Robinson+Cole

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Also admitted in Massachusetts

October 18, 2016

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

Re: **EM-VER-157-160915 – Cellco Partnership d/b/a Verizon Wireless**
56 Norfield Road, Weston, Connecticut

Dear Ms. Bachman:

On October 11, 2016, the Siting Council acknowledged receipt of Cellco's notice of intent to modify its existing telecommunications facility at 56 Norfield Road in Weston, Connecticut. The modifications involved the replacement of antennas and the installation of remote radio heads at the above-referenced facility.

As a condition of the acknowledgement, Cellco was required to provide the Council with a copy of the Structural Analysis Report referencing the Rev. G of the Structural Standards. The updated Structural Analysis Report referencing Rev. G is attached.

If you have any questions please do not hesitate to contact me.

Sincerely,

Kenneth C. Baldwin

Attachment
Copy to:
Tim Parks

15394085-v1

PAUL J. FORD & COMPANY

Date: **September 28, 2016**

Steve Tuttle
Crown Castle
8 Parkmeadow Drive
Pittsford, NY 14534
585.899.3445

Paul J Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
614.221.6679
jjohnson@pjfweb.com

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	Weston, CT
Crown Castle Designation:	**Crown Castle BU Number:**	829046
	Crown Castle Site Name:	Weston/ Rt-57/ Norfield R
	Crown Castle JDE Job Number:	392786
	Crown Castle Work Order Number:	1304625
	Crown Castle Application Number:	358993 Rev. 2
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37516-0710.003.7805
Site Data:	**56 Norfield Rd. (Town Hall), Weston, Fairfield County, CT**	
	Latitude *41° 12' 8.4"*, Longitude *-73° 22' 46.6"*	
	190 Foot - Monopole Tower	

Dear Steve Tuttle,

Paul J Ford and Company 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 953179, in accordance with application 358993, revision 2.

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

LC7: Existing + Reserved + Proposed Equipment **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B with a maximum topographic factor, Kzt, of 1.0 and Risk Category II were used in this analysis.

We at *Paul J Ford and Company* 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:

Joshua Johnson, E.I.
Structural Designer

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
No. PEN 22731
LICENSED PROFESSIONAL ENGINEER

tnxTower Report - version 7.0.5.1

SEP 30 2016

TABLE OF CONTENTS

1) INTRODUCTION

This tower is a 190 ft Monopole tower designed by PIROD MANUFACTURES INC. in January of 2000. The tower was originally designed for a wind speed of 85 mph per TIA/EIA-222-F.

2) ANALYSIS CRITERIA

This analysis has been performed in accordance with the 2016 Connecticut State Building Code based upon an ultimate 3-second gust wind speed of 120 mph converted to a nominal 3-second gust wind speed of 93 mph per Section 1609.3 and Appendix N as required for use in the TIA-222-G Standard per Exception #5 of Section 1609.1.1. Exposure Category B with a maximum topographic factor, Kzt, of 1.0 and Risk Category II were used in this analysis.

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
150.0	150.0	3	alcatel lucent	RRH2X60-1900	1	1-5/8	-
		3	alcatel lucent	RRH2x60-700			
		3	alcatel lucent	RRH4X45-AWS4 B66			
		6	commscope	SBNHH-1D85C w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			

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
188.0	193.0	1	rfs celwave	PD201-7	1 1 1 1	5/16 5/8 7/8 1-1/4	1
	189.0	3	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe			
	188.0	1	tower mounts	Platform Mount [LP 403-1]			
	187.0	1	radiowaves	SP2-5.8			
185.0	188.0	3	alcatel lucent	TME-1900MHz RRH	-	-	1
		3	alcatel lucent	TME-800MHZ RRH			
	185.0	1	tower mounts	Side Arm Mount [SO 102-3]			
184.0	184.0	1	tower mounts	Side Arm Mount [SO 701-1]	-	-	1
179.0	185.0	1	rfs celwave	458-2D	2	7/8	1
		1	rfs celwave	458-2D			
	179.0	1	tower mounts	Platform Mount [LP 403-1]			
170.0	174.0	1	rfs celwave	PD201-7	13 2	1-5/8 7/8	1
	170.0	3	ericsson	ERICSSON AIR 21 B2A B4P w/ Mount Pipe			
		3	ericsson	Ericsson Air 21 B4A B12P-B5P 8FT w/ Mount Pipe			
		3	ericsson	KRY 112 144/1			
		4	ericsson	RRUS 11 B12			
		1	tower mounts	Platform Mount [LP 405-1]			

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
160.0	163.0	3	cci antennas	OPA-65R-LCUU-H6 w/Mount Pipe	-	-	2
		3	ericsson	RRUS12/RRUS A2			
		12	powerwave technologies	7020.00	2 12 1	7/8 1-5/8 5/8	1
		3	ericsson	RRUS-11			
		6	powerwave technologies	LGP21401			
		3	powerwave technologies	TT19-08BP111-001			
		1	raycap	DC6-48-60-18-8F			
		6	powerwave technologies	7770.00 w/ Mount Pipe			
	160.0	1	tower mounts	Platform Mount [LP 403-1]			
150.0	150.0	3	antel	BXA-171063-12CF-EDIN-X w/ Mount Pipe	1	1-5/8	3
		3	ericsson	RRH2x40-AWS			
		1	powerwave technologies	P65-16-XL-R w/ Mount Pipe			
		2	andrew	LNX-6514DS-T4M w/ Mount Pipe			
		3	antel	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	12	1-5/8	1
		2	antel	LPA-80080/6CF w/ Mount Pipe			
		4	decibel	DB846F65ZAXY w/ Mount Pipe			
		1	rfs celwave	DB-T1-6Z-8AB-0Z			
		6	rfs celwave	FD9R6004/2C-3L			
		1	tower mounts	Platform Mount [LP 403-1]			
125.0	130.0	1	rfs celwave	PD128-1	1 1	1/2 7/8	1
		1	rfs celwave	PD201-1			
	125.0	2	tower mounts	Side Arm Mount [SO 701-1]			
110.0	115.0	2	rfs celwave	PD128-1	2	1/2	1
	110.0	2	tower mounts	Side Arm Mount [SO 701-1]			
100.0	101.0	1	gps	GPS_A	1	1/2	1
	100.0	1	tower mounts	Side Arm Mount [SO 701-1]			
95.0	100.0	2	rfs celwave	PD128-1	2	1/2	1
	95.0	2	tower mounts	Side Arm Mount [SO 701-1]			
80.0	85.0	1	decibel	DB222	2	1/2	1
		1	rfs celwave	PD128-1			
	80.0	2	tower mounts	Side Arm Mount [SO 701-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment
3) Equipment To Be Removed

3) ANALYSIS PROCEDURE

Table 3 - Documents Provided

Document	Remarks	Reference	Source
4-GEOTECHNICAL REPORTS	Arcnet, A99.506-247B, 10/15/1999	3529916	CCISITES
4-POST-MODIFICATION INSPECTION	Sabre, 61801, 11/19/2012	3774763	CCISITES
4-TOWER MANUFACTURER DRAWINGS	PiRod, A-116331, 1/5/2000	3529917	CCISITES
4-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	TEP, 1/25/2012	3667108	CCISITES
FABRICATION DRAWINGS	Sabre, 61801-MR, 8/2/2012	-	SABRE
4-POST-MODIFICATION INSPECTION	TEP, 48073, 11/10/14	5392198	CCISITES

3.1) Analysis Method

tnxTower (version 7.0.5.1), 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) Monopole has been reinforced in conformance with the referenced modification drawings.
5) The rock anchors have been analyzed assuming reinforced concrete-type action in the interaction between the rock anchors and the rock.
6) The existing anchor brackets have been welded through their chamfer region. This analysis assumes no damage to the weld from the pole shaft to the base plate has occurred and that the weld is complete and effective.
7) In accordance with discussions with CCI Corporate Engineering: Based on the assumption that the monopole manufacturer (ROHN/PiRod) has designed the flange plates at splices to adequately develop the full capacity of the unreinforced shaft section using unpublished and/or proprietary methodologies, we are assuming that if our analysis shows that both the existing shaft and the existing flange bolts are at a usage capacity of 100% or less, then the existing flange plates are at a usage capacity of 100% or less and no additional analysis of the flange plate is required.

This analysis may be affected if any assumptions are not valid or have been made in error. Paul J Ford and Company should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 4 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	190 - 180	Pole	30" x 0.375"	1	-3.976	1311.060	3.9	Pass
L2	180 - 160	Pole	36" x 0.375"	2	-12.753	1490.100	18.3	Pass
L3	160 - 140	Pole	42" x 0.375"	3	-24.746	1668.870	43.2	Pass
L4	140 - 120	Pole	P48x0.375	4	-30.436	1847.490	62.2	Pass
L5	120 - 113.33	Pole	54" x 0.375"	5	-32.480	2026.000	57.9	Pass
L6	113.33 - 101.084	Pole	RPS 54" x 0.49915"	6	-37.448	2608.970	60.9	Pass
L7	101.084 - 100	Pole	RPS 54" x 0.49915"	7	-37.874	2608.970	62.1	Pass
L8	100 - 89.583	Pole	RPS 60" x 0.7378"	8	-44.449	4299.700	41.0	Pass
L9	89.583 - 85.417	Pole	RPS 60" x 0.82326"	9	-47.245	4669.610	39.4	Pass
L10	85.417 - 83.917	Pole	RPS 60" x 0.90946"	10	-48.345	5024.910	36.6	Pass
L11	83.917 - 80	Pole	RPS 60" x 0.79468"	11	-50.894	4522.980	44.4	Pass
L12	80 - 60	Pole	RPS 60" x 0.58339"	12	-61.075	3419.160	77.4	Pass
L13	60 - 58.417	Pole	RPS 60" x 0.70948"	13	-62.014	4171.130	65.2	Pass
L14	58.417 - 48.417	Pole	P60x5/8	14	-67.380	4139.150	72.2	Pass
L15	48.417 - 40	Pole	RPS 60" x 0.77929"	15	-72.861	4479.600	73.0	Pass
L16	40 - 31.083	Pole	RPS 60" x 0.77929"	16	-78.691	4479.600	79.8	Pass
L17	31.083 - 28.917	Pole	RPS 60" x 0.90145"	17	-80.305	4969.280	71.1	Pass
L18	28.917 - 20	Pole	RPS 60" x 0.74524"	18	-85.948	4308.800	92.6	Pass
L19	20 - 4.583	Pole	RPS 60" x 0.87181"	19	-97.179	4856.390	90.7	Pass
L20	4.583 - 0	Pole	RPS 60" x 1.10184"	20	-101.293	5943.240	75.4	Pass
							Summary	
						Pole (L18)	92.6	Pass
						RATING =	**92.6**	**Pass**

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	67.4	Pass
1	Base Plate	0	68.5	Pass
1	Base Foundation	0	59.8	Pass
1	Flange Connection	20	82.5	Pass
1	Flange Connection	40	72.3	Pass
1	Flange Connection	60	89.7	Pass
1	Flange Connection	80	63.7	Pass
1	Flange Connection	100	57.7	Pass
1	Flange Connection	120	65.7	Pass
1	Flange Connection	140	44.3	Pass
1, 2	Flange Connection	160	18.3	Pass
1, 2	Flange Connection	180	3.9	Pass

Structure Rating (max from all components) =	92.6%

Notes:
1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.
2) See assumption #7.

4) Recommendations

The monopole and its foundation have sufficient capacity to carry the proposed loading configuration. No modifications are required at this time.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Fairfield County, Connecticut.
2) ASCE 7-10 Wind Data is used (wind speeds converted to nominal values).
3) Basic wind speed of 93 mph.
4) Structure Class II.
5) Exposure Category C.
6) Topographic Category 1.
7) Crest Height 0.000 ft.
8) Nominal ice thickness of 0.750 in.
9) Ice thickness is considered to increase with height.
10) Ice density of 56.000 pcf.
11) A wind speed of 50 mph is used in combination with ice.
12) Temperature drop of 50.000 °F.
13) Deflections calculated using a wind speed of 60 mph.
14) A non-linear (P-delta) analysis was used.
15) Pressures are calculated at each section.
16) Stress ratio used in pole design is 1.
17) 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	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	√ Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	√ Bypass Mast Stability Checks	√ Consider Feed Line Torque
Always Use Max Kz	√ Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	√ Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	190.000-180.000	10.000	30" x 0.375"	A53-B-42 (42 ksi)	
L2	180.000-160.000	20.000	36" x 0.375"	A53-B-42 (42 ksi)	
L3	160.000-140.000	20.000	42" x 0.375"	A53-B-42 (42 ksi)	
L4	140.000-120.000	20.000	P48x0.375	A53-B-42 (42 ksi)	
L5	120.000-113.330	6.670	54" x 0.375"	A53-B-42 (42 ksi)	
L6	113.330-101.084	12.246	RPS 54" x	Reinf 36.59	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
			0.49915"	ksi (37 ksi)	
L7	101.084-100.000	1.084	RPS 54" x 0.49915"	Reinf 36.59 ksi (37 ksi)	
L8	100.000-89.583	10.417	RPS 60" x 0.7378"	Reinf 34.78 ksi (35 ksi)	
L9	89.583-85.417	4.166	RPS 60" x 0.82326"	Reinf 33.90 ksi (34 ksi)	
L10	85.417-83.917	1.500	RPS 60" x 0.90946"	Reinf 33.07 ksi (33 ksi)	
L11	83.917-80.000	3.917	RPS 60" x 0.79468"	Reinf 34.18 ksi (34 ksi)	
L12	80.000-60.000	20.000	RPS 60" x 0.58339"	Reinf 36.30 ksi (36 ksi)	
L13	60.000-58.417	1.583	RPS 60" x 0.70948"	Reinf 35.07 ksi (35 ksi)	
L14	58.417-48.417	10.000	P60x5/8	A53-B-42 (42 ksi)	
L15	48.417-40.000	8.417	RPS 60" x 0.77929"	Reinf 34.33 ksi (34 ksi)	
L16	40.000-31.083	8.917	RPS 60" x 0.77929"	Reinf 34.33 ksi (34 ksi)	
L17	31.083-28.917	2.166	RPS 60" x 0.90145"	Reinf 32.99 ksi (33 ksi)	
L18	28.917-20.000	8.917	RPS 60" x 0.74524"	Reinf 34.51 ksi (35 ksi)	
L19	20.000-4.583	15.417	RPS 60" x 0.87181"	Reinf 33.32 ksi (33 ksi)	
L20	4.583-0.000	4.583	RPS 60" x 1.10184"	Reinf 32.39 ksi (32 ksi)	

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
ATCB-B01(5/16")	C	No	Inside Pole	188.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF4.5-50(5/8")	C	No	Inside Pole	188.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF5-50A(7/8")	C	No	Inside Pole	188.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
TYPE I(1-1/4")	C	No	Inside Pole	188.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
****								
LDF5-50A(7/8")	C	No	Inside Pole	179.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
****								
LDF5-50A(7/8")	C	No	Inside Pole	170.000 - 0.000	2	No Ice	0.000	0.000

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF7-50A(1-5/8")	C	No	Inside Pole	170.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	170.000 - 0.000	4	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
MLE Hybrid 9Power/18Fiber RL 2(1-5/8")	C	No	CaAa (Out Of Face)	170.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
MLE Hybrid 9Power/18Fiber RL 2(1-5/8")	C	No	CaAa (Out Of Face)	170.000 - 0.000	1	No Ice	0.163	0.001
						1/2" Ice	0.263	0.002
						1" Ice	0.362	0.004
****								
LDF5-50A(7/8")	C	No	Inside Pole	160.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	160.000 - 0.000	2	No Ice	0.198	0.001
						1/2" Ice	0.298	0.002
						1" Ice	0.398	0.004
LDF7-50A(1-5/8")	C	No	CaAa (Out Of Face)	160.000 - 0.000	10	No Ice	0.000	0.001
						1/2" Ice	0.000	0.002
						1" Ice	0.000	0.004
9776(5/8")	C	No	Inside Pole	160.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
2" (Nominal) Conduit	C	No	Inside Pole	160.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
****								
LDF7-50A(1-5/8")	C	No	Inside Pole	150.000 - 0.000	11	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8")	C	No	Inside Pole	150.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
HB158-1-08U8-S8J18(1-5/8")	C	No	Inside Pole	150.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
****								
LDF5-50A(7/8")	C	No	Inside Pole	125.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF4P-50A(1/2)	C	No	Inside Pole	125.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
*****								
LDF4-50A(1/2")	C	No	Inside Pole	110.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
****								
LDF4-50A(1/2")	C	No	Inside Pole	100.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
LDF4-75A(1/2")	C	No	Inside Pole	95.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
****								
LDF4-75A(1/2")	C	No	Inside Pole	80.000 - 0.000	2	No Ice	0.000	0.000
						1/2" Ice	0.000	0.000
						1" Ice	0.000	0.000
****								
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	15.000 - 0.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1" Flat Reinforcement	C	No	CaAa (Out Of Face)	112.500 - 57.500	1	No Ice	0.167	0.000
						1/2" Ice	0.278	0.000
						1" Ice	0.389	0.000

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	35.000 - 25.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	45.000 - 35.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	51.000 - 45.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	25.000 - 15.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	45.000 - 35.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	65.000 - 55.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	0.000
1 1/4" Flat Reinforcement	C	No	CaAa (Out Of Face)	87.250 - 75.000	1	No Ice	0.208	0.000
						1/2" Ice	0.319	0.000
						1" Ice	0.431	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	190.000-180.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.009
L2	180.000-160.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	1.625	0.146
L3	160.000-140.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	11.170	0.603
L4	140.000-120.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	11.170	0.722
L5	120.000-113.330	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	3.725	0.243
L6	113.330-101.084	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	8.742	0.449
L7	101.084-100.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.786	0.040
L8	100.000-89.583	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	7.554	0.386
L9	89.583-85.417	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	3.403	0.155
L10	85.417-83.917	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	1.400	0.056
L11	83.917-80.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	3.657	0.146
L12	80.000-60.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	16.587	0.751
L13	60.000-58.417	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	1.478	0.059
L14	58.417-48.417	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	0.000
		C	0.000	0.000	0.000	6.988	0.375
L15	48.417-40.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	7.496	0.316
L16	40.000-31.083	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	7.880	0.335
L17	31.083-28.917	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	1.661	0.081
L18	28.917-20.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	6.838	0.335
L19	20.000-4.583	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	11.822	0.579
L20	4.583-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	3.514	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	190.000-180.000	A	1.782	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.009
L2	180.000-160.000	A	1.767	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	5.159	0.629
L3	160.000-140.000	A	1.745	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	32.113	3.516
L4	140.000-120.000	A	1.720	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	31.815	3.580
L5	120.000-113.330	A	1.702	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	10.536	1.183
L6	113.330-101.084	A	1.688	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	25.423	2.156
L7	101.084-100.000	A	1.677	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	2.281	0.190
L8	100.000-89.583	A	1.667	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	21.831	1.814
L9	89.583-85.417	A	1.654	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	9.741	0.720
L10	85.417-83.917	A	1.648	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	3.982	0.258
L11	83.917-80.000	A	1.643	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	10.378	0.673
L12	80.000-60.000	A	1.617	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	46.773	3.385
L13	60.000-58.417	A	1.590	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	4.107	0.263
L14	58.417-48.417	A	1.574	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C		0.000	0.000	0.000	18.851	1.646
L15	48.417-40.000	A	1.545	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	19.901	1.358
L16	40.000-31.083	A	1.511	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	20.638	1.407
L17	31.083-28.917	A	1.486	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	4.307	0.336
L18	28.917-20.000	A	1.456	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	17.511	1.353
L19	20.000-4.583	A	1.359	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	29.049	2.177
L20	4.583-0.000	A	1.149	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	7.843	0.542

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	190.000-180.000	0.000	0.000	0.000	0.000
L2	180.000-160.000	-0.103	0.059	-0.283	0.163
L3	160.000-140.000	-0.626	0.361	-1.353	0.781
L4	140.000-120.000	-0.637	0.368	-1.406	0.812
L5	120.000-113.330	-0.645	0.373	-1.451	0.838
L6	113.330-101.084	-0.800	0.462	-1.770	1.022
L7	101.084-100.000	-0.811	0.468	-1.787	1.032
L8	100.000-89.583	-0.823	0.475	-1.846	1.066
L9	89.583-85.417	-0.912	0.527	-1.995	1.152
L10	85.417-83.917	-1.022	0.590	-2.175	1.256
L11	83.917-80.000	-1.022	0.590	-2.172	1.254
L12	80.000-60.000	-0.924	0.534	-1.997	1.153
L13	60.000-58.417	-1.022	0.590	-2.144	1.238
L14	58.417-48.417	-0.796	0.460	-1.713	0.989
L15	48.417-40.000	-0.982	0.567	-2.015	1.163
L16	40.000-31.083	-0.975	0.563	-1.987	1.147
L17	31.083-28.917	-0.864	0.499	-1.785	1.030
L18	28.917-20.000	-0.864	0.499	-1.770	1.022
L19	20.000-4.583	-0.864	0.499	-1.721	0.994
L20	4.583-0.000	-0.864	0.499	-1.610	0.930

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
PD201-7	C	From Leg	4.000		0.000	188.000	No Ice	1.015	1.015	0.004
			0.000				1/2" Ice	1.809	1.809	0.013
			5.000				1" Ice	2.620	2.620	0.026
APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.000		50.000	188.000	No Ice	8.262	6.946	0.083
			0.000				1/2" Ice	8.822	8.127	0.151
			1.000				1" Ice	9.346	9.021	0.227
APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.000		45.000	188.000	No Ice	8.262	6.946	0.083
			0.000				1/2" Ice	8.822	8.127	0.151
			1.000				1" Ice	9.346	9.021	0.227

