Robinson+Cole

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July 18, 2014

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

Re: **Notice of Exempt Modification – Facility Modification**
56 Norfield Road, Weston, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) antennas at the 150-foot level of the existing 190-foot tower at 56 Norfield Road in Weston, Connecticut (the "Property"). The tower is owned by Crown Castle. The Council approved Cellco's use of this tower in 2000. Cellco now intends to modify its facility by adding three (3) model BXA-171063-12CF, 2100 MHz antennas, for a total of fifteen (15) antennas all at the same 150-foot level on the tower. Cellco also intends to install three (3) remote radio heads ("RRHs") behind its 2100 MHz antennas and one (1) HYBRIFLEX™ antenna cable. Included in Attachment 1 are specifications for Cellco's replacement antennas, RRHs and HYBRIFLEX™ cable.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Gayle Weinstein, First Selectwoman for the Town of Weston. The Town of Weston is the owner of the Property.

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

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1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's new antennas and RRHs will be installed at a centerline height of 150 feet on the existing 190-foot tower.

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

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

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

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

6. The tower and its foundation can support Cellco's proposed modifications. (*See* Structural Analysis Report included in Attachment 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

Enclosures
Copy to:
Gayle Weinstein, Weston First Selectwoman
Sandy M. Carter

ATTACHMENT 1

BXA-171063-12CF-EDIN-X

X-Pol | FET Panel | 63° | 19.0 dBi

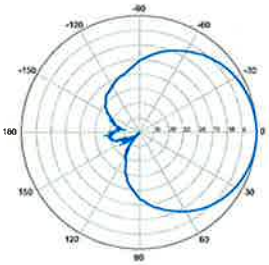
Replace "X" with desired electrical downtilt.

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

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

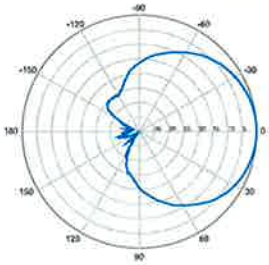
Mounting Options	Part Number	Fits Pipe Diameter	Weight
2-Point Mounting Bracket Kit	26799997	50-102 mm 2.0-4.0 in	2.3 kg 5 lbs
2-Point Mounting & Downtilt Bracket Kit	26799999	50-102 mm 2.0-4.0 in	3.6 kg 8 lbs
Concealment Configurations	For concealment configurations, order BXA-171063-12CF-EDIN-X-FP		

BXA-171063-12CF-EDIN-X



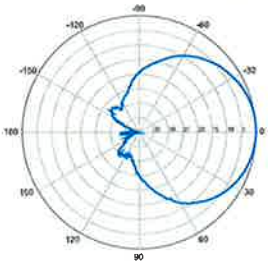
Horizontal | 1710-1880 MHz

BXA-171063-12CF-EDIN-X



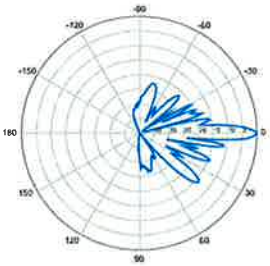
Horizontal | 1850-1990 MHz

BXA-171063-12CF-EDIN-X



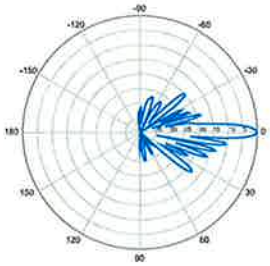
Horizontal | 1920-2170 MHz

BXA-171063-12CF-EDIN-0



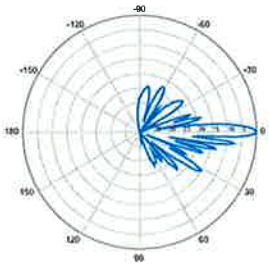
0° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-0



0° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-0

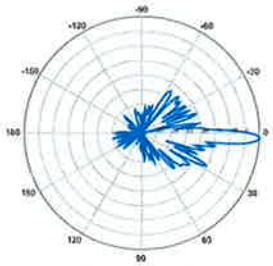


0° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-X

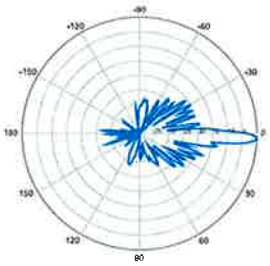
X-Pol | FET Panel | 63° | 19.0 dBi

BXA-171063-12CF-EDIN-2



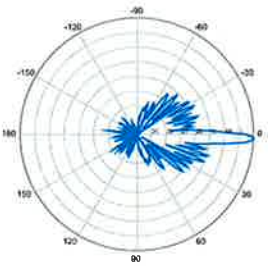
2° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-2



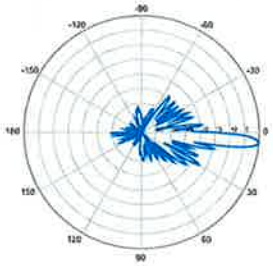
2° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-2



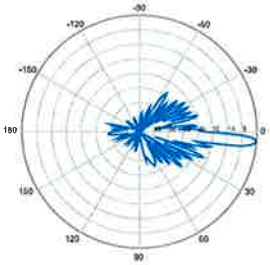
2° | Vertical | 1920-2170 MHz

BXA-171063-12CF-EDIN-5



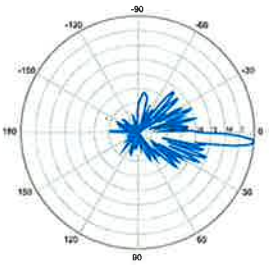
5° | Vertical | 1710-1880 MHz

BXA-171063-12CF-EDIN-5



5° | Vertical | 1850-1990 MHz

BXA-171063-12CF-EDIN-5

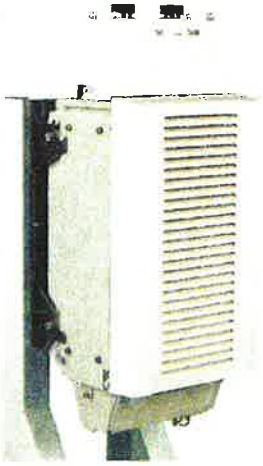


5° | Vertical | 1920-2170 MHz

Alcatel-Lucent RRH2x40-AWS

REMOTE RADIO HEAD

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



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

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

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

Fast, low-cost installation and deployment

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

Excellent RF performance

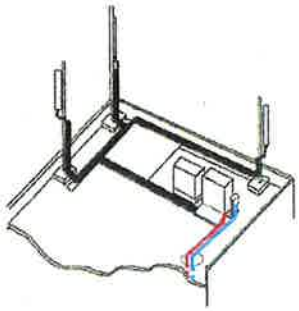
Because of its small size and weight, the Alcatel-Lucent RRH2x40-AWS can be installed close to the antenna. Operators can therefore locate the Alcatel-Lucent RRH2x40-AWS where RF engineering is deemed ideal, minimizing trade-offs between available sites and RF optimum sites. The RF feeder cost and installation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

Features

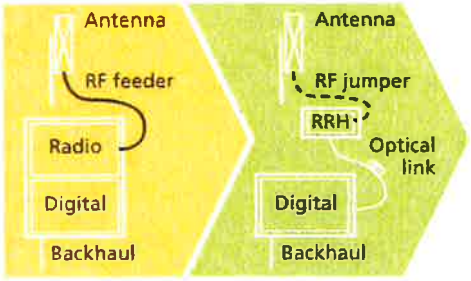
- Zero-footprint deployment
- Easy installation, with a lightweight unit can be carried and set up by one person
- Optimized RF power, with flexible site selection and elimination of a TMA
- Convection-cooled (fanless)
- Noise-free
- Best-in-class power efficiency, with significantly reduced energy consumption

Benefits

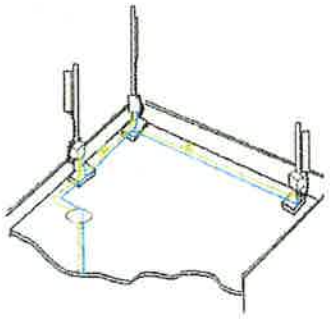
- Leverages existing real estate with lower site costs
- Reduces installation costs, with fewer installation materials and simplified logistics
- Decreases power costs and minimizes environmental impacts, with the potential for eco-sustainable power options
- Improves RF performance and adds flexibility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



Macro



RRH for space-constrained cell sites



Distributed

Technical specifications

Physical dimensions

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

Power

- Power supply: -48VDC

Operating environment

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

RF characteristics

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

Optical characteristics

Type/number of fibers

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

Optical fiber length

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

Digital Ports and Alarms

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

Alcatel·Lucent

Product Data Sheet HB158-1-08U8-S8J18

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

Product Description

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

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

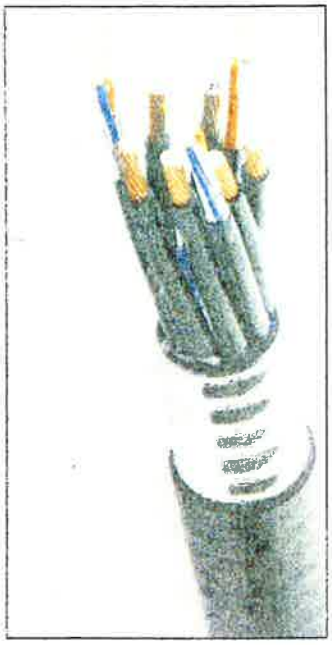


Figure 1: HYBRIFLEX Series

Features/Benefits

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

Technical Specifications

Outer Conductor Armor	Corrugated Aluminum	[mm (in)]	46.5 (1.83)
Jacket	Polyethylene, PE	[mm (in)]	50.3 (1.98)
UV-Protection	Individual and External Jacket		Yes
Weight, Approximate		[kg/m (lb/ft)]	1.9 (1.30)
Minimum Bending Radius, Single Bending		[mm (in)]	200 (8)
Minimum Bending Radius, Repeated Bending		[mm (in)]	500 (20)
Recommended/Maximum Clamp Spacing		[m (ft)]	1.0 / 1.2 (3.25 / 4.0)
DC-Resistance Outer Conductor Armor		[Ω/km (Ω/1000ft)]	068 (0.205)
DC-Resistance Power Cable, 8.4mm²(8AWG)		[Ω/km (Ω/1000ft)]	2.1 (0.307)
Version			Single-mode OM3
Quantity, Fiber Count			16 (8 pairs)
Core/Clad		[µm]	50/125
Primary Coating (Acrylate)		[µm]	245
Buffer Diameter, Nominal		[µm]	900
Secondary Protection, Jacket, Nominal		[mm (in)]	2.0 (0.08)
Minimum Bending Radius		[mm (in)]	104 (4.1)
Insertion Loss @ wavelength 850nm		dB/km	3.0
Insertion Loss @ wavelength 1310nm		dB/km	1.0
Standards (Meets or exceeds)			UL94-V0, UL1666 RoHS Compliant
Size (Power)		[mm² (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm² (AWG)]	0.8 (18)
Quantity, Wire Count (Alarm)			4 (2 pairs)
Type			UV protected
Strands			19
Primary Jacket Diameter, Nominal		[mm (in)]	6.8 (0.27)
Standards (Meets or exceeds)			NFPA 130, ICEA S-95-658 UL Type XHHW-2, UL 44 UL-LS Limited Smoke, UL VW-1 IEEE-383 (1974), IEEE1202/FT4 RoHS Compliant
Installation Temperature		[°C (°F)]	-40 to +65 (-40 to149)
Operation Temperature		[°C (°F)]	-40 to +65 (-40 to149)

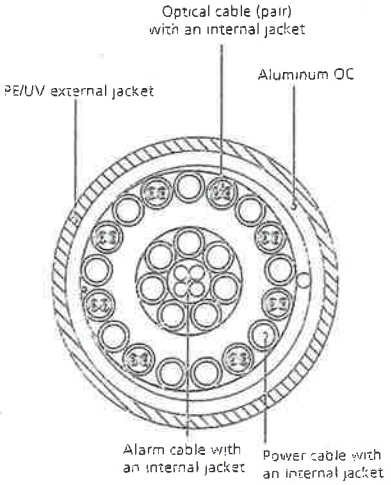


Figure 2: Construction Detail

- This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Weston								
Tower Height: 190'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Town Fire Dept	1	200	121	0.0049	34	0.2000	2.46%	
*Town Fire Dept	1	200	125	0.0046	454	0.3027	1.52%	
*Town of Weston	1	200	110	0.0059	46	0.2000	2.97%	
*EMS	1	200	110	0.0059	11	0.2000	2.97%	
*Town of Weston			195	0.0089	455	0.3033	2.93%	
*Sprint CDMA/LTE	2	693	195	0.0131	1930	1.0000	1.31%	
*Sprint CDMA/LTE	1	390	195	0.0037	850	0.5667	0.65%	
*AT&T UMTS	1	500	160	0.0070	880	0.5867	1.20%	
*AT&T UMTS	1	500	160	0.0070	1900	1.0000	0.70%	
*AT&T LTE	1	500	160	0.0070	734	0.4893	1.44%	
*AT&T GSM	3	296	160	0.0125	880	0.5867	2.13%	
*T-Mobile LTE	2	24	170	0.0006	2100	1.0000	0.06%	
*T-Mobile GSM/UMTS	2	12	170	0.0003	1950	1.0000	0.03%	
*T-Mobile UMTS	2	12	170	0.0003	2100	1.0000	0.03%	
Verizon	**15**	**406**	**150**	**0.0973**	**1970**	**1.0000**	**9.73%**	
Verizon	**9**	**384**	**150**	**0.0552**	**869**	**0.5793**	**9.53%**	
Verizon	**1**	**1750**	**150**	**0.0280**	**2145**	**1.0000**	**2.80%**	
Verizon	**1**	**672**	**150**	**0.0107**	**698**	**0.4973**	**2.16%**	
								44.6%
* Source: Siting Council								

ATTACHMENT 3

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **December 27, 2013**

Andrew Bazinet
Crown Castle
46 Broadway
Albany, NY 12204

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	829046
	Crown Castle Site Name:	Weston/ Rt-57/ Norfield R
	Crown Castle JDE Job Number:	246095
	Crown Castle Work Order Number:	693821
	Crown Castle Application Number:	200494 Rev. 1
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-0787 R4
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 Andrew Bazinet,

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 604890, in accordance with application 200494, revision 1.

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

LC4.7: Existing + Reserved + Proposed Equipment w/ Proposed Modifications **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The structural analysis was performed for this tower in accordance with the requirements the 2005 Connecticut State Building Code of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

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

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:

John J. Woolley, E.I.
Structural Designer

STATE OF CONNECTICUT
JOSEPH PACHICARAH JACOBS
NO. PEN.22781
LICENSED
PROFESSIONAL ENGINEER

tnxTower Report - version 6.1.3.1

DEC 3 0 2013

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 600 • Columbus, Ohio 43215-3708

Date: **December 27, 2013**

Andrew Bazinet
Crown Castle
46 Broadway
Albany, NY 12204

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

Subject: **Structural Analysis Report**

Carrier Designation:	***Verizon Wireless* Co-Locate**	
	Carrier Site Number:	N/A
	Carrier Site Name:	N/A
Crown Castle Designation:	**Crown Castle BU Number:**	829046
	Crown Castle Site Name:	Weston/ Rt-57/ Norfield R
	Crown Castle JDE Job Number:	246095
	Crown Castle Work Order Number:	693821
	Crown Castle Application Number:	200494 Rev. 1
Engineering Firm Designation:	**Paul J Ford and Company Project Number:**	37513-0787 R4
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 Andrew Bazinet,

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 604890, in accordance with application 200494, revision 1.

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

LC4.7: Existing + Reserved + Proposed Equipment w/ Proposed Modifications **Sufficient Capacity**
Note: See Table I and Table II for the proposed and existing/reserved loading, respectively.

The structural analysis was performed for this tower in accordance with the requirements the 2005 Connecticut State Building Code of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

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

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:

John J. Woolley, E.I.
Structural Designer

tnxTower Report - version 6.1.3.1

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

The structural analysis was performed for this tower in accordance with the requirements the 2005 Connecticut State Building Code of TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures using a fastest mile wind speed of 85 mph with no ice, 37.6 mph with 0.75 inch ice thickness and 50 mph under service loads.

Table 1 - Proposed Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)	Note
151.0	151.0	3	alcatel lucent	RRH2X40-AWS	-	-	-
		1	tower mounts	Pipe Mount [PM 601-3]			
150.0	150.0	3	antel	BXA-171063-12CF-EDIN-X w/ Mount Pipe	1	1-5/8	-
		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
190.0	197.0	4	decibel	DB636-A	5	1-5/8	1
		1	rfs celwave	PD128-1			
	190.0	6	rfs celwave	APXVSPP18-C-A20 w/ Mount Pipe	3	1-1/4	2
		1	tower mounts	Platform Mount [LP 403-1]	-	-	1
188.0	188.0	3	alcatel lucent	1900MHz RRH	-	-	2
		3	alcatel lucent	800MHZ RRH			
		1	tower mounts	Side Arm Mount [SO 102-3]			
180.0	180.0	1	tower mounts	Platform Mount [LP 403-1]	-	-	1
170.0	170.0	9	ericsson	AIR 21 w/ Mount Pipe	24	1-5/8	1
		3	ericsson	AIR 33 w/ Mount Pipe			
		12	rfs celwave	ATMAA1412D-1A20			
		1	tower mounts	Platform Mount [LP 405-1]			
160.0	160.0	6	ericsson	RRUS-11	1 2 12	3/4 7/8 1-5/8	1
		6	powerwave technologies	7770.00 w/ Mount Pipe			
		6	powerwave technologies	LGP21401			
		3	powerwave technologies	P65-16-XLH-RR w/ Mount Pipe			
		3	powerwave technologies	TT19-08BP111-001			
		1	raycap	DC6-48-60-18-8F			
		1	tower mounts	Platform Mount [LP 403-1]			

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	2	andrew	LNX-6514DS-T4M w/ Mount Pipe	12	1-5/8	1
		2	antel	LPA-80080/6CF w/ Mount Pipe			
		4	decibel	DB846F65ZAXY w/ Mount Pipe			
		1	powerwave technologies	P65-16-XL-R w/ Mount Pipe			
		6	rfs celwave	FD9R6004/2C-3L			
		3	rymsa wireless	MG D3-800Tx w/ Mount Pipe			
		1	tower mounts	Platform Mount [LP 403-1]			
125.0	130.0	1	rfs celwave	PD128-1	2	7/8	1
		1	rfs celwave	PD201-1			
	125.0	1	tower mounts	Side Arm Mount [SO 701-3]			
110.0	115.0	2	rfs celwave	PD128-1	2	7/8	1
	110.0	1	tower mounts	Side Arm Mount [SO 701-3]			
95.0	100.0	2	rfs celwave	PD128-1	2	7/8	1
	95.0	1	tower mounts	Side Arm Mount [SO 701-3]			
80.0	85.0	1	decibel	DB222	2	7/8	1
		1	rfs celwave	PD128-1			
	80.0	1	tower mounts	Side Arm Mount [SO 701-3]			
70.0	70.0	1	andrew	HP4-102	1	1-5/8	1
		1	tower mounts	Pipe Mount [PM 601-1]			

Notes:
1) Existing Equipment
2) Reserved Equipment

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	3673725	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-TOWER REINFORCEMENT DESIGN/DRAWINGS/DATA	PJF, 37513-0787 BP, 4/15/2013	3801440	CCISITES

3.1) Analysis Method

tnxTower (version 6.1.3.1), 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) Monopole will be reinforced in conformance with the referenced proposed modification drawings.
6) The rock anchors have been analyzed assuming reinforced concrete-type action in the interaction between the rock anchors and the rock.
7) 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.

