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

November 5, 2012

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

RE: **EM-VER-028-121019** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 112 Munn Road, Colchester, Connecticut.

Dear Attorney Baldwin:

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:

- Prior to antenna installation, the modifications identified in the Detailed Structural Analysis prepared by URS Corporation dated July 13, 2012, and stamped by Richard Sambor shall be implemented;
- Not more than 45 days following completion of the antenna installation, a signed letter from a Professional Engineer duly licensed in the State of Connecticut shall be submitted to the Council to certify that the recommended modifications have been completed and the tower and foundation do not exceed 100 percent of the post-construction structural rating;
- Any deviation from the proposed modification as specified in this notice and supporting materials with 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;
- Not less than 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; and
- 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;

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 October 18, 2012. 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,

Linda Roberts
Executive Director

LR/CDM/jbw

c: The Honorable Gregg B. Schuster, First Selectman, Town of Colchester
Adam Turner, Town Planner, Town of Colchester
Brian Benito, Bureau of Police Support, Telecommunications Section

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Also admitted in Massachusetts

EM-VER-028-121019

ORIGINAL

October 18, 2012



Linda Roberts
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap**
**Munn Road, Colchester, Connecticut**

Dear Ms. Roberts:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 220-foot level on an existing 320-foot tower at the above-referenced address. The tower is owned by the Connecticut State Police. Cellco's use of the tower was approved by the Council in 1990. Cellco now intends to replace all of its existing antennas with six (6) model LPA-80080-4CF cellular antennas; three (3) model BXA-171085-8BF PCS antennas; and three (3) model BXA-70063-6CF LTE antennas, all at the same 220-foot level. Cellco also intends to install six (6) coax cable diplexers behind its antennas. Attached behind Tab 1 are the specifications for the replacement antennas and cable diplexers.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Gregg Schuster, First Selectman of the Town of Colchester. A copy of this letter is also being sent to the State of Connecticut, Emergency Services and Public Protection, the owner of the property on which the tower is located.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas and cable diplexers will be located at the 220-foot level on the existing 320-foot tower.

2. The proposed modifications do not involve any change to ground-mounted equipment and, therefore, will not require the extension of the site boundaries.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

4. The operation of the replacement antennas will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Tab 2.

Also attached is a Detailed Structural Analysis and Reinforcement Design confirming that the tower and foundation, with certain modifications, can support Cellco's proposed modifications. (See Tab 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

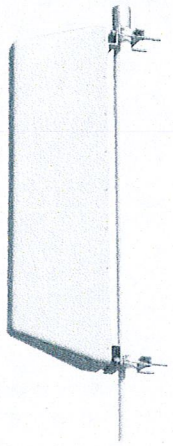
Enclosures
Copy to:
Gregg Schuster, Colchester First Selectman
DESPP, Division of the State Police
Sandy M. Carter

# LPA-80080-4CF-EDIN-X

## V-Pol | Log Periodic | 80° | 12.5 dBd

Replace "X" with desired electrical downtilt

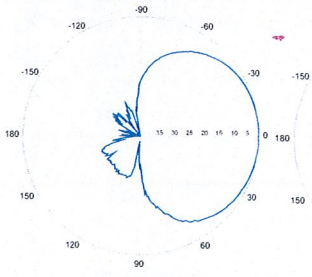
Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.



| Electrical Characteristics | | |
|---|---|---|
| Frequency bands | 806-960 MHz | |
| Polarization | Vertical | |
| Horizontal beamwidth | 80° | |
| Vertical beamwidth | 15° | |
| Gain | 12.5 dBd (14.6 dBi) | |
| Electrical downtilt (X) | 0, 2, 4, 5, 6, 8, 10, 12, 14 | |
| Impedance | 50Ω | |
| VSWR | ≤1.4:1 | |
| Upper sidelobe suppression (0°) | -14.2 dB | |
| Front-to-back ratio (+/-30°) | -34.7 dB | |
| Null fill | 15% (-16.48 dB) | |
| Input power | 500 W | |
| Lightning protection | Direct Ground | |
| Connector(s) | 1 Port / EDIN or NE / Female / Center (Back) | |
| **Mechanical Characteristics** | | |
| Dimensions Length x Width x Depth | 1200 x 140 x 335 mm | 47.2 x 5.5 x 13.2 in |
| Depth of antenna with z-bracket | 375 mm | 14.8 in |
| Weight without mounting brackets | 5.4 kg | 12 lbs |
| Survival wind speed | > 201 km/hr | > 125 mph |
| Wind area | Front: 0.17 $m^2$ Side: 0.40 $m^2$ | Front: 1.8 $ft^2$ Side: 4.3 $ft^2$ |
| Wind load @ 161 km/hr (100 mph) | Front: 254 N Side: 574 N | Front: 57 lbf Side: 129 lbf |

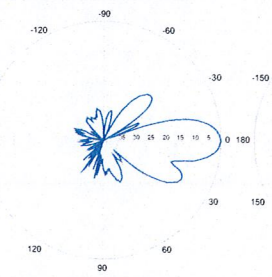
| Mounting Options | Part Number | Fits Pipe Diameter | Weight |
|---|---|---|---|
| 2-Point Mounting & Downtilt Bracket Kit (0-20°) | 21699999 | 50-102 mm 2.0-4.0 in | 5.4 kg 12 lbs |
| Lock-Down Brace | If the lock-down brace is used, the maximum diameter of the mounting pipe is 88.9 mm or 3.5 in. | | |

**LPA-80080-4CF-EDIN-X**



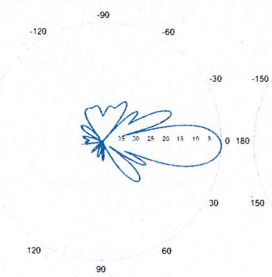
Horizontal

**LPA-80080-4CF-EDIN-0**



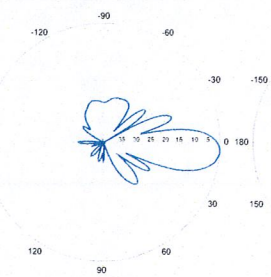
0° | Vertical

**LPA-80080-4CF-EDIN-2**



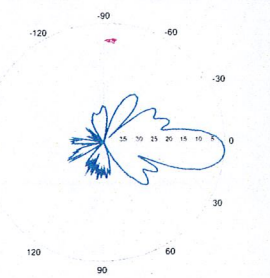
2° | Vertical

**LPA-80080-4CF-EDIN-4**



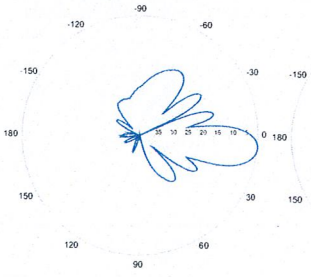
4° | Vertical

**LPA-80080-4CF-EDIN-5**



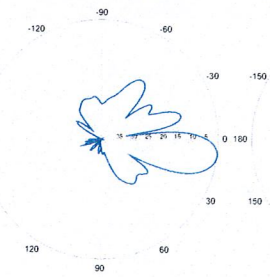
5° | Vertical

**LPA-80080-4CF-EDIN-6**



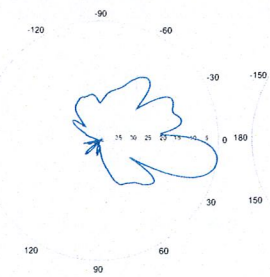
6° | Vertical

**LPA-80080-4CF-EDIN-8**



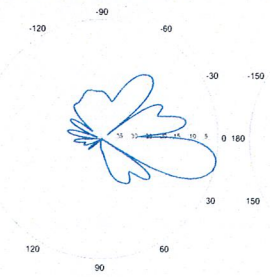
8° | Vertical

**LPA-80080-4CF-EDIN-10**



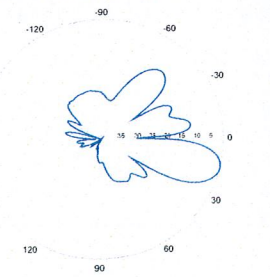
10° | Vertical

**LPA-80080-4CF-EDIN-12**



12° | Vertical

**LPA-80080-4CF-EDIN-14**

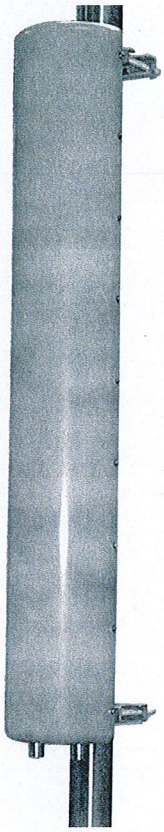


14° | Vertical

# BXA-171085-8BF-EDIN-X

Replace "X" with desired electrical downtilt.

## X-Pol | FET Panel | 85° | 16.4 dBi

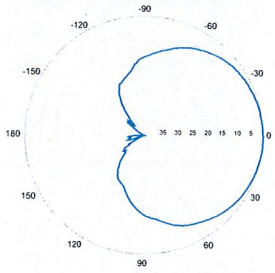


| Electrical Characteristics | 1710-2170 MHz | | |
|---|---|---|---|
| Frequency bands | 1710-1880 MHz | 1850-1990 MHz | 1920-2170 MHz |
| Polarization | ±45° | ±45° | ±45° |
| Horizontal beamwidth | 88° | 85° | 80° |
| Vertical beamwidth | 7° | 7° | 7° |
| Gain | 13.5 dBd / 15.6 dBi | 13.9 dBd / 16.0 dBi | 14.3 dBd / 16.4 dBi |
| Electrical downtilt (X) | 0, 2, 4 | | |
| Impedance | 50Ω | | |
| VSWR | ≤1.5:1 | | |
| First upper sidelobe | < -17 dB | | |
| Front-to-back isolation | > 30 dB | | |
| In-band isolation | > 28 dB | | |
| IM3 (20W carrier) | < -150 dBc | | |
| Input power | 300 W | | |
| Lightning protection | Direct Ground | | |
| Connector(s) | 2 Ports / EDIN / Female / Bottom | | |
| Operating temperature | -40° to +60° C / -40° to +140° F | | |

| Mechanical Characteristics | | |
|---|---|---|
| Dimensions Length x Width x Depth | 1232 x 154 x 105 mm | 48.5 x 6.1 x 4.1 in |
| Depth with t-brackets | 133 mm | 5.2 in |
| Weight without mounting brackets | 4.8 kg | 10.5 lbs |
| Survival wind speed | 296 km/hr | 184 mph |
| Wind area | Front: 0.19 m² Side: 0.14 m² | Front: 2.0 ft² Side: 1.5 ft² |
| Wind load @ 161 km/hr (100 mph) | Front: 281 N Side: 223 N | Front: 63 lbf Side: 50 lbf |

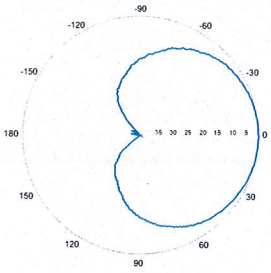
| Mounting Options | Part Number | Fits Pipe Diameter | Weight |
|---|---|---|---|
| 2-Point Mounting Bracket Kit | 26799997 | 50-102 mm 2.0-4.0 in | 2.3 kg 5 lbs |
| 2-Point Mounting & Downtilt Bracket Kit | 26799999 | 50-102 mm 2.0-4.0 in | 3.6 kg 8 lbs |
| Concealment Configurations | For concealment configurations, order BXA-171085-8BF-EDIN-X-FP | | |

**BXA-171085-8BF-EDIN-X**



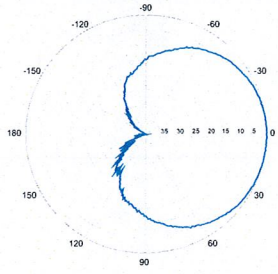
Horizontal | 1710-1880 MHz

**BXA-171085-8BF-EDIN-X**



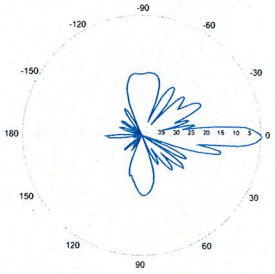
Horizontal | 1850-1990 MHz

**BXA-171085-8BF-EDIN-X**



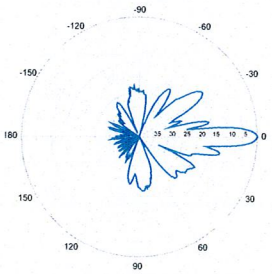
Horizontal | 1920-2170 MHz

**BXA-171085-8BF-EDIN-0**



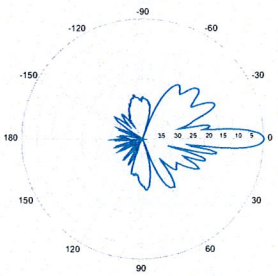
0° | Vertical | 1710-1880 MHz

**BXA-171085-8BF-EDIN-0**



0° | Vertical | 1850-1990 MHz

**BXA-171085-8BF-EDIN-0**

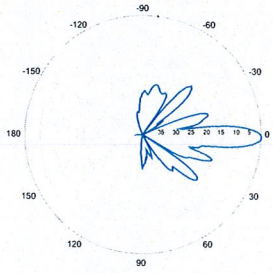


0° | Vertical | 1920-2170 MHz

# BXA-171085-8BF-EDIN-X

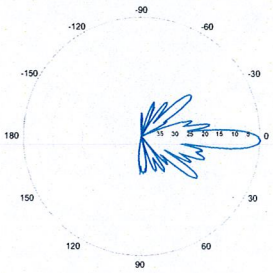
X-Pol | FET Panel | 85° | 16.4 dBi

**BXA-171085-8BF-EDIN-2**



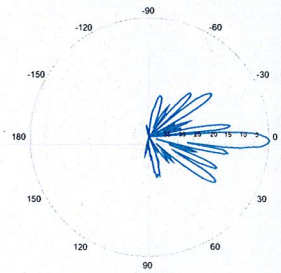

2° | Vertical | 1710-1880 MHz

**BXA-171085-8BF-EDIN-2**



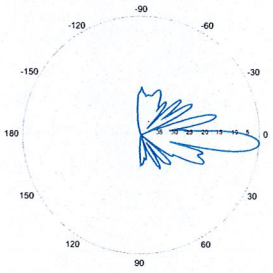

2° | Vertical | 1850-1990 MHz

**BXA-171085-8BF-EDIN-2**



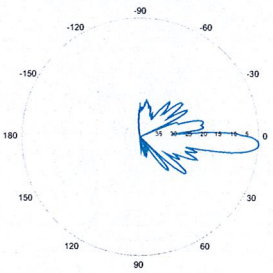

2° | Vertical | 1920-2170 MHz

**BXA-171085-8BF-EDIN-4**



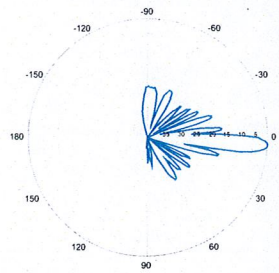

4° | Vertical | 1710-1880 MHz

**BXA-171085-8BF-EDIN-4**




4° | Vertical | 1850-1990 MHz

**BXA-171085-8BF-EDIN-4**




4° | Vertical | 1920-2170 MHz

# BXA-70063-6CF-EDIN-X

## X-Pol | FET Panel | 63° | 14.5 dBd

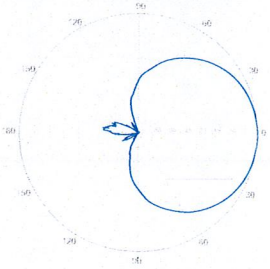
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

| Electrical Characteristics | 696-900 MHz | |
|---|---|---|
| Frequency bands | 696-806 MHz | 806-900 MHz |
| Polarization | ±45° | |
| Horizontal beamwidth | 65° | 63° |
| Vertical beamwidth | 13° | 11° |
| Gain | 14.0 dBd (16.1 dBi) | 14.5 dBd (16.6 dBi) |
| Electrical downtilt (X) | 0, 2, 3, 4, 5, 6, 8, 10 | |
| Impedance | 50Ω | |
| VSWR | ≤1.35:1 | |
| Upper sidelobe suppression (0°) | -18.3 dB | -18.2 dB |
| Front-to-back ratio (+/-30°) | -33.4 dB | -36.3 dB |
| Null fill | 5% (-26.02 dB) | |
| Isolation between ports | < -25 dB | |
| Input power with EDIN connectors | 500 W | |
| Input power with NE connectors | 300 W | |
| Lightning protection | Direct Ground | |
| Connector(s) | 2 Ports / EDIN or NE / Female / Center (Back) | |
| **Mechanical Characteristics** | | |
| Dimensions Length x Width x Depth | 1804 x 285 x 132 mm | 71.0 x 11.2 x 5.2 in |
| Depth with z-brackets | 172 mm | 6.8 in |
| Weight without mounting brackets | 7.9 kg | 17 lbs |
| Survival wind speed | > 201 km/hr | > 125 mph |
| Wind area | Front: 0.51 $m^2$ Side: 0.24 $m^2$ | Front: 5.5 $ft^2$ Side: 2.6 $ft^2$ |
| Wind load @ 161 km/hr (100 mph) | Front: 759 N Side: 391 N | Front: 169 lbf Side: 89 lbf |

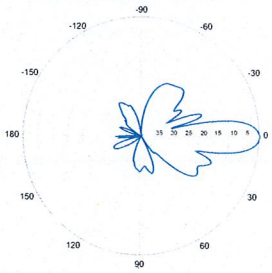
| Mounting Options | Part Number | Fits Pipe Diameter | Weight |
|---|---|---|---|
| 3-Point Mounting & Downtilt Bracket Kit | 36210008 | 40-115 mm 1.57-4.5 in | 6.9 kg 15.2 lbs |
| Concealment Configurations | For concealment configurations, order BXA-70063-6CF-EDIN-X-FP | | |

**BXA-70063-6CF-EDIN-X**



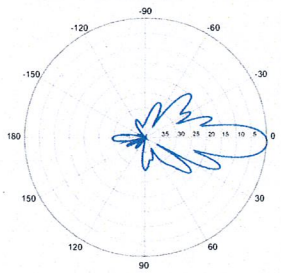
Horizontal | 750 MHz

**BXA-70063-6CF-EDIN-0**

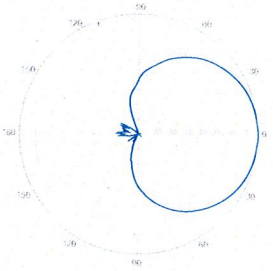


0° | Vertical | 750 MHz

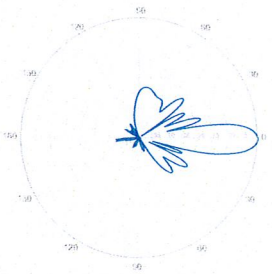
**BXA-70063-6CF-EDIN-2**



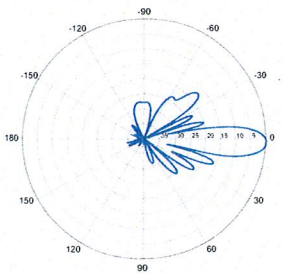
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



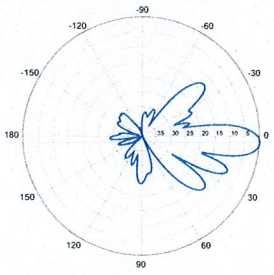
2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

# BXA-70063-6CF-EDIN-X

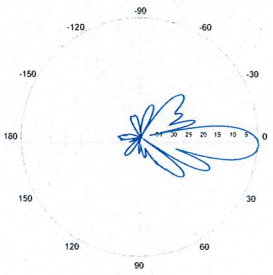
X-Pol | FET Panel | 63° | 14.5 dBd

**BXA-70063-6CF-EDIN-3**



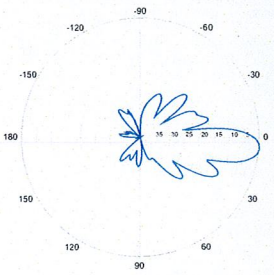
3° | Vertical | 750 MHz

**BXA-70063-6CF-EDIN-4**

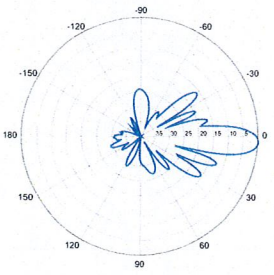


4° | Vertical | 750 MHz

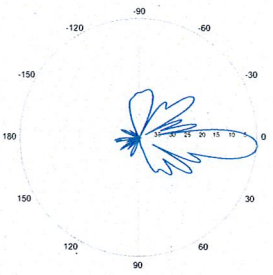
**BXA-70063-6CF-EDIN-5**



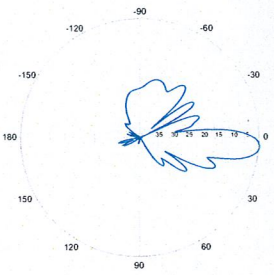
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

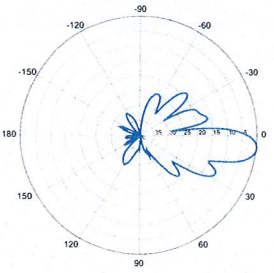


4° | Vertical | 850 MHz



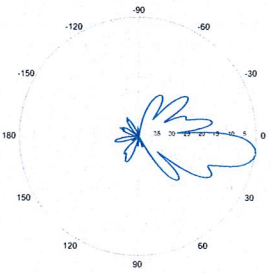
5° | Vertical | 850 MHz

**BXA-70063-6CF-EDIN-6**



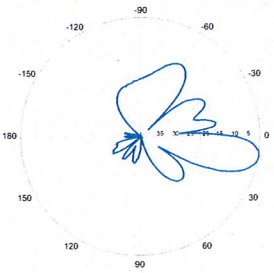
6° | Vertical | 750 MHz

**BXA-70063-6CF-EDIN-8**

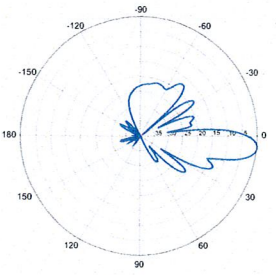


8° | Vertical | 750 MHz

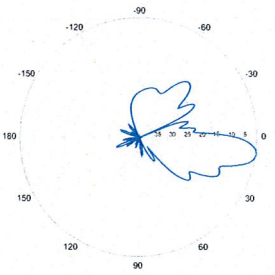
**BXA-70063-6CF-EDIN-10**



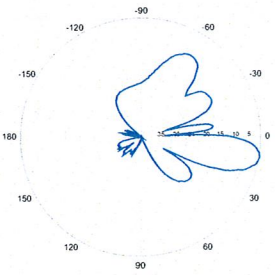
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz

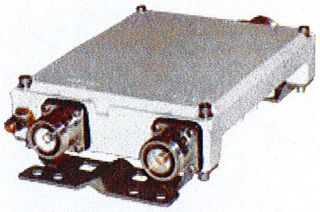


10° | Vertical | 850 MHz

# Product Specifications

COMMSCOPE®

on the go



**Andrew Solutions**

CBC721-DF-7-DCB | E15V95P08

**Crossband Coupler, 698–960 MHz/1710–2170 MHz, dc pass on 1710–2170 MHz port**

## Electrical Specifications

| | |
|---|---|
| 3rd Order IMD Test Method | Two +43 dBm carriers |
| 3rd Order IMD, maximum | -110 dBm |
| dc Pass-through | Band 2 |
| Isolation Between Paths, minimum | 60.0 dB |
| Lightning Surge Current | 10 kA |
| Lightning Surge Current Waveform | 8/20 waveform |

## Electrical Specifications (Band 1)

| | |
|---|---|
| Operating Frequency Band | 698 – 960 MHz |
| Insertion Loss, maximum | 0.15 dB |
| Output Power, maximum composite | 500 W |
| Peak Power | 5 kW |
| Return Loss at Frequency Band, minimum | 20 dB @ 698–960 MHz |
| Return Loss at Frequency Band, typical | 24 dB @ 698–894 MHz |
| Total Group Delay, maximum | 10 ns |

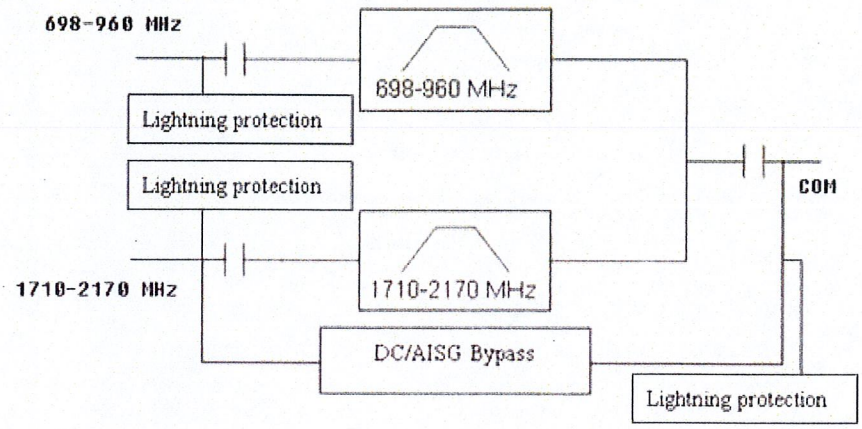
## Electrical Specifications (Band 2)

| | |
|---|---|
| Operating Frequency Band | 1710 – 2170 MHz |
| Insertion Loss, maximum | 0.20 dB |
| Output Power, maximum composite | 500 W |
| Peak Power | 5 kW |
| Return Loss at Frequency Band, minimum | 20 dB @ 1710–2170 MHz \| 22 dB @ 1850–1990 MHz |
| Return Loss at Frequency Band, typical | 24 dB @ 1850–1990 MHz |
| Total Group Delay, maximum | 10 ns |

# Product Specifications

CBC721-DF-7-DCB | E15V95P08

## Block Diagram




## General Specifications

| | |
|---|---|
| Application | Indoor \| Outdoor |
| Includes | Mounting hardware |

## Mechanical Specifications

| | |
|---|---|
| Color | Gray |
| Connector Interface | 7-16 DIN Female |
| Connector Interface Style | Medium neck |
| Ground Screw Diameter | 0.25 in |

## Environmental Specifications

| | |
|---|---|
| Ingress Protection Test Method | IEC 60529:2001, IP67 |
| Operating Temperature | -40 °C to +65 °C (-40 °F to +149 °F) |
| Relative Humidity | 5%–100% |

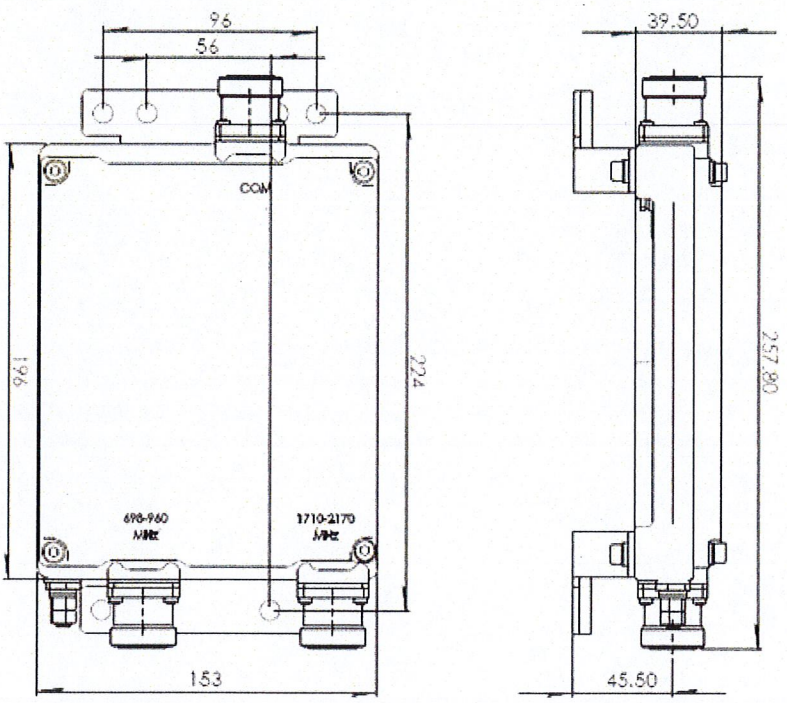
## Dimensions

| | |
|---|---|
| Depth | 39.5 mm \| 1.6 in |
| Height | 196.0 mm \| 7.7 in |
| Volume | 1.2 L |
| Width | 153.0 mm \| 6.0 in |
| Weight, without mounting hardware | 2.0 kg \| 4.4 lb |

# Product Specifications

CBC721-DF-7-DCB | E15V95P08

## Outline Drawing




## Regulatory Compliance/Certifications

| Agency | Classification |
|---|---|
| ISO 9001:2008 | Designed, manufactured and/or distributed under this quality management system |

| | General | Power | Density | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Site Name: Colchester** | | | | | | | | |
| **Tower Height:** Verizon @ 220Ft. | | | | | | | | |
| **CARRIER** | **# OF CHAN.** | **WATTS ERP** | **HEIGHT** | **CALC. POWER DENS** | **FREQ.** | **MAX. PERMISS. EXP.** | **FRACTION MPE** | **Total** |
| *Antenna no. 2 (CSP/FBI) | 1 | 330 | 320 | 0.0002 | 154.665 | 0.2000 | 0.09% | |
| *Antenna no. 3 (CSP) | 1 | 1015 | 315 | 0.0000 | 2141 | 1.0000 | 0.00% | |
| *Antenna no. 4 (SHP) | 1 | 398 | 294 | 0.0002 | 151.355 | 0.2000 | 0.12% | |
| *Antenna no. 5 (DEP) | 1 | 175 | 292 | 0.0001 | 44.72 | 0.2000 | 0.06% | |
| *Antenna no. 6 | 1 | 100 | 257 | 0.0001 | 153.935 | 0.2000 | 0.04% | |
| *Antenna no. 7 (OEM) | 1 | 178 | 243 | 0.0002 | 45.2 | 0.2000 | 0.08% | |
| *Antenna no. 8 (CSP) | 1 | 330 | 227 | 0.0003 | 42.04 | 0.2000 | 0.17% | |
| *Antenna no. 9 (DEP) | 1 | 125 | 138 | 0.0004 | 75.5 | 0.2000 | 0.18% | |
| *Antenna no. 10 (CSP) | 1 | 569 | 97 | 0.0000 | 2138 | 1.0000 | 0.00% | |
| *Antenna no. 11 (CSP) | 1 | 252 | 90 | 0.0000 | 2133.2 | 1.0000 | 0.00% | |
| *Antenna no. 12 (CSP) | 1 | 5750 | 105 | 0.0005 | 6795 | 1.0000 | 0.05% | |
| *Antenna no. 13 (CSP) | 1 | 1545 | 112 | 0.0000 | 10567.5 | 1.0000 | 0.00% | |
| *Antenna no. 14 | 5 | 200 | 320 | 0.0005 | 867.4 | 0.5783 | 0.09% | |
| *Antenna no. 15 | 5 | 200 | 320 | 0.0005 | 867.5 | 0.5783 | 0.09% | |
| *Antenna no. 18 (FBI) | 1 | 473 | 100 | 0.0023 | 453.625 | 0.3024 | 0.77% | |
| *Antenna no. 31 (CTT) | 1 | 10 | 100 | 0.0001 | 406 | 0.2707 | 0.02% | |
| *Cingular | 6 | 296 | 200 | 0.0160 | 880 | 0.5867 | 2.72% | |
| *Cingular | 3 | 427 | 200 | 0.0115 | 1930 | 1.0000 | 1.15% | |
| **Verizon PCS** | **11** | **202** | **220** | **0.0165** | **1970** | **1.0000** | **1.65%** | |
| **Verizon Cellular** | **9** | **225** | **220** | **0.0150** | **869** | **0.5793** | **2.60%** | |
| **Verizon AWS** | **1** | **491** | **220** | **0.0036** | **2145** | **1.0000** | **0.36%** | |
| **Verizon 700** | **1** | **749** | **220** | **0.0056** | **698** | **0.4653** | **1.20%** | |
| | | | | | | | | **11.45%** |
| | | | | | | | | |
| * Source: Siting Council | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

# DETAILED STRUCTURAL ANALYSIS AND REINFORCEMENT OF 320' SELF SUPPORTING LATTICE TOWER AND FOUNDATION FOR NEW ANTENNA ARRANGEMENT

**CT State Police Site #50, Colchester**
**112 Munn Road**
**Colchester, Connecticut**

*prepared for*


**Verizon Wireless**
**99 East River Drive**
**East Hartford, Connecticut 06108**

*prepared by*

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

36922280
VZ5-122 (Rev 2)

July 13, 2012

## TABLE OF CONTENTS

## 1. EXECUTIVE SUMMARY

This report summarizes the structural analysis and reinforcement of the existing 320' self-supporting lattice tower structure located at 112 Munn Road in Colchester, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code, the TIA/EIA-222-F standard, and the Connecticut State Police Requirements for a wind velocity of 90 mph (fastest mile), 90 mph (fastest mile) concurrent with ½" ice, and 90 mph (fastest mile) concurrent with 1/2" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report. The proposed Verizon Wireless modification is as follows:

| Proposed Antenna and Mount | Carrier | Antenna Center Elevation |
|---|---|---|
| **Remove**<br>**(6) 844H90EXYBAM**<br>**(6) 948F85T2E-M** | **Verizon Wireless (Existing)** | **@ 220'** |
| **Install**<br>**(3) BXA-70063-6CF**<br>**(6) LPA-80080/4CF**<br>**(3) BXA-171085/8BF**<br>**(6) Diplexers** | **Verizon Wireless (Proposed)** | |
| **Remove**<br>**(1) 6' Dish**<br>**(1) Dish Mount**<br>**(1) EW65 Coax Cable** | **Verizon Wireless (Existing)** | **@ 175'** |
| **Remove**<br>**(1) 6' Dish**<br>**(1) Dish Mount**<br>**(1) EW65 Coax Cable** | **Verizon Wireless (Existing)** | **@ 115'** |

The results of an initial analysis indicate that the existing tower structure requires modification in order to be considered structurally adequate. The required modifications are shown in drawings SK-1 & SK-2 located in Section 6 of this report. **Once the proposed modifications have been performed the tower and foundation are considered structurally adequate with the wind load specified above and the existing and proposed antenna loadings.** Tower deflection of the modified tower is within the Connecticut State Police requirements. See Section 4 of this report for additional information.

## 1. EXECUTIVE SUMMARY *(continued)*

This analysis is based on:

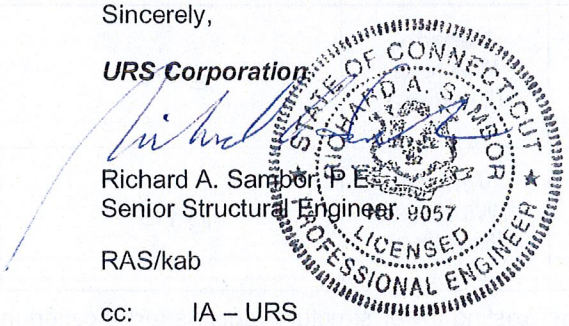
1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Tower geometry and structural member sizes taken from original construction drawings (Rohn File #: 43233AE) prepared by Rohn Industries, Inc., approved May 10, 2001.
3) Previous structural analysis performed by URS Corporation for Verizon Wireless, project number VZ1-166 / 36930991, signed and sealed October 12, 2006.
4) Antenna inventory provided by Connecticut State Police via e-mail on June 12, 2012.
5) Antenna and mount configuration as specified on the following page of this report.
6) Coax cable orientation as specified in section 6 of this report.

This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration. 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/kab

cc: IA – URS
CF/Book

## 2. INTRODUCTION

The subject tower is located at 112 Munn Road in Colchester, Connecticut. The structure is a 320' self-supporting lattice tower structure designed by Rohn Industries, Inc.

The tower geometry and structure member sizes were taken from the original construction drawings (Rohn File #: 43233AE) prepared by Rohn Industries, Inc., approved May 10, 2001.

The inventory provided by the Connecticut State Police is summarized in the table below:

| ***Antenna Type*** | ***Carrier*** | ***Mount*** | ***Antenna Centerline Elevation*** | ***Cable*** |
|---|---|---|---|---|
| (1) PD128 antenna | CSP/FBI (existing) | Side Arm Mount | 320' | (1) 7/8" coax cable |
| (1) PD128 antenna | CSP (existing) | Side Arm Mount | 318' | (1) 7/8" coax cable |
| (1) 8 FT dish | CSP (existing) | Dish Mount | 315' | (1) 7/8" coax cable |
| (3) 6 FT dishes | (wind load) | (3) Dish Mount | 308' | (3) EW63 coax cables |
| (1) DB224 antenna | SHF (existing) | Side Arm Mount | 294' | (1) 7/8" coax cable |
| (1) PD320 antenna | DEP (existing) | Side Arm Mount | 292' | (1) 7/8" coax cable |
| (2) DB809 antenna | CSP (existing) | Side Arm Mount | 285' | (2) 1 5/8" coax cables |
| (3) SC479-HF1LDF<br>(1) BCD806-09NE<br>(1) Tower Top Amplifier | CSP 51-55 (existing) | (3) Side Arm Mounts | 280' | (4) 1 5/8" coax cables<br>(1) 1/2" coax cable |
| (2) OGT9 antenna | CSP (existing) | Side Arm Mount | 275' | (2) 1 5/8" coax cables |
| (1) PD440 antenna | OEM (existing) | Side Arm Mount | 257' | (1) 7/8" coax cable |
| (1) PD128 antenna | OEM (existing) | Side Arm Mount | 243' | (1) 7/8" coax cable |
| (1) PD320 antenna | CSP (existing) | Side Arm Mount | 227' | (1) 7/8" coax cable |
| **(3) BXA-70063-6CF<br>(6) LPA-80080/4CF<br>(3) BXA-171085/8BF<br>(6) Diplexers** | **Verizon (proposed)** | **(3) T-Arms (existing)** | **220'** | **(12) 1 5/8" coax cables (existing)** |
| (12) Powerwave 7770.00 antennas , (12) LPG21401 TMA's and (12) LPG13519 Diplexers | Cingular (existing) | (3) T-Arms | 200' | (24) 1 5/8" coax cables |
| (1) DB-583 | NEU – 48 (existing) | Side Arm Mount | 174' | (1) 7/8" coax cable |
| (1) DB-630 | NEU – 32 (existing) | Side Arm Mount | 170' | (1) 7/8" coax cable |
| (1) DB586-Y | NEU – 49 (existing) | Side Arm Mount | 166' | (1) 7/8" coax cable |
| (1) BA1012 antenna | OEM (existing) | Side Arm Mount | 140' | (1) 7/8" coax cable |
| (1) PD688S antenna | NEU (existing) | Side Arm Mount | 140' | (1) 7/8" coax cable |
| (1) DB212 antenna | NEU (existing) | Side Arm Mount | 140' | (1) 7/8" coax cable |

| Antenna Type | Carrier | Mount | Antenna Centerline Elevation | Cable |
|---|---|---|---|---|
| (1) PD156S antenna | DEP (existing) | Flush Mount | 138' | (1) 7/8" coax cable |
| (1) 4 FT dish | CSP (existing) | Dish Mount | 112' | (1) EW108 coax cable |
| (1) 6 FT dish | CSP (existing) | Dish Mount | 105' | (1) EW65 coax cable |
| (1) PD458 antenna | CTT (existing) | Side Arm Mount | 100' | (1) 7/8" coax cable |
| (1) DB437 antenna | FBI (existing) | Side Arm Mount (listed above) | 100' | (1) 7/8" coax cable |
| (1) 6 FT dish | CSP (existing) | Dish Mount | 97' | (1) 7/8" coax cable |
| (1) 4 FT dish | CSP (existing) | Dish Mount | 90' | (1) 7/8" coax cable |

This structural analysis of the communications tower was performed by URS Corporation (URS) for Verizon Wireless. The purpose of this analysis was to investigate the structural integrity of the existing 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 2005 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.

Load Condition 1 = 90 mph (fastest mile) Wind Load + Tower Dead Load
Load Condition 2 = 90 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

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 were evaluated to compare with the allowable stress in accordance with AISC. The results of the analysis indicate that the modified tower foundation and modified tower steel are in compliance with the proposed loading conditions once the proposed modifications shown in SK-1 & SK-2 in Section 6 of this report are performed (see tables below). **The modified tower structure is considered structurally adequate for the proposed antenna loading with the wind load classifications specified in Section 3.** The tower was originally designed for a maximum of 0.75 degrees for deflection (sway) and 0.75 degrees for twist. **The modified tower structure is compliant with the twist and sway requirements of the Connecticut State Police.**

**TABLE 1: Tower Deflection (Sway) and Rotation (Twist) at the top of the tower:**

| Description | Current | Allowable | Pass/Fail |
|---|---|---|---|
| Tower Sway (degrees) | 0.7469 | 0.750 | **Pass** |
| Tower Twist (degrees) | 0.3592 | 0.750 | **Pass** |

**TABLE 2: Tower Base Reactions:**

| Base Reactions | Original Tower Reactions | Proposed Tower Reactions |
|---|---|---|
| Axial Load (kips) | - | 174 |
| Shear per Leg (kips) | - | 95 |
| Total Shear (kips) | 121.6 | 155 |
| Uplift per Leg (kips) | 549.0 | 633 |
| Comp.per Leg (kips) | 667.4 | 774 |
| O.T. Moment (ft-kips) | 21038.1 | 25240 |

For detailed proposed tower reactions, see drawing no. E-1 in section 6 of this report.

**TABLE 3: Critical Tower Component Stress vs. Capacity Summary:**

| Component/ (Section No.) | Existing Component Size | Controlling Component/Elevation | Stress (% capacity) | Pass/Fail |
|---|---|---|---|---|
| Tower Legs (T14) | ROHN 12EH | Compression / 30'-60' | 89.8% | **Pass** |
| Diagonals (T11) | ROHN 3EH | Compression / 100'-120' | 90.9% | **Pass** |
| Horizontals (T13) | ROHN 3EH | Compression / 60'-80' | 92.7% | **Pass** |
| Top Girts (T1) | L1.75x1.75x3/16 | Compression / 300'-320' | 2.6% | **Pass** |
| Redundant Horiz. Bracing (T15) | ROHN 1.5STD | Compression / 0'-30' | 90.0% | **Pass** |
| Redundant Diag. Bracing (T12) | ROHN 2STD | Compression / 80'-100' | 98.2% | **Pass** |
| Bolt Checks | 7/8" A325 | Bolt Shear / 120'-140' | 98.0% | **Pass** |
| Anchor Bolts | 1 dia. A345 | Tension & Shear | 53% | **Pass** |
| Foundation | Caisson | Compression | 91.9% | **Pass** |

## 5. CONCLUSIONS AND RECOMMENDATIONS

The results of an initial analysis indicate that the existing tower structure requires modification in order to be considered structurally adequate. The required modifications are shown in drawings SK-1 & SK-2 located in Section 6 of this report. **Once the proposed modifications have been performed the tower and foundation are considered structurally adequate with the wind load specified above and the existing and proposed antenna loadings.** Tower deflection of the modified tower is within the Connecticut State Police requirements. See Section 4 of this report for additional information.

