Robinson+Cole

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Also admitted in Massachusetts

December 28, 2015

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

Re: **Notice of Exempt Modification – Facility Modification**
66 Wall Street, Hebron, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains three (3) wireless telecommunications antennas at the 135-foot level of the existing 150-foot flagpole tower at 66 Wall Street in Hebron, Connecticut (the "Property"). The tower is owned by SBA Communications Corporation ("SBA"). The Council approved Cellco's use of the tower in 2001. Cellco now intends to modify its facility by replacing all of its existing antennas with three (3) model SBNHH-1D65A antennas at the same level on the tower. Cellco also intends to install two (2) HYBRIFLEX™ fiber optic antenna cables inside the tower shaft. Included in Attachment 1 are specifications for Cellco's replacement antennas and HYBRIFLEX™ cables.

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 Andrew Tierney, Town Manager for the Town of Hebron. The Town of Hebron is the owner of the Property. A copy of this letter is also being sent to SBA, the tower owner.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco's replacement antennas will be located at the 135-foot level on the 150-foot flagpole 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/or local criteria.

4. The operation of the modified facility 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 behind 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 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:
Andrew Tierney, Hebron Town Manager
SBA
Tim Parks

ATTACHMENT 1

Product Specifications

COMMSCOPE®

SBNHH-1D65A

Andrew® Tri-band Antenna, 698–896 and 2x 1695–2360 MHz, 65° horizontal beamwidth, internal RET. Both high bands share the same electrical tilt.

POWERED BY ANDREW.

Electrical Specifications

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2360
Gain, dBi	13.6	13.7	16.5	16.9	17.1	17.6
Beamwidth, Horizontal, degrees	66	61	70	65	62	61
Beamwidth, Vertical, degrees	17.6	15.9	7.1	6.6	6.2	5.5
Beam Tilt, degrees	0–18	0–18	0–10	0–10	0–10	0–10
USLS, dB	16	13	13	13	12	12
Front-to-Back Ratio at 180°, dB	25	27	28	28	27	29
CPR at Boresight, dB	20	16	20	23	17	20
CPR at Sector, dB	10	5	11	6	1	4
Isolation, dB	25	25	25	25	25	25
Isolation, Intersystem, dB	30	30	30	30	30	30
VSWR | Return Loss, dB	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0	1.5 | 14.0
PIM, 3rd Order, 2 x 20 W, dBc	-153	-153	-153	-153	-153	-153
Input Power per Port, maximum, watts	350	350	350	350	350	300
Polarization	±45°	±45°	±45°	±45°	±45°	±45°

Electrical Specifications, BASTA*

Frequency Band, MHz	698–806	806–896	1695–1880	1850–1990	1920–2180	2300–2360
Gain by all Beam Tilts, average, dBi	13.1	13.1	16.1	16.5	16.7	17.2
Gain by all Beam Tilts Tolerance, dB	±0.5	±0.5	±0.5	±0.3	±0.5	±0.4
Gain by Beam Tilt, average, dBi	0 ° | 13.4	0 ° | 13.4	0 ° | 16.0	0 ° | 16.3	0 ° | 16.5	0 ° | 17.0
	9 ° | 13.1	9 ° | 13.1	5 ° | 16.2	5 ° | 16.5	5 ° | 16.8	5 ° | 17.3
	18 ° | 12.7	18 ° | 12.7	10 ° | 16.1	10 ° | 16.5	10 ° | 16.6	10 ° | 16.9
Beamwidth, Horizontal Tolerance, degrees	±3.1	±5.4	±2.8	±4	±6.6	±4.6
Beamwidth, Vertical Tolerance, degrees	±1.8	±1.4	±0.3	±0.4	±0.5	±0.3
USLS, dB	15	14	15	15	15	14
Front-to-Back Total Power at 180° ± 30°, dB	22	21	26	26	24	25
CPR at Boresight, dB	22	16	22	25	21	22
CPR at Sector, dB	10	6	12	8	5	4

* CommScope® supports NGMN recommendations on Base Station Antenna Standards (BASTA). To learn more about the benefits of BASTA, download the whitepaper Time to Raise the Bar on BSAs.

Mechanical Specifications

Color | Radome Material	Light gray | Fiberglass, UV resistant
Connector Interface | Location | Quantity	7-16 DIN Female | Bottom | 6
Wind Loading, maximum	445.0 N @ 150 km/h 100.0 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h | 150.0 mph
Antenna Dimensions, L x W x D	1409.0 mm x 301.0 mm x 180.0 mm | 55.5 in x 11.9 in x 7.1 in
Net Weight	15.2 kg | 33.5 lb

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)		[mm (AWG)]	8.4 (8)
Quantity, Wire Count (Power)			16 (8 pairs)
Size (Alarm)		[mm (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)

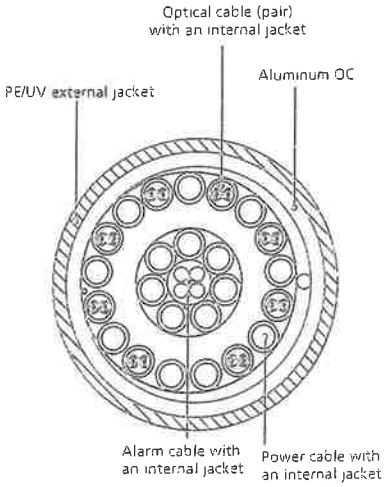


Figure 2: Construction Detail

* This data is provisional and subject to change

ATTACHMENT 2

	General	Power	Density					
Site Name: Hebron								
Tower Height: 150'								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Sprint	2	313	127.4	0.0153	1900	1.0000	0.15%	
*AT&T UMTS	2	982	115	0.0594	880	0.5867	1.01%	
*AT&T UMTS	2	1355	115	0.0820	1900	1.0000	0.82%	
*AT&T GSM	1	491	115	0.0149	880	0.5867	0.25%	
*AT&T GSM	4	813	115	0.0984	1900	1.0000	0.98%	
*AT&T LTE	1	1313	115	0.0397	734	0.4893	0.81%	
Verizon	**11**	**298**	**135**	**0.0647**	**1970**	**1.0000**	**6.47%**	
Verizon	**9**	**207**	**135**	**0.0368**	**869**	**0.5793**	**6.34%**	
Verizon	**1**	**1585**	**135**	**0.0313**	**2145**	**1.0000**	**3.13%**	
Verizon	**1**	**603**	**135**	**0.0119**	**746**	**0.4973**	**2.39%**	
								22.4%
* Source: Siting Council								

ATTACHMENT 3

FDH VELOCITEL

ENGINEERING INNOVATION

FDH Velocitel, 6521 Meridien Drive Raleigh, NC 27616, Ph. 919.755.1012

Structural Analysis for SBA Network Services, Inc.