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	-3.403	1166.570	8.6	Pass
L2	180 - 160	Pole	P36x.375	2	-11.371	1325.678	30.9	Pass
L3	160 - 140	Pole	42" x 0.375"	3	-20.303	1484.549	63.9	Pass
L4	140 - 120	Pole	P48x3/8	4	-25.525	1643.282	89.4	Pass
L5	120 - 113.33	Pole	P54x3/8	5	-27.369	1801.923	83.7	Pass
L6	113.33 - 103	Pole	RPS 54" x 0.49054"	6	-31.118	2350.759	78.3	Pass
L7	103 - 100	Pole	RPS 54" x 0.49054"	7	-32.152	2350.759	82.5	Pass
L8	100 - 85.5	Pole	RPS 60" x 0.47803"	8	-37.698	2493.470	87.8	Pass
L9	85.5 - 84	Pole	RPS 60" x 0.55603"	9	-38.337	2896.062	77.4	Pass
L10	84 - 80	Pole	RPS 60" x 0.50217"	10	-39.919	2620.118	90.3	Pass
L11	80 - 60	Pole	RPS 60" x 0.57817"	11	-49.179	3211.717	95.1	Pass
L12	60 - 58.5	Pole	RPS 60" x 0.70417"	12	-49.993	3764.312	75.5	Pass
L13	58.5 - 47.25	Pole	P60x5/8	13	-55.385	3682.439	95.6	Pass
L14	47.25 - 40	Pole	RPS 60" x 0.76962"	14	-59.637	4113.078	84.3	Pass
L15	40 - 32.25	Pole	RPS 60" x 0.76962"	15	-64.183	4113.078	90.9	Pass
L16	32.25 - 29.75	Pole	RPS 60" x 0.96202"	16	-65.883	5123.199	75.1	Pass
L17	29.75 - 20	Pole	RPS 60" x 0.81453"	17	-71.941	4346.166	96.2	Pass
L18	20 - 4.25	Pole	RPS 60" x 0.94201"	18	-82.813	5311.885	90.0	Pass
L19	4.25 - 0	Pole	RPS 60" x 1.08084"	19	-86.035	6074.014	81.7	Pass
							Summary	
						Pole (L17)	96.2	Pass
						Rating =	96.2	Pass

Table 5 - Tower Component Stresses vs. Capacity

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	89.5	Pass
1	Base Plate	0	72.8	Pass
1	Base Foundation	0	78.1	Pass
1	Flange Connection	20	75.5	Pass
1	Flange Connection	40	79.0	Pass
1	Flange Connection	60	74.7	Pass
1	Flange Connection	80	72.1	Pass
1	Flange Connection	100	64.9	Pass
1	Flange Connection	120	78.8	Pass
1	Flange Connection	140	56.0	Pass
1	Flange Connection	160	26.9	Pass
1	Flange Connection	180	7.4	Pass

Structure Rating (max from all components) =	96.2%

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

4.1) Recommendations

Reinforce the pole as shown in PJF job 37513-0787 BP, dated 4/15/2013.

APPENDIX A

TNXTOWER OUTPUT

Tower Input Data

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

1) Tower is located in Fairfield County, Connecticut.
2) Basic wind speed of 85 mph.
3) Nominal ice thickness of 0.750 in.
4) Ice density of 56.000 pcf.
5) A wind speed of 28 mph is used in combination with ice.
6) Temperature drop of 50.000 °F.
7) Deflections calculated using a wind speed of 50 mph.
8) A non-linear (P-delta) analysis was used.
9) Pressures are calculated at each section.
10) Stress ratio used in pole design is 1.333.
11) Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Treat Feedline Bundles As Cylinder
Consider Moments - Horizontals	Assume Legs Pinned	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Calculate Redundant Bracing Forces
Use Moment Magnification	√ Use Clear Spans For Wind Area	Ignore Redundant Members in FEA
√ Use Code Stress Ratios	√ Use Clear Spans For KL/r	SR Leg Bolts Resist Compression
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	All Leg Panels Have Same Allowable
Escalate Ice	√ Bypass Mast Stability Checks	Offset Girt At Foundation
Always Use Max Kz	√ Use Azimuth Dish Coefficients	√ Consider Feedline Torque
Use Special Wind Profile	√ Project Wind Area of Appurt.	Include Angle Block Shear Check
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Poles
Leg Bolts Are At Top Of Section	SR Members Have Cut Ends	√ Include Shear-Torsion Interaction
Secondary Horizontal Braces Leg	Sort Capacity Reports By Component	Always Use Sub-Critical Flow
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Use Top Mounted Sockets
Add IBC .6D+W Combination	Use TIA-222-G Tension Splice	
	Capacity Exemption	

Pole Section Geometry

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L1	190.000-180.000	10.000	30" x 0.375"	A53-B-42 (42 ksi)	5.000
L2	175.000-155.000	20.000	P36x.375	A53-B-42 (42 ksi)	5.000
L3	155.000-135.000	20.000	42" x 0.375"	A53-B-42 (42 ksi)	5.000
L4	135.000-115.000	20.000	P48x3/8	A53-B-42 (42 ksi)	5.000
L5	115.000-108.330	6.670	P54x3/8	A53-B-42 (42 ksi)	5.000
L6	108.330-98.000	10.330	RPS 54" x 0.49054"	Reinf 38.43 ksi (38 ksi)	5.000
L7	98.000-95.000	3.000	RPS 54" x 0.49054"	Reinf 38.43 ksi (38 ksi)	5.000
L8	95.000-80.500	14.500	RPS 60" x 0.47803"	Reinf 39.13 ksi (39 ksi)	5.000

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L9	80.500-79.000	1.500	RPS 60" x 0.55603"	Reinf 36.97 ksi (37 ksi)	5.000
L10	79.000-75.000	4.000	RPS 60" x 0.50217"	Reinf 38.50 ksi (39 ksi)	5.000
L11	75.000-55.000	20.000	RPS 60" x 0.57817"	Reinf 39.86 ksi (40 ksi)	5.000
L12	55.000-53.500	1.500	RPS 60" x 0.70417"	Reinf 35.88 ksi (36 ksi)	5.000
L13	53.500-42.250	11.250	P60x5/8	A53-B-42 (42 ksi)	5.000
L14	42.250-35.000	7.250	RPS 60" x 0.76962"	Reinf 35.91 ksi (36 ksi)	5.000
L15	35.000-27.250	7.750	RPS 60" x 0.76962"	Reinf 35.91 ksi (36 ksi)	5.000
L16	27.250-24.750	2.500	RPS 60" x 0.96202"	Reinf 35.90 ksi (36 ksi)	5.000
L17	24.750-15.000	9.750	RPS 60" x 0.81453"	Reinf 35.88 ksi (36 ksi)	5.000
L18	15.000-0.750	15.750	RPS 60" x 0.94201"	Reinf 38.00 ksi (38 ksi)	5.000
L19	0.750-3.500	4.250	RPS 60" x 1.08084"	Reinf 37.96 ksi (38 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 190.000-180.000				1	1	1		
L2 180.000-160.000				1	1	1		
L3 160.000-140.000				1	1	1		
L4 140.000-120.000				1	1	1		
L5 120.000-113.330				1	1	1		
L6 113.330-103.000				1	1	1		
L7 103.000-100.000				1	1	1		
L8 100.000-85.500				1	1	1		
L9 85.500-84.000				1	1	1		
L10 84.000-80.000				1	1	1		
L11 80.000-60.000				1	1	1		
L12 60.000-58.500				1	1	1		
L13 58.500-47.250				1	1	1		
L14 47.250-40.000				1	1	1		
L15 40.000-				1	1	1		

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
32.250								
L16 32.250-29.750				1	1	1		
L17 29.750-20.000				1	1	1		
L18 20.000-4.250				1	1	1		
L19 4.250-0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
LDF7-50A(1-5/8")	C	No	Inside Pole	190.000 - 0.000	3	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
TYPE I(1-1/4")	C	No	Inside Pole	190.000 - 0.000	3	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	180.000 - 0.000	12	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	170.000 - 0.000	24	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	CaAa (Out Of Face)	160.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.003
LDF5-50A(7/8")	C	No	CaAa (Out Of Face)	160.000 - 0.000	1	No Ice	0.109	0.000
						1/2" Ice	0.209	0.001
						1" Ice	0.309	0.003
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(3/4")	C	No	CaAa (Out Of Face)	160.000 - 0.000	1	No Ice	0.000	0.000
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.002
LDF7-50A(1-5/8")	C	No	Inside Pole	150.000 - 0.000	12	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	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	110.000 - 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	95.000 - 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	80.000 - 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	Inside Pole	70.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
						1" Ice	0.000	0.001
***								
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

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight klf
						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
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
Aero MP3-06	C	No	CaAa (Out Of Face)	25.000 - 15.000	2	No Ice	0.434	0.029
						1/2" Ice	0.545	0.031
						1" Ice	0.657	0.033
Aero MP3-05	C	No	CaAa (Out Of Face)	45.000 - 35.000	2	No Ice	0.348	0.019
						1/2" Ice	0.400	0.021
						1" Ice	0.657	0.023
Aero MP3-06	C	No	CaAa (Out Of Face)	65.000 - 55.000	1	No Ice	0.434	0.029
						1/2" Ice	0.545	0.031
						1" Ice	0.657	0.033
Aero MP3-03	C	No	CaAa (Out Of Face)	86.000 - 75.000	1	No Ice	0.262	0.010
						1/2" Ice	0.374	0.011
						1" Ice	0.485	0.013
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

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	0.043
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	0.000	0.481
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	10.100	1.005
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	10.100	1.120
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	3.368	0.377
L6	113.330-103.000	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	6.800	0.588
L7	103.000-100.000	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	2.015	0.171
L8	100.000-85.500	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	9.870	0.840
L9	85.500-84.000	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	1.401	0.102
L10	84.000-80.000	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	3.737	0.271
L11	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

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C	0.000	0.000	0.000	16.917	1.371
L12	60.000-58.500	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	1.659	0.132
L13	58.500-47.250	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	8.149	0.768
L14	47.250-40.000	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	8.650	0.622
L15	40.000-32.250	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	9.006	0.652
L16	32.250-29.750	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	1.783	0.148
L17	29.750-20.000	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	10.257	0.866
L18	20.000-4.250	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	14.537	1.222
L19	4.250-0.000	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	3.032	0.252

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	0.750	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	0.043
L2	180.000-160.000	A	0.750	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	0.481
L3	160.000-140.000	A	0.750	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	19.100	1.723
L4	140.000-120.000	A	0.750	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	19.100	1.838
L5	120.000-113.330	A	0.750	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	6.370	0.616
L6	113.330-103.000	A	0.750	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	13.032	0.959
L7	103.000-100.000	A	0.750	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	3.865	0.279
L8	100.000-85.500	A	0.750	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	18.895	1.361
L9	85.500-84.000	A	0.750	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	2.576	0.158
L10	84.000-80.000	A	0.750	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	6.870	0.423
L11	80.000-60.000	A	0.750	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	30.917	2.114
L12	60.000-58.500	A	0.750	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	2.834	0.190
L13	58.500-47.250	A	0.750	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	14.587	1.182
L14	47.250-40.000	A	0.750	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	14.926	0.912
L15	40.000-32.250	A	0.750	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	15.591	0.959
L16	32.250-29.750	A	0.750	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	3.325	0.238
L17	29.750-20.000	A	0.750	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	17.103	1.246
L18	20.000-4.250	A	0.750	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	25.083	1.817
L19	4.250-0.000	A	0.750	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	5.653	0.404

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	0.000	0.000	0.000	0.000
L3	160.000-140.000	-0.573	0.331	-0.948	0.547
L4	140.000-120.000	-0.582	0.336	-0.977	0.564
L5	120.000-113.330	-0.590	0.341	-1.000	0.578
L6	113.330-103.000	-0.746	0.431	-1.253	0.723
L7	103.000-100.000	-0.759	0.438	-1.274	0.735
L8	100.000-85.500	-0.778	0.449	-1.317	0.760
L9	85.500-84.000	-1.022	0.590	-1.630	0.941
L10	84.000-80.000	-1.022	0.590	-1.630	0.941
L11	80.000-60.000	-0.940	0.543	-1.505	0.869
L12	60.000-58.500	-1.176	0.679	-1.750	1.010
L13	58.500-47.250	-0.822	0.475	-1.311	0.757
L14	47.250-40.000	-1.251	0.722	-1.861	1.075
L15	40.000-32.250	-1.225	0.707	-1.831	1.057
L16	32.250-29.750	-0.811	0.468	-1.338	0.773
L17	29.750-20.000	-1.129	0.652	-1.656	0.956
L18	20.000-4.250	-1.012	0.584	-1.540	0.889
L19	4.250-0.000	-0.811	0.468	-1.338	0.773

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
*****									
(2) DB636-A	A	From Leg	4.000 0.000 7.000	0.000	190.000	No Ice 1/2" Ice	2.776 3.961 5.163	2.776 3.961 5.163	0.030 0.051 0.079

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			
(2) DB636-A	B	From Leg	4.000 0.000 7.000	0.000	190.000	No Ice 1/2" Ice 1" Ice	2.776 3.961 5.163	2.776 3.961 5.163	0.030 0.051 0.079
PD128-1	C	From Leg	4.000 0.000 7.000	0.000	190.000	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
(2) APXVSPP18-C-A20 w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	70.000	190.000	No Ice 1/2" Ice 1" Ice	8.498 9.149 9.767	6.946 8.127 9.021	0.083 0.151 0.227
(2) APXVSPP18-C-A20 w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	45.000	190.000	No Ice 1/2" Ice 1" Ice	8.498 9.149 9.767	6.946 8.127 9.021	0.083 0.151 0.227
(2) APXVSPP18-C-A20 w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	60.000	190.000	No Ice 1/2" Ice 1" Ice	8.498 9.149 9.767	6.946 8.127 9.021	0.083 0.151 0.227
800MHZ RRH	A	From Leg	4.000 0.000 0.000	70.000	188.000	No Ice 1/2" Ice 1" Ice	2.490 2.706 2.931	2.068 2.271 2.481	0.053 0.074 0.098
800MHZ RRH	B	From Leg	4.000 0.000 0.000	45.000	188.000	No Ice 1/2" Ice 1" Ice	2.490 2.706 2.931	2.068 2.271 2.481	0.053 0.074 0.098
800MHZ RRH	C	From Leg	4.000 0.000 0.000	60.000	188.000	No Ice 1/2" Ice 1" Ice	2.490 2.706 2.931	2.068 2.271 2.481	0.053 0.074 0.098
1900MHz RRH	A	From Leg	4.000 0.000 0.000	70.000	188.000	No Ice 1/2" Ice 1" Ice	2.907 3.145 3.391	3.801 4.065 4.337	0.044 0.075 0.110
1900MHz RRH	B	From Leg	4.000 0.000 0.000	45.000	188.000	No Ice 1/2" Ice 1" Ice	2.907 3.145 3.391	3.801 4.065 4.337	0.044 0.075 0.110
1900MHz RRH	C	From Leg	4.000 0.000 0.000	60.000	188.000	No Ice 1/2" Ice 1" Ice	2.907 3.145 3.391	3.801 4.065 4.337	0.044 0.075 0.110
Platform Mount [LP 403-1]	C	None		0.000	190.000	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
Side Arm Mount [SO 102-3]	C	None		0.000	188.000	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
****									
Platform Mount [LP 403-1]	C	None		0.000	180.000	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
(4) 6' x 2" Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	180.000	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	180.000	No Ice 1/2" Ice	1.425 1.925 2.294	1.425 1.925 2.294	0.022 0.033 0.048

