B2A/B4P (T-Mobile)	125.5	3' 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
AIR B2A/B4P (T-Mobile)	125.5	Camera	30
Twin PCS TMA (T-Mobile)	125.5	PC9013N	24

SYMBOL LIST

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

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for 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: 97.1%

MAX. CORNER REACTIONS AT BASE:
DOWN: 460 K
UPLIFT: -398 K
SHEAR: 52 K

AXIAL
90 K

SHEAR
78 K

MOMENT
7456 kip-ft

TORQUE 23 kip-ft
74 mph WIND - 0.5000 in ICE

AXIAL
53 K

SHEAR
66 K

MOMENT
6364 kip-ft

TORQUE 13 kip-ft
REACTIONS - 85 mph WIND

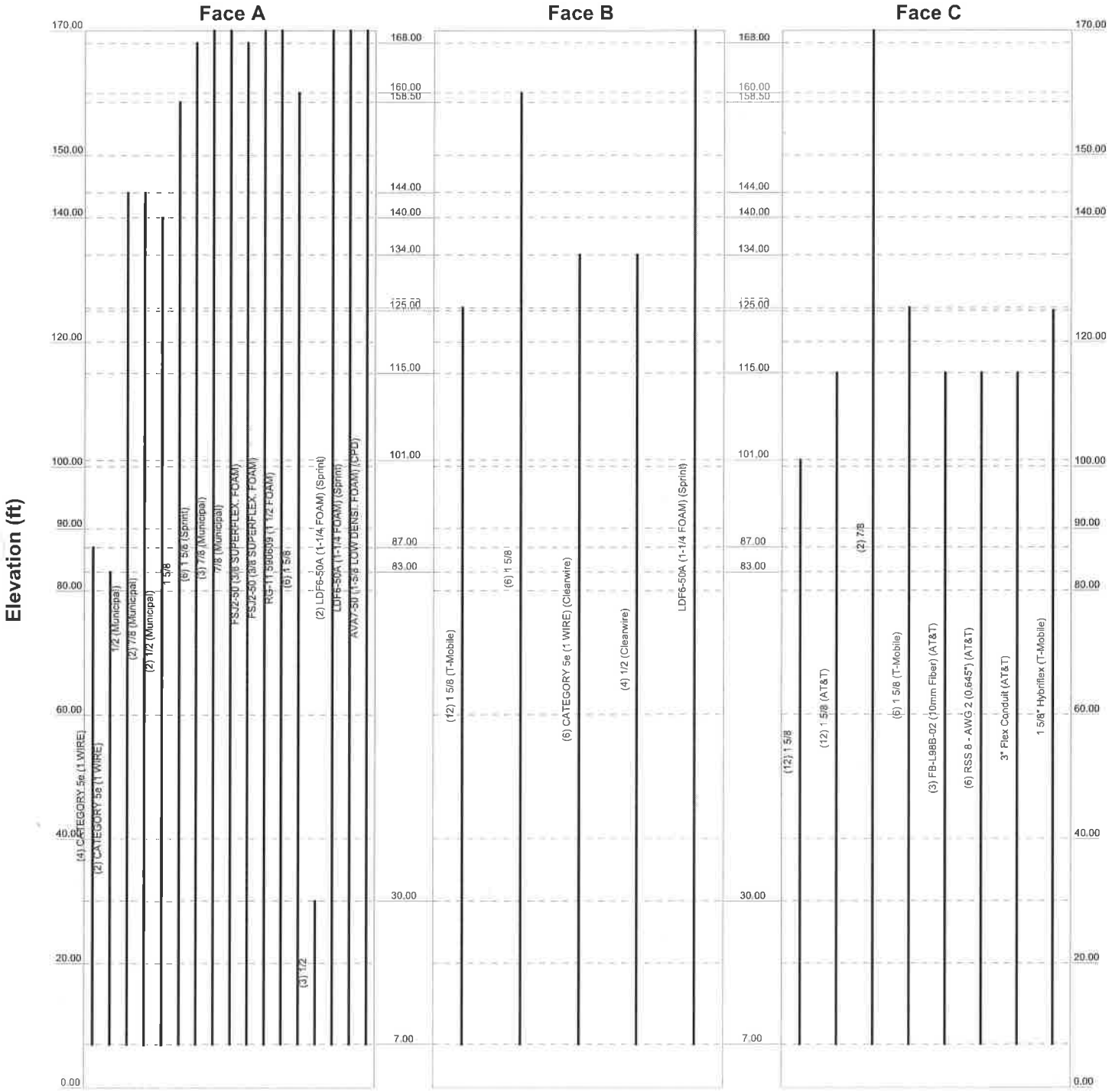
URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: 860-529-8882
FAX: 860-529-3991

Job: *PiROD U20'-0"x170' Lattice Tower*
Project: *HPC-060 / Cromwell, CT Tower MOD*
Client: Sprint / T-Mobile | Drawn by: Michael_Dalickas | App'd:
Code: TIA/EIA-222-F | Date: 09/09/13 | Scale: NTS
Path: P:\GIS\Rev. 1 - 36819664 60605-HPC060\ERI Files\U20'x170' PiROD Self-Supporting Lattice Tower.dgn | Dwg No. E-1

TNX TOWER FEEDLINE DISTRIBUTION CHART

Feedline Distribution Chart
0' - 170'

Round Flat App In Face App Out Face Truss Leg



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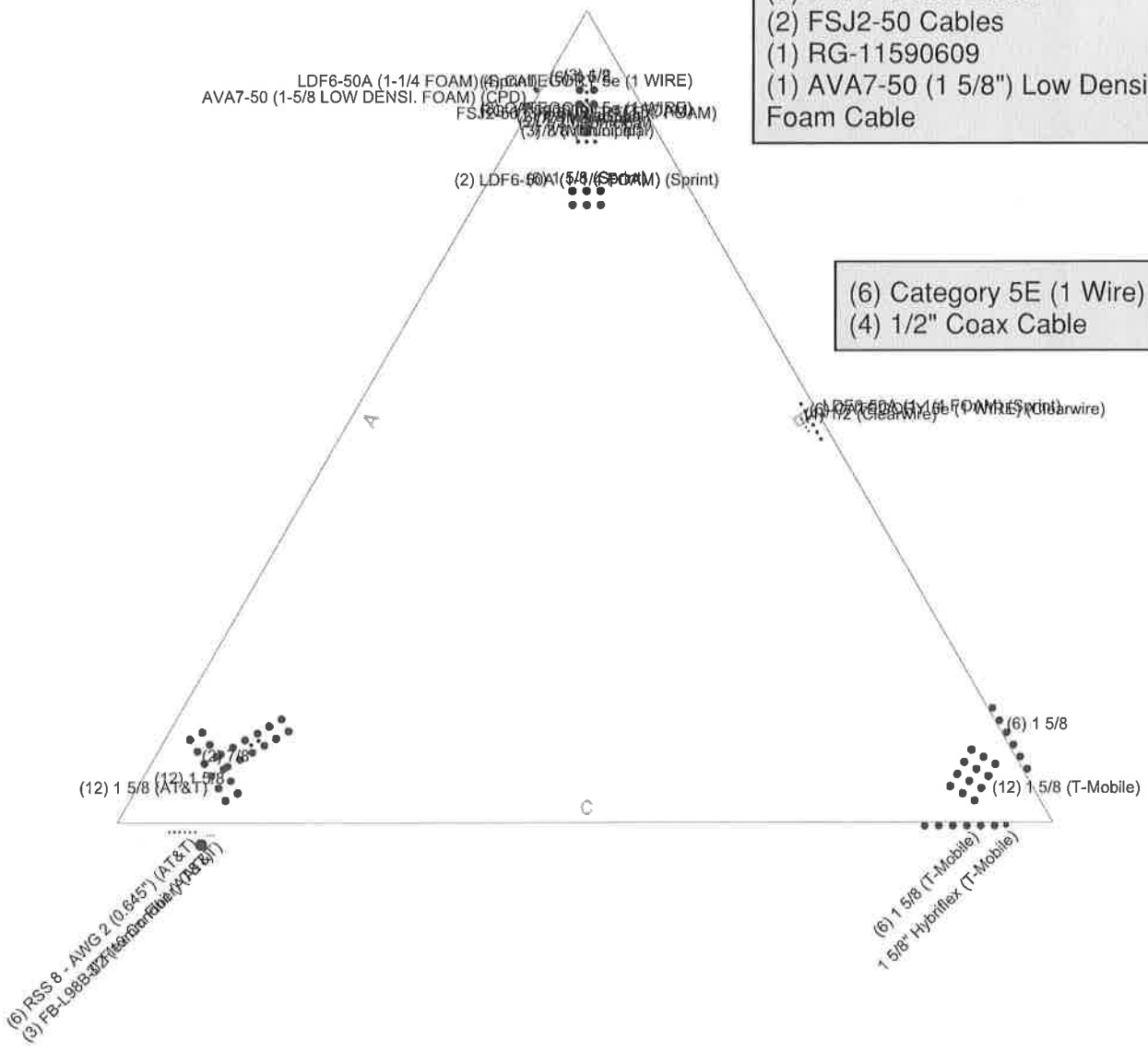
Code: TIA/EIA-222-F	Date: 09/09/13	Scale: NTS	
Path:		Dwg No. E-7	

TNX TOWER FEEDLINE PLAN

Feedline Plan

Round Flat App In Face App Out Face Truss-Leg



(6) Category 5E (1 Wire) Cables
(6) 7/8" Coax Cables
(4) 1/2" Coax Cables
(13) 1 5/8" Coax Cables
(3) 1 1/4" Coax Cables
(2) FSJ2-50 Cables
(1) RG-11590609
(1) AVA7-50 (1 5/8") Low Density Foam Cable

(6) Category 5E (1 Wire) Cables
(4) 1/2" Coax Cable

(6) RSS 8 - AWG 2 (0.645") Cables
(3) FB-L98B-02 (10mm Fiber) Cables
(1) 3" Flex Conduit
(24) 1 5/8" Coax Cables
(2) 7/8" Coax Cables

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Client: Sprint / T-Mobile	Drawn by: Michael_Dalickas	App'd:	
Code: TIA/EIA-222-F	Date: 09/09/13	Scale: NTS	
Path:		Dwg No. E-7	

TNX TOWER DETAILED OUTPUT

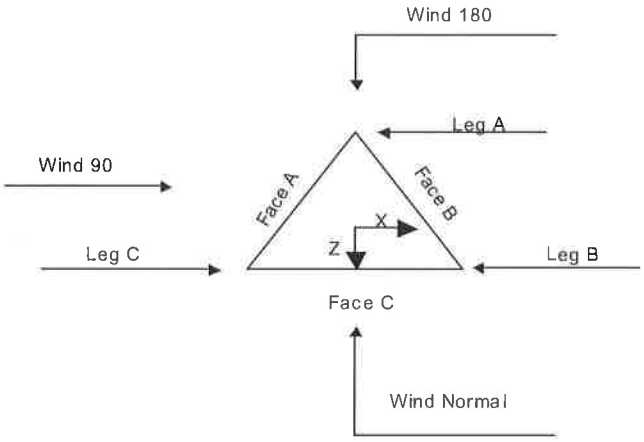
Tower Input Data

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, feedline 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		



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	L3x3x3/16	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_r	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	Yes	Yes	1	1	1	1	1	1	1	1
170.00-150.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
150.00-140.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
100.00-90.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
90.00-80.00				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	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
20.00-0.00				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	1	0.5	0.85	1	0.5	0.85
150.00-140.00						
T3	1	0.5	0.85	1	0.5	0.85
140.00-120.00						
T4	1	0.5	0.85	1	0.5	0.85
120.00-100.00						
T5	1	0.5	0.85	1	0.5	0.85
100.00-90.00						
T6	1	0.5	0.85	1	0.5	0.85
90.00-80.00						
T7	1	0.5	0.85	1	0.5	0.85
80.00-60.00						
T8	1	0.5	0.85	1	0.5	0.85
60.00-40.00						
T9	1	0.5	0.85	1	0.5	0.85
40.00-20.00						
T10	1	0.5	0.85	1	0.5	0.85
20.00-0.00						

Tower Section Geometry *(cont'd)*

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

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	A	No	Ar (Leg)	87.00 - 7.00	0.0000	0.1	4	4	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	A	No	Ar (Leg)	83.00 - 7.00	0.0000	0.12	2	2	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
1 5/8	A	No	Ar (Leg)	158.50 - 7.00	0.0000	0.13	1	1	1.5000	1.9800		1.04
1 5/8 (Sprint)	A	No	Ar (Leg)	168.00 - 7.00	0.0000	0.2	6	2	1.5000	1.9800		1.04
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	B	Yes	Ar (CfAe)	160.00 - 7.00	0.0000	0.4	6	6	1.5000	1.9800		1.04
1 5/8	C	No	Ar (Leg)	101.00 - 7.00	0.0000	0.17	12	6	1.5000	1.9800		1.04
1 5/8 (AT&T)	C	No	Ar (Leg)	115.00 - 7.00	0.0000	0.12	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
1 5/8 (T-Mobile)	C	Yes	Ar (CfAe)	125.50 - 7.00	0.0000	-0.4	6	6	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
LDF6-50A (1-1/4 FOAM) (Sprint)	A	No	Ar (Leg)	170.00 - 7.00	0.0000	0.2	2	2	1.5500	1.5500		0.66
LDF6-50A (1-1/4 FOAM) (Sprint)	B	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0	1	1	1.5500	1.5500		0.66
LDF6-50A (1-1/4 FOAM) (Sprint)	A	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0.4	1	1	1.5500	1.5500		0.66
AVA7-50 (1-5/8 LOW DENSI.	A	Yes	Ar (CfAe)	170.00 - 7.00	0.0000	0.38	1	1	1.5000	1.9800		0.72

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
FOAM) (CPD) 1 5/8" Hybriflex (T-Mobile)	C	Yes	Ar (CfAe)	125.00 - 7.00	0.0000	-0.45	1	1	1.5000	1.6250		0.21

