Hudson Design Group LLC

April 15, 2013

Alcatel-Lucent Sprint

Alcatel-Lucent
1 Robbins Road
Westford, MA 01886

RE:
Crown Site Number:	878783
Sprint Site Number:	NM03XC068
Site Name:	Portland North
Site Address:	527 Presumpscot Street Portland, ME 04103

To Whom It May Concern:

The structural analysis/PE certification completed by Hudson Design Group LLC (HDG) on behalf of ALU was inclusive of the antenna masts, antenna mounts, and all other aspects of the structure applicable to the installation of the network vision antenna system and BTS and that the site will support the Sprint Network Vision Antennas and RRH's deployment for the interim and final equipment scenarios.

Based on our evaluation, we have determined that, in general, structural designs to support the proposed Sprint Antennas and RRH's within or near the proposed location can be completed and components installed with **NO STRUCTURAL UPGRADES REQUIRED** to the existing antenna mounts. HDG reviewed the previous Structural Analysis Report prepared by B+T Group dated March 19, 2013 and field photographs to determine this assessment. See the latest HDG construction drawings for the proposed equipment and locations.

All details will be designed and furnished in HDG's construction drawings.

This determination was based on the following limitations and assumptions:

1. Equipment and locations should not deviate from the construction drawings without written approval of the engineer.
2. HDG is not responsible for any modifications completed prior to and hereafter which HDG was not directly involved.
3. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.
4. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer requirements.
5. All components supporting the Sprint equipment are assumed be designed to all applicable codes and designed for identical to or larger than the currently proposed loads.

Please feel free to contact our office should you have any questions.

Respectfully Submitted,
Hudson Design Group LLC

STATE OF MAINE
DANIEL P. HAMM
No. 10344
LICENSED PROFESSIONAL ENGINEER

Michael Cabral
Structural Dept. Head

Daniel P. Hamm, PE
Principal

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March 19, 2013

Mr. Steve Tuttle
Crown Castle USA, Inc.
349 West commercial Street
East Rochester, NY 14445
(585) 899-3445

B+T Group
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630
ctuttle@btgrp.com

Subject:	**Structural Modification Report**	
Carrier Designation:	***Sprint PCS* Co-Locate**	
	Carrier Site Number:	NM03XC068
	Carrier Site Name:	NM03XC068
Crown Castle Designation:	**Crown Castle BU Number:**	878783
	Crown Castle Site Name:	PORTLAND NORTH
	Crown Castle JDE Job Number:	191400
	Crown Castle Work Order Number:	580858
	Crown Castle Application Number:	164898 Rev. 1
Engineering Firm Designation:	**B+T Group Project Number:**	82822.004.01
Site Data:	**527 Persumpscot, Portland, ME, Cumberland County** **Latitude *43° 41' 58.53"*, Longitude *-70° 15' 30.64"*** **178 Foot - Monopole**	

Dear Mr. Tuttle,

B+T Group is pleased to submit this **"Structural Modification 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 525000, in accordance with application 164898, revision 1.

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:

LC4: TSA specified load case with proposed modification. **Sufficient Capacity**
Note: See Table 1 and Table 2 for the proposed and existing/reserved loading, respectively.

The analysis has been performed in accordance with the TIA-222-G standard and the IBC 2009 based upon a wind speed of 100 mph 3-second gust, exposure category C.

All modifications and equipment proposed in this report shall be installed in accordance with the attached drawings for the determined available structural capacity to be effective.

We at *B+T Group* 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.

Respectfully submitted by:
B+T Engineering, Inc.

Ali Abbaszadeh
Project Engineer

Chad E. Tuttle, P.E.
President

STATE OF MAINE
CHAD
E.
TUTTLE
10488
LICENSED
PROFESSIONAL ENGINEER
3/19/13

tnxTower Report - version 6.0.4.0

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 178 ft. Monopole tower designed by PITTSBURG MONOPOLE in December of 1996. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.Anchor rod reinforcements were designed for the tower per modification drawings prepared by FDH Engineering, P.C. in May of 2012 and must be installed properly for this report to be valid.

2) ANALYSIS CRITERIA

The structural analysis was performed for this tower in accordance with the requirements of TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a 3-second gust wind speed of 100 mph with no ice, 40 mph with 1 inch ice thickness and 60 mph under service loads, exposure category C.

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
178.0	180.0	1	Powerwave	P40-16-XLPP-RR-A	3	1 1/4	--
		1	Rfs Celwave	APXV9ERR18-C-A20			
		1	Rfs Celwave	APXVSPP18-C-A20			
176.0	177.0	3	Alcatel Lucent	800MHz 2X50W RRH W/FILTER	--	--	
		3	Alcatel Lucent	PCS 1900MHz 4x45W-65MHz			
	176.0	1	--	Side Arm Mount [SO 102-3]			

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
178.0	180.0	2	**Decibel**	**DB978G30E-M**	**6**	**1 5/8**	**3**
		4	**Decibel**	**DB978H65E-M**			
	178.0	1	--	Platform Mount [LP 713-1]	--	--	1
168.0	171.0	3	Rfs Celwave	APX16DWV-16DWV-S-E-A20	12	1 5/8	1
	170.0	6	Rfs Celwave	APXV18-206517-C			
	168.0	3	Ericsson	KRY 112 144/1			
		6	Ericsson	KRY 112 71			
		1	--	Platform Mount [LP 305-1]			
162.0	162.0	1	--	Side Arm Mount [SO 701-3]	2 1	3/4 3/8	2
160.0	162.0	6	Ericsson	RRUS-11			
	160.0	1	Andrew	SBNH-1D6565C			
		1	Kmw	AM-X-CD-16-65-00T-RET			
		6	Powerwave	7020.00	12	1 5/8	1
		3	Powerwave	7391.00			
		6	Powerwave	7770.00			
		6	Powerwave	LGP21401			
		6	Powerwave	LGP21903			
		1	Powerwave	P65-17-XLH-RR	--	--	2

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
		1	Raycap	DC6-48-60-18-8F			
		1	--	T-Arm Mount [TA 602-3]	--	--	1
149.0	151.0	2	Andrew	DB846F65ZAXY	6	1 5/8	2
		1	Andrew	HBX-6517DS-T2M			
		2	Andrew	LNX-6514DS-VTM			
	150.0	2	Andrew	DB846F65ZAXY			
		2	Andrew	HBX-6517DS-T2M			
		1	Andrew	LNX-6514DS-VTM			
		2	Decibel	DB846F65ZAXY			
	149.0	1	--	Platform Mount [LP 713-1]	12	1 5/8	1
134.0	135.0	3	Ericsson	KRC 115 032/2	1	3/8	2
		3	Powerwave	P65-17-XL-R	6	1 5/8	
		6	Antel	BSA-185065/10CF	6	1 5/8	1
	134.0	1	--	Platform Mount [LP 403-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) **Equipment to be Removed**

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)
180	180	12	--	4 sq. ft.	--	--
170	170	2	--	6' Dishes	--	--
160	160	12	--	4 sq. ft.	--	--

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	Sprint Co-Locate Revision#1	164898	CCI Sites
Tower Manufacturing Drawing	Pittsburg, Date:12/18/1996	1619399	CCI Sites
Tower Modification Drawing	FDH Engineering, Project No:12-03730E S2	3175691	CCI Sites
Modification Inspection Report	PSG Engineering, Inc. Date:8/28 /2008	2415719	CCI Sites
Foundation Drawing	Pittsburg, Date:12/18/1996	1620582	CCI Sites
Geotech Report	Gemini Geotechnical Associates Date:9/30/1996	1620506	CCI Sites
Antenna Configuration	Previous SA by FDH Engineering	3353243	CCI Sites

3.1) Analysis Method

tnxTower (version 6.0.4.0), 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) Tower and structures were built in accordance with the manufacturer's specifications.
2) The tower and structures 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 the referenced drawings.
4) Mount areas and weights are assumed based on photographs provided.

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

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary) – LC4

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	178 - 140	Pole	P24x1/2	1	-15.208	1162.780	75.6	Pass
L2	140 - 103.25	Pole	P36x1/2	2	-28.648	1756.540	103.8	Acceptable Re: Note2
L3	103.25 - 100	Pole	P36x1/2 [0.655182]	3	-30.014	2837.550	68.3	Pass
L4	100 - 60	Pole	P48x5/8	4	-48.237	2930.150	92.3	Pass
L5	60 - 33.25	Pole	P54x5/8	5	-61.967	3301.250	99.5	Pass
L6	33.25 - 20	Pole	P54x5/8 [0.723801]	6	-70.264	3718.670	97.4	Pass
L7	20 - 8.25	Pole	P60x5/8	7	-76.978	3649.510	102.5	Acceptable Re: Note2
L8	8.25 - 0	Pole	P60x5/8 [0.712755]	8	-82.540	4094.640	96.1	Pass
							Summary	
						Pole (L2)	103.8	Acceptable Re: Note2
						RATING =	**103.8**	**Acceptable Re: Note2**

Table 6 - Tower Component Stresses vs. Capacity - LC4

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Anchor Rods	Base	102.6	Acceptable Re:Note2
1	Base Plate	Base	42.9	Pass
1	Flange Connection	140	95.3	Pass
1,2	Flange Connection	100	100.9	Acceptable Re:Note2
1	Flange Connection	60	97.2	Pass
1	Flange Connection	20	59.7	Pass
1	Bridge Stiffener	20	92.7	Pass
1,2	Base Foundation	Base	95.1	Pass

Structure Rating (max from all components) =	103.8%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) Capacities up to 105% are considered acceptable based on analysis methods used.

4.1) Recommendations

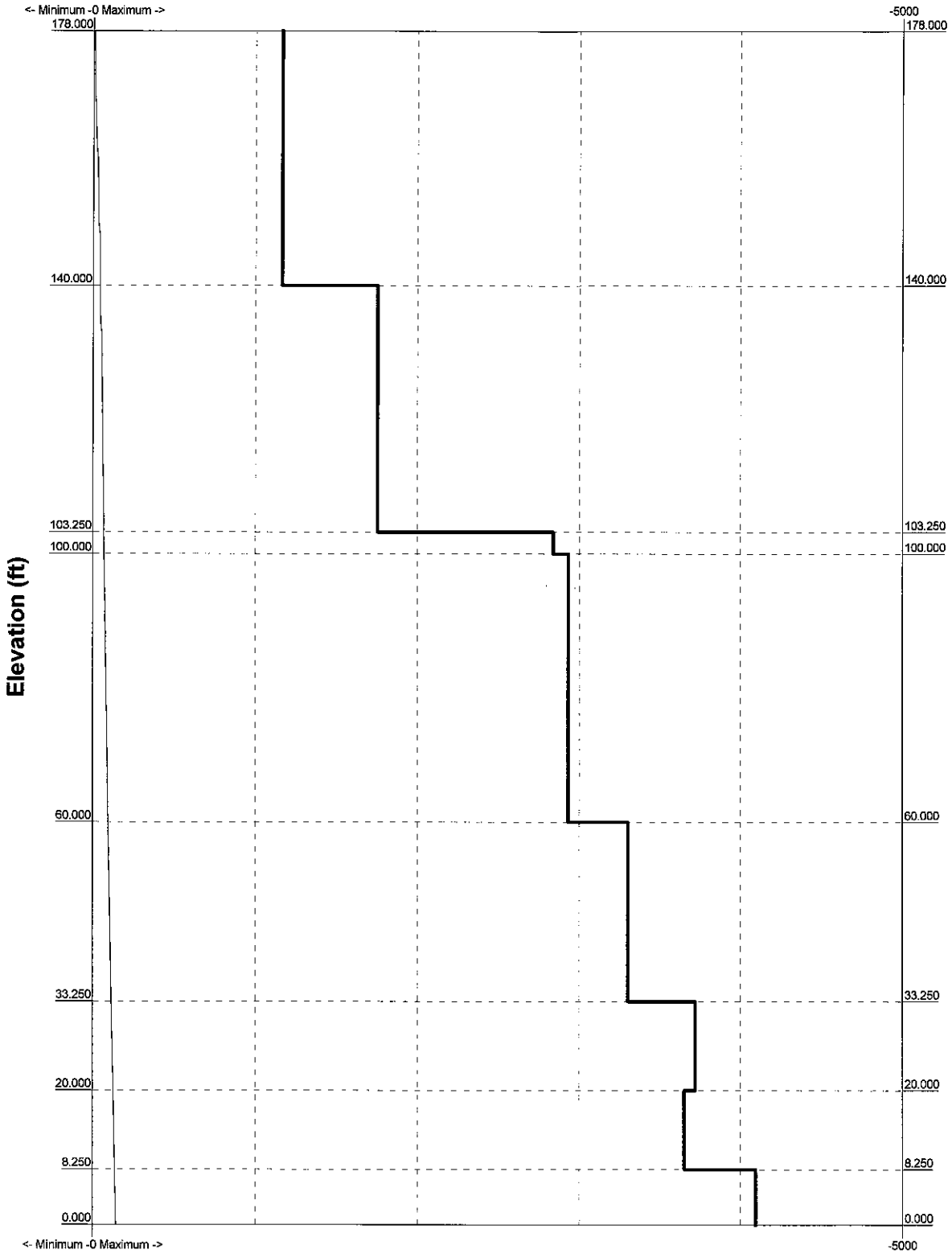
1) All modifications proposed in this report shall be installed in accordance with the attached drawings (Appendix D) for the determined available structural capacity to be effective.

APPENDIX A

tnxTOWER OUTPUT

TIA-222-G - 100 mph/40 mph 1.000 in Ice Exposure C

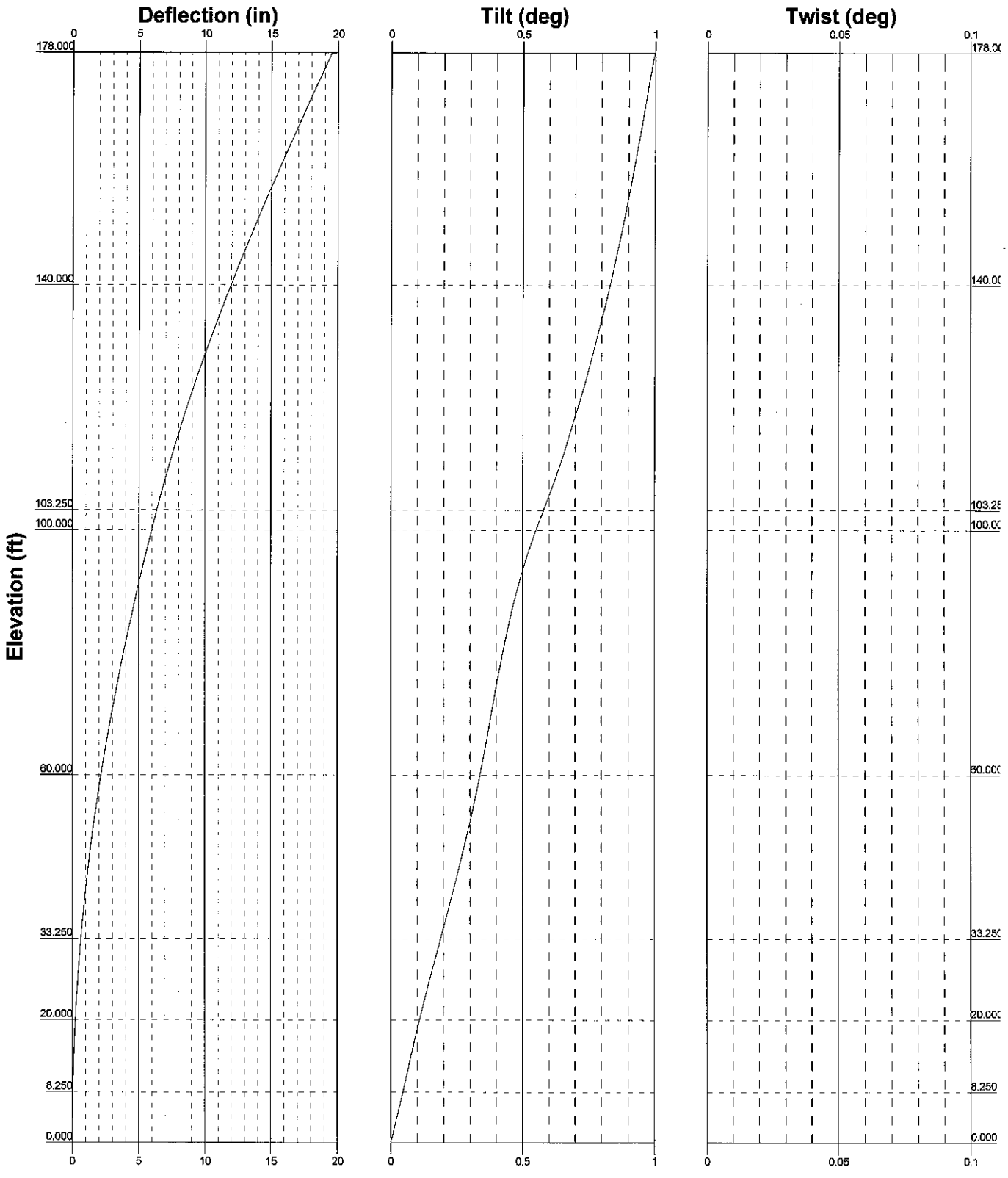
Leg Capacity ——— **Leg Compression (K)**



BT Engineering
1717 S. Boulder, Suite 300
Tulsa, OK 74145
Phone: (918) 587 - 4630
FAX: (918) 295 - 0265

Job: 82822.004.01-Portland North, ME (BU# 878			
Project:			
Client: Crown Castle	Drawn by: A. Abbaszadeh		App'd:
Code: TIA-222-G	Date: 03/18/13		Scale: NT
Path:			Dwg No. E