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
							1" Ice			
(4) 6' x 2" Mount Pipe	C	From Leg	4.000	0.000	180.000	No Ice	1.425	1.425	0.022	
			0.000			1/2" Ice	1.925	1.925	0.033	
			0.000			1" Ice	2.294	2.294	0.048	
***										
(3) AIR 21 w/ Mount Pipe	A	From Leg	4.000	0.000	170.000	No Ice	6.738	5.668	0.111	
			0.000			1/2" Ice	7.246	6.491	0.168	
			0.000			1" Ice	7.753	7.261	0.231	
(3) AIR 21 w/ Mount Pipe	B	From Leg	4.000	0.000	170.000	No Ice	6.738	5.668	0.111	
			0.000			1/2" Ice	7.246	6.491	0.168	
			0.000			1" Ice	7.753	7.261	0.231	
(3) AIR 21 w/ Mount Pipe	C	From Leg	4.000	0.000	170.000	No Ice	6.738	5.668	0.111	
			0.000			1/2" Ice	7.246	6.491	0.168	
			0.000			1" Ice	7.753	7.261	0.231	
AIR 33 w/ Mount Pipe	A	From Leg	4.000	0.000	170.000	No Ice	6.458	5.742	0.127	
			0.000			1/2" Ice	6.934	6.489	0.183	
			0.000			1" Ice	7.416	7.229	0.245	
AIR 33 w/ Mount Pipe	B	From Leg	4.000	0.000	170.000	No Ice	6.458	5.742	0.127	
			0.000			1/2" Ice	6.934	6.489	0.183	
			0.000			1" Ice	7.416	7.229	0.245	
AIR 33 w/ Mount Pipe	C	From Leg	4.000	0.000	170.000	No Ice	6.458	5.742	0.127	
			0.000			1/2" Ice	6.934	6.489	0.183	
			0.000			1" Ice	7.416	7.229	0.245	
(4) ATMAA1412D-1A20	A	From Leg	4.000	0.000	170.000	No Ice	1.167	0.467	0.013	
			0.000			1/2" Ice	1.314	0.575	0.021	
			0.000			1" Ice	1.469	0.691	0.030	
(4) ATMAA1412D-1A20	B	From Leg	4.000	0.000	170.000	No Ice	1.167	0.467	0.013	
			0.000			1/2" Ice	1.314	0.575	0.021	
			0.000			1" Ice	1.469	0.691	0.030	
(4) ATMAA1412D-1A20	C	From Leg	4.000	0.000	170.000	No Ice	1.167	0.467	0.013	
			0.000			1/2" Ice	1.314	0.575	0.021	
			0.000			1" Ice	1.469	0.691	0.030	
Platform Mount [LP 405-1]	C	None		0.000	170.000	No Ice	20.800	20.800	1.800	
						1/2" Ice	28.100	28.100	2.066	
						1" Ice	35.400	35.400	2.332	
***										
(2) 7770.00 w/ Mount Pipe	A	From Leg	4.000	0.000	160.000	No Ice	6.119	4.254	0.055	
			0.000			1/2" Ice	6.626	5.014	0.103	
			0.000			1" Ice	7.128	5.711	0.157	
(2) 7770.00 w/ Mount Pipe	B	From Leg	4.000	0.000	160.000	No Ice	6.119	4.254	0.055	
			0.000			1/2" Ice	6.626	5.014	0.103	
			0.000			1" Ice	7.128	5.711	0.157	
(2) 7770.00 w/ Mount Pipe	C	From Leg	4.000	0.000	160.000	No Ice	6.119	4.254	0.055	
			0.000			1/2" Ice	6.626	5.014	0.103	
			0.000			1" Ice	7.128	5.711	0.157	
TT19-08BP111-001	A	From Leg	4.000	0.000	160.000	No Ice	0.636	0.516	0.016	
			0.000			1/2" Ice	0.747	0.619	0.022	
			0.000			1" Ice	0.867	0.730	0.029	
TT19-08BP111-001	B	From Leg	4.000	0.000	160.000	No Ice	0.636	0.516	0.016	
			0.000			1/2"	0.747	0.619	0.022	

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.000			Ice	0.867	0.730	0.029
						1" Ice			
TT19-08BP111-001	C	From Leg	4.000	0.000	160.000	No Ice	0.636	0.516	0.016
			0.000			1/2"	0.747	0.619	0.022
			0.000			Ice	0.867	0.730	0.029
						1" Ice			
P65-16-XLH-RR w/ Mount Pipe	A	From Leg	4.000	0.000	160.000	No Ice	8.637	6.362	0.079
			0.000			1/2"	9.290	7.538	0.144
			0.000			Ice	9.910	8.427	0.218
						1" Ice			
P65-16-XLH-RR w/ Mount Pipe	B	From Leg	4.000	0.000	160.000	No Ice	8.637	6.362	0.079
			0.000			1/2"	9.290	7.538	0.144
			0.000			Ice	9.910	8.427	0.218
						1" Ice			
P65-16-XLH-RR w/ Mount Pipe	C	From Leg	4.000	0.000	160.000	No Ice	8.637	6.362	0.079
			0.000			1/2"	9.290	7.538	0.144
			0.000			Ice	9.910	8.427	0.218
						1" Ice			
(2) RRUS-11	A	From Leg	4.000	0.000	160.000	No Ice	3.249	1.373	0.048
			0.000			1/2"	3.491	1.551	0.068
			0.000			Ice	3.741	1.738	0.092
						1" Ice			
(2) RRUS-11	B	From Leg	4.000	0.000	160.000	No Ice	3.249	1.373	0.048
			0.000			1/2"	3.491	1.551	0.068
			0.000			Ice	3.741	1.738	0.092
						1" Ice			
(2) RRUS-11	C	From Leg	4.000	0.000	160.000	No Ice	3.249	1.373	0.048
			0.000			1/2"	3.491	1.551	0.068
			0.000			Ice	3.741	1.738	0.092
						1" Ice			
(2) LGP21401	A	From Leg	4.000	0.000	160.000	No Ice	1.288	0.233	0.014
			0.000			1/2"	1.445	0.313	0.021
			0.000			Ice	1.611	0.403	0.030
						1" Ice			
(2) LGP21401	B	From Leg	4.000	0.000	160.000	No Ice	1.288	0.233	0.014
			0.000			1/2"	1.445	0.313	0.021
			0.000			Ice	1.611	0.403	0.030
						1" Ice			
(2) LGP21401	C	From Leg	4.000	0.000	160.000	No Ice	1.288	0.233	0.014
			0.000			1/2"	1.445	0.313	0.021
			0.000			Ice	1.611	0.403	0.030
						1" Ice			
DC6-48-60-18-8F	C	From Leg	4.000	0.000	160.000	No Ice	2.567	2.567	0.019
			0.000			1/2"	2.798	2.798	0.041
			0.000			Ice	3.038	3.038	0.067
						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			
6' x 2" Mount Pipe	A	From Leg	4.000	0.000	160.000	No Ice	1.425	1.425	0.022
			0.000			1/2"	1.925	1.925	0.033
			0.000			Ice	2.294	2.294	0.048
						1" Ice			
(2) 6' x 2" Mount Pipe	B	From Leg	4.000	0.000	160.000	No Ice	1.425	1.425	0.022
			0.000			1/2"	1.925	1.925	0.033
			0.000			Ice	2.294	2.294	0.048
						1" Ice			
(2) 6' x 2" Mount Pipe	C	From Leg	4.000	0.000	160.000	No Ice	1.425	1.425	0.022
			0.000			1/2"	1.925	1.925	0.033
			0.000			Ice	2.294	2.294	0.048
						1" Ice			
***									
LNX-6514DS-T4M w/ Mount Pipe	A	From Leg	4.000	0.000	150.000	No Ice	8.449	6.885	0.056
			0.000			1/2"	9.044	7.951	0.124

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 1" Ice	9.631	8.809	0.199
LNX-6514DS-T4M w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	8.449 9.044 9.631	6.885 7.951 8.809	0.056 0.124 0.199
(2) DB846F65ZAXY w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	7.271 7.877 8.484	7.821 9.010 9.912	0.047 0.114 0.189
(2) DB846F65ZAXY w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	7.271 7.877 8.484	7.821 9.010 9.912	0.047 0.114 0.189
MG D3-800Tx w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	3.570 3.979 4.387	3.418 4.119 4.784	0.035 0.068 0.108
MG D3-800Tx w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	3.570 3.979 4.387	3.418 4.119 4.784	0.035 0.068 0.108
MG D3-800Tx w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	3.570 3.979 4.387	3.418 4.119 4.784	0.035 0.068 0.108
P65-16-XL-R w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	8.544 9.128 9.716	6.569 7.480 8.335	0.082 0.149 0.225
(2) LPA-80080/6CF w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	4.564 5.105 5.612	10.728 11.990 12.968	0.046 0.113 0.187
(2) FD9R6004/2C-3L	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	0.367 0.451 0.543	0.085 0.136 0.196	0.003 0.005 0.009
(2) FD9R6004/2C-3L	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	0.367 0.451 0.543	0.085 0.136 0.196	0.003 0.005 0.009
(2) FD9R6004/2C-3L	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	0.367 0.451 0.543	0.085 0.136 0.196	0.003 0.005 0.009
Platform Mount [LP 403-1]	C	None		0.000	150.000	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
BXA-171063-12CF-EDIN-X w/ Mount Pipe	A	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	5.029 5.583 6.103	5.289 6.459 7.348	0.041 0.087 0.140
BXA-171063-12CF-EDIN-X w/ Mount Pipe	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	5.029 5.583 6.103	5.289 6.459 7.348	0.041 0.087 0.140
DB-T1-6Z-8AB-0Z	B	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice 1" Ice	5.600 5.915 6.240	2.333 2.558 2.791	0.044 0.080 0.120
BXA-171063-12CF-EDIN-X w/ Mount Pipe	C	From Leg	4.000 0.000 0.000	0.000	150.000	No Ice 1/2" Ice	5.029 5.583 6.103	5.289 6.459 7.348	0.041 0.087 0.140

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			
***									
Pipe Mount [PM 601-3]	C	None		0.000	151.000	No Ice	4.390	4.390	0.195
						1/2" Ice	5.480	5.480	0.237
						1" Ice	6.570	6.570	0.280
RRH2X40-AWS	A	From Leg	0.500 0.000 0.000	0.000	151.000	No Ice	2.976	1.596	0.044
						1/2" Ice	3.236	1.824	0.063
						1" Ice	3.505	2.061	0.085
RRH2X40-AWS	B	From Leg	0.500 0.000 0.000	0.000	151.000	No Ice	2.976	1.596	0.044
						1/2" Ice	3.236	1.824	0.063
						1" Ice	3.505	2.061	0.085
RRH2X40-AWS	C	From Leg	0.500 0.000 0.000	0.000	151.000	No Ice	2.976	1.596	0.044
						1/2" Ice	3.236	1.824	0.063
						1" Ice	3.505	2.061	0.085
****									
PD128-1	A	From Leg	4.000 0.000 5.000	0.000	125.000	No Ice	1.277	1.277	0.013
						1/2" Ice	2.272	2.272	0.024
						1" Ice	3.282	3.282	0.041
PD201-1	C	From Leg	4.000 0.000 5.000	0.000	125.000	No Ice	0.628	0.628	0.004
						1/2" Ice	1.539	1.539	0.011
						1" Ice	2.467	2.467	0.023
Side Arm Mount [SO 701-3]	C	None		0.000	125.000	No Ice	2.830	2.830	0.195
						1/2" Ice	3.920	3.920	0.237
						1" Ice	5.010	5.010	0.279
***									
PD128-1	A	From Leg	4.000 0.000 5.000	0.000	110.000	No Ice	1.277	1.277	0.013
						1/2" Ice	2.272	2.272	0.024
						1" Ice	3.282	3.282	0.041
PD128-1	C	From Leg	4.000 0.000 5.000	0.000	110.000	No Ice	1.277	1.277	0.013
						1/2" Ice	2.272	2.272	0.024
						1" Ice	3.282	3.282	0.041
Side Arm Mount [SO 701-3]	C	None		0.000	110.000	No Ice	2.830	2.830	0.195
						1/2" Ice	3.920	3.920	0.237
						1" Ice	5.010	5.010	0.279
***									
PD128-1	A	From Leg	4.000 0.000 5.000	0.000	95.000	No Ice	1.277	1.277	0.013
						1/2" Ice	2.272	2.272	0.024
						1" Ice	3.282	3.282	0.041
PD128-1	C	From Leg	4.000 0.000 5.000	0.000	95.000	No Ice	1.277	1.277	0.013
						1/2" Ice	2.272	2.272	0.024
						1" Ice	3.282	3.282	0.041
Side Arm Mount [SO 701-3]	C	None		0.000	95.000	No Ice	2.830	2.830	0.195
						1/2" Ice	3.920	3.920	0.237
						1" Ice	5.010	5.010	0.279
***									
DB222	A	From Leg	4.000 0.000 5.000	0.000	80.000	No Ice	1.600	1.600	0.016
						1/2" Ice	2.880	2.880	0.021
						1" Ice	4.160	4.160	0.026
PD128-1	C	From Leg	4.000 0.000 5.000	0.000	80.000	No Ice	1.277	1.277	0.013
						1/2" Ice	2.272	2.272	0.024
						Ice	3.282	3.282	0.041

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
Side Arm Mount [SO 701-3]	C	None			0.000	80.000	1" Ice No Ice 1/2" Ice 1" Ice	2.830 3.920 5.010	2.830 3.920 5.010	0.195 0.237 0.279
****										
Pipe Mount [PM 601-1]	C	None			0.000	70.000	No Ice 1/2" Ice 1" Ice	3.000 3.740 4.480	0.900 1.120 1.340	0.065 0.079 0.093

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
HP4-102	A	Paraboloid w/Shroud (HP)	From Leg	1.000 0.000 0.000		0.000		70.000	4.000	No Ice 1/2" Ice 1" Ice	12.570 13.100 13.620	0.079 0.150 0.210

Tower Pressures - No Ice

G_H = 1.690

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	1.636	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	1.597	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	0.000
L3 160.000-140.000	150.000	1.541	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	10.100
L4 140.000-120.000	130.000	1.48	0.027	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	10.100
L5 120.000-113.330	116.665	1.434	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	3.368
L6 113.330-103.000	108.165	1.404	0.026	46.485	A	0.000	46.485	46.485	100.00	0.000	0.000
					B	0.000	46.485		100.00	0.000	0.000
					C	0.000	46.485		100.00	0.000	6.800
L7 103.000-100.000	101.500	1.379	0.025	13.500	A	0.000	13.500	13.500	100.00	0.000	0.000
					B	0.000	13.500		100.00	0.000	0.000
					C	0.000	13.500		100.00	0.000	2.015
L8 100.000-85.500	92.750	1.343	0.025	72.500	A	0.000	72.500	72.500	100.00	0.000	0.000
					B	0.000	72.500		100.00	0.000	0.000
					C	0.000	72.500		100.00	0.000	9.870
L9 85.500-84.000	84.750	1.309	0.024	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

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	7.500		100.00	0.000	1.401
L10 84.000-80.000	82.000	1.297	0.024	20.000	A	0.000	20.000	20.000	100.00	0.000	0.000
					B	0.000	20.000		100.00	0.000	0.000
					C	0.000	20.000		100.00	0.000	3.737
L11 80.000-60.000	70.000	1.24	0.023	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	16.917
L12 60.000-58.500	59.250	1.182	0.022	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	1.659
L13 58.500-47.250	52.875	1.144	0.021	56.250	A	0.000	56.250	56.250	100.00	0.000	0.000
					B	0.000	56.250		100.00	0.000	0.000
					C	0.000	56.250		100.00	0.000	8.149
L14 47.250-40.000	43.625	1.083	0.020	36.250	A	0.000	36.250	36.250	100.00	0.000	0.000
					B	0.000	36.250		100.00	0.000	0.000
					C	0.000	36.250		100.00	0.000	8.650
L15 40.000-32.250	36.125	1.026	0.019	38.750	A	0.000	38.750	38.750	100.00	0.000	0.000
					B	0.000	38.750		100.00	0.000	0.000
					C	0.000	38.750		100.00	0.000	9.006
L16 32.250-29.750	31.000	1	0.018	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	0.000	0.000
					C	0.000	12.500		100.00	0.000	1.783
L17 29.750-20.000	24.875	1	0.018	48.750	A	0.000	48.750	48.750	100.00	0.000	0.000
					B	0.000	48.750		100.00	0.000	0.000
					C	0.000	48.750		100.00	0.000	10.257
L18 20.000-4.250	12.125	1	0.018	78.750	A	0.000	78.750	78.750	100.00	0.000	0.000
					B	0.000	78.750		100.00	0.000	0.000
					C	0.000	78.750		100.00	0.000	14.537
L19 4.250-0.000	2.125	1	0.018	21.250	A	0.000	21.250	21.250	100.00	0.000	0.000
					B	0.000	21.250		100.00	0.000	0.000
					C	0.000	21.250		100.00	0.000	3.032

Tower Pressure - With Ice

G_H = 1.690

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	1.636	0.003	0.750	26.250	A	0.000	26.250	26.250	100.00	0.000	0.000
						B	0.000	26.250		100.00	0.000	0.000
						C	0.000	26.250		100.00	0.000	0.000
L2 180.000-160.000	170.000	1.597	0.003	0.750	62.500	A	0.000	62.500	62.500	100.00	0.000	0.000
						B	0.000	62.500		100.00	0.000	0.000
						C	0.000	62.500		100.00	0.000	0.000
L3 160.000-140.000	150.000	1.541	0.003	0.750	72.500	A	0.000	72.500	72.500	100.00	0.000	0.000
						B	0.000	72.500		100.00	0.000	0.000
						C	0.000	72.500		100.00	0.000	19.100
L4 140.000-120.000	130.000	1.48	0.003	0.750	82.500	A	0.000	82.500	82.500	100.00	0.000	0.000
						B	0.000	82.500		100.00	0.000	0.000
						C	0.000	82.500		100.00	0.000	19.100
L5 120.000-113.330	116.665	1.434	0.003	0.750	30.849	A	0.000	30.849	30.849	100.00	0.000	0.000
						B	0.000	30.849		100.00	0.000	0.000
						C	0.000	30.849		100.00	0.000	6.370
L6 113.330-103.000	108.165	1.404	0.003	0.750	47.776	A	0.000	47.776	47.776	100.00	0.000	0.000
						B	0.000	47.776		100.00	0.000	0.000
						C	0.000	47.776		100.00	0.000	13.032
L7 103.000-100.000	101.500	1.379	0.003	0.750	13.875	A	0.000	13.875	13.875	100.00	0.000	0.000
						B	0.000	13.875		100.00	0.000	0.000
						C	0.000	13.875		100.00	0.000	3.865
L8 100.000-85.500	92.750	1.343	0.003	0.750	74.313	A	0.000	74.313	74.313	100.00	0.000	0.000
						B	0.000	74.313		100.00	0.000	0.000
						C	0.000	74.313		100.00	0.000	18.895
L9 85.500-	84.750	1.309	0.003	0.750	7.688	A	0.000	7.688	7.688	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
84.000						B	0.000	7.688		100.00	0.000	0.000
						C	0.000	7.688		100.00	0.000	2.576
L10 84.000-80.000	82.000	1.297	0.003	0.750	20.500	A	0.000	20.500	20.500	100.00	0.000	0.000
						B	0.000	20.500		100.00	0.000	0.000
						C	0.000	20.500		100.00	0.000	6.870
L11 80.000-60.000	70.000	1.24	0.003	0.750	102.500	A	0.000	102.500	102.500	100.00	0.000	0.000
						B	0.000	102.500		100.00	0.000	0.000
						C	0.000	102.500		100.00	0.000	30.917
L12 60.000-58.500	59.250	1.182	0.002	0.750	7.688	A	0.000	7.688	7.688	100.00	0.000	0.000
						B	0.000	7.688		100.00	0.000	0.000
						C	0.000	7.688		100.00	0.000	2.834
L13 58.500-47.250	52.875	1.144	0.002	0.750	57.656	A	0.000	57.656	57.656	100.00	0.000	0.000
						B	0.000	57.656		100.00	0.000	0.000
						C	0.000	57.656		100.00	0.000	14.587
L14 47.250-40.000	43.625	1.083	0.002	0.750	37.156	A	0.000	37.156	37.156	100.00	0.000	0.000
						B	0.000	37.156		100.00	0.000	0.000
						C	0.000	37.156		100.00	0.000	14.926
L15 40.000-32.250	36.125	1.026	0.002	0.750	39.719	A	0.000	39.719	39.719	100.00	0.000	0.000
						B	0.000	39.719		100.00	0.000	0.000
						C	0.000	39.719		100.00	0.000	15.591
L16 32.250-29.750	31.000	1	0.002	0.750	12.813	A	0.000	12.813	12.813	100.00	0.000	0.000
						B	0.000	12.813		100.00	0.000	0.000
						C	0.000	12.813		100.00	0.000	3.325
L17 29.750-20.000	24.875	1	0.002	0.750	49.969	A	0.000	49.969	49.969	100.00	0.000	0.000
						B	0.000	49.969		100.00	0.000	0.000
						C	0.000	49.969		100.00	0.000	17.103
L18 20.000-4.250	12.125	1	0.002	0.750	80.719	A	0.000	80.719	80.719	100.00	0.000	0.000
						B	0.000	80.719		100.00	0.000	0.000
						C	0.000	80.719		100.00	0.000	25.083
L19 4.250-0.000	2.125	1	0.002	0.750	21.781	A	0.000	21.781	21.781	100.00	0.000	0.000
						B	0.000	21.781		100.00	0.000	0.000
						C	0.000	21.781		100.00	0.000	5.653