**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.

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.

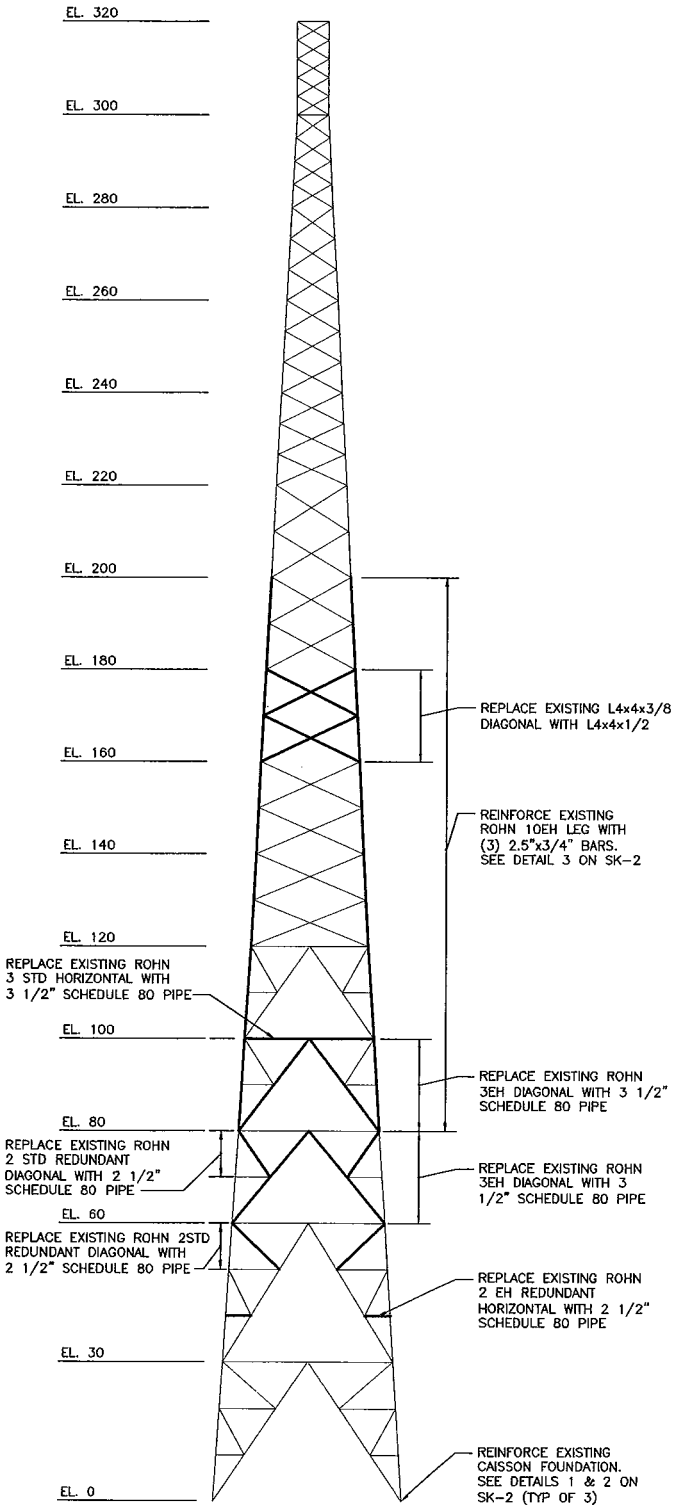
**Ongoing and Periodic Inspection and Maintenance:**

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 REINFORCEMENT DRAWINGS SK-1 & SK-2




1 / SK-1 TOWER ELEVATION
SCALE: 1" = 40'-0"

# STRUCTURAL NOTES

STRUCTURAL STEEL MATERIAL:

STRUCTURAL STEEL BEAMS, CHANNELS, PLATES & ANGLES..... ASTM A572-50
PIPE COLUMN..... ASTM A53 GRADE B
STUB COLUMNS FY=46 KSI ..... ASTM A500
BOLTS ..... ASTM A325-N
STRUCTURAL STEEL SHALL CONFORM TO ALL REQUIREMENTS OF THE 1999 AISC-LRFD SPECIFICATION, AS REFERENCED IN THE CODE.

UNLESS OTHERWISE NOTED, ALL STEEL WILL BE GALVANIZED IN ACCORDANCE WITH ASTM 123 AFTER FABRICATION. 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.

SHOP AND ERECTION DRAWINGS SHALL BE SUBMITTED FOR ALL STRUCTURAL STEEL WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. SUBMIT 2 SETS OF PRINTS FOR THE ENGINEER REVIEW.

EXISTING DIMENSIONS OF STRUCTURE SHOWN ON THESE DOCUMENTS ARE NOT GUARANTEED. CONTRACTOR SHALL TAKE FIELD DIMENSIONS AS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK AND SHALL ASSUME FULL RESPONSIBILITY FOR THEIR ACCURACY. WHEN SHOP DRAWINGS BASED ON FIELD MEASUREMENT ARE SUBMITTED FOR REVIEW, DIMENSIONS ARE PROVIDED FOR THE ENGINEER'S REFERENCE ONLY.

CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 5/16" AND MINIMUM OF (2) 3/4" BOLTS.

ALL BOLT HOLES WILL BE DRILLED OR PUNCHED, WITH BURRS REMOVED PRIOR TO COATING.

MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

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

ALL WELDING SHALL BE DONE BY A CERTIFIED WELDER IN ACCORDANCE WITH AWS STANDARDS, USING E70XX ELECTRODES UNLESS OTHERWISE NOTED. WHERE WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZES PER "PREQUALIFIED WELDED JOINTS" TABLES IN AISC "MANUAL OF STEEL CONSTRUCTION", NINTH EDITION.

CONNECTIONS / FIELD ASSEMBLY:

BOLTED CONNECTIONS: UNLESS OTHERWISE NOTED, ALL JOINTS ARE BEARING TYPE, REQUIRING 3/4" DIA. A325-N BOLTS, A563 NUTS AND F436 WASHERS, ALL GALVANIZED. BEVELED WASHERS SHALL BE USED ON BEAM FLANGES HAVING A SLOPE GREATER THAN 1:20.

NON-STRUCTURAL CONNECTIONS, SUCH AS FOR STEEL GRATING, MAY USE 5/8" DIA. GALVANIZED ASTM A307 BOLTS, UNLESS OTHERWISE NOTED.

STRUCTURE IS DESIGNED TO BE LEVEL AND PLUMB, SELF-SUPPORTING AND STABLE AFTER WORK IS COMPLETED.

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

IF WELDING GALVANIZED MATERIALS, USE PRECAUTIONS & PROCEDURES PER AWS D1.1.

INSPECTIONS:

SPECIAL INSPECTIONS ARE REQUIRED PER CODE.

OWNER WILL SUPPLY THE SERVICES OF A SPECIAL INSPECTOR AND TESTING AGENTS AS REQUIRED. CONTRACTOR SHALL COORDINATE INSPECTIONS OF FABRICATOR'S AND ERECTOR'S WORK AND MATERIALS TO MEET THE REQUIREMENTS OF THE STATEMENT OF SPECIAL INSPECTIONS FOR THIS PROJECT.

COPIES OF TESTING AND INSPECTION REPORTS WILL BE PROVIDED TO THE OWNER, BUILDING OFFICIAL, ENGINEER OF RECORD AND CONTRACTOR.

CONCRETE

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE ACI 301, ACI 318 AND THE SPECIFICATION CAST-IN-PLACE CONCRETE.
2. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS, UNLESS NOTED OTHERWISE. CONCRETE SHALL BE AIR ENTRAINED TO (4% TO 6%) AND SLUMP OF 3" TO 5".
3. REINFORCING STEEL SHALL CONFORM TO ASTM A 615, GRADE 60, DEFORMED UNLESS NOTED OTHERWISE. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 185 WELDED STEEL WIRE FABRIC UNLESS NOTED OTHERWISE. SPLICES SHALL BE CLASS "B" AND ALL HOOKS SHALL BE STANDARD, UNO.
4. THE FOLLOWING MINIMUM CONCRETE COVER SHALL BE PROVIDED FOR REINFORCING STEEL UNLESS SHOWN OTHERWISE ON DRAWINGS:
   - CONCRETE CAST AGAINST EARTH.....3 IN.
   - CONCRETE EXPOSED TO EARTH OR WEATHER:
     - #6 AND LARGER .....2 IN.
     - #5 AND SMALLER & WWF .....1 1/2 IN.
   - CONCRETE NOT EXPOSED TO EARTH OR WEATHER OR NOT CAST AGAINST THE GROUND:
     - SLAB AND WALL .....3/4 IN.
     - BEAMS AND COLUMNS .....1 1/2 IN.
5. A CHAMFER 3/4" SHALL BE PROVIDED AT ALL EXPOSED EDGES OF CONCRETE, UNO, IN ACCORDANCE WITH ACI 301 SECTION 4.2.4.
6. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE. THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR ENGINEERING APPROVAL WHEN DRILLING
7. COLD WEATHER CONCRETE PLACING SHALL BE IN ACCORDANCE WITH ACI-306.
8. NO FOOTING SHALL BE PLACED ON FROZEN GROUND. UNCURED CONCRETE SHALL BE PROTECTED AGAINST FROST.
9. APPLY NON-SLIP BROOM FINISH IMMEDIATELY AFTER TROWEL FINISHING.

FOUNDATION NOTES

1. A PRESUMPTIVE SOIL BEARING CAPACITY OF 3000 PSF WAS USED FOR THE FOUNDATION DESIGN. THE GENERAL CONTRACTOR IS TO CONFIRM THE EXISTING SOIL BEARING PRESSURE.
2. ALL FOOTINGS SHALL BEAR ON EXISTING UNDISTURBED ORGANIC FREE SOIL. ALL UNSUITABLE SOIL SHALL BE REMOVED AS DIRECTED BY THE ENGINEER AND REPLACED WITH COMPACTED GRAVEL PLACED IN 8" LAYERS AND COMPACTED TO 95% OF MODIFIED OPTIMUM DENISTY.
3. INSTALLATION OF CONCRETE EXPANSION/WEDGE ANCHOR, SHALL BE PER MANUFACTURER'S WRITTEN RECOMMENDED PROCEDURE, THE ANCHOR BOLT, DOWEL OR ROD SHALL CONFORM TO MANUFACTURER'S RECOMMENDATION FOR EMBEDMENT DEPTH OR AS SHOWN ON THE DRAWINGS. NO REBAR SHALL BE CUT WITHOUT PRIOR ENGINEERING APPROVAL WHEN DRILLING HOLES IN CONCRETE.

| | |
|---|---|
| OW NO: | 36922280 |
| Designed by: | KAB |
| Drawn by: | KAB |
| Checked by: | MJK |
| Approved by: | RAS |


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


CELLCO PARTNERSHIP DBA
VERIZON WIRELESS
WIRELESS COMMUNICATIONS FACILITY

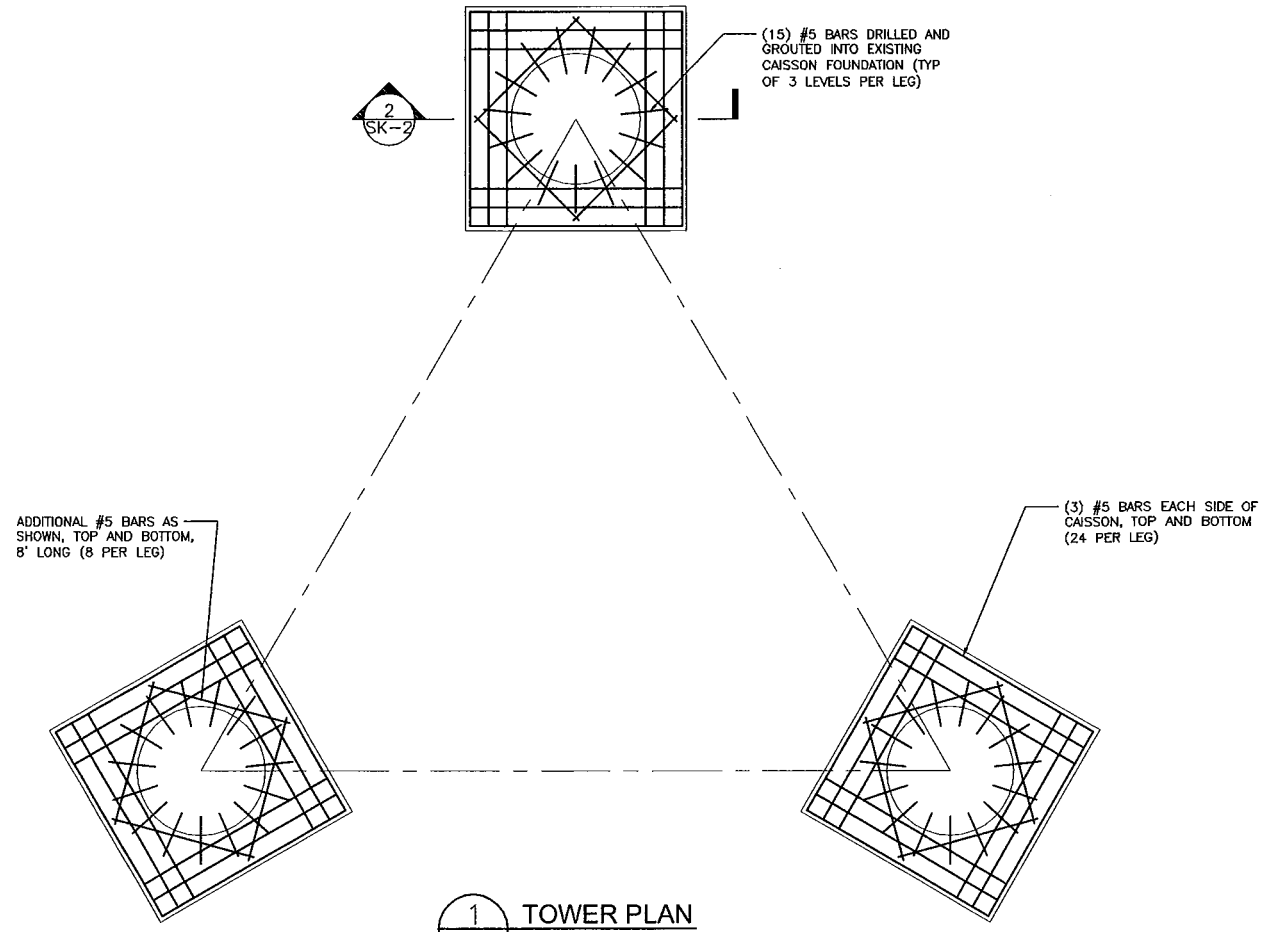
SITE ADDRESS:
CT STATE POLICE SITE #50
112 MUNN ROAD
COLCHESTER, CT 06415

| REV. | DATE: | DESCRIPTION |
|---|---|---|
| | | |
| | | |
| | | |

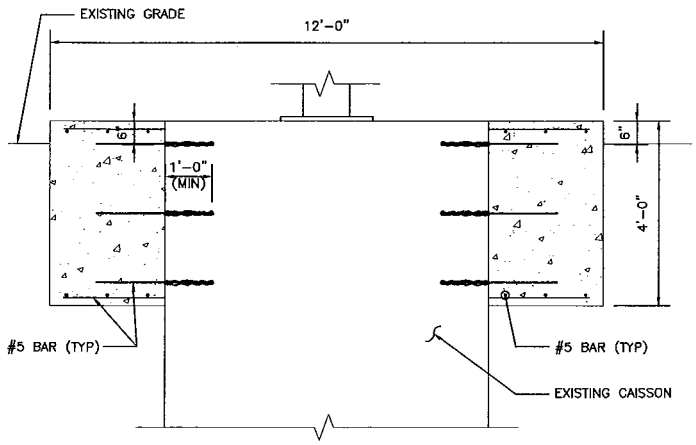
Scale:
Date: 07-13-12
Job No.VZ5-122
File No.

Dwg. No. SK-1

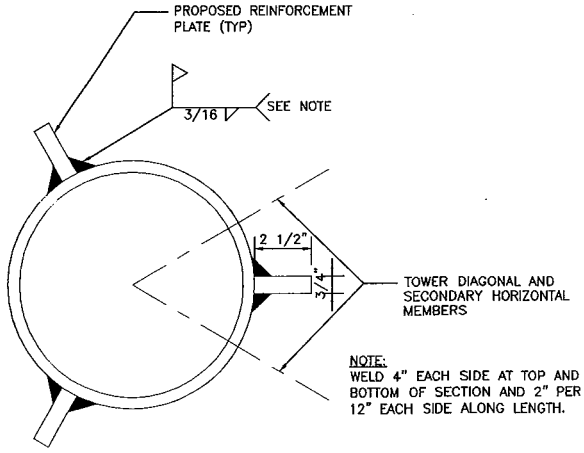
Dwg. 1 of 2




1 SK-2 **TOWER PLAN**
SCALE: N.T.S.




2 SK-2 **FOUNDATION SECTION**
SCALE: N.T.S.




3 SK-2 **TOWER LEG REINFORCEMENT SECTION**
SCALE: N.T.S.

| | |
|---|---|
| OW NO: | 36922280 |
| Designed by: | KAB |
| Drawn by: | KAB |
| Checked by: | MJK |
| Approved by: | RAS |


**URS CORPORATION AES**
500 ENTERPRISE DRIVE
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CELLCO PARTNERSHIP DBA
VERIZON WIRELESS
WIRELESS COMMUNICATIONS FACILITY

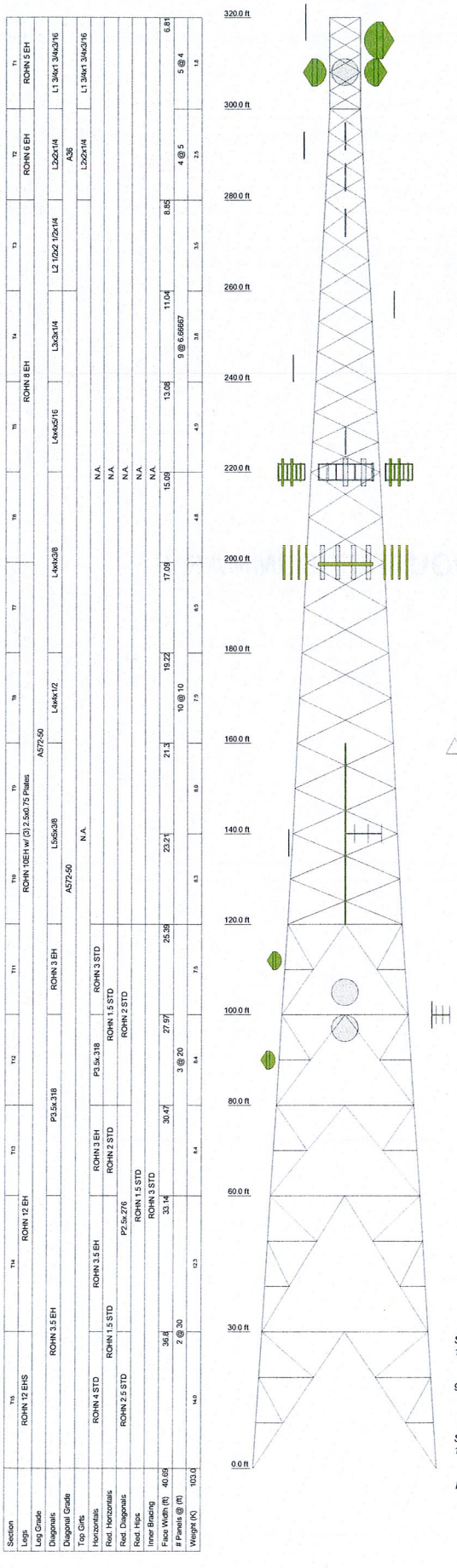
SITE ADDRESS:
CT STATE POLICE SITE #50
112 MUNN ROAD
COLCHESTER, CT 06415

| REV. | DATE: | DESCRIPTION |
|---|---|---|
| | | |
| | | |
| | | |

Scale:
Date: 07-13-12
Job No.VZ5-122
File No.

Dwg. No. SK-2
Dwg. 2 of 2

# TNX TOWER INPUT/OUTPUT SUMMARY




| Section | T15 | T14 | T13 | T12 | T11 | T10 | T9 | T8 | T7 | T6 | T5 | T4 | T3 | T2 | T1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Legs | ROHN 12 EHS | ROHN 12 EH | | | | ROHN 10EH w/ (3) 2.5x0.75 Plates | | | | | | ROHN 8 EH | | ROHN 6 EH | ROHN 5 EH |
| Leg Grade | | | | | | A572-50 | | | | | | | | | |
| Diagonals | ROHN 3.5 EH | | | P3.5x.318 | ROHN 3 EH | L5x5x3/8 | | L4x4x1/2 | L4x4x3/8 | | L4x4x5/16 | L3x3x1/4 | L2 1/2x2 1/2x1/4 | L2x2x1/4 | L1 3/4x1 3/4x3/16 |
| Diagonal Grade | | | | | | A572-50 | | | | | | | | A36 | |
| Top Girts | | | | | | N.A. | | | | | | | | L2x2x1/4 | L1 3/4x1 3/4x3/16 |
| Horizontals | ROHN 4 STD | ROHN 3.5 EH | ROHN 3 EH | P3.5x.318 | ROHN 3 STD | | | | | N.A. | | | | | |
| Rod. Horizontals | | ROHN 1.5 STD | ROHN 2 STD | | ROHN 1.5 STD | | | | | N.A. | | | | | |
| Rod. Diagonals | ROHN 2.5 STD | | | P2.5x.276 | ROHN 2 STD | | | | | N.A. | | | | | |
| Rod. Hips | | | | | | | | | | N.A. | | | | | |
| Inner Bracing | | | ROHN 1.5 STD | | | | | | | N.A. | | | | | |
| Face Width (ft) | 40.69 | 36.8 | ROHN 3 STD 30.47 | | 25.38 | 23.21 | 21.3 | 19.22 | 17.09 | 15.08 | 13.08 | 11.04 | 8.85 | | 6.81 |
| # Panels @ (ft) | | 2 @ 30 | | 3 @ 20 | | | | 10 @ 10 | | | | 9 @ 6.66667 | | 4 @ 5 | 5 @ 4 |
| Weight (K) | 103.0 | 14.0 | 12.3 | 8.4 | 7.5 | 6.3 | 8.9 | 7.5 | 6.5 | 4.8 | 4.0 | 3.8 | 3.5 | 2.5 | 1.8 |

## DESIGNED APPURTENANCE LOADING

| TYPE | ELEVATION | TYPE | ELEVATION |
|---|---|---|---|
| Dual Lights | 320 | LPA-80080-4CF-EDIN (Verizon) | 220 |
| PD128 (CSP) | 320 | BXA-70063/6CF (Verizon) | 220 |
| 6' Side Mount Standoff | 320 | BXA-171085-8BF (Verizon) | 220 |
| PD128 (CSP) | 318 | LPA-80080-4CF-EDIN (Verizon) | 220 |
| 6' Side Mount Standoff | 318 | LPA-80080-4CF-EDIN (Verizon) | 220 |
| 6'8"x4" Pipe Mount (CSP) | 315 | (2) Diplexer (Verizon) | 220 |
| 8 FT DISH | 315 | (2) Diplexer (Verizon) | 220 |
| 5'3"x4" Pipe Mount (CSP future) | 308 | (2) Diplexer (Verizon) | 220 |
| 5'3"x4" Pipe Mount (CSP future) | 308 | (4) 7770.00 (Cingular) | 200 |
| 5'3"x4" Pipe Mount (CSP future) | 308 | (4) LPG21401 TMA (Cingular) | 200 |
| 6 FT DISH | 308 | (4) LPG21401 TMA (Cingular) | 200 |
| 6 FT DISH | 308 | (4) LPG21401 TMA (Cingular) | 200 |
| 6 FT DISH | 308 | (4) LPG13519 Diplexer (Cingular) | 200 |
| DB224 (SHF) | 294 | (4) LPG13519 Diplexer (Cingular) | 200 |
| 6' Side Mount Standoff | 294 | (4) LPG13519 Diplexer (Cingular) | 200 |
| PD320 (DEP) | 292 | PiROD 12' Lightweight T-Frame (Cingular) | 200 |
| 6' Side Mount Standoff | 292 | (4) 7770.00 (Cingular) | 200 |
| (2) DB809 (CSP) | 285 | (4) 7770.00 (Cingular) | 200 |
| 6' Side Mount Standoff | 285 | PiROD 12' Lightweight T-Frame (Cingular) | 200 |
| BCD-80609 (CSP - 51) | 280 | PiROD 12' Lightweight T-Frame (Cingular) | 200 |
| 6' Side Mount Standoff | 280 | 6' Side Mount Standoff | 174 |
| SC479-HF1LDF (CSP - 52) | 280 | DB583 (NEU - 48) | 174 |
| SC479-HF1LDF (CSP - 53) | 280 | DB-630 (NEU - 32) | 170 |
| 6' Side Mount Standoff | 280 | 6' Side Mount Standoff | 170 |
| SC479-HF1LDF (CSP - 54) | 280 | DB586-Y (NEU - 49) | 166 |
| 6' Side Mount Standoff | 280 | 6' Side Mount Standoff | 166 |
| TMA (CSP - 55) | 280 | DB212-1 (NEU) | 140 |
| (2) OGT9 (CSP) | 275 | BA1012-0 (OEM) | 140 |
| 6' Side Mount Standoff | 275 | 6' Side Mount Standoff | 140 |
| PD440 (OEM) | 257 | 6' Side Mount Standoff | 140 |
| 6' Side Mount Standoff | 257 | PD688S-4 (NEU) | 140 |
| PD128 (OEM) | 243 | PD156S (DEP) | 138 |
| 6' Side Mount Standoff | 243 | 3'4"x4" Pipe Mount (DEP) | 138 |
| PD320 (CSP) | 227 | 4 FT DISH | 112 |
| 6' Side Mount Standoff | 227 | 3'4"x4" Pipe Mount (CSP) | 112 |
| Mounting Frame (Verizon) | 220 | 6 FT DISH | 105 |
| Mounting Frame (Verizon) | 220 | 5'3"x4" Pipe Mount (CSP) | 105 |
| Mounting Frame (Verizon) | 220 | DB437 (FBI) | 100 |
| BXA-70063/6CF (Verizon) | 220 | 6' Side Mount Standoff | 100 |
| BXA-171085-8BF (Verizon) | 220 | PD458 (CTT) | 100 |
| LPA-80080-4CF-EDIN (Verizon) | 220 | 5'3"x4" Pipe Mount (CSP) | 97 |
| LPA-80080-4CF-EDIN (Verizon) | 220 | 6 FT DISH | 97 |
| BXA-70063/6CF (Verizon) | 220 | 4 FT DISH | 90 |
| BXA-171085-8BF (Verizon) | 220 | 3'4"x4" Pipe Mount (CSP) | 90 |
| LPA-80080-4CF-EDIN (Verizon) | 220 | | |

## 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 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 90 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 90 mph wind.
4. TOWER RATING: 98.2%

*MAX. CORNER REACTIONS AT BASE:*
*DOWN: 774 K*
*UPLIFT: -633 K*
*SHEAR: 95 K*

*AXIAL 174 K*
*SHEAR 155 K* / *MOMENT 25240 kip-ft*
*TORQUE 336 kip-ft*
*90 mph WIND - 0.5000 in ICE*

*AXIAL 124 K*
*SHEAR 124 K* / *MOMENT 20415 kip-ft*
*TORQUE 210 kip-ft*
*REACTIONS - 90 mph WIND*

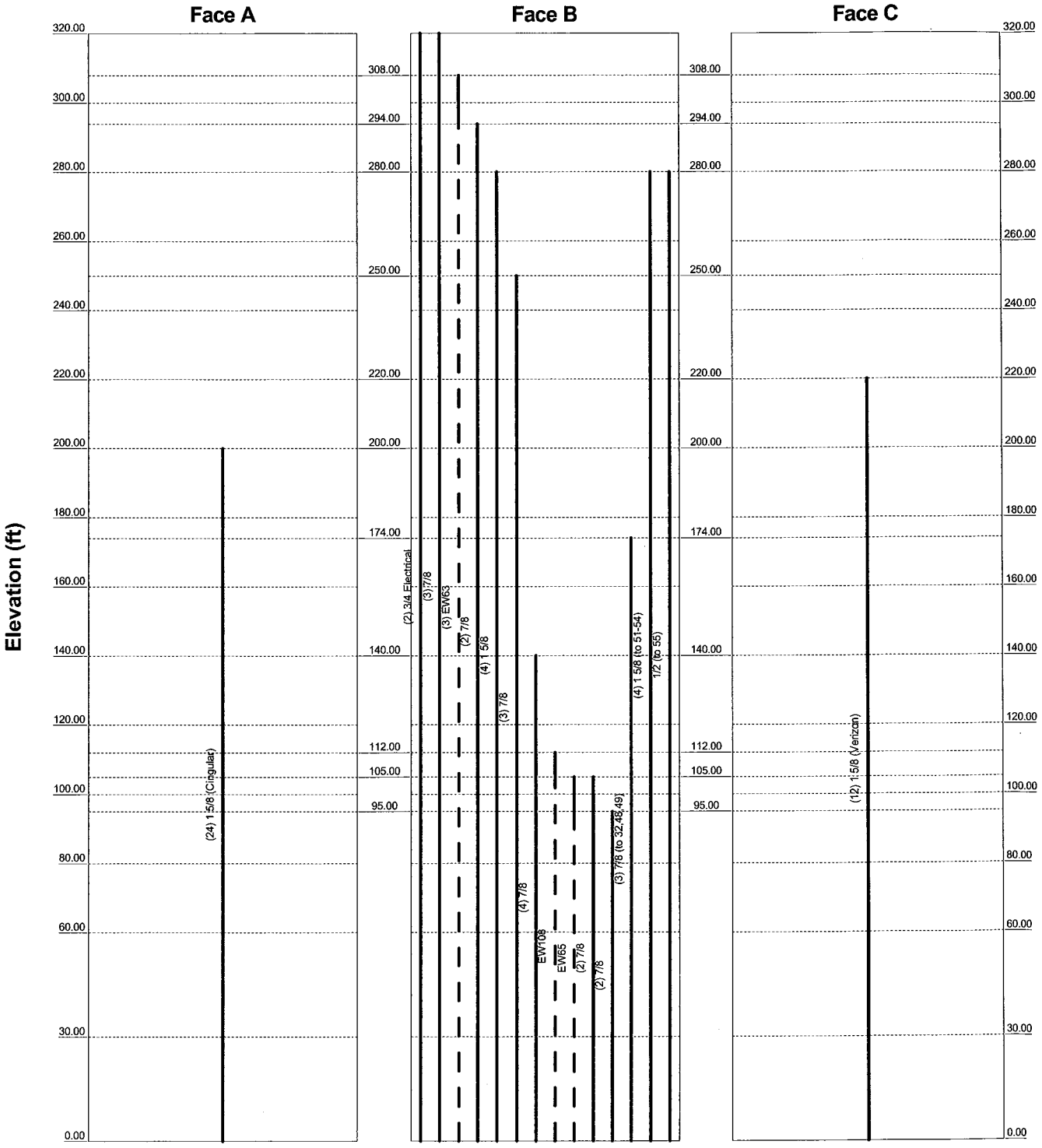

*URS Corporation*
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-3991


| | | | |
|---|---|---|---|
| Job: *320' Rohn SSVMW* | | | |
| Project: *CSP Tower - Colchester, CT* | | | |
| Client: Verizon Wireless | Drawn by: kevin_barker | App'd: | |
| Code: TIA/EIA-222-F | Date: 07/13/12 | Scale: NTS | |
| Path: P:\OBER\Files\Reinforced 320' Rohn SSVMW.eri | | Dwg No. E-1 | |

# TNX TOWER FEEDLINE DISTRIBUTION CHART

# Feedline Distribution Chart
## 0' - 320'

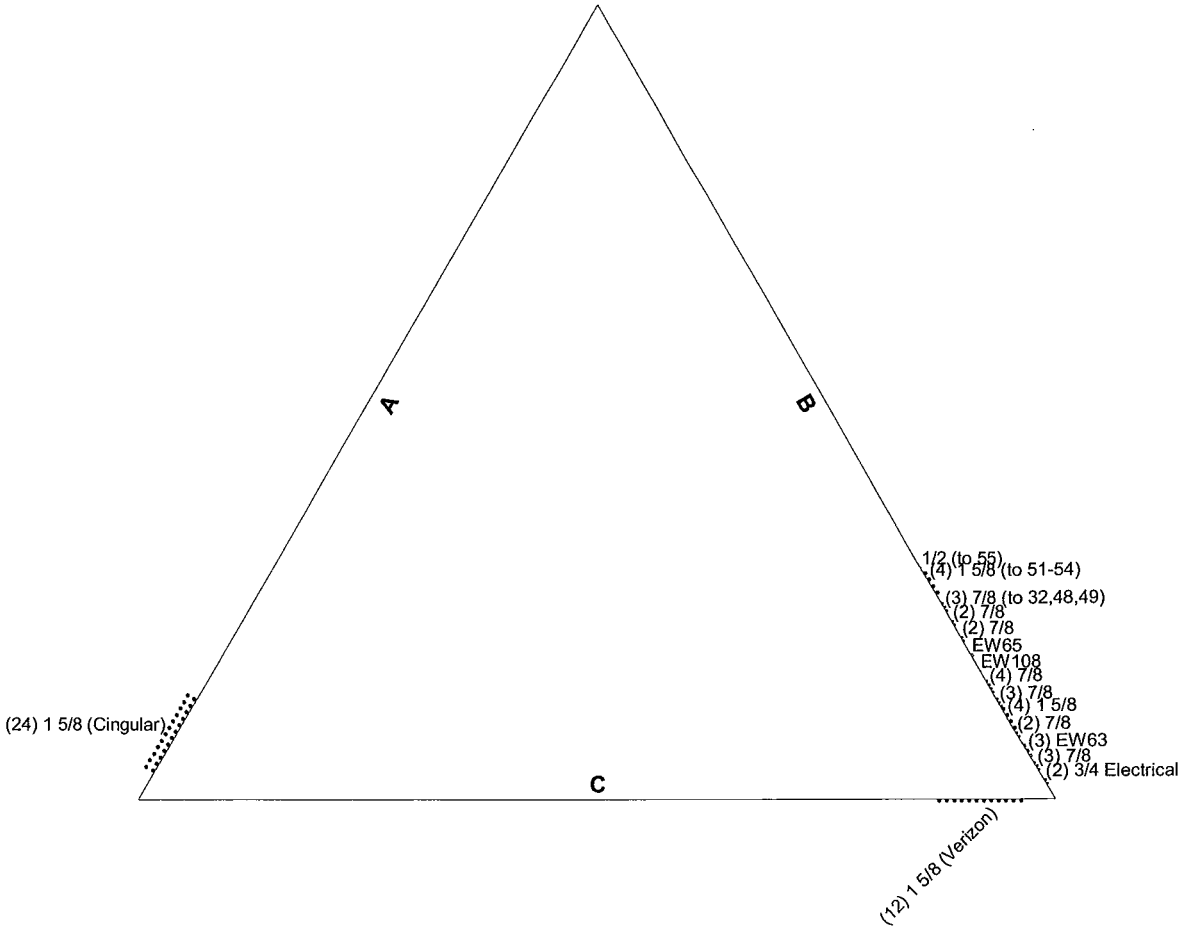
Round  Flat  App In Face  App Out Face  Truss Leg




| | | | |
|---|---|---|---|
| *URS Corporation*<br>500 Enterprise Drive, Suite 3B<br>Rocky Hill, CT 06067<br>Phone: (860) 529-8882<br>FAX: (860) 529-3991 | Job: ***320' Rohn SSVMW*** | | |
| | Project: ***CSP Tower - Colchester, CT*** | | |
| | Client: Verizon Wireless | Drawn by: kevin_barker | App'd: |
| | Code: TIA/EIA-222-F | Date: 07/13/12 | Scale: NTS |
| | Path: P:\08\ERI Files\Reinforced 320' Rohn SSVMW.eri | | Dwg No. E-7 |

# TNX TOWER FEEDLINE PLAN

# Feedline Plan





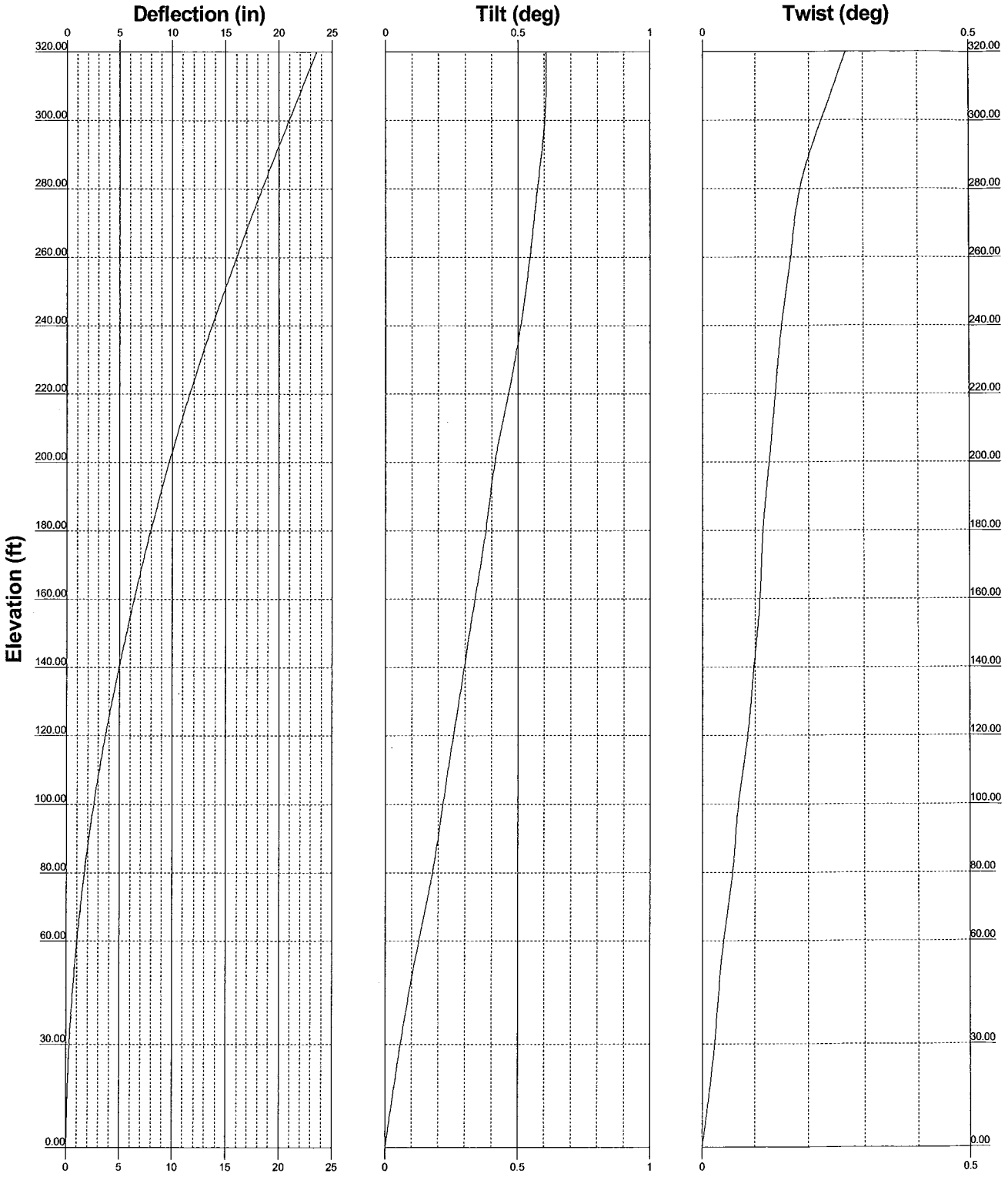
*URS Corporation*
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-3991


| | | | |
|---|---|---|---|
| Job: ***320' Rohn SSVMW*** | | | |
| Project: ***CSP Tower - Colchester, CT*** | | | |
| Client: Verizon Wireless | Drawn by: kevin_barker | App'd: | |
| Code: TIA/EIA-222-F | Date: 07/13/12 | Scale: NTS | |
| Path: P:\08\ERI Files\Reinforced 320' Rohn SSVMW.eri | | Dwg No. E-7 | |

# TNX TOWER DEFLECTION, TILT, TWIST

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

**Maximum Values**





*URS Corporation*
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Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-3991


| | | | |
|---|---|---|---|
| Job: ***320' Rohn SSVMW*** | | | |
| Project: ***CSP Tower - Colchester, CT*** | | | |
| Client: Verizon Wireless | Drawn by: kevin_barker | App'd: | |
| Code: TIA/EIA-222-F | Date: 07/13/12 | Scale: NTS | |
| Path: P:\08\ERI Files\Reinforced 320' Rohn SSVMW.eri | | Dwg No. E-5 | |

# TNX TOWER DETAILED OUTPUT

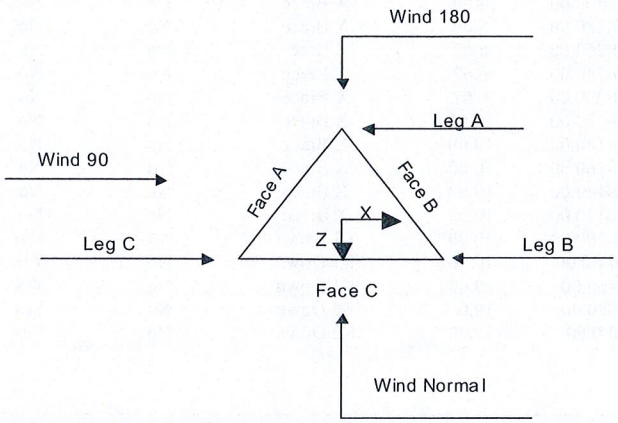
## Tower Input Data

The main tower is a 3x free standing tower with an overall height of 320.00 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 6.81 ft at the top and 40.69 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 90 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 90 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 90 mph.
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 | 320.00-300.00 | | | 6.81 | 1 | 20.00 |
| T2 | 300.00-280.00 | | | 6.81 | 1 | 20.00 |
| T3 | 280.00-260.00 | | | 8.85 | 1 | 20.00 |
| T4 | 260.00-240.00 | | | 11.04 | 1 | 20.00 |
| T5 | 240.00-220.00 | | | 13.08 | 1 | 20.00 |
| T6 | 220.00-200.00 | | | 15.09 | 1 | 20.00 |
| T7 | 200.00-180.00 | | | 17.09 | 1 | 20.00 |
| T8 | 180.00-160.00 | | | 19.22 | 1 | 20.00 |
| T9 | 160.00-140.00 | | | 21.30 | 1 | 20.00 |
| T10 | 140.00-120.00 | | | 23.21 | 1 | 20.00 |
| T11 | 120.00-100.00 | | | 25.39 | 1 | 20.00 |
| T12 | 100.00-80.00 | | | 27.97 | 1 | 20.00 |
| T13 | 80.00-60.00 | | | 30.47 | 1 | 20.00 |
| T14 | 60.00-30.00 | | | 33.14 | 1 | 30.00 |
| T15 | 30.00-0.00 | | | 36.80 | 1 | 30.00 |