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	50.341	0.000	0.000	0.000	0.30
		B	53.241	0.000	0.000	0.000	0.08
		C	3.700	0.000	0.000	0.000	0.02
T2	150.00-140.00	A	31.969	0.000	0.000	0.000	0.20
		B	38.369	0.000	0.000	0.000	0.07
		C	1.850	0.000	0.000	0.000	0.01
T3	140.00-120.00	A	68.672	0.000	0.000	0.000	0.43
		B	97.837	0.000	0.000	0.000	0.24
		C	16.480	0.000	0.000	0.000	0.06
T4	120.00-100.00	A	94.971	0.000	0.000	0.000	0.43
		B	119.551	0.000	0.000	0.000	0.43
		C	86.784	0.000	0.000	0.000	0.42
T5	100.00-90.00	A	67.210	0.000	0.000	0.000	0.21
		B	59.775	0.000	0.000	0.000	0.22
		C	64.794	0.000	0.000	0.000	0.37
T6	90.00-80.00	A	70.044	0.000	0.000	0.000	0.22
		B	62.609	0.000	0.000	0.000	0.22
		C	64.794	0.000	0.000	0.000	0.37
T7	80.00-60.00	A	144.420	0.000	0.000	0.000	0.45
		B	129.551	0.000	0.000	0.000	0.43
		C	129.588	0.000	0.000	0.000	0.75
T8	60.00-40.00	A	144.420	0.000	0.000	0.000	0.45
		B	129.551	0.000	0.000	0.000	0.43
		C	129.588	0.000	0.000	0.000	0.75
T9	40.00-20.00	A	145.870	0.000	0.000	0.000	0.46
		B	131.001	0.000	0.000	0.000	0.43
		C	129.588	0.000	0.000	0.000	0.75
T10	20.00-0.00	A	95.758	0.000	0.000	0.000	0.30
		B	86.093	0.000	0.000	0.000	0.28
		C	84.232	0.000	0.000	0.000	0.49

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	71.366	3.517	0.000	0.000	0.80
		B		77.783	0.000	0.000	0.000	0.19
		C		3.517	3.517	0.000	0.000	0.07
T2	150.00-140.00	A	0.500	44.544	1.758	0.000	0.000	0.52
		B		55.203	0.000	0.000	0.000	0.17
		C		1.758	1.758	0.000	0.000	0.03
T3	140.00-120.00	A	0.500	99.455	3.517	0.000	0.000	1.13

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
		B		132.065	15.727	0.000	0.000	0.68
		C		19.922	3.517	0.000	0.000	0.16
T4	120.00-100.00	A	0.500	127.088	3.517	0.000	0.000	1.13
		B		152.617	22.467	0.000	0.000	1.20
		C		100.002	13.548	0.000	0.000	1.08
T5	100.00-90.00	A	0.500	84.269	1.758	0.000	0.000	0.57
		B		76.309	11.233	0.000	0.000	0.60
		C		72.192	8.446	0.000	0.000	0.94
T6	90.00-80.00	A	0.500	85.935	5.758	0.000	0.000	0.61
		B		77.975	15.233	0.000	0.000	0.60
		C		72.192	8.446	0.000	0.000	0.94
T7	80.00-60.00	A	0.500	175.204	16.850	0.000	0.000	1.29
		B		159.284	35.800	0.000	0.000	1.20
		C		144.384	16.891	0.000	0.000	1.88
T8	60.00-40.00	A	0.500	175.204	16.850	0.000	0.000	1.29
		B		159.284	35.800	0.000	0.000	1.20
		C		144.384	16.891	0.000	0.000	1.88
T9	40.00-20.00	A	0.500	178.454	16.850	0.000	0.000	1.32
		B		162.534	35.800	0.000	0.000	1.20
		C		144.384	16.891	0.000	0.000	1.88
T10	20.00-0.00	A	0.500	118.107	10.953	0.000	0.000	0.88
		B		107.760	23.270	0.000	0.000	0.78
		C		93.849	10.979	0.000	0.000	1.22

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	0.426	1.431	0.000	0.000
		B	0.904	2.973	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	150.00-140.00	A	0.000	0.198	0.328	0.513
		B	0.000	0.730	1.246	1.896
		C	0.000	0.000	0.000	0.000
T3	140.00-120.00	A	0.000	0.269	0.515	0.806
		B	0.000	1.573	2.807	4.720
		C	0.000	0.271	0.536	0.813
T4	120.00-100.00	A	0.000	0.268	0.514	0.805
		B	0.000	1.820	3.167	5.460
		C	0.000	1.544	2.846	4.631
T5	100.00-90.00	A	0.000	0.106	0.203	0.318
		B	0.000	0.719	1.251	2.157
		C	0.000	0.682	1.240	2.046
T6	90.00-80.00	A	0.000	0.102	0.195	0.305
		B	0.000	0.690	1.201	2.070
		C	0.000	0.655	1.190	1.964
T7	80.00-60.00	A	0.000	0.194	0.371	0.582
		B	0.000	1.315	2.288	3.944
		C	0.000	1.247	2.268	3.742
T8	60.00-40.00	A	0.000	0.185	0.413	0.646
		B	0.000	1.252	2.542	4.382
		C	0.000	1.188	2.520	4.158
T9	40.00-20.00	A	0.000	0.178	0.398	0.624
		B	0.000	1.209	2.454	4.230
		C	0.000	1.147	2.432	4.013

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T10	20.00-0.00	A	0.000	0.113	0.288	0.451
		B	0.000	0.765	1.775	3.060
		C	0.000	0.726	1.760	2.903

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	170.00-150.00	1.3324	-7.2845	1.3182	-6.8187
T2	150.00-140.00	1.9049	-5.9259	1.9386	-5.6571
T3	140.00-120.00	4.4527	-6.4949	4.2213	-6.5952
T4	120.00-100.00	3.6336	-1.2098	4.0419	-2.3544
T5	100.00-90.00	-0.2492	1.1393	1.1550	-0.5151
T6	90.00-80.00	-0.2466	0.4575	1.2266	-1.2953
T7	80.00-60.00	-0.2498	-0.0930	1.3587	-1.9306
T8	60.00-40.00	-0.3128	-0.1477	1.5068	-2.2240
T9	40.00-20.00	-0.3264	-0.4447	1.6868	-2.8982
T10	20.00-0.00	-0.3337	-0.6702	1.4855	-3.0289

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
PC9013N	A	From Leg	1.00 0.00 0.00	0.0000	24.00	No Ice 1/2" Ice	0.46 0.52	0.46 0.52	0.00 0.00
3"x2"x22" Panel	B	From Leg	2.00 0.00 0.00	0.0000	80.00	No Ice 1/2" Ice	0.65 0.81	0.47 0.61	0.05 0.05
TMA	B	From Leg	2.00 0.00 0.00	0.0000	82.50	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03
TMA	B	From Leg	2.00 0.00 0.00	0.0000	84.50	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03
3"x2"x22" Panel	B	From Leg	2.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice	0.65 0.81	0.47 0.61	0.05 0.05
3' Stand-off	B	From Leg	1.50 0.00 0.00	0.0000	83.50	No Ice 1/2" Ice	1.00 1.20	2.00 2.70	0.05 0.07
3' Stand-off	A	From Leg	1.50 0.00 0.00	0.0000	83.50	No Ice 1/2" Ice	1.00 1.20	2.00 2.70	0.05 0.07
TMA	A	From Leg	2.00 0.00	0.0000	83.00	No Ice 1/2" Ice	1.06 1.21	0.45 0.57	0.02 0.03

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						
SC-E 6014 rev2	A	From Leg	4.00	0.0000	101.00	No Ice	3.55	3.34	0.02
(Verizon)			6.00			1/2" Ice	3.89	3.68	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						
SC-E 6014 rev2	A	From Leg	4.00	0.0000	101.00	No Ice	3.55	3.34	0.02
(Verizon)			-6.00			1/2" Ice	3.89	3.68	0.04
			0.00						
SC-E 6014 rev2	B	From Leg	4.00	0.0000	101.00	No Ice	3.55	3.34	0.02
(Verizon)			6.00			1/2" Ice	3.89	3.68	0.04
			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						
SC-E 6014 rev2	B	From Leg	4.00	0.0000	101.00	No Ice	3.55	3.34	0.02
(Verizon)			-6.00			1/2" Ice	3.89	3.68	0.04
			0.00						
SC-E 6014 rev2	C	From Leg	4.00	0.0000	101.00	No Ice	3.55	3.34	0.02
(Verizon)			6.00			1/2" Ice	3.89	3.68	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						
SC-E 6014 rev2	C	From Leg	4.00	0.0000	101.00	No Ice	3.55	3.34	0.02
(Verizon)			-6.00			1/2" Ice	3.89	3.68	0.04
			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) TMA (shielded)	A	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)	A	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)	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

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			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						
PiROD 10' Lightweight	A	From Leg	2.00	0.0000	125.50	No Ice	9.30	9.30	0.25
T-Frame			0.00			1/2" Ice	14.50	14.50	0.34
(T-Mobile)			0.00						
PiROD 10' Lightweight	B	From Leg	2.00	0.0000	125.50	No Ice	9.30	9.30	0.25
T-Frame			0.00			1/2" Ice	14.50	14.50	0.34
(T-Mobile)			0.00						
PiROD 10' Lightweight	C	From Leg	2.00	0.0000	125.50	No Ice	9.30	9.30	0.25
T-Frame			0.00			1/2" Ice	14.50	14.50	0.34
(T-Mobile)			0.00						
3" Dia 20' Omni	C	From Face	6.00	0.0000	144.00	No Ice	6.00	6.00	0.06
(Municipal)			9.00			1/2" Ice	8.03	8.03	0.10
			0.00						
PiROD 20' Universal	C	None		0.0000	134.00	No Ice	33.10	33.10	2.27
Platform						1/2" Ice	47.10	47.10	2.70
(Municipal)									
3" Dia 20' Omni	A	From Face	6.00	0.0000	144.00	No Ice	6.00	6.00	0.06
(Municipal)			-9.00			1/2" Ice	8.03	8.03	0.10
			0.00						
9' Whip	A	From Face	6.00	0.0000	138.50	No Ice	5.85	5.85	0.12
(Municipal)			0.00			1/2" Ice	7.66	7.66	0.17
			0.00						
2.5" x 20'6" Whip	A	From Face	6.00	0.0000	144.00	No Ice	5.14	5.14	0.15
(Municipal)			9.00			1/2" Ice	7.24	7.24	0.19
			0.00						
2" Dia 15' Omni	B	From Face	6.00	0.0000	141.00	No Ice	3.20	3.20	0.04
(Municipal)			-5.00			1/2" Ice	4.83	4.83	0.06
			0.00						
1.5" x 10' Omni	B	From Face	6.00	0.0000	139.00	No Ice	1.50	1.50	0.06
(Municipal)			5.00			1/2" Ice	2.52	2.52	0.07
			0.00						
SC420-HF1LDF	A	From Face	6.00	0.0000	158.50	No Ice	2.14	2.14	0.02
(Municipal)			0.00			1/2" Ice	3.02	3.02	0.03
			0.00						
APXV18-206517S-C w/	A	From Leg	1.00	0.0000	159.50	No Ice	5.08	4.46	0.05
mounting hardware			0.00			1/2" Ice	5.53	5.39	0.09
			0.00						
APXV18-206517S-C w/	B	From Leg	1.00	0.0000	159.50	No Ice	5.08	4.46	0.05
mounting hardware			0.00			1/2" Ice	5.53	5.39	0.09
			0.00						
APXV18-206517S-C w/	C	From Leg	1.00	0.0000	159.50	No Ice	5.08	4.46	0.05
mounting hardware			0.00			1/2" Ice	5.53	5.39	0.09
			0.00						
9 Arm Halo Mount	C	None		0.0000	168.00	No Ice	62.60	62.60	3.60
(Municipal)						1/2" Ice	80.40	80.40	4.80

