

November 30, 2015

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

Re: **Notice of Exempt Modification – Facility Modification
800 Booth Hill Road, Trumbull, Connecticut**

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the 232-foot level on the existing 457-foot guyed-lattice tower at 800 Booth Hill Road in Trumbull, Connecticut (the “Property”). The tower is owned by Crown Castle. The Council approved Cellco’s shared use of this tower in 1987 (Docket No. 77). Cellco intends to modify its existing facility by installing three (3) new remote radio heads (“RRHs”) behind its 700 MHz antennas. Included in Attachment 1 are specifications for Cellco’s RRHs.

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 Timothy M. Herbst, First Selectman of the Town of Trumbull. A copy of this letter is also being sent to Francis Daddario, the owner of the Property and Crown, the tower owner.

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

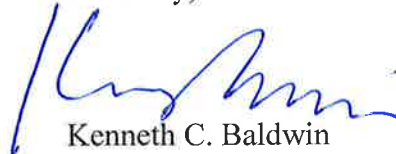
1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco’s RRHs will be installed on its existing antenna mounting structure at the 232-foot level of the 457-foot tower.

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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 additional RRHs 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 General Power Density table 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 Structural Analysis Report 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:

Timothy M. Herbst, Trumbull First Selectman
Francis Daddario
Crown Castle
Timothy Parks

ATTACHMENT 1

ALCATEL-LUCENT B13 RRH4X30-4R

Alcatel-Lucent B13 Remote Radio Head 4x30-4R is the newest addition of Remote Radio Head to the extended product line of Alcatel-Lucent's distributed Base Station solutions, aimed at facilitating smooth RF site acquisition and related civil engineering.

Supporting 2Tx/4Tx MIMO and 4-way Rx diversity, Alcatel-Lucent B13 RRH4x30-4R allows operators to have a compact radio solution to deploy LTE in the 700U band (700 MHz, 3GPP band 13), providing them with the means to achieve high capacity, high quality and high coverage with minimum site requirements.



The Alcatel-Lucent B13 RRH4x30-4R product has four transmit RF paths, offering the possibility to **select, via software only, 2Tx or 4Tx MIMO configurations** with either 2x60 W or 4x30 W RF output power. It supports also 4-way Rx diversity and up to 10MHz instantaneous bandwidth.

The Alcatel-Lucent B13 RRH4x30-4R is a near zero-footprint solution and operates noise free, simplifying negotiations with site property owners and minimizing environmental impacts.

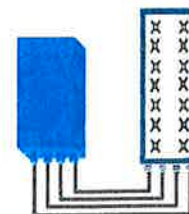
Its compactness and slim design makes the Alcatel-Lucent B13 RRH4x30-4R easy to install close to the antenna: operators can therefore locate this Remote Radio Head where RF design conditions are deemed ideal, minimizing trade-offs between available sites and RF optimum sites, together with reducing the RF feeder needs and installation costs.

FEATURES

- Supporting LTE in 700 MHz band (700U, 3GPP band 13)
- LTE 2Tx or 4Tx MIMO (SW switchable)
- Output power: Up to 2x60W or 4x30W
- 10MHz LTE carrier with 4Rx Diversity
- Convection-cooled (fan-less)
- Supports AISG 2.0 ALD devices (RET, TMA) through RS485 or RF ports

BENEFITS

- Compact to reduce additional footprint when adding LTE in 700U band
- MIMO scheme operation selection (2Tx or 4Tx) by software only
- Improves downlink spectral efficiency through MIMO4
- Increases LTE coverage thanks to 4Rx diversity capability and best in class Rx sensitivity
- Flexible mounting options: Pole or Wall



4x30W with 4T4R
or
2x60W with 2T4R

Can be switched between modes via SW w/o site visit

TECHNICAL SPECIFICATIONS

Features & performance	
Number of TX/RX paths	4 duplexed (either 4T4R or 2T4R by SW)
Frequency band	U700 (C) (3GPP bands 13): DL: 746 - 756 MHz / UL: 777 - 787 MHz
Instantaneous bandwidth - #carriers	10MHz – 1 LTE carrier (in 10MHz occupied bandwidth)
LTE carrier bandwidth	10 MHz
RF output power	2x60W or 4x30W (by SW)
Noise figure – RX Diversity scheme	2. dB typ. (<2.5 dB max) – 2 or 4 way Rx diversity
Sizes (HxWxD) in mm (in.)	550 x 305 x 230 (21.6" x 12.0" x 9") (with solar shield)
Volume in L	38 (with solar shield)
Weight in kg (lb) (w/o mounting HW)	26 (57.2) (with solar shield)
DC voltage range	-40.5 to -57V at full performance, -38 to -57V with relaxation on power consumption
DC power consumption	550W typical @100% RF load (in 2Tx or 4TX mode)
Environmental conditions	-40°C (-40°F) / +55°C (+131°F)
Wind load (@150km/h or 93mph)	IP65 Frontal: <200N / Lateral : <150N
Antenna ports	4 ports 7/16 DIN female (50 ohms) VSWR < 1.5
CPRI ports	2 CPRI ports (HW ready for Rate7, 9.8 Gbps) SFP single mode dual fiber
AISG interfaces	1 AISG2.0 output (RS485) Integrated Smart Bias Tees (x2)
Misc. Interfaces	4 external alarms (1 connector) – 4 RF Tx & 4 RF Rx monitor ports - 1 DC connector (2 pins)
Installation conditions	Pole and wall mounting
Regulatory compliance	3GPP 36.141 / 3GPP 36.113 / GR-1089-CORE / GR-3108-CORE / UL 60950-1 / FCC Part 27

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ATTACHMENT 2

ATTACHMENT 3

Date: **October 27, 2015**

Brittany Richardson
Crown Castle
3530 Toringdon Way, Suite 300
Charlotte, NC 28277
(980) 209-8239



Tower Engineering Professionals
326 Tryon Road
Raleigh, NC 27603
(919) 661-6351
crown@tepgroup.net

Subject: Structural Analysis Report

Carrier Designation:	Verizon Co-Locate	
	Carrier Site Number:	N/A
	Carrier Site Name:	Trumbull
Crown Castle Designation:	Crown Castle BU Number:	873128
	Crown Castle Site Name:	Trumbull
	Crown Castle JDE Job Number:	348438
	Crown Castle Work Order Number:	1126745
	Crown Castle Application Number:	312904 Rev. 0
Engineering Firm Designation:	TEP Project Number:	25575.39261
Site Data:	800 Booth Hill Rd., Shelton, Fairfield County, CT 06611 Latitude 41° 16' 44.26"; Longitude -73° 11' 6.40" 457 Foot - Guyed Tower	

Dear Brittany Richardson,

Tower Engineering Professionals is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 837377, in accordance with application 312904, revision 0.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Existing + Reserved + Proposed Equipment

Sufficient Capacity

Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures, ASCE 7-05 Minimum Design Loads for Buildings and Other Structures and the 2005 Connecticut State Building Code (2003 International Building Code) with 2009 amendment based upon a wind speed of 85 mph fastest mile.

All modifications and equipment proposed in this report shall be installed in accordance with the appurtenances listed in Tables 1 and 2 and the attached drawing for the determined available structural capacity to be effective.

We at *Tower Engineering Professionals* appreciate the opportunity of providing our continuing professional services to you and *Crown Castle*. If you have any questions or need further assistance on this or any other projects please give us a call.

Analysis prepared by: Matthew K. Lackey, P.E. / ZRH

Respectfully submitted by:

Graham M. Andres, P.E.

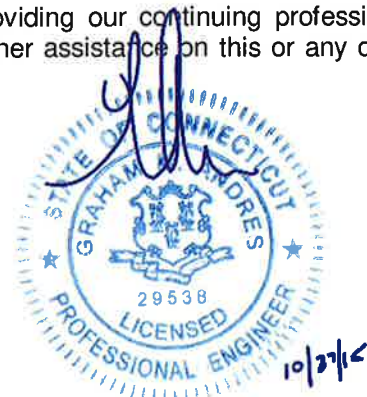


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1) INTRODUCTION

This tower is a 457-ft guyed tower designed by Blaw Knox, and mapped by Pinnacle Towers in July of 2003. The original design standard and wind speed are unknown. The tower has been modified multiple times in the past to accommodate additional loading. All information provided to TEP was assumed to be accurate and complete.

2) ANALYSIS CRITERIA

The analysis has been performed in accordance with the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and ASCE 7-05 Minimum Design Loads for Buildings and Other Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch escalating ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
230.0	232.0	1	RFS/Celwave	DB-T1-6Z-8AB-0Z	-	-	-
		3	Alcatel Lucent	RRH2x60-700			

Table 2 - Existing and Reserved Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
460.0	477.0	1	Dielectric	TFU-20JDAS	1	4-1/16	1
445.0	452.0	1	Antel	BCD-87077	-	-	2
	450.0	1	Antel	BCD-87077			
	445.0	1	Tower Mounts	Side Arm Mount [SO 306-1]			
		1	Tower Mounts	Side Arm Mount [SO 304-1]			
440.0	450.0	1	Decibel	DB420	1	7/8	1
	440.0	1	Tower Mounts	Side Arm Mount [SO 308-1]			
439.0	445.0	1	Antel	BCD-87077	-	-	2
	439.0	1	Tower Mounts	Side Arm Mount [SO 308-1]			
419.0	419.0	3	ERI	1183-3CP	1	3	1
388.0	388.0	3	Shively Labs	6014-2	1	1-5/8	1
367.0	367.0	1	ERI	SHP-2AE	1	3	1
364.0	368.0	1	Andrew	DB806E-XT	1	1-5/8	2
	364.0	1	Tower Mounts	Side Arm Mount [SO 601-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
344.0	354.0	1	RFS Celwave	455-6	1	1/2	2
	344.0	1	Tower Mounts	Side Arm Mount [SO 601-1]			
342.0	352.0	1	RFS Celwave	455-6	1	1-1/4	2
	347.0	1	RFS Celwave	AO9009-3	-	-	
	342.0	1	Tower Mounts	Side Arm Mount [SO 601-1]			
		1	Tower Mounts	Side Arm Mount [SO 302-1]			
340.0	350.0	1	RFS Celwave	455-6	1	7/8	2
	340.0	1	Tower Mounts	Side Arm Mount [SO 308-1]			
330.0	335.0	1	Andrew	PG1N0F-0090-310	1	1-1/4	1
	330.0	1	Tower Mounts	Side Arm Mount [SO 602-1]			
		-	-	-	-	1	1-5/8
328.0	328.0	1	Dielectric	7P-C1-2-CP-L	1	3-1/2	1
		3	Tower Mounts	Side Arm Mount [SO 701-1]			
326.0	329.0	1	Decibel	DB201-A	1	7/8	1
	326.0	1	Tower Mounts	Side Arm Mount [SO 602-1]			
325.0	325.0	1	Laird Tech.	PLC-1296	-	-	2
322.0	327.0	1	Sinclair	SRL-310C-4HD	1	1/2	1
	322.0	1	Radiowaves	SPD3-5.8			
		1	Tower Mounts	Side Arm Mount [SO 308-1]			
310.0	312.0	3	Shively Labs	6014-2	1	1-5/8	1
284.0	290.0	1	Austin Antenna Company	APC-301	1	1-1/4	1
	284.0	1	Tower Mounts	Side Arm Mount [SO 308-1]			
		1	Andrew	DB404-B	-	-	2
277.0	283.0	1	RFS Celwave	BMR10-A-B1	1	1-5/8	1
269.0	269.0	1	Sinclair	SRL-227	-	-	3
		1	Tower Mounts	Side Arm Mount [SO 602-1]			
264.0	273.0	1	Telewave	ANT150F6	1	1-5/8	1
	264.0	1	Tower Mounts	Side Arm Mount [SO 602-1]			
		1	Tower Mounts	Side Arm Mount [SO 602-1]	-	-	3
255.0	261.0	1	Decibel	DB809KT3E-Y	1	1-1/4	1
	255.0	1	Tower Mounts	Side Arm Mount [SO 203-1]			
251.0	256.0	1	Andrew	PG1N0F-0090-310	-	-	3
	251.0	2	Tower Mounts	Side Arm Mount [SO 203-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
247.0	247.0	3	EMS Wireless	LNX-6515DS-VTM w/ Mount Pipe	6	7/8	4
		3	RFS Celwave	APX16PV-16PVL w/ Mount Pipe			
		3	Commscope	TMAT7LA-11A			
		3	Commscope	ATBT-BOTTOM-24V	12	7/8	1
		9	RFS Celwave	ATMAP1412D-1A20			
		1	Tower Mounts	Sector Mount [SM 301-3]			
230.0	232.0	3	Commscope	HBXX-6516DS-VTM w/ Mount Pipe	2 18	1-5/8 7/8	1
		3	Andrew	SBNHH-1D65B w/ Mount Pipe			
		2	Andrew	LNX-8513DS-VTM w/ Mount Pipe			
		1	Andrew	LNX-6514DS-VTM w/ Mount Pipe			
		3	Alcatel Lucent	RRH2X60-PCS			
		3	Alcatel Lucent	RRH2X60-AWS			
		1	RFS Celwave	DB-T1-6Z-8AB-0Z			
	1	Tower Mounts	Sector Mount [SM 407-3]	1 3	1-5/8 7/8	5	
	230.0	-	-				-
214.0	224.0	1	RFS Celwave	220-1N	-	-	5
	214.0	1	Tower Mounts	Side Arm Mount [SO 307-1]			
206.0	206.0	1	Mark	P-9A72GN-U	1	7/8	1
200.0	200.0	1	Gabriel Elec.	DFPD1-52 w/ Mount Pipe	1	1/4	1
188.0	188.0	1	PCTEL	BMYD745K	-	-	2
186.0	186.0	1	Decibel	ASP-960	-	-	2
178.0	178.0	1	Radiowaves	SPD4-5.2	1	1/2	1
150.0	150.0	1	Andrew	HPX6-65-P3A	2	EW63	1
146.0	146.0	1	Andrew	PL6-65-PXA	1	EW63	1
		1	Tower Mounts	Pipe Mount [PM 601-1]			
136.0	138.0	1	RFS Celwave	MGA2-16N	3	3/8	1
	136.0	1	CSI-Cellular Specialties	CSI-AY/809-960/11			
		1	Tower Mounts	2.4"Ø x 8' Mount Pipe			
	134.0	1	RFS Celwave	MGAR3-23N			
133.0	145.0	1	Sinclair	SRL-235-2	1	7/8	1
	143.0	1	RFS Celwave	220-5	1	1/2	
	133.0	1	Tower Mounts	Side Arm Mount [SO 602-1]			
117.0	117.0	1	Mark	P-9A48GN-U	1	7/8	1
109.0	113.0	1	RFS Celwave	PD1132-D	1	7/8	1
108.0	108.0	1	Mark	SSH-9A72GN	1	1/4	1
		1	Tower Mounts	Side Arm Mount [SO 303-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
106.0	106.0	1	Kathrein	PR-950	2	3/8	1
		1	Tower Mounts	Pipe Mount [PM 601-1]			
99.0	99.0	1	Ligowave	PTP 900-13	1	7/8	1
		1	Radiowaves	SPD2-5.8			
		1	Tower Mounts	Pipe Mount [PM 601-1]			
75.0	75.0	-	-	-	1	1-5/8	2
62.0	68.0	1	Mark	P-9A48GN-U	1	7/8	1
	62.0	2	Tower Mounts	Side Arm Mount [SO 601-1]			
		-	-	-	2	1/4	2
	61.0	1	Mark	SSH-9A72GN	2	7/8	1
54.0	1	CSI-Cellular Specialties	CSI-AY/809-960/11				

Notes:

- 1) Existing equipment
- 2) Abandoned equipment; considered in this analysis
- 3) Abandoned equipment to be removed; not considered in this analysis
- 4) Reserved equipment
- 5) Existing equipment to be removed; not considered in this analysis

Table 3 - Design Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
Unknown						

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Geotechnical Reports	FDH Engineering	1418454	CCISites
Tower Foundation Mapping	Tower Engineering Professionals	1520339	CCISites
Tower Mapping	Pinnacle Towers Inc.	1327906	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	2407618	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	2633757	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	2755396	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	3006419	CCISites
Tower Reinforcement Design	Tower Engineering Professionals	5592838	CCISites
Post-Modification Inspection	Pinnacle Towers Inc.	1956007	CCISites
Post-Modification Inspection	Tower Engineering Professionals	2438393	CCISites
Post-Modification Inspection	Tower Engineering Professionals	3417531	CCISites
Post-Modification Inspection	Tower Engineering Professionals	3442609	CCISites
Post-Modification Inspection	Sinnott Gering and Schmitt Tower, Inc.	5760315	CCISites
Appurtenance Mapping	Tower Engineering Professionals	25575.65746	TEP

3.1) Analysis Method

tnxTower (version 6.1.4.1), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A.

3.2) Assumptions

- 1) The tower and foundation were built in accordance with the manufacturer's specifications.
- 2) The tower and foundation have been maintained in accordance with the manufacturer's specification.
- 3) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2, and "Appendix B – Base Level Drawing".
- 4) When applicable, transmission cables are considered as structural components for calculating wind loads as allowed by the standard.
- 5) All tower components are in sufficient condition to carry their full design capacity.
- 6) Serviceability with respect to antenna twist, tilt, roll, or lateral translation, is not checked and is left to the carrier or tower owner to ensure conformance.
- 7) All antenna mounts and mounting hardware are structurally sufficient to carry the full design capacity requirements of appurtenance wind area and weight as provided by the original manufacturer specifications. It is the carrier's responsibility to ensure compliance to the structural limitations of the existing and/or proposed antenna mounts. TEP did not perform a site visit to verify the size, condition or capacity of the antenna mounts and did not analyze antennas supporting mounts as part of this structural analysis report.
- 8) Per photos from CCI Sites, the termination and stitch welds of the reinforcing sleeves to the tower legs at 361-ft to 401-ft were assumed to be 3/16" fillet welds by 3" long. The end gaps between the sleeves and the flange were assumed to be 12".
- 9) The following material grades were assumed:
 - a) Leg grade: A7-33
 - b) Original Bracing Grade: A7-33
 - c) Original Connection bolts: A307
 - d) 2L3-1/2x3-1/2x3/8 pull-off: A36
- 10) TEP could not analyze the base casting. The base casting thickness was not provided. TEP recommends a base casting thickness be obtained prior to modification. TEP assumes the base casting is sufficient for the purposes of this analysis.

This analysis may be affected if any assumptions are not valid or have been made in error. Tower Engineering Professionals should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T1	457 - 436	Leg	3	2	-24447	132219	18.5	Pass
T2	436 - 421	Leg	2 3/4	44	-34887	108536	32.1	Pass
T3	421 - 401	Leg	2 3/4	74	-82951	108536	76.4	Pass
T4-T7	401 - 381	Leg	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	Note 1	Note 1	Note 1	82.7 58.6 (b)	Pass
T8-T11	381 - 361	Leg	3.5" S.R. w/ 3.5 SCH40 Half Pipe	Note 1	Note 1	Note 1	68.1	Pass
T12	361 - 341	Leg	3	191	-106002	164068	64.6	Pass
T13	341 - 321	Leg	3	236	-76408	135863	56.2	Pass
T14	321 - 301	Leg	3	269	-53213	101923	52.2	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P allow (lb)	% Capacity	Pass / Fail
T15	301 - 281	Leg	3	303	-85509	135863	62.9	Pass
T16	281 - 261	Leg	3	336	-119339	135863	87.8	Pass
T17	261 - 241	Leg	3	369	-141117	164427	85.8	Pass
T18	241 - 221	Leg	3	414	-110953	135863	81.7	Pass
T19	221 - 201	Leg	3 1/4	448	-83848	124390	67.4	Pass
T20	201 - 181	Leg	3 1/4	481	-87426	124390	70.3	Pass
T21	181 - 161	Leg	3 1/4	514	-91071	124390	73.2	Pass
T22	161 - 141	Leg	3 1/2	547	-94716	148821	63.6	Pass
T23	141 - 121	Leg	3 1/2	580	-98867	148821	66.4	Pass
T24	121 - 101	Leg	3 1/2	613	-110205	148821	74.1	Pass
T25	101 - 81	Leg	3 1/2	646	-157951	198378	79.6	Pass
T26	81 - 61	Leg	3 1/2	679	-160939	198378	81.1	Pass
T27	61 - 41	Leg	3 1/2	712	-158970	198378	80.1	Pass
T28	41 - 20	Leg	3 1/2	745	-122752	145878	84.1	Pass
T29	20 - 6.70833	Leg	3 1/4	773	-128476	130073	98.8	Pass
T30	6.70833 - 0	Leg	3 1/4	797	-132727	137843	96.3	Pass
T1	457 - 436	Diagonal	L2 1/2x2x1/4	39	-1962	16403	12.0 48.0 (b)	Pass
T2	436 - 421	Diagonal	L2 1/2x2x3/16	53	-2417	12778	18.9	Pass
T3	421 - 401	Diagonal	L2 1/2x2x3/16	86	-6863	12778	53.7 62.4 (b)	Pass
T4	401 - 396	Diagonal	L2 1/2x2x3/16	113	-7374	12778	57.7 67.1 (b)	Pass
T5	396 - 391	Diagonal	L2 1/2x2x3/16	122	-7420	12778	58.1 67.5 (b)	Pass
T6	391 - 386	Diagonal	L2 1/2x2x3/16	134	-8936	12778	69.9	Pass
T7	386 - 381	Diagonal	L2 1/2x2x3/16	146	-8290	12778	64.9 69.9 (b)	Pass
T8	381 - 376	Diagonal	L2 1/2x2x3/16	152	-6491	12778	50.8 70.5 (b)	Pass
T9	376 - 371	Diagonal	L2 1/2x2x3/16	162	-8093	12778	63.3 73.6 (b)	Pass
T10	371 - 366	Diagonal	L2 1/2x2x3/16	176	-6787	12778	53.1 61.7 (b)	Pass
T11	366 - 361	Diagonal	L2 1/2x2x3/16	188	-7025	12778	55.0 63.9 (b)	Pass
T12	361 - 341	Diagonal	L2 1/2x2x3/16	230	-6504	12716	51.1 59.2 (b)	Pass
T13	341 - 321	Diagonal	L2 1/2x2x3/16	266	-4159	12778	32.5 37.8 (b)	Pass
T14	321 - 301	Diagonal	L2 1/2x2x3/16	279	-2574	12778	20.1 49.2 (b)	Pass
T15	301 - 281	Diagonal	L2 1/2x2x3/16	312	-3828	12778	30.0 73.1 (b)	Pass
T16	281 - 261	Diagonal	L2 1/2x2x3/16	345	-4917	12778	38.5 44.7 (b)	Pass
T17	261 - 241	Diagonal	L3x3x1/4	389	-8800	30315	29.0 81.4 (b)	Pass
T18	241 - 221	Diagonal	L3x3x1/4	443	-7247	28608	25.3 65.9 (b)	Pass
T19	221 - 201	Diagonal	L2 1/2x2x3/16	476	-4035	12778	31.6 77.1 (b)	Pass
T20	201 - 181	Diagonal	L2 1/2x2x3/16	509	-2666	12778	20.9 50.9 (b)	Pass
T21	181 - 161	Diagonal	L2 1/2x2x3/16	525	-1363	12778	10.7 26.0 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T22	161 - 141	Diagonal	L3x3x1/4	554	-3464	28661	12.1 20.2 (b)	Pass
T23	141 - 121	Diagonal	L3x3x1/4	605	-4270	28661	14.9 24.9 (b)	Pass
T24	121 - 101	Diagonal	L2 1/2x2x3/16	632	-4313	12778	33.8 39.2 (b)	Pass
T25	101 - 81	Diagonal	L2 1/2x2x3/16	675	-2344	12778	18.3 44.8 (b)	Pass
T26	81 - 61	Diagonal	L2 1/2x2x3/16	689	-1027	12778	8.0 19.6 (b)	Pass
T27	61 - 41	Diagonal	L2 1/2x2x3/16	719	-2261	12778	17.7 43.2 (b)	Pass
T28	41 - 20	Diagonal	L2 1/2x2x3/16	755	-3620	12584	28.8 69.1 (b)	Pass
T29	20 - 6.70833	Diagonal	L2x2x3/16	779	3314	17930	18.5 63.3 (b)	Pass
T30	6.70833 - 0	Diagonal	L2x2x3/16	811	4154	13451	30.9 79.4 (b)	Pass
T1	457 - 436	Horizontal	L2 1/2x2x1/4	36	-972	8147	11.9 18.6 (b)	Pass
T2	436 - 421	Horizontal	L2 1/2x2x1/4	56	1220	27106	4.5 23.3 (b)	Pass
T12	361 - 341	Secondary Horizontal	L2x2x1/4	206	-1836	18022	10.2 23.4 (b)	Pass
T17	261 - 241	Secondary Horizontal	2L3 1/2x3 1/2x3/8x3/8	384	-2451	131047	1.9	Pass
T1	457 - 436	Top Girt	C8x13.75	6	-1	51237	0.2	Pass
T2	436 - 421	Top Girt	L2 1/2x2x1/4	8	787	20334	3.9 15.0 (b)	Pass
T3	421 - 401	Top Girt	L2 1/2x2x1/4	47	575	27106	2.1 11.0 (b)	Pass
T4	401 - 396	Top Girt	L2 1/2x2x1/4	78	-316	10803	2.9 8.8 (b)	Pass
T6	391 - 386	Top Girt	L2 1/2x2x1/4	128	598	27977	2.1	Pass
T10	371 - 366	Top Girt	L2 1/2x2x1/4	170	784	27977	2.8	Pass
T12	361 - 341	Top Girt	L2 1/2x2x1/4	184	-367	9692	3.8 14.5 (b)	Pass
T13	341 - 321	Top Girt	L2 1/2x2x1/4	194	322	27106	1.2 6.1 (b)	Pass
T14	321 - 301	Top Girt	L2 1/2x2x1/4	239	315	27106	1.2 6.0 (b)	Pass
T15	301 - 281	Top Girt	L2 1/2x2x3/16	272	210	15566	1.3 4.0 (b)	Pass
T16	281 - 261	Top Girt	L2 1/2x2x1/4	305	227	20334	1.1 4.3 (b)	Pass
T17	261 - 241	Top Girt	L2 1/2x2x3/16	340	454	15566	2.9 11.5 (b)	Pass
T18	241 - 221	Top Girt	L2 1/2x2x3/16	371	562	15566	3.6 10.7 (b)	Pass
T19	221 - 201	Top Girt	L2 1/2x2x3/16	417	374	15566	2.4 7.1 (b)	Pass
T20	201 - 181	Top Girt	L2 1/2x2x3/16	451	351	15566	2.3 6.7 (b)	Pass
T21	181 - 161	Top Girt	2L3x2x1/4x3/8	483	588	62010	0.9 5.6 (b)	Pass
T22	161 - 141	Top Girt	L2 1/2x2x3/16	516	561	20749	2.7 10.7 (b)	Pass
T23	141 - 121	Top Girt	L2 1/2x2x3/16	550	1147	20749	5.5 21.9 (b)	Pass
T24	121 - 101	Top Girt	L2 1/2x2x3/16	582	-4132	8454	48.9 78.9 (b)	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T25	101 - 81	Top Girt	L2 1/2x2x3/16	615	502	15566	3.2 9.6 (b)	Pass
T26	81 - 61	Top Girt	L2 1/2x2x3/16	648	740	20749	3.6 14.1 (b)	Pass
T27	61 - 41	Top Girt	L2 1/2x2x3/16	682	796	20749	3.8 15.2 (b)	Pass
T28	41 - 20	Top Girt	L2 1/2x2x3/16	714	555	15566	3.6 10.6 (b)	Pass
T29	20 - 6.70833	Top Girt	2L2 1/2x2x3/16x1/4	777	9876	31113	31.7 44.9 (b)	Pass
T1	457 - 436	Mid Girt	L2 1/2x2x1/4	13	3195	27106	11.8 61.0 (b)	Pass
T3	421 - 401	Mid Girt	L2 1/2x2x1/4	81	-462	10803	4.3 11.3 (b)	Pass
T12	361 - 341	Mid Girt	L2 1/2x2x1/4	197	277	27106	1.0 5.3 (b)	Pass
T13	341 - 321	Mid Girt	L2 1/2x2x1/4	242	280	27106	1.0 5.3 (b)	Pass
T14	321 - 301	Mid Girt	L2 1/2x2x1/4	277	506	27106	1.9 9.7 (b)	Pass
T15	301 - 281	Mid Girt	L2 1/2x2x3/16	308	210	15566	1.3 4.0 (b)	Pass
T16	281 - 261	Mid Girt	L2 1/2x2x1/4	343	349	27106	1.3 6.7 (b)	Pass
T18	241 - 221	Mid Girt	L2 1/2x2x3/16	420	836	20749	4.0 16.0 (b)	Pass
T19	221 - 201	Mid Girt	L2 1/2x2x3/16	453	346	15566	2.2 6.6 (b)	Pass
T20	201 - 181	Mid Girt	L2 1/2x2x3/16	486	453	20749	2.2 8.7 (b)	Pass
T21	181 - 161	Mid Girt	L2 1/2x2x3/16	519	480	20749	2.3 9.2 (b)	Pass
T22	161 - 141	Mid Girt	L2 1/2x2x3/16	553	492	15566	3.2 9.4 (b)	Pass
T23	141 - 121	Mid Girt	L2 1/2x2x3/16	585	-5239	8454	62.0 68.6 (b)	Pass
T24	121 - 101	Mid Girt	L2 1/2x2x3/16	619	482	15566	3.1 9.2 (b)	Pass
T25	101 - 81	Mid Girt	L2 1/2x2x3/16	651	713	20749	3.4 13.6 (b)	Pass
T26	81 - 61	Mid Girt	L2 1/2x2x3/16	684	750	20749	3.6 14.3 (b)	Pass
T27	61 - 41	Mid Girt	L2 1/2x2x3/16	717	717	20749	3.5 13.7 (b)	Pass
T28	41 - 20	Mid Girt	L2 1/2x2x3/16	747	870	15566	5.6 16.6 (b)	Pass
T1	457 - 436	Guy A@446.5	9/16	838	12813	17500	73.2	Pass
T8	381 - 376	Guy A@381	1 3/8	835	69483	116000	59.9	Pass
T17	261 - 241	Guy A@251	1 1/4	832	49560	96000	51.6	Pass
T23	141 - 121	Guy A@131	11/16	825	15456	25000	61.8	Pass
T1	457 - 436	Guy B@446.5	9/16	837	12971	17500	74.1	Pass
T8	381 - 376	Guy B@381	1 3/8	834	70194	116000	60.5	Pass
T17	261 - 241	Guy B@251	1 1/4	831	50359	96000	52.5	Pass
T23	141 - 121	Guy B@131	11/16	818	15664	25000	62.7	Pass
T1	457 - 436	Guy C@446.5	9/16	836	12469	17500	71.3	Pass
T8	381 - 376	Guy C@381	1 3/8	833	67408	116000	58.1	Pass
T17	261 - 241	Guy C@251	1 1/4	830	49368	96000	51.4	Pass
T23	141 - 121	Guy C@131	11/16	813	15275	25000	61.1	Pass

