October 08, 2015

Evan Oswald
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Subject:	**Structural Analysis Report**	
Carrier Designation:	***AT&T Mobility* Co-Locate**	
	Carrier Site Number:	MEL05015
	Carrier Site Name:	North Portland
Crown Castle Designation:	**Crown Castle BU Number:**	856245
	Crown Castle Site Name:	NORTH PORTLAND
	Crown Castle JDE Job Number:	347748
	Crown Castle Work Order Number:	1124287
	Crown Castle Application Number:	311267 Rev. 1
Engineering Firm Designation:	**B+T Group Project Number:**	101602.001.01
Site Data:	**1340 Riverside Street, Portland, Cumberland County, ME** **Latitude *43° 43' 0.63"*, Longitude *-70° 18' 18.79"*** **177.5 Foot - Monopole Tower**	

Dear Evan Oswald,

B+T Group is pleased to submit this **"Structural Analysis Report"** to determine the structural integrity of the above mentioned tower. This analysis has been performed in accordance with the Crown Castle Structural 'Statement of Work' and the terms of Crown Castle Purchase Order Number 833615, in accordance with application 311267, 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:

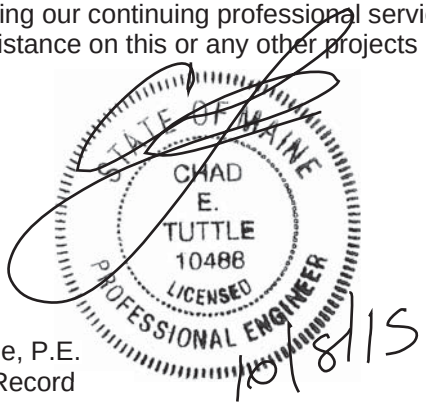
LC5: Existing + Proposed Equipment **Sufficient Capacity**
Note: See Table 1 and Table 2 for the proposed and existing loading, respectively.

The analysis has been performed in accordance with the TIA-222-G standard and 2009 IBC based upon a wind speed of 100 mph 3-second gust, exposure category C with topographic category 1 and crest height of 0 feet.

All 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.



Maher (Mack) Eltarhoni, E.I.
Project Engineer

Chad E. Tuttle, P.E.
Engineer of Record

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1) INTRODUCTION

This tower is a 177.5 ft. Monopole tower designed by PiROD Manufactures INC. in March of 1997. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

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 with topographic category 1 and crest height of 0 feet.

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
179.0	183.0	1	Andrew	SBNHH-1D65A	2 1	3/4 3/8	--
		2	CCI Antennas	HPA-65R-BUU-H8			
		3	Ericsson	RRUS 11			
		3	Ericsson	RRUS A2			
		1	Raycap	DC6-48-60-18-8F			

Table 2 - Existing 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
179.0	183.0	1	Andrew	SBNH-1D6565C	12 2 1	1-5/8 3/4 3/8	1
		6	Ericsson	RRUS-11			
		1	KMW Comm.	AM-X-CD-14-65-00T-RET			
		1	Powerwave Tech.	P65-17-XLH-RR			
		1	Raycap	DC6-48-60-18-8F			
	182.0	6	Powerwave Tech.	7020.00			
		6	Powerwave Tech.	7770.00			
		4	Powerwave Technologies	LGP21401			
		6	Powerwave Tech.	LGP21901			
		1	Powerwave Tech.	TT19-08BP111-001			
	179.0	1	--	Platform Mount [LP 603-1]			
125.0	125.0	2	Gabriel Electronics	DDP8P-3J107ASE	2	EW90	1
		2	--	Pipe Mount [PM 602-1]			

Notes:
1) Existing Equipment

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)
177.5	177.5	12	Allgon	ALP9212	18	7/8
		6	Antennae	PD10017		
		1	Generic	Rotatable Platform		
160.0	160.0	2	Generic	6' HP Dishes	2	EW52
140.0	140.0	2	Generic	6' HP Dishes	2	EW52
120.0	120.0	2	Generic	6' HP Dishes	2	EW52

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Remarks	Reference	Source
Online Application	AT&T Mobility co-locate, Rev # 1	311267	CCI Sites
Tower Manufacturer Drawing	PiROD, Date: 03/05/1997	4899464	CCI Sites
Foundation Drawing	PiROD, Date: 03/05/1997	4899450	CCI Sites
Geotechnical Report	Haley&Aldrich, File No. 80593-001	4899462	CCI Sites
Antenna Configuration	Crown CAD Package	Date: 09/22/2015	CCI Sites

3.1) Analysis Method

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

3.2) Assumptions

1) 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.
5) Base and flange plate design methodology of the manufacturer has been reviewed and found to be an acceptable means of designing to resist the full capacity of the bolts and shaft.

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)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	177.5 - 160	Pole	P24x0.375	1	-5.892	1052.070	38.5	Pass
L2	160 - 140	Pole	P30x0.375	2	-9.303	1311.060	52.6	Pass
L3	140 - 120	Pole	P36x0.375	3	-13.936	1490.100	61.8	Pass
L4	120 - 100	Pole	P42x0.375	4	-18.616	1668.870	71.3	Pass
L5	100 - 80	Pole	P48x0.375	5	-23.913	1847.490	77.1	Pass
L6	80 - 60	Pole	P54x0.375	6	-29.817	2026.000	80.7	Pass
L7	60 - 40	Pole	P60x0.375	7	-36.326	2204.430	83.1	Pass
L8	40 - 20	Pole	P60x0.5	8	-44.762	3125.690	74.7	Pass
L9	20 - 0	Pole	P60x0.5	9	-53.292	3125.690	89.2	Pass
							Summary	
						Pole (L9)	89.2	Pass
						RATING =	89.2	Pass

Table 6 - Tower Component Stresses vs. Capacity – LC5

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1,2	Flange Connections	160	38.5	Pass
1,3	Flange Connections	140	53.9	Pass
1,3	Flange Connections	120	64.6	Pass
1,3	Flange Connections	100	75.9	Pass
1,3	Flange Connections	80	83.0	Pass
1,2	Flange Connections	60	80.7	Pass
1,2	Flange Connections	40	83.1	Pass
1,2	Flange Connections	20	74.7	Pass
1	Anchor Rods	Base	52.4	Pass
1,4	Base Plate	Base	89.2	Pass
1	Base Foundation Structural	Base	49.9	Pass
1	Base Foundation Soil Interaction	Base	56.4	Pass

Structure Rating (max from all components) =	**89.2%**

Notes:
1) See additional documentation in “Appendix C – Additional Calculations” for calculations supporting the % capacity consumed.
2) Flange plates have the same capacity as their respective shaft
3) Flange plates have the same capacity as their respective splice bolts
4) Base plates have the same capacity as their respective shaft

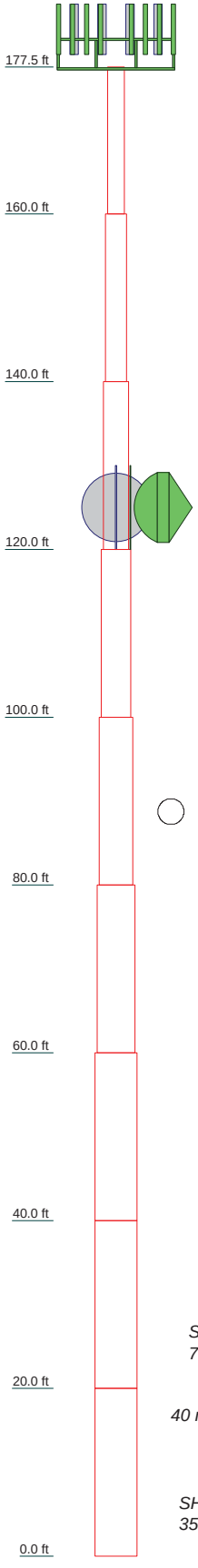
4.1) Recommendations

The tower and its foundation have sufficient capacity to carry the existing and proposed loads. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Section	Size	Length (ft)	Grade	Weight (K)
1	P24x0.375	17.500	A53-B-42	1.7
2	P30x0.375	20.000		2.4
3	P36x0.375	20.000		2.9
4	P42x0.375	20.000		3.3
5	P48x0.375	20.000		3.8
6	P54x0.375	20.000		4.3
7	P60x0.375	20.000		4.8
8	P60x0.5	20.000		6.4
9	P60x0.5	20.000		6.4
				35.8



ALL REACTIONS ARE FACTORED

AXIAL 91 K

SHEAR 7 K — *MOMENT 812 kip-ft*

TORQUE 2 kip-ft
40 mph WIND - 1.000 in ICE

AXIAL 53 K

SHEAR 35 K — *MOMENT 4250 kip-ft*

TORQUE 13 kip-ft
REACTIONS - 100 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 7770.00 w/ Mount Pipe (E)	179	(2) RRUS-11 (E)	179
(2) 7770.00 w/ Mount Pipe (E)	179	(2) RRUS-11 (E)	179
(2) 7770.00 w/ Mount Pipe (E)	179	DC6-48-60-18-8F (E)	179
P65-17-XLH-RR w/ Mount Pipe (E)	179	HPA-65R-BUU-H8 w/ Mount Pipe (P)	179
SBNH-1D6565C w/ Mount Pipe (E)	179	HPA-65R-BUU-H8 w/ Mount Pipe (P)	179
AM-X-CD-14-65-00T-RET w/ Mount Pipe (E)	179	SBNHH-1D65A w/ Mount Pipe (P)	179
(2) LGP21901 (E)	179	RRUS 11 (P)	179
(2) LGP21901 (E)	179	RRUS 11 (P)	179
(2) LGP21901 (E)	179	RRUS 11 (P)	179
TT19-08BP111-001 (E)	179	RRUS A2 (P)	179
(2) 7020.00 (E)	179	RRUS A2 (P)	179
(2) 7020.00 (E)	179	RRUS A2 (P)	179
(2) 7020.00 (E)	179	DC6-48-60-18-8F (P)	179
LGP21401 (E)	179	Platform Mount [LP 603-1] (E)	179
LGP21401 (E)	179	Pipe Mount [PM 602-1] (E)	125
(2) LGP21401 (E)	179	Pipe Mount [PM 602-1] (E)	125
(2) RRUS-11 (E)	179	DDP8P-3J107ASE (E)	125
		DDP8P-3J107ASE (E)	125

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi			

TOWER DESIGN NOTES

1. Tower is located in Cumberland County, Maine.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3. Tower designed for a 100 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 40 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.000 ft
8. TOWER RATING: 89.2%