Tower Pressure - Service

G_H = 1.690

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	1.636	0.010	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	1.597	0.010	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	0.000
L3 160.000-140.000	150.000	1.541	0.010	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	10.100
L4 140.000-120.000	130.000	1.48	0.009	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	10.100
L5 120.000-113.330	116.665	1.434	0.009	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	3.368
L6 113.330-103.000	108.165	1.404	0.009	46.485	A	0.000	46.485	46.485	100.00	0.000	0.000
					B	0.000	46.485		100.00	0.000	0.000
					C	0.000	46.485		100.00	0.000	6.800
L7 103.000-100.000	101.500	1.379	0.009	13.500	A	0.000	13.500	13.500	100.00	0.000	0.000
					B	0.000	13.500		100.00	0.000	0.000
					C	0.000	13.500		100.00	0.000	2.015
L8 100.000-	92.750	1.343	0.009	72.500	A	0.000	72.500	72.500	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
85.500					B	0.000	72.500		100.00	0.000	0.000
					C	0.000	72.500		100.00	0.000	9.870
L9 85.500-84.000	84.750	1.309	0.008	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	1.401
L10 84.000-80.000	82.000	1.297	0.008	20.000	A	0.000	20.000	20.000	100.00	0.000	0.000
					B	0.000	20.000		100.00	0.000	0.000
					C	0.000	20.000		100.00	0.000	3.737
L11 80.000-60.000	70.000	1.24	0.008	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	16.917
L12 60.000-58.500	59.250	1.182	0.008	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	1.659
L13 58.500-47.250	52.875	1.144	0.007	56.250	A	0.000	56.250	56.250	100.00	0.000	0.000
					B	0.000	56.250		100.00	0.000	0.000
					C	0.000	56.250		100.00	0.000	8.149
L14 47.250-40.000	43.625	1.083	0.007	36.250	A	0.000	36.250	36.250	100.00	0.000	0.000
					B	0.000	36.250		100.00	0.000	0.000
					C	0.000	36.250		100.00	0.000	8.650
L15 40.000-32.250	36.125	1.026	0.007	38.750	A	0.000	38.750	38.750	100.00	0.000	0.000
					B	0.000	38.750		100.00	0.000	0.000
					C	0.000	38.750		100.00	0.000	9.006
L16 32.250-29.750	31.000	1	0.006	12.500	A	0.000	12.500	12.500	100.00	0.000	0.000
					B	0.000	12.500		100.00	0.000	0.000
					C	0.000	12.500		100.00	0.000	1.783
L17 29.750-20.000	24.875	1	0.006	48.750	A	0.000	48.750	48.750	100.00	0.000	0.000
					B	0.000	48.750		100.00	0.000	0.000
					C	0.000	48.750		100.00	0.000	10.257
L18 20.000-4.250	12.125	1	0.006	78.750	A	0.000	78.750	78.750	100.00	0.000	0.000
					B	0.000	78.750		100.00	0.000	0.000
					C	0.000	78.750		100.00	0.000	14.537
L19 4.250-0.000	2.125	1	0.006	21.250	A	0.000	21.250	21.250	100.00	0.000	0.000
					B	0.000	21.250		100.00	0.000	0.000
					C	0.000	21.250		100.00	0.000	3.032

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp

Comb. No.	Description
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	190 - 180	Pole	Max Tension	11	0.000	-0.000	-0.003
			Max. Compression	14	-5.544	-0.438	0.252
			Max. Mx	5	-3.408	-58.610	-0.445
			Max. My	2	-3.410	0.364	57.963
			Max. Vy	5	6.006	-58.610	-0.445
			Max. Vx	8	5.952	-0.681	-57.717
			Max. Torque	13			-1.262
L2	180 - 160	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-16.922	-0.419	0.239
			Max. Mx	5	-11.379	-290.460	-1.513
			Max. My	2	-11.380	1.439	288.763
			Max. Vy	5	15.253	-290.460	-1.513
			Max. Vx	8	15.202	-1.728	-288.515
			Max. Torque	13			-1.250
L3	160 - 140	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-31.589	0.914	-1.331
			Max. Mx	11	-20.330	788.077	5.263
			Max. My	8	-20.320	-5.534	-787.660
			Max. Vy	11	-29.303	788.077	5.263
			Max. Vx	8	29.434	-5.534	-787.660
			Max. Torque	13			-1.250
L4	140 - 120	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-38.446	2.672	-2.151
			Max. Mx	11	-25.555	1403.290	12.148
			Max. My	8	-25.545	-12.167	-1405.319
			Max. Vy	11	-32.243	1403.290	12.148
			Max. Vx	8	32.375	-12.167	-1405.319
			Max. Torque	12			1.289
L5	120 - 113.33	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-40.830	3.298	-2.512
			Max. Mx	11	-27.399	1621.616	14.420
			Max. My	8	-27.389	-14.370	-1624.490
			Max. Vy	11	-33.202	1621.616	14.420
			Max. Vx	8	33.334	-14.370	-1624.490
			Max. Torque	12			1.209
L6	113.33 - 103	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-45.529	4.443	-2.969
			Max. Mx	11	-31.146	1975.036	17.977
			Max. My	8	-31.136	-17.726	-1979.112
			Max. Vy	11	-34.990	1975.036	17.977
			Max. Vx	8	35.122	-17.726	-1979.112
			Max. Torque	7			-1.462
L7	103 - 100	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-46.801	4.724	-3.130
			Max. Mx	11	-32.179	2080.678	19.000
			Max. My	8	-32.169	-18.719	-2085.136
			Max. Vy	11	-35.424	2080.678	19.000
			Max. Vx	8	35.555	-18.719	-2085.136

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	7			-1.493
L8	100 - 85.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-53.702	6.403	-3.887
			Max. Mx	11	-37.723	2613.607	23.961
			Max. My	8	-37.714	-23.411	-2619.787
			Max. Vy	11	-37.895	2613.607	23.961
			Max. Vx	8	38.026	-23.411	-2619.787
			Max. Torque	7			-1.837
L9	85.5 - 84	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-54.474	6.589	-3.994
			Max. Mx	11	-38.362	2670.670	24.452
			Max. My	8	-38.353	-23.872	-2677.028
			Max. Vy	5	38.132	-2667.910	-26.404
			Max. Vx	8	38.267	-23.872	-2677.028
			Max. Torque	7			-1.860
L10	84 - 80	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-56.397	7.091	-4.284
			Max. Mx	11	-39.943	2824.577	25.764
			Max. My	8	-39.934	-25.101	-2831.408
			Max. Vy	11	-38.761	2824.577	25.764
			Max. Vx	8	38.892	-25.101	-2831.408
			Max. Torque	7			-1.922
L11	80 - 60	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-67.550	9.731	-5.027
			Max. Mx	11	-49.204	3638.938	33.148
			Max. My	8	-49.190	-31.189	-3650.838
			Max. Vy	11	-42.288	3638.938	33.148
			Max. Vx	8	42.730	-31.189	-3650.838
			Max. Torque	8			-2.311
L12	60 - 58.5	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-68.493	9.982	-5.171
			Max. Mx	11	-50.018	3702.631	33.683
			Max. My	8	-50.004	-31.588	-3715.150
			Max. Vy	5	42.504	-3697.412	-35.186
			Max. Vx	8	42.949	-31.588	-3715.150
			Max. Torque	8			-2.333
L13	58.5 - 47.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-74.765	11.339	-5.954
			Max. Mx	11	-55.405	4188.774	37.965
			Max. My	8	-55.394	-35.056	-4206.128
			Max. Vy	11	-43.862	4188.774	37.965
			Max. Vx	8	44.304	-35.056	-4206.128
			Max. Torque	8			-2.434
L14	47.25 - 40	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-79.613	12.537	-6.646
			Max. Mx	11	-59.655	4510.634	40.559
			Max. My	8	-59.644	-37.009	-4530.987
			Max. Vy	11	-44.801	4510.634	40.559
			Max. Vx	8	45.244	-37.009	-4530.987
			Max. Torque	8			-2.540
L15	40 - 32.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-84.780	13.784	-7.365
			Max. Mx	11	-64.197	4861.815	43.341
			Max. My	8	-64.189	-39.121	-4885.383
			Max. Vy	5	45.706	-4853.358	-43.967
			Max. Vx	8	46.149	-39.121	-4885.383
			Max. Torque	8			-2.644
L16	32.25 - 29.75	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-86.675	14.032	-7.508
			Max. Mx	11	-65.896	4976.406	44.314
			Max. My	8	-65.888	-39.934	-5001.067
			Max. Vy	5	45.959	-4967.842	-44.741
			Max. Vx	8	46.402	-39.934	-5001.067
			Max. Torque	8			-2.663
L17	29.75 - 20	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-93.489	15.686	-8.463
			Max. Mx	11	-71.950	5430.169	47.739
			Max. My	8	-71.945	-42.475	-5458.823

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	5	46.975	-5419.940	-48.111
			Max. Vx	8	47.417	-42.475	-5458.823
			Max. Torque	8			-2.778
L18	20 - 4.25	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-105.550	17.934	-9.760
			Max. Mx	11	-82.815	6182.682	53.451
			Max. My	8	-82.814	-46.928	-6217.924
			Max. Vy	5	48.470	-6170.539	-53.292
			Max. Vx	8	48.909	-46.928	-6217.924
			Max. Torque	8			-2.938
L19	4.25 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	14	-109.084	18.355	-10.003
			Max. Mx	11	-86.035	6389.450	55.079
			Max. My	8	-86.035	-48.289	-6426.534
			Max. Vy	5	48.829	-6377.130	-54.583
			Max. Vx	8	49.267	-48.289	-6426.534
			Max. Torque	8			-2.971

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	14	109.084	-0.002	0.001
	Max. H_x	11	86.044	48.807	0.396
	Max. H_z	2	86.044	0.343	49.132
	Max. M_x	2	6411.313	0.343	49.132
	Max. M_z	5	6377.130	-48.812	-0.290
	Max. Torsion	2	2.966	0.343	49.132
	Min. Vert	11	86.044	48.807	0.396
	Min. H_x	5	86.044	-48.812	-0.290
	Min. H_z	8	86.044	-0.343	-49.250
	Min. M_x	8	-6426.534	-0.343	-49.250
	Min. M_z	11	-6389.450	48.807	0.396
	Min. Torsion	8	-2.971	-0.343	-49.250

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	86.044	-0.000	0.000	3.456	6.419	0.000
Dead+Wind 0 deg - No Ice	86.044	-0.343	-49.132	-6411.313	61.382	-2.966
Dead+Wind 30 deg - No Ice	86.044	24.044	-42.417	-5527.386	-3133.371	-2.487
Dead+Wind 60 deg - No Ice	86.044	42.054	-24.369	-3163.564	-5491.395	-1.563
Dead+Wind 90 deg - No Ice	86.044	48.812	0.290	54.583	-6377.130	-0.253
Dead+Wind 120 deg - No Ice	86.044	42.362	25.077	3273.659	-5543.718	1.743
Dead+Wind 150 deg - No Ice	86.044	24.667	42.884	5597.971	-3230.330	2.775
Dead+Wind 180 deg - No Ice	86.044	0.343	49.250	6426.534	-48.289	2.971
Dead+Wind 210 deg - No Ice	86.044	-24.073	42.541	5543.216	3148.484	2.369
Dead+Wind 240 deg - No Ice	86.044	-42.020	24.483	3178.724	5502.054	1.223
Dead+Wind 270 deg - No Ice	86.044	-48.807	-0.396	-55.079	6389.450	0.248
Dead+Wind 300 deg - No Ice	86.044	-42.397	-24.963	-3258.501	5559.242	-1.408
Dead+Wind 330 deg - No Ice	86.044	-24.638	-42.760	-5582.142	3241.397	-2.652
Dead+Ice+Temp	109.084	0.002	-0.001	10.003	18.355	-0.000
Dead+Wind 0 deg+Ice+Temp	109.084	-0.036	-6.617	-868.019	24.624	-0.573
Dead+Wind 30 deg+Ice+Temp	109.084	3.250	-5.717	-747.818	-412.682	-0.492
Dead+Wind 60 deg+Ice+Temp	109.084	5.673	-3.289	-424.747	-734.870	-0.305

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 90 deg+Ice+Temp	109.084	6.578	0.030	15.572	-855.244	-0.040
Dead+Wind 120 deg+Ice+Temp	109.084	5.704	3.364	456.201	-740.256	0.308
Dead+Wind 150 deg+Ice+Temp	109.084	3.315	5.767	775.199	-422.741	0.515
Dead+Wind 180 deg+Ice+Temp	109.084	0.036	6.631	889.698	13.282	0.573
Dead+Wind 210 deg+Ice+Temp	109.084	-3.253	5.732	769.528	450.825	0.478
Dead+Wind 240 deg+Ice+Temp	109.084	-5.669	3.302	446.379	772.492	0.265
Dead+Wind 270 deg+Ice+Temp	109.084	-6.578	-0.042	4.230	893.150	0.040
Dead+Wind 300 deg+Ice+Temp	109.084	-5.708	-3.351	-434.569	778.447	-0.269
Dead+Wind 330 deg+Ice+Temp	109.084	-3.312	-5.753	-753.489	460.411	-0.501
Dead+Wind 0 deg - Service	86.044	-0.119	-16.998	-2216.690	25.531	-1.029
Dead+Wind 30 deg - Service	86.044	8.319	-14.676	-1910.910	-1080.284	-0.862
Dead+Wind 60 deg - Service	86.044	14.550	-8.432	-1092.708	-1896.476	-0.541
Dead+Wind 90 deg - Service	86.044	16.888	0.100	21.202	-2202.995	-0.087
Dead+Wind 120 deg - Service	86.044	14.658	8.677	1135.509	-1914.716	0.605
Dead+Wind 150 deg - Service	86.044	8.535	14.838	1939.987	-1113.860	0.962
Dead+Wind 180 deg - Service	86.044	0.119	17.040	2226.694	-12.429	1.029
Dead+Wind 210 deg - Service	86.044	-8.329	14.720	1921.111	1094.145	0.821
Dead+Wind 240 deg - Service	86.044	-14.539	8.471	1102.573	1908.737	0.424
Dead+Wind 270 deg - Service	86.044	-16.888	-0.137	-16.758	2216.096	0.086
Dead+Wind 300 deg - Service	86.044	-14.669	-8.637	-1125.584	1928.557	-0.488
Dead+Wind 330 deg - Service	86.044	-8.525	-14.795	-1929.992	1126.322	-0.920