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
SU-RA-HP-2.4 Antenna	B	From Face	3.00	0.0000	168.00	No Ice	0.80	0.37	0.00
(Municipal)			2.50			1/2" Ice	0.93	0.47	0.01
			0.00						
950G65VTZE-M	B	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			1.25			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	B	From Leg	2.50	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			0.00			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	C	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			-1.25			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	C	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			1.25			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	C	From Leg	2.50	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			0.00			1/2" Ice	4.37	3.15	0.03
			0.00						
950G65VTZE-M	A	From Face	6.00	0.0000	168.00	No Ice	3.99	2.78	0.01
(Sprint)			0.00			1/2" Ice	4.37	3.15	0.03
			0.00						
101-90-08-0-01	A	From Leg	2.50	0.0000	183.00	No Ice	3.33	3.33	0.04
(Municipal)			2.00			1/2" Ice	4.31	4.31	0.06
			0.00						
3" Dia 20' Omni	B	From Face	9.00	0.0000	178.00	No Ice	6.00	6.00	0.06
(Municipal)			0.00			1/2" Ice	8.03	8.03	0.10
			0.00						
2.5" x 20'6" Whip	C	From Face	0.00	0.0000	178.00	No Ice	5.14	5.14	0.15
(Municipal)			0.00			1/2" Ice	7.24	7.24	0.19
			0.00						
2.5" x 14' Omni	C	From Face	0.00	0.0000	175.00	No Ice	3.50	3.50	0.03
(Municipal)			0.00			1/2" Ice	4.93	4.93	0.06
			0.00						
2.5" x 14' Omni	C	From Face	0.00	0.0000	175.00	No Ice	3.50	3.50	0.03
(Municipal)			0.00			1/2" Ice	4.93	4.93	0.06
			0.00						
15' Mount Pipe	A	From Leg	2.50	0.0000	179.75	No Ice	4.50	4.50	0.09
(Municipal)			2.00			1/2" Ice	6.03	6.03	0.12
			0.00						
2.5" x 14' Omni	C	From Face	0.00	0.0000	175.00	No Ice	3.50	3.50	0.03
(Municipal)			0.00			1/2" Ice	4.93	4.93	0.06
			0.00						
1.5" x 12' Omni	A	From Face	2.50	0.0000	174.00	No Ice	1.50	1.50	0.06
(Municipal)			4.00			1/2" Ice	2.52	2.52	0.07
			0.00						
AIR B2A/B4P	A	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	B	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	C	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	A	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			-3.00			1/2" Ice	6.86	4.64	0.12
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
AIR B2A/B4P	B	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			-3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
AIR B2A/B4P	C	From Leg	4.00	0.0000	125.50	No Ice	6.42	4.22	0.08
(T-Mobile)			-3.00			1/2" Ice	6.86	4.64	0.12
			0.00						
Twin PCS TMA	A	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	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						
Argus LLPX310R	A	From Face	6.00	0.0000	134.00	No Ice	4.86	3.46	0.03
(Clearwire)			7.00			1/2" Ice	5.22	3.80	0.06
			0.00						
Argus LLPX310R	B	From Face	6.00	0.0000	134.00	No Ice	4.86	3.46	0.03
(Clearwire)			0.00			1/2" Ice	5.22	3.80	0.06
			0.00						
Argus LLPX310R	C	From Face	6.00	0.0000	134.00	No Ice	4.86	3.46	0.03
(Clearwire)			7.00			1/2" Ice	5.22	3.80	0.06
			0.00						
REMOTE RADIO HEAD	A	From Face	6.00	0.0000	134.00	No Ice	1.82	0.83	0.03
(RRH)			7.00			1/2" Ice	2.00	0.97	0.04
(Clearwire)			0.00						
REMOTE RADIO HEAD	B	From Face	6.00	0.0000	134.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(Clearwire)			0.00						
REMOTE RADIO HEAD	C	From Face	6.00	0.0000	134.00	No Ice	1.82	0.83	0.03
(RRH)			7.00			1/2" Ice	2.00	0.97	0.04
(Clearwire)			0.00						
7770.00	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						
7770.00	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						
7770.00	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						
7770.00	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						
7770.00	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						
7770.00	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						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
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
(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						
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						
(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						
PTP49600	C	From Leg	2.00	0.0000	168.00	No Ice	2.04	0.53	0.01
(CPD)			0.00			1/2" Ice	2.24	0.65	0.02
			0.00						
APXV18-209014-C-A20	A	From Face	7.00	0.0000	170.00	No Ice	3.51	2.00	0.02
(Sprint)			-2.50			1/2" Ice	3.85	2.33	0.04
			0.00						
APXV18-209014-C-A20	B	From Face	7.00	0.0000	170.00	No Ice	3.51	2.00	0.02
(Sprint)			-2.50			1/2" Ice	3.85	2.33	0.04
			0.00						
APXV18-209014-C-A20	C	From Face	7.00	0.0000	170.00	No Ice	3.51	2.00	0.02
(Sprint)			-2.50			1/2" Ice	3.85	2.33	0.04
			0.00						
(2) REMOTE RADIO HEAD	A	From Face	6.00	0.0000	170.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(Sprint)			0.00						
(2) REMOTE RADIO HEAD	B	From Face	6.00	0.0000	170.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(Sprint)			0.00						
(2) REMOTE RADIO HEAD	C	From Face	6.00	0.0000	170.00	No Ice	1.82	0.83	0.03
(RRH)			0.00			1/2" Ice	2.00	0.97	0.04
(Sprint)			0.00						
800 MHz Filter	A	From Face	6.00	0.0000	170.00	No Ice	0.52	0.38	0.01
(Sprint)			0.00			1/2" Ice	0.65	0.50	0.01
			0.00						
800 MHz Filter	B	From Face	6.00	0.0000	170.00	No Ice	0.52	0.38	0.01
(Sprint)			0.00			1/2" Ice	0.65	0.50	0.01
			0.00						
800 MHz Filter	C	From Face	6.00	0.0000	170.00	No Ice	0.52	0.38	0.01
(Sprint)			0.00			1/2" Ice	0.65	0.50	0.01
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-70063-6CF (Verizon)	B	From Leg	4.00 -4.00 0.00	0.0000	101.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
3' Dish	A	Paraboloid w/o Radome	From Leg	2.00 0.00 0.00	0.0000		83.00	3.00	No Ice 1/2" Ice	7.07 7.47	0.23 0.27
VHLP2.5-180 (Clearwire)	A	Paraboloid w/o Radome	From Face	6.00 0.00 0.00	0.0000		134.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10
VHLP2.5-180 (Clearwire)	A	Paraboloid w/o Radome	From Face	6.00 -7.00 0.00	0.0000		134.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10
VHLP2.5-180 (Clearwire)	B	Paraboloid w/o Radome	From Face	6.00 -7.00 0.00	0.0000		134.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10
VHLP2-180 (Clearwire)	C	Paraboloid w/o Radome	From Face	6.00 0.00 0.00	0.0000		134.00	2.00	No Ice 1/2" Ice	3.14 3.41	0.03 0.04
HPD2-4.7	C	Paraboloid w/Radome	From Face	2.00 0.00 0.00	0.0000		168.00	2.00	No Ice 1/2" Ice	3.14 3.41	0.03 0.04

Truss-Leg Properties

Section Designation	Area in^2	Area Ice in^2	Self Weight K	Ice Weight K	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area 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	2697.7688	4300.8949	1.29	0.51	9.3673	14.9337	14.2843

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
w/ 1" dia bar							

Tower Pressures - No Ice

$G_H = 1.125$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 170.00-150.00	160.00	1.57	29	102.917	A	0.000	62.782	5.833	9.29	0.000	0.000
					B	0.000	65.204		8.95	0.000	0.000
					C	0.000	16.568		35.21	0.000	0.000
T2 150.00-140.00	145.00	1.526	28	66.055	A	5.148	43.874	11.905	24.28	0.000	0.000
					B	4.229	50.274		21.84	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3 140.00-120.00	130.00	1.48	27	162.111	A	9.952	91.836	23.165	22.76	0.000	0.000
					B	7.660	121.001		18.00	0.000	0.000
					C	9.931	39.645		46.72	0.000	0.000
T4 120.00-100.00	110.00	1.411	26	202.528	A	13.450	119.674	24.703	18.56	0.000	0.000
					B	10.797	144.253		15.93	0.000	0.000
					C	11.118	111.486		20.15	0.000	0.000
T5 100.00-90.00	95.00	1.353	25	116.264	A	6.358	79.561	12.351	14.38	0.000	0.000
					B	5.310	72.127		15.95	0.000	0.000
					C	5.321	77.145		14.98	0.000	0.000
T6 90.00-80.00	85.00	1.31	24	126.517	A	6.764	83.327	13.283	14.74	0.000	0.000
					B	5.758	75.892		16.27	0.000	0.000
					C	5.769	78.077		15.84	0.000	0.000
T7 80.00-60.00	70.00	1.24	23	283.450	A	14.773	172.545	28.124	15.01	0.000	0.000
					B	12.856	157.675		16.49	0.000	0.000
					C	12.876	157.712		16.49	0.000	0.000
T8 60.00-40.00	50.00	1.126	21	323.362	A	19.222	172.730	28.309	14.75	0.000	0.000
					B	17.092	157.860		16.18	0.000	0.000
					C	17.115	157.897		16.18	0.000	0.000
T9 40.00-20.00	30.00	1	18	363.756	A	21.262	175.677	29.807	15.14	0.000	0.000
					B	19.207	160.808		16.56	0.000	0.000
					C	19.229	159.395		16.69	0.000	0.000
T10 20.00-0.00	10.00	1	18	404.134	A	26.837	127.034	31.276	20.33	0.000	0.000
					B	25.350	117.369		21.91	0.000	0.000
					C	25.366	115.508		22.20	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 ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 170.00-150.00	160.00	1.57	22	0.5000	104.583	A	3.517	94.175	9.167	9.38	0.000	0.000
						B	0.000	99.050		9.25	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	6.721	66.489	20.033	27.36	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
150.00-140.00						B	3.579	76.615		24.98	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	13.177	141.599	38.924	25.15	0.000	0.000
140.00-120.00						B	21.474	172.905		20.02	0.000	0.000
						C	13.171	62.064		51.74	0.000	0.000
T4	110.00	1.411	20	0.5000	204.197	A	16.676	172.288	40.814	21.60	0.000	0.000
120.00-100.00						B	30.971	196.266		17.96	0.000	0.000
						C	22.881	143.927		24.47	0.000	0.000
T5 100.00-90.00	95.00	1.353	19	0.5000	117.098	A	8.001	106.756	20.407	17.78	0.000	0.000
						B	15.638	98.184		17.93	0.000	0.000
						C	12.961	94.104		19.06	0.000	0.000
T6 90.00-80.00	85.00	1.31	18	0.5000	127.351	A	12.412	109.762	21.609	17.69	0.000	0.000
						B	20.122	101.214		17.81	0.000	0.000
						C	13.441	95.465		19.84	0.000	0.000
T7 80.00-60.00	70.00	1.24	17	0.5000	285.119	A	31.412	225.361	45.303	17.64	0.000	0.000
						B	47.000	208.320		17.74	0.000	0.000
						C	28.294	193.488		20.43	0.000	0.000
T8 60.00-40.00	50.00	1.126	16	0.5000	325.031	A	35.838	226.333	45.704	17.43	0.000	0.000
						B	51.053	209.346		17.55	0.000	0.000
						C	32.368	194.510		20.14	0.000	0.000
T9 40.00-20.00	30.00	1	14	0.5000	365.425	A	37.887	232.248	47.784	17.69	0.000	0.000
						B	53.231	215.298		17.79	0.000	0.000
						C	34.539	197.210		20.62	0.000	0.000
T10 20.00-0.00	10.00	1	14	0.5000	405.803	A	37.626	174.638	49.862	23.49	0.000	0.000
						B	47.335	163.638		23.63	0.000	0.000
						C	35.201	149.767		26.96	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	62.782	5.833	9.29	0.000	0.000
170.00-150.00					B	0.000	65.204		8.95	0.000	0.000
					C	0.000	16.568		35.21	0.000	0.000
T2	145.00	1.526	10	66.055	A	5.148	43.874	11.905	24.28	0.000	0.000
150.00-140.00					B	4.229	50.274		21.84	0.000	0.000
					C	5.476	13.755		61.91	0.000	0.000
T3	130.00	1.48	9	162.111	A	9.952	91.836	23.165	22.76	0.000	0.000
140.00-120.00					B	7.660	121.001		18.00	0.000	0.000
					C	9.931	39.645		46.72	0.000	0.000
T4	110.00	1.411	9	202.528	A	13.450	119.674	24.703	18.56	0.000	0.000
120.00-100.00					B	10.797	144.253		15.93	0.000	0.000
					C	11.118	111.486		20.15	0.000	0.000
T5	95.00	1.353	9	116.264	A	6.358	79.561	12.351	14.38	0.000	0.000
100.00-90.00					B	5.310	72.127		15.95	0.000	0.000
					C	5.321	77.145		14.98	0.000	0.000
T6 90.00-80.00	85.00	1.31	8	126.517	A	6.764	83.327	13.283	14.74	0.000	0.000
					B	5.758	75.892		16.27	0.000	0.000
					C	5.769	78.077		15.84	0.000	0.000
T7 80.00-60.00	70.00	1.24	8	283.450	A	14.773	172.545	28.124	15.01	0.000	0.000
					B	12.856	157.675		16.49	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	12.876	157.712		16.49	0.000	0.000
T8 60.00-40.00	50.00	1.126	7	323.362	A	19.222	172.730	28.309	14.75	0.000	0.000
					B	17.092	157.860		16.18	0.000	0.000
					C	17.115	157.897		16.18	0.000	0.000
T9 40.00-20.00	30.00	1	6	363.756	A	21.262	175.677	29.807	15.14	0.000	0.000
					B	19.207	160.808		16.56	0.000	0.000
					C	19.229	159.395		16.69	0.000	0.000
T10 20.00-0.00	10.00	1	6	404.134	A	26.837	127.034	31.276	20.33	0.000	0.000
					B	25.350	117.369		21.91	0.000	0.000
					C	25.366	115.508		22.20	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	0.40	1.16	A	0.61	1.798	0.76	1	1	47.701	2.95	147.41	B
170.00-150.00			B	0.634	1.787	0.775	1	1	50.515			
			C	0.161	2.732	0.583	1	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	1	1	42.480	2.94	293.61	B
150.00-140.00			B	0.825	1.837	0.917	1	1	50.341			
			C	0.291	2.32	0.613	1	1	13.910			
T3	0.72	2.09	A	0.628	1.789	0.771	1	1	80.764	6.44	321.98	B
140.00-120.00			B	0.794	1.811	0.891	1	1	115.502			
			C	0.306	2.281	0.618	1	1	34.420			
T4	1.28	2.60	A	0.657	1.78	0.79	1	1	108.034	7.17	358.45	B
120.00-100.00			B	0.766	1.795	0.869	1	1	136.140			
			C	0.605	1.801	0.757	1	1	95.502			
T5	0.80	1.48	A	0.739	1.784	0.849	1	1	73.868	3.71	370.73	A
100.00-90.00			B	0.666	1.778	0.796	1	1	62.740			
			C	0.709	1.777	0.827	1	1	69.088			
T6	0.81	1.76	A	0.712	1.777	0.829	1	1	75.809	3.67	367.27	A
90.00-80.00			B	0.645	1.783	0.782	1	1	65.137			
			C	0.663	1.778	0.794	1	1	67.762			
T7	1.63	4.33	A	0.661	1.779	0.793	1	1	151.553	6.95	347.63	A
80.00-60.00			B	0.602	1.803	0.755	1	1	131.837			
			C	0.602	1.803	0.755	1	1	131.905			
T8	1.63	4.45	A	0.594	1.808	0.75	1	1	148.720	6.30	314.95	A
60.00-40.00			B	0.541	1.852	0.719	1	1	130.640			
			C	0.541	1.852	0.719	1	1	130.705			
T9	1.64	5.44	A	0.541	1.852	0.719	1	1	147.661	5.69	284.45	A
40.00-20.00			B	0.495	1.907	0.695	1	1	130.952			
			C	0.491	1.912	0.693	1	1	129.686			
T10	1.07	6.08	A	0.381	2.103	0.644	1	1	108.639	4.75	237.68	A
20.00-0.00			B	0.353	2.164	0.634	1	1	99.715			
			C	0.349	2.175	0.632	1	1	98.363			
Sum Weight:	10.27	30.51						OTM	4207.41 kip-ft	50.57		