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (lb)	SF*P_allow (lb)	% Capacity	Pass / Fail
T8	381 - 376	Top Guy Pull-Off@381	2L3x2x1/4x3/8	142	21815	62816	34.7	Pass
T17	261 - 241	Top Guy Pull-Off@251	2L3 1/2x3 1/2x3/8x3/8	376	19263	143100	13.5	Pass
T23	141 - 121	Torque Arm Top@131	2L3x3x3/16	820	13659	57538	23.7 58.0 (b)	Pass
T23	141 - 121	Torque Arm Bottom@131	2L3x3x3/16	823	-15339	22404	68.5	Pass
							Summary	
							Leg (T29)	98.8 Pass
							Diagonal (T17)	81.4 Pass
							Horizontal (T2)	23.3 Pass
							Secondary Horizontal (T12)	23.4 Pass
							Top Girt (T24)	78.9 Pass
							Mid Girt (T23)	68.6 Pass
							Guy A (T1)	73.2 Pass
							Guy B (T1)	74.1 Pass
							Guy C (T1)	71.3 Pass
							Top Guy Pull-Off (T8)	34.7 Pass
							Torque Arm Top (T23)	58.0 Pass
							Torque Arm Bottom (T23)	68.5 Pass
							Bolt Checks	81.4 Pass
							RATING =	98.8 Pass

Table 6 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Mast Foundation	-	72.7	Pass
1	Guy Anchor Foundation A	-	85.2	Pass
1	Guy Anchor Foundation B	-	85.7	Pass
1	Guy Anchor Foundation C	-	86.5	Pass

Structure Rating (max from all components) =	98.8%
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Notes:

- 1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.

4.1) Recommendations

- 1) If the load differs from that described in Tables 1 and 2 of this report, "Appendix B – Base Level Drawing" or the provisions of this analysis are found to be invalid, another structural analysis should be performed.
- 2) The tower and its base and anchor foundations have sufficient capacity to carry the existing, reserved, and proposed loads. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

tnxTower Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350	Job Trumbull (BU 873128)	Page 1 of 57
	Project TEP No. 25575.39261	Date 14:20:44 10/27/15
	Client Crown Castle	Designed by mlackey

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 457' above the ground line.

The base of the tower is set at an elevation of 0' above the ground line.

The face width of the tower is 6' at the top and tapered at the base.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Tower is located in Fairfield County, Connecticut.

Basic wind speed of 85 mph.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 38 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

Pressures are calculated at each section.

Safety factor used in guy design is 2.

Stress ratio used in tower member design is 1.333.

Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

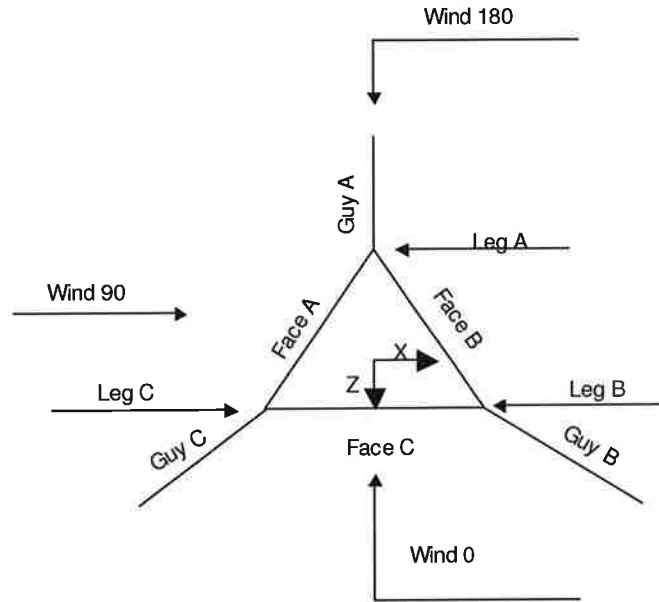
Options

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys √ Escalate Ice Always Use Max Kz Use Special Wind Profile √ Include Bolts In Member Capacity √ Leg Bolts Are At Top Of Section √ Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) Add IBC .6D+W Combination | <ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate √ Use Clear Spans For Wind Area √ Use Clear Spans For KL/r √ Retension Guys To Initial Tension Bypass Mast Stability Checks √ Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. √ Autocalc Torque Arm Areas SR Members Have Cut Ends √ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Use TIA-222-G Tension Splice Capacity Exemption | <ul style="list-style-type: none"> Treat Feedline Bundles As Cylinder Use ASCE 10 X-Brace Ly Rules √ Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feedline Torque √ Include Angle Block Shear Check <li style="text-align: center;">Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets |
|--|---|---|

tnxTower

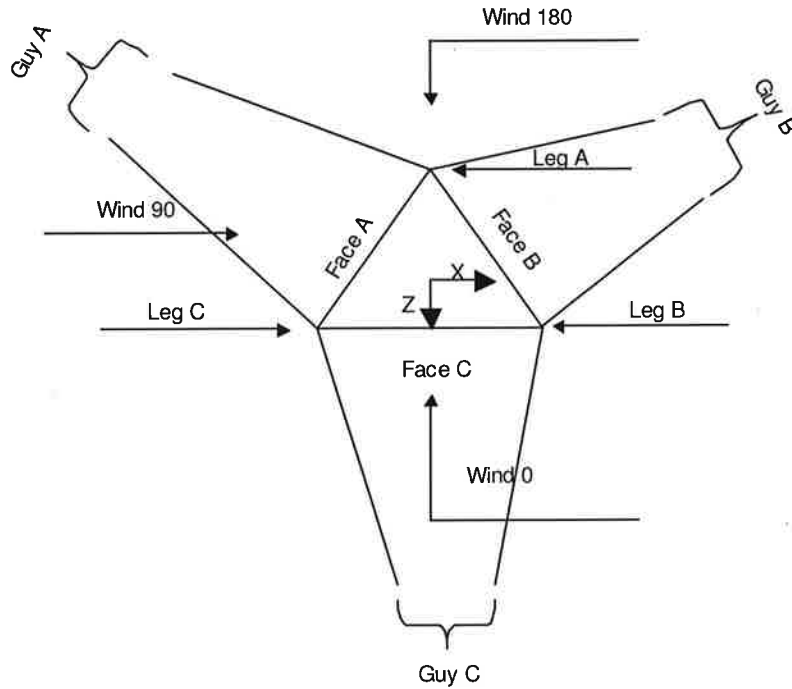
**Tower Engineering
Professionals, Inc.**
326 Tryon Road
Raleigh, NC 27603
Phone: (919) 661-6351
FAX: (919) 661-6350

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Corner & Starmount Guyed Tower

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Face Guyed

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	457'-436'			6'	1	21'
T2	436'-421'			6'	1	15'
T3	421'-401'			6'	1	20'
T4	401'-396'			6'	1	5'
T5	396'-391'			6'	1	5'
T6	391'-386'			6'	1	5'
T7	386'-381'			6'	1	5'
T8	381'-376'			6'	1	5'
T9	376'-371'			6'	1	5'
T10	371'-366'			6'	1	5'
T11	366'-361'			6'	1	5'
T12	361'-341'			6'	1	20'
T13	341'-321'			6'	1	20'
T14	321'-301'			6'	1	20'
T15	301'-281'			6'	1	20'
T16	281'-261'			6'	1	20'

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Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T17	261'-241'			6'	1	20'
T18	241'-221'			6'	1	20'
T19	221'-201'			6'	1	20'
T20	201'-181'			6'	1	20'
T21	181'-161'			6'	1	20'
T22	161'-141'			6'	1	20'
T23	141'-121'			6'	1	20'
T24	121'-101'			6'	1	20'
T25	101'-81'			6'	1	20'
T26	81'-61'			6'	1	20'
T27	61'-41'			6'	1	20'
T28	41'-20'			6'	1	21'
T29	20'-6'8"-17/32"			6'	1	13'3"-15/32"
T30	6'8"-17/32"-0'			2'6"-31/32"	1	6'8"-17/32"

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	457'-436'	5'3"	X Brace	No	Yes	0.0000	0.0000
T2	436'-421'	5'	X Brace	No	Yes	0.0000	0.0000
T3	421'-401'	5'	X Brace	No	Yes	0.0000	0.0000
T4	401'-396'	5'	X Brace	No	Yes	0.0000	0.0000
T5	396'-391'	5'	X Brace	No	Yes	0.0000	0.0000
T6	391'-386'	5'	X Brace	No	Yes	0.0000	0.0000
T7	386'-381'	5'	X Brace	No	Yes	0.0000	0.0000
T8	381'-376'	5'	X Brace	No	Yes	0.0000	0.0000
T9	376'-371'	5'	X Brace	No	Yes	0.0000	0.0000
T10	371'-366'	5'	X Brace	No	Yes	0.0000	0.0000
T11	366'-361'	5'	X Brace	No	Yes	0.0000	0.0000
T12	361'-341'	5'	X Brace	No	Yes	0.0000	0.0000
T13	341'-321'	5'	X Brace	No	Yes	0.0000	0.0000
T14	321'-301'	5'	X Brace	No	Yes	0.0000	0.0000
T15	301'-281'	5'	X Brace	No	Yes	0.0000	0.0000
T16	281'-261'	5'	X Brace	No	Yes	0.0000	0.0000
T17	261'-241'	5'	X Brace	No	Yes	0.0000	0.0000
T18	241'-221'	5'	X Brace	No	Yes	0.0000	0.0000
T19	221'-201'	5'	X Brace	No	Yes	0.0000	0.0000
T20	201'-181'	5'	X Brace	No	Yes	0.0000	0.0000
T21	181'-161'	5'	X Brace	No	Yes	0.0000	0.0000
T22	161'-141'	5'	X Brace	No	Yes	0.0000	0.0000
T23	141'-121'	5'	X Brace	No	Yes	0.0000	0.0000
T24	121'-101'	5'	X Brace	No	Yes	0.0000	0.0000
T25	101'-81'	5'	X Brace	No	Yes	0.0000	0.0000
T26	81'-61'	5'	X Brace	No	Yes	0.0000	0.0000
T27	61'-41'	5'	X Brace	No	Yes	0.0000	0.0000
T28	41'-20'	5'3"	X Brace	No	Yes	0.0000	0.0000
T29	20'-6'8"-17/32"	4'5"-5/32"	X Brace	No	Yes	0.0000	0.0000
T30	6'8"-17/32"-0'	2'2"-7/8"	X Brace	No	Yes	0.0000	0.0000

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	Client Crown Castle	Designed by mlackey

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 457'-436'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T2 436'-421'	Solid Round	2 3/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T3 421'-401'	Solid Round	2 3/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T4 401'-396'	Arbitrary Shape	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T5 396'-391'	Arbitrary Shape	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T6 391'-386'	Arbitrary Shape	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T7 386'-381'	Arbitrary Shape	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T8 381'-376'	Arbitrary Shape	3.5" S.R. w/ 3.5 SCH40 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T9 376'-371'	Arbitrary Shape	3.5" S.R. w/ 3.5 SCH40 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T10 371'-366'	Arbitrary Shape	3.5" S.R. w/ 3.5 SCH40 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T11 366'-361'	Arbitrary Shape	3.5" S.R. w/ 3.5 SCH40 Half Pipe	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T12 361'-341'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T13 341'-321'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T14 321'-301'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T15 301'-281'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T16 281'-261'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T17 261'-241'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T18 241'-221'	Solid Round	3	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T19 221'-201'	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T20 201'-181'	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T21 181'-161'	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T22 161'-141'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T23 141'-121'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L3x3x1/4	A36 (36 ksi)
T24 121'-101'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T25 101'-81'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T26 81'-61'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T27 61'-41'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T28 41'-20'	Solid Round	3 1/2	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T29 20'-6'8-17/32"	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2x2x3/16	A7-33 (33 ksi)

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Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T30 6'8"-17'32"-0'	Solid Round	3 1/4	A7-33 (33 ksi)	Single Angle	L2x2x3/16	A7-33 (33 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 457'-436'	Channel	C8x13.75	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T2 436'-421'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T3 421'-401'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T4 401'-396'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T6 391'-386'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T7 386'-381'	Single Angle		A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T8 381'-376'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T10 371'-366'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T11 366'-361'	Single Angle		A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T12 361'-341'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T13 341'-321'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T14 321'-301'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T15 301'-281'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T16 281'-261'	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T17 261'-241'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T18 241'-221'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T19 221'-201'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T20 201'-181'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T21 181'-161'	Double Angle	2L3x2x1/4x3/8	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T22 161'-141'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T23 141'-121'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T24 121'-101'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T25 101'-81'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T26 81'-61'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)

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Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T27 61'-41'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)
T28 41'-20'	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A7-33 (33 ksi)
T29 20'-6'8"-17'32"	Double Angle	2L2 1/2x2x3/16x1/4	A7-33 (33 ksi)	Single Angle		A7-33 (33 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 457'-436'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T2 436'-421'	None	Single Angle		A7-33 (33 ksi)	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)
T3 421'-401'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Solid Round		A36 (36 ksi)
T12 361'-341'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T13 341'-321'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Solid Round		A36 (36 ksi)
T14 321'-301'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Solid Round		A36 (36 ksi)
T15 301'-281'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Solid Round		A36 (36 ksi)
T16 281'-261'	1	Single Angle	L2 1/2x2x1/4	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T17 261'-241'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T18 241'-221'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T19 221'-201'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T20 201'-181'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T21 181'-161'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T22 161'-141'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T23 141'-121'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T24 121'-101'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T25 101'-81'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T26 81'-61'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T27 61'-41'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)
T28 41'-20'	1	Single Angle	L2 1/2x2x3/16	A7-33 (33 ksi)	Single Angle		A36 (36 ksi)

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Tower Section Geometry (cont'd)

Tower Elevation	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
<i>ft</i>						
T12 361'-341'	Equal Angle	L2x2x1/4	A36 (36 ksi)	Solid Round		A36 (36 ksi)
T17 261'-241'	Double Equal Angle	2L3 1/2x3 1/2x3/8x3/8	A36 (36 ksi)	Solid Round		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_e	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
<i>ft</i>	<i>ft²</i>	<i>in</i>					<i>in</i>	<i>in</i>
T1 457'-436'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T2 436'-421'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T3 421'-401'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T4 401'-396'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T5 396'-391'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T6 391'-386'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T7 386'-381'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T8 381'-376'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T9 376'-371'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T10 371'-366'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T11 366'-361'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T12 361'-341'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T13 341'-321'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T14 321'-301'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T15 301'-281'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T16 281'-261'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T17 261'-241'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T18 241'-221'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T19 221'-201'	0.00	0.3750	A7-33 (33 ksi)	1.03	1	1.05	0.0000	0.0000
T20 201'-181'	0.00	0.3750	A7-33	1.03	1	1.05	0.0000	0.0000

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Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors ¹								
			Legs	X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace	
				X Y	X Y	X Y	X Y	X Y	X Y	X Y	X Y
T14 321'-301'	Yes	No	1	1	1	1	1	1	1	1	1
T15 301'-281'	Yes	No	1	1	1	1	1	1	1	1	1
T16 281'-261'	Yes	No	1	1	1	1	1	1	1	1	1
T17 261'-241'	No	No	1	1.17 1.17	1	1	0.92 0.92	1	1	0.5 0.5	1
T18 241'-221'	Yes	No	1	1	1	1	1	1	1	1	1
T19 221'-201'	Yes	No	1	1	1	1	1	1	1	1	1
T20 201'-181'	Yes	No	1	1	1	1	1	1	1	1	1
T21 181'-161'	Yes	No	1	1	1	1	1	1	1	1	1
T22 161'-141'	Yes	No	1	1	1	1	1	1	1	1	1
T23 141'-121'	Yes	No	1	1	1	1	1	1	1	1	1
T24 121'-101'	Yes	No	1	1	1	1	1	1	1	1	1
T25 101'-81'	Yes	No	1	1	1	1	1	1	1	1	1
T26 81'-61'	Yes	No	1	1	1	1	1	1	1	1	1
T27 61'-41'	Yes	No	1	1	1	1	1	1	1	1	1
T28 41'-20'	Yes	No	1	1	1	1	1	1	1	1	1
T29	Yes	No	1	1	1	1	1	1	1	1	1
20'-6"8-17/32"	Yes	No	1	1	1	1	1	1	1	1	1
T30	Yes	No	1	1	1	1	1	1	1	1	1
6"8-17/32"-0"											

¹Note: 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 457'-436'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1
T2 436'-421'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75	0.0000	1
T3 421'-401'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T4 401'-396'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T5 396'-391'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T6 391'-386'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75
T7 386'-381'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	0.75

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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
T8 381'-376'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T9 376'-371'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T10 371'-366'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T11 366'-361'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1
T12 361'-341'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	0.75
T13 341'-321'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T14 321'-301'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T15 301'-281'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T16 281'-261'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T17 261'-241'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T18 241'-221'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T19 221'-201'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T20 201'-181'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T21 181'-161'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T22 161'-141'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T23 141'-121'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T24 121'-101'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T25 101'-81'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T26 81'-61'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T27 61'-41'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T28 41'-20'	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1
T29	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1
20'-68'-17/32"														
T30	0.0000	1	0.0000	0.75	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
68'-17/32"-0'														

Tower Section Geometry (cont'd)

Tower Elevation ft	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
in	in	in	in	in	in	in	in	
T1 457'-436'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T2 436'-421'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T3 421'-401'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T4 401'-396'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T5 396'-391'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T6 391'-386'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T7 386'-381'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T8 381'-376'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T9 376'-371'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T10 371'-366'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T11 366'-361'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T12 361'-341'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T13 341'-321'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T14 321'-301'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T15 301'-281'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T16 281'-261'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000
T17 261'-241'	3.0000	0.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T15 301'-281'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T16 281'-261'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T17 261'-241'	Flange	0.6250	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T18 241'-221'	Flange	0.6250	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T19 221'-201'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T20 201'-181'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T21 181'-161'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T22 161'-141'	Flange	0.6250	8	0.6250	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T23 141'-121'	Flange	0.6250	8	0.6250	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T24 121'-101'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T25 101'-81'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T26 81'-61'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T27 61'-41'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T28 41'-20'	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	2	0.5000	2	0.0000	0	0.0000	0
T29 20'-6'8-17/32"	Flange	0.8750	8	0.5000	2	0.5000	2	0.5000	0	0.5000	0	0.0000	0	0.0000	0
T30 6'8-17/32"-0'	Flange	0.8750	8	0.5000	2	0.5000	0	0.5000	0	0.5000	0	0.0000	0	0.0000	0

Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension lb	%	Guy Modulus ksi	Guy Weight plf	L _u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
131	EHS	A 11/16	6000	12%	19000	0.994	425'11-5/8"	403'	0.0000	-20'	100%
		B 11/16	6000	12%	19000	0.994	426'5-13/32"	407'6"	0.0000	-9'	100%
		C 11/16	6000	12%	19000	0.994	444'11-17/32"	424'6"	0.0000	-16'6"	100%
251	BS	A 1 1/4	15360	8%	24000	3.280	484'2-3/4"	405'	0.0000	-20'	100%
		B 1 1/4	15360	8%	24000	3.280	471'2-9/32"	394'	0.0000	-13'	100%
		C 1 1/4	15360	8%	24000	3.280	489'5-7/8"	411'	0.0000	-20'6"	100%
381	BS	A 1 3/8	18560	8%	24000	3.970	567'2-3/4"	405'	0.0000	-20'	100%
		B 1 3/8	18560	8%	24000	3.970	554'6-1/8"	394'	0.0000	-13'	100%
		C 1 3/8	18560	8%	24000	3.970	571'10-3/16"	411'	0.0000	-20'6"	100%
446.5	EHS	A 9/16	2800	8%	21000	0.671	615'3-3/8"	405'	0.0000	-20'	100%
		B 9/16	2800	8%	21000	0.671	602'9-19/32"	394'	0.0000	-13'	100%
		C 9/16	2800	8%	21000	0.671	619'7-3/32"	411'	0.0000	-20'6"	100%

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Guy Data (cont'd)

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
131	Torque Arm	15'	53.0000	Bat Ear	A7-33 (33 ksi)	Double Angle	2L3x3x3/16
251	Corner						
381	Corner						
446.5	Corner						

Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
131'	A572-50 (50 ksi)	Solid Round				A7-33 (33 ksi)	Double Angle	
251'	A572-50 (50 ksi)	Solid Round			No	A36 (36 ksi)	Double Angle	2L3 1/2x3 1/2x3/8x3/8
381'	A572-50 (50 ksi)	Solid Round			No	A7-33 (33 ksi)	Double Angle	2L3x2x1/4x3/8
446'6"	A572-50 (50 ksi)	Solid Round				A7-33 (33 ksi)	Double Angle	

Guy Data (cont'd)

Guy Elevation ft	Cable Weight A lb	Cable Weight B lb	Cable Weight C lb	Cable Weight D lb	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
131	423	424	442		14'10-7/16"	14'10-29/32"	16'2-3/4"	
251	1588	1546	1606		6.7 sec/pulse 24'4-5/16"	6.7 sec/pulse 23'1-3/32"	7.0 sec/pulse 24'10-13/16"	
381	2252	2201	2270		8.5 sec/pulse 33'15/32"	8.3 sec/pulse 31'7-3/16"	8.6 sec/pulse 33'6-31/32"	
446.5	413	404	416		9.9 sec/pulse 43'1/4"	9.7 sec/pulse 41'3-31/32"	10.0 sec/pulse 43'7-9/16"	
					11.3 sec/pulse	11.1 sec/pulse	11.4 sec/pulse	

Guy Data (cont'd)