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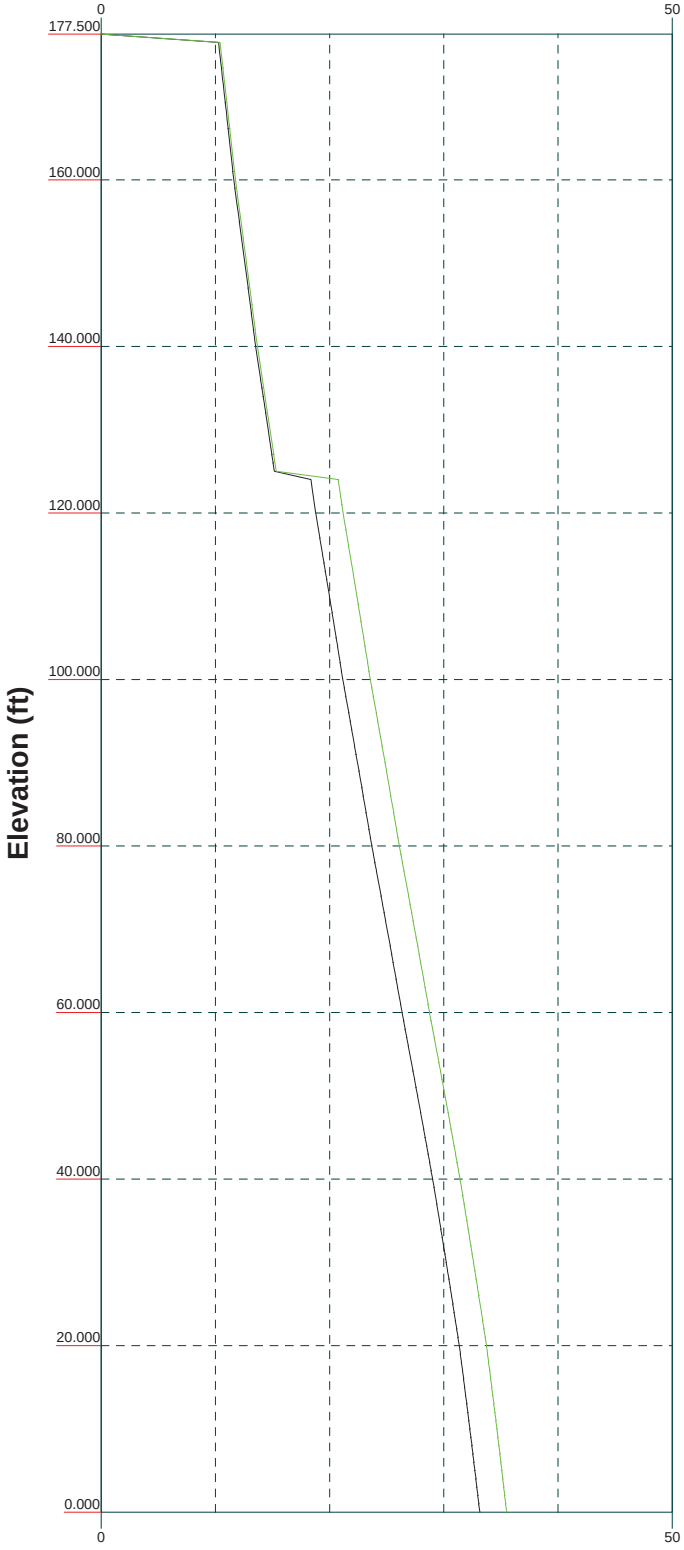
Job: 101602.001.01 - NORTH PORTLAND, ME (BU# 856245			
Project:			
Client: Crown Castle	Drawn by: M. Eltarhoni	App'd:	
Code: TIA-222-G	Date: 10/08/15	Scale: NTS	
Path: S:\Projects\Crown Castle\100000\101602_856245_North Portland\Engineering\tnxTower\101602_001_01_NORTH PORTLAND_ME.eri		Dwg No. E-1	

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

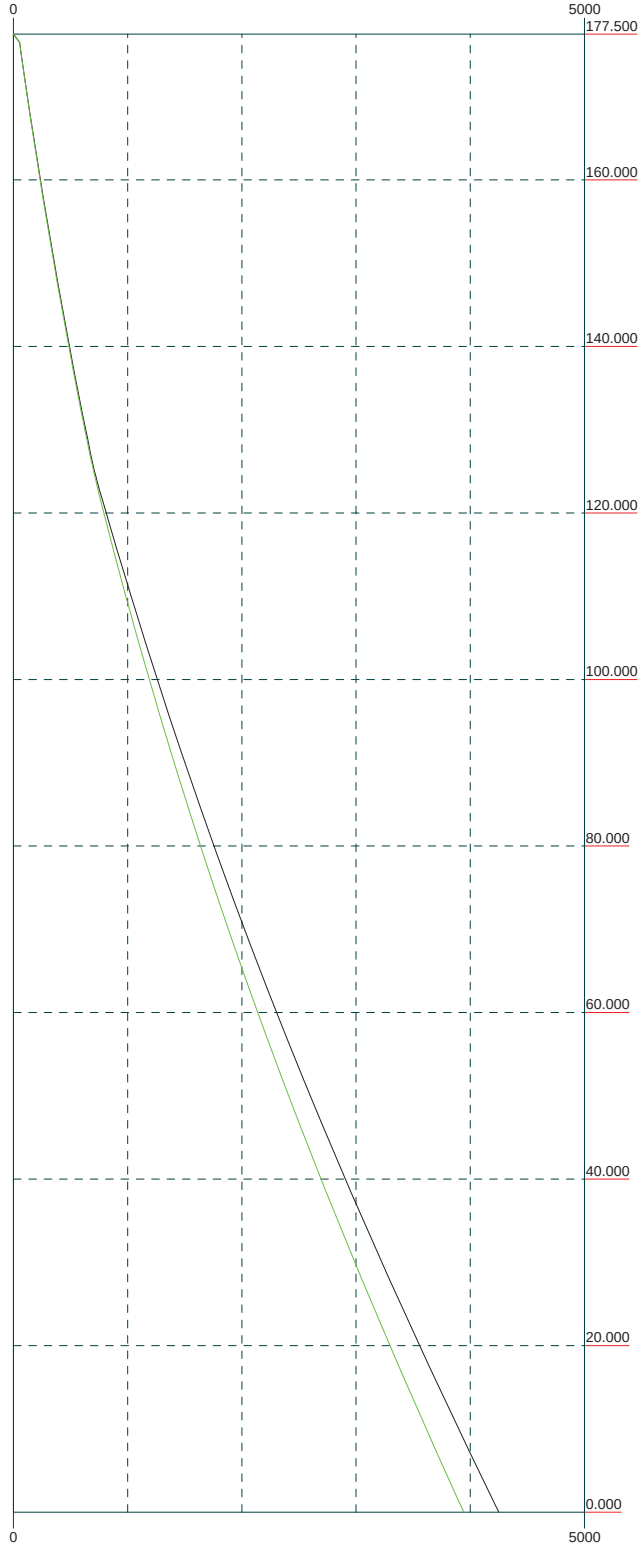
Maximum Values

Vx Vz Mx Mz

Global Mast Shear (K)



Global Mast Moment (kip-ft)



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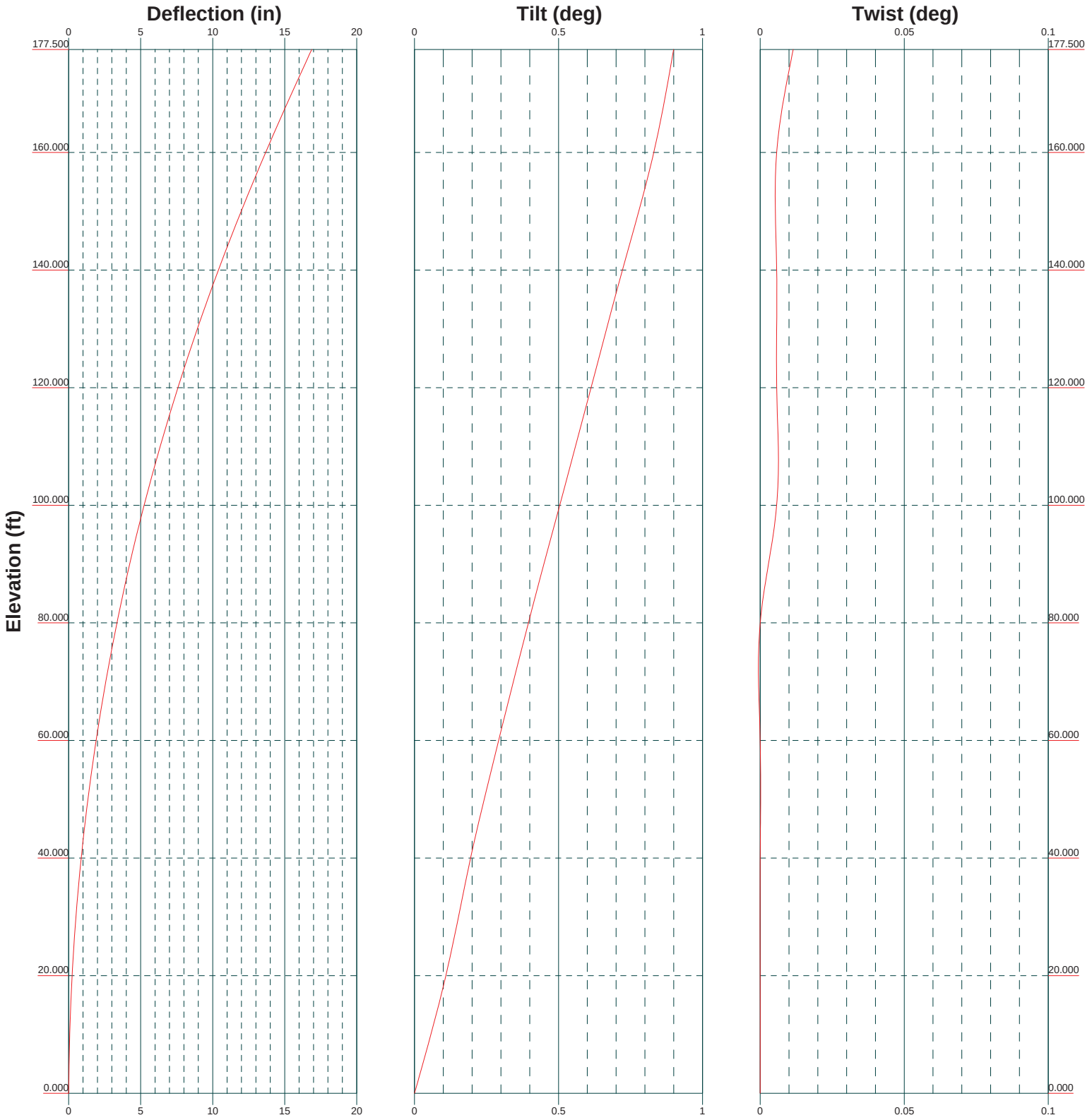
Code: TIA-222-G	Date: 10/08/15	Scale: NTS
Path: S:\Projects\Crown Castle\100000\101602_856245_North Portland\Engineering\tnxTower\101602_001_01_NORTH PORTLAND_ME.eri		Dwg No. E-4