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	0.40	1.16	A	0.61	1.798	0.76	0.825	1	47.701	2.95	147.41	B
170.00-150.00			B	0.634	1.787	0.775	0.825	1	50.515			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.825	1	41.579	2.89	289.29	B
150.00-140.00			B	0.825	1.837	0.917	0.825	1	49.601			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.72	2.09	A	0.628	1.789	0.771	0.825	1	79.023	6.36	318.25	B
140.00-120.00			B	0.794	1.811	0.891	0.825	1	114.161			
			C	0.306	2.281	0.618	0.825	1	32.682			
T4	1.28	2.60	A	0.657	1.78	0.79	0.825	1	105.680	7.07	353.48	B
120.00-100.00			B	0.766	1.795	0.869	0.825	1	134.251			
			C	0.605	1.801	0.757	0.825	1	93.557			
T5	0.80	1.48	A	0.739	1.784	0.849	0.825	1	72.755	3.65	365.15	A
100.00-90.00			B	0.666	1.778	0.796	0.825	1	61.811			
			C	0.709	1.777	0.827	0.825	1	68.157			
T6	0.81	1.76	A	0.712	1.777	0.829	0.825	1	74.625	3.62	361.54	A
90.00-80.00			B	0.645	1.783	0.782	0.825	1	64.129			
			C	0.663	1.778	0.794	0.825	1	66.752			
T7	1.63	4.33	A	0.661	1.779	0.793	0.825	1	148.968	6.83	341.70	A
80.00-60.00			B	0.602	1.803	0.755	0.825	1	129.587			
			C	0.602	1.803	0.755	0.825	1	129.651			
T8	1.63	4.45	A	0.594	1.808	0.75	0.825	1	145.356	6.16	307.83	A
60.00-40.00			B	0.541	1.852	0.719	0.825	1	127.648			
			C	0.541	1.852	0.719	0.825	1	127.710			
T9	1.64	5.44	A	0.541	1.852	0.719	0.825	1	143.940	5.55	277.28	A
40.00-20.00			B	0.495	1.907	0.695	0.825	1	127.591			
			C	0.491	1.912	0.693	0.825	1	126.321			
T10	1.07	6.08	A	0.381	2.103	0.644	0.825	1	103.942	4.55	227.41	A
20.00-0.00			B	0.353	2.164	0.634	0.825	1	95.279			
			C	0.349	2.175	0.632	0.825	1	93.924			
Sum Weight:	10.27	30.51						OTM	4148.53 kip-ft	49.63		

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	0.40	1.16	A	0.61	1.798	0.76	0.8	1	47.701	2.95	147.41	B
170.00-150.00			B	0.634	1.787	0.775	0.8	1	50.515			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.8	1	41.450	2.89	288.67	B
150.00-140.00			B	0.825	1.837	0.917	0.8	1	49.495			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.72	2.09	A	0.628	1.789	0.771	0.8	1	78.774	6.35	317.71	B
140.00-120.00			B	0.794	1.811	0.891	0.8	1	113.970			
			C	0.306	2.281	0.618	0.8	1	32.434			
T4	1.28	2.60	A	0.657	1.78	0.79	0.8	1	105.344	7.06	352.77	B
120.00-100.00			B	0.766	1.795	0.869	0.8	1	133.981			
			C	0.605	1.801	0.757	0.8	1	93.279			
T5	0.80	1.48	A	0.739	1.784	0.849	0.8	1	72.596	3.64	364.35	A
100.00-90.00			B	0.666	1.778	0.796	0.8	1	61.678			
			C	0.709	1.777	0.827	0.8	1	68.024			
T6	0.81	1.76	A	0.712	1.777	0.829	0.8	1	74.456	3.61	360.72	A
90.00-80.00			B	0.645	1.783	0.782	0.8	1	63.986			

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	0.663	1.778	0.794	0.8	1	66.608			
T7	1.63	4.33	A	0.661	1.779	0.793	0.8	1	148.599	6.82	340.85	A
80.00-60.00			B	0.602	1.803	0.755	0.8	1	129.266			
			C	0.602	1.803	0.755	0.8	1	129.329			
T8	1.63	4.45	A	0.594	1.808	0.75	0.8	1	144.875	6.14	306.81	A
60.00-40.00			B	0.541	1.852	0.719	0.8	1	127.221			
			C	0.541	1.852	0.719	0.8	1	127.282			
T9	1.64	5.44	A	0.541	1.852	0.719	0.8	1	143.408	5.53	276.26	A
40.00-20.00			B	0.495	1.907	0.695	0.8	1	127.111			
			C	0.491	1.912	0.693	0.8	1	125.840			
T10	1.07	6.08	A	0.381	2.103	0.644	0.8	1	103.271	4.52	225.94	A
20.00-0.00			B	0.353	2.164	0.634	0.8	1	94.645			
			C	0.349	2.175	0.632	0.8	1	93.290			
Sum Weight:	10.27	30.51						OTM	4140.12 kip-ft	49.49		

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	0.40	1.16	A	0.61	1.798	0.76	0.85	1	47.701	2.95	147.41	B
170.00-150.00			B	0.634	1.787	0.775	0.85	1	50.515			
			C	0.161	2.732	0.583	0.85	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.85	1	41.708	2.90	289.91	B
150.00-140.00			B	0.825	1.837	0.917	0.85	1	49.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.72	2.09	A	0.628	1.789	0.771	0.85	1	79.272	6.38	318.78	B
140.00-120.00			B	0.794	1.811	0.891	0.85	1	114.353			
			C	0.306	2.281	0.618	0.85	1	32.930			
T4	1.28	2.60	A	0.657	1.78	0.79	0.85	1	106.017	7.08	354.19	B
120.00-100.00			B	0.766	1.795	0.869	0.85	1	134.521			
			C	0.605	1.801	0.757	0.85	1	93.835			
T5	0.80	1.48	A	0.739	1.784	0.849	0.85	1	72.914	3.66	365.95	A
100.00-90.00			B	0.666	1.778	0.796	0.85	1	61.943			
			C	0.709	1.777	0.827	0.85	1	68.290			
T6	0.81	1.76	A	0.712	1.777	0.829	0.85	1	74.794	3.62	362.36	A
90.00-80.00			B	0.645	1.783	0.782	0.85	1	64.273			
			C	0.663	1.778	0.794	0.85	1	66.896			
T7	1.63	4.33	A	0.661	1.779	0.793	0.85	1	149.338	6.85	342.54	A
80.00-60.00			B	0.602	1.803	0.755	0.85	1	129.908			
			C	0.602	1.803	0.755	0.85	1	129.973			
T8	1.63	4.45	A	0.594	1.808	0.75	0.85	1	145.836	6.18	308.85	A
60.00-40.00			B	0.541	1.852	0.719	0.85	1	128.076			
			C	0.541	1.852	0.719	0.85	1	128.138			
T9	1.64	5.44	A	0.541	1.852	0.719	0.85	1	144.471	5.57	278.30	A
40.00-20.00			B	0.495	1.907	0.695	0.85	1	128.071			
			C	0.491	1.912	0.693	0.85	1	126.801			
T10	1.07	6.08	A	0.381	2.103	0.644	0.85	1	104.613	4.58	228.88	A
20.00-0.00			B	0.353	2.164	0.634	0.85	1	95.913			
			C	0.349	2.175	0.632	0.85	1	94.558			
Sum Weight:	10.27	30.51						OTM	4156.94 kip-ft	49.76		

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	1.06	1.49	A	0.934	1.976	1	1	1	97.692	4.85	242.43	B
170.00-150.00			B	0.947	1.998	1	1	1	99.050			
			C	0.299	2.299	0.616	1	1	20.604			
T2	0.73	1.64	A	1	2.1	1	1	1	73.210	3.19*	318.60	B
150.00-140.00			B	1	2.1	1	1	1	80.194			
			C	0.465	1.949	0.68	1	1	23.498			
T3	1.97	3.77	A	0.945	1.995	1	1	1	154.777	7.56*	378.07	B
140.00-120.00			B	1	2.1	1	1	1	194.378			
			C	0.459	1.958	0.678	1	1	55.227			
T4	3.41	4.44	A	0.925	1.962	1	1	1	188.964	8.99*	449.40	B
120.00-100.00			B	1	2.1	1	1	1	227.237			
			C	0.817	1.829	0.91	1	1	153.901			
T5	2.10	2.39	A	0.98	2.059	1	1	1	114.758	4.94*	494.28	A
100.00-90.00			B	0.972	2.044	1	1	1	113.821			
			C	0.914	1.945	0.996	1	1	106.720			
T6	2.15	2.70	A	0.959	2.02	1	1	1	122.173	5.05	504.63	A
90.00-80.00			B	0.953	2.008	1	1	1	121.336			
			C	0.855	1.867	0.943	1	1	103.462			
T7	4.37	6.30	A	0.901	1.925	0.984	1	1	253.085	9.42	471.11	A
80.00-60.00			B	0.895	1.918	0.979	1	1	250.939			
			C	0.778	1.801	0.879	1	1	198.288			
T8	4.37	6.58	A	0.807	1.821	0.902	1	1	239.948	7.68	383.84	A
60.00-40.00			B	0.801	1.817	0.897	1	1	238.907			
			C	0.698	1.776	0.818	1	1	191.573			
T9	4.40	7.67	A	0.739	1.784	0.849	1	1	234.995	6.54	327.07	B
40.00-20.00			B	0.735	1.782	0.845	1	1	235.243			
			C	0.634	1.787	0.775	1	1	187.400			
T10	2.88	8.52	A	0.523	1.872	0.71	1	1	161.538	4.77	238.73	B
20.00-0.00			B	0.52	1.875	0.708	1	1	163.165			
			C	0.456	1.964	0.676	1	1	136.437			
Sum Weight:	27.45	45.51			*$2A_g$ limit			OTM	5395.28 kip-ft	62.99		

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	1.06	1.49	A	0.934	1.976	1	0.825	1	97.076	4.85	242.43	B
170.00-150.00			B	0.947	1.998	1	0.825	1	99.050			
			C	0.299	2.299	0.616	0.825	1	19.988			
T2	0.73	1.64	A	1	2.1	1	0.825	1	72.033	3.19*	318.60	B
150.00-140.00			B	1	2.1	1	0.825	1	79.568			
			C	0.465	1.949	0.68	0.825	1	22.232			
T3	1.97	3.77	A	0.945	1.995	1	0.825	1	152.471	7.56*	378.07	B
140.00-120.00			B	1	2.1	1	0.825	1	190.620			
			C	0.459	1.958	0.678	0.825	1	52.922			
T4	3.41	4.44	A	0.925	1.962	1	0.825	1	186.046	8.99*	449.40	B
120.00-100.00			B	1	2.1	1	0.825	1	221.817			

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	0.817	1.829	0.91	0.825	1	149.897			
T5	2.10	2.39	A	0.98	2.059	1	0.825	1	113.358	4.93	492.69	A
100.00-90.00			B	0.972	2.044	1	0.825	1	111.085			
			C	0.914	1.945	0.996	0.825	1	104.452			
T6	2.15	2.70	A	0.959	2.02	1	0.825	1	120.001	4.96	495.65	A
90.00-80.00			B	0.953	2.008	1	0.825	1	117.814			
			C	0.855	1.867	0.943	0.825	1	101.109			
T7	4.37	6.30	A	0.901	1.925	0.984	0.825	1	247.588	9.22	460.88	A
80.00-60.00			B	0.895	1.918	0.979	0.825	1	242.714			
			C	0.778	1.801	0.879	0.825	1	193.336			
T8	4.37	6.58	A	0.807	1.821	0.902	0.825	1	233.677	7.48	373.81	A
60.00-40.00			B	0.801	1.817	0.897	0.825	1	229.973			
			C	0.698	1.776	0.818	0.825	1	185.908			
T9	4.40	7.67	A	0.739	1.784	0.849	0.825	1	228.365	6.35	317.75	A
40.00-20.00			B	0.735	1.782	0.845	0.825	1	225.927			
			C	0.634	1.787	0.775	0.825	1	181.356			
T10	2.88	8.52	A	0.523	1.872	0.71	0.825	1	154.954	4.53	226.61	B
20.00-0.00			B	0.52	1.875	0.708	0.825	1	154.881			
			C	0.456	1.964	0.676	0.825	1	130.277			
Sum Weight:	27.45	45.51			*2A_g limit			OTM	5353.77 kip-ft	62.05		

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	1.06	1.49	A	0.934	1.976	1	0.8	1	96.988	4.85	242.43	B
170.00-150.00			B	0.947	1.998	1	0.8	1	99.050			
			C	0.299	2.299	0.616	0.8	1	19.901			
T2	0.73	1.64	A	1	2.1	1	0.8	1	71.865	3.19*	318.60	B
150.00-140.00			B	1	2.1	1	0.8	1	79.478			
			C	0.465	1.949	0.68	0.8	1	22.051			
T3	1.97	3.77	A	0.945	1.995	1	0.8	1	152.141	7.56*	378.07	B
140.00-120.00			B	1	2.1	1	0.8	1	190.084			
			C	0.459	1.958	0.678	0.8	1	52.593			
T4	3.41	4.44	A	0.925	1.962	1	0.8	1	185.629	8.99*	449.40	B
120.00-100.00			B	1	2.1	1	0.8	1	221.043			
			C	0.817	1.829	0.91	0.8	1	149.325			
T5	2.10	2.39	A	0.98	2.059	1	0.8	1	113.157	4.92	491.82	A
100.00-90.00			B	0.972	2.044	1	0.8	1	110.694			
			C	0.914	1.945	0.996	0.8	1	104.128			
T6	2.15	2.70	A	0.959	2.02	1	0.8	1	119.691	4.94	494.37	A
90.00-80.00			B	0.953	2.008	1	0.8	1	117.311			
			C	0.855	1.867	0.943	0.8	1	100.773			
T7	4.37	6.30	A	0.901	1.925	0.984	0.8	1	246.803	9.19	459.42	A
80.00-60.00			B	0.895	1.918	0.979	0.8	1	241.539			
			C	0.778	1.801	0.879	0.8	1	192.629			
T8	4.37	6.58	A	0.807	1.821	0.902	0.8	1	232.781	7.45	372.38	A
60.00-40.00			B	0.801	1.817	0.897	0.8	1	228.696			
			C	0.698	1.776	0.818	0.8	1	185.099			
T9	4.40	7.67	A	0.739	1.784	0.849	0.8	1	227.418	6.33	316.43	A
40.00-20.00			B	0.735	1.782	0.845	0.8	1	224.597			
			C	0.634	1.787	0.775	0.8	1	180.493			
T10	2.88	8.52	A	0.523	1.872	0.71	0.8	1	154.013	4.50	224.89	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	0.52	1.875	0.708	0.8	1	153.698			
			C	0.456	1.964	0.676	0.8	1	129.397			
Sum Weight:	27.45	45.51			*2A_g limit			OTM	5347.24 kip-ft	61.91		