150' Monopole Tower (150' AGL)

SBA Site Name: Central Hebron
SBA Site ID: CT04374-S-02
Verizon Site Name: Hebron CT
Site Address: 66 Wall Street, Hebron, CT 06248-1530

FDH Velocitel Project Number 15CAXZ1400 R.1

Analysis Results

Tower Components	93.0%	Sufficient
Foundation	88.8%	Sufficient

Prepared By:

Drew Alexander, EI
Project Engineer I

Reviewed By:

Dennis D. Abel, PE
Director of Structural Engineering
CT License No. 23247

Velocitel, Inc., d.b.a. FDH Velocitel
6521 Meridien Drive
Raleigh, NC, 27616
(919) 755-1012

10-21-2015

October 21, 2015

Prepared pursuant to the TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2005 Connecticut Building Code (CBC)

TABLE OF CONTENTS

EXECUTIVE SUMMARY

At the request of SBA Network Services, Inc., FDH Velocitel performed a structural analysis of the existing Monopole Tower located in Hebron, CT to determine whether the tower is structurally adequate to support the antenna configuration in place per **Table 1** pursuant to the *TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2005 Connecticut Building Code (CBC)*. Information pertaining to the antenna loading, current tower geometry, member sizes, and below grade parameters was obtained from:

Source	Document Type	Reference	Date
PiROD, Inc.	Tower & Foundation Drawings	Eng. File No. A-117319	July 19, 2000
FDH Engineering, Inc.	Geotechnical Report	Project No. 1201291EG1	February 14, 2012
SBA Network Services, Inc.	-	-	-

The basic design wind speed per *TIA/EIA-222-F* standards and *2005 Connecticut Building Code* is 85 mph without ice and 38 mph with 1" radial ice. Ice is considered to increase in thickness with height.

Conclusions

With the antenna configuration in place per **Table 1** we have determined the tower stress level to be sufficient and the foundation to be sufficient pursuant to the requirements stipulated by *TIA/EIA-222-F Structural Standards for Steel Antenna Towers and Antenna Supporting Structures and 2005 Connecticut Building Code* provided the **Recommendation** listed below is satisfied. For a more detailed description of the analysis of the tower, see the **Results** section of this report.

Our structural analysis has been performed assuming all information provided to FDH Velocitel is accurate (i.e., the structure member information, tower layout, existing antenna loading, and proposed antenna loading) and that the tower has been properly erected and maintained per the original design drawings.

Recommendations

To ensure the requirements of the current analysis standards are met with the antenna configuration in place per **Table 1**, we have the following recommendation:

1. Proposed feed lines must be installed inside the monopoles shaft unless otherwise noted.

APPURTENANCE LISTING

The antennas and equipment, with their corresponding feed lines, considered for this analysis are shown in **Table 1**. *If the actual layout determined in the field deviates from the layout, FDH Velocitel should be contacted to perform a revised analysis.*

Table 1 - Appurtenance Loading

Existing Loading:

Antenna Elevation (ft.)	Description	Feed Lines	Carrier	Mount Elevation (ft.)	Mount Type
135.0	(3) Antel QXW-634X638XBF-EDIN (6) RFS Celwave FDL85002/1C-3L	(12) 7/8"	Verizon	135.0	Inside 24" Ø Concealment Shroud
125.0	(3) EMS RR90-17	(6) 7/8"	Sprint	125.0	Inside 24" Ø Concealment Shroud
115.0	(3) Powerwave 7770 (6) Powerwave LGP21401	(6) 1-5/8"	AT&T	115.0	Inside 36" Ø Concealment Shroud

Proposed Carrier Final Loading:

Antenna Elevation (ft.)	Description	Feed Lines	Carrier	Mount Elevation (ft.)	Mount Type
135.0	(3) Andrew SBNHH-1D65A (6) RFS Celwave FDL85002/1C-3L (2) RFS Celwave DB-T1-6Z-8AB-0Z	(12) 7/8" (2) 1-5/8" Hybriflex	Verizon	135.0	Inside 24" Ø Concealment Shroud

RESULTS

The following material grades for individual members were used for analysis:

Table 2 - Material Grade

Member Type	Material Grade
Pipe	A53-B-42
Anchor Bolts	A687
Flange Bolts	A325
Plate	A36

Table 3 and **Table 4** display the summary of capacities for the analyzed structure and its additional components. Values greater than 100% indicate locations where the maximum force in the member exceeds its capacity.

If the assumptions outlined in this report differ from actual field conditions, FDH Velocitel should be contacted to perform a revised analysis. Furthermore, as no information pertaining to the allowable twist and sway requirements for the appurtenances was provided, deflection and rotation were not taken into consideration when performing this analysis.

See the **Appendix** for detailed modeling information.

Table 3 - Structure Member Capacities

Section No.	Elevation (ft.)	Component Type	Size	% Capacity	Pass / Fail
L1	150 - 130	Pole	P6.625x0.432	52.6	Pass
L2	130 - 110	Pole	P6.75x1	93.0	Pass
L3	110 - 80	Pole	P24x0.375	36.7	Pass
L4	80 - 50	Pole	P24x0.375	68.8	Pass
L5	50 - 20	Pole	P30x0.375	76.3	Pass
L6	20 - 0	Pole	P36x0.375	71.9	Pass

1. Capacities include 1/3 allowable stress increase for wind, per *TIA/EIA-222-F* standards.

Table 4 – Additional Structure Component Capacities

Elevation (ft.)	Component	% Capacity	Pass / Fail	Notes
130	Spoked Flange Plate	25.6	Pass	-
130	Flange Bolts	15.0	Pass	-
110	Spoked Flange Plate	81.7	Pass	-
110	Flange Bolts	49.8	Pass	-
80	Flange Plate	OK	Pass	2
80	Flange Bolts	54.6	Pass	-
50	Flange Plate	OK	Pass	2
50	Flange Bolts	63.9	Pass	-
20	Flange Plate	OK	Pass	2
20	Flange Bolts	68.9	Pass	-
0	Anchor Bolts	57.0	Pass	-
0	Base Plate	OK	Pass	2
0	Base Foundation (Soil Interaction)	88.8	Pass	-

1. Capacities include 1/3 allowable stress increase for wind, per *TIA/EIA-222-F* standards.
2. Based on the design methodology of the manufacturer, the base/flange plates have been sufficiently designed to resist the full capacity of the bolts and shaft.

GENERAL COMMENTS

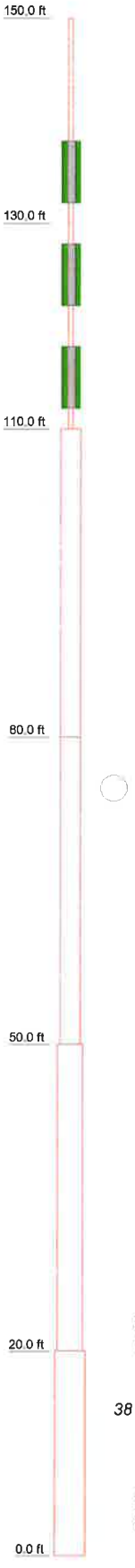
This engineering analysis is based upon the theoretical capacity of the structure. It is not a condition assessment of the tower and its foundation. It is the responsibility of SBA Network Services, Inc. to verify that the tower modeled and analyzed is the correct structure (with accurate antenna loading information) modeled. If there are substantial modifications to be made or the assumptions made in this analysis are not accurate, FDH Velocitel should be notified immediately to perform a revised analysis.

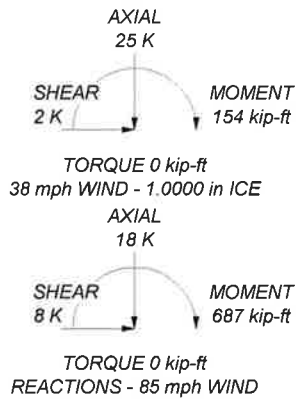
LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Velocitel.