TIA-222-G - Service - 60 mph

Maximum Values



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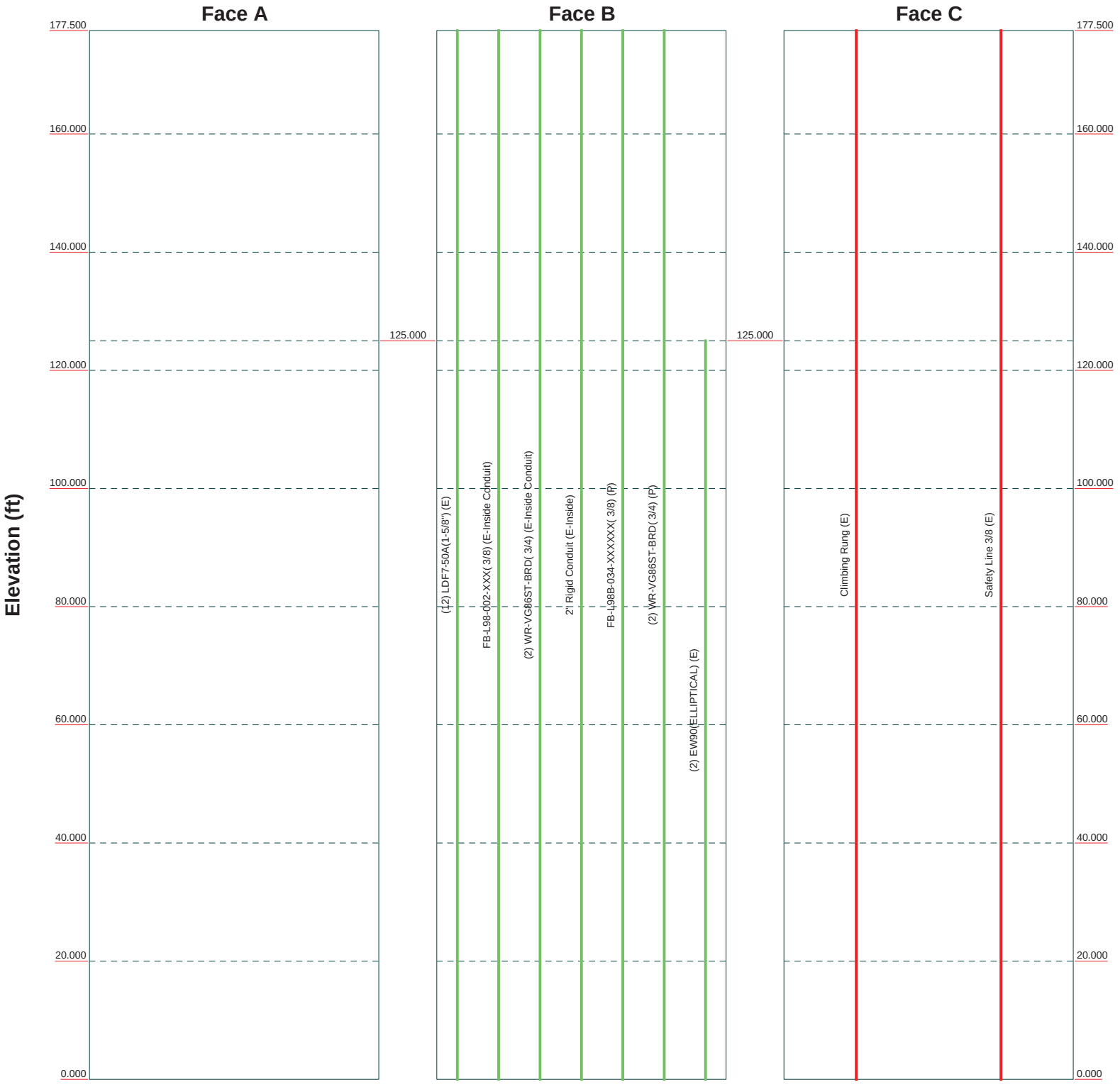
Code: TIA-222-G	Date: 10/08/15	Scale: NTS	
Path: S:\Projects\Crown Castle\100000\101602_856245_North Portland\Engineering\tnxTower\101602_001_01_NORTH PORTLAND_ME.eri		Dwg No. E-5	

Feed Line Distribution Chart
0' - 177'6"

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



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Job: ***101602.001.01 - NORTH PORTLAND, ME (BU# 856245***		
Project:		
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Code: TIA-222-G	Date: 10/08/15	Scale: NTS
Path: S:\Projects\Crown Castle\100000\101602_856245_North Portland\Engineering\tnxTower\101602_001_01_NORTH PORTLAND_ME.eri		Dwg No. E-7

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, feed line 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		Use TIA-222-G Tension Splice Capacity Exemption		

Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Pole Size*	*Pole Grade*	*Socket Length* *ft*
L1	177.500-160.000	17.500	P24x0.375	A53-B-42 (42 ksi)	
L2	160.000-140.000	20.000	P30x0.375	A53-B-42 (42 ksi)	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L3	140.000-120.000	20.000	P36x0.375	A53-B-42 (42 ksi)	
L4	120.000-100.000	20.000	P42x0.375	A53-B-42 (42 ksi)	
L5	100.000-80.000	20.000	P48x0.375	A53-B-42 (42 ksi)	
L6	80.000-60.000	20.000	P54x0.375	A53-B-42 (42 ksi)	
L7	60.000-40.000	20.000	P60x0.375	A53-B-42 (42 ksi)	
L8	40.000-20.000	20.000	P60x0.5	A53-B-42 (42 ksi)	
L9	20.000-0.000	20.000	P60x0.5	A53-B-42 (42 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 177.500-160.000				1	1	1		
L2 160.000-140.000				1	1	1		
L3 140.000-120.000				1	1	1		
L4 120.000-100.000				1	1	1		
L5 100.000-80.000				1	1	1		
L6 80.000-60.000				1	1	1		
L7 60.000-40.000				1	1	1		
L8 40.000-20.000				1	1	1		
L9 20.000-0.000				1	1	1		

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
-									
Climbing Rung (E)	C	Surface Ar (CaAa)	177.500 - 0.000	1	1	0.000 0.000	1.000		0.008
Safety Line 3/8 (E)	C	Surface Ar (CaAa)	177.500 - 0.000	1	1	0.000 0.000	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
-									

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
LDF7-50A(1-5/8") (E)	B	No	Inside Pole	177.500 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
FB-L98-002-XXX(3/8) (E-Inside Conduit)	B	No	Inside Pole	177.500 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
WR-VG86ST-BRD(3/4) (E-Inside Conduit)	B	No	Inside Pole	177.500 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
2" Rigid Conduit (E-Inside)	B	No	Inside Pole	177.500 - 0.000	1	No Ice	0.000	0.003
						1/2" Ice	0.000	0.003
						1" Ice	0.000	0.003
FB-L98B-034-XXXXXX (3/8) (P)	B	No	Inside Pole	177.500 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
WR-VG86ST-BRD(3/4) (P)	B	No	Inside Pole	177.500 - 0.000	2	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
-								
EW90(ELLIPTICAL) (E)	B	No	Inside Pole	125.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
-								

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	177.500-160.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.265
		C	0.000	0.000	2.406	0.000	0.151
L2	160.000-140.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.302
		C	0.000	0.000	2.750	0.000	0.172
L3	140.000-120.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.305
		C	0.000	0.000	2.750	0.000	0.172
L4	120.000-100.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.315
		C	0.000	0.000	2.750	0.000	0.172
L5	100.000-80.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.315
		C	0.000	0.000	2.750	0.000	0.172
L6	80.000-60.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.315
		C	0.000	0.000	2.750	0.000	0.172
L7	60.000-40.000	A	0.000	0.000	0.000	0.000	0.000

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		B	0.000	0.000	0.000	0.000	0.315
		C	0.000	0.000	2.750	0.000	0.172
L8	40.000-20.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.315
		C	0.000	0.000	2.750	0.000	0.172
L9	20.000-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.315
		C	0.000	0.000	2.750	0.000	0.172

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	177.500-160.000	A	2.355	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.265
		C		0.000	0.000	18.888	0.000	0.457
L2	160.000-140.000	A	2.327	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.302
		C		0.000	0.000	21.366	0.000	0.515
L3	140.000-120.000	A	2.294	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.305
		C		0.000	0.000	21.101	0.000	0.507
L4	120.000-100.000	A	2.256	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.315
		C		0.000	0.000	20.797	0.000	0.497
L5	100.000-80.000	A	2.211	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.315
		C		0.000	0.000	20.439	0.000	0.486
L6	80.000-60.000	A	2.156	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.315
		C		0.000	0.000	20.000	0.000	0.472
L7	60.000-40.000	A	2.085	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.315
		C		0.000	0.000	19.429	0.000	0.455
L8	40.000-20.000	A	1.981	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.315
		C		0.000	0.000	18.598	0.000	0.431
L9	20.000-0.000	A	1.775	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.315
		C		0.000	0.000	16.949	0.000	0.386

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	177.500-160.000	0.000	0.200	0.000	0.960
L2	160.000-140.000	0.000	0.201	0.000	1.036
L3	140.000-120.000	0.000	0.202	0.000	1.091
L4	120.000-100.000	0.000	0.202	0.000	1.129
L5	100.000-80.000	0.000	0.203	0.000	1.154
L6	80.000-60.000	0.000	0.203	0.000	1.167
L7	60.000-40.000	0.000	0.204	0.000	1.167

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L8	40.000-20.000	0.000	0.204	0.000	1.127
L9	20.000-0.000	0.000	0.204	0.000	1.047