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	1.06	1.49	A	0.934	1.976	1	0.85	1	97.164	4.85	242.43	B
170.00-150.00			B	0.947	1.998	1	0.85	1	99.050			
			C	0.299	2.299	0.616	0.85	1	20.076			
T2	0.73	1.64	A	1	2.1	1	0.85	1	72.202	3.19*	318.60	B
150.00-140.00			B	1	2.1	1	0.85	1	79.657			
			C	0.465	1.949	0.68	0.85	1	22.413			
T3	1.97	3.77	A	0.945	1.995	1	0.85	1	152.800	7.56*	378.07	B
140.00-120.00			B	1	2.1	1	0.85	1	191.157			
			C	0.459	1.958	0.678	0.85	1	53.252			
T4	3.41	4.44	A	0.925	1.962	1	0.85	1	186.462	8.99*	449.40	B
120.00-100.00			B	1	2.1	1	0.85	1	222.592			
			C	0.817	1.829	0.91	0.85	1	150.469			
T5	2.10	2.39	A	0.98	2.059	1	0.85	1	113.558	4.94	493.56	A
100.00-90.00			B	0.972	2.044	1	0.85	1	111.476			
			C	0.914	1.945	0.996	0.85	1	104.776			
T6	2.15	2.70	A	0.959	2.02	1	0.85	1	120.312	4.97	496.94	A
90.00-80.00			B	0.953	2.008	1	0.85	1	118.318			
			C	0.855	1.867	0.943	0.85	1	101.445			
T7	4.37	6.30	A	0.901	1.925	0.984	0.85	1	248.373	9.25	462.34	A
80.00-60.00			B	0.895	1.918	0.979	0.85	1	243.889			
			C	0.778	1.801	0.879	0.85	1	194.044			
T8	4.37	6.58	A	0.807	1.821	0.902	0.85	1	234.573	7.50	375.24	A
60.00-40.00			B	0.801	1.817	0.897	0.85	1	231.249			
			C	0.698	1.776	0.818	0.85	1	186.717			
T9	4.40	7.67	A	0.739	1.784	0.849	0.85	1	229.312	6.38	319.07	A
40.00-20.00			B	0.735	1.782	0.845	0.85	1	227.258			
			C	0.634	1.787	0.775	0.85	1	182.219			
T10	2.88	8.52	A	0.523	1.872	0.71	0.85	1	155.894	4.57	228.34	B
20.00-0.00			B	0.52	1.875	0.708	0.85	1	156.065			
			C	0.456	1.964	0.676	0.85	1	131.157			
Sum Weight:	27.45	45.51			*2A_g limit			OTM	5360.30 kip-ft	62.19		

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	0.40	1.16	A	0.61	1.798	0.76	1	1	47.701	1.02	51.01	B

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	0.634	1.787	0.775	1	1	50.515			
			C	0.161	2.732	0.583	1	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	1	1	42.480	1.02	101.59	B
150.00-140.00			B	0.825	1.837	0.917	1	1	50.341			
			C	0.291	2.32	0.613	1	1	13.910			
T3	0.72	2.09	A	0.628	1.789	0.771	1	1	80.764	2.23	111.41	B
140.00-120.00			B	0.794	1.811	0.891	1	1	115.502			
			C	0.306	2.281	0.618	1	1	34.420			
T4	1.28	2.60	A	0.657	1.78	0.79	1	1	108.034	2.48	124.03	B
120.00-100.00			B	0.766	1.795	0.869	1	1	136.140			
			C	0.605	1.801	0.757	1	1	95.502			
T5	0.80	1.48	A	0.739	1.784	0.849	1	1	73.868	1.28	128.28	A
100.00-90.00			B	0.666	1.778	0.796	1	1	62.740			
			C	0.709	1.777	0.827	1	1	69.088			
T6	0.81	1.76	A	0.712	1.777	0.829	1	1	75.809	1.27	127.08	A
90.00-80.00			B	0.645	1.783	0.782	1	1	65.137			
			C	0.663	1.778	0.794	1	1	67.762			
T7	1.63	4.33	A	0.661	1.779	0.793	1	1	151.553	2.41	120.29	A
80.00-60.00			B	0.602	1.803	0.755	1	1	131.837			
			C	0.602	1.803	0.755	1	1	131.905			
T8	1.63	4.45	A	0.594	1.808	0.75	1	1	148.720	2.18	108.98	A
60.00-40.00			B	0.541	1.852	0.719	1	1	130.640			
			C	0.541	1.852	0.719	1	1	130.705			
T9	1.64	5.44	A	0.541	1.852	0.719	1	1	147.661	1.97	98.42	A
40.00-20.00			B	0.495	1.907	0.695	1	1	130.952			
			C	0.491	1.912	0.693	1	1	129.686			
T10	1.07	6.08	A	0.381	2.103	0.644	1	1	108.639	1.64	82.24	A
20.00-0.00			B	0.353	2.164	0.634	1	1	99.715			
			C	0.349	2.175	0.632	1	1	98.363			
Sum Weight:	10.27	30.51						OTM	1455.85 kip-ft	17.50		

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	0.40	1.16	A	0.61	1.798	0.76	0.825	1	47.701	1.02	51.01	B
170.00-150.00			B	0.634	1.787	0.775	0.825	1	50.515			
			C	0.161	2.732	0.583	0.825	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.825	1	41.579	1.00	100.10	B
150.00-140.00			B	0.825	1.837	0.917	0.825	1	49.601			
			C	0.291	2.32	0.613	0.825	1	12.952			
T3	0.72	2.09	A	0.628	1.789	0.771	0.825	1	79.023	2.20	110.12	B
140.00-120.00			B	0.794	1.811	0.891	0.825	1	114.161			
			C	0.306	2.281	0.618	0.825	1	32.682			
T4	1.28	2.60	A	0.657	1.78	0.79	0.825	1	105.680	2.45	122.31	B
120.00-100.00			B	0.766	1.795	0.869	0.825	1	134.251			
			C	0.605	1.801	0.757	0.825	1	93.557			
T5	0.80	1.48	A	0.739	1.784	0.849	0.825	1	72.755	1.26	126.35	A
100.00-90.00			B	0.666	1.778	0.796	0.825	1	61.811			
			C	0.709	1.777	0.827	0.825	1	68.157			
T6	0.81	1.76	A	0.712	1.777	0.829	0.825	1	74.625	1.25	125.10	A
90.00-80.00			B	0.645	1.783	0.782	0.825	1	64.129			
			C	0.663	1.778	0.794	0.825	1	66.752			

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	1.63	4.33	A	0.661	1.779	0.793	0.825	1	148.968	2.36	118.23	A
80.00-60.00			B	0.602	1.803	0.755	0.825	1	129.587			
			C	0.602	1.803	0.755	0.825	1	129.651			
T8	1.63	4.45	A	0.594	1.808	0.75	0.825	1	145.356	2.13	106.52	A
60.00-40.00			B	0.541	1.852	0.719	0.825	1	127.648			
			C	0.541	1.852	0.719	0.825	1	127.710			
T9	1.64	5.44	A	0.541	1.852	0.719	0.825	1	143.940	1.92	95.94	A
40.00-20.00			B	0.495	1.907	0.695	0.825	1	127.591			
			C	0.491	1.912	0.693	0.825	1	126.321			
T10	1.07	6.08	A	0.381	2.103	0.644	0.825	1	103.942	1.57	78.69	A
20.00-0.00			B	0.353	2.164	0.634	0.825	1	95.279			
			C	0.349	2.175	0.632	0.825	1	93.924			
Sum Weight:	10.27	30.51						OTM	1435.48 kip-ft	17.17		

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	0.40	1.16	A	0.61	1.798	0.76	0.8	1	47.701	1.02	51.01	B
170.00-150.00			B	0.634	1.787	0.775	0.8	1	50.515			
			C	0.161	2.732	0.583	0.8	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.8	1	41.450	1.00	99.89	B
150.00-140.00			B	0.825	1.837	0.917	0.8	1	49.495			
			C	0.291	2.32	0.613	0.8	1	12.815			
T3	0.72	2.09	A	0.628	1.789	0.771	0.8	1	78.774	2.20	109.93	B
140.00-120.00			B	0.794	1.811	0.891	0.8	1	113.970			
			C	0.306	2.281	0.618	0.8	1	32.434			
T4	1.28	2.60	A	0.657	1.78	0.79	0.8	1	105.344	2.44	122.06	B
120.00-100.00			B	0.766	1.795	0.869	0.8	1	133.981			
			C	0.605	1.801	0.757	0.8	1	93.279			
T5	0.80	1.48	A	0.739	1.784	0.849	0.8	1	72.596	1.26	126.07	A
100.00-90.00			B	0.666	1.778	0.796	0.8	1	61.678			
			C	0.709	1.777	0.827	0.8	1	68.024			
T6	0.81	1.76	A	0.712	1.777	0.829	0.8	1	74.456	1.25	124.82	A
90.00-80.00			B	0.645	1.783	0.782	0.8	1	63.986			
			C	0.663	1.778	0.794	0.8	1	66.608			
T7	1.63	4.33	A	0.661	1.779	0.793	0.8	1	148.599	2.36	117.94	A
80.00-60.00			B	0.602	1.803	0.755	0.8	1	129.266			
			C	0.602	1.803	0.755	0.8	1	129.329			
T8	1.63	4.45	A	0.594	1.808	0.75	0.8	1	144.875	2.12	106.16	A
60.00-40.00			B	0.541	1.852	0.719	0.8	1	127.221			
			C	0.541	1.852	0.719	0.8	1	127.282			
T9	1.64	5.44	A	0.541	1.852	0.719	0.8	1	143.408	1.91	95.59	A
40.00-20.00			B	0.495	1.907	0.695	0.8	1	127.111			
			C	0.491	1.912	0.693	0.8	1	125.840			
T10	1.07	6.08	A	0.381	2.103	0.644	0.8	1	103.271	1.56	78.18	A
20.00-0.00			B	0.353	2.164	0.634	0.8	1	94.645			
			C	0.349	2.175	0.632	0.8	1	93.290			
Sum Weight:	10.27	30.51						OTM	1432.57 kip-ft	17.13		

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 ft^2	F K	w plf	Ctrl. Face
T1	0.40	1.16	A	0.61	1.798	0.76	0.85	1	47.701	1.02	51.01	B
170.00-150.00			B	0.634	1.787	0.775	0.85	1	50.515			
			C	0.161	2.732	0.583	0.85	1	9.663			
T2	0.28	1.12	A	0.742	1.785	0.851	0.85	1	41.708	1.00	100.31	B
150.00-140.00			B	0.825	1.837	0.917	0.85	1	49.707			
			C	0.291	2.32	0.613	0.85	1	13.089			
T3	0.72	2.09	A	0.628	1.789	0.771	0.85	1	79.272	2.21	110.30	B
140.00-120.00			B	0.794	1.811	0.891	0.85	1	114.353			
			C	0.306	2.281	0.618	0.85	1	32.930			
T4	1.28	2.60	A	0.657	1.78	0.79	0.85	1	106.017	2.45	122.56	B
120.00-100.00			B	0.766	1.795	0.869	0.85	1	134.521			
			C	0.605	1.801	0.757	0.85	1	93.835			
T5	0.80	1.48	A	0.739	1.784	0.849	0.85	1	72.914	1.27	126.62	A
100.00-90.00			B	0.666	1.778	0.796	0.85	1	61.943			
			C	0.709	1.777	0.827	0.85	1	68.290			
T6	0.81	1.76	A	0.712	1.777	0.829	0.85	1	74.794	1.25	125.38	A
90.00-80.00			B	0.645	1.783	0.782	0.85	1	64.273			
			C	0.663	1.778	0.794	0.85	1	66.896			
T7	1.63	4.33	A	0.661	1.779	0.793	0.85	1	149.338	2.37	118.53	A
80.00-60.00			B	0.602	1.803	0.755	0.85	1	129.908			
			C	0.602	1.803	0.755	0.85	1	129.973			
T8	1.63	4.45	A	0.594	1.808	0.75	0.85	1	145.836	2.14	106.87	A
60.00-40.00			B	0.541	1.852	0.719	0.85	1	128.076			
			C	0.541	1.852	0.719	0.85	1	128.138			
T9	1.64	5.44	A	0.541	1.852	0.719	0.85	1	144.471	1.93	96.30	A
40.00-20.00			B	0.495	1.907	0.695	0.85	1	128.071			
			C	0.491	1.912	0.693	0.85	1	126.801			
T10	1.07	6.08	A	0.381	2.103	0.644	0.85	1	104.613	1.58	79.20	A
20.00-0.00			B	0.353	2.164	0.634	0.85	1	95.913			
			C	0.349	2.175	0.632	0.85	1	94.558			
Sum Weight:	10.27	30.51						OTM	1438.39 kip-ft	17.22		