Torque Arm	Pull Off	Diagonal
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Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K _x	K _y	K _x	K _y	K _x	K _y
131	Yes	Yes	1	1	1	1	1	1
251	No	No			1	1	1	1
381	No	No			1	1	1	1
446.5	No	No			1	1	1	1

Guy Data (cont'd)

Guy Elevation ft	Torque-Arm				Pull Off				Diagonal			
	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U
131	0.7500 A307	2	0.0000	1	0.6250 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75
251	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
381	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
446.5	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q _z psf	q _z Ice psf	Ice Thickness in
131	A	55'6"	21	4	0.7983
	B	61'	22	4	0.8074
	C	57'3"	22	4	0.8013
251	A	115'6"	26	5	0.8717
	B	119'	27	5	0.8748
	C	115'3"	26	5	0.8714
381	A	180'6"	30	6	0.9196
	B	184'	30	6	0.9218
	C	180'3"	30	6	0.9195
446.5	A	213'3"	32	6	0.9382
	B	216'9"	32	6	0.9401
	C	213'	32	6	0.9381

Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation ft	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x lb	F _y lb	F _z lb	M _x lb-ft	M _y lb-ft	M _z lb-ft
131	A	20.7413	6150 6000	-107	2363	-5677	-10230.94	43039.50	-17720.51
	A	20.7413	6150 6000	107	2363	-5677	-10230.94	-43039.50	17720.51

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x lb	F _y lb	F _z lb	M _x lb-ft	M _y lb-ft	M _z lb-ft
	B	19.1464	6139 6000	5015	2202	2772	19072.00	43432.08	0.00
	B	19.1464	6139 6000	4909	2202	2957	-9536.00	-43432.08	-16516.84
	C	19.3407	6146 6000	-4908	2232	2951	-9665.19	43387.01	16740.60
	C	19.3407	6146 6000	-5010	2232	2774	19330.38	-43387.01	0.00
	Sum:			6	13594	101	-1260.70	0.00	223.76
	251	A	34.0157	16248 15360	0	9633	-13085	-33368.66	0.00
	B	34.0585	16225 15360	11319	9615	6535	16653.31	0.00	-28844.39
	C	33.6715	16250 15360	-11378	9563	6569	16563.39	-0.00	28688.63
	Sum:			-59	28810	19	-151.96	-0.00	-155.76
381	A	44.9617	20151 18560	0	14799	-13676	-51266.23	0.00	0.00
	B	45.2530	20123 18560	11776	14834	6799	25692.88	0.00	-44501.38
	C	44.5725	20153 18560	-11924	14716	6884	25488.36	-0.00	44147.13
Sum:			-148	44349	7	-84.99	-0.00	-354.25	
446.5	A	49.2801	3113 2800	0	2446	-1925	-8474.31	0.00	0.00
	B	49.6383	3108 2800	1654	2452	955	4247.69	0.00	-7357.21
	C	48.8898	3113 2800	-1680	2435	970	4217.01	-0.00	7304.07
Sum:			-27	7333	0	-9.62	-0.00	-53.13	

Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x lb	F _y lb	F _z lb	M _x lb-ft	M _y lb-ft	M _z lb-ft
131	A	20.7413	9525 9157	-164	3827	-8721	-16571.32	66119.35	-28702.36
	A	20.7413	9525 9157	164	3827	-8721	-16571.32	-66119.35	28702.36
	B	19.1464	9566 9221	7754	3606	4287	31226.89	67154.43	0.00
	B	19.1464	9566 9221	7590	3606	4572	-15613.44	-67154.43	-27043.28
	C	19.3407	9637 9276	-7634	3676	4591	-15916.17	67491.97	27567.62
	C	19.3407	9637 9276	-7793	3676	4316	31832.34	-67491.97	0.00
Sum:				-84	22217	324	-1613.02	0.00	524.34
251	A	34.0157	25173 23673	0	14999	-20217	-51958.83	0.00	0.00
	B	34.0585	25120	17475	14961	10089	25913.90	0.00	-44884.19

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		lb	lb	lb	lb-ft	lb-ft	lb-ft
381	C	33.6715	23656	-17594	14904	10158	25814.60	-0.00	44712.19
			25197						
			23694						
			Sum:						
A	44.9617	44.9617	30817	0	22700	-20843	-78634.01	0.00	0.00
			28193						
			30749	17931	22733	10353	39375.05	0.00	-68199.58
			28168						
B	45.2530	45.2530	30843	-18187	22589	10500	39126.06	-0.00	67768.32
			28216						
			Sum:	-256	68022	10	-132.90	-0.00	-431.27
			7114	0	5701	-4256	-19748.09	-0.00	0.00
446.5	A	49.2801	6000	3629	5673	2095	9826.62	0.00	-17020.20
			7053						
			5953						
			Sum:						
B	49.6383	49.6383	7146	-3732	5700	2155	9872.99	-0.00	17100.53
			6031						
			Sum:	-103	17074	-6	-48.48	-0.00	80.33
			6031						

Guy-Mast Forces (Excluding Wind) - Service

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x	F _y	F _z	M _x	M _y	M _z	
ft		°		lb	lb	lb	lb-ft	lb-ft	lb-ft	
131	A	20.7413	6150	-107	2363	-5677	-10230.94	43039.50	-17720.51	
			6000							
	A	20.7413	20.7413	6150	107	2363	-5677	-10230.94	-43039.50	17720.51
				6000						
	B	19.1464	19.1464	6139	5015	2202	2772	19072.00	43432.08	0.00
				6000						
	B	19.1464	19.1464	6139	4909	2202	2957	-9536.00	-43432.08	-16516.84
6000										
C	19.3407	19.3407	6146	-4908	2232	2951	-9665.19	43387.01	16740.60	
			6000							
C	19.3407	19.3407	6146	-5010	2232	2774	19330.38	-43387.01	0.00	
			6000							
251	A	34.0157	Sum:	6	13594	101	-1260.70	0.00	223.76	
			16248	0	9633	-13085	-33368.66	0.00	0.00	
			15360							
			Sum:	-59	28810	19	-151.96	-0.00	-155.76	
B	34.0585	34.0585	16225	11319	9615	6535	16653.31	0.00	-28844.39	
			15360							
			Sum:	-59	28810	19	-151.96	-0.00	-155.76	
			15360							
C	33.6715	33.6715	16250	-11378	9563	6569	16563.39	-0.00	28688.63	
			15360							
			Sum:	-59	28810	19	-151.96	-0.00	-155.76	
			15360							
381	A	44.9617	20151	0	14799	-13676	-51266.23	0.00	0.00	
			18560							
			Sum:	-59	28810	19	-151.96	-0.00	-155.76	
			18560							
B	45.2530	45.2530	20123	11776	14834	6799	25692.88	0.00	-44501.38	
			18560							
			Sum:	-59	28810	19	-151.96	-0.00	-155.76	
			18560							
C	44.5725	44.5725	20153	-11924	14716	6884	25488.36	-0.00	44147.13	
			18560							
			Sum:	-148	44349	7	-84.99	-0.00	-354.25	
			18560							
446.5	A	49.2801	3113	0	2446	-1925	-8474.31	0.00	0.00	
			Sum:	-148	44349	7	-84.99	-0.00	-354.25	

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom lb	F _x	F _y	F _z	M _x	M _y	M _z
ft		°	lb	lb	lb	lb	lb-ft	lb-ft	lb-ft
			2800						
	B	49.6383	3108	1654	2452	955	4247.69	0.00	-7357.21
			2800						
	C	48.8898	3113	-1680	2435	970	4217.01	-0.00	7304.07
			2800						
			Sum:	-27	7333	0	-9.62	-0.00	-53.13

Guy-Tensioning Information

Temperature At Time Of Tensioning																	
Guy Elevation	H	V	0 F		20 F		40 F		60 F		80 F		100 F		120 F		
			Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	Initial Tension lb	Intercept ft	
131	A	398.74	151.00	7504	11.91	6983	12.79	6480	13.78	6000	14.87	5547	16.07	5123	17.38	4732	18.80
	B	403.24	140.00	7529	11.91	6998	12.80	6487	13.80	6000	14.91	5541	16.14	5113	17.48	4718	18.92
	C	420.24	147.50	7499	13.01	6978	13.97	6477	15.04	6000	16.23	5552	17.52	5134	18.93	4751	20.44
251	A	401.54	271.00	19121	19.67	17766	21.13	16511	22.70	15360	24.36	14313	26.10	13367	27.89	12518	29.73
	B	390.54	264.00	19201	18.56	17819	19.97	16537	21.48	15360	23.09	14289	24.77	13321	26.52	12454	28.32
	C	407.54	271.50	19107	20.11	17756	21.61	16506	23.21	15360	24.90	14319	26.66	13380	28.48	12537	30.33
381	A	401.54	401.00	21808	28.28	20660	29.79	19577	31.38	18560	33.04	17610	34.75	16726	36.52	15906	38.32
	B	390.54	394.00	21845	26.99	20686	28.46	19590	29.99	18560	31.60	17597	33.26	16700	34.97	15868	36.73
	C	407.54	401.50	21815	28.73	20663	30.28	19578	31.89	18560	33.58	17610	35.32	16727	37.11	15909	38.93
446.5	A	401.54	466.50	3176	38.15	3044	39.73	2919	41.36	2800	43.02	2682	44.83	2578	46.55	2480	48.29
	B	390.54	459.50	3179	36.60	3046	38.13	2920	39.71	2800	41.33	2680	43.09	2574	44.77	2475	46.46
	C	407.54	467.00	3177	38.67	3044	40.28	2919	41.93	2800	43.63	2682	45.46	2578	47.20	2480	48.96

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
CA Face												
HB158-1-08U 8-S8J18(1-5/8)	C	Yes	Ar (CfAe)	230' - 10'	-5.0000	0.35	2	2	0.5000	1.9800		1.30
LCF78-50A(7/8")	A	Yes	Ar (CfAe)	230' - 10'	-4.0000	0.35	4	3	0.5000	1.0900		0.34
LDF5-50A(7/8")	A	Yes	Ar (CfAe)	247' - 10'	0.0000	0.4	18	9	0.5000 0.2500	1.0900		0.33
LDF6-50A(1-1/4")	A	Yes	Ar (CfAe)	322' - 10'	-0.5000	0.45	1	1	1.5500	1.5500		0.66
EW63(ELLIP TICAL)	A	Yes	Ar (CfAe)	150' - 10'	0.0000	-0.28	1	1	0.5000	2.0100		0.51
EW63(ELLIP TICAL)	A	Yes	Ar (CfAe)	136' - 10'	0.0000	-0.28	1	1	0.5000	0.0001		0.51
EW63(ELLIP TICAL)	A	Yes	Ar (CfAe)	150' - 136'	0.0000	-0.28	1	1	2.0100	2.0100		0.51
LDF2-50A(3/8")	A	Yes	Ar (CfAe)	106' - 10'	0.0000	-0.21	2	2	0.5000 0.4400	0.4400		0.08
LCF78-50A(7/8")	A	Yes	Ar (CfAe)	230' - 10'	-3.0000	-0.38	7	4	0.5000	1.0900		0.34
1" Rigid	A	Yes	Ar (CfAe)	457' - 10'	0.0000	-0.33	1	1	1.0000	1.0000		1.13

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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
Conduit												
3/8" Cable (Lights)	A	Yes	Ar (CfAe)	457' - 10'	0.0000	-0.43	1	1	0.3750	0.3750		0.22
3/8" Coax	A	Yes	Ar (CfAe)	136' - 10'	3.0000	-0.28	3	3	0.3750	0.3750		0.07
Banjo (6" dia, 36" step)	A	Yes	Af (CfAe)	230' - 10'	-2.0000	0.35	1	1	0.3330	0.3330	1.3320	0.45
Banjo (6" dia, 36" step)	A	Yes	Af (CfAe)	230' - 10'	-2.0000	-0.38	1	1	0.3330	0.3330	1.3320	0.45
AB Face												
LDF5-50A(7/8")	B	Yes	Ar (CfAe)	440' - 10'	0.0000	-0.47	1	1	1.0900	1.0900		0.33
HJ8-50B(3")	B	Yes	Ar (CfAe)	419' - 10'	0.0000	0.4	1	1	3.0100	3.0100		1.78
LDF6-50A(1-1/4")	B	Yes	Ar (CfAe)	146' - 10'	0.0000	0.01	1	1	1.5500	0.0001		0.66
LDF6-50A(1-1/4")	B	Yes	Ar (CfAe)	342' - 146'	0.0000	0.01	1	1	1.5500	1.5500		0.66
LDF5-50A(7/8")	B	Yes	Ar (CfAe)	340' - 10'	0.0000	0.49	1	1	1.0900	1.0900		0.33
3-1/2" Feed Line	B	Yes	Ar (CfAe)	328' - 10'	-1.7500	-0.08	1	1	3.5000	3.5000		3.00
LDF7-50A(1-5/8")	B	Yes	Ar (CfAe)	264' - 10'	-1.7500	0.12	1	1	1.9800	0.0001		0.82
LDF7-50A(1-5/8")	B	Yes	Ar (CfAe)	310' - 264'	-0.7500	0.12	1	1	1.9800	1.9800		0.82
LDF7-50A(1-5/8")	B	Yes	Ar (CfAe)	277' - 10'	0.0000	0.15	1	1	1.9800	1.9800		0.82
LDF7-50A(1-5/8")	B	Yes	Ar (CfAe)	330' - 10'	0.0000	-0.07	2	2	0.5000	1.9800		0.82
LDF7-50A(1-5/8")	B	Yes	Ar (CfAe)	364' - 330'	0.0000	-0.07	1	1	0.5000	1.9800		0.82
LDF4P-50A(1-1/2")	B	Yes	Ar (CfAe)	133' - 10'	2.0000	-0.18	1	1	0.6300	0.6300		0.15
LDF7-50A(1-5/8")	B	Yes	Ar (CfAe)	264' - 10'	2.0000	-0.2	1	1	1.9800	1.9800		0.82
LDF6-50A(1-1/4")	B	Yes	Ar (CfAe)	330' - 10'	0.0000	-0.18	1	1	0.5000	1.5500		0.66
LDF4-50A(1/2")	B	Yes	Ar (CfAe)	344' - 322'	1.0000	-0.22	1	1	0.5000	0.6300		0.15
LDF4-50A(1/2")	B	Yes	Ar (CfAe)	322' - 10'	1.0000	-0.22	2	2	0.5000	0.6300		0.15
LDF4-50A(1/2")	B	Yes	Ar (CfAe)	178' - 10'	0.0000	-0.225	1	1	0.6300	0.6300		0.15
EW63(ELLIP TICAL)	B	Yes	Ar (CfAe)	146' - 10'	0.0000	-0.13	1	1	2.0100	2.0100		0.51
LDF5-50A(7/8)	B	Yes	Ar (CfAe)	326' - 10'	0.0000	-0.05	1	1	1.0300	1.0300		0.33
LDF1-50A(1/4")	B	Yes	Ar (CfAe)	62' - 10'	0.0000	-0.03	2	2	0.3450	0.3450		0.06
LDF7-50A(1-5/8")	B	Yes	Ar (CfAe)	75' - 10'	0.0000	-0.01	1	1	1.9800	1.9800		0.82
BC Face												
AVA5-50(7/8")	C	Yes	Ar (CfAe)	230' - 10'	-4.0000	-0.4	7	4	0.5000	1.1020		0.30
Banjo 12" Dia. (40" Step)	C	Yes	Af (CfAe)	230' - 10'	-3.0000	-0.4	1	1	0.2500	0.0000	0.5000	1.91
475-000(4 1/16")	C	Yes	Ar (CfAe)	457' - 10'	-6.0000	0	1	1	4.0620	4.0620		110.00
1.5" dia. M.C.	C	Yes	Ar (CfAe)	457' - 10'	-6.0000	0.1	1	1	1.5000	1.5000		1.85
LDF7-50A(1-5/8")	C	Yes	Ar (CfAe)	388' - 10'	0.0000	-0.1	1	1	1.9800	1.9800		0.82
HJ8-50B(3")	C	Yes	Ar (CfAe)	367' - 10'	0.0000	0.1	1	1	3.0100	3.0100		1.78

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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
LDF5-50A(7/8")	C	Yes	Ar (CfAe)	109' - 10'	0.0000	-0.4	1	1	0.5000	1.0900		0.33
LDF5-50A(7/8")	C	Yes	Ar (CfAe)	99' - 10'	0.0000	0.35	1	1	0.5000	1.0900		0.33
LDF6-50A(1-1/4")	C	Yes	Ar (CfAe)	284' - 255'	0.0000	0.28	1	1	0.5000	1.5500		0.66
LDF6-50A(1-1/4")	C	Yes	Ar (CfAe)	255' - 10'	0.0000	0.28	2	2	0.5000	1.5500		0.66
FSJ1-50A(1/4")	C	Yes	Ar (CfAe)	200' - 99'	0.0000	0.41	1	1	0.2900	0.2900		0.04
FSJ1-50A(1/4")	C	Yes	Ar (CfAe)	99' - 10'	0.0000	0.41	2	2	0.2900	0.2900		0.04
FSJ1-50A(1/4")	C	Yes	Ar (CfAe)	108' - 10'	0.0000	0.25	1	1	0.2900	0.2900		0.04
LDF5-50A(7/8")	C	Yes	Ar (CfAe)	206' - 133'	0.0000	0.475	1	1	0.2500	1.0900		0.33
LDF5-50A(7/8")	C	Yes	Ar (CfAe)	133' - 117'	0.0000	0.475	2	2	0.5000	1.0900		0.33
LDF5-50A(7/8")	C	Yes	Ar (CfAe)	117' - 62'	0.0000	0.475	3	3	0.5000	1.0900		0.33
LDF5-50A(7/8")	C	Yes	Ar (CfAe)	62' - 10'	0.0000	0.475	6	4	0.5000	1.0900		0.33
**Equipment*												
Thin Flat Climbing Ladder	C	Yes	Af (CfAe)	457' - 10'	-9.0000	0	1	1	2.0000	2.0000	8.0000	4.00
Safety Line 3/8"	C	Yes	Ar (CfAe)	457' - 10'	-9.0000	0	1	1	0.3750	0.3750		0.22
cut coax												
LDF1-50A(1/4")	B	Yes	Ar (CfAe)	90' - 15'	0.0000	-0.1	1	1	0.5000	0.9375		0.33
LDF1-50A(1/4")	C	Yes	Ar (CfAe)	24' - 15'	0.0000	0.45	1	1	0.3450	0.3450		0.06

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight lb
T1	457'-436'	A	2.406	0.000	0.000	0.000	28
		B	0.363	0.000	0.000	0.000	1
		C	10.390	3.500	0.000	0.000	2437
T2	436'-421'	A	1.719	0.000	0.000	0.000	20
		B	1.363	0.000	0.000	0.000	5
		C	7.421	2.500	0.000	0.000	1741
T3	421'-401'	A	2.292	0.000	0.000	0.000	27
		B	6.332	0.000	0.000	0.000	39
		C	9.895	3.333	0.000	0.000	2321
T4	401'-396'	A	0.573	0.000	0.000	0.000	7
		B	1.708	0.000	0.000	0.000	11
		C	2.474	0.833	0.000	0.000	580
T5	396'-391'	A	0.573	0.000	0.000	0.000	7
		B	1.708	0.000	0.000	0.000	11
		C	2.474	0.833	0.000	0.000	580
T6	391'-386'	A	0.573	0.000	0.000	0.000	7

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Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight lb
		B	1.708	0.000	0.000	0.000	11
		C	2.804	0.833	0.000	0.000	582
T7	386'-381'	A	0.573	0.000	0.000	0.000	7
		B	1.708	0.000	0.000	0.000	11
		C	3.299	0.833	0.000	0.000	584
T8	381'-376'	A	0.573	0.000	0.000	0.000	7
		B	1.708	0.000	0.000	0.000	11
		C	3.299	0.833	0.000	0.000	584
T9	376'-371'	A	0.573	0.000	0.000	0.000	7
		B	1.708	0.000	0.000	0.000	11
		C	3.299	0.833	0.000	0.000	584
T10	371'-366'	A	0.573	0.000	0.000	0.000	7
		B	1.708	0.000	0.000	0.000	11
		C	3.550	0.833	0.000	0.000	586
T11	366'-361'	A	0.573	0.000	0.000	0.000	7
		B	2.203	0.000	0.000	0.000	13
		C	4.553	0.833	0.000	0.000	593
T12	361'-341'	A	2.292	0.000	0.000	0.000	27
		B	10.420	0.000	0.000	0.000	60
		C	18.212	3.333	0.000	0.000	2373
T13	341'-321'	A	2.421	0.000	0.000	0.000	28
		B	20.663	0.000	0.000	0.000	117
		C	18.212	3.333	0.000	0.000	2373
T14	321'-301'	A	4.875	0.000	0.000	0.000	40
		B	31.552	0.000	0.000	0.000	188
		C	18.212	3.333	0.000	0.000	2373
T15	301'-281'	A	4.875	0.000	0.000	0.000	40
		B	33.367	0.000	0.000	0.000	197
		C	18.599	3.333	0.000	0.000	2375
T16	281'-261'	A	4.875	0.000	0.000	0.000	40
		B	36.007	0.000	0.000	0.000	213
		C	20.795	3.333	0.000	0.000	2387
T17	261'-241'	A	9.780	0.000	0.000	0.000	76
		B	36.667	0.000	0.000	0.000	230
		C	22.603	3.333	0.000	0.000	2396
T18	241'-221'	A	26.948	0.500	0.000	0.000	201
		B	36.667	0.000	0.000	0.000	230
		C	29.654	3.333	0.000	0.000	2459
T19	221'-201'	A	33.942	1.110	0.000	0.000	252
		B	36.667	0.000	0.000	0.000	230
		C	37.779	3.333	0.000	0.000	2534
T20	201'-181'	A	33.942	1.110	0.000	0.000	252
		B	36.667	0.000	0.000	0.000	230
		C	39.601	3.333	0.000	0.000	2539
T21	181'-161'	A	33.942	1.110	0.000	0.000	252
		B	37.559	0.000	0.000	0.000	232
		C	39.625	3.333	0.000	0.000	2540
T22	161'-141'	A	36.957	1.110	0.000	0.000	261
		B	37.909	0.000	0.000	0.000	235
		C	39.625	3.333	0.000	0.000	2540
T23	141'-121'	A	39.536	1.110	0.000	0.000	275
		B	39.114	0.000	0.000	0.000	245
		C	40.715	3.333	0.000	0.000	2543
T24	121'-101'	A	39.533	1.110	0.000	0.000	277
		B	39.534	0.000	0.000	0.000	246
		C	43.791	3.333	0.000	0.000	2554
T25	101'-81'	A	40.633	1.110	0.000	0.000	280
		B	40.237	0.000	0.000	0.000	249
		C	47.628	3.333	0.000	0.000	2567
T26	81'-61'	A	40.633	1.110	0.000	0.000	280
		B	43.464	0.000	0.000	0.000	264

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	Client	Crown Castle	Designed by	mackey

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight lb
T27	61'-41'	C	47.949	3.333	0.000	0.000	2569
		A	40.633	1.110	0.000	0.000	280
		B	45.546	0.000	0.000	0.000	271
T28	41'-20'	C	49.675	3.333	0.000	0.000	2588
		A	42.665	1.166	0.000	0.000	294
		B	47.823	0.000	0.000	0.000	285
T29	20'-6'8-17/32"	C	52.274	3.500	0.000	0.000	2717
		A	20.317	0.555	0.000	0.000	140
		B	22.382	0.000	0.000	0.000	134
T30	6'8-17/32"-0'	C	24.981	1.667	0.000	0.000	1294
		A	0.000	0.000	0.000	0.000	0
		B	0.000	0.000	0.000	0.000	0
		C	0.000	0.000	0.000	0.000	0

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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight lb
T1	457'-436'	A	1.025	9.583	0.000	0.000	0.000	118
		B		1.047	0.000	0.000	0.000	12
		C		21.155	5.892	0.000	0.000	2774
T2	436'-421'	A	1.020	6.820	0.000	0.000	0.000	84
		B		3.913	0.000	0.000	0.000	44
		C		15.073	4.200	0.000	0.000	1980
T3	421'-401'	A	1.015	9.059	0.000	0.000	0.000	111
		B		12.761	0.000	0.000	0.000	181
		C		20.046	5.589	0.000	0.000	2638
T4	401'-396'	A	1.011	2.258	0.000	0.000	0.000	28
		B		3.394	0.000	0.000	0.000	48
		C		5.002	1.395	0.000	0.000	659
T5	396'-391'	A	1.010	2.256	0.000	0.000	0.000	28
		B		3.391	0.000	0.000	0.000	48
		C		4.998	1.394	0.000	0.000	659
T6	391'-386'	A	1.008	2.253	0.000	0.000	0.000	28
		B		3.389	0.000	0.000	0.000	48
		C		5.660	1.393	0.000	0.000	668
T7	386'-381'	A	1.007	2.251	0.000	0.000	0.000	28
		B		3.386	0.000	0.000	0.000	48
		C		6.654	1.393	0.000	0.000	681
T8	381'-376'	A	1.005	2.248	0.000	0.000	0.000	28
		B		3.383	0.000	0.000	0.000	48
		C		6.649	1.392	0.000	0.000	681
T9	376'-371'	A	1.003	2.245	0.000	0.000	0.000	27
		B		3.381	0.000	0.000	0.000	48
		C		6.644	1.391	0.000	0.000	681
T10	371'-366'	A	1.002	2.243	0.000	0.000	0.000	27
		B		3.378	0.000	0.000	0.000	48
		C		7.056	1.390	0.000	0.000	687
T11	366'-361'	A	1.000	2.240	0.000	0.000	0.000	27
		B		4.370	0.000	0.000	0.000	61
		C		8.721	1.389	0.000	0.000	714
T12	361'-341'	A	0.996	8.932	0.000	0.000	0.000	109
		B		21.044	0.000	0.000	0.000	289
		C		34.812	5.547	0.000	0.000	2852
T13	341'-321'	A	0.989	9.179	0.000	0.000	0.000	112
		B		42.204	1.954	0.000	0.000	586
		C		34.696	5.531	0.000	0.000	2847

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight lb
T14	321'-301'	A	0.982	14.692	0.000	0.000	0.000	181
		B		58.125	6.017	0.000	0.000	874
		C		34.573	5.515	0.000	0.000	2843
T15	301'-281'	A	0.974	14.614	0.000	0.000	0.000	179
		B		61.479	6.017	0.000	0.000	915
		C		35.317	5.498	0.000	0.000	2849
T16	281'-261'	A	0.966	14.531	0.000	0.000	0.000	178
		B		66.901	6.017	0.000	0.000	982
		C		40.107	5.479	0.000	0.000	2905
T17	261'-241'	A	0.957	15.944	6.360	0.000	0.000	327
		B		70.587	6.017	0.000	0.000	1023
		C		39.930	7.851	0.000	0.000	2937
T18	241'-221'	A	0.947	23.799	29.557	0.000	0.000	893
		B		70.208	6.017	0.000	0.000	1012
		C		44.894	15.267	0.000	0.000	3157
T19	221'-201'	A	0.937	29.066	39.725	0.000	0.000	1150
		B		69.798	6.017	0.000	0.000	1001
		C		52.154	23.058	0.000	0.000	3417
T20	201'-181'	A	0.926	28.843	39.675	0.000	0.000	1139
		B		69.353	6.017	0.000	0.000	989
		C		58.916	23.008	0.000	0.000	3471
T21	181'-161'	A	0.914	28.599	39.621	0.000	0.000	1128
		B		72.346	6.017	0.000	0.000	1008
		C		58.688	22.954	0.000	0.000	3458
T22	161'-141'	A	0.900	34.044	39.561	0.000	0.000	1182
		B		73.315	6.017	0.000	0.000	1008
		C		58.237	22.894	0.000	0.000	3442
T23	141'-121'	A	0.885	40.792	41.368	0.000	0.000	1256
		B		77.831	6.017	0.000	0.000	1042
		C		57.730	24.416	0.000	0.000	3444
T24	121'-101'	A	0.868	41.232	42.307	0.000	0.000	1251
		B		78.560	6.017	0.000	0.000	1035
		C		60.214	27.519	0.000	0.000	3493
T25	101'-81'	A	0.847	43.270	43.391	0.000	0.000	1261
		B		79.511	6.017	0.000	0.000	1030
		C		68.591	28.828	0.000	0.000	3568
T26	81'-61'	A	0.822	42.441	43.281	0.000	0.000	1232
		B		84.992	6.074	0.000	0.000	1076
		C		67.978	28.947	0.000	0.000	3543
T27	61'-41'	A	0.790	41.374	43.139	0.000	0.000	1195
		B		88.034	7.167	0.000	0.000	1088
		C		66.591	31.322	0.000	0.000	3576
T28	41'-20'	A	0.750	42.035	45.108	0.000	0.000	1207
		B		89.902	7.525	0.000	0.000	1086
		C		68.706	32.700	0.000	0.000	3700
T29	20'-6'-8-17/32"	A	0.750	20.017	21.480	0.000	0.000	575
		B		41.795	3.583	0.000	0.000	508
		C		33.193	15.572	0.000	0.000	1765
T30	6'-8-17/32"-0'	A	0.750	0.000	0.000	0.000	0.000	0
		B		0.000	0.000	0.000	0.000	0
		C		0.000	0.000	0.000	0.000	0

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
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Section	Elevation	Face	A_R	$A_{R, Ice}$	A_F	$A_{F, Ice}$
	ft		ft ²	ft ²	ft ²	ft ²
T1	457'-436'	A	0.000	1.141	0.402	1.600
		B	0.000	0.125	0.061	0.175
		C	0.000	3.362	2.319	4.716
T2	436'-421'	A	0.000	0.836	0.258	1.024
		B	0.000	0.479	0.205	0.587
		C	0.000	2.466	1.490	3.021
T3	421'-401'	A	0.000	0.951	0.296	1.171
		B	0.000	1.340	0.819	1.650
		C	0.000	2.810	1.711	3.461
T4	401'-396'	A	0.000	0.274	0.086	0.339
		B	0.000	0.412	0.256	0.510
		C	0.000	0.811	0.497	1.003
T5	396'-391'	A	0.000	0.198	0.062	0.245
		B	0.000	0.297	0.185	0.368
		C	0.000	0.585	0.359	0.724
T6	391'-386'	A	0.000	0.273	0.086	0.338
		B	0.000	0.410	0.256	0.509
		C	0.000	0.888	0.546	1.101
T7	386'-381'	A	0.000	0.197	0.062	0.244
		B	0.000	0.296	0.185	0.367
		C	0.000	0.727	0.448	0.903
T8	381'-376'	A	0.000	0.271	0.091	0.356
		B	0.000	0.408	0.271	0.536
		C	0.000	1.004	0.655	1.319
T9	376'-371'	A	0.000	0.196	0.062	0.244
		B	0.000	0.294	0.185	0.367
		C	0.000	0.724	0.448	0.902
T10	371'-366'	A	0.000	0.270	0.086	0.337
		B	0.000	0.407	0.256	0.507
		C	0.000	1.050	0.658	1.310
T11	366'-361'	A	0.000	0.194	0.062	0.243
		B	0.000	0.379	0.239	0.474
		C	0.000	0.902	0.584	1.127
T12	361'-341'	A	0.000	1.217	0.373	1.453
		B	0.000	2.867	1.695	3.423
		C	0.000	5.649	3.504	6.744
T13	341'-321'	A	0.000	0.939	0.313	1.187
		B	0.000	4.518	2.672	5.710
		C	0.000	4.228	2.786	5.344
T14	321'-301'	A	0.000	1.492	0.630	1.900
		B	0.000	6.514	4.080	8.294
		C	0.000	4.182	2.786	5.325
T15	301'-281'	A	0.000	1.472	0.630	1.890
		B	0.000	6.800	4.315	8.728
		C	0.000	4.221	2.836	5.418
T16	281'-261'	A	0.000	1.451	0.630	1.879
		B	0.000	7.284	4.656	9.429
		C	0.000	4.661	3.120	6.033
T17	261'-241'	A	0.000	2.919	2.088	4.762
		B	0.000	10.025	7.829	16.355
		C	0.000	6.392	5.538	10.428
T18	241'-221'	A	0.000	5.321	4.145	8.200
		B	0.000	7.469	5.537	11.510
		C	0.000	6.045	4.981	9.315
T19	221'-201'	A	0.000	6.870	4.532	9.164
		B	0.000	7.349	4.741	9.804
		C	0.000	7.492	5.316	9.995
T20	201'-181'	A	0.000	6.760	4.532	9.126
		B	0.000	7.219	4.741	9.746
		C	0.000	8.044	5.552	10.860
T21	181'-161'	A	0.000	6.640	4.606	9.230

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Section	Elevation	Face	A _R	A _R	A _F	A _F
	ft		ft ²	Ice ft ²	ft ²	Ice ft ²
		B	0.000	7.407	4.935	10.296
		C	0.000	7.909	5.644	10.994
T22	161'-141'	A	0.000	7.040	5.748	11.417
		B	0.000	7.387	5.724	11.979
		C	0.000	7.741	6.487	12.553
T23	141'-121'	A	0.000	7.701	6.138	12.703
		B	0.000	7.676	5.906	12.661
		C	0.000	7.700	6.651	12.701
T24	121'-101'	A	0.000	7.670	5.256	11.052
		B	0.000	7.590	5.112	10.936
		C	0.000	8.046	6.094	11.594
T25	101'-81'	A	0.000	7.759	5.398	11.449
		B	0.000	7.495	5.203	11.060
		C	0.000	8.702	6.590	12.841
T26	81'-61'	A	0.000	7.447	5.398	11.321
		B	0.000	7.746	5.620	11.776
		C	0.000	8.400	6.631	12.770
T27	61'-41'	A	0.000	7.052	5.398	11.155
		B	0.000	7.782	5.890	12.310
		C	0.000	8.148	6.854	12.888
T28	41'-20'	A	0.000	6.683	5.492	11.138
		B	0.000	7.325	5.992	12.208
		C	0.000	7.755	6.988	12.925
T29	20'-6'8"-17/32"	A	0.000	3.936	2.653	5.380
		B	0.000	4.219	2.845	5.768
		C	0.000	4.612	3.387	6.304
T30	6'8"-17/32"-0'	A	0.000	0.000	0.000	0.000
		B	0.000	0.000	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	CP _Z
	ft	in	in	Ice in	Ice in
T1	457'-436'	-0.7226	1.4415	-1.3411	1.5879
T2	436'-421'	-0.7702	1.0547	-1.3635	0.9382
T3	421'-401'	0.6155	1.7028	-0.3106	1.5069
T4	401'-396'	0.6363	1.4526	-0.1498	1.3070
T5	396'-391'	0.7643	1.7448	-0.1874	1.6492
T6	391'-386'	0.7040	1.6610	-0.0736	1.5200
T7	386'-381'	0.9556	2.3401	0.0463	2.2822
T8	381'-376'	0.7581	1.8564	0.0364	1.7604
T9	376'-371'	0.9321	2.2824	0.0471	2.2496
T10	371'-366'	0.7253	2.0698	-0.0066	1.9333
T11	366'-361'	0.8469	2.8257	0.0677	2.6812
T12	361'-341'	0.9209	2.2720	0.2475	1.8729
T13	341'-321'	2.4095	1.6314	1.7133	1.5064
T14	321'-301'	3.2751	-0.2190	2.1192	0.3704
T15	301'-281'	3.4293	-0.1842	2.2871	0.4028
T16	281'-261'	3.4261	0.0333	2.3099	0.6379
T17	261'-241'	2.2105	-0.9456	1.8616	-0.4367
T18	241'-221'	1.5321	-2.6607	1.8555	-1.8263
T19	221'-201'	0.8648	-2.0985	1.5162	-1.5345
T20	201'-181'	0.5634	-1.8912	0.9101	-1.1353
T21	181'-161'	0.5985	-1.9767	0.9748	-1.3380
T22	161'-141'	0.1686	-1.8002	0.5706	-1.2628

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Section	Elevation	CP _X	CP _Z	CP _X	CP _Z
	ft	in	in	Ice in	Ice in
T23	141'-121'	-0.3050	-1.7784	0.4973	-1.5427
T24	121'-101'	-0.5459	-1.5977	0.5560	-1.4756
T25	101'-81'	-0.7918	-1.2367	0.5740	-1.1731
T26	81'-61'	-0.5734	-1.3687	0.7875	-1.3546
T27	61'-41'	-0.6586	-1.2717	0.6308	-1.2624
T28	41'-20'	-0.6795	-1.2726	0.5376	-1.2604
T29	20'-6'8"-17'32"	-0.5402	-1.0511	0.3350	-0.9417
T30	6'8"-17'32"-0'	0.0000	0.0000	0.0000	0.0000

Antenna Pole Forces *dielectric TFU-33J*

Length of Pole	I _x	I _y	Modulus E	Antenna Pole C _{AA}	Antenna Pole Weight	Length of Beacon	Beacon C _{AA}	Beacon Weight
ft	in ⁴	in ⁴	ksi	ft ² /ft	plf	ft	ft ²	lb
32'	655.5500	655.5500	10000	No Ice With Ice	2.33 2.48	75.00 86.50	0' 0.00 0.00	0 0

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			ft ft ft	°	ft	ft ²	ft ²	lb	
12" x 3' Beacon	A	From Centroid-LEG	0.00	0.0000	457'	No Ice	2.40	2.40	21
			0'			1/2" Ice	2.67	2.67	49
			34'			1" Ice	2.96	2.96	79
						2" Ice	3.56	3.56	150
						4" Ice	4.89	4.89	337
3" x 6" SideLight	A	From Leg	1.00	0.0000	333'	No Ice	0.10	0.10	1
			0'			1/2" Ice	0.16	0.16	2
			0'			1" Ice	0.22	0.22	5
						2" Ice	0.39	0.39	12
						4" Ice	0.86	0.86	43
3" x 6" SideLight	B	From Leg	1.00	0.0000	333'	No Ice	0.10	0.10	1
			0'			1/2" Ice	0.16	0.16	2
			0'			1" Ice	0.22	0.22	5
						2" Ice	0.39	0.39	12
						4" Ice	0.86	0.86	43
3" x 6" SideLight	C	From Leg	1.00	0.0000	333'	No Ice	0.10	0.10	1
			0'			1/2" Ice	0.16	0.16	2
			0'			1" Ice	0.22	0.22	5
						2" Ice	0.39	0.39	12
						4" Ice	0.86	0.86	43
3" x 6" SideLight	A	From Leg	1.00	0.0000	215'	No Ice	0.10	0.10	1
			0'			1/2" Ice	0.16	0.16	2
			0'			1" Ice	0.22	0.22	5
						2" Ice	0.39	0.39	12
						4" Ice	0.86	0.86	43

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
3" x 6" SideLight	B	From Leg	1.00	0.0000	215'	No Ice	0.10	0.10	1
			0'	0'		1/2" Ice	0.16	0.16	2
			0'	0'		1" Ice	0.22	0.22	5
			0'	0'		2" Ice	0.39	0.39	12
			0'	0'		4" Ice	0.86	0.86	43
3" x 6" SideLight	C	From Leg	1.00	0.0000	215'	No Ice	0.10	0.10	1
			0'	0'		1/2" Ice	0.16	0.16	2
			0'	0'		1" Ice	0.22	0.22	5
			0'	0'		2" Ice	0.39	0.39	12
			0'	0'		4" Ice	0.86	0.86	43
3" x 6" SideLight	A	From Leg	1.00	0.0000	112'	No Ice	0.10	0.10	1
			0'	0'		1/2" Ice	0.16	0.16	2
			0'	0'		1" Ice	0.22	0.22	5
			0'	0'		2" Ice	0.39	0.39	12
			0'	0'		4" Ice	0.86	0.86	43
3" x 6" SideLight	B	From Leg	1.00	0.0000	112'	No Ice	0.10	0.10	1
			0'	0'		1/2" Ice	0.16	0.16	2
			0'	0'		1" Ice	0.22	0.22	5
			0'	0'		2" Ice	0.39	0.39	12
			0'	0'		4" Ice	0.86	0.86	43
3" x 6" SideLight	C	From Leg	1.00	0.0000	112'	No Ice	0.10	0.10	1
			0'	0'		1/2" Ice	0.16	0.16	2
			0'	0'		1" Ice	0.22	0.22	5
			0'	0'		2" Ice	0.39	0.39	12
			0'	0'		4" Ice	0.86	0.86	43
*									

BCD-87077	B	From Leg	4.00	-70.0000	445'	No Ice	3.06	3.06	27
			0'	0'		1/2" Ice	4.27	4.27	49
			5'	0'		1" Ice	5.49	5.49	79
			0'	0'		2" Ice	7.55	7.55	163
			0'	0'		4" Ice	10.52	10.52	429
BCD-87077	C	Stand-Off Right	0.50	-70.0000	445'	No Ice	3.06	3.06	27
			2'	0'		1/2" Ice	4.27	4.27	49
			7'	0'		1" Ice	5.49	5.49	79
			0'	0'		2" Ice	7.55	7.55	163
			0'	0'		4" Ice	10.52	10.52	429
Side Arm Mount [SO 306-1]	B	From Leg	2.00	-70.0000	445'	No Ice	0.98	2.18	42
			0'	0'		1/2" Ice	1.70	3.80	62
			0'	0'		1" Ice	2.42	5.42	83
			0'	0'		2" Ice	3.86	8.66	123
			0'	0'		4" Ice	6.74	15.14	205
Side Arm Mount [SO 304-1]	C	Stand-Off Right	0.50	-70.0000	445'	No Ice	0.63	0.94	23
			2'	0'		1/2" Ice	1.00	1.45	32
			0'	0'		1" Ice	1.37	1.96	41
			0'	0'		2" Ice	2.11	2.98	59
			0'	0'		4" Ice	3.59	5.02	94

DB420	A	From Leg	6.00	40.0000	440'	No Ice	3.33	3.33	34
			0'	0'		1/2" Ice	5.99	5.99	44
			10'	0'		1" Ice	8.66	8.66	54
			0'	0'		2" Ice	13.99	13.99	75
			0'	0'		4" Ice	24.64	24.64	116
Side Arm Mount [SO 308-1]	A	From Leg	3.00	40.0000	440'	No Ice	0.98	3.03	53
			0'	0'		1/2" Ice	1.70	5.22	79
			0'	0'		1" Ice	2.42	7.41	105
			0'	0'		2" Ice	3.86	11.79	156
			0'	0'		4" Ice	6.74	24.64	205

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{MA} Front	C _{MA} Side	Weight	
			Horz	Lateral						Vert
***						4" Ice	6.74	20.55	259	
BCD-87077	B	From Leg	6.00		-50.0000	439'	No Ice	3.06	3.06	27
			0'				1/2" Ice	4.27	4.27	49
			6'				1" Ice	5.49	5.49	79
							2" Ice	7.55	7.55	163
							4" Ice	10.52	10.52	429
Side Arm Mount [SO 308-1]	B	From Leg	3.00		-50.0000	439'	No Ice	0.98	3.03	53
			0'				1/2" Ice	1.70	5.22	79
			0'				1" Ice	2.42	7.41	105
							2" Ice	3.86	11.79	156
							4" Ice	6.74	20.55	259

ERI 1183-3CP	C	None			0.0000	419'	No Ice	182.40	182.40	4350
							1/2" Ice	184.84	184.84	6270
							1" Ice	187.29	187.29	8216
							2" Ice	192.22	192.22	12193
							4" Ice	202.22	202.22	20480

6014-2	C	None			0.0000	388'	No Ice	65.00	65.00	1086
							1/2" Ice	135.00	135.00	2388
							1" Ice	205.00	205.00	3690
							2" Ice	345.00	345.00	6294
							4" Ice	625.00	625.00	11502

SHP-2AE	C	From Leg	1.00		-20.0000	367'	No Ice	39.75	122.77	220
			0'				1/2" Ice	41.11	124.60	780
			0'				1" Ice	42.49	126.43	1359
							2" Ice	45.26	130.11	2576
							4" Ice	50.88	137.59	5251

DB806E-XT	A	From Leg	4.00		-60.0000	364'	No Ice	2.40	2.40	16
			0'				1/2" Ice	3.19	3.19	34
			4'				1" Ice	3.67	3.67	56
							2" Ice	4.68	4.68	119
							4" Ice	6.79	6.79	314
Side Arm Mount [SO 601-1]	A	From Leg	2.00		-60.0000	364'	No Ice	1.22	6.30	159
			0'				1/2" Ice	1.85	8.61	197
			0'				1" Ice	2.48	10.92	234
							2" Ice	3.74	15.54	310
							4" Ice	6.26	24.78	461

455-6	B	From Leg	4.00		-20.0000	344'	No Ice	5.50	5.50	25
			0'				1/2" Ice	7.53	7.53	65
			10'				1" Ice	9.58	9.58	118
							2" Ice	13.73	13.73	262
							4" Ice	21.42	21.42	708
Side Arm Mount [SO 601-1]	B	From Leg	2.00		-20.0000	344'	No Ice	1.22	6.30	159
			0'				1/2" Ice	1.85	8.61	197
			0'				1" Ice	2.48	10.92	234
							2" Ice	3.74	15.54	310
							4" Ice	6.26	24.78	461

AO9009-3	B	From Leg	4.00		-70.0000	342'	No Ice	2.55	2.55	11
			0'				1/2" Ice	3.60	3.60	30
			5'				1" Ice	4.67	4.67	56
							2" Ice	6.14	6.14	127

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement ft	C _A A		Weight lb
			Horz ft	Lateral ft			Front ft ²	Side ft ²	
455-6	A	From Leg	4.00 0' 10'	-60.0000	342'	4" Ice	8.75	8.75	357
						No Ice	5.50	5.50	25
						1/2" Ice	7.53	7.53	65
						1" Ice	9.58	9.58	118
						2" Ice	13.73	13.73	262
						4" Ice	21.42	21.42	708
Side Arm Mount [SO 601-1]	A	From Leg	2.00 0' 0'	-60.0000	342'	No Ice	1.22	6.30	159
						1/2" Ice	1.85	8.61	197
						1" Ice	2.48	10.92	234
						2" Ice	3.74	15.54	310
						4" Ice	6.26	24.78	461
						No Ice	1.67	3.27	55
Side Arm Mount [SO 302-1]	B	From Leg	2.00 0' 0'	-70.0000	342'	1/2" Ice	2.51	4.99	88
						1" Ice	3.35	6.71	121
						2" Ice	5.03	10.15	187
						4" Ice	8.39	17.03	320
						No Ice	5.50	5.50	25
						1/2" Ice	7.53	7.53	65
*** 455-6	A	From Leg	6.00 0' 10'	-50.0000	340'	1" Ice	9.58	9.58	118
						2" Ice	13.73	13.73	262
						4" Ice	21.42	21.42	708
						No Ice	0.98	3.03	53
						1/2" Ice	1.70	5.22	79
						1" Ice	2.42	7.41	105
Side Arm Mount [SO 308-1]	A	From Leg	3.00 0' 0'	-50.0000	340'	2" Ice	3.86	11.79	156
						4" Ice	6.74	20.55	259
						No Ice	3.00	3.00	28
						1/2" Ice	4.03	4.03	50
						1" Ice	5.03	5.03	78
						2" Ice	6.26	6.26	155
*** PG1N0F-0090-310	A	From Leg	6.00 0' 5'	60.0000	330'	4" Ice	8.83	8.83	395
						No Ice	2.72	12.93	146
						1/2" Ice	4.11	17.82	223
						1" Ice	5.50	22.71	301
						2" Ice	8.28	32.49	456
						4" Ice	13.84	52.05	766
Side Arm Mount [SO 602-1]	A	From Leg	3.00 0' 0'	60.0000	330'	No Ice	7.00	7.00	250
						1/2" Ice	8.00	8.00	350
						1" Ice	9.00	9.00	450
						2" Ice	11.00	11.00	650
						4" Ice	15.00	15.00	1050
						No Ice	0.85	1.67	65
(3) Side Arm Mount [SO 701-1]	C	From Leg	1.50 0' 0'	-60.0000	328'	1/2" Ice	1.14	2.34	79
						1" Ice	1.43	3.01	93
						2" Ice	2.01	4.35	121
						4" Ice	3.17	7.03	177
						No Ice	1.10	1.10	25
						1/2" Ice	1.98	1.98	33
*** 7P-C1-2-CP-L	C	From Leg	4.00 0' 0'	-60.0000	328'	1" Ice	9.00	9.00	450
						2" Ice	11.00	11.00	650
						4" Ice	15.00	15.00	1050
						No Ice	0.85	1.67	65
						1/2" Ice	1.14	2.34	79
						1" Ice	1.43	3.01	93
*** DB201-A	A	From Leg	6.00 0' 3'	0.0000	326'	2" Ice	4.62	4.62	55
						4" Ice	8.14	8.14	85
						No Ice	2.72	12.93	146
						1/2" Ice	4.11	17.82	223
						1" Ice	2.86	2.86	40
						2" Ice	4.62	4.62	55
Side Arm Mount [SO 602-1]	A	From Leg	3.00 0'	0.0000	326'	No Ice	1.10	1.10	25
						1/2" Ice	1.98	1.98	33
						1" Ice	2.86	2.86	40
						2" Ice	4.62	4.62	55
						4" Ice	8.14	8.14	85
						No Ice	2.72	12.93	146

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	Client Crown Castle	Designed by mlackey

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Lateral						
			ft	ft	°	ft	ft ²	ft ²	lb	
ANT150F6	A	From Leg	6.00		0.0000	264'	No Ice	4.80	4.80	30
			0'				1/2" Ice	6.83	6.83	66
			9'				1" Ice	8.87	8.87	114
							2" Ice	13.01	13.01	249
							4" Ice	21.03	21.03	678
Side Arm Mount [SO 602-1]	A	From Leg	3.00		0.0000	264'	No Ice	2.72	12.93	146
			0'				1/2" Ice	4.11	17.82	223
			0'				1" Ice	5.50	22.71	301
							2" Ice	8.28	32.49	456
							4" Ice	13.84	52.05	766

DB809KT3E-Y	B	From Leg	3.00		-60.0000	255'	No Ice	3.39	3.39	30
			0'				1/2" Ice	4.55	4.55	55
			6'				1" Ice	5.73	5.73	86
							2" Ice	7.38	7.38	173
							4" Ice	10.25	10.25	441
Side Arm Mount [SO 203-1]	B	From Leg	1.50		-60.0000	255'	No Ice	2.96	3.36	125
			0'				1/2" Ice	4.10	4.68	154
			0'				1" Ice	5.24	6.00	182
							2" Ice	7.52	8.64	239
							4" Ice	12.08	13.92	353

APX16PV-16PVL w/ Mount Pipe	A	From Leg	3.00		90.0000	247'	No Ice	6.88	3.27	59
			-6'				1/2" Ice	7.39	3.97	105
			0'				1" Ice	7.89	4.64	156
							2" Ice	8.92	6.02	281
							4" Ice	11.12	8.99	647
APX16PV-16PVL w/ Mount Pipe	B	From Leg	3.00		70.0000	247'	No Ice	6.88	3.27	59
			-6'				1/2" Ice	7.39	3.97	105
			0'				1" Ice	7.89	4.64	156
							2" Ice	8.92	6.02	281
							4" Ice	11.12	8.99	647
APX16PV-16PVL w/ Mount Pipe	C	From Leg	3.00		-70.0000	247'	No Ice	6.88	3.27	59
			-6'				1/2" Ice	7.39	3.97	105
			0'				1" Ice	7.89	4.64	156
							2" Ice	8.92	6.02	281
							4" Ice	11.12	8.99	647
LNX-6515DS-VTM w/ Mount Pipe	A	From Leg	3.00		90.0000	247'	No Ice	11.68	9.84	83
			6'				1/2" Ice	12.40	11.37	173
			0'				1" Ice	13.14	12.91	273
							2" Ice	14.60	15.27	506
							4" Ice	17.87	20.14	1151
LNX-6515DS-VTM w/ Mount Pipe	B	From Leg	3.00		70.0000	247'	No Ice	11.68	9.84	83
			6'				1/2" Ice	12.40	11.37	173
			0'				1" Ice	13.14	12.91	273
							2" Ice	14.60	15.27	506
							4" Ice	17.87	20.14	1151
LNX-6515DS-VTM w/ Mount Pipe	C	From Leg	3.00		-70.0000	247'	No Ice	11.68	9.84	83
			6'				1/2" Ice	12.40	11.37	173
			0'				1" Ice	13.14	12.91	273
							2" Ice	14.60	15.27	506
							4" Ice	17.87	20.14	1151
ATBT-BOTTOM-24V	A	From Leg	3.00		90.0000	247'	No Ice	0.12	0.08	3
			6'				1/2" Ice	0.17	0.12	4
			0'				1" Ice	0.23	0.17	6
							2" Ice	0.38	0.30	13

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	Client	Crown Castle	Designed by	mlackey

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight	
			Horz	Vert						ft
			ft	ft	°	ft	ft ²	ft ²	lb	
ATBT-BOTTOM-24V	B	From Leg	3.00	6'	70.0000	247'	4" Ice	0.77	0.67	45
							No Ice	0.12	0.08	3
							1/2" Ice	0.17	0.12	4
							1" Ice	0.23	0.17	6
							2" Ice	0.38	0.30	13
ATBT-BOTTOM-24V	C	From Leg	3.00	6'	-70.0000	247'	4" Ice	0.77	0.67	45
							No Ice	0.12	0.08	3
							1/2" Ice	0.17	0.12	4
							1" Ice	0.23	0.17	6
							2" Ice	0.38	0.30	13
TMAT7LA-11A	A	From Leg	3.00	-6'	90.0000	247'	4" Ice	0.77	0.67	45
							No Ice	0.75	0.40	22
							1/2" Ice	0.87	0.49	29
							1" Ice	1.00	0.59	37
							2" Ice	1.29	0.81	60
TMAT7LA-11A	B	From Leg	3.00	-6'	70.0000	247'	4" Ice	1.96	1.36	134
							No Ice	0.75	0.40	22
							1/2" Ice	0.87	0.49	29
							1" Ice	1.00	0.59	37
							2" Ice	1.29	0.81	60
TMAT7LA-11A	C	From Leg	3.00	0'	-70.0000	247'	4" Ice	1.96	1.36	134
							No Ice	0.75	0.40	22
							1/2" Ice	0.87	0.49	29
							1" Ice	1.00	0.59	37
							2" Ice	1.29	0.81	60
(3) ATMAP1412D-1A20	A	From Leg	3.00	-6'	90.0000	247'	4" Ice	1.96	1.36	134
							No Ice	0.47	1.17	13
							1/2" Ice	0.57	1.31	21
							1" Ice	0.69	1.47	30
							2" Ice	0.95	1.81	56
(3) ATMAP1412D-1A20	B	From Leg	3.00	0'	70.0000	247'	4" Ice	1.57	2.58	137
							No Ice	0.47	1.17	13
							1/2" Ice	0.57	1.31	21
							1" Ice	0.69	1.47	30
							2" Ice	0.95	1.81	56
(3) ATMAP1412D-1A20	C	From Leg	3.00	-6'	-70.0000	247'	4" Ice	1.57	2.58	137
							No Ice	0.47	1.17	13
							1/2" Ice	0.57	1.31	21
							1" Ice	0.69	1.47	30
							2" Ice	0.95	1.81	56
Sector Mount [SM 301-3]	C	None			0.0000	247'	4" Ice	1.57	2.58	137
							No Ice	29.61	29.61	1302
							1/2" Ice	39.80	39.80	1843
							1" Ice	49.99	49.99	2383
							2" Ice	70.37	70.37	3465
2.4" x 5-ft Mount Pipe	A	From Leg	3.00	0'	0.0000	247'	4" Ice	111.13	111.13	5628
							No Ice	1.20	1.20	18
							1/2" Ice	1.50	1.50	27
							1" Ice	1.81	1.81	40
							2" Ice	2.47	2.47	76
2.4" x 5-ft Mount Pipe	B	From Leg	3.00	0'	0.0000	247'	4" Ice	3.93	3.93	197
							No Ice	1.20	1.20	18
							1/2" Ice	1.50	1.50	27
							1" Ice	1.81	1.81	40
							2" Ice	2.47	2.47	76
2.4" x 5-ft Mount Pipe	C	From Leg	3.00		0.0000	247'	4" Ice	3.93	3.93	197
							No Ice	1.20	1.20	18

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	Client	Crown Castle	Designed by	mlackey

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
			0'			1/2" Ice	1.50	1.50	27
			0'			1" Ice	1.81	1.81	40
						2" Ice	2.47	2.47	76
						4" Ice	3.93	3.93	197

HBXX-6516DS-VTM w/ Mount Pipe	A	From Leg	4.00	-20.0000	230'	No Ice	6.19	4.53	50
			-6'			1/2" Ice	6.66	5.21	99
			2'			1" Ice	7.15	5.90	155
						2" Ice	8.15	7.38	287
						4" Ice	10.27	10.56	667
HBXX-6516DS-VTM w/ Mount Pipe	B	From Leg	4.00	-20.0000	230'	No Ice	6.19	4.53	50
			-6'			1/2" Ice	6.66	5.21	99
			2'			1" Ice	7.15	5.90	155
						2" Ice	8.15	7.38	287
						4" Ice	10.27	10.56	667
HBXX-6516DS-VTM w/ Mount Pipe	C	From Leg	4.00	-20.0000	230'	No Ice	6.19	4.53	50
			-6'			1/2" Ice	6.66	5.21	99
			2'			1" Ice	7.15	5.90	155
						2" Ice	8.15	7.38	287
						4" Ice	10.27	10.56	667
SBNHH-1D65B w/ Mount Pipe	A	From Leg	4.00	-20.0000	230'	No Ice	9.00	7.73	97
			-2'			1/2" Ice	9.75	9.02	173
			2'			1" Ice	10.43	9.98	258
						2" Ice	11.82	11.93	453
						4" Ice	14.74	16.20	994
SBNHH-1D65B w/ Mount Pipe	B	From Leg	4.00	-20.0000	230'	No Ice	9.00	7.73	97
			-2'			1/2" Ice	9.75	9.02	173
			2'			1" Ice	10.43	9.98	258
						2" Ice	11.82	11.93	453
						4" Ice	14.74	16.20	994
SBNHH-1D65B w/ Mount Pipe	C	From Leg	4.00	-20.0000	230'	No Ice	9.00	7.73	97
			-2'			1/2" Ice	9.75	9.02	173
			2'			1" Ice	10.43	9.98	258
						2" Ice	11.82	11.93	453
						4" Ice	14.74	16.20	994
LNX-8513DS-VTM w/ Mount Pipe	A	From Leg	4.00	-20.0000	230'	No Ice	8.65	7.08	65
			2'			1/2" Ice	9.31	8.27	134
			2'			1" Ice	9.93	9.18	211
						2" Ice	11.20	11.02	393
						4" Ice	13.87	15.06	903
LNX-6514DS-VTM w/ Mount Pipe	C	From Leg	4.00	-20.0000	230'	No Ice	8.68	7.42	79
			2'			1/2" Ice	9.31	8.45	152
			2'			1" Ice	9.93	9.34	233
						2" Ice	11.20	11.18	420
						4" Ice	13.85	15.22	938
LNX-8513DS-VTM w/ Mount Pipe	B	From Leg	4.00	-20.0000	230'	No Ice	8.65	7.08	65
			2'			1/2" Ice	9.31	8.27	134
			2'			1" Ice	9.93	9.18	211
						2" Ice	11.20	11.02	393
						4" Ice	13.87	15.06	903
RRH2X60-PCS	A	From Leg	4.00	-20.0000	230'	No Ice	2.57	2.01	55
			-6'			1/2" Ice	2.79	2.22	75
			2'			1" Ice	3.02	2.43	99
						2" Ice	3.52	2.89	155
						4" Ice	4.61	3.92	313
RRH2X60-PCS	B	From Leg	4.00	-20.0000	230'	No Ice	2.57	2.01	55
			-6'			1/2" Ice	2.79	2.22	75

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _A A Front	C _A A Side	Weight
			Horz	Lateral					
BMYD745K	A	From Leg	1.00	-80.0000	188'	No Ice	1.70	1.70	25
			0'			1/2" Ice	2.00	2.00	35
			0'			1" Ice	2.30	2.30	45
						2" Ice	2.90	2.90	65
						4" Ice	4.10	4.10	105

ASP-960	A	From Leg	0.50	-80.0000	186'	No Ice	1.92	1.92	4
			0'			1/2" Ice	3.46	3.46	6
			0'			1" Ice	4.99	4.99	7
						2" Ice	8.06	8.06	10
						4" Ice	14.21	14.21	15

1.9" x 5.5' Pipe (Horizontal)	B	From Leg	3.00	0.0000	150'	No Ice	1.22	0.04	14
			0'			1/2" Ice	1.66	0.06	24
			0'			1" Ice	2.12	0.10	39
						2" Ice	3.05	0.20	85
						4" Ice	5.02	0.51	241

Pipe Mount [PM 601-1]	B	From Leg	0.50	0.0000	146'	No Ice	3.00	0.90	65
			0'			1/2" Ice	3.74	1.12	79
			0'			1" Ice	4.48	1.34	93
						2" Ice	5.96	1.78	122
						4" Ice	8.92	2.66	178

3-FT Yagi	B	From Leg	0.67	20.0000	136'	No Ice	0.16	0.21	7
			0'			1/2" Ice	0.50	0.69	13
			0'			1" Ice	0.84	1.17	19
						2" Ice	1.52	2.13	32
						4" Ice	2.88	4.05	57

2.4" Dia x 8-ft Mount Pipe	B	From Leg	0.67	0.0000	136'	No Ice	1.90	1.90	29
			0'			1/2" Ice	2.73	2.73	44
			0'			1" Ice	3.40	3.40	63
						2" Ice	4.40	4.40	119
						4" Ice	6.50	6.50	300

220-5	A	From Leg	6.00	-60.0000	133'	No Ice	3.40	3.40	22
			0'			1/2" Ice	5.42	5.42	49
			10'			1" Ice	7.46	7.46	89
						2" Ice	11.59	11.59	206
						4" Ice	20.05	20.05	598

SRL-235-2	C	From Leg	2.00	60.0000	133'	No Ice	5.60	5.60	90
			0'			1/2" Ice	7.84	7.84	124
			12'			1" Ice	10.10	10.10	174
						2" Ice	14.65	14.65	323
						4" Ice	23.90	23.90	821

Side Arm Mount [SO 602-1]	A	From Leg	3.00	-60.0000	133'	No Ice	2.72	12.93	146
			0'			1/2" Ice	4.11	17.82	223
			0'			1" Ice	5.50	22.71	301
						2" Ice	8.28	32.49	456
						4" Ice	13.84	52.05	766

PD1132-D	B	From Leg	0.50	80.0000	109'	No Ice	24.89	24.89	105
			0'			1/2" Ice	25.85	25.85	276
			4'			1" Ice	26.81	26.81	459
						2" Ice	28.75	28.75	862

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Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				ft	°	°	ft	ft	ft ²	lb	
*** SPD3-5.8	A	Paraboloid w/Radome	From Leg	1.00 0' 0'	0.0000		322'	3.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	7.07 7.47 7.86 8.66 10.25	35 73 112 188 342
*** P-9A72GN-U	C	Grid	From Leg	1.00 0' 0'	60.0000		206'	6.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	28.27 29.07 29.86 31.44 34.60	112 261 410 709 1306
*** *** *** HPX6-65-P3A	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0' 0'	0.0000		150'	6.46	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	32.76 33.61 34.46 36.16 39.57	359 532 704 1049 1739
*** PL6-65-PXA	B	Paraboloid w/Radome	From Leg	1.00 0' 0'	-50.0000		146'	6.36	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	31.75 32.59 33.43 35.10 38.45	161 167 174 186 211
*** MGA2-16N	B	Grid	From Leg	0.67 0' 2'	0.0000		136'	2.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.14 3.41 3.68 4.21 5.28	20 38 55 90 160
MGAR3-23N	B	Grid	From Leg	0.67 0' -2'	20.0000		136'	3.38	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	9.00 9.45 9.90 10.79 12.59	30 79 127 224 418
*** P-9A48GN-U	C	Grid	From Leg	1.00 0' 0'	-60.0000		117'	4.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	12.57 13.10 13.62 14.68 16.80	112 179 246 381 650
*** SSH-9A72GN	B	Grid	From Leg	3.00 0' 0'	80.0000		108'	2.84	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	6.35 6.73 7.11 7.86 9.37	38 128 219 400 761
*** SPD2-5.8	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0' 0'	0.0000		99'	2.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	3.14 3.41 3.68 4.21 5.28	22 40 60 90 160
*** P-9A48GN-U	C	Grid	From Leg	2.00 0' 6'	-20.0000		62'	4.00	No Ice 1/2" Ice 1" Ice	12.57 13.10 13.62	112 179 246

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Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter	Aperture Area	Weight	
				ft	°	°	ft	ft	ft ²	lb	
SSH-9A72GN	C	Grid	From Leg	2.00 0' -1'	-60.0000		62'	6.00	2" Ice	14.68	381
									4" Ice	16.80	650
									No Ice	28.27	112
									1/2" Ice	29.07	261
									1" Ice	29.86	410
									2" Ice	31.44	709
									4" Ice	34.60	1306

Load Combinations

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

Maximum Tower Deflections - Service Wind

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
Pole	489 - 457	12.025	33	0.4815	0.2576
Antenna					
T1	457 - 436	9.197	33	0.2443	0.2644
T2	436 - 421	8.359	32	0.2355	0.2651
T3	421 - 401	7.866	31	0.2244	0.2689
T4	401 - 396	7.345	31	0.1913	0.2735
T5	396 - 391	7.227	31	0.1829	0.2747
T6	391 - 386	7.116	31	0.1732	0.2758
T7	386 - 381	7.010	31	0.1618	0.2769
T8	381 - 376	6.914	31	0.1488	0.2780
T9	376 - 371	6.847	31	0.1394	0.2797
T10	371 - 366	6.790	31	0.1312	0.2820
T11	366 - 361	6.734	31	0.1243	0.2814
T12	361 - 341	6.678	31	0.1185	0.2705
T13	341 - 321	6.471	31	0.0948	0.2304
T14	321 - 301	6.247	31	0.0872	0.2006
T15	301 - 281	5.974	31	0.0838	0.1755
T16	281 - 261	5.665	31	0.0777	0.1516
T17	261 - 241	5.371	31	0.0617	0.1280
T18	241 - 221	5.198	31	0.0348	0.1195
T19	221 - 201	5.111	35	0.0341	0.1128
T20	201 - 181	5.011	35	0.0469	0.1015
T21	181 - 161	4.833	35	0.0662	0.0865
T22	161 - 141	4.565	35	0.0855	0.0704
T23	141 - 121	4.227	35	0.0964	0.0624
T24	121 - 101	3.864	35	0.0977	0.0598
T25	101 - 81	3.491	35	0.1149	0.0667
T26	81 - 61	3.021	35	0.1405	0.0742
T27	61 - 41	2.440	35	0.1683	0.0809
T28	41 - 20	1.748	35	0.1931	0.0789
T29	20 - 6.70833	0.922	35	0.2115	0.0766
T30	6.70833 - 0	0.361	35	0.2462	0.0802

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
457'	12" x 3' Beacon	33	9.197	0.2443	0.2644	5122
446'6"	Guy	32	8.723	0.2320	0.2642	12591
445'	BCD-87077	32	8.669	0.2323	0.2642	16502
440'	DB420	32	8.496	0.2343	0.2645	249998
439'	BCD-87077	32	8.462	0.2347	0.2646	65550
419'	ERI 1183-3CP	31	7.811	0.2215	0.2694	49447
388'	6014-2	31	7.052	0.1667	0.2764	35512
381'	Guy	31	6.914	0.1488	0.2780	9583
367'	SHP-2AE	31	6.745	0.1256	0.2823	65463
364'	DB806E-XT	31	6.712	0.1219	0.2779	55850
344'	455-6	31	6.501	0.0977	0.2354	89101
342'	AO9009-3	31	6.481	0.0957	0.2320	100109
340'	455-6	31	6.460	0.0939	0.2288	112764
333'	3" x 6" SideLight	31	6.386	0.0898	0.2178	117552
330'	PG1N0F-0090-310	31	6.353	0.0889	0.2133	105369
328'	7P-CI-2-CP-L	31	6.330	0.0884	0.2104	98560
326'	DB201-A	31	6.307	0.0880	0.2075	92577
325'	PLC-1296	31	6.295	0.0878	0.2061	89879
322'	SPD3-5.8	31	6.259	0.0873	0.2019	84157

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Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
310'	6014-2	31	6.103	0.0857	0.1864	99018
284'	DB404-B	31	5.713	0.0793	0.1554	175609
277'	BMR10-A-B1	31	5.602	0.0755	0.1464	77721
264'	ANT150F6	31	5.409	0.0654	0.1308	28341
255'	DB809KT3E-Y	31	5.306	0.0531	0.1241	29186
251'	Guy	31	5.269	0.0471	0.1224	33324
247'	APX16PV-16PVL w/ Mount Pipe	31	5.238	0.0414	0.1211	38829
230'	HBXX-6516DS-VTM w/ Mount Pipe	35	5.139	0.0313	0.1163	161839
215'	3" x 6" SideLight	35	5.088	0.0371	0.1099	82869
206'	P-9A72GN-U	35	5.043	0.0430	0.1048	65368
200'	DFPD1-52 w/ Mount Pipe	35	5.005	0.0477	0.1009	58310
188'	BMYD745K	35	4.906	0.0591	0.0922	52614
186'	ASP-960	35	4.886	0.0611	0.0906	51811
178'	SPD4-5.2	35	4.798	0.0693	0.0839	51767
150'	HPX6-65-P3A	35	4.385	0.0931	0.0652	102324
146'	PL6-65-PXA	35	4.316	0.0950	0.0638	128275
138'	MGA2-16N	35	4.173	0.0967	0.0616	239591
136'	3-FT Yagi	35	4.137	0.0968	0.0611	298455
134'	MGAR3-23N	35	4.100	0.0967	0.0607	395084
133'	220-5	35	4.082	0.0967	0.0604	471395
131'	Guy	35	4.046	0.0966	0.0601	545334
117'	P-9A48GN-U	35	3.792	0.0994	0.0606	332000
112'	3" x 6" SideLight	35	3.702	0.1032	0.0622	101499
109'	PD1132-D	35	3.647	0.1061	0.0633	71616
108'	SSH-9A72GN	35	3.628	0.1071	0.0638	65215
106'	PR-950	35	3.590	0.1092	0.0646	54829
99'	SPD2-5.8	35	3.450	0.1173	0.0675	39561
68'	P-9A48GN-U	35	2.655	0.1583	0.0792	44952
62'	CSI-AY/809-960/11	35	2.471	0.1669	0.0808	45225
61'	SSH-9A72GN	35	2.440	0.1683	0.0809	45046

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
Pole	489 - 457	53.632	6	1.6163	0.6153
Antenna					
T1	457 - 436	43.957	6	0.9288	0.6379
T2	436 - 421	40.289	6	0.9042	0.6403
T3	421 - 401	37.751	6	0.8728	0.6525
T4	401 - 396	34.500	6	0.7765	0.6677
T5	396 - 391	33.742	6	0.7519	0.6715
T6	391 - 386	33.016	6	0.7230	0.6753
T7	386 - 381	32.306	6	0.6893	0.6790
T8	381 - 376	31.639	6	0.6507	0.6830
T9	376 - 371	31.069	6	0.6230	0.6905
T10	371 - 366	30.535	6	0.5994	0.6996
T11	366 - 361	30.012	6	0.5798	0.7004
T12	361 - 341	29.497	6	0.5634	0.6716
T13	341 - 321	27.591	6	0.4965	0.5652
T14	321 - 301	25.820	6	0.4675	0.4887
T15	301 - 281	24.083	6	0.4492	0.4258
T16	281 - 261	22.410	6	0.4093	0.3663
T17	261 - 241	20.933	6	0.3257	0.3081

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T18	241 - 221	19.951	6	0.2136	0.2898
T19	221 - 201	19.281	6	0.1862	0.2772
T20	201 - 181	18.608	6	0.2101	0.2564
T21	181 - 161	17.755	6	0.2608	0.2245
T22	161 - 141	16.659	6	0.3192	0.1897
T23	141 - 121	15.353	6	0.3599	0.1732
T24	121 - 101	13.956	10	0.3781	0.1689
T25	101 - 81	12.539	10	0.4374	0.1889
T26	81 - 61	10.788	10	0.5182	0.2102
T27	61 - 41	8.667	10	0.6077	0.2296
T28	41 - 20	6.185	10	0.6892	0.2236
T29	20 - 6.70833	3.254	10	0.7494	0.2169
T30	6.70833 - 0	1.270	10	0.8692	0.2267

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
457'	12" x 3' Beacon	6	43.957	0.9288	0.6379	1709
446'6"	Guy	6	41.966	0.8936	0.6374	4213
445'	BCD-87077	6	41.719	0.8944	0.6376	5531
440'	DB420	6	40.924	0.9005	0.6386	124199
439'	BCD-87077	6	40.766	0.9017	0.6389	23144
419'	ERI 1183-3CP	6	37.412	0.8646	0.6542	15739
388'	6014-2	6	32.587	0.7037	0.6776	11453
381'	Guy	6	31.639	0.6507	0.6830	3121
367'	SHP-2AE	6	30.116	0.5834	0.7025	18713
364'	DB806E-XT	6	29.805	0.5731	0.6915	16006
344'	455-6	6	27.864	0.5048	0.5783	22865
342'	AO9009-3	6	27.682	0.4991	0.5695	24605
340'	455-6	6	27.501	0.4940	0.5610	26577
333'	3" x 6" SideLight	6	26.875	0.4804	0.5325	36411
330'	PG1N0F-0090-310	6	26.610	0.4763	0.5210	37650
328'	7P-C1-2-CP-L	6	26.434	0.4740	0.5135	36828
326'	DB201-A	6	26.258	0.4719	0.5062	36041
325'	PLC-1296	6	26.170	0.4709	0.5027	35665
322'	SPD3-5.8	6	25.908	0.4683	0.4921	34866
310'	6014-2	6	24.861	0.4585	0.4529	38446
284'	DB404-B	6	22.654	0.4176	0.3757	36838
277'	BMR10-A-B1	6	22.088	0.3968	0.3533	20618
264'	ANT150F6	6	21.127	0.3419	0.3146	8698
255'	DB809KT3E-Y	6	20.587	0.2899	0.2990	8929
251'	Guy	6	20.383	0.2654	0.2953	10091
247'	APX16PV-16PVL w/ Mount Pipe	6	20.198	0.2422	0.2927	11600
230'	HBXX-6516DS-VTM w/ Mount Pipe	6	19.566	0.1882	0.2837	34914
215'	3" x 6" SideLight	6	19.090	0.1899	0.2720	44870
206'	P-9A72GN-U	6	18.788	0.2011	0.2626	27485
200'	DFPD1-52 w/ Mount Pipe	6	18.570	0.2121	0.2551	22459
188'	BMYD745K	6	18.080	0.2410	0.2369	18817
186'	ASP-960	6	17.990	0.2465	0.2335	18343
178'	SPD4-5.2	6	17.606	0.2696	0.2189	17563
150'	HPX6-65-P3A	6	15.961	0.3456	0.1788	26322
146'	PL6-65-PXA	6	15.694	0.3530	0.1761	30250
138'	MGA2-16N	6	15.145	0.3628	0.1716	44421
136'	3-FT Yagi	6	15.006	0.3643	0.1706	50991

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Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt	Twist	Radius of Curvature ft
134'	MGAR3-23N	6	14.865	0.3656	0.1697	59885
133'	220-5	6	14.795	0.3663	0.1693	65606
131'	Guy	6	14.654	0.3676	0.1686	81102
117'	P-9A48GN-U	10	13.685	0.3861	0.1714	64661
112'	3" x 6" SideLight	10	13.342	0.3995	0.1761	26668
109'	PD1132-D	10	13.132	0.4088	0.1794	19708
108'	SSH-9A72GN	10	13.060	0.4122	0.1806	18130
106'	PR-950	10	12.915	0.4190	0.1830	15629
99'	SPD2-5.8	10	12.382	0.4450	0.1912	11878
68'	P-9A48GN-U	10	9.450	0.5747	0.2248	13740
62'	CSI-AY/809-960/11	10	8.782	0.6029	0.2292	13937
61'	SSH-9A72GN	10	8.667	0.6077	0.2296	13886

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T1	457	Leg	A307	0.8750	8	1390	12026	0.116	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	1256	1964	0.640	1.333	Bolt Shear
		Horizontal	A307	0.5000	2	486	1964	0.248	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	0	1964	0.000	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	1597	1964	0.814	1.333	Bolt Shear
T2	436	Leg	A307	0.8750	8	1531	12026	0.127	1.333	Bolt Tension
		Diagonal	A325X	0.5000	2	1209	5890	0.205	1.333	Bolt Shear
		Horizontal	A307	0.5000	2	610	1964	0.311	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	393	1964	0.200	1.333	Bolt Shear
T3	421	Leg	A307	0.8750	8	3134	12026	0.261	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	3432	4123	0.832	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	287	1964	0.146	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	294	1964	0.150	1.333	Bolt Shear
T4	401	Leg	A307	0.8750	8	9400	12026	0.782	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	3687	4123	0.894	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	229	1964	0.117	1.333	Bolt Shear
T5	396	Diagonal	A325N	0.5000	2	3710	4123	0.900	1.333	Bolt Shear
T6	391	Diagonal	A325X	0.5000	2	4468	5890	0.759	1.333	Bolt Shear
T7	386	Diagonal	A325X	0.5000	2	4784	5133	0.932	1.333	Member Block Shear
T8	381	Leg	A307	0.8750	8	9121	12026	0.758	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	3877	4123	0.940	1.333	Bolt Shear
T9	376	Diagonal	A325N	0.5000	2	4046	4123	0.981	1.333	Bolt Shear
T10	371	Diagonal	A325N	0.5000	2	3394	4123	0.823	1.333	Bolt Shear
T11	366	Diagonal	A325N	0.5000	2	3513	4123	0.852	1.333	Bolt Shear
T12	361	Leg	A307	0.8750	8	3090	12026	0.257	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	3252	4123	0.789	1.333	Bolt Shear
		Secondary	A325X	0.5000	1	1836	5890	0.312	1.333	Bolt Shear
		Horizontal								
		Top Girt	A307	0.5000	2	379	1964	0.193	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	138	1964	0.071	1.333	Bolt Shear
T13	341	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	2079	4123	0.504	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	161	1964	0.082	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	140	1964	0.071	1.333	Bolt Shear
T14	321	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	1287	1964	0.655	1.333	Bolt Shear

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T15	301	Top Girt	A307	0.5000	2	157	1964	0.080	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	253	1964	0.129	1.333	Bolt Shear
		Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	1914	1964	0.975	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	105	1964	0.053	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	105	1964	0.053	1.333	Bolt Shear
T16	281	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	2458	4123	0.596	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	114	1964	0.058	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	175	1964	0.089	1.333	Bolt Shear
T17	261	Leg	A307	0.6250	8	3225	6136	0.526	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	4472	4123	1.085	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	300	1964	0.153	1.333	Bolt Shear
T18	241	Leg	A307	0.6250	8	0	6136	0.000	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	3624	4123	0.879	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	281	1964	0.143	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	418	1964	0.213	1.333	Bolt Shear
T19	221	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	2018	1964	1.028	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	187	1964	0.095	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	173	1964	0.088	1.333	Bolt Shear
T20	201	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	1333	1964	0.679	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	175	1964	0.089	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	227	1964	0.115	1.333	Bolt Shear
T21	181	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	682	1964	0.347	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	294	3927	0.075	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	240	1964	0.122	1.333	Bolt Shear
T22	161	Leg	A307	0.6250	8	0	6136	0.000	1.333	Bolt Tension
		Diagonal	A325N	0.6250	2	1732	6443	0.269	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	280	1964	0.143	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	246	1964	0.125	1.333	Bolt Shear
T23	141	Leg	A307	0.6250	8	0	6136	0.000	1.333	Bolt Tension
		Diagonal	A325N	0.6250	2	2135	6443	0.331	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	574	1964	0.292	1.333	Bolt Shear
		Mid Girt	A325N	0.5000	2	3770	4123	0.914	1.333	Bolt Shear
		Torque Arm Top@131	A307	0.7500	2	6829	8836	0.773	1.333	Bolt Shear
		Torque Arm Bottom@131	A307	0.7500	2	7670	8836	0.868	1.333	Bolt Shear
T24	121	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A325N	0.5000	2	2157	4123	0.523	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	2066	1964	1.052	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	241	1964	0.123	1.333	Bolt Shear
T25	101	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	1172	1964	0.597	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	251	1964	0.128	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	357	1964	0.182	1.333	Bolt Shear
T26	81	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	513	1964	0.261	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	370	1964	0.189	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	375	1964	0.191	1.333	Bolt Shear
T27	61	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	1130	1964	0.576	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	398	1964	0.203	1.333	Bolt Shear
		Mid Girt	A307	0.5000	2	358	1964	0.183	1.333	Bolt Shear
T28	41	Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	1810	1964	0.922	1.333	Bolt Shear
		Top Girt	A307	0.5000	2	277	1964	0.141	1.333	Bolt Shear

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T29	20	Mid Girt	A307	0.5000	2	435	1964	0.221	1.333	Bolt Shear
		Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	1657	1964	0.844	1.333	Bolt Shear
T30	6.70833	Top Girt	A325N	0.5000	2	4938	8247	0.599	1.333	Bolt Shear
		Leg	A307	0.8750	8	0	12026	0.000	1.333	Bolt Tension
		Diagonal	A307	0.5000	2	2077	1964	1.058	1.333	Bolt Shear

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension lb	Breaking Load lb	Actual T lb	Allowable T _a lb	Required S.F.	Actual S.F.
T1	446'6" (A) (838)	9/16 EHS	2800	35000	12813	17500	2.000	2.732
	446'6" (B) (837)	9/16 EHS	2800	35000	12971	17500	2.000	2.698
	446'6" (C) (836)	9/16 EHS	2800	35000	12469	17500	2.000	2.807
T8	381' (A) (835)	1 3/8 BS	18560	232000	69483	116000	2.000	3.339
	381' (B) (834)	1 3/8 BS	18560	232000	70194	116000	2.000	3.305
	381' (C) (833)	1 3/8 BS	18560	232000	67408	116000	2.000	3.442
T17	251' (A) (832)	1 1/4 BS	15360	192000	49560	96000	2.000	3.874
	251' (B) (831)	1 1/4 BS	15360	192000	50359	96000	2.000	3.813
	251' (C) (830)	1 1/4 BS	15360	192000	49368	96000	2.000	3.889
T23	131' (A) (824)	11/16 EHS	6000	50000	15290	25000	2.000	3.270
	131' (A) (825)	11/16 EHS	6000	50000	15456	25000	2.000	3.235
	131' (B) (818)	11/16 EHS	6000	50000	15664	25000	2.000	3.192
	131' (B) (819)	11/16 EHS	6000	50000	15184	25000	2.000	3.293
	131' (C) (812)	11/16 EHS	6000	50000	14981	25000	2.000	3.338
	131' (C) (813)	11/16 EHS	6000	50000	15275	25000	2.000	3.273

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	Mast Stability Index	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T1	457 - 436	3	21'	5'3"	84.0	1.00	14.032	7.0686	-24447	99189	0.246
T2	436 - 421	2 3/4	15'	5'	87.3	1.00	13.708	5.9396	-34887	81422	0.428
					K=1.00						
T3	421 - 401	2 3/4	20'	5'	87.3	1.00	13.708	5.9396	-82951	81422	1.019
					K=1.00						
T4	401 - 396	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2	1.00	15.503	9.7900	-97984	151769	0.646
					K=1.00						

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	Mast Stability Index	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T5	396 - 391	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2 K=1.00	1.00	15.503	9.7900	-113417	151769	0.747
T6	391 - 386	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2 K=1.00	1.00	15.503	9.7900	-129906	151769	0.856
T7	386 - 381	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2 K=1.00	1.00	15.503	9.7900	-149146	151769	0.983
T8	381 - 376	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5 K=1.00	1.00	15.820	11.0000	-154081	174023	0.885
T9	376 - 371	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5 K=1.00	1.00	15.820	11.0000	-139589	174023	0.802
T10	371 - 366	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5 K=1.00	1.00	15.820	11.0000	-127109	174023	0.730
T11	366 - 361	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5 K=1.00	1.00	15.820	11.0000	-115835	174023	0.666
T12	361 - 341	3	20'	2'6"	40.0 K=1.00	0.98	17.413	7.0686	-106002	123082	0.861
T13	341 - 321	3	20'	5'	80.0 K=1.00	1.00	14.419	7.0686	-76408	101923	0.750
T14	321 - 301	3	20'	5'	80.0 K=1.00	1.00	14.419	7.0686	-53213	101923	0.522*
T15	301 - 281	3	20'	5'	80.0 K=1.00	1.00	14.419	7.0686	-85509	101923	0.839
T16	281 - 261	3	20'	5'	80.0 K=1.00	1.00	14.419	7.0686	-119339	101923	1.171
T17	261 - 241	3	20'	2'6"	40.0 K=1.00	0.99	17.451	7.0686	-141117	123351	1.144
T18	241 - 221	3	20'	5'	80.0 K=1.00	1.00	14.419	7.0686	-110953	101923	1.089
T19	221 - 201	3 1/4	20'	5'	73.8 K=1.00	1.00	14.994	8.2958	-83848	124390	0.674*
T20	201 - 181	3 1/4	20'	5'	73.8 K=1.00	1.00	14.994	8.2958	-87426	124390	0.703*
T21	181 - 161	3 1/4	20'	5'	73.8 K=1.00	1.00	14.994	8.2958	-91071	124390	0.732*
T22	161 - 141	3 1/2	20'	5'	68.6 K=1.00	1.00	15.468	9.6211	-94716	148821	0.636*
T23	141 - 121	3 1/2	20'	5'	68.6 K=1.00	1.00	15.468	9.6211	-98867	148821	0.664*
T24	121 - 101	3 1/2	20'	5'	68.6 K=1.00	1.00	15.468	9.6211	-110205	148821	0.741*
T25	101 - 81	3 1/2	20'	5'	68.6 K=1.00	1.00	15.468	9.6211	-157951	148821	1.061
T26	81 - 61	3 1/2	20'	5'	68.6 K=1.00	1.00	15.468	9.6211	-160939	148821	1.081
T27	61 - 41	3 1/2	20'	5'	68.6 K=1.00	1.00	15.468	9.6211	-158970	148821	1.068
T28	41 - 20	3 1/2	21'	5'3"	72.0 K=1.00	1.00	15.162	9.6211	-122752	145878	0.841*
T29	20 - 6.70833	3 1/4	13'5-9/32'	4'5-3/4"	66.2 K=1.00	1.00	15.680	8.2958	-128476	130073	0.988*
T30	6.70833 - 0	3 1/4	6'10-7/16'	2'3-15/32'	33.8 K=1.00	0.92	16.616	8.2958	-132727	137843	0.963*

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* DL controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T1	457 - 436	L2 1/2x2x1/4	7'7-13/16'	3'7-9/16"	107.0 K=1.04	11.608	1.0600	-1962	12305	0.159
T2	436 - 421	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-2417	9586	0.252
T3	421 - 401	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-6863	9586	0.716
T4	401 - 396	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-7374	9586	0.769
T5	396 - 391	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-7420	9586	0.774
T6	391 - 386	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-8936	9586	0.932
T7	386 - 381	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-8290	9586	0.865
T8	381 - 376	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-6491	9586	0.677
T9	376 - 371	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-8093	9586	0.844
T10	371 - 366	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-6787	9586	0.708
T11	366 - 361	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-7025	9586	0.733
T12	361 - 341	L2 1/2x2x3/16	7'6"	3'9"	105.4 K=1.00	11.792	0.8090	-6504	9539	0.682
T13	341 - 321	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-4159	9586	0.434
T14	321 - 301	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-2574	9586	0.268
T15	301 - 281	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-3828	9586	0.399
T16	281 - 261	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-4917	9586	0.513
T17	261 - 241	L3x3x1/4	7'6"	3'9"	76.0 K=1.00	15.793	1.4400	-8800	22742	0.387
T18	241 - 221	L3x3x1/4	7'6"	3'6-19/32"	84.0 K=1.17	14.904	1.4400	-7247	21462	0.338
T19	221 - 201	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-4035	9586	0.421
T20	201 - 181	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-2666	9586	0.278
T21	181 - 161	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-1363	9586	0.142
T22	161 - 141	L3x3x1/4	7'6"	3'6-15/32"	83.8 K=1.17	14.931	1.4400	-3464	21501	0.161
T23	141 - 121	L3x3x1/4	7'6"	3'6-15/32"	83.8 K=1.17	14.931	1.4400	-4270	21501	0.199
T24	121 - 101	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-4313	9586	0.450
T25	101 - 81	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-2344	9586	0.245
T26	81 - 61	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-1027	9586	0.107
T27	61 - 41	L2 1/2x2x3/16	7'6"	3'6-19/32"	104.9 K=1.05	11.849	0.8090	-2261	9586	0.236

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T28	41 - 20	L2 1/2x2x3/16	7'7-13/16'	3'7-9/16"	106.5 K=1.04	11.669	0.8090	-3620	9441	0.383
T29	20 - 6.70833	L2x2x3/16	5'9-31/32'	3'1-3/16"	100.9 K=1.07	12.289	0.7150	-1203	8787	0.137
T30	6.70833 - 0	L2x2x3/16	2'7-3/32"	1'3-1/8"	58.9 K=1.53	16.291	0.7150	-3423	11648	0.294*

* DL controls

Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T1	457 - 436	L2 1/2x2x1/4	6'	5'4-3/16"	139.4 K=0.92	7.685	1.0600	-972	8147	0.119*
T2	436 - 421	L2 1/2x2x1/4	6'	5'4-9/16"	139.8 K=0.92	7.646	1.0600	-370	8104	0.046

* DL controls

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T12	361 - 341	L2x2x1/4	6'	5'9"	88.2 K=0.50	14.413	0.9380	-1836	13520	0.136
T17	261 - 241	2L3 1/2x3 1/2x3/8x3/8	6'	5'9"	32.2 K=0.50	19.781	4.9700	-2451	98310	0.025

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 lb	Allow. P _a lb	Ratio P P _a
T1	457 - 436	C8x13.75	6'	5'9"	124.6 K=1.00	9.514	4.0400	-1	38437	0.000
T3	421 - 401	L2 1/2x2x1/4	6'	5'4-9/16"	139.8 K=0.92	7.646	1.0600	-85	8104	0.010
T4	401 - 396	L2 1/2x2x1/4	6'	5'4-9/16"	139.8 K=0.92	7.646	1.0600	-316	8104	0.039
T12	361 - 341	L2 1/2x2x1/4	6'	5'8-1/32"	147.5 K=0.92	6.859	1.0600	-367	7271	0.050
T23	141 - 121	L2 1/2x2x3/16	6'	5'3-23/32'	138.0 K=0.92	7.839	0.8090	-169	6342	0.027
T24	121 - 101	L2 1/2x2x3/16	6'	5'3-23/32'	138.0	7.839	0.8090	-4132	6342	0.652

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T27	61 - 41	L2 1/2x2x3/16	6'	5'3-23/32'	K=0.92 138.0 K=0.92	7.839	0.8090	-8	6342	0.001

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T3	421 - 401	L2 1/2x2x1/4	6'	5'4-9/16"	139.8 K=0.92	7.646	1.0600	-462	8104	0.057
T14	321 - 301	L2 1/2x2x1/4	6'	5'4-3/16"	139.4 K=0.92	7.685	1.0600	-145	8147	0.018
T18	241 - 221	L2 1/2x2x3/16	6'	5'4-3/16"	138.7 K=0.92	7.758	0.8090	-197	6276	0.031
T23	141 - 121	L2 1/2x2x3/16	6'	5'3-23/32'	138.0 K=0.92	7.839	0.8090	-5239	6342	0.826

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T23	141 - 121 (821)	2L3x3x3/16	7'6-19/32'	6'11-13/32"	104.4 K=1.18	11.882	2.1800	-104	25902	0.004
T23	141 - 121 (826)	2L3x3x3/16	7'6-19/32'	6'11-13/32"	104.4 K=1.18	11.882	2.1800	-178	25902	0.007

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio $\frac{P}{P_a}$
T23	141 - 121 (816)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	139.2 K=0.92	7.710	2.1800	-14741	16807	0.877
T23	141 - 121 (817)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	139.2 K=0.92	7.710	2.1800	-15264	16807	0.908
T23	141 - 121 (822)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	139.2 K=0.92	7.710	2.1800	-15333	16807	0.912
T23	141 - 121 (823)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	139.2 K=0.92	7.710	2.1800	-15339	16807	0.913
T23	141 - 121 (828)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	139.2 K=0.92	7.710	2.1800	-14485	16807	0.862
T23	141 - 121 (829)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	139.2 K=0.92	7.710	2.1800	-14920	16807	0.888

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Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _n ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T1	457 - 436	3	21'	5'3"	84.0	19.800	7.0686	14045	139958	0.100
T2	436 - 421	2 3/4	15'	5'	87.3	19.800	5.9396	19025	117604	0.162
T3	421 - 401	2 3/4	20'	5'	87.3	19.800	5.9396	61079	117604	0.519
T4	401 - 381	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2	19.800	9.7900	75199	193842	0.388
T5	396 - 391	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2	19.800	9.7900	89412	193842	0.461
T6	391 - 386	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2	19.800	9.7900	105744	193842	0.546
T7	386 - 381	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	5'	5'	68.2	19.800	9.7900	120510	193842	0.622
T8	381 - 376	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5	19.800	11.0000	72965	217800	0.335
T9	376 - 371	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5	19.800	11.0000	61096	217800	0.281
T10	371 - 366	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5	19.800	11.0000	46539	217800	0.214
T11	366 - 361	3.5" S.R. w/ 3.5 SCH40 Half Pipe	5'	5'	64.5	19.800	11.0000	34755	217800	0.160
T12	361 - 341	3	20'	2'6"	40.0	19.800	7.0686	24723	139958	0.177
T16	281 - 261	3	20'	5'	80.0	19.800	7.0686	15672	139958	0.112
T17	261 - 241	3	20'	2'6"	40.0	19.800	7.0686	33920	139958	0.242

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _n ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T1	457 - 436	L2 1/2x2x1/4	7'7"-13'16"	3'7"-9'16"	77.5	30.000	0.6778	2513	20334	0.124
T2	436 - 421	L2 1/2x2x3/16	7'6"	3'6"-19'32"	75.0	30.000	0.5189	1933	15566	0.124
T3	421 - 401	L2 1/2x2x3/16	7'6"	3'6"-19'32"	75.0	30.000	0.5189	6780	15566	0.436
T4	401 - 396	L2 1/2x2x3/16	7'6"	3'6"-19'32"	75.0	30.000	0.5189	7206	15566	0.463
T5	396 - 391	L2 1/2x2x3/16	7'6"	3'6"-19'32"	75.0	30.000	0.5189	7409	15566	0.476
T6	391 - 386	L2 1/2x2x3/16	7'6"	3'6"-19'32"	75.0	30.000	0.5189	7700	15566	0.495
T7	386 - 381	L2 1/2x2x3/16	7'6"	3'6"-19'32"	75.0	30.000	0.5189	9568	15566	0.615
T8	381 - 376	L2 1/2x2x3/16	7'6"	3'6"-19'32"	75.0	30.000	0.5189	7753	15566	0.498
T9	376 - 371	L2 1/2x2x3/16	7'6"	3'6"-19'32"	75.0	30.000	0.5189	6861	15566	0.441

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T10	371 - 366	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	6673	15566	0.429
T11	366 - 361	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	6708	15566	0.431
T12	361 - 341	L2 1/2x2x3/16	7'6"	3'9"	75.0	30.000	0.5189	6227	15566	0.400
T13	341 - 321	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	4114	15566	0.264
T14	321 - 301	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	2299	15566	0.148
T15	301 - 281	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	3459	15566	0.222
T16	281 - 261	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	4678	15566	0.301
T17	261 - 241	L3x3x1/4	7'6"	3'9"	48.4	29.000	0.9628	8944	27922	0.320
T18	241 - 221	L3x3x1/4	7'6"	3'6-19/32'	48.4	29.000	0.9628	7220	27922	0.259
T19	221 - 201	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	3876	15566	0.249
T20	201 - 181	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	2486	15566	0.160
T21	181 - 161	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	1075	15566	0.069
T22	161 - 141	L3x3x1/4	7'6"	3'6-15/32'	48.4	29.000	0.9394	3186	27242	0.117
T23	141 - 121	L3x3x1/4	7'6"	3'6-15/32'	48.4	29.000	0.9394	4180	27242	0.153
T24	121 - 101	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	4091	15566	0.263
T25	101 - 81	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	2072	15566	0.133
T26	81 - 61	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	721	15566	0.046
T27	61 - 41	L2 1/2x2x3/16	7'6"	3'6-19/32'	75.0	30.000	0.5189	1965	15566	0.126
T28	41 - 20	L2 1/2x2x3/16	7'7-13/16"	3'7-9/16"	76.6	30.000	0.5189	3603	15566	0.231
T29	20 - 6.70833	L2x2x3/16	5'19/32"	2'9-3/8"	58.0	30.000	0.4484	3314	13451	0.246
T30	6.70833 - 0	L2x2x3/16	3'1-5/16"	1'4-13/16"	31.1	30.000	0.4484	4154	13451	0.309*

* DL controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T1	457 - 436	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	30.000	0.6778	470	20334	0.023*
T2	436 - 421	L2 1/2x2x1/4	6'	5'4-9/16"	116.9	30.000	0.6778	1220	20334	0.060

* DL controls

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Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P P _a
T12	361 - 341	L2x2x1/4	6'	5'9"	113.3	29.000	0.5863	1836	17003	0.108
T17	261 - 241	2L3 1/2x3 1/2x3/8x3/8	6'	5'9"	64.5	21.600	4.9700	2451	107352	0.023

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 lb	Allow. P _a lb	Ratio P P _a
T1	457 - 436	C8x13.75	6'	5'9"	112.2	19.800	4.0400	1	79992	0.000
T2	436 - 421	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	30.000	0.6778	787	20334	0.039*
T3	421 - 401	L2 1/2x2x1/4	6'	5'4-9/16"	116.9	30.000	0.6778	575	20334	0.028
T4	401 - 396	L2 1/2x2x1/4	6'	5'4-9/16"	116.9	30.000	0.6778	458	20334	0.023
T6	391 - 386	L2 1/2x2x1/4	6'	5'8-9/32"	115.2	19.800	1.0600	598	20988	0.028
T10	371 - 366	L2 1/2x2x1/4	6'	5'8-1/32"	114.8	19.800	1.0600	784	20988	0.037
T12	361 - 341	L2 1/2x2x1/4	6'	5'8-1/32"	114.8	30.000	0.6778	759	20334	0.037
T13	341 - 321	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	30.000	0.6778	322	20334	0.016
T14	321 - 301	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	30.000	0.6778	315	20334	0.015
T15	301 - 281	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	30.000	0.5189	210	15566	0.013*
T16	281 - 261	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	30.000	0.6778	227	20334	0.011*
T17	261 - 241	L2 1/2x2x3/16	6'	5'9"	115.0	30.000	0.5189	454	15566	0.029*
T18	241 - 221	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	30.000	0.5189	562	15566	0.036*
T19	221 - 201	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	30.000	0.5189	374	15566	0.024*
T20	201 - 181	L2 1/2x2x3/16	6'	5'3-31/32'	114.6	30.000	0.5189	351	15566	0.023*
T21	181 - 161	2L3x2x1/4x3/8	6'	5'3-31/32'	77.2	30.000	1.5506	588	46519	0.013
T22	161 - 141	L2 1/2x2x3/16	6'	5'3-31/32'	114.6	30.000	0.5189	561	15566	0.036
T23	141 - 121	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	1147	15566	0.074
T24	121 - 101	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	3832	15566	0.246
T25	101 - 81	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	502	15566	0.032*
T26	81 - 61	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	740	15566	0.048
T27	61 - 41	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	796	15566	0.051
T28	41 - 20	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	555	15566	0.036*
T29	20 - 6.70833	2L2 1/2x2x3/16x1/4	6'	5'3-23/32'	86.4	30.000	1.0371	9876	31113	0.317*

* DL controls

Mid Girt Design Data (Tension)

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T1	457 - 436	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	30.000	0.6778	3195	20334	0.157
T3	421 - 401	L2 1/2x2x1/4	6'	5'4-9/16"	116.9	30.000	0.6778	589	20334	0.029
T12	361 - 341	L2 1/2x2x1/4	6'	5'9"	116.5	30.000	0.6778	277	20334	0.014
T13	341 - 321	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	30.000	0.6778	280	20334	0.014
T14	321 - 301	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	30.000	0.6778	506	20334	0.025
T15	301 - 281	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	30.000	0.5189	210	15566	0.013*
T16	281 - 261	L2 1/2x2x1/4	6'	5'4-3/16"	116.5	30.000	0.6778	349	20334	0.017
T18	241 - 221	L2 1/2x2x3/16	6'	5'4-3/16"	115.0	30.000	0.5189	836	15566	0.054
T19	221 - 201	L2 1/2x2x3/16	6'	5'3-31/32'	114.6	30.000	0.5189	346	15566	0.022*
T20	201 - 181	L2 1/2x2x3/16	6'	5'3-31/32'	114.6	30.000	0.5189	453	15566	0.029
T21	181 - 161	L2 1/2x2x3/16	6'	5'3-31/32'	114.6	30.000	0.5189	480	15566	0.031
T22	161 - 141	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	492	15566	0.032*
T23	141 - 121	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	7541	15566	0.484
T24	121 - 101	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	482	15566	0.031*
T25	101 - 81	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	713	15566	0.046
T26	81 - 61	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	750	15566	0.048
T27	61 - 41	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	717	15566	0.046
T28	41 - 20	L2 1/2x2x3/16	6'	5'3-23/32'	114.2	30.000	0.5189	870	15566	0.056*

* DL controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T8	381 - 376	2L3x2x1/4x3/8	6'	5'8-9/32"	76.6	19.800	2.3800	21815	47124	0.463
T17	261 - 241	2L3 1/2x3 1/2x3/8x3/8	6'	5'9"	64.5	21.600	4.9700	19263	107352	0.179

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T23	141 - 121 (814)	2L3x3x3/16	7'6-19/32'	6'11-13/32"	94.6	19.800	2.1800	13347	43164	0.309
T23	141 - 121 (815)	2L3x3x3/16	7'6-19/32'	6'11-13/32"	94.6	19.800	2.1800	13056	43164	0.302
T23	141 - 121 (820)	2L3x3x3/16	7'6-19/32'	6'11-13/32"	94.6	19.800	2.1800	13659	43164	0.316
T23	141 - 121 (821)	2L3x3x3/16	7'6-19/32'	6'11-13/32"	94.6	19.800	2.1800	13219	43164	0.306

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T23	141 - 121 (826)	2L3x3x3/16	7'6-19/32'	6'11-13/32"	94.6	19.800	2.1800	13293	43164	0.308
T23	141 - 121 (827)	2L3x3x3/16	7'6-19/32'	6'11-13/32"	94.6	19.800	2.1800	13357	43164	0.309

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P lb	Allow. P _a lb	Ratio P/P _a
T23	141 - 121 (816)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	157.0	19.800	2.1800	7169	43164	0.166
T23	141 - 121 (817)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	157.0	19.800	2.1800	7320	43164	0.170
T23	141 - 121 (822)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	157.0	19.800	2.1800	7643	43164	0.177
T23	141 - 121 (823)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	157.0	19.800	2.1800	7734	43164	0.179
T23	141 - 121 (828)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	157.0	19.800	2.1800	7119	43164	0.165
T23	141 - 121 (829)	2L3x3x3/16	12'6-3/8"	11'9-31/32"	157.0	19.800	2.1800	7169	43164	0.166

