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February 4, 2014

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap**
880 Post Road East, Westport, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 160-foot level of the existing 180-foot tower at 880 Post Road East in Westport (the "Property"). The tower and underlying property are owned by the State of Connecticut Department of Emergency Services and Public Protection. The Council approved Cellco's use of the existing tower in 1990. Cellco now intends to replace six (6) of its existing antennas with two (2) model BXA-70063-4CF, 850 MHz antennas; one (1) model BXA-70080-4C, 850 MHz antenna; and three (3) model BXA-171063-12CF, 2100 MHz antennas, all at the same 160-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable inside the monopole.

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 James Marpe, Westport's First Selectman.

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. The replaced antennas and RRHs will be located on Cellco's existing platform at the 160-foot level on the tower.

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

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the modified facility will not increase radio frequency (RF) emissions at the facility to a level at or above the Federal Communications Commission (FCC) safety standard. A cumulative RF emissions calculation for Cellco's modified facility is included in Attachment 2.

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Detailed Structural Analysis and Evaluation included in Attachment 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:
James Marpe, First Selectman
Sandy M. Carter

ATTACHMENT 1

BXA-70063-4CF-EDIN-X

X-Pol | FET Panel | 63° | 13.0 dBd

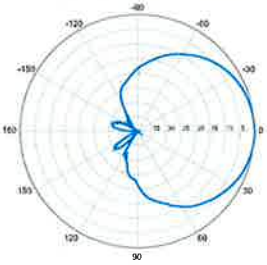
Replace "X" with desired electrical downtilt.

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	17°	15°
Gain	12.5 dBd (14.6 dBi)	13.0 dBd (15.1 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 9, 10, 12, 14	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-16.3 dB	-22.1 dB
Front-to-back ratio (+/-30°)	-36.1 dB	-34.9 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	1205 x 285 x 133 mm	47.4 x 11.2 x 5.2 in
Depth with z-brackets	173 mm	6.8 in
Weight without mounting brackets	4.5 kg	9.9 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.34 m^2 Side: 0.16 m^2	Front: 3.7 ft^2 Side: 1.7 ft^2
Wind load @ 161 km/hr (100 mph)	Front: 498 N Side: 260 N	Front: 111 lbf Side: 55 lbf

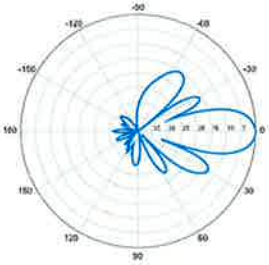
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit	36210006	40-115 mm 1.57-4.5 in	4.1 kg 9 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-4CF-EDIN-X-FP		

BXA-70063-4CF-EDIN-X



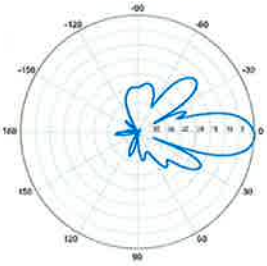
Horizontal | 750 MHz

BXA-70063-4CF-EDIN-0



0° | Vertical | 750 MHz

BXA-70063-4CF-EDIN-2

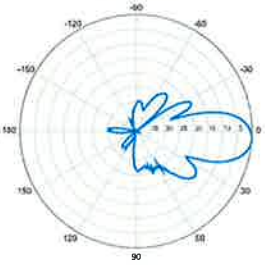


2° | Vertical | 750 MHz

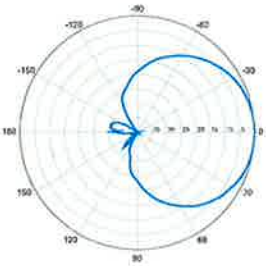
BXA-70063-4CF-EDIN-3

3° | Vertical | 750 MHz

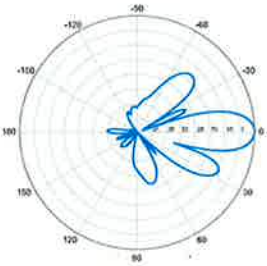
BXA-70063-4CF-EDIN-4



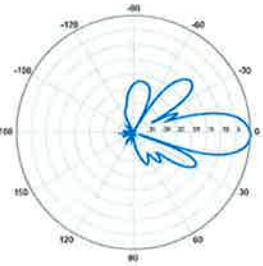
4° | Vertical | 750 MHz



Horizontal | 850 MHz

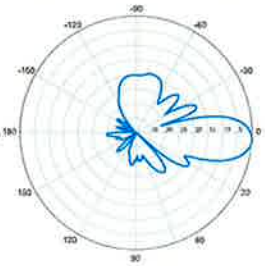


0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

3° | Vertical | 850 MHz

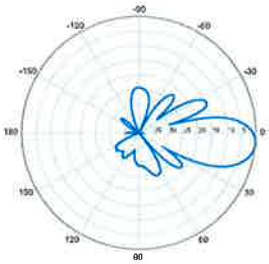


4° | Vertical | 850 MHz

BXA-70063-4CF-EDIN-X

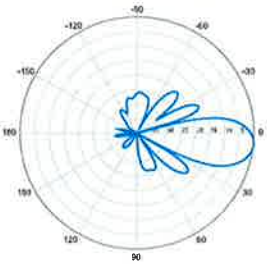
X-Pol | FET Panel | 63° | 13.0 dBd

BXA-70063-4CF-EDIN-5



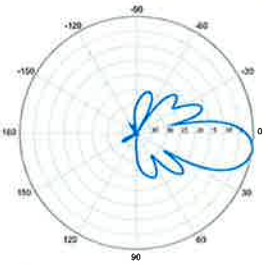
5° | Vertical | 750 MHz

BXA-70063-4CF-EDIN-6



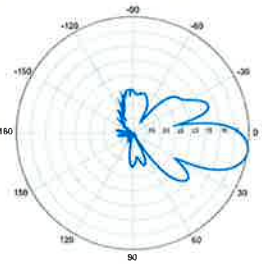
6° | Vertical | 750 MHz

BXA-70063-4CF-EDIN-8



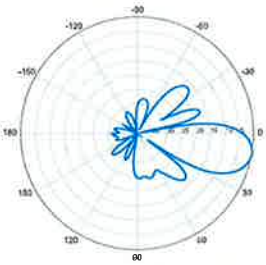
8° | Vertical | 750 MHz

BXA-70063-4CF-EDIN-9

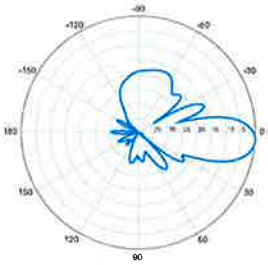


9° | Vertical | 750 MHz

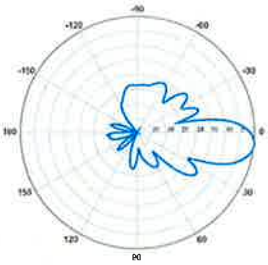
BXA-70063-4CF-EDIN-10



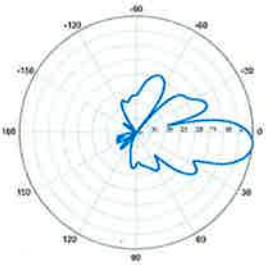
10° | Vertical | 750 MHz



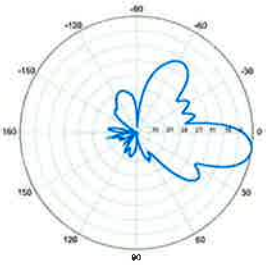
5° | Vertical | 850 MHz



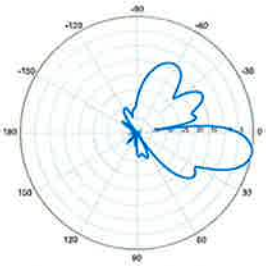
6° | Vertical | 850 MHz



8° | Vertical | 850 MHz

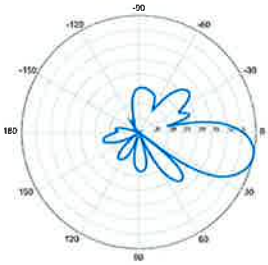


9° | Vertical | 850 MHz



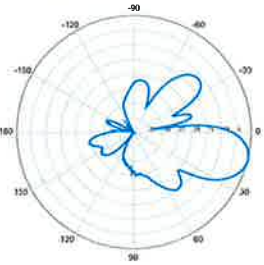
10° | Vertical | 850 MHz

BXA-70063-4CF-EDIN-12

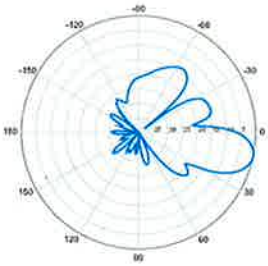


12° | Vertical | 750 MHz

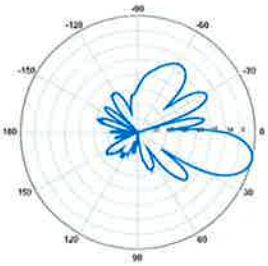
BXA-70063-4CF-EDIN-14



14° | Vertical | 750 MHz



12° | Vertical | 850 MHz



14° | Vertical | 850 MHz

Amphenol ANTENNA SOLUTIONS

BXA-70080-4CF-EDIN-X

X-Pol | FET Panel | 80° | 12.0 dBd

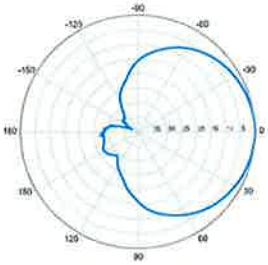
Replace "X" with desired electrical downtilt.

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	82°	80°
Vertical beamwidth	17°	15°
Gain	11.5 dBd (13.6 dBi)	12.0 dBd (14.1 dBi)
Electrical downtilt (X)	0, 2, 4, 6, 8, 10, 12, 14	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-11.8 dB	-13.1 dB
Front-to-back ratio (+/-30°)	-30.3 dB	-36.7 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	1206 x 204 x 151 mm	47.5 x 8.0 x 5.9 in
Depth with z-brackets	196 mm	7.7 in
Weight without mounting brackets	5.4 kg	12 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.25 m² Side: 0.18 m²	Front: 2.6 ft² Side: 1.9 ft²
Wind load @ 161 km/hr (100 mph)	Front: 351 N Side: 280 N	Front: 79 lbf Side: 61 lbf

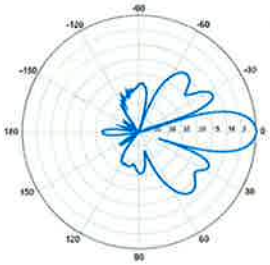
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting & Downtilt Bracket Kit	36210006	40-115 mm 1.57-4.5 in	4.1 kg 9 lbs
Concealment Configurations	For concealment configurations, order BXA-70080-4CF-EDIN-X-FP		

BXA-70080-4CF-EDIN-X



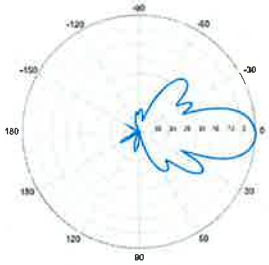
Horizontal | 750 MHz

BXA-70080-4CF-EDIN-0

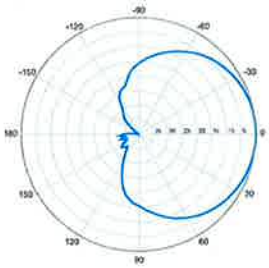


0° | Vertical | 750 MHz

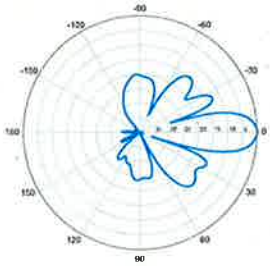
BXA-70080-4CF-EDIN-2



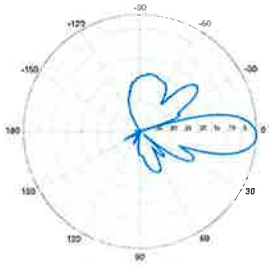
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



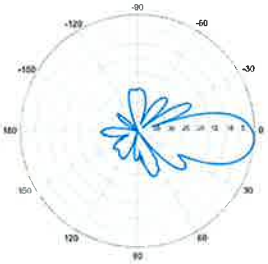
2° | Vertical | 850 MHz

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-70080-4CF-EDIN-X

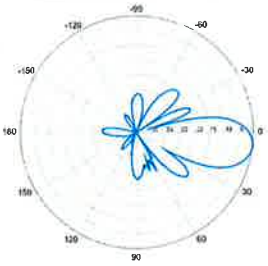
X-Pol | FET Panel | 80° | 12.0 dBd

BXA-70080-4CF-EDIN-4



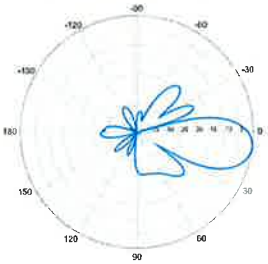
4° | Vertical | 750 MHz

BXA-70080-4CF-EDIN-6

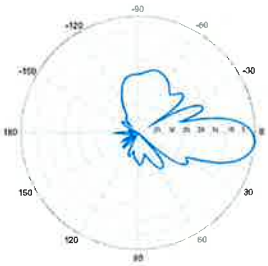


6° | Vertical | 750 MHz

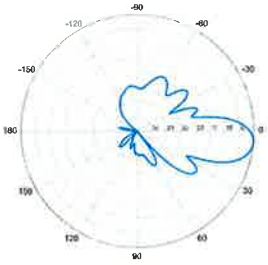
BXA-70080-4CF-EDIN-8



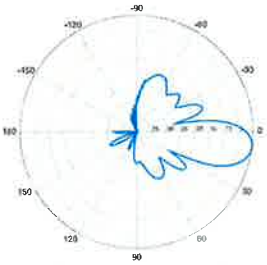
8° | Vertical | 750 MHz



4° | Vertical | 850 MHz

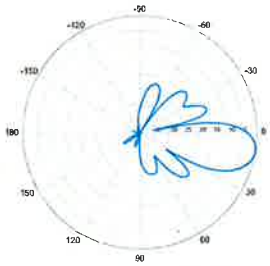


6° | Vertical | 850 MHz



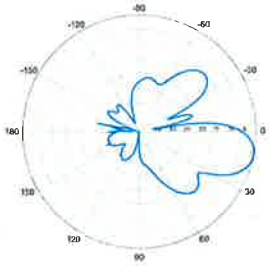
8° | Vertical | 850 MHz

BXA-70080-4CF-EDIN-10



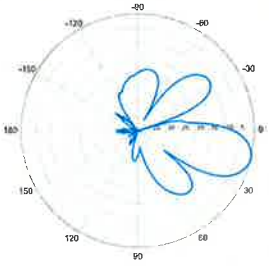
10° | Vertical | 750 MHz

BXA-70080-4CF-EDIN-12

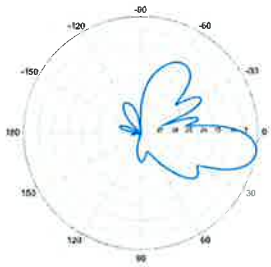


12° | Vertical | 750 MHz

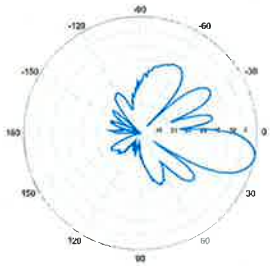
BXA-70080-4CF-EDIN-14



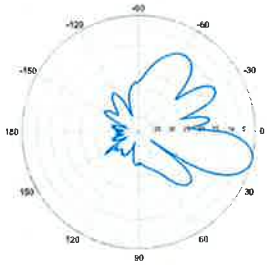
14° | Vertical | 750 MHz



10° | Vertical | 850 MHz



12° | Vertical | 850 MHz



14° | Vertical | 850 MHz

BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

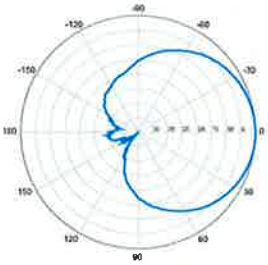
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics	1710-2170 MHz		
Frequency bands	1710-1880 MHz	1850-1990 MHz	1920-2170 MHz
Polarization	±45°	±45°	±45°
Horizontal beamwidth	68°	65°	60°
Vertical beamwidth	4.5°	4.5°	4.5°
Gain	16.1 dBd / 18.2 dBi	16.5 dBd / 18.6 dBi	16.9 dBd / 19.0 dBi
Electrical downtilt (X)	0, 2, 5		
Impedance	50Ω		
VSWR	≤1.5:1		
First upper sidelobe	< -17 dB		
Front-to-back ratio	> 30 dB		
In-band isolation	< -25 dB		
IM3 (20W carrier)	< -150 dBc		
Input power	300 W		
Lightning protection	Direct Ground		
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)		
Operating temperature	-40° to +60° C / -40° to +140° F		
Mechanical Characteristics			
Dimensions Length x Width x Depth	1842 x 154 x 105 mm		72.5 x 6.1 x 4.1 in
Depth with z-brackets	133 mm		5.2 in
Weight without mounting brackets	5.8 kg		12.8 lbs
Survival wind speed	> 201 km/hr		> 125 mph
Wind area	Front: 0.28 m² Side: 0.19 m²		Front: 3.1 ft² Side: 2.1 ft²
Wind load @ 161 km/hr (100 mph)	Front: 460 N Side: 304 N		Front: 103 lbf Side: 68 lbf

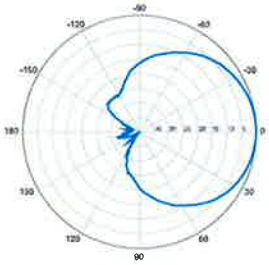
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12CF-EDIN-X-FP		

BXA-171063-12CF-EDIN-X



Horizontal | 1710-1880 MHz

BXA-171063-12CF-EDIN-X



Horizontal | 1850-1990 MHz

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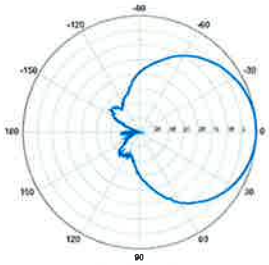
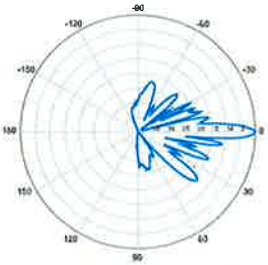


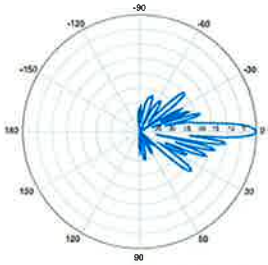
Horizontal | 1920-2170 MHz

BXA-171063-12CF-EDIN-0



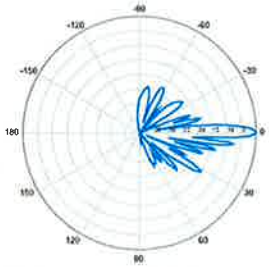
0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-0

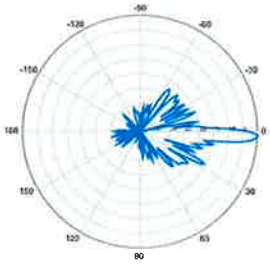


0° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-X

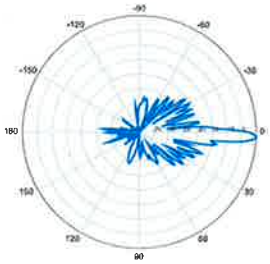
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12CF-EDIN-2



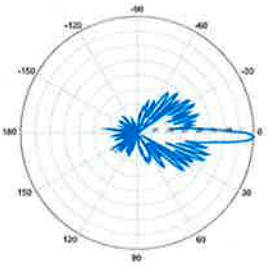
2° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-2



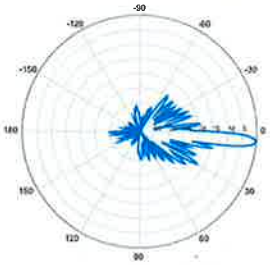
2° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-2



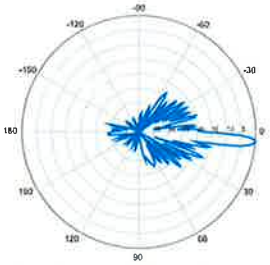
2° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-5



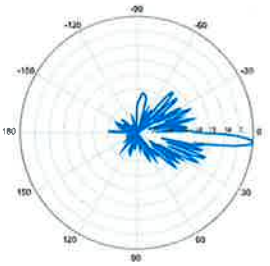
5° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-5



5° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-5

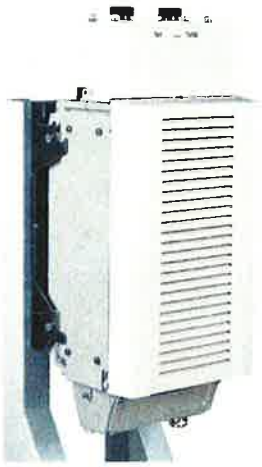


5° | Vertical | 1920-2170 MHz

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

The Alcatel-Lucent RRH2x40-AWS is a high-power, small form-factor Remote Radio Head (RRH) operating in the AWS frequency band (1700/2100MHz - 3GPP Band 4). The Alcatel-Lucent RRH2x40-AWS is designed with an eco-efficient approach, providing operators with the means to achieve high quality and capacity coverage with minimum site requirements.



A distributed eNodeB expands deployment options by using two components, a Base Band Unit (BBU) containing the digital assets and a separate RRH containing the radio-frequency (RF) elements. This modular design optimizes available space and allows the main components of an eNodeB to be installed separately, within the same site or several kilometres apart.

The Alcatel-Lucent RRH2x40-AWS is linked to the BBU by an optical-fiber connection carrying downlink and uplink digital radio signals along with operations, administration and maintenance (OA&M) information. The Alcatel-Lucent RRH2x40-AWS has two transmit RF paths, 40 W RF output power per transmit path, and is designed to manage up to four-way receive diversity. The device is ideally suited to support macro coverage, with multiple-input multiple-output (MIMO) 2x2 operation in up to 20 MHz of bandwidth.

The Alcatel-Lucent RRH2x40-AWS is designed to make available all the benefits of a distributed eNodeB, with excellent RF characteristics, with low capital expenditures (CAPEX) and low operating expenditures (OPEX). The limited space available in some sites may prevent the installation of traditional single-cabinet BTS equipment or require costly cranes to be employed, leaving coverage holes. However, many of these sites can host an Alcatel-Lucent RRH2x40-AWS installation, providing more flexible site selection and improved network quality along with greatly reduced installation time and costs.

Fast, low-cost installation and deployment

The Alcatel-Lucent RRH2x40-AWS is a zero-footprint solution and operates noise-free, simplifying negotiations with site property owners and minimizing environmental impacts. Installation can easily be done by a single person because the Alcatel-Lucent RRH2x40-AWS is compact and weighs less than 20 kg (44 lb), eliminating the need for a crane to hoist the BTS cabinet to the rooftop. A site can be in operation in less than one day — a fraction of the time required for a traditional BTS.

Excellent RF performance

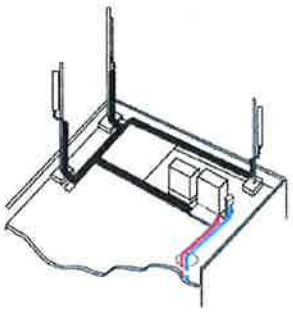
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation costs are reduced or eliminated, and there is no need for a Tower Mounted Amplifier (TMA) because losses introduced by the RF feeder are greatly reduced.
The Alcatel-Lucent RRH2x40-AWS provides more RF power while at the same time consuming less electricity.

Features

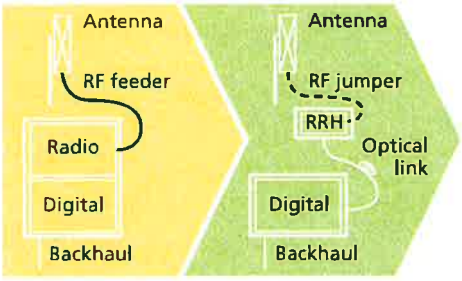
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

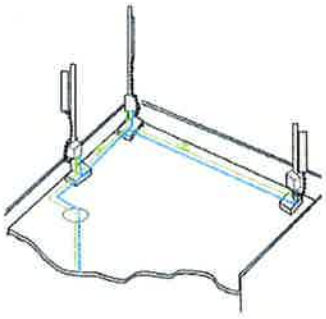
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility to network planning



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

- Height: 620 mm (24.4 in.)
- Width: 270 mm (10.63 in.)
- Depth: 170m (6.7 in.)
- Weight (without mounting kit): less than 20 kg (44 lb)

Power

- Power supply: -48VDC

Operating environment

- Outdoor temperature range:
  - ¬ With solar load: -40°C to +50°C (-40°F to +122°F)
  - ¬ Without solar load: -40°C to +55°C (-40°F to +131°F)
- Passive convection cooling (no fans)
- Enclosure protection
  - ¬ IP65 (International Protection rating)

RF characteristics

- Frequency band: 1700/2100 MHz (AWS); 3GPP Band 4
- Bandwidth: up to 20 MHz
- RF output power at antenna port: 40 W nominal RF power for each Tx port
- Rx diversity: 2-way or 4-way with optional Rx Diversity module
- Noise figure: below 2.0 dB typical
- Antenna Line Device features
  - ¬ TMA and Remote electrical tilt (RET) support via AISG v2.0

Optical characteristics

Type/number of fibers

- Single-mode variant
  - ¬ One Single Mode Single Fiber per RRH2x, carrying UL and DL using CWDM
  - ¬ Single mode dual fiber (SM/DF)
- Multi-mode variant
  - ¬ Two Multi-mode fibers per RRH2x: one carrying UL, the other carrying DL

Optical fiber length

- Up to 500 m (0.31 mi), using MM fiber
- Up to 20 km (12.43 mi), using SM fiber

Digital Ports and Alarms

- Two optical ports to support daisy-chaining
- Six external alarms

Alcatel·Lucent

Product Data Sheet **HB158-1-08U8-S8J18**

HYBRIFLEX™ RRH Hybrid Feeder Cabling Solution, 1-5/8", Single-Mode Fiber

Product Description

RFS' HYBRIFLEX Remote Radio Head (RRH) hybrid feeder cabling solution combines optical fiber and DC power for RRHs in a single lightweight aluminum corrugated cable, making it the world's most innovative solution for RRH deployments.