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
						1" Ice			
APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.000 0.000 1.000	60.000	188.000	No Ice 1/2" Ice 1" Ice	8.262 8.822 9.346	6.946 8.127 9.021	0.083 0.151 0.227
(2) 2.375" OD x 4' Mount Pipe	A	From Leg	4.000 0.000 1.000	0.000	188.000	No Ice 1/2" Ice 1" Ice	0.866 1.111 1.365	0.866 1.111 1.365	0.018 0.025 0.035
(2) 2.375" OD x 4' Mount Pipe	B	From Leg	4.000 0.000 1.000	0.000	188.000	No Ice 1/2" Ice 1" Ice	0.866 1.111 1.365	0.866 1.111 1.365	0.018 0.025 0.035
(2) 2.375" OD x 4' Mount Pipe	C	From Leg	4.000 0.000 1.000	0.000	188.000	No Ice 1/2" Ice 1" Ice	0.866 1.111 1.365	0.866 1.111 1.365	0.018 0.025 0.035
Platform Mount [LP 403-1]	C	None		0.000	188.000	No Ice 1/2" Ice 1" Ice	18.850 24.300 29.750	18.850 24.300 29.750	1.500 1.797 2.093
****									
TME-800MHz RRH	A	From Leg	4.000 0.000 3.000	50.000	185.000	No Ice 1/2" Ice 1" Ice	2.134 2.320 2.512	1.773 1.946 2.127	0.053 0.074 0.098
TME-800MHz RRH	B	From Leg	4.000 0.000 3.000	45.000	185.000	No Ice 1/2" Ice 1" Ice	2.134 2.320 2.512	1.773 1.946 2.127	0.053 0.074 0.098
TME-800MHz RRH	C	From Leg	4.000 0.000 3.000	60.000	185.000	No Ice 1/2" Ice 1" Ice	2.134 2.320 2.512	1.773 1.946 2.127	0.053 0.074 0.098
TME-1900MHZ RRH	A	From Leg	4.000 0.000 3.000	50.000	185.000	No Ice 1/2" Ice 1" Ice	2.492 2.695 2.906	3.258 3.484 3.718	0.044 0.075 0.110
TME-1900MHZ RRH	B	From Leg	4.000 0.000 3.000	45.000	185.000	No Ice 1/2" Ice 1" Ice	2.492 2.695 2.906	3.258 3.484 3.718	0.044 0.075 0.110
TME-1900MHZ RRH	C	From Leg	4.000 0.000 3.000	60.000	185.000	No Ice 1/2" Ice 1" Ice	2.492 2.695 2.906	3.258 3.484 3.718	0.044 0.075 0.110
Side Arm Mount [SO 102-3]	C	None		0.000	185.000	No Ice 1/2" Ice 1" Ice	3.000 3.480 3.960	3.000 3.480 3.960	0.081 0.111 0.141
****									
Side Arm Mount [SO 701-1]	C	None		0.000	184.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093
****									
458-2D	B	From Leg	4.000 0.000 6.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	3.667 5.031 6.412	3.667 5.031 6.412	0.022 0.049 0.084
458-2D	C	From Leg	4.000 0.000 6.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	3.667 5.031 6.412	3.667 5.031 6.412	0.022 0.049 0.084
Platform Mount [LP 403-1]	C	None		0.000	179.000	No Ice	18.850	18.850	1.500

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
						1/2" Ice	24.300 29.750	24.300 29.750	1.797 2.093
						1" Ice			
(4) 6' x 2" Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
(4) 6' x 2" Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
(4) 6' x 2" Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	179.000	No Ice 1/2" Ice 1" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048
***									
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	6.329 6.775 7.214	5.642 6.426 7.131	0.112 0.169 0.233
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	6.329 6.775 7.214	5.642 6.426 7.131	0.112 0.169 0.233
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	6.329 6.775 7.214	5.642 6.426 7.131	0.112 0.169 0.233
Ericsson Air 21 B4A B12P-B5P 8FT w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	11.782 12.502 13.232	11.038 12.564 14.116	0.159 0.254 0.360
Ericsson Air 21 B4A B12P-B5P 8FT w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	11.782 12.502 13.232	11.038 12.564 14.116	0.159 0.254 0.360
Ericsson Air 21 B4A B12P-B5P 8FT w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	11.782 12.502 13.232	11.038 12.564 14.116	0.159 0.254 0.360
KRY 112 144/1	A	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	0.350 0.426 0.509	0.175 0.234 0.301	0.011 0.014 0.019
KRY 112 144/1	B	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	0.350 0.426 0.509	0.175 0.234 0.301	0.011 0.014 0.019
KRY 112 144/1	C	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	0.350 0.426 0.509	0.175 0.234 0.301	0.011 0.014 0.019
(2) RRUS 11 B12	A	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
RRUS 11 B12	B	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
RRUS 11 B12	C	From Leg	4.000 0.000 0.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	2.833 3.043 3.259	1.182 1.330 1.485	0.051 0.072 0.095
Platform Mount [LP 405-1]	C	None		0.000	170.000	No Ice	20.800	20.800	1.800

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
						1/2" Ice	28.100	28.100	2.066
						1" Ice	35.400	35.400	2.332
PD201-7	C	From Leg	4.000 0.000 4.000	0.000	170.000	No Ice 1/2" Ice 1" Ice	1.015 1.809 2.620	1.015 1.809 2.620	0.004 0.013 0.026
***									
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	5.813 6.268 6.697	4.630 5.508 6.213	0.086 0.143 0.208
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	5.813 6.268 6.697	4.630 5.508 6.213	0.086 0.143 0.208
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	5.813 6.268 6.697	4.630 5.508 6.213	0.086 0.143 0.208
(2) LGP21401	A	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	1.104 1.239 1.381	0.347 0.442 0.544	0.014 0.021 0.030
(2) LGP21401	B	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	1.104 1.239 1.381	0.347 0.442 0.544	0.014 0.021 0.030
(2) LGP21401	C	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	1.104 1.239 1.381	0.347 0.442 0.544	0.014 0.021 0.030
(4) 7020.00	A	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	0.102 0.147 0.199	0.175 0.239 0.311	0.002 0.005 0.009
(4) 7020.00	B	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	0.102 0.147 0.199	0.175 0.239 0.311	0.002 0.005 0.009
(4) 7020.00	C	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	0.102 0.147 0.199	0.175 0.239 0.311	0.002 0.005 0.009
TT19-08BP111-001	A	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	0.553 0.649 0.752	0.446 0.534 0.630	0.016 0.022 0.029
TT19-08BP111-001	B	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	0.553 0.649 0.752	0.446 0.534 0.630	0.016 0.022 0.029
TT19-08BP111-001	C	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	0.553 0.649 0.752	0.446 0.534 0.630	0.016 0.022 0.029
RRUS-11	A	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	2.791 2.998 3.213	1.192 1.340 1.496	0.050 0.071 0.095
RRUS-11	B	From Leg	4.000 0.000 3.000	0.000	160.000	No Ice 1/2" Ice 1" Ice	2.791 2.998 3.213	1.192 1.340 1.496	0.050 0.071 0.095
RRUS-11	C	From Leg	4.000	0.000	160.000	No Ice	2.791	1.192	0.050

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
			0.000			1/2"	2.998	1.340	0.071
			3.000			Ice	3.213	1.496	0.095
						1" Ice			
RRUS-11	A	From Leg	4.000	0.000	160.000	No Ice	2.791	1.192	0.050
			0.000			1/2"	2.998	1.340	0.071
			3.000			Ice	3.213	1.496	0.095
						1" Ice			
RRUS-11	B	From Leg	4.000	0.000	160.000	No Ice	2.791	1.192	0.050
			0.000			1/2"	2.998	1.340	0.071
			3.000			Ice	3.213	1.496	0.095
						1" Ice			
RRUS-11	C	From Leg	4.000	0.000	160.000	No Ice	2.791	1.192	0.050
			0.000			1/2"	2.998	1.340	0.071
			3.000			Ice	3.213	1.496	0.095
						1" Ice			
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.000	0.000	160.000	No Ice	8.371	6.362	0.079
			0.000			1/2"	8.931	7.538	0.144
			3.000			Ice	9.457	8.427	0.218
						1" Ice			
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.000	0.000	160.000	No Ice	8.371	6.362	0.079
			0.000			1/2"	8.931	7.538	0.144
			3.000			Ice	9.457	8.427	0.218
						1" Ice			
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.000	0.000	160.000	No Ice	8.371	6.362	0.079
			0.000			1/2"	8.931	7.538	0.144
			3.000			Ice	9.457	8.427	0.218
						1" Ice			
DC6-48-60-18-8F	C	From Leg	4.000	0.000	160.000	No Ice	0.917	0.917	0.019
			0.000			1/2"	1.458	1.458	0.037
			3.000			Ice	1.643	1.643	0.057
						1" Ice			
OPA-65R-LCUU-H6 w/Mount Pipe	A	From Leg	4.000	0.000	160.000	No Ice	9.895	8.113	0.092
			0.000			1/2"	10.470	9.304	0.174
			3.000			Ice	11.010	10.209	0.263
						1" Ice			
OPA-65R-LCUU-H6 w/Mount Pipe	B	From Leg	4.000	0.000	160.000	No Ice	9.895	8.113	0.092
			0.000			1/2"	10.470	9.304	0.174
			3.000			Ice	11.010	10.209	0.263
						1" Ice			
OPA-65R-LCUU-H6 w/Mount Pipe	C	From Leg	4.000	0.000	160.000	No Ice	9.895	8.113	0.092
			0.000			1/2"	10.470	9.304	0.174
			3.000			Ice	11.010	10.209	0.263
						1" Ice			
RRUS12/RRUS A2	A	From Leg	4.000	0.000	160.000	No Ice	3.143	1.835	0.072
			0.000			1/2"	3.363	2.012	0.099
			3.000			Ice	3.590	2.196	0.130
						1" Ice			
RRUS12/RRUS A2	B	From Leg	4.000	0.000	160.000	No Ice	3.143	1.835	0.072
			0.000			1/2"	3.363	2.012	0.099
			3.000			Ice	3.590	2.196	0.130
						1" Ice			
RRUS12/RRUS A2	C	From Leg	4.000	0.000	160.000	No Ice	3.143	1.835	0.072
			0.000			1/2"	3.363	2.012	0.099
			3.000			Ice	3.590	2.196	0.130
						1" Ice			
Platform Mount [LP 403-1]	C	None		0.000	160.000	No Ice	18.850	18.850	1.500
						1/2"	24.300	24.300	1.797
						Ice	29.750	29.750	2.093
						1" Ice			
4' x 2" Pipe Mount	A	From Leg	4.000	0.000	160.000	No Ice	0.785	0.785	0.029
			0.000			1/2"	1.028	1.028	0.035
			3.000			Ice	1.281	1.281	0.044
						1" Ice			
4' x 2" Pipe Mount	B	From Leg	4.000	0.000	160.000	No Ice	0.785	0.785	0.029
			0.000			1/2"	1.028	1.028	0.035

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			Ice	1.281	1.281	0.044
						1" Ice			
4' x 2" Pipe Mount	C	From Leg	4.000	0.000	160.000	No Ice	0.785	0.785	0.029
			0.000			1/2"	1.028	1.028	0.035
			3.000			Ice	1.281	1.281	0.044
						1" Ice			
****									
LNX-6514DS-T4M w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	8.198	6.885	0.056
			0.000			1/2"	8.701	7.951	0.124
			0.000			Ice	9.195	8.809	0.199
						1" Ice			
LNX-6514DS-T4M w/ Mount Pipe	B	From Leg	4.000	0.000	150.000	No Ice	8.198	6.885	0.056
			0.000			1/2"	8.701	7.951	0.124
			0.000			Ice	9.195	8.809	0.199
						1" Ice			
BXA-171063-12CF-EDIN-X w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	5.029	5.289	0.041
			0.000			1/2"	5.583	6.459	0.087
			0.000			Ice	6.103	7.348	0.140
						1" Ice			
BXA-171063-12CF-EDIN-X w/ Mount Pipe	B	From Leg	4.000	0.000	150.000	No Ice	5.029	5.289	0.041
			0.000			1/2"	5.583	6.459	0.087
			0.000			Ice	6.103	7.348	0.140
						1" Ice			
BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Leg	4.000	0.000	150.000	No Ice	5.029	5.289	0.041
			0.000			1/2"	5.583	6.459	0.087
			0.000			Ice	6.103	7.348	0.140
						1" Ice			
P65-16-XL-R w/ Mount Pipe	C	From Leg	4.000	0.000	150.000	No Ice	8.277	6.569	0.082
			0.000			1/2"	8.769	7.480	0.149
			0.000			Ice	9.264	8.335	0.225
						1" Ice			
RRH2X40-AWS	A	From Leg	4.000	0.000	150.000	No Ice	2.161	1.420	0.044
			0.000			1/2"	2.360	1.590	0.061
			0.000			Ice	2.565	1.768	0.082
						1" Ice			
RRH2X40-AWS	B	From Leg	4.000	0.000	150.000	No Ice	2.161	1.420	0.044
			0.000			1/2"	2.360	1.590	0.061
			0.000			Ice	2.565	1.768	0.082
						1" Ice			
RRH2X40-AWS	C	From Leg	4.000	0.000	150.000	No Ice	2.161	1.420	0.044
			0.000			1/2"	2.360	1.590	0.061
			0.000			Ice	2.565	1.768	0.082
						1" Ice			
(2) DB846F65ZAXY w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	7.271	7.821	0.047
			0.000			1/2"	7.832	9.010	0.114
			0.000			Ice	8.348	9.912	0.189
						1" Ice			
(2) DB846F65ZAXY w/ Mount Pipe	B	From Leg	4.000	0.000	150.000	No Ice	7.271	7.821	0.047
			0.000			1/2"	7.832	9.010	0.114
			0.000			Ice	8.348	9.912	0.189
						1" Ice			
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.000	0.000	150.000	No Ice	4.564	10.259	0.046
			0.000			1/2"	5.105	11.427	0.113
			0.000			Ice	5.612	12.312	0.187
						1" Ice			
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	5.029	5.289	0.041
			0.000			1/2"	5.583	6.459	0.087
			0.000			Ice	6.103	7.348	0.140
						1" Ice			
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	B	From Leg	4.000	0.000	150.000	No Ice	5.029	5.289	0.041
			0.000			1/2"	5.583	6.459	0.087
			0.000			Ice	6.103	7.348	0.140
						1" Ice			
BXA-171063-12CF-EDIN-2 w/ Mount Pipe	C	From Leg	4.000	0.000	150.000	No Ice	5.029	5.289	0.041
			0.000			1/2"	5.583	6.459	0.087

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
			0.000			Ice	6.103	7.348	0.140
						1" Ice			
(2) FD9R6004/2C-3L	A	From Leg	4.000	0.000	150.000	No Ice	0.314	0.076	0.003
			0.000			1/2"	0.386	0.119	0.005
			0.000			Ice	0.466	0.169	0.009
						1" Ice			
(2) FD9R6004/2C-3L	B	From Leg	4.000	0.000	150.000	No Ice	0.314	0.076	0.003
			0.000			1/2"	0.386	0.119	0.005
			0.000			Ice	0.466	0.169	0.009
						1" Ice			
(2) FD9R6004/2C-3L	C	From Leg	4.000	0.000	150.000	No Ice	0.314	0.076	0.003
			0.000			1/2"	0.386	0.119	0.005
			0.000			Ice	0.466	0.169	0.009
						1" Ice			
DB-T1-6Z-8AB-0Z	B	From Leg	4.000	0.000	150.000	No Ice	4.800	2.000	0.044
			0.000			1/2"	5.070	2.193	0.080
			0.000			Ice	5.348	2.393	0.120
						1" Ice			
Platform Mount [LP 403-1]	C	None		0.000	150.000	No Ice	18.850	18.850	1.500
						1/2"	24.300	24.300	1.797
						Ice	29.750	29.750	2.093
						1" Ice			
(2) SBNHH-1D85C w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	11.626	9.793	0.077
			0.000			1/2"	12.346	11.311	0.166
			0.000			Ice	13.074	12.854	0.266
						1" Ice			
(2) SBNHH-1D85C w/ Mount Pipe	B	From Leg	4.000	0.000	150.000	No Ice	11.626	9.793	0.077
			0.000			1/2"	12.346	11.311	0.166
			0.000			Ice	13.074	12.854	0.266
						1" Ice			
(2) SBNHH-1D85C w/ Mount Pipe	C	From Leg	4.000	0.000	150.000	No Ice	11.626	9.793	0.077
			0.000			1/2"	12.346	11.311	0.166
			0.000			Ice	13.074	12.854	0.266
						1" Ice			
RRH2x60-700	A	From Leg	4.000	0.000	150.000	No Ice	3.500	1.816	0.060
			0.000			1/2"	3.761	2.052	0.083
			0.000			Ice	4.029	2.289	0.109
						1" Ice			
RRH2x60-700	B	From Leg	4.000	0.000	150.000	No Ice	3.500	1.816	0.060
			0.000			1/2"	3.761	2.052	0.083
			0.000			Ice	4.029	2.289	0.109
						1" Ice			
RRH2x60-700	C	From Leg	4.000	0.000	150.000	No Ice	3.500	1.816	0.060
			0.000			1/2"	3.761	2.052	0.083
			0.000			Ice	4.029	2.289	0.109
						1" Ice			
RRH4X45-AWS4 B66	A	From Leg	4.000	0.000	150.000	No Ice	2.660	1.586	0.064
			0.000			1/2"	2.878	1.769	0.084
			0.000			Ice	3.104	1.959	0.108
						1" Ice			
RRH4X45-AWS4 B66	B	From Leg	4.000	0.000	150.000	No Ice	2.660	1.586	0.064
			0.000			1/2"	2.878	1.769	0.084
			0.000			Ice	3.104	1.959	0.108
						1" Ice			
RRH4X45-AWS4 B66	C	From Leg	4.000	0.000	150.000	No Ice	2.660	1.586	0.064
			0.000			1/2"	2.878	1.769	0.084
			0.000			Ice	3.104	1.959	0.108
						1" Ice			
RRH2X60-1900	A	From Leg	4.000	0.000	150.000	No Ice	1.874	1.218	0.043
			0.000			1/2"	2.052	1.367	0.059
			0.000			Ice	2.237	1.523	0.077
						1" Ice			
RRH2X60-1900	B	From Leg	4.000	0.000	150.000	No Ice	1.874	1.218	0.043
			0.000			1/2"	2.052	1.367	0.059
			0.000			Ice	2.237	1.523	0.077

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
						1" Ice			
RRH2X60-1900	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	1.874 2.052 2.237	1.218 1.367 1.523	0.043 0.059 0.077
DB-T1-6Z-8AB-0Z	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	4.800 5.070 5.348	2.000 2.193 2.393	0.044 0.080 0.120
****									
PD128-1	C	From Leg	4.000 0.000 5.000	70.000	125.000	No Ice 1/2" Ice 1" Ice	1.277 2.272 3.282	1.277 2.272 3.282	0.013 0.024 0.041
PD201-1	B	From Leg	4.000 0.000 5.000	10.000	125.000	No Ice 1/2" Ice 1" Ice	0.628 1.539 2.467	0.628 1.539 2.467	0.004 0.011 0.023
Side Arm Mount [SO 701-1]	B	From Leg	0.000 0.000 0.000	10.000	125.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093
Side Arm Mount [SO 701-1]	C	From Leg	0.000 0.000 0.000	70.000	125.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093
***									
PD128-1	B	From Leg	4.000 0.000 5.000	-10.000	110.000	No Ice 1/2" Ice 1" Ice	1.277 2.272 3.282	1.277 2.272 3.282	0.013 0.024 0.041
PD128-1	C	From Leg	4.000 0.000 5.000	50.000	110.000	No Ice 1/2" Ice 1" Ice	1.277 2.272 3.282	1.277 2.272 3.282	0.013 0.024 0.041
Side Arm Mount [SO 701-1]	B	From Leg	0.000 0.000 0.000	-10.000	110.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093
Side Arm Mount [SO 701-1]	C	From Leg	0.000 0.000 0.000	50.000	110.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093
****									
GPS_A	B	From Leg	0.000 0.000 1.000	60.000	100.000	No Ice 1/2" Ice 1" Ice	0.255 0.320 0.393	0.255 0.320 0.393	0.001 0.005 0.010
Side Arm Mount [SO 701-1]	B	From Leg	0.000 0.000 0.000	60.000	100.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093
***									
PD128-1	A	From Leg	4.000 0.000 5.000	40.000	95.000	No Ice 1/2" Ice 1" Ice	1.277 2.272 3.282	1.277 2.272 3.282	0.013 0.024 0.041
PD128-1	C	From Leg	4.000 0.000 5.000	-20.000	95.000	No Ice 1/2" Ice 1" Ice	1.277 2.272 3.282	1.277 2.272 3.282	0.013 0.024 0.041
Side Arm Mount [SO 701-1]	A	From Leg	0.000 0.000 0.000	40.000	95.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093

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
Side Arm Mount [SO 701-1]	C	From Leg	0.000 0.000 0.000	-20.000	95.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093
***									
DB222	C	From Leg	4.000 0.000 5.000	60.000	80.000	No Ice 1/2" Ice 1" Ice	1.600 2.880 4.160	1.600 2.880 4.160	0.016 0.021 0.026
PD128-1	B	From Leg	4.000 0.000 5.000	0.000	80.000	No Ice 1/2" Ice 1" Ice	1.277 2.272 3.282	1.277 2.272 3.282	0.013 0.024 0.041
Side Arm Mount [SO 701-1]	B	From Leg	0.000 0.000 0.000	0.000	80.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093
Side Arm Mount [SO 701-1]	C	From Leg	0.000 0.000 0.000	60.000	80.000	No Ice 1/2" Ice 1" Ice	0.850 1.140 1.430	1.670 2.340 3.010	0.065 0.079 0.093

Dishes

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
SP2-5.8	A	Paraboloid w/o Radome	From Leg	4.000 0.000 -2.000	0.000		188.000	2.000	No Ice 1/2" Ice 1" Ice	3.140 3.410 3.680	0.022 0.040 0.060

Tower Pressures - No Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 190.000-180.000	185.000	1.441	0.030	25.000	A	0.000	25.000	25.000	100.00	0.000	0.000
					B	0.000	25.000		100.00	0.000	0.000
					C	0.000	25.000		100.00	0.000	0.000
L2 180.000-160.000	170.000	1.415	0.030	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	1.625
L3 160.000-140.000	150.000	1.378	0.029	70.000	A	0.000	70.000	70.000	100.00	0.000	0.000
					B	0.000	70.000		100.00	0.000	0.000
					C	0.000	70.000		100.00	0.000	11.170
L4 140.000-120.000	130.000	1.337	0.028	80.000	A	0.000	80.000	80.000	100.00	0.000	0.000
					B	0.000	80.000		100.00	0.000	0.000
					C	0.000	80.000		100.00	0.000	11.170
L5 120.000-113.330	116.665	1.307	0.027	30.015	A	0.000	30.015	30.015	100.00	0.000	0.000
					B	0.000	30.015		100.00	0.000	0.000
					C	0.000	30.015		100.00	0.000	3.725
L6 113.330-101.084	107.207	1.284	0.027	55.107	A	0.000	55.107	55.107	100.00	0.000	0.000
					B	0.000	55.107		100.00	0.000	0.000
					C	0.000	55.107		100.00	0.000	8.742
L7 101.084-100.000	100.542	1.267	0.027	4.878	A	0.000	4.878	4.878	100.00	0.000	0.000
					B	0.000	4.878		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	4.878		100.00	0.000	0.786
L8 100.000-89.583	94.792	1.251	0.026	52.085	A	0.000	52.085	52.085	100.00	0.000	0.000
					B	0.000	52.085		100.00	0.000	0.000
					C	0.000	52.085		100.00	0.000	7.554
L9 89.583-85.417	87.500	1.231	0.026	20.830	A	0.000	20.830	20.830	100.00	0.000	0.000
					B	0.000	20.830		100.00	0.000	0.000
					C	0.000	20.830		100.00	0.000	3.403
L10 85.417-83.917	84.667	1.222	0.026	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	1.400
L11 83.917-80.000	81.959	1.214	0.026	19.585	A	0.000	19.585	19.585	100.00	0.000	0.000
					B	0.000	19.585		100.00	0.000	0.000
					C	0.000	19.585		100.00	0.000	3.657
L12 80.000-60.000	70.000	1.174	0.025	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00	0.000	0.000
					C	0.000	100.000		100.00	0.000	16.587
L13 60.000-58.417	59.209	1.133	0.024	7.915	A	0.000	7.915	7.915	100.00	0.000	0.000
					B	0.000	7.915		100.00	0.000	0.000
					C	0.000	7.915		100.00	0.000	1.478
L14 58.417-48.417	53.417	1.109	0.023	50.000	A	0.000	50.000	50.000	100.00	0.000	0.000
					B	0.000	50.000		100.00	0.000	0.000
					C	0.000	50.000		100.00	0.000	6.988
L15 48.417-40.000	44.209	1.066	0.022	42.085	A	0.000	42.085	42.085	100.00	0.000	0.000
					B	0.000	42.085		100.00	0.000	0.000
					C	0.000	42.085		100.00	0.000	7.496
L16 40.000-31.083	35.542	1.018	0.021	44.585	A	0.000	44.585	44.585	100.00	0.000	0.000
					B	0.000	44.585		100.00	0.000	0.000
					C	0.000	44.585		100.00	0.000	7.880
L17 31.083-28.917	30.000	0.982	0.021	10.830	A	0.000	10.830	10.830	100.00	0.000	0.000
					B	0.000	10.830		100.00	0.000	0.000
					C	0.000	10.830		100.00	0.000	1.661
L18 28.917-20.000	24.459	0.941	0.020	44.585	A	0.000	44.585	44.585	100.00	0.000	0.000
					B	0.000	44.585		100.00	0.000	0.000
					C	0.000	44.585		100.00	0.000	6.838
L19 20.000-4.583	12.292	0.85	0.018	77.085	A	0.000	77.085	77.085	100.00	0.000	0.000
					B	0.000	77.085		100.00	0.000	0.000
					C	0.000	77.085		100.00	0.000	11.822
L20 4.583-0.000	2.292	0.85	0.018	22.915	A	0.000	22.915	22.915	100.00	0.000	0.000
					B	0.000	22.915		100.00	0.000	0.000
					C	0.000	22.915		100.00	0.000	3.514