TIA-222-G - Service - 60 mph **Maximum Values**



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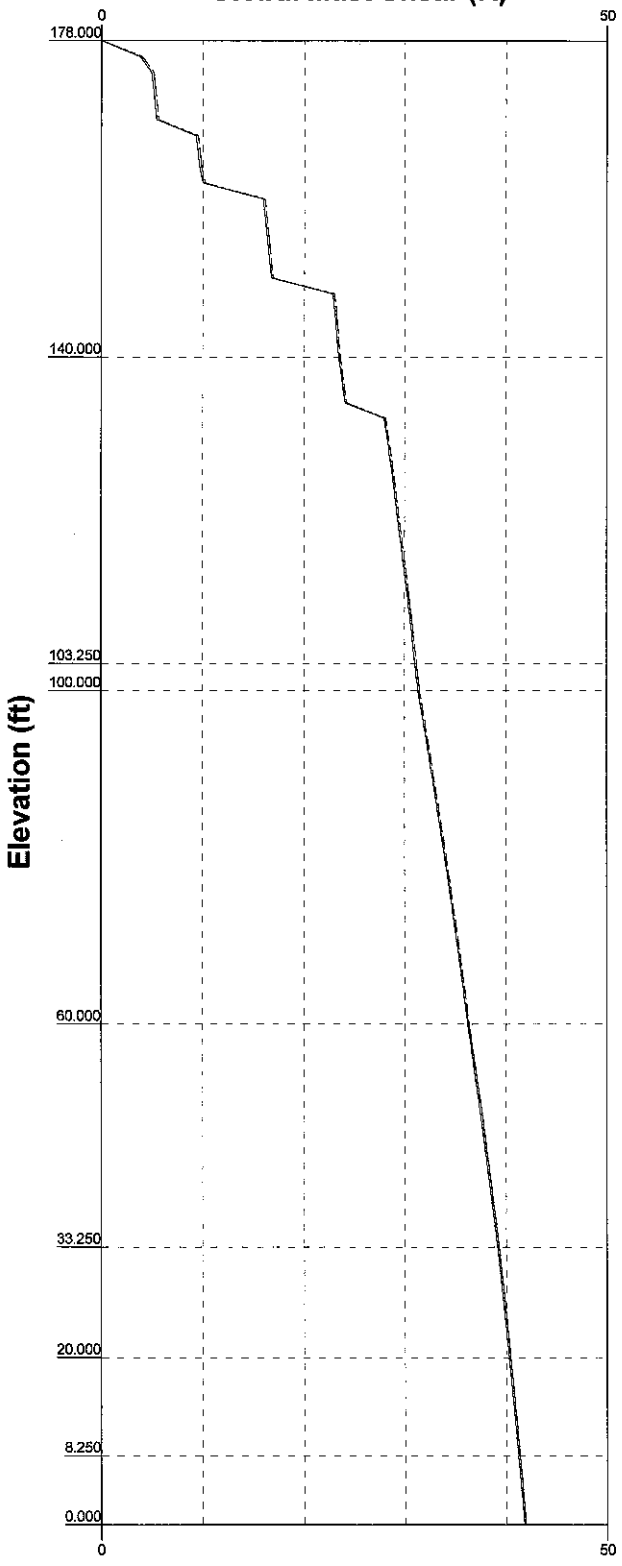
Job: *82822.004.01-Portland North, ME (BU# 878*			
Project:			
Client: Crown Castle	Drawn by: A. Abbaszadeh		App'd:
Code: TIA-222-G	Date: 03/18/13		Scale: NT
Path:			Dwg No. E

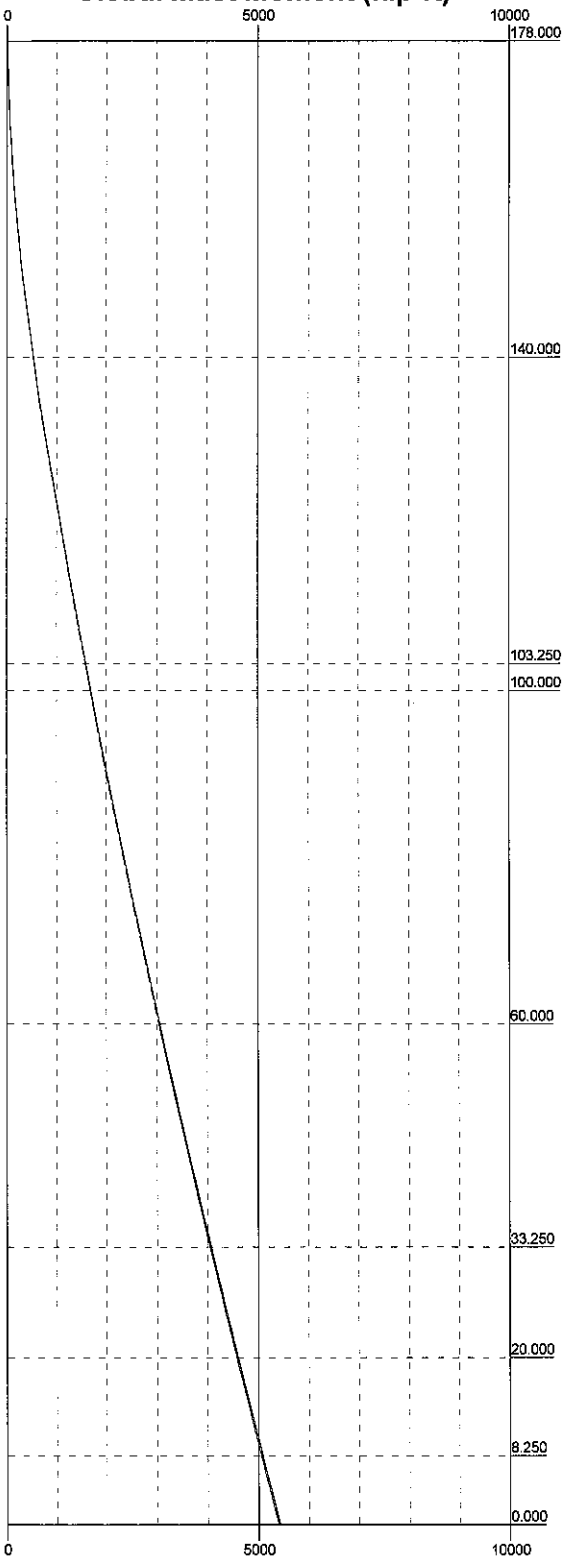
Vx Vz

Mx Mz

Global Mast Shear (K)



Global Mast Moment (kip-ft)



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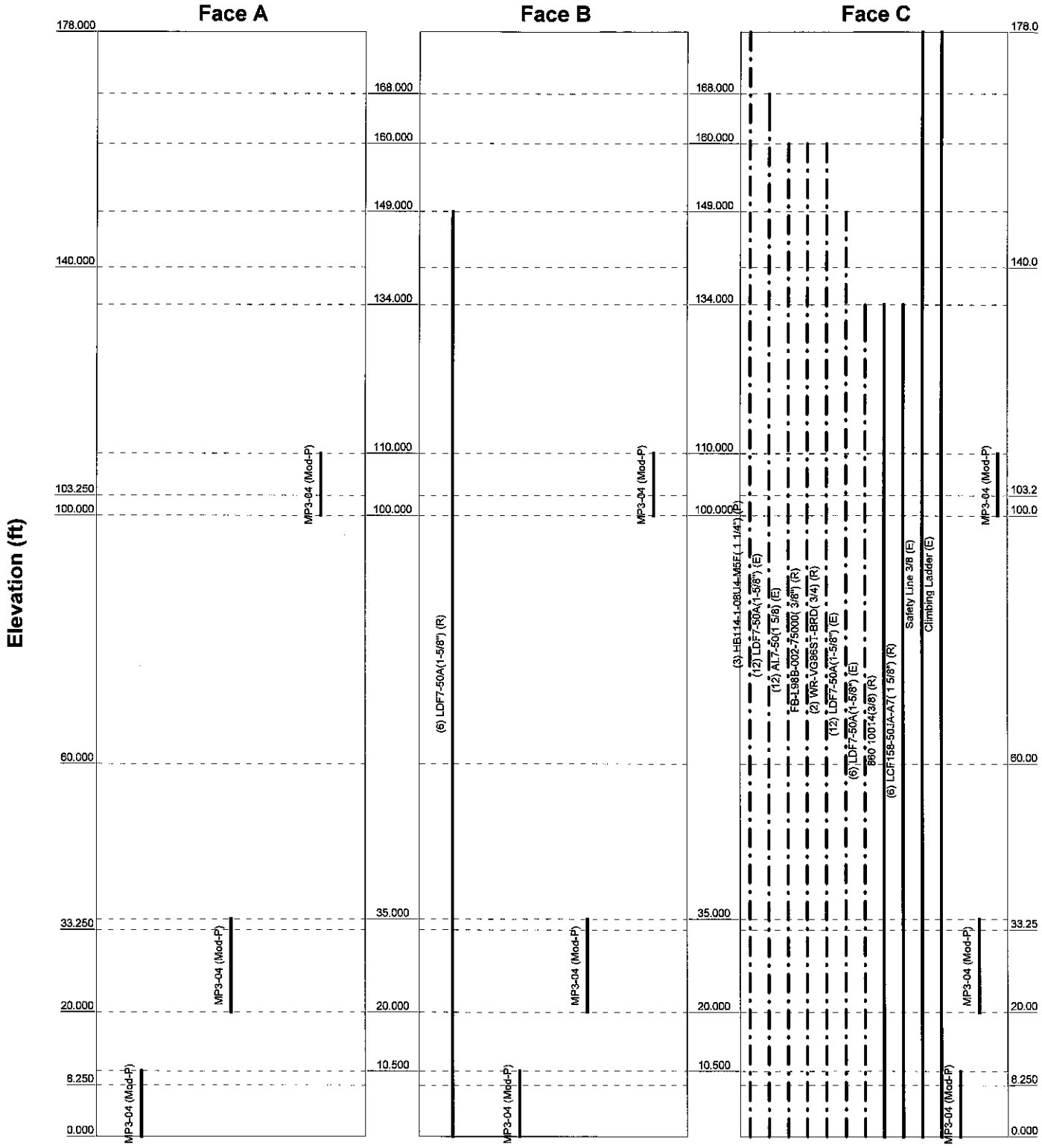
Phone: (918) 587 - 4630
FAX: (918) 295 - 0265

Job: 82822.004.01-Portland North, ME (BU# 878			
Project:			
Client: Crown Castle	Drawn by: A. Abbaszadeh	App'd:	
Code: TIA-222-G	Date: 03/18/13	Scale: NT	
Path:		Dwg No. E	

0' - 178'

Round — Flat — App In Face — App Out Face — Truss Leg



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Phone: (918) 587 - 4630
FAX: (918) 295 - 0265

Job:	82822.004.01-Portland North, ME (BU# 878		
Project:			
Client: Crown Castle		Drawn by: A. Abbaszadeh	App'd:
Code: TIA-222-G		Date: 03/18/13	Scale: NT
Path:			Dwg No. E

Tower Input Data

There is a pole section.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in Cumberland County, Maine.
Basic wind speed of 100 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.000 ft.
Nominal ice thickness of 1.000 in.
Ice thickness is considered to increase with height.
Ice density of 56.000 pcf.
A wind speed of 40 mph is used in combination with ice.
Temperature drop of 50.000 °F.
Deflections calculated using a wind speed of 60 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	**Poles**
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination		

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	178.000-140.000	38.000	P24x1/2	A53-B-35 (35 ksi)	
L2	140.000-103.250	36.750	P36x1/2	A53-B-35 (35 ksi)	
L3	103.250-100.000	3.250	P36x1/2 [0.655182]	43.3375ksi (43 ksi)	
L4	100.000-60.000	40.000	P48x5/8	A53-B-35 (35 ksi)	
L5	60.000-33.250	26.750	P54x5/8	A53-B-35 (35 ksi)	
L6	33.250-20.000	13.250	P54x5/8 [0.723801]	34.106964ksi (34 ksi)	
L7	20.000-8.250	11.750	P60x5/8	A53-B-35 (35 ksi)	
L8	8.250-0.000	8.250	P60x5/8 [0.712755]	34.270623ksi (34 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 178.000-140.000				1	1	1		
L2 140.000-103.250				1	1	1		
L3 103.250-100.000				1	1	0.973174		
L4 100.000-60.000				1	1	1		
L5 60.000-33.250				1	1	1		
L6 33.250-20.000				1	1	0.989419		
L7 20.000-8.250				1	1	1		
L8 8.250-0.000				1	1	0.99167		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
LDF7-50A(1-5/8") (R)	B	Surface Ar (CaAa)	149.000 - 0.000	6	6	-0.200 0.200	1.980		0.001
860 10014(3/8)	C	Surface Ar	134.000 - 0.000	1	1	0.180	0.375		0.000

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight klf
(R)		(CaAa)				0.210			
LCF158-50JA-A7(1 5/8")	C	Surface Ar	134.000 - 0.000	6	6	0.210	1.980		0.001
(R)		(CaAa)				0.460			
//									
Safety Line 3/8	C	Surface Ar	178.000 - 0.000	1	1	0.140	0.375		0.000
(E)		(CaAa)				0.160			
Climbing Ladder	C	Surface Af	178.000 - 0.000	1	1	0.130	3.000	12.000	0.008
(E)		(CaAa)				0.180			
//									
MP3-04	A	Surface Af	10.500 - 0.000	1	1	-0.500	4.780	12.780	0.014
(Mod-P)		(CaAa)				-0.400			
MP3-04	B	Surface Af	10.500 - 0.000	1	1	-0.500	4.780	12.780	0.014
(Mod-P)		(CaAa)				-0.400			
MP3-04	C	Surface Af	10.500 - 0.000	1	1	-0.500	4.780	12.780	0.014
(Mod-P)		(CaAa)				-0.400			
MP3-04	A	Surface Af	35.000 - 20.000	1	1	-0.500	4.780	12.780	0.014
(Mod-P)		(CaAa)				-0.400			
MP3-04	B	Surface Af	35.000 - 20.000	1	1	-0.500	4.780	12.780	0.014
(Mod-P)		(CaAa)				-0.400			
MP3-04	C	Surface Af	35.000 - 20.000	1	1	-0.500	4.780	12.780	0.014
(Mod-P)		(CaAa)				-0.400			
MP3-04	A	Surface Af	110.000 - 100.000	1	1	-0.500	4.780	12.780	0.014
(Mod-P)		(CaAa)				-0.400			
MP3-04	B	Surface Af	110.000 - 100.000	1	1	-0.500	4.780	12.780	0.014
(Mod-P)		(CaAa)				-0.400			
MP3-04	C	Surface Af	110.000 - 100.000	1	1	-0.500	4.780	12.780	0.014
(Mod-P)		(CaAa)				-0.400			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
HB114-1-08U4-M5F(1	C	No	Inside Pole	178.000 - 0.000	3	No Ice	0.000	0.001
1/4")						1/2" Ice	0.000	0.001
(P)						1" Ice	0.000	0.001
//								
LDF7-50A(1-5/8")	C	No	Inside Pole	168.000 - 0.000	12	No Ice	0.000	0.001
(E)						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
//								
AL7-50(1 5/8)	C	No	Inside Pole	160.000 - 0.000	12	No Ice	0.000	0.001
(E)						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
FB-L98B-002-75000(	C	No	Inside Pole	160.000 - 0.000	1	No Ice	0.000	0.000
3/8")						1/2" Ice	0.000	0.000
(R)						1" Ice	0.000	0.000
WR-VG86ST-BRD(3/4)	C	No	Inside Pole	160.000 - 0.000	2	No Ice	0.000	0.001
(R)						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
//								
LDF7-50A(1-5/8")	C	No	Inside Pole	149.000 - 0.000	12	No Ice	0.000	0.001
(E)						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
//								
LDF7-50A(1-5/8")	C	No	Inside Pole	134.000 - 0.000	6	No Ice	0.000	0.001
(E)						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	178.000-140.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	10.692	0.000	0.044
		C	0.000	0.000	20.425	0.000	0.989
L2	140.000-103.250	A	0.000	0.000	5.378	0.000	0.095
		B	0.000	0.000	49.036	0.000	0.276
		C	0.000	0.000	62.815	0.000	1.852
L3	103.250-100.000	A	0.000	0.000	2.589	0.000	0.046
		B	0.000	0.000	6.450	0.000	0.062
		C	0.000	0.000	8.319	0.000	0.206
L4	100.000-60.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	47.520	0.000	0.197
		C	0.000	0.000	70.520	0.000	1.976
L5	60.000-33.250	A	0.000	0.000	1.394	0.000	0.025
		B	0.000	0.000	33.173	0.000	0.156
		C	0.000	0.000	48.554	0.000	1.346
L6	33.250-20.000	A	0.000	0.000	10.556	0.000	0.187
		B	0.000	0.000	26.297	0.000	0.252
		C	0.000	0.000	33.916	0.000	0.841
L7	20.000-8.250	A	0.000	0.000	1.793	0.000	0.032
		B	0.000	0.000	15.752	0.000	0.090
		C	0.000	0.000	22.508	0.000	0.612
L8	8.250-0.000	A	0.000	0.000	6.572	0.000	0.116
		B	0.000	0.000	16.374	0.000	0.157
		C	0.000	0.000	21.117	0.000	0.524

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
L1	178.000-140.000	A	2.341	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	18.632	0.000	0.332
		C		0.000	0.000	56.004	0.000	2.006
L2	140.000-103.250	A	2.279	0.000	0.000	6.897	0.000	0.223
		B		0.000	0.000	82.408	0.000	1.545
		C		0.000	0.000	138.502	0.000	4.105
L3	103.250-100.000	A	2.238	0.000	0.000	3.308	0.000	0.106
		B		0.000	0.000	9.953	0.000	0.221
		C		0.000	0.000	16.186	0.000	0.470
L4	100.000-60.000	A	2.186	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	81.259	0.000	1.381
		C		0.000	0.000	156.721	0.000	4.396
L5	60.000-33.250	A	2.070	0.000	0.000	2.028	0.000	0.054
		B		0.000	0.000	55.597	0.000	0.930
		C		0.000	0.000	104.207	0.000	2.878
L6	33.250-20.000	A	1.958	0.000	0.000	15.217	0.000	0.390
		B		0.000	0.000	41.378	0.000	0.802
		C		0.000	0.000	64.559	0.000	1.735
L7	20.000-8.250	A	1.837	0.000	0.000	2.238	0.000	0.063
		B		0.000	0.000	25.084	0.000	0.407
		C		0.000	0.000	44.793	0.000	1.206
L8	8.250-0.000	A	1.625	0.000	0.000	8.039	0.000	0.215
		B		0.000	0.000	23.641	0.000	0.431
		C		0.000	0.000	36.426	0.000	0.958

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	178.000-140.000	-0.079	0.391	-0.218	0.764
L2	140.000-103.250	0.047	0.511	-0.091	0.831
L3	103.250-100.000	-0.038	0.467	-0.153	0.757
L4	100.000-60.000	-0.061	0.735	-0.234	1.161
L5	60.000-33.250	-0.062	0.751	-0.239	1.207
L6	33.250-20.000	-0.048	0.580	-0.182	0.940
L7	20.000-8.250	-0.063	0.751	-0.228	1.207
L8	8.250-0.000	-0.051	0.611	-0.175	0.979

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	11	LDF7-50A(1-5/8")	140.00 - 149.00	1.0000	1.0000
L1	17	Safety Line 3/8	140.00 - 178.00	1.0000	1.0000
L1	18	Climbing Ladder	140.00 - 178.00	1.0000	1.0000
L2	11	LDF7-50A(1-5/8")	103.25 - 140.00	1.0000	1.0000
L2	14	860 10014(3/8)	103.25 - 134.00	1.0000	1.0000
L2	15	LCF158-50JA-A7(1 5/8")	103.25 - 134.00	1.0000	1.0000
L2	17	Safety Line 3/8	103.25 - 140.00	1.0000	1.0000
L2	18	Climbing Ladder	103.25 - 140.00	1.0000	1.0000
L2	26	MP3-04	103.25 - 110.00	1.0000	1.0000
L2	27	MP3-04	103.25 - 110.00	1.0000	1.0000
L2	28	MP3-04	103.25 - 110.00	1.0000	1.0000
L3	11	LDF7-50A(1-5/8")	100.00 - 103.25	1.0000	1.0000
L3	14	860 10014(3/8)	100.00 - 103.25	1.0000	1.0000
L3	15	LCF158-50JA-A7(1 5/8")	100.00 - 103.25	1.0000	1.0000
L3	17	Safety Line 3/8	100.00 - 103.25	1.0000	1.0000
L3	18	Climbing Ladder	100.00 - 103.25	1.0000	1.0000
L3	26	MP3-04	100.00 - 103.25	1.0000	1.0000
L3	27	MP3-04	100.00 - 103.25	1.0000	1.0000
L3	28	MP3-04	100.00 - 103.25	1.0000	1.0000
L4	11	LDF7-50A(1-5/8")	60.00 - 100.00	1.0000	1.0000

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L4	14	860 10014(3/8)	60.00 - 100.00	1.0000	1.0000
L4	15	LCF158-50JA-A7(1 5/8")	60.00 - 100.00	1.0000	1.0000
L4	17	Safety Line 3/8	60.00 - 100.00	1.0000	1.0000
L4	18	Climbing Ladder	60.00 - 100.00	1.0000	1.0000
L5	11	LDF7-50A(1-5/8")	33.25 - 60.00	1.0000	1.0000
L5	14	860 10014(3/8)	33.25 - 60.00	1.0000	1.0000
L5	15	LCF158-50JA-A7(1 5/8")	33.25 - 60.00	1.0000	1.0000
L5	17	Safety Line 3/8	33.25 - 60.00	1.0000	1.0000
L5	18	Climbing Ladder	33.25 - 60.00	1.0000	1.0000
L5	23	MP3-04	33.25 - 35.00	1.0000	1.0000
L5	24	MP3-04	33.25 - 35.00	1.0000	1.0000
L5	25	MP3-04	33.25 - 35.00	1.0000	1.0000
L6	11	LDF7-50A(1-5/8")	20.00 - 33.25	1.0000	1.0000
L6	14	860 10014(3/8)	20.00 - 33.25	1.0000	1.0000
L6	15	LCF158-50JA-A7(1 5/8")	20.00 - 33.25	1.0000	1.0000
L6	17	Safety Line 3/8	20.00 - 33.25	1.0000	1.0000
L6	18	Climbing Ladder	20.00 - 33.25	1.0000	1.0000
L6	23	MP3-04	20.00 - 33.25	1.0000	1.0000
L6	24	MP3-04	20.00 - 33.25	1.0000	1.0000
L6	25	MP3-04	20.00 - 33.25	1.0000	1.0000
L7	11	LDF7-50A(1-5/8")	8.25 - 20.00	1.0000	1.0000
L7	14	860 10014(3/8)	8.25 - 20.00	1.0000	1.0000
L7	15	LCF158-50JA-A7(1 5/8")	8.25 - 20.00	1.0000	1.0000
L7	17	Safety Line 3/8	8.25 - 20.00	1.0000	1.0000
L7	18	Climbing Ladder	8.25 - 20.00	1.0000	1.0000
L7	20	MP3-04	8.25 - 10.50	1.0000	1.0000
L7	21	MP3-04	8.25 - 10.50	1.0000	1.0000
L7	22	MP3-04	8.25 - 10.50	1.0000	1.0000
L8	11	LDF7-50A(1-5/8")	0.00 - 8.25	1.0000	1.0000
L8	14	860 10014(3/8)	0.00 - 8.25	1.0000	1.0000
L8	15	LCF158-50JA-A7(1 5/8")	0.00 - 8.25	1.0000	1.0000
L8	17	Safety Line 3/8	0.00 - 8.25	1.0000	1.0000
L8	18	Climbing Ladder	0.00 - 8.25	1.0000	1.0000
L8	20	MP3-04	0.00 - 8.25	1.0000	1.0000
L8	21	MP3-04	0.00 - 8.25	1.0000	1.0000
L8	22	MP3-04	0.00 - 8.25	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Lightning Rod	A	From Leg	0.000	0.000	178.000	No Ice	0.600	0.600	0.020
(E)			0.000			1/2" Ice	1.415	1.415	0.026
			3.500			1" Ice	2.246	2.246	0.037
//									
P40-16-XLPP-RR-A w/	A	From Leg	4.000	0.000	178.000	No Ice	9.373	4.825	0.073
Mount Pipe			0.000			1/2" Ice	9.912	5.571	0.133
(P)			2.000			1" Ice	10.450	6.265	0.204
APXVSPP18-C-A20 w/	B	From Leg	4.000	0.000	178.000	No Ice	8.498	6.946	0.083
Mount Pipe			0.000			1/2" Ice	9.149	8.127	0.148

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(P)			2.000			1" Ice	9.767	9.021	0.225
APXV9ERR18-C-A20 w/	C	From Leg	4.000	0.000	178.000	No Ice	8.498	7.471	0.088
Mount Pipe			0.000			1/2" Ice	9.149	8.656	0.155
(P)			2.000			1" Ice	9.767	9.556	0.235
6' x 2" Mount Pipe	A	From Leg	4.000	0.000	178.000	No Ice	1.425	1.425	0.022
(E)			0.000			1/2" Ice	1.925	1.925	0.033
			0.000			1" Ice	2.294	2.294	0.048
6' x 2" Mount Pipe	B	From Leg	4.000	0.000	178.000	No Ice	1.425	1.425	0.022
(E)			0.000			1/2" Ice	1.925	1.925	0.033
			0.000			1" Ice	2.294	2.294	0.048
6' x 2" Mount Pipe	C	From Leg	4.000	0.000	178.000	No Ice	1.425	1.425	0.022
(E)			0.000			1/2" Ice	1.925	1.925	0.033
			0.000			1" Ice	2.294	2.294	0.048
Platform Mount [LP 713-1]	C	None		0.000	178.000	No Ice	31.270	31.270	1.510
(E)						1/2" Ice	39.680	39.680	1.929
						1" Ice	48.090	48.090	2.348
//									
800MHz 2X50W RRH	A	From Leg	1.000	0.000	176.000	No Ice	2.401	2.254	0.064
W/FILTER			0.000			1/2" Ice	2.613	2.460	0.086
(P)			1.000			1" Ice	2.833	2.675	0.111
800MHz 2X50W RRH	B	From Leg	1.000	0.000	176.000	No Ice	2.401	2.254	0.064
W/FILTER			0.000			1/2" Ice	2.613	2.460	0.086
(P)			1.000			1" Ice	2.833	2.675	0.111
800MHz 2X50W RRH	C	From Leg	1.000	0.000	176.000	No Ice	2.401	2.254	0.064
W/FILTER			0.000			1/2" Ice	2.613	2.460	0.086
(P)			1.000			1" Ice	2.833	2.675	0.111
PCS 1900MHz	A	From Leg	1.000	0.000	176.000	No Ice	2.709	2.611	0.060
4x45W-65MHz			0.000			1/2" Ice	2.948	2.847	0.083
(P)			1.000			1" Ice	3.195	3.092	0.110
PCS 1900MHz	B	From Leg	1.000	0.000	176.000	No Ice	2.709	2.611	0.060
4x45W-65MHz			0.000			1/2" Ice	2.948	2.847	0.083
(P)			1.000			1" Ice	3.195	3.092	0.110
PCS 1900MHz	C	From Leg	1.000	0.000	176.000	No Ice	2.709	2.611	0.060
4x45W-65MHz			0.000			1/2" Ice	2.948	2.847	0.083
(P)			1.000			1" Ice	3.195	3.092	0.110
Side Arm Mount [SO 102-3]	C	None		0.000	176.000	No Ice	3.000	3.000	0.081
(P)						1/2" Ice	3.480	3.480	0.111
						1" Ice	3.960	3.960	0.141
//									
(2) APXV18-206517-C w/	A	From Leg	4.000	0.000	168.000	No Ice	5.404	4.700	0.052
Mount Pipe			0.000			1/2" Ice	5.960	5.860	0.094
(E)			2.000			1" Ice	6.481	6.734	0.148
(2) APXV18-206517-C w/	B	From Leg	4.000	0.000	168.000	No Ice	5.404	4.700	0.052
Mount Pipe			0.000			1/2" Ice	5.960	5.860	0.094
(E)			2.000			1" Ice	6.481	6.734	0.148
(2) APXV18-206517-C w/	C	From Leg	4.000	0.000	168.000	No Ice	5.404	4.700	0.052
Mount Pipe			0.000			1/2" Ice	5.960	5.860	0.094
(E)			2.000			1" Ice	6.481	6.734	0.148
APX16DWV-16DWV-S-E-A	A	From Leg	4.000	0.000	168.000	No Ice	7.466	3.494	0.061
20 w/ Mount Pipe			0.000			1/2" Ice	7.994	4.263	0.108
(E)			3.000			1" Ice	8.518	4.960	0.164
APX16DWV-16DWV-S-E-A	B	From Leg	4.000	0.000	168.000	No Ice	7.466	3.494	0.061
20 w/ Mount Pipe			0.000			1/2" Ice	7.994	4.263	0.108
(E)			3.000			1" Ice	8.518	4.960	0.164
APX16DWV-16DWV-S-E-A	C	From Leg	4.000	0.000	168.000	No Ice	7.466	3.494	0.061
20 w/ Mount Pipe			0.000			1/2" Ice	7.994	4.263	0.108
(E)			3.000			1" Ice	8.518	4.960	0.164

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
KRY 112 144/1	A	From Leg	4.000	0.000	168.000	No Ice	0.408	0.204	0.011
(E)			0.000			1/2" Ice	0.497	0.273	0.014
			0.000			1" Ice	0.594	0.351	0.019
KRY 112 144/1	B	From Leg	4.000	0.000	168.000	No Ice	0.408	0.204	0.011
(E)			0.000			1/2" Ice	0.497	0.273	0.014
			0.000			1" Ice	0.594	0.351	0.019
KRY 112 144/1	C	From Leg	4.000	0.000	168.000	No Ice	0.408	0.204	0.011
(E)			0.000			1/2" Ice	0.497	0.273	0.014
			0.000			1" Ice	0.594	0.351	0.019
(2) KRY 112 71	A	From Leg	4.000	0.000	168.000	No Ice	0.681	0.450	0.013
(E)			0.000			1/2" Ice	0.802	0.559	0.018
			0.000			1" Ice	0.932	0.677	0.025
(2) KRY 112 71	B	From Leg	4.000	0.000	168.000	No Ice	0.681	0.450	0.013
(E)			0.000			1/2" Ice	0.802	0.559	0.018
			0.000			1" Ice	0.932	0.677	0.025
(2) KRY 112 71	C	From Leg	4.000	0.000	168.000	No Ice	0.681	0.450	0.013
(E)			0.000			1/2" Ice	0.802	0.559	0.018
			0.000			1" Ice	0.932	0.677	0.025
Platform Mount [LP 305-1]	C	None		0.000	168.000	No Ice	18.010	18.010	1.121
(E)						1/2" Ice	23.330	23.330	1.352
						1" Ice	28.650	28.650	1.584
//									
7391.00 w/ Mount Pipe	A	From Leg	4.000	0.000	160.000	No Ice	5.906	4.084	0.036
(E)			0.000			1/2" Ice	6.395	4.800	0.080
			0.000			1" Ice	6.885	5.476	0.133
7391.00 w/ Mount Pipe	B	From Leg	4.000	0.000	160.000	No Ice	5.906	4.084	0.036
(E)			0.000			1/2" Ice	6.395	4.800	0.080
			0.000			1" Ice	6.885	5.476	0.133
7391.00 w/ Mount Pipe	C	From Leg	4.000	0.000	160.000	No Ice	5.906	4.084	0.036
(E)			0.000			1/2" Ice	6.395	4.800	0.080
			0.000			1" Ice	6.885	5.476	0.133
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000	0.000	160.000	No Ice	6.119	4.254	0.055
(E)			0.000			1/2" Ice	6.626	5.014	0.101
			0.000			1" Ice	7.128	5.711	0.155
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000	0.000	160.000	No Ice	6.119	4.254	0.055
(E)			0.000			1/2" Ice	6.626	5.014	0.101
			0.000			1" Ice	7.128	5.711	0.155
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000	0.000	160.000	No Ice	6.119	4.254	0.055
(E)			0.000			1/2" Ice	6.626	5.014	0.101
			0.000			1" Ice	7.128	5.711	0.155
(2) RRUS-11	A	From Leg	4.000	0.000	160.000	No Ice	4.424	1.186	0.055
(R)			0.000			1/2" Ice	4.708	1.351	0.081
			2.000			1" Ice	5.001	1.526	0.110
(2) RRUS-11	B	From Leg	4.000	0.000	160.000	No Ice	4.424	1.186	0.055
(R)			0.000			1/2" Ice	4.708	1.351	0.081
			2.000			1" Ice	5.001	1.526	0.110
(2) RRUS-11	C	From Leg	4.000	0.000	160.000	No Ice	4.424	1.186	0.055
(R)			0.000			1/2" Ice	4.708	1.351	0.081
			2.000			1" Ice	5.001	1.526	0.110
(2) LGP21401	A	From Leg	4.000	0.000	160.000	No Ice	1.288	0.233	0.014
(E)			0.000			1/2" Ice	1.445	0.313	0.021
			0.000			1" Ice	1.611	0.403	0.030
(2) LGP21401	B	From Leg	4.000	0.000	160.000	No Ice	1.288	0.233	0.014
(E)			0.000			1/2" Ice	1.445	0.313	0.021
			0.000			1" Ice	1.611	0.403	0.030
(2) LGP21401	C	From Leg	4.000	0.000	160.000	No Ice	1.288	0.233	0.014
(E)			0.000			1/2" Ice	1.445	0.313	0.021

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			1" Ice	1.611	0.403	0.030
(2) LGP21903	A	From Leg	4.000	0.000	160.000	No Ice	0.270	0.184	0.011
(E)			0.000			1/2" Ice	0.343	0.248	0.013
			0.000			1" Ice	0.425	0.322	0.017
(2) LGP21903	B	From Leg	4.000	0.000	160.000	No Ice	0.270	0.184	0.011
(E)			0.000			1/2" Ice	0.343	0.248	0.013
			0.000			1" Ice	0.425	0.322	0.017
(2) LGP21903	C	From Leg	4.000	0.000	160.000	No Ice	0.270	0.184	0.011
(E)			0.000			1/2" Ice	0.343	0.248	0.013
			0.000			1" Ice	0.425	0.322	0.017
(2) 7020.00	A	From Leg	4.000	0.000	160.000	No Ice	0.119	0.204	0.002
(E)			0.000			1/2" Ice	0.171	0.279	0.005
			0.000			1" Ice	0.232	0.363	0.009
(2) 7020.00	B	From Leg	4.000	0.000	160.000	No Ice	0.119	0.204	0.002
(E)			0.000			1/2" Ice	0.171	0.279	0.005
			0.000			1" Ice	0.232	0.363	0.009
(2) 7020.00	C	From Leg	4.000	0.000	160.000	No Ice	0.119	0.204	0.002
(E)			0.000			1/2" Ice	0.171	0.279	0.005
			0.000			1" Ice	0.232	0.363	0.009
P65-17-XLH-RR w/ Mount	A	From Leg	4.000	0.000	160.000	No Ice	11.704	8.938	0.092
Pipe			0.000			1/2" Ice	12.424	10.450	0.174
(R)			0.000			1" Ice	13.153	11.986	0.271
SBNH-1D6565C w/ Mount	B	From Leg	4.000	0.000	160.000	No Ice	11.644	9.842	0.094
Pipe			0.000			1/2" Ice	12.365	11.366	0.180
(R)			0.000			1" Ice	13.095	12.914	0.281
AM-X-CD-16-65-00T-RET	C	From Leg	4.000	0.000	160.000	No Ice	8.498	6.304	0.074
w/ Mount Pipe			0.000			1/2" Ice	9.149	7.479	0.136
(R)			0.000			1" Ice	9.767	8.368	0.210
DC6-48-60-18-8F	A	From Leg	4.000	0.000	160.000	No Ice	2.567	4.317	0.019
(R)			0.000			1/2" Ice	2.798	4.596	0.050
			0.000			1" Ice	3.038	4.885	0.085
T-Arm Mount [TA 602-3]	C	None		0.000	160.000	No Ice	11.590	11.590	0.774
(E)						1/2" Ice	15.440	15.440	0.990
						1" Ice	19.290	19.290	1.206
Side Arm Mount [SO 701-3]	C	None		0.000	162.000	No Ice	2.830	2.830	0.195
(R)						1/2" Ice	3.920	3.920	0.237
						1" Ice	5.010	5.010	0.279
//									
(2) DB846F65ZAXY w/	A	From Leg	4.000	0.000	149.000	No Ice	7.271	7.821	0.047
Mount Pipe			0.000			1/2" Ice	7.877	9.010	0.111
(E)			1.000			1" Ice	8.484	9.912	0.188
(2) DB846F65ZAXY w/	B	From Leg	4.000	0.000	149.000	No Ice	7.271	7.821	0.047
Mount Pipe			0.000			1/2" Ice	7.877	9.010	0.111
(E)			1.000			1" Ice	8.484	9.912	0.188
(2) DB846F65ZAXY w/	C	From Leg	4.000	0.000	149.000	No Ice	7.271	7.821	0.047
Mount Pipe			0.000			1/2" Ice	7.877	9.010	0.111
(E)			2.000			1" Ice	8.484	9.912	0.188
HBX-6517DS-T2M w/	A	From Leg	4.000	0.000	149.000	No Ice	5.481	5.021	0.039
Mount Pipe			0.000			1/2" Ice	6.051	6.223	0.082
(E)			1.000			1" Ice	6.592	7.167	0.137
HBX-6517DS-T2M w/	B	From Leg	4.000	0.000	149.000	No Ice	5.481	5.021	0.039
Mount Pipe			0.000			1/2" Ice	6.051	6.223	0.082
(E)			1.000			1" Ice	6.592	7.167	0.137
HBX-6517DS-T2M w/	C	From Leg	4.000	0.000	149.000	No Ice	5.481	5.021	0.039
Mount Pipe			0.000			1/2" Ice	6.051	6.223	0.082
(E)			2.000			1" Ice	6.592	7.167	0.137
LNX-6514DS-VTM w/	A	From Leg	4.000	0.000	149.000	No Ice	8.568	7.004	0.059