It was developed to reduce installation complexity and costs at Cellular sites. HYBRIFLEX allows mobile operators deploying an RRH architecture to standardize the RRH installation process and eliminate the need for and cost of cable grounding. HYBRIFLEX combines optical fiber (multi-mode or single-mode) and power in a single corrugated cable. It eliminates the need for junction boxes and can connect multiple RRHs with a single feeder. Standard RFS CELLFLEX® accessories can be used with HYBRIFLEX cable. Both pre-connectorized and on-site options are available.

Figure 1: HYBRIFLEX Series

Features/Benefits

- Aluminum corrugated armor with outstanding bending characteristics – minimizes installation time and enables mechanical protection and shielding
- Same accessories as 1 5/8" coaxial cable
- Outer conductor grounding – Eliminates typical grounding requirements and saves on installation costs
- Lightweight solution and compact design – Decreases tower loading
- Robust cabling – Eliminates need for expensive cable trays and ducts
- Installation of tight bundled fiber optic cable pairs directly to the RRH – Reduces CAPEX and wind load by eliminating need for interconnection
- Optical fiber and power cables housed in single corrugated cable – Saves CAPEX by standardizing RRH cable installation and reducing installation requirements
- Outdoor polyethylene jacket – Ensures long-lasting cable protection

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	.068 (0.295)
DC-Resistance Power Cable, 8.4mm² (8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

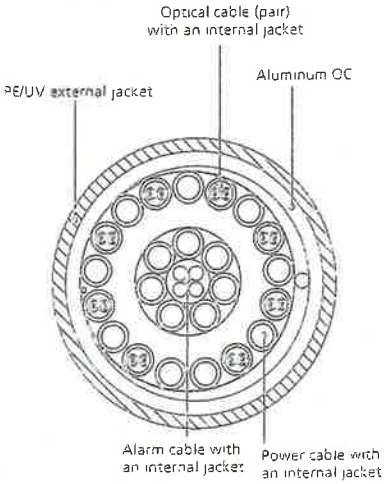


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Westport								
Tower Height: Verizon @ 160ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*AT&T UMTS	1	500	134	0.0100	880	0.5867	1.71%	
*AT&T UMTS	1	500	134	0.0100	1900	1.0000	1.00%	
*AT&T GSM	7	296	134	0.0415	880	0.5867	7.07%	
*AT&T GSM	6	427	134	0.0513	1900	1.0000	5.13%	
*AT&T LTE	1	500	134	0.0100	740	0.4933	2.03%	
*T-Mobile LTE	2	24	125	0.0011	2100	1.0000	0.11%	
*T-Mobile GSM/UMTS	2	12	125	0.0006	1950	1.0000	0.06%	
*T-Mobile UMTS	2	12	125	0.0006	2100	1.0000	0.06%	
*State Police	1	330	180	0.0037	42.04	0.2000	1.83%	
*State Police	1	50.7	169	0.0006	954.4	0.6363	0.10%	
Verizon	**15**	**399**	**160**	**0.0841**	**1970**	**1.0000**	**8.41%**	
Verizon	**9**	**469**	**160**	**0.0593**	**869**	**0.5793**	**10.23%**	
Verizon	**1**	**1750**	**160**	**0.0246**	**2145**	**1.0000**	**2.46%**	
Verizon	**1**	**273**	**160**	**0.0038**	**698**	**0.4653**	**0.82%**	
								41.02%
* Source: Siting Council								

ATTACHMENT 3

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 180' SELF SUPPORTING LATTICE TOWER AND ITS FOUNDATION FOR PROPOSED ANTENNA ARRANGEMENT

Site: Connecticut State Police Tower # 32
Address: 880 Post Road East
Westport, Connecticut

prepared for

verizonwireless

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

URS

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

36917420.00000
VZ5-171

November 20, 2013

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the 180' self-supporting lattice tower located at 880 Post Road East in Westport, Connecticut. The analysis was conducted in accordance with the 2005 Connecticut State Building Code, the TIA/EIA-222-F standard and additional requirements of the Connecticut State Police for wind velocity of 90 mph concurrent with ½" ice design wind load. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Analysis Methodology and Loading Condition Section of this report. The proposed Verizon modification is as follows:

Antenna and Mount	Carrier	Antenna Center Elevation
Remove: (2) Andrew DB844H90-XY Panel Antennas (Alpha Sector) (4) Andrew DB844G65ZA-XY Panel Antennas (Beta and Gamma Sectors)	**Verizon (existing)**	**@ 160'**
Install: **(1) Amphenol BXA 70080-4CF Panel Antennas (Alpha Sector)** **(2) Amphenol 70063-4CF Panel Antennas (Beta and Gamma Sectors)** **(3) Amphenol BXA171063-12CF Panel Antennas** **(3) AWS RRH Units** **(1) Raycap DB-T1-6Z-8AB-0Z Distribution Box** **(1) 1 5/8" Fiber Optic Cable**	**Verizon (proposed)**	**@ 160'**

The results of the analysis indicate that the tower structure has sufficient capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate for the proposed antenna loading with the wind load classification specified above.**

The tower deflection (sway) is 0.4537 degrees, and the tower rotation (twist) is 0.2140 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. **The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees for deflection (sway) and rotation (twist).**

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) Original tower report prepared by Rohn Industries, Inc., engineering file 26263DL and drawing C910693 dated February 1, 1991.
3) Soil investigation and foundation capacity report prepared by Dr. Clarence Welti, P.E., P.C., dated October 10, 2002.
4) Structural analysis performed by URS Corp., project number VZ5083-36922241, signed and sealed on May 19, 2011.
5) Proposed T-Mobile antenna modification provided by HPC Wireless Services via e-mail dated July 10, 2012.
6) Structural analysis performed by URS Corp., project number SAI-071 / 36922433, signed and sealed on April 2, 2013.
7) Antenna inventory provided by Connecticut State Police via email dated November 7, 2013.
8) Tower Mapping and Inventory by Northeast Towers Inc., tower climb and report dated October 2, 2013.
9) Antenna and mount configuration as specified on the following page 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 AES

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

2. INTRODUCTION

The subject tower is located at 880 Post Road East in Westport, Connecticut. The structure is a 180' self-supporting lattice tower manufactured by Rohn Industries Incorporated. The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(1) Yagi Antenna	CSP-1 (existing)	Standoff	@ 180'	(1) LDF5-50A
(1) Celwave PA6-65 dish	CSP-42 (existing)	Dish Standoff	@ 177'	(1) EW-63
(2) Scala AP11-850 antenna	CSP-46,47 (existing)	Leg Mount	@ 175'	(2) LDF7-50A
(1) Sinclair SC479-HF1LDF whip antenna	CSP-56 (existing)	Standoff	@ 170'	(1) LDF7-50A
(3) Sinclair SC479-HF1LDF whip antenna (inverted) (1) TX/RX TTA	CSP-57-60 (existing)	Standoff	@ 170'	(3) LDF7-50A (1) LDF4-50A
(1) Andrew HP6-65H dish	Verizon (existing)	Dish Standoff	@ 170'	(1) EW-65
(1) Yagi Antenna	CSP-22 (existing)	Leg Mount	@ 167'	(1) LDF5-50A
(1) 8' Panel	Unknown (existing)	Mounted to Tower Face	@ 167'	(2) LDF7-50A
(2) Scala OGT9-806 inverted whips	CSP-48,49 (existing)	Standoff	@ 160'	(2) LDF7-50A
(1) Decibel DB536 whip	CSP-45 (future)	Standoff	@ 160'	(1) LDF4-50A
(1) Amphenol BXA 70080-4CF Panel Antennas (Alpha Sector) **(2) Amphenol 70063-4CF Panel Antennas (Beta and Gamma Sectors)** **(3) Amphenol BXA171063-12CF Panel Antennas** **(3) AWS RRH Units** **(1) Raycap DB-T1-6Z-8AB-0Z Distribution Box**	**Verizon (Proposed)**	(3) 15' T-Frames	**@ 160'**	(12) LDF7-50A **(1) 1 5/8" Fiber**
(3) P65-15-XL-2 (3) MG D3-800T0 (6) Diplexers	Verizon (existing)	*See Above Mount*	@ 160'	*See Above Cables*
(9) Powerwave P65-16-XLH-RR antenna (6) Ericsson RRUS11 Dual PA RRU (6) Powerwave TMA (1) Raycap Surge Suppressor	AT&T (existing)	(3) 15' T-Frames	@ 133'	(12) LDF6-50A (1) 3/8" Fiber (2) 5/8" DC Cables
(9) TMAs (1) GPS (6) Ericsson Air 21 antennas	T-Mobile (existing)	Leg Mount	@ 125'	(18) LDF7-50A (1) LDF4-50A (1) Huber Suhner Hybrid cable
(1) Telewave VHF150 Dipole Antenna	CSP-44 (existing)	Leg Mount	@ 111'	(1) LDF4-50A
(1) GPS Antenna	Unknown (existing)	Leg Mount	@ 61'	(1) LDF4-50A

2. INTRODUCTION *(continued)*

This structural analysis of the communications tower was performed by URS Corporation, AES (URS) for Verizon. The purpose of this analysis was to analyze the existing tower for its existing and proposed antenna loads. This analysis was conducted to evaluate twist (rotation), sway (deflection) and 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

The combined axial and bending stresses on the tower structure were evaluated to compare with the allowable stress in accordance with AISC. The results of the analysis indicate that the calculated stresses under the proposed loading, are below the allowable stresses for the tower structure. The foundation reactions were below the allowable values in the foundation capacity report. The anchor bolts under the proposed loading were found to be within the allowable limits. The tower deflection does not exceed the Connecticut State Police specification of 0.75 degrees for deflection (sway) and rotation (twist).

Tower Base Reactions:

Description	Original	Revised Reactions (Geotech 10/10/2002)	Current	Stress (% capacity)	Pass/ Fail
Pier Compression (kips)	319.9	374	294	78.7	Pass
Pier Uplift (kips)	276.7	324	250	77.2	Pass
Overall Overturning (kip-ft)	7010.3	---	6533	---	---
Overall Shear (kips)	61.5	---	62	---	---
Shear per Leg (kips)	41.0	48	37	77.1	Pass

Tower Component Stress vs. Capacity Summary:

Component / (Section No.)	Controlling Component/ Elevation	Stress (% capacity)	Pass/ Fail	Comments:
Tower Leg (T12)	ROHN 8 EHS / 20'-30'	74.6	Pass	
Diagonal (T6)	ROHN 2.5 EH / 100'-120'	81.8	Pass	
Horizontal (T11)	ROHN 2.5 STD / 30'-40'	62.2	Pass	
Top Girt (T12)	ROHN 2.5 STD / 20'-30'	70.9	Pass	
Redund Horz 1 Bracing (T13)	ROHN 1.5 STD / 0'-20'	25.8	Pass	
Redund Diag 1 Bracing (T13)	ROHN 1.5 STD / 0'-20'	72.4	Pass	
Redund Hip 1 Bracing (T13)	ROHN 2.5 STD / 0'-20'	0.1	Pass	
Inner Bracing (T5)	L2x2x1/8 / 120'-126.667'	4.9	Pass	
Anchor Bolts	1" Dia. / Tension	50	Pass	Min area per ASCE @ 50%

Tower Twist & Sway at Top:

Description	Current	Total Allowable
Tower Twist (degrees)	0.2140	
Tower Sway (degrees)	0.4537	
Total Deflection (degrees)	0.6677	0.75

5. CONCLUSIONS

The results of the analysis indicate that the tower superstructure steel stresses are within the allowable limits. Also, the loading to the tower foundation is less than the design reactions utilized in the *Evaluation of Existing Foundation for Increased Design Loads*, prepared by Dr. Clarence Welti, P.E., P.C, signed and sealed October 10, 2002. **Therefore, the overall tower structure and its foundation are deemed structurally adequate for the proposed antenna loading for the wind load classification specified above.**

The tower deflection (sway) is 0.4537 degrees, and the tower rotation (twist) is 0.2140 degrees with a wind velocity of 90 mph concurrent with 0.5" ice. **The tower deflection and rotation are within the Connecticut State Police specification of 0.75 degrees for deflection (sway) and (twist).**

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.

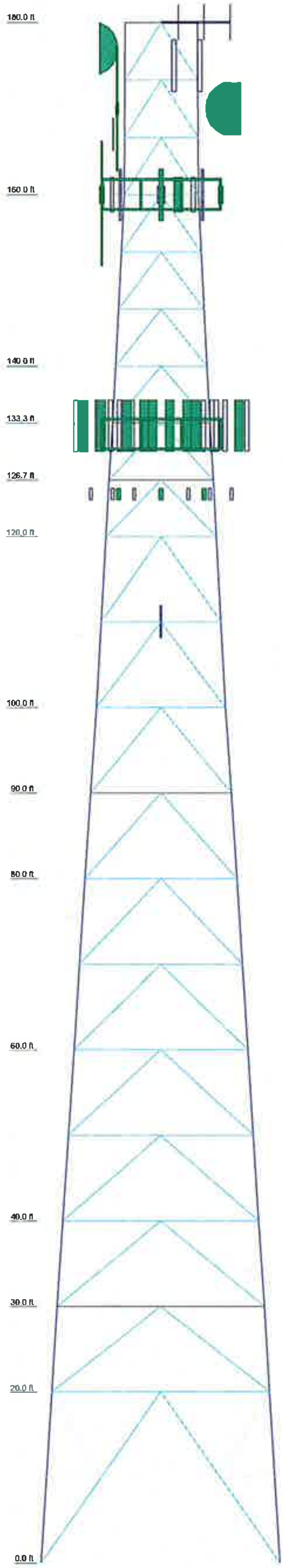
After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

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 condition.

6. DRAWINGS AND DATA

TNX TOWER INPUT / OUPUT SUMMARY

Section	T13	T12	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	ROHN 8 EH	ROHN 8 EHS				ROHN 6 EH		ROHN 6 EHS	ROHN 5 EH			ROHN 4 STD	ROHN 3 STD
Leg Grade	A572-50												
Diagonals	P3.5x.226				ROHN 3 STD			ROHN 2.5 EH	ROHN 2 EH			ROHN 2 STD	
Diagonal Grade	A572-50												
Top Girts	N.A.	ROHN 2.5 STD	N.A.			ROHN 2 STD	N.A.		ROHN 2 STD		N.A.		ROHN 1.5 STD
Horizontals	P3.5x.226	N.A.	ROHN 2.5 STD			N.A.	ROHN 2 STD		N.A.		ROHN 2 STD	ROHN 1.5 STD	
Red. Horizontals	ROHN 1.5 STD	N.A.											
Red. Diagonals	ROHN 1.5 STD	N.A.											
Red. Hips	ROHN 2.5 STD	N.A.											
Inner Bracing	ROHN 2 STD	L3 1/2x3 1/2x1/4			L3x3x3/16	L2 1/2x2 1/2x3/16			L2x2x1/8				
Face Width (ft) 27.677	25.177	23.927	22.677	20.177	17.677	16.2595	15.042	12.792	12.0977	11.4033	10.709	8.625	6.542
# Panels @ (ft)	1 @ 20	10 @ 10							9 @ 6.66667				
Weight (K) 30.5	8.2	2.5	2.4	4.7	4.1	1.7	1.7	3.6	0.8	0.8	0.8	1.5	1.2



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
3' Yagi (CSP-1)	180	RH_2X40-AWS (Verizon)	160
Standoff (CSP)	180	Raycap DC6-48-60-18-8F DC Power Surge Protection (Verizon)	160
Valmont Single Dish Standoff (1) (CSP)	177	Standoff (CSP)	160
PA6-65AC (CSP-42)	177	Standoff (CSP)	160
AP11-850 (CSP-47)	175	(2) RRU (ATT)	133
AP11-850 (CSP-48)	175	P65-16-XLH-RR (ATT)	133
SC479-HF1LDF (CSP-59)	170	P65-16-XLH-RR (ATT)	133
SC479-HF1LDF (CSP-56)	170	P65-16-XLH-RR (ATT)	133
SC479-HF1LDF (CSP-57)	170	TT19-08BP111-001 TMA (ATT)	133
SC479-HF1LDF (CSP-58)	170	TT19-08BP111-001 TMA (ATT)	133
TMA (CSP-60)	170	TT19-08BP111-001 TMA (ATT)	133
Standoff (CSP)	170	P65-16-XLH-RR (ATT)	133
Standoff (CSP)	170	P65-16-XLH-RR (ATT)	133
Valmont Single Dish Standoff (1) (Verizon)	170	P65-16-XLH-RR (ATT)	133
HP6-65 (Verizon)	170	TT19-08BP111-001 TMA (ATT)	133
VHF150 (CSP-22)	167	TT19-08BP111-001 TMA (ATT)	133
Standoff (CSP)	160	TT19-08BP111-001 TMA (ATT)	133
DGT9-606 (CSP-46)	160	Raycap DC6-48-60-18-8F DC Power Surge Protection (ATT)	133
DGT9-606 (CSP-49)	160		
DB636 (CSP-45)	160	P65-16-XLH-RR (ATT)	133
Pirod 15' T-Frame Sector Mount (1) (Verizon)	160	P65-16-XLH-RR (ATT)	133
Pirod 15' T-Frame Sector Mount (1) (Verizon)	160	P65-16-XLH-RR (ATT)	133
Pirod 15' T-Frame Sector Mount (1) (Verizon)	160	(2) RRU (ATT)	133
P65-15-XL-2 (Verizon)	160	(2) RRU (ATT)	133
P65-15-XL-2 (Verizon)	160	Pirod 15' T-Frame Sector Mount (1) (ATT)	132
P65-15-XL-2 (Verizon)	160	Pirod 15' T-Frame Sector Mount (1) (ATT)	132
Rymsa MG D3-800Tx (Verizon)	160	Pirod 15' T-Frame Sector Mount (1) (ATT)	132
Rymsa MG D3-800Tx (Verizon)	160	GPS (GPS)	125
Rymsa MG D3-800Tx (Verizon)	160	Air 21 (T-Mobile)	125
(2) Diplexer (Verizon)	160	Air 21 (T-Mobile)	125
(2) Diplexer (Verizon)	160	Air 21 (T-Mobile)	125
(2) Diplexer (Verizon)	160	(3) TMA (T-Mobile)	125
BXA-171063-12CF-EDIN-X (Verizon)	160	(3) TMA (T-Mobile)	125
BXA-171063-12CF-EDIN-X (Verizon)	160	(3) TMA (T-Mobile)	125
BXA-171063-12CF-EDIN-X (Verizon)	160	Air 21 (T-Mobile)	125
BXA-70080-4CF (Verizon)	160	Air 21 (T-Mobile)	125
BXA-70063-4CF-EDIN-X (Verizon)	160	Air 21 (T-Mobile)	125
BXA-70063-4CF-EDIN-X (Verizon)	160	VHF150 (CSP-44)	110
RH_2X40-AWS (Verizon)	160	4' Standoff (GPS)	60
RH_2X40-AWS (Verizon)	160		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 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 50 mph wind.
4. TOWER RATING: 81.8%

MAX. CORNER REACTIONS AT BASE:
DOWN: 294 K
UPLIFT: -250 K
SHEAR: 37 K

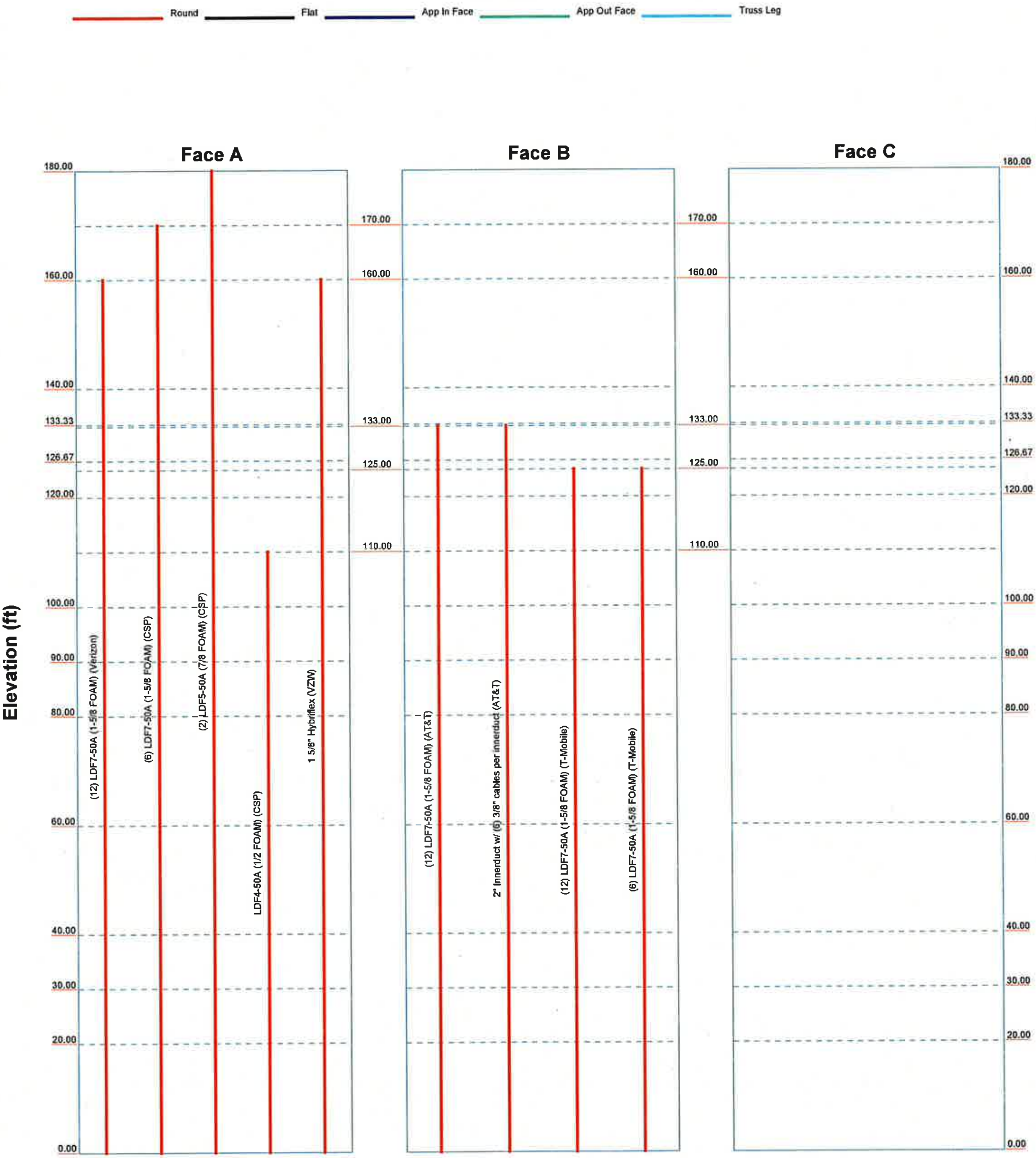
AXIAL 66 K
SHEAR 62 K
MOMENT 6533 kip-ft
TORQUE 40 kip-ft
90 mph WIND - 0.5000 in ICE

AXIAL 43 K
SHEAR 49 K
MOMENT 5162 kip-ft
TORQUE 28 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: ***180' CSP Lattice Tower***
	Project: ***Westport, Connecticut***
	Client: Verizon; Drawn by: Michael Dalickas; App'd:
	Code: TIA/EIA-222-F; Date: 11/20/13; Scale: NTS
	Path: [illegible]; Dwg No. E-1

TNX TOWER FEEDLINE DISTRIBUTION

Feedline Distribution Chart
0' - 180'

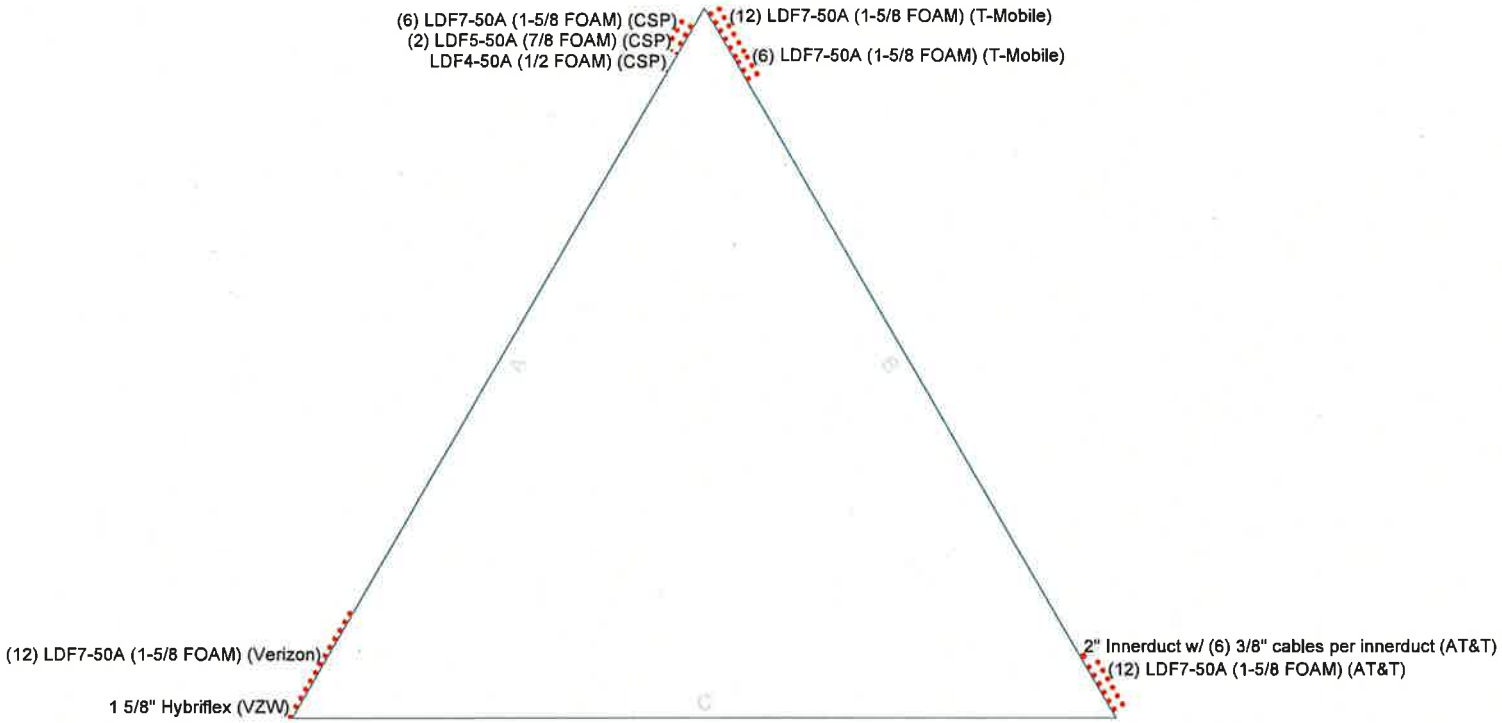


URS Corporation	Job: ***180' CSP Lattice Tower***			
500 Enterprise Drive, Suite 3B	Project: ***Westport, Connecticut***			
Rocky Hill, CT 06067	Client: Verizon	Drawn by: Michael Dalickas	App'd:	
Phone: 860-529-8882	Code: TIA/EIA-222-F	Date: 11/20/13	Scale: NTS	
FAX: 860-529-3991	Path:		Dwg No. E-7	