APPENDIX

Section	Size	Length (ft)	Grade	Weight (K)
1	P6.625x0.432	20.00	A500-42	0.6
2	P6.75x1	20.00		1.2
3	P24x0.375	30.00		2.8
4	P24x0.375	30.00	A53-B-42	2.8
5	P30x0.375	30.00		3.6
6	P36x0.375	20.00		2.9
				13.9





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Truck Ball	150.75	Canister Load3	130
Canister Load1	150	RR90-17-00DP	125
Flag	150	RR90-17-00DP	125
Canister Load2	140	RR90-17-00DP	125
SBNHH-1D65A	135	Canister Load4	120
SBNHH-1D65A	135	(2) LGP21401 TMA	115
SBNHH-1D65A	135	7770.00	115
(2) FDL85002/1C-3L Diplexer	135	(2) LGP21401 TMA	115
(2) FDL85002/1C-3L Diplexer	135	(2) LGP21401 TMA	115
(2) FDL85002/1C-3L Diplexer	135	7770.00	115
DB-T1-6Z-8AB-0Z	135	7770.00	115
DB-T1-6Z-8AB-0Z	135	Canister Load5	110

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-42	42 ksi	58 ksi	A53-B-42	42 ksi	63 ksi

TOWER DESIGN NOTES

1. Tower is located in Tolland 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 38 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 93%

FDH VELOCITEL ENGINEERING INNOVATION
Tower Analysis

Velocitel, Inc. d.b.a. FDH Velocitel
6521 Meridien Drive
Raleigh, North Carolina 27616
Phone: 9197551012
FAX: 9197551031

Job:	***Central Hebron, CT04374-S-02***		
Project:	***15CAXZ1400 R.1***		
Client: SBA Network Services, Inc.		Drawn by: DAlexander	App'd:
Code: TIA/EIA-222-F		Date: 10/21/15	Scale: N
Path:			Dwg No.

Tower Input Data

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

Tower is located in Tolland County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 38 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
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	150.00-130.00	20.00	P6.625x0.432	A500-42 (42 ksi)	
L2	130.00-110.00	20.00	P6.75x1	A500-42 (42 ksi)	
L3	110.00-80.00	30.00	P24x0.375	A53-B-42 (42 ksi)	
L4	80.00-50.00	30.00	P24x0.375	A53-B-42 (42 ksi)	
L5	50.00-20.00	30.00	P30x0.375	A53-B-42	

Section	Elevation ft	Section Length ft	Pole Size	Pole Grade	Socket Length ft
L6	20.00-0.00	20.00	P36x0.375	(42 ksi) A53-B-42 (42 ksi)	

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.00-130.00				1	0	1		
L2 130.00-110.00				1	0	1		
L3 110.00-80.00				1	1	1		
L4 80.00-50.00				1	1	1		
L5 50.00-20.00				1	1	1		
L6 20.00-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
***										

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 plf
7/8"	C	No	Inside Pole	125.00 - 0.00	6	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
						1" Ice	0.00	0.54
						2" Ice	0.00	0.54
						4" Ice	0.00	0.54
1-5/8"	C	No	Inside Pole	115.00 - 0.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	1.04
***								
7/8"	C	No	Inside Pole	135.00 - 0.00	12	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
						1" Ice	0.00	0.54
						2" Ice	0.00	0.54
						4" Ice	0.00	0.54
1-5/8"	C	No	Inside Pole	135.00 - 0.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
						2" Ice	0.00	1.04
						4" Ice	0.00	1.04

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C_AA_A ft^2/ft	Weight plf
***							

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	150.00-130.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.04
L2	130.00-110.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.25
L3	110.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.54
L4	80.00-50.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.54
L5	50.00-20.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.54
L6	20.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.36

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	150.00-130.00	A	1.189	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.04
L2	130.00-110.00	A	1.168	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.25
L3	110.00-80.00	A	1.135	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.54
L4	80.00-50.00	A	1.085	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.54
L5	50.00-20.00	A	1.007	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.54
L6	20.00-0.00	A	1.000	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.36

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	150.00-130.00	0.0000	0.0000	0.0000	0.0000
L2	130.00-110.00	0.0000	0.0000	0.0000	0.0000
L3	110.00-80.00	0.0000	0.0000	0.0000	0.0000
L4	80.00-50.00	0.0000	0.0000	0.0000	0.0000
L5	50.00-20.00	0.0000	0.0000	0.0000	0.0000
L6	20.00-0.00	0.0000	0.0000	0.0000	0.0000

User Defined Loads

Description	Elevation	Offset From Centroid	Azimuth Angle		Weight	F_x	F_z	Wind Force	C_AA_C
	ft	ft	°		K	K	K	K	ft²
Flag	150.00	0.00	0.0000	No Ice	0.18	0.00	0.00	0.27	**5.56**
				Ice	0.32	0.00	0.00	0.07	**7.35**
				Service	0.18	0.00	0.00	0.11	**6.41**

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight K
***										
RR90-17-00DP	A	From Leg	0.50	0.00	0.0000	125.00	No Ice	0.00	0.00	0.02
			0.00				1/2" Ice	0.00	0.00	0.04
							1" Ice	0.00	0.00	0.07
							2" Ice	0.00	0.00	0.14
							4" Ice	0.00	0.00	0.33
RR90-17-00DP	B	From Leg	0.50	0.00	0.0000	125.00	No Ice	0.00	0.00	0.02
			0.00				1/2" Ice	0.00	0.00	0.04
							1" Ice	0.00	0.00	0.07
							2" Ice	0.00	0.00	0.14
							4" Ice	0.00	0.00	0.33
RR90-17-00DP	C	From Leg	0.50	0.00	0.0000	125.00	No Ice	0.00	0.00	0.02
			0.00				1/2" Ice	0.00	0.00	0.04
							1" Ice	0.00	0.00	0.07
							2" Ice	0.00	0.00	0.14
							4" Ice	0.00	0.00	0.33
***										
7770.00	A	From Leg	0.50	0.00	0.0000	115.00	No Ice	0.00	0.00	0.03
			0.00				1/2" Ice	0.00	0.00	0.06
							1" Ice	0.00	0.00	0.10
							2" Ice	0.00	0.00	0.19
							4" Ice	0.00	0.00	0.43
7770.00	B	From Leg	0.50	0.00	0.0000	115.00	No Ice	0.00	0.00	0.03
			0.00				1/2" Ice	0.00	0.00	0.06
							1" Ice	0.00	0.00	0.10

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" Ice	0.00	0.00	0.19
						4" Ice	0.00	0.00	0.43
7770.00	C	From Leg	0.50 0.00 0.00	0.0000	115.00	No Ice	0.00	0.00	0.03
						1/2" Ice	0.00	0.00	0.06
						1" Ice	0.00	0.00	0.10
						2" Ice	0.00	0.00	0.19
						4" Ice	0.00	0.00	0.43
(2) LGP21401 TMA	A	From Leg	0.50 0.00 0.00	0.0000	115.00	No Ice	0.00	0.00	0.02
						1/2" Ice	0.00	0.00	0.02
						1" Ice	0.00	0.00	0.03
						2" Ice	0.00	0.00	0.05
						4" Ice	0.00	0.00	0.12
(2) LGP21401 TMA	B	From Leg	0.50 0.00 0.00	0.0000	115.00	No Ice	0.00	0.00	0.02
						1/2" Ice	0.00	0.00	0.02
						1" Ice	0.00	0.00	0.03
						2" Ice	0.00	0.00	0.05
						4" Ice	0.00	0.00	0.12
(2) LGP21401 TMA	C	From Leg	0.50 0.00 0.00	0.0000	115.00	No Ice	0.00	0.00	0.02
						1/2" Ice	0.00	0.00	0.02
						1" Ice	0.00	0.00	0.03
						2" Ice	0.00	0.00	0.05
						4" Ice	0.00	0.00	0.12
***									
SBNHH-1D65A	A	From Leg	0.50 0.00 0.00	0.0000	135.00	No Ice	0.00	0.00	0.04
						1/2" Ice	0.00	0.00	0.08
						1" Ice	0.00	0.00	0.12
						2" Ice	0.00	0.00	0.22
						4" Ice	0.00	0.00	0.50
SBNHH-1D65A	B	From Leg	0.50 0.00 0.00	0.0000	135.00	No Ice	0.00	0.00	0.04
						1/2" Ice	0.00	0.00	0.08
						1" Ice	0.00	0.00	0.12
						2" Ice	0.00	0.00	0.22
						4" Ice	0.00	0.00	0.50
SBNHH-1D65A	C	From Leg	0.50 0.00 0.00	0.0000	135.00	No Ice	0.00	0.00	0.04
						1/2" Ice	0.00	0.00	0.08
						1" Ice	0.00	0.00	0.12
						2" Ice	0.00	0.00	0.22
						4" Ice	0.00	0.00	0.50
(2) FDL85002/1C-3L Diplexer	A	From Leg	0.50 0.00 0.00	0.0000	135.00	No Ice	0.00	0.00	0.01
						1/2" Ice	0.00	0.00	0.01
						1" Ice	0.00	0.00	0.02
						2" Ice	0.00	0.00	0.03
						4" Ice	0.00	0.00	0.08
(2) FDL85002/1C-3L Diplexer	B	From Leg	0.50 0.00 0.00	0.0000	135.00	No Ice	0.00	0.00	0.01
						1/2" Ice	0.00	0.00	0.01
						1" Ice	0.00	0.00	0.02
						2" Ice	0.00	0.00	0.03
						4" Ice	0.00	0.00	0.08
(2) FDL85002/1C-3L Diplexer	C	From Leg	0.50 0.00 0.00	0.0000	135.00	No Ice	0.00	0.00	0.01
						1/2" Ice	0.00	0.00	0.01
						1" Ice	0.00	0.00	0.02
						2" Ice	0.00	0.00	0.03
						4" Ice	0.00	0.00	0.08
DB-T1-6Z-8AB-0Z	A	From Leg	0.50 0.00 0.00	0.0000	135.00	No Ice	0.00	0.00	0.04
						1/2" Ice	0.00	0.00	0.08
						1" Ice	0.00	0.00	0.12
						2" Ice	0.00	0.00	0.21

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
						4" Ice	0.00	0.00	0.45
DB-T1-6Z-8AB-0Z	B	From Leg	0.50 0.00 0.00	0.0000	135.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	0.00 0.00 0.00 0.00 0.00	0.00 0.00 0.00 0.00 0.00	0.04 0.08 0.12 0.21 0.45
***									
Canister Load1	C	None		0.0000	150.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	5.90 6.15 6.39 6.88 7.87	5.90 6.15 6.39 6.88 7.87	0.06 0.14 0.22 0.38 0.75
Canister Load2	C	None		0.0000	140.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.80 12.29 12.78 13.77 15.73	11.80 12.29 12.78 13.77 15.73	0.13 0.28 0.43 0.76 1.49
Canister Load3	C	None		0.0000	130.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	11.80 12.29 12.78 13.77 15.73	11.80 12.29 12.78 13.77 15.73	0.39 0.54 0.70 1.03 1.76
Canister Load4	C	None		0.0000	120.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	14.75 15.24 15.73 16.72 18.68	14.75 15.24 15.73 16.72 18.68	0.16 0.34 0.54 0.94 1.82
Canister Load5	C	None		0.0000	110.00	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	8.85 9.10 9.34 9.83 10.82	8.85 9.10 9.34 9.83 10.82	0.36 0.47 0.59 0.82 1.34
Truck Ball	C	None		0.0000	150.75	No Ice 1/2" Ice 1" Ice 2" Ice 4" Ice	1.41 1.58 1.75 2.11 2.95	1.41 1.58 1.75 2.11 2.95	0.05 0.07 0.09 0.13 0.25

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

Comb. No.	Description
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
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 Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 130	31.321	30	2.6002	0.0001
L2	130 - 110	20.977	29	2.1742	0.0001
L3	110 - 80	13.715	29	1.0969	0.0000
L4	80 - 50	7.308	29	0.9134	0.0000
L5	50 - 20	2.680	29	0.5194	0.0000
L6	20 - 0	0.397	29	0.1819	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
150.75	Truck Ball	30	31.321	2.6002	0.0001	4895
150.00	Canister Load1	30	31.321	2.6002	0.0001	4895
140.00	Canister Load2	29	25.903	2.4732	0.0001	2447
135.00	SBNHH-1D65A	29	23.348	2.3560	0.0001	1631
130.00	Canister Load3	29	20.977	2.1742	0.0001	1293
125.00	RR90-17-00DP	29	18.839	1.9178	0.0001	1322
120.00	Canister Load4	29	16.928	1.6217	0.0001	1438
115.00	7770.00	29	15.226	1.3326	0.0000	1578

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
110.00	Canister Load5	29	13.715	1.0969	0.0000	1761

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	150 - 130	88.508	5	7.2805	0.0004
L2	130 - 110	59.567	5	6.1189	0.0003
L3	110 - 80	39.082	4	3.1211	0.0000
L4	80 - 50	20.851	4	2.6030	0.0000
L5	50 - 20	7.656	4	1.4831	0.0000
L6	20 - 0	1.135	4	0.5199	0.0000

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
150.75	Truck Ball	5	88.508	7.2805	0.0004	1828
150.00	Canister Load1	5	88.508	7.2805	0.0004	1828
140.00	Canister Load2	5	73.366	6.9414	0.0003	912
135.00	SBNHH-1D65A	5	66.214	6.6208	0.0003	607
130.00	Canister Load3	5	59.567	6.1189	0.0003	479
125.00	RR90-17-00DP	5	53.557	5.4071	0.0002	487
120.00	Canister Load4	5	48.171	4.5836	0.0001	526
115.00	7770.00	4	43.362	3.7783	0.0001	573
110.00	Canister Load5	4	39.082	3.1211	0.0000	634

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
L1	150 - 130 (1)	P6.625x0.432	20.00	0.00	0.0	25.200	8.4049	-1.14	211.81	0.005
L2	130 - 110 (2)	P6.75x1	20.00	0.00	0.0	25.200	18.0642	-3.43	455.22	0.008
L3	110 - 80 (3)	P24x0.375	30.00	0.00	0.0	25.200	27.8325	-7.11	701.38	0.010
L4	80 - 50 (4)	P24x0.375	30.00	0.00	0.0	25.200	27.8325	-10.55	701.38	0.015
L5	50 - 20 (5)	P30x0.375	30.00	0.00	0.0	25.075	34.9011	-14.73	875.15	0.017
L6	20 - 0 (6)	P36x0.375	20.00	0.00	0.0	23.696	41.9697	-18.02	994.51	0.018

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	150 - 130 (1)	P6.625x0.432	19.65	19.287	27.720	0.696	0.00	0.000	27.720	0.000
L2	130 - 110 (2)	P6.75x1	64.86	34.151	27.720	1.232	0.00	0.000	27.720	0.000
L3	110 - 80 (3)	P24x0.375	179.03	13.273	27.720	0.479	0.00	0.000	27.720	0.000
L4	80 - 50 (4)	P24x0.375	337.09	24.992	27.720	0.902	0.00	0.000	27.720	0.000
L5	50 - 20 (5)	P30x0.375	533.48	25.076	25.075	1.000	0.00	0.000	25.075	0.000
L6	20 - 0 (6)	P36x0.375	686.56	22.270	23.696	0.940	0.00	0.000	23.696	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	150 - 130 (1)	P6.625x0.432	1.31	0.312	16.800	0.019	0.00	0.000	16.800	0.000
L2	130 - 110 (2)	P6.75x1	2.59	0.287	16.800	0.017	0.00	0.000	16.800	0.000
L3	110 - 80 (3)	P24x0.375	4.61	0.331	16.800	0.020	0.00	0.000	16.800	0.000
L4	80 - 50 (4)	P24x0.375	5.90	0.424	16.800	0.025	0.00	0.000	16.800	0.000
L5	50 - 20 (5)	P30x0.375	7.17	0.411	16.800	0.024	0.00	0.000	15.644	0.000
L6	20 - 0 (6)	P36x0.375	8.14	0.388	16.800	0.023	0.00	0.000	11.901	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	150 - 130 (1)	0.005	0.696	0.000	0.019	0.000	0.702 ✔	1.333	H1-3+VT ✔
L2	130 - 110 (2)	0.008	1.232	0.000	0.017	0.000	1.240 ✔	1.333	H1-3+VT ✔
L3	110 - 80 (3)	0.010	0.479	0.000	0.020	0.000	0.489 ✔	1.333	H1-3+VT ✔
L4	80 - 50 (4)	0.015	0.902	0.000	0.025	0.000	0.917 ✔	1.333	H1-3+VT ✔
L5	50 - 20 (5)	0.017	1.000	0.000	0.024	0.000	1.017 ✔	1.333	H1-3+VT ✔
L6	20 - 0 (6)	0.018	0.940	0.000	0.023	0.000	0.958 ✔	1.333	H1-3+VT ✔

Section Capacity Table

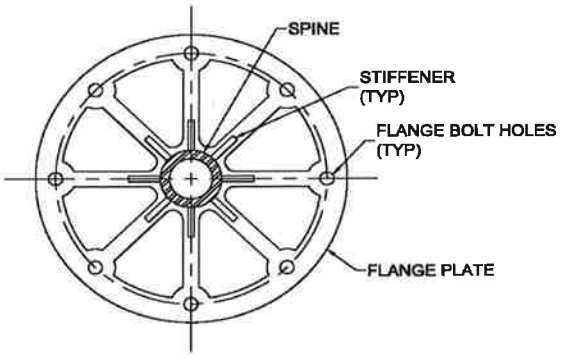
Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
L1	150 - 130	Pole	P6.625x0.432	1	-1.14	282.34	52.6	Pass
L2	130 - 110	Pole	P6.75x1	2	-3.43	606.80	93.0	Pass
L3	110 - 80	Pole	P24x0.375	3	-7.11	934.94	36.7	Pass
L4	80 - 50	Pole	P24x0.375	4	-10.55	934.94	68.8	Pass
L5	50 - 20	Pole	P30x0.375	5	-14.73	1166.57	76.3	Pass
L6	20 - 0	Pole	P36x0.375	6	-18.02	1325.68	71.9	Pass
							Summary	
						Pole (L2)	93.0	Pass
						RATING =	**93.0**	**Pass**

CCI Flagpole Tool

Site Data	
BU#:	CT04374-S
Site Name:	Central Hebron
App #:	

Code		
Code:	TIA/EIA 222-F	
Ice Thickness:	1	in
Windspeed (V):	85	mph
Ice Wind Speed (V):	38	mph

Tower Information		
Total Tower Height:	150	ft
Base Tower Height:	110	ft
Total Canister Length:	40	ft
Number of Canister Assembly Sections:	4	



FLANGE PLATE
(TYPE 4: SOLIDITY RATIO 0.55)

Canister Section Number *:	Canister Assembly Length (ft):	Canister Assembly Diameter (in):	Number of Sides Canister Section	Plate Type:	Mating Flange Plate Thickness (in)**:	Mating Flange Plate Diameter (in):	Solidity Ratio	Plate Weight (Kip):	Canister Weight (Kip)
1	10	24	Round	1			0.45	0.000	0.126
2	10	24	Round	4	2.00	23.25	0.55	0.265	0.126
3	10	24	Round	1			0.45	0.000	0.126
4	10	36	Round	4	2.00	23.25	0.55	0.265	0.188

* Sections are numbered from the top of the tower down

** Mating Flange Plate Thickness at the bottom of canister section

Flag on Tower:	Yes	
Flag Width:	15	ft
Flag Height:	10	ft
Flag Elevation(z):	150	ft

Truck Ball on Tower:	Yes	
Diameter of Ball:	18	in

Geometry : Base Tower + Spine

CT04374-S_Central Hebron_VzW_10-12-15_SA.eri *(last saved 10/12 1:40 pm)*

Pole Height Above Base (ft)	Section Length (ft)	Lap Splice Length (ft)	Number of Sides	Top Diameter (in)	Bottom Diameter (in)	Wall Thickness (in)	Bend Radius (in)	Pole Material	Delete
150	20		0	6.625	6.625	0.432	n/a	A500-42	[x]
130	20		0	6.75	6.75	1	n/a	A500-42	[x]
110	30		0	24	24	0.375	n/a	A53-B-42	[x]
80	30		0	24	24	0.375	n/a	A53-B-42	[x]
50	30		0	30	30	0.375	n/a	A53-B-42	[x]
20	20		0	36	36	0.375	n/a	A53-B-42	[x]

Discrete Loads: Truck Ball	Apply C_aA_A at Elevation(z) (ft)	C_aA_A No Ice (ft^2)	C_aA_A 1/2" Ice (ft^2)	C_aA_A 1" Ice (ft^2)	C_aA_A 2" Ice (ft^2)	C_aA_A 4" Ice (ft^2)	Weight No Ice (Kip)	Weight 1/2" Ice (Kip)
	150.75	1.414	1.575	1.745	2.112	2.950	0.05	0.067

Discrete Loads : C_FA_F for Canister Assembly								
Canister Loading	Apply C_FA_F at Elevation(z) (ft)	C_FA_F No Ice (ft^2)	C_FA_F 1/2" Ice (ft^2)	C_FA_F 1" Ice (ft^2)	C_FA_F 2" Ice (ft^2)	C_FA_F 4" Ice (ft^2)	Canister Assembly Weight No Ice (Kip)	Canister Assembly Weight 1/2" Ice (Kip)
Canister Load 1	150	5.900	6.146	6.392	6.883	7.867	0.063	0.138
Canister Load 2	140	11.800	12.292	12.783	13.767	15.733	0.126	0.275
Canister Load 3	130	11.800	12.292	12.783	13.767	15.733	0.391	0.540
Canister Load 4	120	14.750	15.242	15.733	16.717	18.683	0.157	0.343
Canister Load 5	110	8.850	9.096	9.342	9.833	10.817	0.359	0.471

User Forces: Flag Force Calculation Per ANSI/NAAMM FP 1001-07	
$Wind_{FORCE}$=	0.268 Kip
Weight=	0.182 Kip
$Wind_{FORCE, ICE}$=	0.069 Kip
Weight $_{ICE}$=	0.322 Kip
$W_{FORCE, SERVICE WIND}$=	0.107 Kip
Weight=	0.182 Kip

←Flag force should be included at the top of the flag attachment elevation. If the attachment of the flag to the halyard distributes forces equally to the pole, apply flag forces accordingly in tnx file.

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

TIA Rev F

Site Data

Project No. *15CAXZ1400*
Site Name: *Central Hebron*
Site ID: *CT04374-S*

Pole Manufacturer:	*Pirod*

Anchor Rod Data		
Qty:	28	
Diam:	1	in
Rod Material:	Other	
Strength (Fu):	150	ksi
Yield (Fy):	105	ksi
Bolt Circle:	39	in

Plate Data		
Diam:	42.375	in
Thick:	1.25	in
Grade:	36	ksi
Single-Rod B-eff:	4.04	in

Stiffener Data (Welding at both sides)		
Config:	2	*
Weld Type:	Both	
Groove Depth:	0.4375	in **
Groove Angle:	45	degrees
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:	0.3	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	36	in
Thick:	0.375	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	58	ksi
Reinf. Fillet Weld	0	"0" if None

Stress Increase Factor		
ASIF:	1.333	

Reactions		
Moment:	687	ft-kips
Axial:	18	kips
Shear:	8	kips

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

Anchor Rod Results

		Rigid
Maximum Rod Tension:	29.6 Kips	Service, ASD
Allowable Tension:	51.8 Kips	Fty*ASIF
Anchor Rod Stress Ratio:	57.0% Pass	

Base Plate Results

	Flexural Check	Rigid
Base Plate Stress:	Rohn/Pirod, OK	Service ASD
Allowable Plate Stress:	36.0 ksi	0.75*Fy*ASIF
Base Plate Stress Ratio:	Rohn/Pirod, OK	Y.L. Length: 15.00

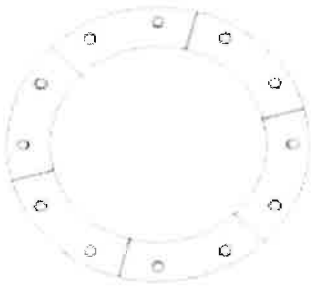
b/Le>2, Stiffeners are not fully effective

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 R

Site Data

BU#:
Site Name: *Central Hebron*
App #:

Pole Manufacturer:	Pirod

Bolt Data			
Qty:	24		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	33		

Plate Data		
Diam:	36.375	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:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.25	in
Width:	3	in
Height:	5	in
Thick:	0.5	in
Notch:	0.375	in
Grade:	36	ksi
Weld str.:	70	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:	1.333	

Reactions		
Moment:	533.48	ft-kips
Axial:	14.73	kips
Shear:	7.17	kips
Elevation:	20	feet

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

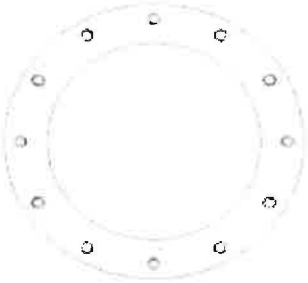
Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07 kips
Max Bolt directly applied T:	31.72 Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.398 in
Min PL "treq" for actual **T w/ Pry**:	0.882 in
Min PL "t1" for actual **T w/o Pry**:	1.160 in
T allowable with Prying:	43.16 kips
Prying Force, Q:	0.00 kips
Total Bolt Tension=T+Q:	31.72 kips
Prying Bolt Stress Ratio=(T+Q)/(B):	68.9% **Pass**

Exterior Flange Plate Results	Flexural Check
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:	49.8% **Pass**

n/a

Stiffener Results	N/A for Rohn / Pirod
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A
Pole Results	
Pole Punching Shear Check:	N/A



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

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

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

Site Data

BU#:
Site Name: *Central Hebron, CT*
App #:

Reactions		
Moment:	533.48	ft-kips
Axial:	14.73	kips
Shear:	7.17	kips
Exterior Flange Run, T+Q:	31.72	kips

Elevation: 20 feet

Manufacturer:	Pirod

Bolt Data

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

Interior Flange Bolt Results

Maximum Bolt Tension:	31.7	Kips, Ext. Flange T+Q
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	68.9%	**Pass**

Plate Data

Plate Outer Diam:	35.25	in
Plate Inner Diam:	27.375	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.61	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	32.9	Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

Stiffener Data (Welding at Both Sides)

Config:	2	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Stiffener Results N/A for Rohn / Pirod

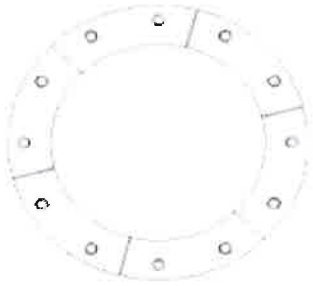
Horizontal Weld :	N/A
Vertical Weld:	N/A
Plate Flex+Shear, fb/Fb+(fv/Fv)^2:	N/A
Plate Tension+Shear, ft/Ft+(fv/Fv)^2:	N/A
Plate Comp. (AISC Bracket):	N/A

Pole 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

Pole Results

Pole Punching Shear Check: N/A



Stress Increase Factor

ASIF:	1.333	

* 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 R

Site Data

BU#:
Site Name: *Central Hebron, CT*
App #:

Pole Manufacturer:	Pirod

Reactions		
Moment:	337.09	ft-kips
Axial:	10.55	kips
Shear:	5.9	kips
Elevation:	50	feet

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

Bolt Data			
Qty:	20		
Diameter (in.):	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle (in.):	27		

Plate Data		
Diam:	30.375	in
Thick, t:	1.25	in
Grade (Fy):	36	ksi
Strength, Fu:	58	ksi
Single-Rod B-eff:	3.77	in

Stiffener Data (Welding at Both Sides)		
Config:	2	*
Weld Type:	Fillet	
Groove Depth:	0.25	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.25	in
Fillet V. Weld:	0.25	in
Width:	3	in
Height:	5	in
Thick:	0.625	in
Notch:	0.375	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Diam:	24	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	

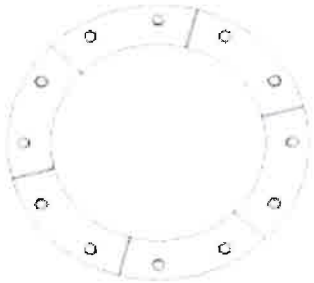
Flange Bolt Results

Bolt Tension Capacity, **B**:	46.07 kips
Max Bolt directly applied T:	29.44 Kips
Min. PL "tc" for **B** cap. **w/o** Pry:	1.427 in
Min PL "treq" for actual **T w/ Pry**:	0.870 in
Min PL "t1" for actual **T w/o Pry**:	1.141 in
T allowable with Prying:	42.70 kips
Prying Force, Q:	0.00 kips
Total Bolt Tension=T+Q:	29.44 kips
Prying Bolt Stress Ratio=(T+Q)/(B):	63.9% **Pass**