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
T1	457 - 436	Leg	3	2	-24447	132219	18.5	Pass
T2	436 - 421	Leg	2 3/4	44	-34887	108536	32.1	Pass
T3	421 - 401	Leg	2 3/4	74	-82951	108536	76.4	Pass
T4-T7	401 - 381	Leg	3" S.R. w/ 3 SCH 40 Half Pipe and 3.75 x 5/16 Half Pipe	Note 1	Note 1	Note 1	82.7	Pass
T8-T11	381 - 361	Leg	3.5" S.R. w/ 3.5 SCH40 Half Pipe	Note 1	Note 1	Note 1	58.6 (b) 68.1	Pass
T12	361 - 341	Leg	3	191	-106002	164068	64.6	Pass
T13	341 - 321	Leg	3	236	-76408	135863	56.2	Pass
T14	321 - 301	Leg	3	269	-53213	101923	52.2	Pass
T15	301 - 281	Leg	3	303	-85509	135863	62.9	Pass
T16	281 - 261	Leg	3	336	-119339	135863	87.8	Pass
T17	261 - 241	Leg	3	369	-141117	164427	85.8	Pass
T18	241 - 221	Leg	3	414	-110953	135863	81.7	Pass
T19	221 - 201	Leg	3 1/4	448	-83848	124390	67.4	Pass
T20	201 - 181	Leg	3 1/4	481	-87426	124390	70.3	Pass
T21	181 - 161	Leg	3 1/4	514	-91071	124390	73.2	Pass
T22	161 - 141	Leg	3 1/2	547	-94716	148821	63.6	Pass
T23	141 - 121	Leg	3 1/2	580	-98867	148821	66.4	Pass
T24	121 - 101	Leg	3 1/2	613	-110205	148821	74.1	Pass
T25	101 - 81	Leg	3 1/2	646	-157951	198378	79.6	Pass
T26	81 - 61	Leg	3 1/2	679	-160939	198378	81.1	Pass
T27	61 - 41	Leg	3 1/2	712	-158970	198378	80.1	Pass
T28	41 - 20	Leg	3 1/2	745	-122752	145878	84.1	Pass
T29	20 - 6.70833	Leg	3 1/4	773	-128476	130073	98.8	Pass

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	Client	Crown Castle	Designed by	mlackey

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
T30	6.70833 - 0	Leg	3 1/4	797	-132727	137843	96.3	Pass
T1	457 - 436	Diagonal	L2 1/2x2x1/4	39	-1962	16403	12.0	Pass
							48.0 (b)	
T2	436 - 421	Diagonal	L2 1/2x2x3/16	53	-2417	12778	18.9	Pass
T3	421 - 401	Diagonal	L2 1/2x2x3/16	86	-6863	12778	53.7	Pass
							62.4 (b)	
T4	401 - 396	Diagonal	L2 1/2x2x3/16	113	-7374	12778	57.7	Pass
							67.1 (b)	
T5	396 - 391	Diagonal	L2 1/2x2x3/16	122	-7420	12778	58.1	Pass
							67.5 (b)	
T6	391 - 386	Diagonal	L2 1/2x2x3/16	134	-8936	12778	69.9	Pass
T7	386 - 381	Diagonal	L2 1/2x2x3/16	146	-8290	12778	64.9	Pass
							69.9 (b)	
T8	381 - 376	Diagonal	L2 1/2x2x3/16	152	-6491	12778	50.8	Pass
							70.5 (b)	
T9	376 - 371	Diagonal	L2 1/2x2x3/16	162	-8093	12778	63.3	Pass
							73.6 (b)	
T10	371 - 366	Diagonal	L2 1/2x2x3/16	176	-6787	12778	53.1	Pass
							61.7 (b)	
T11	366 - 361	Diagonal	L2 1/2x2x3/16	188	-7025	12778	55.0	Pass
							63.9 (b)	
T12	361 - 341	Diagonal	L2 1/2x2x3/16	230	-6504	12716	51.1	Pass
							59.2 (b)	
T13	341 - 321	Diagonal	L2 1/2x2x3/16	266	-4159	12778	32.5	Pass
							37.8 (b)	
T14	321 - 301	Diagonal	L2 1/2x2x3/16	279	-2574	12778	20.1	Pass
							49.2 (b)	
T15	301 - 281	Diagonal	L2 1/2x2x3/16	312	-3828	12778	30.0	Pass
							73.1 (b)	
T16	281 - 261	Diagonal	L2 1/2x2x3/16	345	-4917	12778	38.5	Pass
							44.7 (b)	
T17	261 - 241	Diagonal	L3x3x1/4	389	-8800	30315	29.0	Pass
							81.4 (b)	
T18	241 - 221	Diagonal	L3x3x1/4	443	-7247	28608	25.3	Pass
							65.9 (b)	
T19	221 - 201	Diagonal	L2 1/2x2x3/16	476	-4035	12778	31.6	Pass
							77.1 (b)	
T20	201 - 181	Diagonal	L2 1/2x2x3/16	509	-2666	12778	20.9	Pass
							50.9 (b)	
T21	181 - 161	Diagonal	L2 1/2x2x3/16	525	-1363	12778	10.7	Pass
							26.0 (b)	
T22	161 - 141	Diagonal	L3x3x1/4	554	-3464	28661	12.1	Pass
							20.2 (b)	
T23	141 - 121	Diagonal	L3x3x1/4	605	-4270	28661	14.9	Pass
							24.9 (b)	
T24	121 - 101	Diagonal	L2 1/2x2x3/16	632	-4313	12778	33.8	Pass
							39.2 (b)	
T25	101 - 81	Diagonal	L2 1/2x2x3/16	675	-2344	12778	18.3	Pass
							44.8 (b)	
T26	81 - 61	Diagonal	L2 1/2x2x3/16	689	-1027	12778	8.0	Pass
							19.6 (b)	
T27	61 - 41	Diagonal	L2 1/2x2x3/16	719	-2261	12778	17.7	Pass
							43.2 (b)	
T28	41 - 20	Diagonal	L2 1/2x2x3/16	755	-3620	12584	28.8	Pass
							69.1 (b)	
T29	20 - 6.70833	Diagonal	L2x2x3/16	779	3314	17930	18.5	Pass
							63.3 (b)	
T30	6.70833 - 0	Diagonal	L2x2x3/16	811	4154	13451	30.9	Pass
							79.4 (b)	
T1	457 - 436	Horizontal	L2 1/2x2x1/4	36	-972	8147	11.9	Pass
							18.6 (b)	

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	Client	Crown Castle	Designed by	mlackey

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
T2	436 - 421	Horizontal	L2 1/2x2x1/4	56	1220	27106	4.5	Pass
T12	361 - 341	Secondary Horizontal	L2x2x1/4	206	-1836	18022	23.3 (b)	Pass
T17	261 - 241	Secondary Horizontal	2L3 1/2x3 1/2x3/8x3/8	384	-2451	131047	1.9	Pass
T1	457 - 436	Top Girt	C8x13.75	6	-1	51237	0.2	Pass
T2	436 - 421	Top Girt	L2 1/2x2x1/4	8	787	20334	3.9	Pass
T3	421 - 401	Top Girt	L2 1/2x2x1/4	47	575	27106	15.0 (b)	Pass
T4	401 - 396	Top Girt	L2 1/2x2x1/4	78	-316	10803	2.1	Pass
T6	391 - 386	Top Girt	L2 1/2x2x1/4	128	598	27977	11.0 (b)	Pass
T10	371 - 366	Top Girt	L2 1/2x2x1/4	170	784	27977	2.9	Pass
T12	361 - 341	Top Girt	L2 1/2x2x1/4	184	-367	9692	8.8 (b)	Pass
T13	341 - 321	Top Girt	L2 1/2x2x1/4	194	322	27106	2.1	Pass
T14	321 - 301	Top Girt	L2 1/2x2x1/4	239	315	27106	6.1 (b)	Pass
T15	301 - 281	Top Girt	L2 1/2x2x3/16	272	210	15566	1.2	Pass
T16	281 - 261	Top Girt	L2 1/2x2x1/4	305	227	20334	6.0 (b)	Pass
T17	261 - 241	Top Girt	L2 1/2x2x3/16	340	454	15566	1.1	Pass
T18	241 - 221	Top Girt	L2 1/2x2x3/16	371	562	15566	4.3 (b)	Pass
T19	221 - 201	Top Girt	L2 1/2x2x3/16	417	374	15566	2.9	Pass
T20	201 - 181	Top Girt	L2 1/2x2x3/16	451	351	15566	11.5 (b)	Pass
T21	181 - 161	Top Girt	2L3x2x1/4x3/8	483	588	62010	3.6	Pass
T22	161 - 141	Top Girt	L2 1/2x2x3/16	516	561	20749	10.7 (b)	Pass
T23	141 - 121	Top Girt	L2 1/2x2x3/16	550	1147	20749	5.5	Pass
T24	121 - 101	Top Girt	L2 1/2x2x3/16	582	-4132	8454	21.9 (b)	Pass
T25	101 - 81	Top Girt	L2 1/2x2x3/16	615	502	15566	48.9	Pass
T26	81 - 61	Top Girt	L2 1/2x2x3/16	648	740	20749	78.9 (b)	Pass
T27	61 - 41	Top Girt	L2 1/2x2x3/16	682	796	20749	3.2	Pass
T28	41 - 20	Top Girt	L2 1/2x2x3/16	714	555	15566	9.6 (b)	Pass
T29	20 - 6.70833	Top Girt	2L2 1/2x2x3/16x1/4	777	9876	31113	3.6	Pass
T1	457 - 436	Mid Girt	L2 1/2x2x1/4	13	3195	27106	10.6 (b)	Pass
T3	421 - 401	Mid Girt	L2 1/2x2x1/4	81	-462	10803	31.7	Pass
T12	361 - 341	Mid Girt	L2 1/2x2x1/4	197	277	27106	44.9 (b)	Pass
T13	341 - 321	Mid Girt	L2 1/2x2x1/4	242	280	27106	61.0 (b)	Pass
T14	321 - 301	Mid Girt	L2 1/2x2x1/4	277	506	27106	4.3	Pass
T15	301 - 281	Mid Girt	L2 1/2x2x3/16	308	210	15566	11.3 (b)	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail	
T16	281 - 261	Mid Girt	L2 1/2x2x1/4	343	349	27106	4.0 (b) 1.3	Pass	
T18	241 - 221	Mid Girt	L2 1/2x2x3/16	420	836	20749	6.7 (b) 4.0	Pass	
T19	221 - 201	Mid Girt	L2 1/2x2x3/16	453	346	15566	16.0 (b) 2.2	Pass	
T20	201 - 181	Mid Girt	L2 1/2x2x3/16	486	453	20749	6.6 (b) 2.2	Pass	
T21	181 - 161	Mid Girt	L2 1/2x2x3/16	519	480	20749	8.7 (b) 2.3	Pass	
T22	161 - 141	Mid Girt	L2 1/2x2x3/16	553	492	15566	9.2 (b) 3.2	Pass	
T23	141 - 121	Mid Girt	L2 1/2x2x3/16	585	-5239	8454	9.4 (b) 62.0	Pass	
T24	121 - 101	Mid Girt	L2 1/2x2x3/16	619	482	15566	68.6 (b) 3.1	Pass	
T25	101 - 81	Mid Girt	L2 1/2x2x3/16	651	713	20749	9.2 (b) 3.4	Pass	
T26	81 - 61	Mid Girt	L2 1/2x2x3/16	684	750	20749	13.6 (b) 3.6	Pass	
T27	61 - 41	Mid Girt	L2 1/2x2x3/16	717	717	20749	14.3 (b) 3.5	Pass	
T28	41 - 20	Mid Girt	L2 1/2x2x3/16	747	870	15566	13.7 (b) 5.6	Pass	
T1	457 - 436	Guy A@446.5	9/16	838	12813	17500	16.6 (b) 73.2	Pass	
T8	381 - 376	Guy A@381	1 3/8	835	69483	116000	59.9	Pass	
T17	261 - 241	Guy A@251	1 1/4	832	49560	96000	51.6	Pass	
T23	141 - 121	Guy A@131	11/16	825	15456	25000	61.8	Pass	
T1	457 - 436	Guy B@446.5	9/16	837	12971	17500	74.1	Pass	
T8	381 - 376	Guy B@381	1 3/8	834	70194	116000	60.5	Pass	
T17	261 - 241	Guy B@251	1 1/4	831	50359	96000	52.5	Pass	
T23	141 - 121	Guy B@131	11/16	818	15664	25000	62.7	Pass	
T1	457 - 436	Guy C@446.5	9/16	836	12469	17500	71.3	Pass	
T8	381 - 376	Guy C@381	1 3/8	833	67408	116000	58.1	Pass	
T17	261 - 241	Guy C@251	1 1/4	830	49368	96000	51.4	Pass	
T23	141 - 121	Guy C@131	11/16	813	15275	25000	61.1	Pass	
T8	381 - 376	Top Guy	2L3x2x1/4x3/8	142	21815	62816	34.7	Pass	
T17	261 - 241	Pull-Off@381 Top Guy	2L3 1/2x3 1/2x3/8x3/8	376	19263	143100	13.5	Pass	
T23	141 - 121	Pull-Off@251 Torque Arm	2L3x3x3/16	820	13659	57538	23.7	Pass	
T23	141 - 121	Top@131 Torque Arm	2L3x3x3/16	823	-15339	22404	58.0 (b) 68.5	Pass	
		Bottom@131							
							Summary		
							Leg (T29)	98.8	Pass
							Diagonal (T17)	81.4	Pass
							Horizontal (T2)	23.3	Pass
							Secondary Horizontal (T12)	23.4	Pass
							Top Girt (T24)	78.9	Pass
							Mid Girt (T23)	68.6	Pass
							Guy A (T1)	73.2	Pass
							Guy B (T1)	74.1	Pass
							Guy C (T1)	71.3	Pass

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	Client Crown Castle	Designed by mlackey

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
						Top Guy Pull-Off (T8)	34.7	Pass
						Torque Arm Top (T23)	58.0	Pass
						Torque Arm Bottom (T23)	68.5	Pass
						Bolt Checks	81.4	Pass
						RATING =	98.8	Pass

Notes:

- 1) See additional documentation in "Appendix C - Additional Calculations" for calculations supporting the % capacity listed.

APPENDIX B
BASE LEVEL DRAWING

APPENDIX C
ADDITIONAL CALCULATIONS

Project Name: Trumbull
 Project Number: 25575.39261
 Client Site Number: BU 873128

Engineer: MKL
 Check: ZRH
 Date: 10/27/15

Grouted/Un-Grouted Pipe Length + Full Sleeve R/F, Elevations: 381' - 401'

ASIF: 1.33 - allowable stress increase factor (typically 1.33)
 DL Control: NO - does dead load control (?)

Input - Loads

$P_{initial}$: 30.0 kips - force from initial load (no wind)
 P_{wind} : 149.1 kips - force due to final loading including reinforcement
 T_U : 120.5 kips - maximum load on leg

Input - Tower Leg **3" Diam. SR**

K : 1.00 - effective length factor for leg
 L_U : 5.00 ft - unbraced length of tower leg
 F_{y_leg} : 33.00 ksi - minimum specified yield strength of tower leg
 F_{u_leg} : 60.00 ksi - minimum specified ultimate strength of tower leg
 r : 0.75 in - minimum radius of gyration of tower leg
 A_{leg} : 7.07 in² - area of tower leg
 D_I : 0.00 in - inside diameter of tower leg
 t_{leg} : 1.50 in - thickness of tower leg
 f'_c : 0.00 ksi - minimum specified compressive strength of grout (If ungrouted enter 0)

Quick Check

Weld Size: OK
 Weld Connection: 64.1%
 Crushing Check: 82.7%
 Leg Comp. Check: 65.6%
 Sleeve Check: 46.9%
 Built-up Check: 76.4%
 Slenderness Check: OK
 Leg Tension Check: 64.6%

Input - Sleeve R/F **3.75" OD Inner Sleeve # 3STD Outer Sleeve**

F_{y_sleeve} : 35.00 ksi - minimum specified yield strength of sleeve r/f
 F_{u_sleeve} : 60.00 ksi - minimum specified ultimate strength of sleeve r/f
 r_{x_sleeve} : 0.51 in - minimum radius of gyration of sleeve r/f about the x-axis
 r_{y_sleeve} : 1.16 in - minimum radius of gyration of sleeve r/f about the y-axis
 A_{sleeve} : 1.11 in² - area of sleeve r/f
 t_{sleeve} : 0.22 in - thickness of sleeve r/f

Termination: Connected to Leg ONLY

Input - Sleeve Connection to Leg

a : 6.00 in - spacing of connectors connecting the sleeve to the leg
 D : 3.00 - weld size for the weld connecting the sleeve to the leg (unit = # of 16ths)
 Length //: 3.00 in - length of weld on each side of the leg at the termination
 Length ⊥: 0.00 in - length of weld at the bottom/top of the leg sleeve at termination (tD/2)
 No: 2.00 - number of longitudinal welds per end of the leg (typically near side & far side, so 2)
 F_{EXX} : 70.00 ksi - weld electrode classification
 Width: 3.50 in - maximum width of the built-up leg
 Gap: 12.00 in - length of leg considered for crushing

Input - Built-up Leg Section

r_{x_bu} : 0.90 in - minimum radius of gyration of the built-up section about the x-axis
 r_{y_bu} : 0.91 in - minimum radius of gyration of the built-up section about the y-axis

Input - Leg w/ Single Sleeve

A : 8.18 in² - area of (1)
 r_{x_bu} : 0.80 in - minimum rad
 r_{y_bu} : 0.82 in - minimum rad
 Inner Sleeve Gap: 18.00 in - length of leg

Project Name: Trumbull
Project Number: 25575.39261
Client Site Number: BU 873128
Elevation: 361 - 381

Engineer: MKL
Check: ZRH
Date: 10/27/2015
CODE: TIA-F

Grouted/Un-Grouted Pipe Leg + Half Sleeve R/F

ASIF: 1.33 - allowable stress increase factor (typically 1.33)
 Mast St.: 1.00 - from tnxTower

Input - Loads

$P_{initial}$: 30 kips - force from initial load (no wind)
 P_{wind} : 154.081 kips - force due to final loading including reinforcement
 T_U : 72.965 kips - maximum load on leg

Input - Tower Leg 3.5" SR

K : 1.00 - effective length factor for leg
 L_U : 5.00 ft - unbraced length of tower leg
 F_{y_leg} : 33.00 ksi - minimum specified yield strength of tower leg
 F_{u_leg} : 60.00 ksi - minimum specified ultimate strength of tower leg
 r : 0.88 in - minimum radius of gyration of tower leg
 A_{leg} : 9.62 in² - area of tower leg
 D_I : 0.00 in - inside diameter of tower leg
 t_{leg} : 1.75 in - thickness of tower leg
 f'_c : 0.00 ksi - minimum specified compressive strength of grout (if ungrouted enter 0)

Input - Sleeve R/F 3.5 STD Gap Check: OK

F_{y_sleeve} : 35.00 ksi - minimum specified yield strength of sleeve r/f
 F_{u_sleeve} : 60.00 ksi - minimum specified ultimate strength of sleeve r/f
 r_{x_sleeve} : 0.58 in - minimum radius of gyration of sleeve r/f about the x-axis
 r_{y_sleeve} : 1.34 in - minimum radius of gyration of sleeve r/f about the y-axis
 A_{sleeve} : 1.34 in² - area of sleeve r/f
 t_{sleeve} : 0.23 in - thickness of sleeve r/f

Termination: Connected to Leg ONLY

Input - Sleeve Connection to Leg

a : 6.00 in - spacing of connectors connecting the sleeve to the leg
 D : 3.00 - weld size for the weld connecting the sleeve to the leg (unit = # of 16ths)
 Length //: 3.00 in - length of weld on each side of the leg at the termination
 Length ⊥: 0.00 in - length of weld at the bottom/top of the leg sleeve at termination (tD/2)
 No : 2.00 - number of longitudinal welds per end of the leg (typically near side & far side, so 2)
 F_{EXX} : 70.00 ksi - weld electrode classification
 Width: 4.00 in - maximum width of the built-up leg
 Gap: 1.200 in - length of leg considered for crushing

Input - Built-up Leg Section 3.5" SR w/3.5 STD Half Sleeve

r_{x_bu} : 0.93 in - minimum radius of gyration of the built-up section about the x-axis
 r_{y_bu} : 0.94 in - minimum radius of gyration of the built-up section about the y-axis

Quick Check

Weld Size: OK
 Weld Connection: 68.1%
 Crushing Check: 62.4%
 Leg Comp. Check: 55.4%
 Sleeve Check: 41.3%
 Built-up Check: 66.6%
 Slenderness Check: OK
 Leg Tension Check: 28.7%

Bearing: 72.7%

<i>Pad</i>		
Width at the top of the pad (ft)	Width at the bottom of the pad (ft)	Thickness of the pad (ft)
10.50	10.50	2.00

<i>Pier</i>			
Width at the top of the pier (ft)	Width at the bottom of the pier (ft)	Length of the pier (ft)	Pier Extension above grade (ft)
4.50	10.00	3.00	0.50

Soil Density (kcf)	Depth to base of foundation (ft)	Vertical Load (kip)	Horizontal Load (kip)
0.115	5.00	380.85	5.92

Weight of Concrete	57.86 kip
W _c (Replaced)	13.65 kip
Weight of Soil	18.54 kip
Total Vertical Load	457.25 kip
Moment	29.61 kip-ft
Section Modulus - S	136.43 ft ³
Area - A	110.25 ft ²
Min. Pressure - q _{min}	3.93 ksf
Max Pressure - q _{max}	4.36 ksf

All. Pressure - q_{all} 6.00 ksf

Net Bearing Pressure? No

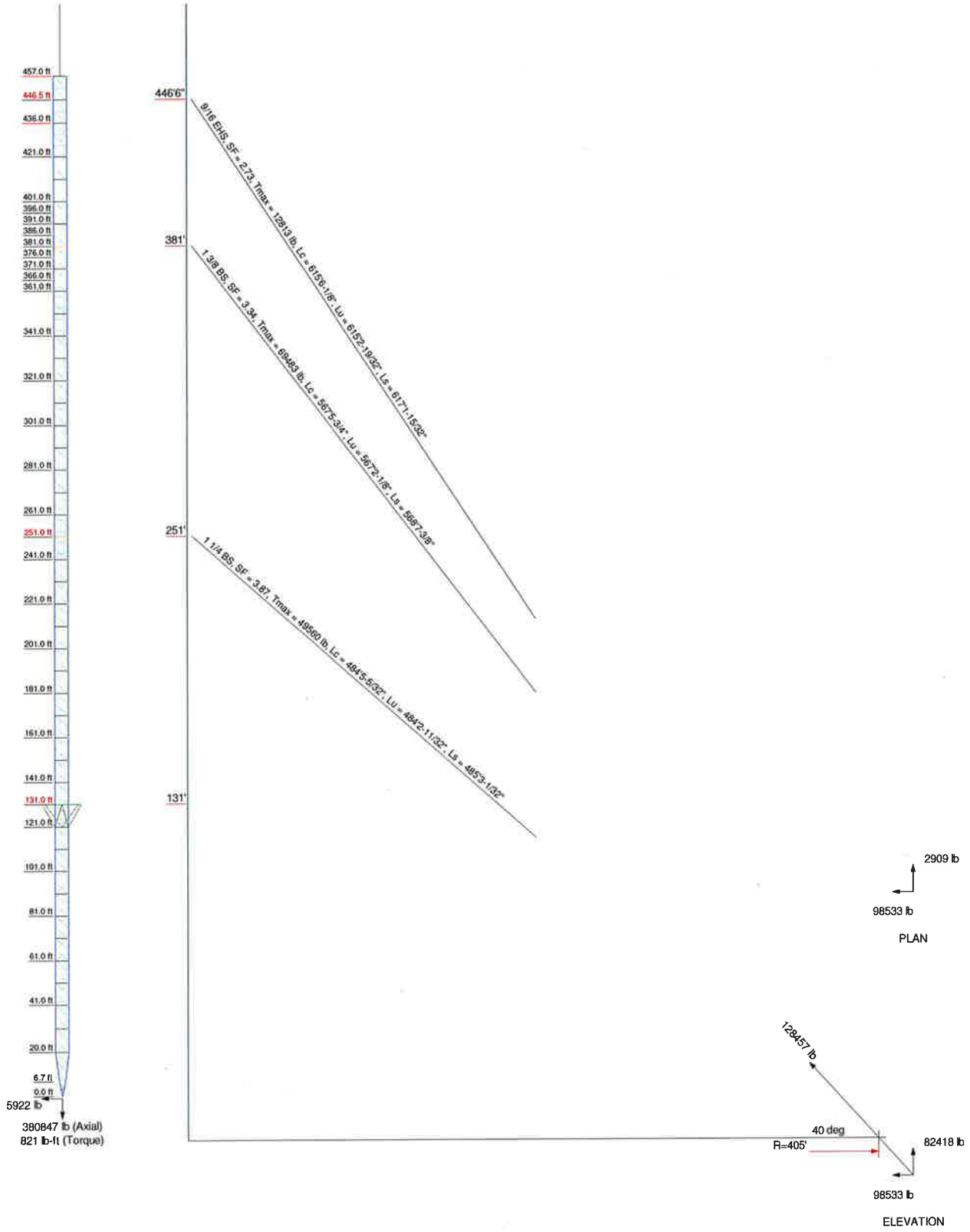
Lateral: 5.5%

Coefficient of Friction (μ)	Friction Angle (φ) (Degrees)	Cohesion (ksf)
0.4	34	0

K _p	3.54
Pressure _{Top}	1.22 ksf
Pressure _{Bottom}	2.03 ksf
Force from pressure	34.17 kip
Force from friction	182.90 kip
Total Resistance	108.53 kip (SF = 2.0)

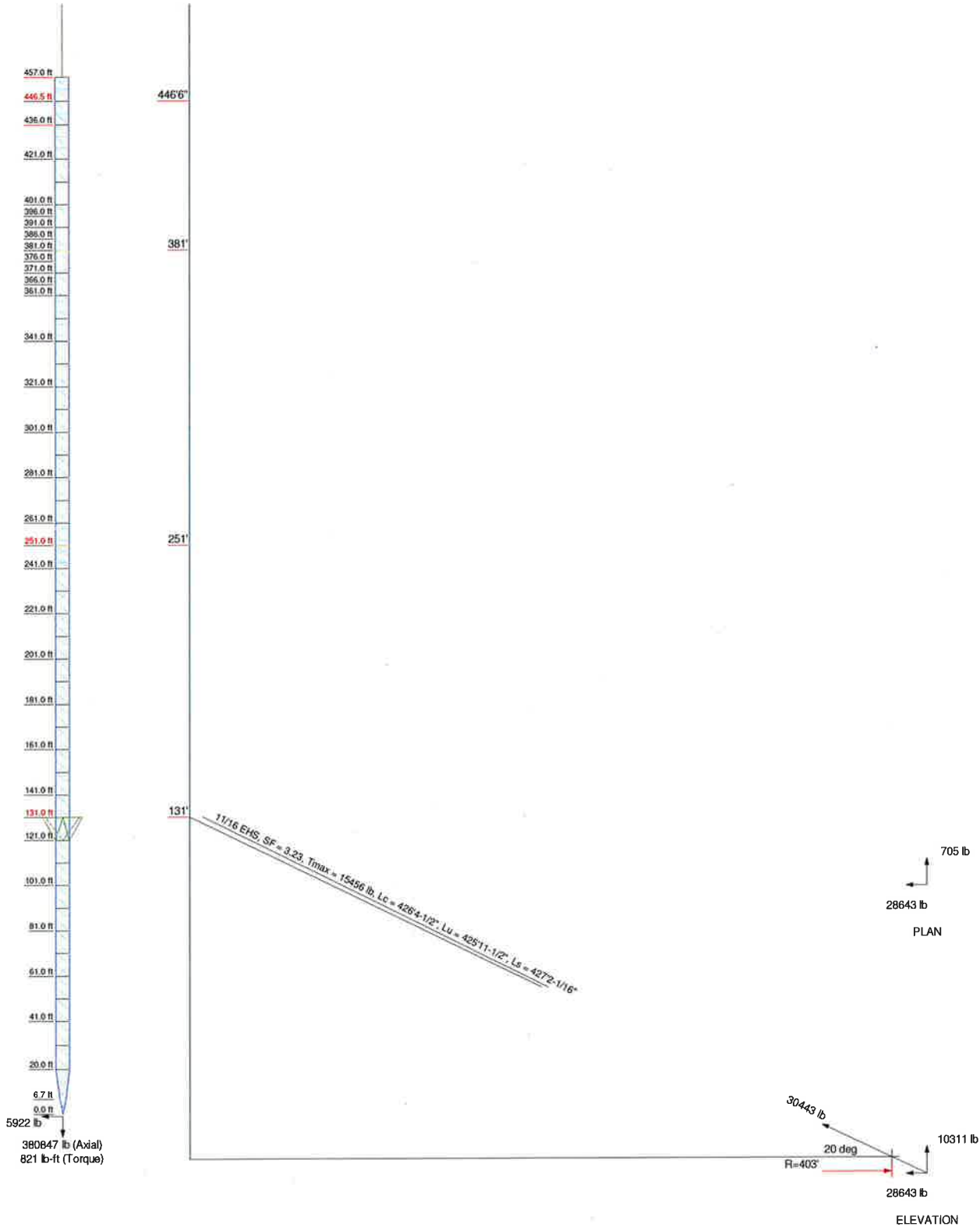
Guy Tensions and Tower Reactions
TIA/EIA-222-F - 85 mph/38 mph 0.7500 In Ice

Maximum Values
Anchor 'A' @ 405 ft Azimuth 0 deg Elev -20 ft
Plane through centroid of tower



Guy Tensions and Tower Reactions
 TIA/EIA-222-F - 85 mph/38 mph 0.7500 In Ice

Maximum Values
 Anchor 'A' @ 403 ft Azimuth 0 deg Elev -20 ft
 Plane through centroid of tower



Deadman Anchor Analysis: A - -

Project Name: Trumbull
 Job #: TEP No. 25575.39261
 Client: BU 873128
 Analysis by: MKL
 Checked by: ZRH
 Code: TIA - F

Anchor Block is Adequate for Uplift 28.0%

Anchor Block is Adequate for Lateral 85.2%

Loads

U_{max}: 92.73 kips - maximum uplift reaction
 H_{max}: 127.18 kips - maximum horizontal reaction

Capacity

U_{all}: 331.26 kips - allowable uplift
 H_{all}: 149.34 kips - allowable horizontal

Foundation Input

Guy Path: A
 Anchor Ring: -

W_b: 18.50 ft - width of anchor block
 L_b: 23.00 ft - length of anchor block
 T_b: 3.30 ft - thickness of anchor block
 d: 2.00 ft - depth from U grade to U/ anchor block
 b: 5.30 ft - depth from U grade to b/ anchor block

Ultimate Soil Properties

D_w: 8.50 ft - depth from U grade to water table

Geotechnical Firm: FDH Engineering
 Report: 04-1229E
 Date: 2/3/2005
 Notes: Boring B-4
42" Frost Depth (per CT building code)

USE? Yes
 Soil Berm:
 depth: 4.00 ft
 width: 18.50 ft
 length: 23.50 ft
 density: 110.00 pcf

Weight: 191.29 kips

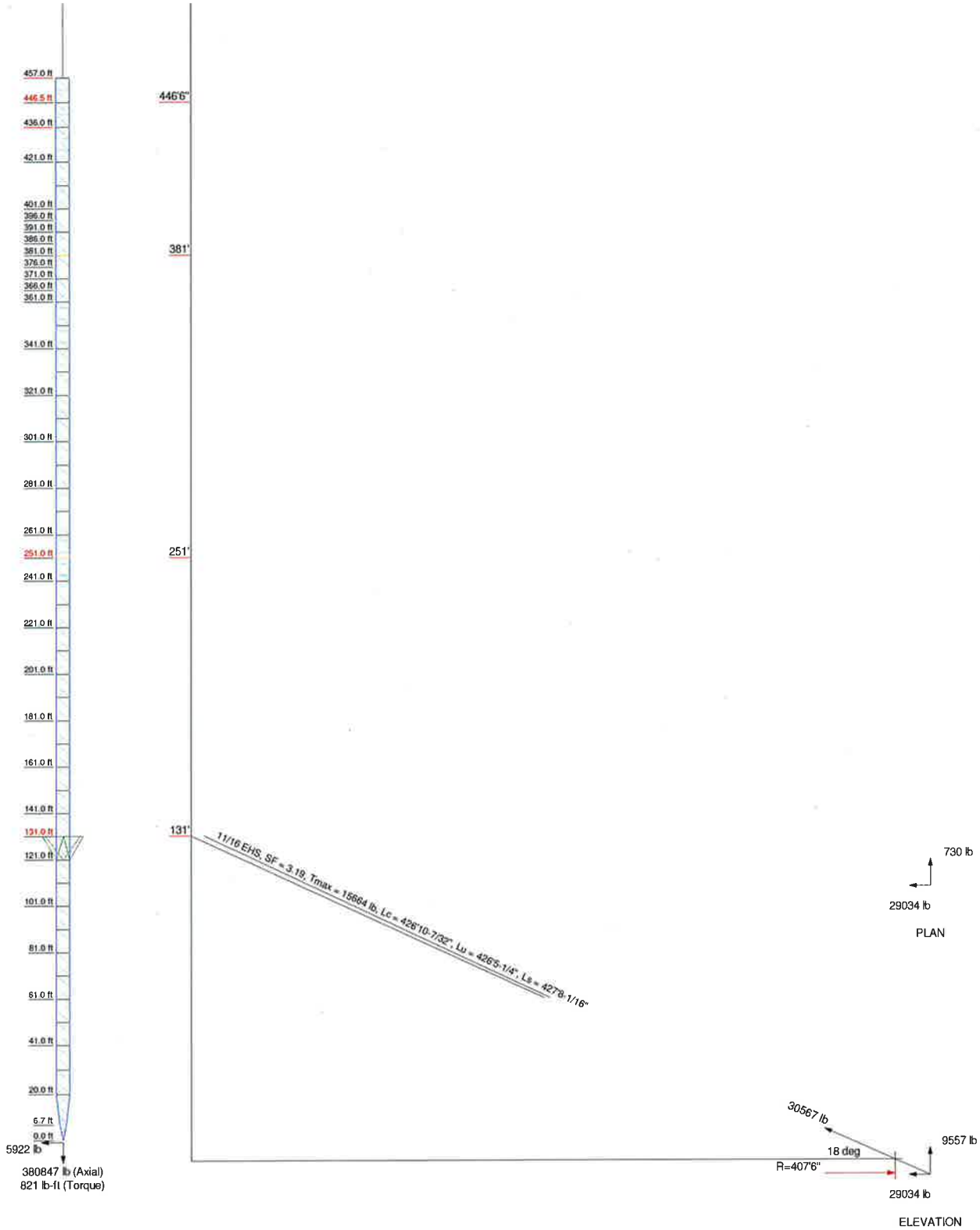
Layer	Begin (ft)	End (ft)	φ Friction Angle (deg)	c Ult. Cohesion (psf)	γ Eff. Unit Weight (pcf)	f _s Ult. Skin Friction (ksf)	μ Friction Factor
1	0.00	2.00	33.00	0.00	115.00	0.00	0.00
2	2.00	3.50	0.00	0.00	115.00	0.00	0.40
3	3.50	4.00	33.00	0.00	115.00	0.19	0.40
4	4.00	5.30	41.00	0.00	125.00	0.33	0.40
5							
6							

Analysis Criteria

Uplift: F_{s_sides}= 11.41 Yes Horizontal F_{s_sides}= 15.65 Yes
 F_{s_front}= 12.04 Yes F_{s_top}= 0.00 No
 F_{s_back}= 0.00 No F_{s_bottom}= 0.00 No
 F_L · μ = 177.36 Yes

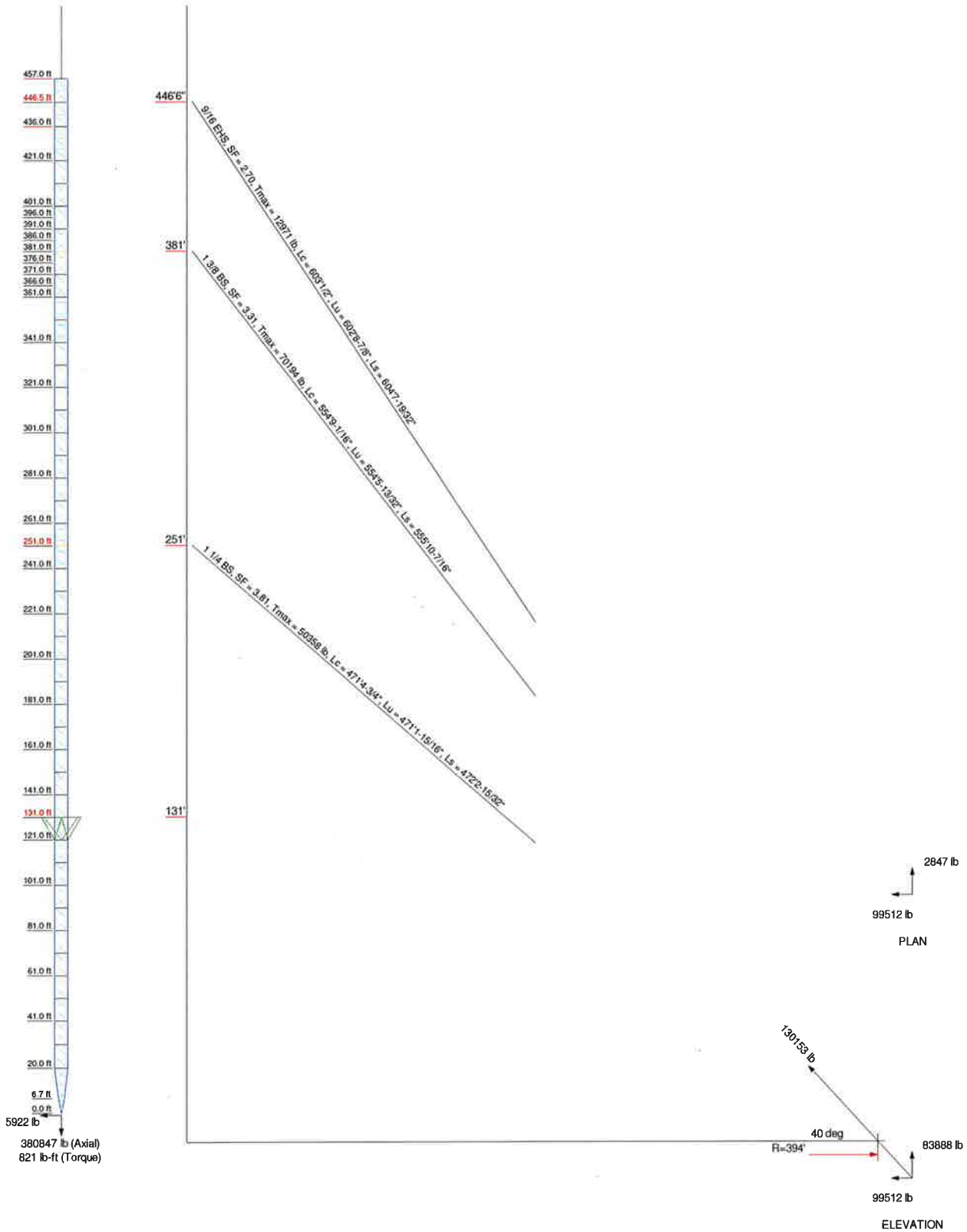
Guy Tensions and Tower Reactions
 TIA/EIA-222-F - 85 mph/38 mph 0.7500 in Ice

Maximum Values
 Anchor 'B' @ 407.5 ft Azimuth 120 deg Elev -9 ft
 Plane through centroid of tower



Guy Tensions and Tower Reactions
 TIA/EIA-222-F - 85 mph/38 mph 0.7500 in Ice

Maximum Values
 Anchor 'B' @ 394 ft Azimuth 120 deg Elev -13 ft
 Plane through centroid of tower



Deadman Anchor Analysis: B - Anchor Path

Project Name: Trumbull
 Job #: TEP No. 25575.39261
 Client: BU 873128
 Analysis by: MKL
 Checked by: ZRH
 Code: TIA - F

Anchor Block is Adequate for Uplift	35.1%
Anchor Block is Adequate for Lateral	35.6%
Concrete Block is Adequate for Lateral	85.7%
Concrete Block is Adequate for Overturning	31.6%

Loads

U₁: 83.89 kips - uplift reaction (block front)
 H₁: 99.51 kips - maximum horizontal reaction (block front)
 U₂: 9.56 kips - uplift reaction (block back)
 H₂: 29.03 kips - maximum horizontal reaction (block back)

Capacity

U_{all}: 239.27 kips - allowable uplift
 H_{all}: 279.44 kips - allowable horizontal

Foundation Input

Guy Path: B
 Anchor Ring: Anchor Path

W_b: 7.00 ft - width of anchor block
 L_b: 6.00 ft - length of anchor block
 T_b: 5.50 ft - thickness of anchor block
 d: 4.30 ft - depth from 1/ grade to 1/ anchor block
 b: 9.80 ft - depth from 1/ grade to b/ anchor block

Ultimate Soil Properties

D_w: 8.50 ft - depth from 1/ grade to water table

Geotechnical Firm: FDH Engineering
 Report: 04-1229E
 Date: 2/3/2005
 Notes: Boring B-2
42" Frost Depth (per CT building code)

USE? Yes
Concrete Berm:
 depth (above gr): 3.00 ft
 depth (below gr): 2.30 ft
 width: 15.00 ft
 length: 15.00 ft
 density: 150.00 pcf

Layer	Begin (ft)	End (ft)	φ Friction Angle (deg)	c Ult. Cohesion (psf)	γ Eil. Unil Weight (pcf)	f _s Ult. Skin Friction (ksf)	μ Friction Factor
1	0.00	2.30	0.00	0.00	115.00	0.00	0.00
2	2.30	3.50	34.00	0.00	115.00	0.00	0.40
3	3.50	4.30	0.00	5000.00	135.00	1.89	0.40
4	4.30	8.50	0.00	5000.00	135.00	1.89	0.40
5	8.50	9.80	0.00	5000.00	72.60	1.89	0.40
6							

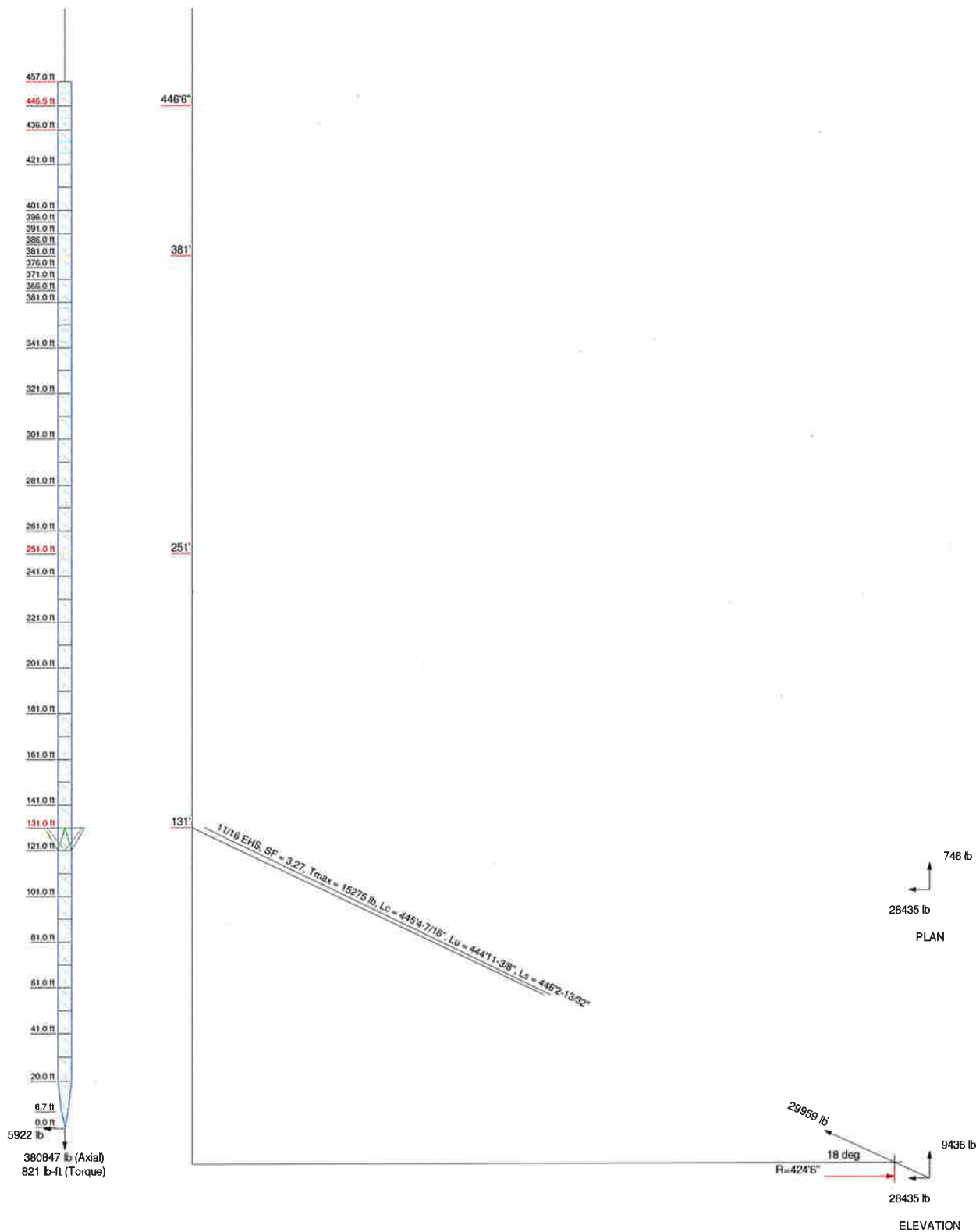
Analysis Criteria

Uplift: F_{s_sides} = 93.80 **Yes**
 F_{s_front} = 62.37 **Yes**
 F_{s_back} = 0.00 **No**

Horizontal: F_{s_sides} = 111.27 **Yes**
 F_{s_top} = 0.00 **No**
 F_{s_bottom} = 0.00 **No**
 F_L · μ = 88.81 **Yes**

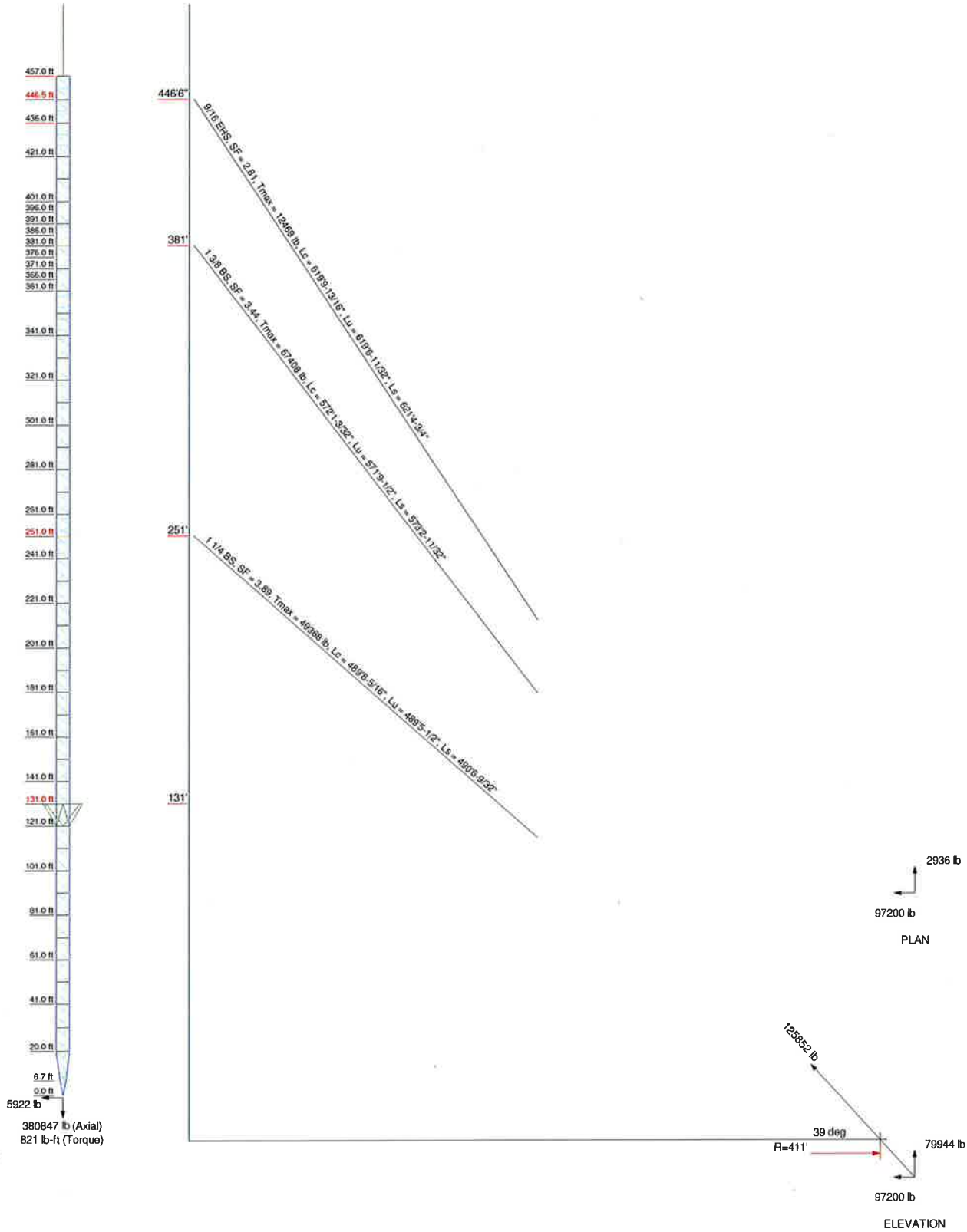
Guy Tensions and Tower Reactions
 TIA/EIA-222-F - 85 mph/38 mph 0.7500 In Ice

Maximum Values
 Anchor 'C' @ 424.5 ft Azimuth 240 deg Elev -16.5 ft
 Plane through centroid of tower



Guy Tensions and Tower Reactions
 TIA/EIA-222-F - 85 mph/38 mph 0.7500 in Ice

Maximum Values
 Anchor 'C'@411 ft Azimuth 240 deg Elev -20.5 ft
 Plane through centroid of tower



 Tower Engineering Professionals, Inc.	Tower Engineering Professionals, Inc. 326 Tryon Road Raleigh, NC 27603 Phone: (919) 661-6351 FAX: (919) 661-6350		Job: Trumbull (BU 873128) Project: TEP No. 25575.39261	
	Client: Crown Castle Code: TIA/EIA-222-F Path:	Drawn by: mlackey Date: 10/27/15	App'd:	Scale:

Deadman Anchor Analysis: C - Anchor Path

Project Name: Trumbull
 Job #: TEP No. 25575.39261
 Client: BU No. 873128
 Analysis by: MKL
 Checked by: ZRH
 Code: TIA - F

Anchor Block is Adequate for Uplift	47.2%
Anchor Block is Adequate for Lateral	86.5%
Concrete Block is Adequate for Lateral	83.9%
Concrete Block is Adequate for Overturning	31.0%

Loads

U_1 : 79.94 kips - uplift reaction (block front)
 H_1 : 97.20 kips - maximum horizontal reaction (block front)
 U_2 : 9.44 kips - uplift reaction (block back)
 H_2 : 28.44 kips - maximum horizontal reaction (block back)

Capacity

U_{all} : 169.51 kips - allowable uplift
 H_{all} : 112.40 kips - allowable horizontal

Foundation Input

Guy Path: C
 Anchor Ring: Anchor Path

W_b : 7.00 ft - width of anchor block
 L_b : 6.00 ft - length of anchor block
 T_b : 5.50 ft - thickness of anchor block
 d : 4.30 ft - depth from V grade to V anchor block
 b : 9.80 ft - depth from V grade to b / anchor block

Ultimate Soil Properties

D_w : 8.50 ft - depth from V grade to water table

Geotechnical Firm: FDH Engineering
 Report: 04-1229E
 Date: 2/3/2005
 Notes: Boring B-3
42" Frost Depth (per CT building code)

USE? Yes
Concrete Berm:

depth (above gr): 3.00 ft
 depth (below gr): 2.30 ft
 width: 15.00 ft
 length: 15.00 ft
 density: 150.00 pcf

Layer	Begin (ft)	End (ft)	ϕ Friction Angle (deg)	c Ult. Cohesion (psf)	γ Eff. Unit Weight (pcf)	f_s Ult. Skin Friction (ksf)	μ Friction Factor
1	0.00	2.30	0.00	0.00	115.00	0.00	0.00
2	2.30	4.00	34.00	0.00	115.00	0.00	0.40
3	4.00	8.50	39.00	0.00	120.00	0.42	0.40
4	8.50	9.00	39.00	0.00	57.60	0.58	0.40
5	9.00	15.50	43.00	0.00	62.60	0.69	0.40
6							

Analysis Criteria

Uplift: F_{s_sides} = 23.29 Yes Horizontal F_{s_sides} = 28.32 Yes
 F_{s_front} = 15.71 Yes F_{s_top} = 0.00 No
 F_{s_back} = 0.00 No F_{s_bottom} = 0.00 No
 $F_L \cdot \mu$ = 73.50 Yes