Solution Summary

Load Comb.	Sum of Applied Forces PX	PY	PZ	Sum of Reactions PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.000	-86.044	0.000	0.000	86.044	-0.000	0.000%
2	-0.343	-86.044	-49.134	0.343	86.044	49.132	0.002%
3	24.044	-86.044	-42.417	-24.044	86.044	42.417	0.000%
4	42.054	-86.044	-24.369	-42.054	86.044	24.369	0.000%
5	48.816	-86.044	0.290	-48.812	86.044	-0.290	0.004%
6	42.362	-86.044	25.077	-42.362	86.044	-25.077	0.000%
7	24.667	-86.044	42.884	-24.667	86.044	-42.884	0.000%
8	0.343	-86.044	49.254	-0.343	86.044	-49.250	0.004%
9	-24.073	-86.044	42.541	24.073	86.044	-42.541	0.000%
10	-42.020	-86.044	24.483	42.020	86.044	-24.483	0.000%
11	-48.816	-86.044	-0.396	48.807	86.044	0.396	0.009%
12	-42.397	-86.044	-24.963	42.397	86.044	24.963	0.000%
13	-24.638	-86.044	-42.760	24.638	86.044	42.760	0.000%
14	0.000	-109.084	0.000	-0.002	109.084	0.001	0.002%
15	-0.036	-109.084	-6.617	0.036	109.084	6.617	0.000%
16	3.250	-109.084	-5.717	-3.250	109.084	5.717	0.000%
17	5.673	-109.084	-3.289	-5.673	109.084	3.289	0.000%
18	6.578	-109.084	0.030	-6.578	109.084	-0.030	0.000%
19	5.704	-109.084	3.364	-5.704	109.084	-3.364	0.000%
20	3.315	-109.084	5.767	-3.315	109.084	-5.767	0.000%
21	0.036	-109.084	6.631	-0.036	109.084	-6.631	0.000%
22	-3.254	-109.084	5.732	3.253	109.084	-5.732	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
23	-5.669	-109.084	3.302	5.669	109.084	-3.302	0.000%
24	-6.578	-109.084	-0.042	6.578	109.084	0.042	0.000%
25	-5.708	-109.084	-3.351	5.708	109.084	3.351	0.000%
26	-3.312	-109.084	-5.753	3.312	109.084	5.753	0.000%
27	-0.119	-86.044	-17.001	0.119	86.044	16.998	0.004%
28	8.320	-86.044	-14.677	-8.319	86.044	14.676	0.001%
29	14.552	-86.044	-8.432	-14.550	86.044	8.432	0.001%
30	16.891	-86.044	0.100	-16.888	86.044	-0.100	0.004%
31	14.658	-86.044	8.677	-14.658	86.044	-8.677	0.001%
32	8.535	-86.044	14.839	-8.535	86.044	-14.838	0.002%
33	0.119	-86.044	17.043	-0.119	86.044	-17.040	0.004%
34	-8.330	-86.044	14.720	8.329	86.044	-14.720	0.001%
35	-14.540	-86.044	8.472	14.539	86.044	-8.471	0.001%
36	-16.891	-86.044	-0.137	16.888	86.044	0.137	0.004%
37	-14.670	-86.044	-8.638	14.669	86.044	8.637	0.002%
38	-8.525	-86.044	-14.796	8.525	86.044	14.795	0.001%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00000001
2	Yes	15	0.00002266	0.00008652
3	Yes	18	0.00000001	0.00010014
4	Yes	18	0.00000001	0.00010276
5	Yes	14	0.00005359	0.00008158
6	Yes	18	0.00000001	0.00010911
7	Yes	18	0.00000001	0.00010512
8	Yes	14	0.00005357	0.00007891
9	Yes	18	0.00000001	0.00010404
10	Yes	18	0.00000001	0.00010201
11	Yes	13	0.00012314	0.00011876
12	Yes	18	0.00000001	0.00010613
13	Yes	18	0.00000001	0.00010955
14	Yes	6	0.00000001	0.00007334
15	Yes	16	0.00000001	0.00007139
16	Yes	16	0.00000001	0.00007176
17	Yes	16	0.00000001	0.00007145
18	Yes	16	0.00000001	0.00007052
19	Yes	16	0.00000001	0.00007332
20	Yes	16	0.00000001	0.00007414
21	Yes	16	0.00000001	0.00007301
22	Yes	16	0.00000001	0.00007487
23	Yes	16	0.00000001	0.00007488
24	Yes	16	0.00000001	0.00007329
25	Yes	16	0.00000001	0.00007485
26	Yes	16	0.00000001	0.00007430
27	Yes	13	0.00012535	0.00005200
28	Yes	14	0.00000001	0.00013687
29	Yes	14	0.00000001	0.00014637
30	Yes	13	0.00012538	0.00002982
31	Yes	15	0.00000001	0.00007460
32	Yes	14	0.00000001	0.00014414
33	Yes	13	0.00012534	0.00004258
34	Yes	15	0.00000001	0.00007143
35	Yes	14	0.00000001	0.00014320
36	Yes	13	0.00012536	0.00002788
37	Yes	14	0.00000001	0.00014739
38	Yes	15	0.00000001	0.00007592

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190 - 180	25.811	32	1.115	0.000
L2	180 - 160	23.483	32	1.107	0.000
L3	160 - 140	18.920	32	1.060	0.001
L4	140 - 120	14.649	32	0.964	0.001
L5	120 - 113.33	10.872	32	0.827	0.001
L6	113.33 - 103	9.746	32	0.783	0.001
L7	103 - 100	8.117	32	0.721	0.001
L8	100 - 85.5	7.671	32	0.700	0.001
L9	85.5 - 84	5.670	32	0.615	0.000
L10	84 - 80	5.478	32	0.606	0.000
L11	80 - 60	4.981	32	0.580	0.000
L12	60 - 58.5	2.823	32	0.445	0.000
L13	58.5 - 47.25	2.685	32	0.436	0.000
L14	47.25 - 40	1.758	32	0.350	0.000
L15	40 - 32.25	1.264	32	0.300	0.000
L16	32.25 - 29.75	0.824	32	0.242	0.000
L17	29.75 - 20	0.702	32	0.226	0.000
L18	20 - 4.25	0.316	32	0.150	0.000
L19	4.25 - 0	0.014	32	0.031	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.000	(2) DB636-A	32	25.811	1.115	0.000	101102
188.000	800MHZ RRH	32	25.345	1.114	0.000	101102
180.000	Platform Mount [LP 403-1]	32	23.483	1.107	0.000	50463
170.000	(3) AIR 21 w/ Mount Pipe	32	21.178	1.090	0.001	25013
160.000	(2) 7770.00 w/ Mount Pipe	32	18.920	1.060	0.001	16567
151.000	Pipe Mount [PM 601-3]	32	16.950	1.023	0.001	12448
150.000	LNX-6514DS-T4M w/ Mount Pipe	32	16.735	1.018	0.001	12111
125.000	PD128-1	32	11.760	0.862	0.001	7768
110.000	PD128-1	32	9.206	0.763	0.001	9439
95.000	PD128-1	32	6.951	0.668	0.001	9780
80.000	DB222	32	4.981	0.580	0.000	9193
70.000	HP4-102	32	3.831	0.511	0.000	8501

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	190 - 180	74.505	7	3.218	0.001
L2	180 - 160	67.786	7	3.196	0.001
L3	160 - 140	54.623	7	3.061	0.003
L4	140 - 120	42.299	7	2.783	0.002
L5	120 - 113.33	31.396	7	2.389	0.002
L6	113.33 - 103	28.146	7	2.262	0.002
L7	103 - 100	23.444	7	2.081	0.002
L8	100 - 85.5	22.155	7	2.022	0.002
L9	85.5 - 84	16.376	7	1.776	0.001
L10	84 - 80	15.822	7	1.751	0.001
L11	80 - 60	14.387	7	1.675	0.001
L12	60 - 58.5	8.154	7	1.286	0.001
L13	58.5 - 47.25	7.755	7	1.258	0.001
L14	47.25 - 40	5.077	7	1.010	0.001
L15	40 - 32.25	3.652	7	0.865	0.001
L16	32.25 - 29.75	2.381	7	0.699	0.000
L17	29.75 - 20	2.027	7	0.654	0.000

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L18	20 - 4.25	0.913	7	0.434	0.000
L19	4.25 - 0	0.040	7	0.089	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
190.000	(2) DB636-A	7	74.505	3.218	0.001	35434
188.000	800MHZ RRH	7	73.159	3.215	0.001	35434
180.000	Platform Mount [LP 403-1]	7	67.786	3.196	0.001	17675
170.000	(3) AIR 21 w/ Mount Pipe	7	61.136	3.146	0.002	8735
160.000	(2) 7770.00 w/ Mount Pipe	7	54.623	3.061	0.003	5778
151.000	Pipe Mount [PM 601-3]	7	48.937	2.954	0.003	4339
150.000	LNX-6514DS-T4M w/ Mount Pipe	7	48.318	2.940	0.003	4221
125.000	PD128-1	7	33.961	2.490	0.002	2703
110.000	PD128-1	7	26.587	2.204	0.002	3280
95.000	PD128-1	7	20.077	1.931	0.001	3396
80.000	DB222	7	14.387	1.675	0.001	3189
70.000	HP4-102	7	11.067	1.476	0.001	2948

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
L1	190 - 180 (1)	30" x 0.375"	10.000	0.000	0.0	25.075	34.901	-3.403	875.146	0.004
L2	180 - 160 (2)	P36x.375	20.000	0.000	0.0	23.696	41.970	-11.371	994.507	0.011
L3	160 - 140 (3)	42" x 0.375"	20.000	0.000	0.0	22.711	49.038	-20.303	1113.690	0.018
L4	140 - 120 (4)	P48x3/8	20.000	0.000	0.0	21.972	56.107	-25.525	1232.770	0.021
L5	120 - 113.33 (5)	P54x3/8	6.670	0.000	0.0	21.397	63.175	-27.369	1351.780	0.020
L6	113.33 - 103 (6)	RPS 54" x 0.49054"	10.330	0.000	0.0	21.386	82.462	-31.118	1763.510	0.018
L7	103 - 100 (7)	RPS 54" x 0.49054"	3.000	0.000	0.0	21.386	82.462	-32.152	1763.510	0.018
L8	100 - 85.5 (8)	RPS 60" x 0.47803"	14.500	0.000	0.0	20.926	89.389	-37.698	1870.570	0.020
L9	85.5 - 84 (9)	RPS 60" x 0.55603"	1.500	0.000	0.0	20.923	103.838	-38.337	2172.590	0.018
L10	84 - 80 (10)	RPS 60" x 0.50217"	4.000	0.000	0.0	20.941	93.865	-39.919	1965.580	0.020
L11	80 - 60 (11)	RPS 60" x 0.57817"	20.000	0.000	0.0	22.323	107.932	-49.179	2409.390	0.020
L12	60 - 58.5 (12)	RPS 60" x 0.70417"	1.500	0.000	0.0	21.528	131.175	-49.993	2823.940	0.018
L13	58.5 - 47.25 (13)	P60x5/8	11.250	0.000	0.0	23.696	116.583	-55.385	2762.520	0.020
L14	47.25 - 40 (14)	RPS 60" x 0.76962"	7.250	0.000	0.0	21.546	143.209	-59.637	3085.580	0.019
L15	40 - 32.25 (15)	RPS 60" x 0.76962"	7.750	0.000	0.0	21.546	143.209	-64.183	3085.580	0.021
L16	32.25 - 29.75 (16)	RPS 60" x 0.96202"	2.500	0.000	0.0	21.540	178.429	-65.883	3843.360	0.017
L17	29.75 - 20 (17)	RPS 60" x 0.81453"	9.750	0.000	0.0	21.528	151.451	-71.941	3260.440	0.022
L18	20 - 4.25 (18)	RPS 60" x 0.94201"	15.750	0.000	0.0	22.800	174.777	-82.813	3984.910	0.021
L19	4.25 - 0 (19)	RPS 60" x 1.08084"	4.250	0.000	0.0	22.776	200.063	-86.035	4556.650	0.019

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	190 - 180 (1)	30" x 0.375"	58.836	2.766	25.075	0.110	0.000	0.000	25.075	0.000
L2	180 - 160 (2)	P36x.375	291.361	9.451	23.696	0.399	0.000	0.000	23.696	0.000
L3	160 - 140 (3)	42" x 0.375"	792.918	18.812	22.711	0.828	0.000	0.000	22.711	0.000
L4	140 - 120 (4)	P48x3/8	1415.642	25.628	21.972	1.166	0.000	0.000	21.972	0.000
L5	120 - 113.33 (5)	P54x3/8	1636.567	23.349	21.397	1.091	0.000	0.000	21.397	0.000
L6	113.33 - 103 (6)	RPS 54" x 0.49054"	1993.883	21.887	21.386	1.023	0.000	0.000	21.386	0.000
L7	103 - 100 (7)	RPS 54" x 0.49054"	2100.692	23.059	21.386	1.078	0.000	0.000	21.386	0.000
L8	100 - 85.5 (8)	RPS 60" x 0.47803"	2639.117	23.999	20.926	1.147	0.000	0.000	20.926	0.000
L9	85.5 - 84 (9)	RPS 60" x 0.55603"	2696.733	21.165	20.923	1.012	0.000	0.000	20.923	0.000
L10	84 - 80 (10)	RPS 60" x 0.50217"	2852.108	24.719	20.941	1.180	0.000	0.000	20.941	0.000
L11	80 - 60 (11)	RPS 60" x 0.57817"	3676.083	27.778	22.323	1.244	0.000	0.000	22.323	0.000
L12	60 - 58.5 (12)	RPS 60" x 0.70417"	3740.658	23.355	23.681	0.986	0.000	0.000	23.681	0.000
L13	58.5 - 47.25 (13)	P60x5/8	4233.933	29.665	23.696	1.252	0.000	0.000	23.696	0.000
L14	47.25 - 40 (14)	RPS 60" x 0.76962"	4560.100	26.136	23.701	1.103	0.000	0.000	23.701	0.000
L15	40 - 32.25 (15)	RPS 60" x 0.76962"	4915.908	28.175	23.701	1.189	0.000	0.000	23.701	0.000
L16	32.25 - 29.75 (16)	RPS 60" x 0.96202"	5032.125	23.297	23.694	0.983	0.000	0.000	23.694	0.000
L17	29.75 - 20 (17)	RPS 60" x 0.81453"	5491.592	29.806	23.681	1.259	0.000	0.000	23.681	0.000
L18	20 - 4.25 (18)	RPS 60" x 0.94201"	6253.650	29.538	25.080	1.178	0.000	0.000	25.080	0.000
L19	4.25 - 0 (19)	RPS 60" x 1.08084"	6463.150	26.792	25.054	1.069	0.000	0.000	25.054	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	190 - 180 (1)	30" x 0.375"	6.039	0.346	16.800	0.021	1.193	0.028	15.644	0.002
L2	180 - 160 (2)	P36x.375	15.292	0.729	16.800	0.043	1.193	0.019	11.901	0.002
L3	160 - 140 (3)	42" x 0.375"	29.644	1.209	16.800	0.072	1.190	0.014	9.619	0.001
L4	140 - 120 (4)	P48x3/8	32.651	1.164	16.800	0.069	1.123	0.010	8.021	0.001
L5	120 - 113.33 (5)	P54x3/8	33.610	1.064	16.800	0.063	1.177	0.008	7.343	0.001
L6	113.33 - 103 (6)	RPS 54" x 0.49054"	35.398	0.859	15.372	0.056	1.462	0.008	10.272	0.001
L7	103 - 100 (7)	RPS 54" x 0.49054"	35.832	0.869	15.372	0.057	1.493	0.008	10.272	0.001
L8	100 - 85.5 (8)	RPS 60" x 0.47803"	38.301	0.857	15.652	0.055	1.837	0.008	9.190	0.001
L9	85.5 - 84 (9)	RPS 60" x 0.55603"	38.543	0.742	14.788	0.050	1.860	0.007	11.101	0.001
L10	84 - 80 (10)	RPS 60" x 0.50217"	39.167	0.835	15.400	0.054	1.922	0.008	9.774	0.001
L11	80 - 60 (11)	RPS 60" x 0.57817"	42.956	0.796	15.944	0.050	2.013	0.008	11.656	0.001
L12	60 - 58.5 (12)	RPS 60" x 0.70417"	43.176	0.658	14.352	0.046	2.038	0.006	14.352	0.000
L13	58.5 - 47.25 (13)	P60x5/8	44.529	0.764	16.800	0.045	2.155	0.008	12.848	0.001
L14	47.25 - 40 (14)	RPS 60" x 0.76962"	45.468	0.635	14.364	0.044	2.277	0.007	14.364	0.000
L15	40 - 32.25 (15)	RPS 60" x 0.76962"	46.374	0.648	14.364	0.045	2.397	0.007	14.364	0.000
L16	32.25 - 29.75 (16)	RPS 60" x 0.96202"	46.627	0.523	14.360	0.036	2.420	0.006	14.360	0.000

Section No.	Elevation ft	Size	Actual V K	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L17	29.75 - 20 (17)	RPS 60" x 0.81453"	47.641	0.629	14.352	0.044	2.552	0.007	14.352	0.000
L18	20 - 4.25 (18)	RPS 60" x 0.94201"	49.131	0.562	15.200	0.037	2.737	0.006	15.200	0.000
L19	4.25 - 0 (19)	RPS 60" x 1.08084"	49.489	0.495	15.184	0.033	2.775	0.006	15.184	0.000

Pole Interaction Design Data

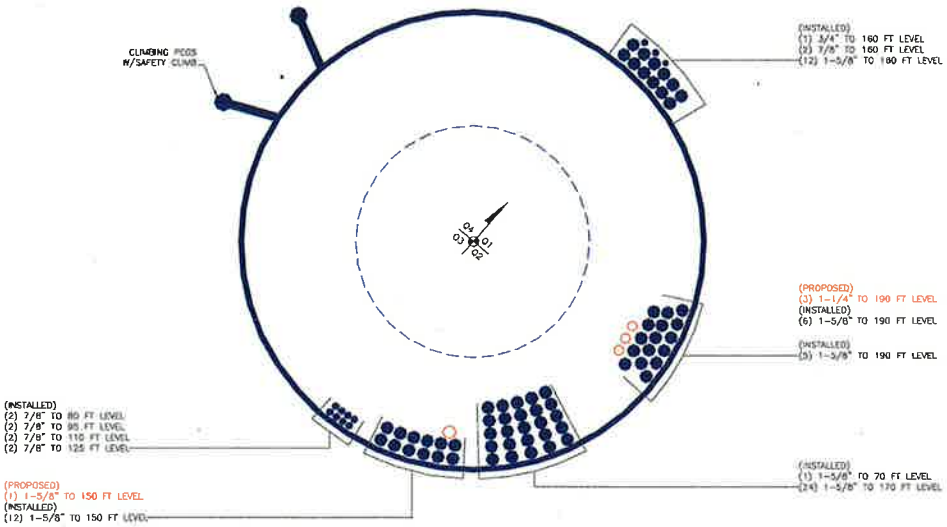
Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	190 - 180 (1)	0.004	0.110	0.000	0.021	0.002	0.115 ✔	1.333	H1-3+VT ✔
L2	180 - 160 (2)	0.011	0.399	0.000	0.043	0.002	0.412 ✔	1.333	H1-3+VT ✔
L3	160 - 140 (3)	0.018	0.828	0.000	0.072	0.001	0.852 ✔	1.333	H1-3+VT ✔
L4	140 - 120 (4)	0.021	1.166	0.000	0.069	0.001	1.192 ✔	1.333	H1-3+VT ✔
L5	120 - 113.33 (5)	0.020	1.091	0.000	0.063	0.001	1.116 ✔	1.333	H1-3+VT ✔
L6	113.33 - 103 (6)	0.018	1.023	0.000	0.056	0.001	1.044 ✔	1.333	H1-3+VT ✔
L7	103 - 100 (7)	0.018	1.078	0.000	0.057	0.001	1.100 ✔	1.333	H1-3+VT ✔
L8	100 - 85.5 (8)	0.020	1.147	0.000	0.055	0.001	1.170 ✔	1.333	H1-3+VT ✔
L9	85.5 - 84 (9)	0.018	1.012	0.000	0.050	0.001	1.032 ✔	1.333	H1-3+VT ✔
L10	84 - 80 (10)	0.020	1.180	0.000	0.054	0.001	1.204 ✔	1.333	H1-3+VT ✔
L11	80 - 60 (11)	0.020	1.244	0.000	0.050	0.001	1.267 ✔	1.333	H1-3+VT ✔
L12	60 - 58.5 (12)	0.018	0.986	0.000	0.046	0.000	1.006 ✔	1.333	H1-3+VT ✔
L13	58.5 - 47.25 (13)	0.020	1.252	0.000	0.045	0.001	1.274 ✔	1.333	H1-3+VT ✔
L14	47.25 - 40 (14)	0.019	1.103	0.000	0.044	0.000	1.124 ✔	1.333	H1-3+VT ✔
L15	40 - 32.25 (15)	0.021	1.189	0.000	0.045	0.000	1.212 ✔	1.333	H1-3+VT ✔
L16	32.25 - 29.75 (16)	0.017	0.983	0.000	0.036	0.000	1.002 ✔	1.333	H1-3+VT ✔
L17	29.75 - 20 (17)	0.022	1.259	0.000	0.044	0.000	1.283 ✔	1.333	H1-3+VT ✔
L18	20 - 4.25 (18)	0.021	1.178	0.000	0.037	0.000	1.200 ✔	1.333	H1-3+VT ✔
L19	4.25 - 0 (19)	0.019	1.069	0.000	0.033	0.000	1.089 ✔	1.333	H1-3+VT ✔