Tower Pressure - With Ice

G_H = 1.100

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 190.000-180.000	185.000	1.441	0.009	1.782	27.970	A	0.000	27.970	27.970	100.00	0.000	0.000
						B	0.000	27.970		100.00	0.000	0.000
						C	0.000	27.970		100.00	0.000	0.000
L2 180.000-160.000	170.000	1.415	0.009	1.767	65.891	A	0.000	65.891	65.891	100.00	0.000	0.000
						B	0.000	65.891		100.00	0.000	0.000
						C	0.000	65.891		100.00	0.000	5.159
L3 160.000-140.000	150.000	1.378	0.008	1.745	75.817	A	0.000	75.817	75.817	100.00	0.000	0.000
						B	0.000	75.817		100.00	0.000	0.000
						C	0.000	75.817		100.00	0.000	32.113
L4 140.000-120.000	130.000	1.337	0.008	1.720	85.735	A	0.000	85.735	85.735	100.00	0.000	0.000
						B	0.000	85.735		100.00	0.000	0.000
						C	0.000	85.735		100.00	0.000	31.815
L5 120.000-113.330	116.665	1.307	0.008	1.702	31.907	A	0.000	31.907	31.907	100.00	0.000	0.000
						B	0.000	31.907		100.00	0.000	0.000
						C	0.000	31.907		100.00	0.000	10.536
L6 113.330-101.084	107.207	1.284	0.008	1.688	58.551	A	0.000	58.551	58.551	100.00	0.000	0.000
						B	0.000	58.551		100.00	0.000	0.000

Section Elevation ft	z ft	K_z	q_z ksf	t_z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
						C	0.000	58.551		100.00	0.000	25.423
L7 101.084-100.000	100.542	1.267	0.008	1.677	5.181	A	0.000	5.181	5.181	100.00	0.000	0.000
						B	0.000	5.181		100.00	0.000	0.000
						C	0.000	5.181		100.00	0.000	2.281
L8 100.000-89.583	94.792	1.251	0.008	1.667	54.979	A	0.000	54.979	54.979	100.00	0.000	0.000
						B	0.000	54.979		100.00	0.000	0.000
						C	0.000	54.979		100.00	0.000	21.831
L9 89.583-85.417	87.500	1.231	0.007	1.654	21.978	A	0.000	21.978	21.978	100.00	0.000	0.000
						B	0.000	21.978		100.00	0.000	0.000
						C	0.000	21.978		100.00	0.000	9.741
L10 85.417-83.917	84.667	1.222	0.007	1.648	7.912	A	0.000	7.912	7.912	100.00	0.000	0.000
						B	0.000	7.912		100.00	0.000	0.000
						C	0.000	7.912		100.00	0.000	3.982
L11 83.917-80.000	81.959	1.214	0.007	1.643	20.658	A	0.000	20.658	20.658	100.00	0.000	0.000
						B	0.000	20.658		100.00	0.000	0.000
						C	0.000	20.658		100.00	0.000	10.378
L12 80.000-60.000	70.000	1.174	0.007	1.617	105.390	A	0.000	105.390	105.390	100.00	0.000	0.000
						B	0.000	105.390		100.00	0.000	0.000
						C	0.000	105.390		100.00	0.000	46.773
L13 60.000-58.417	59.209	1.133	0.007	1.590	8.335	A	0.000	8.335	8.335	100.00	0.000	0.000
						B	0.000	8.335		100.00	0.000	0.000
						C	0.000	8.335		100.00	0.000	4.107
L14 58.417-48.417	53.417	1.109	0.007	1.574	52.623	A	0.000	52.623	52.623	100.00	0.000	0.000
						B	0.000	52.623		100.00	0.000	0.000
						C	0.000	52.623		100.00	0.000	18.851
L15 48.417-40.000	44.209	1.066	0.006	1.545	44.252	A	0.000	44.252	44.252	100.00	0.000	0.000
						B	0.000	44.252		100.00	0.000	0.000
						C	0.000	44.252		100.00	0.000	19.901
L16 40.000-31.083	35.542	1.018	0.006	1.511	46.831	A	0.000	46.831	46.831	100.00	0.000	0.000
						B	0.000	46.831		100.00	0.000	0.000
						C	0.000	46.831		100.00	0.000	20.638
L17 31.083-28.917	30.000	0.982	0.006	1.486	11.366	A	0.000	11.366	11.366	100.00	0.000	0.000
						B	0.000	11.366		100.00	0.000	0.000
						C	0.000	11.366		100.00	0.000	4.307
L18 28.917-20.000	24.459	0.941	0.006	1.456	46.748	A	0.000	46.748	46.748	100.00	0.000	0.000
						B	0.000	46.748		100.00	0.000	0.000
						C	0.000	46.748		100.00	0.000	17.511
L19 20.000-4.583	12.292	0.85	0.005	1.359	80.577	A	0.000	80.577	80.577	100.00	0.000	0.000
						B	0.000	80.577		100.00	0.000	0.000
						C	0.000	80.577		100.00	0.000	29.049
L20 4.583-0.000	2.292	0.85	0.005	1.149	23.793	A	0.000	23.793	23.793	100.00	0.000	0.000
						B	0.000	23.793		100.00	0.000	0.000
						C	0.000	23.793		100.00	0.000	7.843

Tower Pressure - Service

G_H = 1.100

Section Elevation ft	z ft	K_z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 190.000-180.000	185.000	1.441	0.011	25.000	A	0.000	25.000	25.000	100.00	0.000	0.000
					B	0.000	25.000		100.00	0.000	0.000
					C	0.000	25.000		100.00	0.000	0.000
L2 180.000-160.000	170.000	1.415	0.011	60.000	A	0.000	60.000	60.000	100.00	0.000	0.000
					B	0.000	60.000		100.00	0.000	0.000
					C	0.000	60.000		100.00	0.000	1.625
L3 160.000-140.000	150.000	1.378	0.011	70.000	A	0.000	70.000	70.000	100.00	0.000	0.000
					B	0.000	70.000		100.00	0.000	0.000
					C	0.000	70.000		100.00	0.000	11.170
L4 140.000-120.000	130.000	1.337	0.010	80.000	A	0.000	80.000	80.000	100.00	0.000	0.000
					B	0.000	80.000		100.00	0.000	0.000
					C	0.000	80.000		100.00	0.000	11.170
L5 120.000-113.330	116.665	1.307	0.010	30.015	A	0.000	30.015	30.015	100.00	0.000	0.000
					B	0.000	30.015		100.00	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	0.000	30.015		100.00	0.000	3.725
L6 113.330-101.084	107.207	1.284	0.010	55.107	A	0.000	55.107	55.107	100.00	0.000	0.000
					B	0.000	55.107		100.00	0.000	0.000
					C	0.000	55.107		100.00	0.000	8.742
L7 101.084-100.000	100.542	1.267	0.010	4.878	A	0.000	4.878	4.878	100.00	0.000	0.000
					B	0.000	4.878		100.00	0.000	0.000
					C	0.000	4.878		100.00	0.000	0.786
L8 100.000-89.583	94.792	1.251	0.010	52.085	A	0.000	52.085	52.085	100.00	0.000	0.000
					B	0.000	52.085		100.00	0.000	0.000
					C	0.000	52.085		100.00	0.000	7.554
L9 89.583-85.417	87.500	1.231	0.010	20.830	A	0.000	20.830	20.830	100.00	0.000	0.000
					B	0.000	20.830		100.00	0.000	0.000
					C	0.000	20.830		100.00	0.000	3.403
L10 85.417-83.917	84.667	1.222	0.010	7.500	A	0.000	7.500	7.500	100.00	0.000	0.000
					B	0.000	7.500		100.00	0.000	0.000
					C	0.000	7.500		100.00	0.000	1.400
L11 83.917-80.000	81.959	1.214	0.010	19.585	A	0.000	19.585	19.585	100.00	0.000	0.000
					B	0.000	19.585		100.00	0.000	0.000
					C	0.000	19.585		100.00	0.000	3.657
L12 80.000-60.000	70.000	1.174	0.009	100.000	A	0.000	100.000	100.000	100.00	0.000	0.000
					B	0.000	100.000		100.00	0.000	0.000
					C	0.000	100.000		100.00	0.000	16.587
L13 60.000-58.417	59.209	1.133	0.009	7.915	A	0.000	7.915	7.915	100.00	0.000	0.000
					B	0.000	7.915		100.00	0.000	0.000
					C	0.000	7.915		100.00	0.000	1.478
L14 58.417-48.417	53.417	1.109	0.009	50.000	A	0.000	50.000	50.000	100.00	0.000	0.000
					B	0.000	50.000		100.00	0.000	0.000
					C	0.000	50.000		100.00	0.000	6.988
L15 48.417-40.000	44.209	1.066	0.008	42.085	A	0.000	42.085	42.085	100.00	0.000	0.000
					B	0.000	42.085		100.00	0.000	0.000
					C	0.000	42.085		100.00	0.000	7.496
L16 40.000-31.083	35.542	1.018	0.008	44.585	A	0.000	44.585	44.585	100.00	0.000	0.000
					B	0.000	44.585		100.00	0.000	0.000
					C	0.000	44.585		100.00	0.000	7.880
L17 31.083-28.917	30.000	0.982	0.008	10.830	A	0.000	10.830	10.830	100.00	0.000	0.000
					B	0.000	10.830		100.00	0.000	0.000
					C	0.000	10.830		100.00	0.000	1.661
L18 28.917-20.000	24.459	0.941	0.007	44.585	A	0.000	44.585	44.585	100.00	0.000	0.000
					B	0.000	44.585		100.00	0.000	0.000
					C	0.000	44.585		100.00	0.000	6.838
L19 20.000-4.583	12.292	0.85	0.007	77.085	A	0.000	77.085	77.085	100.00	0.000	0.000
					B	0.000	77.085		100.00	0.000	0.000
					C	0.000	77.085		100.00	0.000	11.822
L20 4.583-0.000	2.292	0.85	0.007	22.915	A	0.000	22.915	22.915	100.00	0.000	0.000
					B	0.000	22.915		100.00	0.000	0.000
					C	0.000	22.915		100.00	0.000	3.514

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

Comb. No.	Description
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 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	190 - 180	Pole	Max Tension	45	0.000	-0.000	0.000
			Max. Compression	26	-8.005	0.305	0.284
			Max. Mx	20	-3.991	33.076	0.208
			Max. My	14	-3.976	-0.074	-34.243
			Max. Vy	20	-4.384	33.076	0.208
			Max. Vx	14	4.598	-0.074	-34.243
			Max. Torque	4			0.601
L2	180 - 160	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-24.632	1.478	-0.483
			Max. Mx	20	-12.776	226.985	0.600
			Max. My	14	-12.753	-0.154	-232.955
			Max. Vy	20	-12.688	226.985	0.600
			Max. Vx	14	12.976	-0.154	-232.955
			Max. Torque	13			-1.026
L3	160 - 140	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-56.228	7.436	-5.095
			Max. Mx	20	-24.782	734.731	1.884
			Max. My	14	-24.746	-1.355	-747.405
			Max. Vy	20	-30.705	734.731	1.884
			Max. Vx	14	31.087	-1.355	-747.405
			Max. Torque	12			-3.549
L4	140 - 120	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-67.013	13.655	-9.299
			Max. Mx	20	-30.468	1382.130	4.876
			Max. My	14	-30.436	-4.182	-1402.421
			Max. Vy	20	-34.010	1382.130	4.876
			Max. Vx	14	34.407	-4.182	-1402.421

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	12			-4.911
L5	120 - 113.33	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-70.738	15.887	-10.599
			Max. Mx	20	-32.513	1612.749	5.730
			Max. My	14	-32.481	-4.919	-1635.586
			Max. Vy	20	-35.081	1612.749	5.730
			Max. Vx	14	35.478	-4.919	-1635.586
			Max. Torque	12			-5.315
L6	113.33 - 101.084	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-78.997	19.946	-13.751
			Max. Mx	20	-37.479	2058.378	6.819
			Max. My	14	-37.448	-6.053	-2086.700
			Max. Vy	20	-37.461	2058.378	6.819
			Max. Vx	14	37.918	-6.053	-2086.700
			Max. Torque	12			-6.427
L7	101.084 - 100	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-79.690	20.302	-13.958
			Max. Mx	20	-37.905	2099.118	6.932
			Max. My	14	-37.874	-6.147	-2127.919
			Max. Vy	20	-37.650	2099.118	6.932
			Max. Vx	14	38.107	-6.147	-2127.919
			Max. Torque	12			-6.510
L8	100 - 89.583	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-89.286	24.504	-15.900
			Max. Mx	20	-44.479	2504.950	8.243
			Max. My	14	-44.451	-7.110	-2537.713
			Max. Vy	20	-39.983	2504.950	8.243
			Max. Vx	14	40.390	-7.110	-2537.713
			Max. Torque	12			-7.567
L9	89.583 - 85.417	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-93.160	25.999	-16.770
			Max. Mx	20	-47.274	2673.407	8.822
			Max. My	14	-47.246	-7.610	-2707.798
			Max. Vy	20	-40.822	2673.407	8.822
			Max. Vx	14	41.230	-7.610	-2707.798
			Max. Torque	12			-7.953
L10	85.417 - 83.917	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-94.650	26.533	-17.080
			Max. Mx	20	-48.375	2734.932	9.032
			Max. My	14	-48.347	-7.792	-2769.909
			Max. Vy	20	-41.146	2734.932	9.032
			Max. Vx	14	41.554	-7.792	-2769.909
			Max. Torque	12			-8.112
L11	83.917 - 80	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-98.200	27.929	-17.893
			Max. Mx	20	-50.923	2897.830	9.578
			Max. My	14	-50.896	-8.264	-2934.340
			Max. Vy	20	-41.964	2897.830	9.578
			Max. Vx	14	42.372	-8.264	-2934.340
			Max. Torque	12			-8.522
L12	80 - 60	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-113.424	34.672	-22.634
			Max. Mx	20	-61.098	3777.850	11.438
			Max. My	14	-61.075	-10.019	-3823.199
			Max. Vy	20	-45.682	3777.850	11.438
			Max. Vx	14	46.126	-10.019	-3823.199
			Max. Torque	12			-10.575
L13	60 - 58.417	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-114.743	35.210	-22.946
			Max. Mx	20	-62.037	3850.431	11.608
			Max. My	14	-62.014	-10.159	-3896.456
			Max. Vy	20	-45.970	3850.431	11.608
			Max. Vx	14	46.413	-10.159	-3896.456
			Max. Torque	12			-10.730
L14	58.417 -	Pole	Max Tension	1	0.000	0.000	0.000

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
	48.417						
			Max. Compression	26	-122.408	38.567	-24.897
			Max. Mx	20	-67.399	4317.599	12.681
			Max. My	14	-67.380	-11.041	-4367.880
			Max. Vy	20	-47.404	4317.599	12.681
			Max. Vx	14	47.846	-11.041	-4367.880
			Max. Torque	12			-11.444
L15	48.417 - 40	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-129.790	41.312	-26.490
			Max. Mx	20	-72.877	4722.417	13.583
			Max. My	14	-72.861	-11.783	-4776.269
			Max. Vy	20	-48.729	4722.417	13.583
			Max. Vx	14	49.169	-11.783	-4776.269
			Max. Torque	12			-12.182
L16	40 - 31.083	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-137.555	44.125	-28.122
			Max. Mx	20	-78.704	5162.866	14.536
			Max. My	14	-78.691	-12.568	-5220.485
			Max. Vy	20	-50.003	5162.866	14.536
			Max. Vx	14	50.442	-12.568	-5220.485
			Max. Torque	12			-12.923
L17	31.083 - 28.917	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-139.629	44.792	-28.509
			Max. Mx	20	-80.318	5271.518	14.767
			Max. My	14	-80.305	-12.758	-5330.050
			Max. Vy	20	-50.277	5271.518	14.767
			Max. Vx	14	50.715	-12.758	-5330.050
			Max. Torque	12			-13.073
L18	28.917 - 20	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-147.075	47.402	-30.019
			Max. Mx	20	-85.956	5724.429	15.716
			Max. My	14	-85.948	-13.540	-5786.702
			Max. Vy	20	-51.255	5724.429	15.716
			Max. Vx	14	51.690	-13.540	-5786.702
			Max. Torque	12			-13.667
L19	20 - 4.583	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-161.133	51.464	-32.363
			Max. Mx	20	-97.181	6525.944	17.343
			Max. My	14	-97.179	-14.882	-6594.619
			Max. Vy	20	-52.652	6525.944	17.343
			Max. Vx	14	53.081	-14.882	-6594.619
			Max. Torque	12			-14.596
L20	4.583 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	26	-165.918	52.445	-32.929
			Max. Mx	20	-101.293	6768.279	17.823
			Max. My	14	-101.293	-15.278	-6838.839
			Max. Vy	20	-53.064	6768.279	17.823
			Max. Vx	14	53.491	-15.278	-6838.839
			Max. Torque	12			-14.873

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	26	165.918	-0.000	0.000
	Max. H_x	20	101.305	53.042	0.126
	Max. H_z	3	75.979	0.125	53.386
	Max. M_x	2	6813.903	0.125	53.386
	Max. M_z	8	6755.011	-53.042	-0.123
	Max. Torsion	24	14.460	26.666	46.273
	Min. Vert	21	75.978	53.042	0.126
	Min. H_x	9	75.979	-53.042	-0.123
	Min. H_z	15	75.979	-0.125	-53.469
	Min. M_x	14	-6838.839	-0.125	-53.469

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M_z	20	-6768.279	53.042	0.126
	Min. Torsion	12	-14.873	-26.595	-46.404

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	84.421	-0.000	0.000	3.600	5.357	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	101.305	-0.125	-53.386	-6813.903	28.508	-12.007
0.9 Dead+1.6 Wind 0 deg - No Ice	75.979	-0.125	-53.386	-6762.740	26.628	-12.004
1.2 Dead+1.6 Wind 30 deg - No Ice	101.305	26.450	-46.149	-5885.059	-3362.342	-6.339
0.9 Dead+1.6 Wind 30 deg - No Ice	75.979	26.450	-46.149	-5841.010	-3338.203	-6.340
1.2 Dead+1.6 Wind 60 deg - No Ice	101.305	45.901	-26.574	-3383.571	-5843.409	1.233
0.9 Dead+1.6 Wind 60 deg - No Ice	75.979	45.901	-26.574	-3358.724	-5800.239	1.229
1.2 Dead+1.6 Wind 90 deg - No Ice	101.305	53.042	0.123	25.963	-6755.011	8.525
0.9 Dead+1.6 Wind 90 deg - No Ice	75.979	53.042	0.123	24.641	-6704.879	8.519
1.2 Dead+1.6 Wind 120 deg - No Ice	101.305	45.989	26.989	3468.863	-5858.325	13.493
0.9 Dead+1.6 Wind 120 deg - No Ice	75.979	45.989	26.989	3441.063	-5815.032	13.486
1.2 Dead+1.6 Wind 150 deg - No Ice	101.305	26.595	46.404	5941.063	-3386.616	14.873
0.9 Dead+1.6 Wind 150 deg - No Ice	75.979	26.595	46.404	5894.314	-3362.279	14.867
1.2 Dead+1.6 Wind 180 deg - No Ice	101.305	0.125	53.469	6838.839	-15.278	12.013
0.9 Dead+1.6 Wind 180 deg - No Ice	75.979	0.125	53.469	6785.242	-16.789	12.011
1.2 Dead+1.6 Wind 210 deg - No Ice	101.305	-26.379	46.280	5919.222	3361.954	5.933
0.9 Dead+1.6 Wind 210 deg - No Ice	75.979	-26.379	46.280	5872.651	3334.544	5.934
1.2 Dead+1.6 Wind 240 deg - No Ice	101.305	-45.865	26.773	3430.980	5849.724	-1.486
0.9 Dead+1.6 Wind 240 deg - No Ice	75.979	-45.865	26.774	3403.495	5803.218	-1.482
1.2 Dead+1.6 Wind 270 deg - No Ice	101.305	-53.042	-0.126	-17.824	6768.279	-8.532
0.9 Dead+1.6 Wind 270 deg - No Ice	75.978	-53.042	-0.126	-18.775	6714.631	-8.526
1.2 Dead+1.6 Wind 300 deg - No Ice	101.305	-46.025	-26.789	-3421.488	5878.526	-13.247
0.9 Dead+1.6 Wind 300 deg - No Ice	75.979	-46.025	-26.789	-3396.318	5831.775	-13.240
1.2 Dead+1.6 Wind 330 deg - No Ice	101.305	-26.666	-46.273	-5906.934	3413.481	-14.460
0.9 Dead+1.6 Wind 330 deg - No Ice	75.979	-26.666	-46.273	-5862.697	3385.631	-14.455
1.2 Dead+1.0 Ice+1.0 Temp	165.918	0.000	-0.000	32.929	52.445	-0.001
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	165.918	-0.010	-19.260	-2462.432	55.313	-5.870
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	165.918	9.586	-16.669	-2125.668	-1187.413	-2.891
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	165.918	16.605	-9.619	-1211.832	-2096.131	0.911
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	165.918	19.172	0.010	35.624	-2428.631	4.480