## 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 |

| Tower Section | Tower Elevation ft | Diagonal Spacing ft | Bracing Type | Has K Brace End Panels | Has Horizontals | Top Girt Offset in | Bottom Girt Offset in |
|---|---|---|---|---|---|---|---|
| T1 | 320.00-300.00 | 4.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T2 | 300.00-280.00 | 5.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T3 | 280.00-260.00 | 6.67 | X Brace | No | No | 0.0000 | 0.0000 |
| T4 | 260.00-240.00 | 6.67 | X Brace | No | No | 0.0000 | 0.0000 |
| T5 | 240.00-220.00 | 6.67 | X Brace | No | No | 0.0000 | 0.0000 |
| T6 | 220.00-200.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T7 | 200.00-180.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T8 | 180.00-160.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T9 | 160.00-140.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T10 | 140.00-120.00 | 10.00 | X Brace | No | No | 0.0000 | 0.0000 |
| T11 | 120.00-100.00 | 20.00 | K1 Down | No | Yes | 0.0000 | 0.0000 |
| T12 | 100.00-80.00 | 20.00 | K1 Down | No | Yes | 0.0000 | 0.0000 |
| T13 | 80.00-60.00 | 20.00 | K1 Down | No | Yes | 0.0000 | 0.0000 |
| T14 | 60.00-30.00 | 30.00 | K2 Down | No | Yes | 0.0000 | 0.0000 |
| T15 | 30.00-0.00 | 30.00 | K2 Down | No | Yes | 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 320.00-300.00 | Pipe | ROHN 5 EH | A572-50 (50 ksi) | Equal Angle | L1 3/4x1 3/4x3/16 | A36 (36 ksi) |
| T2 300.00-280.00 | Pipe | ROHN 6 EH | A572-50 (50 ksi) | Equal Angle | L2x2x1/4 | A36 (36 ksi) |
| T3 280.00-260.00 | Pipe | ROHN 8 EH | A572-50 (50 ksi) | Equal Angle | L2 1/2x2 1/2x1/4 | A36 (36 ksi) |
| T4 260.00-240.00 | Pipe | ROHN 8 EH | A572-50 (50 ksi) | Equal Angle | L3x3x1/4 | A572-50 (50 ksi) |
| T5 240.00-220.00 | Pipe | ROHN 8 EH | A572-50 (50 ksi) | Equal Angle | L4x4x5/16 | A572-50 (50 ksi) |
| T6 220.00-200.00 | Pipe | ROHN 8 EH | A572-50 (50 ksi) | Equal Angle | L4x4x3/8 | A572-50 (50 ksi) |
| T7 200.00-180.00 | Arbitrary Shape | ROHN 10EH w/ (3) 2.5x0.75 Plates | A572-50 (50 ksi) | Equal Angle | L4x4x3/8 | A572-50 (50 ksi) |
| T8 180.00-160.00 | Arbitrary Shape | ROHN 10EH w/ (3) 2.5x0.75 Plates | A572-50 (50 ksi) | Equal Angle | L4x4x1/2 | A572-50 (50 ksi) |
| T9 160.00-140.00 | Arbitrary Shape | ROHN 10EH w/ (3) 2.5x0.75 Plates | A572-50 (50 ksi) | Equal Angle | L5x5x3/8 | A572-50 (50 ksi) |
| T10 140.00-120.00 | Arbitrary Shape | ROHN 10EH w/ (3) 2.5x0.75 Plates | A572-50 (50 ksi) | Equal Angle | L5x5x3/8 | A572-50 (50 ksi) |
| T11 120.00-100.00 | Arbitrary Shape | ROHN 10EH w/ (3) 2.5x0.75 Plates | A572-50 (50 ksi) | Pipe | ROHN 3 EH | A572-50 (50 ksi) |
| T12 100.00-80.00 | Arbitrary Shape | ROHN 10EH w/ (3) 2.5x0.75 Plates | A572-50 (50 ksi) | Pipe | P3.5x.318 | A572-50 (50 ksi) |
| T13 80.00-60.00 | Pipe | ROHN 12 EH | A572-50 (50 ksi) | Pipe | P3.5x.318 | A572-50 (50 ksi) |
| T14 60.00-30.00 | Pipe | ROHN 12 EH | A572-50 (50 ksi) | Pipe | ROHN 3.5 EH | A572-50 (50 ksi) |
| T15 30.00-0.00 | Pipe | ROHN 12 EHS | A572-50 (50 ksi) | Pipe | ROHN 3.5 EH | A572-50 (50 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 320.00-300.00 | Equal Angle | L1 3/4x1 3/4x3/16 | A36 (36 ksi) | Solid Round | | A36 (36 ksi) |
| T2 300.00-280.00 | Equal Angle | L2x2x1/4 | A36 (36 ksi) | Solid Round | | 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 |
|---|---|---|---|---|---|---|---|
| T11 120.00-100.00 | None | Flat Bar | | A36 (36 ksi) | Pipe | ROHN 3 STD | A572-50 (50 ksi) |
| T12 100.00-80.00 | None | Flat Bar | | A36 (36 ksi) | Pipe | P3.5x.318 | A572-50 (50 ksi) |
| T13 80.00-60.00 | None | Flat Bar | | A36 (36 ksi) | Pipe | ROHN 3 EH | A572-50 (50 ksi) |
| T14 60.00-30.00 | None | Flat Bar | | A36 (36 ksi) | Pipe | ROHN 3.5 EH | A572-50 (50 ksi) |
| T15 30.00-0.00 | None | Flat Bar | | A36 (36 ksi) | Pipe | ROHN 4 STD | A572-50 (50 ksi) |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Secondary Horizontal Type | Secondary Horizontal Size | Secondary Horizontal Grade | Inner Bracing Type | Inner Bracing Size | Inner Bracing Grade |
|---|---|---|---|---|---|---|
| T11 120.00-100.00 | Pipe | | A572-50 (50 ksi) | Pipe | ROHN 3 STD | A572-50 (50 ksi) |
| T12 100.00-80.00 | Pipe | | A572-50 (50 ksi) | Pipe | ROHN 3 STD | A572-50 (50 ksi) |
| T13 80.00-60.00 | Pipe | | A572-50 (50 ksi) | Pipe | ROHN 3 STD | A572-50 (50 ksi) |
| T14 60.00-30.00 | Pipe | | A572-50 (50 ksi) | Pipe | ROHN 3 STD | A572-50 (50 ksi) |
| T15 30.00-0.00 | Pipe | | A572-50 (50 ksi) | Pipe | ROHN 3 STD | A572-50 (50 ksi) |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Redundant Bracing Grade | | Redundant Type | Redundant Size | K Factor |
|---|---|---|---|---|---|
| T11 | A572-50 | Horizontal (1) | Pipe | ROHN 1.5 STD | 1 |
| 120.00-100.00 | (50 ksi) | Diagonal (1) | Pipe | ROHN 2 STD | 1 |
| | | Hip (1) | Pipe | ROHN 1.5 STD | 1 |
| | | Hip Diagonal | | ROHN 2.5 STD | 1 |
| T12 | A572-50 | Horizontal (1) | Pipe | ROHN 1.5 STD | 1 |
| 100.00-80.00 | (50 ksi) | Diagonal (1) | Pipe | ROHN 2 STD | 1 |
| | | Hip (1) | Pipe | ROHN 1.5 STD | 1 |
| | | Hip Diagonal | | ROHN 2.5 STD | 1 |
| T13 | A572-50 | Horizontal (1) | Pipe | ROHN 2 STD | 1 |
| 80.00-60.00 | (50 ksi) | Diagonal (1) | Pipe | P2.5x.276 | 1 |
| | | Hip (1) | Pipe | ROHN 1.5 STD | 1 |
| | | Hip Diagonal | | ROHN 3 STD | 1 |
| T14 | A572-50 | Horizontal (1) | Pipe | ROHN 1.5 STD | 1 |
| 60.00-30.00 | (50 ksi) | Horizontal (2) | | P2.5x.276 | |
| | | Diagonal (1) | Pipe | P2.5x.276 | 1 |
| | | Diagonal (2) | | ROHN 2.5 STD | |
| | | Hip (1) | Pipe | ROHN 1.5 STD | 1 |
| | | Hip (2) | | ROHN 2 STD | |
| | | Hip Diagonal | | ROHN 2 STD | 1 |
| T15 | A572-50 | Horizontal (1) | Pipe | ROHN 1.5 STD | 1 |
| 30.00-0.00 | (50 ksi) | Horizontal (2) | | ROHN 2.5 EH | |
| | | Diagonal (1) | Pipe | ROHN 2.5 STD | 1 |
| | | Diagonal (2) | | ROHN 2.5 STD | |
| | | Hip (1) | Pipe | ROHN 1.5 STD | 1 |
| | | Hip (2) | | ROHN 2 STD | |
| | | Hip Diagonal | | ROHN 2.5 STD | 1 |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Gusset Area (per face) $ft^2$ | Gusset Thickness in | Gusset Grade | Adjust. Factor $A_f$ | Adjust. Factor $A_r$ | Weight Mult. | Double Angle Stitch Bolt Spacing Diagonals in | Double Angle Stitch Bolt Spacing Horizontals in |
|---|---|---|---|---|---|---|---|---|
| T1 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 320.00-300.00 | | | (36 ksi) | | | | | |
| T2 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 300.00-280.00 | | | (36 ksi) | | | | | |
| T3 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 280.00-260.00 | | | (36 ksi) | | | | | |
| T4 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 260.00-240.00 | | | (36 ksi) | | | | | |
| T5 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 240.00-220.00 | | | (36 ksi) | | | | | |
| T6 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 220.00-200.00 | | | (36 ksi) | | | | | |
| T7 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 200.00-180.00 | | | (36 ksi) | | | | | |
| T8 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 180.00-160.00 | | | (36 ksi) | | | | | |
| T9 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 160.00-140.00 | | | (36 ksi) | | | | | |
| T10 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 140.00-120.00 | | | (36 ksi) | | | | | |
| T11 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 120.00-100.00 | | | (36 ksi) | | | | | |
| T12 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |

| Tower Elevation | Gusset Area (per face) | Gusset Thickness | Gusset Grade | Adjust. Factor $A_f$ | Adjust. Factor $A_r$ | Weight Mult. | Double Angle Stitch Bolt Spacing Diagonals | Double Angle Stitch Bolt Spacing Horizontals |
|---|---|---|---|---|---|---|---|---|
| ft | $ft^2$ | in | | | | | in | in |
| 100.00-80.00 | | | (36 ksi) | | | | | |
| T13 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 80.00-60.00 | | | (36 ksi) | | | | | |
| T14 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| 60.00-30.00 | | | (36 ksi) | | | | | |
| T15 30.00-0.00 | 0.00 | 0.0000 | A36 | 1 | 1 | 1 | 36.0000 | 36.0000 |
| | | | (36 ksi) | | | | | |

## Tower Section Geometry *(cont'd)*

| Tower Elevation | Calc K Single Angles | Calc K Solid Rounds | K Factors[1] Legs | X Brace Diags X | X Brace Diags Y | K Single Diags X | K Single Diags Y | Girts X | Girts Y | Horiz. X | Horiz. Y | Sec. Horiz. X | Sec. Horiz. Y | Inner Brace X | Inner Brace Y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ft | | | | | | | | | | | | | | | |
| T1 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 320.00-300.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T2 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 300.00-280.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T3 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 280.00-260.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T4 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 260.00-240.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T5 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 240.00-220.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T6 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 220.00-200.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T7 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 200.00-180.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T8 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 180.00-160.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T9 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 160.00-140.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T10 | Yes | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 140.00-120.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T11 | No | No | 1 | 1 | 0.95 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 120.00-100.00 | | | | 1 | 0.95 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T12 | No | No | 1 | 1 | 0.95 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 100.00-80.00 | | | | 1 | 0.95 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T13 | No | No | 1 | 1 | 0.95 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 80.00-60.00 | | | | 1 | 0.95 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T14 | No | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 60.00-30.00 | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| T15 | No | No | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 30.00-0.00 | | | | 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 | Leg | | Diagonal | | Top Girt | | Bottom Girt | | Mid Girt | | Long Horizontal | | Short Horizontal | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U | Net Width Deduct in | U |
| T1 320.00-300.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T2 300.00-280.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T3 280.00-260.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T4 260.00-240.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T5 240.00-220.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T6 220.00-200.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T7 200.00-180.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T8 180.00-160.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T9 160.00-140.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T10 140.00-120.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T11 120.00-100.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T12 100.00-80.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T13 80.00-60.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T14 60.00-30.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |
| T15 30.00-0.00 | 0.0000 | 1 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 | 0.0000 | 0.75 |

## Tower Section Geometry *(cont'd)*

| Tower Elevation ft | Leg Connection Type | Leg | | Diagonal | | Top Girt | | Bottom Girt | | Mid Girt | | Long Horizontal | | Short Horizontal | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. | Bolt Size in | No. |
| T1 320.00-300.00 | Flange | 1.0000 A325N | 6 | 0.6250 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T2 300.00-280.00 | Flange | 1.0000 A325N | 8 | 0.6250 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T3 280.00-260.00 | Flange | 1.0000 A325N | 8 | 0.7500 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T4 260.00-240.00 | Flange | 1.0000 A325N | 8 | 0.7500 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T5 240.00-220.00 | Flange | 1.0000 A325N | 8 | 0.7500 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T6 220.00-200.00 | Flange | 1.0000 A325N | 12 | 0.7500 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T7 200.00-180.00 | Flange | 1.0000 A325N | 12 | 0.8750 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |

| 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. |
| T8 180.00-160.00 | Flange | 1.0000 A325N | 12 | 0.8750 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T9 160.00-140.00 | Flange | 1.0000 A325N | 12 | 0.8750 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T10 140.00-120.00 | Flange | 1.0000 A325N | 12 | 0.8750 A325X | 1 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 |
| T11 120.00-100.00 | Flange | 1.0000 A325N | 12 | 0.7500 A325X | 3 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.7500 A325X | 2 | 0.6250 A325N | 0 |
| T12 100.00-80.00 | Flange | 1.0000 A325N | 16 | 0.7500 A325X | 3 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.7500 A325X | 2 | 0.6250 A325N | 0 |
| T13 80.00-60.00 | Flange | 1.0000 A325N | 16 | 0.7500 A325X | 3 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.7500 A325X | 2 | 0.6250 A325N | 0 |
| T14 60.00-30.00 | Flange | 1.0000 A325N | 16 | 0.8750 A325X | 3 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.7500 A325X | 2 | 0.6250 A325N | 0 |
| T15 30.00-0.00 | Flange | 1.0000 A325N | 24 | 0.8750 A325X | 3 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.6250 A325N | 0 | 0.7500 A325X | 2 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 5/8 (Verizon) | C | Yes | Ar (CfAe) | 220.00 - 0.00 | 0.0000 | -0.42 | 12 | 12 | 1.9800 | 1.9800 | | 1.04 |
| 3/4 Electrical | B | Yes | Ar (CfAe) | 320.00 - 0.00 | 0.0000 | 0.48 | 2 | 2 | 1.1100 | 1.1100 | | 0.54 |
| 7/8 | B | Yes | Ar (CfAe) | 320.00 - 0.00 | 0.0000 | 0.46 | 3 | 3 | 1.1100 | 1.1100 | | 0.54 |
| EW63 | B | Yes | Af (CfAe) | 308.00 - 0.00 | 0.0000 | 0.44 | 3 | 3 | 1.5742 | 1.5742 | 5.0668 | 0.51 |
| 7/8 | B | Yes | Ar (CfAe) | 294.00 - 0.00 | 0.0000 | 0.42 | 2 | 2 | 1.1100 | 1.1100 | | 0.54 |
| 1 5/8 | B | Yes | Ar (CfAe) | 280.00 - 0.00 | 0.0000 | 0.4 | 4 | 4 | 1.9800 | 1.9800 | | 1.04 |
| 7/8 | B | Yes | Ar (CfAe) | 250.00 - 0.00 | 0.0000 | 0.38 | 3 | 3 | 1.1100 | 1.1100 | | 0.54 |
| 7/8 | B | Yes | Ar (CfAe) | 140.00 - 0.00 | 0.0000 | 0.36 | 4 | 4 | 1.1100 | 1.1100 | | 0.54 |
| EW108 | B | Yes | Af (CfAe) | 112.00 - 0.00 | 0.0000 | 0.34 | 1 | 1 | 0.5899 | 0.5899 | 2.0063 | 0.15 |
| EW65 | B | Yes | Af (CfAe) | 105.00 - 0.00 | 0.0000 | 0.32 | 1 | 1 | 1.5742 | 1.5742 | 5.0668 | 0.51 |
| 7/8 | B | Yes | Ar (CfAe) | 105.00 - 0.00 | 0.0000 | 0.3 | 2 | 2 | 1.1100 | 1.1100 | | 0.54 |
| 7/8 | B | Yes | Ar (CfAe) | 95.00 - 0.00 | 0.0000 | 0.28 | 2 | 2 | 1.1100 | 1.1100 | | 0.54 |
| 1 5/8 (Cingular) | A | Yes | Ar (CfAe) | 200.00 - 0.00 | 0.0000 | -0.42 | 24 | 12 | 1.9800 | 1.9800 | | 1.04 |
| 7/8 (to 32,48,49) | B | Yes | Ar (CfAe) | 174.00 - 0.00 | 0.0000 | 0.26 | 3 | 3 | 1.1100 | 1.1100 | | 0.54 |
| 1 5/8 (to 51-54) | B | Yes | Ar (CfAe) | 280.00 - 0.00 | 0.0000 | 0.23 | 4 | 4 | 1.9800 | 1.9800 | | 1.04 |
| 1/2 (to 55) | B | Yes | Ar (CfAe) | 280.00 - 0.00 | 0.0000 | 0.21 | 1 | 1 | 0.5800 | 0.5800 | | 0.25 |

## 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 | 320.00-300.00 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |

| 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 |
|---|---|---|---|---|---|---|---|
| | | B | 9.250 | 3.148 | 0.000 | 0.000 | 0.07 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T2 | 300.00-280.00 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | 11.840 | 7.871 | 0.000 | 0.000 | 0.10 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T3 | 280.00-260.00 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | 40.317 | 7.871 | 0.000 | 0.000 | 0.28 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T4 | 260.00-240.00 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | 43.092 | 7.871 | 0.000 | 0.000 | 0.29 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T5 | 240.00-220.00 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | 45.867 | 7.871 | 0.000 | 0.000 | 0.31 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T6 | 220.00-200.00 | A | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | 45.867 | 7.871 | 0.000 | 0.000 | 0.31 |
| | | C | 39.600 | 0.000 | 0.000 | 0.000 | 0.25 |
| T7 | 200.00-180.00 | A | 39.600 | 0.000 | 0.000 | 0.000 | 0.50 |
| | | B | 45.867 | 7.871 | 0.000 | 0.000 | 0.31 |
| | | C | 39.600 | 0.000 | 0.000 | 0.000 | 0.25 |
| T8 | 180.00-160.00 | A | 39.600 | 0.000 | 0.000 | 0.000 | 0.50 |
| | | B | 49.752 | 7.871 | 0.000 | 0.000 | 0.33 |
| | | C | 39.600 | 0.000 | 0.000 | 0.000 | 0.25 |
| T9 | 160.00-140.00 | A | 39.600 | 0.000 | 0.000 | 0.000 | 0.50 |
| | | B | 51.417 | 7.871 | 0.000 | 0.000 | 0.34 |
| | | C | 39.600 | 0.000 | 0.000 | 0.000 | 0.25 |
| T10 | 140.00-120.00 | A | 39.600 | 0.000 | 0.000 | 0.000 | 0.50 |
| | | B | 58.817 | 7.871 | 0.000 | 0.000 | 0.39 |
| | | C | 39.600 | 0.000 | 0.000 | 0.000 | 0.25 |
| T11 | 120.00-100.00 | A | 39.600 | 0.000 | 0.000 | 0.000 | 0.50 |
| | | B | 59.742 | 9.117 | 0.000 | 0.000 | 0.40 |
| | | C | 39.600 | 0.000 | 0.000 | 0.000 | 0.25 |
| T12 | 100.00-80.00 | A | 39.600 | 0.000 | 0.000 | 0.000 | 0.50 |
| | | B | 65.292 | 11.478 | 0.000 | 0.000 | 0.44 |
| | | C | 39.600 | 0.000 | 0.000 | 0.000 | 0.25 |
| T13 | 80.00-60.00 | A | 39.600 | 0.000 | 0.000 | 0.000 | 0.50 |
| | | B | 66.217 | 11.478 | 0.000 | 0.000 | 0.44 |
| | | C | 39.600 | 0.000 | 0.000 | 0.000 | 0.25 |
| T14 | 60.00-30.00 | A | 59.400 | 0.000 | 0.000 | 0.000 | 0.75 |
| | | B | 99.325 | 17.217 | 0.000 | 0.000 | 0.66 |
| | | C | 59.400 | 0.000 | 0.000 | 0.000 | 0.37 |
| T15 | 30.00-0.00 | A | 59.400 | 0.000 | 0.000 | 0.000 | 0.75 |
| | | B | 99.325 | 17.217 | 0.000 | 0.000 | 0.66 |
| | | C | 59.400 | 0.000 | 0.000 | 0.000 | 0.37 |

## 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 | 320.00-300.00 | A | 0.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | | 17.583 | 4.482 | 0.000 | 0.000 | 0.20 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T2 | 300.00-280.00 | A | 0.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | | 22.507 | 11.204 | 0.000 | 0.000 | 0.31 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T3 | 280.00-260.00 | A | 0.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | | 66.983 | 11.204 | 0.000 | 0.000 | 0.75 |

| Tower Section | Tower Elevation ft | Face or Leg | Ice Thickness in | $A_R$ $ft^2$ | $A_F$ $ft^2$ | $C_AA_A$ In Face $ft^2$ | $C_AA_A$ Out Face $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|---|
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T4 | 260.00-240.00 | A | 0.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | | 72.258 | 11.204 | 0.000 | 0.000 | 0.80 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T5 | 240.00-220.00 | A | 0.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | | 77.533 | 11.204 | 0.000 | 0.000 | 0.84 |
| | | C | | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| T6 | 220.00-200.00 | A | 0.500 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 |
| | | B | | 77.533 | 11.204 | 0.000 | 0.000 | 0.84 |
| | | C | | 59.600 | 0.000 | 0.000 | 0.000 | 0.61 |
| T7 | 200.00-180.00 | A | 0.500 | 59.600 | 0.000 | 0.000 | 0.000 | 1.23 |
| | | B | | 77.533 | 11.204 | 0.000 | 0.000 | 0.84 |
| | | C | | 59.600 | 0.000 | 0.000 | 0.000 | 0.61 |
| T8 | 180.00-160.00 | A | 0.500 | 59.600 | 0.000 | 0.000 | 0.000 | 1.23 |
| | | B | | 84.918 | 11.204 | 0.000 | 0.000 | 0.91 |
| | | C | | 59.600 | 0.000 | 0.000 | 0.000 | 0.61 |
| T9 | 160.00-140.00 | A | 0.500 | 59.600 | 0.000 | 0.000 | 0.000 | 1.23 |
| | | B | | 88.083 | 11.204 | 0.000 | 0.000 | 0.93 |
| | | C | | 59.600 | 0.000 | 0.000 | 0.000 | 0.61 |
| T10 | 140.00-120.00 | A | 0.500 | 59.600 | 0.000 | 0.000 | 0.000 | 1.23 |
| | | B | | 102.150 | 11.204 | 0.000 | 0.000 | 1.06 |
| | | C | | 59.600 | 0.000 | 0.000 | 0.000 | 0.61 |
| T11 | 120.00-100.00 | A | 0.500 | 59.600 | 0.000 | 0.000 | 0.000 | 1.23 |
| | | B | | 103.908 | 13.395 | 0.000 | 0.000 | 1.09 |
| | | C | | 59.600 | 0.000 | 0.000 | 0.000 | 0.61 |
| T12 | 100.00-80.00 | A | 0.500 | 59.600 | 0.000 | 0.000 | 0.000 | 1.23 |
| | | B | | 114.458 | 17.033 | 0.000 | 0.000 | 1.22 |
| | | C | | 59.600 | 0.000 | 0.000 | 0.000 | 0.61 |
| T13 | 80.00-60.00 | A | 0.500 | 59.600 | 0.000 | 0.000 | 0.000 | 1.23 |
| | | B | | 116.217 | 17.033 | 0.000 | 0.000 | 1.23 |
| | | C | | 59.600 | 0.000 | 0.000 | 0.000 | 0.61 |
| T14 | 60.00-30.00 | A | 0.500 | 89.400 | 0.000 | 0.000 | 0.000 | 1.84 |
| | | B | | 174.325 | 25.550 | 0.000 | 0.000 | 1.85 |
| | | C | | 89.400 | 0.000 | 0.000 | 0.000 | 0.92 |
| T15 | 30.00-0.00 | A | 0.500 | 89.400 | 0.000 | 0.000 | 0.000 | 1.84 |
| | | B | | 174.325 | 25.550 | 0.000 | 0.000 | 1.85 |
| | | C | | 89.400 | 0.000 | 0.000 | 0.000 | 0.92 |

## 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 | 320.00-300.00 | A | 0.000 | 0.000 | 0.000 | 0.000 |
| | | B | 0.000 | 1.193 | 1.139 | 2.088 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 |
| T2 | 300.00-280.00 | A | 0.000 | 0.000 | 0.000 | 0.000 |
| | | B | 0.000 | 1.549 | 1.727 | 3.099 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 |
| T3 | 280.00-260.00 | A | 0.000 | 0.000 | 0.000 | 0.000 |
| | | B | 0.000 | 2.407 | 3.631 | 6.017 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 |
| T4 | 260.00-240.00 | A | 0.000 | 0.000 | 0.000 | 0.000 |
| | | B | 0.000 | 2.433 | 4.370 | 7.300 |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 |
| T5 | 240.00-220.00 | A | 0.000 | 0.000 | 0.000 | 0.000 |
| | | B | 0.000 | 2.501 | 5.948 | 10.006 |

| Section | Elevation | Face | $A_R$ | $A_R$ Ice | $A_F$ | $A_F$ Ice |
|---|---|---|---|---|---|---|
| | ft | | $ft^2$ | $ft^2$ | $ft^2$ | $ft^2$ |
| | | C | 0.000 | 0.000 | 0.000 | 0.000 |
| T6 | 220.00-200.00 | A | 0.000 | 0.000 | 0.000 | 0.000 |
| | | B | 0.000 | 1.775 | 4.219 | 7.098 |
| | | C | 0.000 | 1.170 | 3.109 | 4.680 |
| T7 | 200.00-180.00 | A | 0.000 | 1.134 | 3.015 | 4.537 |
| | | B | 0.000 | 1.721 | 4.091 | 6.882 |
| | | C | 0.000 | 1.134 | 3.015 | 4.537 |
| T8 | 180.00-160.00 | A | 0.000 | 1.108 | 2.945 | 4.432 |
| | | B | 0.000 | 1.818 | 4.285 | 7.271 |
| | | C | 0.000 | 1.108 | 2.945 | 4.432 |
| T9 | 160.00-140.00 | A | 0.000 | 1.089 | 3.618 | 5.446 |
| | | B | 0.000 | 1.845 | 5.417 | 9.224 |
| | | C | 0.000 | 1.089 | 3.618 | 5.446 |
| T10 | 140.00-120.00 | A | 0.000 | 1.074 | 3.569 | 5.371 |
| | | B | 0.000 | 2.073 | 6.010 | 10.366 |
| | | C | 0.000 | 1.074 | 3.569 | 5.371 |
| T11 | 120.00-100.00 | A | 2.688 | 5.475 | 0.000 | 0.000 |
| | | B | 4.673 | 10.972 | 0.000 | 0.000 |
| | | C | 2.688 | 5.475 | 0.000 | 0.000 |
| T12 | 100.00-80.00 | A | 2.791 | 5.568 | 0.000 | 0.000 |
| | | B | 5.410 | 12.544 | 0.000 | 0.000 |
| | | C | 2.791 | 5.568 | 0.000 | 0.000 |
| T13 | 80.00-60.00 | A | 2.834 | 5.585 | 0.000 | 0.000 |
| | | B | 5.559 | 12.747 | 0.000 | 0.000 |
| | | C | 2.834 | 5.585 | 0.000 | 0.000 |
| T14 | 60.00-30.00 | A | 4.439 | 8.806 | 0.000 | 0.000 |
| | | B | 8.709 | 20.099 | 0.000 | 0.000 |
| | | C | 4.439 | 8.806 | 0.000 | 0.000 |
| T15 | 30.00-0.00 | A | 4.315 | 8.525 | 0.000 | 0.000 |
| | | B | 8.467 | 19.457 | 0.000 | 0.000 |
| | | C | 4.315 | 8.525 | 0.000 | 0.000 |

## Feed Line Center of Pressure

| Section | Elevation | $CP_X$ | $CP_Z$ | $CP_X$ Ice | $CP_Z$ Ice |
|---|---|---|---|---|---|
| | ft | in | in | in | in |
| T1 | 320.00-300.00 | 4.3910 | 2.2719 | 5.3628 | 2.7845 |
| T2 | 300.00-280.00 | 6.6750 | 3.3779 | 8.1423 | 4.1324 |
| T3 | 280.00-260.00 | 13.5720 | 5.3391 | 16.3759 | 6.5045 |
| T4 | 260.00-240.00 | 15.5497 | 6.1662 | 19.0392 | 7.6193 |
| T5 | 240.00-220.00 | 15.9322 | 6.3531 | 20.0227 | 8.0533 |
| T6 | 220.00-200.00 | 29.2415 | 15.3142 | 34.7775 | 18.0552 |
| T7 | 200.00-180.00 | 12.6960 | 17.3825 | 16.2149 | 20.7460 |
| T8 | 180.00-160.00 | 14.7394 | 19.0472 | 18.9184 | 22.6937 |
| T9 | 160.00-140.00 | 15.0671 | 19.0385 | 19.6558 | 23.0073 |
| T10 | 140.00-120.00 | 17.9350 | 20.7859 | 23.5936 | 25.1685 |
| T11 | 120.00-100.00 | 22.3265 | 25.2491 | 28.3291 | 29.4774 |
| T12 | 100.00-80.00 | 25.6452 | 26.7904 | 32.6759 | 31.3891 |
| T13 | 80.00-60.00 | 28.3546 | 29.3663 | 35.9545 | 34.2235 |
| T14 | 60.00-30.00 | 30.8983 | 31.9981 | 39.0043 | 37.1294 |
| T15 | 30.00-0.00 | 33.1136 | 34.2894 | 41.9757 | 39.9562 |

# Discrete Tower Loads

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral Vert<br>ft<br>ft<br>ft | Azimuth Adjustment<br>° | Placement<br>ft | | $C_AA_A$ Front<br>$ft^2$ | $C_AA_A$ Side<br>$ft^2$ | Weight<br>K |
|---|---|---|---|---|---|---|---|---|---|
| Dual Lights | C | None | | 0.0000 | 320.00 | No Ice | 4.00 | 4.00 | 0.25 |
| | | | | | | 1/2" Ice | 4.80 | 4.80 | 0.40 |
| 5'3"x4" Pipe Mount | A | From Leg | 0.50 | 0.0000 | 308.00 | No Ice | 1.88 | 1.88 | 0.06 |
| (CSP future) | | | 0.00 | | | 1/2" Ice | 2.21 | 2.21 | 0.07 |
| | | | 0.00 | | | | | | |
| 5'3"x4" Pipe Mount | B | From Leg | 0.50 | 0.0000 | 308.00 | No Ice | 1.88 | 1.88 | 0.06 |
| (CSP future) | | | 0.00 | | | 1/2" Ice | 2.21 | 2.21 | 0.07 |
| | | | 0.00 | | | | | | |
| 5'3"x4" Pipe Mount | C | From Leg | 0.50 | 0.0000 | 308.00 | No Ice | 1.88 | 1.88 | 0.06 |
| (CSP future) | | | 0.00 | | | 1/2" Ice | 2.21 | 2.21 | 0.07 |
| | | | 0.00 | | | | | | |
| PD128 | C | From Leg | 6.00 | 0.0000 | 320.00 | No Ice | 1.00 | 1.00 | 0.01 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 1.80 | 1.80 | 0.02 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | C | None | | 0.0000 | 320.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| PD128 | C | From Leg | 6.00 | 0.0000 | 318.00 | No Ice | 1.00 | 1.00 | 0.01 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 1.80 | 1.80 | 0.02 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | C | None | | 0.0000 | 318.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| 6'8"x4" Pipe Mount | C | From Leg | 0.50 | 0.0000 | 315.00 | No Ice | 2.60 | 2.60 | 0.07 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 3.01 | 3.01 | 0.09 |
| | | | 0.00 | | | | | | |
| DB224 | A | From Leg | 6.00 | 0.0000 | 294.00 | No Ice | 3.15 | 3.15 | 0.03 |
| (SHF) | | | 0.00 | | | 1/2" Ice | 5.67 | 5.67 | 0.04 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | A | None | | 0.0000 | 294.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| PD320 | C | From Leg | 6.00 | 0.0000 | 292.00 | No Ice | 2.25 | 2.25 | 0.03 |
| (DEP) | | | 0.00 | | | 1/2" Ice | 4.05 | 4.05 | 0.04 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | C | None | | 0.0000 | 292.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| (2) DB809 | A | From Leg | 6.00 | 0.0000 | 285.00 | No Ice | 3.39 | 3.39 | 0.03 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 4.55 | 4.55 | 0.06 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | A | None | | 0.0000 | 285.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| (2) OGT9 | A | From Leg | 6.00 | 0.0000 | 275.00 | No Ice | 3.15 | 3.15 | 0.03 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 5.67 | 5.67 | 0.04 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | A | None | | 0.0000 | 275.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| PD440 | B | From Leg | 6.00 | 0.0000 | 257.00 | No Ice | 1.38 | 1.38 | 0.02 |
| (OEM) | | | 0.00 | | | 1/2" Ice | 2.48 | 2.48 | 0.02 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | B | None | | 0.0000 | 257.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| PD128 | C | From Leg | 6.00 | 0.0000 | 243.00 | No Ice | 1.00 | 1.00 | 0.01 |
| (OEM) | | | 0.00 | | | 1/2" Ice | 1.80 | 1.80 | 0.02 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | C | None | | 0.0000 | 243.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| PD320 | A | From Leg | 6.00 | 0.0000 | 227.00 | No Ice | 2.25 | 2.25 | 0.03 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 4.05 | 4.05 | 0.04 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | A | None | | 0.0000 | 227.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| Mounting Frame | A | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 17.00 | 17.00 | 0.56 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 20.00 | 20.00 | 0.70 |
| | | | 0.00 | | | | | | |
| Mounting Frame | B | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 17.00 | 17.00 | 0.56 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 20.00 | 20.00 | 0.70 |
| | | | 0.00 | | | | | | |
| Mounting Frame | C | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 17.00 | 17.00 | 0.56 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 20.00 | 20.00 | 0.70 |
| | | | 0.00 | | | | | | |
| PiROD 12' Lightweight | A | None | | 0.0000 | 200.00 | No Ice | 10.20 | 10.20 | 0.25 |
| T-Frame | | | | | | 1/2" Ice | 16.20 | 16.20 | 0.35 |
| (Cingular) | | | | | | | | | |
| PiROD 12' Lightweight | B | None | | 0.0000 | 200.00 | No Ice | 10.20 | 10.20 | 0.25 |
| T-Frame | | | | | | 1/2" Ice | 16.20 | 16.20 | 0.35 |
| (Cingular) | | | | | | | | | |
| PiROD 12' Lightweight | C | None | | 0.0000 | 200.00 | No Ice | 10.20 | 10.20 | 0.25 |
| T-Frame | | | | | | 1/2" Ice | 16.20 | 16.20 | 0.35 |
| (Cingular) | | | | | | | | | |
| (4) 7770.00 | A | From Leg | 3.00 | 0.0000 | 200.00 | No Ice | 10.03 | 5.60 | 0.02 |
| (Cingular) | | | 0.00 | | | 1/2" Ice | 10.61 | 6.15 | 0.07 |
| | | | 0.00 | | | | | | |
| (4) 7770.00 | B | From Leg | 3.00 | 0.0000 | 200.00 | No Ice | 10.03 | 5.60 | 0.02 |
| (Cingular) | | | 0.00 | | | 1/2" Ice | 10.61 | 6.15 | 0.07 |
| | | | 0.00 | | | | | | |
| (4) 7770.00 | C | From Leg | 3.00 | 0.0000 | 200.00 | No Ice | 10.03 | 5.60 | 0.02 |
| (Cingular) | | | 0.00 | | | 1/2" Ice | 10.61 | 6.15 | 0.07 |
| | | | 0.00 | | | | | | |
| (4) LPG21401 TMA | A | From Leg | 3.00 | 0.0000 | 200.00 | No Ice | 0.95 | 0.37 | 0.02 |
| (Cingular) | | | 0.00 | | | 1/2" Ice | 1.09 | 0.48 | 0.02 |
| | | | 0.00 | | | | | | |
| (4) LPG21401 TMA | B | From Leg | 3.00 | 0.0000 | 200.00 | No Ice | 0.95 | 0.37 | 0.02 |
| (Cingular) | | | 0.00 | | | 1/2" Ice | 1.09 | 0.48 | 0.02 |
| | | | 0.00 | | | | | | |
| (4) LPG21401 TMA | C | From Leg | 3.00 | 0.0000 | 200.00 | No Ice | 0.95 | 0.37 | 0.02 |
| (Cingular) | | | 0.00 | | | 1/2" Ice | 1.09 | 0.48 | 0.02 |
| | | | 0.00 | | | | | | |
| (4) LPG13519 Diplexer | A | From Leg | 3.00 | 0.0000 | 200.00 | No Ice | 0.27 | 0.18 | 0.01 |
| (Cingular) | | | 0.00 | | | 1/2" Ice | 0.34 | 0.25 | 0.01 |
| | | | 0.00 | | | | | | |
| (4) LPG13519 Diplexer | B | From Leg | 3.00 | 0.0000 | 200.00 | No Ice | 0.27 | 0.18 | 0.01 |
| (Cingular) | | | 0.00 | | | 1/2" Ice | 0.34 | 0.25 | 0.01 |
| | | | 0.00 | | | | | | |
| (4) LPG13519 Diplexer | C | From Leg | 3.00 | 0.0000 | 200.00 | No Ice | 0.27 | 0.18 | 0.01 |
| (Cingular) | | | 0.00 | | | 1/2" Ice | 0.34 | 0.25 | 0.01 |
| | | | 0.00 | | | | | | |
| PD688S-4 | A | From Leg | 6.00 | 0.0000 | 140.00 | No Ice | 0.35 | 0.35 | 0.00 |
| (NEU) | | | 0.00 | | | 1/2" Ice | 0.63 | 0.63 | 0.00 |
| | | | 0.00 | | | | | | |
| DB212-1 | B | None | | 0.0000 | 140.00 | No Ice | 4.40 | 4.40 | 0.03 |
| (NEU) | | | | | | 1/2" Ice | 8.42 | 8.42 | 0.07 |
| 6' Side Mount Standoff | B | None | | 0.0000 | 140.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |

| 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 |
|---|---|---|---|---|---|---|---|---|---|
| BA1012-0 | A | From Leg | 6.00 | 0.0000 | 140.00 | No Ice | 0.47 | 0.47 | 0.00 |
| (OEM) | | | 0.00 | | | 1/2" Ice | 0.96 | 0.96 | 0.01 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | A | None | | 0.0000 | 140.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| PD156S | C | From Leg | 1.00 | 0.0000 | 138.00 | No Ice | 0.44 | 0.44 | 0.01 |
| (DEP) | | | 0.00 | | | 1/2" Ice | 0.79 | 0.79 | 0.01 |
| | | | 0.00 | | | | | | |
| 3'4"x4" Pipe Mount | C | From Leg | 0.50 | 0.0000 | 138.00 | No Ice | 1.05 | 1.05 | 0.04 |
| (DEP) | | | 0.00 | | | 1/2" Ice | 1.27 | 1.27 | 0.05 |
| | | | 0.00 | | | | | | |
| 3'4"x4" Pipe Mount | C | From Leg | 0.50 | 0.0000 | 112.00 | No Ice | 1.05 | 1.05 | 0.04 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 1.27 | 1.27 | 0.05 |
| | | | 0.00 | | | | | | |
| 5'3"x4" Pipe Mount | A | From Leg | 0.50 | 0.0000 | 105.00 | No Ice | 1.88 | 1.88 | 0.06 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 2.21 | 2.21 | 0.07 |
| | | | 0.00 | | | | | | |
| PD458 | B | From Leg | 6.00 | 0.0000 | 100.00 | No Ice | 2.88 | 2.88 | 0.02 |
| (CTT) | | | 0.00 | | | 1/2" Ice | 4.34 | 4.34 | 0.05 |
| | | | 0.00 | | | | | | |
| DB437 | B | From Leg | 6.00 | 0.0000 | 100.00 | No Ice | 0.45 | 0.45 | 0.01 |
| (FBI) | | | 0.00 | | | 1/2" Ice | 0.81 | 0.81 | 0.01 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | B | None | | 0.0000 | 100.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| 5'3"x4" Pipe Mount | A | From Leg | 0.50 | 0.0000 | 97.00 | No Ice | 1.88 | 1.88 | 0.06 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 2.21 | 2.21 | 0.07 |
| | | | 0.00 | | | | | | |
| 3'4"x4" Pipe Mount | C | From Leg | 0.50 | 0.0000 | 90.00 | No Ice | 1.05 | 1.05 | 0.04 |
| (CSP) | | | 0.00 | | | 1/2" Ice | 1.27 | 1.27 | 0.05 |
| | | | 0.00 | | | | | | |
| DB-630 | C | From Leg | 6.00 | 0.0000 | 170.00 | No Ice | 0.59 | 0.59 | 0.01 |
| (NEU - 32) | | | 0.00 | | | 1/2" Ice | 0.80 | 0.80 | 0.01 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | C | None | | 0.0000 | 170.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| DB583 | B | From Leg | 6.00 | 0.0000 | 174.00 | No Ice | 0.54 | 0.54 | 0.01 |
| (NEU - 48) | | | 0.00 | | | 1/2" Ice | 0.71 | 0.71 | 0.01 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | B | None | | 0.0000 | 174.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| DB586-Y | B | From Leg | 6.00 | 0.0000 | 166.00 | No Ice | 1.01 | 1.01 | 0.01 |
| (NEU - 49) | | | 0.00 | | | 1/2" Ice | 1.28 | 1.28 | 0.02 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | B | None | | 0.0000 | 166.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| BCD-80609 | A | From Leg | 6.00 | 0.0000 | 280.00 | No Ice | 2.95 | 2.95 | 0.03 |
| (CSP - 51) | | | 0.00 | | | 1/2" Ice | 4.11 | 4.11 | 0.05 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | A | None | | 0.0000 | 280.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| SC479-HF1LDF | A | From Leg | 6.00 | 0.0000 | 280.00 | No Ice | 5.06 | 5.06 | 0.03 |
| (CSP - 52) | | | 0.00 | | | 1/2" Ice | 6.54 | 6.54 | 0.07 |
| | | | 0.00 | | | | | | |
| SC479-HF1LDF | B | From Leg | 6.00 | 0.0000 | 280.00 | No Ice | 5.06 | 5.06 | 0.03 |
| (CSP - 53) | | | 0.00 | | | 1/2" Ice | 6.54 | 6.54 | 0.07 |
| | | | 0.00 | | | | | | |

| Description | Face or Leg | Offset Type | Offsets: Horz Lateral ft / Vert ft / ft | Azimuth Adjustment ° | Placement ft | | $C_AA_A$ Front $ft^2$ | $C_AA_A$ Side $ft^2$ | Weight K |
|---|---|---|---|---|---|---|---|---|---|
| 6' Side Mount Standoff | B | None | | 0.0000 | 280.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| SC479-HF1LDF | C | From Leg | 6.00 | 0.0000 | 280.00 | No Ice | 5.06 | 5.06 | 0.03 |
| (CSP - 54) | | | 0.00 | | | 1/2" Ice | 6.54 | 6.54 | 0.07 |
| | | | 0.00 | | | | | | |
| 6' Side Mount Standoff | C | None | | 0.0000 | 280.00 | No Ice | 6.50 | 6.50 | 0.10 |
| | | | | | | 1/2" Ice | 8.50 | 8.50 | 0.17 |
| TMA | C | None | | 0.0000 | 280.00 | No Ice | 1.91 | 0.95 | 0.03 |
| (CSP - 55) | | | | | | 1/2" Ice | 2.09 | 1.09 | 0.04 |
| BXA-70063/6CF | A | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 7.73 | 3.76 | 0.02 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 8.27 | 4.19 | 0.06 |
| | | | 0.00 | | | | | | |
| BXA-171085-8BF | A | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 2.00 | 1.50 | 0.02 |
| (Verizon) | | | 4.00 | | | 1/2" Ice | 2.30 | 1.80 | 0.04 |
| | | | 0.00 | | | | | | |
| LPA-80080-4CF-EDIN | A | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 2.62 | 6.06 | 0.02 |
| (Verizon) | | | 6.00 | | | 1/2" Ice | 2.92 | 6.45 | 0.05 |
| | | | 0.00 | | | | | | |
| LPA-80080-4CF-EDIN | A | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 2.62 | 6.06 | 0.02 |
| (Verizon) | | | -4.00 | | | 1/2" Ice | 2.92 | 6.45 | 0.05 |
| | | | 0.00 | | | | | | |
| BXA-70063/6CF | B | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 7.73 | 3.76 | 0.02 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 8.27 | 4.19 | 0.06 |
| | | | 0.00 | | | | | | |
| BXA-171085-8BF | B | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 2.00 | 1.50 | 0.02 |
| (Verizon) | | | 4.00 | | | 1/2" Ice | 2.30 | 1.80 | 0.04 |
| | | | 0.00 | | | | | | |
| LPA-80080-4CF-EDIN | B | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 2.62 | 6.06 | 0.02 |
| (Verizon) | | | 6.00 | | | 1/2" Ice | 2.92 | 6.45 | 0.05 |
| | | | 0.00 | | | | | | |
| LPA-80080-4CF-EDIN | B | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 2.62 | 6.06 | 0.02 |
| (Verizon) | | | -4.00 | | | 1/2" Ice | 2.92 | 6.45 | 0.05 |
| | | | 0.00 | | | | | | |
| BXA-70063/6CF | C | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 7.73 | 3.76 | 0.02 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 8.27 | 4.19 | 0.06 |
| | | | 0.00 | | | | | | |
| BXA-171085-8BF | C | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 2.00 | 1.50 | 0.02 |
| (Verizon) | | | 4.00 | | | 1/2" Ice | 2.30 | 1.80 | 0.04 |
| | | | 0.00 | | | | | | |
| LPA-80080-4CF-EDIN | C | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 2.62 | 6.06 | 0.02 |
| (Verizon) | | | 6.00 | | | 1/2" Ice | 2.92 | 6.45 | 0.05 |
| | | | 0.00 | | | | | | |
| LPA-80080-4CF-EDIN | C | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 2.62 | 6.06 | 0.02 |
| (Verizon) | | | -4.00 | | | 1/2" Ice | 2.92 | 6.45 | 0.05 |
| | | | 0.00 | | | | | | |
| (2) Diplexer | A | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 0.47 | 0.12 | 0.01 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 0.56 | 0.17 | 0.01 |
| | | | 0.00 | | | | | | |
| (2) Diplexer | B | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 0.47 | 0.12 | 0.01 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 0.56 | 0.17 | 0.01 |
| | | | 0.00 | | | | | | |
| (2) Diplexer | C | From Leg | 5.00 | 0.0000 | 220.00 | No Ice | 0.47 | 0.12 | 0.01 |
| (Verizon) | | | 0.00 | | | 1/2" Ice | 0.56 | 0.17 | 0.01 |
| | | | 0.00 | | | | | | |