Section Capacity Table

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	-3.403	1166.570	8.6	Pass
L2	180 - 160	Pole	P36x.375	2	-11.371	1325.678	30.9	Pass
L3	160 - 140	Pole	42" x 0.375"	3	-20.303	1484.549	63.9	Pass
L4	140 - 120	Pole	P48x3/8	4	-25.525	1643.282	89.4	Pass
L5	120 - 113.33	Pole	P54x3/8	5	-27.369	1801.923	83.7	Pass
L6	113.33 - 103	Pole	RPS 54" x 0.49054"	6	-31.118	2350.759	78.3	Pass
L7	103 - 100	Pole	RPS 54" x 0.49054"	7	-32.152	2350.759	82.5	Pass
L8	100 - 85.5	Pole	RPS 60" x 0.47803"	8	-37.698	2493.470	87.8	Pass
L9	85.5 - 84	Pole	RPS 60" x 0.55603"	9	-38.337	2896.062	77.4	Pass
L10	84 - 80	Pole	RPS 60" x 0.50217"	10	-39.919	2620.118	90.3	Pass
L11	80 - 60	Pole	RPS 60" x 0.57817"	11	-49.179	3211.717	95.1	Pass
L12	60 - 58.5	Pole	RPS 60" x 0.70417"	12	-49.993	3764.312	75.5	Pass
L13	58.5 - 47.25	Pole	P60x5/8	13	-55.385	3682.439	95.6	Pass
L14	47.25 - 40	Pole	RPS 60" x 0.76962"	14	-59.637	4113.078	84.3	Pass
L15	40 - 32.25	Pole	RPS 60" x 0.76962"	15	-64.183	4113.078	90.9	Pass
L16	32.25 - 29.75	Pole	RPS 60" x 0.96202"	16	-65.883	5123.199	75.1	Pass
L17	29.75 - 20	Pole	RPS 60" x 0.81453"	17	-71.941	4346.166	96.2	Pass
L18	20 - 4.25	Pole	RPS 60" x 0.94201"	18	-82.813	5311.885	90.0	Pass
L19	4.25 - 0	Pole	RPS 60" x 1.08084"	19	-86.035	6074.014	81.7	Pass
							Summary	
						Pole (L17)	96.2	Pass
						RATING =	**96.2**	**Pass**

APPENDIX B

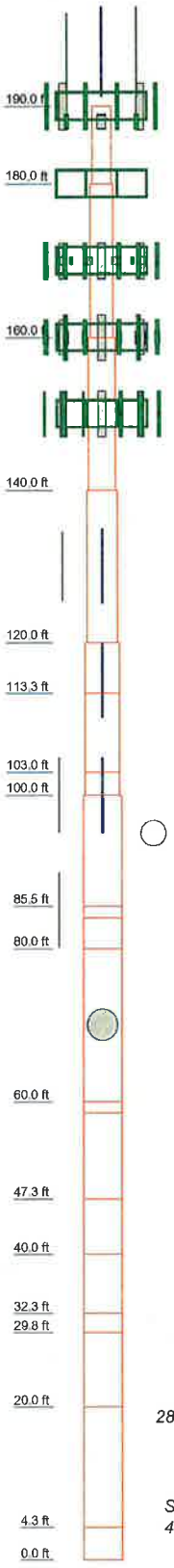
BASE LEVEL DRAWING

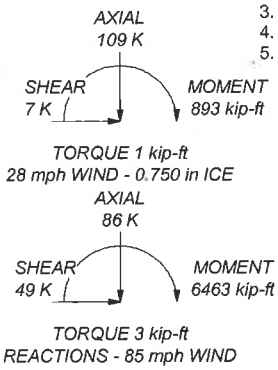

CLIMBING PEGS
W/SAFETY CLIMB
(INSTALLED)
(1) 3/4" TO 160 FT LEVEL
(2) 7/8" TO 160 FT LEVEL
(12) 1-5/8" TO 180 FT LEVEL
(PROPOSED)
(3) 1-1/4" TO 190 FT LEVEL
(INSTALLED)
(6) 1-5/8" TO 190 FT LEVEL
(INSTALLED)
(5) 1-5/8" TO 190 FT LEVEL
(INSTALLED)
(2) 7/8" TO 110 FT LEVEL
(2) 7/8" TO 125 FT LEVEL
(PROPOSED)
(1) 1-5/8" TO 150 FT LEVEL
(INSTALLED)
(12) 1-5/8" TO 150 FT LEVEL
(INSTALLED)
(1) 1-5/8" TO 70 FT LEVEL
(24) 1-5/8" TO 170 FT LEVEL

APPENDIX C

ADDITIONAL CALCULATIONS

Section	Size	Length (ft)	Socket Length (ft)	Grade	Weight (K)
1	30" x 0.375"	10.000	5.000	A53-B-42	1.2
2	P36x.375	20.000	5.000		2.9
3	42" x 0.375"	20.000	5.000		3.3
4	P48x3/8	20.000	5.000		3.8
5	P54x3/8	6.670	5.000		1.4
6	P54x0.490	10.330	5.000	Reinf 38.43 ksi	2.9
7	P54x0.625	3.000	5.000		0.8
8	P54x0.688	14.500	5.000	Reinf 39.13 ksi	4.4
9	P54x0.750	4.000	5.000		1.3
10	P54x0.812	0.500	5.000		0.5
11	P54x0.875	20.000	5.000	Reinf 39.86 ksi	7.3
12	P54x0.938	1.500	5.000	Reinf 35.88 ksi	0.7
13	P54x1.000	11.250	5.000	A53-B-42	4.5
14	P54x1.062	7.250	5.000		3.5
15	P54x1.125	7.750	5.000	Reinf 35.91 ksi	3.8
16	P54x1.188	2.500	5.000	Reinf 35.90 ksi	1.5
17	P54x1.250	9.750	5.000	Reinf 36.00 ksi	5.0
18	P54x1.312	15.750	5.000	Reinf 38.00 ksi	9.4
19	P54x1.375	4.250		Reinf 37.96 ksi	2.9
	RPS 60" x 1.000				61.2





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB636-A	190	DC6-48-60-18-8F	160
(2) DB636-A	190	Platform Mount [LP 403-1]	160
PD128-1	190	6' x 2" Mount Pipe	160
(2) APXVSPP18-C-A20 w/ Mount Pipe	190	(2) 6' x 2" Mount Pipe	160
(2) APXVSPP18-C-A20 w/ Mount Pipe	190	(2) 6' x 2" Mount Pipe	160
(2) APXVSPP18-C-A20 w/ Mount Pipe	190	Pipe Mount [PM 601-3]	151
Platform Mount [LP 403-1]	190	RRH2X40-AWS	151
800MHZ RRH	188	RRH2X40-AWS	151
800MHZ RRH	188	RRH2X40-AWS	151
1900MHz RRH	188	MG D3-800Tx w/ Mount Pipe	150
1900MHz RRH	188	MG D3-800Tx w/ Mount Pipe	150
1900MHz RRH	188	MG D3-800Tx w/ Mount Pipe	150
800MHZ RRH	188	P65-16-XL-R w/ Mount Pipe	150
Side Arm Mount [SO 102-3]	188	(2) LPA-80080/6CF w/ Mount Pipe	150
Platform Mount [LP 403-1]	180	(2) FD9R6004/2C-3L	150
(4) 6' x 2" Mount Pipe	180	(2) FD9R6004/2C-3L	150
(4) 6' x 2" Mount Pipe	180	(2) FD9R6004/2C-3L	150
(4) 6' x 2" Mount Pipe	180	Platform Mount [LP 403-1]	150
(3) AIR 21 w/ Mount Pipe	170	BXA-171063-12CF-EDIN-X w/ Mount Pipe	150
(3) AIR 21 w/ Mount Pipe	170		
(3) AIR 21 w/ Mount Pipe	170	BXA-171063-12CF-EDIN-X w/ Mount Pipe	150
AIR 33 w/ Mount Pipe	170	DB-T1-6Z-8AB-0Z	150
AIR 33 w/ Mount Pipe	170	BXA-171063-12CF-EDIN-X w/ Mount Pipe	150
AIR 33 w/ Mount Pipe	170		
(4) ATMAA1412D-1A20	170	LNX-6514DS-T4M w/ Mount Pipe	150
(4) ATMAA1412D-1A20	170	LNX-6514DS-T4M w/ Mount Pipe	150
(4) ATMAA1412D-1A20	170	(2) DB846F65ZAXY w/ Mount Pipe	150
Platform Mount [LP 405-1]	170	(2) DB846F65ZAXY w/ Mount Pipe	150
(2) 7770.00 w/ Mount Pipe	160	PD128-1	125
(2) 7770.00 w/ Mount Pipe	160	PD201-1	125
(2) 7770.00 w/ Mount Pipe	160	Side Arm Mount [SO 701-3]	125
TT19-08BP111-001	160	PD128-1	110
TT19-08BP111-001	160	PD128-1	110
TT19-08BP111-001	160	Side Arm Mount [SO 701-3]	110
P65-16-XLH-RR w/ Mount Pipe	160	PD128-1	95
P65-16-XLH-RR w/ Mount Pipe	160	PD128-1	95
P65-16-XLH-RR w/ Mount Pipe	160	Side Arm Mount [SO 701-3]	95
(2) RRUS-11	160	DB222	80
(2) RRUS-11	160	PD128-1	80
(2) RRUS-11	160	Side Arm Mount [SO 701-3]	80
(2) LGP21401	160	Pipe Mount [PM 601-1]	70
(2) LGP21401	160	HP4-102	70
(2) LGP21401	160		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A53-B-42	42 ksi	63 ksi	Reinf 35.88 ksi	36 ksi	45 ksi
Reinf 38.43 ksi	38 ksi	49 ksi	Reinf 35.91 ksi	36 ksi	45 ksi
Reinf 39.13 ksi	39 ksi	49 ksi	Reinf 35.90 ksi	36 ksi	45 ksi
Reinf 36.97 ksi	37 ksi	47 ksi	Reinf 38.00 ksi	38 ksi	48 ksi
Reinf 38.50 ksi	39 ksi	49 ksi	Reinf 37.96 ksi	38 ksi	48 ksi
Reinf 39.86 ksi	40 ksi	50 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 28 mph basic wind with 0.75 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 96.2%

Paul J Ford and Company
250 E. Broad Street, Suite 600
Columbus, OH 43215
Phone: 614.221.6679
FAX: 614.448.4105

Job: *190' Monopole / Weston Rt-57 Norfield R*		
Project: *PJF 37513-0787 / BU 829046*		
Client: CCI	Drawn by: John J Woolley	App'd:
Code: TIA/EIA-222-F	Date: 12/30/13	Scale: NTS
Path:		Dwg No. E-1

PAUL J. FORD AND COMPANY
STRUCTURAL ENGINEERS
250 East Broad Street • Suite 1500 • Columbus, Ohio 43215-3708
Phone 614-221-6679 • Fax 614-448-4105 • www.PJFweb.com

Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description:
Owner:
Engineer: JJW

v4.1 - Effective 7-3-12

Asymmetric Anchor Rod Analysis

Moment =	6463	k-ft	TIA Ref.	F	Location =	Base Plate	
Axial =	86.0	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	49.0	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, 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	A687	105	150	0.0	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
2	1.250	A687	105	150	6.9	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
3	1.250	A687	105	150	13.8	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
4	1.250	A687	105	150	20.8	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
5	1.250	A687	105	150	27.7	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
6	1.250	A687	105	150	34.6	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
7	1.250	A687	105	150	41.5	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
8	1.250	A687	105	150	48.5	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
9	1.250	A687	105	150	55.4	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
10	1.250	A687	105	150	62.3	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
11	1.250	A687	105	150	69.2	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
12	1.250	A687	105	150	76.2	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
13	1.250	A687	105	150	83.1	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
14	1.250	A687	105	150	90.0	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
15	1.250	A687	105	150	96.9	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
16	1.250	A687	105	150	103.8	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
17	1.250	A687	105	150	110.8	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
18	1.250	A687	105	150	117.7	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
19	1.250	A687	105	150	124.6	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
20	1.250	A687	105	150	131.5	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
21	1.250	A687	105	150	138.5	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
22	1.250	A687	105	150	145.4	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
23	1.250	A687	105	150	152.3	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
24	1.250	A687	105	150	159.2	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
25	1.250	A687	105	150	166.2	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
26	1.250	A687	105	150	173.1	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
27	1.250	A687	105	150	180.0	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
28	1.250	A687	105	150	186.9	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
29	1.250	A687	105	150	193.8	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
30	1.250	A687	105	150	200.8	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
31	1.250	A687	105	150	207.7	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
32	1.250	A687	105	150	214.6	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
33	1.250	A687	105	150	221.5	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
34	1.250	A687	105	150	228.5	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
35	1.250	A687	105	150	235.4	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
36	1.250	A687	105	150	242.3	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
37	1.250	A687	105	150	249.2	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
38	1.250	A687	105	150	256.2	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
39	1.250	A687	105	150	263.1	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
40	1.250	A687	105	150	270.0	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
41	1.250	A687	105	150	276.9	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
42	1.250	A687	105	150	283.8	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
43	1.250	A687	105	150	290.8	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
44	1.250	A687	105	150	297.7	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
45	1.250	A687	105	150	304.6	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
46	1.250	A687	105	150	311.5	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
47	1.250	A687	105	150	318.5	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
48	1.250	A687	105	150	325.4	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
49	1.250	A687	105	150	332.3	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
50	1.250	A687	105	150	339.2	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
51	1.250	A687	105	150	346.2	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
52	1.250	A687	105	150	353.1	67.00	0.00	1.23	55.35	53.15	53.15	0.00	80.99	65.6%
53	2.250	F1554 Gr 105	105	125	3.5	76.00	0.00	3.98	202.95	195.80	195.80	0.00	218.68	89.5%
54	2.250	F1554 Gr 105	105	125	48.5	76.00	0.00	3.98	202.95	195.80	195.80	0.00	218.68	89.5%
55	2.250	F1554 Gr 105	105	125	93.5	76.00	0.00	3.98	202.95	195.80	195.80	0.00	218.68	89.5%
56	2.250	F1554 Gr 105	105	125	138.5	76.00	0.00	3.98	202.95	195.80	195.80	0.00	218.68	89.5%
57	2.250	F1554 Gr 105	105	125	183.5	76.00	0.00	3.98	202.95	195.80	195.80	0.00	218.68	89.5%

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v4.1 - Effective 7-3-12

Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description:
Owner:
Engineer: JJW

Asymmetric Anchor Rod Analysis

Moment =	6463	k-ft	TIA Ref.	F	
Axial =	86.0	kips	ASIF =	1.3333	
Shear =	49.0	kips	Max Ratio =	100.0%	
Anchor Qty =	60				

Location =	Base Plate				
η =	N/A	for BP, Rev. G Sect. 4.9.9			
Threads =	N/A	for FP, Rev. G			

** 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	202.95	195.80	195.80	0.00	218.68	89.5%
59	2.250	F1554 Gr 105	105	125	273.5	76.00	0.00	3.98	202.95	195.80	195.80	0.00	218.68	89.5%
60	2.250	F1554 Gr 105	105	125	318.5	76.00	0.00	3.98	202.95	195.80	195.80	0.00	218.68	89.5%
								95.62						

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

TIA Rev F

Site Data

BU#: *829046*
Site Name:
App #:
Pole Manufacturer: *Other*

Reactions		
Moment:	3937.6	ft-kips
Axial:	57.4	kips
Shear:	32.7	kips

Reactions adjusted to account for additional anchors

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

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

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

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

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

Stress Increase Factor		
ASIF:	1.333	

Anchor Rod Results

		Stiffened
Maximum Rod Tension:	53.1 Kips	Service, ASD
Allowable Tension:	81.0 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	65.6% Pass	

Base Plate Results — Shear Check Only

		Stiffened
Base Plate Stress:	4.9 ksi	Service, ASD
Allowable Plate Stress:	19.2 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	25.6% Pass	Y.L. Length: N/A, Roark

Stiffener Results

Horizontal Weld :	67.0% Pass
Vertical Weld:	43.1% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	30.7% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	50.3% Pass
Plate Comp. (AISC Bracket):	72.8% Pass

Pole Results

Pole Punching Shear Check:	10.5% 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

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v4.1 - Effective 7-3-12

Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description: Flange at 20'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

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

Moment =	4254	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	71.9	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	47.6	kips	Max Ratio =	100.0%	Threads =	N/A	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, 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	34.74	33.38	33.38	0.00	71.99	46.4%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	34.74	33.38	33.38	0.00	71.99	46.4%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%

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Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description: Flange at 20'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