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	10.77					
Total Member Self-Weight	30.51			-3.19	-0.23	
Total Weight	52.73			-3.19	-0.23	
Wind 0 deg - No Ice		-0.03	-66.24	-6320.60	1.91	0.02
Wind 30 deg - No Ice		32.62	-56.61	-5426.03	-3124.00	-6.21
Wind 45 deg - No Ice		46.30	-46.02	-4412.00	-4446.65	-8.16
Wind 60 deg - No Ice		56.64	-32.40	-3106.01	-5445.22	-9.43
Wind 90 deg - No Ice		65.46	0.23	24.99	-6276.05	-11.11
Wind 120 deg - No Ice		57.44	33.40	3179.32	-5484.67	-9.95
Wind 135 deg - No Ice		46.31	46.30	4428.72	-4447.53	-8.13
Wind 150 deg - No Ice		32.90	56.74	5425.74	-3161.19	-5.44

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 180 deg - No Ice		0.21	65.38	6270.38	-25.58	2.23
Wind 210 deg - No Ice		-32.71	56.66	5417.67	3138.89	6.45
Wind 225 deg - No Ice		-46.18	46.20	4418.30	4432.82	8.77
Wind 240 deg - No Ice		-57.32	33.29	3169.14	5470.84	11.29
Wind 270 deg - No Ice		-65.39	0.09	10.16	6266.11	13.34
Wind 300 deg - No Ice		-56.55	-32.58	-3127.08	5430.54	11.97
Wind 315 deg - No Ice		-46.24	-46.15	-4426.77	4435.11	9.88
Wind 330 deg - No Ice		-32.68	-56.68	-5433.35	3127.72	6.25
Member Ice	15.00					
Total Weight Ice	89.90			-8.37	-3.22	
Wind 0 deg - Ice		-0.02	-77.82	-7402.73	-1.84	7.32
Wind 30 deg - Ice		38.44	-66.66	-6378.41	-3675.42	-4.39
Wind 45 deg - Ice		54.47	-54.24	-5194.64	-5219.54	-9.45
Wind 60 deg - Ice		66.63	-38.23	-3664.13	-6391.37	-13.76
Wind 90 deg - Ice		77.05	0.18	13.88	-7369.77	-20.27
Wind 120 deg - Ice		67.45	39.13	3707.34	-6417.58	-21.56
Wind 135 deg - Ice		54.47	54.46	5195.55	-5219.87	-19.66
Wind 150 deg - Ice		38.66	66.75	6365.93	-3704.78	-16.32
Wind 180 deg - Ice		0.16	76.91	7356.57	-23.23	-5.43
Wind 210 deg - Ice		-38.51	66.70	6359.78	3681.38	4.58
Wind 225 deg - Ice		-54.37	54.39	5187.65	5202.45	9.95
Wind 240 deg - Ice		-67.36	39.05	3699.73	6400.73	15.33
Wind 270 deg - Ice		-76.99	0.07	2.63	7355.71	22.06
Wind 300 deg - Ice		-66.55	-38.37	-3680.46	6373.18	23.02
Wind 315 deg - Ice		-54.42	-54.34	-5206.02	5203.74	21.05
Wind 330 deg - Ice		-38.48	-66.71	-6383.96	3671.75	16.96
Total Weight	52.73			-3.19	-0.23	
Wind 0 deg - Service		-0.01	-22.92	-2191.37	1.67	0.01
Wind 30 deg - Service		11.29	-19.59	-1881.83	-1079.96	-2.15
Wind 45 deg - Service		16.02	-15.92	-1530.95	-1537.62	-2.82
Wind 60 deg - Service		19.60	-11.21	-1079.05	-1883.14	-3.26
Wind 90 deg - Service		22.65	0.08	4.34	-2170.63	-3.85
Wind 120 deg - Service		19.87	11.56	1095.80	-1896.80	-3.44
Wind 135 deg - Service		16.02	16.02	1528.12	-1537.92	-2.81
Wind 150 deg - Service		11.38	19.63	1873.11	-1092.82	-1.88
Wind 180 deg - Service		0.07	22.62	2165.37	-7.84	0.77
Wind 210 deg - Service		-11.32	19.61	1870.32	1087.14	2.23
Wind 225 deg - Service		-15.98	15.99	1524.51	1534.86	3.04
Wind 240 deg - Service		-19.83	11.52	1092.28	1894.04	3.91
Wind 270 deg - Service		-22.63	0.03	-0.79	2169.22	4.62
Wind 300 deg - Service		-19.57	-11.27	-1086.34	1880.09	4.14
Wind 315 deg - Service		-16.00	-15.97	-1536.06	1535.65	3.42
Wind 330 deg - Service		-11.31	-19.61	-1884.36	1083.27	2.16

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

Comb. No.	Description
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	30.59	-0.37	0.26
			Max. Compression	19	-36.45	0.02	0.48
			Max. Mx	30	-35.39	0.39	-0.27
			Max. My	19	-36.45	0.02	0.48
			Max. Vy	30	-4.12	0.39	-0.27
			Max. Vx	19	-4.90	0.02	0.48
		Diagonal	Max Tension	34	3.98	0.00	0.00
			Max. Compression	34	-4.04	0.00	0.00
			Max. Mx	19	3.23	-0.00	0.00
			Max. My	33	-3.67	-0.00	0.00
			Max. Vy	19	0.01	-0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	33	0.00	0.00	0.00
		Top Girt	Max Tension	21	0.02	0.00	0.00
			Max. Compression	32	-0.04	0.00	0.00
			Max. Mx	18	-0.02	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	22	0.15	0.00	0.00
			Max. Compression	19	-0.16	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
T2	150 - 140	Leg	Max Tension	22	36.47	-0.45	0.04
			Max. Compression	19	-43.02	2.92	0.23
			Max. Mx	22	35.93	-3.40	0.27
			Max. My	31	-4.37	-0.23	-4.03
			Max. Vy	27	0.61	-3.35	-0.27
			Max. Vx	31	0.82	-0.23	-4.03
		Diagonal	Max Tension	32	6.01	0.00	0.00
			Max. Compression	24	-6.58	0.00	0.00
			Max. Mx	22	4.42	0.05	0.00
			Max. My	33	-5.34	-0.02	-0.03
			Max. Vy	22	0.02	0.05	0.00
			Max. Vx	33	0.01	0.00	0.00
		Top Girt	Max Tension	22	0.42	0.00	0.00
			Max. Compression	19	-0.36	0.00	0.00
			Max. Mx	18	0.03	-0.02	0.00
			Max. My	31	0.03	0.00	0.00
			Max. Vy	18	-0.02	0.00	0.00
			Max. Vx	31	-0.00	0.00	0.00
T3	140 - 120	Leg	Max Tension	32	74.29	-3.66	-0.22
			Max. Compression	19	-88.00	3.11	-0.05
			Max. Mx	32	73.24	-3.90	-0.14
			Max. My	23	-8.84	-0.36	5.81
			Max. Vy	27	0.65	-3.61	-0.10
			Max. Vx	23	-0.73	-0.36	5.81
		Diagonal	Max Tension	28	9.38	0.00	0.00
			Max. Compression	29	-9.90	0.00	0.00
			Max. Mx	19	6.51	0.12	0.00
			Max. My	22	-6.98	-0.03	0.03
			Max. Vy	19	-0.03	0.12	0.00
			Max. Vx	22	-0.01	0.00	0.00
T4	120 - 100	Leg	Max Tension	22	123.12	-5.18	-0.00
			Max. Compression	19	-143.19	4.24	-0.05
			Max. Mx	19	-114.35	6.10	-0.02
			Max. My	31	-11.61	-0.43	-8.10
			Max. Vy	19	-0.89	6.10	-0.02
			Max. Vx	31	1.60	-0.43	-8.10
		Diagonal	Max Tension	33	11.92	0.00	0.00
			Max. Compression	25	-12.75	0.00	0.00
			Max. Mx	19	7.76	0.10	-0.01
			Max. My	33	-11.33	-0.03	-0.04
			Max. Vy	22	0.03	0.10	0.00
			Max. Vx	33	0.01	0.00	0.00
		Mid Girt	Max Tension	22	3.48	0.00	0.00
			Max. Compression	19	-2.77	0.00	0.00
			Max. Mx	22	3.48	-0.07	0.00
			Max. My	31	0.29	0.00	0.00
			Max. Vy	22	0.03	0.00	0.00
			Max. Vx	31	0.00	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T5	100 - 90	Leg	Max Tension	22	151.92	-5.08	0.16
			Max. Compression	19	-175.67	4.40	-0.01
			Max. Mx	22	151.92	-5.08	0.16
			Max. My	31	-12.86	-0.43	-8.10
			Max. Vy	32	-0.25	-5.08	-0.29
			Max. Vx	31	-0.54	-0.43	-8.10
		Diagonal	Max Tension	26	13.77	0.00	0.00
			Max. Compression	26	-14.14	0.00	0.00
			Max. Mx	19	10.70	0.18	-0.01
			Max. My	31	-7.12	0.04	-0.02
			Max. Vy	19	-0.05	0.18	-0.01
			Max. Vx	31	0.00	0.00	0.00
T6	90 - 80	Leg	Max Tension	22	181.44	-4.27	-0.04
			Max. Compression	19	-208.57	6.08	-0.04
			Max. Mx	24	-207.61	6.08	0.12
			Max. My	23	-14.78	0.02	4.72
			Max. Vy	27	0.45	-6.03	0.05
			Max. Vx	31	0.28	0.03	-4.72
		Diagonal	Max Tension	26	13.84	0.00	0.00
			Max. Compression	26	-14.20	0.00	0.00
			Max. Mx	19	10.99	0.15	-0.01
			Max. My	24	-0.59	0.08	0.02
			Max. Vy	19	-0.05	0.15	-0.01
			Max. Vx	24	0.00	0.00	0.00
T7	80 - 60	Leg	Max Tension	22	237.84	-5.21	-0.01
			Max. Compression	19	-272.12	5.78	-0.01
			Max. Mx	24	-238.83	6.08	0.12
			Max. My	20	-15.62	-0.09	-5.39
			Max. Vy	27	-0.25	-6.03	0.05
			Max. Vx	23	-0.22	-0.08	5.38
		Diagonal	Max Tension	26	14.95	0.00	0.00
			Max. Compression	26	-15.37	0.00	0.00
			Max. Mx	19	11.86	0.15	-0.01
			Max. My	32	-13.31	0.03	-0.02
			Max. Vy	22	0.05	0.15	0.01
			Max. Vx	32	0.00	0.00	0.00
T8	60 - 40	Leg	Max Tension	22	291.49	-5.31	-0.02
			Max. Compression	19	-333.64	5.84	-0.03
			Max. Mx	22	290.77	-7.34	0.03
			Max. My	20	-20.47	0.05	-6.29
			Max. Vy	32	0.33	-7.33	-0.08
			Max. Vx	23	-0.22	0.06	6.29
		Diagonal	Max Tension	26	15.42	0.00	0.00
			Max. Compression	26	-15.82	0.00	0.00
			Max. Mx	24	11.77	0.22	0.01
			Max. My	32	-13.64	0.02	-0.03
			Max. Vy	24	-0.06	0.22	0.01
			Max. Vx	32	0.00	0.00	0.00
T9	40 - 20	Leg	Max Tension	22	340.44	-3.43	-0.02
			Max. Compression	24	-393.52	0.11	-0.01
			Max. Mx	22	339.63	-11.99	-0.02
			Max. My	23	-21.98	-0.76	6.21
			Max. Vy	32	0.97	-11.98	0.00
			Max. Vx	23	0.27	2.47	6.10
		Diagonal	Max Tension	26	16.85	0.00	0.00
			Max. Compression	26	-16.46	0.00	0.00
			Max. Mx	24	12.00	0.23	0.02
			Max. My	32	-12.73	0.07	-0.03
			Max. Vy	22	0.08	0.22	0.02
			Max. Vx	32	0.00	0.00	0.00
T10	20 - 0	Leg	Max Tension	22	382.86	3.30	-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	24	-450.01	-0.00	-0.00
			Max. Mx	24	-418.77	15.85	0.00
			Max. My	23	-31.42	9.51	10.65
			Max. Vy	24	1.65	15.85	0.00
			Max. Vx	23	1.16	9.51	10.65
		Diagonal	Max Tension	33	20.64	0.00	0.00
			Max. Compression	26	-18.39	0.00	0.00
			Max. Mx	22	9.02	0.30	0.02
			Max. My	32	-16.89	0.14	-0.04
			Max. Vy	22	0.09	0.30	0.02
			Max. Vx	32	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	459.35	36.70	-21.71
	Max. H_x	30	459.35	36.70	-21.71
	Max. H_z	21	-383.47	-43.35	26.59
	Min. Vert	22	-397.97	-45.19	26.55
	Min. H_x	22	-397.97	-45.19	26.55
	Min. H_z	30	459.35	36.70	-21.71
Leg B	Max. Vert	24	460.42	-36.68	-21.91
	Max. H_x	32	-397.53	45.04	26.78
	Max. H_z	33	-383.01	43.17	26.88
	Min. Vert	32	-397.53	45.04	26.78
	Min. H_x	24	460.42	-36.68	-21.91
	Min. H_z	24	460.42	-36.68	-21.91
Leg A	Max. Vert	19	459.92	0.21	42.63
	Max. H_x	31	29.81	4.65	-5.01
	Max. H_z	19	459.92	0.21	42.63
	Min. Vert	27	-397.35	-0.16	-52.44
	Min. H_x	23	29.15	-4.59	-5.08
	Min. H_z	27	-397.35	-0.16	-52.44

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	52.67	0.00	0.00	-3.20	-0.23	-0.00
Dead+Wind 0 deg - No Ice	52.67	-0.03	-66.24	-6345.33	1.91	0.02
Dead+Wind 30 deg - No Ice	52.67	32.62	-56.61	-5447.36	-3136.24	-6.23
Dead+Wind 45 deg - No Ice	52.67	46.30	-46.02	-4429.38	-4464.09	-8.20
Dead+Wind 60 deg - No Ice	52.67	56.64	-32.40	-3118.28	-5466.59	-9.49
Dead+Wind 90 deg - No Ice	52.67	65.46	0.23	24.98	-6300.66	-11.20
Dead+Wind 120 deg - No Ice	52.67	57.44	33.40	3191.62	-5506.13	-10.02
Dead+Wind 135 deg - No Ice	52.67	46.31	46.30	4445.97	-4464.99	-8.17
Dead+Wind 150 deg - No Ice	52.67	32.90	56.74	5446.93	-3173.60	-5.46
Dead+Wind 180 deg - No Ice	52.67	0.21	65.38	6294.94	-25.66	2.23
Dead+Wind 210 deg - No Ice	52.67	-32.71	56.66	5438.83	3151.24	6.46
Dead+Wind 225 deg - No Ice	52.67	-46.18	46.20	4435.51	4450.25	8.81