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	10	Climbing Rung	160.00 - 177.50	1.0000	1.0000
L1	11	Safety Line 3/8	160.00 - 177.50	1.0000	1.0000
L2	10	Climbing Rung	140.00 - 160.00	1.0000	1.0000
L2	11	Safety Line 3/8	140.00 - 160.00	1.0000	1.0000
L3	10	Climbing Rung	120.00 - 140.00	1.0000	1.0000
L3	11	Safety Line 3/8	120.00 - 140.00	1.0000	1.0000
L4	10	Climbing Rung	100.00 - 120.00	1.0000	1.0000
L4	11	Safety Line 3/8	100.00 - 120.00	1.0000	1.0000
L5	10	Climbing Rung	80.00 - 100.00	1.0000	1.0000
L5	11	Safety Line 3/8	80.00 - 100.00	1.0000	1.0000
L6	10	Climbing Rung	60.00 - 80.00	1.0000	1.0000
L6	11	Safety Line 3/8	60.00 - 80.00	1.0000	1.0000
L7	10	Climbing Rung	40.00 - 60.00	1.0000	1.0000
L7	11	Safety Line 3/8	40.00 - 60.00	1.0000	1.0000
L8	10	Climbing Rung	20.00 - 40.00	1.0000	1.0000
L8	11	Safety Line 3/8	20.00 - 40.00	1.0000	1.0000
L9	10	Climbing Rung	0.00 - 20.00	1.0000	1.0000
L9	11	Safety Line 3/8	0.00 - 20.00	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
(2) 7770.00 w/ Mount Pipe (E)	A	From Leg	4.000 0.000 3.000		0.000	179.000	No Ice 1/2" Ice 1" Ice	6.119 6.626 7.128	4.254 5.014 5.711	0.055 0.103 0.157
(2) 7770.00 w/ Mount Pipe (E)	B	From Leg	4.000 0.000		0.000	179.000	No Ice 1/2" Ice	6.119 6.626	4.254 5.014	0.055 0.103

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			3.000			1" Ice	7.128	5.711	0.157
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000	0.000	179.000	No Ice	6.119	4.254	0.055
(E)			0.000			1/2" Ice	6.626	5.014	0.103
			3.000			1" Ice	7.128	5.711	0.157
P65-17-XLH-RR w/ Mount Pipe	A	From Leg	4.000	0.000	179.000	No Ice	11.704	8.938	0.092
			0.000			1/2" Ice	12.424	10.450	0.178
(E)			4.000			1" Ice	13.153	11.986	0.273
SBNH-1D6565C w/ Mount Pipe	B	From Leg	4.000	0.000	179.000	No Ice	11.683	9.842	0.099
			0.000			1/2" Ice	12.404	11.366	0.189
(E)			4.000			1" Ice	13.135	12.914	0.288
AM-X-CD-14-65-00T-RET w/ Mount Pipe	C	From Leg	4.000	0.000	179.000	No Ice	5.744	4.015	0.035
			0.000			1/2" Ice	6.198	4.633	0.080
(E)			4.000			1" Ice	6.661	5.276	0.131
(2) LGP21901	A	From Leg	2.000	0.000	179.000	No Ice	0.270	0.184	0.006
(E)			0.000			1/2" Ice	0.343	0.248	0.008
			3.000			1" Ice	0.425	0.322	0.011
(2) LGP21901	B	From Leg	2.000	0.000	179.000	No Ice	0.270	0.184	0.006
(E)			0.000			1/2" Ice	0.343	0.248	0.008
			3.000			1" Ice	0.425	0.322	0.011
(2) LGP21901	C	From Leg	2.000	0.000	179.000	No Ice	0.270	0.184	0.006
(E)			0.000			1/2" Ice	0.343	0.248	0.008
			3.000			1" Ice	0.425	0.322	0.011
TT19-08BP111-001	A	From Leg	4.000	0.000	179.000	No Ice	0.636	0.516	0.016
(E)			0.000			1/2" Ice	0.747	0.619	0.022
			3.000			1" Ice	0.867	0.730	0.029
(2) 7020.00	A	From Leg	4.000	0.000	179.000	No Ice	0.119	0.204	0.002
(E)			0.000			1/2" Ice	0.171	0.279	0.005
			3.000			1" Ice	0.232	0.363	0.009
(2) 7020.00	B	From Leg	4.000	0.000	179.000	No Ice	0.119	0.204	0.002
(E)			0.000			1/2" Ice	0.171	0.279	0.005
			3.000			1" Ice	0.232	0.363	0.009
(2) 7020.00	C	From Leg	4.000	0.000	179.000	No Ice	0.119	0.204	0.002
(E)			0.000			1/2" Ice	0.171	0.279	0.005
			3.000			1" Ice	0.232	0.363	0.009
LGP21401	A	From Leg	4.000	0.000	179.000	No Ice	1.288	0.233	0.014
(E)			0.000			1/2" Ice	1.445	0.313	0.021
			3.000			1" Ice	1.611	0.403	0.030
LGP21401	B	From Leg	4.000	0.000	179.000	No Ice	1.288	0.233	0.014
(E)			0.000			1/2" Ice	1.445	0.313	0.021
			3.000			1" Ice	1.611	0.403	0.030
(2) LGP21401	C	From Leg	4.000	0.000	179.000	No Ice	1.288	0.233	0.014
(E)			0.000			1/2" Ice	1.445	0.313	0.021
			3.000			1" Ice	1.611	0.403	0.030
(2) RRUS-11	A	From Leg	4.000	0.000	179.000	No Ice	3.249	1.373	0.048
(E)			0.000			1/2" Ice	3.491	1.551	0.068
			4.000			1" Ice	3.741	1.738	0.092
(2) RRUS-11	B	From Leg	4.000	0.000	179.000	No Ice	3.249	1.373	0.048
(E)			0.000			1/2" Ice	3.491	1.551	0.068
			4.000			1" Ice	3.741	1.738	0.092
(2) RRUS-11	C	From Leg	4.000	0.000	179.000	No Ice	3.249	1.373	0.048
(E)			0.000			1/2" Ice	3.491	1.551	0.068
			4.000			1" Ice	3.741	1.738	0.092
DC6-48-60-18-8F	B	From Leg	4.000	0.000	179.000	No Ice	1.467	1.467	0.019
(E)			0.000			1/2" Ice	1.667	1.667	0.037
			4.000			1" Ice	1.878	1.878	0.057
HPA-65R-BUU-H8 w/ Mount Pipe	A	From Leg	4.000	0.000	179.000	No Ice	13.533	9.582	0.100
			0.000			1/2" Ice	14.335	11.052	0.196

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
(P)			4.000			1" Ice	15.143	12.496	0.303
HPA-65R-BUU-H8 w/ Mount Pipe	B	From Leg	4.000 0.000	0.000	179.000	No Ice 1/2" Ice	13.533 14.335	9.582 11.052	0.100 0.196
(P)			4.000			1" Ice	15.143	12.496	0.303
SBNHH-1D65A w/ Mount Pipe	C	From Leg	4.000 0.000	0.000	179.000	No Ice 1/2" Ice	6.387 6.896	5.190 5.961	0.061 0.114
(P)			4.000			1" Ice	7.402	6.705	0.174
RRUS 11 (P)	A	From Leg	4.000 0.000 4.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	3.249 3.491 3.741	1.373 1.551 1.738	0.048 0.068 0.092
RRUS 11 (P)	B	From Leg	4.000 0.000 4.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	3.249 3.491 3.741	1.373 1.551 1.738	0.048 0.068 0.092
RRUS 11 (P)	C	From Leg	4.000 0.000 4.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	3.249 3.491 3.741	1.373 1.551 1.738	0.048 0.068 0.092
RRUS A2 (P)	A	From Leg	4.000 0.000 4.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	2.411 2.619 2.837	0.533 0.665 0.806	0.022 0.035 0.050
RRUS A2 (P)	B	From Leg	4.000 0.000 4.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	2.411 2.619 2.837	0.533 0.665 0.806	0.022 0.035 0.050
RRUS A2 (P)	C	From Leg	4.000 0.000 4.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	2.411 2.619 2.837	0.533 0.665 0.806	0.022 0.035 0.050
DC6-48-60-18-8F (P)	A	From Leg	4.000 0.000 4.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	1.467 1.667 1.878	1.467 1.667 1.878	0.019 0.037 0.057
Platform Mount [LP 603-1] (E) *-*	C	None		0.000	179.000	No Ice 1/2" Ice 1" Ice	42.100 52.900 63.700	42.100 52.900 63.700	2.060 2.680 3.300
Pipe Mount [PM 602-1] (E)	A	From Leg	0.500 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	5.250 6.500 7.750	1.580 1.950 2.320	0.093 0.118 0.142
Pipe Mount [PM 602-1] (E) *-*	B	From Leg	0.500 0.000 0.000	0.000	125.000	No Ice 1/2" Ice 1" Ice	5.250 6.500 7.750	1.580 1.950 2.320	0.093 0.118 0.142

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft / Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
DDP8P-3J107ASE (E)	A	Paraboloid w/Radome	From Leg	1.000 0.000 0.000	0.000		125.000	8.333	No Ice 1/2" Ice 1" Ice	54.542 55.638 56.734	0.280 0.566 0.851
DDP8P-3J107ASE	B	Paraboloid	From	1.000	50.000		125.000	8.333	No Ice	54.542	0.280

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
(E)		w/Radome	Leg	0.000 0.000					1/2" Ice 1" Ice	55.638 56.734	0.566 0.851

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

Comb. No.	Description
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	177.5 - 160	Pole	Max Tension	26	0.000	0.000	0.000
			Max. Compression	26	-18.183	-3.087	1.416
			Max. Mx	8	-5.947	-233.229	-1.072
			Max. My	2	-5.892	0.727	235.972
			Max. Vy	20	-11.608	232.127	1.319
			Max. Vx	2	-11.750	0.727	235.972
			Max. Torque	24			-3.507
L2	160 - 140	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-23.784	-3.218	0.719
			Max. Mx	8	-9.363	-484.641	-2.356
			Max. My	14	-9.304	-2.714	-490.253
			Max. Vy	20	-13.523	483.580	2.137
			Max. Vx	2	-13.677	1.656	490.118
			Max. Torque	24			-3.505
L3	140 - 120	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-33.996	-7.296	2.167
			Max. Mx	8	-14.140	-791.854	-4.212
			Max. My	2	-13.928	2.404	812.459
			Max. Vy	20	-18.784	790.427	3.933
			Max. Vx	2	-21.182	2.404	812.459
			Max. Torque	24			-13.427
L4	120 - 100	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-41.350	-7.426	1.209
			Max. Mx	20	-18.784	1190.023	7.364
			Max. My	2	-18.616	5.369	1259.749
			Max. Vy	20	-21.160	1190.023	7.364
			Max. Vx	2	-23.567	5.369	1259.749
			Max. Torque	24			-13.424
L5	100 - 80	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-49.543	-7.522	0.134
			Max. Mx	20	-24.053	1638.772	10.731
			Max. My	2	-23.913	8.363	1756.266
			Max. Vy	20	-23.701	1638.772	10.731
			Max. Vx	2	-26.111	8.363	1756.266
			Max. Torque	24			-13.414
L6	80 - 60	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-58.546	-7.522	-1.024
			Max. Mx	20	-29.926	2139.417	14.032
			Max. My	2	-29.817	11.371	2304.622
			Max. Vy	20	-26.351	2139.417	14.032
			Max. Vx	2	-28.758	11.371	2304.622
			Max. Torque	24			-13.405
L7	60 - 40	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-68.313	-7.522	-2.264
			Max. Mx	20	-36.404	2693.341	17.257
			Max. My	2	-36.326	14.383	2906.077
			Max. Vy	20	-29.030	2693.341	17.257
			Max. Vx	2	-31.428	14.383	2906.077
			Max. Torque	24			-13.399
L8	40 - 20	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-79.789	-7.522	-3.443
			Max. Mx	20	-44.807	3297.403	20.454