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
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	165.918	16.606	9.683	1291.959	-2097.090	6.841
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	165.918	9.587	16.710	2200.618	-1188.681	7.373
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	165.918	0.010	19.280	2532.480	50.007	5.869
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	165.918	-9.569	16.700	2197.967	1289.407	2.792
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	165.918	-16.596	9.666	1287.366	2199.760	-0.973
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	165.918	-19.172	-0.011	30.319	2533.954	-4.482
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	165.918	-16.615	-9.636	-1216.429	2204.106	-6.781
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	165.918	-9.603	-16.679	-2128.322	1297.328	-7.276
Dead+Wind 0 deg - Service	84.421	-0.029	-12.424	-1575.628	10.573	-0.463
Dead+Wind 30 deg - Service	84.421	6.156	-10.740	-1360.457	-774.834	-0.130
Dead+Wind 60 deg - Service	84.421	10.682	-6.184	-781.048	-1349.508	0.287
Dead+Wind 90 deg - Service	84.421	12.344	0.029	8.684	-1560.680	0.639
Dead+Wind 120 deg - Service	84.421	10.703	6.281	806.141	-1352.970	0.811
Dead+Wind 150 deg - Service	84.421	6.189	10.799	1378.772	-780.458	0.770
Dead+Wind 180 deg - Service	84.421	0.029	12.444	1586.742	0.436	0.463
Dead+Wind 210 deg - Service	84.421	-6.139	10.770	1373.704	782.688	0.032
Dead+Wind 240 deg - Service	84.421	-10.674	6.231	797.362	1358.910	-0.348
Dead+Wind 270 deg - Service	84.421	-12.344	-0.029	-1.454	1571.688	-0.639
Dead+Wind 300 deg - Service	84.421	-10.711	-6.235	-789.827	1365.585	-0.750
Dead+Wind 330 deg - Service	84.421	-6.206	-10.769	-1365.525	794.622	-0.672

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	-84.421	0.000	0.000	84.421	-0.000	0.000%
2	-0.125	-101.305	-53.387	0.125	101.305	53.386	0.001%
3	-0.125	-75.979	-53.387	0.125	75.979	53.386	0.001%
4	26.450	-101.305	-46.149	-26.450	101.305	46.149	0.000%
5	26.450	-75.979	-46.149	-26.450	75.979	46.149	0.000%
6	45.901	-101.305	-26.574	-45.901	101.305	26.574	0.000%
7	45.901	-75.979	-26.574	-45.901	75.979	26.574	0.000%
8	53.043	-101.305	0.123	-53.042	101.305	-0.123	0.001%
9	53.043	-75.979	0.123	-53.042	75.979	-0.123	0.001%
10	45.989	-101.305	26.989	-45.989	101.305	-26.989	0.000%
11	45.989	-75.979	26.989	-45.989	75.979	-26.989	0.000%
12	26.595	-101.305	46.404	-26.595	101.305	-46.404	0.000%
13	26.595	-75.979	46.404	-26.595	75.979	-46.404	0.000%
14	0.125	-101.305	53.470	-0.125	101.305	-53.469	0.001%
15	0.125	-75.979	53.470	-0.125	75.979	-53.469	0.001%
16	-26.380	-101.305	46.280	26.379	101.305	-46.280	0.000%
17	-26.380	-75.979	46.280	26.379	75.979	-46.280	0.000%
18	-45.865	-101.305	26.774	45.865	101.305	-26.773	0.000%
19	-45.865	-75.979	26.774	45.865	75.979	-26.774	0.000%
20	-53.043	-101.305	-0.126	53.042	101.305	0.126	0.001%
21	-53.043	-75.979	-0.126	53.042	75.978	0.126	0.001%
22	-46.025	-101.305	-26.789	46.025	101.305	26.789	0.000%
23	-46.025	-75.979	-26.789	46.025	75.979	26.789	0.000%
24	-26.666	-101.305	-46.273	26.666	101.305	46.273	0.000%
25	-26.666	-75.979	-46.273	26.666	75.979	46.273	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
26	0.000	-165.918	0.000	-0.000	165.918	0.000	0.000%
27	-0.010	-165.918	-19.260	0.010	165.918	19.260	0.000%
28	9.586	-165.918	-16.669	-9.586	165.918	16.669	0.000%
29	16.605	-165.918	-9.619	-16.605	165.918	9.619	0.000%
30	19.172	-165.918	0.010	-19.172	165.918	-0.010	0.000%
31	16.606	-165.918	9.683	-16.606	165.918	-9.683	0.000%
32	9.587	-165.918	16.710	-9.587	165.918	-16.710	0.000%
33	0.010	-165.918	19.280	-0.010	165.918	-19.280	0.000%
34	-9.569	-165.918	16.700	9.569	165.918	-16.700	0.000%
35	-16.596	-165.918	9.666	16.596	165.918	-9.666	0.000%
36	-19.172	-165.918	-0.011	19.172	165.918	0.011	0.000%
37	-16.615	-165.918	-9.636	16.615	165.918	9.636	0.000%
38	-9.603	-165.918	-16.679	9.603	165.918	16.679	0.000%
39	-0.029	-84.421	-12.426	0.029	84.421	12.424	0.002%
40	6.157	-84.421	-10.742	-6.156	84.421	10.740	0.002%
41	10.684	-84.421	-6.185	-10.682	84.421	6.184	0.002%
42	12.346	-84.421	0.029	-12.344	84.421	-0.029	0.002%
43	10.705	-84.421	6.282	-10.703	84.421	-6.281	0.002%
44	6.190	-84.421	10.801	-6.189	84.421	-10.799	0.002%
45	0.029	-84.421	12.446	-0.029	84.421	-12.444	0.002%
46	-6.140	-84.421	10.772	6.139	84.421	-10.770	0.002%
47	-10.676	-84.421	6.232	10.674	84.421	-6.231	0.002%
48	-12.346	-84.421	-0.029	12.344	84.421	0.029	0.002%
49	-10.713	-84.421	-6.236	10.711	84.421	6.235	0.002%
50	-6.207	-84.421	-10.771	6.206	84.421	10.769	0.002%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	16	0.00000001	0.00011701
3	Yes	16	0.00000001	0.00009665
4	Yes	18	0.00000001	0.00011109
5	Yes	18	0.00000001	0.00008754
6	Yes	18	0.00000001	0.00011401
7	Yes	18	0.00000001	0.00008996
8	Yes	16	0.00000001	0.00008948
9	Yes	16	0.00000001	0.00007393
10	Yes	18	0.00000001	0.00013237
11	Yes	18	0.00000001	0.00010465
12	Yes	18	0.00000001	0.00010842
13	Yes	18	0.00000001	0.00008521
14	Yes	16	0.00000001	0.00010707
15	Yes	16	0.00000001	0.00008849
16	Yes	18	0.00000001	0.00012194
17	Yes	18	0.00000001	0.00009613
18	Yes	18	0.00000001	0.00011953
19	Yes	18	0.00000001	0.00009418
20	Yes	16	0.00000001	0.00007948
21	Yes	15	0.00000001	0.00014985
22	Yes	18	0.00000001	0.00010915
23	Yes	18	0.00000001	0.00008582
24	Yes	18	0.00000001	0.00013251
25	Yes	18	0.00000001	0.00010473
26	Yes	12	0.00000001	0.00011426
27	Yes	17	0.00000001	0.00011790
28	Yes	17	0.00000001	0.00013220
29	Yes	17	0.00000001	0.00013199
30	Yes	17	0.00000001	0.00011575
31	Yes	17	0.00000001	0.00013962
32	Yes	17	0.00000001	0.00013693
33	Yes	17	0.00000001	0.00012181
34	Yes	17	0.00000001	0.00014371
35	Yes	17	0.00000001	0.00014337
36	Yes	17	0.00000001	0.00012144
37	Yes	17	0.00000001	0.00013854

38	Yes	17	0.00000001	0.00014188
39	Yes	13	0.00011596	0.00002626
40	Yes	13	0.00011590	0.00009037
41	Yes	13	0.00011590	0.00008850
42	Yes	13	0.00011595	0.00002974
43	Yes	13	0.00011590	0.00011450
44	Yes	13	0.00011591	0.00008548
45	Yes	13	0.00011596	0.00002536
46	Yes	13	0.00011591	0.00009730
47	Yes	13	0.00011590	0.00010316
48	Yes	13	0.00011595	0.00002877
49	Yes	13	0.00011590	0.00008617
50	Yes	13	0.00011590	0.00011146

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190 - 180	17.458	45	0.724	0.001
L2	180 - 160	15.942	45	0.722	0.001
L3	160 - 140	12.955	45	0.698	0.001
L4	140 - 120	10.130	45	0.640	0.001
L5	120 - 113.33	7.616	45	0.551	0.001
L6	113.33 - 101.084	6.865	45	0.522	0.001
L7	101.084 - 100	5.588	45	0.472	0.000
L8	100 - 89.583	5.481	45	0.467	0.000
L9	89.583 - 85.417	4.491	45	0.440	0.000
L10	85.417 - 83.917	4.111	45	0.430	0.000
L11	83.917 - 80	3.977	45	0.426	0.000
L12	80 - 60	3.632	45	0.415	0.000
L13	60 - 58.417	2.080	45	0.322	0.000
L14	58.417 - 48.417	1.975	45	0.315	0.000
L15	48.417 - 40	1.369	45	0.262	0.000
L16	40 - 31.083	0.942	45	0.222	0.000
L17	31.083 - 28.917	0.569	45	0.176	0.000
L18	28.917 - 20	0.492	45	0.166	0.000
L19	20 - 4.583	0.232	45	0.112	0.000
L20	4.583 - 0	0.011	45	0.023	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
188.000	PD201-7	45	17.154	0.724	0.001	288569
186.000	SP2-5.8	45	16.851	0.724	0.001	288569
185.000	TME-800MHz RRH	45	16.700	0.723	0.001	288569
184.000	Side Arm Mount [SO 701-1]	45	16.548	0.723	0.001	240244
179.000	458-2D	45	15.791	0.721	0.001	117948
170.000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	45	14.437	0.714	0.001	50376
160.000	(2) 7770.00 w/ Mount Pipe	45	12.955	0.698	0.001	30232
150.000	LNX-6514DS-T4M w/ Mount Pipe	45	11.513	0.674	0.001	20254
125.000	PD128-1	45	8.208	0.575	0.001	11807
110.000	PD128-1	45	6.505	0.509	0.001	14267
100.000	GPS_A	45	5.481	0.467	0.000	16984
95.000	PD128-1	45	4.999	0.451	0.000	21929
80.000	DB222	45	3.632	0.415	0.000	15759

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190 - 180	75.277	14	3.125	0.013

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L2	180 - 160	68.742	14	3.115	0.013
L3	160 - 140	55.856	14	3.012	0.012
L4	140 - 120	43.678	14	2.761	0.010
L5	120 - 113.33	32.837	14	2.378	0.008
L6	113.33 - 101.084	29.601	14	2.251	0.008
L7	101.084 - 100	24.094	14	2.036	0.007
L8	100 - 89.583	23.634	14	2.014	0.007
L9	89.583 - 85.417	19.362	14	1.900	0.006
L10	85.417 - 83.917	17.725	14	1.853	0.006
L11	83.917 - 80	17.146	14	1.837	0.006
L12	80 - 60	15.658	14	1.788	0.006
L13	60 - 58.417	8.969	14	1.389	0.004
L14	58.417 - 48.417	8.513	14	1.359	0.004
L15	48.417 - 40	5.903	14	1.130	0.003
L16	40 - 31.083	4.060	14	0.958	0.003
L17	31.083 - 28.917	2.454	14	0.759	0.002
L18	28.917 - 20	2.120	14	0.714	0.002
L19	20 - 4.583	1.000	14	0.483	0.001
L20	4.583 - 0	0.048	14	0.099	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
188.000	PD201-7	14	73.969	3.124	0.013	66774
186.000	SP2-5.8	14	72.661	3.122	0.013	66774
185.000	TME-800MHz RRH	14	72.007	3.121	0.013	66774
184.000	Side Arm Mount [SO 701-1]	14	71.354	3.121	0.013	55592
179.000	458-2D	14	68.089	3.113	0.013	27302
170.000	ERICSSON AIR 21 B2A B4P w/ Mount Pipe	14	62.247	3.080	0.012	11668
160.000	(2) 7770.00 w/ Mount Pipe	14	55.856	3.012	0.012	7005
150.000	LNX-6514DS-T4M w/ Mount Pipe	14	49.639	2.907	0.011	4707
125.000	PD128-1	14	35.391	2.478	0.009	2746
110.000	PD128-1	14	28.048	2.194	0.007	3317
100.000	GPS_A	14	23.634	2.014	0.007	3947
95.000	PD128-1	14	21.552	1.947	0.006	5095
80.000	DB222	14	15.658	1.788	0.006	3660

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	190 - 180 (1)	30" x 0.375"	10.000	0.000	0.0	34.901	-3.976	1311.060	0.003
L2	180 - 160 (2)	36" x 0.375"	20.000	0.000	0.0	41.970	-12.753	1490.100	0.009
L3	160 - 140 (3)	42" x 0.375"	20.000	0.000	0.0	49.038	-24.746	1668.870	0.015
L4	140 - 120 (4)	P48x0.375	20.000	0.000	0.0	56.107	-30.436	1847.490	0.016
L5	120 - 113.33 (5)	54" x 0.375"	6.670	0.000	0.0	63.175	-32.480	2026.000	0.016
L6	113.33 - 101.084 (6)	RPS 54" x 0.49915"	12.246	0.000	0.0	83.896	-37.448	2608.970	0.014
L7	101.084 - 100 (7)	RPS 54" x 0.49915"	1.084	0.000	0.0	83.896	-37.874	2608.970	0.015
L8	100 - 89.583 (8)	RPS 60" x 0.7378"	10.417	0.000	0.0	137.362	-44.449	4299.700	0.010
L9	89.583 - 85.417 (9)	RPS 60" x 0.82326"	4.166	0.000	0.0	153.052	-47.245	4669.610	0.010
L10	85.417 - 83.917 (10)	RPS 60" x 0.90946"	1.500	0.000	0.0	168.831	-48.345	5024.910	0.010

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L11	83.917 - 80 (11)	RPS 60" x 0.79468"	3.917	0.000	0.0	147.810	-50.894	4522.980	0.011
L12	80 - 60 (12)	RPS 60" x 0.58339"	20.000	0.000	0.0	108.897	-61.075	3419.160	0.018
L13	60 - 58.417 (13)	RPS 60" x 0.70948"	1.583	0.000	0.0	132.152	-62.014	4171.130	0.015
L14	58.417 - 48.417 (14)	P60x5/8	10.000	0.000	0.0	116.583	-67.380	4139.150	0.016
L15	48.417 - 40 (15)	RPS 60" x 0.77929"	8.417	0.000	0.0	144.985	-72.861	4479.600	0.016
L16	40 - 31.083 (16)	RPS 60" x 0.77929"	8.917	0.000	0.0	144.985	-78.691	4479.600	0.018
L17	31.083 - 28.917 (17)	RPS 60" x 0.90145"	2.166	0.000	0.0	167.366	-80.305	4969.280	0.016
L18	28.917 - 20 (18)	RPS 60" x 0.74524"	8.917	0.000	0.0	138.730	-85.948	4308.800	0.020
L19	20 - 4.583 (19)	RPS 60" x 0.87181"	15.417	0.000	0.0	161.945	-97.179	4856.390	0.020
L20	4.583 - 0 (20)	RPS 60" x 1.10184"	4.583	0.000	0.0	203.878	-101.293	5943.240	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	190 - 180 (1)	30" x 0.375"	34.243	947.858	0.036	0.000	947.858	0.000
L2	180 - 160 (2)	36" x 0.375"	232.956	1338.808	0.174	0.000	1338.808	0.000
L3	160 - 140 (3)	42" x 0.375"	747.406	1796.558	0.416	0.000	1796.558	0.000
L4	140 - 120 (4)	P48x0.375	1402.425	2321.108	0.604	0.000	2321.108	0.000
L5	120 - 113.33 (5)	54" x 0.375"	1635.608	2912.458	0.562	0.000	2912.458	0.000
L6	113.33 - 101.084 (6)	RPS 54" x 0.49915"	2086.650	3513.917	0.594	0.000	3513.917	0.000
L7	101.084 - 100 (7)	RPS 54" x 0.49915"	2127.925	3513.917	0.606	0.000	3513.917	0.000
L8	100 - 89.583 (8)	RPS 60" x 0.7378"	2537.733	6357.075	0.399	0.000	6357.075	0.000
L9	89.583 - 85.417 (9)	RPS 60" x 0.82326"	2707.942	7058.867	0.384	0.000	7058.867	0.000
L10	85.417 - 83.917 (10)	RPS 60" x 0.90946"	2770.100	7770.250	0.356	0.000	7770.250	0.000
L11	83.917 - 80 (11)	RPS 60" x 0.79468"	2934.642	6793.483	0.432	0.000	6793.483	0.000
L12	80 - 60 (12)	RPS 60" x 0.58339"	3823.308	5062.742	0.755	0.000	5062.742	0.000
L13	60 - 58.417 (13)	RPS 60" x 0.70948"	3896.558	6122.725	0.636	0.000	6122.725	0.000
L14	58.417 - 48.417 (14)	P60x5/8	4367.908	6198.183	0.705	0.000	6198.183	0.000
L15	48.417 - 40 (15)	RPS 60" x 0.77929"	4776.233	6695.041	0.713	0.000	6695.041	0.000
L16	40 - 31.083 (16)	RPS 60" x 0.77929"	5220.500	6695.041	0.780	0.000	6695.041	0.000
L17	31.083 - 28.917 (17)	RPS 60" x 0.90145"	5330.067	7675.658	0.694	0.000	7675.658	0.000
L18	28.917 - 20 (18)	RPS 60" x 0.74524"	5786.717	6389.008	0.906	0.000	6389.008	0.000
L19	20 - 4.583 (19)	RPS 60" x 0.87181"	6594.633	7440.258	0.886	0.000	7440.258	0.000
L20	4.583 - 0 (20)	RPS 60" x 1.10184"	6838.858	9286.333	0.736	0.000	9286.333	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	190 - 180 (1)	30" x 0.375"	4.598	655.528	0.007	0.308	1598.367	0.000
L2	180 - 160 (2)	36" x 0.375"	12.976	745.048	0.017	0.623	2189.067	0.000
L3	160 - 140 (3)	42" x 0.375"	31.087	834.437	0.037	2.607	2868.842	0.001
L4	140 - 120 (4)	P48x0.375	34.407	923.745	0.037	3.659	3637.700	0.001
L5	120 - 113.33 (5)	54" x 0.375"	35.526	1013.000	0.035	5.315	4495.625	0.001
L6	113.33 - 101.084 (6)	RPS 54" x 0.49915"	37.929	1304.480	0.029	6.427	5762.658	0.001
L7	101.084 - 100 (7)	RPS 54" x 0.49915"	38.107	1304.480	0.029	4.860	5762.658	0.001
L8	100 - 89.583 (8)	RPS 60" x 0.7378"	40.449	2149.850	0.019	7.567	10488.167	0.001
L9	89.583 - 85.417 (9)	RPS 60" x 0.82326"	41.289	2334.800	0.018	7.953	11358.083	0.001
L10	85.417 - 83.917 (10)	RPS 60" x 0.90946"	41.610	2512.450	0.017	8.112	12187.249	0.001
L11	83.917 - 80 (11)	RPS 60" x 0.79468"	42.428	2261.490	0.019	8.522	11011.917	0.001
L12	80 - 60 (12)	RPS 60" x 0.58339"	46.143	1709.580	0.027	10.575	8383.333	0.001
L13	60 - 58.417 (13)	RPS 60" x 0.70948"	46.430	2085.560	0.022	10.730	10184.167	0.001
L14	58.417 - 48.417 (14)	P60x5/8	47.862	2069.580	0.023	11.444	10134.583	0.001
L15	48.417 - 40 (15)	RPS 60" x 0.77929"	49.185	2239.800	0.022	12.182	10911.833	0.001
L16	40 - 31.083 (16)	RPS 60" x 0.77929"	50.442	2239.800	0.023	10.325	10911.833	0.001
L17	31.083 - 28.917 (17)	RPS 60" x 0.90145"	50.715	2484.640	0.020	10.455	12055.500	0.001
L18	28.917 - 20 (18)	RPS 60" x 0.74524"	51.690	2154.400	0.024	10.970	10507.750	0.001
L19	20 - 4.583 (19)	RPS 60" x 0.87181"	53.081	2428.200	0.022	11.774	11793.249	0.001
L20	4.583 - 0 (20)	RPS 60" x 1.10184"	53.492	2971.620	0.018	12.013	14322.416	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	190 - 180 (1)	0.003	0.036	0.000	0.007	0.000	0.039 ✔	1.000	4.8.2 ✔
L2	180 - 160 (2)	0.009	0.174	0.000	0.017	0.000	0.183 ✔	1.000	4.8.2 ✔
L3	160 - 140 (3)	0.015	0.416	0.000	0.037	0.001	0.432 ✔	1.000	4.8.2 ✔
L4	140 - 120 (4)	0.016	0.604	0.000	0.037	0.001	0.622 ✔	1.000	4.8.2 ✔
L5	120 - 113.33 (5)	0.016	0.562	0.000	0.035	0.001	0.579 ✔	1.000	4.8.2 ✔
L6	113.33 - 101.084 (6)	0.014	0.594	0.000	0.029	0.001	0.609 ✔	1.000	4.8.2 ✔
L7	101.084 - 100 (7)	0.015	0.606	0.000	0.029	0.001	0.621 ✔	1.000	4.8.2 ✔
L8	100 - 89.583 (8)	0.010	0.399	0.000	0.019	0.001	0.410 ✔	1.000	4.8.2 ✔
L9	89.583 - 85.417 (9)	0.010	0.384	0.000	0.018	0.001	0.394 ✔	1.000	4.8.2 ✔
L10	85.417 - 83.917 (10)	0.010	0.356	0.000	0.017	0.001	0.366 ✔	1.000	4.8.2 ✔
L11	83.917 - 80 (11)	0.011	0.432	0.000	0.019	0.001	0.444 ✔	1.000	4.8.2 ✔