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 240 deg - No Ice	52.67	-57.32	33.29	3181.40	5492.27	11.36
Dead+Wind 270 deg - No Ice	52.67	-65.39	0.09	10.09	6290.67	13.43
Dead+Wind 300 deg - No Ice	52.67	-56.55	-32.58	-3139.43	5451.84	12.04
Dead+Wind 315 deg - No Ice	52.67	-46.24	-46.15	-4444.19	4452.49	9.91
Dead+Wind 330 deg - No Ice	52.67	-32.68	-56.68	-5454.69	3139.96	6.27
Dead+Ice+Temp	89.84	-0.00	0.00	-8.43	-3.23	-0.00
Dead+Wind 0 deg+Ice+Temp	89.84	-0.02	-77.82	-7447.38	-1.89	7.35
Dead+Wind 30 deg+Ice+Temp	89.84	38.44	-66.66	-6417.03	-3697.63	-4.41
Dead+Wind 45 deg+Ice+Temp	89.84	54.47	-54.24	-5226.16	-5251.10	-9.52
Dead+Wind 60 deg+Ice+Temp	89.84	66.63	-38.23	-3686.45	-6430.04	-13.88
Dead+Wind 90 deg+Ice+Temp	89.84	77.05	0.18	13.74	-7414.31	-20.46
Dead+Wind 120 deg+Ice+Temp	89.84	67.45	39.13	3729.43	-6456.29	-21.71
Dead+Wind 135 deg+Ice+Temp	89.84	54.47	54.46	5226.73	-5251.47	-19.77
Dead+Wind 150 deg+Ice+Temp	89.84	38.66	66.75	6404.21	-3727.22	-16.39
Dead+Wind 180 deg+Ice+Temp	89.84	0.16	76.91	7400.96	-23.40	-5.46
Dead+Wind 210 deg+Ice+Temp	89.84	-38.51	66.70	6398.05	3703.64	4.60
Dead+Wind 225 deg+Ice+Temp	89.84	-54.37	54.39	5218.81	5233.92	10.01
Dead+Wind 240 deg+Ice+Temp	89.84	-67.36	39.05	3721.80	6439.32	15.45
Dead+Wind 270 deg+Ice+Temp	89.84	-76.99	0.07	2.42	7400.14	22.25
Dead+Wind 300 deg+Ice+Temp	89.84	-66.55	-38.37	-3702.91	6411.69	23.17
Dead+Wind 315 deg+Ice+Temp	89.84	-54.42	-54.34	-5237.63	5235.14	21.16
Dead+Wind 330 deg+Ice+Temp	89.84	-38.48	-66.71	-6422.62	3693.88	17.03
Dead+Wind 0 deg - Service	52.67	-0.01	-22.92	-2197.80	0.51	0.01
Dead+Wind 30 deg - Service	52.67	11.29	-19.59	-1887.06	-1085.38	-2.17
Dead+Wind 45 deg - Service	52.67	16.02	-15.92	-1534.80	-1544.86	-2.84
Dead+Wind 60 deg - Service	52.67	19.60	-11.21	-1081.12	-1891.75	-3.28
Dead+Wind 90 deg - Service	52.67	22.65	0.08	6.54	-2180.36	-3.86
Dead+Wind 120 deg - Service	52.67	19.87	11.56	1102.29	-1905.43	-3.47
Dead+Wind 135 deg - Service	52.67	16.02	16.02	1536.33	-1545.16	-2.84
Dead+Wind 150 deg - Service	52.67	11.38	19.63	1882.68	-1098.30	-1.90
Dead+Wind 180 deg - Service	52.67	0.07	22.62	2176.11	-9.03	0.77
Dead+Wind 210 deg - Service	52.67	-11.32	19.61	1879.88	1090.27	2.25
Dead+Wind 225 deg - Service	52.67	-15.98	15.99	1532.71	1539.77	3.06
Dead+Wind 240 deg - Service	52.67	-19.83	11.52	1098.76	1900.34	3.93
Dead+Wind 270 deg - Service	52.67	-22.63	0.03	1.39	2176.61	4.64
Dead+Wind 300 deg - Service	52.67	-19.57	-11.27	-1088.44	1886.35	4.17
Dead+Wind 315 deg - Service	52.67	-16.00	-15.97	-1539.93	1540.55	3.44
Dead+Wind 330 deg - Service	52.67	-11.31	-19.61	-1889.60	1086.37	2.18

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-52.67	0.00	0.00	52.67	0.00	0.000%
2	-0.03	-52.67	-66.24	0.03	52.67	66.24	0.000%
3	32.62	-52.67	-56.61	-32.62	52.67	56.61	0.000%
4	46.30	-52.67	-46.02	-46.30	52.67	46.02	0.000%
5	56.64	-52.67	-32.40	-56.64	52.67	32.40	0.000%
6	65.46	-52.67	0.23	-65.46	52.67	-0.23	0.000%
7	57.44	-52.67	33.40	-57.44	52.67	-33.40	0.000%
8	46.31	-52.67	46.30	-46.31	52.67	-46.30	0.000%
9	32.90	-52.67	56.74	-32.90	52.67	-56.74	0.000%
10	0.21	-52.67	65.38	-0.21	52.67	-65.38	0.000%
11	-32.71	-52.67	56.66	32.71	52.67	-56.66	0.000%
12	-46.18	-52.67	46.20	46.18	52.67	-46.20	0.000%
13	-57.32	-52.67	33.29	57.32	52.67	-33.29	0.000%
14	-65.39	-52.67	0.09	65.39	52.67	-0.09	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
15	-56.55	-52.67	-32.58	56.55	52.67	32.58	0.000%
16	-46.24	-52.67	-46.15	46.24	52.67	46.15	0.000%
17	-32.68	-52.67	-56.68	32.68	52.67	56.68	0.000%
18	0.00	-89.84	0.00	0.00	89.84	-0.00	0.000%
19	-0.02	-89.84	-77.82	0.02	89.84	77.82	0.000%
20	38.44	-89.84	-66.66	-38.44	89.84	66.66	0.000%
21	54.47	-89.84	-54.24	-54.47	89.84	54.24	0.000%
22	66.63	-89.84	-38.23	-66.63	89.84	38.23	0.000%
23	77.05	-89.84	0.18	-77.05	89.84	-0.18	0.000%
24	67.45	-89.84	39.13	-67.45	89.84	-39.13	0.000%
25	54.47	-89.84	54.46	-54.47	89.84	-54.46	0.000%
26	38.66	-89.84	66.75	-38.66	89.84	-66.75	0.000%
27	0.16	-89.84	76.91	-0.16	89.84	-76.91	0.000%
28	-38.51	-89.84	66.70	38.51	89.84	-66.70	0.000%
29	-54.37	-89.84	54.39	54.37	89.84	-54.39	0.000%
30	-67.36	-89.84	39.05	67.36	89.84	-39.05	0.000%
31	-76.99	-89.84	0.07	76.99	89.84	-0.07	0.000%
32	-66.55	-89.84	-38.37	66.55	89.84	38.37	0.000%
33	-54.42	-89.84	-54.34	54.42	89.84	54.34	0.000%
34	-38.48	-89.84	-66.71	38.48	89.84	66.71	0.000%
35	-0.01	-52.67	-22.92	0.01	52.67	22.92	0.000%
36	11.29	-52.67	-19.59	-11.29	52.67	19.59	0.000%
37	16.02	-52.67	-15.92	-16.02	52.67	15.92	0.000%
38	19.60	-52.67	-11.21	-19.60	52.67	11.21	0.000%
39	22.65	-52.67	0.08	-22.65	52.67	-0.08	0.000%
40	19.87	-52.67	11.56	-19.87	52.67	-11.56	0.000%
41	16.02	-52.67	16.02	-16.02	52.67	-16.02	0.000%
42	11.38	-52.67	19.63	-11.38	52.67	-19.63	0.000%
43	0.07	-52.67	22.62	-0.07	52.67	-22.62	0.000%
44	-11.32	-52.67	19.61	11.32	52.67	-19.61	0.000%
45	-15.98	-52.67	15.99	15.98	52.67	-15.99	0.000%
46	-19.83	-52.67	11.52	19.83	52.67	-11.52	0.000%
47	-22.63	-52.67	0.03	22.63	52.67	-0.03	0.000%
48	-19.57	-52.67	-11.27	19.57	52.67	11.27	0.000%
49	-16.00	-52.67	-15.97	16.00	52.67	15.97	0.000%
50	-11.31	-52.67	-19.61	11.31	52.67	19.61	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	0.00000069
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	0.00000071
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	0.00000076
20	Yes	4	0.00000001	0.00000117
21	Yes	4	0.00000001	0.00000112
22	Yes	4	0.00000001	0.00000114
23	Yes	4	0.00000001	0.00000139
24	Yes	4	0.00000001	0.00000113
25	Yes	4	0.00000001	0.00000109
26	Yes	4	0.00000001	0.00000114
27	Yes	4	0.00000001	0.00000108
28	Yes	4	0.00000001	0.00000116
29	Yes	4	0.00000001	0.00000106
30	Yes	4	0.00000001	0.00000110
31	Yes	4	0.00000001	0.00000141
32	Yes	4	0.00000001	0.00000118
33	Yes	4	0.00000001	0.00000111
34	Yes	4	0.00000001	0.00000114
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	6.283	35	0.3482	0.0543
T2	150 - 140	4.837	35	0.3199	0.0462
T3	140 - 120	4.171	35	0.3001	0.0388
T4	120 - 100	2.987	35	0.2457	0.0223
T5	100 - 90	2.010	35	0.1960	0.0113
T6	90 - 80	1.614	35	0.1660	0.0088
T7	80 - 60	1.275	40	0.1437	0.0070
T8	60 - 40	0.718	40	0.1064	0.0044
T9	40 - 20	0.325	40	0.0643	0.0025
T10	20 - 0	0.096	40	0.0293	0.0012

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	6.283	0.3482	0.0543	97724
179.75	15' Mount Pipe	35	6.283	0.3482	0.0543	97724
178.00	3" Dia 20' Omni	35	6.283	0.3482	0.0543	97724
175.00	2.5" x 14' Omni	35	6.283	0.3482	0.0543	97724
174.00	1.5" x 12' Omni	35	6.283	0.3482	0.0543	97724
170.00	APXV18-209014-C-A20	35	6.283	0.3482	0.0543	97724
168.00	HPD2-4.7	35	6.135	0.3456	0.0537	97724
159.50	APXV18-206517S-C w/ mounting hardware	35	5.511	0.3344	0.0509	46535
158.50	SC420-HF1LDF	35	5.439	0.3330	0.0505	42489
144.00	3" Dia 20' Omni	35	4.431	0.3088	0.0420	24224
141.00	2" Dia 15' Omni	35	4.235	0.3024	0.0396	24100
139.00	1.5" x 10' Omni	35	4.107	0.2977	0.0380	24079
138.50	9' Whip	35	4.075	0.2965	0.0376	24086
134.00	VHLP2.5-180	35	3.795	0.2847	0.0338	24267
125.50	PiROD 10' Lightweight T-Frame	35	3.293	0.2607	0.0266	24683
115.00	(2) TMA (shielded)	35	2.722	0.2333	0.0188	22714
101.00	SC-E 6014 rev2	35	2.053	0.1988	0.0116	18370
87.00	3"x2"x22" Panel	35	1.507	0.1584	0.0082	23284
84.50	TMA	40	1.422	0.1528	0.0078	25684
83.50	3' Stand-off	40	1.388	0.1507	0.0076	26774
83.00	3' Dish	40	1.372	0.1496	0.0075	27327
82.50	TMA	40	1.355	0.1486	0.0074	27876
80.00	3"x2"x22" Panel	40	1.275	0.1437	0.0070	30198
30.00	Camera	40	0.190	0.0457	0.0018	29689
24.00	PC9013N	40	0.129	0.0356	0.0014	30164

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	170 - 150	20.862	22	1.1416	0.2054
T2	150 - 140	16.116	22	1.0548	0.1712
T3	140 - 120	13.915	22	0.9913	0.1400
T4	120 - 100	9.998	19	0.8152	0.0836
T5	100 - 90	6.759	24	0.6527	0.0456
T6	90 - 80	5.443	24	0.5543	0.0373
T7	80 - 60	4.306	24	0.4810	0.0305
T8	60 - 40	2.433	24	0.3578	0.0202
T9	40 - 20	1.103	24	0.2171	0.0118
T10	20 - 0	0.326	24	0.0991	0.0057

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	22	20.862	1.1416	0.2054	32921
179.75	15' Mount Pipe	22	20.862	1.1416	0.2054	32921
178.00	3" Dia 20' Omni	22	20.862	1.1416	0.2054	32921
175.00	2.5" x 14' Omni	22	20.862	1.1416	0.2054	32921

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
174.00	1.5" x 12' Omni	22	20.862	1.1416	0.2054	32921
170.00	APXV18-209014-C-A20	22	20.862	1.1416	0.2054	32921
168.00	HPD2-4.7	22	20.378	1.1339	0.2030	32921
159.50	APXV18-206517S-C w/ mounting hardware	22	18.334	1.0999	0.1912	15677
158.50	SC420-HF1LDF	22	18.096	1.0956	0.1895	14313
144.00	3" Dia 20' Omni	22	14.777	1.0195	0.1531	7578
141.00	2" Dia 15' Omni	22	14.128	0.9988	0.1433	7337
139.00	1.5" x 10' Omni	22	13.704	0.9836	0.1368	7267
138.50	9' Whip	22	13.599	0.9796	0.1352	7262
134.00	VHLP2.5-180	22	12.672	0.9415	0.1214	7330
125.50	PiROD 10' Lightweight T-Frame	19	11.010	0.8639	0.0976	7522
115.00	(2) TMA (shielded)	19	9.119	0.7751	0.0718	6960
101.00	SC-E 6014 rev2	24	6.902	0.6621	0.0468	5600
87.00	3"x2"x22" Panel	24	5.085	0.5294	0.0352	7157
84.50	TMA	24	4.798	0.5109	0.0334	7879
83.50	3' Stand-off	24	4.687	0.5040	0.0328	8206
83.00	3' Dish	24	4.631	0.5006	0.0324	8371
82.50	TMA	24	4.576	0.4972	0.0321	8535
80.00	3"x2"x22" Panel	24	4.306	0.4810	0.0305	9222
30.00	Camera	24	0.646	0.1544	0.0086	8775
24.00	PC9013N	24	0.438	0.1205	0.0068	8891

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	4.04	6.44	0.627 ✔	1.333	Bolt Shear
T2	150	Leg	A325N	1.0000	6	6.08	34.56	0.176 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6.01	9.52	0.632 ✔	1.333	Member Bearing
		Top Girt	A325N	1.0000	1	0.42	9.52	0.044 ✔	1.333	Member Bearing
T3	140	Leg	A325N	1.0000	6	9.02	34.56	0.261 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	9.38	9.52	0.985 ✔	1.333	Member Bearing
T4	120	Leg	A325N	1.0000	6	16.25	34.56	0.470 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	11.92	9.52	1.253 ✔	1.333	Member Bearing
		Mid Girt	A325N	1.0000	1	3.48	9.52	0.365 ✔	1.333	Member Bearing
T5	100	Leg	A325N	1.0000	6	25.32	34.56	0.733 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	13.77	15.86	0.868 ✔	1.333	Member Bearing
T6	90	Leg	A325N	1.0000	6	30.24	34.56	0.875 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	13.84	15.86	0.873 ✔	1.333	Member Bearing
T7	80	Leg	A325N	1.0000	6	34.93	34.56	1.011 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	15.37	16.49	0.932 ✔	1.333	Bolt Shear
T8	60	Leg	A325N	1.2500	6	44.21	54.00	0.819 ✔	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	15.42	20.39	0.756 ✔	1.333	Member Bearing
T9	40	Leg	A325N	1.2500	6	52.95	54.00	0.981 ✔	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	1.2500	1	16.85	24.47	0.689 ✔	1.333	Member Bearing
T10	20	Diagonal	A325N	1.2500	1	20.64	20.39	1.012 ✔	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 P / P_a
T1	170 - 150	1 3/4	20.00	2.49	68.3 K=1.00	21.253	2.4053	-36.45	51.12	0.713 ✔
T2	150 - 140	Pirod 105244	10.02	10.02	45.4 K=1.00	25.051	3.6816	-43.02	92.23	0.466 ✔
T3	140 - 120	Pirod 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-88.00	92.23	0.954 ✔
T4	120 - 100	Pirod 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-143.19	138.54	1.034 ✔
T5	100 - 90	Pirod 105217	10.02	10.02	37.8 K=1.00	26.132	5.3014	-175.68	138.54	1.268 ✔
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5 K=1.00	26.968	7.6570	-208.57	206.49	1.010 ✔
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6 K=1.00	27.439	9.9280	-272.12	272.41	0.999 ✔
T8	60 - 40	Pirod 105219	20.03	10.02	28.4 K=1.00	27.351	9.4248	-333.64	257.78	1.294 ✔
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4 K=1.00	27.705	11.7803	-393.52	326.37	1.206 ✔
T10	20 - 0	Pirod 105220 reinf w/ 1" dia bar	20.03	10.02	24.3 K=1.00	27.824	14.2843	-450.01	397.44	1.132 ✔

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	0.88	2.24	0.394 ✔
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.74	2.23	0.334 ✔
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.61	2.26	0.711 ✔
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.54	2.26	0.239

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
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.45	2.30	0.196 ✓
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.25	2.33	0.106 ✓
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.33	4.69	0.071 ✓
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.176 ✓
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.72	4.75	0.361 ✓

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	-4.04	7.22	0.559 ✓
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	121.3 K=1.00	10.097	0.9020	-6.58	9.11	0.722 ✓
T3	140 - 120	L3x3x3/16	12.50	5.65	115.3 K=1.01	10.840	1.0900	-9.90	11.82	0.838 ✓
T4	120 - 100	L3x3x3/16	13.80	6.35	127.8 K=1.00	9.141	1.0900	-12.75	9.96	1.279 ✓
T5	100 - 90	L3x3x5/16	14.50	6.72	136.9 K=1.00	7.969	1.7800	-14.14	14.19	0.997 ✓
T6	90 - 80	L3x3x5/16	15.24	7.10	144.7 K=1.00	7.132	1.7800	-14.20	12.69	1.119 ✓
T7	80 - 60	L3x3x3/8	16.80	7.90	161.6 K=1.00	5.721	2.1100	-15.37	12.07	1.273 ✓
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.70	151.3 K=1.00	6.527	2.0900	-15.82	13.64	1.160 ✓
T9	40 - 20	L3 1/2x3 1/2x3/8	20.16	9.56	167.0 K=1.00	5.353	2.4800	-15.16	13.28	1.142 ✓
T10	20 - 0	L4x4x5/16	21.03	10.01	151.8 K=1.00	6.477	2.4000	-18.39	15.54	1.183 ✓

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	-0.04	2.58	0.014 ✓
T2	150 - 140	L3x3x3/16	5.00	4.48	105.1 K=1.17	12.131	1.0900	-0.36	13.22	0.027 ✓

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 $\frac{P}{P_a}$

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	-0.16	2.58	0.061 ✔

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	7.63	153.5 K=1.00	6.336	1.0900	-2.77	6.91	0.401 ✔

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	30.59	72.16	0.424 ✔
T2	150 - 140	Pirod 105244	10.02	10.02	45.4	30.000	3.6816	36.47	110.45	0.330 ✔
T3	140 - 120	Pirod 105216	20.03	10.02	45.4	30.000	3.6816	74.29	110.45	0.673 ✔
T4	120 - 100	Pirod 105217	20.03	10.02	37.8	30.000	5.3014	123.12	159.04	0.774 ✔
T5	100 - 90	Pirod 105217	10.02	10.02	37.8	30.000	5.3014	151.92	159.04	0.955 ✔
T6	90 - 80	Pirod 105217 reinf w/ 1" dia bar	10.02	10.02	31.5	30.000	7.6570	181.44	229.71	0.790 ✔
T7	80 - 60	Pirod 105218 reinf w/ 1" dia bar	20.03	10.02	27.6	30.000	9.9280	237.84	297.84	0.799 ✔
T8	60 - 40	Pirod 105219	20.03	10.02	28.4	30.000	9.4248	291.49	282.74	1.031 ✔
T9	40 - 20	Pirod 105219 reinf w /1" dia bar	20.03	10.02	25.4	30.000	11.7803	340.44	353.41	0.963 ✔
T10	20 - 0	Pirod 105220 reinf w/ 1" dia	20.03	10.02	24.3	30.000	14.2843	382.86	428.53	0.893

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 $\frac{P}{P_a}$
		bar								✓

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	0.88	2.24	0.394 ✓
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	0.74	2.23	0.334 ✓
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	1.61	2.26	0.711 ✓
T5	100 - 90	0.5	1.47	120.0	10.279	0.1963	0.54	2.26	0.239 ✓
T6	90 - 80	0.5	1.46	118.8	10.452	0.1963	0.45	2.30	0.196 ✓
T7	80 - 60	0.5	1.44	117.8	10.592	0.1963	0.25	2.33	0.106 ✓
T8	60 - 40	0.625	1.45	94.4	13.671	0.3068	0.33	4.69	0.071 ✓
T9	40 - 20	0.625	1.44	93.7	16.133	0.3068	0.97	5.54	0.176 ✓
T10	20 - 0	0.625	1.42	93.0	13.845	0.3068	1.72	4.75	0.361 ✓

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	3.98	18.04	0.221 ✓
T2	150 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	80.1	21.600	0.9020	6.01	19.48	0.308 ✓
T3	140 - 120	L3x3x3/16	12.50	5.65	74.6	21.600	1.0900	9.38	23.54	0.398 ✓
T4	120 - 100	L3x3x3/16	13.80	6.35	83.5	21.600	1.0900	11.92	23.54	0.506 ✓
T5	100 - 90	L3x3x5/16	14.50	6.72	89.9	21.600	1.7800	13.77	38.45	0.358 ✓
T6	90 - 80	L3x3x5/16	15.24	7.10	94.9	21.600	1.7800	13.84	38.45	0.360 ✓
T7	80 - 60	L3x3x3/8	16.80	7.90	106.3	21.600	2.1100	14.95	45.58	0.328 ✓
T8	60 - 40	L3 1/2x3 1/2x5/16	18.45	8.70	99.2	21.600	2.0900	15.42	45.14	0.342 ✓

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 $\frac{P}{P_a}$
T9	40 - 20	L3 1/2x3 1/2x3/8	20.16	9.56	109.8	21.600	2.4800	16.85	53.57	0.315 ✔
T10	20 - 0	L4x4x5/16	21.92	10.45	103.3	21.600	2.4000	20.64	51.84	0.398 ✔

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 $\frac{P}{P_a}$
T1	170 - 150	7/8	5.00	4.85	266.3	30.000	0.6013	0.02	18.04	0.001 ✔
T2	150 - 140	L3x3x3/16	5.00	4.48	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 $\frac{P}{P_a}$
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 $\frac{P}{P_a}$
T4	120 - 100	L3x3x3/16	9.00	7.63	102.2	21.600	1.0900	3.48	23.54	0.148 ✔

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	-36.45	68.14	53.5	Pass
T2	150 - 140	Leg	Pirod 105244	60	-43.02	122.94	35.0	Pass
T3	140 - 120	Leg	Pirod 105216	72	-88.00	122.94	71.6	Pass
T4	120 - 100	Leg	Pirod 105217	87	-143.19	184.67	77.5	Pass
T5	100 - 90	Leg	Pirod 105217	105	-175.68	184.67	95.1	Pass
T6	90 - 80	Leg	Pirod 105217 reinf w/ 1" dia bar	114	-208.57	275.26	75.8	Pass
T7	80 - 60	Leg	Pirod 105218 reinf w/ 1" dia bar	123	-272.12	363.13	74.9	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T8	60 - 40	Leg	Pirod 105219	138	-333.64	343.62	97.1	Pass
T9	40 - 20	Leg	Pirod 105219 reinf w /1" dia bar	152	-393.52	435.06	90.5	Pass
T10	20 - 0	Leg	Pirod 105220 reinf w/ 1" dia bar	167	-450.01	529.79	84.9	Pass
T1	170 - 150	Diagonal	7/8	13	-4.04	9.62	42.0	Pass
T2	150 - 140	Diagonal	L2 1/2x2 1/2x3/16	66	-6.58	12.14	54.2	Pass
T3	140 - 120	Diagonal	L3x3x3/16	78	-9.90	15.75	62.9	Pass
T4	120 - 100	Diagonal	L3x3x3/16	93	-12.75	13.28	96.0	Pass
T5	100 - 90	Diagonal	L3x3x5/16	108	-14.14	18.91	74.8	Pass
T6	90 - 80	Diagonal	L3x3x5/16	117	-14.20	16.92	83.9	Pass
T7	80 - 60	Diagonal	L3x3x3/8	126	-15.37	16.09	95.5	Pass
T8	60 - 40	Diagonal	L3 1/2x3 1/2x5/16	141	-15.82	18.18	87.0	Pass
T9	40 - 20	Diagonal	L3 1/2x3 1/2x3/8	156	-15.16	17.70	85.6	Pass
T10	20 - 0	Diagonal	L4x4x5/16	177	-18.39	20.72	88.8	Pass
T1	170 - 150	Top Girt	7/8	6	-0.04	3.45	1.0	Pass
T2	150 - 140	Top Girt	L3x3x3/16	61	-0.36	17.63	2.0	Pass
T1	170 - 150	Bottom Girt	7/8	7	-0.16	3.45	4.6	Pass
T4	120 - 100	Mid Girt	L3x3x3/16	88	-2.77	9.21	30.1	Pass
							Summary	
						Leg (T8)	97.1	Pass
						Diagonal (T4)	96.0	Pass
						Top Girt (T2)	2.0	Pass
						Bottom Girt (T1)	4.6	Pass
						Mid Girt (T4)	30.1	Pass
						Bolt Checks	94.0	Pass
						RATING =	**97.1**	**Pass**

ANCHOR BOLT EVALUATION

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift := 398 kips	*user input*
Shear:	Shear := 53 kips	*user input*
Compression:	Compression := 460 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 ksi	*user input*	
Bolt Yield Strength:	Fy := 105 ksi	*user input*	
Bolt Modulus:	E := 29000 ksi	*user input*	
Thickness of Anchor Bolts	D := 1.25in	*user input*	
Threads per Inch:	n := 7	*user input*	
Coefficient of Friction:	μ := 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:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 66.3 \cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.82$$

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

Condition1 = "OK"

Check Anchor Bolt Area:

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

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 4.9 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 1.7 \cdot in^2$$

Provided Area:

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

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.84$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.30$$

Condition3 = "OK"

FOUNDATION EVALUATION

FOUNDATION ANALYSIS

Input Data

Maximum Pier Reactions:

Compression: $C_t := 460\,kips$ *user input*

Uplift: $U_t := 398\,kips$ *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 $Conc_{addl} := 5ft \cdot \left(13ft \cdot 13ft - \frac{\pi \cdot d_p^{\,2}}{4} \right)$

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

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 reinforcement per drawings by Tectonic, dated May 5, 2004

Loading:

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

$TotalDownLoad = 607.9\,kips$

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

$PierWeight = 256.8 \cdot kips$

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

$SoilShear = 556.6 \cdot kips$

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:

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

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

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

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

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

$\text{SafetyFactor}_{provided} = 2.04$

Check Cone Failure:

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

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

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

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

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

$\text{ConeSafetyFactor}_{provided} = 7.53$