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. My	2	-44.762	17.389	3557.431
			Max. Vy	20	-31.363	3297.403	20.454
			Max. Vx	2	-33.746	17.389	3557.431
			Max. Torque	24			-13.394
L9	20 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-90.900	-7.521	-4.509
			Max. Mx	20	-53.294	3942.780	23.604
			Max. My	2	-53.292	20.382	4249.653
			Max. Vy	20	-33.159	3942.780	23.604
			Max. Vx	2	-35.512	20.382	4249.653
			Max. Torque	24			-13.390

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	90.900	-0.000	-0.000
	Max. H_x	20	53.301	33.147	0.183
	Max. H_z	2	53.301	0.148	35.499
	Max. M_x	2	4249.653	0.148	35.499
	Max. M_z	8	3909.871	-32.865	-0.244
	Max. Torsion	14	8.117	-0.039	-35.411
	Min. Vert	7	39.976	-28.600	16.917
	Min. H_x	9	39.976	-32.865	-0.244
	Min. H_z	14	53.301	-0.039	-35.411
	Min. M_x	14	-4244.022	-0.039	-35.411
	Min. M_z	20	-3942.780	33.147	0.183
	Min. Torsion	24	-13.389	17.529	30.570

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	44.418	0.000	0.000	2.257	-1.235	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	53.301	-0.148	-35.499	-4249.653	20.382	7.031
0.9 Dead+1.6 Wind 0 deg - No Ice	39.976	-0.148	-35.499	-4221.274	20.623	7.008
1.2 Dead+1.6 Wind 30 deg - No Ice	53.301	17.075	-30.377	-3631.734	-2035.254	2.801
0.9 Dead+1.6 Wind 30 deg - No Ice	39.976	17.075	-30.377	-3607.554	-2020.923	2.788
1.2 Dead+1.6 Wind 60 deg - No Ice	53.301	28.600	-16.917	-2014.546	-3402.452	-1.188
0.9 Dead+1.6 Wind 60 deg - No Ice	39.976	28.600	-16.917	-2001.392	-3378.643	-1.187
1.2 Dead+1.6 Wind 90 deg - No Ice	53.301	32.865	0.244	37.038	-3909.871	-2.349
0.9 Dead+1.6 Wind 90 deg - No Ice	39.976	32.865	0.244	36.102	-3882.543	-2.334
1.2 Dead+1.6 Wind 120 deg -	53.301	29.107	17.464	2095.141	-3470.219	-3.585

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
No Ice						
0.9 Dead+1.6 Wind 120 deg - No Ice	39.976	29.107	17.464	2080.083	-3445.979	-3.561
1.2 Dead+1.6 Wind 150 deg - No Ice	53.301	17.621	30.690	3680.280	-2110.195	-5.902
0.9 Dead+1.6 Wind 150 deg - No Ice	39.976	17.621	30.690	3654.413	-2095.373	-5.875
1.2 Dead+1.6 Wind 180 deg - No Ice	53.301	0.039	35.411	4244.022	-9.449	-8.117
0.9 Dead+1.6 Wind 180 deg - No Ice	39.976	0.039	35.411	4214.309	-8.985	-8.095
1.2 Dead+1.6 Wind 210 deg - No Ice	53.301	-17.075	30.254	3621.498	2032.187	-7.826
0.9 Dead+1.6 Wind 210 deg - No Ice	39.976	-17.075	30.254	3596.016	2018.654	-7.814
1.2 Dead+1.6 Wind 240 deg - No Ice	53.301	-28.931	16.905	2018.446	3441.575	-2.726
0.9 Dead+1.6 Wind 240 deg - No Ice	39.976	-28.931	16.905	2003.899	3418.312	-2.728
1.2 Dead+1.6 Wind 270 deg - No Ice	53.301	-33.147	-0.183	-23.604	3942.780	5.307
0.9 Dead+1.6 Wind 270 deg - No Ice	39.976	-33.147	-0.183	-24.128	3916.038	5.293
1.2 Dead+1.6 Wind 300 deg - No Ice	53.301	-29.415	-17.339	-2073.502	3506.560	11.654
0.9 Dead+1.6 Wind 300 deg - No Ice	39.976	-29.415	-17.339	-2059.960	3482.874	11.631
1.2 Dead+1.6 Wind 330 deg - No Ice	53.301	-17.529	-30.570	-3659.293	2095.477	13.389
0.9 Dead+1.6 Wind 330 deg - No Ice	39.976	-17.529	-30.570	-3634.932	2081.514	13.363
1.2 Dead+1.0 Ice+1.0 Temp	90.900	0.000	0.000	4.509	-7.521	-0.001
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	90.900	-0.016	-6.771	-801.409	-5.838	0.991
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	90.900	3.312	-5.824	-688.281	-401.136	0.423
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	90.900	5.630	-3.295	-386.645	-674.881	-0.150
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	90.900	6.564	0.027	7.878	-790.211	-0.406
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	90.900	5.685	3.354	403.291	-681.941	-0.630
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	90.900	3.371	5.858	701.743	-408.584	-0.913
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	90.900	0.004	6.761	809.338	-8.063	-1.110
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	90.900	-3.312	5.810	695.695	385.662	-0.976
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	90.900	-5.666	3.293	395.649	664.153	-0.283
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	90.900	-6.594	-0.020	2.193	778.786	0.727
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	90.900	-5.719	-3.341	-392.302	670.898	1.513
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	90.900	-3.361	-5.845	-690.823	391.800	1.732
Dead+Wind 0 deg - Service	44.418	-0.030	-7.146	-850.454	3.107	1.421
Dead+Wind 30 deg - Service	44.418	3.437	-6.115	-726.520	-409.101	0.565
Dead+Wind 60 deg - Service	44.418	5.758	-3.406	-402.205	-683.213	-0.242
Dead+Wind 90 deg - Service	44.418	6.616	0.049	9.167	-784.948	-0.473
Dead+Wind 120 deg - Service	44.418	5.860	3.516	421.860	-696.825	-0.721

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 150 deg - Service	44.418	3.547	6.178	739.757	-424.142	-1.192
Dead+Wind 180 deg - Service	44.418	0.008	7.129	852.808	-2.874	-1.638
Dead+Wind 210 deg - Service	44.418	-3.437	6.091	727.952	406.529	-1.581
Dead+Wind 240 deg - Service	44.418	-5.824	3.403	406.476	689.116	-0.552
Dead+Wind 270 deg - Service	44.418	-6.673	-0.037	-2.993	789.605	1.071
Dead+Wind 300 deg - Service	44.418	-5.922	-3.491	-414.046	702.163	2.354
Dead+Wind 330 deg - Service	44.418	-3.529	-6.154	-732.064	419.226	2.705

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.000	-44.418	0.000	0.000	44.418	0.000	0.000%
2	-0.148	-53.301	-35.499	0.148	53.301	35.499	0.000%
3	-0.148	-39.976	-35.499	0.148	39.976	35.499	0.000%
4	17.075	-53.301	-30.377	-17.075	53.301	30.377	0.000%
5	17.075	-39.976	-30.377	-17.075	39.976	30.377	0.000%
6	28.600	-53.301	-16.917	-28.600	53.301	16.917	0.000%
7	28.600	-39.976	-16.917	-28.600	39.976	16.917	0.000%
8	32.865	-53.301	0.244	-32.865	53.301	-0.244	0.000%
9	32.865	-39.976	0.244	-32.865	39.976	-0.244	0.000%
10	29.107	-53.301	17.464	-29.107	53.301	-17.464	0.000%
11	29.107	-39.976	17.464	-29.107	39.976	-17.464	0.000%
12	17.621	-53.301	30.690	-17.621	53.301	-30.690	0.000%
13	17.621	-39.976	30.690	-17.621	39.976	-30.690	0.000%
14	0.039	-53.301	35.411	-0.039	53.301	-35.411	0.000%
15	0.039	-39.976	35.411	-0.039	39.976	-35.411	0.000%
16	-17.075	-53.301	30.254	17.075	53.301	-30.254	0.000%
17	-17.075	-39.976	30.254	17.075	39.976	-30.254	0.000%
18	-28.931	-53.301	16.905	28.931	53.301	-16.905	0.000%
19	-28.931	-39.976	16.905	28.931	39.976	-16.905	0.000%
20	-33.147	-53.301	-0.183	33.147	53.301	0.183	0.000%
21	-33.147	-39.976	-0.183	33.147	39.976	0.183	0.000%
22	-29.415	-53.301	-17.339	29.415	53.301	17.339	0.000%
23	-29.415	-39.976	-17.339	29.415	39.976	17.339	0.000%
24	-17.529	-53.301	-30.570	17.529	53.301	30.570	0.000%
25	-17.529	-39.976	-30.570	17.529	39.976	30.570	0.000%
26	0.000	-90.900	0.000	-0.000	90.900	-0.000	0.000%
27	-0.016	-90.900	-6.771	0.016	90.900	6.771	0.000%
28	3.312	-90.900	-5.824	-3.312	90.900	5.824	0.000%
29	5.630	-90.900	-3.294	-5.630	90.900	3.295	0.000%
30	6.564	-90.900	0.027	-6.564	90.900	-0.027	0.000%
31	5.685	-90.900	3.354	-5.685	90.900	-3.354	0.000%
32	3.371	-90.900	5.858	-3.371	90.900	-5.858	0.000%
33	0.004	-90.900	6.761	-0.004	90.900	-6.761	0.000%
34	-3.312	-90.900	5.810	3.312	90.900	-5.810	0.000%
35	-5.666	-90.900	3.293	5.666	90.900	-3.293	0.000%
36	-6.594	-90.900	-0.020	6.594	90.900	0.020	0.000%
37	-5.719	-90.900	-3.341	5.719	90.900	3.341	0.000%
38	-3.361	-90.900	-5.845	3.361	90.900	5.845	0.000%
39	-0.030	-44.418	-7.146	0.030	44.418	7.146	0.000%
40	3.437	-44.418	-6.115	-3.437	44.418	6.115	0.000%
41	5.758	-44.418	-3.406	-5.758	44.418	3.406	0.000%
42	6.616	-44.418	0.049	-6.616	44.418	-0.049	0.000%
43	5.860	-44.418	3.516	-5.860	44.418	-3.516	0.000%
44	3.547	-44.418	6.178	-3.547	44.418	-6.178	0.000%
45	0.008	-44.418	7.129	-0.008	44.418	-7.129	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
46	-3.437	-44.418	6.091	3.437	44.418	-6.091	0.000%
47	-5.824	-44.418	3.403	5.824	44.418	-3.403	0.000%
48	-6.673	-44.418	-0.037	6.673	44.418	0.037	0.000%
49	-5.922	-44.418	-3.491	5.922	44.418	3.491	0.000%
50	-3.529	-44.418	-6.154	3.529	44.418	6.154	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00016413
3	Yes	5	0.00000001	0.00007599
4	Yes	5	0.00000001	0.00079003
5	Yes	5	0.00000001	0.00035462
6	Yes	5	0.00000001	0.00071197
7	Yes	5	0.00000001	0.00032255
8	Yes	5	0.00000001	0.00004718
9	Yes	4	0.00000001	0.00092946
10	Yes	5	0.00000001	0.00069582
11	Yes	5	0.00000001	0.00031113
12	Yes	5	0.00000001	0.00087562
13	Yes	5	0.00000001	0.00039249
14	Yes	5	0.00000001	0.00020286
15	Yes	5	0.00000001	0.00009395
16	Yes	5	0.00000001	0.00066410
17	Yes	5	0.00000001	0.00029502
18	Yes	5	0.00000001	0.00073800
19	Yes	5	0.00000001	0.00033453
20	Yes	5	0.00000001	0.00013560
21	Yes	5	0.00000001	0.00006396
22	Yes	5	0.00000001	0.00091397
23	Yes	5	0.00000001	0.00041726
24	Yes	5	0.00000001	0.00067147
25	Yes	5	0.00000001	0.00029738
26	Yes	4	0.00000001	0.00015069
27	Yes	5	0.00000001	0.00056794
28	Yes	5	0.00000001	0.00060401
29	Yes	5	0.00000001	0.00059085
30	Yes	5	0.00000001	0.00056847
31	Yes	5	0.00000001	0.00059675
32	Yes	5	0.00000001	0.00061106
33	Yes	5	0.00000001	0.00056768
34	Yes	5	0.00000001	0.00058511
35	Yes	5	0.00000001	0.00057110
36	Yes	5	0.00000001	0.00054742
37	Yes	5	0.00000001	0.00058124
38	Yes	5	0.00000001	0.00059081
39	Yes	4	0.00000001	0.00026811
40	Yes	4	0.00000001	0.00034304
41	Yes	4	0.00000001	0.00027705
42	Yes	4	0.00000001	0.00011146
43	Yes	4	0.00000001	0.00026085
44	Yes	4	0.00000001	0.00044474
45	Yes	4	0.00000001	0.00030642
46	Yes	4	0.00000001	0.00029476