Exterior Flange Plate Results	Flexural Check
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:	48.5% **Pass**

b/Le>2, Stiffeners are not fully effective

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#:
Site Name: *Central Hebron, CT*
App #:

Manufacturer:	Pirod

Reactions		
Moment:	337.09	ft-kips
Axial:	10.55	kips
Shear:	5.9	kips
Exterior Flange Run, T+Q:	29.44	kips

Elevation: 50 feet

Bolt Data			
Qty:	20		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty: 44.00
N/A:		<-- Disregard	
Circle:	27	in	

Interior Flange Bolt Results

Maximum Bolt Tension:	29.4	Kips, Ext. Flange T+Q
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	63.9%	**Pass**

Plate Data		
Plate Outer Diam:	29.25	in
Plate Inner Diam:	24.25	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.59	in

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	30.5	Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

Stiffener Data (Welding at Both Sides)		
Config:	2	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

b/Le>2, Stiffeners are not fully effective

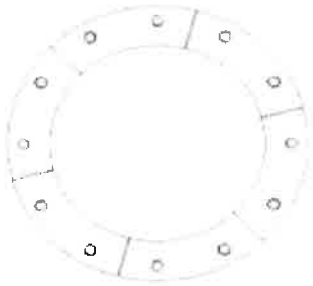
Stiffener Results N/A for Rohn / Pirod

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

Pole Results

Pole Punching Shear Check: N/A

Pole Data		
Pole OuterDiam:	30	in
Thick:	0.375	in
Pole Inner Diam:	29.25	in
Grade:	42	ksi
# of Sides:	0	"0" IF Round
Fu	60	ksi



Stress Increase Factor		
ASIF:	1.333	

* 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#:
Site Name: *Central Hebron, CT*
App #:

Manufacturer:	Pirod

Reactions		
Moment:	179.03	ft-kips
Axial:	7.11	kips
Shear:	4.61	kips
Exterior Flange Run, T+Q:	0	kips

Elevation: 80 feet

Bolt Data			
Qty:	16		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty:
N/A:		<-- Disregard	44.00
Circle:	21	in	

Plate Data		
Plate Outer Diam:	23.25	in
Plate Inner Diam:	18.25	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.57	in

Stiffener Data (Welding at Both Sides)		
Config:	2	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	24	in
Thick:	0.375	in
Pole Inner Diam:	23.25	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:	25.1	Kips, Ext. T=Interior T
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	54.6%	**Pass**

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	26.0	Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

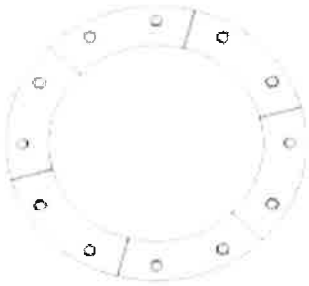
b/Le>2, Stiffeners are not fully effective

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#:
Site Name: *Central Hebron, CT*
App #:

Manufacturer:	Pirod

Reactions		
Moment:	64.86	ft-kips
Axial:	3.43	kips
Shear:	2.59	kips
Exterior Flange Run, T+Q:	0	kips

Elevation: 110 feet

Bolt Data			
Qty:	16		
Diam:	1	Bolt Fu:	120
Bolt Material:	A325	Bolt Fy:	92
N/A:		<-- Disregard	Bolt Fty: 44.00
N/A:		<-- Disregard	
Circle:	21	in	

Plate Data		
Plate Outer Diam:	23.25	in
Plate Inner Diam:	18.25	in (Hole @ Ctr)
Thick:	1.25	in
Grade:	36	ksi
Effective Width:	4.57	in

Stiffener Data (Welding at Both Sides)		
Config:	2	*
Weld Type:	Fillet	
Groove Depth:	0.375	<-- Disregard
Groove Angle:	45	<-- Disregard
Fillet H. Weld:	0.3125	in
Fillet V. Weld:	0.3125	in
Width:	3	in
Height:	5	in
Thick:	0.625	in
Notch:	0.5	in
Grade:	36	ksi
Weld str.:	70	ksi

Pole Data		
Pole OuterDiam:	24	in
Thick:	0.375	in
Pole Inner Diam:	23.25	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:	9.1	Kips, Ext. T=Interior T
Allowable Tension:	46.1	Kips
Bolt Stress Ratio:	19.6%	**Pass**

Interior Flange Plate Results Flexural Check

Controlling Bolt Axial Force:	9.5	Kips, Ext. C= Interior C
Plate Stress:	Rohn/Pirod	OK
Allowable Plate Stress:	36.0	ksi
Plate Stress Ratio:	Rohn/Pirod	OK

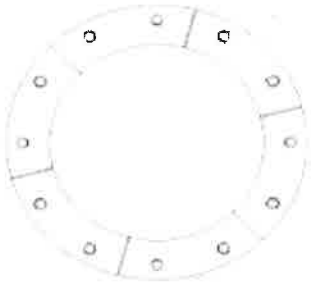
b/Le>2, Stiffeners are not fully effective

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

Reactions		
Mu	19.65	ft-kips
Axial, Pu	1.14	kips
Shear, Vu	1.31	kips
Elevation	130	feet

Plate and Bolt Data		
Qty	8	
Diameter	1	in
Bolt Circle	21	in
Bolt Fy	92	ksi
Bolt Fu	120	ksi
Plate thk.	2	in
Plate Fy	36	ksi
Moment Arm	1.6875	in
Spoke Width	0.75	in

Upper Plate

$S = bd^2/6$	0.5
$F_{b\_pl} = Tb*L$	9.2336384
$MOI = 1/8 N_{bolt} BC^2$	441
$T_{bolt} = (Pu/N_{bolt}) - ((MuBC/2)/MOI)$	5.4717857
$C_{bolt} = (Pu/N_{bolt}) + ((MuBC/2)/MOI)$	5.7567857
$Ag_{bolt} = (d_n - 0.9743/n)^2 \pi/5$	0.581981
$An_{bolt} = A_g - A_{holes} + t\Sigma s/4g$	0.606
$\Phi Tn = 0.75*Ag_{bolt}*Fy$	32.125352
$\Phi Tn = 0.75*An_{bolt}*Fu$	36.36
$Tu/\Phi Tn$ = Stress in Bolts	**15.0%**
F_{b_pl}/F_{max} = Stress in Plate	**25.6%**

Reactions		
Mu	64.86	ft-kips
Axial, Pu	3.43	kips
Shear, Vu	2.59	kips
Elevation	110	feet

Plate and Bolt Data		
Qty	8	
Diameter	1	in
Bolt Circle	21	in
Bolt Fy	92	ksi
Bolt Fu	120	ksi
Plate thk.	2	in
Plate Fy	36	ksi
Moment Arm	1.625	in
Spoke Width	0.75	in

Upper Plate

$S = bd^2/6$	0.5
$F_{b\_pl} = Tb*L$	29.416853
$MOI = 1/8 N_{bolt} BC^2$	441
$T_{bolt} = (Pu/N_{bolt}) - ((MuBC/2)/MOI)$	18.102679
$C_{bolt} = (Pu/N_{bolt}) + ((MuBC/2)/MOI)$	18.960179
$Ag_{bolt} = (d_n - 0.9743/n)^2 \pi/5$	0.581981
$An_{bolt} = A_g - A_{holes} + t\Sigma s/4g$	0.606
$\Phi Tn = 0.75*Ag_{bolt}*Fy$	32.125352
$\Phi Tn = 0.75*An_{bolt}*Fu$	36.36
$Tu/\Phi Tn$ = Stress in Bolts	**49.8%**
F_{b_pl}/F_{max} = Stress in Plate	**81.7%**

Reactions		
Mu	19.65	ft-kips
Axial, Pu	1.14	kips
Shear, Vu	1.31	kips
Elevation	130	feet

Plate and Bolt Data		
Qty	8	
Diameter	1	in
Bolt Circle	21	in
Bolt Fy	92	ksi
Bolt Fu	120	ksi
Plate thk.	2	in
Plate Fy	36	ksi
Moment Arm	1.125	in
Spoke Width	0.75	in

Lower Plate

$S = bd^2/6$	0.5
$F_{b\_pl} = Tb*L$	6.1557589
$MOI = 1/8 N_{bolt} BC^2$	441
$T_{bolt} = (Pu/N_{bolt}) - ((MuBC/2)/MOI)$	5.4717857
$C_{bolt} = (Pu/N_{bolt}) + ((MuBC/2)/MOI)$	5.7567857
$Ag_{bolt} = (d_n - 0.9743/n)^2 \pi/5$	0.581981
$An_{bolt} = A_g - A_{holes} + t\Sigma s/4g$	0.606
$\Phi Tn = 0.75*Ag_{bolt}*Fy$	32.125352
$\Phi Tn = 0.75*An_{bolt}*Fu$	36.36
$Tu/\Phi Tn$ = Stress in Bolts	**15.0%**
F_{b_pl}/F_{max} = Stress in Plate	**17.1%**

Reactions		
Mu	64.86	ft-kips
Axial, Pu	3.43	kips
Shear, Vu	2.59	kips
Elevation	110	feet

Plate and Bolt Data		
Qty	8	
Diameter	1	in
Bolt Circle	21	in
Bolt Fy	92	ksi
Bolt Fu	120	ksi
Plate thk.	2	in
Plate Fy	36	ksi
Moment Arm	1.125	in
Spoke Width	0.75	in

Lower Plate

$S = bd^2/6$	0.5
$F_{b\_pl} = Tb*L$	20.365513
$MOI = 1/8 N_{bolt} BC^2$	441
$T_{bolt} = (Pu/N_{bolt}) - ((MuBC/2)/MOI)$	18.102679
$C_{bolt} = (Pu/N_{bolt}) + ((MuBC/2)/MOI)$	18.960179
$Ag_{bolt} = (d_n - 0.9743/n)^2 \pi/5$	0.581981
$An_{bolt} = A_g - A_{holes} + t\Sigma s/4g$	0.606
$\Phi Tn = 0.75*Ag_{bolt}*Fy$	32.125352
$\Phi Tn = 0.75*An_{bolt}*Fu$	36.36
$Tu/\Phi Tn$ = Stress in Bolts	**49.8%**
F_{b_pl}/F_{max} = Stress in Plate	**56.6%**

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

Site Data

BU#: *CT04374-S*
Site Name: *Central Hebron*
App #:

Enter Load Factors Below:		
For P (DL)	1.2	<---- Enter Factor
For P,V, and M (WL)	1.35	<---- Enter Factor

Pad & Pier Data		
Base PL Dist. Above Pier:	6	in
Pier Dist. Above Grade:	6	in
Pad Bearing Depth, D:	4.5	ft
Pad Thickness, T:	2	ft
Pad Width=Length, L:	14.5	ft
Pier Cross Section Shape:	Round	<--Pull Down
Enter Pier Diameter:	4.5	ft
Concrete Density:	150.0	pcf
Pier Cross Section Area:	15.90	ft^2
Pier Height:	3.00	ft
Soil (above pad) Height:	2.50	ft

Soil Parameters		
Unit Weight, γ:	130.0	pcf
Ultimate Gross Bearing Capacity, qn:	30.60	ksf
Strength Reduct. factor, ϕ:	0.75	
Angle of Friction, Φ:	39.0	degrees
Undrained Shear Strength, Cu:	0.00	ksf
Allowable Gross Bearing: ϕ*qn:	22.95	ksf
Passive Pres. Coeff., Kp	4.40	

Forces/Moments due to Wind and Lateral Soil		
Minimum of (φ*Ultimate Pad Passive Force, Vu):	10.8	kips
Pad Force Location Above D:	0.90	ft
ϕ(Passive Pressure Moment):	9.77	ft-kips
Factored O.T. M(WL), "1.6W":	986.9	ft-kips
Factored OT (MW-Msoil), M1	977.08	ft-kips

Resistance due to Foundation Gravity		
Soil Wedge Projection grade, a:	2.02	ft
Sum of Soil Wedges Wt:	13.88	kips
Soil Wedges ecc, K1:	3.83	ft
Ftg+Soil above Pad wt:	133.4	kips
Unfactored (Total ftg-soil Wt):	147.27	kips
1.2D. **No Soil Wedges.**	181.67	kips
0.9D. **With Soil Wedges**	148.75	kips

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

Monopole Base Reaction Forces		
TIA Revision:	F	<--Pull Down
Unfactored DL Axial, PD:	18	kips
Unfactored WL Axial, PW:	0	kips
Unfactored WL Shear, V:	8	kips
Unfactored WL Moment, M:	687	ft-kips

Load Factor	Shaft Factored Loads		
1.20	1.2D+1.6W, Pu:	21.6	kips
0.90	0.9D+1.6W, Pu:	16.2	kips
1.35	Vu:	10.8	kips
	Mu:	927.45	ft-kips

1.2D+1.6W Load Combination, Bearing Results:

(**No Soil Wedges**) [Reaction+Conc+Soil]	181.67	P1="1.2D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil), M1	977.08	ft-kips

Orthogonal Direction:

ecc1 = M1/P1 =	5.38	ft
Orthogonal qu=	3.35	ksf
qu/ϕ*qn Ratio=	**14.58%**	Pass

Diagonal Direction:

ecc2 = (0.707M1)/P1 =	3.80	ft
Diagonal qu=	3.82	ksf
qu/ϕ*qn Ratio=	**16.65%**	Pass

Run <-- Press Upon Completing All Input

Overturning Stability Check

0.9D+1.6W Load Combination, Bearing Results:

(**w/ Soil Wedges**) [Reaction+Conc+Soil]	148.75	P2="0.9D+1.6W" (Kips)
Factored "1.6W" Overturning Moment (MW-Msoil) - 0.9(M of Wedge + M of Cohesion), M2	929.24	ft-kips

Orthogonal ecc3 = M2/P2 =	6.25	ft
Ortho Non Bearing Length,NBL=	12.49	ft
Orthogonal qu=	5.11	ksf
Diagonal qu=	4.63	ksf

Max Reaction Moment (ft-kips) so that qu=φ*qn = 100% Capacity Rating			
Actual M:	687.00		
M Orthogonal:	773.40	**88.83%**	Pass
M Diagonal:	773.40	**88.83%**	Pass