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Mount Pipe			0.000			1/2" Ice	9.220	8.185	0.124
(E)			1.000			1" Ice	9.838	9.081	0.202
LNX-6514DS-VTM w/	B	From Leg	4.000	0.000	149.000	No Ice	8.568	7.004	0.059
Mount Pipe			0.000			1/2" Ice	9.220	8.185	0.124
(E)			2.000			1" Ice	9.838	9.081	0.202
LNX-6514DS-VTM w/	C	From Leg	4.000	0.000	149.000	No Ice	8.568	7.004	0.059
Mount Pipe			0.000			1/2" Ice	9.220	8.185	0.124
(E)			2.000			1" Ice	9.838	9.081	0.202
Platform Mount [LP 713-1]	C	None		0.000	149.000	No Ice	31.270	31.270	1.510
(E)						1/2" Ice	39.680	39.680	1.929
						1" Ice	48.090	48.090	2.348
//									
(2) BSA-185065/10CF w/	A	From Leg	4.000	0.000	134.000	No Ice	4.149	3.101	0.031
Mount Pipe			0.000			1/2" Ice	4.614	4.105	0.063
(E)			1.000			1" Ice	5.065	4.841	0.106
(2) BSA-185065/10CF w/	B	From Leg	4.000	0.000	134.000	No Ice	4.149	3.101	0.031
Mount Pipe			0.000			1/2" Ice	4.614	4.105	0.063
(E)			1.000			1" Ice	5.065	4.841	0.106
(2) BSA-185065/10CF w/	C	From Leg	4.000	0.000	134.000	No Ice	4.149	3.101	0.031
Mount Pipe			0.000			1/2" Ice	4.614	4.105	0.063
(E)			1.000			1" Ice	5.065	4.841	0.106
P65-17-XL-R w/ Mount Pipe	A	From Leg	4.000	0.000	134.000	No Ice	11.704	8.938	0.081
(R)			0.000			1/2" Ice	12.424	10.450	0.163
			1.000			1" Ice	13.153	11.986	0.260
P65-17-XL-R w/ Mount Pipe	C	From Leg	4.000	0.000	134.000	No Ice	11.704	8.938	0.081
(R)			0.000			1/2" Ice	12.424	10.450	0.163
			1.000			1" Ice	13.153	11.986	0.260
P65-17-XL-R w/ Mount Pipe	B	From Leg	4.000	0.000	134.000	No Ice	11.704	8.938	0.081
(R)			0.000			1/2" Ice	12.424	10.450	0.163
			1.000			1" Ice	13.153	11.986	0.260
KRC 115 032/2	B	From Leg	4.000	0.000	134.000	No Ice	0.187	0.136	0.002
(R)			0.000			1/2" Ice	0.249	0.193	0.003
			1.000			1" Ice	0.321	0.258	0.006
KRC 115 032/2	C	From Leg	4.000	0.000	134.000	No Ice	0.187	0.136	0.002
(R)			0.000			1/2" Ice	0.249	0.193	0.003
			1.000			1" Ice	0.321	0.258	0.006
KRC 115 032/2	A	From Leg	4.000	0.000	134.000	No Ice	0.187	0.136	0.002
(R)			0.000			1/2" Ice	0.249	0.193	0.003
			1.000			1" Ice	0.321	0.258	0.006
Platform Mount [LP 403-1]	C	None		0.000	134.000	No Ice	18.850	18.850	1.500
						1/2" Ice	24.300	24.300	1.797
						1" Ice	29.750	29.750	2.093
//									

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	178 - 140	19.515	43	0.996	0.001
L2	140 - 103.25	11.949	43	0.830	0.000
L3	103.25 - 100	6.361	43	0.579	0.000
L4	100 - 60	5.976	43	0.552	0.000
L5	60 - 33.25	2.152	43	0.340	0.000
L6	33.25 - 20	0.648	43	0.189	0.000
L7	20 - 8.25	0.230	43	0.110	0.000
L8	8.25 - 0	0.039	43	0.044	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.000	Lightning Rod	43	19.515	0.996	0.001	63048
176.000	800MHz 2X50W RRH W/FILTER	43	19.099	0.988	0.001	63048
168.000	(2) APXV18-206517-C w/ Mount Pipe	43	17.439	0.957	0.001	31524
162.000	Side Arm Mount [SO 701-3]	43	16.210	0.933	0.001	19702
160.000	7391.00 w/ Mount Pipe	43	15.804	0.924	0.001	17513
149.000	(2) DB846F65ZAXY w/ Mount Pipe	43	13.631	0.875	0.000	10870
134.000	(2) BSA-185065/10CF w/ Mount Pipe	43	10.890	0.797	0.000	7979

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	178 - 140	97.437	10	4.981	0.003
L2	140 - 103.25	59.685	10	4.149	0.002
L3	103.25 - 100	31.778	10	2.894	0.001
L4	100 - 60	29.856	10	2.758	0.001
L5	60 - 33.25	10.753	10	1.700	0.000
L6	33.25 - 20	3.237	10	0.947	0.000
L7	20 - 8.25	1.149	10	0.550	0.000
L8	8.25 - 0	0.193	10	0.221	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation *ft*	*Appurtenance*	*Gov. Load Comb.*	*Deflection* *in*	*Tilt* °	*Twist* °	*Radius of Curvature* *ft*
178.000	Lightning Rod	10	97.437	4.981	0.003	12800
176.000	800MHz 2X50W RRH W/FILTER	10	95.360	4.942	0.003	12800
168.000	(2) APXV18-206517-C w/ Mount Pipe	10	87.080	4.784	0.003	6399
162.000	Side Arm Mount [SO 701-3]	10	80.945	4.662	0.003	3998
160.000	7391.00 w/ Mount Pipe	10	78.922	4.621	0.003	3553
149.000	(2) DB846F65ZAXY w/ Mount Pipe	10	68.077	4.375	0.002	2203
134.000	(2) BSA-185065/10CF w/ Mount Pipe	10	54.399	3.982	0.002	1614

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	178 - 176.1	P24x1/2	38.000	0.000	0.0	36.914	-2.220	1162.780	0.002
	176.1 - 174.2					36.914	-3.020	1162.780	0.003
	174.2 - 172.3					36.914	-3.355	1162.780	0.003
	172.3 - 170.4					36.914	-3.692	1162.780	0.003
	170.4 - 168.5					36.914	-4.028	1162.780	0.003
	168.5 - 166.6					36.914	-6.129	1162.780	0.005
	166.6 - 164.7					36.914	-6.467	1162.780	0.006
	164.7 - 162.8					36.914	-6.806	1162.780	0.006
	162.8 - 160.9					36.914	-7.365	1162.780	0.006
	160.9 - 159					36.914	-9.618	1162.780	0.008
	159 - 157.1					36.914	-9.964	1162.780	0.009
	157.1 - 155.2					36.914	-10.311	1162.780	0.009
	155.2 - 153.3					36.914	-10.661	1162.780	0.009
	153.3 - 151.4					36.914	-11.013	1162.780	0.009
	151.4 - 149.5					36.914	-11.367	1162.780	0.010
	149.5 - 147.6					36.914	-13.766	1162.780	0.012
	147.6 - 145.7					36.914	-14.134	1162.780	0.012
	145.7 - 143.8					36.914	-14.506	1162.780	0.012
	143.8 - 141.9					36.914	-14.828	1162.780	0.013
	141.9 - 140					36.914	-15.208	1162.780	0.013
L2	140 - 138.162	P36x1/2 4.8.2 (1.04 CR) - 2/19	36.750	0.000	0.0	55.763	-15.771	1756.540	0.009
	138.162 - 136.325	4.8.2 (1.04 CR) - 2/18				55.763	-16.319	1756.540	0.009
	136.325 - 134.488	4.8.2 (1.04 CR) - 2/17				55.763	-16.868	1756.540	0.010
	134.488 - 132.65	4.8.2 (1.04 CR) - 2/16				55.763	-19.487	1756.540	0.011
	132.65 - 130.813	4.8.2 (1.04 CR) - 2/15				55.763	-20.042	1756.540	0.011
	130.813 - 128.975	4.8.2 (1.04 CR) - 2/14				55.763	-20.600	1756.540	0.012
	128.975 - 127.138	4.8.2 (1.04 CR) - 2/13				55.763	-21.160	1756.540	0.012
	127.138 - 125.3	4.8.2 (1.04 CR) - 2/12				55.763	-21.721	1756.540	0.012
	125.3 - 123.463	4.8.2 (1.04 CR) - 2/11				55.763	-22.285	1756.540	0.013
	123.463 - 121.625	4.8.2 (1.04 CR) - 2/10				55.763	-22.852	1756.540	0.013
	121.625 - 119.787	4.8.2 (1.04 CR) - 2/9				55.763	-23.420	1756.540	0.013

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	119.787 - 117.95					55.763	-23.991	1756.540	0.014
		4.8.2 (1.04 CR) - 2/8							
	117.95 - 116.113					55.763	-24.564	1756.540	0.014
		4.8.2 (1.04 CR) - 2/7							
	116.113 - 114.275					55.763	-25.140	1756.540	0.014
		4.8.2 (1.04 CR) - 2/6							
	114.275 - 112.438					55.763	-25.718	1756.540	0.015
		4.8.2 (1.04 CR) - 2/5							
	112.438 - 110.6					55.763	-26.299	1756.540	0.015
		4.8.2 (1.04 CR) - 2/4							
	110.6 - 108.762					55.763	-26.882	1756.540	0.015
		4.8.2 (1.04 CR) - 2/3							
	108.762 - 106.925					55.763	-27.468	1756.540	0.016
		4.8.2 (1.04 CR) - 2/2							
	106.925 - 105.088					55.763	-28.056	1756.540	0.016
		4.8.2 (1.04 CR) - 2							
	105.088 - 103.25					55.763	-28.648	1756.540	0.016
		4.8.2 (1.04 CR) - 2							
L3	103.25 - 102.167	P36x1/2 [0.655182]	3.250	0.000	0.0	72.751	-29.112	2837.550	0.010
	102.167 - 101.083					72.751	-29.562	2837.550	0.010
	101.083 - 100					72.751	-30.014	2837.550	0.011
L4	100 - 98	P48x5/8	40.000	0.000	0.0	93.021	-30.914	2930.150	0.011
	98 - 96					93.021	-31.812	2930.150	0.011
	96 - 94					93.021	-32.711	2930.150	0.011
	94 - 92					93.021	-33.612	2930.150	0.011
	92 - 90					93.021	-34.515	2930.150	0.012
	90 - 88					93.021	-35.419	2930.150	0.012
	88 - 86					93.021	-36.324	2930.150	0.012
	86 - 84					93.021	-37.230	2930.150	0.013
	84 - 82					93.021	-38.139	2930.150	0.013
	82 - 80					93.021	-39.049	2930.150	0.013
	80 - 78					93.021	-39.960	2930.150	0.014
	78 - 76					93.021	-40.873	2930.150	0.014
	76 - 74					93.021	-41.788	2930.150	0.014
	74 - 72					93.021	-42.704	2930.150	0.015
	72 - 70					93.021	-43.622	2930.150	0.015
	70 - 68					93.021	-44.541	2930.150	0.015
	68 - 66					93.021	-45.463	2930.150	0.016
	66 - 64					93.021	-46.386	2930.150	0.016
	64 - 62					93.021	-47.310	2930.150	0.016
	62 - 60					93.021	-48.237	2930.150	0.016
L5	60 - 58.6625	P54x5/8	26.750	0.000	0.0	104.802	-48.929	3301.250	0.015
	58.6625 - 57.325					104.802	-49.610	3301.250	0.015
	57.325 - 55.9875					104.802	-50.291	3301.250	0.015
	55.9875 - 54.65					104.802	-50.973	3301.250	0.015
	54.65 -					104.802	-51.656	3301.250	0.016

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	53.3125								
	53.3125 - 51.975					104.802	-52.339	3301.250	0.016
	51.975 - 50.6375					104.802	-53.023	3301.250	0.016
	50.6375 - 49.3					104.802	-53.707	3301.250	0.016
	49.3 - 47.9625					104.802	-54.392	3301.250	0.016
	47.9625 - 46.625					104.802	-55.077	3301.250	0.017
	46.625 - 45.2875					104.802	-55.763	3301.250	0.017
	45.2875 - 43.95					104.802	-56.450	3301.250	0.017
	43.95 - 42.6125					104.802	-57.137	3301.250	0.017
	42.6125 - 41.275					104.802	-57.825	3301.250	0.018
	41.275 - 39.9375					104.802	-58.514	3301.250	0.018
	39.9375 - 38.6					104.802	-59.203	3301.250	0.018
	38.6 - 37.2625					104.802	-59.893	3301.250	0.018
	37.2625 - 35.925					104.802	-60.584	3301.250	0.018
	35.925 - 34.5875					104.802	-61.275	3301.250	0.019
	34.5875 - 33.25					104.802	-61.967	3301.250	0.019
L6	33.25 - 32.2308	P54x5/8 [0.723801]	13.250	0.000	0.0	121.144	-62.608	3718.670	0.017
	32.2308 - 31.2115					121.144	-63.244	3718.670	0.017
	31.2115 - 30.1923					121.144	-63.880	3718.670	0.017
	30.1923 - 29.1731					121.144	-64.517	3718.670	0.017
	29.1731 - 28.1538					121.144	-65.154	3718.670	0.018
	28.1538 - 27.1346					121.144	-65.792	3718.670	0.018
	27.1346 - 26.1154					121.144	-66.430	3718.670	0.018
	26.1154 - 25.0962					121.144	-67.068	3718.670	0.018
	25.0962 - 24.0769					121.144	-67.706	3718.670	0.018
	24.0769 - 23.0577					121.144	-68.345	3718.670	0.018
	23.0577 - 22.0385					121.144	-68.984	3718.670	0.019
	22.0385 - 21.0192					121.144	-69.624	3718.670	0.019
	21.0192 - 20					121.144	-70.264	3718.670	0.019
L7	20 - 18.9318	P60x5/8 4.8.2 (1.02 CR) - 7/10	11.750	0.000	0.0	116.583	-70.874	3649.510	0.019
	18.9318 - 17.8636	4.8.2 (1.02 CR) - 7/9				116.583	-71.483	3649.510	0.020
	17.8636 - 16.7955	4.8.2 (1.02 CR) - 7/8				116.583	-72.092	3649.510	0.020

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	16.7955 - 15.7273	4.8.2 (1.02 CR) - 7/7				116.583	-72.702	3649.510	0.020
	15.7273 - 14.6591	4.8.2 (1.02 CR) - 7/6				116.583	-73.312	3649.510	0.020
	14.6591 - 13.5909	4.8.2 (1.02 CR) - 7/5				116.583	-73.922	3649.510	0.020
	13.5909 - 12.5227	4.8.2 (1.02 CR) - 7/4				116.583	-74.532	3649.510	0.020
	12.5227 - 11.4545	4.8.2 (1.02 CR) - 7/3				116.583	-75.144	3649.510	0.021
	11.4545 - 10.3864	4.8.2 (1.02 CR) - 7/2				116.583	-75.755	3649.510	0.021
	10.3864 - 9.31818	4.8.2 (1.02 CR) - 7				116.583	-76.366	3649.510	0.021
	9.31818 - 8.25	4.8.2 (1.02 CR) - 7				116.583	-76.978	3649.510	0.021
L8	8.25 - 7.21875	P60x5/8 [0.712755]	8.250	0.000	0.0	132.755	-77.674	4094.640	0.019
	7.21875 - 6.1875					132.755	-78.368	4094.640	0.019
	6.1875 - 5.15625					132.755	-79.063	4094.640	0.019
	5.15625 - 4.125					132.755	-79.758	4094.640	0.019
	4.125 - 3.09375					132.755	-80.453	4094.640	0.020
	3.09375 - 2.0625					132.755	-81.148	4094.640	0.020
	2.0625 - 1.03125					132.755	-81.844	4094.640	0.020
	1.03125 - 0					132.755	-82.540	4094.640	0.020

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	178 - 176.1	P24x1/2	10.731	724.938	0.015	0.000	724.938	0.000
	176.1 - 174.2		21.057	724.938	0.029	0.000	724.938	0.000
	174.2 - 172.3		31.066	724.938	0.043	0.000	724.938	0.000
	172.3 - 170.4		41.392	724.938	0.057	0.000	724.938	0.000
	170.4 - 168.5		52.033	724.938	0.072	0.000	724.938	0.000
	168.5 - 166.6		73.511	724.938	0.101	0.000	724.938	0.000
	166.6 - 164.7		91.858	724.938	0.127	0.000	724.938	0.000
	164.7 - 162.8		110.515	724.938	0.152	0.000	724.938	0.000
	162.8 - 160.9		129.688	724.938	0.179	0.000	724.938	0.000
	160.9 - 159		156.481	724.938	0.216	0.000	724.938	0.000
	159 - 157.1		187.277	724.938	0.258	0.000	724.938	0.000
	157.1 - 155.2		218.370	724.938	0.301	0.000	724.938	0.000
	155.2 - 153.3		249.759	724.938	0.345	0.000	724.938	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	153.3 - 151.4		281.439	724.938	0.388	0.000	724.938	0.000
	151.4 - 149.5		313.405	724.938	0.432	0.000	724.938	0.000
	149.5 - 147.6		359.691	724.938	0.496	0.000	724.938	0.000
	147.6 - 145.7		403.618	724.938	0.557	0.000	724.938	0.000
	145.7 - 143.8		447.811	724.938	0.618	0.000	724.938	0.000
	143.8 - 141.9		492.322	724.938	0.679	0.000	724.938	0.000
	141.9 - 140		537.320	724.938	0.741	0.000	724.938	0.000
L2	140 - 138.162	P36x1/2	581.221	1586.550	0.366	0.000	1586.550	0.000
	138.162 - 136.325		625.611	1586.550	0.394	0.000	1586.550	0.000
	136.325 - 134.488		670.488	1586.550	0.423	0.000	1586.550	0.000
	134.488 - 132.65		723.286	1586.550	0.456	0.000	1586.550	0.000
	132.65 - 130.813		775.914	1586.550	0.489	0.000	1586.550	0.000
	130.813 - 128.975		829.015	1586.550	0.523	0.000	1586.550	0.000
	128.975 - 127.138		882.583	1586.550	0.556	0.000	1586.550	0.000
	127.138 - 125.3		936.617	1586.550	0.590	0.000	1586.550	0.000
	125.3 - 123.463		991.100	1586.550	0.625	0.000	1586.550	0.000
	123.463 - 121.625		1046.042	1586.550	0.659	0.000	1586.550	0.000
	121.625 - 119.787		1101.425	1586.550	0.694	0.000	1586.550	0.000
	119.787 - 117.95		1157.250	1586.550	0.729	0.000	1586.550	0.000
	117.95 - 116.113		1213.517	1586.550	0.765	0.000	1586.550	0.000
	116.113 - 114.275		1270.200	1586.550	0.801	0.000	1586.550	0.000
	114.275 - 112.438		1327.317	1586.550	0.837	0.000	1586.550	0.000
	112.438 - 110.6		1384.842	1586.550	0.873	0.000	1586.550	0.000
	110.6 - 108.762		1442.775	1586.550	0.909	0.000	1586.550	0.000
	108.762 - 106.925		1501.117	1586.550	0.946	0.000	1586.550	0.000
	106.925 - 105.088		1559.850	1586.550	0.983	0.000	1586.550	0.000
	105.088 - 103.25		1618.967	1586.550	1.020	0.000	1586.550	0.000
L3	103.25 - 102.167	P36x1/2 [0.655182]	1654.083	2569.442	0.644	0.000	2569.442	0.000
	102.167 - 101.083		1689.483	2569.442	0.658	0.000	2569.442	0.000
	101.083 - 100		1725.167	2569.442	0.671	0.000	2569.442	0.000
L4	100 - 98	P48x5/8	1791.625	3492.392	0.513	0.000	3492.392	0.000
	98 - 96		1858.700	3492.392	0.532	0.000	3492.392	0.000
	96 - 94		1926.392	3492.392	0.552	0.000	3492.392	0.000
	94 - 92		1994.692	3492.392	0.571	0.000	3492.392	0.000
	92 - 90		2063.592	3492.392	0.591	0.000	3492.392	0.000
	90 - 88		2133.083	3492.392	0.611	0.000	3492.392	0.000
	88 - 86		2203.158	3492.392	0.631	0.000	3492.392	0.000
	86 - 84		2273.817	3492.392	0.651	0.000	3492.392	0.000
	84 - 82		2345.050	3492.392	0.671	0.000	3492.392	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	82 - 80		2416.850	3492.392	0.692	0.000	3492.392	0.000
	80 - 78		2489.200	3492.392	0.713	0.000	3492.392	0.000
	78 - 76		2562.100	3492.392	0.734	0.000	3492.392	0.000
	76 - 74		2635.550	3492.392	0.755	0.000	3492.392	0.000
	74 - 72		2709.525	3492.392	0.776	0.000	3492.392	0.000
	72 - 70		2784.025	3492.392	0.797	0.000	3492.392	0.000
	70 - 68		2859.050	3492.392	0.819	0.000	3492.392	0.000
	68 - 66		2934.575	3492.392	0.840	0.000	3492.392	0.000
	66 - 64		3010.608	3492.392	0.862	0.000	3492.392	0.000
	64 - 62		3087.125	3492.392	0.884	0.000	3492.392	0.000
	62 - 60		3164.125	3492.392	0.906	0.000	3492.392	0.000
L5	60 - 58.6625	P54x5/8	3215.900	4349.317	0.739	0.000	4349.317	0.000
	58.6625 - 57.325		3267.892	4349.317	0.751	0.000	4349.317	0.000
	57.325 - 55.9875		3320.117	4349.317	0.763	0.000	4349.317	0.000
	55.9875 - 54.65		3372.567	4349.317	0.775	0.000	4349.317	0.000
	54.65 - 53.3125		3425.242	4349.317	0.788	0.000	4349.317	0.000
	53.3125 - 51.975		3478.142	4349.317	0.800	0.000	4349.317	0.000
	51.975 - 50.6375		3531.250	4349.317	0.812	0.000	4349.317	0.000
	50.6375 - 49.3		3584.592	4349.317	0.824	0.000	4349.317	0.000
	49.3 - 47.9625		3638.142	4349.317	0.836	0.000	4349.317	0.000
	47.9625 - 46.625		3691.908	4349.317	0.849	0.000	4349.317	0.000
	46.625 - 45.2875		3745.883	4349.317	0.861	0.000	4349.317	0.000
	45.2875 - 43.95		3800.075	4349.317	0.874	0.000	4349.317	0.000
	43.95 - 42.6125		3854.475	4349.317	0.886	0.000	4349.317	0.000
	42.6125 - 41.275		3909.083	4349.317	0.899	0.000	4349.317	0.000
	41.275 - 39.9375		3963.900	4349.317	0.911	0.000	4349.317	0.000
	39.9375 - 38.6		4018.908	4349.317	0.924	0.000	4349.317	0.000
	38.6 - 37.2625		4074.125	4349.317	0.937	0.000	4349.317	0.000
	37.2625 - 35.925		4129.542	4349.317	0.949	0.000	4349.317	0.000
	35.925 - 34.5875		4185.158	4349.317	0.962	0.000	4349.317	0.000
	34.5875 - 33.25		4240.967	4349.317	0.975	0.000	4349.317	0.000
L6	33.25 - 32.2308	P54x5/8 [0.723801]	4283.617	5033.700	0.851	0.000	5033.700	0.000
	32.2308 - 31.2115		4326.375	5033.700	0.859	0.000	5033.700	0.000
	31.2115 - 30.1923		4369.233	5033.700	0.868	0.000	5033.700	0.000
	30.1923 - 29.1731		4412.192	5033.700	0.877	0.000	5033.700	0.000
	29.1731 - 28.1538		4455.250	5033.700	0.885	0.000	5033.700	0.000
	28.1538 - 27.1346		4498.408	5033.700	0.894	0.000	5033.700	0.000
	27.1346 - 26.1154		4541.667	5033.700	0.902	0.000	5033.700	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
	26.1154 - 25.0962		4585.025	5033.700	0.911	0.000	5033.700	0.000
	25.0962 - 24.0769		4628.475	5033.700	0.919	0.000	5033.700	0.000
	24.0769 - 23.0577		4672.025	5033.700	0.928	0.000	5033.700	0.000
	23.0577 - 22.0385		4715.667	5033.700	0.937	0.000	5033.700	0.000
	22.0385 - 21.0192		4759.400	5033.700	0.946	0.000	5033.700	0.000
	21.0192 - 20		4803.225	5033.700	0.954	0.000	5033.700	0.000
L7	20 - 18.9318	P60x5/8	4849.250	5299.025	0.915	0.000	5299.025	0.000
	18.9318 - 17.8636		4895.375	5299.025	0.924	0.000	5299.025	0.000
	17.8636 - 16.7955		4941.600	5299.025	0.933	0.000	5299.025	0.000
	16.7955 - 15.7273		4987.917	5299.025	0.941	0.000	5299.025	0.000
	15.7273 - 14.6591		5034.333	5299.025	0.950	0.000	5299.025	0.000
	14.6591 - 13.5909		5080.833	5299.025	0.959	0.000	5299.025	0.000
	13.5909 - 12.5227		5127.433	5299.025	0.968	0.000	5299.025	0.000
	12.5227 - 11.4545		5174.125	5299.025	0.976	0.000	5299.025	0.000
	11.4545 - 10.3864		5220.900	5299.025	0.985	0.000	5299.025	0.000
	10.3864 - 9.31818		5267.767	5299.025	0.994	0.000	5299.025	0.000
	9.31818 - 8.25		5314.725	5299.025	1.003	0.000	5299.025	0.000
L8	8.25 - 7.21875	P60x5/8 [0.712755]	5360.142	6038.167	0.888	0.000	6038.167	0.000
	7.21875 - 6.1875		5405.650	6038.167	0.895	0.000	6038.167	0.000
	6.1875 - 5.15625		5451.242	6038.167	0.903	0.000	6038.167	0.000
	5.15625 - 4.125		5496.917	6038.167	0.910	0.000	6038.167	0.000
	4.125 - 3.09375		5542.667	6038.167	0.918	0.000	6038.167	0.000
	3.09375 - 2.0625		5588.508	6038.167	0.926	0.000	6038.167	0.000
	2.0625 - 1.03125		5634.425	6038.167	0.933	0.000	6038.167	0.000
	1.03125 - 0		5680.425	6038.167	0.941	0.000	6038.167	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	178 - 176.1	P24x1/2	4.051	581.391	0.007	0.139	1115.342	0.000
	176.1 - 174.2		5.175	581.391	0.009	0.139	1115.342	0.000
	174.2 - 172.3		5.342	581.391	0.009	0.139	1115.342	0.000
	172.3 - 170.4		5.509	581.391	0.009	0.139	1115.342	0.000
	170.4 - 168.5		5.675	581.391	0.010	0.139	1115.342	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
	168.5 - 166.6		9.566	581.391	0.016	0.139	1115.342	0.000
	166.6 - 164.7		9.730	581.391	0.017	0.139	1115.342	0.000
	164.7 - 162.8		9.893	581.391	0.017	0.139	1115.342	0.000
	162.8 - 160.9		10.244	581.391	0.018	0.139	1115.342	0.000
	160.9 - 159		16.123	581.391	0.028	0.587	1115.342	0.001
	159 - 157.1		16.281	581.391	0.028	0.587	1115.342	0.001
	157.1 - 155.2		16.438	581.391	0.028	0.587	1115.342	0.001
	155.2 - 153.3		16.593	581.391	0.029	0.587	1115.342	0.001
	153.3 - 151.4		16.746	581.391	0.029	0.587	1115.342	0.001
	151.4 - 149.5		16.896	581.391	0.029	0.587	1115.342	0.001
	149.5 - 147.6		23.049	581.391	0.040	0.587	1115.342	0.001
	147.6 - 145.7		23.191	581.391	0.040	0.581	1115.342	0.001
	145.7 - 143.8		23.330	581.391	0.040	0.581	1115.342	0.001
	143.8 - 141.9		23.626	581.391	0.041	0.728	1115.342	0.001
	141.9 - 140		23.770	581.391	0.041	0.728	1115.342	0.001
L2	140 - 138.162	P36x1/2	24.030	878.272	0.027	0.728	2562.642	0.000
	138.162 - 136.325		24.297	878.272	0.028	0.728	2562.642	0.000
	136.325 - 134.488		24.561	878.272	0.028	0.728	2562.642	0.000
	134.488 - 132.65		28.520	878.272	0.032	0.728	2562.642	0.000
	132.65 - 130.813		28.779	878.272	0.033	0.728	2562.642	0.000
	130.813 - 128.975		29.035	878.272	0.033	0.728	2562.642	0.000
	128.975 - 127.138		29.289	878.272	0.033	0.728	2562.642	0.000
	127.138 - 125.3		29.540	878.272	0.034	0.728	2562.642	0.000
	125.3 - 123.463		29.788	878.272	0.034	0.727	2562.642	0.000
	123.463 - 121.625		30.033	878.272	0.034	0.727	2562.642	0.000
	121.625 - 119.787		30.276	878.272	0.034	0.727	2562.642	0.000
	119.787 - 117.95		30.515	878.272	0.035	0.727	2562.642	0.000
	117.95 - 116.113		30.750	878.272	0.035	0.727	2562.642	0.000
	116.113 - 114.275		30.983	878.272	0.035	0.727	2562.642	0.000
	114.275 - 112.438		31.212	878.272	0.036	0.727	2562.642	0.000
	112.438 - 110.6		31.437	878.272	0.036	0.727	2562.642	0.000
	110.6 - 108.762		31.659	878.272	0.036	0.727	2562.642	0.000
	108.762 - 106.925		31.877	878.272	0.036	0.727	2562.642	0.000
	106.925 - 105.088		32.091	878.272	0.037	0.727	2562.642	0.000
	105.088 - 103.25		32.301	878.272	0.037	0.726	2562.642	0.000
L3	103.25 - 102.167	P36x1/2 [0.655182]	32.557	1418.780	0.023	0.726	4104.225	0.000
	102.167 - 101.083		32.822	1418.780	0.023	0.714	4104.225	0.000
	101.083 - 100		33.087	1418.780	0.023	0.702	4104.225	0.000
L4	100 - 98	P48x5/8	33.395	1465.070	0.023	0.690	5709.675	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
	98 - 96		33.704	1465.070	0.023	0.690	5709.675	0.000
	96 - 94		34.010	1465.070	0.023	0.690	5709.675	0.000
	94 - 92		34.312	1465.070	0.023	0.690	5709.675	0.000
	92 - 90		34.611	1465.070	0.024	0.690	5709.675	0.000
	90 - 88		34.907	1465.070	0.024	0.690	5709.675	0.000
	88 - 86		35.199	1465.070	0.024	0.690	5709.675	0.000
	86 - 84		35.488	1465.070	0.024	0.690	5709.675	0.000
	84 - 82		35.773	1465.070	0.024	0.690	5709.675	0.000
	82 - 80		36.055	1465.070	0.025	0.689	5709.675	0.000
	80 - 78		36.332	1465.070	0.025	0.689	5709.675	0.000
	78 - 76		36.606	1465.070	0.025	0.689	5709.675	0.000
	76 - 74		36.876	1465.070	0.025	0.689	5709.675	0.000
	74 - 72		37.142	1465.070	0.025	0.689	5709.675	0.000
	72 - 70		37.403	1465.070	0.026	0.689	5709.675	0.000
	70 - 68		37.661	1465.070	0.026	0.689	5709.675	0.000
	68 - 66		37.914	1465.070	0.026	0.689	5709.675	0.000
	66 - 64		38.163	1465.070	0.026	0.689	5709.675	0.000
	64 - 62		38.407	1465.070	0.026	0.689	5709.675	0.000
	62 - 60		38.646	1465.070	0.026	0.689	5709.675	0.000
L5	60 - 58.6625	P54x5/8	38.804	1650.620	0.024	0.689	7257.858	0.000
	58.6625 - 57.325		38.975	1650.620	0.024	0.689	7257.858	0.000
	57.325 - 55.9875		39.145	1650.620	0.024	0.689	7257.858	0.000
	55.9875 - 54.65		39.313	1650.620	0.024	0.689	7257.858	0.000
	54.65 - 53.3125		39.480	1650.620	0.024	0.689	7257.858	0.000
	53.3125 - 51.975		39.646	1650.620	0.024	0.689	7257.858	0.000
	51.975 - 50.6375		39.810	1650.620	0.024	0.689	7257.858	0.000
	50.6375 - 49.3		39.973	1650.620	0.024	0.689	7257.858	0.000
	49.3 - 47.9625		40.135	1650.620	0.024	0.689	7257.858	0.000
	47.9625 - 46.625		40.295	1650.620	0.024	0.689	7257.858	0.000
	46.625 - 45.2875		40.454	1650.620	0.025	0.689	7257.858	0.000
	45.2875 - 43.95		40.612	1650.620	0.025	0.689	7257.858	0.000
	43.95 - 42.6125		40.768	1650.620	0.025	0.689	7257.858	0.000
	42.6125 - 41.275		40.923	1650.620	0.025	0.689	7257.858	0.000
	41.275 - 39.9375		41.076	1650.620	0.025	0.689	7257.858	0.000
	39.9375 - 38.6		41.227	1650.620	0.025	0.689	7257.858	0.000
	38.6 - 37.2625		41.378	1650.620	0.025	0.689	7257.858	0.000
	37.2625 - 35.925		41.526	1650.620	0.025	0.688	7257.858	0.000
	35.925 - 34.5875		41.673	1650.620	0.025	0.688	7257.858	0.000
	34.5875 - 33.25		41.819	1650.620	0.025	0.688	7257.858	0.000
L6	33.25 - 32.2308	P54x5/8 [0.723801]	41.913	1859.340	0.023	0.688	8145.717	0.000
	32.2308 - 31.2115		42.014	1859.340	0.023	0.688	8145.717	0.000
	31.2115 - 30.1923		42.114	1859.340	0.023	0.688	8145.717	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
	30.1923 - 29.1731		42.213	1859.340	0.023	0.688	8145.717	0.000
	29.1731 - 28.1538		42.312	1859.340	0.023	0.688	8145.717	0.000
	28.1538 - 27.1346		42.409	1859.340	0.023	0.688	8145.717	0.000
	27.1346 - 26.1154		42.505	1859.340	0.023	0.688	8145.717	0.000
	26.1154 - 25.0962		42.600	1859.340	0.023	0.688	8145.717	0.000
	25.0962 - 24.0769		42.695	1859.340	0.023	0.688	8145.717	0.000
	24.0769 - 23.0577		42.788	1859.340	0.023	0.688	8145.717	0.000
	23.0577 - 22.0385		42.880	1859.340	0.023	0.688	8145.717	0.000
	22.0385 - 21.0192		42.971	1859.340	0.023	0.688	8145.717	0.000
	21.0192 - 20		43.061	1859.340	0.023	0.688	8145.717	0.000
L7	20 - 18.9318	P60x5/8	43.151	1824.750	0.024	0.688	8935.667	0.000
	18.9318 - 17.8636		43.242	1824.750	0.024	0.688	8935.667	0.000
	17.8636 - 16.7955		43.332	1824.750	0.024	0.688	8935.667	0.000
	16.7955 - 15.7273		43.422	1824.750	0.024	0.688	8935.667	0.000
	15.7273 - 14.6591		43.510	1824.750	0.024	0.688	8935.667	0.000
	14.6591 - 13.5909		43.597	1824.750	0.024	0.688	8935.667	0.000
	13.5909 - 12.5227		43.684	1824.750	0.024	0.688	8935.667	0.000
	12.5227 - 11.4545		43.769	1824.750	0.024	0.688	8935.667	0.000
	11.4545 - 10.3864		43.853	1824.750	0.024	0.688	8935.667	0.000
	10.3864 - 9.31818		43.937	1824.750	0.024	0.688	8935.667	0.000
	9.31818 - 8.25		44.019	1824.750	0.024	0.688	8935.667	0.000
L8	8.25 - 7.21875	P60x5/8 [0.712755]	44.100	2047.320	0.022	0.688	9996.250	0.000
	7.21875 - 6.1875		44.183	2047.320	0.022	0.688	9996.250	0.000
	6.1875 - 5.15625		44.265	2047.320	0.022	0.688	9996.250	0.000
	5.15625 - 4.125		44.346	2047.320	0.022	0.688	9996.250	0.000
	4.125 - 3.09375		44.426	2047.320	0.022	0.688	9996.250	0.000
	3.09375 - 2.0625		44.505	2047.320	0.022	0.688	9996.250	0.000
	2.0625 - 1.03125		44.584	2047.320	0.022	0.688	9996.250	0.000
	1.03125 - 0		44.661	2047.320	0.022	0.688	9996.250	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	178 - 176.1	0.002	0.015	0.000	0.007	0.000	0.017 ✔	1.000	4.8.2 ✔
	176.1 - 174.2	0.003	0.029	0.000	0.009	0.000	0.032 ✔	1.000	4.8.2 ✔
	174.2 - 172.3	0.003	0.043	0.000	0.009	0.000	0.046 ✔	1.000	4.8.2 ✔
	172.3 - 170.4	0.003	0.057	0.000	0.009	0.000	0.060 ✔	1.000	4.8.2 ✔
	170.4 - 168.5	0.003	0.072	0.000	0.010	0.000	0.075 ✔	1.000	4.8.2 ✔
	168.5 - 166.6	0.005	0.101	0.000	0.016	0.000	0.107 ✔	1.000	4.8.2 ✔
	166.6 - 164.7	0.006	0.127	0.000	0.017	0.000	0.133 ✔	1.000	4.8.2 ✔
	164.7 - 162.8	0.006	0.152	0.000	0.017	0.000	0.159 ✔	1.000	4.8.2 ✔
	162.8 - 160.9	0.006	0.179	0.000	0.018	0.000	0.186 ✔	1.000	4.8.2 ✔
	160.9 - 159	0.008	0.216	0.000	0.028	0.001	0.225 ✔	1.000	4.8.2 ✔
	159 - 157.1	0.009	0.258	0.000	0.028	0.001	0.268 ✔	1.000	4.8.2 ✔
	157.1 - 155.2	0.009	0.301	0.000	0.028	0.001	0.311 ✔	1.000	4.8.2 ✔
	155.2 - 153.3	0.009	0.345	0.000	0.029	0.001	0.355 ✔	1.000	4.8.2 ✔
	153.3 - 151.4	0.009	0.388	0.000	0.029	0.001	0.399 ✔	1.000	4.8.2 ✔
	151.4 - 149.5	0.010	0.432	0.000	0.029	0.001	0.443 ✔	1.000	4.8.2 ✔
	149.5 - 147.6	0.012	0.496	0.000	0.040	0.001	0.510 ✔	1.000	4.8.2 ✔
	147.6 - 145.7	0.012	0.557	0.000	0.040	0.001	0.571 ✔	1.000	4.8.2 ✔
	145.7 - 143.8	0.012	0.618	0.000	0.040	0.001	0.632 ✔	1.000	4.8.2 ✔
	143.8 - 141.9	0.013	0.679	0.000	0.041	0.001	0.694 ✔	1.000	4.8.2 ✔
	141.9 - 140	0.013	0.741	0.000	0.041	0.001	0.756 ✔	1.000	4.8.2 ✔
L2	140 - 138.162	0.009	0.366	0.000	0.027	0.000	0.376 ✔	1.000	4.8.2 ✔
	138.162 - 136.325	0.009	0.394	0.000	0.028	0.000	0.404 ✔	1.000	4.8.2 ✔
	136.325 - 134.488	0.010	0.423	0.000	0.028	0.000	0.433 ✔	1.000	4.8.2 ✔
	134.488 - 132.65	0.011	0.456	0.000	0.032	0.000	0.468 ✔	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	132.65 - 130.813	0.011	0.489	0.000	0.033	0.000	0.502 ✔	1.000	4.8.2 ✔
	130.813 - 128.975	0.012	0.523	0.000	0.033	0.000	0.535 ✔	1.000	4.8.2 ✔
	128.975 - 127.138	0.012	0.556	0.000	0.033	0.000	0.569 ✔	1.000	4.8.2 ✔
	127.138 - 125.3	0.012	0.590	0.000	0.034	0.000	0.604 ✔	1.000	4.8.2 ✔
	125.3 - 123.463	0.013	0.625	0.000	0.034	0.000	0.639 ✔	1.000	4.8.2 ✔
	123.463 - 121.625	0.013	0.659	0.000	0.034	0.000	0.674 ✔	1.000	4.8.2 ✔
	121.625 - 119.787	0.013	0.694	0.000	0.034	0.000	0.709 ✔	1.000	4.8.2 ✔
	119.787 - 117.95	0.014	0.729	0.000	0.035	0.000	0.744 ✔	1.000	4.8.2 ✔
	117.95 - 116.113	0.014	0.765	0.000	0.035	0.000	0.780 ✔	1.000	4.8.2 ✔
	116.113 - 114.275	0.014	0.801	0.000	0.035	0.000	0.816 ✔	1.000	4.8.2 ✔
	114.275 - 112.438	0.015	0.837	0.000	0.036	0.000	0.853 ✔	1.000	4.8.2 ✔
	112.438 - 110.6	0.015	0.873	0.000	0.036	0.000	0.889 ✔	1.000	4.8.2 ✔
	110.6 - 108.762	0.015	0.909	0.000	0.036	0.000	0.926 ✔	1.000	4.8.2 ✔
	108.762 - 106.925	0.016	0.946	0.000	0.036	0.000	0.963 ✔	1.000	4.8.2 ✔
	106.925 - 105.088	0.016	0.983	0.000	0.037	0.000	**1.000** ✘	1.000	4.8.2 ✘
	105.088 - 103.25	0.016	1.020	0.000	0.037	0.000	**1.038** ✘	1.000	4.8.2 ✘
L3	103.25 - 102.167	0.010	0.644	0.000	0.023	0.000	0.655 ✔	1.000	4.8.2 ✔
	102.167 - 101.083	0.010	0.658	0.000	0.023	0.000	0.668 ✔	1.000	4.8.2 ✔
	101.083 - 100	0.011	0.671	0.000	0.023	0.000	0.683 ✔	1.000	4.8.2 ✔
L4	100 - 98	0.011	0.513	0.000	0.023	0.000	0.524 ✔	1.000	4.8.2 ✔
	98 - 96	0.011	0.532	0.000	0.023	0.000	0.544 ✔	1.000	4.8.2 ✔
	96 - 94	0.011	0.552	0.000	0.023	0.000	0.563 ✔	1.000	4.8.2 ✔
	94 - 92	0.011	0.571	0.000	0.023	0.000	0.583 ✔	1.000	4.8.2 ✔
	92 - 90	0.012	0.591	0.000	0.024	0.000	0.603 ✔	1.000	4.8.2 ✔
	90 - 88	0.012	0.611	0.000	0.024	0.000	0.623 ✔	1.000	4.8.2 ✔
	88 - 86	0.012	0.631	0.000	0.024	0.000	0.644 ✔	1.000	4.8.2 ✔
	86 - 84	0.013	0.651	0.000	0.024	0.000	0.664 ✔	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	84 - 82	0.013	0.671	0.000	0.024	0.000	0.685	1.000	4.8.2
	82 - 80	0.013	0.692	0.000	0.025	0.000	0.706	1.000	4.8.2
	80 - 78	0.014	0.713	0.000	0.025	0.000	0.727	1.000	4.8.2
	78 - 76	0.014	0.734	0.000	0.025	0.000	0.748	1.000	4.8.2
	76 - 74	0.014	0.755	0.000	0.025	0.000	0.770	1.000	4.8.2
	74 - 72	0.015	0.776	0.000	0.025	0.000	0.791	1.000	4.8.2
	72 - 70	0.015	0.797	0.000	0.026	0.000	0.813	1.000	4.8.2
	70 - 68	0.015	0.819	0.000	0.026	0.000	0.835	1.000	4.8.2
	68 - 66	0.016	0.840	0.000	0.026	0.000	0.856	1.000	4.8.2
	66 - 64	0.016	0.862	0.000	0.026	0.000	0.879	1.000	4.8.2
	64 - 62	0.016	0.884	0.000	0.026	0.000	0.901	1.000	4.8.2
	62 - 60	0.016	0.906	0.000	0.026	0.000	0.923	1.000	4.8.2
L5	60 - 58.6625	0.015	0.739	0.000	0.024	0.000	0.755	1.000	4.8.2
	58.6625 - 57.325	0.015	0.751	0.000	0.024	0.000	0.767	1.000	4.8.2
	57.325 - 55.9875	0.015	0.763	0.000	0.024	0.000	0.779	1.000	4.8.2
	55.9875 - 54.65	0.015	0.775	0.000	0.024	0.000	0.791	1.000	4.8.2
	54.65 - 53.3125	0.016	0.788	0.000	0.024	0.000	0.804	1.000	4.8.2
	53.3125 - 51.975	0.016	0.800	0.000	0.024	0.000	0.816	1.000	4.8.2
	51.975 - 50.6375	0.016	0.812	0.000	0.024	0.000	0.829	1.000	4.8.2
	50.6375 - 49.3	0.016	0.824	0.000	0.024	0.000	0.841	1.000	4.8.2
	49.3 - 47.9625	0.016	0.836	0.000	0.024	0.000	0.854	1.000	4.8.2
	47.9625 - 46.625	0.017	0.849	0.000	0.024	0.000	0.866	1.000	4.8.2
	46.625 - 45.2875	0.017	0.861	0.000	0.025	0.000	0.879	1.000	4.8.2
	45.2875 - 43.95	0.017	0.874	0.000	0.025	0.000	0.891	1.000	4.8.2
	43.95 - 42.6125	0.017	0.886	0.000	0.025	0.000	0.904	1.000	4.8.2
	42.6125 -	0.018	0.899	0.000	0.025	0.000	0.917	1.000	4.8.2

Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	41.275						✔		
	41.275 - 39.9375	0.018	0.911	0.000	0.025	0.000	0.930 ✔	1.000	4.8.2 ✔
	39.9375 - 38.6	0.018	0.924	0.000	0.025	0.000	0.943 ✔	1.000	4.8.2 ✔
	38.6 - 37.2625	0.018	0.937	0.000	0.025	0.000	0.956 ✔	1.000	4.8.2 ✔
	37.2625 - 35.925	0.018	0.949	0.000	0.025	0.000	0.968 ✔	1.000	4.8.2 ✔
	35.925 - 34.5875	0.019	0.962	0.000	0.025	0.000	0.981 ✔	1.000	4.8.2 ✔
	34.5875 - 33.25	0.019	0.975	0.000	0.025	0.000	0.995 ✔	1.000	4.8.2 ✔
L6	33.25 - 32.2308	0.017	0.851	0.000	0.023	0.000	0.868 ✔	1.000	4.8.2 ✔
	32.2308 - 31.2115	0.017	0.859	0.000	0.023	0.000	0.877 ✔	1.000	4.8.2 ✔
	31.2115 - 30.1923	0.017	0.868	0.000	0.023	0.000	0.886 ✔	1.000	4.8.2 ✔
	30.1923 - 29.1731	0.017	0.877	0.000	0.023	0.000	0.894 ✔	1.000	4.8.2 ✔
	29.1731 - 28.1538	0.018	0.885	0.000	0.023	0.000	0.903 ✔	1.000	4.8.2 ✔
	28.1538 - 27.1346	0.018	0.894	0.000	0.023	0.000	0.912 ✔	1.000	4.8.2 ✔
	27.1346 - 26.1154	0.018	0.902	0.000	0.023	0.000	0.921 ✔	1.000	4.8.2 ✔
	26.1154 - 25.0962	0.018	0.911	0.000	0.023	0.000	0.929 ✔	1.000	4.8.2 ✔
	25.0962 - 24.0769	0.018	0.919	0.000	0.023	0.000	0.938 ✔	1.000	4.8.2 ✔
	24.0769 - 23.0577	0.018	0.928	0.000	0.023	0.000	0.947 ✔	1.000	4.8.2 ✔
	23.0577 - 22.0385	0.019	0.937	0.000	0.023	0.000	0.956 ✔	1.000	4.8.2 ✔
	22.0385 - 21.0192	0.019	0.946	0.000	0.023	0.000	0.965 ✔	1.000	4.8.2 ✔
	21.0192 - 20	0.019	0.954	0.000	0.023	0.000	0.974 ✔	1.000	4.8.2 ✔
L7	20 - 18.9318	0.019	0.915	0.000	0.024	0.000	0.935 ✔	1.000	4.8.2 ✔
	18.9318 - 17.8636	0.020	0.924	0.000	0.024	0.000	0.944 ✔	1.000	4.8.2 ✔
	17.8636 - 16.7955	0.020	0.933	0.000	0.024	0.000	0.953 ✔	1.000	4.8.2 ✔
	16.7955 - 15.7273	0.020	0.941	0.000	0.024	0.000	0.962 ✔	1.000	4.8.2 ✔
	15.7273 - 14.6591	0.020	0.950	0.000	0.024	0.000	0.971 ✔	1.000	4.8.2 ✔
	14.6591 - 13.5909	0.020	0.959	0.000	0.024	0.000	0.980 ✔	1.000	4.8.2 ✔
	13.5909 -	0.020	0.968	0.000	0.024	0.000	0.989	1.000	4.8.2 ✔