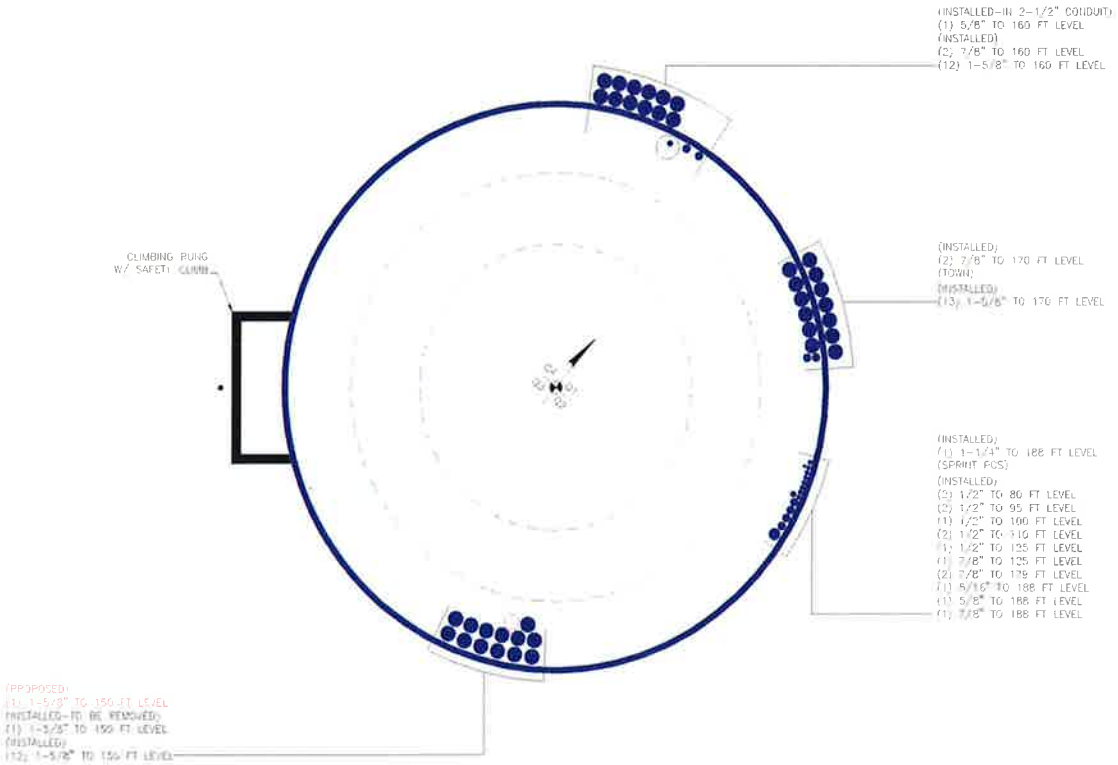
Section No.	Elevation ft	Ratio P_u / ϕP_n	Ratio M_{ux} / ϕM_{nx}	Ratio M_{uy} / ϕM_{ny}	Ratio V_u / ϕV_n	Ratio T_u / ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L12	80 - 60 (12)	0.018	0.755	0.000	0.027	0.001	0.774 ✔	1.000	4.8.2 ✔
L13	60 - 58.417 (13)	0.015	0.636	0.000	0.022	0.001	0.652 ✔	1.000	4.8.2 ✔
L14	58.417 - 48.417 (14)	0.016	0.705	0.000	0.023	0.001	0.722 ✔	1.000	4.8.2 ✔
L15	48.417 - 40 (15)	0.016	0.713	0.000	0.022	0.001	0.730 ✔	1.000	4.8.2 ✔
L16	40 - 31.083 (16)	0.018	0.780	0.000	0.023	0.001	0.798 ✔	1.000	4.8.2 ✔
L17	31.083 - 28.917 (17)	0.016	0.694	0.000	0.020	0.001	0.711 ✔	1.000	4.8.2 ✔
L18	28.917 - 20 (18)	0.020	0.906	0.000	0.024	0.001	0.926 ✔	1.000	4.8.2 ✔
L19	20 - 4.583 (19)	0.020	0.886	0.000	0.022	0.001	0.907 ✔	1.000	4.8.2 ✔
L20	4.583 - 0 (20)	0.017	0.736	0.000	0.018	0.001	0.754 ✔	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	190 - 180	Pole	30" x 0.375"	1	-3.976	1311.060	3.9	Pass
L2	180 - 160	Pole	36" x 0.375"	2	-12.753	1490.100	18.3	Pass
L3	160 - 140	Pole	42" x 0.375"	3	-24.746	1668.870	43.2	Pass
L4	140 - 120	Pole	P48x0.375	4	-30.436	1847.490	62.2	Pass
L5	120 - 113.33	Pole	54" x 0.375"	5	-32.480	2026.000	57.9	Pass
L6	113.33 - 101.084	Pole	RPS 54" x 0.49915"	6	-37.448	2608.970	60.9	Pass
L7	101.084 - 100	Pole	RPS 54" x 0.49915"	7	-37.874	2608.970	62.1	Pass
L8	100 - 89.583	Pole	RPS 60" x 0.7378"	8	-44.449	4299.700	41.0	Pass
L9	89.583 - 85.417	Pole	RPS 60" x 0.82326"	9	-47.245	4669.610	39.4	Pass
L10	85.417 - 83.917	Pole	RPS 60" x 0.90946"	10	-48.345	5024.910	36.6	Pass
L11	83.917 - 80	Pole	RPS 60" x 0.79468"	11	-50.894	4522.980	44.4	Pass
L12	80 - 60	Pole	RPS 60" x 0.58339"	12	-61.075	3419.160	77.4	Pass
L13	60 - 58.417	Pole	RPS 60" x 0.70948"	13	-62.014	4171.130	65.2	Pass
L14	58.417 - 48.417	Pole	P60x5/8	14	-67.380	4139.150	72.2	Pass
L15	48.417 - 40	Pole	RPS 60" x 0.77929"	15	-72.861	4479.600	73.0	Pass
L16	40 - 31.083	Pole	RPS 60" x 0.77929"	16	-78.691	4479.600	79.8	Pass
L17	31.083 - 28.917	Pole	RPS 60" x 0.90145"	17	-80.305	4969.280	71.1	Pass
L18	28.917 - 20	Pole	RPS 60" x 0.74524"	18	-85.948	4308.800	92.6	Pass
L19	20 - 4.583	Pole	RPS 60" x 0.87181"	19	-97.179	4856.390	90.7	Pass
L20	4.583 - 0	Pole	RPS 60" x 1.10184"	20	-101.293	5943.240	75.4	Pass
							Summary	
						Pole (L18)	92.6	Pass
						RATING =	**92.6**	**Pass**

APPENDIX B

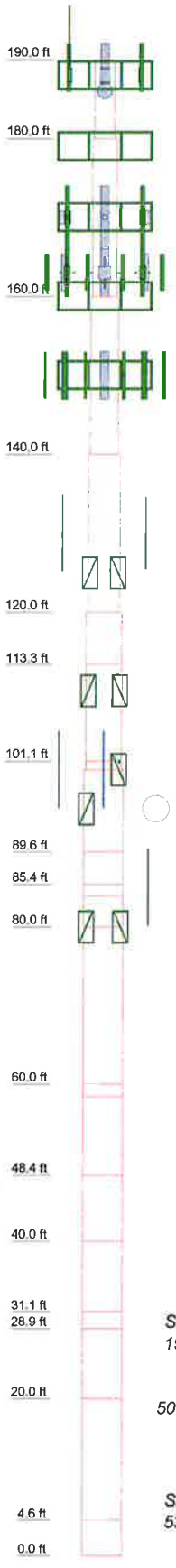
BASE LEVEL DRAWING



APPENDIX C

ADDITIONAL CALCULATIONS

Section	Size	Length (ft)	Grade	Weight (K)
1	30" x 0.375"	10.000	A53-B-42	1.2
2	36" x 0.375"	20.000		2.9
3	42" x 0.375"	20.000		3.3
4	P48x0.375	20.000		3.8
5		6.670		1.4
6		12.246	Reinf 36.59 ksi	3.5
7		1.084		0.3
8		10.417	Reinf 34.78 ksi	4.9
9				
10				
11		3.917		2.0
12		20.000	Reinf 36.30 ksi	7.4
13		1.583	Reinf 35.07 ksi	0.7
14		10.000	A53-B-42	4.0
15		8.417	Reinf 34.33 ksi	4.2
16		8.917	Reinf 34.51 ksi	4.4
17		2.166		1.2
18		8.917	Reinf 34.51 ksi	4.2
19		15.417	Reinf 33.32 ksi	8.5
20	RPS 60" x 1.[illegible]	4.583	Reinf 32.39 ksi	3.2
				64.1



ALL REACTIONS ARE FACTORED

AXIAL 166 K

SHEAR 19 K

MOMEI 2549 kip

TORQUE 7 kip-ft
50 mph WIND - 0.750 in ICE

AXIAL 101 K

SHEAR 53 K

MOMEI 6839 kip

TORQUE 15 kip-ft
REACTIONS - 93 mph WIND

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
PD201-7	188	OPA-65R-LCUU-H6 w/Mount Pipe	160
APXVSPP18-C-A20 w/ Mount Pipe	188	RRUS12/RRUS A2	160
APXVSPP18-C-A20 w/ Mount Pipe	188	RRUS12/RRUS A2	160
APXVSPP18-C-A20 w/ Mount Pipe	188	RRUS12/RRUS A2	160
(2) 2.375" OD x 4' Mount Pipe	188	Platform Mount [LP 403-1]	160
(2) 2.375" OD x 4' Mount Pipe	188	4' x 2" Pipe Mount	160
(2) 2.375" OD x 4' Mount Pipe	188	4' x 2" Pipe Mount	160
Platform Mount [LP 403-1]	188	4' x 2" Pipe Mount	160
SP2-5.8	188	(2) 7770.00 w/ Mount Pipe	160
TME-800MHz RRH	185	LNX-6514DS-T4M w/ Mount Pipe	150
TME-800MHz RRH	185	BXA-171063-12CF-EDIN-X w/ Mount Pipe	150
TME-1900MHZ RRH	185		
TME-1900MHZ RRH	185	BXA-171063-12CF-EDIN-X w/ Mount Pipe	150
TME-1900MHZ RRH	185		
Side Arm Mount [SO 102-3]	185	BXA-171063-12CF-EDIN-X w/ Mount Pipe	150
TME-800MHz RRH	185		
Side Arm Mount [SO 701-1]	184	P65-16-XL-R w/ Mount Pipe	150
458-2D	179	RRH2X40-AWS	150
Platform Mount [LP 403-1]	179	RRH2X40-AWS	150
(4) 6' x 2" Mount Pipe	179	RRH2X40-AWS	150
(4) 6' x 2" Mount Pipe	179	(2) DB846F65ZAXY w/ Mount Pipe	150
(4) 6' x 2" Mount Pipe	179	(2) DB846F65ZAXY w/ Mount Pipe	150
458-2D	179	(2) LPA-80080/6CF w/ Mount Pipe	150
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	170	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	150
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	170	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	150
Ericsson Air 21 B4A B12P-B5P 8FT w/ Mount Pipe	170	BXA-171063-12CF-EDIN-2 w/ Mount Pipe	150
Ericsson Air 21 B4A B12P-B5P 8FT w/ Mount Pipe	170	(2) FD9R6004/2C-3L	150
Ericsson Air 21 B4A B12P-B5P 8FT w/ Mount Pipe	170	(2) FD9R6004/2C-3L	150
KRY 112 144/1	170	(2) FD9R6004/2C-3L	150
KRY 112 144/1	170	DB-T1-6Z-8AB-0Z	150
KRY 112 144/1	170	Platform Mount [LP 403-1]	150
(2) RRUS 11 B12	170	(2) SBNHH-1D85C w/ Mount Pipe	150
RRUS 11 B12	170	(2) SBNHH-1D85C w/ Mount Pipe	150
RRUS 11 B12	170	(2) SBNHH-1D85C w/ Mount Pipe	150
Platform Mount [LP 405-1]	170	RRH2x60-700	150
PD201-7	170	RRH2x60-700	150
ERICSSON AIR 21 B2A B4P w/ Mount Pipe	170	RRH2x60-700	150
(2) 7770.00 w/ Mount Pipe	160	RRH4X45-AWS4 B66	150
(2) 7770.00 w/ Mount Pipe	160	RRH4X45-AWS4 B66	150
(2) LGP21401	160	RRH4X45-AWS4 B66	150
(2) LGP21401	160	RRH2X60-1900	150
(2) LGP21401	160	RRH2X60-1900	150
(4) 7020.00	160	RRH2X60-1900	150
(4) 7020.00	160	DB-T1-6Z-8AB-0Z	150
(4) 7020.00	160	LNX-6514DS-T4M w/ Mount Pipe	150
TT19-08BP111-001	160	PD201-1	125
TT19-08BP111-001	160	Side Arm Mount [SO 701-1]	125
TT19-08BP111-001	160	Side Arm Mount [SO 701-1]	125
RRUS-11	160	PD128-1	125
RRUS-11	160	PD128-1	110
RRUS-11	160	Side Arm Mount [SO 701-1]	110
RRUS-11	160	Side Arm Mount [SO 701-1]	110
RRUS-11	160	PD128-1	110
RRUS-11	160	Side Arm Mount [SO 701-1]	100
RRUS-11	160	GPS_A	100
RRUS-11	160	PD128-1	95
RRUS-11	160	Side Arm Mount [SO 701-1]	95
P65-16-XLH-RR w/ Mount Pipe	160	Side Arm Mount [SO 701-1]	95
P65-16-XLH-RR w/ Mount Pipe	160	PD128-1	95
P65-16-XLH-RR w/ Mount Pipe	160	PD128-1	80
DC6-48-60-18-8F	160	Side Arm Mount [SO 701-1]	80
OPA-65R-LCUU-H6 w/Mount Pipe	160	Side Arm Mount [SO 701-1]	80
OPA-65R-LCUU-H6 w/Mount Pipe	160	DB222	80

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi	Reinf 35.07 ksi	35 ksi	44 ksi
Reinf 36.59 ksi	37 ksi	46 ksi	Reinf 34.33 ksi	34 ksi	43 ksi
Reinf 34.78 ksi	35 ksi	44 ksi	Reinf 32.99 ksi	33 ksi	42 ksi
Reinf 33.90 ksi	34 ksi	43 ksi	Reinf 34.51 ksi	35 ksi	44 ksi
Reinf 33.07 ksi	33 ksi	42 ksi	Reinf 33.32 ksi	33 ksi	42 ksi
Reinf 34.18 ksi	34 ksi	43 ksi	Reinf 32.39 ksi	32 ksi	41 ksi
Reinf 36.30 ksi	36 ksi	46 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-G Standard.
3.

PJF
Paul J. Ford and Company
250 East Broad St., Suite 600
Columbus, Ohio
Phone: 614.221.6679
FAX:

Job:	*190' Monopole / Weston Rt-57 Norfield*		
Project:	*PJF 37516-0710/ BU 829046*		
Client: CCI	Drawn by: jjohnson	App'd:	
Code: TIA-222-G	Date: 09/28/16	Scale: N	
Path:		Dwg No. E	

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
Effective Date: 3/21/2016 Verison 1.3

DATE:	9/29/2016
PROJECT NO:	37516-0710.003.7805
SITE NAME:	WESTON/ RT-57/ NORFIELD R
SITE NUMBER/BUN:	829046.00
DESCRIPTION:	20ft Flange
OWNER:	CCI
ENGINEER:	JRJ

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

General Parameters & Loading

Flange Elevation:	20.00	ft
TIA Reference Standard:	TIA-222-G	
AISC Manual:	13th Ed. (Black)	
Method:	LRFD	
ASD Stress Increase, ASIF:	1.00	
Moment, Muf:	4882.43	k-ft
Axial, Puf:	85.90	kips
Shear, Vf:	51.70	kips

Pole Parameters

	Upper Pole	Lower Pole	
Number of Sides	Round	Round	
Pole Diameter, Dp:	60.00	60.00	in
Pole Thickness, tp:	0.6250	0.7500	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	60.00	60.00	in
Flange Thickness, tf:	1.25	1.25	in

Flange Parameters

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	32	32	
Bolt Diameter:	1.25	1.25	in
Bolt Circle:	47.00	53.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0.00	0.00	degrees
Bolt Area, Ag:	1.2272	1.2272	in^2

	Bolt Circle 1	Bolt Circle 2	
Max. Tension:	38.85	43.69	kips
Max. Net Tension:	38.03	42.86	kips
Max. Net Compression:	39.68	44.52	kips
Moment to Bolt Circle:	1217.43	1543.69	k-ft
Axial to Bolt Circle:	26.50	26.50	kips
Shear to Bolt Circle:	25.85	25.85	kips
Equivalent Bolt Circle:	50.18	50.18	in

	Thickness	Width	Height
Top Flange Stiffener Parameters			
Bot. Flange Stiffener Parameters			

Shaft Reinforcing Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Condition					
Top Shaft Reinf. Designation					
Top Shaft Reinf. Thickness					in
Top Shaft Reinf. Width					in
Top Shaft Reinf. Term. Bolts					
Top Shaft Reinf. Bolt Spacing					in
Top Shaft Reinf. End Spacing					in
Bottom Condition					
Bottom Shaft Reinf. Designation					
Bottom Shaft Reinf. Thickness					in
Bottom Shaft Reinf. Width					in
Bottom Shaft Reinf. Term. Bolts					
Bottom Shaft Reinf. Bolt Spacing					in
Bottom Shaft Reinf. End Spacing					in

Bridge Stiffener Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Reference Document					
Analysis, Design, New, Ignore	Analysis				
Jump Plate Designation	CCI-065125				
Jump Plate Width Override					in
Jump Plate Thickness Override					in
Clear Distance from Flange	0.00				in
Jump Plate Fy	65				ksi
Jump Plate Fu	80				ksi
Bolt Type	EXISTING AJAX				
Bolt Tension Method	Elastic				
Top Bolt Quantity	11				
Top Bolt Spacing	3.00				in
Top Bolt Edge Distance	3.00				in
Bottom Bolt Quantity	11				
Bottom Bolt Spacing	3.00				in
Bottom Bolt Edge Distance	3.00				in
Unbraced Length	18.00	18.00			in
Unbraced Length Override					in
K	0.80				
Stiffener Circle	61.25				in
Clearance Check	OK				
Qty. Jump Plates	6				in
Location 1	28				deg
Location 2	100				deg
Location 3	166				deg
Location 4	193				deg
Location 5	266				deg
Location 6	323				deg

PAUL J. FORD & COMPANY
250 E Broad St, Ste 600 • Columbus, OH 43215
Phone 614.221.6679 www.pauljford.com
Effective Date: 3/21/2016 Verison 1.3

DATE:	9/29/2016
PROJECT NO:	37516-0710.003.7805
SITE NAME:	WESTON/ RT-57/ NORFIELD R
SITE NUMBER/BUN:	829046.00
DESCRIPTION:	20ft Flange
OWNER:	CCI
ENGINEER:	JRJ

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

Jump Plate Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Applied Axial Load (Pu)	328.69				kips
Hole Diameter	1.19				in
Gross Area (Ag)	8.13				in^2
Net Area (An)	6.64				in^2
b/t Ratio	5.20				
Radius of Gyration (r)	0.36				in
K L / r	33.26				
Q (Where Qa = 1.0)	1.00				
ASIF Value	1.00				
Critical Stress (Fa or Fcr)	58.51				ksi
Nominal Compressive Capacity	427.88				kips
Nominal Tensile Capacity	398.44				kips
Controlling Stress Ratio	82.5%				

Bolt Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Bolt Shear Load (Vu)	29.881				kips
Top Bolt Tension Load (Tu)	2.283				kips
Top Eccentricity (e)	0.625				in
Top Bolt Bearing Capacity (Rn)	75.525				kips
Top Bolt Shear Capacity (Vn)	37.000				kips
Top Bolt Tension Capacity (Tn)	30.000				kips
Top Connection Length Reduction	N/a				
Top Bolt Combined Stress Ratio	65.8%				

Bottom Bolt Shear Load (Vu)	29.881				kips
Bottom Bolt Tension Load (Tu)	2.283				kips
Bottom Eccentricity (e)	0.625				in
Bottom Bolt Bearing Capacity (Rn)	90.630				kips
Bottom Bolt Shear Capacity (Vn)	37.000				kips
Bottom Bolt Tension Capacity (Tn)	30.000				kips
Bottom Connection Length Reduction	N/a				
Bottom Bolt Combined Stress Ratio	65.8%				

Analysis Summary

	Generation 1	Generation 2	Generation 3	Generation 4
JUMP PLATE COMBINED STRESS RATIO	82.5%			
TOP BOLT COMBINED STRESS RATIO	65.8%			
BOTTOM BOLT COMBINED STRESS RATIO	65.8%			

PAUL J. FORD AND COMPANY
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v4.1 - Effective 7-3-12

Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description: Flange at 20'
Owner:
Engineer: JRJ

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	4882	k-ft	TIA Ref.	G	Location =	Flange Plate		
Axial =	85.9	kips	ASIF =	1.0000	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	51.7	kips	Max Ratio =	100.0%	Threads =	X-Excluded	for FP, Rev. G	
Anchor Qty =	70							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

Item	Nominal Bolt Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Bolt Circle, in	Area Override, in²	Area, in²	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A325	81	105	0.0	53.00	0.00	1.23	40.45	38.80	38.80	0.00	76.31	50.8%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	41.16	39.51	39.51	0.00	76.31	51.8%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	42.04	40.38	40.38	0.00	76.31	52.9%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	42.94	41.28	41.28	0.00	76.31	54.1%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	43.73	42.07	42.07	0.00	76.31	55.1%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	44.28	42.63	42.63	0.00	76.31	55.9%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	44.52	42.86	42.86	0.00	76.31	56.2%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	44.38	42.72	42.72	0.00	76.31	56.0%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	43.86	42.20	42.20	0.00	76.31	55.3%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	43.00	41.34	41.34	0.00	76.31	54.2%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	41.88	40.23	40.23	0.00	76.31	52.7%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	40.63	38.98	38.98	0.00	76.31	51.1%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	39.40	37.75	37.75	0.00	76.31	49.5%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	38.36	36.70	36.70	0.00	76.31	48.1%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	37.64	35.98	35.98	0.00	76.31	47.2%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	37.36	35.71	35.71	0.00	76.31	46.8%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	37.55	35.90	35.90	0.00	76.31	47.0%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	38.16	36.50	36.50	0.00	76.31	47.8%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	39.06	37.41	37.41	0.00	76.31	49.0%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	40.11	38.45	38.45	0.00	76.31	50.4%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	41.14	39.48	39.48	0.00	76.31	51.7%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	42.01	40.36	40.36	0.00	76.31	52.9%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	42.63	40.97	40.97	0.00	76.31	53.7%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	42.92	41.27	41.27	0.00	76.31	54.1%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	42.88	41.23	41.23	0.00	76.31	54.0%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	42.55	40.89	40.89	0.00	76.31	53.6%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	41.98	40.33	40.33	0.00	76.31	52.8%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	41.31	39.65	39.65	0.00	76.31	52.0%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	40.65	39.00	39.00	0.00	76.31	51.1%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	40.15	38.50	38.50	0.00	76.31	50.4%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	39.92	38.26	38.26	0.00	76.31	50.1%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	40.02	38.36	38.36	0.00	76.31	50.3%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	36.13	34.48	34.48	0.00	76.31	45.2%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	36.77	35.11	35.11	0.00	76.31	46.0%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	37.54	35.88	35.88	0.00	76.31	47.0%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	38.33	36.68	36.68	0.00	76.31	48.1%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	39.02	37.36	37.36	0.00	76.31	49.0%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	39.50	37.84	37.84	0.00	76.31	49.6%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	39.68	38.03	38.03	0.00	76.31	49.8%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	39.54	37.88	37.88	0.00	76.31	49.6%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	39.05	37.39	37.39	0.00	76.31	49.0%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	38.26	36.60	36.60	0.00	76.31	48.0%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	37.24	35.58	35.58	0.00	76.31	46.6%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	36.10	34.44	34.44	0.00	76.31	45.1%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	34.97	33.31	33.31	0.00	76.31	43.7%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	34.01	32.35	32.35	0.00	76.31	42.4%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	33.35	31.69	31.69	0.00	76.31	41.5%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	33.08	31.42	31.42	0.00	76.31	41.2%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	33.23	31.58	31.58	0.00	76.31	41.4%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	33.76	32.11	32.11	0.00	76.31	42.1%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	34.57	32.91	32.91	0.00	76.31	43.1%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	35.50	33.85	33.85	0.00	76.31	44.4%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	36.43	34.78	34.78	0.00	76.31	45.6%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	37.23	35.57	35.57	0.00	76.31	46.6%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	37.79	36.14	36.14	0.00	76.31	47.4%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	38.08	36.42	36.42	0.00	76.31	47.7%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	38.07	36.42	36.42	0.00	76.31	47.7%