TNX TOWER FEEDLINE PLAN

Feedline Plan

Round Flat App In Face App Out Face



URS Corporation
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Code: TIA/EIA-222-F	Date: 11/20/13	Scale: NTS	
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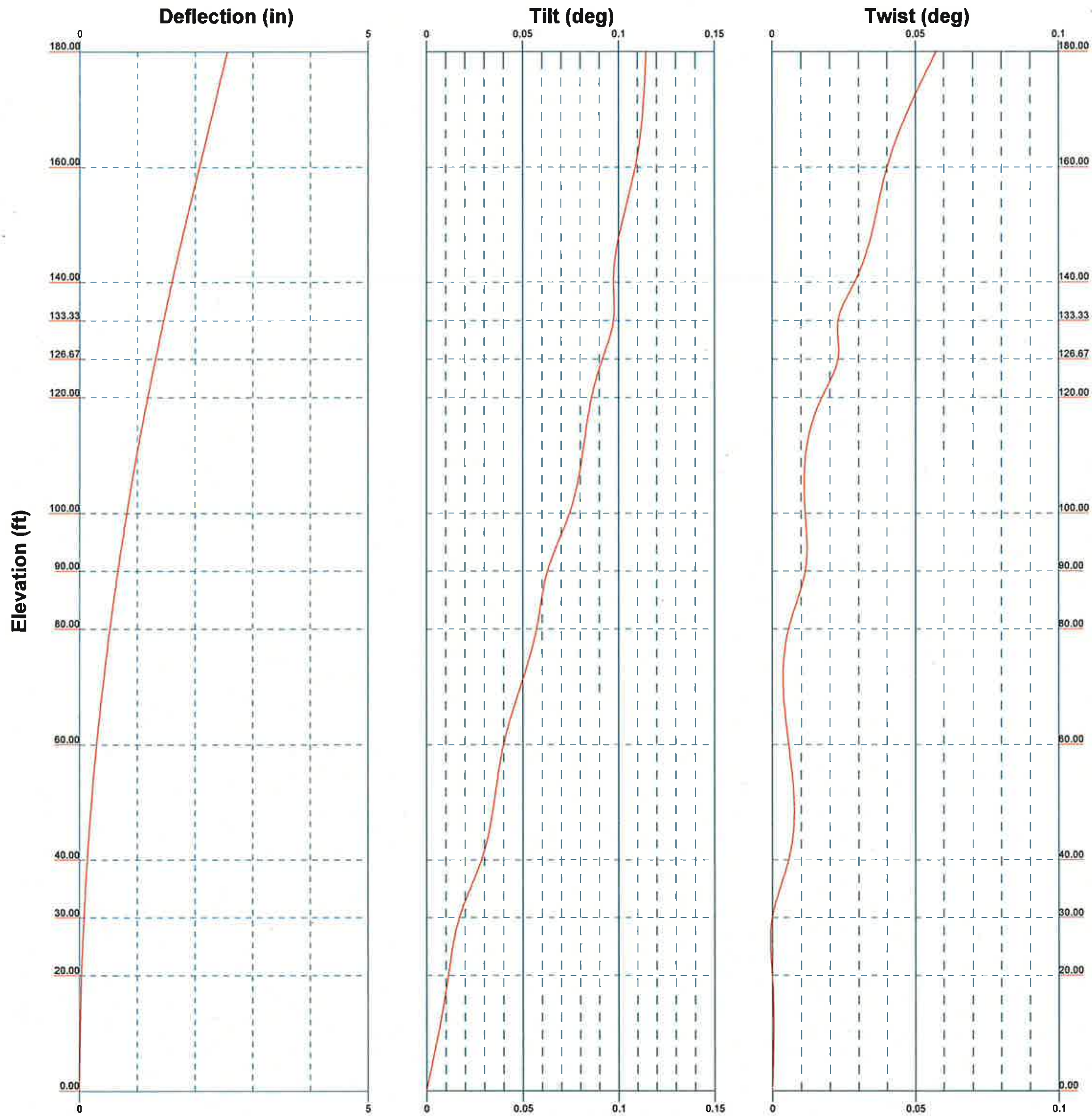
TNX TOWER DEFLECTION, TILT, AND TWIST

TIA/EIA-222-F - Service - 50 mph

Maximum Values



URS Corporation	Job: ***180' CSP Lattice Tower***		
500 Enterprise Drive, Suite 3B	Project: ***Westport, Connecticut***		
Rocky Hill, CT 06067	Client: Verizon	Drawn by: Michael Dalickas	App'd:
Phone: 860-529-8882	Code: TIA/EIA-222-F	Date: 11/20/13	Scale: NTS
FAX: 860-529-3991	Path:		Dwg No. E-5

DETAILED OUTPUT

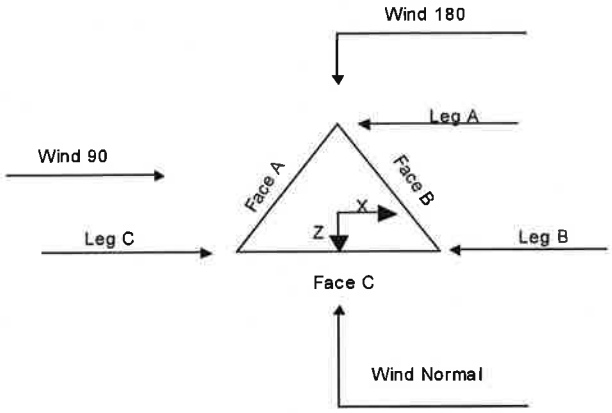
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 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 8.54 ft at the top and 27.68 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.
Deflections calculated using a wind speed of 50 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	180.00-160.00			8.54	1	20.00
T2	160.00-140.00			8.63	1	20.00
T3	140.00-133.33			10.71	1	6.67
T4	133.33-126.67			11.40	1	6.67
T5	126.67-120.00			12.10	1	6.67
T6	120.00-100.00			12.79	1	20.00
T7	100.00-90.00			15.04	1	10.00
T8	90.00-80.00			16.36	1	10.00
T9	80.00-60.00			17.68	1	20.00
T10	60.00-40.00			20.18	1	20.00
T11	40.00-30.00			22.68	1	10.00
T12	30.00-20.00			23.93	1	10.00
T13	20.00-0.00			25.18	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	180.00-160.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T2	160.00-140.00	6.67	K Brace Down	No	Yes	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T3	140.00-133.33	6.67	K Brace Down	No	Yes	0.0000	0.0000
T4	133.33-126.67	6.67	K Brace Down	No	Yes	0.0000	0.0000
T5	126.67-120.00	6.67	K Brace Down	No	Yes	0.0000	0.0000
T6	120.00-100.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T7	100.00-90.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T8	90.00-80.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T9	80.00-60.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T10	60.00-40.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T11	40.00-30.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T12	30.00-20.00	10.00	K Brace Down	No	Yes	0.0000	0.0000
T13	20.00-0.00	20.00	K1 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 180.00-160.00	Pipe	ROHN 3 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T2 160.00-140.00	Pipe	ROHN 4 STD	A572-50 (50 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T3 140.00-133.33	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Pipe	ROHN 2 EH	A572-50 (50 ksi)
T4 133.33-126.67	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Pipe	ROHN 2 EH	A572-50 (50 ksi)
T5 126.67-120.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Pipe	ROHN 2 EH	A572-50 (50 ksi)
T6 120.00-100.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)
T7 100.00-90.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T8 90.00-80.00	Pipe	ROHN 6 EH	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T9 80.00-60.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	ROHN 3 STD	A572-50 (50 ksi)
T10 60.00-40.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	P3.5x.226	A572-50 (50 ksi)
T11 40.00-30.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	P3.5x.226	A572-50 (50 ksi)
T12 30.00-20.00	Pipe	ROHN 8 EHS	A572-50 (50 ksi)	Pipe	P3.5x.226	A572-50 (50 ksi)
T13 20.00-0.00	Pipe	ROHN 8 EH	A572-50 (50 ksi)	Pipe	P3.5x.226	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
T4 133.33-126.67	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Solid Round		A36 (36 ksi)
T5 126.67-120.00	Pipe	ROHN 2 STD	A572-50	Solid Round		A36

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T8 90.00-80.00	Pipe	ROHN 2 STD	(50 ksi) A572-50 (50 ksi)	Single Angle		(36 ksi) A36 (36 ksi)
T12 30.00-20.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Single Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 180.00-160.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T2 160.00-140.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 1.5 STD	A572-50 (50 ksi)
T3 140.00-133.33	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T4 133.33-126.67	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T5 126.67-120.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T6 120.00-100.00	None	Single Angle		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T7 100.00-90.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T8 90.00-80.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)
T9 80.00-60.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T10 60.00-40.00	None	Single Angle		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T11 40.00-30.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T12 30.00-20.00	None	Flat Bar		A36 (36 ksi)	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)
T13 20.00-0.00	None	Flat Bar		A36 (36 ksi)	Pipe	P3.5x.226	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
T1 180.00-160.00	Solid Round		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T2 160.00-140.00	Solid Round		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T3 140.00-133.33	Solid Round		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T4 133.33-126.67	Solid Round		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T5 126.67-120.00	Solid Round		A36 (36 ksi)	Single Angle	L2x2x1/8	A36 (36 ksi)
T6 120.00-100.00	Single Angle		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T7 100.00-90.00	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T8 90.00-80.00	Solid Round		A36 (36 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T9 80.00-60.00	Solid Round		A36 (36 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T10 60.00-40.00	Single Angle		A36 (36 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T11 40.00-30.00	Single Angle		A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T12 30.00-20.00	Single Angle		A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x1/4	A572-50 (50 ksi)
T13 20.00-0.00	Solid Round		A36 (36 ksi)	Pipe	ROHN 2 STD	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Redundant Bracing Grade		Redundant Type	Redundant Size	K Factor
T13 20.00-0.00	A572-50 (50 ksi)	Horizontal (1)	Pipe	ROHN 1.5 STD	0.8
		Diagonal (1)	Pipe	ROHN 1.5 STD	0.8
		Hip (1)	Pipe	ROHN 2.5 STD	0.8

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 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 140.00-133.33	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 133.33-126.67	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 126.67-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 100.00-90.00	0.00	0.0000	A36 (36 ksi)	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
T8 90.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T11 40.00-30.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T12 30.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T13 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

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 180.00-160.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T2 160.00-140.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T3 140.00-133.33	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T4 133.33-126.67	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T5 126.67-120.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T6 120.00-100.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T7 100.00-90.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T8 90.00-80.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T9 80.00-60.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T10 60.00-40.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T11 40.00-30.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T12 30.00-20.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1
T13 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		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 180.00-160.00	0.0000	0.75	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 160.00-140.00	0.0000	0.75	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 140.00-133.33	0.0000	0.75	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 133.33-126.67	0.0000	0.75	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 126.67-120.00	0.0000	0.75	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 120.00-100.00	0.0000	0.75	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 100.00-90.00	0.0000	0.75	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 90.00-80.00	0.0000	0.75	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 80.00-60.00	0.0000	0.75	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 60.00-40.00	0.0000	0.75	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 40.00-30.00	0.0000	0.75	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 30.00-20.00	0.0000	0.75	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 20.00-0.00	0.0000	0.75	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	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T1 180.00-160.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T2 160.00-140.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T3 140.00-133.33	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T4 133.33-126.67	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T5 126.67-120.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T6 120.00-100.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T7 100.00-90.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T8 90.00-80.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T9 80.00-60.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T10 60.00-40.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000

Tower Elevation	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
ft	in	in	in	in	in	in	in	in
T11 40.00-30.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T12 30.00-20.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000
T13 20.00-0.00	0.0000	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000

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
LDF7-50A (1-5/8 FOAM) (Verizon)	A	Yes	Ar (CfAe)	160.00 - 0.00	0.0000	-0.42	12	12	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (AT&T)	B	Yes	Ar (CfAe)	133.00 - 0.00	0.0000	0.46	12	6	1.9800	1.9800		0.82
2" Innerduct w/ (6) 3/8" cables per innerduct (AT&T)	B	Yes	Ar (CfAe)	133.00 - 0.00	0.0000	0.415	1	1	2.3750	2.3750		0.80
LDF7-50A (1-5/8 FOAM) (T-Mobile)	B	Yes	Ar (CfAe)	125.00 - 0.00	0.0000	-0.46	12	6	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (T-Mobile)	B	Yes	Ar (CfAe)	125.00 - 0.00	0.0000	-0.41	6	3	1.9800	1.9800		0.82
LDF7-50A (1-5/8 FOAM) (CSP)	A	Yes	Ar (CfAe)	170.00 - 0.00	0.0000	0.46	6	3	1.9800	1.9800		0.82
LDF5-50A (7/8 FOAM) (CSP)	A	Yes	Ar (CfAe)	180.00 - 0.00	0.0000	0.435	2	1	1.0900	1.0900		0.33
LDF4-50A (1/2 FOAM) (CSP)	A	Yes	Ar (CfAe)	110.00 - 0.00	0.0000	0.41	1	1	0.6300	0.6300		0.15
1 5/8" Hybriflex (VZW)	A	Yes	Ar (CfAe)	160.00 - 0.00	0.0000	-0.5	1	1	1.6250	1.6250		0.21

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	180.00-160.00	A	6.767	0.000	0.000	0.000	0.06
		B	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
		C	0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	54.025	0.000	0.000	0.000	0.31
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T3	140.00-133.33	A	18.008	0.000	0.000	0.000	0.10
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T4	133.33-126.67	A	18.008	0.000	0.000	0.000	0.10
		B	7.523	0.000	0.000	0.000	0.07
		C	0.000	0.000	0.000	0.000	0.00
T5	126.67-120.00	A	18.008	0.000	0.000	0.000	0.10
		B	15.344	0.000	0.000	0.000	0.14
		C	0.000	0.000	0.000	0.000	0.00
T6	120.00-100.00	A	54.550	0.000	0.000	0.000	0.31
		B	53.458	0.000	0.000	0.000	0.51
		C	0.000	0.000	0.000	0.000	0.00
T7	100.00-90.00	A	27.538	0.000	0.000	0.000	0.16
		B	26.729	0.000	0.000	0.000	0.25
		C	0.000	0.000	0.000	0.000	0.00
T8	90.00-80.00	A	27.538	0.000	0.000	0.000	0.16
		B	26.729	0.000	0.000	0.000	0.25
		C	0.000	0.000	0.000	0.000	0.00
T9	80.00-60.00	A	55.075	0.000	0.000	0.000	0.32
		B	53.458	0.000	0.000	0.000	0.51
		C	0.000	0.000	0.000	0.000	0.00
T10	60.00-40.00	A	55.075	0.000	0.000	0.000	0.32
		B	53.458	0.000	0.000	0.000	0.51
		C	0.000	0.000	0.000	0.000	0.00
T11	40.00-30.00	A	27.538	0.000	0.000	0.000	0.16
		B	26.729	0.000	0.000	0.000	0.25
		C	0.000	0.000	0.000	0.000	0.00
T12	30.00-20.00	A	27.538	0.000	0.000	0.000	0.16
		B	26.729	0.000	0.000	0.000	0.25
		C	0.000	0.000	0.000	0.000	0.00
T13	20.00-0.00	A	55.075	0.000	0.000	0.000	0.32
		B	53.458	0.000	0.000	0.000	0.51
		C	0.000	0.000	0.000	0.000	0.00

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	180.00-160.00	A	0.500	10.933	0.000	0.000	0.000	0.19
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	0.500	82.358	0.000	0.000	0.000	0.92
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T3	140.00-133.33	A	0.500	27.453	0.000	0.000	0.000	0.31
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T4	133.33-126.67	A	0.500	27.453	0.000	0.000	0.000	0.31
		B		11.218	0.000	0.000	0.000	0.19
		C		0.000	0.000	0.000	0.000	0.00
T5	126.67-120.00	A	0.500	27.453	0.000	0.000	0.000	0.31
		B		22.983	0.000	0.000	0.000	0.41
		C		0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T6	120.00-100.00	A	0.500	83.717	0.000	0.000	0.000	0.93
		B		80.125	0.000	0.000	0.000	1.45
		C		0.000	0.000	0.000	0.000	0.00
T7	100.00-90.00	A	0.500	42.538	0.000	0.000	0.000	0.47
		B		40.063	0.000	0.000	0.000	0.73
		C		0.000	0.000	0.000	0.000	0.00
T8	90.00-80.00	A	0.500	42.538	0.000	0.000	0.000	0.47
		B		40.063	0.000	0.000	0.000	0.73
		C		0.000	0.000	0.000	0.000	0.00
T9	80.00-60.00	A	0.500	85.075	0.000	0.000	0.000	0.94
		B		80.125	0.000	0.000	0.000	1.45
		C		0.000	0.000	0.000	0.000	0.00
T10	60.00-40.00	A	0.500	85.075	0.000	0.000	0.000	0.94
		B		80.125	0.000	0.000	0.000	1.45
		C		0.000	0.000	0.000	0.000	0.00
T11	40.00-30.00	A	0.500	42.538	0.000	0.000	0.000	0.47
		B		40.063	0.000	0.000	0.000	0.73
		C		0.000	0.000	0.000	0.000	0.00
T12	30.00-20.00	A	0.500	42.538	0.000	0.000	0.000	0.47
		B		40.063	0.000	0.000	0.000	0.73
		C		0.000	0.000	0.000	0.000	0.00
T13	20.00-0.00	A	0.500	85.075	0.000	0.000	0.000	0.94
		B		80.125	0.000	0.000	0.000	1.45
		C		0.000	0.000	0.000	0.000	0.00

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	180.00-160.00	A	0.531	1.247	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T2	160.00-140.00	A	3.959	8.782	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T3	140.00-133.33	A	1.359	2.942	0.000	0.000
		B	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000
T4	133.33-126.67	A	1.332	2.884	0.000	0.000
		B	0.556	1.178	0.000	0.000
		C	0.000	0.000	0.000	0.000
T5	126.67-120.00	A	1.308	2.833	0.000	0.000
		B	1.115	2.372	0.000	0.000
		C	0.000	0.000	0.000	0.000
T6	120.00-100.00	A	3.309	6.967	0.000	0.000
		B	3.243	6.668	0.000	0.000
		C	0.000	0.000	0.000	0.000
T7	100.00-90.00	A	1.813	3.714	0.000	0.000
		B	1.760	3.498	0.000	0.000
		C	0.000	0.000	0.000	0.000
T8	90.00-80.00	A	1.757	3.604	0.000	0.000
		B	1.706	3.394	0.000	0.000
		C	0.000	0.000	0.000	0.000
T9	80.00-60.00	A	3.618	7.312	0.000	0.000
		B	3.512	6.887	0.000	0.000
		C	0.000	0.000	0.000	0.000

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
T10	60.00-40.00	A	3.798	7.534	0.000	0.000
		B	3.687	7.095	0.000	0.000
		C	0.000	0.000	0.000	0.000
T11	40.00-30.00	A	1.856	3.683	0.000	0.000
		B	1.801	3.469	0.000	0.000
		C	0.000	0.000	0.000	0.000
T12	30.00-20.00	A	1.832	3.637	0.000	0.000
		B	1.778	3.425	0.000	0.000
		C	0.000	0.000	0.000	0.000
T13	20.00-0.00	A	3.848	7.994	0.000	0.000
		B	3.735	7.529	0.000	0.000
		C	0.000	0.000	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	180.00-160.00	-0.3626	-4.4014	-0.4064	-4.9134
T2	160.00-140.00	-16.0443	2.2300	-16.9324	2.1690
T3	140.00-133.33	-16.1618	2.2858	-17.5016	2.2843
T4	133.33-126.67	-6.7440	6.0991	-7.3744	6.3163
T5	126.67-120.00	-5.2028	-2.4104	-5.6782	-2.7389
T6	120.00-100.00	-5.2652	-5.4924	-5.8977	-6.3061
T7	100.00-90.00	-5.6640	-5.9876	-6.4038	-7.0699
T8	90.00-80.00	-6.0867	-6.3722	-6.8816	-7.5285
T9	80.00-60.00	-6.0474	-6.2573	-7.0071	-7.5823
T10	60.00-40.00	-6.5144	-6.6586	-7.5980	-8.1282
T11	40.00-30.00	-6.9700	-7.0714	-8.1309	-8.6378
T12	30.00-20.00	-7.2625	-7.3361	-8.4731	-8.9647
T13	20.00-0.00	-7.9163	-7.9507	-9.1612	-9.6407

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
3' Yagi (CSP-1)	A	From Leg	1.50	0.00	0.0000	180.00	No Ice	2.08	2.08	0.03
							1/2" Ice	3.79	3.79	0.05
Standoff (CSP)	A	None		0.00	0.0000	180.00	No Ice	0.52	0.52	0.02
							1/2" Ice	0.79	0.79	0.02
Valmont Single Dish Standoff (1) (CSP)	C	None			0.0000	177.00	No Ice	2.64	2.64	0.04
							1/2" Ice	3.69	3.69	0.05
AP11-850 (CSP-46)	B	From Face	1.00	0.00	0.0000	175.00	No Ice	4.96	2.25	0.01
			3.00				1/2" Ice	5.36	2.57	0.04

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
AP11-850	B	From Face	1.00	0.0000	175.00	No Ice	4.96	2.25	0.01
(CSP-47)			-3.00			1/2" Ice	5.36	2.57	0.04
			0.00						
Valmont Single Dish Standoff (1)	B	None		0.0000	170.00	No Ice	2.64	2.64	0.04
(Verizon)						1/2" Ice	3.69	3.69	0.05
SC479-HF1LDF	C	From Leg	3.00	0.0000	170.00	No Ice	5.06	5.06	0.03
(CSP-59)			0.00			1/2" Ice	6.54	6.54	0.07
			-11.00						
SC479-HF1LDF	C	From Leg	1.00	0.0000	170.00	No Ice	5.06	5.06	0.03
(CSP-56)			0.00			1/2" Ice	6.54	6.54	0.07
			0.00						
SC479-HF1LDF	C	From Leg	1.00	0.0000	170.00	No Ice	5.06	5.06	0.03
(CSP-57)			0.00			1/2" Ice	6.54	6.54	0.07
			0.00						
SC479-HF1LDF	C	From Leg	1.00	0.0000	170.00	No Ice	5.06	5.06	0.03
(CSP-58)			0.00			1/2" Ice	6.54	6.54	0.07
			0.00						
TMA	C	From Leg	1.00	0.0000	170.00	No Ice	1.06	0.45	0.02
(CSP-60)			0.00			1/2" Ice	1.21	0.57	0.03
			0.00						
Standoff	B	None		0.0000	170.00	No Ice	0.52	0.52	0.02
(CSP)						1/2" Ice	0.79	0.79	0.02
Standoff	C	None		0.0000	170.00	No Ice	0.52	0.52	0.02
(CSP)						1/2" Ice	0.79	0.79	0.02
VHF150	C	From Leg	1.50	0.0000	167.00	No Ice	1.38	0.94	0.02
(CSP-22)			0.00			1/2" Ice	1.65	1.28	0.02
			0.00						
Standoff	A	None		0.0000	160.00	No Ice	0.52	0.52	0.02
(CSP)						1/2" Ice	0.79	0.79	0.02
Standoff	A	None		0.0000	160.00	No Ice	0.52	0.52	0.02
(CSP)						1/2" Ice	0.79	0.79	0.02
Standoff	C	None		0.0000	160.00	No Ice	0.52	0.52	0.02
(CSP)						1/2" Ice	0.79	0.79	0.02
OGT9-806	A	From Leg	3.00	0.0000	160.00	No Ice	2.15	2.15	0.02
(CSP-48)			3.00			1/2" Ice	3.25	3.25	0.03
			-11.00						
OGT9-806	A	From Leg	3.00	0.0000	160.00	No Ice	2.15	2.15	0.02
(CSP-49)			-3.00			1/2" Ice	3.25	3.25	0.03
			-11.00						
DB536	C	From Leg	3.00	0.0000	160.00	No Ice	2.83	2.83	0.02
(CSP-45)			0.00			1/2" Ice	3.99	3.99	0.04
			0.00						
Pirod 15' T-Frame Sector Mount (1)	A	None		0.0000	160.00	No Ice	15.00	15.00	0.50
(Verizon)						1/2" Ice	20.60	20.60	0.65
Pirod 15' T-Frame Sector Mount (1)	B	None		0.0000	160.00	No Ice	15.00	15.00	0.50
(Verizon)						1/2" Ice	20.60	20.60	0.65
Pirod 15' T-Frame Sector Mount (1)	C	None		0.0000	160.00	No Ice	15.00	15.00	0.50
(Verizon)						1/2" Ice	20.60	20.60	0.65
P65-15-XL-2	A	From Face	3.00	0.0000	160.00	No Ice	8.54	5.99	0.07
(Verizon)			2.00			1/2" Ice	9.13	6.89	0.13
			0.00						
P65-15-XL-2	B	From Face	3.00	0.0000	160.00	No Ice	8.54	5.99	0.07
(Verizon)			2.00			1/2" Ice	9.13	6.89	0.13