## Dishes

| Description | Face or Leg | Dish Type | Offset Type | Offsets: Horz Lateral Vert<br>ft | Azimuth Adjustment<br>° | 3 dB Beam Width<br>° | Elevation<br>ft | Outside Diameter<br>ft | | Aperture Area<br>ft² | Weight<br>K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 FT DISH | B | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | Worst | | 315.00 | 8.00 | No Ice<br>1/2" Ice | 50.30<br>51.29 | 0.25<br>0.51 |
| 4 FT DISH | C | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | Worst | | 112.00 | 4.00 | No Ice<br>1/2" Ice | 12.56<br>13.09 | 0.17<br>0.24 |
| 6 FT DISH | A | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | Worst | | 105.00 | 6.00 | No Ice<br>1/2" Ice | 28.27<br>29.05 | 0.14<br>0.29 |
| 6 FT DISH | A | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | Worst | | 97.00 | 6.00 | No Ice<br>1/2" Ice | 28.27<br>29.05 | 0.14<br>0.29 |
| 4 FT DISH | C | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | Worst | | 90.00 | 4.00 | No Ice<br>1/2" Ice | 12.56<br>13.09 | 0.17<br>0.24 |
| 6 FT DISH | A | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | Worst | | 308.00 | 6.00 | No Ice<br>1/2" Ice | 28.27<br>29.05 | 0.14<br>0.29 |
| 6 FT DISH | B | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | Worst | | 308.00 | 6.00 | No Ice<br>1/2" Ice | 28.27<br>29.05 | 0.14<br>0.29 |
| 6 FT DISH | C | Paraboloid w/Radome | From Leg | 1.00<br>0.00<br>0.00 | Worst | | 308.00 | 6.00 | No Ice<br>1/2" Ice | 28.27<br>29.05 | 0.14<br>0.29 |

## Tower Pressures - No Ice

$G_H = 1.084$

| Section Elevation<br>ft | z<br>ft | $K_Z$ | $q_z$<br>psf | $A_G$<br>ft² | Face | $A_F$<br>ft² | $A_R$<br>ft² | $A_{leg}$<br>ft² | Leg %<br>% | $C_AA_A$ In Face<br>ft² | $C_AA_A$ Out Face<br>ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 310.00 | 1.897 | 39 | 145.472 | A | 11.659 | 18.543 | 18.543 | 61.40 | 0.000 | 0.000 |
| 320.00-300.00 | | | | | B | 13.669 | 27.793 | | 44.72 | 0.000 | 0.000 |
| | | | | | C | 11.659 | 18.543 | | 61.40 | 0.000 | 0.000 |
| T2 | 290.00 | 1.861 | 39 | 167.656 | A | 12.596 | 22.122 | 22.122 | 63.72 | 0.000 | 0.000 |
| 300.00-280.00 | | | | | B | 18.740 | 33.962 | | 41.97 | 0.000 | 0.000 |
| | | | | | C | 12.596 | 22.122 | | 63.72 | 0.000 | 0.000 |
| T3 | 270.00 | 1.823 | 38 | 213.297 | A | 13.934 | 28.807 | 28.807 | 67.40 | 0.000 | 0.000 |
| 280.00-260.00 | | | | | B | 18.174 | 69.124 | | 33.00 | 0.000 | 0.000 |
| | | | | | C | 13.934 | 28.807 | | 67.40 | 0.000 | 0.000 |
| T4 | 250.00 | 1.783 | 37 | 255.594 | A | 19.443 | 28.800 | 28.800 | 59.70 | 0.000 | 0.000 |
| 260.00-240.00 | | | | | B | 22.944 | 71.891 | | 30.37 | 0.000 | 0.000 |
| | | | | | C | 19.443 | 28.800 | | 59.70 | 0.000 | 0.000 |
| T5 | 230.00 | 1.741 | 36 | 296.093 | A | 29.581 | 28.798 | 28.798 | 49.33 | 0.000 | 0.000 |
| 240.00-220.00 | | | | | B | 31.505 | 74.665 | | 27.12 | 0.000 | 0.000 |
| | | | | | C | 29.581 | 28.798 | | 49.33 | 0.000 | 0.000 |
| T6 | 210.00 | 1.697 | 35 | 336.193 | A | 24.136 | 28.798 | 28.798 | 54.40 | 0.000 | 0.000 |
| 220.00-200.00 | | | | | B | 27.787 | 74.665 | | 28.11 | 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 | 21.026 | 68.398 | | 32.20 | 0.000 | 0.000 |
| T7 | 190.00 | 1.649 | 34 | 389.387 | A | 23.020 | 86.405 | 46.805 | 42.77 | 0.000 | 0.000 |
| 200.00-180.00 | | | | | B | 29.815 | 92.671 | | 38.21 | 0.000 | 0.000 |
| | | | | | C | 23.020 | 86.405 | | 42.77 | 0.000 | 0.000 |
| T8 | 170.00 | 1.597 | 33 | 431.485 | A | 25.448 | 86.400 | 46.800 | 41.84 | 0.000 | 0.000 |
| 180.00-160.00 | | | | | B | 31.978 | 96.552 | | 36.41 | 0.000 | 0.000 |
| | | | | | C | 25.448 | 86.400 | | 41.84 | 0.000 | 0.000 |
| T9 | 150.00 | 1.541 | 32 | 471.380 | A | 34.916 | 86.387 | 46.787 | 38.57 | 0.000 | 0.000 |
| 160.00-140.00 | | | | | B | 40.988 | 98.204 | | 33.61 | 0.000 | 0.000 |
| | | | | | C | 34.916 | 86.387 | | 38.57 | 0.000 | 0.000 |
| T10 | 130.00 | 1.48 | 31 | 512.289 | A | 38.126 | 86.409 | 46.809 | 37.59 | 0.000 | 0.000 |
| 140.00-120.00 | | | | | B | 43.556 | 105.625 | | 31.38 | 0.000 | 0.000 |
| | | | | | C | 38.126 | 86.409 | | 37.59 | 0.000 | 0.000 |
| T11 | 110.00 | 1.411 | 29 | 559.905 | A | 0.000 | 118.656 | 46.846 | 39.48 | 0.000 | 0.000 |
| 120.00-100.00 | | | | | B | 9.117 | 133.181 | | 32.92 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 111.395 | | 42.05 | 0.000 | 0.000 |
| T12 | 90.00 | 1.332 | 28 | 610.701 | A | 0.000 | 123.775 | 46.838 | 37.84 | 0.000 | 0.000 |
| 100.00-80.00 | | | | | B | 11.478 | 143.014 | | 30.32 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 116.109 | | 40.34 | 0.000 | 0.000 |
| T13 | 70.00 | 1.24 | 26 | 657.397 | A | 0.000 | 123.911 | 42.626 | 34.40 | 0.000 | 0.000 |
| 80.00-60.00 | | | | | B | 11.478 | 142.880 | | 27.62 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 114.066 | | 37.37 | 0.000 | 0.000 |
| T14 | 45.00 | 1.093 | 23 | 1081.03 | A | 0.000 | 183.259 | 63.908 | 34.87 | 0.000 | 0.000 |
| 60.00-30.00 | | | | 4 | B | 17.217 | 215.369 | | 27.48 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 176.169 | | 36.28 | 0.000 | 0.000 |
| T15 30.00-0.00 | 15.00 | 1 | 21 | 1194.29 | A | 0.000 | 191.513 | 63.928 | 33.38 | 0.000 | 0.000 |
| | | | | 2 | B | 17.217 | 222.667 | | 26.65 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 182.273 | | 35.07 | 0.000 | 0.000 |

## Tower Pressure - With Ice

$G_H = 1.084$

| Section Elevation ft | z ft | $K_Z$ | $q_z$ psf | $t_Z$ in | $A_G$ ft² | Face | $A_F$ ft² | $A_R$ ft² | $A_{leg}$ ft² | Leg % | $C_AA_A$ In Face ft² | $C_AA_A$ Out Face ft² |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 310.00 | 1.897 | 39 | 0.5000 | 147.138 | A | 11.659 | 28.539 | 21.877 | 54.42 | 0.000 | 0.000 |
| 320.00-300.00 | | | | | | B | 14.053 | 44.929 | | 37.09 | 0.000 | 0.000 |
| | | | | | | C | 11.659 | 28.539 | | 54.42 | 0.000 | 0.000 |
| T2 | 290.00 | 1.861 | 39 | 0.5000 | 169.325 | A | 12.596 | 31.759 | 25.461 | 57.40 | 0.000 | 0.000 |
| 300.00-280.00 | | | | | | B | 20.701 | 52.716 | | 34.68 | 0.000 | 0.000 |
| | | | | | | C | 12.596 | 31.759 | | 57.40 | 0.000 | 0.000 |
| T3 | 270.00 | 1.823 | 38 | 0.5000 | 214.966 | A | 13.934 | 37.721 | 32.147 | 62.24 | 0.000 | 0.000 |
| 280.00-260.00 | | | | | | B | 19.121 | 102.297 | | 26.48 | 0.000 | 0.000 |
| | | | | | | C | 13.934 | 37.721 | | 62.24 | 0.000 | 0.000 |
| T4 | 250.00 | 1.783 | 37 | 0.5000 | 257.263 | A | 19.443 | 38.620 | 32.139 | 55.35 | 0.000 | 0.000 |
| 260.00-240.00 | | | | | | B | 23.348 | 108.445 | | 24.39 | 0.000 | 0.000 |
| | | | | | | C | 19.443 | 38.620 | | 55.35 | 0.000 | 0.000 |
| T5 | 230.00 | 1.741 | 36 | 0.5000 | 297.762 | A | 29.581 | 39.533 | 32.137 | 46.50 | 0.000 | 0.000 |
| 240.00-220.00 | | | | | | B | 30.780 | 114.564 | | 22.11 | 0.000 | 0.000 |
| | | | | | | C | 29.581 | 39.533 | | 46.50 | 0.000 | 0.000 |
| T6 | 210.00 | 1.697 | 35 | 0.5000 | 337.862 | A | 24.136 | 38.171 | 32.137 | 51.58 | 0.000 | 0.000 |
| 220.00-200.00 | | | | | | B | 28.242 | 113.929 | | 22.60 | 0.000 | 0.000 |
| | | | | | | C | 19.456 | 96.601 | | 27.69 | 0.000 | 0.000 |
| T7 | 190.00 | 1.649 | 34 | 0.5000 | 391.056 | A | 21.498 | 115.119 | 50.144 | 36.70 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 200.00-180.00 | | | | | | B | 30.357 | 132.466 | | 30.80 | 0.000 | 0.000 |
| | | | | | | C | 21.498 | 115.119 | | 36.70 | 0.000 | 0.000 |
| T8 | 170.00 | 1.597 | 33 | 0.5000 | 433.154 | A | 23.960 | 115.730 | 50.140 | 35.89 | 0.000 | 0.000 |
| 180.00-160.00 | | | | | | B | 32.325 | 140.338 | | 29.04 | 0.000 | 0.000 |
| | | | | | | C | 23.960 | 115.730 | | 35.89 | 0.000 | 0.000 |
| T9 | 150.00 | 1.541 | 32 | 0.5000 | 473.048 | A | 33.088 | 116.343 | 50.126 | 33.54 | 0.000 | 0.000 |
| 160.00-140.00 | | | | | | B | 40.514 | 144.071 | | 27.16 | 0.000 | 0.000 |
| | | | | | | C | 33.088 | 116.343 | | 33.54 | 0.000 | 0.000 |
| T10 | 130.00 | 1.48 | 31 | 0.5000 | 513.958 | A | 36.323 | 117.013 | 50.149 | 32.70 | 0.000 | 0.000 |
| 140.00-120.00 | | | | | | B | 42.533 | 158.564 | | 24.94 | 0.000 | 0.000 |
| | | | | | | C | 36.323 | 117.013 | | 32.70 | 0.000 | 0.000 |
| T11 | 110.00 | 1.411 | 29 | 0.5000 | 561.575 | A | 0.000 | 150.868 | 50.188 | 33.27 | 0.000 | 0.000 |
| 120.00-100.00 | | | | | | B | 13.395 | 184.785 | | 25.32 | 0.000 | 0.000 |
| | | | | | | C | 0.000 | 141.081 | | 35.57 | 0.000 | 0.000 |
| T12 | 90.00 | 1.332 | 28 | 0.5000 | 612.371 | A | 0.000 | 156.717 | 50.180 | 32.02 | 0.000 | 0.000 |
| 100.00-80.00 | | | | | | B | 17.033 | 199.433 | | 23.18 | 0.000 | 0.000 |
| | | | | | | C | 0.000 | 146.385 | | 34.28 | 0.000 | 0.000 |
| T13 80.00-60.00 | 70.00 | 1.24 | 26 | 0.5000 | 659.068 | A | 0.000 | 157.626 | 45.969 | 29.16 | 0.000 | 0.000 |
| | | | | | | B | 17.033 | 200.752 | | 21.11 | 0.000 | 0.000 |
| | | | | | | C | 0.000 | 144.968 | | 31.71 | 0.000 | 0.000 |
| T14 60.00-30.00 | 45.00 | 1.093 | 23 | 0.5000 | 1083.539 | A | 0.000 | 234.346 | 68.920 | 29.41 | 0.000 | 0.000 |
| | | | | | | B | 25.550 | 302.941 | | 20.98 | 0.000 | 0.000 |
| | | | | | | C | 0.000 | 224.271 | | 30.73 | 0.000 | 0.000 |
| T15 30.00-0.00 | 15.00 | 1 | 21 | 0.5000 | 1196.797 | A | 0.000 | 244.216 | 68.942 | 28.23 | 0.000 | 0.000 |
| | | | | | | B | 25.550 | 311.982 | | 20.43 | 0.000 | 0.000 |
| | | | | | | C | 0.000 | 231.762 | | 29.75 | 0.000 | 0.000 |

## Tower Pressure - Service

$G_H = 1.084$

| 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 | 310.00 | 1.897 | 39 | 145.472 | A | 11.659 | 18.543 | 18.543 | 61.40 | 0.000 | 0.000 |
| 320.00-300.00 | | | | | B | 13.669 | 27.793 | | 44.72 | 0.000 | 0.000 |
| | | | | | C | 11.659 | 18.543 | | 61.40 | 0.000 | 0.000 |
| T2 | 290.00 | 1.861 | 39 | 167.656 | A | 12.596 | 22.122 | 22.122 | 63.72 | 0.000 | 0.000 |
| 300.00-280.00 | | | | | B | 18.740 | 33.962 | | 41.97 | 0.000 | 0.000 |
| | | | | | C | 12.596 | 22.122 | | 63.72 | 0.000 | 0.000 |
| T3 | 270.00 | 1.823 | 38 | 213.297 | A | 13.934 | 28.807 | 28.807 | 67.40 | 0.000 | 0.000 |
| 280.00-260.00 | | | | | B | 18.174 | 69.124 | | 33.00 | 0.000 | 0.000 |
| | | | | | C | 13.934 | 28.807 | | 67.40 | 0.000 | 0.000 |
| T4 | 250.00 | 1.783 | 37 | 255.594 | A | 19.443 | 28.800 | 28.800 | 59.70 | 0.000 | 0.000 |
| 260.00-240.00 | | | | | B | 22.944 | 71.891 | | 30.37 | 0.000 | 0.000 |
| | | | | | C | 19.443 | 28.800 | | 59.70 | 0.000 | 0.000 |
| T5 | 230.00 | 1.741 | 36 | 296.093 | A | 29.581 | 28.798 | 28.798 | 49.33 | 0.000 | 0.000 |
| 240.00-220.00 | | | | | B | 31.505 | 74.665 | | 27.12 | 0.000 | 0.000 |
| | | | | | C | 29.581 | 28.798 | | 49.33 | 0.000 | 0.000 |
| T6 | 210.00 | 1.697 | 35 | 336.193 | A | 24.136 | 28.798 | 28.798 | 54.40 | 0.000 | 0.000 |
| 220.00-200.00 | | | | | B | 27.787 | 74.665 | | 28.11 | 0.000 | 0.000 |
| | | | | | C | 21.026 | 68.398 | | 32.20 | 0.000 | 0.000 |
| T7 | 190.00 | 1.649 | 34 | 389.387 | A | 23.020 | 86.405 | 46.805 | 42.77 | 0.000 | 0.000 |
| 200.00-180.00 | | | | | B | 29.815 | 92.671 | | 38.21 | 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 | 23.020 | 86.405 | | 42.77 | 0.000 | 0.000 |
| T8 | 170.00 | 1.597 | 33 | 431.485 | A | 25.448 | 86.400 | 46.800 | 41.84 | 0.000 | 0.000 |
| 180.00-160.00 | | | | | B | 31.978 | 96.552 | | 36.41 | 0.000 | 0.000 |
| | | | | | C | 25.448 | 86.400 | | 41.84 | 0.000 | 0.000 |
| T9 | 150.00 | 1.541 | 32 | 471.380 | A | 34.916 | 86.387 | 46.787 | 38.57 | 0.000 | 0.000 |
| 160.00-140.00 | | | | | B | 40.988 | 98.204 | | 33.61 | 0.000 | 0.000 |
| | | | | | C | 34.916 | 86.387 | | 38.57 | 0.000 | 0.000 |
| T10 | 130.00 | 1.48 | 31 | 512.289 | A | 38.126 | 86.409 | 46.809 | 37.59 | 0.000 | 0.000 |
| 140.00-120.00 | | | | | B | 43.556 | 105.625 | | 31.38 | 0.000 | 0.000 |
| | | | | | C | 38.126 | 86.409 | | 37.59 | 0.000 | 0.000 |
| T11 | 110.00 | 1.411 | 29 | 559.905 | A | 0.000 | 118.656 | 46.846 | 39.48 | 0.000 | 0.000 |
| 120.00-100.00 | | | | | B | 9.117 | 133.181 | | 32.92 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 111.395 | | 42.05 | 0.000 | 0.000 |
| T12 | 90.00 | 1.332 | 28 | 610.701 | A | 0.000 | 123.775 | 46.838 | 37.84 | 0.000 | 0.000 |
| 100.00-80.00 | | | | | B | 11.478 | 143.014 | | 30.32 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 116.109 | | 40.34 | 0.000 | 0.000 |
| T13 | 70.00 | 1.24 | 26 | 657.397 | A | 0.000 | 123.911 | 42.626 | 34.40 | 0.000 | 0.000 |
| 80.00-60.00 | | | | | B | 11.478 | 142.880 | | 27.62 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 114.066 | | 37.37 | 0.000 | 0.000 |
| T14 | 45.00 | 1.093 | 23 | 1081.03 | A | 0.000 | 183.259 | 63.908 | 34.87 | 0.000 | 0.000 |
| 60.00-30.00 | | | | 4 | B | 17.217 | 215.369 | | 27.48 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 176.169 | | 36.28 | 0.000 | 0.000 |
| T15 30.00-0.00 | 15.00 | 1 | 21 | 1194.29 | A | 0.000 | 191.513 | 63.928 | 33.38 | 0.000 | 0.000 |
| | | | | 2 | B | 17.217 | 222.667 | | 26.65 | 0.000 | 0.000 |
| | | | | | C | 0.000 | 182.273 | | 35.07 | 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 | 0.07 | 1.79 | A | 0.208 | 2.571 | 0.592 | 1 | 1 | 22.637 | 3.05 | 152.67 | B |
| 320.00-300.00 | | | B | 0.285 | 2.337 | 0.611 | 1 | 1 | 30.662 | | | |
| | | | C | 0.208 | 2.571 | 0.592 | 1 | 1 | 22.637 | | | |
| T2 | 0.10 | 2.50 | A | 0.207 | 2.573 | 0.592 | 1 | 1 | 25.689 | 3.76 | 187.98 | B |
| 300.00-280.00 | | | B | 0.314 | 2.259 | 0.62 | 1 | 1 | 39.810 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 1 | 1 | 25.689 | | | |
| T3 | 0.28 | 3.48 | A | 0.2 | 2.595 | 0.59 | 1 | 1 | 30.944 | 5.32 | 266.04 | B |
| 280.00-260.00 | | | B | 0.409 | 2.046 | 0.655 | 1 | 1 | 63.480 | | | |
| | | | C | 0.2 | 2.595 | 0.59 | 1 | 1 | 30.944 | | | |
| T4 | 0.29 | 3.83 | A | 0.189 | 2.634 | 0.588 | 1 | 1 | 36.382 | 5.87 | 293.58 | B |
| 260.00-240.00 | | | B | 0.371 | 2.124 | 0.64 | 1 | 1 | 68.970 | | | |
| | | | C | 0.189 | 2.634 | 0.588 | 1 | 1 | 36.382 | | | |
| T5 | 0.31 | 4.90 | A | 0.197 | 2.605 | 0.59 | 1 | 1 | 46.567 | 6.65 | 332.47 | B |
| 240.00-220.00 | | | B | 0.359 | 2.152 | 0.636 | 1 | 1 | 78.960 | | | |
| | | | C | 0.197 | 2.605 | 0.59 | 1 | 1 | 46.567 | | | |
| T6 | 0.56 | 4.82 | A | 0.157 | 2.744 | 0.583 | 1 | 1 | 40.915 | 6.43 | 321.64 | B |
| 220.00-200.00 | | | B | 0.305 | 2.283 | 0.617 | 1 | 1 | 73.883 | | | |
| | | | C | 0.266 | 2.39 | 0.606 | 1 | 1 | 62.481 | | | |
| T7 | 1.06 | 6.87 | A | 0.281 | 2.348 | 0.61 | 1 | 1 | 75.751 | 7.31 | 365.28 | B |
| 200.00-180.00 | | | B | 0.315 | 2.258 | 0.62 | 1 | 1 | 87.314 | | | |
| | | | C | 0.281 | 2.348 | 0.61 | 1 | 1 | 75.751 | | | |
| T8 | 1.08 | 7.91 | A | 0.259 | 2.41 | 0.604 | 1 | 1 | 77.657 | 7.55 | 377.51 | B |
| 180.00-160.00 | | | B | 0.298 | 2.302 | 0.615 | 1 | 1 | 91.383 | | | |
| | | | C | 0.259 | 2.41 | 0.604 | 1 | 1 | 77.657 | | | |
| T9 | 1.09 | 8.04 | A | 0.257 | 2.416 | 0.604 | 1 | 1 | 87.074 | 8.10 | 405.12 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 160.00-140.00 | | | B | 0.295 | 2.309 | 0.614 | 1 | 1 | 101.331 | | | |
| | | | C | 0.257 | 2.416 | 0.604 | 1 | 1 | 87.074 | | | |
| T10 | 1.13 | 8.32 | A | 0.243 | 2.458 | 0.6 | 1 | 1 | 89.983 | 8.35 | 417.74 | B |
| 140.00-120.00 | | | B | 0.291 | 2.32 | 0.613 | 1 | 1 | 108.330 | | | |
| | | | C | 0.243 | 2.458 | 0.6 | 1 | 1 | 89.983 | | | |
| T11 | 1.14 | 7.49 | A | 0.212 | 2.557 | 0.593 | 1 | 1 | 70.352 | 6.87 | 343.68 | B |
| 120.00-100.00 | | | B | 0.254 | 2.425 | 0.603 | 1 | 1 | 89.417 | | | |
| | | | C | 0.199 | 2.599 | 0.59 | 1 | 1 | 65.744 | | | |
| T12 | 1.19 | 8.42 | A | 0.203 | 2.587 | 0.591 | 1 | 1 | 73.145 | 7.10 | 354.97 | B |
| 100.00-80.00 | | | B | 0.253 | 2.429 | 0.603 | 1 | 1 | 97.664 | | | |
| | | | C | 0.19 | 2.629 | 0.588 | 1 | 1 | 68.322 | | | |
| T13 | 1.19 | 8.35 | A | 0.188 | 2.635 | 0.588 | 1 | 1 | 72.875 | 6.71 | 335.38 | B |
| 80.00-60.00 | | | B | 0.235 | 2.484 | 0.598 | 1 | 1 | 96.937 | | | |
| | | | C | 0.174 | 2.687 | 0.585 | 1 | 1 | 66.769 | | | |
| T14 | 1.79 | 12.30 | A | 0.17 | 2.701 | 0.585 | 1 | 1 | 107.143 | 9.07 | 302.30 | B |
| 60.00-30.00 | | | B | 0.215 | 2.546 | 0.594 | 1 | 1 | 145.061 | | | |
| | | | C | 0.163 | 2.724 | 0.584 | 1 | 1 | 102.802 | | | |
| T15 | 1.79 | 14.02 | A | 0.16 | 2.734 | 0.583 | 1 | 1 | 111.674 | 8.67 | 288.87 | B |
| 30.00-0.00 | | | B | 0.201 | 2.593 | 0.591 | 1 | 1 | 148.718 | | | |
| | | | C | 0.153 | 2.762 | 0.582 | 1 | 1 | 106.061 | | | |
| Sum Weight: | 13.07 | 103.04 | | | | | | OTM | 15197.38 kip-ft | 100.82 | | |

## 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 | 0.07 | 1.79 | A | 0.208 | 2.571 | 0.592 | 0.825 | 1 | 20.596 | 2.82 | 140.76 | B |
| 320.00-300.00 | | | B | 0.285 | 2.337 | 0.611 | 0.825 | 1 | 28.270 | | | |
| | | | C | 0.208 | 2.571 | 0.592 | 0.825 | 1 | 20.596 | | | |
| T2 | 0.10 | 2.50 | A | 0.207 | 2.573 | 0.592 | 0.825 | 1 | 23.485 | 3.45 | 172.49 | B |
| 300.00-280.00 | | | B | 0.314 | 2.259 | 0.62 | 0.825 | 1 | 36.530 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 0.825 | 1 | 23.485 | | | |
| T3 | 0.28 | 3.48 | A | 0.2 | 2.595 | 0.59 | 0.825 | 1 | 28.505 | 5.05 | 252.71 | B |
| 280.00-260.00 | | | B | 0.409 | 2.046 | 0.655 | 0.825 | 1 | 60.299 | | | |
| | | | C | 0.2 | 2.595 | 0.59 | 0.825 | 1 | 28.505 | | | |
| T4 | 0.29 | 3.83 | A | 0.189 | 2.634 | 0.588 | 0.825 | 1 | 32.980 | 5.53 | 276.49 | B |
| 260.00-240.00 | | | B | 0.371 | 2.124 | 0.64 | 0.825 | 1 | 64.955 | | | |
| | | | C | 0.189 | 2.634 | 0.588 | 0.825 | 1 | 32.980 | | | |
| T5 | 0.31 | 4.90 | A | 0.197 | 2.605 | 0.59 | 0.825 | 1 | 41.390 | 6.19 | 309.25 | B |
| 240.00-220.00 | | | B | 0.359 | 2.152 | 0.636 | 0.825 | 1 | 73.446 | | | |
| | | | C | 0.197 | 2.605 | 0.59 | 0.825 | 1 | 41.390 | | | |
| T6 | 0.56 | 4.82 | A | 0.157 | 2.744 | 0.583 | 0.825 | 1 | 36.691 | 6.01 | 300.47 | B |
| 220.00-200.00 | | | B | 0.305 | 2.283 | 0.617 | 0.825 | 1 | 69.020 | | | |
| | | | C | 0.266 | 2.39 | 0.606 | 0.825 | 1 | 58.802 | | | |
| T7 | 1.06 | 6.87 | A | 0.281 | 2.348 | 0.61 | 0.825 | 1 | 71.722 | 6.87 | 343.45 | B |
| 200.00-180.00 | | | B | 0.315 | 2.258 | 0.62 | 0.825 | 1 | 82.096 | | | |
| | | | C | 0.281 | 2.348 | 0.61 | 0.825 | 1 | 71.722 | | | |
| T8 | 1.08 | 7.91 | A | 0.259 | 2.41 | 0.604 | 0.825 | 1 | 73.203 | 7.09 | 354.39 | B |
| 180.00-160.00 | | | B | 0.298 | 2.302 | 0.615 | 0.825 | 1 | 85.786 | | | |
| | | | C | 0.259 | 2.41 | 0.604 | 0.825 | 1 | 73.203 | | | |
| T9 | 1.09 | 8.04 | A | 0.257 | 2.416 | 0.604 | 0.825 | 1 | 80.964 | 7.53 | 376.44 | B |
| 160.00-140.00 | | | B | 0.295 | 2.309 | 0.614 | 0.825 | 1 | 94.158 | | | |
| | | | C | 0.257 | 2.416 | 0.604 | 0.825 | 1 | 80.964 | | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T10 | 1.13 | 8.32 | A | 0.243 | 2.458 | 0.6 | 0.825 | 1 | 83.311 | 7.77 | 388.35 | B |
| 140.00-120.00 | | | B | 0.291 | 2.32 | 0.613 | 0.825 | 1 | 100.708 | | | |
| | | | C | 0.243 | 2.458 | 0.6 | 0.825 | 1 | 83.311 | | | |
| T11 | 1.14 | 7.49 | A | 0.212 | 2.557 | 0.593 | 0.825 | 1 | 70.352 | 6.75 | 337.55 | B |
| 120.00-100.00 | | | B | 0.254 | 2.425 | 0.603 | 0.825 | 1 | 87.822 | | | |
| | | | C | 0.199 | 2.599 | 0.59 | 0.825 | 1 | 65.744 | | | |
| T12 | 1.19 | 8.42 | A | 0.203 | 2.587 | 0.591 | 0.825 | 1 | 73.145 | 6.95 | 347.67 | B |
| 100.00-80.00 | | | B | 0.253 | 2.429 | 0.603 | 0.825 | 1 | 95.655 | | | |
| | | | C | 0.19 | 2.629 | 0.588 | 0.825 | 1 | 68.322 | | | |
| T13 | 1.19 | 8.35 | A | 0.188 | 2.635 | 0.588 | 0.825 | 1 | 72.875 | 6.57 | 328.43 | B |
| 80.00-60.00 | | | B | 0.235 | 2.484 | 0.598 | 0.825 | 1 | 94.928 | | | |
| | | | C | 0.174 | 2.687 | 0.585 | 0.825 | 1 | 66.769 | | | |
| T14 | 1.79 | 12.30 | A | 0.17 | 2.701 | 0.585 | 0.825 | 1 | 107.143 | 8.88 | 296.02 | B |
| 60.00-30.00 | | | B | 0.215 | 2.546 | 0.594 | 0.825 | 1 | 142.048 | | | |
| | | | C | 0.163 | 2.724 | 0.584 | 0.825 | 1 | 102.802 | | | |
| T15 | 1.79 | 14.02 | A | 0.16 | 2.734 | 0.583 | 0.825 | 1 | 111.674 | 8.49 | 283.02 | B |
| 30.00-0.00 | | | B | 0.201 | 2.593 | 0.591 | 0.825 | 1 | 145.705 | | | |
| | | | C | 0.153 | 2.762 | 0.582 | 0.825 | 1 | 106.061 | | | |
| Sum Weight: | 13.07 | 103.04 | | | | | | OTM | 14309.11 kip-ft | 95.94 | | |

## 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 | 0.07 | 1.79 | A | 0.208 | 2.571 | 0.592 | 0.8 | 1 | 20.305 | 2.78 | 139.06 | B |
| 320.00-300.00 | | | B | 0.285 | 2.337 | 0.611 | 0.8 | 1 | 27.929 | | | |
| | | | C | 0.208 | 2.571 | 0.592 | 0.8 | 1 | 20.305 | | | |
| T2 | 0.10 | 2.50 | A | 0.207 | 2.573 | 0.592 | 0.8 | 1 | 23.170 | 3.41 | 170.28 | B |
| 300.00-280.00 | | | B | 0.314 | 2.259 | 0.62 | 0.8 | 1 | 36.062 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 0.8 | 1 | 23.170 | | | |
| T3 | 0.28 | 3.48 | A | 0.2 | 2.595 | 0.59 | 0.8 | 1 | 28.157 | 5.02 | 250.81 | B |
| 280.00-260.00 | | | B | 0.409 | 2.046 | 0.655 | 0.8 | 1 | 59.845 | | | |
| | | | C | 0.2 | 2.595 | 0.59 | 0.8 | 1 | 28.157 | | | |
| T4 | 0.29 | 3.83 | A | 0.189 | 2.634 | 0.588 | 0.8 | 1 | 32.494 | 5.48 | 274.05 | B |
| 260.00-240.00 | | | B | 0.371 | 2.124 | 0.64 | 0.8 | 1 | 64.381 | | | |
| | | | C | 0.189 | 2.634 | 0.588 | 0.8 | 1 | 32.494 | | | |
| T5 | 0.31 | 4.90 | A | 0.197 | 2.605 | 0.59 | 0.8 | 1 | 40.651 | 6.12 | 305.94 | B |
| 240.00-220.00 | | | B | 0.359 | 2.152 | 0.636 | 0.8 | 1 | 72.659 | | | |
| | | | C | 0.197 | 2.605 | 0.59 | 0.8 | 1 | 40.651 | | | |
| T6 | 0.56 | 4.82 | A | 0.157 | 2.744 | 0.583 | 0.8 | 1 | 36.088 | 5.95 | 297.45 | B |
| 220.00-200.00 | | | B | 0.305 | 2.283 | 0.617 | 0.8 | 1 | 68.325 | | | |
| | | | C | 0.266 | 2.39 | 0.606 | 0.8 | 1 | 58.276 | | | |
| T7 | 1.06 | 6.87 | A | 0.281 | 2.348 | 0.61 | 0.8 | 1 | 71.147 | 6.81 | 340.33 | B |
| 200.00-180.00 | | | B | 0.315 | 2.258 | 0.62 | 0.8 | 1 | 81.351 | | | |
| | | | C | 0.281 | 2.348 | 0.61 | 0.8 | 1 | 71.147 | | | |
| T8 | 1.08 | 7.91 | A | 0.259 | 2.41 | 0.604 | 0.8 | 1 | 72.567 | 7.02 | 351.08 | B |
| 180.00-160.00 | | | B | 0.298 | 2.302 | 0.615 | 0.8 | 1 | 84.987 | | | |
| | | | C | 0.259 | 2.41 | 0.604 | 0.8 | 1 | 72.567 | | | |
| T9 | 1.09 | 8.04 | A | 0.257 | 2.416 | 0.604 | 0.8 | 1 | 80.091 | 7.45 | 372.35 | B |
| 160.00-140.00 | | | B | 0.295 | 2.309 | 0.614 | 0.8 | 1 | 93.134 | | | |
| | | | C | 0.257 | 2.416 | 0.604 | 0.8 | 1 | 80.091 | | | |
| T10 | 1.13 | 8.32 | A | 0.243 | 2.458 | 0.6 | 0.8 | 1 | 82.358 | 7.68 | 384.15 | B |
| 140.00-120.00 | | | B | 0.291 | 2.32 | 0.613 | 0.8 | 1 | 99.619 | | | |

| 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 | 0.243 | 2.458 | 0.6 | 0.8 | 1 | 82.358 | | | |
| T11 | 1.14 | 7.49 | A | 0.212 | 2.557 | 0.593 | 0.8 | 1 | 70.352 | 6.73 | 336.67 | B |
| 120.00-100.00 | | | B | 0.254 | 2.425 | 0.603 | 0.8 | 1 | 87.594 | | | |
| | | | C | 0.199 | 2.599 | 0.59 | 0.8 | 1 | 65.744 | | | |
| T12 | 1.19 | 8.42 | A | 0.203 | 2.587 | 0.591 | 0.8 | 1 | 73.145 | 6.93 | 346.63 | B |
| 100.00-80.00 | | | B | 0.253 | 2.429 | 0.603 | 0.8 | 1 | 95.368 | | | |
| | | | C | 0.19 | 2.629 | 0.588 | 0.8 | 1 | 68.322 | | | |
| T13 | 1.19 | 8.35 | A | 0.188 | 2.635 | 0.588 | 0.8 | 1 | 72.875 | 6.55 | 327.44 | B |
| 80.00-60.00 | | | B | 0.235 | 2.484 | 0.598 | 0.8 | 1 | 94.641 | | | |
| | | | C | 0.174 | 2.687 | 0.585 | 0.8 | 1 | 66.769 | | | |
| T14 | 1.79 | 12.30 | A | 0.17 | 2.701 | 0.585 | 0.8 | 1 | 107.143 | 8.85 | 295.13 | B |
| 60.00-30.00 | | | B | 0.215 | 2.546 | 0.594 | 0.8 | 1 | 141.618 | | | |
| | | | C | 0.163 | 2.724 | 0.584 | 0.8 | 1 | 102.802 | | | |
| T15 | 1.79 | 14.02 | A | 0.16 | 2.734 | 0.583 | 0.8 | 1 | 111.674 | 8.47 | 282.19 | B |
| 30.00-0.00 | | | B | 0.201 | 2.593 | 0.591 | 0.8 | 1 | 145.275 | | | |
| | | | C | 0.153 | 2.762 | 0.582 | 0.8 | 1 | 106.061 | | | |
| Sum Weight: | 13.07 | 103.04 | | | | | | OTM | 14182.22 kip-ft | 95.24 | | |