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v4.1 - Effective 7-3-12

Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description: Flange at 20'
Owner:
Engineer: JRJ

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	4882	k-ft	TIA Ref.	G	Location =	Flange Plate	
Axial =	85.9	kips	ASIF =	1.0000	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	51.7	kips	Max Ratio =	100.0%	Threads =	X-Excluded	for FP, Rev. G
Anchor Qty =	70						

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

58	1.250	A325	81	105	281.3	47.00	0.00	1.23	37.80	36.15	36.15	0.00	76.31	47.4%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	37.34	35.68	35.68	0.00	76.31	46.8%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	36.77	35.11	35.11	0.00	76.31	46.0%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	36.22	34.56	34.56	0.00	76.31	45.3%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	35.81	34.15	34.15	0.00	76.31	44.8%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	35.62	33.97	33.97	0.00	76.31	44.5%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	35.73	34.08	34.08	0.00	76.31	44.7%
65	0.000	Sabre 6.5 x 1.25	65	80	28.0	61.25	8.13	8.13	322.70	311.73	322.70	398.44	398.44	81.0%
66	0.000	Sabre 6.5 x 1.25	65	80	100.0	61.25	8.13	8.13	328.69	317.73	328.69	398.44	398.44	82.5%
67	0.000	Sabre 6.5 x 1.25	65	80	166.0	61.25	8.13	8.13	286.53	275.56	286.53	398.44	398.44	71.9%
68	0.000	Sabre 6.5 x 1.25	65	80	193.0	61.25	8.13	8.13	293.61	282.65	293.61	398.44	398.44	73.7%
69	0.000	Sabre 6.5 x 1.25	65	80	266.0	61.25	8.13	8.13	328.22	317.25	328.22	398.44	398.44	82.4%
70	0.000	Sabre 6.5 x 1.25	65	80	323.0	61.25	8.13	8.13	306.41	295.44	306.41	398.44	398.44	76.9%
								127.29						

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

Site Data

BU#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Other

Reactions		
Moment:	2761.12	ft-kips
Axial:	53	kips
Shear:	51.69	kips
Exterior Flange Run, T+q:		kips

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

Elevation: 20 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	50.18	in	

Flange Plate Check Only

Plate Data		
Plate Outer Diam:	58.75	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.77	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.625	in
Pole Inner Diam:	58.75	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	84.2	Kips, Ext. Cu=Interior Cu
Plate Stress:	22.9	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	70.7%	Pass

Stiffener Results

Horizontal Weld :	47.5%	Pass
Vertical Weld:	41.5%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	31.3%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	35.5%	Pass
Plate Comp. (AISC Bracket):	68.4%	Pass

Pole Results

Pole Punching Shear Check:	14.9%	Pass

* 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#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Other

Reactions		
Moment:	2761.12	ft-kips
Axial:	53	kips
Shear:	51.69	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 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	50.18	in	

Flange Plate Check Only

Plate Data		
Plate Outer Diam:	58.5	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.74	in

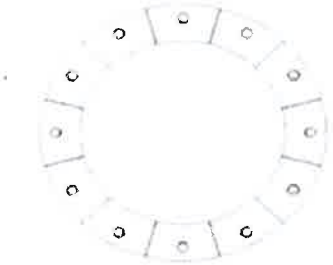
Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.75	in
Pole Inner Diam:	58.5	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi

Interior Flange Plate Results	Flexural Check	
Controlling Bolt Axial Force:	84.2	Kips, Ext. Cu=Interior Cu
Plate Stress:	22.9	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	70.7%	Pass

Stiffener Results		
Horizontal Weld :	42.9%	Pass
Vertical Weld:	37.5%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	27.4%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	31.5%	Pass
Plate Comp. (AISC Bracket):	61.8%	Pass

Pole Results		
Pole Punching Shear Check:	11.2%	Pass



* 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

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Effective Date: 3/21/2016 Verison 1.3

DATE:	9/29/2016
PROJECT NO:	37516-0710.003.7805
SITE NAME:	WESTON/ RT-57/ NORFIELD R
SITE NUMBER/BUN:	829046.00
DESCRIPTION:	40ft Flange
OWNER:	CCI
ENGINEER:	JRJ

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

General Parameters & Loading

Flange Elevation:	40.00	ft
TIA Reference Standard:	TIA-222-G	
AISC Manual:	13th Ed. (Black)	
Method:	LRFD	
ASD Stress Increase, ASIF:	1.00	
Moment, Muf:	3860.37	k-ft
Axial, Puf:	72.90	kips
Shear, Vf:	49.20	kips

Pole Parameters

	Upper Pole	Lower Pole	
Number of Sides	Round	Round	
Pole Diameter, Dp:	60.00	60.00	in
Pole Thickness, tp:	0.6250	0.6250	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	60.00	60.00	in
Flange Thickness, tf:	1.25	1.25	in

Flange Parameters

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	32	32	
Bolt Diameter:	1.25	1.25	in
Bolt Circle:	47.00	53.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0.00	0.00	degrees
Bolt Area, Ag:	1.2272	1.2272	in^2

	Bolt Circle 1	Bolt Circle 2	
Max. Tension:	32.29	36.41	kips
Max. Net Tension:	31.51	35.63	kips
Max. Net Compression:	33.07	37.19	kips
Moment to Bolt Circle:	1011.67	1286.46	k-ft
Axial to Bolt Circle:	24.99	24.99	kips
Shear to Bolt Circle:	24.60	24.60	kips
Equivalent Bolt Circle:	50.18	50.18	in

	Thickness	Width	Height
Top Flange Stiffener Parameters			
Bot. Flange Stiffener Parameters			

Shaft Reinforcing Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Condition					
Top Shaft Reinf. Designation					
Top Shaft Reinf. Thickness					in
Top Shaft Reinf. Width					in
Top Shaft Reinf. Term. Bolts					
Top Shaft Reinf. Bolt Spacing					in
Top Shaft Reinf. End Spacing					in
Bottom Condition					
Bottom Shaft Reinf. Designation					
Bottom Shaft Reinf. Thickness					in
Bottom Shaft Reinf. Width					in
Bottom Shaft Reinf. Term. Bolts					
Bottom Shaft Reinf. Bolt Spacing					in
Bottom Shaft Reinf. End Spacing					in

Bridge Stiffener Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Reference Document					
Analysis, Design, New, Ignore	Analysis				
Jump Plate Designation	CCI-060100				
Jump Plate Width Override					in
Jump Plate Thickness Override					in
Clear Distance from Flange	0.00				in
Jump Plate Fy	65				ksi
Jump Plate Fu	80				ksi
Bolt Type	EXISTING AJAX				
Bolt Tension Method	Elastic				
Top Bolt Quantity	8				
Top Bolt Spacing	3.00				in
Top Bolt Edge Distance	3.00				in
Bottom Bolt Quantity	8				
Bottom Bolt Spacing	3.00				in
Bottom Bolt Edge Distance	3.00				in
Unbraced Length	18.00	18.00			in
Unbraced Length Override					in
K	0.80				
Stiffener Circle	61.00				in
Clearance Check	OK				
Qty. Jump Plates	6				in
Location 1	38				deg
Location 2	95				deg
Location 3	158				deg
Location 4	215				deg
Location 5	278				deg
Location 6	335				deg

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DATE:	9/29/2016
PROJECT NO:	37516-0710.003.7805
SITE NAME:	WESTON/ RT-57/ NORFIELD R
SITE NUMBER/BUN:	829046.00
DESCRIPTION:	40ft Flange
OWNER:	CCI
ENGINEER:	JRJ

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

Jump Plate Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Applied Axial Load (Pu)	208.70				kips
Hole Diameter	1.19				in
Gross Area (Ag)	6.00				in^2
Net Area (An)	4.81				in^2
b/t Ratio	6.00				
Radius of Gyration (r)	0.29				in
K L / r	41.57				
Q (Where Qa = 1.0)	1.00				
ASIF Value	1.00				
Critical Stress (Fa or Fcr)	55.15				ksi
Nominal Compressive Capacity	297.83				kips
Nominal Tensile Capacity	288.75				kips
Controlling Stress Ratio	72.3%				

Bolt Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Bolt Shear Load (Vu)	26.088				kips
Top Bolt Tension Load (Tu)	2.174				kips
Top Eccentricity (e)	0.500				in
Top Bolt Bearing Capacity (Rn)	75.525				kips
Top Bolt Shear Capacity (Vn)	37.000				kips
Top Bolt Tension Capacity (Tn)	30.000				kips
Top Connection Length Reduction	N/a				
Top Bolt Combined Stress Ratio	50.2%				

Bottom Bolt Shear Load (Vu)	26.088				kips
Bottom Bolt Tension Load (Tu)	2.174				kips
Bottom Eccentricity (e)	0.500				in
Bottom Bolt Bearing Capacity (Rn)	75.525				kips
Bottom Bolt Shear Capacity (Vn)	37.000				kips
Bottom Bolt Tension Capacity (Tn)	30.000				kips
Bottom Connection Length Reduction	N/a				
Bottom Bolt Combined Stress Ratio	50.2%				

Analysis Summary

	Generation 1	Generation 2	Generation 3	Generation 4
JUMP PLATE COMBINED STRESS RATIO	72.3%			
TOP BOLT COMBINED STRESS RATIO	50.2%			
BOTTOM BOLT COMBINED STRESS RATIO	50.2%			

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Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description: Flange at 40'
Owner:
Engineer: JRJ

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	3860	k-ft	TIA Ref.	G	Location =	Flange Plate	
Axial =	72.9	kips	ASIF =	1.0000	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	49.2	kips	Max Ratio =	100.0%	Threads =	X-Excluded	for FP, Rev. G
Anchor Qty =	70						

** For Flange Plates: Prying action is not considered in the bolt loads. **

Item	Nominal Bolt Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Bolt Circle, in	Area Override, in²	Area, in²	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A325	81	105	0.0	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	37.19	35.63	35.63	0.00	76.31	46.7%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%

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v4.1 - Effective 7-3-12

Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description: Flange at 40'
Owner:
Engineer: JRJ

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	3860	k-ft	TIA Ref.	G	Location =	Flange Plate		
Axial =	72.9	kips	ASIF =	1.0000	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	49.2	kips	Max Ratio =	100.0%	Threads =	X-Excluded	for FP, Rev. G	
Anchor Qty =	70							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

58	1.250	A325	81	105	281.3	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	33.07	31.51	31.51	0.00	76.31	41.3%
65	0.000	Sabre 6 x 1	65	80	38.0	61.00	6.00	6.00	208.70	201.06	208.70	288.75	288.75	72.3%
66	0.000	Sabre 6 x 1	65	80	95.0	61.00	6.00	6.00	208.70	201.06	208.70	288.75	288.75	72.3%
67	0.000	Sabre 6 x 1	65	80	158.0	61.00	6.00	6.00	208.70	201.06	208.70	288.75	288.75	72.3%
68	0.000	Sabre 6 x 1	65	80	215.0	61.00	6.00	6.00	208.70	201.06	208.70	288.75	288.75	72.3%
69	0.000	Sabre 6 x 1	65	80	278.0	61.00	6.00	6.00	208.70	201.06	208.70	288.75	288.75	72.3%
70	0.000	Sabre 6 x 1	65	80	335.0	61.00	6.00	6.00	208.70	201.06	208.70	288.75	288.75	72.3%
								114.54						

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

Site Data

BU#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Other

Reactions		
Moment:	2298.13	ft-kips
Axial:	50	kips
Shear:	49.2	kips
Exterior Flange Run, T+q:		kips

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

Elevation: 40 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	50.18	in	

Flange Plate Check Only

Plate Data		
Plate Outer Diam:	58.75	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.77	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.625	in
Pole Inner Diam:	58.75	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi

Interior Flange Plate Results	Flexural Check	
Controlling Bolt Axial Force:	70.3	Kips, Ext. Cu=Interior Cu
Plate Stress:	19.1	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	59.0%	Pass

Stiffener Results		
Horizontal Weld :	39.6%	Pass
Vertical Weld:	34.6%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	24.7%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	28.7%	Pass
Plate Comp. (AISC Bracket):	57.1%	Pass

Pole Results		
Pole Punching Shear Check:	12.4%	Pass

* 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#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Other

Reactions		
Moment:	2298.13	ft-kips
Axial:	50	kips
Shear:	49.2	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 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	50.18	in	

Flange Plate Check Only

Plate Data		
Plate Outer Diam:	58.75	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.77	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.625	in
Pole Inner Diam:	58.75	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi

Interior Flange Plate Results	Flexural Check	
Controlling Bolt Axial Force:	70.3	Kips, Ext. Cu=Interior Cu
Plate Stress:	19.1	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	59.0%	Pass

Stiffener Results		
Horizontal Weld :	39.6%	Pass
Vertical Weld:	34.6%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	24.7%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	28.7%	Pass
Plate Comp. (AISC Bracket):	57.1%	Pass

Pole Results		
Pole Punching Shear Check:	12.4%	Pass

* 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

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Effective Date: 3/21/2016 Verison 1.3

DATE:	9/29/2016
PROJECT NO:	37516-0710.003.7805
SITE NAME:	WESTON/ RT-57/ NORFIELD R
SITE NUMBER/BUN:	829046.00
DESCRIPTION:	60ft Flange
OWNER:	CCI
ENGINEER:	JRJ

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

General Parameters & Loading

Flange Elevation:	60.00	ft
TIA Reference Standard:	TIA-222-G	
AISC Manual:	13th Ed. (Black)	
Method:	LRFD	
ASD Stress Increase, ASIF:	1.00	
Moment, Muf:	3290.52	k-ft
Axial, Puf:	61.10	kips
Shear, Vf:	46.10	kips

Pole Parameters

	Upper Pole	Lower Pole	
Number of Sides	Round	Round	
Pole Diameter, Dp:	60.00	60.00	in
Pole Thickness, tp:	0.5000	0.6250	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	60.00	60.00	in
Flange Thickness, tf:	1.25	1.25	in

Flange Parameters

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	32	32	
Bolt Diameter:	1.25	1.25	in
Bolt Circle:	47.00	53.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0.00	0.00	degrees
Bolt Area, Ag:	1.2272	1.2272	in^2

	Bolt Circle 1	Bolt Circle 2	
Max. Tension:	36.84	41.54	kips
Max. Net Tension:	36.02	40.73	kips
Max. Net Compression:	37.65	42.36	kips
Moment to Bolt Circle:	1154.29	1467.81	k-ft
Axial to Bolt Circle:	26.07	26.07	kips
Shear to Bolt Circle:	23.05	23.05	kips
Equivalent Bolt Circle:	50.18	50.18	in

	Thickness	Width	Height
Top Flange Stiffener Parameters			
Bot. Flange Stiffener Parameters			

Shaft Reinforcing Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Condition					
Top Shaft Reinf. Designation					
Top Shaft Reinf. Thickness					in
Top Shaft Reinf. Width					in
Top Shaft Reinf. Term. Bolts					
Top Shaft Reinf. Bolt Spacing					in
Top Shaft Reinf. End Spacing					in
Bottom Condition					
Bottom Shaft Reinf. Designation					
Bottom Shaft Reinf. Thickness					in
Bottom Shaft Reinf. Width					in
Bottom Shaft Reinf. Term. Bolts					
Bottom Shaft Reinf. Bolt Spacing					in
Bottom Shaft Reinf. End Spacing					in

Bridge Stiffener Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Reference Document					
Analysis, Design, New, Ignore	Analysis				
Jump Plate Designation	CCI-045100				
Jump Plate Width Override					in
Jump Plate Thickness Override					in
Clear Distance from Flange	0.00				in
Jump Plate Fy	65				ksi
Jump Plate Fu	80				ksi
Bolt Type	EXISTING AJAX				
Bolt Tension Method	Elastic				
Top Bolt Quantity	6				
Top Bolt Spacing	3.00				in
Top Bolt Edge Distance	3.00				in
Bottom Bolt Quantity	6				
Bottom Bolt Spacing	3.00				in
Bottom Bolt Edge Distance	3.00				in
Unbraced Length	18.00	18.00			in
Unbraced Length Override					in
K	0.80				
Stiffener Circle	61.00				in
Clearance Check	OK				
Qty. Jump Plates	3				in
Location 1	0				deg
Location 2	120				deg
Location 3	240				deg
Location 4					deg
Location 5					deg
Location 6					deg

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Effective Date: 3/21/2016 Verison 1.3

DATE:	9/29/2016
PROJECT NO:	37516-0710.003.7805
SITE NAME:	WESTON/ RT-57/ NORFIELD R
SITE NUMBER/BUN:	829046.00
DESCRIPTION:	60ft Flange
OWNER:	CCI
ENGINEER:	JRJ

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

Jump Plate Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Applied Axial Load (Pu)	178.31				kips
Hole Diameter	1.19				in
Gross Area (Ag)	4.50				in^2
Net Area (An)	3.31				in^2
b/t Ratio	4.50				
Radius of Gyration (r)	0.29				in
K L / r	41.67				
Q (Where Qa = 1.0)	1.00				
ASIF Value	1.00				
Critical Stress (Fa or Fcr)	55.15				ksi
Nominal Compressive Capacity	223.38				kips
Nominal Tensile Capacity	198.75				kips
Controlling Stress Ratio	89.7%				

Bolt Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Bolt Shear Load (Vu)	29.719				kips
Top Bolt Tension Load (Tu)	3.302				kips
Top Eccentricity (e)	0.500				in
Top Bolt Bearing Capacity (Rn)	60.420				kips
Top Bolt Shear Capacity (Vn)	37.000				kips
Top Bolt Tension Capacity (Tn)	30.000				kips
Top Connection Length Reduction	N/a				
Top Bolt Combined Stress Ratio	65.7%				

Bottom Bolt Shear Load (Vu)	29.719				kips
Bottom Bolt Tension Load (Tu)	3.302				kips
Bottom Eccentricity (e)	0.500				in
Bottom Bolt Bearing Capacity (Rn)	75.525				kips
Bottom Bolt Shear Capacity (Vn)	37.000				kips
Bottom Bolt Tension Capacity (Tn)	30.000				kips
Bottom Connection Length Reduction	N/a				
Bottom Bolt Combined Stress Ratio	65.7%				

Analysis Summary

	Generation 1	Generation 2	Generation 3	Generation 4
JUMP PLATE COMBINED STRESS RATIO	89.7%			
TOP BOLT COMBINED STRESS RATIO	65.7%			
BOTTOM BOLT COMBINED STRESS RATIO	65.7%			

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v4.1 - Effective 7-3-12

Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description: Flange at 60'
Owner:
Engineer: JRJ

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	3291	k-ft	TIA Ref.	G	Location =	Flange Plate		
Axial =	61.1	kips	ASIF =	1.0000	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	46.1	kips	Max Ratio =	100.0%	Threads =	X-Excluded	for FP, Rev. G	
Anchor Qty =	67							

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

Item	Nominal Bolt Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Bolt Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A325	81	105	0.0	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	42.36	40.73	40.73	0.00	76.30	53.4%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%

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v4.1 - Effective 7-3-12

Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description: Flange at 60'
Owner:
Engineer: JRJ

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	3291	k-ft	TIA Ref.	G	Location =	Flange Plate	
Axial =	61.1	kips	ASIF =	1.0000	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	46.1	kips	Max Ratio =	100.0%	Threads =	X-Excluded	for FP, Rev. G
Anchor Qty =	67						

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

58	1.250	A325	81	105	281.3	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	37.65	36.02	36.02	0.00	76.30	47.2%
65	0.000	Sabre 4.5 x 1	65	80	0.0	61.00	4.50	4.50	178.31	172.34	178.31	198.75	198.75	89.7%
66	0.000	Sabre 4.5 x 1	65	80	120.0	61.00	4.50	4.50	178.31	172.34	178.31	198.75	198.75	89.7%
67	0.000	Sabre 4.5 x 1	65	80	240.0	61.00	4.50	4.50	178.31	172.34	178.31	198.75	198.75	89.7%
								92.04						

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

Site Data

BU#: *829046*
Site Name: *Weston*
App #:

Reactions		
Moment:	2622.1	ft-kips
Axial:	52.14	kips
Shear:	46.14	kips
Exterior Flange Run, T+q:		kips

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

Elevation: 60 feet

Manufacturer:	Other

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	50.18	in	

Flange Plate Check Only

Plate Data		
Plate Outer Diam:	59	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.79	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

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	60	ksi

Interior Flange Plate Results	Flexural Check	
Controlling Bolt Axial Force:	80.0	Kips, Ext. Cu=Interior Cu
Plate Stress:	21.8	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	67.2%	Pass

Stiffener Results		
Horizontal Weld :	50.5%	Pass
Vertical Weld:	44.1%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	34.0%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	38.2%	Pass
Plate Comp. (AISC Bracket):	72.7%	Pass

Pole Results		
Pole Punching Shear Check:	19.8%	Pass

* 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#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Other

Reactions		
Moment:	2622.1	ft-kips
Axial:	52.14	kips
Shear:	46.14	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: 60 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	50.18	in	

Flange Plate Check Only

Plate Data		
Plate Outer Diam:	58.75	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.77	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	60	in
Thick:	0.625	in
Pole Inner Diam:	58.75	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	80.0	Kips, Ext. Cu=Interior Cu
Plate Stress:	21.8	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	67.2%	Pass

Stiffener Results

Horizontal Weld :	45.1%	Pass
Vertical Weld:	39.4%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	29.3%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	33.4%	Pass
Plate Comp. (AISC Bracket):	65.0%	Pass

Pole Results

Pole Punching Shear Check:	14.1%	Pass

* 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

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Effective Date: 3/21/2016 Verison 1.3

DATE:	9/29/2016
PROJECT NO:	37516-0710.003.7805
SITE NAME:	WESTON/ RT-57/ NORFIELD R
SITE NUMBER/BUN:	829046.00
DESCRIPTION:	80ft Flange
OWNER:	CCI
ENGINEER:	JRJ

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

General Parameters & Loading

Flange Elevation:	80.00	ft
TIA Reference Standard:	TIA-222-G	
AISC Manual:	13th Ed. (Black)	
Method:	LRFD	
ASD Stress Increase, ASIF:	1.00	
Moment, Muf:	2327.75	k-ft
Axial, Puf:	50.90	kips
Shear, Vf:	42.40	kips

Pole Parameters

	Upper Pole	Lower Pole	
Number of Sides	Round	Round	
Pole Diameter, Dp:	60.00	60.00	in
Pole Thickness, tp:	0.3750	0.5000	in
Pole Fy:	42	42	ksi
Pole Fu:	60	60	ksi
Flange Diameter, Df:	60.00	60.00	in
Flange Thickness, tf:	1.25	1.25	in