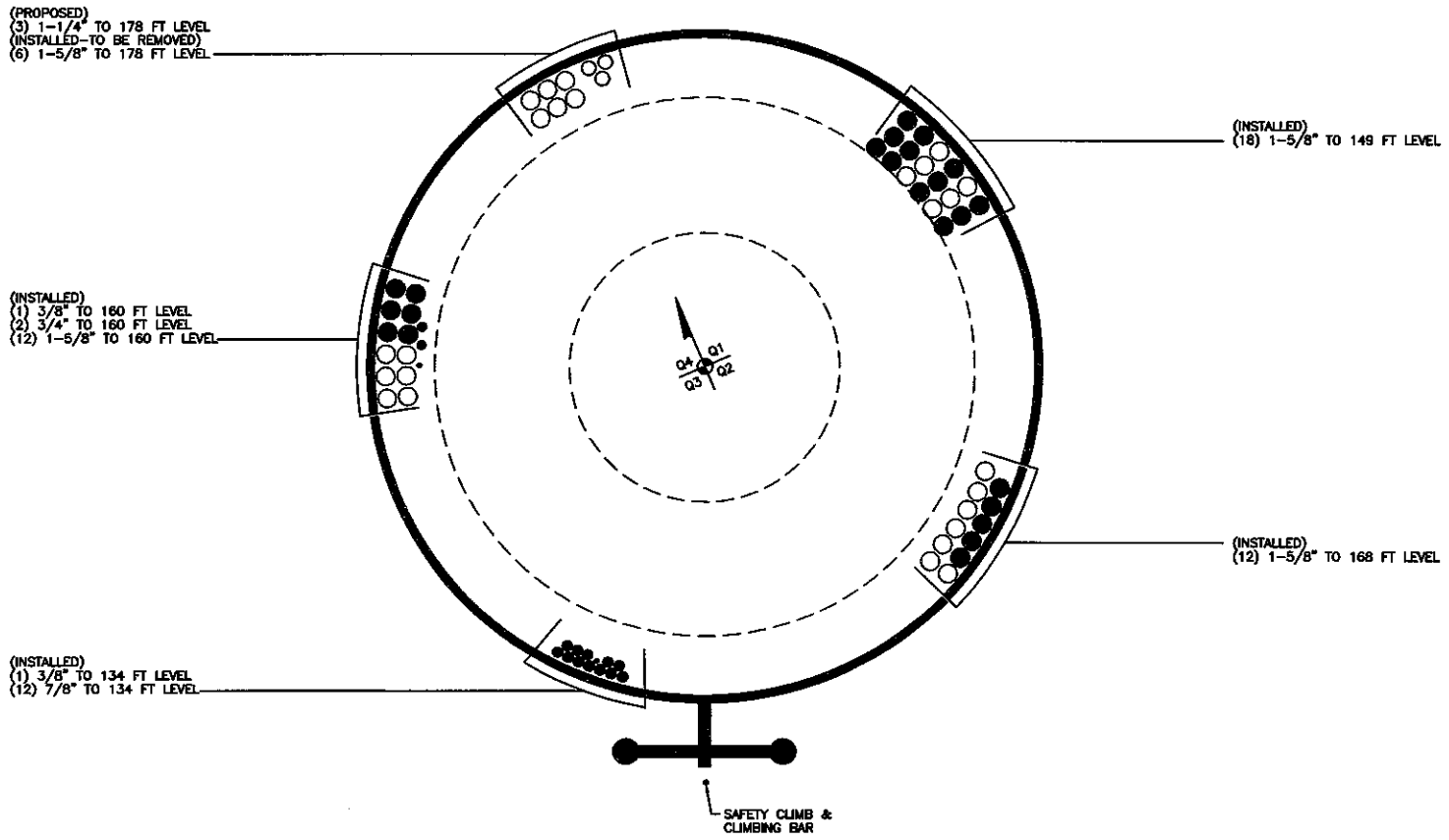
Section No.	Elevation ft	Ratio $P_u/\phi P_n$	Ratio $M_{ux}/\phi M_{nx}$	Ratio $M_{uy}/\phi M_{ny}$	Ratio $V_u/\phi V_n$	Ratio $T_u/\phi T_n$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	12.5227						✔		
	12.5227 - 11.4545	0.021	0.976	0.000	0.024	0.000	0.998 ✔	1.000	4.8.2 ✔
	11.4545 - 10.3864	0.021	0.985	0.000	0.024	0.000	**1.007** ✘	1.000	4.8.2 ✘
	10.3864 - 9.31818	0.021	0.994	0.000	0.024	0.000	**1.016** ✘	1.000	4.8.2 ✘
	9.31818 - 8.25	0.021	1.003	0.000	0.024	0.000	**1.025** ✘	1.000	4.8.2 ✘
L8	8.25 - 7.21875	0.019	0.888	0.000	0.022	0.000	0.907 ✔	1.000	4.8.2 ✔
	7.21875 - 6.1875	0.019	0.895	0.000	0.022	0.000	0.915 ✔	1.000	4.8.2 ✔
	6.1875 - 5.15625	0.019	0.903	0.000	0.022	0.000	0.923 ✔	1.000	4.8.2 ✔
	5.15625 - 4.125	0.019	0.910	0.000	0.022	0.000	0.930 ✔	1.000	4.8.2 ✔
	4.125 - 3.09375	0.020	0.918	0.000	0.022	0.000	0.938 ✔	1.000	4.8.2 ✔
	3.09375 - 2.0625	0.020	0.926	0.000	0.022	0.000	0.946 ✔	1.000	4.8.2 ✔
	2.0625 - 1.03125	0.020	0.933	0.000	0.022	0.000	0.954 ✔	1.000	4.8.2 ✔
	1.03125 - 0	0.020	0.941	0.000	0.022	0.000	0.961 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	178 - 140	Pole	P24x1/2	1	-15.208	1162.780	75.6	Pass
L2	140 - 103.25	Pole	P36x1/2	2	-28.648	1756.540	103.8	Fail ✘
L3	103.25 - 100	Pole	P36x1/2 [0.655182]	3	-30.014	2837.550	68.3	Pass
L4	100 - 60	Pole	P48x5/8	4	-48.237	2930.150	92.3	Pass
L5	60 - 33.25	Pole	P54x5/8	5	-61.967	3301.250	99.5	Pass
L6	33.25 - 20	Pole	P54x5/8 [0.723801]	6	-70.264	3718.670	97.4	Pass
L7	20 - 8.25	Pole	P60x5/8	7	-76.978	3649.510	102.5	Fail ✘
L8	8.25 - 0	Pole	P60x5/8 [0.712755]	8	-82.540	4094.640	96.1	Pass
						Summary		
						Pole (L2)	103.8	Fail ✘
						RATING =	**103.8**	**Fail ✘**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 878783 TOWER ID: C_BASELEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Reinforcement Capacity

AeroSolutions LLC
Optimizing Your Tower Infrastructure
5500 Flatirons Parkway, Suite 100
Boulder, CO 80301
720-304-6882

Dimensions and Properties														Compression				Axial				
																		ASD-9			LRFD	
Model	Weight (lb/ft)	Area (in²)	Moment of Inertia (in⁴)	Moment of Inertia (in⁴)	Centroid from Mating Edge (in)	Centroid from Bolt Hole Center (in)	Web Thickness (in)	Width (in)	Flange Width (in)	Flange Thickness (in)	Hole Diameter (in)	Yield Stress (ksi)	Ultimate Stress (ksi)	Slender. Ratio Coefficient	Unbraced Length (in)	Slender. Ratio Coefficient	Unbraced Length (in)	Allowable Axial (kip)	Allowable Axial w/ increase (kip)	Governing Axial	Design Axial Strength (kip)	Governing Axial
MP303	9.9	2.92	0.66	6.57	0.59	0	0.30	4.06	1.57	0.64	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	1447.6	Rupture
MP304	14.1	4.13	0.91	11.86	0.61	0	0.43	4.78	1.61	0.84	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	2060.1	Rupture
MP305	19.2	5.65	2.15	20.79	0.79	0	0.5	5.33	2.09	0.91	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	2913.8	Rupture
MP306	28.8	8.47	4.95	52.50	0.93	0	0.64	6.89	2.61	1.01	1.21875	65	80	0.80	24	1.00	24	[illegible]	[illegible]	Rupture	4406.1	Rupture
MP308	35.1	10.32	6.48	82.29	0.95	0	0.76	7.93	2.8	1.01	1.21875	65	80	0.80	24	1.00	24	[illegible]	[illegible]	Rupture	5485.9	Rupture
MP404	12.1	3.56	0.17	6.70	0.375	0	0.75	4.75	0	0	1.21875	100	110	0.80	14	1.00	14	[illegible]	[illegible]	Rupture	2146.6	Rupture
MP405	16.6	4.88	0.41	9.65	0.5	0	1	4.875	0	0	1.21875	100	110	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	2965.5	Rupture
MP406	20.7	6.09	0.79	12.07	0.625	0	1.25	4.875	0	0	1.21875	100	110	0.80	23	1.00	23	[illegible]	[illegible]	Rupture	3706.9	Rupture
MP408	29.8	8.75	2.23	18.23	0.875	0	1.75	5	0	0	1.21875	100	110	0.80	32	1.00	32	[illegible]	[illegible]	Rupture	5536.9	Rupture
AF303	8.1	2.39	0.69	13.10	0.512	0	0.2	6	1.92	0.343	1.21875	65	80	0.80	22	1.00	22	[illegible]	[illegible]	Compress.	1223.3	Rupture
MP308.5	16.9	4.96	3.16	6.15	0.96		0.76	3.84	2.8	1.01	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	2282.4	Rupture
MP1-50B	17.1	5.02	0.42	40.99	-0.19	0	0.5	10	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	2320.6	Compress.
MP1-75B	25.5	7.50	0.82	60.71	-0.06	0	0.75	10	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	3466.2	Compress.
MS400	10.2	3.00	0.14	4.00	0.375	0	0.75	4	0	0	1.25	65	80	0.80	16.875	1.00	16.875	[illegible]	[illegible]	Rupture	1210.9	Rupture
MS450	15.3	4.50	0.38	7.59	0.5	0	1	4.5	0	0	1.25	65	80	0.80	20.625	1.00	20.625	[illegible]	[illegible]	Rupture	1913	Rupture
MS600	20.4	6.00	0.50	18.00	0.5	0	1	6	0	0	1.25	65	80	0.80	16.375	1.00	16.375	[illegible]	[illegible]	Rupture	2813	Rupture
MS650	27.6	8.13	1.06	28.61	0.625	0	1.25	6.5	0	0	1.25	65	80	0.80	19.25	1.00	19.25	[illegible]	[illegible]	Rupture	3891.1	Rupture
MS850	36.2	10.63	1.38	63.97	0.625	0	1.25	8.5	0	0	1.25	65	80	0.80	17.25	1.00	17.25	[illegible]	[illegible]	Compress.	5391	Rupture
CCI(1x5)	17.0	5.00	0.42	10.42	0.5	0	1	5	0	0	1.25	100	110	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	3042	Rupture
CCI(1x6)	20.4	6.00	0.50	18.00	0.5	0	1	6	0	0	1.25	100	110	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	3753	Compress.
CCI(1x7)	23.8	7.00	0.58	28.58	0.5	0	1	7	0	0	1.25	100	110	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	4378	Compress.
PL1.25x4.6875-18	19.9	5.86	0.76	10.73	0.625	0	1.25	4.6875	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	2555	Rupture
PL1.25x4.875-18	20.7	6.09	0.79	12.07	0.625	0	1.25	4.875	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	2695	Rupture
PL1.25x5-18	21.3	6.25	0.81	13.02	0.625	0	1.25	5	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	2789	Rupture
PL1.25x5.25-18	22.3	6.56	0.85	15.07	0.625	0	1.25	5.25	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	2977	Rupture
PL1.25x5.5625-18	23.7	6.95	0.91	17.93	0.625	0	1.25	5.5625	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	3321.1	Rupture
PL1.25x5.9375-18	25.3	7.42	0.97	21.80	0.625	0	1.25	5.9375	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	3492.5	Rupture
PL1.25x6-18	25.5	7.50	0.98	22.50	0.625	0	1.25	6	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	3353.9	Rupture
PL1.25x6.25-18	26.6	7.81	1.02	25.43	0.625	0	1.25	6.25	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Rupture	3727.7	Rupture
PL1.25x7-18	29.8	8.75	1.14	35.73	0.625	0	1.25	7	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	4289	Rupture
PL1.25x7.375-18	31.4	9.22	1.20	41.78	0.625	0	1.25	7.375	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	4570	Rupture
PL1.25x7.75-18	33.0	9.69	1.26	48.49	0.625	0	1.25	7.75	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	4852	Rupture
PL1.25x8.0625-18	34.3	10.08	1.31	54.59	0.625	0	1.25	8.0625	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	5506.8	Compress.
PL1.25x8.4375-18	35.9	10.55	1.37	62.57	0.625	0	1.25	8.4375	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	5303	Compress.
PL1.25x9-18	38.3	11.25	1.46	75.94	0.625	0	1.25	9	0	0	1.21875	65	80	0.80	18	1.00	18	[illegible]	[illegible]	Compress.	5657	Compress.
HSS4x3x1/4-12	9.9	2.91	3.91	6.15	1.5	0	0.233	4				50	62	0.80	12	1.00	12	[illegible]	[illegible]	Compress.	1303	Compress.
HSS5x4x5/16-12	15.9	4.68	11.1	15.8	2.0	0	0.291	5				50	62	0.80	12	1.00	12	[illegible]	[illegible]	Compress.	2099	Compress.
HSS6x5x3/8-12	23.4	6.88	25.5	33.9	2.5	0	0.349	6				50	62	0.80	12	1.00	12	[illegible]	[illegible]	Compress.	3086.3	Compress.
HSS6x6x3/8-120	25.8	7.58	39.5	39.5	3.0	0	0.349	6				46	58	1.00	120	1.00	120	[illegible]	[illegible]	Compress.	2601.6	Compress.
HSS6x6x1/2-120	33.1	9.74	48.3	48.3	3.0	0	0.465	6				46	58	1.00	120	1.00	120	[illegible]	[illegible]	Compress.	3316.7	Compress.
HSS7x7x1/2-120	39.5	11.6	80.5	80.5	3.5	0	0.465	7				46	58	1.00	120	1.00	120	[illegible]	[illegible]	Compress.	4177.7	Compress.
HSS8x8x1/2-120	45.9	13.5	125	125	4.0	0	0.465	8				46	58	1.00	120	1.00	120	[illegible]	[illegible]	Compress.	5038.4	Compress.

Rein1

Bottom	Top	Qty	Model	Position	T or T&C
0	8.25	3	CCI(1x5)	F	T&C
20	33.25	3	CCI(1x5)	F	T&C
100	103.25	3	CCI(1x5)	F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Flats (Used for relative orientation only. Actual flat numbers may vary.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1	1															
1	1	1															
1	1	1															

Rein2

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Rein3

Bottom	Top	Qty	Model	Position	T or T&C
0				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C
				F	T&C

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Reactions		
Mu	537.32	ft-kips
Axial, Pu:	15.21	kips
Shear, Vu:	23.77	kips
Elevation:	140	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
27.34

Pole Manufacturer:	Other

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data				
Qty:	24			
Diameter (in.):	0.75	Bolt Fu:	150	
Bolt Material:	Other	Bolt Fy:	113	
Strength (Fu):	150	ksi		
Yield (Fy):	113	ksi		
Circle (in.):	29.5			

Plate Data		
Diam:	34.75	in
Thick, t:	1.875	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.14	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	24	in
Thick:	0.5	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results | Rigid

Bolt Tension Capacity, φ*Tn,**B1**:	37.58 kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	37.55 kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	35.79 Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.474 in	
Min PL "treq" for actual **T w/ Pry:**	1.394 in	
Min PL "t1" for actual **T w/o Pry:**	1.439 in	
T allowable w/o Prying:	37.58 kips	α'<0 case
Prying Force, q:	0.00 kips	
Total Bolt Tension=Tu+q:	35.79 kips	
Non-Prying Bolt Stress Ratio, Tu/B:	95.3% Pass	

Exterior Flange Plate Results Flexural Check | Rigid

Compression Side Plate Stress:	20.7 ksi	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	64.0% Pass	Comp. Y.L. Length:
No Prying		17.15
Tension Side Stress Ratio, (treq/t)^2:	55.3% Pass	

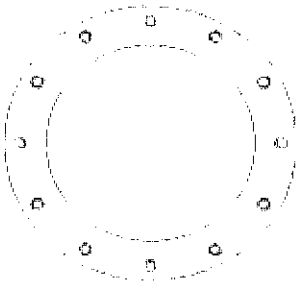
n/a

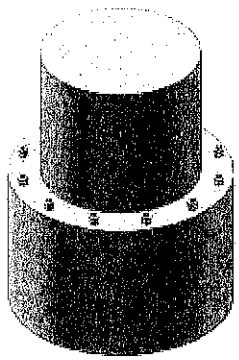
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Manufacturer:	Other

Reactions		
Moment:	537.32	ft-kips
Axial:	15.21	kips
Shear:	23.77	kips
Exterior Flange Run, T+q:	35.58	kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
27.34

Elevation: 140 feet

Bolt Data				
Qty:	24			
Diam:	0.75		Bolt Fu:	150
Bolt Material:	Other		Bolt Fy:	113
Strength (Fu):	150	ksi		
Yield (Fy):	113	ksi		
Circle:	29.5	in		

Plate Data		
Plate Outer Diam:	35	in
Plate Inner Diam:	24.25	in (Hole @ Ctr)
Thick:	1.875	in
Grade:	36	ksi
Effective Width:	4.58	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	36	in
Thick:	0.5	in
Pole Inner Diam:	35	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	35.8	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty),	37.6	Kips
Bolt Stress Ratio:	95.3%	**Pass**

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	37.1	Kips, Ext. Cu=Interior Cu
Plate Stress:	25.3	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	78.1%	**Pass**

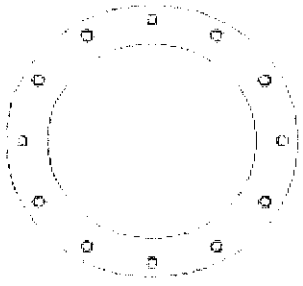
n/a

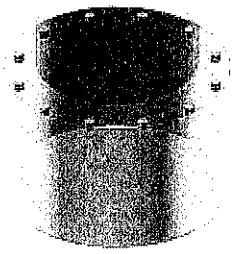
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Reactions		
Mu	1725.17	ft-kips
Axial, Pu:	30.015	kips
Shear, Vu:	33.9	kips
Elevation:	100	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
27.34

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Pole Manufacturer:	Other

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	52		
Diameter (in.):	0.75	Bolt Fu:	150
Bolt Material:	Other	Bolt Fy:	113
Strength (Fu):	150	ksi	
Yield (Fy):	113	ksi	
Circle (in.):	41.375		

Plate Data		
Diam:	46.5	in
Thick, t:	2.5	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	2.17	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	36	in
Thick:	0.5	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

			Rigid
Bolt Tension Capacity, φ*Tn,**B1**:	37.58	kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	37.56	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	37.91	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	Tu>B N/A	in	
Min PL "treq" for actual **T w/ Pry**:	1.757	in	
Min PL "t1" for actual **T w/o Pry**:	Tu>B N/A	in	
T allowable w/o Prying:	37.58	kips	
Prying Force, q:	0.00	kips T>B	Case
Total Bolt Tension=Tu+q:	37.91	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	100.9%	**Pass**	

Exterior Flange Plate Results Flexural Check

			Rigid
Compression Side Plate Stress:	18.2	ksi	TIA G
Allowable Plate Stress:	32.4	ksi	φ*Fy
Compression Plate Stress Ratio:	56.2%	**Pass**	Comp. Y.L. Length:
No Prying Check for Tu>B			20.39
Tension Side Stress Ratio, (treq/t)^2:	49.4%	**Pass**	

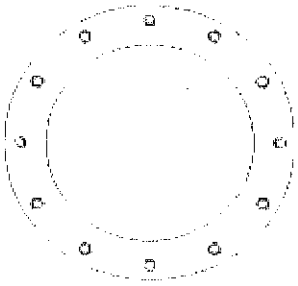
n/a

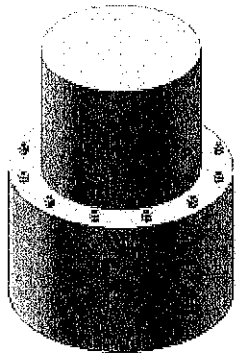
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Manufacturer:	Other

Reactions		
Moment:	1725.17	ft-kips
Axial:	30.015	kips
Shear:	33.9	kips
Exterior Flange Run, T+q:	37.91	kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
27.34

Elevation: 100 feet

Bolt Data				
Qty:	52			
Diam:	0.75		Bolt Fu:	150
Bolt Material:	Other		Bolt Fy:	113
Strength (Fu):	150	ksi		
Yield (Fy):	113	ksi		
Circle:	41.375	in		

Plate Data		
Plate Outer Diam:	46.75	in
Plate Inner Diam:	36.25	in (Hole @ Ctr)
Thick:	2.5	in
Grade:	36	ksi
Effective Width:	2.82	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	48	in
Thick:	0.625	in
Pole Inner Diam:	46.75	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	37.9	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty),	37.6	Kips
Bolt Stress Ratio:	100.9%	**Pass**

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	39.1	Kips, Ext. Cu=Interior Cu
Plate Stress:	23.8	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	73.4%	**Pass**

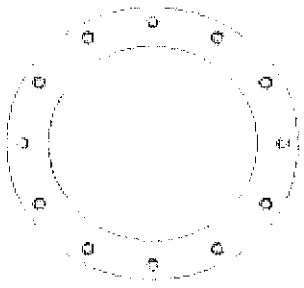
n/a

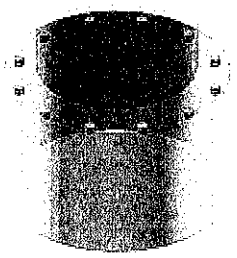
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Reactions		
Mu	3164.125	ft-kips
Axial, Pu:	48.24	kips
Shear, Vu:	38.65	kips
Elevation:	60	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Pole Manufacturer:	Other

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	56		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	
N/A:	55	<-- Disregard	
Circle (in.):	50.375		

Plate Data		
Diam:	52.5	in
Thick, t:	2.75	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	2.69	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	48	in
Thick:	0.625	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

			Rigid
Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.53	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	52.98	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.032	in	
Min PL "treq" for actual **T w/ Pry**:	0.983	in	
Min PL "t1" for actual **T w/o Pry**:	1.018	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	52.98	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	97.1%	**Pass**	

Exterior Flange Plate Results

	Flexural Check		Rigid
Compression Side Plate Stress:	8.2	ksi	TIA G
Allowable Plate Stress:	32.4	ksi	φ*Fy
Compression Plate Stress Ratio:	25.3%	**Pass**	Comp. Y.L. Length:
No Prying			15.29
Tension Side Stress Ratio, (treq/t)^2:	12.8%	**Pass**	

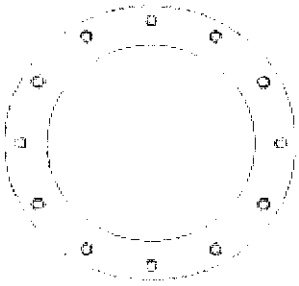
n/a

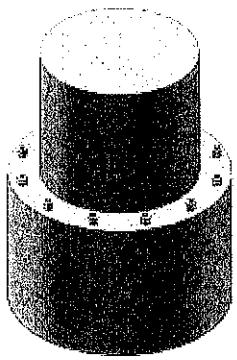
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Manufacturer:	Other

Reactions		
Moment:	3164.125	ft-kips
Axial:	48.24	kips
Shear:	38.65	kips
Exterior Flange Run, T+q:	52.98	kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
38.88

Elevation: 60 feet

Bolt Data			
Qty:	56		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle:	50.375	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	53.0	Kips, Ext. Flange Tu+q
Adjusted φ*Tn (due to Vu=Vu/Qty),	54.5	Kips
Bolt Stress Ratio:	97.2%	Pass

Plate Data		
Plate Outer Diam:	52.75	in
Plate Inner Diam:	48.25	in (Hole @ Ctr)
Thick:	2.75	in
Grade:	36	ksi
Effective Width:	2.96	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	54.7	Kips, Ext. Cu=Interior Cu
Plate Stress:	11.6	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	35.8%	Pass

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

n/a

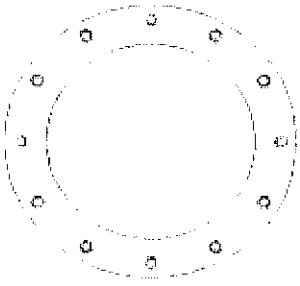
Stiffener Results

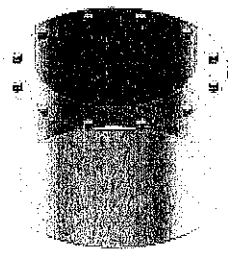
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Pole OuterDiam:	54	in
Thick:	0.625	in
Pole Inner Diam:	52.75	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

PROJECT	**82822.004.01 - Riverview, FL**				
SUBJECT	**Sabre MS450 Bridge Stiffeners @ 20'**				
DATE	**03/18/13**	PAGE	1	OF	1

B&T Engineering, Inc.
1325 E. 15th St., Suite 202
Tulsa, OK 74120
(918) 587-4630

SSC

Determine Load to Bridge Stiffener:

M =	4803.2 k-ft	From Risa Model	**Stiffener Width**	**4.500 in**
I =	43617.3 in^4	From AutoCAD Sketch	**Stiffener Thickness**	**1.000 in**
ybar =	30.600 in		**Stiffener Height**	**60.000 in**
S =	1425.40 in^3	I/y	**Fy**	**65 ksi**
fc =	40.44 ksi	M/S	**Step Width**	**3.00 in**
Ag =	4.500 in^2			
Pu =	181.97 k	fc x Ag	**Bolt Circle**	**56.38 in**
			Number of Bolts	**60**
Determine ΦPn (Allowable Axial Load):			**Bolt Size**	**1 1/8**
			Gap @ Flange	**3.00 in**

Pn = Fcr x Ag		Eqn E3-1, AISC 13th Edition, Section E3.
K =	1	
l =	16.000 in	Unsupported Length
Iy =	.375 in^4	Local Weak Axis Moment of Intertia
Ag =	4.500 in^2	Stiffener Cross Sectional Area
ry =	.289 in	Radius of Gyration (Weak Axis)
kl/r =	55.43	
4.71 x √(E/Fy) =	99.49	Limit State Equation for Flexural Buckling - AISC 13th Edition, Section E3.
Fe =	93.17 ksi	Eqn E3-4 - AISC 13th Edition, Section E3. Elastic Critical Buckling Stress
Fcr =	48.54 ksi	Eqn E3-2, AISC 13th Edition, Section E3 Critical Buckling Stress
Pn =	218.43 k	Nominal Compressive Strength
ΦPn =	196.59 k	Allowable Compressive Strength

Unity% = 92.6 %

Moment to Existing Bolt Group:

S_{BG} =	1547.40 in^3	# Bolts Acting	15
ft =	37.25 ksi		
Ab =	.994 in^2		
T =	555.39 k		
Arm =	56.38 ksi		
M_{EQ} =	2609.2 k-ft	**<-------Insert into Crown Spreadsheet**	

Stiffened or Unstiffened, Exterior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Reactions		
Mu	2609	ft-kips
Axial, Pu:	70.26	kips
Shear, Vu:	43.061	kips
Elevation:	20	feet

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
43.05

Pole Manufacturer:	Other

If No stiffeners, Criteria:	TIA G	<-Only Applcable to Unstiffened Cases

Bolt Data			
Qty:	60		
Diameter (in.):	1.125	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	75	<-- Disregard	
N/A:	55	<-- Disregard	
Circle (in.):	56.375		

Plate Data		
Diam:	58.5	in
Thick, t:	3.125	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	2.83	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	54	in
Thick:	0.625	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

			Rigid
Bolt Tension Capacity, φ*Tn,**B1**:	60.09	kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	60.08	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	35.85	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.008	in	
Min PL "treq" for actual **T w/ Pry**:	0.620	in	
Min PL "t1" for actual **T w/o Pry**:	0.779	in	
T allowable w/o Prying:	60.09	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	35.85	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	59.7%	**Pass**	

Exterior Flange Plate Results Flexural Check

			Rigid
Compression Side Plate Stress:	4.2	ksi	TIA G
Allowable Plate Stress:	32.4	ksi	φ*Fy
Compression Plate Stress Ratio:	13.1%	Pass	Comp. Y.L. Length:
No Prying			16.19
Tension Side Stress Ratio, (treq/t)^2:	3.9%	**Pass**	

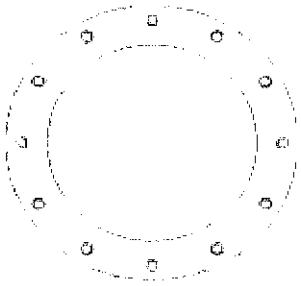
n/a

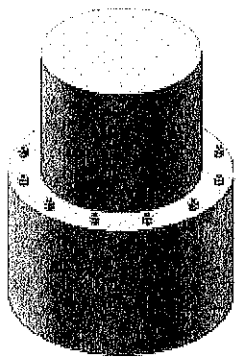
Stiffener Results

Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

Stiffened or Unstiffened, Interior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Manufacturer:	Other

Reactions		
Moment:	2609	ft-kips
Axial:	70.26	kips
Shear:	43.061	kips
Exterior Flange Run, T+q:	35.85	kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
43.05

Elevation: 20 feet

Bolt Data			
Qty:	60		
Diam:	1.125	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle:	56.375	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	35.9	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty),	60.1	Kips
Bolt Stress Ratio:	59.7%	**Pass**

Plate Data		
Plate Outer Diam:	58.75	in
Plate Inner Diam:	54.25	in (Hole @ Ctr)
Thick:	3.125	in
Grade:	36	ksi
Effective Width:	3.08	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	38.2	Kips, Ext. Cu=Interior Cu
Plate Stress:	6.0	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	18.6%	**Pass**

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

n/a

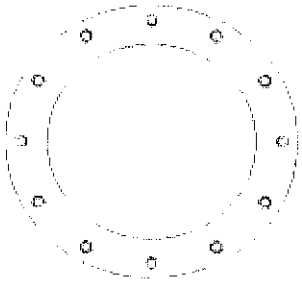
Stiffener Results

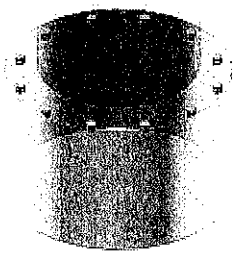
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

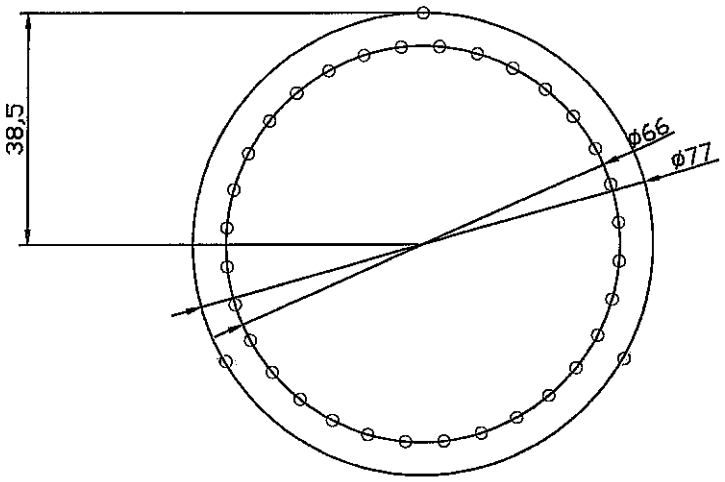
Pole Data		
Pole OuterDiam:	60	in
Thick:	0.625	in
Pole Inner Diam:	58.75	in
Grade:	36	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes



---------- REGIONS ----------
Area: 109.9557
Perimeter: 219.9115
Bounding Box:
Lower Bound: X= 306.8425 Y= -72.3442
Upper Bound: X= 375.5251 Y= 1.0371
Centroid: X= 341.0635 Y= -38.4622
Moments of Inertia: X= 224413.2006 Y= 12852276.4066
Products of Inertia: XY= -1442403.5644
Radii of gyration: X= 45.1768 Y= 341.8858
Principal moments and X-Y directions about centroid:
MOI: I: 61751.5379 along X= 1 Y= 0 Z= 0
J: 61751.5379 along X= 0 Y= 1 Z= 0

BASE MOMENT: 5680 K-ft

$$\sigma_1 = \frac{MY}{I} = \frac{5680\ \text{k-ft} \times 12\ \text{in/ft} \times 38.5\ \text{in}}{61{,}751.54\ \text{in}^4} = 42.5\ \text{KSI}$$

$\sigma_1 \times A_{net} = 42.5\ \text{KSI} \times 2.5\ \text{in}^2 = 106.24\ \text{kip}$.

$P_{all} = 210\ \text{kip}$ new rod stress ratio: $\frac{106.24\ \text{k}}{210\ \text{k}} = 50.6\%$

MOMENT GOING TO NEW ANCHOR RODS: $106.24\ \text{kip} \times 38.5\ \text{in} \times (2) = 8180.5\ \text{k-in}$
$= 681.71\ \text{k-ft}$

BENDING MOMENT GOING TO EXISTING ANCHOR RODS:

$5{,}680\ \text{k-ft} - 681.7 = 4{,}998.3\ \text{k-ft}$

Stiffened or Unstiffened, Ungrouted, Circular Base Plate - Any Rod Material

TIA Rev G Assumption: Clear space between bottom of leveling nut and top of concrete **not** exceeding (1)*(Rod Diameter)

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Pole Manufacturer:	*Other*

Reactions		
Mu:	4998.3	ft-kips
Axial, Pu:	83	kips
Shear, Vu:	45	kips
Eta Factor, η	0.5	TIA G (Fig. 4-4)

If No stiffeners, Criteria:	AISC LRFD	<-Only Applcable to Unstiffened Cases

Anchor Rod Data		
Qty:	32	
Diam:	2	in
Rod Material:	Other	
Strength (Fu):	58	ksi
Yield (Fy):	36	ksi
Bolt Circle:	66	in

Anchor Rod Results

		Rigid
Max Rod (Cu+ Vu/ή):	119.0 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	116.0 Kips	φ*Tn
Anchor Rod Stress Ratio:	102.6% **Pass**	

Plate Data		
Diam:	72	in
Thick:	3.25	in
Grade:	36	ksi
Single-Rod B-eff:	5.89	in

Base Plate Results Flexural Check

		Rigid
Base Plate Stress:	13.9 ksi	AISC LRFD
Allowable Plate Stress:	32.4 ksi	φ*Fy
Base Plate Stress Ratio:	42.9% **Pass**	Y.L. Length: 27.50

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.3125	in
Width:	5	in
Height:	18	in
Thick:	0.75	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

n/a

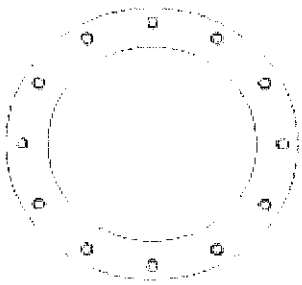
Stiffener Results

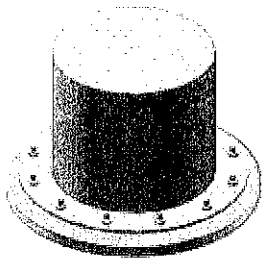
Horizontal Weld :	n/a
Vertical Weld:	n/a
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	n/a
Plate Tension+Shear, ft/Ft+(fv/Fv)^2	n/a
Plate Comp. (AISC Bracket):	n/a

Pole Results

Pole Punching Shear Check: n/a

Pole Data		
Diam:	60	in
Thick:	0.625	in
Grade:	35	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None





* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt

** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

(Bearing and Stability Checks) Tool for TIA Rev F or G - Application (MP, SST with unitbase)

Site Data

BU#: *878783*
Site Name: *PORTLAND NORTH*
App #: *164898, Rev 1*

Loads Already Factored		
For P (DL)	1.2	<----Disregard
For P,V, and M (WL)	1.35	<----Disregard

Pad & Pier Data		
Base PL Dist. Above Pier:	0	in
Pier Dist. Above Grade:	0	in
Pad Bearing Depth, D:	5	ft
Pad Thickness, T:	5	ft
Pad Width=Length, L:	27	ft
Pier Cross Section Shape:	Round	<--Pull Down
Enter Pier Diameter:	0	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	0.00	ft^2
Pier Height:	0.00	ft
Soil (above pad) Height:	0.00	ft

Soil Parameters		
Unit Weight, γ:	125.0	pcf
Ultimate Bearing Capacity, qn:	6.00	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	30.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Bearing: ϕ*qn:	4.50	ksf
Passive Pres. Coeff., Kp	3.00	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	45.0	kips
Pad Force Location Above D:	1.67	ft
ϕ(Passive Pressure Moment):	75.00	ft-kips
Factored O.T. M(WL), "1.6W":	5995.0	ft-kips
Factored OT (MW-Msoil), M1	5920.00	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	0.00	ft
Sum of Soil Wedges Wt:	0.00	kips
Soil Wedges ecc, K1:	0.00	ft
Ftg+Soil above Pad wt:	546.8	kips
Unfactored (Total ftg-soil Wt):	546.75	kips
1.2D. **No Soil Wedges**.	739.10	kips
0.9D. **With Soil Wedges**	554.33	kips

Resistance due to Cohesion (Vertical)		
ϕ*(1/2*Cu)(Total Vert. Planes)	0.00	kips
Cohesion Force Eccentricity, K2	0.00	ft

Monopole Base Reaction Forces		
TIA Revision:	G	<--Pull Down
Factored DL Axial, PDu:	83	kips
Factored WL Axial, PWu:	0	kips
Factored WL Shear, Vu:	45	kips
Factored WL Moment, Mu:	5770	ft-kips

Load Factor	Shaft Factored Loads		
1.00	1.2D+1.6W, Pu:	83	kips
0.90	0.9D+1.6W, Pu:	62.25	kips
1.00	Vu:	45	kips
	Mu:	5770	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	739.10	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	5920.00	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	8.01	ft
Orthogonal qu=	2.49	ksf
qu/ϕ*qn Ratio=	**55.40%**	**Pass**

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	5.66	ft
Diagonal qu=	3.01	ksf
qu/ϕ*qn Ratio=	**66.85%**	**Pass**

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	554.33	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	5920.00	ft-kips

Orthogonal ecc3 = M2/P2 =	10.68	ft
Ortho Non Bearing Length,NBL=	21.36	ft
Orthogonal qu=	3.64	ksf
Diagonal qu=	3.92	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	5770.00		
M Orthogonal:	6068.88	**95.08%**	**Pass**
M Diagonal:	6068.88	**95.08%**	**Pass**

APPENDIX D

TOWER MODIFICATION DRAWINGS