## 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 | 0.07 | 1.79 | A | 0.208 | 2.571 | 0.592 | 0.85 | 1 | 20.888 | 2.85 | 142.46 | B |
| 320.00-300.00 | | | B | 0.285 | 2.337 | 0.611 | 0.85 | 1 | 28.612 | | | |
| | | | C | 0.208 | 2.571 | 0.592 | 0.85 | 1 | 20.888 | | | |
| T2 | 0.10 | 2.50 | A | 0.207 | 2.573 | 0.592 | 0.85 | 1 | 23.800 | 3.49 | 174.71 | B |
| 300.00-280.00 | | | B | 0.314 | 2.259 | 0.62 | 0.85 | 1 | 36.999 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 0.85 | 1 | 23.800 | | | |
| T3 | 0.28 | 3.48 | A | 0.2 | 2.595 | 0.59 | 0.85 | 1 | 28.854 | 5.09 | 254.62 | B |
| 280.00-260.00 | | | B | 0.409 | 2.046 | 0.655 | 0.85 | 1 | 60.754 | | | |
| | | | C | 0.2 | 2.595 | 0.59 | 0.85 | 1 | 28.854 | | | |
| T4 | 0.29 | 3.83 | A | 0.189 | 2.634 | 0.588 | 0.85 | 1 | 33.466 | 5.58 | 278.93 | B |
| 260.00-240.00 | | | B | 0.371 | 2.124 | 0.64 | 0.85 | 1 | 65.528 | | | |
| | | | C | 0.189 | 2.634 | 0.588 | 0.85 | 1 | 33.466 | | | |
| T5 | 0.31 | 4.90 | A | 0.197 | 2.605 | 0.59 | 0.85 | 1 | 42.130 | 6.25 | 312.57 | B |
| 240.00-220.00 | | | B | 0.359 | 2.152 | 0.636 | 0.85 | 1 | 74.234 | | | |
| | | | C | 0.197 | 2.605 | 0.59 | 0.85 | 1 | 42.130 | | | |
| T6 | 0.56 | 4.82 | A | 0.157 | 2.744 | 0.583 | 0.85 | 1 | 37.294 | 6.07 | 303.50 | B |
| 220.00-200.00 | | | B | 0.305 | 2.283 | 0.617 | 0.85 | 1 | 69.714 | | | |
| | | | C | 0.266 | 2.39 | 0.606 | 0.85 | 1 | 59.327 | | | |
| T7 | 1.06 | 6.87 | A | 0.281 | 2.348 | 0.61 | 0.85 | 1 | 72.298 | 6.93 | 346.57 | B |
| 200.00-180.00 | | | B | 0.315 | 2.258 | 0.62 | 0.85 | 1 | 82.842 | | | |
| | | | C | 0.281 | 2.348 | 0.61 | 0.85 | 1 | 72.298 | | | |
| T8 | 1.08 | 7.91 | A | 0.259 | 2.41 | 0.604 | 0.85 | 1 | 73.839 | 7.15 | 357.69 | B |
| 180.00-160.00 | | | B | 0.298 | 2.302 | 0.615 | 0.85 | 1 | 86.586 | | | |
| | | | C | 0.259 | 2.41 | 0.604 | 0.85 | 1 | 73.839 | | | |
| T9 | 1.09 | 8.04 | A | 0.257 | 2.416 | 0.604 | 0.85 | 1 | 81.837 | 7.61 | 380.54 | B |
| 160.00-140.00 | | | B | 0.295 | 2.309 | 0.614 | 0.85 | 1 | 95.183 | | | |
| | | | C | 0.257 | 2.416 | 0.604 | 0.85 | 1 | 81.837 | | | |
| T10 | 1.13 | 8.32 | A | 0.243 | 2.458 | 0.6 | 0.85 | 1 | 84.264 | 7.85 | 392.55 | B |
| 140.00-120.00 | | | B | 0.291 | 2.32 | 0.613 | 0.85 | 1 | 101.797 | | | |
| | | | C | 0.243 | 2.458 | 0.6 | 0.85 | 1 | 84.264 | | | |
| T11 | 1.14 | 7.49 | A | 0.212 | 2.557 | 0.593 | 0.85 | 1 | 70.352 | 6.77 | 338.43 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 120.00-100.00 | | | B | 0.254 | 2.425 | 0.603 | 0.85 | 1 | 88.050 | | | |
| | | | C | 0.199 | 2.599 | 0.59 | 0.85 | 1 | 65.744 | | | |
| T12 | 1.19 | 8.42 | A | 0.203 | 2.587 | 0.591 | 0.85 | 1 | 73.145 | 6.97 | 348.71 | B |
| 100.00-80.00 | | | B | 0.253 | 2.429 | 0.603 | 0.85 | 1 | 95.942 | | | |
| | | | C | 0.19 | 2.629 | 0.588 | 0.85 | 1 | 68.322 | | | |
| T13 | 1.19 | 8.35 | A | 0.188 | 2.635 | 0.588 | 0.85 | 1 | 72.875 | 6.59 | 329.42 | B |
| 80.00-60.00 | | | B | 0.235 | 2.484 | 0.598 | 0.85 | 1 | 95.215 | | | |
| | | | C | 0.174 | 2.687 | 0.585 | 0.85 | 1 | 66.769 | | | |
| T14 | 1.79 | 12.30 | A | 0.17 | 2.701 | 0.585 | 0.85 | 1 | 107.143 | 8.91 | 296.92 | B |
| 60.00-30.00 | | | B | 0.215 | 2.546 | 0.594 | 0.85 | 1 | 142.479 | | | |
| | | | C | 0.163 | 2.724 | 0.584 | 0.85 | 1 | 102.802 | | | |
| T15 | 1.79 | 14.02 | A | 0.16 | 2.734 | 0.583 | 0.85 | 1 | 111.674 | 8.52 | 283.86 | B |
| 30.00-0.00 | | | B | 0.201 | 2.593 | 0.591 | 0.85 | 1 | 146.136 | | | |
| | | | C | 0.153 | 2.762 | 0.582 | 0.85 | 1 | 106.061 | | | |
| Sum Weight: | 13.07 | 103.04 | | | | | | OTM | 14436.01 kip-ft | 96.64 | | |

## Tower Forces - With Ice - Wind Normal To Face

| Section Elevation ft | Add Weight K | Self Weight K | Face | e | $C_F$ | $R_R$ | $D_F$ | $D_R$ | $A_E$ ft² | F K | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 0.20 | 2.46 | A | 0.273 | 2.37 | 0.608 | 1 | 1 | 29.013 | 3.81 | 190.48 | B |
| 320.00-300.00 | | | B | 0.401 | 2.062 | 0.652 | 1 | 1 | 43.345 | | | |
| | | | C | 0.273 | 2.37 | 0.608 | 1 | 1 | 29.013 | | | |
| T2 | 0.31 | 3.23 | A | 0.262 | 2.402 | 0.605 | 1 | 1 | 31.810 | 4.67 | 233.49 | B |
| 300.00-280.00 | | | B | 0.434 | 2.001 | 0.666 | 1 | 1 | 55.804 | | | |
| | | | C | 0.262 | 2.402 | 0.605 | 1 | 1 | 31.810 | | | |
| T3 | 0.75 | 4.32 | A | 0.24 | 2.467 | 0.599 | 1 | 1 | 36.545 | 7.05 | 352.66 | B |
| 280.00-260.00 | | | B | 0.565 | 1.83 | 0.733 | 1 | 1 | 94.075 | | | |
| | | | C | 0.24 | 2.467 | 0.599 | 1 | 1 | 36.545 | | | |
| T4 | 0.80 | 4.83 | A | 0.226 | 2.512 | 0.596 | 1 | 1 | 42.460 | 7.53 | 376.42 | B |
| 260.00-240.00 | | | B | 0.512 | 1.885 | 0.704 | 1 | 1 | 99.676 | | | |
| | | | C | 0.226 | 2.512 | 0.596 | 1 | 1 | 42.460 | | | |
| T5 | 0.84 | 6.22 | A | 0.232 | 2.492 | 0.597 | 1 | 1 | 53.201 | 8.25 | 412.39 | B |
| 240.00-220.00 | | | B | 0.488 | 1.916 | 0.692 | 1 | 1 | 110.003 | | | |
| | | | C | 0.232 | 2.492 | 0.597 | 1 | 1 | 53.201 | | | |
| T6 | 1.46 | 5.95 | A | 0.184 | 2.649 | 0.587 | 1 | 1 | 46.555 | 7.99 | 399.33 | B |
| 220.00-200.00 | | | B | 0.421 | 2.024 | 0.66 | 1 | 1 | 103.470 | | | |
| | | | C | 0.344 | 2.187 | 0.63 | 1 | 1 | 80.332 | | | |
| T7 | 2.68 | 8.67 | A | 0.349 | 2.173 | 0.632 | 1 | 1 | 94.281 | 8.86 | 442.76 | B |
| 200.00-180.00 | | | B | 0.416 | 2.033 | 0.658 | 1 | 1 | 117.574 | | | |
| | | | C | 0.349 | 2.173 | 0.632 | 1 | 1 | 94.281 | | | |
| T8 | 2.75 | 9.78 | A | 0.322 | 2.238 | 0.623 | 1 | 1 | 96.065 | 9.18 | 458.82 | B |
| 180.00-160.00 | | | B | 0.399 | 2.067 | 0.651 | 1 | 1 | 123.691 | | | |
| | | | C | 0.322 | 2.238 | 0.623 | 1 | 1 | 96.065 | | | |
| T9 | 2.77 | 10.22 | A | 0.316 | 2.255 | 0.621 | 1 | 1 | 105.325 | 9.66 | 482.90 | B |
| 160.00-140.00 | | | B | 0.39 | 2.084 | 0.648 | 1 | 1 | 133.822 | | | |
| | | | C | 0.316 | 2.255 | 0.621 | 1 | 1 | 105.325 | | | |
| T10 | 2.90 | 10.60 | A | 0.298 | 2.3 | 0.615 | 1 | 1 | 108.333 | 10.06 | 502.77 | B |
| 140.00-120.00 | | | B | 0.391 | 2.082 | 0.648 | 1 | 1 | 145.295 | | | |
| | | | C | 0.298 | 2.3 | 0.615 | 1 | 1 | 108.333 | | | |
| T11 | 2.93 | 9.36 | A | 0.269 | 2.383 | 0.607 | 1 | 1 | 91.548 | 8.95 | 447.60 | B |
| 120.00-100.00 | | | B | 0.353 | 2.165 | 0.634 | 1 | 1 | 130.459 | | | |
| | | | C | 0.251 | 2.434 | 0.602 | 1 | 1 | 84.957 | | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T12 | 3.06 | 10.41 | A | 0.256 | 2.42 | 0.603 | 1 | 1 | 94.563 | 9.29 | 464.36 | B |
| 100.00-80.00 | | | B | 0.353 | 2.163 | 0.634 | 1 | 1 | 143.420 | | | |
| | | | C | 0.239 | 2.471 | 0.599 | 1 | 1 | 87.705 | | | |
| T13 | 3.07 | 9.99 | A | 0.239 | 2.47 | 0.599 | 1 | 1 | 94.445 | 8.81 | 440.72 | B |
| 80.00-60.00 | | | B | 0.33 | 2.218 | 0.626 | 1 | 1 | 142.641 | | | |
| | | | C | 0.22 | 2.531 | 0.595 | 1 | 1 | 86.209 | | | |
| T14 | 4.61 | 14.76 | A | 0.216 | 2.543 | 0.594 | 1 | 1 | 139.168 | 11.93 | 397.74 | B |
| 60.00-30.00 | | | B | 0.303 | 2.288 | 0.617 | 1 | 1 | 212.426 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 1 | 1 | 132.735 | | | |
| T15 | 4.61 | 16.66 | A | 0.204 | 2.583 | 0.591 | 1 | 1 | 144.389 | 11.38 | 379.46 | B |
| 30.00-0.00 | | | B | 0.282 | 2.345 | 0.611 | 1 | 1 | 216.036 | | | |
| | | | C | 0.194 | 2.617 | 0.589 | 1 | 1 | 136.537 | | | |
| Sum Weight: | 33.74 | 127.46 | | | | | | OTM | 19039.49 kip-ft | 127.41 | | |

## Tower Forces - With Ice - Wind 45 To Face

| Section Elevation ft | Add Weight K | Self Weight K | Face | e | $C_F$ | $R_R$ | $D_F$ | $D_R$ | $A_E$ ft² | F K | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 0.20 | 2.46 | A | 0.273 | 2.37 | 0.608 | 0.825 | 1 | 26.972 | 3.59 | 179.67 | B |
| 320.00-300.00 | | | B | 0.401 | 2.062 | 0.652 | 0.825 | 1 | 40.885 | | | |
| | | | C | 0.273 | 2.37 | 0.608 | 0.825 | 1 | 26.972 | | | |
| T2 | 0.31 | 3.23 | A | 0.262 | 2.402 | 0.605 | 0.825 | 1 | 29.606 | 4.37 | 218.33 | B |
| 300.00-280.00 | | | B | 0.434 | 2.001 | 0.666 | 0.825 | 1 | 52.181 | | | |
| | | | C | 0.262 | 2.402 | 0.605 | 0.825 | 1 | 29.606 | | | |
| T3 | 0.75 | 4.32 | A | 0.24 | 2.467 | 0.599 | 0.825 | 1 | 34.107 | 6.80 | 340.11 | B |
| 280.00-260.00 | | | B | 0.565 | 1.83 | 0.733 | 0.825 | 1 | 90.729 | | | |
| | | | C | 0.24 | 2.467 | 0.599 | 0.825 | 1 | 34.107 | | | |
| T4 | 0.80 | 4.83 | A | 0.226 | 2.512 | 0.596 | 0.825 | 1 | 39.057 | 7.22 | 360.99 | B |
| 260.00-240.00 | | | B | 0.512 | 1.885 | 0.704 | 0.825 | 1 | 95.590 | | | |
| | | | C | 0.226 | 2.512 | 0.596 | 0.825 | 1 | 39.057 | | | |
| T5 | 0.84 | 6.22 | A | 0.232 | 2.492 | 0.597 | 0.825 | 1 | 48.024 | 7.84 | 392.20 | B |
| 240.00-220.00 | | | B | 0.488 | 1.916 | 0.692 | 0.825 | 1 | 104.616 | | | |
| | | | C | 0.232 | 2.492 | 0.597 | 0.825 | 1 | 48.024 | | | |
| T6 | 1.46 | 5.95 | A | 0.184 | 2.649 | 0.587 | 0.825 | 1 | 42.331 | 7.61 | 380.25 | B |
| 220.00-200.00 | | | B | 0.421 | 2.024 | 0.66 | 0.825 | 1 | 98.528 | | | |
| | | | C | 0.344 | 2.187 | 0.63 | 0.825 | 1 | 76.927 | | | |
| T7 | 2.68 | 8.67 | A | 0.349 | 2.173 | 0.632 | 0.825 | 1 | 90.519 | 8.46 | 422.75 | B |
| 200.00-180.00 | | | B | 0.416 | 2.033 | 0.658 | 0.825 | 1 | 112.262 | | | |
| | | | C | 0.349 | 2.173 | 0.632 | 0.825 | 1 | 90.519 | | | |
| T8 | 2.75 | 9.78 | A | 0.322 | 2.238 | 0.623 | 0.825 | 1 | 91.872 | 8.76 | 437.84 | B |
| 180.00-160.00 | | | B | 0.399 | 2.067 | 0.651 | 0.825 | 1 | 118.034 | | | |
| | | | C | 0.322 | 2.238 | 0.623 | 0.825 | 1 | 91.872 | | | |
| T9 | 2.77 | 10.22 | A | 0.316 | 2.255 | 0.621 | 0.825 | 1 | 99.534 | 9.15 | 457.31 | B |
| 160.00-140.00 | | | B | 0.39 | 2.084 | 0.648 | 0.825 | 1 | 126.732 | | | |
| | | | C | 0.316 | 2.255 | 0.621 | 0.825 | 1 | 99.534 | | | |
| T10 | 2.90 | 10.60 | A | 0.298 | 2.3 | 0.615 | 0.825 | 1 | 101.976 | 9.54 | 477.01 | B |
| 140.00-120.00 | | | B | 0.391 | 2.082 | 0.648 | 0.825 | 1 | 137.852 | | | |
| | | | C | 0.298 | 2.3 | 0.615 | 0.825 | 1 | 101.976 | | | |
| T11 | 2.93 | 9.36 | A | 0.269 | 2.383 | 0.607 | 0.825 | 1 | 91.548 | 8.79 | 439.56 | B |
| 120.00-100.00 | | | B | 0.353 | 2.165 | 0.634 | 0.825 | 1 | 128.115 | | | |
| | | | C | 0.251 | 2.434 | 0.602 | 0.825 | 1 | 84.957 | | | |
| T12 | 3.06 | 10.41 | A | 0.256 | 2.42 | 0.603 | 0.825 | 1 | 94.563 | 9.09 | 454.71 | B |
| 100.00-80.00 | | | B | 0.353 | 2.163 | 0.634 | 0.825 | 1 | 140.439 | | | |

| 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 | 0.239 | 2.471 | 0.599 | 0.825 | 1 | 87.705 | | | |
| T13 | 3.07 | 9.99 | A | 0.239 | 2.47 | 0.599 | 0.825 | 1 | 94.445 | 8.63 | 431.51 | B |
| 80.00-60.00 | | | B | 0.33 | 2.218 | 0.626 | 0.825 | 1 | 139.661 | | | |
| | | | C | 0.22 | 2.531 | 0.595 | 0.825 | 1 | 86.209 | | | |
| T14 | 4.61 | 14.76 | A | 0.216 | 2.543 | 0.594 | 0.825 | 1 | 139.168 | 11.68 | 389.36 | B |
| 60.00-30.00 | | | B | 0.303 | 2.288 | 0.617 | 0.825 | 1 | 207.955 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 0.825 | 1 | 132.735 | | | |
| T15 | 4.61 | 16.66 | A | 0.204 | 2.583 | 0.591 | 0.825 | 1 | 144.389 | 11.15 | 371.61 | B |
| 30.00-0.00 | | | B | 0.282 | 2.345 | 0.611 | 0.825 | 1 | 211.564 | | | |
| | | | C | 0.194 | 2.617 | 0.589 | 0.825 | 1 | 136.537 | | | |
| Sum Weight: | 33.74 | 127.46 | | | | | | OTM | 18212.80 kip-ft | 122.67 | | |

## Tower Forces - With Ice - Wind 60 To Face

| Section Elevation ft | Add Weight K | Self Weight K | Face | e | $C_F$ | $R_R$ | $D_F$ | $D_R$ | $A_E$ ft² | F K | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 0.20 | 2.46 | A | 0.273 | 2.37 | 0.608 | 0.8 | 1 | 26.681 | 3.56 | 178.13 | B |
| 320.00-300.00 | | | B | 0.401 | 2.062 | 0.652 | 0.8 | 1 | 40.534 | | | |
| | | | C | 0.273 | 2.37 | 0.608 | 0.8 | 1 | 26.681 | | | |
| T2 | 0.31 | 3.23 | A | 0.262 | 2.402 | 0.605 | 0.8 | 1 | 29.291 | 4.32 | 216.17 | B |
| 300.00-280.00 | | | B | 0.434 | 2.001 | 0.666 | 0.8 | 1 | 51.664 | | | |
| | | | C | 0.262 | 2.402 | 0.605 | 0.8 | 1 | 29.291 | | | |
| T3 | 0.75 | 4.32 | A | 0.24 | 2.467 | 0.599 | 0.8 | 1 | 33.759 | 6.77 | 338.32 | B |
| 280.00-260.00 | | | B | 0.565 | 1.83 | 0.733 | 0.8 | 1 | 90.250 | | | |
| | | | C | 0.24 | 2.467 | 0.599 | 0.8 | 1 | 33.759 | | | |
| T4 | 0.80 | 4.83 | A | 0.226 | 2.512 | 0.596 | 0.8 | 1 | 38.571 | 7.18 | 358.78 | B |
| 260.00-240.00 | | | B | 0.512 | 1.885 | 0.704 | 0.8 | 1 | 95.006 | | | |
| | | | C | 0.226 | 2.512 | 0.596 | 0.8 | 1 | 38.571 | | | |
| T5 | 0.84 | 6.22 | A | 0.232 | 2.492 | 0.597 | 0.8 | 1 | 47.285 | 7.79 | 389.31 | B |
| 240.00-220.00 | | | B | 0.488 | 1.916 | 0.692 | 0.8 | 1 | 103.847 | | | |
| | | | C | 0.232 | 2.492 | 0.597 | 0.8 | 1 | 47.285 | | | |
| T6 | 1.46 | 5.95 | A | 0.184 | 2.649 | 0.587 | 0.8 | 1 | 41.728 | 7.55 | 377.53 | B |
| 220.00-200.00 | | | B | 0.421 | 2.024 | 0.66 | 0.8 | 1 | 97.822 | | | |
| | | | C | 0.344 | 2.187 | 0.63 | 0.8 | 1 | 76.441 | | | |
| T7 | 2.68 | 8.67 | A | 0.349 | 2.173 | 0.632 | 0.8 | 1 | 89.981 | 8.40 | 419.89 | B |
| 200.00-180.00 | | | B | 0.416 | 2.033 | 0.658 | 0.8 | 1 | 111.503 | | | |
| | | | C | 0.349 | 2.173 | 0.632 | 0.8 | 1 | 89.981 | | | |
| T8 | 2.75 | 9.78 | A | 0.322 | 2.238 | 0.623 | 0.8 | 1 | 91.273 | 8.70 | 434.84 | B |
| 180.00-160.00 | | | B | 0.399 | 2.067 | 0.651 | 0.8 | 1 | 117.226 | | | |
| | | | C | 0.322 | 2.238 | 0.623 | 0.8 | 1 | 91.273 | | | |
| T9 | 2.77 | 10.22 | A | 0.316 | 2.255 | 0.621 | 0.8 | 1 | 98.707 | 9.07 | 453.66 | B |
| 160.00-140.00 | | | B | 0.39 | 2.084 | 0.648 | 0.8 | 1 | 125.719 | | | |
| | | | C | 0.316 | 2.255 | 0.621 | 0.8 | 1 | 98.707 | | | |
| T10 | 2.90 | 10.60 | A | 0.298 | 2.3 | 0.615 | 0.8 | 1 | 101.068 | 9.47 | 473.33 | B |
| 140.00-120.00 | | | B | 0.391 | 2.082 | 0.648 | 0.8 | 1 | 136.789 | | | |
| | | | C | 0.298 | 2.3 | 0.615 | 0.8 | 1 | 101.068 | | | |
| T11 | 2.93 | 9.36 | A | 0.269 | 2.383 | 0.607 | 0.8 | 1 | 91.548 | 8.77 | 438.41 | B |
| 120.00-100.00 | | | B | 0.353 | 2.165 | 0.634 | 0.8 | 1 | 127.780 | | | |
| | | | C | 0.251 | 2.434 | 0.602 | 0.8 | 1 | 84.957 | | | |
| T12 | 3.06 | 10.41 | A | 0.256 | 2.42 | 0.603 | 0.8 | 1 | 94.563 | 9.07 | 453.33 | B |
| 100.00-80.00 | | | B | 0.353 | 2.163 | 0.634 | 0.8 | 1 | 140.013 | | | |
| | | | C | 0.239 | 2.471 | 0.599 | 0.8 | 1 | 87.705 | | | |
| T13 | 3.07 | 9.99 | A | 0.239 | 2.47 | 0.599 | 0.8 | 1 | 94.445 | 8.60 | 430.19 | B |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80.00-60.00 | | | B | 0.33 | 2.218 | 0.626 | 0.8 | 1 | 139.235 | | | |
| | | | C | 0.22 | 2.531 | 0.595 | 0.8 | 1 | 86.209 | | | |
| T14 | 4.61 | 14.76 | A | 0.216 | 2.543 | 0.594 | 0.8 | 1 | 139.168 | 11.65 | 388.17 | B |
| 60.00-30.00 | | | B | 0.303 | 2.288 | 0.617 | 0.8 | 1 | 207.316 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 0.8 | 1 | 132.735 | | | |
| T15 | 4.61 | 16.66 | A | 0.204 | 2.583 | 0.591 | 0.8 | 1 | 144.389 | 11.11 | 370.49 | B |
| 30.00-0.00 | | | B | 0.282 | 2.345 | 0.611 | 0.8 | 1 | 210.926 | | | |
| | | | C | 0.194 | 2.617 | 0.589 | 0.8 | 1 | 136.537 | | | |
| Sum Weight: | 33.74 | 127.46 | | | | | | OTM | 18094.70 kip-ft | 122.00 | | |

## Tower Forces - With Ice - Wind 90 To Face

| Section Elevation ft | Add Weight K | Self Weight K | Face | e | $C_F$ | $R_R$ | $D_F$ | $D_R$ | $A_E$ $ft^2$ | F K | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 0.20 | 2.46 | A | 0.273 | 2.37 | 0.608 | 0.85 | 1 | 27.264 | 3.62 | 181.22 | B |
| 320.00-300.00 | | | B | 0.401 | 2.062 | 0.652 | 0.85 | 1 | 41.237 | | | |
| | | | C | 0.273 | 2.37 | 0.608 | 0.85 | 1 | 27.264 | | | |
| T2 | 0.31 | 3.23 | A | 0.262 | 2.402 | 0.605 | 0.85 | 1 | 29.920 | 4.41 | 220.50 | B |
| 300.00-280.00 | | | B | 0.434 | 2.001 | 0.666 | 0.85 | 1 | 52.699 | | | |
| | | | C | 0.262 | 2.402 | 0.605 | 0.85 | 1 | 29.920 | | | |
| T3 | 0.75 | 4.32 | A | 0.24 | 2.467 | 0.599 | 0.85 | 1 | 34.455 | 6.84 | 341.90 | B |
| 280.00-260.00 | | | B | 0.565 | 1.83 | 0.733 | 0.85 | 1 | 91.207 | | | |
| | | | C | 0.24 | 2.467 | 0.599 | 0.85 | 1 | 34.455 | | | |
| T4 | 0.80 | 4.83 | A | 0.226 | 2.512 | 0.596 | 0.85 | 1 | 39.544 | 7.26 | 363.19 | B |
| 260.00-240.00 | | | B | 0.512 | 1.885 | 0.704 | 0.85 | 1 | 96.174 | | | |
| | | | C | 0.226 | 2.512 | 0.596 | 0.85 | 1 | 39.544 | | | |
| T5 | 0.84 | 6.22 | A | 0.232 | 2.492 | 0.597 | 0.85 | 1 | 48.764 | 7.90 | 395.08 | B |
| 240.00-220.00 | | | B | 0.488 | 1.916 | 0.692 | 0.85 | 1 | 105.386 | | | |
| | | | C | 0.232 | 2.492 | 0.597 | 0.85 | 1 | 48.764 | | | |
| T6 | 1.46 | 5.95 | A | 0.184 | 2.649 | 0.587 | 0.85 | 1 | 42.935 | 7.66 | 382.98 | B |
| 220.00-200.00 | | | B | 0.421 | 2.024 | 0.66 | 0.85 | 1 | 99.234 | | | |
| | | | C | 0.344 | 2.187 | 0.63 | 0.85 | 1 | 77.413 | | | |
| T7 | 2.68 | 8.67 | A | 0.349 | 2.173 | 0.632 | 0.85 | 1 | 91.056 | 8.51 | 425.61 | B |
| 200.00-180.00 | | | B | 0.416 | 2.033 | 0.658 | 0.85 | 1 | 113.021 | | | |
| | | | C | 0.349 | 2.173 | 0.632 | 0.85 | 1 | 91.056 | | | |
| T8 | 2.75 | 9.78 | A | 0.322 | 2.238 | 0.623 | 0.85 | 1 | 92.471 | 8.82 | 440.83 | B |
| 180.00-160.00 | | | B | 0.399 | 2.067 | 0.651 | 0.85 | 1 | 118.842 | | | |
| | | | C | 0.322 | 2.238 | 0.623 | 0.85 | 1 | 92.471 | | | |
| T9 | 2.77 | 10.22 | A | 0.316 | 2.255 | 0.621 | 0.85 | 1 | 100.362 | 9.22 | 460.97 | B |
| 160.00-140.00 | | | B | 0.39 | 2.084 | 0.648 | 0.85 | 1 | 127.745 | | | |
| | | | C | 0.316 | 2.255 | 0.621 | 0.85 | 1 | 100.362 | | | |
| T10 | 2.90 | 10.60 | A | 0.298 | 2.3 | 0.615 | 0.85 | 1 | 102.884 | 9.61 | 480.69 | B |
| 140.00-120.00 | | | B | 0.391 | 2.082 | 0.648 | 0.85 | 1 | 138.915 | | | |
| | | | C | 0.298 | 2.3 | 0.615 | 0.85 | 1 | 102.884 | | | |
| T11 | 2.93 | 9.36 | A | 0.269 | 2.383 | 0.607 | 0.85 | 1 | 91.548 | 8.81 | 440.71 | B |
| 120.00-100.00 | | | B | 0.353 | 2.165 | 0.634 | 0.85 | 1 | 128.450 | | | |
| | | | C | 0.251 | 2.434 | 0.602 | 0.85 | 1 | 84.957 | | | |
| T12 | 3.06 | 10.41 | A | 0.256 | 2.42 | 0.603 | 0.85 | 1 | 94.563 | 9.12 | 456.09 | B |
| 100.00-80.00 | | | B | 0.353 | 2.163 | 0.634 | 0.85 | 1 | 140.865 | | | |
| | | | C | 0.239 | 2.471 | 0.599 | 0.85 | 1 | 87.705 | | | |
| T13 | 3.07 | 9.99 | A | 0.239 | 2.47 | 0.599 | 0.85 | 1 | 94.445 | 8.66 | 432.82 | B |
| 80.00-60.00 | | | B | 0.33 | 2.218 | 0.626 | 0.85 | 1 | 140.086 | | | |
| | | | C | 0.22 | 2.531 | 0.595 | 0.85 | 1 | 86.209 | | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T14 | 4.61 | 14.76 | A | 0.216 | 2.543 | 0.594 | 0.85 | 1 | 139.168 | 11.72 | 390.56 | B |
| 60.00-30.00 | | | B | 0.303 | 2.288 | 0.617 | 0.85 | 1 | 208.594 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 0.85 | 1 | 132.735 | | | |
| T15 | 4.61 | 16.66 | A | 0.204 | 2.583 | 0.591 | 0.85 | 1 | 144.389 | 11.18 | 372.73 | B |
| 30.00-0.00 | | | B | 0.282 | 2.345 | 0.611 | 0.85 | 1 | 212.203 | | | |
| | | | C | 0.194 | 2.617 | 0.589 | 0.85 | 1 | 136.537 | | | |
| Sum Weight: | 33.74 | 127.46 | | | | | | OTM | 18330.90 kip-ft | 123.35 | | |

## 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 | 0.07 | 1.79 | A | 0.208 | 2.571 | 0.592 | 1 | 1 | 22.637 | 3.05 | 152.67 | B |
| 320.00-300.00 | | | B | 0.285 | 2.337 | 0.611 | 1 | 1 | 30.662 | | | |
| | | | C | 0.208 | 2.571 | 0.592 | 1 | 1 | 22.637 | | | |
| T2 | 0.10 | 2.50 | A | 0.207 | 2.573 | 0.592 | 1 | 1 | 25.689 | 3.76 | 187.98 | B |
| 300.00-280.00 | | | B | 0.314 | 2.259 | 0.62 | 1 | 1 | 39.810 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 1 | 1 | 25.689 | | | |
| T3 | 0.28 | 3.48 | A | 0.2 | 2.595 | 0.59 | 1 | 1 | 30.944 | 5.32 | 266.04 | B |
| 280.00-260.00 | | | B | 0.409 | 2.046 | 0.655 | 1 | 1 | 63.480 | | | |
| | | | C | 0.2 | 2.595 | 0.59 | 1 | 1 | 30.944 | | | |
| T4 | 0.29 | 3.83 | A | 0.189 | 2.634 | 0.588 | 1 | 1 | 36.382 | 5.87 | 293.58 | B |
| 260.00-240.00 | | | B | 0.371 | 2.124 | 0.64 | 1 | 1 | 68.970 | | | |
| | | | C | 0.189 | 2.634 | 0.588 | 1 | 1 | 36.382 | | | |
| T5 | 0.31 | 4.90 | A | 0.197 | 2.605 | 0.59 | 1 | 1 | 46.567 | 6.65 | 332.47 | B |
| 240.00-220.00 | | | B | 0.359 | 2.152 | 0.636 | 1 | 1 | 78.960 | | | |
| | | | C | 0.197 | 2.605 | 0.59 | 1 | 1 | 46.567 | | | |
| T6 | 0.56 | 4.82 | A | 0.157 | 2.744 | 0.583 | 1 | 1 | 40.915 | 6.43 | 321.64 | B |
| 220.00-200.00 | | | B | 0.305 | 2.283 | 0.617 | 1 | 1 | 73.883 | | | |
| | | | C | 0.266 | 2.39 | 0.606 | 1 | 1 | 62.481 | | | |
| T7 | 1.06 | 6.87 | A | 0.281 | 2.348 | 0.61 | 1 | 1 | 75.751 | 7.31 | 365.28 | B |
| 200.00-180.00 | | | B | 0.315 | 2.258 | 0.62 | 1 | 1 | 87.314 | | | |
| | | | C | 0.281 | 2.348 | 0.61 | 1 | 1 | 75.751 | | | |
| T8 | 1.08 | 7.91 | A | 0.259 | 2.41 | 0.604 | 1 | 1 | 77.657 | 7.55 | 377.51 | B |
| 180.00-160.00 | | | B | 0.298 | 2.302 | 0.615 | 1 | 1 | 91.383 | | | |
| | | | C | 0.259 | 2.41 | 0.604 | 1 | 1 | 77.657 | | | |
| T9 | 1.09 | 8.04 | A | 0.257 | 2.416 | 0.604 | 1 | 1 | 87.074 | 8.10 | 405.12 | B |
| 160.00-140.00 | | | B | 0.295 | 2.309 | 0.614 | 1 | 1 | 101.331 | | | |
| | | | C | 0.257 | 2.416 | 0.604 | 1 | 1 | 87.074 | | | |
| T10 | 1.13 | 8.32 | A | 0.243 | 2.458 | 0.6 | 1 | 1 | 89.983 | 8.35 | 417.74 | B |
| 140.00-120.00 | | | B | 0.291 | 2.32 | 0.613 | 1 | 1 | 108.330 | | | |
| | | | C | 0.243 | 2.458 | 0.6 | 1 | 1 | 89.983 | | | |
| T11 | 1.14 | 7.49 | A | 0.212 | 2.557 | 0.593 | 1 | 1 | 70.352 | 6.87 | 343.68 | B |
| 120.00-100.00 | | | B | 0.254 | 2.425 | 0.603 | 1 | 1 | 89.417 | | | |
| | | | C | 0.199 | 2.599 | 0.59 | 1 | 1 | 65.744 | | | |
| T12 | 1.19 | 8.42 | A | 0.203 | 2.587 | 0.591 | 1 | 1 | 73.145 | 7.10 | 354.97 | B |
| 100.00-80.00 | | | B | 0.253 | 2.429 | 0.603 | 1 | 1 | 97.664 | | | |
| | | | C | 0.19 | 2.629 | 0.588 | 1 | 1 | 68.322 | | | |
| T13 | 1.19 | 8.35 | A | 0.188 | 2.635 | 0.588 | 1 | 1 | 72.875 | 6.71 | 335.38 | B |
| 80.00-60.00 | | | B | 0.235 | 2.484 | 0.598 | 1 | 1 | 96.937 | | | |
| | | | C | 0.174 | 2.687 | 0.585 | 1 | 1 | 66.769 | | | |
| T14 | 1.79 | 12.30 | A | 0.17 | 2.701 | 0.585 | 1 | 1 | 107.143 | 9.07 | 302.30 | B |
| 60.00-30.00 | | | B | 0.215 | 2.546 | 0.594 | 1 | 1 | 145.061 | | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | 0.163 | 2.724 | 0.584 | 1 | 1 | 102.802 | | | |
| T15 | 1.79 | 14.02 | A | 0.16 | 2.734 | 0.583 | 1 | 1 | 111.674 | 8.67 | 288.87 | B |
| 30.00-0.00 | | | B | 0.201 | 2.593 | 0.591 | 1 | 1 | 148.718 | | | |
| | | | C | 0.153 | 2.762 | 0.582 | 1 | 1 | 106.061 | | | |
| Sum Weight: | 13.07 | 103.04 | | | | | | OTM | 15197.38 kip-ft | 100.82 | | |

## Tower Forces - Service - Wind 45 To Face

| Section Elevation ft | Add Weight K | Self Weight K | Face | e | $C_F$ | $R_R$ | $D_F$ | $D_R$ | $A_E$ $ft^2$ | F K | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 0.07 | 1.79 | A | 0.208 | 2.571 | 0.592 | 0.825 | 1 | 20.596 | 2.82 | 140.76 | B |
| 320.00-300.00 | | | B | 0.285 | 2.337 | 0.611 | 0.825 | 1 | 28.270 | | | |
| | | | C | 0.208 | 2.571 | 0.592 | 0.825 | 1 | 20.596 | | | |
| T2 | 0.10 | 2.50 | A | 0.207 | 2.573 | 0.592 | 0.825 | 1 | 23.485 | 3.45 | 172.49 | B |
| 300.00-280.00 | | | B | 0.314 | 2.259 | 0.62 | 0.825 | 1 | 36.530 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 0.825 | 1 | 23.485 | | | |
| T3 | 0.28 | 3.48 | A | 0.2 | 2.595 | 0.59 | 0.825 | 1 | 28.505 | 5.05 | 252.71 | B |
| 280.00-260.00 | | | B | 0.409 | 2.046 | 0.655 | 0.825 | 1 | 60.299 | | | |
| | | | C | 0.2 | 2.595 | 0.59 | 0.825 | 1 | 28.505 | | | |
| T4 | 0.29 | 3.83 | A | 0.189 | 2.634 | 0.588 | 0.825 | 1 | 32.980 | 5.53 | 276.49 | B |
| 260.00-240.00 | | | B | 0.371 | 2.124 | 0.64 | 0.825 | 1 | 64.955 | | | |
| | | | C | 0.189 | 2.634 | 0.588 | 0.825 | 1 | 32.980 | | | |
| T5 | 0.31 | 4.90 | A | 0.197 | 2.605 | 0.59 | 0.825 | 1 | 41.390 | 6.19 | 309.25 | B |
| 240.00-220.00 | | | B | 0.359 | 2.152 | 0.636 | 0.825 | 1 | 73.446 | | | |
| | | | C | 0.197 | 2.605 | 0.59 | 0.825 | 1 | 41.390 | | | |
| T6 | 0.56 | 4.82 | A | 0.157 | 2.744 | 0.583 | 0.825 | 1 | 36.691 | 6.01 | 300.47 | B |
| 220.00-200.00 | | | B | 0.305 | 2.283 | 0.617 | 0.825 | 1 | 69.020 | | | |
| | | | C | 0.266 | 2.39 | 0.606 | 0.825 | 1 | 58.802 | | | |
| T7 | 1.06 | 6.87 | A | 0.281 | 2.348 | 0.61 | 0.825 | 1 | 71.722 | 6.87 | 343.45 | B |
| 200.00-180.00 | | | B | 0.315 | 2.258 | 0.62 | 0.825 | 1 | 82.096 | | | |
| | | | C | 0.281 | 2.348 | 0.61 | 0.825 | 1 | 71.722 | | | |
| T8 | 1.08 | 7.91 | A | 0.259 | 2.41 | 0.604 | 0.825 | 1 | 73.203 | 7.09 | 354.39 | B |
| 180.00-160.00 | | | B | 0.298 | 2.302 | 0.615 | 0.825 | 1 | 85.786 | | | |
| | | | C | 0.259 | 2.41 | 0.604 | 0.825 | 1 | 73.203 | | | |
| T9 | 1.09 | 8.04 | A | 0.257 | 2.416 | 0.604 | 0.825 | 1 | 80.964 | 7.53 | 376.44 | B |
| 160.00-140.00 | | | B | 0.295 | 2.309 | 0.614 | 0.825 | 1 | 94.158 | | | |
| | | | C | 0.257 | 2.416 | 0.604 | 0.825 | 1 | 80.964 | | | |
| T10 | 1.13 | 8.32 | A | 0.243 | 2.458 | 0.6 | 0.825 | 1 | 83.311 | 7.77 | 388.35 | B |
| 140.00-120.00 | | | B | 0.291 | 2.32 | 0.613 | 0.825 | 1 | 100.708 | | | |
| | | | C | 0.243 | 2.458 | 0.6 | 0.825 | 1 | 83.311 | | | |
| T11 | 1.14 | 7.49 | A | 0.212 | 2.557 | 0.593 | 0.825 | 1 | 70.352 | 6.75 | 337.55 | B |
| 120.00-100.00 | | | B | 0.254 | 2.425 | 0.603 | 0.825 | 1 | 87.822 | | | |
| | | | C | 0.199 | 2.599 | 0.59 | 0.825 | 1 | 65.744 | | | |
| T12 | 1.19 | 8.42 | A | 0.203 | 2.587 | 0.591 | 0.825 | 1 | 73.145 | 6.95 | 347.67 | B |
| 100.00-80.00 | | | B | 0.253 | 2.429 | 0.603 | 0.825 | 1 | 95.655 | | | |
| | | | C | 0.19 | 2.629 | 0.588 | 0.825 | 1 | 68.322 | | | |
| T13 | 1.19 | 8.35 | A | 0.188 | 2.635 | 0.588 | 0.825 | 1 | 72.875 | 6.57 | 328.43 | B |
| 80.00-60.00 | | | B | 0.235 | 2.484 | 0.598 | 0.825 | 1 | 94.928 | | | |
| | | | C | 0.174 | 2.687 | 0.585 | 0.825 | 1 | 66.769 | | | |
| T14 | 1.79 | 12.30 | A | 0.17 | 2.701 | 0.585 | 0.825 | 1 | 107.143 | 8.88 | 296.02 | B |
| 60.00-30.00 | | | B | 0.215 | 2.546 | 0.594 | 0.825 | 1 | 142.048 | | | |
| | | | C | 0.163 | 2.724 | 0.584 | 0.825 | 1 | 102.802 | | | |
| T15 | 1.79 | 14.02 | A | 0.16 | 2.734 | 0.583 | 0.825 | 1 | 111.674 | 8.49 | 283.02 | B |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30.00-0.00 | | | B | 0.201 | 2.593 | 0.591 | 0.825 | 1 | 145.705 | | | |
| | | | C | 0.153 | 2.762 | 0.582 | 0.825 | 1 | 106.061 | | | |
| Sum Weight: | 13.07 | 103.04 | | | | | | OTM | 14309.11 kip-ft | 95.94 | | |