Flange Parameters

Number of Bolt Circles: (1) Bolt Circle

	Bolt Circle 1	Bolt Circle 2	
Qty. Bolts:	32	32	
Bolt Diameter:	1.25	1.25	in
Bolt Circle:	47.00	53.00	in
Bolt Spacing:	Symmetric	Symmetric	
Start Angle, for Symmetric:	0.00	0.00	degrees
Bolt Area, Ag:	1.2272	1.2272	in^2

	Bolt Circle 1	Bolt Circle 2	
Max. Tension:	26.06	29.39	kips
Max. Net Tension:	25.38	28.71	kips
Max. Net Compression:	26.74	30.07	kips
Moment to Bolt Circle:	816.56	1038.34	k-ft
Axial to Bolt Circle:	21.72	21.72	kips
Shear to Bolt Circle:	21.20	21.20	kips
Equivalent Bolt Circle:	50.18	50.18	in

	Thickness	Width	Height
Top Flange Stiffener Parameters			
Bot. Flange Stiffener Parameters			

Shaft Reinforcing Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Condition					
Top Shaft Reinf. Designation					
Top Shaft Reinf. Thickness					in
Top Shaft Reinf. Width					in
Top Shaft Reinf. Term. Bolts					
Top Shaft Reinf. Bolt Spacing					in
Top Shaft Reinf. End Spacing					in
Bottom Condition					
Bottom Shaft Reinf. Designation					
Bottom Shaft Reinf. Thickness					in
Bottom Shaft Reinf. Width					in
Bottom Shaft Reinf. Term. Bolts					
Bottom Shaft Reinf. Bolt Spacing					in
Bottom Shaft Reinf. End Spacing					in

Bridge Stiffener Parameters

	Generation 1	Generation 2	Generation 3	Generation 4	
Reference Document					
Analysis, Design, New, Ignore	Analysis				
Jump Plate Designation	CCI-045100				
Jump Plate Width Override					in
Jump Plate Thickness Override					in
Clear Distance from Flange	0.00				in
Jump Plate Fy	65				ksi
Jump Plate Fu	80				ksi
Bolt Type	EXISTING AJAX				
Bolt Tension Method	Elastic				
Top Bolt Quantity	6				
Top Bolt Spacing	3.00				in
Top Bolt Edge Distance	3.00				in
Bottom Bolt Quantity	6				
Bottom Bolt Spacing	3.00				in
Bottom Bolt Edge Distance	3.00				in
Unbraced Length	18.00	18.00			in
Unbraced Length Override					in
K	0.80				
Stiffener Circle	61.00				in
Clearance Check	OK				
Qty. Jump Plates	3				in
Location 1	58				deg
Location 2	178				deg
Location 3	298				deg
Location 4					deg
Location 5					deg
Location 6					deg

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Effective Date: 3/21/2016 Verison 1.3

DATE:	9/29/2016
PROJECT NO:	37516-0710.003.7805
SITE NAME:	WESTON/ RT-57/ NORFIELD R
SITE NUMBER/BUN:	829046.00
DESCRIPTION:	80ft Flange
OWNER:	CCI
ENGINEER:	JRJ

BOLTED FLANGE JUMP ANALYSIS PER TIA-222-G & AISC 13TH ED. (BLACK)

Jump Plate Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Applied Axial Load (Pu)	126.51				kips
Hole Diameter	1.19				in
Gross Area (Ag)	4.50				in^2
Net Area (An)	3.31				in^2
b/t Ratio	4.50				
Radius of Gyration (r)	0.29				in
K L / r	41.57				
Q (Where Qa = 1.0)	1.00				
ASIF Value	1.00				
Critical Stress (Fa or Fcr)	55.15				ksi
Nominal Compressive Capacity	223.38				kips
Nominal Tensile Capacity	198.75				kips
Controlling Stress Ratio	63.7%				

Bolt Analysis

	Generation 1	Generation 2	Generation 3	Generation 4	
Top Bolt Shear Load (Vu)	21.086				kips
Top Bolt Tension Load (Tu)	2.343				kips
Top Eccentricity (e)	0.500				in
Top Bolt Bearing Capacity (Rn)	45.315				kips
Top Bolt Shear Capacity (Vn)	37.000				kips
Top Bolt Tension Capacity (Tn)	30.000				kips
Top Connection Length Reduction	N/a				
Top Bolt Combined Stress Ratio	33.1%				

Bottom Bolt Shear Load (Vu)	21.086				kips
Bottom Bolt Tension Load (Tu)	2.343				kips
Bottom Eccentricity (e)	0.500				in
Bottom Bolt Bearing Capacity (Rn)	60.420				kips
Bottom Bolt Shear Capacity (Vn)	37.000				kips
Bottom Bolt Tension Capacity (Tn)	30.000				kips
Bottom Connection Length Reduction	N/a				
Bottom Bolt Combined Stress Ratio	33.1%				

Analysis Summary

	Generation 1	Generation 2	Generation 3	Generation 4
JUMP PLATE COMBINED STRESS RATIO	63.7%			
TOP BOLT COMBINED STRESS RATIO	33.1%			
BOTTOM BOLT COMBINED STRESS RATIO	33.1%			

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v4.1 - Effective 7-3-12

Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description: Flange at 80'
Owner:
Engineer: JRJ

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	2328	k-ft	TIA Ref.	G	Location =	Flange Plate	
Axial =	50.9	kips	ASIF =	1.0000	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	42.4	kips	Max Ratio =	100.0%	Threads =	X-Excluded	for FP, Rev. G
Anchor Qty =	67						

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

Item	Nominal Bolt Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Bolt Circle, in	Area Override, in²	Area, in²	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A325	81	105	0.0	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	30.07	28.71	28.71	0.00	76.30	37.6%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%

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v4.1 - Effective 7-3-12

Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description: Flange at 80'
Owner:
Engineer: JRJ

Asymmetric Bolt Analysis

Moment adjusted to account for load in Reinforcing Flat Plate on Pole Exterior

Moment =	2328	k-ft	TIA Ref.	G	Location =	Flange Plate	
Axial =	50.9	kips	ASIF =	1.0000	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	42.4	kips	Max Ratio =	100.0%	Threads =	X-Excluded	for FP, Rev. G
Anchor Qty =	67						

**** For Flange Plates: Prying action is not considered in the bolt loads. ****

58	1.250	A325	81	105	281.3	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	26.74	25.38	25.38	0.00	76.30	33.3%
65	0.000	Sabre 4.5 x 1	65	80	0.0	61.00	4.50	4.50	126.51	121.54	126.51	198.75	198.75	63.7%
66	0.000	Sabre 4.5 x 1	65	80	120.0	61.00	4.50	4.50	126.51	121.54	126.51	198.75	198.75	63.7%
67	0.000	Sabre 4.5 x 1	65	80	240.0	61.00	4.50	4.50	126.51	121.54	126.51	198.75	198.75	63.7%
								92.04						

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

Site Data

BU#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Other

Reactions		
Moment:	1854.9	ft-kips
Axial:	43.43	kips
Shear:	42.43	kips
Exterior Flange Run, T+q:		kips

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

Elevation: 80 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	50.18	in	

Flange Plate Check Only

Plate Data		
Plate Outer Diam:	59.25	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.82	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

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	60	ksi

Interior Flange Plate Results	Flexural Check	
Controlling Bolt Axial Force:	56.8	Kips, Ext. Cu=Interior Cu
Plate Stress:	15.5	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	47.7%	Pass

Stiffener Results		
Horizontal Weld :	40.7%	Pass
Vertical Weld:	35.5%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	25.6%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	29.6%	Pass
Plate Comp. (AISC Bracket):	58.6%	Pass

Pole Results		
Pole Punching Shear Check:	21.2%	Pass

* 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#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Other

Reactions		
Moment:	1854.9	ft-kips
Axial:	43.43	kips
Shear:	42.43	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: 80 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	50.18	in	

Flange Plate Check Only

Plate Data		
Plate Outer Diam:	59	in
Plate Inner Diam:	41	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	5.79	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	7	in
Height:	10	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

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	60	ksi

Interior Flange Plate Results	Flexural Check	
Controlling Bolt Axial Force:	56.8	Kips, Ext. Cu=Interior Cu
Plate Stress:	15.5	ksi
Allowable Plate Stress, φ*Fy:	32.4	ksi
Plate Stress Ratio:	47.7%	Pass

Stiffener Results		
Horizontal Weld :	35.8%	Pass
Vertical Weld:	31.3%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	21.7%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	25.5%	Pass
Plate Comp. (AISC Bracket):	51.6%	Pass

Pole Results		
Pole Punching Shear Check:	14.0%	Pass

* 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#: *829046*
Site Name: *Weston*
App #:

Reactions		
Mu	1609.74	ft-kips
Axial, Pu:	37.87	kips
Shear, Vu:	38.11	kips
Elevation:	100	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:	48		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- 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:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	54	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

			Stiffened
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:	27.45	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	Stiffened	in	
Min PL "treq" for actual **T w/ Pry**:	Stiffened	in	
Min PL "t1" for actual **T w/o Pry**:	Stiffened	in	
T allowable	54.54	kips	<-- B, Stiffened
Prying Force, q:	0.00	kips	Stiffened
Total Bolt Tension=Tu+q:	27.45	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	50.3%	Pass	

Exterior Flange Plate Results	Shear Check Only		Stiffened
Compression Side Plate Stress:	3.9	ksi	TIA G
Allowable Plate Stress:	19.4	ksi	φ*Fy
Compression Plate Stress Ratio:	19.9%	Pass	Comp. Y.L. Length:
Stiffened			N/A, Roark
Tension Side Stress Ratio, (treq/t)^2:	N/A		

Stiffener Results

Horizontal Weld :	53.7%	Pass
Vertical Weld:	36.4%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	26.4%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	40.8%	Pass
Plate Comp. (AISC Bracket):	57.7%	Pass

Pole Results

Pole Punching Shear Check:	20.5%	Pass

* 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#: *829046*
Site Name: *Weston*
App #:

Reactions		
Moment:	1609.74	ft-kips
Axial:	37.87	kips
Shear:	38.11	kips
Exterior Flange Run, T+q:	27.45	kips

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

Manufacturer:	Other

Elevation: 100 feet

Bolt Data			
Qty:	48		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	57	in	

Plate Data		
Plate Outer Diam:	59.25	in
Plate Inner Diam:	54	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	3.88	in

Stiffener Data (Welding at Both Sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:	0	<-- Disregard
Groove Angle:	0	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

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	60	ksi

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	27.5	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty), I	54.5	Kips
Bolt Stress Ratio:	50.3%	Pass

Interior Flange Plate Results Shear Check Only

Controlling Bolt Axial Force:	29.0	Kips, Ext. Cu=Interior Cu
Plate Stress:	4.4	ksi
Allowable Plate Stress, φ*Fy:	19.4	ksi
Plate Stress Ratio:	22.8%	Pass

Stiffener Results

Horizontal Weld :	53.5%	Pass
Vertical Weld:	30.0%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	20.2%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	40.0%	Pass
Plate Comp. (AISC Bracket):	49.9%	Pass

Pole Results

Pole Punching Shear Check:	15.8%	Pass

* 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#: *829046*
Site Name: *Weston*
App #:

Reactions		
Mu	1402.43	ft-kips
Axial, Pu:	30.44	kips
Shear, Vu:	34.41	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:	36		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- 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:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	48	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results | Rigid

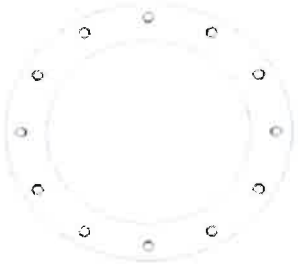
Bolt Tension Capacity, φ*Tn,**B1**:	54.54 kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.52 kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	35.82 Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	0.998 in	
Min PL "treq" for actual **T w/ Pry:**	0.612 in	
Min PL "t1" for actual **T w/o Pry:**	0.809 in	
T allowable w/o Prying:	54.54 kips	α'<0 case
Prying Force, q:	0.00 kips	
Total Bolt Tension=Tu+q:	35.82 kips	
Non-Prying Bolt Stress Ratio, Tu/B:	65.7% Pass	

Exterior Flange Plate Results Flexural Check | Rigid

Compression Side Plate Stress:	Rohn/Pirod, OK	TIA G
Allowable Plate Stress:	32.4 ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Pirod, OK	Comp. Y.L. Length:
No Prying		17.23
Tension Side Stress Ratio, (treq/t)^2:	24.0% 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, Interior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Pirod

Reactions		
Moment:	1402.43	ft-kips
Axial:	30.44	kips
Shear:	34.41	kips
Exterior Flange Run, T+q:	35.82	kips

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

Elevation: 120 feet

Bolt Data			
Qty:	36		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	51	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	35.8	Kips, Ext. Flange Tu+q
Adjusted φ*Tn (due to Vu=Vu/Qty), I	54.5	Kips
Bolt Stress Ratio:	65.7%	Pass

Plate Data		
Plate Outer Diam:	53.25	in
Plate Inner Diam:	48	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.65	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	37.5	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:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	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:	54	in
Thick:	0.375	in
Pole Inner Diam:	53.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	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#: *829046*
Site Name: *Weston*
App #:

Reactions		
Mu	747.41	ft-kips
Axial, Pu:	24.75	kips
Shear, Vu:	31.09	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:	32		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- 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:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	42	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	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**:	54.52	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	24.14	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.006	in	
Min PL "treq" for actual **T w/ Pry:**	0.507	in	
Min PL "t1" for actual **T w/o Pry:**	0.669	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	24.14	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	44.3%	Pass	

Exterior Flange Plate Results

			Rigid
Flexural Check			TIA G
Compression Side Plate Stress:	Rohn/Pirod,	OK	φ*Fy
Allowable Plate Stress:	32.4	ksi	Comp. Y.L. Length:
Compression Plate Stress Ratio:	Rohn/Pirod,	OK	16.16
No Prying			
Tension Side Stress Ratio, (treq/t)^2:	16.5%	Pass	

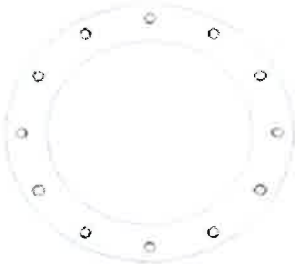
n/a

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, Interior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Pirod

Reactions		
Moment:	747.41	ft-kips
Axial:	24.75	kips
Shear:	31.09	kips
Exterior Flange Run, T+q:	24.14	kips

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

Elevation: 140 feet

Bolt Data			
Qty:	32		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	45	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	24.1	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty), I	54.5	Kips
Bolt Stress Ratio:	44.3%	Pass

Plate Data		
Plate Outer Diam:	47.25	in
Plate Inner Diam:	42	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.64	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	25.7	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:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

n/a

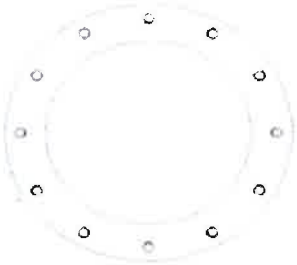
Stiffener Results N/A for Rohn / Pirod

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:	48	in
Thick:	0.375	in
Pole Inner Diam:	47.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	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#: *829046*
Site Name: *Weston*
App #:

Reactions		
Mu	232.96	ft-kips
Axial, Pu:	12.75	kips
Shear, Vu:	12.98	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:	28		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- 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:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	36	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	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**:	54.54	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	9.78	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.017	in	
Min PL "treq" for actual **T w/ Pry**:	0.327	in	
Min PL "t1" for actual **T w/o Pry**:	0.431	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	9.78	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	17.9%	Pass	

Exterior Flange Plate Results Flexural Check

			Rigid
Compression Side Plate Stress:	Rohn/Pirod,	OK	TIA G
Allowable Plate Stress:	32.4	ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Pirod,	OK	Comp. Y.L. Length:
No Prying			15.00
Tension Side Stress Ratio, (treq/t)^2:	6.8%	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, Interior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *829046*
Site Name: *Weston*
App #:

Reactions		
Moment:	232.96	ft-kips
Axial:	12.75	kips
Shear:	12.98	kips
Exterior Flange Run, T+q:	9.78	kips

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

Elevation: 160 feet

Manufacturer:	Pirod

Bolt Data			
Qty:	28		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	39	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	9.8	Kips, Ext. Tu=Interior Tu
Adjusted φ*Tn (due to Vu=Vu/Qty), I	54.5	Kips
Bolt Stress Ratio:	17.9%	Pass

Plate Data		
Plate Outer Diam:	41.25	in
Plate Inner Diam:	36	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.63	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	10.7	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:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	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:	42	in
Thick:	0.375	in
Pole Inner Diam:	41.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	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#: *829046*
Site Name: *Weston*
App #:

Reactions		
Mu	34.24	ft-kips
Axial, Pu:	3.98	kips
Shear, Vu:	4.6	kips
Elevation:	180	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:	0	<-- Disregard	
N/A:	0	<-- 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:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	ksi

Pole Data		
Diam:	30	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Flange Bolt Results

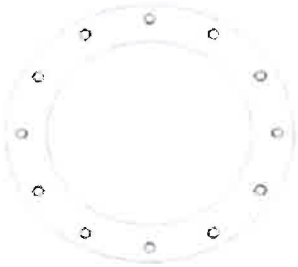
			Rigid
Bolt Tension Capacity, φ*Tn,**B1**:	54.54	kips	φ*Tn
Adjusted φ*Tn (due to Vu=Vu/Qty), **B**:	54.54	kips	φTn[(1-(Vu/φVn)^2]^0.5
Max Bolt directly applied Tu:	1.91	Kips	
Min. PL "tc" for **B** cap. **w/o** Pry:	1.031	in	
Min PL "treq" for actual **T w/ Pry**:	0.147	in	
Min PL "t1" for actual **T w/o Pry**:	0.193	in	
T allowable w/o Prying:	54.54	kips	α'<0 case
Prying Force, q:	0.00	kips	
Total Bolt Tension=Tu+q:	1.91	kips	
Non-Prying Bolt Stress Ratio, Tu/B:	3.5%	Pass	

Exterior Flange Plate Results Flexural Check

			Rigid
Compression Side Plate Stress:	Rohn/Pirod,	OK	TIA G
Allowable Plate Stress:	32.4	ksi	φ*Fy
Compression Plate Stress Ratio:	Rohn/Pirod,	OK	Comp. Y.L. Length:
No Prying			13.75
Tension Side Stress Ratio, (treq/t)^2:	1.4%	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, Interior Flange Plate - Any Bolt Material TIA Rev G

Site Data

BU#: *829046*
Site Name: *Weston*
App #:

Manufacturer:	Pirod

Reactions		
Moment:	34.24	ft-kips
Axial:	3.98	kips
Shear:	4.6	kips
Exterior Flange Run, T+q:	1.91	kips

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

Elevation: 180 feet

Bolt Data			
Qty:	24		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	
N/A:	0	<-- Disregard	
Circle:	33	in	

Interior Flange Bolt Results

Maximum Bolt Tension, Tu:	1.9	Kips, Ext. Flange Tu+q
Adjusted φ*Tn (due to Vu=Vu/Qty), I	54.5	Kips
Bolt Stress Ratio:	3.5%	Pass

Plate Data		
Plate Outer Diam:	35.25	in
Plate Inner Diam:	30	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.61	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	2.2	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:	0	
Groove Depth:	0	in **
Groove Angle:	0	degrees
Fillet H. Weld:	0	<-- Disregard
Fillet V. Weld:	0	in
Width:	0	in
Height:	0	in
Thick:	0	in
Notch:	0	in
Grade:	0	ksi
Weld str.:	0	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:	36	in
Thick:	0.375	in
Pole Inner Diam:	35.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	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

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Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description:
Owner:
Engineer: JRJ

v4.1 - Effective 7-3-12

Asymmetric Anchor Rod Analysis

Moment =	6839	k-ft	TIA Ref.	G	Location =	Base Plate		
Axial =	101.0	kips	ASIF =	1.0000	η =	0.55	for BP, Rev. G Sect. 4.9.9	
Shear =	53.0	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	60							

**** For Post Installed Anchors: Check anchors for embedment, epoxy/grout bond, and capacity based on proof load. ****

Item	Nominal Anchor Dia, in	Spec	Fy, ksi	Fu, ksi	Location, degrees	Anchor Circle, in	Area Override, in^2	Area, in^2	Max Net Compression, kips	Max Net Tension, kips	Load for Capacity Calc, kips	Capacity Override, kips	Capacity, kips	Capacity Ratio
1	1.250	A687	105	125	0.0	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
2	1.250	A687	105	125	6.9	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
3	1.250	A687	105	125	13.8	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
4	1.250	A687	105	125	20.8	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
5	1.250	A687	105	125	27.7	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
6	1.250	A687	105	125	34.6	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
7	1.250	A687	105	125	41.5	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
8	1.250	A687	105	125	48.5	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
9	1.250	A687	105	125	55.4	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
10	1.250	A687	105	125	62.3	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
11	1.250	A687	105	125	69.2	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
12	1.250	A687	105	125	76.2	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
13	1.250	A687	105	125	83.1	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
14	1.250	A687	105	125	90.0	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
15	1.250	A687	105	125	96.9	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
16	1.250	A687	105	125	103.8	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
17	1.250	A687	105	125	110.8	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
18	1.250	A687	105	125	117.7	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
19	1.250	A687	105	125	124.6	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
20	1.250	A687	105	125	131.5	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
21	1.250	A687	105	125	138.5	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
22	1.250	A687	105	125	145.4	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
23	1.250	A687	105	125	152.3	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
24	1.250	A687	105	125	159.2	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
25	1.250	A687	105	125	166.2	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
26	1.250	A687	105	125	173.1	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
27	1.250	A687	105	125	180.0	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
28	1.250	A687	105	125	186.9	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
29	1.250	A687	105	125	193.8	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
30	1.250	A687	105	125	200.8	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
31	1.250	A687	105	125	207.7	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
32	1.250	A687	105	125	214.6	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
33	1.250	A687	105	125	221.5	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
34	1.250	A687	105	125	228.5	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
35	1.250	A687	105	125	235.4	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
36	1.250	A687	105	125	242.3	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
37	1.250	A687	105	125	249.2	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
38	1.250	A687	105	125	256.2	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
39	1.250	A687	105	125	263.1	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
40	1.250	A687	105	125	270.0	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
41	1.250	A687	105	125	276.9	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
42	1.250	A687	105	125	283.8	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
43	1.250	A687	105	125	290.8	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
44	1.250	A687	105	125	297.7	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
45	1.250	A687	105	125	304.6	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
46	1.250	A687	105	125	311.5	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
47	1.250	A687	105	125	318.5	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
48	1.250	A687	105	125	325.4	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
49	1.250	A687	105	125	332.3	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
50	1.250	A687	105	125	339.2	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
51	1.250	A687	105	125	346.2	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
52	1.250	A687	105	125	353.1	67.00	0.00	1.23	58.70	56.11	59.94	0.00	96.90	61.9%
53	2.250	F1554 Gr 105	105	125	3.5	76.00	0.00	3.98	215.18	206.78	219.18	0.00	325.00	67.4%
54	2.250	F1554 Gr 105	105	125	48.5	76.00	0.00	3.98	215.18	206.78	219.18	0.00	325.00	67.4%
55	2.250	F1554 Gr 105	105	125	93.5	76.00	0.00	3.98	215.18	206.78	219.18	0.00	325.00	67.4%
56	2.250	F1554 Gr 105	105	125	138.5	76.00	0.00	3.98	215.18	206.78	219.18	0.00	325.00	67.4%
57	2.250	F1554 Gr 105	105	125	183.5	76.00	0.00	3.98	215.18	206.78	219.18	0.00	325.00	67.4%