47	Yes	4	0.00000001	0.00030711
48	Yes	4	0.00000001	0.00019430
49	Yes	4	0.00000001	0.00056176
50	Yes	4	0.00000001	0.00043633

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	177.5 - 160	16.877	44	0.900	0.011
L2	160 - 140	13.676	44	0.830	0.008
L3	140 - 120	10.400	44	0.722	0.007
L4	120 - 100	7.587	44	0.612	0.006
L5	100 - 80	5.238	44	0.501	0.004
L6	80 - 60	3.351	44	0.393	0.002
L7	60 - 40	1.906	44	0.292	0.002
L8	40 - 20	0.876	44	0.197	0.001
L9	20 - 0	0.232	45	0.108	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.000	(2) 7770.00 w/ Mount Pipe	44	16.877	0.900	0.011	34266
125.000	DDP8P-3J107ASE	44	8.247	0.640	0.006	10376

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	177.5 - 160	84.076	2	4.485	0.053
L2	160 - 140	68.148	2	4.133	0.041
L3	140 - 120	51.838	2	3.598	0.034
L4	120 - 100	37.823	2	3.053	0.028
L5	100 - 80	26.114	2	2.500	0.018
L6	80 - 60	16.708	2	1.962	0.012
L7	60 - 40	9.504	2	1.455	0.008
L8	40 - 20	4.366	2	0.981	0.005
L9	20 - 0	1.157	2	0.537	0.002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
179.000	(2) 7770.00 w/ Mount Pipe	2	84.076	4.485	0.053	6983
125.000	DDP8P-3J107ASE	2	41.113	3.189	0.030	2099

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	177.5 - 160 (1)	P24x0.375	17.500	0.000	0.0	27.833	-5.892	1052.070	0.006
L2	160 - 140 (2)	P30x0.375	20.000	0.000	0.0	34.901	-9.303	1311.060	0.007
L3	140 - 120 (3)	P36x0.375	20.000	0.000	0.0	41.970	-13.936	1490.100	0.009
L4	120 - 100 (4)	P42x0.375	20.000	0.000	0.0	49.038	-18.616	1668.870	0.011
L5	100 - 80 (5)	P48x0.375	20.000	0.000	0.0	56.107	-23.913	1847.490	0.013
L6	80 - 60 (6)	P54x0.375	20.000	0.000	0.0	63.175	-29.817	2026.000	0.015
L7	60 - 40 (7)	P60x0.375	20.000	0.000	0.0	70.244	-36.326	2204.430	0.016
L8	40 - 20 (8)	P60x0.5	20.000	0.000	0.0	93.462	-44.762	3125.690	0.014
L9	20 - 0 (9)	P60x0.5	20.000	0.000	0.0	93.462	-53.292	3125.690	0.017

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	177.5 - 160 (1)	P24x0.375	236.183	623.717	0.379	0.000	623.717	0.000
L2	160 - 140 (2)	P30x0.375	491.057	947.858	0.518	0.000	947.858	0.000
L3	140 - 120 (3)	P36x0.375	813.076	1338.808	0.607	0.000	1338.808	0.000
L4	120 - 100 (4)	P42x0.375	1259.758	1796.558	0.701	0.000	1796.558	0.000
L5	100 - 80 (5)	P48x0.375	1756.283	2321.108	0.757	0.000	2321.108	0.000
L6	80 - 60 (6)	P54x0.375	2304.650	2912.458	0.791	0.000	2912.458	0.000
L7	60 - 40 (7)	P60x0.375	2906.117	3570.608	0.814	0.000	3570.608	0.000
L8	40 - 20 (8)	P60x0.5	3557.475	4860.408	0.732	0.000	4860.408	0.000
L9	20 - 0 (9)	P60x0.5	4249.700	4860.408	0.874	0.000	4860.408	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	177.5 - 160 (1)	P24x0.375	11.762	526.035	0.022	3.501	1019.708	0.003
L2	160 - 140 (2)	P30x0.375	13.689	655.528	0.021	3.498	1598.367	0.002
L3	140 - 120 (3)	P36x0.375	21.073	745.048	0.028	5.918	2189.067	0.003
L4	120 - 100 (4)	P42x0.375	23.568	834.437	0.028	7.045	2868.842	0.002
L5	100 - 80 (5)	P48x0.375	26.112	923.745	0.028	7.040	3637.700	0.002
L6	80 - 60 (6)	P54x0.375	28.758	1013.000	0.028	7.036	4495.625	0.002

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 $\frac{T_u}{\phi T_n}$
L7	60 - 40 (7)	P60x0.375	31.428	1102.210	0.029	7.034	5442.617	0.001
L8	40 - 20 (8)	P60x0.5	33.746	1562.840	0.022	7.032	7685.067	0.001
L9	20 - 0 (9)	P60x0.5	35.513	1562.840	0.023	7.031	7685.067	0.001