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
P65-15-XL-2 (Verizon)	C	From Face	0.00 3.00 2.00	0.0000	160.00	No Ice 1/2" Ice	8.54 9.13	5.99 6.89	0.07 0.13
Rymsa MG D3-800Tx (Verizon)	A	From Face	0.00 3.00 4.00	0.0000	160.00	No Ice 1/2" Ice	3.57 3.94	3.43 4.07	0.03 0.06
Rymsa MG D3-800Tx (Verizon)	B	From Face	0.00 3.00 4.00	0.0000	160.00	No Ice 1/2" Ice	3.57 3.94	3.43 4.07	0.03 0.06
Rymsa MG D3-800Tx (Verizon)	C	From Face	0.00 3.00 4.00	0.0000	160.00	No Ice 1/2" Ice	3.57 3.94	3.43 4.07	0.03 0.06
(2) Diplexer (Verizon)	A	From Leg	0.00 3.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.47 0.56	0.12 0.17	0.01 0.01
(2) Diplexer (Verizon)	B	From Leg	0.00 3.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.47 0.56	0.12 0.17	0.01 0.01
(2) Diplexer (Verizon)	C	From Leg	0.00 3.00 0.00	0.0000	160.00	No Ice 1/2" Ice	0.47 0.56	0.12 0.17	0.01 0.01
P65-16-XLH-RR (AT&T)	A	From Face	0.00 3.00 -4.00	0.0000	133.00	No Ice 1/2" Ice	8.40 8.95	4.70 5.15	0.06 0.11
P65-16-XLH-RR (AT&T)	B	From Face	0.00 3.00 -4.00	0.0000	133.00	No Ice 1/2" Ice	8.40 8.95	4.70 5.15	0.06 0.11
P65-16-XLH-RR (AT&T)	C	From Face	0.00 3.00 -4.00	0.0000	133.00	No Ice 1/2" Ice	8.40 8.95	4.70 5.15	0.06 0.11
TT19-08BP111-001 TMA (AT&T)	A	From Face	0.00 3.00 -4.00	0.0000	133.00	No Ice 1/2" Ice	0.64 0.76	0.52 0.62	0.02 0.02
TT19-08BP111-001 TMA (AT&T)	B	From Face	0.00 3.00 -4.00	0.0000	133.00	No Ice 1/2" Ice	0.64 0.76	0.52 0.62	0.02 0.02
TT19-08BP111-001 TMA (AT&T)	C	From Face	0.00 3.00 -4.00	0.0000	133.00	No Ice 1/2" Ice	0.64 0.76	0.52 0.62	0.02 0.02
Raycap DC6-48-60-18-8F DC Power Surge Protection (AT&T)	C	From Face	0.00 3.00 -5.00	0.0000	133.00	No Ice 1/2" Ice	1.27 1.46	1.27 1.46	0.05 0.07
P65-16-XLH-RR (AT&T)	A	From Face	0.00 3.00 2.00	0.0000	133.00	No Ice 1/2" Ice	8.40 8.95	4.70 5.15	0.06 0.11
P65-16-XLH-RR (AT&T)	B	From Face	0.00 3.00 2.00	0.0000	133.00	No Ice 1/2" Ice	8.40 8.95	4.70 5.15	0.06 0.11
P65-16-XLH-RR (AT&T)	C	From Face	0.00 3.00 2.00	0.0000	133.00	No Ice 1/2" Ice	8.40 8.95	4.70 5.15	0.06 0.11
(2) RRU (AT&T)	A	From Face	0.00 3.00 2.00	0.0000	133.00	No Ice 1/2" Ice	3.79 4.16	1.02 1.23	0.06 0.08
(2) RRU (AT&T)	B	From Face	0.00 3.00 2.00	0.0000	133.00	No Ice 1/2" Ice	3.79 4.16	1.02 1.23	0.06 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
					0.00						
(2) RRU (AT&T)	C	From Face	3.00	2.00	0.00	0.0000	133.00	No Ice	3.79	1.02	0.06
								1/2" Ice	4.16	1.23	0.08
P65-16-XLH-RR (AT&T)	A	From Face	3.00	4.00	0.00	0.0000	133.00	No Ice	8.40	4.70	0.06
								1/2" Ice	8.95	5.15	0.11
P65-16-XLH-RR (AT&T)	B	From Face	3.00	4.00	0.00	0.0000	133.00	No Ice	8.40	4.70	0.06
								1/2" Ice	8.95	5.15	0.11
P65-16-XLH-RR (AT&T)	C	From Face	3.00	4.00	0.00	0.0000	133.00	No Ice	8.40	4.70	0.06
								1/2" Ice	8.95	5.15	0.11
TT19-08BP111-001 TMA (AT&T)	A	From Face	3.00	4.00	0.00	0.0000	133.00	No Ice	0.64	0.52	0.02
								1/2" Ice	0.76	0.62	0.02
TT19-08BP111-001 TMA (AT&T)	B	From Face	3.00	4.00	0.00	0.0000	133.00	No Ice	0.64	0.52	0.02
								1/2" Ice	0.76	0.62	0.02
TT19-08BP111-001 TMA (AT&T)	C	From Face	3.00	4.00	0.00	0.0000	133.00	No Ice	0.64	0.52	0.02
								1/2" Ice	0.76	0.62	0.02
Pirod 15' T-Frame Sector Mount (1) (AT&T)	A	None				0.0000	132.00	No Ice	15.00	15.00	0.50
								1/2" Ice	20.60	20.60	0.65
Pirod 15' T-Frame Sector Mount (1) (AT&T)	B	None				0.0000	132.00	No Ice	15.00	15.00	0.50
								1/2" Ice	20.60	20.60	0.65
Pirod 15' T-Frame Sector Mount (1) (AT&T)	C	None				0.0000	132.00	No Ice	15.00	15.00	0.50
								1/2" Ice	20.60	20.60	0.65
Air 21 (T-Mobile)	A	From Face	3.00	0.00	0.00	0.0000	125.00	No Ice	6.53	4.36	0.08
								1/2" Ice	6.98	4.77	0.12
Air 21 (T-Mobile)	B	From Face	3.00	0.00	0.00	0.0000	125.00	No Ice	6.53	4.36	0.08
								1/2" Ice	6.98	4.77	0.12
Air 21 (T-Mobile)	C	From Face	3.00	0.00	0.00	0.0000	125.00	No Ice	6.53	4.36	0.08
								1/2" Ice	6.98	4.77	0.12
(3) TMA (T-Mobile)	A	From Face	3.00	0.00	0.00	0.0000	125.00	No Ice	1.06	0.45	0.02
								1/2" Ice	1.21	0.57	0.03
(3) TMA (T-Mobile)	B	From Face	3.00	0.00	0.00	0.0000	125.00	No Ice	1.06	0.45	0.02
								1/2" Ice	1.21	0.57	0.03
(3) TMA (T-Mobile)	C	From Face	3.00	0.00	0.00	0.0000	125.00	No Ice	1.06	0.45	0.02
								1/2" Ice	1.21	0.57	0.03
Air 21 (T-Mobile)	A	From Face	3.00	0.00	0.00	0.0000	125.00	No Ice	6.53	4.36	0.08
								1/2" Ice	6.98	4.77	0.12
Air 21 (T-Mobile)	B	From Face	3.00	0.00	0.00	0.0000	125.00	No Ice	6.53	4.36	0.08
								1/2" Ice	6.98	4.77	0.12
Air 21 (T-Mobile)	C	From Face	3.00	0.00	0.00	0.0000	125.00	No Ice	6.53	4.36	0.08
								1/2" Ice	6.98	4.77	0.12

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
GPS	C	From Face	1.00	0.0000	125.00	No Ice	0.00	0.00	0.00
(GPS)			0.00			1/2" Ice	0.00	0.00	0.00
			0.00						
VHF150	A	From Leg	1.50	0.0000	110.00	No Ice	1.38	0.94	0.02
(CSP-44)			0.00			1/2" Ice	1.65	1.28	0.02
			0.00						
BXA-171063-12CF-EDIN-X	A	From Face	3.00	0.0000	160.00	No Ice	4.80	3.63	0.02
(Verizon)			0.00			1/2" Ice	5.25	4.06	0.05
			0.00						
BXA-171063-12CF-EDIN-X	B	From Face	3.00	0.0000	160.00	No Ice	4.80	3.63	0.02
(Verizon)			0.00			1/2" Ice	5.25	4.06	0.05
			0.00						
BXA-171063-12CF-EDIN-X	C	From Face	3.00	0.0000	160.00	No Ice	4.80	3.63	0.02
(Verizon)			0.00			1/2" Ice	5.25	4.06	0.05
			0.00						
BXA-70080-4CF	A	From Face	3.00	0.0000	160.00	No Ice	3.69	2.79	0.02
(Verizon)			-2.00			1/2" Ice	4.06	3.10	0.05
			0.00						
BXA-70063-4CF-EDIN-X	B	From Face	3.00	0.0000	160.00	No Ice	5.16	2.52	0.01
(Verizon)			-2.00			1/2" Ice	5.55	2.82	0.04
			0.00						
BXA-70063-4CF-EDIN-X	C	From Face	3.00	0.0000	160.00	No Ice	5.16	2.52	0.01
(Verizon)			-2.00			1/2" Ice	5.55	2.82	0.04
			0.00						
RH_2X40-AWS	A	From Leg	3.00	0.0000	160.00	No Ice	2.52	1.59	0.04
(Verizon)			0.00			1/2" Ice	2.75	1.80	0.06
			0.00						
RH_2X40-AWS	B	From Leg	3.00	0.0000	160.00	No Ice	2.52	1.59	0.04
(Verizon)			0.00			1/2" Ice	2.75	1.80	0.06
			0.00						
RH_2X40-AWS	C	From Leg	3.00	0.0000	160.00	No Ice	2.52	1.59	0.04
(Verizon)			0.00			1/2" Ice	2.75	1.80	0.06
			0.00						
Raycap DC6-48-60-18-8F	C	From Face	3.00	0.0000	160.00	No Ice	1.27	1.27	0.05
DC Power Surge Protection			0.00			1/2" Ice	1.46	1.46	0.07
(Verizon)			0.00						
4' Standoff	C	None		0.0000	60.00	No Ice	3.42	3.42	0.80
(GPS)						1/2" Ice	3.67	3.67	0.84

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
PA6-65AC	C	Paraboloid w/o	From	1.00	Worst		177.00	6.00	No Ice	28.27	0.09
(CSP-42)		Radome	Leg	0.00					1/2" Ice	29.05	0.24
				0.00							
HP6-65	B	Paraboloid	From	1.00	Worst		170.00	6.00	No Ice	28.27	0.14

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
(Verizon)		w/Shroud (HP)	Leg	0.00 0.00					1/2" Ice	29.05	0.29

Tower Pressures - No Ice

$G_H = 1.121$

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	170.00	1.597	33	177.503	A	0.000	30.934	11.667	37.71	0.000	0.000
180.00-160.00					B	0.000	24.699		47.24	0.000	0.000
					C	0.000	24.699		47.24	0.000	0.000
T2	150.00	1.541	32	200.850	A	0.000	78.891	15.027	19.05	0.000	0.000
160.00-140.00					B	0.000	28.825		52.13	0.000	0.000
					C	0.000	28.825		52.13	0.000	0.000
T3	136.67	1.501	31	76.803	A	0.000	28.226	6.192	21.94	0.000	0.000
140.00-133.33					B	0.000	11.577		53.49	0.000	0.000
					C	0.000	11.577		53.49	0.000	0.000
T4	130.00	1.48	31	81.431	A	0.000	28.469	6.192	21.75	0.000	0.000
133.33-126.67					B	0.000	18.759		33.01	0.000	0.000
					C	0.000	11.792		52.51	0.000	0.000
T5	123.33	1.457	30	86.060	A	0.000	28.728	6.192	21.56	0.000	0.000
126.67-120.00					B	0.000	26.257		23.58	0.000	0.000
					C	0.000	12.028		51.48	0.000	0.000
T6	110.00	1.411	29	289.399	A	0.000	89.842	22.130	24.63	0.000	0.000
120.00-100.00					B	0.000	88.816		24.92	0.000	0.000
					C	0.000	38.601		57.33	0.000	0.000
T7	95.00	1.353	28	162.540	A	0.000	46.951	11.074	23.59	0.000	0.000
100.00-90.00					B	0.000	46.196		23.97	0.000	0.000
					C	0.000	21.227		52.17	0.000	0.000
T8 90.00-80.00	85.00	1.31	27	175.715	A	0.000	47.528	11.074	23.30	0.000	0.000
					B	0.000	46.771		23.68	0.000	0.000
					C	0.000	21.747		50.92	0.000	0.000
T9 80.00-60.00	70.00	1.24	26	392.943	A	0.000	104.470	28.825	27.59	0.000	0.000
					B	0.000	102.959		28.00	0.000	0.000
					C	0.000	53.013		54.37	0.000	0.000
T10	50.00	1.126	23	442.943	A	0.000	108.932	28.825	26.46	0.000	0.000
60.00-40.00					B	0.000	107.427		26.83	0.000	0.000
					C	0.000	57.656		49.99	0.000	0.000
T11	35.00	1.017	21	240.222	A	0.000	55.440	14.412	26.00	0.000	0.000
40.00-30.00					B	0.000	54.687		26.35	0.000	0.000
					C	0.000	29.759		48.43	0.000	0.000
T12	25.00	1	21	252.722	A	0.000	56.093	14.412	25.69	0.000	0.000
30.00-20.00					B	0.000	55.339		26.04	0.000	0.000
					C	0.000	30.387		47.43	0.000	0.000
T13 20.00-0.00	10.00	1	21	542.943	A	0.000	110.803	28.825	26.01	0.000	0.000
					B	0.000	109.300		26.37	0.000	0.000
					C	0.000	59.577		48.38	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.121$

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	170.00	1.597	33	0.5000	179.170	A	0.000	43.619	15.000	34.39	0.000	0.000
180.00-160.00						B	0.000	33.933		44.20	0.000	0.000
						C	0.000	33.933		44.20	0.000	0.000
T2	150.00	1.541	32	0.5000	202.519	A	0.000	111.999	18.366	16.40	0.000	0.000
160.00-140.00						B	0.000	38.423		47.80	0.000	0.000
						C	0.000	38.423		47.80	0.000	0.000
T3	136.67	1.501	31	0.5000	77.359	A	0.000	39.465	7.305	18.51	0.000	0.000
140.00-133.33						B	0.000	14.954		48.85	0.000	0.000
						C	0.000	14.954		48.85	0.000	0.000
T4	130.00	1.48	31	0.5000	81.988	A	0.000	39.829	7.305	18.34	0.000	0.000
133.33-126.67						B	0.000	25.300		28.88	0.000	0.000
						C	0.000	15.260		47.87	0.000	0.000
T5	123.33	1.457	30	0.5000	86.617	A	0.000	40.214	7.305	18.17	0.000	0.000
126.67-120.00						B	0.000	36.206		20.18	0.000	0.000
						C	0.000	15.595		46.85	0.000	0.000
T6	110.00	1.411	29	0.5000	291.068	A	0.000	124.793	25.470	20.41	0.000	0.000
120.00-100.00						B	0.000	121.500		20.96	0.000	0.000
						C	0.000	48.043		53.02	0.000	0.000
T7 100.00-90.00	95.00	1.353	28	0.5000	163.375	A	0.000	65.011	12.745	19.60	0.000	0.000
						B	0.000	62.752		20.31	0.000	0.000
						C	0.000	26.187		48.67	0.000	0.000
T8 90.00-80.00	85.00	1.31	27	0.5000	176.550	A	0.000	65.826	12.745	19.36	0.000	0.000
						B	0.000	63.560		20.05	0.000	0.000
						C	0.000	26.892		47.39	0.000	0.000
T9 80.00-60.00	70.00	1.24	26	0.5000	394.613	A	0.000	141.554	32.167	22.72	0.000	0.000
						B	0.000	137.030		23.47	0.000	0.000
						C	0.000	63.792		50.42	0.000	0.000
T10 60.00-40.00	50.00	1.126	23	0.5000	444.613	A	0.000	146.688	32.167	21.93	0.000	0.000
						B	0.000	142.177		22.62	0.000	0.000
						C	0.000	69.147		46.52	0.000	0.000
T11 40.00-30.00	35.00	1.017	21	0.5000	241.056	A	0.000	74.635	16.083	21.55	0.000	0.000
						B	0.000	72.375		22.22	0.000	0.000
						C	0.000	35.781		44.95	0.000	0.000
T12 30.00-20.00	25.00	1	21	0.5000	253.556	A	0.000	75.497	16.083	21.30	0.000	0.000
						B	0.000	73.233		21.96	0.000	0.000
						C	0.000	36.596		43.95	0.000	0.000
T13 20.00-0.00	10.00	1	21	0.5000	544.613	A	0.000	149.298	32.167	21.55	0.000	0.000
						B	0.000	144.813		22.21	0.000	0.000
						C	0.000	72.216		44.54	0.000	0.000

Tower Pressure - Service

$G_H = 1.121$

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	170.00	1.597	10	177.503	A	0.000	30.934	11.667	37.71	0.000	0.000
180.00-160.00					B	0.000	24.699		47.24	0.000	0.000
					C	0.000	24.699		47.24	0.000	0.000
T2	150.00	1.541	10	200.850	A	0.000	78.891	15.027	19.05	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
160.00-140.00					B	0.000	28.825		52.13	0.000	0.000
					C	0.000	28.825		52.13	0.000	0.000
T3	136.67	1.501	10	76.803	A	0.000	28.226	6.192	21.94	0.000	0.000
140.00-133.33					B	0.000	11.577		53.49	0.000	0.000
					C	0.000	11.577		53.49	0.000	0.000
T4	130.00	1.48	9	81.431	A	0.000	28.469	6.192	21.75	0.000	0.000
133.33-126.67					B	0.000	18.759		33.01	0.000	0.000
					C	0.000	11.792		52.51	0.000	0.000
T5	123.33	1.457	9	86.060	A	0.000	28.728	6.192	21.56	0.000	0.000
126.67-120.00					B	0.000	26.257		23.58	0.000	0.000
					C	0.000	12.028		51.48	0.000	0.000
T6	110.00	1.411	9	289.399	A	0.000	89.842	22.130	24.63	0.000	0.000
120.00-100.00					B	0.000	88.816		24.92	0.000	0.000
					C	0.000	38.601		57.33	0.000	0.000
T7	95.00	1.353	9	162.540	A	0.000	46.951	11.074	23.59	0.000	0.000
100.00-90.00					B	0.000	46.196		23.97	0.000	0.000
					C	0.000	21.227		52.17	0.000	0.000
T8 90.00-80.00	85.00	1.31	8	175.715	A	0.000	47.528	11.074	23.30	0.000	0.000
					B	0.000	46.771		23.68	0.000	0.000
					C	0.000	21.747		50.92	0.000	0.000
T9 80.00-60.00	70.00	1.24	8	392.943	A	0.000	104.470	28.825	27.59	0.000	0.000
					B	0.000	102.959		28.00	0.000	0.000
					C	0.000	53.013		54.37	0.000	0.000
T10	50.00	1.126	7	442.943	A	0.000	108.932	28.825	26.46	0.000	0.000
60.00-40.00					B	0.000	107.427		26.83	0.000	0.000
					C	0.000	57.656		49.99	0.000	0.000
T11	35.00	1.017	7	240.222	A	0.000	55.440	14.412	26.00	0.000	0.000
40.00-30.00					B	0.000	54.687		26.35	0.000	0.000
					C	0.000	29.759		48.43	0.000	0.000
T12	25.00	1	6	252.722	A	0.000	56.093	14.412	25.69	0.000	0.000
30.00-20.00					B	0.000	55.339		26.04	0.000	0.000
					C	0.000	30.387		47.43	0.000	0.000
T13 20.00-0.00	10.00	1	6	542.943	A	0.000	110.803	28.825	26.01	0.000	0.000
					B	0.000	109.300		26.37	0.000	0.000
					C	0.000	59.577		48.38	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	0.06	1.25	A	0.174	2.684	0.585	1	1	18.112	1.80	90.25	A
180.00-160.00			B	0.139	2.812	0.58	1	1	14.322			
			C	0.139	2.812	0.58	1	1	14.322			
T2	0.31	1.50	A	0.393	2.078	0.649	1	1	51.175	3.81	190.52	A
160.00-140.00			B	0.144	2.796	0.581	1	1	16.733			
			C	0.144	2.796	0.581	1	1	16.733			
T3	0.10	0.83	A	0.368	2.132	0.639	1	1	18.033	1.34	201.16	A
140.00-133.33			B	0.151	2.769	0.582	1	1	6.733			
			C	0.151	2.769	0.582	1	1	6.733			
T4	0.17	0.84	A	0.35	2.172	0.632	1	1	18.002	1.34	201.72	A
133.33-126.67			B	0.23	2.498	0.597	1	1	11.201			
			C	0.145	2.791	0.581	1	1	6.848			
T5	0.25	0.86	A	0.334	2.21	0.627	1	1	18.007	1.35	202.21	A
126.67-120.00			B	0.305	2.283	0.617	1	1	16.213			
			C	0.14	2.81	0.58	1	1	6.976			

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
T6	0.82	2.93	A	0.31	2.269	0.619	1	1	55.626	4.14	206.86	A
120.00-100.00			B	0.307	2.278	0.618	1	1	54.892			
			C	0.133	2.834	0.579	1	1	22.353			
T7	0.41	1.68	A	0.289	2.326	0.613	1	1	28.760	2.10	210.33	A
100.00-90.00			B	0.284	2.339	0.611	1	1	28.235			
			C	0.131	2.844	0.579	1	1	12.284			
T8	0.41	1.72	A	0.27	2.377	0.607	1	1	28.864	2.09	209.01	A
90.00-80.00			B	0.266	2.39	0.606	1	1	28.349			
			C	0.124	2.87	0.578	1	1	12.566			
T9	0.82	4.10	A	0.266	2.391	0.606	1	1	63.314	4.36	218.07	A
80.00-60.00			B	0.262	2.402	0.605	1	1	62.292			
			C	0.135	2.828	0.579	1	1	30.710			
T10	0.82	4.70	A	0.246	2.45	0.601	1	1	65.452	4.20	209.82	A
60.00-40.00			B	0.243	2.46	0.6	1	1	64.456			
			C	0.13	2.846	0.579	1	1	33.362			
T11	0.41	2.44	A	0.231	2.496	0.597	1	1	33.107	1.95	195.35	A
40.00-30.00			B	0.228	2.506	0.596	1	1	32.617			
			C	0.124	2.87	0.578	1	1	17.195			
T12	0.41	2.50	A	0.222	2.524	0.595	1	1	33.382	1.96	195.86	A
30.00-20.00			B	0.219	2.534	0.594	1	1	32.896			
			C	0.12	2.884	0.577	1	1	17.545			
T13	0.82	5.17	A	0.204	2.582	0.591	1	1	65.511	3.93	196.61	A
20.00-0.00			B	0.201	2.592	0.591	1	1	64.560			
			C	0.11	2.925	0.576	1	1	34.325			
Sum Weight:	5.84	30.51						OTM	2907.08 kip-ft	34.38		

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	0.06	1.25	A	0.174	2.684	0.585	0.825	1	18.112	1.80	90.25	A
180.00-160.00			B	0.139	2.812	0.58	0.825	1	14.322			
			C	0.139	2.812	0.58	0.825	1	14.322			
T2	0.31	1.50	A	0.393	2.078	0.649	0.825	1	51.175	3.81	190.52	A
160.00-140.00			B	0.144	2.796	0.581	0.825	1	16.733			
			C	0.144	2.796	0.581	0.825	1	16.733			
T3	0.10	0.83	A	0.368	2.132	0.639	0.825	1	18.033	1.34	201.16	A
140.00-133.33			B	0.151	2.769	0.582	0.825	1	6.733			
			C	0.151	2.769	0.582	0.825	1	6.733			
T4	0.17	0.84	A	0.35	2.172	0.632	0.825	1	18.002	1.34	201.72	A
133.33-126.67			B	0.23	2.498	0.597	0.825	1	11.201			
			C	0.145	2.791	0.581	0.825	1	6.848			
T5	0.25	0.86	A	0.334	2.21	0.627	0.825	1	18.007	1.35	202.21	A
126.67-120.00			B	0.305	2.283	0.617	0.825	1	16.213			
			C	0.14	2.81	0.58	0.825	1	6.976			
T6	0.82	2.93	A	0.31	2.269	0.619	0.825	1	55.626	4.14	206.86	A
120.00-100.00			B	0.307	2.278	0.618	0.825	1	54.892			
			C	0.133	2.834	0.579	0.825	1	22.353			
T7	0.41	1.68	A	0.289	2.326	0.613	0.825	1	28.760	2.10	210.33	A
100.00-90.00			B	0.284	2.339	0.611	0.825	1	28.235			
			C	0.131	2.844	0.579	0.825	1	12.284			
T8	0.41	1.72	A	0.27	2.377	0.607	0.825	1	28.864	2.09	209.01	A
90.00-80.00			B	0.266	2.39	0.606	0.825	1	28.349			

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	0.124	2.87	0.578	0.825	1	12.566			
T9	0.82	4.10	A	0.266	2.391	0.606	0.825	1	63.314	4.36	218.07	A
80.00-60.00			B	0.262	2.402	0.605	0.825	1	62.292			
			C	0.135	2.828	0.579	0.825	1	30.710			
T10	0.82	4.70	A	0.246	2.45	0.601	0.825	1	65.452	4.20	209.82	A
60.00-40.00			B	0.243	2.46	0.6	0.825	1	64.456			
			C	0.13	2.846	0.579	0.825	1	33.362			
T11	0.41	2.44	A	0.231	2.496	0.597	0.825	1	33.107	1.95	195.35	A
40.00-30.00			B	0.228	2.506	0.596	0.825	1	32.617			
			C	0.124	2.87	0.578	0.825	1	17.195			
T12	0.41	2.50	A	0.222	2.524	0.595	0.825	1	33.382	1.96	195.86	A
30.00-20.00			B	0.219	2.534	0.594	0.825	1	32.896			
			C	0.12	2.884	0.577	0.825	1	17.545			
T13	0.82	5.17	A	0.204	2.582	0.591	0.825	1	65.511	3.93	196.61	A
20.00-0.00			B	0.201	2.592	0.591	0.825	1	64.560			
			C	0.11	2.925	0.576	0.825	1	34.325			
Sum Weight:	5.84	30.51						OTM	2907.08 kip-ft	34.38		