## Tower Forces - Service - Wind 60 To Face

| Section Elevation ft | Add Weight K | Self Weight K | Face | e | $C_F$ | $R_R$ | $D_F$ | $D_R$ | $A_E$ $ft^2$ | F K | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T1 | 0.07 | 1.79 | A | 0.208 | 2.571 | 0.592 | 0.8 | 1 | 20.305 | 2.78 | 139.06 | B |
| 320.00-300.00 | | | B | 0.285 | 2.337 | 0.611 | 0.8 | 1 | 27.929 | | | |
| | | | C | 0.208 | 2.571 | 0.592 | 0.8 | 1 | 20.305 | | | |
| T2 | 0.10 | 2.50 | A | 0.207 | 2.573 | 0.592 | 0.8 | 1 | 23.170 | 3.41 | 170.28 | B |
| 300.00-280.00 | | | B | 0.314 | 2.259 | 0.62 | 0.8 | 1 | 36.062 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 0.8 | 1 | 23.170 | | | |
| T3 | 0.28 | 3.48 | A | 0.2 | 2.595 | 0.59 | 0.8 | 1 | 28.157 | 5.02 | 250.81 | B |
| 280.00-260.00 | | | B | 0.409 | 2.046 | 0.655 | 0.8 | 1 | 59.845 | | | |
| | | | C | 0.2 | 2.595 | 0.59 | 0.8 | 1 | 28.157 | | | |
| T4 | 0.29 | 3.83 | A | 0.189 | 2.634 | 0.588 | 0.8 | 1 | 32.494 | 5.48 | 274.05 | B |
| 260.00-240.00 | | | B | 0.371 | 2.124 | 0.64 | 0.8 | 1 | 64.381 | | | |
| | | | C | 0.189 | 2.634 | 0.588 | 0.8 | 1 | 32.494 | | | |
| T5 | 0.31 | 4.90 | A | 0.197 | 2.605 | 0.59 | 0.8 | 1 | 40.651 | 6.12 | 305.94 | B |
| 240.00-220.00 | | | B | 0.359 | 2.152 | 0.636 | 0.8 | 1 | 72.659 | | | |
| | | | C | 0.197 | 2.605 | 0.59 | 0.8 | 1 | 40.651 | | | |
| T6 | 0.56 | 4.82 | A | 0.157 | 2.744 | 0.583 | 0.8 | 1 | 36.088 | 5.95 | 297.45 | B |
| 220.00-200.00 | | | B | 0.305 | 2.283 | 0.617 | 0.8 | 1 | 68.325 | | | |
| | | | C | 0.266 | 2.39 | 0.606 | 0.8 | 1 | 58.276 | | | |
| T7 | 1.06 | 6.87 | A | 0.281 | 2.348 | 0.61 | 0.8 | 1 | 71.147 | 6.81 | 340.33 | B |
| 200.00-180.00 | | | B | 0.315 | 2.258 | 0.62 | 0.8 | 1 | 81.351 | | | |
| | | | C | 0.281 | 2.348 | 0.61 | 0.8 | 1 | 71.147 | | | |
| T8 | 1.08 | 7.91 | A | 0.259 | 2.41 | 0.604 | 0.8 | 1 | 72.567 | 7.02 | 351.08 | B |
| 180.00-160.00 | | | B | 0.298 | 2.302 | 0.615 | 0.8 | 1 | 84.987 | | | |
| | | | C | 0.259 | 2.41 | 0.604 | 0.8 | 1 | 72.567 | | | |
| T9 | 1.09 | 8.04 | A | 0.257 | 2.416 | 0.604 | 0.8 | 1 | 80.091 | 7.45 | 372.35 | B |
| 160.00-140.00 | | | B | 0.295 | 2.309 | 0.614 | 0.8 | 1 | 93.134 | | | |
| | | | C | 0.257 | 2.416 | 0.604 | 0.8 | 1 | 80.091 | | | |
| T10 | 1.13 | 8.32 | A | 0.243 | 2.458 | 0.6 | 0.8 | 1 | 82.358 | 7.68 | 384.15 | B |
| 140.00-120.00 | | | B | 0.291 | 2.32 | 0.613 | 0.8 | 1 | 99.619 | | | |
| | | | C | 0.243 | 2.458 | 0.6 | 0.8 | 1 | 82.358 | | | |
| T11 | 1.14 | 7.49 | A | 0.212 | 2.557 | 0.593 | 0.8 | 1 | 70.352 | 6.73 | 336.67 | B |
| 120.00-100.00 | | | B | 0.254 | 2.425 | 0.603 | 0.8 | 1 | 87.594 | | | |
| | | | C | 0.199 | 2.599 | 0.59 | 0.8 | 1 | 65.744 | | | |
| T12 | 1.19 | 8.42 | A | 0.203 | 2.587 | 0.591 | 0.8 | 1 | 73.145 | 6.93 | 346.63 | B |
| 100.00-80.00 | | | B | 0.253 | 2.429 | 0.603 | 0.8 | 1 | 95.368 | | | |
| | | | C | 0.19 | 2.629 | 0.588 | 0.8 | 1 | 68.322 | | | |
| T13 | 1.19 | 8.35 | A | 0.188 | 2.635 | 0.588 | 0.8 | 1 | 72.875 | 6.55 | 327.44 | B |
| 80.00-60.00 | | | B | 0.235 | 2.484 | 0.598 | 0.8 | 1 | 94.641 | | | |
| | | | C | 0.174 | 2.687 | 0.585 | 0.8 | 1 | 66.769 | | | |
| T14 | 1.79 | 12.30 | A | 0.17 | 2.701 | 0.585 | 0.8 | 1 | 107.143 | 8.85 | 295.13 | B |
| 60.00-30.00 | | | B | 0.215 | 2.546 | 0.594 | 0.8 | 1 | 141.618 | | | |
| | | | C | 0.163 | 2.724 | 0.584 | 0.8 | 1 | 102.802 | | | |
| T15 | 1.79 | 14.02 | A | 0.16 | 2.734 | 0.583 | 0.8 | 1 | 111.674 | 8.47 | 282.19 | B |
| 30.00-0.00 | | | B | 0.201 | 2.593 | 0.591 | 0.8 | 1 | 145.275 | | | |
| | | | C | 0.153 | 2.762 | 0.582 | 0.8 | 1 | 106.061 | | | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sum Weight: | 13.07 | 103.04 | | | | | | OTM | 14182.22 kip-ft | 95.24 | | |

## 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 | 0.07 | 1.79 | A | 0.208 | 2.571 | 0.592 | 0.85 | 1 | 20.888 | 2.85 | 142.46 | B |
| 320.00-300.00 | | | B | 0.285 | 2.337 | 0.611 | 0.85 | 1 | 28.612 | | | |
| | | | C | 0.208 | 2.571 | 0.592 | 0.85 | 1 | 20.888 | | | |
| T2 | 0.10 | 2.50 | A | 0.207 | 2.573 | 0.592 | 0.85 | 1 | 23.800 | 3.49 | 174.71 | B |
| 300.00-280.00 | | | B | 0.314 | 2.259 | 0.62 | 0.85 | 1 | 36.999 | | | |
| | | | C | 0.207 | 2.573 | 0.592 | 0.85 | 1 | 23.800 | | | |
| T3 | 0.28 | 3.48 | A | 0.2 | 2.595 | 0.59 | 0.85 | 1 | 28.854 | 5.09 | 254.62 | B |
| 280.00-260.00 | | | B | 0.409 | 2.046 | 0.655 | 0.85 | 1 | 60.754 | | | |
| | | | C | 0.2 | 2.595 | 0.59 | 0.85 | 1 | 28.854 | | | |
| T4 | 0.29 | 3.83 | A | 0.189 | 2.634 | 0.588 | 0.85 | 1 | 33.466 | 5.58 | 278.93 | B |
| 260.00-240.00 | | | B | 0.371 | 2.124 | 0.64 | 0.85 | 1 | 65.528 | | | |
| | | | C | 0.189 | 2.634 | 0.588 | 0.85 | 1 | 33.466 | | | |
| T5 | 0.31 | 4.90 | A | 0.197 | 2.605 | 0.59 | 0.85 | 1 | 42.130 | 6.25 | 312.57 | B |
| 240.00-220.00 | | | B | 0.359 | 2.152 | 0.636 | 0.85 | 1 | 74.234 | | | |
| | | | C | 0.197 | 2.605 | 0.59 | 0.85 | 1 | 42.130 | | | |
| T6 | 0.56 | 4.82 | A | 0.157 | 2.744 | 0.583 | 0.85 | 1 | 37.294 | 6.07 | 303.50 | B |
| 220.00-200.00 | | | B | 0.305 | 2.283 | 0.617 | 0.85 | 1 | 69.714 | | | |
| | | | C | 0.266 | 2.39 | 0.606 | 0.85 | 1 | 59.327 | | | |
| T7 | 1.06 | 6.87 | A | 0.281 | 2.348 | 0.61 | 0.85 | 1 | 72.298 | 6.93 | 346.57 | B |
| 200.00-180.00 | | | B | 0.315 | 2.258 | 0.62 | 0.85 | 1 | 82.842 | | | |
| | | | C | 0.281 | 2.348 | 0.61 | 0.85 | 1 | 72.298 | | | |
| T8 | 1.08 | 7.91 | A | 0.259 | 2.41 | 0.604 | 0.85 | 1 | 73.839 | 7.15 | 357.69 | B |
| 180.00-160.00 | | | B | 0.298 | 2.302 | 0.615 | 0.85 | 1 | 86.586 | | | |
| | | | C | 0.259 | 2.41 | 0.604 | 0.85 | 1 | 73.839 | | | |
| T9 | 1.09 | 8.04 | A | 0.257 | 2.416 | 0.604 | 0.85 | 1 | 81.837 | 7.61 | 380.54 | B |
| 160.00-140.00 | | | B | 0.295 | 2.309 | 0.614 | 0.85 | 1 | 95.183 | | | |
| | | | C | 0.257 | 2.416 | 0.604 | 0.85 | 1 | 81.837 | | | |
| T10 | 1.13 | 8.32 | A | 0.243 | 2.458 | 0.6 | 0.85 | 1 | 84.264 | 7.85 | 392.55 | B |
| 140.00-120.00 | | | B | 0.291 | 2.32 | 0.613 | 0.85 | 1 | 101.797 | | | |
| | | | C | 0.243 | 2.458 | 0.6 | 0.85 | 1 | 84.264 | | | |
| T11 | 1.14 | 7.49 | A | 0.212 | 2.557 | 0.593 | 0.85 | 1 | 70.352 | 6.77 | 338.43 | B |
| 120.00-100.00 | | | B | 0.254 | 2.425 | 0.603 | 0.85 | 1 | 88.050 | | | |
| | | | C | 0.199 | 2.599 | 0.59 | 0.85 | 1 | 65.744 | | | |
| T12 | 1.19 | 8.42 | A | 0.203 | 2.587 | 0.591 | 0.85 | 1 | 73.145 | 6.97 | 348.71 | B |
| 100.00-80.00 | | | B | 0.253 | 2.429 | 0.603 | 0.85 | 1 | 95.942 | | | |
| | | | C | 0.19 | 2.629 | 0.588 | 0.85 | 1 | 68.322 | | | |
| T13 | 1.19 | 8.35 | A | 0.188 | 2.635 | 0.588 | 0.85 | 1 | 72.875 | 6.59 | 329.42 | B |
| 80.00-60.00 | | | B | 0.235 | 2.484 | 0.598 | 0.85 | 1 | 95.215 | | | |
| | | | C | 0.174 | 2.687 | 0.585 | 0.85 | 1 | 66.769 | | | |
| T14 | 1.79 | 12.30 | A | 0.17 | 2.701 | 0.585 | 0.85 | 1 | 107.143 | 8.91 | 296.92 | B |
| 60.00-30.00 | | | B | 0.215 | 2.546 | 0.594 | 0.85 | 1 | 142.479 | | | |
| | | | C | 0.163 | 2.724 | 0.584 | 0.85 | 1 | 102.802 | | | |
| T15 | 1.79 | 14.02 | A | 0.16 | 2.734 | 0.583 | 0.85 | 1 | 111.674 | 8.52 | 283.86 | B |
| 30.00-0.00 | | | B | 0.201 | 2.593 | 0.591 | 0.85 | 1 | 146.136 | | | |
| | | | C | 0.153 | 2.762 | 0.582 | 0.85 | 1 | 106.061 | | | |
| Sum Weight: | 13.07 | 103.04 | | | | | | OTM | 14436.01 | 96.64 | | |

| Section Elevation ft | Add Weight K | Self Weight K | Face | e | $C_F$ | $R_R$ | $D_F$ | $D_R$ | $A_E$ $ft^2$ kip-ft | F K | w plf | Ctrl. Face |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | |

## 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 | 57.25 | | | | | |
| Bracing Weight | 45.79 | | | | | |
| Total Member Self-Weight | 103.04 | | | 69.90 | -16.47 | |
| Total Weight | 123.70 | | | 69.90 | -16.47 | |
| Wind 0 deg - No Ice | | 0.00 | -124.50 | -20631.35 | -16.47 | 169.21 |
| Wind 30 deg - No Ice | | 60.16 | -104.20 | -17198.54 | -9986.41 | 208.94 |
| Wind 45 deg - No Ice | | 84.59 | -84.59 | -13939.99 | -14026.36 | 209.69 |
| Wind 60 deg - No Ice | | 103.00 | -59.47 | -9773.14 | -17065.12 | 196.18 |
| Wind 90 deg - No Ice | | 120.32 | 0.00 | 69.90 | -19956.34 | 135.37 |
| Wind 120 deg - No Ice | | 107.82 | 62.25 | 10420.52 | -17944.28 | 37.40 |
| Wind 135 deg - No Ice | | 84.59 | 84.59 | 14079.79 | -14026.36 | -19.55 |
| Wind 150 deg - No Ice | | 60.16 | 104.20 | 17338.33 | -9986.41 | -73.57 |
| Wind 180 deg - No Ice | | 0.00 | 118.93 | 19755.98 | -16.47 | -161.08 |
| Wind 210 deg - No Ice | | -60.16 | 104.20 | 17338.33 | 9953.47 | -208.94 |
| Wind 225 deg - No Ice | | -84.59 | 84.59 | 14079.79 | 13993.42 | -209.69 |
| Wind 240 deg - No Ice | | -107.82 | 62.25 | 10420.52 | 17911.33 | -206.61 |
| Wind 270 deg - No Ice | | -120.32 | 0.00 | 69.90 | 19923.40 | -135.37 |
| Wind 300 deg - No Ice | | -103.00 | -59.47 | -9773.14 | 17032.18 | -35.10 |
| Wind 315 deg - No Ice | | -84.59 | -84.59 | -13939.99 | 13993.42 | 19.55 |
| Wind 330 deg - No Ice | | -60.16 | -104.20 | -17198.54 | 9953.47 | 73.57 |
| Member Ice | 24.42 | | | | | |
| Total Weight Ice | 173.63 | | | 180.79 | -66.44 | |
| Wind 0 deg - Ice | | 0.00 | -155.58 | -25399.21 | -66.44 | 273.24 |
| Wind 30 deg - Ice | | 75.76 | -131.22 | -21358.48 | -12502.14 | 335.93 |
| Wind 45 deg - Ice | | 106.66 | -106.66 | -17322.44 | -17569.67 | 335.96 |
| Wind 60 deg - Ice | | 130.05 | -75.08 | -12136.82 | -21401.15 | 313.15 |
| Wind 90 deg - Ice | | 151.52 | 0.00 | 180.79 | -24937.84 | 212.07 |
| Wind 120 deg - Ice | | 134.74 | 77.79 | 12970.78 | -22219.36 | 52.88 |
| Wind 135 deg - Ice | | 106.66 | 106.66 | 17684.02 | -17569.67 | -37.64 |
| Wind 150 deg - Ice | | 75.76 | 131.22 | 21720.05 | -12502.14 | -123.87 |
| Wind 180 deg - Ice | | 0.00 | 150.17 | 24815.99 | -66.44 | -262.88 |
| Wind 210 deg - Ice | | -75.76 | 131.22 | 21720.05 | 12369.27 | -335.93 |
| Wind 225 deg - Ice | | -106.66 | 106.66 | 17684.02 | 17436.79 | -335.96 |
| Wind 240 deg - Ice | | -134.74 | 77.79 | 12970.78 | 22086.49 | -326.11 |
| Wind 270 deg - Ice | | -151.52 | 0.00 | 180.79 | 24804.97 | -212.07 |
| Wind 300 deg - Ice | | -130.05 | -75.08 | -12136.82 | 21268.28 | -50.27 |
| Wind 315 deg - Ice | | -106.66 | -106.66 | -17322.44 | 17436.79 | 37.64 |
| Wind 330 deg - Ice | | -75.76 | -131.22 | -21358.48 | 12369.27 | 123.87 |
| Total Weight | 123.70 | | | 69.90 | -16.47 | |
| Wind 0 deg - Service | | 0.00 | -124.50 | -20704.99 | 5.73 | 169.21 |
| Wind 30 deg - Service | | 60.16 | -104.20 | -17272.19 | -9964.21 | 208.94 |
| Wind 45 deg - Service | | 84.59 | -84.59 | -14013.64 | -14004.16 | 209.69 |
| Wind 60 deg - Service | | 103.00 | -59.47 | -9846.79 | -17042.92 | 196.18 |
| Wind 90 deg - Service | | 120.32 | 0.00 | -3.75 | -19934.14 | 135.37 |
| Wind 120 deg - Service | | 107.82 | 62.25 | 10346.87 | -17922.08 | 37.40 |
| Wind 135 deg - Service | | 84.59 | 84.59 | 14006.14 | -14004.16 | -19.55 |
| Wind 150 deg - Service | | 60.16 | 104.20 | 17264.69 | -9964.21 | -73.57 |
| Wind 180 deg - Service | | 0.00 | 118.93 | 19682.33 | 5.73 | -161.08 |

| 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 210 deg - Service | | -60.16 | 104.20 | 17264.69 | 9975.67 | -208.94 |
| Wind 225 deg - Service | | -84.59 | 84.59 | 14006.14 | 14015.62 | -209.69 |
| Wind 240 deg - Service | | -107.82 | 62.25 | 10346.87 | 17933.53 | -206.61 |
| Wind 270 deg - Service | | -120.32 | 0.00 | -3.75 | 19945.60 | -135.37 |
| Wind 300 deg - Service | | -103.00 | -59.47 | -9846.79 | 17054.38 | -35.10 |
| Wind 315 deg - Service | | -84.59 | -84.59 | -14013.64 | 14015.62 | 19.55 |
| Wind 330 deg - Service | | -60.16 | -104.20 | -17272.19 | 9975.67 | 73.57 |

## Load Combinations

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

| Comb. No. | Description |
|---|---|
| 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 | 320 - 300 | Leg | Max Tension | 27 | 14.72 | 0.03 | 0.05 |
| | | | Max. Compression | 24 | -18.31 | -0.57 | -0.35 |
| | | | Max. Mx | 30 | -17.68 | 0.70 | -0.11 |
| | | | Max. My | 28 | -1.19 | 0.20 | 0.93 |
| | | | Max. Vy | 23 | -1.17 | 0.19 | -0.15 |
| | | | Max. Vx | 19 | 1.21 | 0.00 | -0.11 |
| | | Diagonal | Max Tension | 23 | 4.31 | 0.00 | 0.00 |
| | | | Max. Compression | 31 | -4.34 | 0.00 | 0.00 |
| | | | Max. Mx | 25 | 1.05 | 0.01 | -0.00 |
| | | | Max. My | 29 | -3.55 | 0.01 | 0.01 |
| | | | Max. Vy | 25 | 0.01 | 0.01 | -0.00 |
| | | | Max. Vx | 29 | -0.00 | 0.01 | 0.01 |
| | | Top Girt | Max Tension | 24 | 0.07 | 0.00 | 0.00 |
| | | | Max. Compression | 27 | -0.10 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | -0.02 | 0.00 |
| | | | Max. My | 28 | -0.01 | 0.00 | 0.00 |
| | | | Max. Vy | 18 | -0.01 | 0.00 | 0.00 |
| | | | Max. Vx | 28 | 0.00 | 0.00 | 0.00 |
| T2 | 300 - 280 | Leg | Max Tension | 27 | 42.82 | -0.09 | -0.00 |
| | | | Max. Compression | 24 | -49.83 | 0.71 | 0.03 |
| | | | Max. Mx | 24 | -49.83 | 0.71 | 0.03 |
| | | | Max. My | 20 | -2.30 | 0.03 | -0.56 |
| | | | Max. Vy | 27 | -0.26 | -0.19 | -0.05 |
| | | | Max. Vx | 31 | -0.56 | -0.01 | -0.20 |
| | | Diagonal | Max Tension | 34 | 5.02 | 0.00 | 0.00 |
| | | | Max. Compression | 34 | -5.05 | 0.00 | 0.00 |
| | | | Max. Mx | 33 | 3.05 | 0.02 | -0.00 |
| | | | Max. My | 29 | -3.95 | 0.01 | 0.01 |
| | | | Max. Vy | 32 | 0.01 | 0.02 | -0.00 |
| | | | Max. Vx | 29 | -0.00 | 0.00 | 0.00 |
| | | Top Girt | Max Tension | 21 | 0.02 | 0.00 | 0.00 |
| | | | Max. Compression | 30 | -0.04 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | -0.03 | 0.00 |
| | | | Max. My | 28 | 0.01 | 0.00 | 0.00 |
| | | | Max. Vy | 18 | 0.02 | 0.00 | 0.00 |
| | | | Max. Vx | 28 | -0.00 | 0.00 | 0.00 |
| T3 | 280 - 260 | Leg | Max Tension | 22 | 75.97 | -0.55 | -0.01 |
| | | | Max. Compression | 24 | -87.99 | 1.10 | 0.05 |
| | | | Max. Mx | 32 | 74.58 | -1.10 | -0.06 |
| | | | Max. My | 20 | -5.96 | -0.01 | -1.16 |
| | | | Max. Vy | 27 | -0.92 | -0.68 | 0.11 |
| | | | Max. Vx | 31 | -0.99 | 0.00 | -0.29 |
| | | Diagonal | Max Tension | 34 | 7.80 | 0.00 | 0.00 |
| | | | Max. Compression | 34 | -7.85 | 0.00 | 0.00 |
| | | | Max. Mx | 33 | 4.07 | 0.04 | -0.00 |
| | | | Max. My | 19 | -7.28 | 0.02 | -0.01 |
| | | | Max. Vy | 33 | 0.02 | 0.04 | -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 | 19 | 0.00 | 0.00 | 0.00 |
| T4 | 260 - 240 | Leg | Max Tension | 22 | 113.39 | -0.66 | 0.00 |
| | | | Max. Compression | 24 | -130.70 | 2.14 | 0.11 |
| | | | Max. Mx | 19 | -129.49 | 2.14 | -0.33 |
| | | | Max. My | 20 | -8.37 | 0.05 | -1.99 |
| | | | Max. Vy | 30 | -0.40 | 2.14 | 0.22 |
| | | | Max. Vx | 28 | -0.44 | 0.05 | 1.99 |
| | | Diagonal | Max Tension | 34 | 9.41 | 0.00 | 0.00 |
| | | | Max. Compression | 34 | -9.51 | 0.00 | 0.00 |
| | | | Max. Mx | 27 | 5.70 | 0.06 | 0.01 |
| | | | Max. My | 19 | -8.72 | 0.02 | -0.02 |
| | | | Max. Vy | 27 | 0.03 | 0.06 | 0.01 |
| | | | Max. Vx | 19 | 0.00 | 0.00 | 0.00 |
| T5 | 240 - 220 | Leg | Max Tension | 22 | 152.45 | -0.93 | -0.03 |
| | | | Max. Compression | 24 | -176.19 | 1.91 | 0.06 |
| | | | Max. Mx | 19 | -143.83 | 2.14 | -0.33 |
| | | | Max. My | 20 | -8.74 | 0.05 | -1.99 |
| | | | Max. Vy | 30 | 0.32 | 2.14 | 0.22 |
| | | | Max. Vx | 28 | 0.33 | 0.05 | 1.99 |
| | | Diagonal | Max Tension | 34 | 11.52 | 0.00 | 0.00 |
| | | | Max. Compression | 34 | -11.58 | 0.00 | 0.00 |
| | | | Max. Mx | 22 | 7.61 | 0.14 | -0.02 |
| | | | Max. My | 19 | -10.13 | 0.02 | -0.03 |
| | | | Max. Vy | 22 | 0.06 | 0.14 | -0.02 |
| | | | Max. Vx | 27 | -0.01 | 0.00 | 0.00 |
| T6 | 220 - 200 | Leg | Max Tension | 22 | 193.23 | -0.85 | -0.29 |
| | | | Max. Compression | 24 | -225.23 | 2.07 | -0.00 |
| | | | Max. Mx | 19 | -222.68 | 2.08 | -0.22 |
| | | | Max. My | 20 | -13.51 | -0.13 | -3.25 |
| | | | Max. Vy | 32 | -1.81 | -1.80 | -0.06 |
| | | | Max. Vx | 28 | 1.61 | 0.05 | 0.71 |
| | | Diagonal | Max Tension | 34 | 15.73 | 0.00 | 0.00 |
| | | | Max. Compression | 34 | -15.95 | 0.00 | 0.00 |
| | | | Max. Mx | 24 | 11.19 | 0.24 | 0.02 |
| | | | Max. My | 27 | -13.28 | 0.09 | 0.06 |
| | | | Max. Vy | 24 | -0.08 | 0.24 | 0.02 |
| | | | Max. Vx | 27 | -0.01 | 0.00 | 0.00 |
| T7 | 200 - 180 | Leg | Max Tension | 22 | 241.92 | -2.31 | -0.06 |
| | | | Max. Compression | 24 | -284.50 | 3.98 | 0.00 |
| | | | Max. Mx | 19 | -281.19 | 3.99 | -0.41 |
| | | | Max. My | 28 | -19.84 | 0.04 | 4.30 |
| | | | Max. Vy | 32 | -2.29 | -1.87 | 0.00 |
| | | | Max. Vx | 20 | -2.08 | 0.09 | -0.04 |
| | | Diagonal | Max Tension | 34 | 18.25 | 0.00 | 0.00 |
| | | | Max. Compression | 34 | -18.45 | 0.00 | 0.00 |
| | | | Max. Mx | 27 | 11.44 | 0.22 | 0.03 |
| | | | Max. My | 27 | -15.85 | 0.13 | 0.05 |
| | | | Max. Vy | 27 | 0.08 | 0.22 | 0.03 |
| | | | Max. Vx | 27 | -0.01 | 0.00 | 0.00 |
| T8 | 180 - 160 | Leg | Max Tension | 27 | 292.07 | -2.96 | 0.08 |
| | | | Max. Compression | 24 | -344.83 | 2.68 | -0.03 |
| | | | Max. Mx | 19 | -309.92 | 3.99 | -0.42 |
| | | | Max. My | 28 | -20.86 | 0.03 | 4.30 |
| | | | Max. Vy | 32 | -0.48 | -2.95 | 0.06 |
| | | | Max. Vx | 28 | 0.59 | 0.03 | 4.30 |
| | | Diagonal | Max Tension | 34 | 20.04 | 0.00 | 0.00 |
| | | | Max. Compression | 34 | -20.23 | 0.00 | 0.00 |
| | | | Max. Mx | 27 | 12.69 | 0.32 | 0.04 |
| | | | Max. My | 21 | -15.71 | 0.24 | -0.06 |
| | | | Max. Vy | 27 | 0.11 | 0.32 | 0.04 |
| | | | Max. Vx | 21 | 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 |
|---|---|---|---|---|---|---|---|
| T9 | 160 - 140 | Leg | Max Tension | 27 | 343.58 | -2.83 | 0.09 |
| | | | Max. Compression | 24 | -406.75 | 4.72 | -0.08 |
| | | | Max. Mx | 24 | -406.75 | 4.72 | -0.08 |
| | | | Max. My | 28 | -26.80 | -0.24 | 4.09 |
| | | | Max. Vy | 19 | -0.44 | 4.69 | -0.09 |
| | | | Max. Vx | 28 | 0.68 | -0.24 | 4.09 |
| | | Diagonal | Max Tension | 31 | 22.40 | 0.00 | 0.00 |
| | | | Max. Compression | 31 | -22.92 | 0.00 | 0.00 |
| | | | Max. Mx | 30 | 14.48 | 0.40 | 0.05 |
| | | | Max. My | 21 | -17.06 | 0.24 | -0.08 |
| | | | Max. Vy | 27 | 0.13 | 0.40 | 0.05 |
| | | | Max. Vx | 21 | 0.01 | 0.00 | 0.00 |
| T10 | 140 - 120 | Leg | Max Tension | 27 | 393.03 | -3.17 | 0.09 |
| | | | Max. Compression | 24 | -467.70 | -3.90 | -0.06 |
| | | | Max. Mx | 24 | -437.35 | 4.72 | -0.08 |
| | | | Max. My | 26 | -29.95 | -0.96 | -6.29 |
| | | | Max. Vy | 19 | 0.85 | 2.83 | -0.08 |
| | | | Max. Vx | 28 | -0.91 | -0.21 | 6.23 |
| | | Diagonal | Max Tension | 31 | 23.16 | 0.00 | 0.00 |
| | | | Max. Compression | 31 | -23.56 | 0.00 | 0.00 |
| | | | Max. Mx | 25 | 13.11 | 0.47 | 0.05 |
| | | | Max. My | 22 | -20.24 | 0.28 | -0.10 |
| | | | Max. Vy | 28 | 0.14 | 0.45 | 0.07 |
| | | | Max. Vx | 22 | 0.01 | 0.00 | 0.00 |
| T11 | 120 - 100 | Leg | Max Tension | 27 | 401.07 | 1.30 | -0.06 |
| | | | Max. Compression | 24 | -481.03 | -13.46 | -0.25 |
| | | | Max. Mx | 24 | -480.22 | 19.61 | 0.41 |
| | | | Max. My | 28 | -36.78 | -2.65 | 16.72 |
| | | | Max. Vy | 24 | 3.59 | 19.61 | 0.41 |
| | | | Max. Vx | 28 | -2.85 | -2.65 | 16.72 |
| | | Diagonal | Max Tension | 31 | 34.50 | -0.17 | -0.03 |
| | | | Max. Compression | 30 | -36.37 | 0.00 | 0.00 |
| | | | Max. Mx | 27 | 23.67 | -0.23 | 0.07 |
| | | | Max. My | 31 | -35.76 | -0.06 | -0.16 |
| | | | Max. Vy | 27 | 0.06 | -0.23 | 0.07 |
| | | | Max. Vx | 31 | -0.01 | 0.00 | 0.00 |
| | | Horizontal | Max Tension | 31 | 19.49 | -0.21 | 0.00 |
| | | | Max. Compression | 31 | -19.70 | -0.22 | 0.00 |
| | | | Max. Mx | 27 | -4.35 | -0.29 | -0.04 |
| | | | Max. My | 19 | 3.53 | -0.14 | 0.04 |
| | | | Max. Vy | 27 | 0.09 | -0.29 | -0.04 |
| | | | Max. Vx | 19 | -0.00 | -0.14 | 0.04 |
| | | Redund Horz 1 Bracing | Max Tension | 24 | 8.35 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -8.35 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | 0.62 | 0.02 | 0.00 |
| | | | Max. My | 20 | 7.01 | 0.00 | -0.00 |
| | | | Max. Vy | 18 | 0.01 | 0.00 | 0.00 |
| | | | Max. Vx | 20 | -0.00 | 0.00 | 0.00 |
| | | Redund Diag 1 Bracing | Max Tension | 24 | 7.57 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -7.57 | 0.00 | 0.00 |
| | | | Max. Mx | 23 | 6.47 | 0.05 | 0.00 |
| | | | Max. My | 30 | 3.71 | 0.00 | 0.00 |
| | | | Max. Vy | 23 | -0.02 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | -0.00 | 0.00 | 0.00 |
| | | Redund Hip 1 Bracing | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 23 | -0.10 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.02 | 0.00 |
| | | | Max. My | 30 | -0.05 | 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. Vy | 18 | -0.01 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | 0.00 | 0.00 | 0.00 |
| | | Redund Hip Diagonal Bracing | Max Tension | 23 | 0.17 | 0.00 | 0.00 |
| | | | Max. Compression | 30 | -0.11 | 0.00 | 0.00 |
| | | | Max. Mx | 24 | 0.13 | 0.17 | 0.00 |
| | | | Max. My | 28 | 0.05 | 0.00 | 0.00 |
| | | | Max. Vy | 24 | -0.04 | 0.00 | 0.00 |
| | | | Max. Vx | 28 | -0.00 | 0.00 | 0.00 |
| | | Inner Bracing | Max Tension | 22 | 0.01 | 0.00 | 0.00 |
| | | | Max. Compression | 19 | -0.04 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.20 | 0.00 |
| | | | Max. My | 30 | -0.00 | 0.00 | 0.00 |
| | | | Max. Vy | 18 | -0.06 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | -0.00 | 0.00 | 0.00 |
| T12 | 100 - 80 | Leg | Max Tension | 27 | 438.68 | 7.07 | 2.36 |
| | | | Max. Compression | 24 | -528.97 | -19.27 | -0.28 |
| | | | Max. Mx | 24 | -528.27 | 22.79 | 0.38 |
| | | | Max. My | 28 | -38.75 | -2.67 | 16.71 |
| | | | Max. Vy | 24 | 4.46 | 22.79 | 0.38 |
| | | | Max. Vx | 28 | 2.99 | -2.67 | 16.71 |
| | | Diagonal | Max Tension | 31 | 37.36 | -0.27 | -0.05 |
| | | | Max. Compression | 30 | -39.68 | 0.00 | 0.00 |
| | | | Max. Mx | 27 | 26.44 | -0.35 | 0.10 |
| | | | Max. My | 31 | -39.03 | -0.04 | -0.22 |
| | | | Max. Vy | 27 | 0.09 | -0.35 | 0.10 |
| | | | Max. Vx | 31 | 0.02 | -0.04 | -0.22 |
| | | Horizontal | Max Tension | 31 | 21.85 | -0.39 | -0.00 |
| | | | Max. Compression | 30 | -23.08 | -0.47 | -0.03 |
| | | | Max. Mx | 27 | 4.73 | -0.53 | -0.06 |
| | | | Max. My | 19 | 5.52 | -0.25 | 0.06 |
| | | | Max. Vy | 27 | -0.14 | -0.53 | -0.06 |
| | | | Max. Vx | 19 | -0.00 | -0.25 | 0.06 |
| | | Redund Horz 1 Bracing | Max Tension | 24 | 9.18 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -9.18 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | 0.70 | 0.03 | 0.00 |
| | | | Max. My | 20 | 7.71 | 0.00 | -0.00 |
| | | | Max. Vy | 18 | 0.01 | 0.00 | 0.00 |
| | | | Max. Vx | 20 | 0.00 | 0.00 | 0.00 |
| | | Redund Diag 1 Bracing | Max Tension | 24 | 7.79 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -7.79 | 0.00 | 0.00 |
| | | | Max. Mx | 23 | 6.65 | 0.05 | 0.00 |
| | | | Max. My | 30 | 4.29 | 0.00 | 0.00 |
| | | | Max. Vy | 23 | -0.02 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | -0.00 | 0.00 | 0.00 |
| | | Redund Hip 1 Bracing | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 23 | -0.11 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.03 | 0.00 |
| | | | Max. My | 30 | -0.06 | 0.00 | -0.00 |
| | | | Max. Vy | 18 | -0.01 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | 0.00 | 0.00 | 0.00 |
| | | Redund Hip Diagonal Bracing | Max Tension | 23 | 0.17 | 0.00 | 0.00 |
| | | | Max. Compression | 30 | -0.11 | 0.00 | 0.00 |
| | | | Max. Mx | 24 | 0.13 | 0.20 | 0.00 |
| | | | Max. My | 28 | 0.04 | 0.00 | 0.00 |
| | | | Max. Vy | 24 | -0.05 | 0.00 | 0.00 |
| | | | Max. Vx | 28 | -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 |
|---|---|---|---|---|---|---|---|
| | | Inner Bracing | Max Tension | 22 | 0.01 | 0.00 | 0.00 |
| | | | Max. Compression | 19 | -0.04 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.25 | 0.00 |
| | | | Max. My | 30 | -0.00 | 0.00 | 0.00 |
| | | | Max. Vy | 18 | -0.07 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | -0.00 | 0.00 | 0.00 |
| T13 | 80 - 60 | Leg | Max Tension | 27 | 478.74 | 11.80 | 1.81 |
| | | | Max. Compression | 24 | -579.99 | -22.35 | -0.38 |
| | | | Max. Mx | 24 | -579.64 | 31.59 | 0.30 |
| | | | Max. My | 28 | -45.58 | -3.93 | 22.41 |
| | | | Max. Vy | 24 | 5.49 | 31.59 | 0.30 |
| | | | Max. Vx | 28 | -3.43 | -3.93 | 22.41 |
| | | Diagonal | Max Tension | 31 | 35.80 | -0.32 | -0.06 |
| | | | Max. Compression | 30 | -38.90 | 0.00 | 0.00 |
| | | | Max. Mx | 27 | 25.61 | -0.42 | 0.11 |
| | | | Max. My | 31 | -37.66 | -0.03 | -0.21 |
| | | | Max. Vy | 27 | 0.10 | -0.42 | 0.11 |
| | | | Max. Vx | 31 | 0.02 | -0.03 | -0.21 |
| | | Horizontal | Max Tension | 31 | 21.87 | -0.38 | -0.00 |
| | | | Max. Compression | 30 | -23.25 | -0.43 | -0.02 |
| | | | Max. Mx | 27 | -5.50 | -0.47 | -0.04 |
| | | | Max. My | 19 | 5.58 | -0.29 | 0.04 |
| | | | Max. Vy | 27 | 0.13 | -0.47 | -0.04 |
| | | | Max. Vx | 19 | -0.00 | -0.29 | 0.04 |
| | | Redund Horz 1 Bracing | Max Tension | 24 | 10.07 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -10.07 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | 0.78 | 0.04 | 0.00 |
| | | | Max. My | 20 | 8.46 | 0.00 | -0.00 |
| | | | Max. Vy | 18 | 0.02 | 0.00 | 0.00 |
| | | | Max. Vx | 20 | 0.00 | 0.00 | 0.00 |
| | | Redund Diag 1 Bracing | Max Tension | 24 | 8.05 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -8.05 | 0.00 | 0.00 |
| | | | Max. Mx | 23 | 6.88 | 0.10 | 0.00 |
| | | | Max. My | 30 | 5.32 | 0.00 | 0.00 |
| | | | Max. Vy | 23 | -0.03 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | -0.00 | 0.00 | 0.00 |
| | | Redund Hip 1 Bracing | Max Tension | 1 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 23 | -0.10 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.03 | 0.00 |
| | | | Max. My | 29 | -0.01 | 0.00 | 0.00 |
| | | | Max. Vy | 18 | 0.02 | 0.00 | 0.00 |
| | | | Max. Vx | 29 | 0.00 | 0.00 | 0.00 |
| | | Redund Hip Diagonal Bracing | Max Tension | 23 | 0.15 | 0.00 | 0.00 |
| | | | Max. Compression | 30 | -0.11 | 0.00 | 0.00 |
| | | | Max. Mx | 24 | 0.12 | 0.29 | 0.00 |
| | | | Max. My | 28 | 0.05 | 0.00 | 0.00 |
| | | | Max. Vy | 24 | -0.07 | 0.00 | 0.00 |
| | | | Max. Vx | 28 | -0.00 | 0.00 | 0.00 |
| | | Inner Bracing | Max Tension | 22 | 0.00 | 0.00 | 0.00 |
| | | | Max. Compression | 19 | -0.04 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.29 | 0.00 |
| | | | Max. My | 30 | -0.01 | 0.00 | 0.00 |
| | | | Max. Vy | 18 | -0.08 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | -0.00 | 0.00 | 0.00 |
| T14 | 60 - 30 | Leg | Max Tension | 27 | 519.14 | 12.91 | 2.33 |
| | | | Max. Compression | 24 | -631.87 | 4.26 | 0.30 |
| | | | Max. Mx | 24 | -623.45 | 39.40 | 0.49 |