Pole Interaction Design Data

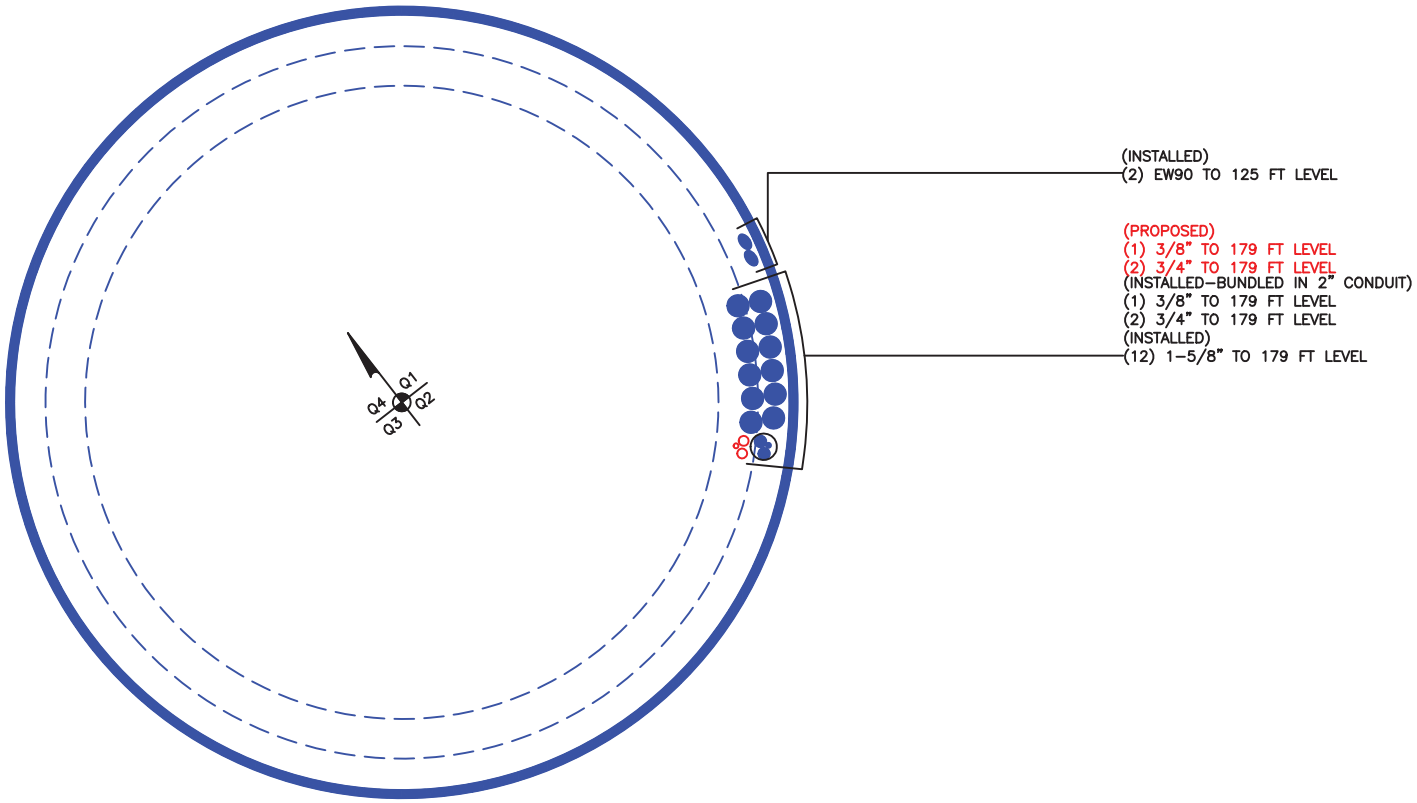
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	177.5 - 160 (1)	0.006	0.379	0.000	0.022	0.003	0.385 ✔	1.000	4.8.2 ✔
L2	160 - 140 (2)	0.007	0.518	0.000	0.021	0.002	0.526 ✔	1.000	4.8.2 ✔
L3	140 - 120 (3)	0.009	0.607	0.000	0.028	0.003	0.618 ✔	1.000	4.8.2 ✔
L4	120 - 100 (4)	0.011	0.701	0.000	0.028	0.002	0.713 ✔	1.000	4.8.2 ✔
L5	100 - 80 (5)	0.013	0.757	0.000	0.028	0.002	0.771 ✔	1.000	4.8.2 ✔
L6	80 - 60 (6)	0.015	0.791	0.000	0.028	0.002	0.807 ✔	1.000	4.8.2 ✔
L7	60 - 40 (7)	0.016	0.814	0.000	0.029	0.001	0.831 ✔	1.000	4.8.2 ✔
L8	40 - 20 (8)	0.014	0.732	0.000	0.022	0.001	0.747 ✔	1.000	4.8.2 ✔
L9	20 - 0 (9)	0.017	0.874	0.000	0.023	0.001	0.892 ✔	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	177.5 - 160	Pole	P24x0.375	1	-5.892	1052.070	38.5	Pass
L2	160 - 140	Pole	P30x0.375	2	-9.303	1311.060	52.6	Pass
L3	140 - 120	Pole	P36x0.375	3	-13.936	1490.100	61.8	Pass
L4	120 - 100	Pole	P42x0.375	4	-18.616	1668.870	71.3	Pass
L5	100 - 80	Pole	P48x0.375	5	-23.913	1847.490	77.1	Pass
L6	80 - 60	Pole	P54x0.375	6	-29.817	2026.000	80.7	Pass
L7	60 - 40	Pole	P60x0.375	7	-36.326	2204.430	83.1	Pass
L8	40 - 20	Pole	P60x0.5	8	-44.762	3125.690	74.7	Pass
L9	20 - 0	Pole	P60x0.5	9	-53.292	3125.690	89.2	Pass
							Summary	
						Pole (L9)	89.2	Pass
						RATING =	**89.2**	**Pass**

APPENDIX B

BASE LEVEL DRAWING



BUSINESS UNIT: 856245

APPENDIX C

ADDITIONAL CALCULATIONS

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#:	*856245*
Site Name:	*NORTH PORTLAND, ME*
App #:	*311267, Revision # 1*
Pole Manufacturer:	*Pirod*

Reactions		
Mu:	4250	ft-kips
Axial, Pu:	53	kips
Shear, Vu:	35	kips
Eta Factor, ɳ	0.5	TIA G (Fig. 4-4)

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

Anchor Rod Data		
Qty:	52	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	67	in

Anchor Rod Results

Max Rod (Cu+ Vu/ɳ):	60.9	Kips
Allowable Axial, Φ*Fu*Anet:	116.3	Kips
Anchor Rod Stress Ratio:	52.4%	**Pass**

Non-Rigid
AISC LRFD
φ*Tn

Plate Data		
Diam:	70	in
Thick:	1	in
Grade:	36	ksi
Single-Rod B-eff:	3.62	in

Base Plate Results Flexural Check

Base Plate Stress:	Rohn/Pirod,	OK
Allowable Plate Stress:	32.4	ksi
Base Plate Stress Ratio:	Rohn/Pirod,	OK

Non-Rigid
AISC LRFD
φ*Fy
Y.L. Length: 29.82

Stiffener Data (Welding at both sides)		
Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

n/a

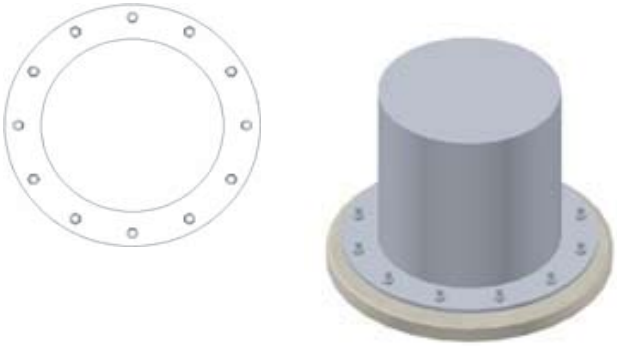
Stiffener Results N/A for Rohn / Pirod

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:	0.5	in
Grade:	42	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

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

Site Data

BU#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267 Revision # 1*

Manufacturer:	Pirod

Reactions		
Moment:	1566	ft-kips
Axial:	44.765	kips
Shear:	421	kips
Exterior Flange Run, T+q:	0	kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
53.15

Elevation: 20--47BC feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:		<-- Disregard	
N/A:		<-- Disregard	
Circle:	47	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	48.6	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty),	73.9	Kips
Bolt Stress Ratio:	65.7%	**Pass**

Plate Data		
Plate Outer Diam:	59	in
Plate Inner Diam:	45	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.79	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	51.4	Kips, Ext. Cu=Interior Cu
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

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

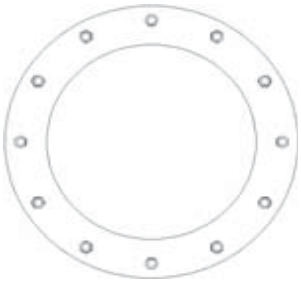
Stiffener Results N/A for Rohn / Pirod

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:	0.5	in
Pole Inner Diam:	59	in
Grade:	42	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

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

Site Data

BU#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267 Revision # 1*

Manufacturer:	Pirod

Reactions		
Moment:	1991.42	ft-kips
Axial:	44.765	kips
Shear:	33.74	kips
Exterior Flange Run, T+q:	0	kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
53.15

Elevation: 20--53BC feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:		<-- Disregard	
N/A:		<-- Disregard	
Circle:	53	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	55.0	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty),	76.3	Kips
Bolt Stress Ratio:	72.0%	**Pass**

Plate Data		
Plate Outer Diam:	59	in
Plate Inner Diam:	45	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.79	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	57.8	Kips, Ext. Cu=Interior Cu
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

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

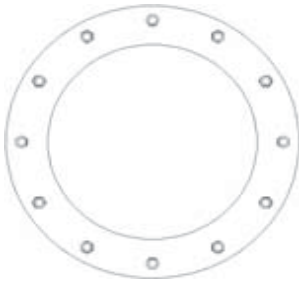
Stiffener Results N/A for Rohn / Pirod

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:	0.5	in
Pole Inner Diam:	59	in
Grade:	42	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

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

Site Data

BU#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267 Revision # 1*

Reactions		
Moment:	1279.32	ft-kips
Axial:	36.32	kips
Shear:	31.4	kips
Exterior Flange Run, T+q:	0	kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
53.15

Elevation: 40--47BC feet

Manufacturer:	Pirod

Bolt Data

Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:		<-- Disregard	
N/A:		<-- Disregard	
Circle:	47	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	39.7	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty),	76.3	Kips
Bolt Stress Ratio:	52.0%	**Pass**

Plate Data

Plate Outer Diam:	59.25	in
Plate Inner Diam:	45	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.82	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	42.0	Kips, Ext. Cu=Interior Cu
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

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 N/A for Rohn / Pirod

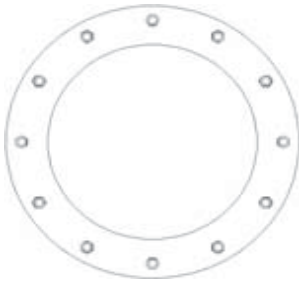
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

Pole Results

Pole Punching Shear Check: N/A

Pole Data

Pole OuterDiam:	60	in
Thick:	0.375	in
Pole Inner Diam:	59.25	in
Grade:	42	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

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

Site Data

BU#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267 Revision # 1*

Manufacturer:	Pirod

Reactions		
Moment:	1626.8	ft-kips
Axial:	36.32	kips
Shear:	31.4	kips
Exterior Flange Run, T+q:	0	kips

Bolt Threads:
X-Excluded
φVn=φ(0.55*Ab*Fu)
φ=0.75, φ*Vn (kips):
53.15

Elevation: 40--53BC feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:		<-- Disregard	
N/A:		<-- Disregard	
Circle:	53	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	44.9	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty),	76.3	Kips
Bolt Stress Ratio:	58.9%	**Pass**

Plate Data		
Plate Outer Diam:	59.25	in
Plate Inner Diam:	45	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.82	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	47.2	Kips, Ext. Cu=Interior Cu
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

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

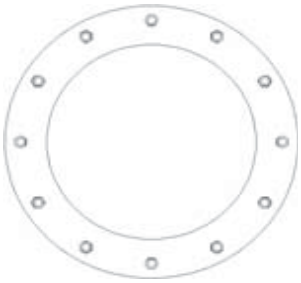
Stiffener Results N/A for Rohn / Pirod

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:	0.375	in
Pole Inner Diam:	59.25	in
Grade:	42	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

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

Site Data

BU#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267, Revision # 1*

Reactions		
Mu	2304.65	ft-kips
Axial, Pu:	29.82	kips
Shear, Vu:	28.73	kips
Elevation:	60	feet

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

Pole Manufacturer:	Pirod

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

Bolt Data			
Qty:	48		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	57		

Plate Data		
Diam:	60	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.53	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	54	in
Thick:	0.375	in
Grade:	42	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:	39.81	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.087	in	
Min PL "treq" for actual **T w/ Pry**:	0.712	in	
Min PL "t1" for actual **T w/o Pry**:	0.929	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	39.81	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	73.0%	**Pass**	

Exterior Flange Plate Results Flexural Check

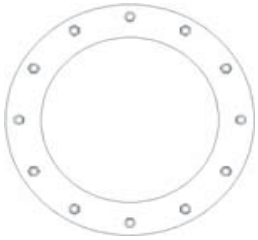
		Rigid
Compression Side Plate Stress:	Rohn/Piroc OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Piroc OK	Comp. Y.L. Length: 18.25