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	0.06	1.25	A	0.174	2.684	0.585	0.8	1	18.112	1.80	90.25	A
180.00-160.00			B	0.139	2.812	0.58	0.8	1	14.322			
			C	0.139	2.812	0.58	0.8	1	14.322			
T2	0.31	1.50	A	0.393	2.078	0.649	0.8	1	51.175	3.81	190.52	A
160.00-140.00			B	0.144	2.796	0.581	0.8	1	16.733			
			C	0.144	2.796	0.581	0.8	1	16.733			
T3	0.10	0.83	A	0.368	2.132	0.639	0.8	1	18.033	1.34	201.16	A
140.00-133.33			B	0.151	2.769	0.582	0.8	1	6.733			
			C	0.151	2.769	0.582	0.8	1	6.733			
T4	0.17	0.84	A	0.35	2.172	0.632	0.8	1	18.002	1.34	201.72	A
133.33-126.67			B	0.23	2.498	0.597	0.8	1	11.201			
			C	0.145	2.791	0.581	0.8	1	6.848			
T5	0.25	0.86	A	0.334	2.21	0.627	0.8	1	18.007	1.35	202.21	A
126.67-120.00			B	0.305	2.283	0.617	0.8	1	16.213			
			C	0.14	2.81	0.58	0.8	1	6.976			
T6	0.82	2.93	A	0.31	2.269	0.619	0.8	1	55.626	4.14	206.86	A
120.00-100.00			B	0.307	2.278	0.618	0.8	1	54.892			
			C	0.133	2.834	0.579	0.8	1	22.353			
T7	0.41	1.68	A	0.289	2.326	0.613	0.8	1	28.760	2.10	210.33	A
100.00-90.00			B	0.284	2.339	0.611	0.8	1	28.235			
			C	0.131	2.844	0.579	0.8	1	12.284			
T8	0.41	1.72	A	0.27	2.377	0.607	0.8	1	28.864	2.09	209.01	A
90.00-80.00			B	0.266	2.39	0.606	0.8	1	28.349			
			C	0.124	2.87	0.578	0.8	1	12.566			
T9	0.82	4.10	A	0.266	2.391	0.606	0.8	1	63.314	4.36	218.07	A
80.00-60.00			B	0.262	2.402	0.605	0.8	1	62.292			
			C	0.135	2.828	0.579	0.8	1	30.710			
T10	0.82	4.70	A	0.246	2.45	0.601	0.8	1	65.452	4.20	209.82	A
60.00-40.00			B	0.243	2.46	0.6	0.8	1	64.456			
			C	0.13	2.846	0.579	0.8	1	33.362			
T11	0.41	2.44	A	0.231	2.496	0.597	0.8	1	33.107	1.95	195.35	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
40.00-30.00			B	0.228	2.506	0.596	0.8	1	32.617			
			C	0.124	2.87	0.578	0.8	1	17.195			
T12	0.41	2.50	A	0.222	2.524	0.595	0.8	1	33.382	1.96	195.86	A
30.00-20.00			B	0.219	2.534	0.594	0.8	1	32.896			
			C	0.12	2.884	0.577	0.8	1	17.545			
T13	0.82	5.17	A	0.204	2.582	0.591	0.8	1	65.511	3.93	196.61	A
20.00-0.00			B	0.201	2.592	0.591	0.8	1	64.560			
			C	0.11	2.925	0.576	0.8	1	34.325			
Sum Weight:	5.84	30.51						OTM	2907.08 kip-ft	34.38		

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	0.06	1.25	A	0.174	2.684	0.585	0.85	1	18.112	1.80	90.25	A
180.00-160.00			B	0.139	2.812	0.58	0.85	1	14.322			
			C	0.139	2.812	0.58	0.85	1	14.322			
T2	0.31	1.50	A	0.393	2.078	0.649	0.85	1	51.175	3.81	190.52	A
160.00-140.00			B	0.144	2.796	0.581	0.85	1	16.733			
			C	0.144	2.796	0.581	0.85	1	16.733			
T3	0.10	0.83	A	0.368	2.132	0.639	0.85	1	18.033	1.34	201.16	A
140.00-133.33			B	0.151	2.769	0.582	0.85	1	6.733			
			C	0.151	2.769	0.582	0.85	1	6.733			
T4	0.17	0.84	A	0.35	2.172	0.632	0.85	1	18.002	1.34	201.72	A
133.33-126.67			B	0.23	2.498	0.597	0.85	1	11.201			
			C	0.145	2.791	0.581	0.85	1	6.848			
T5	0.25	0.86	A	0.334	2.21	0.627	0.85	1	18.007	1.35	202.21	A
126.67-120.00			B	0.305	2.283	0.617	0.85	1	16.213			
			C	0.14	2.81	0.58	0.85	1	6.976			
T6	0.82	2.93	A	0.31	2.269	0.619	0.85	1	55.626	4.14	206.86	A
120.00-100.00			B	0.307	2.278	0.618	0.85	1	54.892			
			C	0.133	2.834	0.579	0.85	1	22.353			
T7	0.41	1.68	A	0.289	2.326	0.613	0.85	1	28.760	2.10	210.33	A
100.00-90.00			B	0.284	2.339	0.611	0.85	1	28.235			
			C	0.131	2.844	0.579	0.85	1	12.284			
T8	0.41	1.72	A	0.27	2.377	0.607	0.85	1	28.864	2.09	209.01	A
90.00-80.00			B	0.266	2.39	0.606	0.85	1	28.349			
			C	0.124	2.87	0.578	0.85	1	12.566			
T9	0.82	4.10	A	0.266	2.391	0.606	0.85	1	63.314	4.36	218.07	A
80.00-60.00			B	0.262	2.402	0.605	0.85	1	62.292			
			C	0.135	2.828	0.579	0.85	1	30.710			
T10	0.82	4.70	A	0.246	2.45	0.601	0.85	1	65.452	4.20	209.82	A
60.00-40.00			B	0.243	2.46	0.6	0.85	1	64.456			
			C	0.13	2.846	0.579	0.85	1	33.362			
T11	0.41	2.44	A	0.231	2.496	0.597	0.85	1	33.107	1.95	195.35	A
40.00-30.00			B	0.228	2.506	0.596	0.85	1	32.617			
			C	0.124	2.87	0.578	0.85	1	17.195			
T12	0.41	2.50	A	0.222	2.524	0.595	0.85	1	33.382	1.96	195.86	A
30.00-20.00			B	0.219	2.534	0.594	0.85	1	32.896			
			C	0.12	2.884	0.577	0.85	1	17.545			
T13	0.82	5.17	A	0.204	2.582	0.591	0.85	1	65.511	3.93	196.61	A
20.00-0.00			B	0.201	2.592	0.591	0.85	1	64.560			
			C	0.11	2.925	0.576	0.85	1	34.325			

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:	5.84	30.51						OTM	2907.08 kip-ft	34.38		

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	0.19	1.84	A	0.243	2.457	0.6	1	1	26.181	2.39	119.43	A
180.00-160.00			B	0.189	2.632	0.588	1	1	19.963			
			C	0.189	2.632	0.588	1	1	19.963			
T2	0.92	2.15	A	0.553	1.841	0.726	1	1	81.309	5.36	268.06	A
160.00-140.00			B	0.19	2.631	0.588	1	1	22.606			
			C	0.19	2.631	0.588	1	1	22.606			
T3	0.31	1.08	A	0.51	1.887	0.703	1	1	27.733	1.83	273.84	A
140.00-133.33			B	0.193	2.619	0.589	1	1	8.809			
			C	0.193	2.619	0.589	1	1	8.809			
T4	0.50	1.10	A	0.486	1.919	0.69	1	1	27.496	1.81	272.19	A
133.33-126.67			B	0.309	2.273	0.619	1	1	15.649			
			C	0.186	2.643	0.588	1	1	8.968			
T5	0.72	1.13	A	0.464	1.951	0.68	1	1	27.343	1.81	271.03	A
126.67-120.00			B	0.418	2.029	0.659	1	1	23.864			
			C	0.18	2.664	0.587	1	1	9.147			
T6	2.38	3.73	A	0.429	2.01	0.664	1	1	82.831	5.46	272.90	A
120.00-100.00			B	0.417	2.031	0.659	1	1	80.052			
			C	0.165	2.717	0.584	1	1	28.052			
T7	1.20	2.13	A	0.398	2.068	0.651	1	1	42.306	2.75	275.08	A
100.00-90.00			B	0.384	2.096	0.645	1	1	40.490			
			C	0.16	2.734	0.583	1	1	15.270			
T8	1.20	2.19	A	0.373	2.12	0.641	1	1	42.188	2.72	272.43	A
90.00-80.00			B	0.36	2.149	0.636	1	1	40.431			
			C	0.152	2.763	0.582	1	1	15.647			
T9	2.39	5.22	A	0.359	2.152	0.636	1	1	89.976	5.58	278.89	A
80.00-60.00			B	0.347	2.178	0.631	1	1	86.534			
			C	0.162	2.729	0.583	1	1	37.211			
T10	2.39	5.98	A	0.33	2.219	0.626	1	1	91.755	5.33	266.49	A
60.00-40.00			B	0.32	2.245	0.622	1	1	88.455			
			C	0.156	2.751	0.582	1	1	40.267			
T11	1.20	3.11	A	0.31	2.271	0.619	1	1	46.191	2.48	247.92	A
40.00-30.00			B	0.3	2.295	0.616	1	1	44.581			
			C	0.148	2.777	0.581	1	1	20.797			
T12	1.20	3.19	A	0.298	2.302	0.615	1	1	46.447	2.49	248.51	A
30.00-20.00			B	0.289	2.326	0.613	1	1	44.859			
			C	0.144	2.792	0.581	1	1	21.249			
T13	2.39	6.38	A	0.274	2.367	0.608	1	1	90.822	5.00	249.83	A
20.00-0.00			B	0.266	2.391	0.606	1	1	87.765			
			C	0.133	2.837	0.579	1	1	41.811			
Sum Weight:	16.99	39.23						OTM	3867.58 kip-ft	45.00		

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	0.19	1.84	A	0.243	2.457	0.6	0.825	1	26.181	2.39	119.43	A
180.00-160.00			B	0.189	2.632	0.588	0.825	1	19.963			
			C	0.189	2.632	0.588	0.825	1	19.963			
T2	0.92	2.15	A	0.553	1.841	0.726	0.825	1	81.309	5.36	268.06	A
160.00-140.00			B	0.19	2.631	0.588	0.825	1	22.606			
			C	0.19	2.631	0.588	0.825	1	22.606			
T3	0.31	1.08	A	0.51	1.887	0.703	0.825	1	27.733	1.83	273.84	A
140.00-133.33			B	0.193	2.619	0.589	0.825	1	8.809			
			C	0.193	2.619	0.589	0.825	1	8.809			
T4	0.50	1.10	A	0.486	1.919	0.69	0.825	1	27.496	1.81	272.19	A
133.33-126.67			B	0.309	2.273	0.619	0.825	1	15.649			
			C	0.186	2.643	0.588	0.825	1	8.968			
T5	0.72	1.13	A	0.464	1.951	0.68	0.825	1	27.343	1.81	271.03	A
126.67-120.00			B	0.418	2.029	0.659	0.825	1	23.864			
			C	0.18	2.664	0.587	0.825	1	9.147			
T6	2.38	3.73	A	0.429	2.01	0.664	0.825	1	82.831	5.46	272.90	A
120.00-100.00			B	0.417	2.031	0.659	0.825	1	80.052			
			C	0.165	2.717	0.584	0.825	1	28.052			
T7	1.20	2.13	A	0.398	2.068	0.651	0.825	1	42.306	2.75	275.08	A
100.00-90.00			B	0.384	2.096	0.645	0.825	1	40.490			
			C	0.16	2.734	0.583	0.825	1	15.270			
T8	1.20	2.19	A	0.373	2.12	0.641	0.825	1	42.188	2.72	272.43	A
90.00-80.00			B	0.36	2.149	0.636	0.825	1	40.431			
			C	0.152	2.763	0.582	0.825	1	15.647			
T9	2.39	5.22	A	0.359	2.152	0.636	0.825	1	89.976	5.58	278.89	A
80.00-60.00			B	0.347	2.178	0.631	0.825	1	86.534			
			C	0.162	2.729	0.583	0.825	1	37.211			
T10	2.39	5.98	A	0.33	2.219	0.626	0.825	1	91.755	5.33	266.49	A
60.00-40.00			B	0.32	2.245	0.622	0.825	1	88.455			
			C	0.156	2.751	0.582	0.825	1	40.267			
T11	1.20	3.11	A	0.31	2.271	0.619	0.825	1	46.191	2.48	247.92	A
40.00-30.00			B	0.3	2.295	0.616	0.825	1	44.581			
			C	0.148	2.777	0.581	0.825	1	20.797			
T12	1.20	3.19	A	0.298	2.302	0.615	0.825	1	46.447	2.49	248.51	A
30.00-20.00			B	0.289	2.326	0.613	0.825	1	44.859			
			C	0.144	2.792	0.581	0.825	1	21.249			
T13	2.39	6.38	A	0.274	2.367	0.608	0.825	1	90.822	5.00	249.83	A
20.00-0.00			B	0.266	2.391	0.606	0.825	1	87.765			
			C	0.133	2.837	0.579	0.825	1	41.811			
Sum Weight:	16.99	39.23						OTM	3867.58 kip-ft	45.00		

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	0.19	1.84	A	0.243	2.457	0.6	0.8	1	26.181	2.39	119.43	A
180.00-160.00			B	0.189	2.632	0.588	0.8	1	19.963			
			C	0.189	2.632	0.588	0.8	1	19.963			
T2	0.92	2.15	A	0.553	1.841	0.726	0.8	1	81.309	5.36	268.06	A
160.00-140.00			B	0.19	2.631	0.588	0.8	1	22.606			
			C	0.19	2.631	0.588	0.8	1	22.606			
T3	0.31	1.08	A	0.51	1.887	0.703	0.8	1	27.733	1.83	273.84	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
140.00-133.33			B	0.193	2.619	0.589	0.8	1	8.809			
			C	0.193	2.619	0.589	0.8	1	8.809			
T4	0.50	1.10	A	0.486	1.919	0.69	0.8	1	27.496	1.81	272.19	A
133.33-126.67			B	0.309	2.273	0.619	0.8	1	15.649			
			C	0.186	2.643	0.588	0.8	1	8.968			
T5	0.72	1.13	A	0.464	1.951	0.68	0.8	1	27.343	1.81	271.03	A
126.67-120.00			B	0.418	2.029	0.659	0.8	1	23.864			
			C	0.18	2.664	0.587	0.8	1	9.147			
T6	2.38	3.73	A	0.429	2.01	0.664	0.8	1	82.831	5.46	272.90	A
120.00-100.00			B	0.417	2.031	0.659	0.8	1	80.052			
			C	0.165	2.717	0.584	0.8	1	28.052			
T7	1.20	2.13	A	0.398	2.068	0.651	0.8	1	42.306	2.75	275.08	A
100.00-90.00			B	0.384	2.096	0.645	0.8	1	40.490			
			C	0.16	2.734	0.583	0.8	1	15.270			
T8	1.20	2.19	A	0.373	2.12	0.641	0.8	1	42.188	2.72	272.43	A
90.00-80.00			B	0.36	2.149	0.636	0.8	1	40.431			
			C	0.152	2.763	0.582	0.8	1	15.647			
T9	2.39	5.22	A	0.359	2.152	0.636	0.8	1	89.976	5.58	278.89	A
80.00-60.00			B	0.347	2.178	0.631	0.8	1	86.534			
			C	0.162	2.729	0.583	0.8	1	37.211			
T10	2.39	5.98	A	0.33	2.219	0.626	0.8	1	91.755	5.33	266.49	A
60.00-40.00			B	0.32	2.245	0.622	0.8	1	88.455			
			C	0.156	2.751	0.582	0.8	1	40.267			
T11	1.20	3.11	A	0.31	2.271	0.619	0.8	1	46.191	2.48	247.92	A
40.00-30.00			B	0.3	2.295	0.616	0.8	1	44.581			
			C	0.148	2.777	0.581	0.8	1	20.797			
T12	1.20	3.19	A	0.298	2.302	0.615	0.8	1	46.447	2.49	248.51	A
30.00-20.00			B	0.289	2.326	0.613	0.8	1	44.859			
			C	0.144	2.792	0.581	0.8	1	21.249			
T13	2.39	6.38	A	0.274	2.367	0.608	0.8	1	90.822	5.00	249.83	A
20.00-0.00			B	0.266	2.391	0.606	0.8	1	87.765			
			C	0.133	2.837	0.579	0.8	1	41.811			
Sum Weight:	16.99	39.23						OTM	3867.58 kip-ft	45.00		

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 ft²	F K	w plf	Ctrl. Face
T1	0.19	1.84	A	0.243	2.457	0.6	0.85	1	26.181	2.39	119.43	A
180.00-160.00			B	0.189	2.632	0.588	0.85	1	19.963			
			C	0.189	2.632	0.588	0.85	1	19.963			
T2	0.92	2.15	A	0.553	1.841	0.726	0.85	1	81.309	5.36	268.06	A
160.00-140.00			B	0.19	2.631	0.588	0.85	1	22.606			
			C	0.19	2.631	0.588	0.85	1	22.606			
T3	0.31	1.08	A	0.51	1.887	0.703	0.85	1	27.733	1.83	273.84	A
140.00-133.33			B	0.193	2.619	0.589	0.85	1	8.809			
			C	0.193	2.619	0.589	0.85	1	8.809			
T4	0.50	1.10	A	0.486	1.919	0.69	0.85	1	27.496	1.81	272.19	A
133.33-126.67			B	0.309	2.273	0.619	0.85	1	15.649			
			C	0.186	2.643	0.588	0.85	1	8.968			
T5	0.72	1.13	A	0.464	1.951	0.68	0.85	1	27.343	1.81	271.03	A
126.67-120.00			B	0.418	2.029	0.659	0.85	1	23.864			
			C	0.18	2.664	0.587	0.85	1	9.147			

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
T6	2.38	3.73	A	0.429	2.01	0.664	0.85	1	82.831	5.46	272.90	A
120.00-100.00			B	0.417	2.031	0.659	0.85	1	80.052			
			C	0.165	2.717	0.584	0.85	1	28.052			
T7	1.20	2.13	A	0.398	2.068	0.651	0.85	1	42.306	2.75	275.08	A
100.00-90.00			B	0.384	2.096	0.645	0.85	1	40.490			
			C	0.16	2.734	0.583	0.85	1	15.270			
T8	1.20	2.19	A	0.373	2.12	0.641	0.85	1	42.188	2.72	272.43	A
90.00-80.00			B	0.36	2.149	0.636	0.85	1	40.431			
			C	0.152	2.763	0.582	0.85	1	15.647			
T9	2.39	5.22	A	0.359	2.152	0.636	0.85	1	89.976	5.58	278.89	A
80.00-60.00			B	0.347	2.178	0.631	0.85	1	86.534			
			C	0.162	2.729	0.583	0.85	1	37.211			
T10	2.39	5.98	A	0.33	2.219	0.626	0.85	1	91.755	5.33	266.49	A
60.00-40.00			B	0.32	2.245	0.622	0.85	1	88.455			
			C	0.156	2.751	0.582	0.85	1	40.267			
T11	1.20	3.11	A	0.31	2.271	0.619	0.85	1	46.191	2.48	247.92	A
40.00-30.00			B	0.3	2.295	0.616	0.85	1	44.581			
			C	0.148	2.777	0.581	0.85	1	20.797			
T12	1.20	3.19	A	0.298	2.302	0.615	0.85	1	46.447	2.49	248.51	A
30.00-20.00			B	0.289	2.326	0.613	0.85	1	44.859			
			C	0.144	2.792	0.581	0.85	1	21.249			
T13	2.39	6.38	A	0.274	2.367	0.608	0.85	1	90.822	5.00	249.83	A
20.00-0.00			B	0.266	2.391	0.606	0.85	1	87.765			
			C	0.133	2.837	0.579	0.85	1	41.811			
Sum Weight:	16.99	39.23						OTM	3867.58 kip-ft	45.00		

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	0.06	1.25	A	0.174	2.684	0.585	1	1	18.112	0.56	27.85	A
180.00-160.00			B	0.139	2.812	0.58	1	1	14.322			
			C	0.139	2.812	0.58	1	1	14.322			
T2	0.31	1.50	A	0.393	2.078	0.649	1	1	51.175	1.18	58.80	A
160.00-140.00			B	0.144	2.796	0.581	1	1	16.733			
			C	0.144	2.796	0.581	1	1	16.733			
T3	0.10	0.83	A	0.368	2.132	0.639	1	1	18.033	0.41	62.09	A
140.00-133.33			B	0.151	2.769	0.582	1	1	6.733			
			C	0.151	2.769	0.582	1	1	6.733			
T4	0.17	0.84	A	0.35	2.172	0.632	1	1	18.002	0.42	62.26	A
133.33-126.67			B	0.23	2.498	0.597	1	1	11.201			
			C	0.145	2.791	0.581	1	1	6.848			
T5	0.25	0.86	A	0.334	2.21	0.627	1	1	18.007	0.42	62.41	A
126.67-120.00			B	0.305	2.283	0.617	1	1	16.213			
			C	0.14	2.81	0.58	1	1	6.976			
T6	0.82	2.93	A	0.31	2.269	0.619	1	1	55.626	1.28	63.85	A
120.00-100.00			B	0.307	2.278	0.618	1	1	54.892			
			C	0.133	2.834	0.579	1	1	22.353			
T7	0.41	1.68	A	0.289	2.326	0.613	1	1	28.760	0.65	64.92	A
100.00-90.00			B	0.284	2.339	0.611	1	1	28.235			
			C	0.131	2.844	0.579	1	1	12.284			
T8	0.41	1.72	A	0.27	2.377	0.607	1	1	28.864	0.65	64.51	A
90.00-80.00			B	0.266	2.39	0.606	1	1	28.349			

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	0.124	2.87	0.578	1	1	12.566			
T9	0.82	4.10	A	0.266	2.391	0.606	1	1	63.314	1.35	67.31	A
80.00-60.00			B	0.262	2.402	0.605	1	1	62.292			
			C	0.135	2.828	0.579	1	1	30.710			
T10	0.82	4.70	A	0.246	2.45	0.601	1	1	65.452	1.30	64.76	A
60.00-40.00			B	0.243	2.46	0.6	1	1	64.456			
			C	0.13	2.846	0.579	1	1	33.362			
T11	0.41	2.44	A	0.231	2.496	0.597	1	1	33.107	0.60	60.29	A
40.00-30.00			B	0.228	2.506	0.596	1	1	32.617			
			C	0.124	2.87	0.578	1	1	17.195			
T12	0.41	2.50	A	0.222	2.524	0.595	1	1	33.382	0.60	60.45	A
30.00-20.00			B	0.219	2.534	0.594	1	1	32.896			
			C	0.12	2.884	0.577	1	1	17.545			
T13	0.82	5.17	A	0.204	2.582	0.591	1	1	65.511	1.21	60.68	A
20.00-0.00			B	0.201	2.592	0.591	1	1	64.560			
			C	0.11	2.925	0.576	1	1	34.325			
Sum Weight:	5.84	30.51						OTM	897.25 kip-ft	10.61		

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	0.06	1.25	A	0.174	2.684	0.585	0.825	1	18.112	0.56	27.85	A
180.00-160.00			B	0.139	2.812	0.58	0.825	1	14.322			
			C	0.139	2.812	0.58	0.825	1	14.322			
T2	0.31	1.50	A	0.393	2.078	0.649	0.825	1	51.175	1.18	58.80	A
160.00-140.00			B	0.144	2.796	0.581	0.825	1	16.733			
			C	0.144	2.796	0.581	0.825	1	16.733			
T3	0.10	0.83	A	0.368	2.132	0.639	0.825	1	18.033	0.41	62.09	A
140.00-133.33			B	0.151	2.769	0.582	0.825	1	6.733			
			C	0.151	2.769	0.582	0.825	1	6.733			
T4	0.17	0.84	A	0.35	2.172	0.632	0.825	1	18.002	0.42	62.26	A
133.33-126.67			B	0.23	2.498	0.597	0.825	1	11.201			
			C	0.145	2.791	0.581	0.825	1	6.848			
T5	0.25	0.86	A	0.334	2.21	0.627	0.825	1	18.007	0.42	62.41	A
126.67-120.00			B	0.305	2.283	0.617	0.825	1	16.213			
			C	0.14	2.81	0.58	0.825	1	6.976			
T6	0.82	2.93	A	0.31	2.269	0.619	0.825	1	55.626	1.28	63.85	A
120.00-100.00			B	0.307	2.278	0.618	0.825	1	54.892			
			C	0.133	2.834	0.579	0.825	1	22.353			
T7	0.41	1.68	A	0.289	2.326	0.613	0.825	1	28.760	0.65	64.92	A
100.00-90.00			B	0.284	2.339	0.611	0.825	1	28.235			
			C	0.131	2.844	0.579	0.825	1	12.284			
T8	0.41	1.72	A	0.27	2.377	0.607	0.825	1	28.864	0.65	64.51	A
90.00-80.00			B	0.266	2.39	0.606	0.825	1	28.349			
			C	0.124	2.87	0.578	0.825	1	12.566			
T9	0.82	4.10	A	0.266	2.391	0.606	0.825	1	63.314	1.35	67.31	A
80.00-60.00			B	0.262	2.402	0.605	0.825	1	62.292			
			C	0.135	2.828	0.579	0.825	1	30.710			
T10	0.82	4.70	A	0.246	2.45	0.601	0.825	1	65.452	1.30	64.76	A
60.00-40.00			B	0.243	2.46	0.6	0.825	1	64.456			
			C	0.13	2.846	0.579	0.825	1	33.362			
T11	0.41	2.44	A	0.231	2.496	0.597	0.825	1	33.107	0.60	60.29	A

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
40.00-30.00			B	0.228	2.506	0.596	0.825	1	32.617			
			C	0.124	2.87	0.578	0.825	1	17.195			
T12	0.41	2.50	A	0.222	2.524	0.595	0.825	1	33.382	0.60	60.45	A
30.00-20.00			B	0.219	2.534	0.594	0.825	1	32.896			
			C	0.12	2.884	0.577	0.825	1	17.545			
T13	0.82	5.17	A	0.204	2.582	0.591	0.825	1	65.511	1.21	60.68	A
20.00-0.00			B	0.201	2.592	0.591	0.825	1	64.560			
			C	0.11	2.925	0.576	0.825	1	34.325			
Sum Weight:	5.84	30.51						OTM	897.25 kip-ft	10.61		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.06	1.25	A	0.174	2.684	0.585	0.8	1	18.112	0.56	27.85	A
180.00-160.00			B	0.139	2.812	0.58	0.8	1	14.322			
			C	0.139	2.812	0.58	0.8	1	14.322			
T2	0.31	1.50	A	0.393	2.078	0.649	0.8	1	51.175	1.18	58.80	A
160.00-140.00			B	0.144	2.796	0.581	0.8	1	16.733			
			C	0.144	2.796	0.581	0.8	1	16.733			
T3	0.10	0.83	A	0.368	2.132	0.639	0.8	1	18.033	0.41	62.09	A
140.00-133.33			B	0.151	2.769	0.582	0.8	1	6.733			
			C	0.151	2.769	0.582	0.8	1	6.733			
T4	0.17	0.84	A	0.35	2.172	0.632	0.8	1	18.002	0.42	62.26	A
133.33-126.67			B	0.23	2.498	0.597	0.8	1	11.201			
			C	0.145	2.791	0.581	0.8	1	6.848			
T5	0.25	0.86	A	0.334	2.21	0.627	0.8	1	18.007	0.42	62.41	A
126.67-120.00			B	0.305	2.283	0.617	0.8	1	16.213			
			C	0.14	2.81	0.58	0.8	1	6.976			
T6	0.82	2.93	A	0.31	2.269	0.619	0.8	1	55.626	1.28	63.85	A
120.00-100.00			B	0.307	2.278	0.618	0.8	1	54.892			
			C	0.133	2.834	0.579	0.8	1	22.353			
T7	0.41	1.68	A	0.289	2.326	0.613	0.8	1	28.760	0.65	64.92	A
100.00-90.00			B	0.284	2.339	0.611	0.8	1	28.235			
			C	0.131	2.844	0.579	0.8	1	12.284			
T8	0.41	1.72	A	0.27	2.377	0.607	0.8	1	28.864	0.65	64.51	A
90.00-80.00			B	0.266	2.39	0.606	0.8	1	28.349			
			C	0.124	2.87	0.578	0.8	1	12.566			
T9	0.82	4.10	A	0.266	2.391	0.606	0.8	1	63.314	1.35	67.31	A
80.00-60.00			B	0.262	2.402	0.605	0.8	1	62.292			
			C	0.135	2.828	0.579	0.8	1	30.710			
T10	0.82	4.70	A	0.246	2.45	0.601	0.8	1	65.452	1.30	64.76	A
60.00-40.00			B	0.243	2.46	0.6	0.8	1	64.456			
			C	0.13	2.846	0.579	0.8	1	33.362			
T11	0.41	2.44	A	0.231	2.496	0.597	0.8	1	33.107	0.60	60.29	A
40.00-30.00			B	0.228	2.506	0.596	0.8	1	32.617			
			C	0.124	2.87	0.578	0.8	1	17.195			
T12	0.41	2.50	A	0.222	2.524	0.595	0.8	1	33.382	0.60	60.45	A
30.00-20.00			B	0.219	2.534	0.594	0.8	1	32.896			
			C	0.12	2.884	0.577	0.8	1	17.545			
T13	0.82	5.17	A	0.204	2.582	0.591	0.8	1	65.511	1.21	60.68	A
20.00-0.00			B	0.201	2.592	0.591	0.8	1	64.560			
			C	0.11	2.925	0.576	0.8	1	34.325			

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
Sum Weight:	5.84	30.51						OTM	897.25 kip-ft	10.61		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.06	1.25	A	0.174	2.684	0.585	0.85	1	18.112	0.56	27.85	A
180.00-160.00			B	0.139	2.812	0.58	0.85	1	14.322			
			C	0.139	2.812	0.58	0.85	1	14.322			
T2	0.31	1.50	A	0.393	2.078	0.649	0.85	1	51.175	1.18	58.80	A
160.00-140.00			B	0.144	2.796	0.581	0.85	1	16.733			
			C	0.144	2.796	0.581	0.85	1	16.733			
T3	0.10	0.83	A	0.368	2.132	0.639	0.85	1	18.033	0.41	62.09	A
140.00-133.33			B	0.151	2.769	0.582	0.85	1	6.733			
			C	0.151	2.769	0.582	0.85	1	6.733			
T4	0.17	0.84	A	0.35	2.172	0.632	0.85	1	18.002	0.42	62.26	A
133.33-126.67			B	0.23	2.498	0.597	0.85	1	11.201			
			C	0.145	2.791	0.581	0.85	1	6.848			
T5	0.25	0.86	A	0.334	2.21	0.627	0.85	1	18.007	0.42	62.41	A
126.67-120.00			B	0.305	2.283	0.617	0.85	1	16.213			
			C	0.14	2.81	0.58	0.85	1	6.976			
T6	0.82	2.93	A	0.31	2.269	0.619	0.85	1	55.626	1.28	63.85	A
120.00-100.00			B	0.307	2.278	0.618	0.85	1	54.892			
			C	0.133	2.834	0.579	0.85	1	22.353			
T7	0.41	1.68	A	0.289	2.326	0.613	0.85	1	28.760	0.65	64.92	A
100.00-90.00			B	0.284	2.339	0.611	0.85	1	28.235			
			C	0.131	2.844	0.579	0.85	1	12.284			
T8	0.41	1.72	A	0.27	2.377	0.607	0.85	1	28.864	0.65	64.51	A
90.00-80.00			B	0.266	2.39	0.606	0.85	1	28.349			
			C	0.124	2.87	0.578	0.85	1	12.566			
T9	0.82	4.10	A	0.266	2.391	0.606	0.85	1	63.314	1.35	67.31	A
80.00-60.00			B	0.262	2.402	0.605	0.85	1	62.292			
			C	0.135	2.828	0.579	0.85	1	30.710			
T10	0.82	4.70	A	0.246	2.45	0.601	0.85	1	65.452	1.30	64.76	A
60.00-40.00			B	0.243	2.46	0.6	0.85	1	64.456			
			C	0.13	2.846	0.579	0.85	1	33.362			
T11	0.41	2.44	A	0.231	2.496	0.597	0.85	1	33.107	0.60	60.29	A
40.00-30.00			B	0.228	2.506	0.596	0.85	1	32.617			
			C	0.124	2.87	0.578	0.85	1	17.195			
T12	0.41	2.50	A	0.222	2.524	0.595	0.85	1	33.382	0.60	60.45	A
30.00-20.00			B	0.219	2.534	0.594	0.85	1	32.896			
			C	0.12	2.884	0.577	0.85	1	17.545			
T13	0.82	5.17	A	0.204	2.582	0.591	0.85	1	65.511	1.21	60.68	A
20.00-0.00			B	0.201	2.592	0.591	0.85	1	64.560			
			C	0.11	2.925	0.576	0.85	1	34.325			
Sum Weight:	5.84	30.51						OTM	897.25 kip-ft	10.61		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	14.03					
Bracing Weight	16.48					
Total Member Self-Weight	30.51			-14.65	-0.45	
Total Weight	43.16			-14.65	-0.45	
Wind 0 deg - No Ice		0.13	-48.92	-5128.33	-23.06	-28.24
Wind 30 deg - No Ice		24.61	-42.43	-4454.53	-2584.04	-25.78
Wind 45 deg - No Ice		34.74	-34.68	-3646.55	-3642.49	-21.83
Wind 60 deg - No Ice		42.50	-24.57	-2591.07	-4452.75	-16.40
Wind 90 deg - No Ice		48.99	-0.13	-37.25	-5128.47	-2.63
Wind 120 deg - No Ice		42.36	24.34	2522.62	-4430.14	11.84
Wind 135 deg - No Ice		34.55	34.50	3585.29	-3610.52	18.11
Wind 150 deg - No Ice		24.38	42.30	4402.63	-2544.88	23.15
Wind 180 deg - No Ice		-0.13	48.92	5099.04	22.15	28.24
Wind 210 deg - No Ice		-24.61	42.43	4425.23	2583.13	25.78
Wind 225 deg - No Ice		-34.74	34.68	3617.26	3641.59	21.83
Wind 240 deg - No Ice		-42.50	24.57	2561.77	4451.84	16.40
Wind 270 deg - No Ice		-48.99	0.13	7.96	5127.56	2.63
Wind 300 deg - No Ice		-42.36	-24.34	-2551.91	4429.24	-11.84
Wind 315 deg - No Ice		-34.55	-34.50	-3614.58	3609.62	-18.11
Wind 330 deg - No Ice		-24.38	-42.30	-4431.93	2543.98	-23.15
Member Ice	8.72					
Total Weight Ice	66.13			-43.29	-0.37	
Wind 0 deg - Ice		0.13	-62.06	-6498.13	-23.39	-40.13
Wind 30 deg - Ice		31.19	-53.81	-5644.86	-3255.19	-39.64
Wind 45 deg - Ice		44.03	-43.98	-4623.83	-4591.47	-35.29
Wind 60 deg - Ice		53.88	-31.15	-3290.65	-5614.86	-28.53
Wind 90 deg - Ice		62.14	-0.13	-66.31	-6470.14	-9.77
Wind 120 deg - Ice		53.75	30.91	3164.20	-5591.85	11.60
Wind 135 deg - Ice		43.84	43.79	4504.70	-4558.92	21.47
Wind 150 deg - Ice		30.95	53.68	5535.26	-3215.33	29.87
Wind 180 deg - Ice		-0.13	62.06	6411.55	22.64	40.13
Wind 210 deg - Ice		-31.19	53.81	5558.27	3254.44	39.64
Wind 225 deg - Ice		-44.03	43.98	4537.25	4590.72	35.29
Wind 240 deg - Ice		-53.88	31.15	3204.06	5614.12	28.53
Wind 270 deg - Ice		-62.14	0.13	-20.28	6469.39	9.77
Wind 300 deg - Ice		-53.75	-30.91	-3250.78	5591.10	-11.60
Wind 315 deg - Ice		-43.84	-43.79	-4591.28	4558.17	-21.47
Wind 330 deg - Ice		-30.95	-53.68	-5621.84	3214.58	-29.87
Total Weight	43.16			-14.65	-0.45	
Wind 0 deg - Service		0.04	-15.10	-1577.18	-6.46	-8.72
Wind 30 deg - Service		7.60	-13.10	-1369.22	-796.89	-7.96
Wind 45 deg - Service		10.72	-10.71	-1119.84	-1123.57	-6.74
Wind 60 deg - Service		13.12	-7.58	-794.07	-1373.65	-5.06
Wind 90 deg - Service		15.12	-0.04	-5.86	-1582.21	-0.81
Wind 120 deg - Service		13.08	7.51	784.22	-1366.68	3.66
Wind 135 deg - Service		10.66	10.65	1112.21	-1113.71	5.59
Wind 150 deg - Service		7.53	13.06	1364.47	-784.81	7.14
Wind 180 deg - Service		-0.04	15.10	1579.41	7.49	8.72
Wind 210 deg - Service		-7.60	13.10	1371.45	797.92	7.96
Wind 225 deg - Service		-10.72	10.71	1122.08	1124.60	6.74
Wind 240 deg - Service		-13.12	7.58	796.31	1374.68	5.06
Wind 270 deg - Service		-15.12	0.04	8.09	1583.23	0.81
Wind 300 deg - Service		-13.08	-7.51	-781.99	1367.70	-3.66
Wind 315 deg - Service		-10.66	-10.65	-1109.97	1114.73	-5.59
Wind 330 deg - Service		-7.53	-13.06	-1362.24	785.83	-7.14

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
19	Dead+Wind 0 deg+Ice
20	Dead+Wind 30 deg+Ice
21	Dead+Wind 45 deg+Ice
22	Dead+Wind 60 deg+Ice
23	Dead+Wind 90 deg+Ice
24	Dead+Wind 120 deg+Ice
25	Dead+Wind 135 deg+Ice
26	Dead+Wind 150 deg+Ice
27	Dead+Wind 180 deg+Ice
28	Dead+Wind 210 deg+Ice
29	Dead+Wind 225 deg+Ice
30	Dead+Wind 240 deg+Ice
31	Dead+Wind 270 deg+Ice
32	Dead+Wind 300 deg+Ice
33	Dead+Wind 315 deg+Ice
34	Dead+Wind 330 deg+Ice
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	180 - 160	Leg	Max Tension	27	4.71	-0.48	0.16
			Max. Compression	30	-6.66	0.05	-0.10
			Max. Mx	22	-0.33	-1.08	-0.21
			Max. My	34	-0.33	-0.00	-1.82
			Max. Vy	22	0.69	-1.08	-0.21
			Max. Vx	34	-0.99	-0.00	1.51
		Diagonal	Max Tension	23	5.84	0.00	0.00
			Max. Compression	23	-5.93	0.00	0.00
			Max. Mx	31	5.84	0.02	0.00
			Max. My	19	0.50	0.00	0.00
			Max. Vy	31	-0.01	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Horizontal	Max Tension	23	3.21	0.00	0.00
			Max. Compression	23	-3.16	0.00	0.00
			Max. Mx	27	0.07	-0.02	-0.01
			Max. My	22	-0.06	-0.01	-0.01
			Max. Vy	27	-0.01	-0.02	-0.01
			Max. Vx	22	0.00	-0.01	-0.01
		Top Girt	Max Tension	27	0.77	-0.01	0.00
			Max. Compression	19	-0.77	-0.01	-0.00
			Max. Mx	32	-0.05	-0.01	-0.00
			Max. My	22	-0.34	-0.01	-0.00
			Max. Vy	32	-0.01	-0.01	-0.00
			Max. Vx	27	0.00	-0.01	-0.00
		Inner Bracing	Max Tension	19	0.01	0.00	0.00
			Max. Compression	19	-0.01	0.00	0.00
			Max. Mx	18	-0.00	-0.01	0.00
			Max. My	30	0.00	0.00	-0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	32	29.63	-0.43	0.08
			Max. Compression	30	-36.16	0.43	-0.03
			Max. Mx	22	9.19	-0.46	0.01
			Max. My	34	-3.41	-0.01	0.60
			Max. Vy	22	0.36	-0.46	0.01
			Max. Vx	34	-0.44	-0.01	0.56
		Diagonal	Max Tension	23	8.59	0.00	0.00
			Max. Compression	23	-8.70	0.00	0.00
			Max. Mx	20	8.37	0.03	0.00
			Max. My	19	1.05	0.00	0.00
			Max. Vy	20	0.01	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Horizontal	Max Tension	23	5.41	0.00	0.00
			Max. Compression	23	-5.38	-0.01	0.00
			Max. Mx	32	0.62	-0.02	-0.01
			Max. My	30	-0.00	-0.01	0.01
			Max. Vy	32	-0.02	-0.02	-0.01
			Max. Vx	30	-0.00	-0.01	0.01
		Inner Bracing	Max Tension	34	0.01	0.00	0.00
			Max. Compression	23	-0.01	0.00	0.00
			Max. Mx	18	-0.00	-0.01	0.00
			Max. My	30	0.00	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T3	140 - 133.333	Leg	Max Tension	32	39.61	-0.43	0.08
			Max. Compression	30	-47.07	0.77	-0.01
			Max. Mx	22	39.34	-0.82	0.01
			Max. My	34	-3.88	-0.02	0.72
			Max. Vy	22	0.37	-0.82	0.01
			Max. Vx	34	-0.39	-0.02	0.72
		Diagonal	Max Tension	23	8.65	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. Compression	23	-8.80	0.00	0.00
			Max. Mx	20	8.60	0.04	0.00
			Max. My	19	1.35	0.00	0.00
			Max. Vy	20	-0.02	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Horizontal	Max Tension	23	5.67	0.00	0.00
			Max. Compression	23	-5.64	-0.02	0.00
			Max. Mx	32	0.64	-0.03	-0.01
			Max. My	22	-0.43	-0.03	-0.01
			Max. Vy	32	-0.02	-0.03	-0.01
			Max. Vx	22	0.00	-0.03	-0.01
		Inner Bracing	Max Tension	25	0.00	0.00	0.00
			Max. Compression	27	-0.01	0.00	0.00
			Max. Mx	18	-0.00	-0.01	0.00
			Max. My	19	0.00	0.00	-0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T4	133.333 - 126.667	Leg	Max Tension	32	49.33	-0.81	0.03
			Max. Compression	30	-59.04	0.81	0.01
			Max. Mx	32	48.05	-0.86	0.02
			Max. My	34	-5.51	-0.02	0.90
			Max. Vy	32	-1.87	-0.81	0.03
			Max. Vx	34	1.82	-0.02	0.72
		Diagonal	Max Tension	23	11.11	0.00	0.00
			Max. Compression	23	-11.27	0.00	0.00
			Max. Mx	20	11.07	0.05	0.00
			Max. My	19	1.34	0.00	0.00
			Max. Vy	20	-0.02	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Top Girt	Max Tension	27	7.54	-0.02	0.01
			Max. Compression	24	-7.57	-0.03	-0.01
			Max. Mx	32	-0.23	-0.04	-0.02
			Max. My	22	-1.18	-0.04	-0.02
			Max. Vy	32	-0.02	-0.04	-0.02
			Max. Vx	22	0.00	-0.04	-0.02
		Inner Bracing	Max Tension	24	0.13	0.00	0.00
			Max. Compression	24	-0.13	0.00	0.00
			Max. Mx	18	0.00	-0.01	0.00
			Max. My	19	0.13	0.00	-0.00
			Max. Vy	18	0.01	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
T5	126.667 - 120	Leg	Max Tension	22	60.84	-0.86	-0.00
			Max. Compression	30	-73.04	1.12	-0.04
			Max. Mx	27	60.10	-1.14	-0.07
			Max. My	34	-6.28	-0.01	1.15
			Max. Vy	27	-0.65	-0.86	-0.01
			Max. Vx	23	0.65	-0.02	0.88
		Diagonal	Max Tension	23	11.83	0.00	0.00
			Max. Compression	23	-12.01	0.00	0.00
			Max. Mx	20	11.80	0.05	0.00
			Max. My	19	1.26	0.00	0.00
			Max. Vy	20	-0.02	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Top Girt	Max Tension	23	8.24	-0.03	0.00
			Max. Compression	23	-8.22	-0.03	0.00
			Max. Mx	22	-0.67	-0.04	-0.02
			Max. My	22	-0.63	-0.04	-0.02
			Max. Vy	22	-0.02	-0.04	-0.02
			Max. Vx	22	0.00	-0.04	-0.02
		Inner Bracing	Max Tension	23	0.14	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. Compression	23	-0.14	0.00	0.00
			Max. Mx	18	-0.00	-0.02	0.00
			Max. My	19	0.14	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T6	120 - 100	Leg	Max Tension	22	92.92	-1.16	0.06
			Max. Compression	30	-108.26	1.18	-0.06
			Max. Mx	27	91.56	-1.21	-0.06
			Max. My	31	-6.12	-0.03	-1.24
			Max. Vy	27	-0.49	-1.18	-0.04
			Max. Vx	31	-0.52	-0.03	-1.24
		Diagonal	Max Tension	20	14.91	0.00	0.00
			Max. Compression	20	-15.15	0.00	0.00
			Max. Mx	20	14.69	0.12	0.00
			Max. My	19	1.55	0.00	0.00
			Max. Vy	20	-0.04	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Horizontal	Max Tension	28	8.86	0.00	0.00
			Max. Compression	28	-8.89	-0.04	-0.00
			Max. Mx	22	0.99	-0.06	-0.02
			Max. My	22	-1.01	-0.05	-0.02
			Max. Vy	22	-0.03	-0.06	-0.02
			Max. Vx	22	0.00	-0.05	-0.02
		Inner Bracing	Max Tension	26	0.00	0.00	0.00
			Max. Compression	20	-0.01	0.00	0.00
			Max. Mx	18	-0.00	-0.03	0.00
			Max. My	19	0.00	0.00	-0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T7	100 - 90	Leg	Max Tension	22	111.18	-1.20	0.06
			Max. Compression	30	-128.38	1.15	-0.05
			Max. Mx	27	109.84	-1.21	-0.06
			Max. My	31	-8.54	-0.04	-1.20
			Max. Vy	27	-0.48	-1.21	-0.06
			Max. Vx	23	-0.49	-0.03	1.20
		Diagonal	Max Tension	28	13.42	0.00	0.00
			Max. Compression	28	-13.72	0.00	0.00
			Max. Mx	20	13.39	0.13	0.00
			Max. My	19	1.32	0.00	0.00
			Max. Vy	20	-0.04	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
		Horizontal	Max Tension	28	8.49	0.00	0.00
			Max. Compression	28	-8.62	-0.04	-0.00
			Max. Mx	22	1.18	-0.06	-0.02
			Max. My	22	-1.20	-0.06	-0.02
			Max. Vy	22	-0.03	-0.06	-0.02
			Max. Vx	22	0.00	-0.06	-0.02
		Inner Bracing	Max Tension	26	0.00	0.00	0.00
			Max. Compression	20	-0.01	0.00	0.00
			Max. Mx	18	-0.00	-0.04	0.00
			Max. My	19	0.00	0.00	-0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
T8	90 - 80	Leg	Max Tension	22	126.96	-1.18	0.06
			Max. Compression	30	-146.14	1.34	-0.06
			Max. Mx	27	124.82	-1.38	-0.07
			Max. My	34	-9.60	-0.01	1.45
			Max. Vy	27	0.49	-1.38	-0.07
			Max. Vx	23	-0.51	-0.03	1.44
		Diagonal	Max Tension	28	13.24	0.00	0.00
			Max. Compression	28	-13.56	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	20	13.19	0.15	0.00
			Max. My	19	1.21	0.00	0.00
			Max. Vy	20	0.04	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Top Girt	Max Tension	28	8.82	-0.05	-0.00
			Max. Compression	28	-8.85	-0.05	-0.00
			Max. Mx	22	-0.16	-0.06	-0.01
			Max. My	22	-0.74	-0.06	-0.01
			Max. Vy	22	-0.03	-0.06	-0.01
			Max. Vx	22	0.00	-0.06	-0.01
		Inner Bracing	Max Tension	28	0.15	0.00	0.00
			Max. Compression	28	-0.15	0.00	0.00
			Max. Mx	18	-0.01	-0.05	0.00
			Max. My	19	0.14	0.00	-0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
T9	80 - 60	Leg	Max Tension	22	156.82	-1.64	0.05
			Max. Compression	19	-180.74	1.74	0.07
			Max. Mx	27	154.00	-1.79	-0.07
			Max. My	34	-11.81	-0.02	1.80
			Max. Vy	27	0.51	-1.64	-0.02
			Max. Vx	31	0.51	-0.03	-1.62
		Diagonal	Max Tension	28	13.72	0.00	0.00
			Max. Compression	28	-14.15	0.00	0.00
			Max. Mx	20	13.64	0.18	0.00
			Max. My	19	1.11	0.00	0.00
			Max. Vy	20	-0.05	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Horizontal	Max Tension	28	9.87	0.00	0.00
			Max. Compression	28	-9.84	-0.09	-0.00
			Max. Mx	22	1.66	-0.12	-0.02
			Max. My	27	-1.64	-0.11	-0.02
			Max. Vy	22	-0.05	-0.12	-0.02
			Max. Vx	22	0.00	-0.11	-0.02
		Inner Bracing	Max Tension	8	0.00	0.00	0.00
			Max. Compression	21	-0.01	0.00	0.00
			Max. Mx	18	-0.01	-0.07	0.00
			Max. My	19	-0.00	0.00	-0.00
			Max. Vy	18	0.03	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T10	60 - 40	Leg	Max Tension	22	185.18	-1.62	0.04
			Max. Compression	19	-215.06	1.41	0.04
			Max. Mx	27	168.74	-1.79	-0.07
			Max. My	34	-12.72	-0.02	1.80
			Max. Vy	27	-0.54	-1.79	-0.07
			Max. Vx	31	-0.52	-0.03	-1.79
		Diagonal	Max Tension	28	13.95	0.00	0.00
			Max. Compression	28	-14.54	0.00	0.00
			Max. Mx	20	13.85	0.25	0.00
			Max. My	19	0.96	0.00	0.00
			Max. Vy	20	-0.07	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Horizontal	Max Tension	28	10.69	0.00	0.00
			Max. Compression	28	-10.57	-0.12	-0.00
			Max. Mx	22	1.98	-0.15	-0.02
			Max. My	27	-1.96	-0.13	-0.02
			Max. Vy	22	-0.06	-0.15	-0.02
			Max. Vx	22	0.00	-0.13	-0.02
		Inner Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	21	-0.01	0.00	0.00
			Max. Mx	18	-0.01	-0.13	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	19	-0.00	0.00	-0.00
			Max. Vy	18	0.05	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T11	40 - 30	Leg	Max Tension	22	198.93	-1.52	0.05
			Max. Compression	19	-231.67	2.28	-0.01
			Max. Mx	30	-230.70	2.29	-0.00
			Max. My	31	-16.70	-0.05	-1.70
			Max. Vy	27	0.49	-2.08	0.01
			Max. Vx	31	-0.50	-0.05	-1.70
		Diagonal	Max Tension	28	14.04	0.00	0.00
			Max. Compression	28	-14.68	0.00	0.00
			Max. Mx	20	13.93	0.28	0.00
			Max. My	19	0.85	0.00	0.00
			Max. Vy	20	-0.07	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Horizontal	Max Tension	28	11.03	0.00	0.00
			Max. Compression	28	-10.90	-0.13	-0.00
			Max. Mx	22	2.14	-0.16	-0.02
			Max. My	27	-2.11	-0.16	-0.02
			Max. Vy	22	-0.06	-0.16	-0.02
			Max. Vx	22	0.00	-0.16	-0.02
		Inner Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	28	-0.01	0.00	0.00
			Max. Mx	18	-0.01	-0.14	0.00
			Max. My	19	-0.00	0.00	-0.00
			Max. Vy	18	0.05	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T12	30 - 20	Leg	Max Tension	22	212.27	-2.10	0.02
			Max. Compression	19	-247.91	-1.50	0.22
			Max. Mx	30	-246.42	2.29	-0.00
			Max. My	34	-17.19	-0.44	4.23
			Max. Vy	30	0.78	2.29	-0.00
			Max. Vx	23	-0.75	-0.51	4.17
		Diagonal	Max Tension	28	14.11	0.00	0.00
			Max. Compression	28	-14.79	0.00	0.00
			Max. Mx	20	13.99	0.30	0.00
			Max. My	19	0.77	0.00	0.00
			Max. Vy	20	-0.07	0.00	0.00
			Max. Vx	19	-0.00	0.00	0.00
		Top Girt	Max Tension	28	11.38	-0.14	-0.00
			Max. Compression	28	-11.14	-0.14	-0.00
			Max. Mx	22	0.79	-0.17	-0.02
			Max. My	27	1.06	-0.17	-0.02
			Max. Vy	22	-0.06	-0.17	-0.02
			Max. Vx	22	0.00	-0.17	-0.02
		Inner Bracing	Max Tension	28	0.19	0.00	0.00
			Max. Compression	28	-0.19	0.00	0.00
			Max. Mx	18	-0.01	-0.16	0.00
			Max. My	19	0.17	0.00	-0.00
			Max. Vy	18	0.05	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T13	20 - 0	Leg	Max Tension	22	222.75	0.39	0.17
			Max. Compression	19	-263.35	0.00	-0.00
			Max. Mx	19	-262.60	7.15	-0.29
			Max. My	34	-18.52	-0.44	4.23
			Max. Vy	30	-1.26	7.10	0.20
			Max. Vx	34	1.06	-0.44	4.23
		Diagonal	Max Tension	28	22.13	-0.20	0.03
			Max. Compression	28	-22.78	0.00	0.00
			Max. Mx	21	13.69	-0.27	0.06
			Max. My	20	-21.46	0.01	-0.13

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	21	0.06	-0.27	0.06
			Max. Vx	20	-0.01	0.00	0.00
		Horizontal	Max Tension	28	12.05	0.00	0.00
			Max. Compression	28	-12.26	-0.25	-0.00
			Max. Mx	22	-2.49	-0.37	-0.04
			Max. My	30	1.87	-0.14	0.04
			Max. Vy	22	0.10	-0.37	-0.04
			Max. Vx	30	-0.00	-0.14	0.04
		Redund Horz 1 Bracing	Max Tension	19	4.57	0.00	0.00
			Max. Compression	19	-4.57	0.00	0.00
			Max. Mx	18	0.39	0.02	0.00
			Max. Vy	18	-0.01	0.00	0.00
		Redund Diag 1 Bracing	Max Tension	19	4.18	0.00	0.00
			Max. Compression	19	-4.18	0.00	0.00
			Max. Mx	19	4.18	0.03	0.00
			Max. My	20	1.29	0.00	0.00
			Max. Vy	19	-0.01	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Redund Hip 1 Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-0.03	0.00	0.00
			Max. Mx	18	-0.01	0.04	0.00
			Max. Vy	18	-0.02	0.00	0.00
		Inner Bracing	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-0.01	0.00	0.00
			Max. Mx	18	-0.01	0.11	0.00
			Max. My	19	-0.00	0.00	0.00
			Max. Vy	18	-0.03	0.00	0.00
			Max. Vx	19	-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	292.40	32.11	-19.24
	Max. H_x	30	292.40	32.11	-19.24
	Max. H_z	21	-240.96	-27.37	18.40
	Min. Vert	22	-250.15	-29.26	17.57
	Min. H_x	22	-250.15	-29.26	17.57
	Min. H_z	29	283.21	30.28	-20.00
Leg B	Max. Vert	24	290.76	-32.39	-18.46
	Max. H_x	32	-248.45	29.56	16.75
	Max. H_z	33	-239.08	27.83	17.26
	Min. Vert	32	-248.45	29.56	16.75
	Min. H_x	24	290.76	-32.39	-18.46
	Min. H_z	25	281.38	-30.72	-18.92
Leg A	Max. Vert	19	293.83	-0.82	37.36
	Max. H_x	31	22.89	5.92	1.78
	Max. H_z	19	293.83	-0.82	37.36
	Min. Vert	27	-246.12	0.86	-33.96
	Min. H_x	23	24.81	-5.92	1.95
	Min. H_z	27	-246.12	0.86	-33.96

Tower Mast Reaction Summary

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	43.16	0.00	0.00	-14.65	-0.45	0.00
Dead+Wind 0 deg - No Ice	43.16	0.13	-48.92	-5136.59	-23.04	-28.25
Dead+Wind 30 deg - No Ice	43.16	24.61	-42.43	-4461.73	-2588.17	-25.78
Dead+Wind 45 deg - No Ice	43.16	34.74	-34.68	-3652.45	-3648.35	-21.84
Dead+Wind 60 deg - No Ice	43.16	42.50	-24.57	-2595.27	-4459.75	-16.42
Dead+Wind 90 deg - No Ice	43.16	48.99	-0.13	-37.29	-5136.74	-2.67
Dead+Wind 120 deg - No Ice	43.16	42.36	24.35	2526.73	-4437.26	11.82
Dead+Wind 135 deg - No Ice	43.16	34.55	34.50	3591.12	-3616.29	18.10
Dead+Wind 150 deg - No Ice	43.16	24.38	42.30	4409.77	-2548.92	23.14
Dead+Wind 180 deg - No Ice	43.16	-0.13	48.92	5107.26	22.27	28.25
Dead+Wind 210 deg - No Ice	43.16	-24.61	42.43	4432.36	2587.35	25.78
Dead+Wind 225 deg - No Ice	43.16	-34.74	34.68	3623.08	3647.49	21.84
Dead+Wind 240 deg - No Ice	43.16	-42.50	24.57	2565.90	4459.04	16.42
Dead+Wind 270 deg - No Ice	43.16	-48.99	0.13	8.01	5135.84	2.67
Dead+Wind 300 deg - No Ice	43.16	-42.36	-24.34	-2555.83	4436.33	-11.81
Dead+Wind 315 deg - No Ice	43.16	-34.55	-34.50	-3620.35	3615.48	-18.10
Dead+Wind 330 deg - No Ice	43.16	-24.38	-42.30	-4439.03	2548.14	-23.14
Dead+Ice	66.13	0.00	0.00	-43.27	-0.37	-0.00
Dead+Wind 0 deg+Ice	66.13	0.13	-62.06	-6514.37	-23.35	-40.15
Dead+Wind 30 deg+Ice	66.13	31.19	-53.81	-5659.01	-3263.28	-39.67
Dead+Wind 45 deg+Ice	66.13	44.03	-43.98	-4635.43	-4602.93	-35.34
Dead+Wind 60 deg+Ice	66.13	53.88	-31.15	-3298.90	-5628.91	-28.62
Dead+Wind 90 deg+Ice	66.13	62.14	-0.13	-66.43	-6486.34	-9.92
Dead+Wind 120 deg+Ice	66.13	53.75	30.91	3172.21	-5605.79	11.51
Dead+Wind 135 deg+Ice	66.13	43.84	43.79	4516.07	-4570.24	21.42
Dead+Wind 150 deg+Ice	66.13	30.95	53.68	5549.20	-3223.25	29.86
Dead+Wind 180 deg+Ice	66.13	-0.13	62.06	6427.63	22.86	40.16
Dead+Wind 210 deg+Ice	66.13	-31.19	53.81	5572.18	3262.71	39.67
Dead+Wind 225 deg+Ice	66.13	-44.03	43.98	4548.60	4602.30	35.34
Dead+Wind 240 deg+Ice	66.13	-53.88	31.15	3212.09	5628.23	28.62
Dead+Wind 270 deg+Ice	66.13	-62.14	0.13	-20.27	6485.61	9.92
Dead+Wind 300 deg+Ice	66.13	-53.75	-30.91	-3258.65	5605.06	-11.50
Dead+Wind 315 deg+Ice	66.13	-43.84	-43.79	-4602.67	4569.65	-21.42
Dead+Wind 330 deg+Ice	66.13	-30.95	-53.68	-5635.83	3222.72	-29.86
Dead+Wind 0 deg - Service	43.16	0.04	-15.10	-1595.52	-7.44	-8.72
Dead+Wind 30 deg - Service	43.16	7.60	-13.10	-1387.21	-799.13	-7.96
Dead+Wind 45 deg - Service	43.16	10.72	-10.71	-1137.48	-1126.34	-6.74
Dead+Wind 60 deg - Service	43.16	13.12	-7.58	-811.15	-1376.84	-5.07
Dead+Wind 90 deg - Service	43.16	15.12	-0.04	-21.65	-1585.74	-0.82
Dead+Wind 120 deg - Service	43.16	13.08	7.51	769.71	-1369.85	3.65
Dead+Wind 135 deg - Service	43.16	10.66	10.65	1098.23	-1116.47	5.58
Dead+Wind 150 deg - Service	43.16	7.53	13.06	1350.91	-787.07	7.15
Dead+Wind 180 deg - Service	43.16	-0.04	15.10	1566.19	6.56	8.72
Dead+Wind 210 deg - Service	43.16	-7.60	13.10	1357.88	798.25	7.96
Dead+Wind 225 deg - Service	43.16	-10.72	10.71	1108.11	1125.46	6.75
Dead+Wind 240 deg - Service	43.16	-13.12	7.58	781.81	1375.94	5.07
Dead+Wind 270 deg - Service	43.16	-15.12	0.04	-7.67	1584.83	0.82
Dead+Wind 300 deg - Service	43.16	-13.08	-7.51	-799.03	1368.96	-3.65
Dead+Wind 315 deg - Service	43.16	-10.66	-10.65	-1127.57	1115.57	-5.59
Dead+Wind 330 deg - Service	43.16	-7.53	-13.06	-1380.26	786.13	-7.15

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	-43.16	0.00	0.00	43.16	0.00	0.000%
2	0.13	-43.16	-48.92	-0.13	43.16	48.92	0.000%
3	24.61	-43.16	-42.43	-24.61	43.16	42.43	0.001%
4	34.74	-43.16	-34.68	-34.74	43.16	34.68	0.000%
5	42.50	-43.16	-24.57	-42.50	43.16	24.57	0.000%
6	48.99	-43.16	-0.13	-48.99	43.16	0.13	0.000%
7	42.36	-43.16	24.34	-42.36	43.16	-24.35	0.000%
8	34.55	-43.16	34.50	-34.55	43.16	-34.50	0.000%
9	24.38	-43.16	42.30	-24.38	43.16	-42.30	0.000%
10	-0.13	-43.16	48.92	0.13	43.16	-48.92	0.000%
11	-24.61	-43.16	42.43	24.61	43.16	-42.43	0.001%
12	-34.74	-43.16	34.68	34.74	43.16	-34.68	0.001%
13	-42.50	-43.16	24.57	42.50	43.16	-24.57	0.000%
14	-48.99	-43.16	0.13	48.99	43.16	-0.13	0.000%
15	-42.36	-43.16	-24.34	42.36	43.16	24.34	0.000%
16	-34.55	-43.16	-34.50	34.55	43.16	34.50	0.000%
17	-24.38	-43.16	-42.30	24.38	43.16	42.30	0.000%
18	0.00	-66.13	0.00	0.00	66.13	0.00	0.000%
19	0.13	-66.13	-62.06	-0.13	66.13	62.06	0.001%
20	31.19	-66.13	-53.81	-31.19	66.13	53.81	0.001%
21	44.03	-66.13	-43.98	-44.03	66.13	43.98	0.001%
22	53.88	-66.13	-31.15	-53.88	66.13	31.15	0.001%
23	62.14	-66.13	-0.13	-62.14	66.13	0.13	0.001%
24	53.75	-66.13	30.91	-53.75	66.13	-30.91	0.000%
25	43.84	-66.13	43.79	-43.84	66.13	-43.79	0.001%
26	30.95	-66.13	53.68	-30.95	66.13	-53.68	0.001%
27	-0.13	-66.13	62.06	0.13	66.13	-62.06	0.001%
28	-31.19	-66.13	53.81	31.19	66.13	-53.81	0.001%
29	-44.03	-66.13	43.98	44.03	66.13	-43.98	0.001%
30	-53.88	-66.13	31.15	53.88	66.13	-31.15	0.001%
31	-62.14	-66.13	0.13	62.14	66.13	-0.13	0.001%
32	-53.75	-66.13	-30.91	53.75	66.13	30.91	0.000%
33	-43.84	-66.13	-43.79	43.84	66.13	43.79	0.001%
34	-30.95	-66.13	-53.68	30.95	66.13	53.68	0.001%
35	0.04	-43.16	-15.10	-0.04	43.16	15.10	0.000%
36	7.60	-43.16	-13.10	-7.60	43.16	13.10	0.000%
37	10.72	-43.16	-10.71	-10.72	43.16	10.71	0.000%
38	13.12	-43.16	-7.58	-13.12	43.16	7.58	0.000%
39	15.12	-43.16	-0.04	-15.12	43.16	0.04	0.000%
40	13.08	-43.16	7.51	-13.08	43.16	-7.51	0.000%
41	10.66	-43.16	10.65	-10.66	43.16	-10.65	0.000%
42	7.53	-43.16	13.06	-7.53	43.16	-13.06	0.000%
43	-0.04	-43.16	15.10	0.04	43.16	-15.10	0.000%
44	-7.60	-43.16	13.10	7.60	43.16	-13.10	0.000%
45	-10.72	-43.16	10.71	10.72	43.16	-10.71	0.000%
46	-13.12	-43.16	7.58	13.12	43.16	-7.58	0.000%
47	-15.12	-43.16	0.04	15.12	43.16	-0.04	0.000%
48	-13.08	-43.16	-7.51	13.08	43.16	7.51	0.000%
49	-10.66	-43.16	-10.65	10.66	43.16	10.65	0.000%
50	-7.53	-43.16	-13.06	7.53	43.16	13.06	0.000%

Non-Linear Convergence Results

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

2	Yes	4	0.00000001	0.00000126
3	Yes	4	0.00000001	0.00000292
4	Yes	4	0.00000001	0.00000250
5	Yes	4	0.00000001	0.00000196
6	Yes	4	0.00000001	0.00000210
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000124
9	Yes	4	0.00000001	0.00000159
10	Yes	4	0.00000001	0.00000181
11	Yes	4	0.00000001	0.00000293
12	Yes	4	0.00000001	0.00000219
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000211
15	Yes	4	0.00000001	0.00000164
16	Yes	4	0.00000001	0.00000159
17	Yes	4	0.00000001	0.00000158
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000264
20	Yes	4	0.00021045	0.00000641
21	Yes	4	0.00000001	0.00000562
22	Yes	4	0.00000001	0.00000375
23	Yes	4	0.00000001	0.00000408
24	Yes	4	0.00000001	0.00000208
25	Yes	4	0.00000001	0.00000259
26	Yes	4	0.00000001	0.00000331
27	Yes	4	0.00000001	0.00000400
28	Yes	4	0.00021509	0.00000645
29	Yes	4	0.00017767	0.00000485
30	Yes	4	0.00000001	0.00000237
31	Yes	4	0.00000001	0.00000408
32	Yes	4	0.00000001	0.00000352
33	Yes	4	0.00000001	0.00000344
34	Yes	4	0.00000001	0.00000327
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	*Elevation*	*Horz. Deflection*	*Gov. Load Comb.*	*Tilt*	*Twist*
	ft	*in*		°	°
T1	180 - 160	2.559	37	0.1136	0.0551
T2	160 - 140	2.076	37	0.1113	0.0421
T3	140 - 133.333	1.600	37	0.0997	0.0269
T4	133.333 - 126.667	1.456	37	0.0964	0.0235
T5	126.667 - 120	1.313	37	0.0926	0.0204

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T6	120 - 100	1.176	37	0.0880	0.0176
T7	100 - 90	0.819	37	0.0723	0.0120
T8	90 - 80	0.666	37	0.0649	0.0100
T9	80 - 60	0.529	37	0.0571	0.0082
T10	60 - 40	0.301	37	0.0429	0.0056
T11	40 - 30	0.138	37	0.0276	0.0035
T12	30 - 20	0.080	45	0.0198	0.0026
T13	20 - 0	0.038	43	0.0119	0.0017

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	3' Yagi	37	2.559	0.1136	0.0551	Inf
177.00	PA6-65AC	37	2.487	0.1136	0.0533	Inf
175.00	AP11-850	37	2.439	0.1136	0.0521	Inf
170.00	HP6-65	37	2.319	0.1134	0.0490	531589
167.00	VHF150	37	2.246	0.1131	0.0471	408912
160.00	Standoff	37	2.076	0.1113	0.0421	399846
133.00	P65-16-XLH-RR	37	1.449	0.0962	0.0234	Inf
132.00	Pirod 15' T-Frame Sector Mount (1)	37	1.427	0.0957	0.0229	992267
125.00	Air 21	37	1.278	0.0915	0.0196	77385
110.00	VHF150	37	0.987	0.0803	0.0143	61610
60.00	4' Standoff	37	0.301	0.0429	0.0056	73749

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	10.359	21	0.4537	0.2140
T2	160 - 140	8.424	21	0.4455	0.1687
T3	140 - 133.333	6.505	21	0.4025	0.1107
T4	133.333 - 126.667	5.922	21	0.3895	0.0972
T5	126.667 - 120	5.345	21	0.3744	0.0862
T6	120 - 100	4.788	21	0.3563	0.0762
T7	100 - 90	3.340	21	0.2932	0.0545
T8	90 - 80	2.718	21	0.2635	0.0455
T9	80 - 60	2.160	21	0.2321	0.0375
T10	60 - 40	1.234	21	0.1743	0.0255
T11	40 - 30	0.568	21	0.1125	0.0162
T12	30 - 20	0.329	28	0.0806	0.0119
T13	20 - 0	0.158	27	0.0484	0.0078

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	3' Yagi	21	10.359	0.4537	0.2140	231110
177.00	PA6-65AC	21	10.071	0.4539	0.2080	231110
175.00	AP11-850	21	9.879	0.4540	0.2039	231110
170.00	HP6-65	21	9.397	0.4534	0.1933	115555
167.00	VHF150	21	9.107	0.4522	0.1865	88889
160.00	Standoff	21	8.424	0.4455	0.1687	82050
133.00	P65-16-XLH-RR	21	5.893	0.3888	0.0967	275115
132.00	Pirod 15' T-Frame Sector Mount (1)	21	5.806	0.3867	0.0950	264664
125.00	Air 21	21	5.203	0.3701	0.0836	19516
110.00	VHF150	21	4.025	0.3251	0.0642	15448
60.00	4' Standoff	21	1.234	0.1743	0.0255	18143

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	180 - 160	ROHN 3 STD	20.00	6.67	68.8 K=1.00	21.168	2.2285	-6.66	47.17	0.141 ✓
T2	160 - 140	ROHN 4 STD	20.04	6.68	53.1 K=1.00	23.861	3.1741	-36.16	75.74	0.477 ✓
T3	140 - 133.333	ROHN 5 EH	6.68	6.68	43.6 K=1.00	25.320	6.1120	-47.07	154.75	0.304 ✓
T4	133.333 - 126.667	ROHN 5 EH	6.68	6.68	43.6 K=1.00	25.320	6.1120	-59.04	154.75	0.381 ✓
T5	126.667 - 120	ROHN 5 EH	6.68	6.68	43.6 K=1.00	25.320	6.1120	-73.04	154.75	0.472 ✓
T6	120 - 100	ROHN 6 EHS	20.04	10.02	54.0 K=1.00	23.709	6.7133	-108.26	159.16	0.680 ✓
T7	100 - 90	ROHN 6 EH	10.03	10.03	54.8 K=1.00	23.580	8.4049	-128.38	198.19	0.648 ✓
T8	90 - 80	ROHN 6 EH	10.03	10.03	54.8 K=1.00	23.580	8.4049	-146.14	198.19	0.737 ✓
T9	80 - 60	ROHN 8 EHS	20.05	10.03	41.2 K=1.00	25.662	9.7193	-180.74	249.41	0.725 ✓
T10	60 - 40	ROHN 8 EHS	20.05	10.03	41.2 K=1.00	25.662	9.7193	-215.06	249.41	0.862 ✓
T11	40 - 30	ROHN 8 EHS	10.03	10.03	41.2 K=1.00	25.662	9.7193	-231.67	249.41	0.929 ✓
T12	30 - 20	ROHN 8 EHS	10.03	10.03	41.2 K=1.00	25.662	9.7193	-247.91	249.41	0.994 ✓
T13	20 - 0	ROHN 8 EH	20.05	10.03	41.8 K=1.00	25.576	12.7627	-263.36	326.43	0.807 ✓

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	180 - 160	ROHN 2 STD	7.94	7.67	117.0 K=1.00	10.918	1.0745	-5.93	11.73	0.506 ✓
T2	160 - 140	ROHN 2 STD	8.55	8.25	125.8 K=1.00	9.431	1.0745	-8.70	10.13	0.859 ✓
T3	140 - 133.333	ROHN 2 EH	8.77	8.42	131.5 K=1.00	8.637	1.4807	-8.80	12.79	0.688 ✓
T4	133.333 - 126.667	ROHN 2 EH	9.00	8.66	135.3 K=1.00	8.163	1.4807	-11.27	12.09	0.932 ✓
T5	126.667 - 120	ROHN 2 EH	9.24	8.91	139.1 K=1.00	7.717	1.4807	-12.01	11.43	1.051 ✓
T6	120 - 100	ROHN 2.5 EH	12.52	12.06	156.6 K=1.00	6.090	2.2535	-14.96	13.72	1.090 ✓
T7	100 - 90	ROHN 3 STD	12.92	12.49	128.8 K=1.00	9.001	2.2285	-13.72	20.06	0.684 ✓
T8	90 - 80	ROHN 3 STD	13.35	12.93	133.4 K=1.00	8.392	2.2285	-13.56	18.70	0.725 ✓
T9	80 - 60	ROHN 3 STD	14.21	13.70	141.3 K=1.00	7.477	2.2285	-14.15	16.66	0.849 ✓
T10	60 - 40	P3.5x.226	15.12	14.64	131.5 K=1.00	8.641	2.6795	-14.54	23.15	0.628 ✓
T11	40 - 30	P3.5x.226	15.60	15.13	135.8 K=1.00	8.096	2.6795	-14.68	21.69	0.677 ✓
T12	30 - 20	P3.5x.226	16.08	15.62	140.2 K=1.00	7.592	2.6795	-14.79	20.34	0.727 ✓
T13	20 - 0	P3.5x.226	24.33	12.17	109.2 K=1.00	12.519	2.6795	-22.78	33.55	0.679 ✓

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 $\frac{P}{P_a}$
T1	180 - 160	ROHN 1.5 STD	8.60	4.15	80.0 K=1.00	19.004	0.7995	-3.16	15.19	0.208 ✓
T2	160 - 140	ROHN 1.5 STD	10.01	4.82	92.9 K=1.00	16.309	0.7995	-5.38	13.04	0.413 ✓
T3	140 - 133.333	ROHN 2 STD	10.71	5.17	78.8 K=1.00	19.257	1.0745	-5.64	20.69	0.273 ✓
T6	120 - 100	ROHN 2 STD	13.92	6.68	101.9 K=1.00	14.269	1.0745	-8.89	15.33	0.580 ✓
T7	100 - 90	ROHN 2 STD	15.04	7.24	110.5 K=1.00	12.241	1.0745	-8.62	13.15	0.655 ✓
T9	80 - 60	ROHN 2.5 STD	18.93	9.10	115.3 K=1.00	11.230	1.7040	-9.84	19.14	0.514 ✓
T10	60 - 40	ROHN 2.5 STD	21.43	10.35	131.1 K=1.00	8.682	1.7040	-10.57	14.80	0.715 ✓
T11	40 - 30	ROHN 2.5 STD	22.68	10.98	139.1	7.722	1.7040	-10.90	13.16	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 $\frac{P}{P_a}$
T13	20 - 0	P3.5x.226	25.18	12.23	K=1.00 109.8 K=1.00	12.390	2.6795	-12.26	33.20	0.369 ✔

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	180 - 160	ROHN 1.5 STD	8.54	4.13	79.5 K=1.00	19.110	0.7995	-0.77	15.28	0.050 ✔
T4	133.333 - 126.667	ROHN 2 STD	11.40	5.47	83.4 K=1.00	18.326	1.0745	-7.57	19.69	0.384 ✔
T5	126.667 - 120	ROHN 2 STD	12.10	5.82	88.7 K=1.00	17.220	1.0745	-8.22	18.50	0.444 ✔
T8	90 - 80	ROHN 2 STD	16.36	7.90	120.5 K=1.00	10.285	1.0745	-8.85	11.05	0.801 ✔
T12	30 - 20	ROHN 2.5 STD	23.93	11.60	147.0 K=1.00	6.913	1.7040	-11.14	11.78	0.946 ✔

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 $\frac{P}{P_a}$
T13	20 - 0	ROHN 1.5 STD	6.29	5.93	91.5 K=0.80	16.611	0.7995	-4.57	13.28	0.344 ✔

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 $\frac{P}{P_a}$
T13	20 - 0	ROHN 1.5 STD	11.50	10.77	166.1 K=0.80	5.412	0.7995	-4.18	4.33	0.965 ✔

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 $\frac{P}{P_a}$

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 $\frac{P}{P_a}$
T13	20 - 0	ROHN 2.5 STD	6.29	6.29	63.8 K=0.80	22.062	1.7040	-0.03	37.59	0.001 ✔

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 $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	4.27	4.27	128.9 K=1.00	8.985	0.4844	-0.01	4.35	0.003 ✔
T2	160 - 140	L2x2x1/8	5.01	5.01	151.1 K=1.00	6.537	0.4844	-0.01	3.17	0.002 ✔
T3	140 - 133.333	L2x2x1/8	5.35	5.35	161.6 K=1.00	5.716	0.4844	-0.01	2.77	0.003 ✔
T4	133.333 - 126.667	L2x2x1/8	5.70	5.70	172.1 K=1.00	5.041	0.4844	-0.13	2.44	0.054 ✔
T5	126.667 - 120	L2x2x1/8	6.05	6.05	182.6 K=1.00	4.479	0.4844	-0.14	2.17	0.066 ✔
T6	120 - 100	L2 1/2x2 1/2x3/16	6.96	6.96	168.7 K=1.00	5.248	0.9020	-0.01	4.73	0.002 ✔
T7	100 - 90	L2 1/2x2 1/2x3/16	7.52	7.52	182.3 K=1.00	4.492	0.9020	-0.01	4.05	0.003 ✔
T8	90 - 80	L2 1/2x2 1/2x3/16	8.18	8.18	198.3 K=1.00	3.798	0.9020	-0.15	3.43	0.045 ✔
T9	80 - 60	L3x3x3/16	9.46	9.46	190.5 K=1.00	4.113	1.0900	-0.01	4.48	0.003 ✔
T10	60 - 40	L3 1/2x3 1/2x1/4	10.71	10.71	185.2 K=1.00	4.352	1.6900	-0.01	7.35	0.002 ✔
T11	40 - 30	L3 1/2x3 1/2x1/4	11.34	11.34	196.1 K=1.00	3.885	1.6900	-0.01	6.57	0.002 ✔
T12	30 - 20	L3 1/2x3 1/2x1/4	11.96	11.96	206.9 K=1.00	3.490	1.6900	-0.19	5.90	0.033 ✔
T13	20 - 0	ROHN 2 STD	12.59	12.59	191.9 K=1.00	4.054	1.0745	-0.01	4.36	0.002* ✔

* DL controls

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	180 - 160	ROHN 3 STD	20.00	6.67	68.8	30.000	2.2285	4.71	66.85	0.070

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 $\frac{P}{P_a}$
T2	160 - 140	ROHN 4 STD	20.04	6.68	53.1	30.000	3.1741	29.63	95.22	0.311
T3	140 - 133.333	ROHN 5 EH	6.68	6.68	43.6	30.000	6.1120	39.61	183.36	0.216
T4	133.333 - 126.667	ROHN 5 EH	6.68	6.68	43.6	30.000	6.1120	49.33	183.36	0.269
T5	126.667 - 120	ROHN 5 EH	6.68	6.68	43.6	30.000	6.1120	60.84	183.36	0.332
T6	120 - 100	ROHN 6 EHS	20.04	10.02	54.0	30.000	6.7133	92.92	201.40	0.461
T7	100 - 90	ROHN 6 EH	10.03	10.03	54.8	30.000	8.4049	111.18	252.15	0.441
T8	90 - 80	ROHN 6 EH	10.03	10.03	54.8	30.000	8.4049	126.96	252.15	0.504
T9	80 - 60	ROHN 8 EHS	20.05	10.03	41.2	30.000	9.7193	156.82	291.58	0.538
T10	60 - 40	ROHN 8 EHS	20.05	10.03	41.2	30.000	9.7193	185.18	291.58	0.635
T11	40 - 30	ROHN 8 EHS	10.03	10.03	41.2	30.000	9.7193	198.93	291.58	0.682
T12	30 - 20	ROHN 8 EHS	10.03	10.03	41.2	30.000	9.7193	212.26	291.58	0.728
T13	20 - 0	ROHN 8 EH	20.05	10.03	41.8	30.000	12.7627	222.75	382.88	0.582

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	180 - 160	ROHN 2 STD	7.94	7.67	117.0	30.000	1.0745	5.84	32.24	0.181
T2	160 - 140	ROHN 2 STD	8.55	8.25	125.8	30.000	1.0745	8.59	32.24	0.266
T3	140 - 133.333	ROHN 2 EH	8.77	8.42	131.5	30.000	1.4807	8.65	44.42	0.195
T4	133.333 - 126.667	ROHN 2 EH	9.00	8.66	135.3	30.000	1.4807	11.11	44.42	0.250
T5	126.667 - 120	ROHN 2 EH	9.24	8.91	139.1	30.000	1.4807	11.83	44.42	0.266
T6	120 - 100	ROHN 2.5 EH	12.19	11.73	152.3	30.000	2.2535	14.91	67.61	0.221
T7	100 - 90	ROHN 3 STD	12.92	12.49	128.8	30.000	2.2285	13.42	66.85	0.201
T8	90 - 80	ROHN 3 STD	13.35	12.93	133.4	30.000	2.2285	13.24	66.85	0.198
T9	80 - 60	ROHN 3 STD	14.21	13.70	141.3	30.000	2.2285	13.72	66.85	0.205
T10	60 - 40	P3.5x.226	15.12	14.64	131.5	30.000	2.6795	13.95	80.39	0.174

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	40 - 30	P3.5x.226	15.60	15.13	135.8	30.000	2.6795	14.04	80.39	0.175 ✓
T12	30 - 20	P3.5x.226	16.08	15.62	140.2	30.000	2.6795	14.11	80.39	0.175 ✓
T13	20 - 0	P3.5x.226	24.33	12.17	109.2	30.000	2.6795	22.13	80.39	0.275 ✓

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 $\frac{P}{P_a}$
T1	180 - 160	ROHN 1.5 STD	8.60	4.15	80.0	30.000	0.7995	3.21	23.98	0.134 ✓
T2	160 - 140	ROHN 1.5 STD	10.01	4.82	92.9	30.000	0.7995	5.41	23.98	0.226 ✓
T3	140 - 133.333	ROHN 2 STD	10.71	5.17	78.8	30.000	1.0745	5.67	32.24	0.176 ✓
T6	120 - 100	ROHN 2 STD	13.92	6.68	101.9	30.000	1.0745	8.86	32.24	0.275 ✓
T7	100 - 90	ROHN 2 STD	15.04	7.24	110.5	30.000	1.0745	8.49	32.24	0.263 ✓
T9	80 - 60	ROHN 2.5 STD	18.93	9.10	115.3	30.000	1.7040	9.87	51.12	0.193 ✓
T10	60 - 40	ROHN 2.5 STD	21.43	10.35	131.1	30.000	1.7040	10.69	51.12	0.209 ✓
T11	40 - 30	ROHN 2.5 STD	22.68	10.98	139.1	30.000	1.7040	11.03	51.12	0.216 ✓
T13	20 - 0	P3.5x.226	25.18	12.23	109.8	30.000	2.6795	12.05	80.39	0.150 ✓

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	180 - 160	ROHN 1.5 STD	8.54	4.13	79.5	30.000	0.7995	0.77	23.98	0.032 ✓
T4	133.333 - 126.667	ROHN 2 STD	11.40	5.47	83.4	30.000	1.0745	7.54	32.24	0.234 ✓
T5	126.667 - 120	ROHN 2 STD	12.10	5.82	88.7	30.000	1.0745	8.24	32.24	0.256 ✓
T8	90 - 80	ROHN 2 STD	16.36	7.90	120.5	30.000	1.0745	8.82	32.24	0.274 ✓
T12	30 - 20	ROHN 2.5 STD	23.93	11.60	147.0	30.000	1.7040	11.38	51.12	0.223 ✓

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 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 $\frac{P}{P_a}$
T13	20 - 0	ROHN 1.5 STD	6.29	5.93	114.4	30.000	0.7995	4.57	23.98	0.191 ✔

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 $\frac{P}{P_a}$
T13	20 - 0	ROHN 1.5 STD	11.50	10.77	207.6	30.000	0.7995	4.18	23.98	0.174 ✔

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 $\frac{P}{P_a}$
T1	180 - 160	L2x2x1/8	4.27	4.27	81.8	21.600	0.4844	0.01	10.46	0.001 ✔
T2	160 - 140	L2x2x1/8	4.31	4.31	82.6	21.600	0.4844	0.01	10.46	0.000 ✔
T3	140 - 133.333	L2x2x1/8	5.35	5.35	102.6	21.600	0.4844	0.00	10.46	0.000 ✔
T4	133.333 - 126.667	L2x2x1/8	5.70	5.70	109.3	21.600	0.4844	0.13	10.46	0.013 ✔
T5	126.667 - 120	L2x2x1/8	6.05	6.05	115.9	21.600	0.4844	0.14	10.46	0.014 ✔
T6	120 - 100	L2 1/2x2 1/2x3/16	6.40	6.40	98.7	21.600	0.9020	0.00	19.48	0.000 ✔
T7	100 - 90	L2 1/2x2 1/2x3/16	7.52	7.52	116.0	21.600	0.9020	0.00	19.48	0.000 ✔
T8	90 - 80	L2 1/2x2 1/2x3/16	8.18	8.18	126.2	21.600	0.9020	0.15	19.48	0.008 ✔
T9	80 - 60	L3x3x3/16	8.84	8.84	113.0	21.600	1.0900	0.00	23.54	0.000 ✔
T12	30 - 20	L3 1/2x3 1/2x1/4	11.96	11.96	131.7	30.000	1.6900	0.19	50.70	0.004 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	180 - 160	Leg	ROHN 3 STD	1	-6.66	62.88	10.6	Pass
		Diagonal	ROHN 2 STD	9	-5.93	15.64	37.9	Pass
		Horizontal	ROHN 1.5 STD	7	-3.16	20.25	15.6	Pass
		Top Girt	ROHN 1.5 STD	6	-0.77	20.37	3.8	Pass
		Inner Bracing	L2x2x1/8	38	-0.01	5.80	0.2	Pass
T2	160 - 140	Leg	ROHN 4 STD	40	-36.16	100.96	35.8	Pass
		Diagonal	ROHN 2 STD	45	-8.70	13.51	64.4	Pass
		Horizontal	ROHN 1.5 STD	43	-5.38	17.38	31.0	Pass
		Inner Bracing	L2x2x1/8	54	-0.01	4.22	0.2	Pass
T3	140 - 133.333	Leg	ROHN 5 EH	79	-47.07	206.29	22.8	Pass
		Diagonal	ROHN 2 EH	84	-8.80	17.05	51.6	Pass
		Horizontal	ROHN 2 STD	82	-5.64	27.58	20.4	Pass
		Inner Bracing	L2x2x1/8	92	-0.01	3.69	0.2	Pass
T4	133.333 - 126.667	Leg	ROHN 5 EH	94	-59.04	206.29	28.6	Pass
		Diagonal	ROHN 2 EH	101	-11.27	16.11	69.9	Pass
		Top Girt	ROHN 2 STD	97	-7.57	26.25	28.8	Pass
		Inner Bracing	L2x2x1/8	108	-0.13	3.26	4.0	Pass
T5	126.667 - 120	Leg	ROHN 5 EH	109	-73.04	206.29	35.4	Pass
		Diagonal	ROHN 2 EH	116	-12.01	15.23	78.9	Pass
		Top Girt	ROHN 2 STD	112	-8.22	24.67	33.3	Pass
		Inner Bracing	L2x2x1/8	121	-0.14	2.89	4.9	Pass
T6	120 - 100	Leg	ROHN 6 EHS	124	-108.26	212.17	51.0	Pass
		Diagonal	ROHN 2.5 EH	135	-14.96	18.30	81.8	Pass
		Horizontal	ROHN 2 STD	133	-8.89	20.44	43.5	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	136	-0.01	6.31	0.2	Pass
T7	100 - 90	Leg	ROHN 6 EH	151	-128.38	264.19	48.6	Pass
		Diagonal	ROHN 3 STD	162	-13.72	26.74	51.3	Pass
		Horizontal	ROHN 2 STD	160	-8.62	17.53	49.2	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	163	-0.01	5.40	0.2	Pass
T8	90 - 80	Leg	ROHN 6 EH	166	-146.14	264.19	55.3	Pass
		Diagonal	ROHN 3 STD	177	-13.56	24.93	54.4	Pass
		Top Girt	ROHN 2 STD	171	-8.85	14.73	60.1	Pass
		Inner Bracing	L2 1/2x2 1/2x3/16	179	-0.15	4.57	3.4	Pass
T9	80 - 60	Leg	ROHN 8 EHS	183	-180.74	332.47	54.4	Pass
		Diagonal	ROHN 3 STD	192	-14.15	22.21	63.7	Pass
		Horizontal	ROHN 2.5 STD	190	-9.84	25.51	38.6	Pass
		Inner Bracing	L3x3x3/16	194	-0.01	5.98	0.3	Pass
T10	60 - 40	Leg	ROHN 8 EHS	210	-215.06	332.47	64.7	Pass
		Diagonal	P3.5x.226	219	-14.54	30.86	47.1	Pass
		Horizontal	ROHN 2.5 STD	217	-10.57	19.72	53.6	Pass
		Inner Bracing	L3 1/2x3 1/2x1/4	220	-0.01	9.80	0.2	Pass
T11	40 - 30	Leg	ROHN 8 EHS	237	-231.67	332.47	69.7	Pass
		Diagonal	P3.5x.226	246	-14.68	28.92	50.8	Pass
		Horizontal	ROHN 2.5 STD	244	-10.90	17.54	62.2	Pass
		Inner Bracing	L3 1/2x3 1/2x1/4	247	-0.01	8.75	0.2	Pass
T12	30 - 20	Leg	ROHN 8 EHS	252	-247.91	332.47	74.6	Pass
		Diagonal	P3.5x.226	261	-14.79	27.12	54.5	Pass
		Top Girt	ROHN 2.5 STD	255	-11.14	15.70	70.9	Pass
		Inner Bracing	L3 1/2x3 1/2x1/4	264	-0.19	7.86	2.5	Pass
T13	20 - 0	Leg	ROHN 8 EH	267	-263.36	435.13	60.5	Pass
		Diagonal	P3.5x.226	287	-22.78	44.72	50.9	Pass
		Horizontal	P3.5x.226	283	-12.26	44.25	27.7	Pass
		Redund Horz 1 Bracing	ROHN 1.5 STD	280	-4.57	17.70	25.8	Pass
		Redund Diag 1 Bracing	ROHN 1.5 STD	286	-4.18	5.77	72.4	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
		Redund Hip 1 Bracing	ROHN 2.5 STD	282	-0.03	50.11	0.1	Pass
		Inner Bracing	ROHN 2 STD	294	-0.01	4.36	0.4	Pass
							Summary	
						Leg (T12)	74.6	Pass
						Diagonal (T6)	81.8	Pass
						Horizontal (T11)	62.2	Pass
						Top Girt (T12)	70.9	Pass
						Redund Horz 1 Bracing (T13)	25.8	Pass
						Redund Diag 1 Bracing (T13)	72.4	Pass
						Redund Hip 1 Bracing (T13)	0.1	Pass
						Inner Bracing (T5)	4.9	Pass
						RATING =	**81.8**	**Pass**

ANCHOR BOLT EVALUATION

ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift := 250 kips	*user input*
Shear:	Shear := 37 kips	*user input*
Compression:	Compression := 294 kips	*user input*

Anchor Bolt Data:

Use ASTM A354 Gr. BC

Number of Anchor Bolts = N	N := 10	*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 := 1.0in	*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):

$$AllowableTension := 1.333\cdot\left(0.33\cdot A_g\cdot F_u\right) \qquad AllowableTension = 43.2\cdot kips$$

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{net.area} := 1.333\cdot\left(0.60\cdot A_n\cdot Fy\right) \qquad F_{net.area} = 52.8\cdot kips$$

Note: 1.333 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{Uplift}{N} \qquad MaxTension = 25.0\cdot kips$$

Check Stresses:

$$\frac{MaxTension}{F_{net.area}} = 0.47$$

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

Condition1 = "OK"

URS

Job	180' Rohn SSMW Tower - Westport, CT	Project No.	VZ5-171	Page / Sheet	of / 3 of 3
Description	Anchor Bolt Analysis	Computed by	MCD	Date	11/20/13
		Checked by		Date	

Check Anchor Bolt Area:

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

Required Area:

$$A_{s1} := \frac{Uplift}{Fy} + \frac{Shear}{\mu \cdot 0.85 \cdot Fy} \qquad A_{s1} = 3.0 \cdot in^2$$

$$A_{s2} := \left| \frac{Shear - (0.3 \cdot Compression)}{\mu \cdot 0.85 \cdot Fy} \right| \qquad A_{s2} = 1.0 \cdot in^2$$

Provided Area:

$$A_{sprovided} := A_n \cdot N \qquad A_{sprovided} = 6.1 \cdot in^2$$

$$Condition2 := if\left(\frac{A_{s1}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s1}}{A_{sprovided}} = 0.50$$

Condition2 = "OK"

$$Condition3 := if\left(\frac{A_{s2}}{A_{sprovided}} \le 1.00, "OK", "Overstressed" \right) \qquad \frac{A_{s2}}{A_{sprovided}} = 0.17$$

Condition3 = "OK"

FOUNDATION ANALYSIS
(PERFORMED BY DR. CLARENCE WELTI, P.E., P.C.)

DR. CLARENCE WELTI, P.E., P.C.

GEOTECHNICAL ENGINEERING

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October 10, 2002

Mr. Mohsen Sahirad
URS Corporation
500 Enterprise Drive; Suite 3B
Rocky Hill, CT 06067

Re: Telecommunications Tower; 880 Post Road; Westport, CT ; Evaluation of Existing Foundation for Increased Design Loads

Dear Mohsen:

1.0 Herewith are boring data pertaining to the above. Two borings were drilled to a maximum depth of 12 feet. One boring was drilled 10 feet into bedrock and the second boring was drilled to the top of bedrock. The two borings are shown on the attached photo. Boring B-1 was about 11 feet from the tower leg and boring B-2 was about 15 feet from the tower leg. Considering that the rock outcrops at the third leg, the two borings define rock sufficiently to permit a reasonable interpolation of rock at the actual leg foundations. The former police station site is undergoing environmental remediation. *The borings were drilled by Clarence Welti Associates, Inc. and sampling was conducted by this firm solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.*

2.0 The purpose of this study is to assess the capability of tower legs to receive the proposed revised loadings. The load summary, including initial and revised design loadings is as follows:

Loading Type	Original Reaction	Revised Reactions
Uplift	276.7 kips	324 kips
Download	319.9 kips	374 kips
Shear	41.0 kips	48 kips

3.0 The initial boring data (1990 data from Test Craig Laboratories) indicated bedrock over the entire site. It is understood that there is information indicating that two of the legs were placed in earth instead of rock. The recent boring tends to belie this. The analyses for uplift (which is the only critical item on the above reaction schedule) have been done for both earth and rock. The reference for both analyses is FHWA-1F-025 Publication "Drilled Shafts: Construction Procedures and Design Methods".

3.0.1 The tower legs were each placed on 4.5 feet diameter shafts installed 27 feet deep into either earth or rock. The design uplift was and is based on an effective length of 21 feet.

3.1 Regarding the shaft in earth analysis there were no deep blow counts in the borings, since rock was encountered within 2 feet of grade. It is however reasonable to assume the N value (blows per 12" on split spoon) will be about 60 in the till overlying rock. Using the procedure indicated on the attached calculations the ultimate uplift capacity would be 831 kips. Design capacity would be ½ of this value or 415 kips. In reviewing the reference you cited (Foundation Engineering by Das, 4th edition) a similar ultimate load capacity can also be found if one assumes an angle of internal friction of about 40° (which would be typical for N = 60) and a δ/ϕ ratio of 1.0 (relative density of soil ≥ 85+%).

3.2 Regarding the shaft in rock the friction is defined in the attached calculations. The ultimate uplift of the shaft placed the Straits Schist rock formation would be about 10 kips/sf. With a factor of safety of 3 (using 3 kips/sf) the allowable loading would be 888 kips.

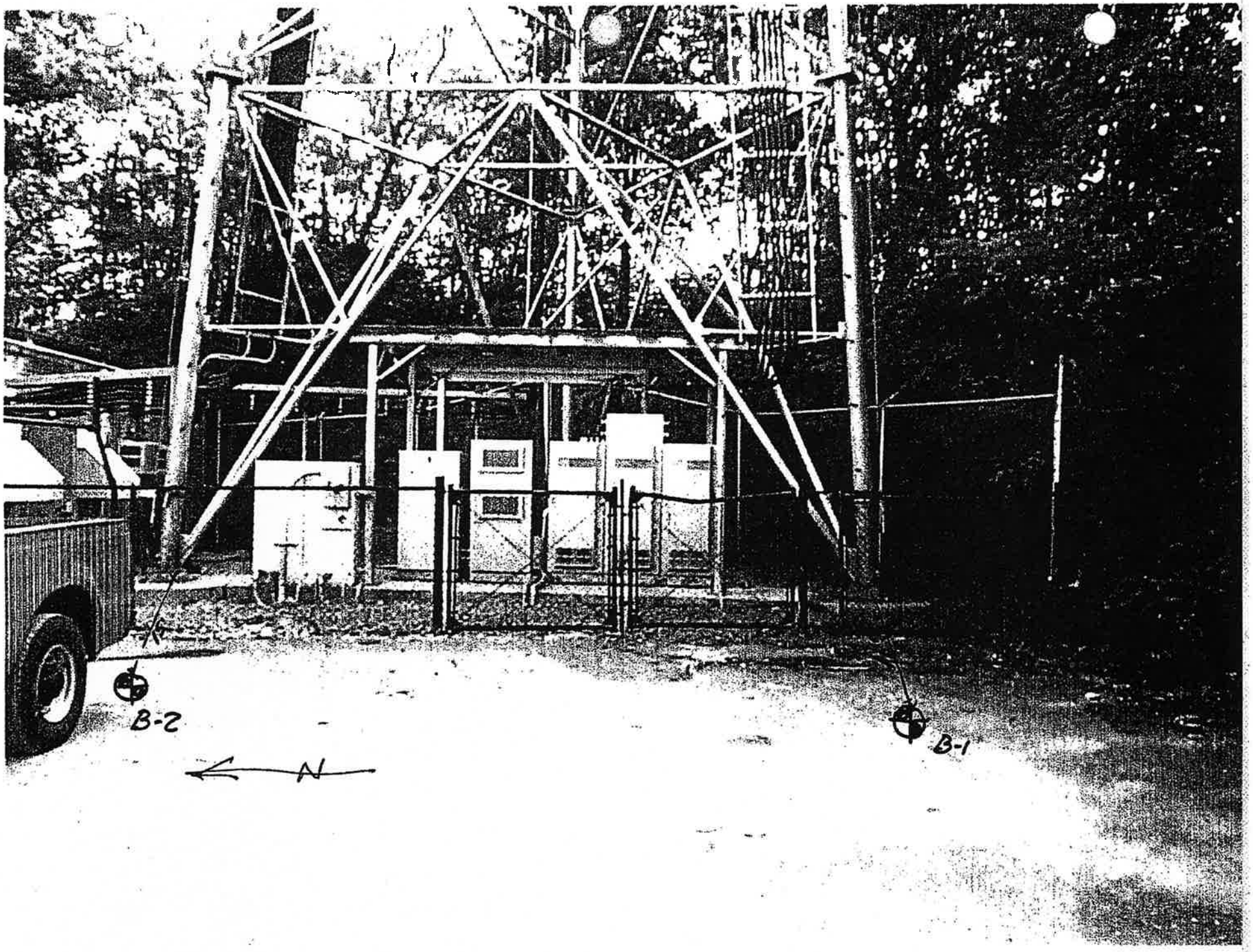
4.0 In summary it is believed that the shafts are in rock. The rock is a Schist with steep foliation and may have been drilled with only moderate effort. If the actual shaft are in earth there would have to have been a deep depression between the rock outcrop (which was cut down about 5 feet at the east leg) and the boring locations west of the two west legs, which indicated rock at 2 feet below grade similar to the original borings on the site. If there was a depression in the rock, the soil would be glacial till similar to what is being excavated to the northwest of the site at the old State Police Station. The analyses included herewith indicate that with either rock or till overburden the shafts have adequate capacity for the revised loading.

If you have any questions, please call me.

Very truly yours.

Clarence Welti, PhD, P. E.
Pres. Dr. Clarence Welti, P. E., P.C.

A:\urstoweranalysis9/04/02


B-2
B-1
N

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT
URS CORPORATION

PROJECT NAME
CELL TOWER SITE

LOCATION
880 POST ROAD
WESTPORT, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	NX
SIZE I.D.	3.75"		1.5"	2.0"
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET
LINE & STA.
N. COORDINATE
E. COORDINATE

SURFACE ELEV.

HOLE NO. **B-1**

GROUND WATER OBSERVATIONS
AT 2.0 FT. AFTER 0 HOURS
AT FT. AFTER HOURS

START DATE 10/7/02
FINISH DATE 10/7/02

DEPTH	SAMPLE NO.	SAMPLE BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0	1	4-13-20-60	0.00'-1.50'		ASPHALT .10	
					BR. FINE-CRS. SAND AND FINE GRAVEL - FILL .80	
					GRAY ROCK FRAGMENTS, LITTLE SILT AND FINE SAND 1.5	
					GRAY ROCK FRAGMENTS 2.0	
					CORED ROCK -	
					RUN #1 2.0' - 7.0' RECOVERED 50"	
5					RUN #2 7.0' - 12.0' RECOVERED 60"	
10					BOTTOM OF BORING @ 12.0' 12.0	
					NOTE: BORING WAS DRILLED 11.0' WEST OF TOWER LEG	
15						
20						
25						
30						
35						

LEGEND: COL. A:
SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: BROMLEY
INSPECTOR:

SHEET 1 OF 1 | HOLE NO. **B-1**

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT
URS CORPORATION

PROJECT NAME
CELL TOWER SITE

LOCATION
880 POST ROAD
WESTPORT, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.5"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET
LINE & STA.
N. COORDINATE
E. COORDINATE

SURFACE ELEV.

HOLE NO. **B-2**

GROUND WATER OBSERVATIONS
AT none FT. AFTER 0 HOURS
AT FT. AFTER HOURS

START DATE 10/7/02
FINISH DATE 10/7/02

DEPTH	SAMPLE NO.	SAMPLE BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0	1	1-8-12-60	0.00'-1.50'		DARK BR. FINE-CRS. SAND, SOME FINE-MED. GRAVEL, TRACE SILT - FILL (1.0)	
					BR./GRAY ROCK FRAGMENTS, SILT AND FINE SAND (1.5)	
					GRAY ROCK FRAGMENTS (2.0)	
					AUGER REFUSAL @ 2.0'	
					NOTE: BORING WAS DRILLED 15'WEST OF TOWER LEG	
5						
10						
15						
20						
25						
30						
35						

LEGEND: COL. A:
SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: BROMLEY
INSPECTOR:

SHEET 1 OF 1 | HOLE NO. **B-2**

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CLIENT URS.
PROJECT Communication Tower Neal Post
SUBJECT Assessment of Capacity
BY CW DATE 10/ /02 SHEET NO.

Reference: Drilled Shafts Construction Procedures & Design Methods PUBLICATION NO FHWA-IF-99-025

Material: "Intermediate Geo-material" N > 50 B/12"
(IGM)

(1) $f_{max} = \sigma_{vi} K_{oi} \tan \phi_i'$

σ_{vi} = vertical effective stress at mid-height of layer i' ≈ 1.18 ksf

K_{oi} = design value of earth pressure coefficient at rest

ϕ_i = design value of angle of friction for the layer i'

(2) $\phi_i' = \tan^{-1}\left[\left(\frac{N_{60}\,(\text{LAYER } i)}{12.3 + 20.3\left(\frac{\sigma_{vi}}{p_a}\right)}\right)^{0.34}\right]$ p_a = 2 ksf ≈ 14.7 psi

N_{60} (LAYER 6) = 60

$= \tan^{-1}\left\{\left[\frac{60}{12.3 + 20.3 \times 6.9}\right]^{.34}\right\} = \tan^{-1}(1.96)^{.34} = 51.5°$

(3) $K_{oi} = (1 - \sin\phi_i')\left[\frac{0.2\, p_a\, N_{60}\,(\text{layer})}{\sigma_{vi}}\right]^{\sin\phi}$

$= (1 - .78)\left[\frac{.2 \times 2 \times 60}{11.8}\right]^{.78} = .165$

$f_s = (\text{from (1)}) = 3.73 \text{ ksf} \times 0.75 = 2.8 \text{ ksf}$ ULTIMATE SIDE FRICTION

$21' \times 4.5 \times \pi \times 2.8 = 831$ KIPS ULTIMATE SIDE FRICTION

FOR SHAFT IN ROCK

$f_{max} = 0.8\left[\frac{4R}{R}\left(\frac{L'}{L}\right)\right]^{0.45} q_u$

$f_{max} = 5.37 \text{ TSF} = 10.78 \text{ ksf}$

q_u = 5200 psi × 333 TSF

L = 21'
4R = 05' L' = 0.2'

$21' \times \pi \times 4.5 = 296$ SF
Assume 1/3 to f_{all} = 3 ksf. Φ = 888 KIPS