| Section No. | Elevation ft | Component Type | Condition | Gov. Load Comb. | Force K | Major Axis Moment kip-ft | Minor Axis Moment kip-ft |
|---|---|---|---|---|---|---|---|
| | | | Max. My | 28 | -51.50 | -2.83 | 30.52 |
| | | | Max. Vy | 24 | 7.35 | 39.40 | 0.49 |
| | | | Max. Vx | 20 | 4.36 | -2.82 | -30.52 |
| | | Diagonal | Max Tension | 31 | 51.95 | -0.39 | -0.09 |
| | | | Max. Compression | 30 | -55.01 | 0.00 | 0.00 |
| | | | Max. Mx | 27 | 39.45 | -0.49 | 0.28 |
| | | | Max. My | 31 | -50.70 | 0.29 | -0.49 |
| | | | Max. Vy | 30 | -0.10 | -0.22 | 0.23 |
| | | | Max. Vx | 30 | 0.06 | 0.37 | -0.49 |
| | | Horizontal | Max Tension | 31 | 25.64 | -0.56 | -0.00 |
| | | | Max. Compression | 31 | -26.58 | -0.56 | -0.00 |
| | | | Max. Mx | 27 | -5.72 | -0.75 | -0.05 |
| | | | Max. My | 19 | 4.56 | -0.36 | 0.06 |
| | | | Max. Vy | 27 | 0.17 | -0.75 | -0.05 |
| | | | Max. Vx | 19 | -0.00 | -0.36 | 0.06 |
| | | Redund Horz 1 Bracing | Max Tension | 24 | 10.96 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -10.96 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | 0.88 | 0.02 | 0.00 |
| | | | Max. My | 30 | -0.49 | 0.00 | -0.00 |
| | | | Max. Vy | 18 | -0.01 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | 0.00 | 0.00 | 0.00 |
| | | Redund Horz 2 Bracing | Max Tension | 24 | 10.96 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -10.96 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | 0.88 | 0.15 | 0.00 |
| | | | Max. My | 28 | 9.31 | 0.00 | -0.00 |
| | | | Max. Vy | 18 | -0.05 | 0.00 | 0.00 |
| | | | Max. Vx | 28 | 0.00 | 0.00 | 0.00 |
| | | Redund Diag 1 Bracing | Max Tension | 24 | 11.06 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -11.06 | 0.00 | 0.00 |
| | | | Max. Mx | 23 | 9.45 | 0.07 | 0.00 |
| | | | Max. My | 23 | 9.45 | 0.00 | -0.00 |
| | | | Max. Vy | 23 | -0.02 | 0.00 | 0.00 |
| | | | Max. Vx | 23 | 0.00 | 0.00 | 0.00 |
| | | Redund Diag 2 Bracing | Max Tension | 24 | 7.18 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -7.18 | 0.00 | 0.00 |
| | | | Max. Mx | 30 | 7.14 | 0.15 | 0.00 |
| | | | Max. My | 30 | 7.14 | 0.00 | 0.00 |
| | | | Max. Vy | 30 | -0.04 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | -0.00 | 0.00 | 0.00 |
| | | Redund Hip 1 Bracing | Max Tension | 6 | 0.02 | 0.00 | 0.00 |
| | | | Max. Compression | 23 | -0.26 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.02 | 0.00 |
| | | | Max. My | 30 | -0.12 | 0.00 | -0.00 |
| | | | Max. Vy | 18 | -0.01 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | -0.00 | 0.00 | 0.00 |
| | | Redund Hip 2 Bracing | Max Tension | 27 | 0.02 | 0.00 | 0.00 |
| | | | Max. Compression | 27 | -0.09 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.02 | 0.08 | 0.00 |
| | | | Max. My | 28 | -0.00 | 0.00 | 0.00 |
| | | | Max. Vy | 18 | 0.03 | 0.00 | 0.00 |
| | | | Max. Vx | 28 | 0.00 | 0.00 | 0.00 |
| | | Redund Hip Diagonal Bracing | Max Tension | 23 | 0.40 | 0.00 | 0.00 |
| | | | Max. Compression | 29 | -0.16 | 0.00 | 0.00 |
| | | | Max. Mx | 30 | 0.13 | 0.18 | 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. My | 20 | -0.01 | 0.00 | -0.00 |
| | | | Max. Vy | 30 | 0.04 | 0.00 | 0.00 |
| | | | Max. Vx | 28 | -0.00 | 0.00 | 0.00 |
| | | Inner Bracing | Max Tension | 30 | 0.05 | 0.00 | 0.00 |
| | | | Max. Compression | 31 | -0.06 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.34 | 0.00 |
| | | | Max. My | 30 | 0.05 | 0.00 | 0.00 |
| | | | Max. Vy | 18 | 0.08 | 0.00 | 0.00 |
| | | | Max. Vx | 30 | 0.00 | 0.00 | 0.00 |
| T15 | 30 - 0 | Leg | Max Tension | 27 | 579.36 | 24.43 | 4.31 |
| | | | Max. Compression | 24 | -707.87 | 6.82 | 0.42 |
| | | | Max. Mx | 24 | -706.67 | -33.25 | -0.94 |
| | | | Max. My | 28 | -55.81 | -2.84 | 30.51 |
| | | | Max. Vy | 24 | -4.08 | 6.82 | 0.42 |
| | | | Max. Vx | 20 | -4.09 | -2.82 | -30.51 |
| | | Diagonal | Max Tension | 31 | 48.61 | -0.34 | -0.08 |
| | | | Max. Compression | 31 | -50.17 | 0.00 | 0.00 |
| | | | Max. Mx | 27 | 33.05 | -0.44 | 0.22 |
| | | | Max. My | 31 | -48.18 | 0.20 | -0.42 |
| | | | Max. Vy | 30 | -0.09 | -0.25 | 0.21 |
| | | | Max. Vx | 30 | 0.05 | 0.26 | -0.41 |
| | | Horizontal | Max Tension | 22 | 26.04 | 0.00 | 0.00 |
| | | | Max. Compression | 30 | -28.57 | -0.65 | -0.04 |
| | | | Max. Mx | 27 | 6.36 | -0.73 | -0.07 |
| | | | Max. My | 19 | 8.27 | -0.40 | 0.08 |
| | | | Max. Vy | 27 | -0.17 | -0.73 | -0.07 |
| | | | Max. Vx | 19 | -0.00 | -0.40 | 0.08 |
| | | Redund Horz 1 Bracing | Max Tension | 24 | 12.29 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -12.29 | 0.00 | 0.00 |
| | | | Max. Mx | 33 | 8.56 | 0.02 | 0.00 |
| | | | Max. Vy | 33 | -0.01 | 0.00 | 0.00 |
| | | Redund Horz 2 Bracing | Max Tension | 24 | 12.29 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -12.29 | 0.00 | 0.00 |
| | | | Max. Mx | 31 | 0.85 | 0.18 | 0.00 |
| | | | Max. My | 22 | -2.12 | 0.00 | 0.00 |
| | | | Max. Vy | 31 | -0.06 | 0.00 | 0.00 |
| | | | Max. Vx | 22 | -0.00 | 0.00 | 0.00 |
| | | Redund Diag 1 Bracing | Max Tension | 24 | 11.43 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -11.43 | 0.00 | 0.00 |
| | | | Max. Mx | 19 | 11.29 | 0.06 | 0.00 |
| | | | Max. My | 31 | 3.26 | 0.00 | 0.00 |
| | | | Max. Vy | 19 | 0.02 | 0.00 | 0.00 |
| | | | Max. Vx | 31 | -0.00 | 0.00 | 0.00 |
| | | Redund Diag 2 Bracing | Max Tension | 24 | 7.68 | 0.00 | 0.00 |
| | | | Max. Compression | 24 | -7.68 | 0.00 | 0.00 |
| | | | Max. Mx | 30 | 7.64 | 0.18 | 0.00 |
| | | | Max. My | 22 | 2.89 | 0.00 | -0.00 |
| | | | Max. Vy | 30 | -0.05 | 0.00 | 0.00 |
| | | | Max. Vx | 22 | 0.00 | 0.00 | 0.00 |
| | | Redund Hip 1 Bracing | Max Tension | 23 | 0.02 | 0.00 | 0.00 |
| | | | Max. Compression | 23 | -0.22 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.02 | 0.00 |
| | | | Max. Vy | 18 | -0.01 | 0.00 | 0.00 |
| | | Redund Hip 2 Bracing | Max Tension | 27 | 0.02 | 0.00 | 0.00 |
| | | | Max. Compression | 27 | -0.07 | 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. Mx | 18 | -0.02 | 0.10 | 0.00 |
| | | | Max. My | 20 | -0.05 | 0.00 | 0.00 |
| | | | Max. Vy | 18 | -0.03 | 0.00 | 0.00 |
| | | Redund Hip Diagonal Bracing | Max Tension | 23 | 0.35 | 0.00 | 0.00 |
| | | | Max. Compression | 29 | -0.16 | 0.00 | 0.00 |
| | | | Max. Mx | 31 | 0.15 | 0.31 | 0.00 |
| | | | Max. My | 21 | 0.25 | 0.00 | -0.00 |
| | | | Max. Vy | 31 | -0.06 | 0.00 | 0.00 |
| | | | Max. Vx | 21 | 0.00 | 0.00 | 0.00 |
| | | Inner Bracing | Max Tension | 21 | 0.03 | 0.00 | 0.00 |
| | | | Max. Compression | 31 | -0.06 | 0.00 | 0.00 |
| | | | Max. Mx | 18 | -0.01 | 0.42 | 0.00 |
| | | | Max. My | 22 | -0.04 | 0.00 | -0.00 |
| | | | Max. Vy | 18 | -0.09 | 0.00 | 0.00 |
| | | | Max. Vx | 22 | 0.00 | 0.00 | 0.00 |

## Maximum Reactions

| Location | Condition | Gov. Load Comb. | Vertical K | Horizontal, X K | Horizontal, Z K |
|---|---|---|---|---|---|
| Leg C | Max. Vert | 30 | 770.87 | 84.07 | -43.33 |
| | Max. $H_x$ | 30 | 770.87 | 84.07 | -43.33 |
| | Max. $H_z$ | 21 | -607.13 | -69.99 | 38.84 |
| | Min. Vert | 22 | -627.35 | -73.91 | 37.42 |
| | Min. $H_x$ | 22 | -627.35 | -73.91 | 37.42 |
| | Min. $H_z$ | 30 | 770.87 | 84.07 | -43.33 |
| Leg B | Max. Vert | 24 | 774.13 | -82.26 | -46.59 |
| | Max. $H_x$ | 32 | -624.08 | 71.92 | 40.73 |
| | Max. $H_z$ | 33 | -603.87 | 67.25 | 43.60 |
| | Min. Vert | 32 | -624.08 | 71.92 | 40.73 |
| | Min. $H_x$ | 24 | 774.13 | -82.26 | -46.59 |
| | Min. $H_z$ | 25 | 727.52 | -75.13 | -47.56 |
| Leg A | Max. Vert | 19 | 764.83 | 3.73 | 94.37 |
| | Max. $H_x$ | 32 | 395.83 | 10.19 | 48.28 |
| | Max. $H_z$ | 19 | 764.83 | 3.73 | 94.37 |
| | Min. Vert | 27 | -633.41 | -3.86 | -82.82 |
| | Min. $H_x$ | 24 | -303.29 | -11.01 | -40.33 |
| | Min. $H_z$ | 27 | -633.41 | -3.86 | -82.82 |

## 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 | 123.70 | -0.00 | -0.00 | 69.89 | -16.47 | -0.00 |
| Dead+Wind 0 deg - No Ice | 123.69 | 0.00 | -124.28 | -20295.56 | -16.17 | 169.24 |
| Dead+Wind 30 deg - No Ice | 123.69 | 60.09 | -104.03 | -16915.43 | -9829.72 | 209.04 |
| Dead+Wind 45 deg - No Ice | 123.69 | 84.48 | -84.46 | -13712.14 | -13804.12 | 209.83 |
| Dead+Wind 60 deg - No Ice | 123.69 | 102.85 | -59.38 | -9615.67 | -16791.60 | 196.35 |
| Dead+Wind 90 deg - No Ice | 123.69 | 120.13 | -0.02 | 63.28 | -19632.81 | 135.56 |
| Dead+Wind 120 deg - No Ice | 123.69 | 107.63 | 62.14 | 10252.30 | -17653.42 | 37.55 |

| 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+Wind 135 deg - No Ice | 123.69 | 84.43 | 84.45 | 13851.48 | -13792.00 | -19.44 |
| Dead+Wind 150 deg - No Ice | 123.69 | 60.05 | 104.05 | 17061.15 | -9819.02 | -73.51 |
| Dead+Wind 180 deg - No Ice | 123.69 | 0.00 | 118.77 | 19440.37 | -16.05 | -161.10 |
| Dead+Wind 210 deg - No Ice | 123.69 | -60.05 | 104.05 | 17061.23 | 9786.58 | -209.02 |
| Dead+Wind 225 deg - No Ice | 123.69 | -84.43 | 84.46 | 13851.56 | 13759.26 | -209.80 |
| Dead+Wind 240 deg - No Ice | 123.69 | -107.63 | 62.14 | 10252.37 | 17620.38 | -206.76 |
| Dead+Wind 270 deg - No Ice | 123.69 | -120.13 | -0.02 | 63.32 | 19599.55 | -135.54 |
| Dead+Wind 300 deg - No Ice | 123.69 | -102.85 | -59.38 | -9615.64 | 16758.61 | -35.22 |
| Dead+Wind 315 deg - No Ice | 123.69 | -84.48 | -84.46 | -13712.09 | 13771.34 | 19.46 |
| Dead+Wind 330 deg - No Ice | 123.69 | -60.09 | -104.03 | -16915.36 | 9797.13 | 73.53 |
| Dead+Ice+Temp | 173.63 | -0.00 | -0.00 | 180.65 | -66.38 | -0.00 |
| Dead+Wind 0 deg+Ice+Temp | 173.61 | 0.00 | -155.21 | -24912.26 | -65.79 | 273.38 |
| Dead+Wind 30 deg+Ice+Temp | 173.61 | 75.63 | -130.92 | -20948.49 | -12275.40 | 336.31 |
| Dead+Wind 45 deg+Ice+Temp | 173.61 | 106.47 | -106.43 | -16992.96 | -17248.13 | 336.43 |
| Dead+Wind 60 deg+Ice+Temp | 173.61 | 129.80 | -74.94 | -11909.66 | -21005.35 | 313.70 |
| Dead+Wind 90 deg+Ice+Temp | 173.61 | 151.19 | -0.04 | 170.16 | -24468.98 | 212.63 |
| Dead+Wind 120 deg+Ice+Temp | 173.61 | 134.41 | 77.60 | 12726.58 | -21797.18 | 53.28 |
| Dead+Wind 135 deg+Ice+Temp | 173.61 | 106.39 | 106.43 | 17353.28 | -17229.28 | -37.36 |
| Dead+Wind 150 deg+Ice+Temp | 173.61 | 75.56 | 130.95 | 21318.89 | -12258.76 | -123.72 |
| Dead+Wind 180 deg+Ice+Temp | 173.61 | 0.00 | 149.87 | 24359.66 | -65.37 | -263.00 |
| Dead+Wind 210 deg+Ice+Temp | 173.61 | -75.56 | 130.95 | 21318.89 | 12127.31 | -336.27 |
| Dead+Wind 225 deg+Ice+Temp | 173.61 | -106.39 | 106.43 | 17353.28 | 17097.14 | -336.38 |
| Dead+Wind 240 deg+Ice+Temp | 173.61 | -134.41 | 77.60 | 12726.58 | 21664.41 | -326.61 |
| Dead+Wind 270 deg+Ice+Temp | 173.61 | -151.19 | -0.04 | 170.31 | 24335.68 | -212.59 |
| Dead+Wind 300 deg+Ice+Temp | 173.61 | -129.80 | -74.94 | -11909.25 | 20872.56 | -50.63 |
| Dead+Wind 315 deg+Ice+Temp | 173.61 | -106.47 | -106.44 | -16992.50 | 17115.75 | 37.40 |
| Dead+Wind 330 deg+Ice+Temp | 173.61 | -75.63 | -130.92 | -20948.08 | 12143.40 | 123.76 |
| Dead+Wind 0 deg - Service | 123.69 | 0.00 | -124.28 | -20295.56 | -16.17 | 169.24 |
| Dead+Wind 30 deg - Service | 123.69 | 60.09 | -104.03 | -16915.43 | -9829.72 | 209.04 |
| Dead+Wind 45 deg - Service | 123.69 | 84.48 | -84.46 | -13712.14 | -13804.12 | 209.83 |
| Dead+Wind 60 deg - Service | 123.69 | 102.85 | -59.38 | -9615.67 | -16791.60 | 196.35 |
| Dead+Wind 90 deg - Service | 123.69 | 120.13 | -0.02 | 63.28 | -19632.81 | 135.56 |
| Dead+Wind 120 deg - Service | 123.69 | 107.63 | 62.14 | 10252.30 | -17653.42 | 37.55 |
| Dead+Wind 135 deg - Service | 123.69 | 84.43 | 84.45 | 13851.48 | -13792.00 | -19.44 |
| Dead+Wind 150 deg - Service | 123.69 | 60.05 | 104.05 | 17061.15 | -9819.02 | -73.51 |
| Dead+Wind 180 deg - Service | 123.69 | 0.00 | 118.77 | 19440.37 | -16.05 | -161.10 |
| Dead+Wind 210 deg - Service | 123.69 | -60.05 | 104.05 | 17061.23 | 9786.58 | -209.02 |
| Dead+Wind 225 deg - Service | 123.69 | -84.43 | 84.46 | 13851.56 | 13759.26 | -209.80 |
| Dead+Wind 240 deg - Service | 123.69 | -107.63 | 62.14 | 10252.37 | 17620.38 | -206.76 |
| Dead+Wind 270 deg - Service | 123.69 | -120.13 | -0.02 | 63.32 | 19599.55 | -135.54 |
| Dead+Wind 300 deg - Service | 123.69 | -102.85 | -59.38 | -9615.64 | 16758.61 | -35.22 |
| Dead+Wind 315 deg - Service | 123.69 | -84.48 | -84.46 | -13712.09 | 13771.34 | 19.46 |
| Dead+Wind 330 deg - Service | 123.69 | -60.09 | -104.03 | -16915.36 | 9797.13 | 73.53 |

# Solution Summary

| | Sum of Applied Forces | | | Sum of Reactions | | | |
|---|---|---|---|---|---|---|---|
| Load Comb. | PX K | PY K | PZ K | PX K | PY K | PZ K | % Error |
| 1 | 0.00 | -123.70 | 0.00 | 0.00 | 123.70 | 0.00 | 0.000% |
| 2 | -0.00 | -123.70 | -124.50 | -0.00 | 123.69 | 124.28 | 0.126% |
| 3 | 60.16 | -123.70 | -104.20 | -60.09 | 123.69 | 104.03 | 0.111% |
| 4 | 84.59 | -123.70 | -84.59 | -84.48 | 123.69 | 84.46 | 0.101% |
| 5 | 103.00 | -123.70 | -59.47 | -102.85 | 123.69 | 59.38 | 0.096% |
| 6 | 120.32 | -123.70 | -0.00 | -120.13 | 123.69 | 0.02 | 0.111% |
| 7 | 107.82 | -123.70 | 62.25 | -107.63 | 123.69 | -62.14 | 0.127% |
| 8 | 84.59 | -123.70 | 84.59 | -84.43 | 123.69 | -84.45 | 0.120% |
| 9 | 60.16 | -123.70 | 104.20 | -60.05 | 123.69 | -104.05 | 0.112% |

| Load Comb. | Sum of Applied Forces PX K | PY K | PZ K | Sum of Reactions PX K | PY K | PZ K | % Error |
|---|---|---|---|---|---|---|---|
| 10 | 0.00 | -123.70 | 118.93 | -0.00 | 123.69 | -118.77 | 0.097% |
| 11 | -60.16 | -123.70 | 104.20 | 60.05 | 123.69 | -104.05 | 0.111% |
| 12 | -84.59 | -123.70 | 84.59 | 84.43 | 123.69 | -84.46 | 0.120% |
| 13 | -107.82 | -123.70 | 62.25 | 107.63 | 123.69 | -62.14 | 0.128% |
| 14 | -120.32 | -123.70 | 0.00 | 120.13 | 123.69 | 0.02 | 0.112% |
| 15 | -103.00 | -123.70 | -59.47 | 102.85 | 123.69 | 59.38 | 0.096% |
| 16 | -84.59 | -123.70 | -84.59 | 84.48 | 123.69 | 84.46 | 0.100% |
| 17 | -60.16 | -123.70 | -104.20 | 60.09 | 123.69 | 104.03 | 0.110% |
| 18 | 0.00 | -173.63 | 0.00 | 0.00 | 173.63 | 0.00 | 0.000% |
| 19 | -0.00 | -173.63 | -155.58 | -0.00 | 173.61 | 155.21 | 0.161% |
| 20 | 75.76 | -173.63 | -131.22 | -75.63 | 173.61 | 130.92 | 0.144% |
| 21 | 106.66 | -173.63 | -106.66 | -106.47 | 173.61 | 106.43 | 0.133% |
| 22 | 130.05 | -173.63 | -75.08 | -129.80 | 173.61 | 74.94 | 0.128% |
| 23 | 151.52 | -173.63 | -0.00 | -151.19 | 173.61 | 0.04 | 0.146% |
| 24 | 134.74 | -173.63 | 77.79 | -134.41 | 173.61 | -77.60 | 0.164% |
| 25 | 106.66 | -173.63 | 106.66 | -106.39 | 173.61 | -106.43 | 0.157% |
| 26 | 75.76 | -173.63 | 131.22 | -75.56 | 173.61 | -130.95 | 0.147% |
| 27 | 0.00 | -173.63 | 150.17 | -0.00 | 173.61 | -149.87 | 0.129% |
| 28 | -75.76 | -173.63 | 131.22 | 75.56 | 173.61 | -130.95 | 0.145% |
| 29 | -106.66 | -173.63 | 106.66 | 106.39 | 173.61 | -106.43 | 0.155% |
| 30 | -134.74 | -173.63 | 77.79 | 134.41 | 173.61 | -77.60 | 0.164% |
| 31 | -151.52 | -173.63 | 0.00 | 151.19 | 173.61 | 0.04 | 0.146% |
| 32 | -130.05 | -173.63 | -75.08 | 129.80 | 173.61 | 74.94 | 0.127% |
| 33 | -106.66 | -173.63 | -106.66 | 106.47 | 173.61 | 106.44 | 0.132% |
| 34 | -75.76 | -173.63 | -131.22 | 75.63 | 173.61 | 130.92 | 0.143% |
| 35 | -0.00 | -123.70 | -124.50 | -0.00 | 123.69 | 124.28 | 0.126% |
| 36 | 60.16 | -123.70 | -104.20 | -60.09 | 123.69 | 104.03 | 0.111% |
| 37 | 84.59 | -123.70 | -84.59 | -84.48 | 123.69 | 84.46 | 0.101% |
| 38 | 103.00 | -123.70 | -59.47 | -102.85 | 123.69 | 59.38 | 0.096% |
| 39 | 120.32 | -123.70 | -0.00 | -120.13 | 123.69 | 0.02 | 0.111% |
| 40 | 107.82 | -123.70 | 62.25 | -107.63 | 123.69 | -62.14 | 0.127% |
| 41 | 84.59 | -123.70 | 84.59 | -84.43 | 123.69 | -84.45 | 0.120% |
| 42 | 60.16 | -123.70 | 104.20 | -60.05 | 123.69 | -104.05 | 0.112% |
| 43 | 0.00 | -123.70 | 118.93 | -0.00 | 123.69 | -118.77 | 0.097% |
| 44 | -60.16 | -123.70 | 104.20 | 60.05 | 123.69 | -104.05 | 0.111% |
| 45 | -84.59 | -123.70 | 84.59 | 84.43 | 123.69 | -84.46 | 0.120% |
| 46 | -107.82 | -123.70 | 62.25 | 107.63 | 123.69 | -62.14 | 0.128% |
| 47 | -120.32 | -123.70 | 0.00 | 120.13 | 123.69 | 0.02 | 0.112% |
| 48 | -103.00 | -123.70 | -59.47 | 102.85 | 123.69 | 59.38 | 0.096% |
| 49 | -84.59 | -123.70 | -84.59 | 84.48 | 123.69 | 84.46 | 0.100% |
| 50 | -60.16 | -123.70 | -104.20 | 60.09 | 123.69 | 104.03 | 0.110% |

## Non-Linear Convergence Results

| Load Combination | Converged? | Number of Cycles | Displacement Tolerance | Force Tolerance |
|---|---|---|---|---|
| 1 | Yes | 4 | 0.00000001 | 0.00000001 |
| 2 | Yes | 4 | 0.00027778 | 0.00036781 |
| 3 | Yes | 4 | 0.00024622 | 0.00033622 |
| 4 | Yes | 4 | 0.00022359 | 0.00031554 |
| 5 | Yes | 4 | 0.00021441 | 0.00030612 |
| 6 | Yes | 4 | 0.00024797 | 0.00033565 |
| 7 | Yes | 4 | 0.00027830 | 0.00036798 |
| 8 | Yes | 4 | 0.00026839 | 0.00035388 |
| 9 | Yes | 4 | 0.00024791 | 0.00033631 |
| 10 | Yes | 4 | 0.00021426 | 0.00030588 |

| | | | | |
|---|---|---|---|---|
| 11 | Yes | 4 | 0.00024613 | 0.00033623 |
| 12 | Yes | 4 | 0.00026775 | 0.00035501 |
| 13 | Yes | 4 | 0.00027903 | 0.00037054 |
| 14 | Yes | 4 | 0.00024909 | 0.00033729 |
| 15 | Yes | 4 | 0.00021412 | 0.00030377 |
| 16 | Yes | 4 | 0.00022357 | 0.00031234 |
| 17 | Yes | 4 | 0.00024668 | 0.00033352 |
| 18 | Yes | 4 | 0.00000001 | 0.00000351 |
| 19 | Yes | 4 | 0.00038819 | 0.00049230 |
| 20 | Yes | 4 | 0.00034878 | 0.00045377 |
| 21 | Yes | 4 | 0.00032101 | 0.00042758 |
| 22 | Yes | 4 | 0.00031032 | 0.00041630 |
| 23 | Yes | 4 | 0.00035257 | 0.00045453 |
| 24 | Yes | 4 | 0.00038948 | 0.00049323 |
| 25 | Yes | 4 | 0.00037737 | 0.00047745 |
| 26 | Yes | 4 | 0.00035157 | 0.00045412 |
| 27 | Yes | 4 | 0.00030962 | 0.00041559 |
| 28 | Yes | 4 | 0.00034923 | 0.00045501 |
| 29 | Yes | 4 | 0.00037684 | 0.00048021 |
| 30 | Yes | 4 | 0.00039101 | 0.00049769 |
| 31 | Yes | 4 | 0.00035389 | 0.00045574 |
| 32 | Yes | 4 | 0.00030913 | 0.00041081 |
| 33 | Yes | 4 | 0.00032059 | 0.00042152 |
| 34 | Yes | 4 | 0.00034948 | 0.00044921 |
| 35 | Yes | 4 | 0.00027778 | 0.00036781 |
| 36 | Yes | 4 | 0.00024622 | 0.00033622 |
| 37 | Yes | 4 | 0.00022359 | 0.00031554 |
| 38 | Yes | 4 | 0.00021441 | 0.00030612 |
| 39 | Yes | 4 | 0.00024797 | 0.00033565 |
| 40 | Yes | 4 | 0.00027830 | 0.00036798 |
| 41 | Yes | 4 | 0.00026839 | 0.00035388 |
| 42 | Yes | 4 | 0.00024791 | 0.00033631 |
| 43 | Yes | 4 | 0.00021426 | 0.00030588 |
| 44 | Yes | 4 | 0.00024613 | 0.00033623 |
| 45 | Yes | 4 | 0.00026775 | 0.00035501 |
| 46 | Yes | 4 | 0.00027903 | 0.00037054 |
| 47 | Yes | 4 | 0.00024909 | 0.00033729 |
| 48 | Yes | 4 | 0.00021412 | 0.00030377 |
| 49 | Yes | 4 | 0.00022357 | 0.00031234 |
| 50 | Yes | 4 | 0.00024668 | 0.00033352 |

## Maximum Tower Deflections - Service Wind

| Section No. | Elevation<br>ft | Horz. Deflection<br>in | Gov. Load Comb. | Tilt<br>° | Twist<br>° |
|---|---|---|---|---|---|
| T1 | 320 - 300 | 23.567 | 40 | 0.6091 | 0.2706 |
| T2 | 300 - 280 | 20.966 | 40 | 0.5995 | 0.2216 |
| T3 | 280 - 260 | 18.436 | 40 | 0.5725 | 0.1861 |
| T4 | 260 - 240 | 16.012 | 40 | 0.5447 | 0.1681 |
| T5 | 240 - 220 | 13.719 | 40 | 0.5077 | 0.1506 |
| T6 | 220 - 200 | 11.616 | 40 | 0.4626 | 0.1386 |
| T7 | 200 - 180 | 9.715 | 40 | 0.4106 | 0.1280 |
| T8 | 180 - 160 | 7.972 | 40 | 0.3774 | 0.1163 |
| T9 | 160 - 140 | 6.385 | 40 | 0.3403 | 0.1070 |
| T10 | 140 - 120 | 4.942 | 40 | 0.3003 | 0.0968 |
| T11 | 120 - 100 | 3.666 | 40 | 0.2580 | 0.0860 |
| T12 | 100 - 80 | 2.568 | 40 | 0.2174 | 0.0675 |
| T13 | 80 - 60 | 1.673 | 40 | 0.1757 | 0.0547 |
| T14 | 60 - 30 | 0.980 | 35 | 0.1276 | 0.0425 |

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| T15 | 30 - 0 | 0.304 | 35 | 0.0573 | 0.0212 |

## Critical Deflections and Radius of Curvature - Service Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 320.00 | Dual Lights | 40 | 23.567 | 0.6091 | 0.2706 | 244515 |
| 318.00 | PD128 | 40 | 23.305 | 0.6087 | 0.2654 | 244515 |
| 315.00 | 8 FT DISH | 40 | 22.913 | 0.6079 | 0.2578 | 244515 |
| 308.00 | 6 FT DISH | 40 | 22.001 | 0.6052 | 0.2403 | 101881 |
| 294.00 | DB224 | 40 | 20.197 | 0.5927 | 0.2090 | 54350 |
| 292.00 | PD320 | 40 | 19.942 | 0.5900 | 0.2051 | 52412 |
| 285.00 | (2) DB809 | 40 | 19.059 | 0.5798 | 0.1930 | 46599 |
| 280.00 | BCD-80609 | 40 | 18.436 | 0.5725 | 0.1861 | 43627 |
| 275.00 | (2) OGT9 | 40 | 17.819 | 0.5656 | 0.1805 | 42680 |
| 257.00 | PD440 | 40 | 15.659 | 0.5399 | 0.1655 | 37064 |
| 243.00 | PD128 | 40 | 14.052 | 0.5138 | 0.1530 | 25336 |
| 227.00 | PD320 | 40 | 12.328 | 0.4797 | 0.1422 | 22648 |
| 220.00 | Mounting Frame | 40 | 11.616 | 0.4626 | 0.1386 | 22516 |
| 200.00 | PiROD 12' Lightweight T-Frame | 40 | 9.715 | 0.4106 | 0.1280 | 33157 |
| 174.00 | DB583 | 40 | 7.480 | 0.3671 | 0.1134 | 30688 |
| 170.00 | DB-630 | 40 | 7.160 | 0.3598 | 0.1116 | 32297 |
| 166.00 | DB586-Y | 40 | 6.846 | 0.3521 | 0.1098 | 34084 |
| 140.00 | PD688S-4 | 40 | 4.942 | 0.3003 | 0.0968 | 27885 |
| 138.00 | PD156S | 40 | 4.807 | 0.2961 | 0.0958 | 27658 |
| 112.00 | 4 FT DISH | 40 | 3.204 | 0.2415 | 0.0789 | 25590 |
| 105.00 | 6 FT DISH | 40 | 2.825 | 0.2274 | 0.0720 | 23982 |
| 100.00 | PD458 | 40 | 2.568 | 0.2174 | 0.0675 | 23141 |
| 97.00 | 6 FT DISH | 40 | 2.421 | 0.2113 | 0.0651 | 23060 |
| 90.00 | 4 FT DISH | 40 | 2.095 | 0.1971 | 0.0604 | 23286 |

## Maximum Tower Deflections - Design Wind

| Section No. | Elevation ft | Horz. Deflection in | Gov. Load Comb. | Tilt ° | Twist ° |
|---|---|---|---|---|---|
| T1 | 320 - 300 | 29.042 | 24 | 0.7469 | 0.3592 |
| T2 | 300 - 280 | 25.859 | 24 | 0.7354 | 0.3097 |
| T3 | 280 - 260 | 22.757 | 24 | 0.7041 | 0.2728 |
| T4 | 260 - 240 | 19.773 | 24 | 0.6716 | 0.2534 |
| T5 | 240 - 220 | 16.942 | 24 | 0.6270 | 0.2307 |
| T6 | 220 - 200 | 14.343 | 24 | 0.5717 | 0.2139 |
| T7 | 200 - 180 | 11.993 | 24 | 0.5075 | 0.1988 |
| T8 | 180 - 160 | 9.839 | 24 | 0.4665 | 0.1818 |
| T9 | 160 - 140 | 7.880 | 24 | 0.4207 | 0.1680 |
| T10 | 140 - 120 | 6.098 | 24 | 0.3712 | 0.1529 |
| T11 | 120 - 100 | 4.521 | 24 | 0.3189 | 0.1369 |
| T12 | 100 - 80 | 3.170 | 24 | 0.2685 | 0.1086 |
| T13 | 80 - 60 | 2.067 | 24 | 0.2170 | 0.0882 |
| T14 | 60 - 30 | 1.214 | 19 | 0.1577 | 0.0685 |
| T15 | 30 - 0 | 0.380 | 19 | 0.0709 | 0.0342 |

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

## Critical Deflections and Radius of Curvature - Design Wind

| Elevation ft | Appurtenance | Gov. Load Comb. | Deflection in | Tilt ° | Twist ° | Radius of Curvature ft |
|---|---|---|---|---|---|---|
| 320.00 | Dual Lights | 24 | 29.042 | 0.7469 | 0.3592 | 209105 |
| 318.00 | PD128 | 24 | 28.722 | 0.7463 | 0.3540 | 209105 |
| 315.00 | 8 FT DISH | 24 | 28.242 | 0.7453 | 0.3464 | 209105 |
| 308.00 | 6 FT DISH | 24 | 27.126 | 0.7421 | 0.3287 | 87127 |
| 294.00 | DB224 | 24 | 24.917 | 0.7274 | 0.2967 | 47942 |
| 292.00 | PD320 | 24 | 24.606 | 0.7244 | 0.2926 | 46652 |
| 285.00 | (2) DB809 | 24 | 23.522 | 0.7126 | 0.2800 | 42639 |
| 280.00 | BCD-80609 | 24 | 22.757 | 0.7041 | 0.2728 | 40313 |
| 275.00 | (2) OGT9 | 24 | 21.999 | 0.6961 | 0.2670 | 38747 |
| 257.00 | PD440 | 24 | 19.337 | 0.6658 | 0.2502 | 31213 |
| 243.00 | PD128 | 24 | 17.354 | 0.6343 | 0.2339 | 20850 |
| 227.00 | PD320 | 24 | 15.223 | 0.5928 | 0.2191 | 18367 |
| 220.00 | Mounting Frame | 24 | 14.343 | 0.5717 | 0.2139 | 18168 |
| 200.00 | PiROD 12' Lightweight T-Frame | 24 | 11.993 | 0.5075 | 0.1988 | 26754 |
| 174.00 | DB583 | 24 | 9.232 | 0.4538 | 0.1774 | 24787 |
| 170.00 | DB-630 | 24 | 8.837 | 0.4447 | 0.1747 | 26044 |
| 166.00 | DB586-Y | 24 | 8.449 | 0.4352 | 0.1721 | 27435 |
| 140.00 | PD688S-4 | 24 | 6.098 | 0.3712 | 0.1529 | 22680 |
| 138.00 | PD156S | 24 | 5.930 | 0.3660 | 0.1515 | 22447 |
| 112.00 | 4 FT DISH | 24 | 3.953 | 0.2985 | 0.1261 | 20487 |
| 105.00 | 6 FT DISH | 24 | 3.486 | 0.2810 | 0.1156 | 19491 |
| 100.00 | PD458 | 24 | 3.170 | 0.2685 | 0.1086 | 18962 |
| 97.00 | 6 FT DISH | 24 | 2.989 | 0.2611 | 0.1048 | 18911 |
| 90.00 | 4 FT DISH | 24 | 2.587 | 0.2435 | 0.0974 | 19058 |

## 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 | 320 | Leg | A325N | 1.0000 | 6 | 2.45 | 34.56 | 0.071 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.6250 | 1 | 4.31 | 6.12 | 0.704 ✓ | 1.333 | Member Bearing |
| T2 | 300 | Leg | A325N | 1.0000 | 8 | 5.34 | 34.56 | 0.154 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.6250 | 1 | 5.02 | 8.16 | 0.615 ✓ | 1.333 | Member Bearing |
| T3 | 280 | Leg | A325N | 1.0000 | 8 | 9.50 | 34.56 | 0.275 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.7500 | 1 | 7.80 | 9.06 | 0.861 ✓ | 1.333 | Member Bearing |
| T4 | 260 | Leg | A325N | 1.0000 | 8 | 14.17 | 34.56 | 0.410 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.7500 | 1 | 9.41 | 10.16 | 0.927 ✓ | 1.333 | Member Bearing |
| T5 | 240 | Leg | A325N | 1.0000 | 8 | 19.06 | 34.56 | 0.551 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.7500 | 1 | 11.52 | 12.70 | 0.907 ✓ | 1.333 | Member Bearing |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| T6 | 220 | Leg | A325N | 1.0000 | 12 | 16.10 | 34.56 | 0.466 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.7500 | 1 | 15.95 | 13.25 | 1.203 ✓ | 1.333 | Bolt Shear |
| T7 | 200 | Leg | A325N | 1.0000 | 12 | 20.16 | 34.56 | 0.583 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.8750 | 1 | 18.45 | 18.04 | 1.023 ✓ | 1.333 | Bolt Shear |
| T8 | 180 | Leg | A325N | 1.0000 | 12 | 24.33 | 34.56 | 0.704 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.8750 | 1 | 20.23 | 18.04 | 1.121 ✓ | 1.333 | Bolt Shear |
| T9 | 160 | Leg | A325N | 1.0000 | 12 | 28.63 | 34.56 | 0.829 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.8750 | 1 | 22.92 | 18.04 | 1.270 ✓ | 1.333 | Bolt Shear |
| T10 | 140 | Leg | A325N | 1.0000 | 12 | 32.75 | 34.56 | 0.948 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.8750 | 1 | 23.56 | 18.04 | 1.306 ✓ | 1.333 | Bolt Shear |
| T11 | 120 | Leg | A325N | 1.0000 | 12 | 33.35 | 34.55 | 0.965 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.7500 | 3 | 12.12 | 13.25 | 0.915 ✓ | 1.333 | Bolt Shear |
| | | Horizontal | A325X | 0.7500 | 2 | 9.85 | 13.25 | 0.743 ✓ | 1.333 | Bolt Shear |
| T12 | 100 | Leg | A325N | 1.0000 | 16 | 27.33 | 34.56 | 0.791 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.7500 | 3 | 13.23 | 13.25 | 0.998 ✓ | 1.333 | Bolt Shear |
| | | Horizontal | A325X | 0.7500 | 2 | 11.54 | 13.25 | 0.871 ✓ | 1.333 | Bolt Shear |
| T13 | 80 | Leg | A325N | 1.0000 | 16 | 29.86 | 34.55 | 0.864 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.7500 | 3 | 12.97 | 13.25 | 0.978 ✓ | 1.333 | Bolt Shear |
| | | Horizontal | A325X | 0.7500 | 2 | 11.62 | 13.25 | 0.877 ✓ | 1.333 | Bolt Shear |
| T14 | 60 | Leg | A325N | 1.0000 | 16 | 31.69 | 34.55 | 0.917 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.8750 | 3 | 18.34 | 18.04 | 1.016 ✓ | 1.333 | Bolt Shear |
| | | Horizontal | A325X | 0.7500 | 2 | 13.29 | 13.25 | 1.003 ✓ | 1.333 | Bolt Shear |
| T15 | 30 | Leg | A325N | 1.0000 | 24 | 23.83 | 34.56 | 0.690 ✓ | 1.333 | Bolt Tension |
| | | Diagonal | A325X | 0.8750 | 3 | 16.72 | 18.04 | 0.927 ✓ | 1.333 | Bolt Shear |
| | | Horizontal | A325X | 0.7500 | 2 | 14.29 | 13.25 | 1.078 ✓ | 1.333 | Bolt Shear |

## 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 | 320 - 300 | ROHN 5 EH | 20.00 | 4.00 | 26.1<br>K=1.00 | 27.622 | 6.1120 | -18.31 | 168.82 | 0.108 ✓ |
| T2 | 300 - 280 | ROHN 6 EH | 20.03 | 5.01 | 27.4<br>K=1.00 | 27.470 | 8.4049 | -49.83 | 230.89 | 0.216 ✓ |
| T3 | 280 - 260 | ROHN 8 EH | 20.04 | 6.68 | 27.9<br>K=1.00 | 27.414 | 12.7627 | -87.99 | 349.88 | 0.251 ✓ |

| 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 | 260 - 240 | ROHN 8 EH | 20.03 | 6.68 | 27.8<br>K=1.00 | 27.415 | 12.7627 | -130.70 | 349.89 | 0.374 ✓ |
| T5 | 240 - 220 | ROHN 8 EH | 20.03 | 6.68 | 27.8<br>K=1.00 | 27.415 | 12.7627 | -176.19 | 349.89 | 0.504 ✓ |
| T6 | 220 - 200 | ROHN 8 EH | 20.03 | 10.02 | 41.8<br>K=1.00 | 25.582 | 12.7627 | -225.24 | 326.50 | 0.690 ✓ |
| T7 | 200 - 180 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.04 | 10.02 | 30.5<br>K=1.00 | 27.087 | 21.7355 | -284.50 | 588.76 | 0.483 ✓ |
| T8 | 180 - 160 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.04 | 10.02 | 30.5<br>K=1.00 | 27.088 | 21.7355 | -344.83 | 588.76 | 0.586 ✓ |
| T9 | 160 - 140 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.03 | 10.02 | 30.5<br>K=1.00 | 27.089 | 21.7355 | -406.75 | 588.79 | 0.691 ✓ |
| T10 | 140 - 120 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.04 | 10.02 | 30.5<br>K=1.00 | 27.087 | 21.7355 | -467.70 | 588.75 | 0.794 ✓ |
| T11 | 120 - 100 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.06 | 10.03 | 30.6<br>K=1.00 | 27.084 | 21.7355 | -481.03 | 588.68 | 0.817 ✓ |
| T12 | 100 - 80 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.05 | 10.03 | 30.5<br>K=1.00 | 27.085 | 21.7355 | -528.97 | 588.70 | 0.899 ✓ |
| T13 | 80 - 60 | ROHN 12 EH | 20.06 | 10.03 | 27.8<br>K=1.00 | 27.425 | 19.2423 | -579.99 | 527.71 | 1.099 ✓ |
| T14 | 60 - 30 | ROHN 12 EH | 30.07 | 10.02 | 27.8<br>K=1.00 | 27.426 | 19.2423 | -631.87 | 527.74 | 1.197 ✓ |
| T15 | 30 - 0 | ROHN 12 EHS | 30.08 | 10.03 | 28.0<br>K=1.00 | 27.392 | 23.8074 | -707.87 | 652.14 | 1.085 ✓ |

## 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 | 320 - 300 | L1 3/4x1 3/4x3/16 | 7.90 | 3.54 | 123.8<br>K=1.00 | 9.724 | 0.6211 | -4.34 | 6.04 | 0.718 ✓ |
| T2 | 300 - 280 | L2x2x1/4 | 9.94 | 4.67 | 143.2<br>K=1.00 | 7.285 | 0.9380 | -5.05 | 6.83 | 0.739 ✓ |
| T3 | 280 - 260 | L2 1/2x2 1/2x1/4 | 12.59 | 5.94 | 145.2<br>K=1.00 | 7.087 | 1.1900 | -7.85 | 8.43 | 0.930 ✓ |
| T4 | 260 - 240 | L3x3x1/4 | 14.38 | 6.83 | 138.5<br>K=1.00 | 7.790 | 1.4400 | -9.51 | 11.22 | 0.848 ✓ |
| T5 | 240 - 220 | L4x4x5/16 | 16.19 | 7.74 | 118.1<br>K=1.01 | 10.713 | 2.4000 | -11.58 | 25.71 | 0.451 ✓ |
| T6 | 220 - 200 | L4x4x3/8 | 19.37 | 9.41 | 143.3<br>K=1.00 | 7.268 | 2.8600 | -15.95 | 20.79 | 0.767 ✓ |
| T7 | 200 - 180 | L4x4x3/8 | 21.20 | 10.07 | 153.4<br>K=1.00 | 6.348 | 2.8600 | -18.45 | 18.16 | 1.016 ✓ |
| T8 | 180 - 160 | L4x4x1/2 | 23.06 | 11.01 | 168.9<br>K=1.00 | 5.236 | 3.7500 | -20.23 | 19.63 | 1.030 ✓ |
| T9 | 160 - 140 | L5x5x3/8 | 24.84 | 11.87 | 143.9<br>K=1.00 | 7.208 | 3.6100 | -22.92 | 26.02 | 0.881 ✓ |
| T10 | 140 - 120 | L5x5x3/8 | 26.78 | 12.89 | 156.2<br>K=1.00 | 6.118 | 3.6100 | -23.56 | 22.08 | 1.067 ✓ |

| 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 3 EH | 24.42 | 12.21 | 122.5<br>K=0.95 | 9.956 | 3.0159 | -36.37 | 30.03 | 1.211 ✓ |
| T12 | 100 - 80 | P3.5x.318 | 25.15 | 12.58 | 109.7<br>K=0.95 | 12.404 | 3.6784 | -39.68 | 45.63 | 0.870 ✓ |
| T13 | 80 - 60 | P3.5x.318 | 25.98 | 12.99 | 113.4<br>K=0.95 | 11.623 | 3.6784 | -38.90 | 42.75 | 0.910 ✓ |
| T14 | 60 - 30 | ROHN 3.5 EH | 35.21 | 11.74 | 107.8<br>K=1.00 | 12.854 | 3.6784 | -55.01 | 47.28 | 1.163 ✓ |
| T15 | 30 - 0 | ROHN 3.5 EH | 36.27 | 12.09 | 111.0<br>K=1.00 | 12.116 | 3.6784 | -50.17 | 44.57 | 1.126 ✓ |

## Horizontal 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 3 STD | 25.39 | 12.11 | 124.9<br>K=1.00 | 9.572 | 2.2285 | -19.70 | 21.33 | 0.924 ✓ |
| T12 | 100 - 80 | P3.5x.318 | 27.97 | 13.40 | 123.1<br>K=1.00 | 9.859 | 3.6784 | -23.08 | 36.26 | 0.636 ✓ |
| T13 | 80 - 60 | ROHN 3 EH | 30.47 | 14.65 | 154.7<br>K=1.00 | 6.238 | 3.0159 | -23.25 | 18.81 | 1.236 ✓ |
| T14 | 60 - 30 | ROHN 3.5 EH | 33.14 | 16.04 | 147.3<br>K=1.00 | 6.883 | 3.6784 | -26.58 | 25.32 | 1.050 ✓ |
| T15 | 30 - 0 | ROHN 4 STD | 36.80 | 17.87 | 142.0<br>K=1.00 | 7.401 | 3.1741 | -28.57 | 23.49 | 1.216 ✓ |

## 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 | 320 - 300 | L1 3/4x1 3/4x3/16 | 6.81 | 6.35 | 182.6<br>K=0.82 | 4.480 | 0.6211 | -0.10 | 2.78 | 0.034 ✓ |
| T2 | 300 - 280 | L2x2x1/4 | 6.81 | 6.35 | 166.0<br>K=0.85 | 5.420 | 0.9380 | -0.04 | 5.08 | 0.008 ✓ |

## Redundant Horizontal (1) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 1.5 STD | 6.35 | 5.76 | 111.1<br>K=1.00 | 12.101 | 0.7995 | -8.35 | 9.67 | 0.863 ✓ |

| 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T12 | 100 - 80 | ROHN 1.5 STD | 6.99 | 6.41 | 123.5<br>K=1.00 | 9.788 | 0.7995 | -9.18 | 7.82 | 1.173 ✓ |
| T13 | 80 - 60 | ROHN 2 STD | 7.62 | 7.09 | 108.0<br>K=1.00 | 12.795 | 1.0745 | -10.07 | 13.75 | 0.732 ✓ |
| T14 | 60 - 30 | ROHN 1.5 STD | 5.52 | 4.99 | 96.2<br>K=1.00 | 15.570 | 0.7995 | -10.96 | 12.45 | 0.881 ✓ |
| T15 | 30 - 0 | ROHN 1.5 STD | 6.13 | 5.60 | 108.0<br>K=1.00 | 12.809 | 0.7995 | -12.29 | 10.24 | 1.200 ✓ |

## Redundant Horizontal (2) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T14 | 60 - 30 | P2.5x.276 | 11.05 | 10.52 | 136.6<br>K=1.00 | 8.008 | 2.2535 | -10.96 | 18.05 | 0.608 ✓ |
| T15 | 30 - 0 | ROHN 2.5 EH | 12.27 | 11.74 | 152.4<br>K=1.00 | 6.430 | 2.2535 | -12.29 | 14.49 | 0.848 ✓ |

## Redundant Diagonal (1) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 2 STD | 11.52 | 10.34 | 157.6<br>K=1.00 | 6.009 | 1.0745 | -7.57 | 6.46 | 1.173 ✓ |
| T12 | 100 - 80 | ROHN 2 STD | 11.86 | 10.77 | 164.3<br>K=1.00 | 5.534 | 1.0745 | -7.79 | 5.95 | 1.309 ✓ |
| T13 | 80 - 60 | P2.5x.276 | 12.18 | 11.16 | 145.0<br>K=1.00 | 7.107 | 2.2535 | -8.05 | 16.02 | 0.503 ✓ |
| T14 | 60 - 30 | P2.5x.276 | 11.15 | 9.95 | 129.2<br>K=1.00 | 8.953 | 2.2535 | -11.06 | 20.18 | 0.548 ✓ |
| T15 | 30 - 0 | ROHN 2.5 STD | 11.41 | 10.31 | 130.6<br>K=1.00 | 8.759 | 1.7040 | -11.43 | 14.93 | 0.766 ✓ |

## Redundant Diagonal (2) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T14 | 60 - 30 | ROHN 2.5 STD | 14.46 | 13.72 | 173.8<br>K=1.00 | 4.943 | 1.7040 | -7.18 | 8.42 | 0.852 ✓ |
| T15 | 30 - 0 | ROHN 2.5 STD | 15.33 | 14.63 | 185.3<br>K=1.00 | 4.347 | 1.7040 | -7.68 | 7.41 | 1.037 ✓ |

| 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|

## Redundant Hip (1) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 1.5 STD | 6.35 | 6.35 | 122.3<br>K=1.00 | 9.977 | 0.7995 | -0.10 | 7.98 | 0.012 ✓ |
| T12 | 100 - 80 | ROHN 1.5 STD | 6.99 | 6.99 | 134.8<br>K=1.00 | 8.221 | 0.7995 | -0.11 | 6.57 | 0.016 ✓ |
| T13 | 80 - 60 | ROHN 1.5 STD | 7.62 | 7.62 | 146.8<br>K=1.00 | 6.928 | 0.7995 | -0.10 | 5.54 | 0.019 ✓ |
| T14 | 60 - 30 | ROHN 1.5 STD | 5.52 | 5.52 | 106.5<br>K=1.00 | 13.175 | 0.7995 | -0.26 | 10.53 | 0.024 ✓ |
| T15 | 30 - 0 | ROHN 1.5 STD | 6.13 | 6.13 | 118.2<br>K=1.00 | 10.686 | 0.7995 | -0.22 | 8.54 | 0.025 ✓ |

## Redundant Hip (2) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T14 | 60 - 30 | ROHN 2 STD | 11.05 | 11.05 | 168.4<br>K=1.00 | 5.265 | 1.0745 | -0.09 | 5.66 | 0.016 ✓ |
| T15 | 30 - 0 | ROHN 2 STD | 12.27 | 12.27 | 187.0<br>K=1.00 | 4.270 | 1.0745 | -0.07 | 4.59 | 0.016 ✓ |

## Redundant Hip 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 2.5 STD | 15.15 | 15.15 | 191.9<br>K=1.00 | 4.054 | 1.7040 | -0.11 | 6.91 | 0.016 ✓ |
| T12 | 100 - 80 | ROHN 2.5 STD | 16.00 | 16.00 | 202.6<br>K=1.00 | 3.637 | 1.7040 | -0.11 | 6.20 | 0.018 ✓ |
| T13 | 80 - 60 | ROHN 3 STD | 16.88 | 16.88 | 174.1<br>K=1.00 | 4.929 | 2.2285 | -0.11 | 10.98 | 0.010 ✓ |
| T14 | 60 - 30 | ROHN 2 STD | 17.91 | 17.91 | 273.1<br>K=1.00 | 2.003 | 1.0745 | -0.13 | 2.15 | 0.063 ✓ |
| T15 | 30 - 0 | KL/R > 250 (C) - 351<br>ROHN 2.5 STD | 19.28 | 19.28 | 244.2<br>K=1.00 | 2.503 | 1.7040 | -0.13 | 4.27 | 0.030 ✓ |

## Inner Bracing 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 3 STD | 12.69 | 12.69 | 130.9 K=1.00 | 8.712 | 2.2285 | -0.04 | 19.41 | 0.002 ✓ |
| T12 | 100 - 80 | ROHN 3 STD | 13.99 | 13.99 | 144.2 K=1.00 | 7.179 | 2.2285 | -0.04 | 16.00 | 0.003 ✓ |
| T13 | 80 - 60 | ROHN 3 STD | 15.24 | 15.24 | 157.1 K=1.00 | 6.049 | 2.2285 | -0.04 | 13.48 | 0.003 ✓ |
| T14 | 60 - 30 | ROHN 3 STD | 16.57 | 16.57 | 170.9 K=1.00 | 5.114 | 2.2285 | -0.06 | 11.40 | 0.005 ✓ |
| T15 | 30 - 0 | ROHN 3 STD | 18.40 | 18.40 | 189.8 K=1.00 | 4.147 | 2.2285 | -0.06 | 9.24 | 0.006 ✓ |

## 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 | 320 - 300 | ROHN 5 EH | 20.00 | 4.00 | 26.1 | 30.000 | 6.1120 | 14.72 | 183.36 | 0.080 ✓ |
| T2 | 300 - 280 | ROHN 6 EH | 20.03 | 5.01 | 27.4 | 30.000 | 8.4049 | 42.69 | 252.15 | 0.169 ✓ |
| T3 | 280 - 260 | ROHN 8 EH | 20.04 | 6.68 | 27.9 | 30.000 | 12.7627 | 75.97 | 382.88 | 0.198 ✓ |
| T4 | 260 - 240 | ROHN 8 EH | 20.03 | 6.68 | 27.8 | 30.000 | 12.7627 | 113.39 | 382.88 | 0.296 ✓ |
| T5 | 240 - 220 | ROHN 8 EH | 20.03 | 6.68 | 27.8 | 30.000 | 12.7627 | 152.45 | 382.88 | 0.398 ✓ |
| T6 | 220 - 200 | ROHN 8 EH | 20.03 | 10.02 | 41.8 | 30.000 | 12.7627 | 193.23 | 382.88 | 0.505 ✓ |
| T7 | 200 - 180 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.04 | 10.02 | 30.5 | 30.000 | 21.7355 | 241.92 | 652.07 | 0.371 ✓ |
| T8 | 180 - 160 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.04 | 10.02 | 30.5 | 30.000 | 21.7355 | 292.02 | 652.07 | 0.448 ✓ |
| T9 | 160 - 140 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.03 | 10.02 | 30.5 | 30.000 | 21.7355 | 343.58 | 652.07 | 0.527 ✓ |
| T10 | 140 - 120 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.04 | 10.02 | 30.5 | 30.000 | 21.7355 | 393.03 | 652.07 | 0.603 ✓ |
| T11 | 120 - 100 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.06 | 10.03 | 30.6 | 30.000 | 21.7355 | 401.07 | 652.07 | 0.615 ✓ |
| T12 | 100 - 80 | ROHN 10EH w/ (3) 2.5x0.75 Plates | 20.05 | 10.03 | 30.5 | 30.000 | 21.7355 | 438.68 | 652.07 | 0.673 ✓ |
| T13 | 80 - 60 | ROHN 12 EH | 20.06 | 10.03 | 27.8 | 30.000 | 19.2423 | 478.74 | 577.27 | 0.829 |

| 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T14 | 60 - 30 | ROHN 12 EH | 30.07 | 10.02 | 27.8 | 30.000 | 19.2423 | 519.14 | 577.27 | 0.899 ✓ |
| T15 | 30 - 0 | ROHN 12 EHS | 30.08 | 10.03 | 28.0 | 30.000 | 23.8074 | 579.36 | 714.22 | 0.811 ✓ |

## 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 | 320 - 300 | L1 3/4x1 3/4x3/16 | 7.90 | 3.54 | 82.2 | 29.000 | 0.3604 | 4.31 | 10.45 | 0.412 ✓ |
| T2 | 300 - 280 | L2x2x1/4 | 9.94 | 4.67 | 94.6 | 29.000 | 0.5629 | 5.02 | 16.32 | 0.307 ✓ |
| T3 | 280 - 260 | L2 1/2x2 1/2x1/4 | 12.59 | 5.94 | 95.0 | 29.000 | 0.7284 | 7.80 | 21.12 | 0.369 ✓ |
| T4 | 260 - 240 | L3x3x1/4 | 14.38 | 6.83 | 90.0 | 32.500 | 0.9159 | 9.41 | 29.77 | 0.316 ✓ |
| T5 | 240 - 220 | L4x4x5/16 | 16.19 | 7.74 | 76.3 | 32.500 | 1.5949 | 11.52 | 51.84 | 0.222 ✓ |
| T6 | 220 - 200 | L4x4x3/8 | 19.37 | 9.41 | 93.3 | 32.500 | 1.8989 | 15.73 | 61.71 | 0.255 ✓ |
| T7 | 200 - 180 | L4x4x3/8 | 21.20 | 10.07 | 99.9 | 32.500 | 1.8637 | 18.25 | 60.57 | 0.301 ✓ |
| T8 | 180 - 160 | L4x4x1/2 | 23.06 | 11.01 | 109.9 | 32.500 | 2.4375 | 20.04 | 79.22 | 0.253 ✓ |
| T9 | 160 - 140 | L5x5x3/8 | 24.84 | 11.87 | 92.6 | 32.500 | 2.4262 | 22.40 | 78.85 | 0.284 ✓ |
| T10 | 140 - 120 | L5x5x3/8 | 26.78 | 12.89 | 100.4 | 32.500 | 2.4262 | 23.16 | 78.85 | 0.294 ✓ |
| T11 | 120 - 100 | ROHN 3 EH | 24.42 | 12.21 | 128.9 | 30.000 | 3.0159 | 34.50 | 90.48 | 0.381 ✓ |
| T12 | 100 - 80 | P3.5x.318 | 25.15 | 12.58 | 115.5 | 30.000 | 3.6784 | 37.36 | 110.35 | 0.339 ✓ |
| T13 | 80 - 60 | P3.5x.318 | 25.98 | 12.99 | 119.3 | 30.000 | 3.6784 | 35.80 | 110.35 | 0.324 ✓ |
| T14 | 60 - 30 | ROHN 3.5 EH | 35.21 | 11.74 | 107.8 | 30.000 | 3.6784 | 51.95 | 110.35 | 0.471 ✓ |
| T15 | 30 - 0 | ROHN 3.5 EH | 36.27 | 12.09 | 111.0 | 30.000 | 3.6784 | 48.61 | 110.35 | 0.441 ✓ |

## Horizontal 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|

| 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 3 STD | 25.39 | 12.11 | 124.9 | 30.000 | 2.2285 | 19.49 | 66.85 | 0.291 ✓ |
| T12 | 100 - 80 | P3.5x.318 | 27.97 | 13.40 | 123.1 | 30.000 | 3.6784 | 21.85 | 110.35 | 0.198 ✓ |
| T13 | 80 - 60 | ROHN 3 EH | 30.47 | 14.65 | 154.7 | 30.000 | 3.0159 | 21.87 | 90.48 | 0.242 ✓ |
| T14 | 60 - 30 | ROHN 3.5 EH | 33.14 | 16.04 | 147.3 | 30.000 | 3.6784 | 25.64 | 110.35 | 0.232 ✓ |
| T15 | 30 - 0 | ROHN 4 STD | 36.80 | 17.87 | 142.0 | 30.000 | 3.1741 | 26.04 | 95.22 | 0.273 ✓ |

## 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 | 320 - 300 | L1 3/4x1 3/4x3/16 | 6.81 | 6.35 | 141.8 | 21.600 | 0.6211 | 0.07 | 13.42 | 0.005 ✓ |
| T2 | 300 - 280 | L2x2x1/4 | 6.81 | 6.35 | 125.1 | 21.600 | 0.9380 | 0.02 | 20.26 | 0.001 ✓ |

## Redundant Horizontal (1) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 1.5 STD | 6.35 | 5.76 | 111.1 | 30.000 | 0.7995 | 8.35 | 23.98 | 0.348 ✓ |
| T12 | 100 - 80 | ROHN 1.5 STD | 6.99 | 6.41 | 123.5 | 30.000 | 0.7995 | 9.18 | 23.98 | 0.383 ✓ |
| T13 | 80 - 60 | ROHN 2 STD | 7.62 | 7.09 | 108.0 | 30.000 | 1.0745 | 10.07 | 32.24 | 0.312 ✓ |
| T14 | 60 - 30 | ROHN 1.5 STD | 5.52 | 4.99 | 96.2 | 30.000 | 0.7995 | 10.96 | 23.98 | 0.457 ✓ |
| T15 | 30 - 0 | ROHN 1.5 STD | 6.13 | 5.60 | 108.0 | 30.000 | 0.7995 | 12.29 | 23.98 | 0.512 ✓ |

## Redundant Horizontal (2) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T14 | 60 - 30 | P2.5x.276 | 11.05 | 10.52 | 136.6 | 30.000 | 2.2535 | 10.96 | 67.61 | 0.162 ✓ |

| 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T15 | 30 - 0 | ROHN 2.5 EH | 12.27 | 11.74 | 152.4 | 30.000 | 2.2535 | 12.29 | 67.61 | 0.182 ✓ |

## Redundant Diagonal (1) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 2 STD | 11.52 | 10.34 | 157.6 | 30.000 | 1.0745 | 7.57 | 32.24 | 0.235 ✓ |
| T12 | 100 - 80 | ROHN 2 STD | 11.86 | 10.77 | 164.3 | 30.000 | 1.0745 | 7.79 | 32.24 | 0.242 ✓ |
| T13 | 80 - 60 | P2.5x.276 | 12.18 | 11.16 | 145.0 | 30.000 | 2.2535 | 8.05 | 67.61 | 0.119 ✓ |
| T14 | 60 - 30 | P2.5x.276 | 11.15 | 9.95 | 129.2 | 30.000 | 2.2535 | 11.06 | 67.61 | 0.164 ✓ |
| T15 | 30 - 0 | ROHN 2.5 STD | 11.41 | 10.31 | 130.6 | 30.000 | 1.7040 | 11.43 | 51.12 | 0.224 ✓ |

## Redundant Diagonal (2) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T14 | 60 - 30 | ROHN 2.5 STD | 14.46 | 13.72 | 173.8 | 30.000 | 1.7040 | 7.18 | 51.12 | 0.140 ✓ |
| T15 | 30 - 0 | ROHN 2.5 STD | 15.33 | 14.63 | 185.3 | 30.000 | 1.7040 | 7.68 | 51.12 | 0.150 ✓ |

## Redundant Hip (1) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T14 | 60 - 30 | ROHN 1.5 STD | 5.52 | 5.52 | 106.5 | 30.000 | 0.7995 | 0.02 | 23.98 | 0.001 ✓ |
| T15 | 30 - 0 | ROHN 1.5 STD | 6.13 | 6.13 | 118.2 | 30.000 | 0.7995 | 0.02 | 23.98 | 0.001 ✓ |

## Redundant Hip (2) 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T14 | 60 - 30 | ROHN 2 STD | 11.05 | 11.05 | 168.4 | 30.000 | 1.0745 | 0.02 | 32.24 | 0.001 ✓ |
| T15 | 30 - 0 | ROHN 2 STD | 12.27 | 12.27 | 187.0 | 30.000 | 1.0745 | 0.02 | 32.24 | 0.001 ✓ |

## Redundant Hip 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 2.5 STD | 15.15 | 15.15 | 191.9 | 30.000 | 1.7040 | 0.17 | 51.12 | 0.003 ✓ |
| T12 | 100 - 80 | ROHN 2.5 STD | 16.00 | 16.00 | 202.6 | 30.000 | 1.7040 | 0.17 | 51.12 | 0.003 ✓ |
| T13 | 80 - 60 | ROHN 3 STD | 16.88 | 16.88 | 174.1 | 30.000 | 2.2285 | 0.15 | 66.85 | 0.002 ✓ |
| T14 | 60 - 30 | ROHN 2 STD | 14.10 | 14.10 | 214.9 | 30.000 | 1.0745 | 0.40 | 32.24 | 0.012 ✓ |
| T15 | 30 - 0 | ROHN 2.5 STD | 14.88 | 14.88 | 188.4 | 30.000 | 1.7040 | 0.35 | 51.12 | 0.007 ✓ |

## Inner Bracing 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 $\frac{P}{P_a}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| T11 | 120 - 100 | ROHN 3 STD | 12.69 | 12.69 | 130.9 | 30.000 | 2.2285 | 0.01 | 66.85 | 0.000 ✓ |
| T12 | 100 - 80 | ROHN 3 STD | 13.99 | 13.99 | 144.2 | 30.000 | 2.2285 | 0.01 | 66.85 | 0.000 ✓ |
| T13 | 80 - 60 | ROHN 3 STD | 15.24 | 15.24 | 157.1 | 30.000 | 2.2285 | 0.00 | 66.85 | 0.000 ✓ |
| T14 | 60 - 30 | ROHN 3 STD | 16.57 | 16.57 | 170.9 | 30.000 | 2.2285 | 0.05 | 66.85 | 0.001 ✓ |
| T15 | 30 - 0 | ROHN 3 STD | 18.40 | 18.40 | 189.8 | 30.000 | 2.2285 | 0.03 | 66.85 | 0.000 ✓ |

## Section Capacity Table

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | $SF*P_{allow}$ K | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| T1 | 320 - 300 | Leg | ROHN 5 EH | 2 | -18.31 | 225.04 | 8.1 | Pass |
| T2 | 300 - 280 | Leg | ROHN 6 EH | 38 | -49.83 | 307.77 | 16.2 | Pass |
| T3 | 280 - 260 | Leg | ROHN 8 EH | 68 | -87.99 | 466.39 | 18.9<br>20.6 (b) | Pass |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | SF*$P_{allow}$ K | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| T4 | 260 - 240 | Leg | ROHN 8 EH | 89 | -130.70 | 466.41 | 28.0 | Pass |
| | | | | | | | 30.8 (b) | |
| T5 | 240 - 220 | Leg | ROHN 8 EH | 110 | -176.19 | 466.41 | 37.8 | Pass |
| | | | | | | | 41.4 (b) | |
| T6 | 220 - 200 | Leg | ROHN 8 EH | 131 | -225.24 | 435.22 | 51.8 | Pass |
| T7 | 200 - 180 | Leg | ROHN 10EH w/ (3) 2.5x0.75 Plates | 146 | -284.50 | 784.81 | 36.3 | Pass |
| | | | | | | | 43.8 (b) | |
| T8 | 180 - 160 | Leg | ROHN 10EH w/ (3) 2.5x0.75 Plates | 161 | -344.83 | 784.82 | 43.9 | Pass |
| | | | | | | | 52.8 (b) | |
| T9 | 160 - 140 | Leg | ROHN 10EH w/ (3) 2.5x0.75 Plates | 176 | -406.75 | 784.85 | 51.8 | Pass |
| | | | | | | | 62.2 (b) | |
| T10 | 140 - 120 | Leg | ROHN 10EH w/ (3) 2.5x0.75 Plates | 191 | -467.70 | 784.80 | 59.6 | Pass |
| | | | | | | | 71.1 (b) | |
| T11 | 120 - 100 | Leg | ROHN 10EH w/ (3) 2.5x0.75 Plates | 206 | -481.03 | 784.72 | 61.3 | Pass |
| | | | | | | | 72.4 (b) | |
| T12 | 100 - 80 | Leg | ROHN 10EH w/ (3) 2.5x0.75 Plates | 239 | -528.97 | 784.74 | 67.4 | Pass |
| T13 | 80 - 60 | Leg | ROHN 12 EH | 272 | -579.99 | 703.44 | 82.5 | Pass |
| T14 | 60 - 30 | Leg | ROHN 12 EH | 305 | -631.87 | 703.48 | 89.8 | Pass |
| T15 | 30 - 0 | Leg | ROHN 12 EHS | 356 | -707.87 | 869.31 | 81.4 | Pass |
| T1 | 320 - 300 | Diagonal | L1 3/4x1 3/4x3/16 | 7 | -4.34 | 8.05 | 53.9 | Pass |
| T2 | 300 - 280 | Diagonal | L2x2x1/4 | 46 | -5.05 | 9.11 | 55.4 | Pass |
| T3 | 280 - 260 | Diagonal | L2 1/2x2 1/2x1/4 | 73 | -7.85 | 11.24 | 69.8 | Pass |
| T4 | 260 - 240 | Diagonal | L3x3x1/4 | 94 | -9.51 | 14.95 | 63.6 | Pass |
| | | | | | | | 69.5 (b) | |
| T5 | 240 - 220 | Diagonal | L4x4x5/16 | 115 | -11.58 | 34.27 | 33.8 | Pass |
| | | | | | | | 68.1 (b) | |
| T6 | 220 - 200 | Diagonal | L4x4x3/8 | 136 | -15.95 | 27.71 | 57.6 | Pass |
| | | | | | | | 90.3 (b) | |
| T7 | 200 - 180 | Diagonal | L4x4x3/8 | 151 | -18.45 | 24.20 | 76.2 | Pass |
| | | | | | | | 76.7 (b) | |
| T8 | 180 - 160 | Diagonal | L4x4x1/2 | 166 | -20.23 | 26.17 | 77.3 | Pass |
| | | | | | | | 84.1 (b) | |
| T9 | 160 - 140 | Diagonal | L5x5x3/8 | 178 | -22.92 | 34.69 | 66.1 | Pass |
| | | | | | | | 95.3 (b) | |
| T10 | 140 - 120 | Diagonal | L5x5x3/8 | 193 | -23.56 | 29.44 | 80.0 | Pass |
| | | | | | | | 98.0 (b) | |
| T11 | 120 - 100 | Diagonal | ROHN 3 EH | 209 | -36.37 | 40.02 | 90.9 | Pass |
| T12 | 100 - 80 | Diagonal | P3.5x.318 | 242 | -39.68 | 60.82 | 65.2 | Pass |
| | | | | | | | 74.9 (b) | |
| T13 | 80 - 60 | Diagonal | P3.5x.318 | 275 | -38.90 | 56.99 | 68.3 | Pass |
| | | | | | | | 73.4 (b) | |
| T14 | 60 - 30 | Diagonal | ROHN 3.5 EH | 308 | -55.01 | 63.03 | 87.3 | Pass |
| T15 | 30 - 0 | Diagonal | ROHN 3.5 EH | 359 | -50.17 | 59.41 | 84.4 | Pass |
| T11 | 120 - 100 | Horizontal | ROHN 3 STD | 208 | -19.70 | 28.44 | 69.3 | Pass |
| T12 | 100 - 80 | Horizontal | P3.5x.318 | 241 | -23.08 | 48.34 | 47.7 | Pass |
| | | | | | | | 65.3 (b) | |
| T13 | 80 - 60 | Horizontal | ROHN 3 EH | 274 | -23.25 | 25.08 | 92.7 | Pass |
| T14 | 60 - 30 | Horizontal | ROHN 3.5 EH | 307 | -26.58 | 33.75 | 78.8 | Pass |
| T15 | 30 - 0 | Horizontal | ROHN 4 STD | 358 | -28.57 | 31.31 | 91.2 | Pass |
| T1 | 320 - 300 | Top Girt | L1 3/4x1 3/4x3/16 | 4 | -0.10 | 3.71 | 2.6 | Pass |
| T2 | 300 - 280 | Top Girt | L2x2x1/4 | 40 | -0.04 | 6.78 | 0.6 | Pass |
| T11 | 120 - 100 | Redund Horz 1 Bracing | ROHN 1.5 STD | 213 | -8.35 | 12.90 | 64.7 | Pass |
| T12 | 100 - 80 | Redund Horz 1 Bracing | ROHN 1.5 STD | 246 | -9.18 | 10.43 | 88.0 | Pass |
| T13 | 80 - 60 | Redund Horz 1 Bracing | ROHN 2 STD | 283 | -10.07 | 18.33 | 54.9 | Pass |
| T14 | 60 - 30 | Redund Horz 1 Bracing | ROHN 1.5 STD | 314 | -10.96 | 16.59 | 66.1 | Pass |
| T15 | 30 - 0 | Redund Horz 1 | ROHN 1.5 STD | 365 | -12.29 | 13.65 | 90.0 | Pass |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | $SF*P_{allow}$ K | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| T14 | 60 - 30 | Bracing Redund Horz 2 Bracing | P2.5x.276 | 321 | -10.96 | 24.06 | 45.6 | Pass |
| T15 | 30 - 0 | Redund Horz 2 Bracing | ROHN 2.5 EH | 366 | -12.29 | 19.31 | 63.6 | Pass |
| T11 | 120 - 100 | Redund Diag 1 Bracing | ROHN 2 STD | 214 | -7.57 | 8.61 | 88.0 | Pass |
| T12 | 100 - 80 | Redund Diag 1 Bracing | ROHN 2 STD | 247 | -7.79 | 7.93 | 98.2 | Pass |
| T13 | 80 - 60 | Redund Diag 1 Bracing | P2.5x.276 | 280 | -8.05 | 21.35 | 37.7 | Pass |
| T14 | 60 - 30 | Redund Diag 1 Bracing | P2.5x.276 | 316 | -11.06 | 26.89 | 41.1 | Pass |
| T15 | 30 - 0 | Redund Diag 1 Bracing | ROHN 2.5 STD | 367 | -11.43 | 19.90 | 57.4 | Pass |
| T14 | 60 - 30 | Redund Diag 2 Bracing | ROHN 2.5 STD | 323 | -7.18 | 11.23 | 63.9 | Pass |
| T15 | 30 - 0 | Redund Diag 2 Bracing | ROHN 2.5 STD | 368 | -7.68 | 9.87 | 77.8 | Pass |
| T11 | 120 - 100 | Redund Hip 1 Bracing | ROHN 1.5 STD | 233 | -0.10 | 10.63 | 0.9 | Pass |
| T12 | 100 - 80 | Redund Hip 1 Bracing | ROHN 1.5 STD | 266 | -0.11 | 8.76 | 1.2 | Pass |
| T13 | 80 - 60 | Redund Hip 1 Bracing | ROHN 1.5 STD | 299 | -0.10 | 7.38 | 1.4 | Pass |
| T14 | 60 - 30 | Redund Hip 1 Bracing | ROHN 1.5 STD | 348 | -0.26 | 14.04 | 1.8 | Pass |
| T15 | 30 - 0 | Redund Hip 1 Bracing | ROHN 1.5 STD | 399 | -0.22 | 11.39 | 1.9 | Pass |
| T14 | 60 - 30 | Redund Hip 2 Bracing | ROHN 2 STD | 345 | -0.09 | 7.54 | 1.2 | Pass |
| T15 | 30 - 0 | Redund Hip 2 Bracing | ROHN 2 STD | 396 | -0.07 | 6.12 | 1.2 | Pass |
| T11 | 120 - 100 | Redund Hip Diagonal Bracing | ROHN 2.5 STD | 223 | -0.11 | 9.21 | 1.2 | Pass |
| T12 | 100 - 80 | Redund Hip Diagonal Bracing | ROHN 2.5 STD | 256 | -0.11 | 8.26 | 1.3 | Pass |
| T13 | 80 - 60 | Redund Hip Diagonal Bracing | ROHN 3 STD | 289 | -0.11 | 14.64 | 0.7 | Pass |
| T14 | 60 - 30 | Redund Hip Diagonal Bracing | ROHN 2 STD | 351 | -0.13 | 2.87 | 4.7 | Pass |
| T15 | 30 - 0 | Redund Hip Diagonal Bracing | ROHN 2.5 STD | 402 | -0.13 | 5.69 | 2.3 | Pass |
| T11 | 120 - 100 | Inner Bracing | ROHN 3 STD | 236 | -0.02 | 25.88 | 0.3 | Pass |
| T12 | 100 - 80 | Inner Bracing | ROHN 3 STD | 268 | -0.04 | 21.33 | 0.4 | Pass |
| T13 | 80 - 60 | Inner Bracing | ROHN 3 STD | 302 | -0.01 | 13.48 | 0.4 | Pass |
| T14 | 60 - 30 | Inner Bracing | ROHN 3 STD | 352 | -0.06 | 15.19 | 0.4 | Pass |
| T15 | 30 - 0 | Inner Bracing | ROHN 3 STD | 403 | -0.06 | 12.32 | 0.5 | Pass |
| | | | | | | | Summary | |
| | | | | | | Leg (T14) | 89.8 | Pass |
| | | | | | | Diagonal (T10) | 98.0 | Pass |
| | | | | | | Horizontal (T13) | 92.7 | Pass |
| | | | | | | Top Girt (T1) | 2.6 | Pass |
| | | | | | | Redund Horz 1 Bracing (T15) | 90.0 | Pass |
| | | | | | | Redund | 63.6 | Pass |

| Section No. | Elevation ft | Component Type | Size | Critical Element | P K | SF*$P_{allow}$ K | % Capacity | Pass Fail |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Horz 2 Bracing (T15) | | |
| | | | | | | Redund Diag 1 Bracing (T12) | 98.2 | Pass |
| | | | | | | Redund Diag 2 Bracing (T15) | 77.8 | Pass |
| | | | | | | Redund Hip 1 Bracing (T15) | 1.9 | Pass |
| | | | | | | Redund Hip 2 Bracing (T14) | 1.2 | Pass |
| | | | | | | Redund Hip Diagonal Bracing (T14) | 4.7 | Pass |
| | | | | | | Inner Bracing (T15) | 0.5 | Pass |
| | | | | | | Bolt Checks | 98.0 | Pass |
| | | | | | | **RATING =** | **98.2** | **Pass** |

# ANCHOR BOLT ANALYSIS

# ANCHOR BOLT ANALYSIS

## Input Data

### Max Pier Reactions:

| | | |
|---|---|---|
| Uplift: | Uplift := 633·kips | *user input* |
| Shear: | Shear := 95·kips | *user input* |
| Compression: | Compression := 774·kips | *user input* |

### Anchor Bolt Data:

Use ASTM A354 Grade BC

| | | | |
|---|---|---|---|
| Number of Anchor Bolts = N | N := 24 | *user input* | |
| Bolt Ultimate Strength: | $F_u$ := 125·ksi | *user input* | |
| Bolt Yield Strength: | Fy := 109·ksi | *user input* | |
| Bolt Modulus: | E := 29000·ksi | *user input* | |
| Thickness of Anchor Bolts | D := 1in | *user input* | |
| Threads per Inch: | n := 8 | *user input* | |
| Coefficient of Friction: | μ := 0.55 | *user input* | (for baseplate with grout ASCE 10-97) |

## Anchor Bolt Area:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4}\cdot D^2 \qquad A_g = 0.785\cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4}\cdot\left(D - \frac{0.9743\cdot in}{n}\right)^2 \qquad A_n = 0.606\cdot in^2$$

## Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$AllowableTension := 1.33\cdot\left(0.33\cdot A_g\cdot F_u\right) \qquad AllowableTension = 43.1\cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.33\cdot\left(0.60\cdot A_n\cdot Fy\right) \qquad F_{net.area} = 52.7\cdot kips$$

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 26.4\cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.50$$

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

Condition1 = "OK"

URS

| | | | | | |
|---|---|---|---|---|---|
| Job | 320' Rohn SSVMW - Colchester, CT | Project No. | VZ5-122 (Rev 2) | Page / Sheet | of / 3 of 3 |
| Description | Anchor Bolt Analysis | Computed by | KAB | Date | 07/13/12 |
| | | Checked by | | Date | |

## Check Anchor Bolt Area:

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

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 7.7 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 2.7 \cdot in^2$$

Provided Area:

$$A_{sprovided} := A_n \cdot N \qquad A_{sprovided} = 14.5 \cdot in^2$$

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed"\right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.53$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed"\right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.19$$

Condition3 = "OK"

# FOUNDATION ANALYSIS

URS

| | | | | | |
|---|---|---|---|---|---|
| Job | 320' Rohn SSVMW - Colchester, CT | Project No. | VZ5-122 (Rev 2) | Page | of |
| Description | Evaluation of Drilled Pier Caisson | Computed by | KAB | Sheet 1 | of 3 |
| | | Checked by | | Date 07/13/12 | Date |

3 SIDED SELF SUPPORTING TOWER FOUNDATION DRILLED PIER

| | | | |
|---|---|---|---|
| Compression: | DownLoad := 774·kips | γc := 150pcf | Concrete unit weight |
| Uplift: | uplift := 633·kips | γw := 62.4pcf | Water unit weight |
| Depth Neglected for Skin Friction at the top | Depthunbond := 4·ft | γs := 120pcf | Soil unit weight |
| Drill Caisson length | CasissonLength := 35.5·ft | Pierϕ := 7.5·ft | Pier diameter |
| Water Table Below grade: | Wd := 10·ft | hg := 0.5·ft | Height of Pier Above grade |
| Ave allowable Shear at Depth of 4' to 10' | f1 := 380psf | Per BL Companies Report 9.13.2000 | SoilBearingCapacity := 6.7ksf |
| Ave allowable Shear at Depth of 10' to 35' | f2 := 700psf | | Allowable Bearing Pressure at Depth 35' |

## Loading:

$$TotalDownLoad := DownLoad + \pi \cdot \frac{Pier\phi^2}{4} \cdot [hg \cdot \gamma c + [(\gamma c - \gamma s) \cdot (CasissonLength - hg)]]$$

$$TotalDownLoad = 823.7 \cdot kips$$

$$Pierweight := \pi \cdot \frac{Pier\phi^2}{4} \cdot [(Wd + hg) \cdot \gamma c + (CasissonLength - Wd - hg) \cdot (\gamma c - \gamma w)]$$

$$Pierweight = 166.33 \cdot kips$$

$$Soilshear := \pi \cdot Pier\phi \cdot [f1 \cdot (Wd - Depthunbond) + f2 \cdot (CasissonLength - Wd - hg)]$$

$$Soilshear = 466.06 \cdot kips$$

## Compression Capacity:

$$TotalDownLoadCapacity := Soilshear + SoilBearingCapacity \cdot \left( \pi \cdot \frac{Pier\phi^2}{4} \right)$$

$$TotalDownLoadCapacity = 762.05 \cdot kips$$

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

$$CheckDownLoadCapacity = "No Good"$$

Reinforce Foundation See Below for Calc

$$\frac{TotalDownLoad}{TotalDownLoadCapacity} = 108.1 \cdot \%$$

## Tension Capacity:

TotalUpLiftCapacity := Soilshear + Pierweight

TotalUpLiftCapacity = 632.39·kips

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

CheckUpLiftCapacity = "No Good"

Reinforce Foundation
See Below for Calc

$$\frac{\text{uplift}}{\text{TotalUpLiftCapacity}} = 100.1\cdot\%$$

Check Cone Failure

$$\text{ConeFailureCapacity} := \frac{[(\text{CasissonLength} - \text{hg})\cdot\tan(30\cdot\text{deg})\cdot 2 + \text{Pier}\phi]^2\cdot\pi}{4}\cdot\frac{\text{CasissonLength} - \text{hg}}{3}\cdot\gamma s$$

ConeFailureCapacity = 2524.37·kips

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

CheckConeFailureCapacity = "Okay"

$$\frac{\text{uplift}}{\text{ConeFailureCapacity}} = 25.1\cdot\%$$

## Foundation Modification:

Add Concrete around existing caisson foundations

$L_{modification} := 12ft$

$Depth_{modification} := 4ft$

$$Area_{modification} := L_{modification}^2 - \pi\cdot\frac{Pier\phi^2}{4} \qquad Area_{modification} = 99.82\,ft^2$$

$Weight_{modification} := Area_{modification}\cdot Depth_{modification}\cdot\gamma c$ $\qquad Weight_{modification} = 59.89\cdot kip$

$SoilBearingCapacity_{4ft} := 2ksf$ Soil Bearing Capacity at 4' Below --> Based on Boring Logs

$TotalDownLoad_2 := TotalDownLoad + Weight_{modification}$ $TotalDownLoad_2 = 883.59 \cdot kip$

$TotalDownLoadCapacity_2 := TotalDownLoadCapacity + Area_{modification} \cdot SoilBearingCapacity_{4ft}$

$TotalDownLoadCapacity_2 = 961.69 \cdot kip$

$CheckDownLoadCapacity_2 := if(TotalDownLoad_2 < TotalDownLoadCapacity_2, "Okay", "No Good")$

$CheckDownLoadCapacity_2 = "Okay"$ $\frac{TotalDownLoad_2}{TotalDownLoadCapacity_2} = 91.9 \cdot \%$

$TotalUpLiftCapacity_2 := TotalUpLiftCapacity + Weight_{modification}$

$TotalUpLiftCapacity_2 = 692.28 \cdot kips$

$CheckUpLiftCapacity_2 := if(uplift < TotalUpLiftCapacity_2, "Okay", "No Good")$

$CheckUpLiftCapacity_2 = "Okay"$ $\frac{uplift}{TotalUpLiftCapacity_2} = 91.4 \cdot \%$

## Foundation Modification Reinforcement:

Maximum Shear on Modification

$V_{mod} := SoilBearingCapacity_{4ft} \cdot Area_{modification}$ $V_{mod} = 199.64 \cdot kip$

$A_{vf} := \frac{V_{mod}}{0.44 \cdot 60ksi \cdot 0.6}$ Required area of shear-friction reinforcement per ACI R11.6.4.1

$A_{vf} = 12.6 \cdot in^2$

$\frac{A_{vf}}{.31in^2} = 40.66$ Use 3 rings of 15 #5 bars