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v4.1 - Effective 7-3-12

Date: 9/29/2016
PJF Project: 37516-0710.003.7805
Client Ref. # 829046
Site Name:
Description:
Owner:
Engineer: JRJ

Asymmetric Anchor Rod Analysis

Moment =	6839	k-ft	TIA Ref.	G	Location =	Base Plate		
Axial =	101.0	kips	ASIF =	1.0000	η =	0.55	for BP, Rev. G Sect. 4.9.9	
Shear =	53.0	kips	Max Ratio =	100.0%	Threads =	N/A	for FP, Rev. G	
Anchor Qty =	60							

**** For Post Installed Anchors: Check anchors for embedment, epoxy/grout bond, and capacity based on proof load. ****

58	2.250	F1554 Gr 105	105	125	228.5	76.00	0.00	3.98	215.18	206.78	219.18	0.00	325.00	67.4%
59	2.250	F1554 Gr 105	105	125	273.5	76.00	0.00	3.98	215.18	206.78	219.18	0.00	325.00	67.4%
60	2.250	F1554 Gr 105	105	125	318.5	76.00	0.00	3.98	215.18	206.78	219.18	0.00	325.00	67.4%
								95.62						

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#:	
Site Name:	
App #:	
Pole Manufacturer:	*Other*

Reactions		
Mu:	4157.7408	ft-kips
Axial, Pu:	67.4	kips
Shear, Vu:	35.4	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:	52	
Diam:	1.25	in
Rod Material:	Other	
Strength (Fu):	125	ksi
Yield (Fy):	105	ksi
Bolt Circle:	67	in

Anchor Rod Results

		Stiffened
Max Rod (Cu+ Vu/ή):	59.9 Kips	AISC LRFD
Allowable Axial, Φ*Fu*Anet:	96.9 Kips	φ*Tn
Anchor Rod Stress Ratio:	61.9% Pass	

Plate Data		
Diam:	70	in
Thick:	1.25	in
Grade:	36	ksi
Single-Rod B-eff:	3.62	in

Base Plate Results Shear Check Only

		Stiffened
Base Plate Stress:	5.2 ksi	AISC LRFD
Allowable Plate Stress:	19.4 ksi	φ*Fy
Base Plate Stress Ratio:	26.8% Pass	Y.L. Length: N/A, Roark

Stiffener Data (Welding at both sides)		
Config:	1	*
Weld Type:	Fillet	
Groove Depth:		<-- Disregard
Groove Angle:		<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	4.5	in
Height:	8	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

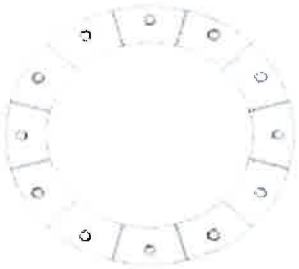
Stiffener Results

Horizontal Weld :	63.0% Pass
Vertical Weld:	40.6% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	30.6% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2	48.6% Pass
Plate Comp. (AISC Bracket):	68.5% Pass

Pole Data		
Diam:	60	in
Thick:	0.75	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi
Reinf. Fillet Weld	0	"0" if None

Pole Results

Pole Punching Shear Check:	11.0% Pass



* 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

Moment Capacity of Rock Anchored Foundation - Wind into Corner

Determination of effective rock compression area (for moment loads)

Controlling foundation % Capacity = **45.6%** **OK**

Elevation = **0** feet Total pole plus soil & fdn weight = **271.59** kips
Diagonal dimension = **305.40** in 1/2 x diagonal dimension = **152.70** in
Neutral axis location = **102.92** in (Measured from max. compression fiber)
Therefore c= **102.92** inches and a = β_1 x c = **87.48** inches β_1 = **0.85**

Load Case: 0.9D + 1.6W

Area of fdn-rock contact, Afr = **7652.4** square inches Net area of Afr = **7536.2** square inches

Centroid of Afr located **247.08** inches from maximum tension fiber of cross-section

Check fdn-rock contact area compression capacity versus actual rock compressive stress

Rock f'c = **277** psi Gross area of rock, Ac = **######** sq. in. ΣT -ΣC = **0.0**

Total rock anchor load, T_L, on annulus area, ΣT = **1502.8** kips

Usable rock and rock anchor compression capacity, SC = **1774.4** kips

Rock contribution to Mn = **6594.3** ft-kips

Pole / foundation / soil wt contribution to Mn = **1126.7** ft-kips

Cross-section Moment Cap.		
M_{ult} =	21143.4	ft-kips
M_{cap} =	15857.6	ft-kips

phi= **0.75**
(Mcap = ϕMult)

M_{actual} = **7236.5** ft-kips (At bottom of pad)
Mact / Mcap = **45.6%**

Strand information

No. of strands, Ns = **4** Number of strand group locations = **3** No. of strands per group location = **1**

Separation angle between strand groups = **90** degrees Strand diameter = **2** in

Strand edge distance = **44.563** inches (measured to center of strand group) Strand yield = **127.7** ksi

Modulus of elasticity of strand, E_s = **29000** ksi Area of strand = **2.6** sq. in.

Effective prestress = R x Initial prestress = **0** kips (Where R varies between 0.75 and 0.90)

Strand strain calculations

Strand strain due to effective prestress, ε_{se} = Eff. prestress of strand / (area of strand x E_s) = **0.00000**

rock strain due to effective prestress, ece = Total eff. prestress of strands / (Ac x Es) = **0.00000**

Assumed rock strain = **0.003**

Location	No. of strand groups	Dist. to neutral axis	Bending Strain	Total Strain	Strain Factor	Adjust
1	1	157.92	0.0046	0.0046	1.00	0
2	2	49.78	0.0015	0.0015	1.00	
3	1	-58.35	0.0000	0.0000	1.00	
4	0	---	---	---	1.00	
5	0	---	---	---	1.00	
6	0	---	---	---	---	
7	0	---	---	---	---	
8	0	---	---	---	---	
9	0	---	---	---	---	
10	0	---	---	---	---	
11	0	---	---	---	---	
12	0	---	---	---	---	
13	0	---	---	---	---	
14	0	---	---	---	---	
15	0	---	---	---	---	
16	0	---	---	---	---	
17	0	---	---	---	---	
18	0	---	---	---	---	
19	0	---	---	---	---	
20	0	---	---	---	---	
21	0	---	---	---	---	
22	0	---	---	---	---	
23	0	---	---	---	---	
24	0	---	---	---	---	
25	0	---	---	---	---	
26	0	---	---	---	---	
27	0	---	---	---	---	
28	0	---	---	---	---	
29	0	---	---	---	---	
30	0	---	---	---	---	
31	0	---	---	---	---	

Determination of strand contribution to ultimate moment capacity

Location	Group Strand Tension Load	Total Strand Tension Load Per Location, T_L	Contribution to Mn	Area Occupied by Strands
1	332.0	332.0	4369.4	- - -
2	109.4	218.8	907.9	- - -
3	0.0	0.0	0.0	3.14
4	- - -	- - -	- - -	- - -
5	- - -	- - -	- - -	- - -
6	- - -	- - -	- - -	- - -
7	- - -	- - -	- - -	- - -
8	- - -	- - -	- - -	- - -
9	- - -	- - -	- - -	- - -
10	- - -	- - -	- - -	- - -
11	- - -	- - -	- - -	- - -
12	- - -	- - -	- - -	- - -
13	- - -	- - -	- - -	- - -
14	- - -	- - -	- - -	- - -
15	- - -	- - -	- - -	- - -
16	- - -	- - -	- - -	- - -
17	- - -	- - -	- - -	- - -
18	- - -	- - -	- - -	- - -
19	- - -	- - -	- - -	- - -
20	- - -	- - -	- - -	- - -
21	- - -	- - -	- - -	- - -
22	- - -	- - -	- - -	- - -
23	- - -	- - -	- - -	- - -
24	- - -	- - -	- - -	- - -
25	- - -	- - -	- - -	- - -
26	- - -	- - -	- - -	- - -
27	- - -	- - -	- - -	- - -
28	- - -	- - -	- - -	- - -
29	- - -	- - -	- - -	- - -
30	- - -	- - -	- - -	- - -
31	- - -	- - -	- - -	- - -

$M_n = \Sigma$ (Tension in strand groups x strand group distance to N.A.) = **5277.4** ft-kips

$M_u = \phi M_n = 0.9 \times M_n =$ **4749.6** ft-kips

Tendon yield strength = **332.020** kips

Additional bar reinforcement information

No. of bars, Nb = 12 Number of bar group locations = 7 No. of bars per group location = 1

Separation angle between bar groups = 30 degrees Area of bar = 2.6 sq. in.

Bar edge distance = 72.094 inches (measured to center of bar group) Modulus of elasticity of bar, E_b = 29000 ksi

Bar strain calculations

Assumed rock strain = 0.003

Location	No. of bar groups, N_{BG}	Dist. to neutral axis	ε (Tension)	Tension per bar, T_B	$T_L = N_{BG} \times T_B$	Mn Contribution
1	0	130.39	0.0038	283.7	0.0	0.0
2	2	119.59	0.0034	260.0	520.0	5182.1
3	2	90.09	0.0026	195.1	390.3	2930.0
4	0	49.78	0.0015	109.4	0.0	0.0
5	2	9.48	0.0003	20.8	41.7	32.9
6	2	-20.02	0.0000	0.0	0.0	0.0
7	0	-30.82	0.0000	0.0	0.0	0.0
8	0	---	---	---	---	---
9	0	---	---	---	---	---
10	0	---	---	---	---	---

Determination of bar contribution to ultimate moment capacity

Location	No. of bar groups, N_{BG}	ε (C)	Comp. per bar, C_B	$C_L = N_{BG} \times C_B$	Mn Contribution	Area Occupied by Bar
1	0	0.0000	0.0	0.0	0.0	---
2	2	0.0000	0.0	0.0	0.0	---
3	2	0.0000	0.0	0.0	0.0	---
4	0	0.0000	0.0	0.0	0.0	---
5	2	0.0000	0.0	0.0	0.0	---
6	2	-0.0006	-44.0	0.0	0.0	28.27
7	0	-0.0009	-67.7	0.0	0.0	28.27
8	0	---	---	---	---	---
9	0	---	---	---	---	---
10	0	---	---	---	---	---

$M_n = \Sigma$ (Load in bar groups x bar group distance to N.A.) = 8145.0 ft-kips

$M_u = \phi M_n = 0.75 \times M_n$ = 6108.7 ft-kips

Bar yield strength = 332.020 kips

Rock Anchored Foundation Structural and Overturning Checks

Beam Shear, Tension Side - Wind into corner

b =	206.19	in	(Critical section at distance of d away from center of anchor, towards face of pier)
d=	31	in	
f'c=	5000	psi	
Vu=	147.7	kips	
ϕ=	0.85		
ϕVc=	768.3	kips	
% Cap=	8.8%	OK	(Vu adjusted for actual rock bolt load)

Beam Shear, Compression Side - Wind into corner

b =	261.0	in	(Critical section at distance of a plus d away from corner of foundation)
d=	43	in	
f'c=	5000	psi	
Vu=	607.3	kips	(SC, adjusted for overall foundation % Capacity and phi)
ϕ=	0.85		
ϕVc=	1348.9	kips	
% Cap=	45.0%	OK	

Punching Shear, Tension Side - Wind into corner

b =	94	in	(Critical section at anchor location)
d=	31	in	
f'c=	5000	psi	
Vu=	147.7	kips	
ϕ=	0.85		
ϕVc=	700.6	kips	
% Cap=	9.6%	OK	(Adjusted for actual rock bolt load)

Moment Capacity of Rock Anchored Foundation - Wind into Side

PJF job no. 37516-0710.003

Determination of effective rock compression area (for moment loads)

Controlling foundation % Capacity = 59.8% OK

Elevation = 0 feet Total pole plus soil & fdn weight = 271.59 kips

Side dimension = 216.00 in 1/2 x diagonal dimension = 108.00 in

Neutral axis location = 56.82 in (Measured from max. compression fiber)

Therefore c= 56.82 inches and a = β_1 x c = 48.30 inches β_1 = 0.85

Pier diameter / square dim = 7.5 feet

(Or if mat, bolt circle or pole diameter if direct emb)

Load Case: 0.9D + 1.6W

Area of fdn-rock contact, Afr = 10431.7 square inches Net area of Afr = 10255.8 square inches

Centroid of Afr located 191.85 inches from maximum tension fiber of cross-section

Check fdn-rock contact area compression capacity versus actual rock compressive stress

Rock f'c = 277 psi Gross area of rock, Ac = ####### sq. in. ΣT -ΣC = 0.0

Total rock anchor load, T_L, on annulus area, ΣT = 2143.1 kips

Usable rock and rock anchor compression capacity, SC = 2414.7 kips

Rock contribution to Mn = 6574.1 ft-kips

Pole / foundation / soil wt contribution to Mn = 1158.4 ft-kips

Cross-section Moment Cap.		
M_{ult} =	26171.7	ft-kips
M_{cap} =	19628.8	ft-kips

phi= 0.75 (Mcap = ϕMult)

M_{actual} = 7236.5 ft-kips (At bottom of pad)

Mact / Mcap = 36.9%

Strand information

No. of strands, Ns = 8 Number of strand group locations = 5 No. of strands per group location = 1

Separation angle between strand groups = 45 degrees Strand diameter = 2 in

Strand edge distance = -0.187 inches (measured to center of strand group) Strand yield = 127.7 ksi

Modulus of elasticity of strand, E_s = 29000 ksi Area of strand = 2.6 sq. in.

Effective prestress = R x Initial prestress = 0 kips (Where R varies between 0.75 and 0.90)

Strand strain calculations

Strand strain due to effective prestress, ε_{se} = Eff. prestress of strand / (area of strand x E_s) = **0.00000**

rock strain due to effective prestress, ece = Total eff. prestress of strands / (Ac x Es) = **0.00000**

Assumed rock strain = **0.003**

Location	No. of strand groups	Dist. to neutral axis	Bending Strain	Total Strain	Strain Factor
1	0	159.37	0.0084	0.0084	1.00
2	2	127.68	0.0067	0.0067	1.00
3	0	51.18	0.0027	0.0027	1.00
4	2	-25.32	0.0000	0.0000	1.00
5	0	-57.00	0.0000	0.0000	1.00
6	0	---	---	---	---
7	0	---	---	---	---
8	0	---	---	---	---
9	0	---	---	---	---
10	0	---	---	---	---
11	0	---	---	---	---
12	0	---	---	---	---
13	0	---	---	---	---
14	0	---	---	---	---
15	0	---	---	---	---
16	0	---	---	---	---
17	0	---	---	---	---
18	0	---	---	---	---
19	0	---	---	---	---
20	0	---	---	---	---
21	0	---	---	---	---
22	0	---	---	---	---
23	0	---	---	---	---
24	0	---	---	---	---
25	0	---	---	---	---
26	0	---	---	---	---
27	0	---	---	---	---
28	0	---	---	---	---
29	0	---	---	---	---
30	0	---	---	---	---
31	0	---	---	---	---

Determination of strand contribution to ultimate moment capacity

Location	Group Strand Tension Load	Total Strand Tension Load Per Location, T_L	Contribution to Mn	Area Occupied by Strands
1	332.0	0.0	0.0	---
2	332.0	664.0	7065.5	---
3	203.8	0.0	0.0	---
4	0.0	0.0	0.0	6.28
5	0.0	0.0	0.0	0.00
6	---	---	---	---
7	---	---	---	---
8	---	---	---	---
9	---	---	---	---
10	---	---	---	---
11	---	---	---	---
12	---	---	---	---
13	---	---	---	---
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23	---	---	---	---
24	---	---	---	---
25	---	---	---	---
26	---	---	---	---
27	---	---	---	---
28	---	---	---	---
29	---	---	---	---
30	---	---	---	---
31	---	---	---	---

$M_n = \Sigma$ (Tension in strand groups x strand group distance to N.A.) = **7065.5** ft-kips

$M_u = \phi M_n = 0.9 \times M_n =$ **6358.9** ft-kips

Tendon yield strength = **332.020** kips

Additional bar reinforcement information

No. of bars, Nb = 20 Number of bar group locations = 11 No. of bars per group location = 1

Separation angle between bar groups = 18 degrees Area of bar = 2.6 sq. in.

Bar edge distance = 27.4 inches (measured to center of bar group) Modulus of elasticity of bar, E_b = 29000 ksi

Bar strain calculations

Assumed rock strain = 0.003

Location	No. of bar groups, N_{BG}	Dist. to neutral axis	ε (Tension)	Tension per bar, T_B	$T_L = N_{BG} \times T_B$	Mn Contribution
1	0	131.78	0.0069	332.0	0.0	0.0
2	2	127.84	0.0067	332.0	664.0	7074.1
3	0	116.39	0.0061	332.0	0.0	0.0
4	0	98.56	0.0052	332.0	0.0	0.0
5	2	76.09	0.0040	302.9	605.8	3841.5
6	0	51.18	0.0027	203.8	0.0	0.0
7	2	26.28	0.0014	104.6	209.2	458.1
8	0	3.81	0.0002	15.2	0.0	0.0
9	0	-14.02	0.0000	0.0	0.0	0.0
10	2	-25.47	0.0000	0.0	0.0	0.0
11	0	-29.42	0.0000	0.0	0.0	0.0
12	0	---	---	---	---	---
13	0	---	---	---	---	---
14	0	---	---	---	---	---
15	0	---	---	---	---	---
16	0	---	---	---	---	---
17	0	---	---	---	---	---
18	0	---	---	---	---	---
19	0	---	---	---	---	---
20	0	---	---	---	---	---
21	0	---	---	---	---	---
22	0	---	---	---	---	---
23	0	---	---	---	---	---
24	0	---	---	---	---	---
25	0	---	---	---	---	---
26	0	---	---	---	---	---
27	0	---	---	---	---	---
28	0	---	---	---	---	---
29	0	---	---	---	---	---
30	0	---	---	---	---	---
31	0	---	---	---	---	---

Determination of bar contribution to ultimate moment capacity

Location	No. of bar groups, N_{BG}	ε (C)	Comp. per bar, C_B	$C_L = N_{BG} \times C_B$	Mn Contribution	Area Occupied by Bar
1	0	0.0000	0.0	0.0	0.0	- - -
2	2	0.0000	0.0	0.0	0.0	- - -
3	0	0.0000	0.0	0.0	0.0	- - -
4	0	0.0000	0.0	0.0	0.0	- - -
5	2	0.0000	0.0	0.0	0.0	- - -
6	0	0.0000	0.0	0.0	0.0	- - -
7	2	0.0000	0.0	0.0	0.0	- - -
8	0	0.0000	0.0	0.0	0.0	- - -
9	0	-0.0007	-55.8	0.0	0.0	28.27
10	2	-0.0013	-101.4	0.0	0.0	28.27
11	0	-0.0016	-117.1	0.0	0.0	28.27
12	0	- - -	- - -	- - -	- - -	- - -
13	0	- - -	- - -	- - -	- - -	- - -
14	0	- - -	- - -	- - -	- - -	- - -
15	0	- - -	- - -	- - -	- - -	- - -
16	0	- - -	- - -	- - -	- - -	- - -
17	0	- - -	- - -	- - -	- - -	- - -
18	0	- - -	- - -	- - -	- - -	- - -
19	0	- - -	- - -	- - -	- - -	- - -
20	0	- - -	- - -	- - -	- - -	- - -
21	0	- - -	- - -	- - -	- - -	- - -
22	0	- - -	- - -	- - -	- - -	- - -
23	0	- - -	- - -	- - -	- - -	- - -
24	0	- - -	- - -	- - -	- - -	- - -
25	0	- - -	- - -	- - -	- - -	- - -
26	0	- - -	- - -	- - -	- - -	- - -
27	0	- - -	- - -	- - -	- - -	- - -
28	0	- - -	- - -	- - -	- - -	- - -
29	0	- - -	- - -	- - -	- - -	- - -
30	0	- - -	- - -	- - -	- - -	- - -
31	0	- - -	- - -	- - -	- - -	- - -

$M_n = \Sigma$ (Load in bar groups x bar group distance to N.A.) = **11373.7** ft-kips

$M_u = \phi M_n = 0.75 \times M_n =$ **8530.3** ft-kips

Bar yield strength = **332.020** kips

Rock Anchored Foundation Structural and Overturning Checks

Beam Shear, Tension Side - Wind into Side

b =	216.00	in	(Equal to width of mat)
d=	31	in	
f'c=	5000	psi	
Vu=	238.7	kips	
ϕ=	0.85		
ϕVc=	804.9	kips	
% Cap=	29.7%	OK	

Beam Shear, Compression Side - Wind into Side

b =	216.0	in	(Equal to width of mat)
d=	43	in	
f'c=	5000	psi	
Vu=	667.7	kips	(SC, adjusted for overall foundation % Capacity and phi)
ϕ=	0.85		
ϕVc=	1116.5	kips	
% Cap=	59.8%	OK	

Punching Shear, Tension Side - Wind into Side

b =	94	in	(Critical section at anchor location)
d=	31	in	
f'c=	5000	psi	
Vu=	119.3	kips	
ϕ=	0.85		
ϕVc=	700.6	kips	
% Cap=	6.3%	OK	(Adjusted for actual rock bolt load)

Internal Pad Bending - Wind into Side

Moment at face of pier, Mu =	2161.7	ft-k	Load factor = 1
Fact. Nom. moment cap, ϕMn =	5601	ft-k	From PJF Mat or Spread Footing Spreadsheet or other (spColumn, etc)
% Capacity =	38.6%	OK	

Overturning / Stability - Worst case assumed to be wind into the side

Rock anchor proof load, PL =	259	kips	(Assumed to be ultimate anchor capacity)
# of anchors in Line 1, N1 =	4		
Line 1 distance to rotation pt, d1 =	15.375	feet	
# of anchors in Line 2, N2 =	0		(Combined anchors on either side of foundation centerline)
Line 2 distance to rotation pt, d2 =	0	feet	
Foundation / pole / soil wt, W =	271.59	kips	
Distance to rotation pt, dw =	9	feet	
Foundation actual OTM, Mo =	7236.5	ft-k	(At bottom of foundation)
Overturning resistance, Mr =	18373	ft-k	(N1 x d1 x PL + N2 x d2 x [d2/d1 x PL] + W x dw)
% Cap = Mo / ϕMr =	39.4%	OK	ϕ = 1 (Defaults: 0.5 if TIA-F; 1 if TIA-G)

Note - Overturning % Cap conservative due to:

1) Line of anchors closest to point of overturning not included in calculation
2) Ultimate / maximum anchor capacity likely greater than proof load applied to anchor during installation