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

Moment =	4254	k-ft	TIA Ref.	F	Location =	Flange Plate	
Axial =	71.9	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	47.6	kips	Max Ratio =	100.0%	Threads =	N/A	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	30.89	29.52	29.52	0.00	71.99	41.0%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	30.89	29.52	29.52	0.00	71.99	41.0%
65	0.000	MP306	65	80	0.0	61.87	8.40	8.40	276.78	267.40	276.78	397.12	397.12	69.7%
66	0.000	MP306	65	80	60.0	61.87	8.40	8.40	276.78	267.40	276.78	397.12	397.12	69.7%
67	0.000	MP306	65	80	120.0	61.87	8.40	8.40	276.78	267.40	276.78	397.12	397.12	69.7%
68	0.000	MP306	65	80	180.0	61.87	8.40	8.40	276.78	267.40	276.78	397.12	397.12	69.7%
69	0.000	MP306	65	80	240.0	61.87	8.40	8.40	276.78	267.40	276.78	397.12	397.12	69.7%
70	0.000	MP306	65	80	300.0	61.87	8.40	8.40	276.78	267.40	276.78	397.12	397.12	69.7%
								128.93						

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

Site Data	20' Flange
BU#:	829046
Site Name:	
App #:	

Manufacturer:	Other

Reactions		
Moment:	2149.9	ft-kips
Axial:	71.9	kips
Shear:	47.6	kips
Exterior Flange Run, T+Q:	0	kips

Reactions adjusted to account for flange jumps

Elevation: 20 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
Circle:	50	in	

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:		<-- Disregard
Groove Angle:		<-- 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

Stress Increase Factor	
ASIF:	1.333

Interior Flange Plate Results	Flexural Check
Controlling Bolt Axial Force:	66.7 Kips, Ext. C= Interior C
Plate Stress:	27.2 ksi
Allowable Plate Stress:	36.0 ksi
Plate Stress Ratio:	75.5% Pass

Stiffener Results	
Horizontal Weld :	42.3% Pass
Vertical Weld:	37.0% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	25.3% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	29.9% Pass
Plate Comp. (AISC Bracket):	60.9% Pass

Pole Results	
Pole Punching Shear Check:	11.9% 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

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Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description: Flange at 40'
Owner:
Engineer: JJW

v4.1 - Effective 7-3-12

Asymmetric Bolt Analysis

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

Moment =	3730	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	59.6	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	45.5	kips	Max Ratio =	100.0%	Threads =	N/A	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	36.52	35.22	35.22	0.00	71.99	48.9%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	36.52	35.22	35.22	0.00	71.99	48.9%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%

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v4.1 - Effective 7-3-12

Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description: Flange at 40'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

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

Moment =	3730	k-ft	TIA Ref.	F	Location =	Flange Plate	
Axial =	59.6	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	45.5	kips	Max Ratio =	100.0%	Threads =	N/A	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	32.46	31.16	31.16	0.00	71.99	43.3%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	32.46	31.16	31.16	0.00	71.99	43.3%
65	0.000	MP305	65	80	0.0	61.57	5.61	5.61	193.45	187.49	193.45	264.97	264.97	73.0%
66	0.000	MP305	65	80	60.0	61.57	5.61	5.61	193.45	187.49	193.45	264.97	264.97	73.0%
67	0.000	MP305	65	80	120.0	61.57	5.61	5.61	193.45	187.49	193.45	264.97	264.97	73.0%
68	0.000	MP305	65	80	180.0	61.57	5.61	5.61	193.45	187.49	193.45	264.97	264.97	73.0%
69	0.000	MP305	65	80	240.0	61.57	5.61	5.61	193.45	187.49	193.45	264.97	264.97	73.0%
70	0.000	MP305	65	80	300.0	61.57	5.61	5.61	193.45	187.49	193.45	264.97	264.97	73.0%

112.19

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

Site Data	40' Flange
BU#:	829046
Site Name:	
App #:	

Reactions		
Moment:	2264.3	ft-kips
Axial:	59.6	kips
Shear:	45.5	kips
Exterior Flange Run, T+Q:	0	kips

Reactions adjusted to account for flange jumps

Manufacturer:	Other

Elevation: 40 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
Circle:	50	in	

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:		<-- Disregard
Groove Angle:		<-- 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

Stress Increase Factor	
ASIF:	1.333

Interior Flange Plate Results	Flexural Check
Controlling Bolt Axial Force:	69.8 Kips, Ext. C= Interior C
Plate Stress:	28.4 ksi
Allowable Plate Stress:	36.0 ksi
Plate Stress Ratio:	79.0% Pass

Stiffener Results	
Horizontal Weld :	49.4% Pass
Vertical Weld:	43.2% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	30.9% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	35.8% Pass
Plate Comp. (AISC Bracket):	71.1% Pass

Pole Results	
Pole Punching Shear Check:	17.4% 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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v4.1 - Effective 7-3-12

Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description: Flange at 60'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

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

Moment =	3192	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	49.2	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	43.0	kips	Max Ratio =	100.0%	Threads =	N/A	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	34.64	33.47	33.47	0.00	71.99	46.5%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	34.64	33.47	33.47	0.00	71.99	46.5%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%

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v4.1 - Effective 7-3-12

Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description: Flange at 60'
Owner:
Engineer: JJW

Asymmetric Bolt Analysis

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

Moment =	3192	k-ft	TIA Ref.	F	Location =	Flange Plate	
Axial =	49.2	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	43.0	kips	Max Ratio =	100.0%	Threads =	N/A	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	30.78	29.62	29.62	0.00	71.99	41.1%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	30.78	29.62	29.62	0.00	71.99	41.1%
65	0.000	MP306	65	80	0.0	61.57	8.40	8.40	274.74	266.78	274.74	397.12	397.12	69.2%
66	0.000	MP306	65	80	120.0	61.57	8.40	8.40	274.74	266.78	274.74	397.12	397.12	69.2%
67	0.000	MP306	65	80	240.0	61.57	8.40	8.40	274.74	266.78	274.74	397.12	397.12	69.2%
								103.73						

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

Site Data	60' Flange
BU#:	829046
Site Name:	
App #:	

Reactions		
Moment:	2149.6	ft-kips
Axial:	49.2	kips
Shear:	43	kips
Exterior Flange Run, T+Q:	0	kips

Reactions adjusted to account for flange jumps

Manufacturer:	Other

Elevation: 60 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
Circle:	50	in	

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:		<-- Disregard
Groove Angle:		<-- 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

Stress Increase Factor	
ASIF:	1.333

Interior Flange Plate Results — Flexural Check

Controlling Bolt Axial Force:	66.0 Kips, Ext. C= Interior C
Plate Stress:	26.9 ksi
Allowable Plate Stress:	36.0 ksi
Plate Stress Ratio:	74.7% Pass

Stiffener Results

Horizontal Weld :	46.7% Pass
Vertical Weld:	40.8% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	28.7% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	33.6% Pass
Plate Comp. (AISC Bracket):	67.3% Pass

Pole Results

Pole Punching Shear Check:	16.5% 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

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Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description: Flange at 80'
Owner:
Engineer: JJW

v4.1 - Effective 7-3-12

Asymmetric Bolt Analysis

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

Moment =	2375	k-ft	TIA Ref.	F	Location =	Flange Plate		
Axial =	39.9	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9	
Shear =	39.2	kips	Max Ratio =	100.0%	Threads =	N/A	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	32.88	31.75	31.75	0.00	71.99	44.1%
2	1.250	A325	81	105	11.3	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
3	1.250	A325	81	105	22.5	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
4	1.250	A325	81	105	33.8	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
5	1.250	A325	81	105	45.0	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
6	1.250	A325	81	105	56.3	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
7	1.250	A325	81	105	67.5	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
8	1.250	A325	81	105	78.8	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
9	1.250	A325	81	105	90.0	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
10	1.250	A325	81	105	101.3	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
11	1.250	A325	81	105	112.5	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
12	1.250	A325	81	105	123.8	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
13	1.250	A325	81	105	135.0	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
14	1.250	A325	81	105	146.3	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
15	1.250	A325	81	105	157.5	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
16	1.250	A325	81	105	168.8	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
17	1.250	A325	81	105	180.0	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
18	1.250	A325	81	105	191.3	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
19	1.250	A325	81	105	202.5	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
20	1.250	A325	81	105	213.8	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
21	1.250	A325	81	105	225.0	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
22	1.250	A325	81	105	236.3	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
23	1.250	A325	81	105	247.5	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
24	1.250	A325	81	105	258.8	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
25	1.250	A325	81	105	270.0	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
26	1.250	A325	81	105	281.3	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
27	1.250	A325	81	105	292.5	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
28	1.250	A325	81	105	303.8	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
29	1.250	A325	81	105	315.0	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
30	1.250	A325	81	105	326.3	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
31	1.250	A325	81	105	337.5	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
32	1.250	A325	81	105	348.8	53.00	0.00	1.23	32.88	31.75	31.75	0.00	71.99	44.1%
33	1.250	A325	81	105	0.0	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
34	1.250	A325	81	105	11.3	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
35	1.250	A325	81	105	22.5	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
36	1.250	A325	81	105	33.8	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
37	1.250	A325	81	105	45.0	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
38	1.250	A325	81	105	56.3	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
39	1.250	A325	81	105	67.5	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
40	1.250	A325	81	105	78.8	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
41	1.250	A325	81	105	90.0	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
42	1.250	A325	81	105	101.3	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
43	1.250	A325	81	105	112.5	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
44	1.250	A325	81	105	123.8	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
45	1.250	A325	81	105	135.0	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
46	1.250	A325	81	105	146.3	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
47	1.250	A325	81	105	157.5	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
48	1.250	A325	81	105	168.8	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
49	1.250	A325	81	105	180.0	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
50	1.250	A325	81	105	191.3	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
51	1.250	A325	81	105	202.5	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
52	1.250	A325	81	105	213.8	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
53	1.250	A325	81	105	225.0	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
54	1.250	A325	81	105	236.3	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
55	1.250	A325	81	105	247.5	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
56	1.250	A325	81	105	258.8	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
57	1.250	A325	81	105	270.0	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%

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Date: 12/30/2013
PJF Project: 37513-0787 R4
Client Ref. # 829046
Site Name:
Description: Flange at 80'
Owner:
Engineer: JJW

v4.1 - Effective 7-3-12

Asymmetric Bolt Analysis

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

Moment =	2375	k-ft	TIA Ref.	F	Location =	Flange Plate	
Axial =	39.9	kips	ASIF =	1.3333	η =	N/A	for BP, Rev. G Sect. 4.9.9
Shear =	39.2	kips	Max Ratio =	100.0%	Threads =	N/A	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	29.22	28.09	28.09	0.00	71.99	39.0%
59	1.250	A325	81	105	292.5	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
60	1.250	A325	81	105	303.8	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
61	1.250	A325	81	105	315.0	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
62	1.250	A325	81	105	326.3	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
63	1.250	A325	81	105	337.5	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
64	1.250	A325	81	105	348.8	47.00	0.00	1.23	29.22	28.09	28.09	0.00	71.99	39.0%
65	0.000	MP303	65	80	0.0	61.18	2.88	2.88	88.87	86.23	88.87	132.35	132.35	67.1%
66	0.000	MP303	65	80	120.0	61.18	2.88	2.88	88.87	86.23	88.87	132.35	132.35	67.1%
67	0.000	MP303	65	80	240.0	61.18	2.88	2.88	88.87	86.23	88.87	132.35	132.35	67.1%
								87.18						

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

Site Data	80' Flange
BU#:	829046
Site Name:	
App #:	

Manufacturer:	Other

Reactions		
Moment:	2039.7	ft-kips
Axial:	39.9	kips
Shear:	39.2	kips
Exterior Flange Run, T+Q:	0	kips

Reactions adjusted to account for flange jumps

Elevation: 80 feet

Bolt Data			
Qty:	32		
Diam:	1.25	Bolt Fu:	105
Bolt Material:	A325	Bolt Fy:	81
N/A:	100	<-- Disregard	Bolt Fty:
N/A:	75	<-- Disregard	44.00
Circle:	50	in	

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:		<-- Disregard
Groove Angle:		<-- 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

Stress Increase Factor	
ASIF:	1.333

Interior Flange Plate Results	Flexural Check
Controlling Bolt Axial Force:	62.4 Kips, Ext. C= Interior C
Plate Stress:	25.4 ksi
Allowable Plate Stress:	36.0 ksi
Plate Stress Ratio:	70.7% Pass

Stiffener Results	
Horizontal Weld :	50.1% Pass
Vertical Weld:	43.8% Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	31.5% Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	36.4% Pass
Plate Comp. (AISC Bracket):	72.1% Pass

Pole Results	
Pole Punching Shear Check:	23.5% 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, Exterior Flange Plate - Any Bolt Material TIA Rev F

Site Data

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

Pole Manufacturer:	Other

Reactions		
Moment:	1616.28	ft-kips
Axial:	32.152	kips
Shear:	35.832	kips
Elevation:	100	feet

Reactions adjusted to account for load in flat plate shaft reinforcing.

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

Bolt Data			
Qty:	48		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	75	<-- Disregard	Bolt Fty: 44.00
N/A:	55	<-- 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:		<-- Disregard
Groove Angle:		<-- 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

Stress Increase Factor	
ASIF:	1.333

Flange Bolt Results

			Stiffened
Bolt Tension Capacity, B:	46.07	kips	Service, ASD
Max Bolt directly applied T:	27.69	Kips	Fty*ASIF
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	46.07	kips	<-- B, Stiffened
Prying Force, Q:	0.00	kips	Stiffened
Total Bolt Tension=T+Q:	27.69	kips	
Non-Prying Bolt Stress Ratio, T/B:	60.1%	Pass	

Exterior Flange Plate Results Shear Check Only

			Stiffened
Compression Side Plate Stress:	3.9	ksi	Service, ASD
Allowable Plate Stress:	19.2	ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	20.2%	Pass	Comp. Y.L. Length:
Stiffened			N/A, Roark
Tension Side Stress Ratio, (treq/t)^2:	N/A		

Stiffener Results

Horizontal Weld :	60.4%	Pass
Vertical Weld:	41.0%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	28.8%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	45.1%	Pass
Plate Comp. (AISC Bracket):	64.9%	Pass

Pole Results

Pole Punching Shear Check:	20.8%	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 F

Site Data

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

Manufacturer:	Other

Reactions		
Moment:	1616.28	ft-kips
Axial:	32.152	kips
Shear:	35.832	kips
Exterior Flange Run, T+Q:	27.69	kips

Reactions adjusted to account for load in flat plate shaft reinforcing

Elevation: 100 feet

Bolt Data				
Qty:	48			
Diam:	1	Bolt Fu:	120	
Bolt Material:	A325	Bolt Fy:	92	
N/A:	100	<-- Disregard	Bolt Fty:	44.00
N/A:	75	<-- 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:		<-- Disregard
Groove Angle:		<-- 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

Stress Increase Factor		
ASIF:	1.333	

Interior Flange Bolt Results

Maximum Bolt Tension:	27.7	Kips, Ext. Flange T+Q
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	60.1%	Pass

Interior Flange Plate Results Shear Check Only

Controlling Bolt Axial Force:	29.0	Kips, Ext. C= Interior C
Plate Stress:	4.4	ksi
Allowable Plate Stress:	19.2	ksi
Plate Stress Ratio:	23.0%	Pass

Stiffener Results

Horizontal Weld :	60.1%	Pass
Vertical Weld:	33.7%	Pass
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	22.0%	Pass
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	44.3%	Pass
Plate Comp. (AISC Bracket):	56.1%	Pass

Pole Results

Pole Punching Shear Check:	16.0%	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 F

Site Data

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

Pole Manufacturer:	Pirod

Bolt Data			
Qty:	36		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	Bolt Fty:
N/A:	0	<-- Disregard	44.00
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

Stress Increase Factor	
ASIF:	1.3333333

Reactions		
Moment:	1415.64	ft-kips
Axial:	25.53	kips
Shear:	32.65	kips
Elevation:	120	feet

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

Flange Bolt Results

		Rigid
Bolt Tension Capacity, B:	46.08 kips	Service, ASD
Max Bolt directly applied T:	36.30 Kips	Fty*ASIF
Min. PL "tc" for B cap. w/o Pry:	1.354 in	
Min PL "treq" for actual T w/ Pry:	0.909 in	
Min PL "t1" for actual T w/o Pry:	1.202 in	
T allowable with Prying:	43.81 kips	0≤α'≤1 case
Prying Force, Q:	0.00 kips	
Total Bolt Tension=T+Q:	36.30 kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	78.8% Pass	

Exterior Flange Plate Results	Flexural Check	Rigid
Compression Side Plate Stress:	Rohn/Pirod, OK	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	Rohn/Pirod, OK	Comp. Y.L. Length: 17.23
No Prying		
Tension Side Stress Ratio, (treq/t)^2:	52.9% Pass	

n/a

Stiffener Results	
Horizontal Weld :	N/A for Rohn / Pirod
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 F

Site Data

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

Manufacturer:	Pirod

Reactions		
Moment:	1415.64	ft-kips
Axial:	25.53	kips
Shear:	32.65	kips
Exterior Flange Run, T+Q:	36.3	kips

Elevation: 120 feet

Bolt Data			
Qty:	36		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	Bolt Fty: 44.00
N/A:	0	<-- Disregard	
Circle:	51	in	

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

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		
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

Stress Increase Factor	
ASIF:	1.3333333

Interior Flange Bolt Results

Maximum Bolt Tension:	36.3 Kips, Ext. T=Interior T
Allowable Tension:	46.1 Kips
Bolt Stress Ratio:	78.8% Pass

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	37.7 Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod OK
Allowable Plate Stress:	36.0 ksi
Plate Stress Ratio:	Rohn/Pirod OK

n/a

Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A

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

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

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

Site Data

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

Pole Manufacturer:	Pirod

Bolt Data			
Qty:	32		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	Bolt Fty:
N/A:	0	<-- Disregard	44.00
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

Stress Increase Factor	
ASIF:	1.3333333

Reactions		
Moment:	792.92	ft-kips
Axial:	20.3	kips
Shear:	29.64	kips
Elevation:	140	feet

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

Flange Bolt Results

		Rigid
Bolt Tension Capacity, B:	46.08 kips	Service, ASD
Max Bolt directly applied T:	25.80 Kips	Fty*ASIF
Min. PL "tc" for B cap. w/o Pry:	1.365 in	
Min PL "treq" for actual T w/ Pry:	0.774 in	
Min PL "t1" for actual T w/o Pry:	1.021 in	
T allowable with Prying:	43.60 kips	0≤α'≤1 case
Prying Force, Q:	0.00 kips	
Total Bolt Tension=T+Q:	25.80 kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	56.0% Pass	

Exterior Flange Plate Results Flexural Check

		Rigid
Compression Side Plate Stress:	Rohn/Pirod, OK	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Compression Plate Stress Ratio:	Rohn/Pirod, OK	Comp. Y.L. Length:
No Prying		16.16
Tension Side Stress Ratio, (treq/t)^2:	38.3% 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 F

Site Data

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

Reactions		
Moment:	792.92	ft-kips
Axial:	20.3	kips
Shear:	29.64	kips
Exterior Flange Run, T+Q:	25.8	kips

Elevation: 140 feet

Manufacturer:	Pirod

Bolt Data				
Qty:	32			
Diam:	1	Bolt Fu:	120	
Bolt Material:	A325	Bolt Fy:	92	
N/A:	0	<-- Disregard	Bolt Fty:	
N/A:	0	<-- Disregard	44.00	
Circle:	45	in		

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

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		
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

Stress Increase Factor		
ASIF:	1.3333333	

Interior Flange Bolt Results

Maximum Bolt Tension:	25.8	Kips, Ext. Flange T+Q
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	56.0%	Pass

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	27.1	Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

n/a

Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt
** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

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

Site Data

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

Pole Manufacturer:	Pirod

Bolt Data			
Qty:	28		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	Bolt Fty:
N/A:	0	<-- Disregard	44.00
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

Stress Increase Factor	
ASIF:	1.3333333

Reactions		
Moment:	291.36	ft-kips
Axial:	11.37	kips
Shear:	15.29	kips
Elevation:	160	feet

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

Flange Bolt Results

Rigid
Service, ASD
Fty*ASIF

Bolt Tension Capacity, B:	46.08 kips	
Max Bolt directly applied T:	12.40 Kips	
Min. PL "tc" for B cap. w/o Pry:	1.379 in	
Min PL "treq" for actual T w/ Pry:	0.543 in	
Min PL "t1" for actual T w/o Pry:	0.715 in	
T allowable with Prying:	43.34 kips	0≤α'≤1 case
Prying Force, Q:	0.00 kips	
Total Bolt Tension=T+Q:	12.40 kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	26.9% Pass	

Exterior Flange Plate Results — Flexural Check

Rigid
Service ASD
0.75*Fy*ASIF
Comp. Y.L. Length: 15.00

Compression Side Plate Stress:	Rohn/Pirod, OK
Allowable Plate Stress:	36.0 ksi
Compression Plate Stress Ratio:	Rohn/Pirod, OK
No Prying	
Tension Side Stress Ratio, (treq/t)^2:	18.9% 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 F

Site Data

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

Reactions		
Moment:	291.36	ft-kips
Axial:	11.37	kips
Shear:	15.29	kips
Exterior Flange Run, T+Q:	12.4	kips

Elevation: 160 feet

Manufacturer:	Pirod

Bolt Data			
Qty:	28		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	Bolt Fty: 44.00
N/A:	0	<-- Disregard	
Circle:	39	in	

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

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		
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

Stress Increase Factor	
ASIF:	1.3333333

Interior Flange Bolt Results

Maximum Bolt Tension:	12.4 Kips, Ext. T=Interior T
Allowable Tension:	46.1 Kips
Bolt Stress Ratio:	26.9% Pass

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	13.2 Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod OK
Allowable Plate Stress:	36.0 ksi
Plate Stress Ratio:	Rohn/Pirod OK

n/a

Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A

* 0 = none, 1 = every bolt, 2 = every 2 bolts, 3 = 2 per bolt
** Note: for complete joint penetration groove welds the groove depth must be exactly 1/2 the stiffener thickness for calculation purposes

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

Site Data

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

Pole Manufacturer:	Pirod

Bolt Data			
Qty:	24		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	Bolt Fty:
N/A:	0	<-- Disregard	44.00
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

Stress Increase Factor	
ASIF:	1.3333333

Reactions		
Moment:	58.84	ft-kips
Axial:	3.4	kips
Shear:	6.04	kips
Elevation:	180	feet

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

Flange Bolt Results

Bolt Tension Capacity, B:	46.08 kips	Rigid
Max Bolt directly applied T:	3.42 Kips	Service, ASD
Min. PL "tc" for B cap. w/o Pry:	1.398 in	Fty*ASIF
Min PL "treq" for actual T w/ Pry:	0.290 in	
Min PL "t1" for actual T w/o Pry:	0.381 in	
T allowable with Prying:	42.99 kips	0≤α'≤1 case
Prying Force, Q:	0.00 kips	
Total Bolt Tension=T+Q:	3.42 kips	
Prying Bolt Stress Ratio=(T+Q)/(B):	7.4% Pass	

Exterior Flange Plate Results Flexural Check

Compression Side Plate Stress:	Rohn/Pirod, OK	Rigid
Allowable Plate Stress:	36.0 ksi	Service ASD
Compression Plate Stress Ratio:	Rohn/Pirod, OK	0.75*Fy*ASIF
No Prying		Comp. Y.L. Length: 13.75
Tension Side Stress Ratio, (treq/t)^2:	5.4% 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 F

Site Data

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

Reactions		
Moment:	58.84	ft-kips
Axial:	3.4	kips
Shear:	6.04	kips
Exterior Flange Run, T+Q:	3.42	kips

Manufacturer:	Pirod

Elevation: 180 feet

Bolt Data			
Qty:	24		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:	0	<-- Disregard	Bolt Fty:
N/A:	0	<-- Disregard	44.00
Circle:	33	in	

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

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		
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

Stress Increase Factor	
ASIF:	1.3333333

Interior Flange Bolt Results

Maximum Bolt Tension:	3.4	Kips, Ext. T=Interior T
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	7.4%	Pass

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	3.7	Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

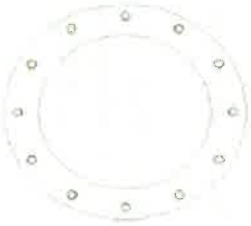
n/a

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

Moment Capacity of Rock Anchored Foundation - Wind into Corner

PJF job no. 37513-0787, R4

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Note: For purposes of this check, max allowable rock anchor cap limited to proved rock anchor cap / lock-off load of 172 kips

Determination of effective rock compression area (for moment loads)

Controlling foundation % Capacity = **62.7%** **OK**

Elevation = 0 feet Total pole plus soil & fdn weight = 376.4 kips

Diagonal dimension = 305.40 in 1/2 x diagonal dimension = 152.70 in

Neutral axis location = 108.85 in (Measured from max. compression fiber)

Therefore c= 108.85 inches and a = β_1 x c = 92.52 inches β_1 = 0.85

Area of fdn-rock contact, Afr = 8559.6 square inches Net area of Afr = 8470.3 square inches

Centroid of Afr located 243.72 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 = 730.5 kips

Usable rock and rock anchor compression capacity, SC = 1106.9 kips

Rock contribution to Mn = 4350.5 ft-kips

Pole / foundation / soil wt contribution to Mn = 1375.6 ft-kips

Cross-section Moment Cap.		
M_{cap} =	12094.5	ft-kips

M_{actual} = 6831 ft-kips (At bottom of pad)

Mact / Mcap = 56.5%

Rock anchor steel capacity = 200 kips (SF = 2)

Rock anchor % Cap = 48.5% OK

Max rock strain = 0.0015 (SF=2)

Rock % Cap = 62.7% OK

Additional bar reinforcement information

No. of bars, Nb = 4 Number of bar group locations = 3 No. of bars per group location = 1

Separation angle between bar groups = 90 degrees Area of bar = 2.6 sq. in.

Bar edge distance = 44.5 inches (measured to center of bar group) Modulus of elasticity of bar, E_b = 29000 ksi

Bar strain calculations

Assumed rock strain = 0.001665

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	1	152.05	0.0023	171.8	171.8	2177.5
2	2	43.85	0.0006	47.0	94.1	343.9
3	1	-64.35	0.0000	0.0	0.0	0.0
4	0	---	---	---	---	---
5	0	---	---	---	---	---
6	0	---	---	---	---	---
7	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	1	0.0000	0.0	0.0	0.0	---
2	2	0.0000	0.0	0.0	0.0	---
3	1	-0.0010	-77.7	0.0	0.0	28.27
4	0	---	---	---	---	---
5	0	---	---	---	---	---
6	0	---	---	---	---	---
7	0	---	---	---	---	---
8	0	---	---	---	---	---
9	0	---	---	---	---	---
10	0	---	---	---	---	---

$M_n = \Sigma$ (Load in bar groups x bar group distance to N.A.) = **2521.4** ft-kips

$M_u = \phi M_n = 0.75 \times M_n =$ **1891.1** ft-kips

Bar yield strength = **332.000** kips

Additional bar reinforcement information

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

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

bar edge distance = 72.1 inches (measured to center of bar group) Modulus of elasticity of bar, Ef = 29000 ksi

Bar strain calculations

(Type of bar = B ("B" for bar, "T" for tape or "L" for laminate)

Assumed rock strain = 0.001665

Location	No. of bar groups, NFG	Dist. to neutral axis	ε (Tension)	Tension per bar, TF	$T_L = N_{FG} \times T_F$	Mn Contribution
1	0	124.45	0.0019	143.5	0.0	0.0
2	2	113.66	0.0017	131.1	262.2	2483.2
3	2	84.15	0.0013	97.1	194.1	1361.4
4	0	43.85	0.0007	50.6	0.0	0.0
5	2	3.55	0.0001	4.1	8.2	2.4
6	2	-25.95	0.0000	0.0	0.0	0.0
7	0	-36.75	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, NFG	ε (Comp)	Comp. per bar, CF	$C_L = N_{FG} \times C_F$	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	-0.0004	-29.9	0.0	0.0	28.27
7	0	-0.0006	-42.4	0.0	0.0	28.27
8	0	---	---	---	---	---
9	0	---	---	---	---	---
10	0	---	---	---	---	---

Mn = S (Load in bar groups x bar group distance to N.A.) = **3847.0** ft-kips

$M_u = \phi M_n = 0.9 \times M_n =$ **3462.3** ft-kips

bar yield strength = **332.000** kips

Rock Anchored Foundation Structural and Overturning Checks

Beam Shear, Tension Side - Wind into corner

b =	151	in	(Critical section at distance of d away from center of anchor, towards face of pier)
d=	31	in	
f'c=	5000	psi	
Vu=	223.6	kips	(Assumed to be 1.3 times max proven anchor capacity)
ϕ=	0.85		
ϕVc=	562.7	kips	
% Cap=	22.4%	OK	(Vu adjusted for actual rock bolt load)

Beam Shear, Compression Side - Wind into corner

b =	271.0	in	(Critical section at distance of a plus d away from corner of foundation)
d=	43	in	
f'c=	5000	psi	
Vu=	812.7	kips	(1.3 times SC, adjusted for overall foundation % Capacity)
ϕ=	0.85		
ϕVc=	1401.0	kips	
% Cap=	58.0%	OK	

Punching Shear, Tension Side - Wind into corner

b =	94	in	(Critical section at distance of 0.5d away from center of anchor in all applicable directions)
d=	31	in	
f'c=	5000	psi	
Vu=	223.6	kips	(Assumed to be 1.3 times max proven anchor capacity)
ϕ=	0.85		
ϕVc=	700.6	kips	
% Cap=	18.0%	OK	(Adjusted for actual rock bolt load)

Internal Pad Bending - Wind into Side

Centroid of loads on tension and compression sides of foundation less than distance of d away from face of pier. Therefore, load assumed to be transferred through deep beam type action (bending is negligible)

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 =	13.75	feet	
# of anchors in Line 2, N2 =	4		(Combined anchors on either side of foundation centerline)
Line 2 distance to rotation pt, d2 =	9	feet	
Foundation / pole / soil wt, W =	376.4	kips	
Distance to rotation pt, dw =	9	feet	
Foundation actual OTM, Mo =	6831	ft-k	(At bottom of foundation)
Overturning resistance, Mr =	23736	ft-k	(N1 x d1 x PL + N2 x d2 x [d2/d1 x PL] + W x dw)
% Cap = Mo / 0.5Mr =	57.6%	OK	(Min SF=2)

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

Moment Capacity of Rock Anchored Foundation - Wind into Side

PJF job no. 37513-0787, R4

Note: For purposes of this check, max allowable rock anchor cap limited to proved rock anchor cap / lock-off load of 172 kips

Determination of effective rock compression area (for moment loads)

Controlling foundation % Capacity = 78.1% OK

Elevation = 0 feet Total pole plus soil & fdn weight = 376.4 kips
Side dimension = 216.00 in 1/2 x diagonal dimension = 108.00 in
Neutral axis location = 68.20 in (Measured from max. compression fiber)
Therefore c= 68.20 inches and a = β_1 x c = 57.97 inches β_1 = 0.85

Area of fdn-rock contact, Afr = 12521.7 square inches Net area of Afr = 12347.9 square inches

Centroid of Afr located 187.01 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 = 916.7 kips

Usable rock and rock anchor compression capacity, SC = 1293.1 kips
Rock contribution to Mn = 4225.7 ft-kips
Pole / foundation / soil wt contribution to Mn = 1248.4 ft-kips

Cross-section Moment Cap.		
M_{cap} =	13170.6	ft-kips

M_{actual} = 6831 ft-kips (At bottom of pad)
Mact / Mcap = 51.9%

Rock anchor steel capacity = 200 kips (SF = 2)
Rock anchor % Cap = 44.5% OK

Max rock strain = 0.0015 (SF=2)
Rock % Cap = 46.1% OK

Additional bar reinforcement information

No. of bars, Nb = 8 Number of bar group locations = 5 No. of bars per group location = 1

Separation angle between bar groups = 45 degrees Area of bar = 2.6 sq. in.

Bar edge distance = -0.187 inches (measured to center of bar group) Modulus of elasticity of bar, E_b = 29000 ksi

Bar strain calculations

Assumed rock strain = 0.0013343

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	147.99	0.0029	215.9	0.0	0.0
2	2	116.30	0.0022	169.1	338.3	3278.4
3	0	39.80	0.0007	56.3	0.0	0.0
4	2	-36.70	0.0000	0.0	0.0	0.0
5	0	-68.39	0.0000	0.0	0.0	0.0
6	0	---	---	---	---	---
7	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	0	0.0000	0.0	0.0	0.0	---
4	2	-0.0007	-54.1	0.0	0.0	28.27
5	0	-0.0013	-100.9	0.0	0.0	28.27
6	0	---	---	---	---	---
7	0	---	---	---	---	---
8	0	---	---	---	---	---
9	0	---	---	---	---	---
10	0	---	---	---	---	---

$M_n = \Sigma$ (Load in bar groups x bar group distance to N.A.) = **3278.4** ft-kips

$M_u = \phi M_n = 0.75 \times M_n =$ **2458.8** ft-kips

Bar yield strength = **332.000** kips

Additional bar reinforcement information

No. of bar, Nf = 20 Number of bar group locations = 11 No. of bar 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, Ef = 29000 ksi

Bar strain calculations

(Type of bar = B ("B" for bar, "T" for tape or "L" for laminate)

Assumed rock strain = 0.0013343

Location	No. of bar groups, NFG	Dist. to neutral axis	ε (Tension)	Tension per bar, TF	$T_L = N_{FG} \times T_F$	Mn Contribution
1	0	120.40	0.0024	177.6	0.0	0.0
2	2	116.45	0.0023	171.8	343.6	3334.2
3	0	105.01	0.0021	154.9	0.0	0.0
4	0	87.17	0.0017	128.6	0.0	0.0
5	2	64.71	0.0013	95.5	190.9	1029.4
6	0	39.80	0.0008	58.7	0.0	0.0
7	2	14.89	0.0003	22.0	43.9	54.5
8	0	-7.58	0.0000	0.0	0.0	0.0
9	0	-25.41	0.0000	0.0	0.0	0.0
10	2	-36.86	0.0000	0.0	0.0	0.0
11	0	-40.80	0.0000	0.0	0.0	0.0
12	0	---	---	---	---	---
13	0	---	---	---	---	---

Determination of bar contribution to ultimate moment capacity

Location	No. of bar groups, NFG	ε (Comp)	Comp. per bar, CF	$C_L = N_{FG} \times C_F$	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	-0.0001	-11.2	0.0	0.0	28.27
9	0	-0.0005	-37.5	0.0	0.0	28.27
10	2	-0.0007	-54.4	0.0	0.0	28.27
11	0	-0.0008	-60.2	0.0	0.0	28.27
12	0	- - -	- - -	- - -	- - -	- - -
13	0	- - -	- - -	- - -	- - -	- - -

Mn = S (Load in bar groups x bar group distance to N.A.) = **4418.1** ft-kips

$M_u = \phi M_n = 0.9 \times M_n =$ **3976.3** ft-kips

bar yield strength = **332.000** kips

Rock Anchored Foundation Structural and Overturning Checks

PJF job no. 37513-0787, R4

Beam Shear, Tension Side - Wind into Side

b =	216.00	in	(Equal to width of mat)
d=	31	in	
f'c=	5000	psi	
Vu=	463.9	kips	(1.3 times max proven anchor capacity, adjusted for overall foundation % Capacity)
ϕ=	0.85		
ϕVc=	804.9	kips	
% Cap=	57.6%	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=	871.9	kips	(1.3 times SC, adjusted for overall foundation % Capacity)
ϕ=	0.85		
ϕVc=	1116.5	kips	
% Cap=	78.1%	OK	

Punching Shear, Tension Side - Wind into Side

b =	94	in	(Critical section at distance of 0.5d away from center of anchor in all applicable directions)
d=	31	in	
f'c=	5000	psi	
Vu=	223.6	kips	(Assumed to be 1.3 times max proven anchor capacity)
ϕ=	0.85		
ϕVc=	700.6	kips	
% Cap=	16.6%	OK	(Adjusted for actual rock bolt load)

Centroid of loads on tension and compression sides of foundation less than distance of d away from face of pier. Therefore, load assumed to be transferred through deep beam type action (bending is negligible)

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 =	13.75	feet	
# of anchors in Line 2, N2 =	4		(Combined anchors on either side of foundation centerline)
Line 2 distance to rotation pt, d2 =	9	feet	
Foundation / pole / soil wt, W =	376.4	kips	
Distance to rotation pt, dw =	9	feet	
Foundation actual OTM, Mo =	6831	ft-k	(At bottom of foundation)
Overturning resistance, Mr =	23736	ft-k	(N1 x d1 x PL + N2 x d2 x [d2/d1 x PL] + W x dw)
% Cap = Mo / 0.5Mr =	57.6%	OK	(Min SF=2)

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