No Prying

Tension Side Stress Ratio, (treq/t)^2: 32.5% **Pass**

n/a

Stiffener Results	N/A for Rohn / Pirod
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#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267, Revision # 1*

Reactions		
Mu	1756.28	ft-kips
Axial, Pu:	23.92	kips
Shear, Vu:	26.09	kips
Elevation:	80	feet

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

Pole Manufacturer:	Pirod

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

Bolt Data				
Qty:	36			
Diameter (in.):	1	Bolt Fu:	120	
Bolt Material:	A325	Bolt Fy:	92	
N/A:	100	<-- Disregard		
N/A:	75	<-- Disregard		
Circle (in.):	51			

Plate Data		
Diam:	54	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.19	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	48	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

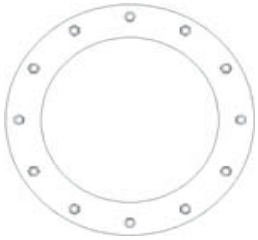
			Rigid
Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.53	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	45.25	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	0.998	in	
Min PL "treq" for actual **T w/ Pry**:	0.698	in	
Min PL "t1" for actual **T w/o Pry**:	0.909	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	45.25	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	83.0%	**Pass**	

Exterior Flange Plate Results Flexural Check

		Rigid
Compression Side Plate Stress:	Rohn/Piroc OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Piroc OK	Comp. Y.L. Length:
No Prying		17.23
Tension Side Stress Ratio, (treq/t)^2:	31.2% **Pass**	

n/a

Stiffener Results	N/A for Rohn / Pirod
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#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267, Revision # 1*

Reactions		
Mu	1259.70	ft-kips
Axial, Pu:	18.62	kips
Shear, Vu:	23.54	kips
Elevation:	100	feet

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

Pole Manufacturer:	Pirod

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

Bolt Data			
Qty:	32		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	45		

Plate Data		
Diam:	48	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.12	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	42	in
Thick:	0.375	in
Grade:	42	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:	41.41	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.006	in	
Min PL "treq" for actual **T w/ Pry**:	0.664	in	
Min PL "t1" for actual **T w/o Pry**:	0.877	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	41.41	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	75.9%	**Pass**	

Exterior Flange Plate Results Flexural Check

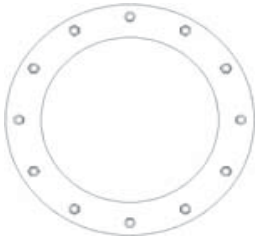
		Rigid
Compression Side Plate Stress:	Rohn/Piroc OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Piroc OK	Comp. Y.L. Length: 16.16

No Prying

Tension Side Stress Ratio, (treq/t)^2: 28.2% **Pass**

n/a

Stiffener Results	N/A for Rohn / Pirod
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#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267, Revision # 1*

Reactions		
Mu	813.07	ft-kips
Axial, Pu:	13.94	kips
Shear, Vu:	21.05	kips
Elevation:	120	feet

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

Pole Manufacturer:	Pirod

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

Bolt Data			
Qty:	28		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	39		

Plate Data		
Diam:	42	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	4.04	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	36	in
Thick:	0.375	in
Grade:	42	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:	35.24	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.017	in	
Min PL "treq" for actual **T w/ Pry**:	0.620	in	
Min PL "t1" for actual **T w/o Pry**:	0.817	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	35.24	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	64.6%	**Pass**	

Exterior Flange Plate Results Flexural Check

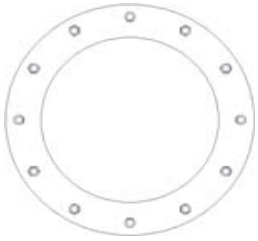
		Rigid
Compression Side Plate Stress:	Rohn/Piroc OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Piroc OK	Comp. Y.L. Length: 15.00

No Prying

Tension Side Stress Ratio, (treq/t)^2: 24.6% **Pass**

n/a

Stiffener Results	N/A for Rohn / Pirod
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#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267, Revision # 1*

Reactions		
Mu	491.05	ft-kips
Axial, Pu:	9.31	kips
Shear, Vu:	13.66	kips
Elevation:	140	feet

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

Pole Manufacturer:	Pirod

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

Bolt Data			
Qty:	24		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	100	<-- Disregard	
N/A:	75	<-- Disregard	
Circle (in.):	33		

Plate Data		
Diam:	36	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.93	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	30	in
Thick:	0.375	in
Grade:	42	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:	29.37	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.031	in	
Min PL "treq" for actual **T w/ Pry**:	0.575	in	
Min PL "t1" for actual **T w/o Pry**:	0.757	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	29.37	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	53.9%	**Pass**	

Exterior Flange Plate Results Flexural Check

			Rigid
Compression Side Plate Stress:	Rohn/Piroc	OK	TIA G
Allowable Plate Stress:	32.4	ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Piroc	OK	Comp. Y.L. Length: 13.75

No Prying

Tension Side Stress Ratio, (treq/t)^2: 21.2% **Pass**

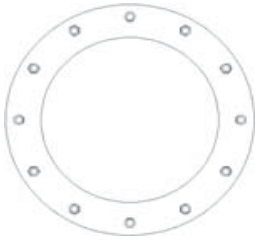
n/a

Stiffener Results N/A for Rohn / Pirod

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#: *856245*
Site Name: *NORTH PORTLAND, ME*
App #: *311267, Revision # 1*

Reactions		
Mu	236.18	ft-kips
Axial, Pu:	5.90	kips
Shear, Vu:	11.74	kips
Elevation:	160	feet

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

Pole Manufacturer:	Pirod

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

Bolt Data				
Qty:	20			
Diameter (in.):	1	Bolt Fu:	120	
Bolt Material:	A325	Bolt Fy:	92	
N/A:	100	<-- Disregard		
N/A:	75	<-- Disregard		
Circle (in.):	27			

Plate Data		
Diam:	30	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.77	in

Stiffener Data (Welding at Both Sides)		
Config:	0	*
Weld Type:		
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:		in
Fillet V. Weld:		in
Width:		in
Height:		in
Thick:		in
Notch:		in
Grade:		ksi
Weld str.:		ksi

Pole Data		
Diam:	24	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	63	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	Rigid: 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:	20.70	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.052	in	
Min PL "treq" for actual **T w/ Pry**:	0.495	in	
Min PL "t1" for actual **T w/o Pry**:	0.648	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	20.70	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	38.0%	**Pass**	

Exterior Flange Plate Results Flexural Check — Rigid: TIA G

Compression Side Plate Stress:	Rohn/Piroc OK	φ*Fy
Allowable Plate Stress:	32.4 ksi	Comp. Y.L. Length: 12.37
Compression Plate Stress Ratio:	Rohn/Piroc OK	

No Prying

Tension Side Stress Ratio, (treq/t)^2: 15.7% **Pass**

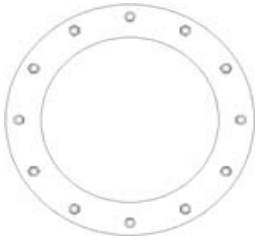
n/a

Stiffener Results N/A for Rohn / Pirod

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

PROJECT	**856245 - NORTH PORTLAND, ME**				
SUBJECT	**Foundation Analysis**				
DATE	**10/08/15**	PAGE	1	OF	1

B+T GRP
1717 S. Boulder, Suite 300
Tulsa, OK 74119
(918) 587-4630

Monopole Pad & Pier Foundation Analysis

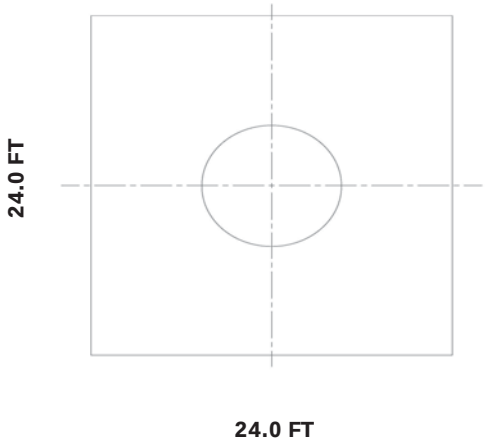
Rev. Type: G

Design Loads:

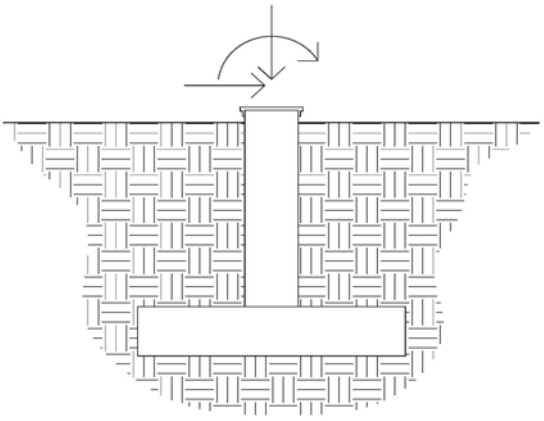
	Input factored loads	
Shear:	35.0	kips
Moment:	4,250.0	ft-kips
Tower Height:	177.5	ft
Tower Weight:	53.0	kips

Pad & Pier Dimensions / Properties:

Pole Diameter at Base:	60.00	in
Bearing Depth:	12.0	ft
Pad Width:	24.0	ft
Neglected Depth:	5.8	ft
Thickness:	3.0	ft
Pier Diameter:	7.0	ft
Pier Height Above Grade:	0.5	ft
BP Dist. Above Pier:	3.0	in
Clear Cover:	3.0	in
Pier Rebar Size:	11	
Pier Rebar Quanity:	38	
Pad Rebar Size:	9	
Pad Rebar Quanity:	31	
Pier Tie Size:	5	
Tie Quanity:	16	
Rebar Yield Strength:	60000	psi
Concrete Strength:	4000	psi
Concrete Unit Weight:	0.0876	kcf



Elevation Overview



Soil Data:

	Allowable Values	
Soil Unit Weight:	0.085	kcf
Ult. Bearing Capacity:	9.000	ksf
Angle of Friction:	32.000	deg
Cohesion:	0.000	ksf
Passive Pressure:	0.000	ksf
Base Friction:	0.300	

Summary of Results

Req'd Pier Diam.	OK
Overturning	56.4%
Shear Capacity	17.5%
Bearing	47.7%
Pad Shear - 1-way	49.3%
Pad Shear - 2-way	4.2%
Pad Moment Capacity	33.7%
Pier Moment Capacity	49.9%

** Notes: