STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL
Ten Franklin Square, New Britain, CT 06051
Phone: (860) 827-2935 Fax: (860) 827-2950
E-Mail: siting.council@ct.gov
www.ct.gov/csc

August 13, 2013

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103

RE: **EM-VER-049-130726** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 37 Bacon Road, Enfield, Connecticut.

Dear Attorney Baldwin:

The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies with the following conditions:

- Any deviation from the proposed modification as specified in this notice and supporting materials with the Council shall render this acknowledgement invalid;
- Any material changes to this modification as proposed shall require the filing of a new notice with the Council;
- Within 45 days after completion of construction, the Council shall be notified in writing that construction has been completed;
- The validity of this action shall expire one year from the date of this letter; and
- The applicant may file a request for an extension of time beyond the one year deadline provided that such request is submitted to the Council not less than 60 days prior to the expiration.

The proposed modifications including the placement of all necessary equipment and shelters within the tower compound are to be implemented as specified here and in your notice dated July 25, 2013. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Thank you for your attention and cooperation.

Very truly yours,

Melanie A. Bachman
Acting Executive Director

MAB/CDM/jb

c: The Honorable Scott Kaupin, Mayor, Town of Enfield
Matthew W. Coppler, Town Manager, Town of Enfield
Jose Giner, Director of Planning and Community Development, Town of Enfield
Shaker Pines Fire Department

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Also admitted in Massachusetts

July 25, 2013

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

Re: **Notice of Exempt Modification – Facility Modification**
37 Bacon Road, Enfield, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains twelve (12) wireless telecommunications antennas at the 150-foot level on the existing 180-foot tower at the above-referenced address. The tower and underlying property are owned by Shaker Pines Fire Department. The Council approved Cellco's use of this tower in 2005. Cellco now intends to replace three (3) of its existing antennas with three (3) model BXA-70063-6CF LTE antennas, all at the same 150-foot level. Attached behind Tab 1 are the specifications for Cellco's replacement antennas.

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 Matthew W. Coppler, Town Manager for the Town of Enfield.

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 150-foot level on the 180-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 modified facility will not increase radio frequency (RF) emissions to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative General Power Density table for Cellco's modified facility is included behind Tab 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 attached behind Tab 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:
Matthew W. Coppler, Enfield Town Manager
Sandy M. Carter

TAB 1

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

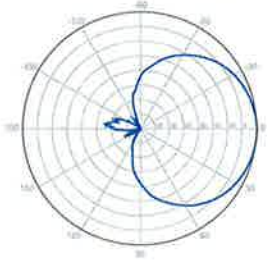
Replace "X" with desired electrical downtilt.

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

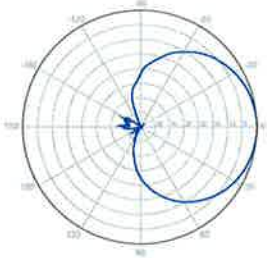
Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m² Side: 0.24 m²	Front: 5.5 ft² Side: 2.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X

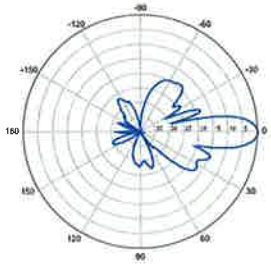


Horizontal | 750 MHz

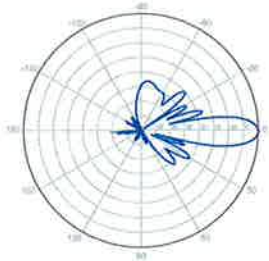


Horizontal | 850 MHz

BXA-70063-6CF-EDIN-0

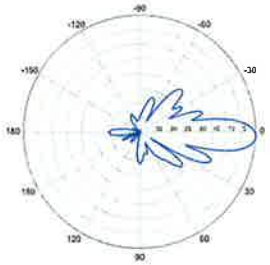


0° | Vertical | 750 MHz

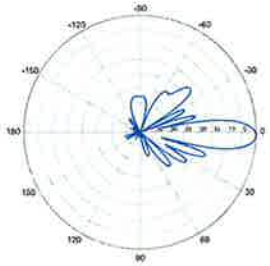


0° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-2



2° | Vertical | 750 MHz



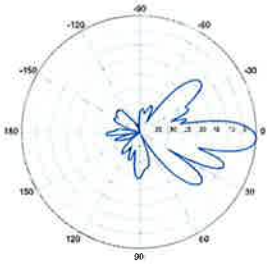
2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

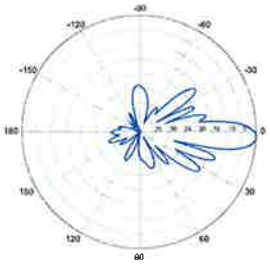
BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3

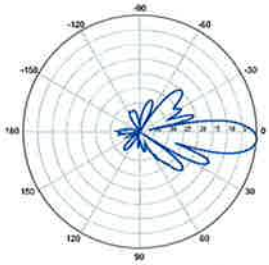


3° | Vertical | 750 MHz

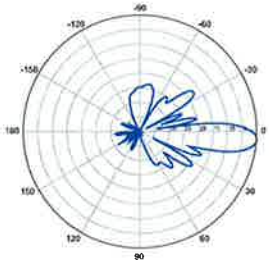


3° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-4

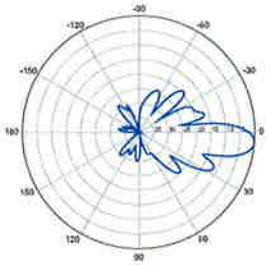


4° | Vertical | 750 MHz

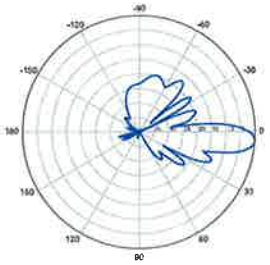


4° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-5

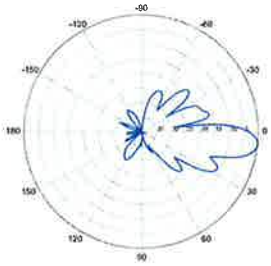


5° | Vertical | 750 MHz

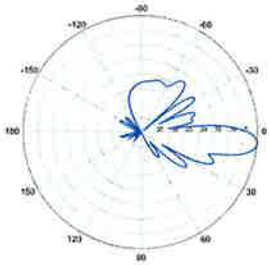


5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6

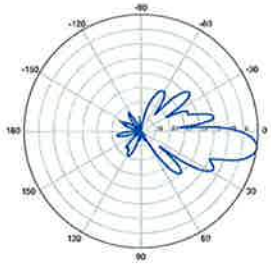


6° | Vertical | 750 MHz

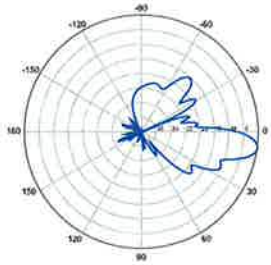


6° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-8

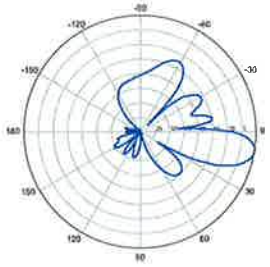


8° | Vertical | 750 MHz

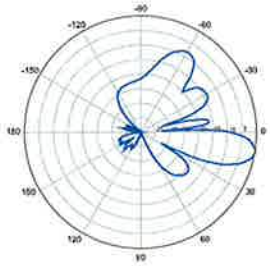


8° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-10



10° | Vertical | 750 MHz



10° | Vertical | 850 MHz

TAB 2

	General	Power	Density					
Site Name: Somers W (Enfield)								
Tower Height: Verizon @ 150ft								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Omnipoint	8	199	160	0.0224	1950	1.0000	2.24%	
*Town - UHF	2	250	180	0.0055	450	0.3000	1.85%	
*Town - VHF	1	60	180	0.0007	34	0.2000	0.33%	
*AT&T UMTS	2	565	168	0.0144	880	0.5867	2.45%	
*AT&T UMTS	2	1077	168	0.0274	1900	1.0000	2.74%	
*AT&T GSM	1	647	168	0.0082	880	0.5867	1.40%	
*AT&T GSM	4	934	168	0.0476	1900	1.0000	4.76%	
*AT&T LTE	1	1615	168	0.0206	734	0.4893	4.20%	
Verizon PCS	**11**	**238**	**150**	**0.0418**	**1970**	**1.0000**	**4.18%**	
Verizon Cellular	**9**	**249**	**150**	**0.0358**	**869**	**0.5793**	**6.18%**	
Verizon AWS	**1**	**1750**	**150**	**0.0280**	**2145**	**1.0000**	**2.80%**	
Verizon 700	**1**	**820**	**150**	**0.0131**	**698**	**0.4653**	**2.82%**	
								35.96%
* Source: Siting Council								

TAB 3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

180-ft Existing Sabre Monopole

Proposed Verizon Wireless
Antenna Upgrade

Verizon Site Ref: Somers West

37 Bacon Road
Enfield, CT

Centek Project No. 13075.CO21

Date: June 10, 2013

Prepared for:

Verizon Wireless
99 East River Road, 9th Floor
East Hartford, CT 06108

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna upgrade proposed by Verizon Wireless on the existing monopole (tower) located in Enfield, CT.

The host tower is a 180-ft tall, four-section, eighteen sided, tapered monopole, originally designed and manufactured by Sabre Communications Corp. job no; 04-07104, dated July 23, 2003. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned Sabre design documents. The tower was previously reinforced by Hudson Design Group job no. 1103 dated May 29, 2013.

Antenna and appurtenance information were obtained from the aforementioned Hudson structural report, visual verification from grade by Centek personnel on June 4, 2013 and a Verizon RF data sheet.

The tower is made up of four (4) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 14.40-in at the top and 53.23-in at the base.

Verizon proposes the replacement of three (3) existing panel antennas with three (3) proposed panel antennas mounted to the existing low profile platform. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- UNKNOWN (EXISTING):
  Antennas: One (1) 10-ft Omni-directional whip, one (1) 1'x1' panel antenna and one (1) 2-ft dish mounted on two (2) existing 4-ft Dual Standoff Mounts with an elevation of 177-ft above grade.
  Coax Cables: Two (2) 1-1/4" ∅ and two (2) 1/2" ∅ coax cables running on the inside of the existing tower.
- AT&T (EXISTING/RESERVED):
  Antennas: Two (2) KMW AM-X-CD-16-65-00T panel antennas, two (2) Andrew SBNH-1D656C panel antennas, two (2) Powerwave P65-17-XLH-RR panel antennas, three (3) Kathrein 800-10121 panel antennas, six (6) Kathrein 860-10025 remote control units, six (6) Powerwave LGP21401 TMA's, twelve (12) Powerwave LGP21901 diplexers and three (3) DTMABP7819VG12A TMA's mounted on three (3) existing T-Arms with a RAD center elevation of 168-ft above grade.
  Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- AT&T (EXISTING/RESERVED):
  Antennas: Six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrestor flush mounted with an elevation of 168-ft above grade.
  Cables: One (1) fiber cable and two (2) dc control cables running on the inside of the existing tower.

- T-MOBILE (EXISTING):
  Antennas: Three (3) EMS RR90-17-02DP panel antennas and six (6) 10"x8"x3" TMA's mounted on three (3) existing T-Arms w/ work support platforms with a RAD center elevation of 160-ft above grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- VERIZON (EXISTING TO REMAIN):
  Antennas: Six (6) Antel LPA-80080-4CF panel antennas, three (3) Antel BXA-171085-8BF panel antennas and six (6) RFS FD9R6004/2C-3L Diplexers mounted on a low profile platform with a RAD center elevation of 150-ft above grade.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- **VERIZON (EXISTING TO REMOVE):**
  Antennas: One (1) Antel BXA-70063-4CF and two (2) Swedcom SLCP 2X6014 panel antennas mounted on a low profile platform with a RAD center elevation of 150-ft above grade.
- **VERIZON (PROPOSED):**
  Antennas: Three (3) Antel BXA-70063-6CF panel antennas mounted on a low profile platform with a RAD center elevation of 150-ft above grade.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed as indicated in this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. The program analyzes the tower, considering the worst case loading condition. The tower is considered as loaded by concentric forces along the tower shaft, and the model assumes that the shaft members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA/EIA-222-F, gravity loads of the tower structure and its components, and the application of ½" radial ice on the tower structure and its components.

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Enfield; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA wind speed controls.	
Load Cases:	Load Case 1; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

[1] The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. Allowable stresses were determined based on Table 5 of the TIA/EIA code with a 1/3 increase per Section 3.1.1.1 of the same code.

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxTower "Section Capacity Table", this tower was found to be at **93.9%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L5)	21.00'-48.75'	93.9%	**PASS**

Note 1: Equivalent thickness of 0.28" used for section L3 of pole shaft with reinforcement plates.
Note 2: Equivalent thickness of 0.35" used for section L6 of pole shaft with reinforcement plates

Foundation and Anchors

The existing foundation consists of a 7-ft square x 4.5-ft long reinforced concrete pier on a 23.0-ft square x 2.0-ft thick reinforced concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned design documents prepared by Sabre Communications Corp. job no; 04-07104, dated July 23, 2003. The base of the tower is connected to the foundation by means of (12) 2.25"∅, ASTM A615-75 anchor bolts embedded approximately 6-ft into the concrete foundation structure.

Review of the foundation and anchor design consisted of verification of applied loads obtained from the tower design calculations and code checks of allowable stresses:

- The tower base reactions developed from the governing Load Case 1 were used in the verification of the foundation and its anchors:

Location	Vector	Proposed Reactions
Base	Shear	22 kips
	Compression	31 kips
	Moment	2716 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS)[1]	Proposed Loading (FS)[1]	Result
Reinforced Concrete Pad and Pier	OTM[2]	2.0	2.02	**PASS**

Note 1: FS denotes Factor of Safety.
Note 2: OTM denotes Overturning Moment

- The anchor bolts and base plate were found to be within allowable limits.

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Compression	58.7%	**PASS**
Base Plate	Bending	89.5%	**PASS**

Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

The analysis is based, in part, on the information provided to this office by Verizon Wireless. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer

STATE OF CONNECTICUT
CARLO F. CENTORE
No. 16694
LICENSED
PROFESSIONAL ENGINEER

Prepared by:

Timothy J. Lynn, EIT
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessarily limited to:

- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of CENTEK engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provide to CENTEK engineering, Inc. and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and are in an un-corroded condition and have not deteriorated. It is therefore assumed that its capacity has not significantly changed from the "as new" condition.
- All services will be performed to the codes specified by the client, and we do not imply to meet any other codes or requirements unless explicitly agreed in writing. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement. In the absence of information to the contrary, all work will be performed in accordance with the latest revision of ANSI/ASCE10 & ANSI/EIA-222
- All services performed, results obtained, and recommendations made are in accordance with generally accepted engineering principles and practices. CENTEK engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

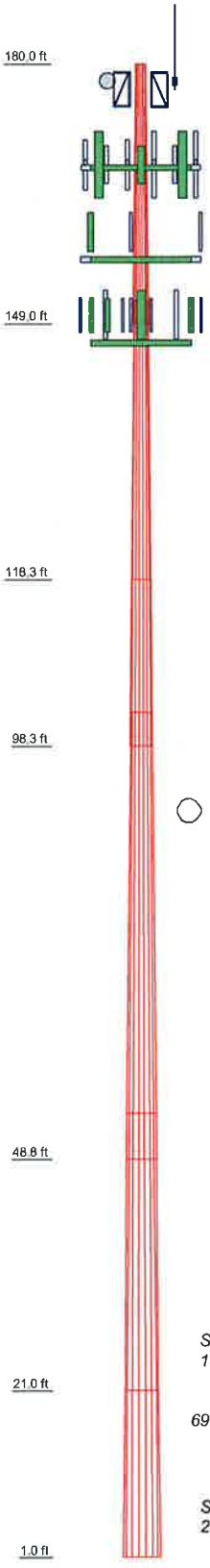
General Description of Structural Analysis Program

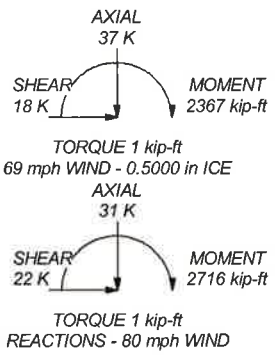
tnxTower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, tnxTower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

- tnxTower can analyze and design 3- and 4-sided guyed towers, 3- and 4-sided self-supporting towers and either round or tapered ground mounted poles with or without guys.
- The program analyzes towers using the TIA-222-G (2005) standard or any of the previous TIA/EIA standards back to RS-222 (1959). Steel design is checked using the AISC ASD 9th Edition or the AISC LRFD specifications.
- Linear and non-linear (P-delta) analyses can be used in determining displacements and forces in the structure. Wind pressures and forces are automatically calculated.
- Extensive graphics plots include material take-off, shear-moment, leg compression, displacement, twist, feed line, guy anchor and stress plots.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	Length (ft)	Number of Sides	Thickness (in)	Socket Length (ft)	Top Dia (in)	Bot Dia (in)	Grade	Weight (K)
1	31.00	18	0.1875	2.75	14.4000	21.3800		1.1
2	33.50	18	0.2500		20.3858	27.9400		2.2
3	20.00	18	0.2800	4.00	27.9400	32.4400		1.8
4	53.50	18	0.3125	5.50	30.9800	43.1000	A572-65	6.6
5	33.25	18	0.3125		41.2290	48.9500		5.0
6	20.00	18	0.3500		48.9500	53.2300		3.8





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
HP2-4.7	178	Valmont T-Arm (1) (ATI - Existing)	168
4-ft Dual Mount Standoff	177	RR90-17-02DP (T-Mobile - Existing)	160
10' x 1" Dia Omni	177	RR90-17-02DP (T-Mobile - Existing)	160
1' x 1' Panel	177	RR90-17-02DP (T-Mobile - Existing)	160
4-ft Dual Mount Standoff	177	(2) TMA 10"x8"x3" (T-Mobile - Existing)	157
Valmont T-Arm (1) (ATI - Existing)	168	(2) TMA 10"x8"x3" (T-Mobile - Existing)	157
Valmont T-Arm (1) (ATI - Existing)	168	12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	157
(2) AM-X-CD-16-65-00T-RET(72") (ATI - Existing)	168	12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	157
(2) SBNH-1D6565C (ATI - Existing)	168	12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	157
(2) P65-17-XLH-RR (ATI - Existing)	168	(2) TMA 10"x8"x3" (T-Mobile - Existing)	157
(2) RRUS-11 (ATI - Existing)	168	BXA-171085-8BF (Verizon - Existing)	150
(2) RRUS-11 (ATI - Existing)	168	BXA-70063/6CF (Verizon - Proposed)	150
(2) RRUS-11 (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
800 10121 (ATI - Existing)	168	BXA-171085-8BF (Verizon - Existing)	150
800 10121 (ATI - Existing)	168	BXA-70063/6CF (Verizon - Proposed)	150
800 10121 (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
(2) 860 10025 RCU (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
(2) 860 10025 RCU (ATI - Existing)	168	BXA-171085-8BF (Verizon - Existing)	150
(2) 860 10025 RCU (ATI - Existing)	168	BXA-70063/6CF (Verizon - Proposed)	150
(2) LGP21401 TMA (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
(2) LGP21401 TMA (ATI - Existing)	168	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	150
(2) LGP21401 TMA (ATI - Existing)	168	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	150
(4) LGP21901 Diplexer (ATI - Existing)	168	(2) FD9R6004/2C-3L Diplexer (Verizon - Existing)	150
(4) LGP21901 Diplexer (ATI - Existing)	168	LPA-80080-4CF (Verizon - Existing)	150
(4) LGP21901 Diplexer (ATI - Existing)	168	Andrew 12'-6" Low Profile Platform (Verizon - Existing)	147
DTMABP7819VG12A TMA (ATI - Existing)	168		
DTMABP7819VG12A TMA (ATI - Existing)	168		
DTMABP7819VG12A TMA (ATI - Existing)	168		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
5. Welds are fabricated with ER-70S-6 electrodes.
6. TOWER RATING: 93.9%

Centek Engineering Inc.
63-2 North Branford Rd.
Branford, CT 06405
Phone: (203) 488-0580
FAX: (203) 488-8587

Job: 13075.CO21 - Somers West		
Project: 180' Sabre Monopole - 37 Bacon Rd., Enfield, CT		
Client: Verizon Wireless	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 06/10/13	Scale: NTS
Path:		Dwg No. E-1

tnxTower	Job	Page
	13075.CO21 - Somers West	1 of 35
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Project 180' Sabre Monopole - 37 Bacon Rd., Enfield, CT	Date 09:38:08 06/10/13
	Client Verizon Wireless	Designed by TJL

Tower Input Data

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

Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56.0 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
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, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	*Elevation*	*Section Length*	*Splice Length*	*Number of Sides*	*Top Diameter*	*Bottom Diameter*	*Wall Thickness*	*Bend Radius*	*Pole Grade*
	ft	*ft*	*ft*		*in*	*in*	*in*	*in*	
L1	180.00-149.00	31.00	2.75	18	14.4000	21.3800	0.1875	0.7500	A572-65 (65 ksi)
L2	149.00-118.25	33.50	0.00	18	20.3858	27.9400	0.2500	1.0000	A572-65 (65 ksi)
L3	118.25-98.25	20.00	4.00	18	27.9400	32.4400	0.2800	1.1200	A572-65 (65 ksi)
L4	98.25-48.75	53.50	5.50	18	30.9800	43.1000	0.3125	1.2500	A572-65 (65 ksi)
L5	48.75-21.00	33.25	0.00	18	41.2290	48.9500	0.3125	1.2500	A572-65 (65 ksi)

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L6	21.00-1.00	20.00		18	48.9500	53.2300	0.3500	1.4000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	14.6221	8.4582	215.8525	5.0454	7.3152	29.5074	431.9890	4.2299	2.2044	11.757
	21.7098	12.6122	715.6361	7.5233	10.8610	65.8902	1432.2138	6.3073	3.4329	18.309
L2	21.3300	15.9778	818.4487	7.1482	10.3560	79.0314	1637.9743	7.9904	3.1479	12.592
	28.3710	21.9720	2128.4000	9.8300	14.1935	149.9558	4259.6006	10.9881	4.4774	17.91
L3	28.3710	24.5820	2376.0684	9.8193	14.1935	167.4052	4755.2632	12.2933	4.4246	15.802
	32.9404	28.5812	3734.6553	11.4168	16.4795	226.6240	7474.2248	14.2933	5.2166	18.631
L4	32.3781	30.4183	3614.3443	10.8870	15.7378	229.6595	7233.4444	15.2121	4.9025	15.688
	43.7649	42.4399	9816.2392	15.1896	21.8948	448.3366	19645.3948	21.2240	7.0356	22.514
L5	43.1619	40.5841	8584.0141	14.5254	20.9443	409.8488	17179.3232	20.2959	6.7063	21.46
	49.7051	48.2423	14418.1031	17.2663	24.8666	579.8180	28855.1778	24.1257	8.0652	25.809
L6	49.7051	53.9897	16110.9528	17.2530	24.8666	647.8953	32243.1048	27.0000	7.9992	22.855
	54.0512	58.7444	20753.2805	18.7724	27.0408	767.4791	41533.8687	29.3778	8.7525	25.007

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 180.00-149.00				1	1	1		
L2 149.00-118.25				1	1	1		
L3 118.25-98.25				1	1	1		
L4 98.25-48.75				1	1	1		
L5 48.75-21.00				1	1	1		
L6 21.00-1.00				1	1	1		

Monopole Base Plate Data

Base Plate Data	
Base plate is square	
Base plate is grouted	√
Anchor bolt grade	A615-75
Anchor bolt size	2.2500 in
Number of bolts	16
Embedment length	60.0000 in
f'_c	4.000 ksi
Grout space	3.0000 in
Base plate grade	A572-60
Base plate thickness	2.0000 in
Bolt circle diameter	60.0000 in
Outer diameter	66.0000 in
Inner diameter	40.0000 in

Base Plate Data	
Base plate type	Plain Plate

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
1 1/4	C	No	Inside Pole	180.00 - 1.00	2	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
1/2	C	No	Inside Pole	180.00 - 1.00	2	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1 5/8 (AT&T - Existing)	C	No	Inside Pole	171.00 - 1.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (T-Mobile - Existing)	C	No	Inside Pole	161.00 - 1.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Verizon - Existing)	C	No	Inside Pole	151.00 - 1.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
#8 AWG Copper WIre (AT&T - Existing)	C	No	Inside Pole	171.00 - 1.00	2	No Ice	0.00	0.05
						1/2" Ice	0.00	0.05
RG6-Fiber (AT&T - Existing)	C	No	Inside Pole	171.00 - 1.00	1	No Ice	0.00	1.00
						1/2" Ice	0.00	1.00

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	180.00-149.00	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	0.46
L2	149.00-118.25	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	1.05
L3	118.25-98.25	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	0.68
L4	98.25-48.75	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	1.69
L5	48.75-21.00	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	0.95
L6	21.00-1.00	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	0.68

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	180.00-149.00	A	0.500	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	0.46

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
L2	149.00-118.25	A	0.500	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	1.05
L3	118.25-98.25	A	0.500	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	0.68
L4	98.25-48.75	A	0.500	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	1.69
L5	48.75-21.00	A	0.500	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	0.95
L6	21.00-1.00	A	0.500	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	0.68

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	180.00-149.00	0.0000	0.0000	0.0000	0.0000
L2	149.00-118.25	0.0000	0.0000	0.0000	0.0000
L3	118.25-98.25	0.0000	0.0000	0.0000	0.0000
L4	98.25-48.75	0.0000	0.0000	0.0000	0.0000
L5	48.75-21.00	0.0000	0.0000	0.0000	0.0000
L6	21.00-1.00	0.0000	0.0000	0.0000	0.0000

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
4-ft Dual Mount Standoff	A	From Face	2.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	5.20 6.30	5.20 6.30	0.05 0.06
4-ft Dual Mount Standoff	B	From Face	2.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice	5.20 6.30	5.20 6.30	0.05 0.06
10' x 1" Dia Omni	B	From Face	4.00 0.00 5.00	0.0000	177.00	No Ice 1/2" Ice	1.00 2.02	1.00 2.02	0.03 0.04
1' x 1' Panel	B	From Face	4.00 0.00 1.00	0.0000	177.00	No Ice 1/2" Ice	1.40 1.56	0.35 0.45	0.02 0.03
Valmont T-Arm (1) (AT&T - Existing)	A	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	0.34 0.41

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
Valmont T-Arm (1)	B	From Face	4.00	0.0000	168.00	No Ice	10.54	10.54	0.34
(AT&T - Existing)			0.00			1/2" Ice	14.45	14.45	0.41
			0.00						
Valmont T-Arm (1)	C	From Face	4.00	0.0000	168.00	No Ice	10.54	10.54	0.34
(AT&T - Existing)			0.00			1/2" Ice	14.45	14.45	0.41
			0.00						
(2)	A	From Face	4.00	0.0000	168.00	No Ice	8.26	4.64	0.05
AM-X-CD-16-65-00T-RET(72")			0.00			1/2" Ice	8.81	5.09	0.10
(AT&T - Existing)			0.00						
(2) SBNH-1D6565C	B	From Face	4.00	0.0000	168.00	No Ice	11.41	7.70	0.06
(AT&T - Existing)			0.00			1/2" Ice	12.03	8.29	0.13
			0.00						
(2) P65-17-XLH-RR	C	From Face	4.00	0.0000	168.00	No Ice	11.47	6.80	0.06
(AT&T - Existing)			0.00			1/2" Ice	12.08	7.38	0.12
			0.00						
(2) RRUS-11	A	From Face	0.50	0.0000	168.00	No Ice	0.00	1.25	0.05
(AT&T - Existing)			0.00			1/2" Ice	0.00	1.41	0.07
			0.00						
(2) RRUS-11	B	From Face	0.50	0.0000	168.00	No Ice	0.00	1.25	0.05
(AT&T - Existing)			0.00			1/2" Ice	0.00	1.41	0.07
			0.00						
(2) RRUS-11	C	From Face	0.50	0.0000	168.00	No Ice	0.00	1.25	0.05
(AT&T - Existing)			0.00			1/2" Ice	0.00	1.41	0.07
			0.00						
DC6-48-60-18-8F Surge Arrestor	C	From Face	0.50	0.0000	168.00	No Ice	2.23	2.23	0.02
			0.00			1/2" Ice	2.45	2.45	0.04
(AT&T - Existing)			0.00						
800 10121	A	From Face	4.00	0.0000	168.00	No Ice	5.46	3.29	0.05
(AT&T - Existing)			0.00			1/2" Ice	5.88	3.64	0.08
			0.00						
800 10121	B	From Face	4.00	0.0000	168.00	No Ice	5.46	3.29	0.05
(AT&T - Existing)			0.00			1/2" Ice	5.88	3.64	0.08
			0.00						
800 10121	C	From Face	4.00	0.0000	168.00	No Ice	5.46	3.29	0.05
(AT&T - Existing)			0.00			1/2" Ice	5.88	3.64	0.08
			0.00						
(2) 860 10025 RCU	A	From Face	4.00	0.0000	168.00	No Ice	0.00	0.00	0.00
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.00	0.00
			0.00						
(2) 860 10025 RCU	B	From Face	4.00	0.0000	168.00	No Ice	0.00	0.00	0.00
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.00	0.00
			0.00						
(2) 860 10025 RCU	C	From Face	4.00	0.0000	168.00	No Ice	0.00	0.00	0.00
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.00	0.00
			0.00						
(2) LGP21401 TMA	A	From Face	4.00	0.0000	168.00	No Ice	0.95	0.37	0.02
(AT&T - Existing)			0.00			1/2" Ice	1.09	0.48	0.02
			0.00						
(2) LGP21401 TMA	B	From Face	4.00	0.0000	168.00	No Ice	0.95	0.37	0.02
(AT&T - Existing)			0.00			1/2" Ice	1.09	0.48	0.02
			0.00						
(2) LGP21401 TMA	C	From Face	4.00	0.0000	168.00	No Ice	0.95	0.37	0.02
(AT&T - Existing)			0.00			1/2" Ice	1.09	0.48	0.02
			0.00						
(4) LGP21901 Diplexer	A	From Face	4.00	0.0000	168.00	No Ice	0.00	0.12	0.01
(AT&T - Existing)			0.00			1/2" Ice	0.00	0.17	0.01

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		*C_AA_A Front* *ft²*	*C_AA_A Side* *ft²*	*Weight* *K*
			0.00						
(4) LGP21901 Diplexer (AT&T - Existing)	B	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.12 0.17	0.01 0.01
(4) LGP21901 Diplexer (AT&T - Existing)	C	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.12 0.17	0.01 0.01
DTMABP7819VG12A TMA (AT&T - Existing)	A	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.58 0.70	0.02 0.03
DTMABP7819VG12A TMA (AT&T - Existing)	B	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.58 0.70	0.02 0.03
DTMABP7819VG12A TMA (AT&T - Existing)	C	From Face	4.00 0.00 0.00	0.0000	168.00	No Ice 1/2" Ice	0.00 0.00	0.58 0.70	0.02 0.03
RR90-17-02DP (T-Mobile - Existing)	A	From Face	4.00 6.00 0.00	0.0000	160.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
RR90-17-02DP (T-Mobile - Existing)	B	From Face	4.00 6.00 0.00	0.0000	160.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
RR90-17-02DP (T-Mobile - Existing)	C	From Face	4.00 6.00 0.00	0.0000	160.00	No Ice 1/2" Ice	4.36 4.77	1.97 2.31	0.02 0.04
(2) TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	4.00 5.00 0.00	0.0000	157.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.02 0.02
(2) TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	4.00 5.00 0.00	0.0000	157.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.02 0.02
(2) TMA 10"x8"x3" (T-Mobile - Existing)	A	From Face	4.00 5.00 0.00	0.0000	157.00	No Ice 1/2" Ice	0.00 0.00	0.00 0.00	0.02 0.02
12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	A	From Face	4.00 0.00 0.00	0.0000	157.00	No Ice 1/2" Ice	14.20 19.70	14.20 19.70	0.49 0.57
12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	B	From Face	4.00 0.00 0.00	0.0000	157.00	No Ice 1/2" Ice	14.20 19.70	14.20 19.70	0.49 0.57
12-ft T-arm w/ Work Support Platform (T-Mobile - Existing)	C	From Face	4.00 0.00 0.00	0.0000	157.00	No Ice 1/2" Ice	14.20 19.70	14.20 19.70	0.49 0.57
LPA-80080-4CF (Verizon - Existing)	A	From Face	4.00 6.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
BXA-171085-8BF (Verizon - Existing)	A	From Face	4.00 4.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.94 3.26	2.16 2.46	0.01 0.03
BXA-70063/6CF (Verizon - Proposed)	A	From Face	4.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
LPA-80080-4CF (Verizon - Existing)	A	From Face	4.00 -6.00 0.00	0.0000	150.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05
LPA-80080-4CF (Verizon - Existing)	B	From Face	4.00 6.00	0.0000	150.00	No Ice 1/2" Ice	2.62 2.92	6.06 6.45	0.01 0.05

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
			0.00						
BXA-171085-8BF	B	From Face	4.00	0.0000	150.00	No Ice	2.94	2.16	0.01
(Verizon - Existing)			4.00			1/2" Ice	3.26	2.46	0.03
			0.00						
BXA-70063/6CF	B	From Face	4.00	0.0000	150.00	No Ice	7.73	4.16	0.02
(Verizon - Proposed)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
LPA-80080-4CF	B	From Face	4.00	0.0000	150.00	No Ice	2.62	6.06	0.01
(Verizon - Existing)			-6.00			1/2" Ice	2.92	6.45	0.05
			0.00						
LPA-80080-4CF	C	From Face	4.00	0.0000	150.00	No Ice	2.62	6.06	0.01
(Verizon - Existing)			6.00			1/2" Ice	2.92	6.45	0.05
			0.00						
BXA-171085-8BF	C	From Face	4.00	0.0000	150.00	No Ice	2.94	2.16	0.01
(Verizon - Existing)			4.00			1/2" Ice	3.26	2.46	0.03
			0.00						
BXA-70063/6CF	C	From Face	4.00	0.0000	150.00	No Ice	7.73	4.16	0.02
(Verizon - Proposed)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
LPA-80080-4CF	C	From Face	4.00	0.0000	150.00	No Ice	2.62	6.06	0.01
(Verizon - Existing)			-6.00			1/2" Ice	2.92	6.45	0.05
			0.00						
(2) FD9R6004/2C-3L	A	From Face	4.00	0.0000	150.00	No Ice	0.00	0.00	0.00
Diplexer			6.00			1/2" Ice	0.00	0.00	0.01
(Verizon - Existing)			0.00						
(2) FD9R6004/2C-3L	B	From Face	4.00	0.0000	150.00	No Ice	0.00	0.00	0.00
Diplexer			6.00			1/2" Ice	0.00	0.00	0.01
(Verizon - Existing)			0.00						
(2) FD9R6004/2C-3L	C	From Face	4.00	0.0000	150.00	No Ice	0.00	0.00	0.00
Diplexer			6.00			1/2" Ice	0.00	0.00	0.01
(Verizon - Existing)			0.00						
Andrew 12'-6" Low Profile	C	None		0.0000	147.00	No Ice	14.45	14.45	1.30
Platform						1/2" Ice	19.00	19.00	1.69
(Verizon - Existing)									

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
HP2-4.7	A	Paraboloid w/Shroud (HP)	From Face	4.00 0.00 0.00	Worst		178.00	2.00	No Ice 1/2" Ice	3.14 3.41	0.03 0.04

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	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 180.00-149.00	163.60	1.58	25.88	46.216	A	0.000	46.216	46.216	100.00	0.000	0.000
					B	0.000	46.216		100.00	0.000	0.000
					C	0.000	46.216		100.00	0.000	0.000
L2 149.00-118.25	133.02	1.489	24.39	62.712	A	0.000	62.712	62.712	100.00	0.000	0.000
					B	0.000	62.712		100.00	0.000	0.000
					C	0.000	62.712		100.00	0.000	0.000
L3 118.25-98.25	108.00	1.403	22.99	50.317	A	0.000	50.317	50.317	100.00	0.000	0.000
					B	0.000	50.317		100.00	0.000	0.000
					C	0.000	50.317		100.00	0.000	0.000
L4 98.25-48.75	72.87	1.254	20.44	154.659	A	0.000	154.659	154.659	100.00	0.000	0.000
					B	0.000	154.659		100.00	0.000	0.000
					C	0.000	154.659		100.00	0.000	0.000
L5 48.75-21.00	34.55	1.013	16.60	105.746	A	0.000	105.746	105.746	100.00	0.000	0.000
					B	0.000	105.746		100.00	0.000	0.000
					C	0.000	105.746		100.00	0.000	0.000
L6 21.00-1.00	10.86	1	16.38	85.150	A	0.000	85.150	85.150	100.00	0.000	0.000
					B	0.000	85.150		100.00	0.000	0.000
					C	0.000	85.150		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	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 180.00-149.00	163.60	1.58	19.41	0.5000	48.799	A	0.000	48.799	48.799	100.00	0.000	0.000
						B	0.000	48.799		100.00	0.000	0.000
						C	0.000	48.799		100.00	0.000	0.000
L2 149.00-118.25	133.02	1.489	18.29	0.5000	65.274	A	0.000	65.274	65.274	100.00	0.000	0.000
						B	0.000	65.274		100.00	0.000	0.000
						C	0.000	65.274		100.00	0.000	0.000
L3 118.25-98.25	108.00	1.403	17.24	0.5000	51.983	A	0.000	51.983	51.983	100.00	0.000	0.000
						B	0.000	51.983		100.00	0.000	0.000
						C	0.000	51.983		100.00	0.000	0.000
L4 98.25-48.75	72.87	1.254	15.33	0.5000	158.784	A	0.000	158.784	158.784	100.00	0.000	0.000
						B	0.000	158.784		100.00	0.000	0.000
						C	0.000	158.784		100.00	0.000	0.000
L5 48.75-21.00	34.55	1.013	12.45	0.5000	108.059	A	0.000	108.059	108.059	100.00	0.000	0.000
						B	0.000	108.059		100.00	0.000	0.000
						C	0.000	108.059		100.00	0.000	0.000
L6 21.00-1.00	10.86	1	12.29	0.5000	86.817	A	0.000	86.817	86.817	100.00	0.000	0.000
						B	0.000	86.817		100.00	0.000	0.000
						C	0.000	86.817		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	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	163.60	1.58	10.11	46.216	A	0.000	46.216	46.216	100.00	0.000	0.000
180.00-149.00					B	0.000	46.216		100.00	0.000	0.000
					C	0.000	46.216		100.00	0.000	0.000
L2	133.02	1.489	9.53	62.712	A	0.000	62.712	62.712	100.00	0.000	0.000
149.00-118.25					B	0.000	62.712		100.00	0.000	0.000
					C	0.000	62.712		100.00	0.000	0.000
L3	108.00	1.403	8.98	50.317	A	0.000	50.317	50.317	100.00	0.000	0.000
118.25-98.25					B	0.000	50.317		100.00	0.000	0.000
					C	0.000	50.317		100.00	0.000	0.000
L4 98.25-48.75	72.87	1.254	7.98	154.659	A	0.000	154.659	154.659	100.00	0.000	0.000
					B	0.000	154.659		100.00	0.000	0.000
					C	0.000	154.659		100.00	0.000	0.000
L5 48.75-21.00	34.55	1.013	6.48	105.746	A	0.000	105.746	105.746	100.00	0.000	0.000
					B	0.000	105.746		100.00	0.000	0.000
					C	0.000	105.746		100.00	0.000	0.000
L6 21.00-1.00	10.86	1	6.40	85.150	A	0.000	85.150	85.150	100.00	0.000	0.000
					B	0.000	85.150		100.00	0.000	0.000
					C	0.000	85.150		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	1.31	42.38	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	1.05	2.16	A	1	0.65	1	1	1	62.712	1.68	54.63	C
149.00-118.25			B	1	0.65	1	1	1	62.712			
			C	1	0.65	1	1	1	62.712			
L3	0.68	1.81	A	1	0.65	1	1	1	50.317	1.27	63.54	C
118.25-98.25			B	1	0.65	1	1	1	50.317			
			C	1	0.65	1	1	1	50.317			
L4	1.69	6.63	A	1	0.65	1	1	1	154.659	3.47	70.14	C
98.25-48.75			B	1	0.65	1	1	1	154.659			
			C	1	0.65	1	1	1	154.659			
L5	0.95	5.03	A	1	0.65	1	1	1	105.746	1.93	69.49	C
48.75-21.00			B	1	0.65	1	1	1	105.746			
			C	1	0.65	1	1	1	105.746			
L6 21.00-1.00	0.68	3.84	A	1	0.65	1	1	1	85.150	1.53	76.63	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	5.50	20.58						OTM	900.67 kip-ft	11.20		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	1.31	42.38	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	1.05	2.16	A	1	0.65	1	1	1	62.712	1.68	54.63	C
149.00-118.25			B	1	0.65	1	1	1	62.712			
			C	1	0.65	1	1	1	62.712			
L3	0.68	1.81	A	1	0.65	1	1	1	50.317	1.27	63.54	C
118.25-98.25			B	1	0.65	1	1	1	50.317			
			C	1	0.65	1	1	1	50.317			
L4	1.69	6.63	A	1	0.65	1	1	1	154.659	3.47	70.14	C
98.25-48.75			B	1	0.65	1	1	1	154.659			
			C	1	0.65	1	1	1	154.659			
L5	0.95	5.03	A	1	0.65	1	1	1	105.746	1.93	69.49	C
48.75-21.00			B	1	0.65	1	1	1	105.746			
			C	1	0.65	1	1	1	105.746			
L6 21.00-1.00	0.68	3.84	A	1	0.65	1	1	1	85.150	1.53	76.63	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	5.50	20.58						OTM	900.67 kip-ft	11.20		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	1.31	42.38	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	1.05	2.16	A	1	0.65	1	1	1	62.712	1.68	54.63	C
149.00-118.25			B	1	0.65	1	1	1	62.712			
			C	1	0.65	1	1	1	62.712			
L3	0.68	1.81	A	1	0.65	1	1	1	50.317	1.27	63.54	C
118.25-98.25			B	1	0.65	1	1	1	50.317			
			C	1	0.65	1	1	1	50.317			
L4	1.69	6.63	A	1	0.65	1	1	1	154.659	3.47	70.14	C
98.25-48.75			B	1	0.65	1	1	1	154.659			
			C	1	0.65	1	1	1	154.659			
L5	0.95	5.03	A	1	0.65	1	1	1	105.746	1.93	69.49	C
48.75-21.00			B	1	0.65	1	1	1	105.746			
			C	1	0.65	1	1	1	105.746			
L6 21.00-1.00	0.68	3.84	A	1	0.65	1	1	1	85.150	1.53	76.63	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	5.50	20.58						OTM	900.67 kip-ft	11.20		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.46	1.46	A	1	0.65	1	1	1	48.799	1.04	33.56	C
180.00-149.00			B	1	0.65	1	1	1	48.799			
			C	1	0.65	1	1	1	48.799			
L2	1.05	2.64	A	1	0.65	1	1	1	65.274	1.31	42.65	C
149.00-118.25			B	1	0.65	1	1	1	65.274			
			C	1	0.65	1	1	1	65.274			
L3	0.68	2.19	A	1	0.65	1	1	1	51.983	0.98	49.23	C
118.25-98.25			B	1	0.65	1	1	1	51.983			
			C	1	0.65	1	1	1	51.983			
L4	1.69	7.79	A	1	0.65	1	1	1	158.784	2.67	54.01	C
98.25-48.75			B	1	0.65	1	1	1	158.784			
			C	1	0.65	1	1	1	158.784			
L5	0.95	5.82	A	1	0.65	1	1	1	108.059	1.48	53.26	C
48.75-21.00			B	1	0.65	1	1	1	108.059			
			C	1	0.65	1	1	1	108.059			
L6 21.00-1.00	0.68	4.47	A	1	0.65	1	1	1	86.817	1.17	58.59	C
			B	1	0.65	1	1	1	86.817			
			C	1	0.65	1	1	1	86.817			
Sum Weight:	5.50	24.37						OTM	700.91 kip-ft	8.66		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.46	1.46	A	1	0.65	1	1	1	48.799	1.04	33.56	C
180.00-149.00			B	1	0.65	1	1	1	48.799			
			C	1	0.65	1	1	1	48.799			
L2	1.05	2.64	A	1	0.65	1	1	1	65.274	1.31	42.65	C
149.00-118.25			B	1	0.65	1	1	1	65.274			
			C	1	0.65	1	1	1	65.274			
L3	0.68	2.19	A	1	0.65	1	1	1	51.983	0.98	49.23	C
118.25-98.25			B	1	0.65	1	1	1	51.983			
			C	1	0.65	1	1	1	51.983			
L4	1.69	7.79	A	1	0.65	1	1	1	158.784	2.67	54.01	C
98.25-48.75			B	1	0.65	1	1	1	158.784			
			C	1	0.65	1	1	1	158.784			
L5	0.95	5.82	A	1	0.65	1	1	1	108.059	1.48	53.26	C
48.75-21.00			B	1	0.65	1	1	1	108.059			
			C	1	0.65	1	1	1	108.059			
L6 21.00-1.00	0.68	4.47	A	1	0.65	1	1	1	86.817	1.17	58.59	C
			B	1	0.65	1	1	1	86.817			
			C	1	0.65	1	1	1	86.817			
Sum Weight:	5.50	24.37						OTM	700.91 kip-ft	8.66		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.46	1.46	A	1	0.65	1	1	1	48.799	1.04	33.56	C
180.00-149.00			B	1	0.65	1	1	1	48.799			
			C	1	0.65	1	1	1	48.799			
L2	1.05	2.64	A	1	0.65	1	1	1	65.274	1.31	42.65	C
149.00-118.25			B	1	0.65	1	1	1	65.274			
			C	1	0.65	1	1	1	65.274			
L3	0.68	2.19	A	1	0.65	1	1	1	51.983	0.98	49.23	C
118.25-98.25			B	1	0.65	1	1	1	51.983			
			C	1	0.65	1	1	1	51.983			
L4	1.69	7.79	A	1	0.65	1	1	1	158.784	2.67	54.01	C
98.25-48.75			B	1	0.65	1	1	1	158.784			
			C	1	0.65	1	1	1	158.784			
L5	0.95	5.82	A	1	0.65	1	1	1	108.059	1.48	53.26	C
48.75-21.00			B	1	0.65	1	1	1	108.059			
			C	1	0.65	1	1	1	108.059			
L6 21.00-1.00	0.68	4.47	A	1	0.65	1	1	1	86.817	1.17	58.59	C
			B	1	0.65	1	1	1	86.817			
			C	1	0.65	1	1	1	86.817			
Sum Weight:	5.50	24.37						OTM	700.91 kip-ft	8.66		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	0.51	16.55	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	1.05	2.16	A	1	0.65	1	1	1	62.712	0.66	21.34	C
149.00-118.25			B	1	0.65	1	1	1	62.712			
			C	1	0.65	1	1	1	62.712			
L3	0.68	1.81	A	1	0.65	1	1	1	50.317	0.50	24.82	C
118.25-98.25			B	1	0.65	1	1	1	50.317			
			C	1	0.65	1	1	1	50.317			
L4	1.69	6.63	A	1	0.65	1	1	1	154.659	1.36	27.40	C
98.25-48.75			B	1	0.65	1	1	1	154.659			
			C	1	0.65	1	1	1	154.659			
L5	0.95	5.03	A	1	0.65	1	1	1	105.746	0.75	27.14	C
48.75-21.00			B	1	0.65	1	1	1	105.746			
			C	1	0.65	1	1	1	105.746			
L6 21.00-1.00	0.68	3.84	A	1	0.65	1	1	1	85.150	0.60	29.93	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	5.50	20.58						OTM	351.82 kip-ft	4.37		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	0.51	16.55	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	1.05	2.16	A	1	0.65	1	1	1	62.712	0.66	21.34	C
149.00-118.25			B	1	0.65	1	1	1	62.712			
			C	1	0.65	1	1	1	62.712			
L3	0.68	1.81	A	1	0.65	1	1	1	50.317	0.50	24.82	C
118.25-98.25			B	1	0.65	1	1	1	50.317			
			C	1	0.65	1	1	1	50.317			
L4	1.69	6.63	A	1	0.65	1	1	1	154.659	1.36	27.40	C
98.25-48.75			B	1	0.65	1	1	1	154.659			
			C	1	0.65	1	1	1	154.659			
L5	0.95	5.03	A	1	0.65	1	1	1	105.746	0.75	27.14	C
48.75-21.00			B	1	0.65	1	1	1	105.746			
			C	1	0.65	1	1	1	105.746			
L6 21.00-1.00	0.68	3.84	A	1	0.65	1	1	1	85.150	0.60	29.93	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	5.50	20.58						OTM	351.82 kip-ft	4.37		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
L1	0.46	1.11	A	1	0.65	1	1	1	46.216	0.51	16.55	C
180.00-149.00			B	1	0.65	1	1	1	46.216			
			C	1	0.65	1	1	1	46.216			
L2	1.05	2.16	A	1	0.65	1	1	1	62.712	0.66	21.34	C
149.00-118.25			B	1	0.65	1	1	1	62.712			
			C	1	0.65	1	1	1	62.712			
L3	0.68	1.81	A	1	0.65	1	1	1	50.317	0.50	24.82	C
118.25-98.25			B	1	0.65	1	1	1	[illegible]			
			C	1	0.65	1	1	1	[illegible] 50.317			
L4	1.69	6.63	A	1	0.65	1	1	1	154.659	1.36	27.40	C
98.25-48.75			B	1	0.65	1	1	1	154.659			
			C	1	0.65	1	1	1	154.659			
L5	0.95	5.03	A	1	0.65	1	1	1	105.746	0.75	27.14	C
48.75-21.00			B	1	0.65	1	1	1	105.746			
			C	1	0.65	1	1	1	105.746			
L6 21.00-1.00	0.68	3.84	A	1	0.65	1	1	1	85.150	0.60	29.93	C
			B	1	0.65	1	1	1	85.150			
			C	1	0.65	1	1	1	85.150			
Sum Weight:	5.50	20.58						OTM	351.82 kip-ft	4.37		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	20.58					
Bracing Weight	0.00					
Total Member Self-Weight	20.58			-1.05	0.04	
Total Weight	31.45			-1.05	0.04	
Wind 0 deg - No Ice		0.02	-21.72	-2589.54	-4.16	0.63
Wind 30 deg - No Ice		10.85	-18.82	-2244.84	-1292.54	0.16
Wind 60 deg - No Ice		18.76	-10.88	-1298.93	-2234.58	-0.36
Wind 90 deg - No Ice		21.65	-0.02	-5.25	-2577.86	-0.78
Wind 120 deg - No Ice		18.74	10.84	1289.56	-2230.39	-0.99
Wind 150 deg - No Ice		10.81	18.80	2238.54	-1285.28	-0.94
Wind 180 deg - No Ice		-0.02	21.72	2587.43	4.23	-0.63
Wind 210 deg - No Ice		-10.85	18.82	2242.74	1292.62	-0.16
Wind 240 deg - No Ice		-18.76	10.88	1296.82	2234.66	0.36
Wind 270 deg - No Ice		-21.65	0.02	3.14	2577.93	0.78
Wind 300 deg - No Ice		-18.74	-10.84	-1291.66	2230.46	0.99
Wind 330 deg - No Ice		-10.81	-18.80	-2240.65	1285.35	0.94
Member Ice	3.79					
Total Weight Ice	37.30			-1.05	-0.15	
Wind 0 deg - Ice		0.02	-18.14	-2222.23	-3.08	0.62
Wind 30 deg - Ice		9.06	-15.71	-1926.12	-1109.57	0.15
Wind 60 deg - Ice		15.68	-9.08	-1114.18	-1918.78	-0.36
Wind 90 deg - Ice		18.09	-0.02	-3.98	-2213.90	-0.77
Wind 120 deg - Ice		15.66	9.05	1107.00	-1915.85	-0.98
Wind 150 deg - Ice		9.03	15.70	1921.09	-1104.48	-0.92
Wind 180 deg - Ice		-0.02	18.14	2220.14	2.79	-0.62
Wind 210 deg - Ice		-9.06	15.71	1924.03	1109.28	-0.15
Wind 240 deg - Ice		-15.68	9.08	1112.09	1918.49	0.36
Wind 270 deg - Ice		-18.09	0.02	1.89	2213.61	0.77
Wind 300 deg - Ice		-15.66	-9.05	-1109.10	1915.56	0.98
Wind 330 deg - Ice		-9.03	-15.70	-1923.18	1104.19	0.92
Total Weight	31.45			-1.05	0.04	
Wind 0 deg - Service		0.01	-8.48	-1012.18	-1.60	0.25
Wind 30 deg - Service		4.24	-7.35	-877.53	-504.88	0.06
Wind 60 deg - Service		7.33	-4.25	-508.04	-872.86	-0.14
Wind 90 deg - Service		8.46	-0.01	-2.69	-1006.95	-0.31
Wind 120 deg - Service		7.32	4.23	503.09	-871.22	-0.39
Wind 150 deg - Service		4.22	7.34	873.79	-502.04	-0.37
Wind 180 deg - Service		-0.01	8.48	1010.07	1.68	-0.25
Wind 210 deg - Service		-4.24	7.35	875.43	504.95	-0.06
Wind 240 deg - Service		-7.33	4.25	505.93	872.94	0.14
Wind 270 deg - Service		-8.46	0.01	0.59	1007.03	0.31
Wind 300 deg - Service		-7.32	-4.23	-505.20	871.30	0.39
Wind 330 deg - Service		-4.22	-7.34	-875.90	502.11	0.37

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

Comb. No.	Description
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
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	180 - 149	Pole	Max Tension	27	0.00	0.00	-0.00
			Max. Compression	14	-6.89	-0.15	1.07
			Max. Mx	11	-3.99	132.02	0.37
			Max. My	2	-3.97	-0.50	133.88
			Max. Vy	11	-9.49	132.02	0.37
			Max. Vx	2	-9.56	-0.50	133.88
			Max. Torque	10			-1.23
L2	149 - 118.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-13.03	-0.16	1.12
			Max. Mx	11	-8.66	575.20	-0.42
			Max. My	2	-8.65	-1.41	579.39
			Max. Vy	11	-14.45	575.20	-0.42
			Max. Vx	2	-14.52	-1.41	579.39
			Max. Torque	6			0.98
L3	118.25 - 98.25	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-15.30	-0.16	1.12
			Max. Mx	11	-10.82	814.14	-0.81
			Max. My	2	-10.81	-1.83	819.44
			Max. Vy	11	-15.44	814.14	-0.81
			Max. Vx	2	-15.51	-1.83	819.44
			Max. Torque	6			0.98
L4	98.25 - 48.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-24.26	-0.16	1.12

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	11	-19.25	1631.42	-2.00
			Max. My	2	-19.24	-3.08	1640.05
			Max. Vy	11	-18.58	1631.42	-2.00
			Max. Vx	2	-18.65	-3.08	1640.05
			Max. Torque	6			0.97
L5	48.75 - 21	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-32.14	-0.16	1.12
			Max. Mx	11	-26.64	2281.98	-2.81
			Max. My	2	-26.64	-3.91	2292.86
			Max. Vy	11	-20.50	2281.98	-2.81
			Max. Vx	2	-20.56	-3.91	2292.86
			Max. Torque	6			0.97
L6	21 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-37.30	-0.16	1.12
			Max. Mx	11	-31.44	2703.26	-3.30
			Max. My	2	-31.44	-4.39	2715.46
			Max. Vy	11	-21.66	2703.26	-3.30
			Max. Vx	2	-21.73	-4.39	2715.46
			Max. Torque	6			0.97

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	21	37.30	0.02	-18.14
	Max. H_x	11	31.45	21.65	-0.02
	Max. H_z	2	31.45	-0.02	21.72
	Max. M_x	2	2715.46	-0.02	21.72
	Max. M_z	5	2703.19	-21.65	0.02
	Max. Torsion	6	0.97	-18.74	-10.84
	Min. Vert	1	31.45	0.00	0.00
	Min. H_x	5	31.45	-21.65	0.02
	Min. H_z	8	31.45	0.02	-21.72
	Min. M_x	8	-2713.18	0.02	-21.72
	Min. M_z	11	-2703.26	21.65	-0.02
	Min. Torsion	12	-0.96	18.74	10.84

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	31.45	0.00	-0.00	-1.11	0.04	0.00
Dead+Wind 0 deg - No Ice	31.45	0.02	-21.72	-2715.46	-4.39	0.67
Dead+Wind 30 deg - No Ice	31.45	10.85	-18.82	-2354.03	-1355.36	0.22
Dead+Wind 60 deg - No Ice	31.45	18.76	-10.88	-1362.17	-2343.20	-0.29
Dead+Wind 90 deg - No Ice	31.45	21.65	-0.02	-5.58	-2703.19	-0.73
Dead+Wind 120 deg - No Ice	31.45	18.74	10.84	1352.23	-2338.82	-0.97
Dead+Wind 150 deg - No Ice	31.45	10.81	18.80	2347.36	-1347.71	-0.94
Dead+Wind 180 deg - No Ice	31.45	-0.02	21.72	2713.18	4.49	-0.67
Dead+Wind 210 deg - No Ice	31.45	-10.85	18.82	2351.74	1355.46	-0.22
Dead+Wind 240 deg - No Ice	31.45	-18.76	10.88	1359.87	2343.28	0.29

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+Wind 270 deg - No Ice	31.45	-21.65	0.02	3.30	2703.26	0.72
Dead+Wind 300 deg - No Ice	31.45	-18.74	-10.84	-1354.50	2338.89	0.96
Dead+Wind 330 deg - No Ice	31.45	-10.81	-18.80	-2349.63	1347.80	0.94
Dead+Ice+Temp	37.30	0.00	-0.00	-1.12	-0.16	0.00
Dead+Wind 0 deg+Ice+Temp	37.30	0.02	-18.14	-2366.04	-3.32	0.68
Dead+Wind 30 deg+Ice+Temp	37.30	9.06	-15.71	-2050.79	-1181.35	0.23
Dead+Wind 60 deg+Ice+Temp	37.30	15.68	-9.08	-1186.36	-2042.90	-0.28
Dead+Wind 90 deg+Ice+Temp	37.30	18.09	-0.02	-4.34	-2357.12	-0.72
Dead+Wind 120 deg+Ice+Temp	37.30	15.66	9.05	1178.56	-2039.76	-0.96
Dead+Wind 150 deg+Ice+Temp	37.30	9.03	15.70	2045.31	-1175.88	-0.95
Dead+Wind 180 deg+Ice+Temp	37.30	-0.02	18.14	2363.70	3.01	-0.68
Dead+Wind 210 deg+Ice+Temp	37.30	-9.06	15.71	2048.44	1181.03	-0.23
Dead+Wind 240 deg+Ice+Temp	37.30	-15.68	9.08	1184.01	2042.57	0.28
Dead+Wind 270 deg+Ice+Temp	37.30	-18.09	0.02	2.00	2356.78	0.72
Dead+Wind 300 deg+Ice+Temp	37.30	-15.66	-9.05	-1180.88	2039.43	0.96
Dead+Wind 330 deg+Ice+Temp	37.30	-9.03	-15.70	-2047.64	1175.56	0.95
Dead+Wind 0 deg - Service	31.45	0.01	-8.48	-1064.24	-1.70	0.27
Dead+Wind 30 deg - Service	31.45	4.24	-7.35	-922.69	-530.82	0.09
Dead+Wind 60 deg - Service	31.45	7.33	-4.25	-534.22	-917.69	-0.12
Dead+Wind 90 deg - Service	31.45	8.46	-0.01	-2.91	-1058.65	-0.29
Dead+Wind 120 deg - Service	31.45	7.32	4.23	528.87	-915.96	-0.39
Dead+Wind 150 deg - Service	31.45	4.22	7.34	918.62	-527.80	-0.38
Dead+Wind 180 deg - Service	31.45	-0.01	8.48	1061.90	1.78	-0.27
Dead+Wind 210 deg - Service	31.45	-4.24	7.35	920.36	530.90	-0.09
Dead+Wind 240 deg - Service	31.45	-7.33	4.25	531.88	917.78	0.12
Dead+Wind 270 deg - Service	31.45	-8.46	0.01	0.57	1058.74	0.29
Dead+Wind 300 deg - Service	31.45	-7.32	-4.23	-531.20	916.04	0.38
Dead+Wind 330 deg - Service	31.45	-4.22	-7.34	-920.96	527.89	0.38

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
1	0.00	-31.45	0.00	0.00	31.45	0.00	0.000%
2	0.02	-31.45	-21.72	-0.02	31.45	21.72	0.000%
3	10.85	-31.45	-18.82	-10.85	31.45	18.82	0.000%
4	18.76	-31.45	-10.88	-18.76	31.45	10.88	0.000%
5	21.65	-31.45	-0.02	-21.65	31.45	0.02	0.000%
6	18.74	-31.45	10.84	-18.74	31.45	-10.84	0.000%
7	10.81	-31.45	18.80	-10.81	31.45	-18.80	0.000%
8	-0.02	-31.45	21.72	0.02	31.45	-21.72	0.000%
9	-10.85	-31.45	18.82	10.85	31.45	-18.82	0.000%
10	-18.76	-31.45	10.88	18.76	31.45	-10.88	0.000%
11	-21.65	-31.45	0.02	21.65	31.45	-0.02	0.000%
12	-18.74	-31.45	-10.84	18.74	31.45	10.84	0.000%
13	-10.81	-31.45	-18.80	10.81	31.45	18.80	0.000%
14	0.00	-37.30	0.00	-0.00	37.30	0.00	0.000%
15	0.02	-37.30	-18.14	-0.02	37.30	18.14	0.000%
16	9.06	-37.30	-15.71	-9.06	37.30	15.71	0.000%
17	15.68	-37.30	-9.08	-15.68	37.30	9.08	0.000%
18	18.09	-37.30	-0.02	-18.09	37.30	0.02	0.000%
19	15.66	-37.30	9.05	-15.66	37.30	-9.05	0.000%
20	9.03	-37.30	15.70	-9.03	37.30	-15.70	0.000%
21	-0.02	-37.30	18.14	0.02	37.30	-18.14	0.000%
22	-9.06	-37.30	15.71	9.06	37.30	-15.71	0.000%
23	-15.68	-37.30	9.08	15.68	37.30	-9.08	0.000%
24	-18.09	-37.30	0.02	18.09	37.30	-0.02	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
25	-15.66	-37.30	-9.05	15.66	37.30	9.05	0.000%
26	-9.03	-37.30	-15.70	9.03	37.30	15.70	0.000%
27	0.01	-31.45	-8.48	-0.01	31.45	8.48	0.000%
28	4.24	-31.45	-7.35	-4.24	31.45	7.35	0.000%
29	7.33	-31.45	-4.25	-7.33	31.45	4.25	0.000%
30	8.46	-31.45	-0.01	-8.46	31.45	0.01	0.000%
31	7.32	-31.45	4.23	-7.32	31.45	-4.23	0.000%
32	4.22	-31.45	7.34	-4.22	31.45	-7.34	0.000%
33	-0.01	-31.45	8.48	0.01	31.45	-8.48	0.000%
34	-4.24	-31.45	7.35	4.24	31.45	-7.35	0.000%
35	-7.33	-31.45	4.25	7.33	31.45	-4.25	0.000%
36	-8.46	-31.45	0.01	8.46	31.45	-0.01	0.000%
37	-7.32	-31.45	-4.23	7.32	31.45	4.23	0.000%
38	-4.22	-31.45	-7.34	4.22	31.45	7.34	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00018235
3	Yes	6	0.00000001	0.00038987
4	Yes	6	0.00000001	0.00039035
5	Yes	5	0.00000001	0.00021241
6	Yes	6	0.00000001	0.00037916
7	Yes	6	0.00000001	0.00039417
8	Yes	5	0.00000001	0.00010878
9	Yes	6	0.00000001	0.00038625
10	Yes	6	0.00000001	0.00038540
11	Yes	5	0.00000001	0.00013917
12	Yes	6	0.00000001	0.00039391
13	Yes	6	0.00000001	0.00037928
14	Yes	4	0.00000001	0.00001366
15	Yes	6	0.00000001	0.00011956
16	Yes	6	0.00000001	0.00097132
17	Yes	6	0.00000001	0.00097230
18	Yes	6	0.00000001	0.00012039
19	Yes	6	0.00000001	0.00094457
20	Yes	6	0.00000001	0.00097662
21	Yes	6	0.00000001	0.00011832
22	Yes	6	0.00000001	0.00096148
23	Yes	6	0.00000001	0.00095965
24	Yes	6	0.00000001	0.00011880
25	Yes	6	0.00000001	0.00097729
26	Yes	6	0.00000001	0.00094606
27	Yes	4	0.00000001	0.00081391
28	Yes	5	0.00000001	0.00089667
29	Yes	5	0.00000001	0.00089717
30	Yes	4	0.00000001	0.00091151
31	Yes	5	0.00000001	0.00084281
32	Yes	5	0.00000001	0.00089945
33	Yes	4	0.00000001	0.00071676
34	Yes	5	0.00000001	0.00087564
35	Yes	5	0.00000001	0.00087107
36	Yes	4	0.00000001	0.00081457
37	Yes	5	0.00000001	0.00090697

38	Yes	5	0.00000001	0.00085408

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 149	66.901	27	3.5124	0.0138
L2	151.75 - 118.25	46.523	27	3.2619	0.0057
L3	118.25 - 98.25	26.436	28	2.3812	0.0024
L4	102.25 - 48.75	19.192	28	1.9460	0.0016
L5	54.25 - 21	4.901	28	0.8930	0.0005
L6	21 - 1	0.629	28	0.3045	0.0002

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	HP2-4.7	27	65.420	3.5031	0.0131	16673
177.00	4-ft Dual Mount Standoff	27	64.680	3.4984	0.0128	16673
168.00	Valmont T-Arm (1)	27	58.055	3.4480	0.0099	6946
160.00	RR90-17-02DP	27	52.282	3.3776	0.0076	4167
157.00	(2) TMA 10"x8"x3"	27	50.161	3.3416	0.0068	3623
150.00	LPA-80080-4CF	28	45.334	3.2301	0.0055	2863
147.00	Andrew 12'-6" Low Profile Platform	28	43.327	3.1697	0.0050	2702

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 149	169.739	2	8.9085	0.0352
L2	151.75 - 118.25	118.214	2	8.2846	0.0142
L3	118.25 - 98.25	67.280	2	6.0590	0.0060
L4	102.25 - 48.75	48.868	2	4.9549	0.0041
L5	54.25 - 21	12.498	3	2.2768	0.0013
L6	21 - 1	1.604	3	0.7768	0.0004

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
178.00	HP2-4.7	2	165.996	8.8859	0.0335	6925
177.00	4-ft Dual Mount Standoff	2	164.125	8.8744	0.0327	6925
168.00	Valmont T-Arm (1)	2	147.382	8.7501	0.0251	2883

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
160.00	RR90-17-02DP	2	132.785	8.5750	0.0192	1727
157.00	(2) TMA 10"x8"x3"	2	127.419	8.4846	0.0172	1500
150.00	LPA-80080-4CF	2	115.205	8.2045	0.0139	1182
147.00	Andrew 12'-6" Low Profile Platform	2	110.123	8.0522	0.0129	1112

Base Plate Design Data

Plate Thickness in	Number of Anchor Bolts	Anchor Bolt Size in	Actual Allowable Ratio Bolt Tension K	Actual Allowable Ratio Concrete Stress ksi	Actual Allowable Ratio Plate Stress ksi	Actual Allowable Ratio Stiffener Stress ksi	Controlling Condition	Critical Ratio
2.0000	16	2.2500	102.80 131.21 0.78	1.756 2.800 0.63	53.692 45.000 1.19		Plate	1.19 ✔

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	180 - 178.513	TP21.38x14.4x0.1875	31.00	0.00	0.0	39.000	8.6574	-0.06	337.64	0.000
	178.513 - 177.026					39.000	8.8567	-0.17	345.41	0.000
	177.026 - 175.539					39.000	9.0559	-0.35	353.18	0.001
	175.539 - 174.053					39.000	9.2552	-0.29	360.95	0.001
	174.053 - 172.566					39.000	9.4544	-0.35	368.72	0.001
	172.566 - 171.079					39.000	9.6536	-0.41	376.49	0.001
	171.079 - 169.592					39.000	9.8529	-0.47	384.26	0.001
	169.592 - 168.105					39.000	10.0521	-0.54	392.03	0.001
	168.105 - 166.618					39.000	10.2513	-1.94	399.80	0.005
	166.618 - 165.132					39.000	10.4506	-2.00	407.57	0.005
	165.132 - 163.645					39.000	10.6498	-2.06	415.34	0.005
	163.645 - 162.158					39.000	10.8490	-2.13	423.11	0.005
	162.158 - 160.671					39.000	11.0483	-2.21	430.88	0.005

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 $\frac{P}{P_a}$
	160.671 - 159.184					39.000	11.2475	-2.28	438.65	0.005
	159.184 - 157.697					39.000	11.4467	-2.35	446.42	0.005
	157.697 - 156.211					39.000	11.6460	-3.72	454.19	0.008
	156.211 - 154.724					39.000	11.8452	-3.80	461.96	0.008
	154.724 - 153.237					39.000	12.0445	-3.88	469.73	0.008
	153.237 - 151.75					39.000	12.2437	-3.97	477.50	0.008
	151.75 - 149					39.000	12.6122	-1.73	491.88	0.004
L2	151.75 - 149	TP27.94x20.3858x0.25	33.50	0.00	0.0	39.000	16.4698	-2.39	642.32	0.004
	149 - 147.382					39.000	16.7594	-4.27	653.62	0.007
	147.382 - 145.763					39.000	17.0490	-5.62	664.91	0.008
	145.763 - 144.145					39.000	17.3386	-5.78	676.21	0.009
	144.145 - 142.526					39.000	17.6282	-5.94	687.50	0.009
	142.526 - 140.908					39.000	17.9178	-6.11	698.79	0.009
	140.908 - 139.289					39.000	18.2074	-6.27	710.09	0.009
	139.289 - 137.671					39.000	18.4970	-6.44	721.38	0.009
	137.671 - 136.053					39.000	18.7865	-6.61	732.67	0.009
	136.053 - 134.434					39.000	19.0761	-6.79	743.97	0.009
	134.434 - 132.816					39.000	19.3657	-6.96	755.26	0.009
	132.816 - 131.197					39.000	19.6553	-7.14	766.56	0.009
	131.197 - 129.579					39.000	19.9449	-7.32	777.85	0.009
	129.579 - 127.961					39.000	20.2345	-7.50	789.14	0.010
	127.961 - 126.342					39.000	20.5241	-7.69	800.44	0.010
	126.342 - 124.724					39.000	20.8137	-7.88	811.73	0.010
	124.724 - 123.105					39.000	21.1032	-8.07	823.03	0.010
	123.105 - 121.487					39.000	21.3928	-8.26	834.32	0.010
	121.487 - 119.868					39.000	21.6824	-8.45	845.62	0.010
	119.868 - 118.25					39.000	21.9720	-8.65	856.91	0.010
L3	118.25 - 117.25	TP32.44x27.94x0.28	20.00	0.00	0.0	39.000	24.7820	-8.78	966.50	0.009
	117.25 - 116.25					39.000	24.9819	-8.91	974.29	0.009
	116.25 - 115.25					39.000	25.1819	-9.04	982.09	0.009
	115.25 - 114.25					39.000	25.3818	-9.17	989.89	0.009
	114.25 - 113.25					39.000	25.5818	-9.31	997.69	0.009
	113.25 - 112.25					39.000	25.7818	-9.44	1005.49	0.009
	112.25 - 111.25					39.000	25.9817	-9.57	1013.29	0.009
	111.25 - 110.25					39.000	26.1817	-9.71	1021.09	0.010
	110.25 - 109.25					39.000	26.3817	-9.84	1028.88	0.010

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 $\frac{P}{P_a}$
	109.25 - 108.25					39.000	26.5816	-9.98	1036.68	0.010
	108.25 - 107.25					39.000	26.7816	-10.11	1044.48	0.010
	107.25 - 106.25					39.000	26.9815	-10.25	1052.28	0.010
	106.25 - 105.25					39.000	27.1815	-10.39	1060.08	0.010
	105.25 - 104.25					39.000	27.3815	-10.53	1067.88	0.010
	104.25 - 103.25					39.000	27.5814	-10.67	1075.68	0.010
	103.25 - 102.25					39.000	27.7814	-10.81	1083.47	0.010
	102.25 - 98.25					39.000	28.5812	-5.64	1114.67	0.005
L4	102.25 - 98.25	TP43.1x30.98x0.3125	53.50	0.00	0.0	39.000	31.3171	-6.11	1221.37	0.005
	98.25 - 95.8056					39.000	31.8664	-12.12	1242.79	0.010
	95.8056 - 93.3611					39.000	32.4157	-12.50	1264.21	0.010
	93.3611 - 90.9167					39.000	32.9649	-12.89	1285.63	0.010
	90.9167 - 88.4722					39.000	33.5142	-13.28	1307.05	0.010
	88.4722 - 86.0278					39.000	34.0635	-13.67	1328.48	0.010
	86.0278 - 83.5833					39.000	34.6128	-14.07	1349.90	0.010
	83.5833 - 81.1389					39.000	35.1620	-14.47	1371.32	0.011
	81.1389 - 78.6944					39.000	35.7113	-14.88	1392.74	0.011
	78.6944 - 76.25					39.000	36.2606	-15.30	1414.16	0.011
	76.25 - 73.8056					39.000	36.8098	-15.72	1435.58	0.011
	73.8056 - 71.3611					39.000	37.3591	-16.14	1457.01	0.011
	71.3611 - 68.9167					39.000	37.9084	-16.57	1478.43	0.011
	68.9167 - 66.4722					39.000	38.4576	-17.00	1499.85	0.011
	66.4722 - 64.0278					39.000	39.0069	-17.44	1521.27	0.011
	64.0278 - 61.5833					39.000	39.5562	-17.88	1542.69	0.012
	61.5833 - 59.1389					39.000	40.1055	-18.33	1564.11	0.012
	59.1389 - 56.6944					39.000	40.6547	-18.79	1585.53	0.012
	56.6944 - 54.25					39.000	41.2040	-19.24	1606.96	0.012
	54.25 - 48.75					39.000	42.4398	-10.62	1655.15	0.006
L5	54.25 - 48.75	TP48.95x41.229x0.3125	33.25	0.00	0.0	39.000	41.8508	-10.39	1632.18	0.006
	48.75 - 47.2895					39.000	41.8508	-21.05	1632.18	0.013
	47.2895 - 45.8289					39.000	42.1872	-21.33	1645.30	0.013
	45.8289 - 44.3684					39.000	42.5236	-21.61	1658.42	0.013
	44.3684 - 42.9079					39.000	42.8600	-21.89	1671.54	0.013
	42.9079 - 41.4474					39.000	43.1964	-22.18	1684.66	0.013
	41.4474 - 39.9868					39.000	43.5328	-22.47	1697.78	0.013
	39.9868 - 38.5263					39.000	43.8692	-22.76	1710.90	0.013
	38.5263 - 37.0658					39.000	44.2056	-23.05	1724.02	0.013
	37.0658 - 35.6053					39.000	44.5420	-23.34	1737.14	0.013

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 $\frac{P}{P_a}$
	35.6053 - 34.1447					39.000	44.8784	-23.63	1750.26	0.014
	34.1447 - 32.6842					39.000	45.2148	-23.93	1763.38	0.014
	32.6842 - 31.2237					39.000	45.5512	-24.23	1776.50	0.014
	31.2237 - 29.7632					39.000	45.8876	-24.53	1789.62	0.014
	29.7632 - 28.3026					39.000	46.2240	-24.83	1802.73	0.014
	28.3026 - 26.8421					38.863	46.8967	-25.41	1822.54	0.014
	26.8421 - 25.3816					38.741	47.2331	-25.71	1829.88	0.014
	25.3816 - 23.9211					38.620	47.5695	-26.02	1837.13	0.014
	23.9211 - 22.4605					38.498	47.9059	-26.33	1844.30	0.014
	22.4605 - 21					38.377	48.2423	-26.64	1851.39	0.014
L6	21 - 20	TP53.23x48.95x0.35	20.00	0.00	0.0	39.000	54.2275	-26.88	2114.87	0.013
	20 - 19					39.000	54.4652	-27.11	2124.14	0.013
	19 - 18					39.000	54.7029	-27.34	2133.41	0.013
	18 - 17					39.000	54.9407	-27.58	2142.69	0.013
	17 - 16					39.000	55.1784	-27.81	2151.96	0.013
	16 - 15					39.000	55.4161	-28.05	2161.23	0.013
	15 - 14					39.000	55.6539	-28.29	2170.50	0.013
	14 - 13					39.000	55.8916	-28.52	2179.77	0.013
	13 - 12					39.000	56.1293	-28.76	2189.04	0.013
	12 - 11					39.000	56.3671	-29.00	2198.32	0.013
	11 - 10					39.000	56.6048	-29.24	2207.59	0.013
	10 - 9					39.000	56.8425	-29.48	2216.86	0.013
	9 - 8					39.000	56.8425	-29.50	2216.86	0.013
	8 - 7					39.000	57.0803	-29.74	2226.13	0.013
	7 - 6					39.000	57.3180	-29.98	2235.40	0.013
	6 - 5					39.000	57.5557	-30.23	2244.67	0.013
	5 - 4					39.000	57.7935	-30.47	2253.95	0.014
	4 - 3					39.000	58.0312	-30.72	2263.22	0.014
	3 - 2					38.955	58.5067	-31.19	2279.14	0.014
	2 - 1					38.887	58.7444	-31.44	2284.38	0.014

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	180 - 178.513	TP21.38x14.4x0.1875	0.05	0.018	39.000	0.000	0.00	0.000	39.000	0.000
	178.513 - 177.026		0.48	0.179	39.000	0.005	0.00	0.000	39.000	0.000
	177.026 - 175.539		2.31	0.819	39.000	0.021	0.00	0.000	39.000	0.000
	175.539 - 174.053		3.76	1.274	39.000	0.033	0.00	0.000	39.000	0.000
	174.053 - 172.566		5.31	1.726	39.000	0.044	0.00	0.000	39.000	0.000
	172.566 - 171.079		6.97	2.171	39.000	0.056	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	171.079 - 169.592		8.73	2.612	39.000	0.067	0.00	0.000	39.000	0.000
	169.592 - 168.105		10.61	3.049	39.000	0.078	0.00	0.000	39.000	0.000
	168.105 - 166.618		19.45	5.372	39.000	0.138	0.00	0.000	39.000	0.000
	166.618 - 165.132		28.89	7.678	39.000	0.197	0.00	0.000	39.000	0.000
	165.132 - 163.645		38.48	9.845	39.000	0.252	0.00	0.000	39.000	0.000
	163.645 - 162.158		48.18	11.876	39.000	0.305	0.00	0.000	39.000	0.000
	162.158 - 160.671		57.99	13.780	39.000	0.353	0.00	0.000	39.000	0.000
	160.671 - 159.184		68.25	15.646	39.000	0.401	0.00	0.000	39.000	0.000
	159.184 - 157.697		78.91	17.461	39.000	0.448	0.00	0.000	39.000	0.000
	157.697 - 156.211		91.89	19.641	39.000	0.504	0.00	0.000	39.000	0.000
	156.211 - 154.724		105.82	21.862	39.000	0.561	0.00	0.000	39.000	0.000
	154.724 - 153.237		119.87	23.948	39.000	0.614	0.00	0.000	39.000	0.000
	153.237 - 151.75		134.04	25.909	39.000	0.664	0.00	0.000	39.000	0.000
	151.75 - 149		72.81	13.261	39.000	0.340	0.00	0.000	39.000	0.000
L2	151.75 - 149	TP27.94x20.3858x0.25	89.97	12.852	39.000	0.330	0.00	0.000	39.000	0.000
	149 - 147.382		182.17	25.127	39.000	0.644	0.00	0.000	39.000	0.000
	147.382 - 145.763		202.69	27.010	39.000	0.693	0.00	0.000	39.000	0.000
	145.763 - 144.145		223.66	28.811	39.000	0.739	0.00	0.000	39.000	0.000
	144.145 - 142.526		244.78	30.498	39.000	0.782	0.00	0.000	39.000	0.000
	142.526 - 140.908		266.04	32.079	39.000	0.823	0.00	0.000	39.000	0.000
	140.908 - 139.289		287.46	33.562	39.000	0.861	0.00	0.000	39.000	0.000
	139.289 - 137.671		309.02	34.953	39.000	0.896	0.00	0.000	39.000	0.000
	137.671 - 136.053		330.74	36.258	39.000	0.930	0.00	0.000	39.000	0.000
	136.053 - 134.434		352.60	37.485	39.000	0.961	0.00	0.000	39.000	0.000
	134.434 - 132.816		374.62	38.637	39.000	0.991	0.00	0.000	39.000	0.000
	132.816 - 131.197		396.79	39.721	39.000	1.018	0.00	0.000	39.000	0.000
	131.197 - 129.579		419.11	40.740	39.000	1.045	0.00	0.000	39.000	0.000
	129.579 - 127.961		441.59	41.699	39.000	1.069	0.00	0.000	39.000	0.000
	127.961 - 126.342		464.22	42.602	39.000	1.092	0.00	0.000	39.000	0.000
	126.342 - 124.724		487.00	43.452	39.000	1.114	0.00	0.000	39.000	0.000
	124.724 - 123.105		509.94	44.253	39.000	1.135	0.00	0.000	39.000	0.000
	123.105 -		533.04	45.007	39.000	1.154	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	121.487									
	121.487 - 119.868		556.29	45.719	39.000	1.172	0.00	0.000	39.000	0.000
	119.868 - 118.25		579.70	46.390	39.000	1.189	0.00	0.000	39.000	0.000
L3	118.25 - 117.25	TP32.44x27.94x0.28	594.25	41.909	39.000	1.075	0.00	0.000	39.000	0.000
	117.25 - 116.25		608.85	42.251	39.000	1.083	0.00	0.000	39.000	0.000
	116.25 - 115.25		623.52	42.581	39.000	1.092	0.00	0.000	39.000	0.000
	115.25 - 114.25		638.25	42.899	39.000	1.100	0.00	0.000	39.000	0.000
	114.25 - 113.25		653.03	43.207	39.000	1.108	0.00	0.000	39.000	0.000
	113.25 - 112.25		667.88	43.503	39.000	1.115	0.00	0.000	39.000	0.000
	112.25 - 111.25		682.80	43.789	39.000	1.123	0.00	0.000	39.000	0.000
	111.25 - 110.25		697.77	44.065	39.000	1.130	0.00	0.000	39.000	0.000
	110.25 - 109.25		712.81	44.332	39.000	1.137	0.00	0.000	39.000	0.000
	109.25 - 108.25		727.91	44.589	39.000	1.143	0.00	0.000	39.000	0.000
	108.25 - 107.25		743.07	44.838	39.000	1.150	0.00	0.000	39.000	0.000
	107.25 - 106.25		758.29	45.078	39.000	1.156	0.00	0.000	39.000	0.000
	106.25 - 105.25		773.58	45.310	39.000	1.162	0.00	0.000	39.000	0.000
	105.25 - 104.25		788.93	45.533	39.000	1.168	0.00	0.000	39.000	0.000
	104.25 - 103.25		804.35	45.749	39.000	1.173	0.00	0.000	39.000	0.000
	103.25 - 102.25		819.83	45.958	39.000	1.178	0.00	0.000	39.000	0.000
	102.25 - 98.25		429.50	22.742	39.000	0.583	0.00	0.000	39.000	0.000
L4	102.25 - 98.25	TP43.1x30.98x0.3125	453.03	22.326	39.000	0.572	0.00	0.000	39.000	0.000
	98.25 - 95.8056		921.42	43.849	39.000	1.124	0.00	0.000	39.000	0.000
	95.8056 - 93.3611		960.70	44.175	39.000	1.133	0.00	0.000	39.000	0.000
	93.3611 - 90.9167		1000.35	44.471	39.000	1.140	0.00	0.000	39.000	0.000
	90.9167 - 88.4722		1040.38	44.740	39.000	1.147	0.00	0.000	39.000	0.000
	88.4722 - 86.0278		1080.80	44.985	39.000	1.153	0.00	0.000	39.000	0.000
	86.0278 - 83.5833		1121.58	45.206	39.000	1.159	0.00	0.000	39.000	0.000
	83.5833 - 81.1389		1162.76	45.406	39.000	1.164	0.00	0.000	39.000	0.000
	81.1389 - 78.6944		1204.31	45.587	39.000	1.169	0.00	0.000	39.000	0.000
	78.6944 - 76.25		1246.23	45.750	39.000	1.173	0.00	0.000	39.000	0.000
	76.25 - 73.8056		1288.54	45.896	39.000	1.177	0.00	0.000	39.000	0.000
	73.8056 -		1331.22	46.027	39.000	1.180	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	71.3611									
	71.3611 - 68.9167		1374.29	46.143	39.000	1.183	0.00	0.000	39.000	0.000
	68.9167 - 66.4722		1417.74	46.247	39.000	1.186	0.00	0.000	39.000	0.000
	66.4722 - 64.0278		1461.57	46.338	39.000	1.188	0.00	0.000	39.000	0.000
	64.0278 - 61.5833		1505.78	46.418	39.000	1.190	0.00	0.000	39.000	0.000
	61.5833 - 59.1389		1550.36	46.487	39.000	1.192	0.00	0.000	39.000	0.000
	59.1389 - 56.6944		1595.33	46.547	39.000	1.194	0.00	0.000	39.000	0.000
	56.6944 - 54.25		1640.68	46.598	39.000	1.195	0.00	0.000	39.000	0.000
	54.25 - 48.75		891.27	23.855	39.000	0.612	0.00	0.000	39.000	0.000
L5	54.25 - 48.75	TP48.95x41.229x0.3125	853.05	23.482	39.000	0.602	0.00	0.000	39.000	0.000
	48.75 - 47.2895		1744.32	48.016	39.000	1.231	0.00	0.000	39.000	0.000
	47.2895 - 45.8289		1772.21	48.006	39.000	1.231	0.00	0.000	39.000	0.000
	45.8289 - 44.3684		1800.21	47.993	39.000	1.231	0.00	0.000	39.000	0.000
	44.3684 - 42.9079		1828.32	47.978	39.000	1.230	0.00	0.000	39.000	0.000
	42.9079 - 41.4474		1856.54	47.960	39.000	1.230	0.00	0.000	39.000	0.000
	41.4474 - 39.9868		1884.88	47.940	39.000	1.229	0.00	0.000	39.000	0.000
	39.9868 - 38.5263		1913.33	47.917	39.000	1.229	0.00	0.000	39.000	0.000
	38.5263 - 37.0658		1941.89	47.893	39.000	1.228	0.00	0.000	39.000	0.000
	37.0658 - 35.6053		1970.57	47.866	39.000	1.227	0.00	0.000	39.000	0.000
	35.6053 - 34.1447		1999.35	47.837	39.000	1.227	0.00	0.000	39.000	0.000
	34.1447 - 32.6842		2028.26	47.807	39.000	1.226	0.00	0.000	39.000	0.000
	32.6842 - 31.2237		2057.28	47.775	39.000	1.225	0.00	0.000	39.000	0.000
	31.2237 - 29.7632		2086.42	47.742	39.000	1.224	0.00	0.000	39.000	0.000
	29.7632 - 28.3026		2115.67	47.707	39.000	1.223	0.00	0.000	39.000	0.000
	28.3026 - 26.8421		2174.52	47.633	38.863	1.226	0.00	0.000	38.863	0.000
	26.8421 - 25.3816		2204.13	47.593	38.741	1.228	0.00	0.000	38.741	0.000
	25.3816 - 23.9211		2233.84	47.553	38.620	1.231	0.00	0.000	38.620	0.000
	23.9211 - 22.4605		2263.68	47.512	38.498	1.234	0.00	0.000	38.498	0.000
	22.4605 - 21		2293.64	47.469	38.377	1.237	0.00	0.000	38.377	0.000
L6	21 - 20	TP53.23x48.95x0.35	2314.22	42.487	39.000	1.089	0.00	0.000	39.000	0.000
	20 - 19		2334.86	42.491	39.000	1.090	0.00	0.000	39.000	0.000
	19 - 18		2355.56	42.494	39.000	1.090	0.00	0.000	39.000	0.000
	18 - 17		2376.32	42.497	39.000	1.090	0.00	0.000	39.000	0.000
	17 - 16		2397.13	42.500	39.000	1.090	0.00	0.000	39.000	0.000
	16 - 15		2418.00	42.501	39.000	1.090	0.00	0.000	39.000	0.000

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 $\frac{f_{by}}{F_{by}}$
	15 - 14		2438.93	42.502	39.000	1.090	0.00	0.000	39.000	0.000
	14 - 13		2459.92	42.503	39.000	1.090	0.00	0.000	39.000	0.000
	13 - 12		2480.96	42.503	39.000	1.090	0.00	0.000	39.000	0.000
	12 - 11		2502.06	42.503	39.000	1.090	0.00	0.000	39.000	0.000
	11 - 10		2523.22	42.502	39.000	1.090	0.00	0.000	39.000	0.000
	10 - 9		2544.44	42.500	39.000	1.090	0.00	0.000	39.000	0.000
	9 - 8		2544.44	42.500	39.000	1.090	0.00	0.000	39.000	0.000
	8 - 7		2565.72	42.498	39.000	1.090	0.00	0.000	39.000	0.000
	7 - 6		2587.07	42.496	39.000	1.090	0.00	0.000	39.000	0.000
	6 - 5		2608.46	42.493	39.000	1.090	0.00	0.000	39.000	0.000
	5 - 4		2629.92	42.489	39.000	1.089	0.00	0.000	39.000	0.000
	4 - 3		2651.43	42.485	39.000	1.089	0.00	0.000	39.000	0.000
	3 - 2		2694.64	42.477	38.955	1.090	0.00	0.000	38.955	0.000
	2 - 1		2716.33	42.471	38.887	1.092	0.00	0.000	38.887	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	180 - 178.513	TP21.38x14.4x0.1875	0.06	0.007	26.000	0.001	0.00	0.000	26.000	0.000
	178.513 - 177.026		0.25	0.029	26.000	0.002	0.00	0.000	26.000	0.000
	177.026 - 175.539		0.86	0.095	26.000	0.007	0.73	0.125	26.000	0.005
	175.539 - 174.053		1.01	0.109	26.000	0.008	0.96	0.158	26.000	0.006
	174.053 - 172.566		1.08	0.114	26.000	0.009	0.96	0.151	26.000	0.006
	172.566 - 171.079		1.15	0.119	26.000	0.009	0.96	0.145	26.000	0.006
	171.079 - 169.592		1.23	0.125	26.000	0.010	1.23	0.179	26.000	0.007
	169.592 - 168.105		1.30	0.129	26.000	0.010	1.23	0.172	26.000	0.007
	168.105 - 166.618		6.31	0.616	26.000	0.047	1.23	0.166	26.000	0.006
	166.618 - 165.132		6.42	0.614	26.000	0.047	0.18	0.024	26.000	0.001
	165.132 - 163.645		6.49	0.609	26.000	0.047	0.18	0.023	26.000	0.001
	163.645 - 162.158		6.56	0.605	26.000	0.047	0.18	0.022	26.000	0.001
	162.158 - 160.671		6.64	0.601	26.000	0.046	0.18	0.021	26.000	0.001
	160.671 - 159.184		7.13	0.634	26.000	0.049	0.18	0.021	26.000	0.001
	159.184 - 157.697		7.20	0.629	26.000	0.048	0.18	0.020	26.000	0.001
	157.697 - 156.211		9.34	0.802	26.000	0.062	0.23	0.024	26.000	0.001
	156.211 - 154.724		9.41	0.795	26.000	0.061	0.23	0.023	26.000	0.001
	154.724 - 153.237		9.49	0.788	26.000	0.061	0.23	0.022	26.000	0.001
	153.237 -		9.57	0.781	26.000	0.060	0.23	0.021	26.000	0.001

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 $\frac{f_{vt}}{F_{vt}}$
	151.75									
	151.75 - 149		6.20	0.491	26.000	0.038	0.10	0.009	26.000	0.000
L2	151.75 - 149	TP27.94x20.3858x0.25	5.74	0.349	26.000	0.027	0.13	0.009	26.000	0.000
	149 - 147.382		12.03	0.718	26.000	0.055	0.23	0.015	26.000	0.001
	147.382 - 145.763		12.92	0.758	26.000	0.058	0.23	0.015	26.000	0.001
	145.763 - 144.145		13.01	0.750	26.000	0.058	0.23	0.014	26.000	0.001
	144.145 - 142.526		13.10	0.743	26.000	0.057	0.23	0.014	26.000	0.001
	142.526 - 140.908		13.19	0.736	26.000	0.057	0.23	0.013	26.000	0.001
	140.908 - 139.289		13.28	0.730	26.000	0.056	0.23	0.013	26.000	0.000
	139.289 - 137.671		13.38	0.723	26.000	0.056	0.23	0.012	26.000	0.000
	137.671 - 136.053		13.47	0.717	26.000	0.055	0.23	0.012	26.000	0.000
	136.053 - 134.434		13.56	0.711	26.000	0.055	0.23	0.012	26.000	0.000
	134.434 - 132.816		13.66	0.705	26.000	0.054	0.23	0.011	26.000	0.000
	132.816 - 131.197		13.75	0.700	26.000	0.054	0.23	0.011	26.000	0.000
	131.197 - 129.579		13.85	0.694	26.000	0.053	0.22	0.011	26.000	0.000
	129.579 - 127.961		13.94	0.689	26.000	0.053	0.22	0.010	26.000	0.000
	127.961 - 126.342		14.04	0.684	26.000	0.053	0.22	0.010	26.000	0.000
	126.342 - 124.724		14.14	0.679	26.000	0.052	0.22	0.010	26.000	0.000
	124.724 - 123.105		14.23	0.674	26.000	0.052	0.22	0.009	26.000	0.000
	123.105 - 121.487		14.33	0.670	26.000	0.052	0.22	0.009	26.000	0.000
	121.487 - 119.868		14.43	0.665	26.000	0.051	0.22	0.009	26.000	0.000
	119.868 - 118.25		14.52	0.661	26.000	0.051	0.22	0.009	26.000	0.000
L3	118.25 - 117.25	TP32.44x27.94x0.28	14.58	0.588	26.000	0.045	0.22	0.008	26.000	0.000
	117.25 - 116.25		14.64	0.586	26.000	0.045	0.22	0.008	26.000	0.000
	116.25 - 115.25		14.70	0.584	26.000	0.045	0.22	0.007	26.000	0.000
	115.25 - 114.25		14.76	0.582	26.000	0.045	0.22	0.007	26.000	0.000
	114.25 - 113.25		14.83	0.580	26.000	0.045	0.22	0.007	26.000	0.000
	113.25 - 112.25		14.89	0.577	26.000	0.044	0.22	0.007	26.000	0.000
	112.25 - 111.25		14.95	0.575	26.000	0.044	0.22	0.007	26.000	0.000
	111.25 - 110.25		15.01	0.573	26.000	0.044	0.22	0.007	26.000	0.000
	110.25 - 109.25		15.07	0.571	26.000	0.044	0.22	0.007	26.000	0.000
	109.25 - 108.25		15.14	0.569	26.000	0.044	0.22	0.007	26.000	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 $\frac{f_{vt}}{F_{vt}}$
	108.25 - 107.25		15.20	0.568	26.000	0.044	0.22	0.007	26.000	0.000
	107.25 - 106.25		15.26	0.566	26.000	0.044	0.22	0.006	26.000	0.000
	106.25 - 105.25		15.33	0.564	26.000	0.043	0.22	0.006	26.000	0.000
	105.25 - 104.25		15.39	0.562	26.000	0.043	0.22	0.006	26.000	0.000
	104.25 - 103.25		15.46	0.560	26.000	0.043	0.22	0.006	26.000	0.000
	103.25 - 102.25		15.52	0.559	26.000	0.043	0.22	0.006	26.000	0.000
	102.25 - 98.25		7.78	0.272	26.000	0.021	0.11	0.003	26.000	0.000
L4	102.25 - 98.25	TP43.1x30.98x0.3125	8.06	0.258	26.000	0.020	0.11	0.003	26.000	0.000
	98.25 - 95.8056		16.01	0.502	26.000	0.039	0.22	0.005	26.000	0.000
	95.8056 - 93.3611		16.16	0.499	26.000	0.038	0.22	0.005	26.000	0.000
	93.3611 - 90.9167		16.32	0.495	26.000	0.038	0.22	0.005	26.000	0.000
	90.9167 - 88.4722		16.47	0.491	26.000	0.038	0.22	0.005	26.000	0.000
	88.4722 - 86.0278		16.63	0.488	26.000	0.038	0.22	0.005	26.000	0.000
	86.0278 - 83.5833		16.78	0.485	26.000	0.037	0.22	0.004	26.000	0.000
	83.5833 - 81.1389		16.94	0.482	26.000	0.037	0.22	0.004	26.000	0.000
	81.1389 - 78.6944		17.09	0.479	26.000	0.037	0.22	0.004	26.000	0.000
	78.6944 - 76.25		17.25	0.476	26.000	0.037	0.22	0.004	26.000	0.000
	76.25 - 73.8056		17.40	0.473	26.000	0.036	0.22	0.004	26.000	0.000
	73.8056 - 71.3611		17.56	0.470	26.000	0.036	0.22	0.004	26.000	0.000
	71.3611 - 68.9167		17.72	0.467	26.000	0.036	0.22	0.004	26.000	0.000
	68.9167 - 66.4722		17.87	0.465	26.000	0.036	0.22	0.004	26.000	0.000
	66.4722 - 64.0278		18.03	0.462	26.000	0.036	0.22	0.003	26.000	0.000
	64.0278 - 61.5833		18.18	0.460	26.000	0.035	0.22	0.003	26.000	0.000
	61.5833 - 59.1389		18.34	0.457	26.000	0.035	0.22	0.003	26.000	0.000
	59.1389 - 56.6944		18.49	0.455	26.000	0.035	0.22	0.003	26.000	0.000
	56.6944 - 54.25		18.65	0.453	26.000	0.035	0.22	0.003	26.000	0.000
	54.25 - 48.75		9.85	0.232	26.000	0.018	0.11	0.001	26.000	0.000
L5	54.25 - 48.75	TP48.95x41.229x0.3125	9.23	0.221	26.000	0.017	0.11	0.001	26.000	0.000
	48.75 - 47.2895		19.15	0.458	26.000	0.035	0.22	0.003	26.000	0.000
	47.2895 - 45.8289		19.22	0.456	26.000	0.035	0.22	0.003	26.000	0.000
	45.8289 - 44.3684		19.30	0.454	26.000	0.035	0.22	0.003	26.000	0.000
	44.3684 - 42.9079		19.38	0.452	26.000	0.034	0.22	0.003	26.000	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 $\frac{f_{vt}}{F_{vt}}$
	42.9079 - 41.4474		19.45	0.450	26.000	0.034	0.22	0.003	26.000	0.000
	41.4474 - 39.9868		19.53	0.449	26.000	0.034	0.22	0.003	26.000	0.000
	39.9868 - 38.5263		19.61	0.447	26.000	0.034	0.22	0.003	26.000	0.000
	38.5263 - 37.0658		19.69	0.445	26.000	0.034	0.22	0.003	26.000	0.000
	37.0658 - 35.6053		19.77	0.444	26.000	0.034	0.22	0.003	26.000	0.000
	35.6053 - 34.1447		19.84	0.442	26.000	0.034	0.22	0.003	26.000	0.000
	34.1447 - 32.6842		19.92	0.441	26.000	0.034	0.22	0.003	26.000	0.000
	32.6842 - 31.2237		20.00	0.439	26.000	0.034	0.22	0.003	26.000	0.000
	31.2237 - 29.7632		20.08	0.438	26.000	0.033	0.22	0.002	26.000	0.000
	29.7632 - 28.3026		20.16	0.436	26.000	0.033	0.22	0.002	26.000	0.000
	28.3026 - 26.8421		20.24	0.432	26.000	0.033	0.22	0.002	26.000	0.000
	26.8421 - 25.3816		20.32	0.430	26.000	0.033	0.22	0.002	26.000	0.000
	25.3816 - 23.9211		20.41	0.429	26.000	0.033	0.22	0.002	26.000	0.000
	23.9211 - 22.4605		20.49	0.428	26.000	0.033	0.22	0.002	26.000	0.000
	22.4605 - 21		20.57	0.426	26.000	0.033	0.22	0.002	26.000	0.000
L6	21 - 20	TP53.23x48.95x0.35	20.62	0.380	26.000	0.029	0.22	0.002	26.000	0.000
	20 - 19		20.68	0.380	26.000	0.029	0.22	0.002	26.000	0.000
	19 - 18		20.74	0.379	26.000	0.029	0.22	0.002	26.000	0.000
	18 - 17		20.79	0.378	26.000	0.029	0.22	0.002	26.000	0.000
	17 - 16		20.85	0.378	26.000	0.029	0.22	0.002	26.000	0.000
	16 - 15		20.91	0.377	26.000	0.029	0.22	0.002	26.000	0.000
	15 - 14		20.97	0.377	26.000	0.029	0.22	0.002	26.000	0.000
	14 - 13		21.03	0.376	26.000	0.029	0.22	0.002	26.000	0.000
	13 - 12		21.08	0.376	26.000	0.029	0.22	0.002	26.000	0.000
	12 - 11		21.14	0.375	26.000	0.029	0.22	0.002	26.000	0.000
	11 - 10		21.20	0.375	26.000	0.029	0.22	0.002	26.000	0.000
	10 - 9		21.26	0.374	26.000	0.029	0.22	0.002	26.000	0.000
	9 - 8		21.32	0.375	26.000	0.029	0.22	0.002	26.000	0.000
	8 - 7		21.38	0.375	26.000	0.029	0.22	0.002	26.000	0.000
	7 - 6		21.44	0.374	26.000	0.029	0.22	0.002	26.000	0.000
	6 - 5		21.50	0.373	26.000	0.029	0.22	0.002	26.000	0.000
	5 - 4		21.55	0.373	26.000	0.029	0.22	0.002	26.000	0.000
	4 - 3		21.61	0.372	26.000	0.029	0.22	0.002	26.000	0.000
	3 - 2		21.67	0.370	26.000	0.028	0.22	0.002	26.000	0.000
	2 - 1		21.73	0.370	26.000	0.028	0.22	0.002	26.000	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

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{bv}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 178.513	0.000	0.000	0.000	0.001	0.000	0.001 ✔	1.333	H1-3+VT ✔
	178.513 - 177.026	0.000	0.005	0.000	0.002	0.000	0.005 ✔	1.333	H1-3+VT ✔
	177.026 - 175.539	0.001	0.021	0.000	0.007	0.005	0.022 ✔	1.333	H1-3+VT ✔
	175.539 - 174.053	0.001	0.033	0.000	0.008	0.006	0.034 ✔	1.333	H1-3+VT ✔
	174.053 - 172.566	0.001	0.044	0.000	0.009	0.006	0.045 ✔	1.333	H1-3+VT ✔
	172.566 - 171.079	0.001	0.056	0.000	0.009	0.006	0.057 ✔	1.333	H1-3+VT ✔
	171.079 - 169.592	0.001	0.067	0.000	0.010	0.007	0.068 ✔	1.333	H1-3+VT ✔
	169.592 - 168.105	0.001	0.078	0.000	0.010	0.007	0.080 ✔	1.333	H1-3+VT ✔
	168.105 - 166.618	0.005	0.138	0.000	0.047	0.006	0.144 ✔	1.333	H1-3+VT ✔
	166.618 - 165.132	0.005	0.197	0.000	0.047	0.001	0.202 ✔	1.333	H1-3+VT ✔
	165.132 - 163.645	0.005	0.252	0.000	0.047	0.001	0.258 ✔	1.333	H1-3+VT ✔
	163.645 - 162.158	0.005	0.305	0.000	0.047	0.001	0.310 ✔	1.333	H1-3+VT ✔
	162.158 - 160.671	0.005	0.353	0.000	0.046	0.001	0.359 ✔	1.333	H1-3+VT ✔
	160.671 - 159.184	0.005	0.401	0.000	0.049	0.001	0.407 ✔	1.333	H1-3+VT ✔
	159.184 - 157.697	0.005	0.448	0.000	0.048	0.001	0.454 ✔	1.333	H1-3+VT ✔
	157.697 - 156.211	0.008	0.504	0.000	0.062	0.001	0.513 ✔	1.333	H1-3+VT ✔
	156.211 - 154.724	0.008	0.561	0.000	0.061	0.001	0.570 ✔	1.333	H1-3+VT ✔
	154.724 - 153.237	0.008	0.614	0.000	0.061	0.001	0.623 ✔	1.333	H1-3+VT ✔
	153.237 - 151.75	0.008	0.664	0.000	0.060	0.001	0.674 ✔	1.333	H1-3+VT ✔
	151.75 - 149	0.004	0.340	0.000	0.038	0.000	0.344 ✔	1.333	H1-3+VT ✔
L2	151.75 - 149	0.004	0.330	0.000	0.027	0.000	0.333 ✔	1.333	H1-3+VT ✔
	149 - 147.382	0.007	0.644	0.000	0.055	0.001	0.652 ✔	1.333	H1-3+VT ✔
	147.382 - 145.763	0.008	0.693	0.000	0.058	0.001	0.702 ✔	1.333	H1-3+VT ✔
	145.763 - 144.145	0.009	0.739	0.000	0.058	0.001	0.748 ✔	1.333	H1-3+VT ✔
	144.145 - 142.526	0.009	0.782	0.000	0.057	0.001	0.791 ✔	1.333	H1-3+VT ✔
	142.526 - 140.908	0.009	0.823	0.000	0.057	0.001	0.832 ✔	1.333	H1-3+VT ✔

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
	140.908 - 139.289	0.009	0.861	0.000	0.056	0.000	0.870 ✔	1.333	H1-3+VT ✔
	139.289 - 137.671	0.009	0.896	0.000	0.056	0.000	0.906 ✔	1.333	H1-3+VT ✔
	137.671 - 136.053	0.009	0.930	0.000	0.055	0.000	0.940 ✔	1.333	H1-3+VT ✔
	136.053 - 134.434	0.009	0.961	0.000	0.055	0.000	0.971 ✔	1.333	H1-3+VT ✔
	134.434 - 132.816	0.009	0.991	0.000	0.054	0.000	1.001 ✔	1.333	H1-3+VT ✔
	132.816 - 131.197	0.009	1.018	0.000	0.054	0.000	1.029 ✔	1.333	H1-3+VT ✔
	131.197 - 129.579	0.009	1.045	0.000	0.053	0.000	1.055 ✔	1.333	H1-3+VT ✔
	129.579 - 127.961	0.010	1.069	0.000	0.053	0.000	1.079 ✔	1.333	H1-3+VT ✔
	127.961 - 126.342	0.010	1.092	0.000	0.053	0.000	1.103 ✔	1.333	H1-3+VT ✔
	126.342 - 124.724	0.010	1.114	0.000	0.052	0.000	1.125 ✔	1.333	H1-3+VT ✔
	124.724 - 123.105	0.010	1.135	0.000	0.052	0.000	1.145 ✔	1.333	H1-3+VT ✔
	123.105 - 121.487	0.010	1.154	0.000	0.052	0.000	1.165 ✔	1.333	H1-3+VT ✔
	121.487 - 119.868	0.010	1.172	0.000	0.051	0.000	1.183 ✔	1.333	H1-3+VT ✔
	119.868 - 118.25	0.010	1.189	0.000	0.051	0.000	1.200 ✔	1.333	H1-3+VT ✔
L3	118.25 - 117.25	0.009	1.075	0.000	0.045	0.000	1.084 ✔	1.333	H1-3+VT ✔
	117.25 - 116.25	0.009	1.083	0.000	0.045	0.000	1.093 ✔	1.333	H1-3+VT ✔
	116.25 - 115.25	0.009	1.092	0.000	0.045	0.000	1.102 ✔	1.333	H1-3+VT ✔
	115.25 - 114.25	0.009	1.100	0.000	0.045	0.000	1.110 ✔	1.333	H1-3+VT ✔
	114.25 - 113.25	0.009	1.108	0.000	0.045	0.000	1.118 ✔	1.333	H1-3+VT ✔
	113.25 - 112.25	0.009	1.115	0.000	0.044	0.000	1.125 ✔	1.333	H1-3+VT ✔
	112.25 - 111.25	0.009	1.123	0.000	0.044	0.000	1.133 ✔	1.333	H1-3+VT ✔
	111.25 - 110.25	0.010	1.130	0.000	0.044	0.000	1.140 ✔	1.333	H1-3+VT ✔
	110.25 - 109.25	0.010	1.137	0.000	0.044	0.000	1.147 ✔	1.333	H1-3+VT ✔
	109.25 - 108.25	0.010	1.143	0.000	0.044	0.000	1.153 ✔	1.333	H1-3+VT ✔
	108.25 - 107.25	0.010	1.150	0.000	0.044	0.000	1.160 ✔	1.333	H1-3+VT ✔
	107.25 - 106.25	0.010	1.156	0.000	0.044	0.000	1.166 ✔	1.333	H1-3+VT ✔

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
	106.25 - 105.25	0.010	1.162	0.000	0.043	0.000	1.172 ✔	1.333	H1-3+VT ✔
	105.25 - 104.25	0.010	1.168	0.000	0.043	0.000	1.178 ✔	1.333	H1-3+VT ✔
	104.25 - 103.25	0.010	1.173	0.000	0.043	0.000	1.183 ✔	1.333	H1-3+VT ✔
	103.25 - 102.25	0.010	1.178	0.000	0.043	0.000	1.189 ✔	1.333	H1-3+VT ✔
	102.25 - 98.25	0.005	0.583	0.000	0.021	0.000	0.588 ✔	1.333	H1-3+VT ✔
L4	102.25 - 98.25	0.005	0.572	0.000	0.020	0.000	0.578 ✔	1.333	H1-3+VT ✔
	98.25 - 95.8056	0.010	1.124	0.000	0.039	0.000	1.134 ✔	1.333	H1-3+VT ✔
	95.8056 - 93.3611	0.010	1.133	0.000	0.038	0.000	1.143 ✔	1.333	H1-3+VT ✔
	93.3611 - 90.9167	0.010	1.140	0.000	0.038	0.000	1.151 ✔	1.333	H1-3+VT ✔
	90.9167 - 88.4722	0.010	1.147	0.000	0.038	0.000	1.158 ✔	1.333	H1-3+VT ✔
	88.4722 - 86.0278	0.010	1.153	0.000	0.038	0.000	1.164 ✔	1.333	H1-3+VT ✔
	86.0278 - 83.5833	0.010	1.159	0.000	0.037	0.000	1.170 ✔	1.333	H1-3+VT ✔
	83.5833 - 81.1389	0.011	1.164	0.000	0.037	0.000	1.175 ✔	1.333	H1-3+VT ✔
	81.1389 - 78.6944	0.011	1.169	0.000	0.037	0.000	1.180 ✔	1.333	H1-3+VT ✔
	78.6944 - 76.25	0.011	1.173	0.000	0.037	0.000	1.184 ✔	1.333	H1-3+VT ✔
	76.25 - 73.8056	0.011	1.177	0.000	0.036	0.000	1.188 ✔	1.333	H1-3+VT ✔
	73.8056 - 71.3611	0.011	1.180	0.000	0.036	0.000	1.192 ✔	1.333	H1-3+VT ✔
	71.3611 - 68.9167	0.011	1.183	0.000	0.036	0.000	1.195 ✔	1.333	H1-3+VT ✔
	68.9167 - 66.4722	0.011	1.186	0.000	0.036	0.000	1.197 ✔	1.333	H1-3+VT ✔
	66.4722 - 64.0278	0.011	1.188	0.000	0.036	0.000	1.200 ✔	1.333	H1-3+VT ✔
	64.0278 - 61.5833	0.012	1.190	0.000	0.035	0.000	1.202 ✔	1.333	H1-3+VT ✔
	61.5833 - 59.1389	0.012	1.192	0.000	0.035	0.000	1.204 ✔	1.333	H1-3+VT ✔
	59.1389 - 56.6944	0.012	1.194	0.000	0.035	0.000	1.206 ✔	1.333	H1-3+VT ✔
	56.6944 - 54.25	0.012	1.195	0.000	0.035	0.000	1.207 ✔	1.333	H1-3+VT ✔
	54.25 - 48.75	0.006	0.612	0.000	0.018	0.000	0.618 ✔	1.333	H1-3+VT ✔
L5	54.25 - 48.75	0.006	0.602	0.000	0.017	0.000	0.609 ✔	1.333	H1-3+VT ✔

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
	48.75 - 47.2895	0.013	1.231	0.000	0.035	0.000	1.244 ✔	1.333	H1-3+VT ✔
	47.2895 - 45.8289	0.013	1.231	0.000	0.035	0.000	1.244 ✔	1.333	H1-3+VT ✔
	45.8289 - 44.3684	0.013	1.231	0.000	0.035	0.000	1.244 ✔	1.333	H1-3+VT ✔
	44.3684 - 42.9079	0.013	1.230	0.000	0.034	0.000	1.244 ✔	1.333	H1-3+VT ✔
	42.9079 - 41.4474	0.013	1.230	0.000	0.034	0.000	1.243 ✔	1.333	H1-3+VT ✔
	41.4474 - 39.9868	0.013	1.229	0.000	0.034	0.000	1.243 ✔	1.333	H1-3+VT ✔
	39.9868 - 38.5263	0.013	1.229	0.000	0.034	0.000	1.242 ✔	1.333	H1-3+VT ✔
	38.5263 - 37.0658	0.013	1.228	0.000	0.034	0.000	1.242 ✔	1.333	H1-3+VT ✔
	37.0658 - 35.6053	0.013	1.227	0.000	0.034	0.000	1.241 ✔	1.333	H1-3+VT ✔
	35.6053 - 34.1447	0.014	1.227	0.000	0.034	0.000	1.240 ✔	1.333	H1-3+VT ✔
	34.1447 - 32.6842	0.014	1.226	0.000	0.034	0.000	1.240 ✔	1.333	H1-3+VT ✔
	32.6842 - 31.2237	0.014	1.225	0.000	0.034	0.000	1.239 ✔	1.333	H1-3+VT ✔
	31.2237 - 29.7632	0.014	1.224	0.000	0.033	0.000	1.238 ✔	1.333	H1-3+VT ✔
	29.7632 - 28.3026	0.014	1.223	0.000	0.033	0.000	1.237 ✔	1.333	H1-3+VT ✔
	28.3026 - 26.8421	0.014	1.226	0.000	0.033	0.000	1.240 ✔	1.333	H1-3+VT ✔
	26.8421 - 25.3816	0.014	1.228	0.000	0.033	0.000	1.243 ✔	1.333	H1-3+VT ✔
	25.3816 - 23.9211	0.014	1.231	0.000	0.033	0.000	1.246 ✔	1.333	H1-3+VT ✔
	23.9211 - 22.4605	0.014	1.234	0.000	0.033	0.000	1.249 ✔	1.333	H1-3+VT ✔
	22.4605 - 21	0.014	1.237	0.000	0.033	0.000	1.252 ✔	1.333	H1-3+VT ✔
L6	21 - 20	0.013	1.089	0.000	0.029	0.000	1.102 ✔	1.333	H1-3+VT ✔
	20 - 19	0.013	1.090	0.000	0.029	0.000	1.102 ✔	1.333	H1-3+VT ✔
	19 - 18	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	18 - 17	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	17 - 16	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	16 - 15	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	15 - 14	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔

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
	14 - 13	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	13 - 12	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	12 - 11	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	11 - 10	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	10 - 9	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	9 - 8	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	8 - 7	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	7 - 6	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	6 - 5	0.013	1.090	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	5 - 4	0.014	1.089	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	4 - 3	0.014	1.089	0.000	0.029	0.000	1.103 ✔	1.333	H1-3+VT ✔
	3 - 2	0.014	1.090	0.000	0.028	0.000	1.104 ✔	1.333	H1-3+VT ✔
	2 - 1	0.014	1.092	0.000	0.028	0.000	1.106 ✔	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	180 - 149	Pole	TP21.38x14.4x0.1875	1	-3.97	636.51	50.5	Pass
L2	149 - 118.25	Pole	TP27.94x20.3858x0.25	2	-8.65	1142.26	90.0	Pass
L3	118.25 - 98.25	Pole	TP32.44x27.94x0.28	3	-10.81	1444.27	89.2	Pass
L4	98.25 - 48.75	Pole	TP43.1x30.98x0.3125	4	-19.24	2142.08	90.6	Pass
L5	48.75 - 21	Pole	TP48.95x41.229x0.3125	5	-26.64	2467.90	93.9	Pass
L6	21 - 1	Pole	TP53.23x48.95x0.35	6	-31.44	3045.08	83.0	Pass
							Summary	
						Pole (L5)	93.9	Pass
						Base Plate	89.5	Pass
						RATING =	**93.9**	**Pass**

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Subject:		Foundation Analysis
Location:		180-ft Monopole Enfield, CT
Rev. 0: 6/10/13		Prepared by: T.J.L. Checked by: C.F.C. Job No. 13075.CO21

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	OM := 2716·ft·kips	(User Input from RISATower)	
Shear Force =	Shear := 22·kip	(User Input from RISATower)	
Axial Force =	Axial := 31·kip	(User Input from RISATower)	
Tower Height =	H_t := 180·ft	(User Input)	

Footing Data:

Overall Depth of Footing =	D_f := 5.5·ft	(User Input)	
Length of Pier =	L_p := 4.5·ft	(User Input)	
Extension of Pier Above Grade =	L_{pag} := 1.0·ft	(User Input)	
Diameter of Pier =	d_p := 7.0·ft	(User Input)	
Thickness of Footing =	T_f := 2.0·ft	(User Input)	
Width of Footing =	W_f := 23.0·ft	(User Input)	

Anchor Bolt Data:

Length of Anchor Bolts =	L_{st} := 84·in	(User Input)	
Projection of Anchor Bolts Above Pier =	A_{BP} := 12.0·in	(User Input)	
Anchor Bolt Diameter =	d_{anchor} := 2.25·in	(User Input)	
Base Plate Bolt Circle =	MP := 60.0·in	(User Input)	

Material Properties:

Concrete Compressive Strength =	f_c := 4000·psi	(User Input)	
Steel Reinforcment Yield Strength =	f_y := 60000·psi	(User Input)	
Anchor Bolt Yield Strength =	f_{ya} := 75000·psi	(User Input)	
Internal Friction Angle of Soil =	Φ_s := 32·deg	(User Input)	
Allowable Soil Bearing Capacity =	q_s := 3000·psf	(User Input)	
Unit Weight of Soil =	γ_{soil} := 120·pcf	(User Input)	
Unit Weight of Concrete =	γ_{conc} := 150·pcf	(User Input)	
Foundation Bouyancy =	Bouyancy := 0	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	n := 0·ft	(User Input)	
Cohesion of Clay Type Soil =	c := 0·ksf	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	Z := 2	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	μ := 0.45	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 36$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 0.5 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 8$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.0 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 36$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.0 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 36$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =

$$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$$

Pad Top Reinforcement Bar Area =

$$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.785 \cdot in^2$$

Pad Bottom Reinforcement Bar Area =

$$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785 \cdot in^2$$

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.255$$

Load Factor =

$$LF := \begin{cases} 1.333 & \text{if } H_t \le 700 \cdot ft \\ 1.7 & \text{if } H_t \ge 1200 \cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft}\right) \cdot 0.4 & \text{otherwise} \end{cases} = 1.333$$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := if(Bouyancy = 1, \gamma_{conc} - 62.4pcf, \gamma_{conc}) = 150 \cdot pcf$

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 120 \cdot pcf$

Passive Pressure = $P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} = 0 \cdot ksf$

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.367 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.367 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.148 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.757 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 2$

$A_p := W_f \cdot T_p = 46$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 80.844 \cdot kip$

Weight of Concrete Pad = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 \cdot L_p\right] \cdot \gamma_c = 191.775 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left(W_f^2 - d_p^2\right) \cdot \begin{vmatrix} (L_p - L_{pag} - n) & \text{if } (L_p - L_{pag} - n) \geq 0 \\ 0 & \text{if } (L_p - L_{pag} - n) \leq 0 \end{vmatrix}\right] \cdot \gamma_s = 201.6 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left(\frac{D_f^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right) \cdot \gamma_s = 26.085 \cdot kip$

Weight of Soil Wedge at back face Corners = $WT_{s3} := 2 \cdot \left[(D_f)^3 \cdot \frac{\tan(\Phi_s)}{3}\right] \cdot \gamma_s = 8.317 \cdot kips$

Total Weight = $WT_{tot} := WT_c + WT_{s1} + Axial = 424.375 \cdot kip$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + \left[(WT_{s2} + WT_{s3}) \cdot \left(W_f + \frac{D_f \cdot \tan(\Phi_s)}{3}\right)\right] = 5765 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + Shear \cdot (L_p + T_f) = 2859 \cdot kip \cdot ft$

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 2.02$

Factor of Safety Required = $FS_{req} := 2$

$OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

$OverTurning\_Moment\_Check = "Okay"$

Shear Capacity in Pier:

Shear Resistance of Pier =

$$S_p := \frac{\mu \cdot WT_{tot}}{FS_{req}} = 95.484 \cdot kips$$

$$Shear\_Check := if\left(S_p > Shear, "Okay", "No Good"\right)$$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat =

$$A_{mat} := W_f^{\,2} = 529$$

Section Modulus of Mat =

$$S := \frac{W_f^{\,3}}{6} = 2027.83 \cdot ft^3$$

Maximum Pressure in Mat =

$$P_{max} := \frac{\left(WT_c + Axial\right)}{A_{mat}} + \frac{M_{ot}}{S} = 1.831 \cdot ksf$$

$$Max\_Pressure\_Check := if\left(P_{max} < q_s, "Okay", "No Good"\right)$$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat =

$$P_{min} := \frac{\left(WT_c + Axial\right)}{A_{mat}} - \frac{M_{ot}}{S} = -0.989 \cdot ksf$$

$$Min\_Pressure\_Check := if\left[\left(P_{min} \geq 0\right) \cdot \left(P_{min} < q_s\right), "Okay", "No Good"\right]$$

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution =

$$X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 4.978$$

Distance to Kern =

$$X_k := \frac{W_f}{6} = 3.833$$

Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.

Eccentricity =

$$e := \frac{M_{ot}}{WT_{tot}} = 6.737$$

Adjusted Soil Pressure =

$$P_a := \frac{2 \cdot \left(WT_c + Axial\right)}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 1.356 \cdot ksf$$

$$q_{adj} := if\left(P_{min} < 0, P_a, P_{max}\right) = 1.356 \cdot ksf$$

$$Pressure\_Check := if\left(q_{adj} < q_s, "Okay", "No Good"\right)$$

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.225 \times 10^4 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > LF \cdot Axial, "Okay", "No Good")$

Bearing_Check = "Okay"

Shear Strength of Concrete:

Beam Shear: (Critical section located at a distance d from the face of Pier) (ACI 11.3.1.1)

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 20 \cdot in$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$

$V_{req} := LF \cdot \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d$ (ACI-2008 11.2.1.1)

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 27.2$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot \left(d_p + d\right)^2}{4} = 59$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 470$

Guess Value = $v_u := 1ksf$

(From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := \text{Find}(v_u) = 9.4 \cdot ksf$

$V_u := v_u \cdot d \cdot W_f = 358.5 \cdot kips$

Required Shear Strength = $V_{req} := LF \cdot V_u = 477.9 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 1405.1 \cdot kip$ (ACI-2008 11.11.2.1)

$Punching\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$q_b := q_{adj} - d_1 \cdot Slope = 0.597 \cdot ksf$

Maximum Bending at Face of Pier = $M_u := LF \cdot \left[\left(q_{adj} - q_b \right) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f = 1081.8 \cdot kip \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000 \right)}{1000} \right] \cdot 0.5 \right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$R_n := \frac{M_u}{\phi_m \cdot W_f \cdot d^2} = 130.7 \cdot psi$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.0022$

$\rho_{min} := \rho = 0.00222$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases}$$ (ACI -2008 7.12.2.1)

Check Bottom Bars:

$$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 12.261 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 28.3 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := \rho_{sh} \cdot \left(W_f \cdot \frac{d}{2}\right) = 5 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 28.3 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 6.69 \cdot in$$

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pad} < \frac{B_{sPad}}{2}, Cvr_{pad}, \frac{B_{sPad}}{2}\right) = 3 \cdot in$$

Transverse Reinforcement Index =

$$k_{tr} := 0$$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 23.7 \cdot in$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot in$$ (ACI-2008 12.2.1)

$$L_{dbtCheck} := if\left(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin"\right)$$

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 93 \cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No Good"\right)$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^2}{4} = 5541.77 \cdot in^2$$

$$A_{smin} := 0.01 \cdot 0.05 \cdot A_p = 2.77 \cdot in^2 \qquad \text{(ACI-2008 10.8.4 \& 10.9.1)}$$

$$A_{sprov} := NB_{pier} \cdot A_{bpier} = 28.27 \cdot in^2$$

$$Steel\_Area\_Check := if\left(A_{sprov} > A_{smin}, "Okay", "No Good"\right)$$

Steel_Area_Check = "Okay"

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 6.33 \cdot in$$

Diameter of Reinforcement Cage =

$$Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 78 \cdot in$$

Maximum Moment in Pier =

$$M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] \cdot LF = 45204.7 \cdot in \cdot kips$$

Pier Check evaluated from outside program and results are listed below;

$$\left(D \; N \; n \; P_u \; M_{xu}\right) := \left(d_p \cdot 12 \;\; NB_{pier} \;\; BS_{pier} \;\; \frac{Axial \cdot 1.333}{kips} \;\; \frac{M_p}{in \cdot kips}\right)$$

$$\left(D \; N \; n \; P_u \; M_{xu}\right) = \left(84 \;\; 36 \;\; 8 \;\; 41.323 \;\; 4.52 \times 10^4\right)$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := (0 \;\; 0 \;\; 0 \;\; 0)$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := \phi P'_n\left(D, N, n, P_u, M_{xu}\right)^T$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = \left(51.006 \;\; 5.58 \times 10^4 \;\; -60 \;\; 5.132 \times 10^{-3}\right)$$

$$Axial\_Load\_Check := if\left(\phi P_n \geq P_u, "Okay", "No Good"\right)$$

Axial_Load_Check = "Okay"

$$Bending\_Check := if\left(\phi M_{xn} \geq M_{xu}, "Okay", "No Good"\right)$$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 51 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 21 \cdot in$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 3 \cdot in$

Transverse Reinforcement =

$k_{tr} := 0$ (ACI-2008 12.2.3)

$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 23.72 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 13.282 \cdot in$ (ACI 12.2.1)

Pier reinforcement bars are standard 90 degree hooks and therefore developement in the pad is computed as follows:

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right)$

$L_{tension\_Check} := if\left(L_{pier} + L_{pad} > L_{dbt}, "Okay", "No Good"\right)$

$L_{tension\_Check} = "Okay"$

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 18.974 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} f_y\right) = 18 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 18.974 \cdot in$

$L_{compression\_Check} := if\left(L_{pier} + L_{pad} > L_{dbc}, "Okay", "No Good"\right)$

$L_{compression\_Check} = "Okay"$

Tie Size and Spacing in Column:

Minimum Tie Size =

$Tie_{min} := if(BS_{pier} \le 10, 3, 4) = 3$

Used #4 Ties

Seismic Factor =

$z := if(Z \le 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 16 \cdot in$

$s_{lim2} := 48 \cdot d_{Tie} \cdot z = 24 \cdot in$

$s_{lim3} := D_f \cdot z = 66 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing =

$$s_{tie} := \min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) = 16 \cdot in$$

Number of Ties Required =

$$n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 4$$

Check Anchor Steel Embedment:

Depth Available =

$D_{ab} := L_{st} - A_{BP} = 6 \cdot ft$

Length of Anchor Bolt =

$$L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot in}{\sqrt{f_c \cdot psi}} = 10.87 \cdot ft$$

$Depth\_Check := if(D_{ab} \ge L_{anchor}, "Okay", "No Good")$

Depth_Check = "No Good"

Note: Anchor plate is provided

SITE NAME	SOMERS WEST CT	ECP - CELL #	8	16
LATITUDE	42-00-57.37 N	LONGITUDE	72-31-43.46 W	
		SAVE BUTTON		
Additional Comments: 2013 LTE ANTMO. Antenna change on all sectors.		STRUCTURE TYPE	MONOPOLE	

700 Mhz - LTE Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	eNodeB	eNodeB	eNodeB
ANTENNA TYPE	BXA-70063-4CF-5	SLCP 2X6014	SLCP 2X6014
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	2	0	2
RAD CTR (FT AGL)	150	150	150
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
MCPA BRICKS (QTY)			
RRH - QTY/MODEL			
SECTOR DISTRIBUTION BOX			
MAIN DISTRIBUTION BOX			

700 Mhz - LTE Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	eNodeB	eNodeB	eNodeB
ANTENNA TYPE	BXA-70063-6CF-2	BXA-70063-6CF-2	BXA-70063-6CF-2
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	2	0	2
RAD CTR (FT AGL)	150	150	150
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
MCPA BRICKS (QTY)			
RRH - QTY/MODEL			
SECTOR DISTRIBUTION BOX			
MAIN DISTRIBUTION BOX			

850 Celluar - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0	Cellular Modcell 4.0	Cellular Modcell 4.0
ANTENNA TYPE	LPA-80080-4CF	LPA-80080-4CF-5	LPA-80080-4CF-5
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	150	150	150
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2 FD9R6004/2C-3L	2 FD9R6004/2C-3L	2 FD9R6004/2C-3L
DIPLEX WITH LTE CABLE			
MCPA BRICKS (QTY)			

850 Celluar - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	Cellular Modcell 4.0	Cellular Modcell 4.0	Cellular Modcell 4.0
ANTENNA TYPE	LPA-80080-4CF	LPA-80080-4CF-5	LPA-80080-4CF-5
QTY OF ANTENNAS PER FACE	2	2	2
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	150	150	150
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL	2 FD9R6004/2C-3L	2 FD9R6004/2C-3L	2 FD9R6004/2C-3L
DIPLEX WITH LTE CABLE			
MCPA BRICKS (QTY)			

1900 PCS - Current Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0	PCS Modcell 4.0	PCS Modcell 4.0
ANTENNA TYPE	BXA-171085-8BF-2	BXA-171085-8BF-2	BXA-171085-8BF-2
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	150	150	150
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE	DIPLEX with Cellular Cable	DIPLEX with Cellular Cable	DIPLEX with Cellular Cable
MCPA BRICKS (QTY)			

1900 PCS - Future Config	ALPHA	BETA	GAMMA
EQUIPMENT TYPE	PCS Modcell 4.0	PCS Modcell 4.0	PCS Modcell 4.0
ANTENNA TYPE	BXA-171085-8BF-2	BXA-171085-8BF-2	BXA-171085-8BF-2
QTY OF ANTENNAS PER FACE	1	1	1
ORIENTATION (DEG)	30	150	270
DOWN TILT (MECH/DEG)	0	0	0
RAD CTR (FT AGL)	150	150	150
TMA - QTY / MODEL			
DIPLEXER - QTY / MODEL			
DIPLEX WITH CELLULAR CABLE	DIPLEX with Cellular Cable	DIPLEX with Cellular Cable	DIPLEX with Cellular Cable
MCPA BRICKS (QTY)			

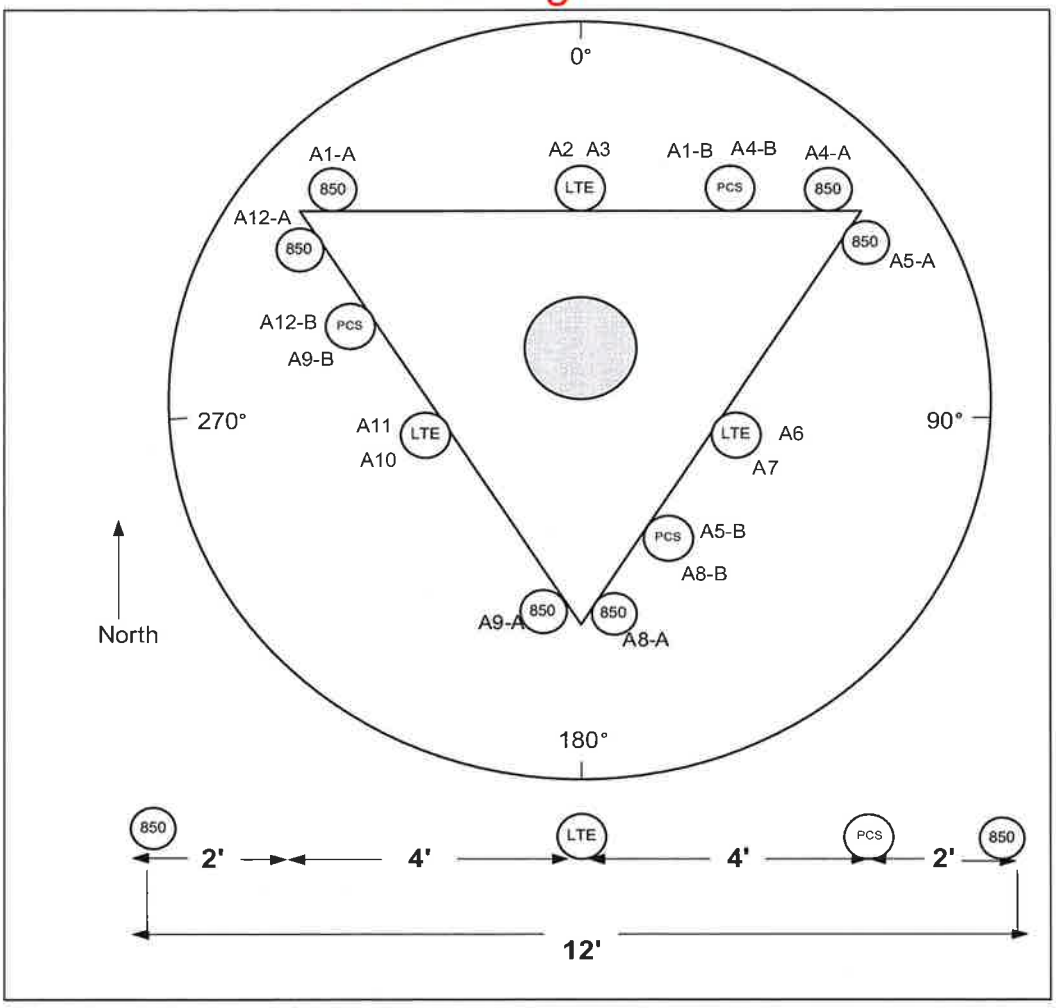
NUMBER OF CABLE'S NEEDED						ESTIMATED CABLE LENGTH			
MAINLINE SIZE	1 5/8"	TOTAL # OF MAINLINES			12	MAINLINE (FT)			190
JUMPER SIZE	1/2 "	TOTAL # OF TOP JUMPERS			18	TOP JUMPER (FT)			12
Equipment Cable Ordering		MAIN CABLE	12	+	6	TOP JUMPER #	12	+	6

TX / RX FREQUENCIES			TX POWER OUTPUT	
Cellular A-Band	PCS F-Band	700 Mhz C - B	Cellular (Watts)	20
TX - 869-880,890-891.5 MHz	TX - 1970-1975	TX - 746-757	PCS (Watts)	16
RX - 824-835,845-846.5 MHz	RX - 1890-1895	RX - 776-787	LTE (Watts)	40

ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN
A1-B	1900	Tx1/Rx0	RED/	A5-B	1900	Tx2/Rx0	BLUE/ WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE
A2	700	Tx1/Rx0	RED/	A6	700	Tx2/Rx0	BLUE/ ORANGE	A10	700	Tx3/Rx0	GREEN/ORANGE
A3	700	Tx4/Rx1	RED/RED/ ORANGE	A7	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A11	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A4-B	1900	Tx4/Rx1	RED/RED/ WHITE	A8-B	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A12-B	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A4-A	800	Tx4/Rx1	RED/RED	A8-A	800	Tx5/Rx1	BLUE/BLUE	A12-A	800	Tx6/Rx1	GREEN/GREEN

RF ENGINEER	RF MANAGER	INITIALS	DATE
Prepared By : Justin Kober	Robert Hesselbach	JK	6/4/2013

Site Configuration



BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

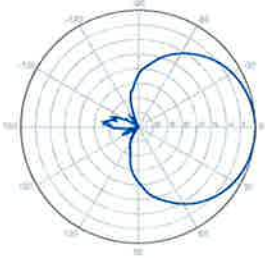
Replace "X" with desired electrical downtilt.

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

Electrical Characteristics	696-900 MHz	
Frequency bands	696-806 MHz	806-900 MHz
Polarization	±45°	
Horizontal beamwidth	65°	63°
Vertical beamwidth	13°	11°
Gain	14.0 dBd (16.1 dBi)	14.5 dBd (16.6 dBi)
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10	
Impedance	50Ω	
VSWR	≤1.35:1	
Upper sidelobe suppression (0°)	-18.3 dB	-18.2 dB
Front-to-back ratio (+/-30°)	-33.4 dB	-36.3 dB
Null fill	5% (-26.02 dB)	
Isolation between ports	< -25 dB	
Input power with EDIN connectors	500 W	
Input power with NE connectors	300 W	
Lightning protection	Direct Ground	
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)	
Mechanical Characteristics		
Dimensions Length x Width x Depth	1804 x 285 x 132 mm	71.0 x 11.2 x 5.2 in
Depth with z-brackets	172 mm	6.8 in
Weight without mounting brackets	7.9 kg	17 lbs
Survival wind speed	> 201 km/hr	> 125 mph
Wind area	Front: 0.51 m² Side: 0.24 m²	Front: 5.5 ft² Side: 2.6 ft²
Wind load @ 161 km/hr (100 mph)	Front: 759 N Side: 391 N	Front: 169 lbf Side: 89 lbf

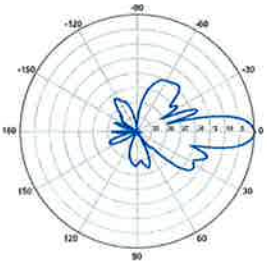
Mounting Options	Part Number	Fits Pipe Diameter	Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP		

BXA-70063-6CF-EDIN-X



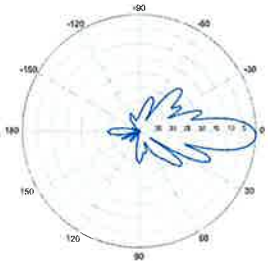
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

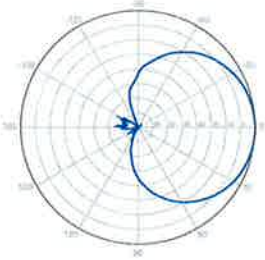


0° | Vertical | 750 MHz

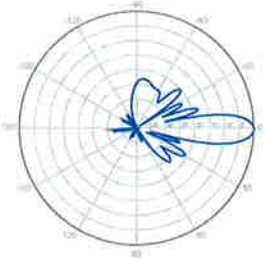
BXA-70063-6CF-EDIN-2



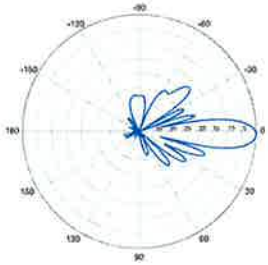
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz