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

Internet: ct.gov/csc

Daniel F. Caruso
Chairman

August 2, 2010

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-007-100224** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 1657 Wilbur Cross Parkway, Berlin, Connecticut. Modification.

Dear Attorney Baldwin:

In addition to the Connecticut Siting Council (Council) acknowledgement dated April 6, 2010 (filing dated February 24, 2010), 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.

The proposed modifications are to be implemented as specified here and in your notice dated July 13, 2010, including the placement of all necessary equipment and shelters within the tower compound. 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. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/MP/laf

c: The Honorable Adam P. Salina, Mayor, Town of Berlin
Denise McNair, Interim Town Manager, Town of Berlin
Hellyn Riggins, Town Planner, Town of Berlin
Berlin Volunteer Fire Department

ROBINSON & COLE LLP

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

ORIGINAL

July 15, 2010

Michael Perrone
Siting Analyst
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Cellco Partnership d/b/a Verizon Wireless**
EM-VER-007-100224 – 1657 Wilbur Cross Parkway, Berlin, Connecticut

Dear Mr. Perrone:

On April 6, 2010, the Siting Council acknowledged receipt of Cellco's notice of intent to modify the above-referenced telecommunications facility. This modification involved the removal of six (6) existing PCS antennas and the installation of three (3) new PCS antennas and three (3) LTE antennas. The existing antennas are currently served by twelve (12) coax cables located inside the tower.

To address a recently identified increase in network capacity demands in the Berlin area, Cellco intends to install six (6) additional coax cables, two cables each for it three (3) LTE antennas. The existing twelve (12) coax cables will continue to serve the existing cellular antennas (six (6) antennas/six (6) coax cables) and PCS antennas (three (3) antennas/six (6) coax cables). The six (6) additional cables can not, however, fit inside the existing monopole and will therefore be attached to the outside of the tower structure.

Attached to this letter is an updated Structural Analysis for the previously-authorized antenna modifications and the installation of the six (6) additional coax cables attached to the outside of the tower. This analysis confirms that the tower can support all of the proposed modifications.

If you have any questions regarding any of these materials, please do not hesitate to contact me or Rachel Mayo.

Sincerely,

Kenneth C. Baldwin

10512226-v1

Attachment
Copy to:
Sandy M. Carter
Brian Ragozzine
Mark Gauger

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 176' MONOPOLE FOR PROPOSED ANTENNA ARRANGEMENT

Site: Berlin Fire Department
Address: 1657 Wilbur Cross Parkway, Berlin, CT

prepared for

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

URS CORPORATION
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CT 06067
TEL. 860-529-8882

36931194.00000
VZ5-047 (Rev 2)

June 23, 2010

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 176' steel tapered monopole structure, located at 1657 Wilbur Cross Parkway in Berlin, CT. The analysis was conducted in accordance with the 2005 Connecticut State Building Code and the TIA/EIA-222-F standard for a wind velocity of 80 mph (fastest mile) and 69 mph (fastest mile) concurrent with 0.5" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report.

The proposed Verizon Wireless installation is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove: **(6) LPA-185080 / 8CF 2 panel antennas (two per sector)**	**Verizon Wireless (Existing)**	
Install: **(3) LNX-6514DS-T4M-750_4 panel antennas (One per Sector)** **(1) BXA-185060/12CF 2 panel antenna (Alpha Sector)** **(2) MG D3-900T0 panel antenna (Beta and Gamma Sectors)** **Mounted on existing platform**	**Verizon Wireless (Proposed)**	**@ 114'** (113' above base plate)

The results of the analysis indicate that the tower structure has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

This analysis is based on:

1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Geotechnical investigation and report performed by Dr. Clarence Welti, P.E., P.C. dated June 11, 2002.
3) Tower geometry and structural member sizes utilized in the preparation of this report obtained from manufacturers original design documents for a 176' tapered steel monopole, prepared by Engineered Endeavors, Inc., EEI Job #: 11129, signed and sealed September 16, 2002.
4) Foundation geometry utilized in the preparation of this report obtained from manufacturers original design documents for a 176; tapered steel monopole, prepared by Engineered Endeavors, Inc., EEI Job # 11129, signed and sealed September 20, 2002.
5) Previous structural analysis performed by URS Corp, project number VS1-034 / 36922118, signed and sealed September 29, 2005.
6) Previous structural analysis performed by URS Corp, project number VZ1-005 / 36912556, signed and sealed February 21, 2006.
7) Previous structural analysis performed by Natcomm Consulting Engineers, Inc., project number 08007.C05, signed and sealed February 14, 2008.
8) Site documentation and visual verification of existing appurtenances conducted from grade by URS during July 2008.

1. EXECUTIVE SUMMARY - continued

9) Previous structural analysis performed by URS Corp, project number PWS-002 / 36923532, signed and sealed July 18, 2008.

10) Previous structural analysis performed by URS Corp, project number MXN-003 / 36924391, signed and sealed April 7, 2010.

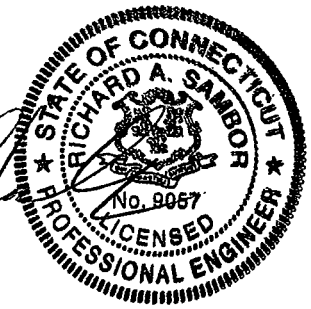
11) Antenna and mount configuration as specified within Section 2 and 6 of this report.

This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration as well as the physical condition of the tower. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,

URS Corporation



Richard A. Sambor, P.E.
Senior Structural Engineer

RAS/mjk
cc: MJE, ICA – URS, CF/Book

2. INTRODUCTION

The subject tower is located at 1657 Wilbur Cross Parkway in Berlin, CT. The structure is an existing 176' steel tapered monopole structure, designed and manufactured by Engineered Endeavors, Inc.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(2) Dipole antennas	Town (existing)	Low-Profile Platform	176'	(2) 1 5/8" (within monopole)
(2) Grid Dishes				(2) 1 5/8" (within monopole)
(2) Omni antennas				(2) 1 5/8" (within monopole)
(1) 4- Bay Dipole antenna	Town (reserved)			(1) 1 5/8" (within monopole)
(3) Powerwave 7770 panel antennas and (6) Powerwave LGP21401 TMA's	AT&T/Cingular (existing)	Cluster/Pipe Mounted	170'	(6) 1 5/8" (within monopole)
(6) EMS DR65-19-00DPQ antennas and (6) Decibel PCS 1900 TMA's	T-Mobile (existing)	(3) T-Arms	160'	(12) 1 5/8" (within monopole)
(3) EMS DR65-19-00DPQ antennas and (6) Decibel PCS 1900 TMA's	T-Mobile (reserved)			(12) 1 5/8" (within monopole)
(1) 4- Bay Dipole antenna and (1) Grid Dish	Town (existing)	T-Arm (listed above)	160'	(2) 1 5/8" (within monopole)
(3) Andrew VHLP2.5 Dishes	Clearwire (existing)	Modified Low-Profile Platform	154'	(3) 1/2" (within monopole)
(6) Dapa 48000 antennas (6 existing)	Sprint/Nextel (existing)	Modified Low-Profile Platform	150'	(12) 1 5/8" (within monopole)
(3) Kathrein 840 10054 (3) Samsung Remote Radio Heads	Clearwire (existing)	Modified Low-Profile Platform	150'	(6) CAT 5 (within monopole)
(1) Andrew VHLP2.5 Dishes	Clearwire (existing)	Modified Low-Profile Platform	146'	(1) 1/2" (within monopole)
(1) 2-Bay Dipole antenna	Town (existing)	6' Extension Arm	130'	(1) 1 5/8" (within monopole)
(3) Kathrein 742 213 panel antennas	Pocket Wireless (existing)	Flush mount assembly	124'	(6) 1 5/8" (Andrew AVA7-50 exterior of monopole)
(4) Antel LPA 80063/6CF (2)RWA80013	Verizon (existing)	Low-Profile Platform (existing)	114'	(12) 1 5/8" (within monopole) (existing)
(3) LNX-6514DS-T4M-750_4 (1) BXA-185060/12CF 2 & (2) MG D3-900T0	**Verizon (proposed)**			**(6) 1 5/8" (outside monopole) (proposed)**
(1) 4-Bay Dipole antenna (1) Grid Dish	Town (existing)	6' Extension Arm	100'	(2) 1 5/8" (within monopole)
(1) GPS antenna	Sprint/Nextel (existing)	Standoff Mount	75'	(1) 1/2" (within monopole)
(1) VIC-100 GPS antenna	T-Mobile (reserved)	Standoff Mount	60'	(1) 1/2" (within monopole)
(1) Scanner antenna	Town (existing)	Standoff Mount	60'	(1) 1/2" (within monopole)

Note: Base of structure established as 1.0ft above average grade.

This structural analysis of the communications tower was performed by URS Corporation (URS) for Verizon Wireless. The purpose of this analysis was to investigate the structural integrity of the existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangement.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was conducted in accordance with the 2005 Connecticut State Building Code, TIA/EIA-222-F - Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, and the American Institute of Steel Construction (AISC) Manual of Steel Construction - Allowable Stress Design (ASD).

The analysis was conducted using RISA Tower 5.3. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Load Condition 1 = 80 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 69 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

Combined axial and bending stresses on the monopole structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were **BELOW** the allowable stresses (see table below). Detailed analysis and calculations for the proposed load condition are provided in section 6 of this report. Additionally, the anchor bolts, base plate and foundation were all found to be within the allowable limits.

TABLE 1: Proposed Tower Base Reactions vs. Original Design Reactions

Base Reactions	Proposed Reactions	Original Design Reactions
Axial Load (kips)	50	49.6
Shear (kips)	32	34.94
O.T. Moment (ft-kips)	3737	4306.5

Note: Original design reactions based on TIA/EIA 222-F with a wind speed of 85mph and 0.5in ice.

TABLE 2: Proposed Tower Component Stress vs. Capacity Summary

Component (Section No.)	Controlling Component / Elevation	Stress Ratio (% capacity)	Pass/Fail	Comments:
Pole Shaft (L3)	43'-86.13'	74.2%	**Pass**	
Anchor Bolts	Compression	75%	**Pass**	
Base Plate	Bending	74%	**Pass**	
Caisson Foundation	Flexure	59%	**Pass**	

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicate that the tower structure has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Foundations were properly constructed to support original design loads as specified in the original design documents.
10. All coaxial cable is installed within the monopole unless specified otherwise.

URS is not responsible for any modifications completed prior to or hereafter in which URS is not or was not directly involved. Modifications include but are not limited to:

A. Adding antennas
B. Removing/replacing antennas
C. Adding coaxial cables

URS hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact URS. URS disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

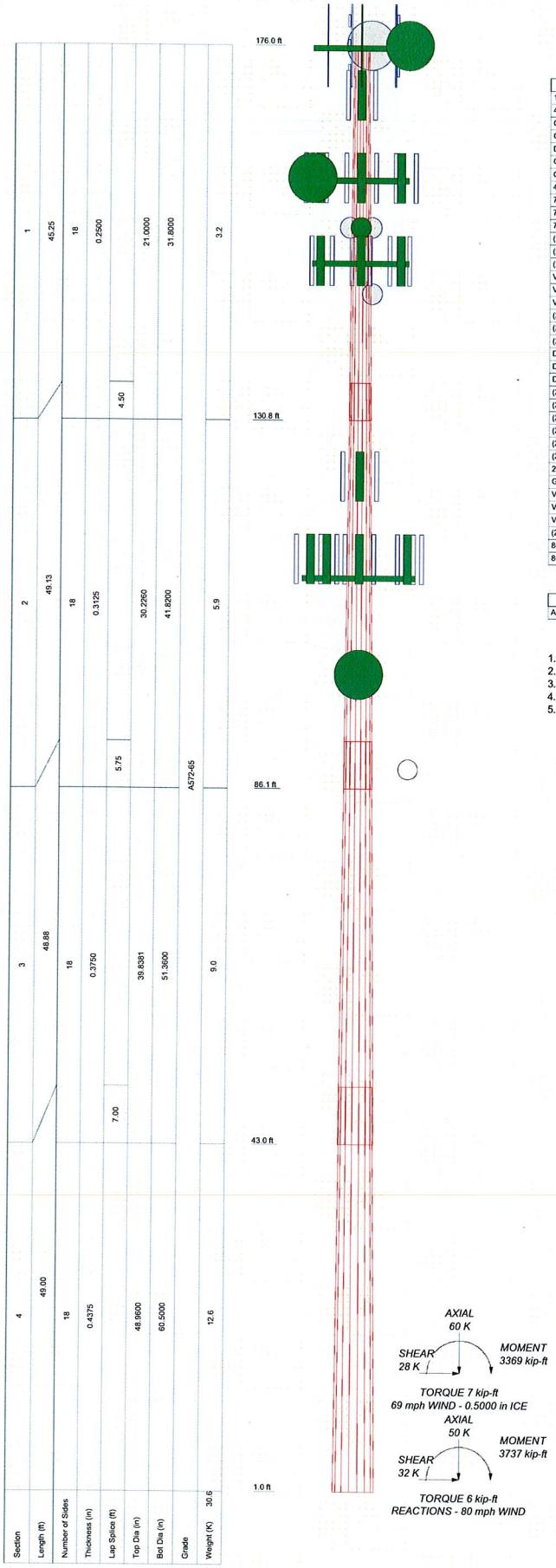
Ongoing and Periodic Inspection and Maintenance:

After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

RISA TOWER INPUT/OUTPUT SUMMARY



Section	1	2	3	4
Length (ft)	45.25	49.13	48.88	49.00
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.4375
Lap Splice (ft)	4.50	5.75	7.00	
Top Dia (in)	21.0000	30.2260	39.8381	48.9600
Bot Dia (in)	31.8000	41.8200	51.3600	60.5000
Grade			A572-65	
Weight (K)	3.2	5.9	9.0	12.6

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' Low Profile Platform (Town)	176	840 10054 (Clearwire)	150
4 Bay Dipole (Town)	176	Remote Radio Heads U-RAS (Clearwire)	150
Omni (Town)	176	Remote Radio Heads U-RAS (Clearwire)	150
Grid Dish (Town)	176	Remote Radio Heads U-RAS (Clearwire)	150
Dipole (Town)	176	Low Profile Platform (Sprint/Nextel)	150
Grid Dish (Town)	176	(2) 48000 (Sprint/Nextel)	150
Omni (Town)	176	(2) 48000 (Sprint/Nextel)	150
4 Bay Dipole (reserved) (Town)	176	VHLP2.5-180 (Clearwire)	146
7770.00 w/ mount pipe (ATI/Cingular)	170	2 Bay Dipole (Town)	130
7770.00 w/ mount pipe (ATI/Cingular)	170	6' Side Mount Standoff (Town)	130
7770.00 w/ mount pipe (ATI/Cingular)	170	Valmont Uni-Tri Bracket (Pocket Wireless)	125.5
(2) LPG 21401 TMA (ATI/Cingular)	170	742 213 w/mount pipe (Pocket Wireless)	124
(2) LPG 21401 TMA (ATI/Cingular)	170	742 213 w/mount pipe (Pocket Wireless)	124
(2) LPG 21401 TMA (ATI/Cingular)	170	742 213 w/mount pipe (Pocket Wireless)	124
Valmont T-Arm (1) (T-Mobile)	160	Valmont Uni-Tri Bracket (Pocket Wireless)	122.5
Valmont T-Arm (1) (T-Mobile)	160	RWA80013 (Verizon)	114
Valmont T-Arm (1) (T-Mobile)	160	LPA-80063/6CF (Verizon)	114
(2) DR65-19-00DPQ (T-Mobile)	160	RWA80013 (Verizon)	114
(2) DR65-19-00DPQ (T-Mobile)	160	LPA-80063/6CF (Verizon)	114
(2) DR65-19-00DPQ (T-Mobile)	160	LPA-80063/6CF (Verizon)	114
DR65-19-00DPQ (T-Mobile (reserved))	160	LPA-80063/6CF (Verizon)	114
DR65-19-00DPQ (T-Mobile (reserved))	160	BXA-185060/12CF 2 (Verizon)	114
DR65-19-00DPQ (T-Mobile (reserved))	160	LNX-6514DS-T4M (Verizon)	114
(2) TMA 10'x8"x3" (T-Mobile)	160	Rymsa MG D3-900Tx (Verizon)	114
(2) TMA 10'x8"x3" (T-Mobile)	160	LNX-6514DS-T4M (Verizon)	114
(2) TMA 10'x8"x3" (T-Mobile)	160	Rymsa MG D3-900Tx (Verizon)	114
(2) TMA 10'x8"x3" (T-Mobile (reserved))	160	LNX-6514DS-T4M (Verizon)	114
(2) TMA 10'x8"x3" (T-Mobile (reserved))	160	Andrew 12'-6" Low Profile Platform (Verizon)	112
(2) TMA 10'x8"x3" (T-Mobile (reserved))	160	6' Side Mount Standoff (Town)	100
2 Bay Dipole (Town)	160	4 Bay Dipole (Town)	100
Grid Dish (Town)	160	Grid Dish (Town)	100
VHLP2.5-180 (Clearwire)	154	Side Mount Standoff (Sprint/Nextel)	75
VHLP2.5-180 (Clearwire)	154	GPS (Sprint/Nextel)	75
VHLP2.5-180 (Clearwire)	154	Scanner Antenna (Town (reserved))	60
(2) 48000 (Sprint/Nextel)	150	Side Mount Standoff (T-Mobile (reserved))	60
840 10054 (Clearwire)	150	GPS (T-Mobile (reserved))	60
840 10054 (Clearwire)	150	Side Mount Standoff (Town (reserved))	60

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 74.2%

URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT
Phone: (860) 529-8882
FAX: (860) 529-3991

Job:	176' EEI Monopole, Berlin, CT
Project:	Berlin Fire Department
Client: Verizon Wireless	Drawn by: Matthew Kapinos — App'd:
Code: TIA/EIA-222-F	Date: 06/23/10 — Scale: NTS
Path: P:\06\ERI Files\176_EEI_Monopole.eri	Dwg No. E-1

RISA TOWER DETAILED OUTPUT

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 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.
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 ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	176.01-130.76	45.25	4.50	18	21.0000	31.8000	0.2500	1.0000	A572-65 (65 ksi)
L2	130.76-86.13	49.13	5.75	18	30.2260	41.8200	0.3125	1.2500	A572-65 (65 ksi)
L3	86.13-43.00	48.88	7.00	18	39.8381	51.3600	0.3750	1.5000	A572-65 (65 ksi)
L4	43.00-1.00	49.00		18	48.9600	60.5000	0.4375	1.7500	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	21.3240	16.4651	895.6507	7.3663	10.6680	83.9568	1792.4800	8.2341	3.2560	13.024
	32.2906	25.0349	3148.3461	11.2003	16.1544	194.8909	6300.8349	12.5198	5.1568	20.627
L2	31.7706	29.6704	3354.2440	10.6193	15.3548	218.4493	6712.9015	14.8380	4.7698	15.263
	42.4651	41.1703	8961.3641	14.7352	21.2446	421.8192	17934.5198	20.5890	6.8103	21.793
L3	41.8289	46.9709	9241.6271	14.0094	20.2377	456.6531	18495.4146	23.4899	6.3515	16.937
	52.1523	60.6849	19929.7987	18.0997	26.0909	763.8607	39885.8215	30.3482	8.3794	22.345
L4	51.3893	67.3795	20042.4648	17.2255	24.8717	805.8353	40111.3021	33.6962	7.8470	17.936
	61.4333	83.4043	38013.0437	21.3222	30.7340	1236.8401	76076.1060	41.7101	9.8780	22.578

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 176.01-130.76				1	1	1		
L2 130.76-86.13				1	1	1		
L3 86.13-43.00				1	1	1		
L4 43.00-1.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8 (Town)	C	No	Inside Pole	176.00 - 21.00	7	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (AT&T/Cingular)	C	No	Inside Pole	171.00 - 9.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (T-Mobile)	C	No	Inside Pole	161.00 - 9.00	24	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Town)	C	No	Inside Pole	161.00 - 21.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Sprint/Nextel)	C	No	Inside Pole	151.00 - 9.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Town)	C	No	Inside Pole	131.00 - 21.00	1	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Town)	C	No	Inside Pole	101.00 - 21.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1/2 (Sprint/Nextel)	C	No	Inside Pole	76.00 - 9.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2 (Town)	C	No	Inside Pole	61.00 - 21.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2 (T-Mobile)	C	No	Inside Pole	61.00 - 13.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1 5/8 (Verizon)	C	No	Inside Pole	111.00 - 21.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
AVA7-50 (1-5/8 LOW DENSI. FOAM) (Pocket Wireless)	C	No	CaAa (Out Of Face)	124.00 - 4.00	1	No Ice	0.20	0.72
						1/2" Ice	0.30	2.23
AVA7-50 (1-5/8 LOW DENSI. FOAM)	C	No	CaAa (Out Of Face)	124.00 - 4.00	5	No Ice	0.00	0.72
						1/2" Ice	0.00	2.23

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
(Pocket Wireless)								
1/2 (Clearwire)	C	No	Inside Pole	154.00 - 9.00	3	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2 (Clearwire)	C	No	Inside Pole	146.00 - 9.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
CATEGORY 5e (1 WIRE) (Clearwire)	C	No	Inside Pole	150.00 - 9.00	6	No Ice	0.00	0.21
						1/2" Ice	0.00	0.21
1 5/8 (Verizon)	A	No	CaAa (Out Of Face)	111.00 - 21.00	1	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (Verizon)	A	No	CaAa (Out Of Face)	111.00 - 21.00	5	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55

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	176.01-130.76	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	1.70
L2	130.76-86.13	A	0.000	0.000	0.000	4.924	0.16
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	7.498	3.02
L3	86.13-43.00	A	0.000	0.000	0.000	8.540	0.27
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	8.540	3.26
L4	43.00-1.00	A	0.000	0.000	0.000	4.356	0.14
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	7.722	2.30

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	176.01-130.76	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	1.70
L2	130.76-86.13	A	0.500	0.000	0.000	0.000	7.411	0.38
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	11.285	3.36
L3	86.13-43.00	A	0.500	0.000	0.000	0.000	12.853	0.66
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	12.853	3.65
L4	43.00-1.00	A	0.500	0.000	0.000	0.000	6.556	0.34
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	11.622	2.66

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
L1	176.01-130.76	0.0000	0.0000	0.0000	0.0000
L2	130.76-86.13	-0.2043	-0.0433	-0.2881	-0.0611
L3	86.13-43.00	-0.2333	-0.1347	-0.3291	-0.1900
L4	43.00-1.00	-0.2234	-0.0113	-0.3213	-0.0162

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
12' Low Profile Platform (Town)	C	None		0.0000	176.00	No Ice	15.70	15.70	1.30
						1/2" Ice	20.10	20.10	1.76
4 Bay Dipole (Town)	C	From Face	4.00 6.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
Omni (Town)	C	From Face	4.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
Grid Dish (Town)	C	From Face	4.00 -6.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
Dipole (Town)	B	From Face	4.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
Grid Dish (Town)	B	From Face	4.00 -6.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
Omni (Town)	A	From Face	4.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
4 Bay Dipole (reserved) (Town)	A	From Face	4.00 6.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
7770.00 w/ mount pipe (AT&T/Cingular)	A	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	5.99 6.45	4.26 4.91	0.06 0.11
7770.00 w/ mount pipe (AT&T/Cingular)	B	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	5.99 6.45	4.26 4.91	0.06 0.11
7770.00 w/ mount pipe (AT&T/Cingular)	C	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	5.99 6.45	4.26 4.91	0.06 0.11
(2) LPG 21401 TMA (AT&T/Cingular)	A	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LPG 21401 TMA (AT&T/Cingular)	B	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
(2) LPG 21401 TMA (AT&T/Cingular)	C	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	0.02 0.02
Valmont T-Arm (1)	A	From Face	2.00	0.0000	160.00	No Ice	10.54	10.54	0.34

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)
(T-Mobile)			0.00 0.00			1/2" Ice	14.45	14.45	0.41
Valmont T-Arm (1)	B	From Face	2.00	0.0000	160.00	No Ice	10.54	10.54	0.34
(T-Mobile)			0.00 0.00			1/2" Ice	14.45	14.45	0.41
Valmont T-Arm (1)	C	From Face	2.00	0.0000	160.00	No Ice	10.54	10.54	0.34
(T-Mobile)			0.00 0.00			1/2" Ice	14.45	14.45	0.41
(2) DR65-19-00DPQ	A	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	0.03
(T-Mobile)			0.00 0.00			1/2" Ice	8.95	3.97	0.07
(2) DR65-19-00DPQ	B	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	0.03
(T-Mobile)			0.00 0.00			1/2" Ice	8.95	3.97	0.07
(2) DR65-19-00DPQ	C	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	0.03
(T-Mobile)			0.00 0.00			1/2" Ice	8.95	3.97	0.07
DR65-19-00DPQ	A	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	0.03
(T-Mobile (reserved))			0.00 0.00			1/2" Ice	8.95	3.97	0.07
DR65-19-00DPQ	B	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	0.03
(T-Mobile (reserved))			0.00 0.00			1/2" Ice	8.95	3.97	0.07
DR65-19-00DPQ	C	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	0.03
(T-Mobile (reserved))			0.00 0.00			1/2" Ice	8.95	3.97	0.07
(2) TMA 10"x8"x3"	A	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	0.01
(T-Mobile)			0.00 0.00			1/2" Ice	0.90	0.38	0.02
(2) TMA 10"x8"x3"	B	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	0.01
(T-Mobile)			0.00 0.00			1/2" Ice	0.90	0.38	0.02
(2) TMA 10"x8"x3"	C	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	0.01
(T-Mobile)			0.00 0.00			1/2" Ice	0.90	0.38	0.02
(2) TMA 10"x8"x3"	A	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	0.01
(T-Mobile (reserved))			0.00 0.00			1/2" Ice	0.90	0.38	0.02
(2) TMA 10"x8"x3"	B	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	0.01
(T-Mobile (reserved))			0.00 0.00			1/2" Ice	0.90	0.38	0.02
(2) TMA 10"x8"x3"	C	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	0.01
(T-Mobile (reserved))			0.00 0.00			1/2" Ice	0.90	0.38	0.02
2 Bay Dipole	C	From Face	4.00	0.0000	160.00	No Ice	0.00	0.00	0.00
(Town)			6.00 0.00			1/2" Ice	0.00	0.00	0.00
Grid Dish	C	From Face	4.00	0.0000	160.00	No Ice	5.40	5.40	0.05
(Town)			6.00 0.00			1/2" Ice	9.00	9.00	0.08
Low Profile Platform	C	None		0.0000	150.00	No Ice	17.30	17.30	1.50
(Sprint/Nextel)						1/2" Ice	22.10	22.10	2.03
(2) 48000	A	From Face	3.00	0.0000	150.00	No Ice	4.51	1.82	0.02
(Sprint/Nextel)			0.00 0.00			1/2" Ice	4.91	2.15	0.04
(2) 48000	B	From Face	3.00	0.0000	150.00	No Ice	4.51	1.82	0.02
(Sprint/Nextel)			0.00			1/2" Ice	4.91	2.15	0.04

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						
(2) 48000 (Sprint/Nextel)	C	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice 1/2" Ice	4.51 4.91	1.82 2.15	0.02 0.04
2 Bay Dipole (Town)	C	From Face	6.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
6' Side Mount Standoff (Town)	C	From Face	3.00 0.00 0.00	0.0000	130.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	0.07 0.13
6' Side Mount Standoff (Town)	C	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	0.07 0.13
4 Bay Dipole (Town)	C	From Face	6.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
Grid Dish (Town)	C	From Face	6.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	0.05 0.08
Side Mount Standoff (Sprint/Nextel)	B	From Face	1.50 0.00 0.00	0.0000	75.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	0.07 0.13
GPS (Sprint/Nextel)	B	From Face	3.00 0.00 0.00	0.0000	75.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	0.01 0.03
Side Mount Standoff (T-Mobile (reserved))	B	From Face	1.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	0.07 0.13
GPS (T-Mobile (reserved))	B	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	0.01 0.03
Side Mount Standoff (Town (reserved))	C	From Face	1.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	0.07 0.13
Scanner Antenna (Town (reserved))	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	0.01 0.03
Andrew 12'-6" Low Profile Platform (Verizon)	C	None		0.0000	112.00	No Ice 1/2" Ice	14.45 19.00	14.45 19.00	1.30 1.69
LPA-80063/6CF (Verizon)	A	From Face	4.00 6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	7.40 8.00	6.50 7.00	0.03 0.04
LPA-80063/6CF (Verizon)	A	From Face	4.00 -6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	7.40 8.00	6.50 7.00	0.03 0.04
LPA-80063/6CF (Verizon)	B	From Face	4.00 6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	7.40 8.00	6.50 7.00	0.03 0.04
LPA-80063/6CF (Verizon)	B	From Face	4.00 -6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	7.40 8.00	6.50 7.00	0.03 0.04
RWA80013 (Verizon)	C	From Face	4.00 6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	5.44 6.04	5.44 6.04	0.01 0.05
RWA80013 (Verizon)	C	From Face	4.00 -6.00	0.0000	114.00	No Ice 1/2" Ice	5.44 6.04	5.44 6.04	0.01 0.05

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
			0.00						
Valmont Uni-Tri Bracket (Pocket Wireless)	C	None		0.0000	125.50	No Ice	1.75	1.75	0.29
						1/2" Ice	1.94	1.94	0.31
Valmont Uni-Tri Bracket (Pocket Wireless)	C	None		0.0000	122.50	No Ice	1.75	1.75	0.29
						1/2" Ice	1.94	1.94	0.31
742 213 w/mount pipe (Pocket Wireless)	A	From Face	1.00 0.00 0.00	0.0000	124.00	No Ice	5.28	4.53	0.05
						1/2" Ice	5.82	5.87	0.09
742 213 w/mount pipe (Pocket Wireless)	B	From Face	1.00 0.00 0.00	0.0000	124.00	No Ice	5.28	4.53	0.05
						1/2" Ice	5.82	5.87	0.09
742 213 w/mount pipe (Pocket Wireless)	C	From Face	1.00 0.00 0.00	0.0000	124.00	No Ice	5.28	4.53	0.05
						1/2" Ice	5.82	5.87	0.09
BXA-185060/12CF 2 (Verizon)	A	From Face	4.00 4.00 0.00	0.0000	114.00	No Ice	3.10	2.10	0.04
						1/2" Ice	3.60	2.60	0.08
LNX-6514DS-T4M (Verizon)	A	From Face	4.00 0.00 0.00	0.0000	114.00	No Ice	8.52	9.95	0.06
						1/2" Ice	9.11	11.12	0.14
Rymsa MG D3-900Tx (Verizon)	B	From Face	4.00 4.00 0.00	0.0000	114.00	No Ice	5.38	5.02	0.05
						1/2" Ice	5.86	5.96	0.09
LNX-6514DS-T4M (Verizon)	B	From Face	4.00 0.00 0.00	0.0000	114.00	No Ice	8.52	9.95	0.06
						1/2" Ice	9.11	11.12	0.14
Rymsa MG D3-900Tx (Verizon)	C	From Face	4.00 4.00 0.00	0.0000	114.00	No Ice	5.38	5.02	0.05
						1/2" Ice	5.86	5.96	0.09
LNX-6514DS-T4M (Verizon)	C	From Face	4.00 0.00 0.00	0.0000	114.00	No Ice	8.52	9.95	0.06
						1/2" Ice	9.11	11.12	0.14
840 10054 (Clearwire)	A	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice	5.24	2.15	0.05
						1/2" Ice	5.61	2.64	0.08
840 10054 (Clearwire)	B	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice	5.24	2.15	0.05
						1/2" Ice	5.61	2.64	0.08
840 10054 (Clearwire)	C	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice	5.24	2.15	0.05
						1/2" Ice	5.61	2.64	0.08
Remote Radio Heads U-RAS (Clearwire)	A	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice	1.80	0.78	0.03
						1/2" Ice	1.99	0.92	0.04
Remote Radio Heads U-RAS (Clearwire)	B	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice	1.80	0.78	0.03
						1/2" Ice	1.99	0.92	0.04
Remote Radio Heads U-RAS (Clearwire)	C	From Face	3.00 0.00 0.00	0.0000	150.00	No Ice	1.80	0.78	0.03
						1/2" Ice	1.99	0.92	0.04

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
VHLP2.5-180 (Clearwire)	A	Paraboloid w/o Radome	From Face	0.50 0.00 0.00	Worst		154.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10
VHLP2.5-180 (Clearwire)	B	Paraboloid w/o Radome	From Face	0.50 0.00 0.00	Worst		154.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10
VHLP2.5-180 (Clearwire)	C	Paraboloid w/o Radome	From Face	0.50 0.00 0.00	Worst		154.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10
VHLP2.5-180 (Clearwire)	B	Paraboloid w/o Radome	From Face	0.50 0.00 0.00	Worst		146.00	2.50	No Ice 1/2" Ice	4.90 5.24	0.07 0.10

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 176.01-130.76	152.08	1.547	25	99.550	A	0.000	99.550	99.550	100.00	0.000	0.000
					B	0.000	99.550		100.00	0.000	0.000
					C	0.000	99.550		100.00	0.000	0.000
L2 130.76-86.13	107.70	1.402	23	135.950	A	0.000	135.950	135.950	100.00	0.000	4.924
					B	0.000	135.950		100.00	0.000	0.000
					C	0.000	135.950		100.00	0.000	7.498
L3 86.13-43.00	64.29	1.21	20	166.326	A	0.000	166.326	166.326	100.00	0.000	8.540
					B	0.000	166.326		100.00	0.000	0.000
					C	0.000	166.326		100.00	0.000	8.540
L4 43.00-1.00	21.38	1	16	194.440	A	0.000	194.440	194.440	100.00	0.000	4.356
					B	0.000	194.440		100.00	0.000	0.000
					C	0.000	194.440		100.00	0.000	7.722

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 176.01-130.76	152.08	1.547	19	0.5000	103.321	A	0.000	103.321	103.321	100.00	0.000	0.000
						B	0.000	103.321		100.00	0.000	0.000
						C	0.000	103.321		100.00	0.000	0.000
L2 130.76-86.13	107.70	1.402	17	0.5000	139.669	A	0.000	139.669	139.669	100.00	0.000	7.411
						B	0.000	139.669		100.00	0.000	0.000
						C	0.000	139.669		100.00	0.000	11.285
L3 86.13-43.00	64.29	1.21	15	0.5000	169.920	A	0.000	169.920	169.920	100.00	0.000	12.853

Section Elevation	z	K_Z	q_z	t_Z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	in	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
L4 43.00-1.00	21.38	1	12	0.5000	197.940	B	0.000	169.920		100.00	0.000	0.000
						C	0.000	169.920		100.00	0.000	12.853
						A	0.000	197.940	197.940	100.00	0.000	6.556
						B	0.000	197.940		100.00	0.000	0.000
						C	0.000	197.940		100.00	0.000	11.622

Tower Pressure - Service

$G_H = 1.690$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft^2		ft^2	ft^2	ft^2		ft^2	ft^2
L1 176.01-130.76	152.08	1.547	10	99.550	A	0.000	99.550	99.550	100.00	0.000	0.000
					B	0.000	99.550		100.00	0.000	0.000
					C	0.000	99.550		100.00	0.000	0.000
L2 130.76-86.13	107.70	1.402	9	135.950	A	0.000	135.950	135.950	100.00	0.000	4.924
					B	0.000	135.950		100.00	0.000	0.000
					C	0.000	135.950		100.00	0.000	7.498
L3 86.13-43.00	64.29	1.21	8	166.326	A	0.000	166.326	166.326	100.00	0.000	8.540
					B	0.000	166.326		100.00	0.000	0.000
					C	0.000	166.326		100.00	0.000	8.540
L4 43.00-1.00	21.38	1	6	194.440	A	0.000	194.440	194.440	100.00	0.000	4.356
					B	0.000	194.440		100.00	0.000	0.000
					C	0.000	194.440		100.00	0.000	7.722

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	plf	
L1 176.01-130.76	1.70	3.20	A	1	0.65	1	1	1	99.550	2.77	61.21	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	3.17	5.92	A	1	0.65	1	1	1	135.950	3.91	87.50	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3.53	8.95	A	1	0.65	1	1	1	166.326	4.17	96.74	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2.44	12.57	A	1	0.65	1	1	1	194.440	3.83	91.28	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	10.84	30.64						OTM	1177.32 kip-ft	14.68		

Tower Forces - No Ice - Wind 45 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 176.01-130.76	1.70	3.20	A	1	0.65	1	1	1	99.550	2.77	61.21	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	3.17	5.92	A	1	0.65	1	1	1	135.950	3.91	87.50	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3.53	8.95	A	1	0.65	1	1	1	166.326	4.17	96.74	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2.44	12.57	A	1	0.65	1	1	1	194.440	3.83	91.28	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	10.84	30.64						OTM	1177.32 kip-ft	14.68		

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 ft^2	F K	w plf	Ctrl. Face
L1 176.01-130.76	1.70	3.20	A	1	0.65	1	1	1	99.550	2.77	61.21	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	3.17	5.92	A	1	0.65	1	1	1	135.950	3.91	87.50	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3.53	8.95	A	1	0.65	1	1	1	166.326	4.17	96.74	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2.44	12.57	A	1	0.65	1	1	1	194.440	3.83	91.28	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	10.84	30.64						OTM	1177.32 kip-ft	14.68		

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 ft^2	F K	w plf	Ctrl. Face
L1 176.01-130.76	1.70	3.20	A	1	0.65	1	1	1	99.550	2.77	61.21	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	3.17	5.92	A	1	0.65	1	1	1	135.950	3.91	87.50	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			

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
L3 86.13-43.00	3.53	8.95	A	1	0.65	1	1	1	166.326	4.17	96.74	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2.44	12.57	A	1	0.65	1	1	1	194.440	3.83	91.28	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	10.84	30.64						OTM	1177.32 kip-ft	14.68		

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 ft²	F K	w plf	Ctrl. Face
L1 176.01-130.76	1.70	3.95	A	1	0.65	1	1	1	103.321	2.16	47.64	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	3.74	6.94	A	1	0.65	1	1	1	139.669	3.18	71.29	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	4.31	10.20	A	1	0.65	1	1	1	169.920	3.40	78.91	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2.99	14.02	A	1	0.65	1	1	1	197.940	3.05	72.60	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	12.75	35.11						OTM	942.71 kip-ft	11.79		

Tower Forces - With Ice - Wind 45 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 176.01-130.76	1.70	3.95	A	1	0.65	1	1	1	103.321	2.16	47.64	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	3.74	6.94	A	1	0.65	1	1	1	139.669	3.18	71.29	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	4.31	10.20	A	1	0.65	1	1	1	169.920	3.40	78.91	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2.99	14.02	A	1	0.65	1	1	1	197.940	3.05	72.60	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	12.75	35.11						OTM	942.71 kip-ft	11.79		

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 ft²	F K	w plf	Ctrl. Face
L1 176.01-130.76	1.70	3.95	A	1	0.65	1	1	1	103.321	2.16	47.64	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	3.74	6.94	A	1	0.65	1	1	1	139.669	3.18	71.29	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	4.31	10.20	A	1	0.65	1	1	1	169.920	3.40	78.91	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2.99	14.02	A	1	0.65	1	1	1	197.940	3.05	72.60	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	12.75	35.11						OTM	942.71 kip-ft	11.79		

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 176.01-130.76	1.70	3.95	A	1	0.65	1	1	1	103.321	2.16	47.64	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	3.74	6.94	A	1	0.65	1	1	1	139.669	3.18	71.29	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	4.31	10.20	A	1	0.65	1	1	1	169.920	3.40	78.91	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2.99	14.02	A	1	0.65	1	1	1	197.940	3.05	72.60	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	12.75	35.11						OTM	942.71 kip-ft	11.79		

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 176.01-130.76	1.70	3.20	A	1	0.65	1	1	1	99.550	1.08	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-	3.17	5.92	A	1	0.65	1	1	1	135.950	1.53	34.18	C

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
86.13			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3.53	8.95	A	1	0.65	1	1	1	166.326	1.63	37.79	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2.44	12.57	A	1	0.65	1	1	1	194.440	1.50	35.66	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	10.84	30.64						OTM	459.89 kip-ft	5.73		

Tower Forces - Service - Wind 45 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 176.01-130.76	1.70	3.20	A	1	0.65	1	1	1	99.550	1.08	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	3.17	5.92	A	1	0.65	1	1	1	135.950	1.53	34.18	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3.53	8.95	A	1	0.65	1	1	1	166.326	1.63	37.79	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2.44	12.57	A	1	0.65	1	1	1	194.440	1.50	35.66	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	10.84	30.64						OTM	459.89 kip-ft	5.73		

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 ft²	F K	w plf	Ctrl. Face
L1 176.01-130.76	1.70	3.20	A	1	0.65	1	1	1	99.550	1.08	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	3.17	5.92	A	1	0.65	1	1	1	135.950	1.53	34.18	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3.53	8.95	A	1	0.65	1	1	1	166.326	1.63	37.79	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2.44	12.57	A	1	0.65	1	1	1	194.440	1.50	35.66	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	10.84	30.64						OTM	459.89	5.73		

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
									kip-ft			

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 ft²	F K	w plf	Ctrl. Face
L1 176.01-130.76	1.70	3.20	A	1	0.65	1	1	1	99.550	1.08	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	3.17	5.92	A	1	0.65	1	1	1	135.950	1.53	34.18	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3.53	8.95	A	1	0.65	1	1	1	166.326	1.63	37.79	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2.44	12.57	A	1	0.65	1	1	1	194.440	1.50	35.66	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	10.84	30.64						OTM	459.89 kip-ft	5.73		

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	30.64					
Bracing Weight	0.00					
Total Member Self-Weight	30.64			1.04	0.49	
Total Weight	50.10			1.04	0.49	
Wind 0 deg - No Ice		-0.01	-31.75	-3602.89	1.73	0.52
Wind 30 deg - No Ice		15.91	-27.49	-3119.43	-1805.13	3.52
Wind 45 deg - No Ice		22.50	-22.44	-2546.44	-2553.68	4.71
Wind 60 deg - No Ice		27.57	-15.87	-1799.85	-3128.17	5.58
Wind 90 deg - No Ice		31.84	0.01	2.28	-3612.90	6.15
Wind 120 deg - No Ice		27.58	15.89	1804.08	-3129.41	5.06
Wind 135 deg - No Ice		22.52	22.46	2550.28	-2555.44	3.98
Wind 150 deg - No Ice		15.93	27.50	3122.75	-1807.28	2.62
Wind 180 deg - No Ice		0.01	31.75	3604.96	-0.75	-0.52
Wind 210 deg - No Ice		-15.91	27.49	3121.51	1806.11	-3.52
Wind 225 deg - No Ice		-22.50	22.44	2548.52	2554.66	-4.71
Wind 240 deg - No Ice		-27.57	15.87	1801.93	3129.15	-5.58
Wind 270 deg - No Ice		-31.84	-0.01	-0.20	3613.88	-6.15
Wind 300 deg - No Ice		-27.58	-15.89	-1802.00	3130.40	-5.06
Wind 315 deg - No Ice		-22.52	-22.46	-2548.20	2556.42	-3.98
Wind 330 deg - No Ice		-15.93	-27.50	-3120.67	1808.26	-2.62
Member Ice	4.47					
Total Weight Ice	60.38			1.97	1.98	

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
Wind 0 deg - Ice		-0.01	-27.67	-3212.65	3.56	-0.03
Wind 30 deg - Ice		13.86	-23.96	-2781.18	-1608.22	3.59
Wind 45 deg - Ice		19.61	-19.56	-2269.99	-2276.00	5.09
Wind 60 deg - Ice		24.02	-13.82	-1603.97	-2788.55	6.24
Wind 90 deg - Ice		27.75	0.01	3.55	-3221.16	7.23
Wind 120 deg - Ice		24.04	13.85	1610.65	-2790.13	6.28
Wind 135 deg - Ice		19.63	19.58	2276.17	-2278.24	5.14
Wind 150 deg - Ice		13.89	23.97	2786.70	-1610.96	3.64
Wind 180 deg - Ice		0.01	27.67	3216.59	0.39	0.03
Wind 210 deg - Ice		-13.86	23.96	2785.12	1612.17	-3.59
Wind 225 deg - Ice		-19.61	19.56	2273.93	2279.96	-5.09
Wind 240 deg - Ice		-24.02	13.82	1607.91	2792.50	-6.24
Wind 270 deg - Ice		-27.75	-0.01	0.38	3225.11	-7.23
Wind 300 deg - Ice		-24.04	-13.85	-1606.71	2794.09	-6.28
Wind 315 deg - Ice		-19.63	-19.58	-2272.23	2282.20	-5.14
Wind 330 deg - Ice		-13.89	-23.97	-2782.77	1614.92	-3.64
Total Weight	50.10			1.04	0.49	
Wind 0 deg - Service		-0.00	-12.40	-1406.17	0.11	0.20
Wind 30 deg - Service		6.21	-10.74	-1217.32	-705.70	1.38
Wind 45 deg - Service		8.79	-8.77	-993.50	-998.10	1.84
Wind 60 deg - Service		10.77	-6.20	-701.86	-1222.51	2.18
Wind 90 deg - Service		12.44	0.00	2.10	-1411.86	2.40
Wind 120 deg - Service		10.77	6.21	705.92	-1223.00	1.98
Wind 135 deg - Service		8.80	8.77	997.41	-998.79	1.55
Wind 150 deg - Service		6.22	10.74	1221.03	-706.54	1.02
Wind 180 deg - Service		0.00	12.40	1409.40	-0.86	-0.20
Wind 210 deg - Service		-6.21	10.74	1220.55	704.94	-1.38
Wind 225 deg - Service		-8.79	8.77	996.72	997.35	-1.84
Wind 240 deg - Service		-10.77	6.20	705.08	1221.76	-2.18
Wind 270 deg - Service		-12.44	-0.00	1.13	1411.10	-2.40
Wind 300 deg - Service		-10.77	-6.21	-702.70	1222.24	-1.98
Wind 315 deg - Service		-8.80	-8.77	-994.18	998.03	-1.55
Wind 330 deg - Service		-6.22	-10.74	-1217.81	705.78	-1.02

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 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp

Comb. No.	Description
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	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	176.01 - 130.76	Pole	Max Tension	18	0.00	-0.00	0.00
			Max. Compression	18	-13.08	0.35	0.09
			Max. Mx	14	-8.88	352.59	-0.06
			Max. My	2	-8.89	0.15	352.44
			Max. Vy	14	-14.22	352.59	-0.06
			Max. Vx	10	14.22	0.14	-352.29
			Max. Torque	19			1.74
L2	130.76 - 86.13	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-26.95	0.93	-2.89
			Max. Mx	14	-19.99	1181.64	-1.17
			Max. My	10	-20.00	0.07	-1180.84
			Max. Vy	14	-23.70	1181.64	-1.17
			Max. Vx	10	23.62	0.07	-1180.84
			Max. Torque	23			-7.19
L3	86.13 - 43	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-41.02	0.81	-2.28
			Max. Mx	14	-32.41	2264.46	-0.50
			Max. My	10	-32.41	-0.61	-2260.03
			Max. Vy	14	-28.11	2264.46	-0.50
			Max. Vx	10	28.02	-0.61	-2260.03

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Torque	23			-7.18
L4	43 - 1	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-60.38	2.00	-2.02
			Max. Mx	14	-50.08	3736.55	0.21
			Max. My	10	-50.08	-0.77	-3727.41
			Max. Vy	14	-31.86	3736.55	0.21
			Max. Vx	10	31.78	-0.77	-3727.41
			Max. Torque	23			-7.12

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	31	60.38	27.75	0.01
	Max. H_x	14	50.10	31.84	0.01
	Max. H_z	2	50.10	0.01	31.75
	Max. M_x	2	3725.21	0.01	31.75
	Max. M_z	6	3735.53	-31.84	-0.01
	Max. Torsion	31	7.11	27.75	0.01
	Min. Vert	1	50.10	0.00	0.00
	Min. H_x	6	50.10	-31.84	-0.01
	Min. H_z	10	50.10	-0.01	-31.75
	Min. M_x	10	-3727.41	-0.01	-31.75
	Min. M_z	14	-3736.55	31.84	0.01
	Min. Torsion	23	-7.11	-27.75	-0.01

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	50.10	0.00	0.00	1.04	0.49	0.00
Dead+Wind 0 deg - No Ice	50.10	-0.01	-31.75	-3725.21	1.79	0.54
Dead+Wind 30 deg - No Ice	50.10	15.91	-27.49	-3225.35	-1866.40	3.50
Dead+Wind 45 deg - No Ice	50.10	22.50	-22.44	-2632.91	-2640.36	4.67
Dead+Wind 60 deg - No Ice	50.10	27.57	-15.87	-1860.97	-3234.35	5.52
Dead+Wind 90 deg - No Ice	50.10	31.84	0.01	2.35	-3735.53	6.06
Dead+Wind 120 deg - No Ice	50.10	27.58	15.89	1865.34	-3235.65	4.97
Dead+Wind 135 deg - No Ice	50.10	22.52	22.46	2636.89	-2642.19	3.90
Dead+Wind 150 deg - No Ice	50.10	15.93	27.50	3228.81	-1868.64	2.56
Dead+Wind 180 deg - No Ice	50.10	0.01	31.75	3727.41	-0.77	-0.55
Dead+Wind 210 deg - No Ice	50.10	-15.91	27.49	3227.54	1867.44	-3.50
Dead+Wind 225 deg - No Ice	50.10	-22.50	22.44	2635.08	2641.40	-4.67
Dead+Wind 240 deg - No Ice	50.10	-27.57	15.87	1863.13	3235.39	-5.52
Dead+Wind 270 deg - No Ice	50.10	-31.84	-0.01	-0.21	3736.55	-6.06
Dead+Wind 300 deg - No Ice	50.10	-27.58	-15.89	-1863.18	3236.64	-4.97
Dead+Wind 315 deg - No Ice	50.10	-22.52	-22.46	-2634.72	2643.18	-3.90
Dead+Wind 330 deg - No Ice	50.10	-15.93	-27.50	-3226.63	1869.63	-2.56
Dead+Ice+Temp	60.38	-0.00	0.00	2.02	2.00	0.00
Dead+Wind 0 deg+Ice+Temp	60.38	-0.01	-27.67	-3356.11	3.70	0.01
Dead+Wind 30 deg+Ice+Temp	60.38	13.86	-23.96	-2905.38	-1680.04	3.56
Dead+Wind 45 deg+Ice+Temp	60.38	19.61	-19.56	-2371.36	-2377.64	5.03

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead+Wind 60 deg+Ice+Temp	60.38	24.02	-13.82	-1675.59	-2913.07	6.16
Dead+Wind 90 deg+Ice+Temp	60.38	27.75	0.01	3.73	-3365.00	7.11
Dead+Wind 120 deg+Ice+Temp	60.38	24.04	13.85	1682.63	-2914.74	6.16
Dead+Wind 135 deg+Ice+Temp	60.38	19.63	19.58	2377.89	-2379.99	5.02
Dead+Wind 150 deg+Ice+Temp	60.38	13.89	23.97	2911.25	-1682.91	3.55
Dead+Wind 180 deg+Ice+Temp	60.38	0.01	27.67	3360.36	0.41	-0.01
Dead+Wind 210 deg+Ice+Temp	60.38	-13.86	23.96	2909.61	1684.19	-3.56
Dead+Wind 225 deg+Ice+Temp	60.38	-19.61	19.56	2375.57	2381.79	-5.03
Dead+Wind 240 deg+Ice+Temp	60.38	-24.02	13.82	1679.79	2917.22	-6.16
Dead+Wind 270 deg+Ice+Temp	60.38	-27.75	-0.01	0.44	3369.12	-7.11
Dead+Wind 300 deg+Ice+Temp	60.38	-24.04	-13.85	-1678.44	2918.83	-6.16
Dead+Wind 315 deg+Ice+Temp	60.38	-19.63	-19.58	-2373.68	2384.08	-5.03
Dead+Wind 330 deg+Ice+Temp	60.38	-13.89	-23.97	-2907.02	1687.00	-3.55
Dead+Wind 0 deg - Service	50.10	-0.00	-12.40	-1455.74	1.01	0.21
Dead+Wind 30 deg - Service	50.10	6.21	-10.74	-1260.31	-729.38	1.37
Dead+Wind 45 deg - Service	50.10	8.79	-8.77	-1028.69	-1031.97	1.83
Dead+Wind 60 deg - Service	50.10	10.77	-6.20	-726.89	-1264.20	2.16
Dead+Wind 90 deg - Service	50.10	12.44	0.00	1.60	-1460.14	2.38
Dead+Wind 120 deg - Service	50.10	10.77	6.21	729.96	-1264.70	1.95
Dead+Wind 135 deg - Service	50.10	8.80	8.77	1031.60	-1032.68	1.53
Dead+Wind 150 deg - Service	50.10	6.22	10.74	1263.02	-730.25	1.01
Dead+Wind 180 deg - Service	50.10	0.00	12.40	1457.95	0.01	-0.21
Dead+Wind 210 deg - Service	50.10	-6.21	10.74	1262.52	730.41	-1.37
Dead+Wind 225 deg - Service	50.10	-8.79	8.77	1030.90	1033.00	-1.83
Dead+Wind 240 deg - Service	50.10	-10.77	6.20	729.09	1265.22	-2.16
Dead+Wind 270 deg - Service	50.10	-12.44	-0.00	0.60	1461.16	-2.38
Dead+Wind 300 deg - Service	50.10	-10.77	-6.21	-727.75	1265.72	-1.95
Dead+Wind 315 deg - Service	50.10	-8.80	-8.77	-1029.39	1033.70	-1.53
Dead+Wind 330 deg - Service	50.10	-6.22	-10.74	-1260.81	731.27	-1.01

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-50.10	0.00	0.00	50.10	0.00	0.000%
2	-0.01	-50.10	-31.75	0.01	50.10	31.75	0.000%
3	15.91	-50.10	-27.49	-15.91	50.10	27.49	0.000%
4	22.50	-50.10	-22.44	-22.50	50.10	22.44	0.000%
5	27.57	-50.10	-15.87	-27.57	50.10	15.87	0.000%
6	31.84	-50.10	0.01	-31.84	50.10	-0.01	0.000%
7	27.58	-50.10	15.89	-27.58	50.10	-15.89	0.000%
8	22.52	-50.10	22.46	-22.52	50.10	-22.46	0.000%
9	15.93	-50.10	27.50	-15.93	50.10	-27.50	0.000%
10	0.01	-50.10	31.75	-0.01	50.10	-31.75	0.000%
11	-15.91	-50.10	27.49	15.91	50.10	-27.49	0.000%
12	-22.50	-50.10	22.44	22.50	50.10	-22.44	0.000%
13	-27.57	-50.10	15.87	27.57	50.10	-15.87	0.000%
14	-31.84	-50.10	-0.01	31.84	50.10	0.01	0.000%
15	-27.58	-50.10	-15.89	27.58	50.10	15.89	0.000%
16	-22.52	-50.10	-22.46	22.52	50.10	22.46	0.000%
17	-15.93	-50.10	-27.50	15.93	50.10	27.50	0.000%
18	0.00	-60.38	0.00	0.00	60.38	-0.00	0.000%
19	-0.01	-60.38	-27.67	0.01	60.38	27.67	0.000%
20	13.86	-60.38	-23.96	-13.86	60.38	23.96	0.000%
21	19.61	-60.38	-19.56	-19.61	60.38	19.56	0.000%
22	24.02	-60.38	-13.82	-24.02	60.38	13.82	0.000%
23	27.75	-60.38	0.01	-27.75	60.38	-0.01	0.000%

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
24	24.04	-60.38	13.85	-24.04	60.38	-13.85	0.000%
25	19.63	-60.38	19.58	-19.63	60.38	-19.58	0.000%
26	13.89	-60.38	23.97	-13.89	60.38	-23.97	0.000%
27	0.01	-60.38	27.67	-0.01	60.38	-27.67	0.000%
28	-13.86	-60.38	23.96	13.86	60.38	-23.96	0.000%
29	-19.61	-60.38	19.56	19.61	60.38	-19.56	0.000%
30	-24.02	-60.38	13.82	24.02	60.38	-13.82	0.000%
31	-27.75	-60.38	-0.01	27.75	60.38	0.01	0.000%
32	-24.04	-60.38	-13.85	24.04	60.38	13.85	0.000%
33	-19.63	-60.38	-19.58	19.63	60.38	19.58	0.000%
34	-13.89	-60.38	-23.97	13.89	60.38	23.97	0.000%
35	-0.00	-50.10	-12.40	0.00	50.10	12.40	0.000%
36	6.21	-50.10	-10.74	-6.21	50.10	10.74	0.000%
37	8.79	-50.10	-8.77	-8.79	50.10	8.77	0.000%
38	10.77	-50.10	-6.20	-10.77	50.10	6.20	0.000%
39	12.44	-50.10	0.00	-12.44	50.10	-0.00	0.000%
40	10.77	-50.10	6.21	-10.77	50.10	-6.21	0.000%
41	8.80	-50.10	8.77	-8.80	50.10	-8.77	0.000%
42	6.22	-50.10	10.74	-6.22	50.10	-10.74	0.000%
43	0.00	-50.10	12.40	-0.00	50.10	-12.40	0.000%
44	-6.21	-50.10	10.74	6.21	50.10	-10.74	0.000%
45	-8.79	-50.10	8.77	8.79	50.10	-8.77	0.000%
46	-10.77	-50.10	6.20	10.77	50.10	-6.20	0.000%
47	-12.44	-50.10	-0.00	12.44	50.10	0.00	0.000%
48	-10.77	-50.10	-6.21	10.77	50.10	6.21	0.000%
49	-8.80	-50.10	-8.77	8.80	50.10	8.77	0.000%
50	-6.22	-50.10	-10.74	6.22	50.10	10.74	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	4	0.00000001	0.00025075
3	Yes	5	0.00000001	0.00041119
4	Yes	5	0.00000001	0.00044698
5	Yes	5	0.00000001	0.00037447
6	Yes	5	0.00000001	0.00005982
7	Yes	5	0.00000001	0.00042915
8	Yes	5	0.00000001	0.00044888
9	Yes	5	0.00000001	0.00038206
10	Yes	4	0.00000001	0.00024498
11	Yes	5	0.00000001	0.00038571
12	Yes	5	0.00000001	0.00044815
13	Yes	5	0.00000001	0.00042620
14	Yes	5	0.00000001	0.00005922
15	Yes	5	0.00000001	0.00037307
16	Yes	5	0.00000001	0.00044816
17	Yes	5	0.00000001	0.00041640
18	Yes	4	0.00000001	0.00000476
19	Yes	5	0.00000001	0.00021878
20	Yes	5	0.00000001	0.00079575
21	Yes	5	0.00000001	0.00088158
22	Yes	5	0.00000001	0.00074477
23	Yes	5	0.00000001	0.00025201
24	Yes	5	0.00000001	0.00083686

25	Yes	5	0.00000001	0.00088916
26	Yes	5	0.00000001	0.00075280
27	Yes	5	0.00000001	0.00021900
28	Yes	5	0.00000001	0.00076617
29	Yes	5	0.00000001	0.00088680
30	Yes	5	0.00000001	0.00082633
31	Yes	5	0.00000001	0.00025159
32	Yes	5	0.00000001	0.00074106
33	Yes	5	0.00000001	0.00088731
34	Yes	5	0.00000001	0.00081604
35	Yes	4	0.00000001	0.00007406
36	Yes	4	0.00000001	0.00089637
37	Yes	4	0.00000001	0.00097658
38	Yes	4	0.00000001	0.00075266
39	Yes	4	0.00000001	0.00029467
40	Yes	4	0.00000001	0.00098519
41	Yes	4	0.00000001	0.00098844
42	Yes	4	0.00000001	0.00077458
43	Yes	4	0.00000001	0.00007396
44	Yes	4	0.00000001	0.00079098
45	Yes	4	0.00000001	0.00098542
46	Yes	4	0.00000001	0.00097333
47	Yes	4	0.00000001	0.00029385
48	Yes	4	0.00000001	0.00074801
49	Yes	4	0.00000001	0.00098367
50	Yes	4	0.00000001	0.00092011

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176.01 - 130.76	39.149	47	1.9684	0.0044
L2	135.26 - 86.13	23.089	47	1.6959	0.0066
L3	91.88 - 43	10.159	47	1.0962	0.0040
L4	50 - 1	2.865	47	0.5362	0.0014

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	12' Low Profile Platform	47	39.145	1.9683	0.0045	36602
170.00	7770.00 w/ mount pipe	47	36.673	1.9380	0.0048	30451
160.00	Valmont T-Arm (1)	47	32.593	1.8838	0.0054	11430
154.00	VHLP2.5-180	47	30.191	1.8471	0.0057	8314
150.00	Low Profile Platform	47	28.618	1.8201	0.0060	7035
146.00	VHLP2.5-180	47	27.072	1.7906	0.0063	6097
130.00	2 Bay Dipole	47	21.244	1.6398	0.0066	4443
125.50	Valmont Uni-Tri Bracket	47	19.725	1.5870	0.0065	4404
124.00	742 213 w/mount pipe	47	19.231	1.5684	0.0064	4391
122.50	Valmont Uni-Tri Bracket	47	18.743	1.5495	0.0063	4378
114.00	LPA-80063/6CF	47	16.096	1.4348	0.0058	4307
112.00	Andrew 12'-6" Low Profile Platform	47	15.502	1.4062	0.0057	4290
100.00	6' Side Mount Standoff	47	12.176	1.2250	0.0047	4193
75.00	Side Mount Standoff	47	6.582	0.8298	0.0027	3995

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
60.00	Side Mount Standoff	47	4.121	0.6300	0.0018	3883

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	176.01 - 130.76	99.960	14	5.0264	0.0147
L2	135.26 - 86.13	58.985	14	4.3314	0.0198
L3	91.88 - 43	25.967	14	2.8017	0.0119
L4	50 - 1	7.325	14	1.3710	0.0043

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
176.00	12' Low Profile Platform	14	99.949	5.0263	0.0149	14537
170.00	7770.00 w/ mount pipe	14	93.645	4.9506	0.0156	12094
160.00	Valmont T-Arm (1)	14	83.236	4.8148	0.0173	4538
154.00	VHLP2.5-180	14	77.108	4.7218	0.0182	3300
150.00	Low Profile Platform	14	73.094	4.6528	0.0187	2791
146.00	VHLP2.5-180	14	69.149	4.5769	0.0190	2418
130.00	2 Bay Dipole	14	54.276	4.1851	0.0197	1759
125.50	Valmont Uni-Tri Bracket	14	50.399	4.0472	0.0193	1742
124.00	742 213 w/mount pipe	14	49.138	3.9989	0.0192	1736
122.50	Valmont Uni-Tri Bracket	14	47.892	3.9495	0.0190	1731
114.00	LPA-80063/6CF	14	41.133	3.6522	0.0175	1700
112.00	Andrew 12'-6" Low Profile Platform	14	39.616	3.5786	0.0170	1693
100.00	6' Side Mount Standoff	14	31.121	3.1195	0.0140	1652
75.00	Side Mount Standoff	14	16.827	2.1626	0.0082	1569
60.00	Side Mount Standoff	14	10.535	1.6564	0.0056	1521

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	K	K	
L1	176.01 - 130.76 (1)	TP31.8x21x0.25	45.25	0.00	0.0	39.000	24.1827	-8.88	943.13	0.009
L2	130.76 - 86.13 (2)	TP41.82x30.226x0.3125	49.13	0.00	0.0	39.000	39.8244	-19.99	1553.15	0.013
L3	86.13 - 43 (3)	TP51.36x39.8381x0.375	48.88	0.00	0.0	39.000	58.7209	-32.41	2290.12	0.014
L4	43 - 1 (4)	TP60.5x48.96x0.4375	49.00	0.00	0.0	39.000	83.4043	-50.08	3252.77	0.015

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 $\frac{P}{P_a}$

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	176.01 - 130.76 (1)	TP31.8x21x0.25	352.59	23.274	39.000	0.597	0.00	0.000	39.000	0.000
L2	130.76 - 86.13 (2)	TP41.82x30.226x0.3125	1181.64	35.935	39.000	0.921	0.00	0.000	39.000	0.000
L3	86.13 - 43 (3)	TP51.36x39.8381x0.375	2264.46	38.002	39.000	0.974	0.00	0.000	39.000	0.000
L4	43 - 1 (4)	TP60.5x48.96x0.4375	3736.55	36.252	39.000	0.930	0.00	0.000	39.000	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	176.01 - 130.76 (1)	TP31.8x21x0.25	14.22	0.588	26.000	0.045	0.48	0.015	26.000	0.001
L2	130.76 - 86.13 (2)	TP41.82x30.226x0.3125	23.70	0.595	26.000	0.046	6.12	0.091	26.000	0.003
L3	86.13 - 43 (3)	TP51.36x39.8381x0.375	28.11	0.479	26.000	0.037	6.07	0.050	26.000	0.002
L4	43 - 1 (4)	TP60.5x48.96x0.4375	31.86	0.382	26.000	0.029	6.06	0.029	26.000	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	176.01 - 130.76 (1)	0.009	0.597	0.000	0.045	0.001	0.607 ✔	1.333	H1-3+VT ✔
L2	130.76 - 86.13 (2)	0.013	0.921	0.000	0.046	0.003	0.935 ✔	1.333	H1-3+VT ✔
L3	86.13 - 43 (3)	0.014	0.974	0.000	0.037	0.002	0.989 ✔	1.333	H1-3+VT ✔
L4	43 - 1 (4)	0.015	0.930	0.000	0.029	0.001	0.945 ✔	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	176.01 - 130.76	Pole	TP31.8x21x0.25	1	-8.88	1257.19	45.5	Pass
L2	130.76 - 86.13	Pole	TP41.82x30.226x0.3125	2	-19.99	2070.35	70.1	Pass
L3	86.13 - 43	Pole	TP51.36x39.8381x0.375	3	-32.41	3052.73	74.2	Pass
L4	43 - 1	Pole	TP60.5x48.96x0.4375	4	-50.08	4335.94	70.9	Pass
							Summary	
						Pole (L3)	74.2	Pass
						RATING =	**74.2**	**Pass**

ANCHOR BOLT AND
BASE PLATE ANALYSIS

ANCHOR BOLT AND BASE PLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	$OM := 3737ft \cdot kips$	*user input*
Shear Force:	$Shear := 32 \cdot kips$	*user input*
Axial Force:	$Axial := 50 \cdot kips$	*user input*

Anchor Bolt Data:

Use ASTM A615 Grade 75		*user input*
Number of Anchor Bolts = N	$N := 18$	*user input*
Diameter of Bolt Circle:	$D_{bc} := 70.00in$	*user input*
Bolt "Column" Distance:	$l := 3.0in$	*user input*
Bolt Ultimate Strength:	$F_u := 100 \cdot ksi$	*user input*
Bolt Yield Strength:	$Fy := 75 \cdot ksi$	*user input*
Bolt Modulus:	$E := 29000 \cdot ksi$	*user input*
Anchor Bolt Diameter	$D := 2.25in$	*user input*
Threads per Inch:	$n := 4.5$	*user input*

Base Plate Data:

Use ASTM A572 Grade 60		*user input*
Plate Yield Strength:	$Fy_{bp} := 60 \cdot ksi$	*user input*
Base Plate Thickness:	$PlateThickness := 2.00 \cdot in$	*user input*
Base Plate Diameter:	$D_{bp} := 76.00in$	*user input*
Outer Pole Diameter:	$D_{pole} := 60.50in$	*user input*

Geometric Layout Data:

Distance from the center of gravity of the group to bolt in question = d(i)

Radius of Bolt Circle: $R_{bc} := \frac{D_{bc}}{2}$

Distance to Bolts: $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 11.97 \cdot in$ $d_7 = 22.50 \cdot in$

$d_2 = 22.50 \cdot in$ $d_8 = 11.97 \cdot in$

$d_3 = 30.31 \cdot in$ $d_9 = 0.00 \cdot in$

$d_4 = 34.47 \cdot in$ $d_{10} = -11.97 \cdot in$

$d_5 = 34.47 \cdot in$ $d_{11} = -22.50 \cdot in$

$d_6 = 30.31 \cdot in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius: $R_{pole} := \frac{D_{pole}}{2}$ $R_{pole} = 30.25 \cdot in$

Moment Arms of Bolts about Neutral Axis: $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 0.00 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 0.06 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 4.22 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 4.22 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.06 \cdot in$ etc.

Effective Width of Baseplate for Bending: $EffectiveWidth := .9 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2}$ $EffectiveWidth = 41.40 \cdot in$

Anchor Bolt Analysis:

Polar Moment of Inertia I_p:

$$I_p := \sum_i \left(d_i\right)^2 \qquad I_p = 1.103 \times 10^4 \cdot in^2$$

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 3.976 \cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 \qquad A_n = 3.248 \cdot in^2$$

Net Diameter:

$$D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} \qquad D_n = 2.03 \cdot in$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \qquad r = 0.51 \cdot in$$

Section Modulus of Bolt:

$$S_x := \frac{\pi \cdot D_n^{\,3}}{32} \qquad S_x = 0.826 \cdot in^3$$

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{Shear}{N}\right) \cdot l \qquad M_x = 0.444 \cdot ft \cdot kips$$

$$f_{bx} := \frac{M_x}{S_x} \qquad f_{bx} = 6.5 \cdot ksi$$

Allowable Bending

$$F_{bx} := 1.333 \cdot 0.60 \cdot Fy \qquad F_{bx} = 60.0 \cdot ksi$$

Note: 1.333 increase allowed per TIA/EIA

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$AllowableTension := 1.333 \cdot (0.33 \cdot A_g \cdot F_u)$ $\quad AllowableTension = 174.9 \cdot kips$

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$F_{net.area} := 1.333 \cdot (0.60 \cdot A_n \cdot Fy)$ $\quad F_{net.area} = 194.8 \cdot kips$

Note: 1.333 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{OM \cdot R_{bc}}{I_p} - \frac{Axial}{N} \qquad MaxTension = 139.6 \cdot kips$$

Check Stresses:

Note: Bolts supplied are "upset bolts." Use net area for checking per AISC.

$$\frac{MaxTension}{F_{net.area}} = 0.72$$

$$Condition := if\left(\frac{MaxTension}{F_{net.area}} \le 1.00, "OK", "Overstressed"\right)$$

Condition = "OK"

Check Compression & Combined Stresses (if required):

Check to see if a complete combined stress analysis is required:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required."

Set the clear space between the plate and bolt to zero and remove bending stresses if a combined stress analysis is not required:

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0.00\,in & \text{otherwise} \end{cases} \qquad l = 0.00 \cdot in$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0\,ksi & \text{otherwise} \end{cases} \qquad f_{bx} = 0.0 \cdot ksi$$

Allowable Compressive Force:

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Fy}} \qquad C_c = 87.36$$

$$F_a := \begin{cases} \left[1 - \frac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^{\,2}}\right] \cdot Fy & \text{if } \frac{K \cdot l}{r} \le C_c \\ \frac{5}{3} + \frac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \frac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^{\,3}} & \\ \frac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \frac{K \cdot l}{r} > C_c \end{cases} \qquad F_a = 45.0 \cdot ksi$$

$$F_a := 1.333 \cdot F_a \qquad \text{Note: 1.333 increase allowed per TIA/EIA} \qquad F_a = 60.0 \cdot ksi$$

Applied Compressive Force:

$$MaxCompression := \frac{OM \cdot R_{bc}}{I_p} + \frac{Axial}{N} \qquad MaxCompression = 145.1 \cdot kips$$

$$f_a := \frac{MaxCompression}{A_n} \qquad f_a = 44.7 \cdot ksi$$

Check Combined Stresses:

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} = 0.75$$

$$Condition := if\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right) \qquad \boxed{Condition = \text{"OK"}}$$

Base Plate Analysis:

Force from Bolt(s):

$$C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$$

$C_1 = 51.5 \cdot kips$ $C_7 = 94.3 \cdot kips$

$C_2 = 94.3 \cdot kips$ $C_8 = 51.5 \cdot kips$

$C_3 = 126.1 \cdot kips$ $C_9 = 2.8 \cdot kips$

$C_4 = 143.0 \cdot kips$ $C_{10} = -45.9 \cdot kips$

$C_5 = 143.0 \cdot kips$ $C_{11} = -88.7 \cdot kips$

$C_6 = 126.1 \cdot kips$ etc.

Bending Stress in Plate:

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{EffectiveWidth \cdot PlateThickness^2}$$

$f_{bp} = 44.3 \cdot ksi$

Check Stresses:

$$\frac{f_{bp}}{1.333 \cdot 0.75 Fy_{bp}} = 0.74$$

$$Condition := if\left(\frac{f_{bp}}{1.333 \cdot 0.75 Fy_{bp}} < 1.00, "OK", "Overstressed"\right)$$

Condition = "OK"

FOUNDATION ANALYSIS

URS

Job	176' EEI Monopole - Berlin, CT	Project No.	VZ5-047 (Rev 2)	Page	of
Description	Caisson Foundation Evaluation	Computed by	MJK	Sheet 1	of 2
		Checked by		Date	06/23/10
				Date	

Check Foundation Depth TIA/EIA-222-F 7.2.5

Shear Force:	$S := 32k$		USER INPUT
Overturning Moment:	$M := 3737ft \cdot k$		USER INPUT
Foundation Diameter:	$d := 7.5ft$		USER INPUT
Overall Length of Caisson:	$L_c := 39ft$		USER INPUT
Depth From Top of Caisson to Grade:	$L_{pag} := 4ft$		USER INPUT
Depth of Caisson Below Ground Level:	$LD := L_c - L_{pag}$	$LD = 35.0\,ft$	USER INPUT

Depth Required:

$$LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d}\right) + 2ft^{.5}\left(\frac{M \cdot ft}{3 \cdot k\,d} + \frac{S \cdot ft}{2k} + \frac{S^2\,ft^3}{18k^2\,d^2}\right)^{.5} \qquad LD1 = 30.5\,ft$$

$DepthCheck := if(LD1 \le LD, "OK", "NO GOOD")$ $DepthCheck = "OK"$

Note: Result not applicable. Actual soil is better than normal soil as defined in TIA/EIA 222 F. Refer to L-Pile analysis.

Moment Capacity:

Bending Moment:	$Mu := 4004ft \cdot k$		USER INPUT--FROM LPILE
Moment Capacity:	$Mn := 8817ft \cdot k$		USER INPUT--FROM LPILE
Factor of Safety:	$FS := \frac{Mn}{Mu}$	$FS = 2.2$	
Factor of Safety Required	$FS_{reqd} := 1.3$	$FOSCheck := if(FS \ge FS_{reqd}, "OK", "NO GOOD")$	$FOSCheck = "OK"$
Factor of Safety Ratio:	$FS_{ratio} := \left(\frac{FS_{reqd}}{FS}\right) = 0.59$		

Axial Capacity:

Applied Axial Load: $A1 := 60k$ *USER INPUT*

Concrete Weight: $A2 := .150\frac{k}{ft^3}\cdot LD\cdot\pi\frac{d^2}{4}$ $A2 = 231.9\cdot k$

Total Axial Load: $AT := A1 + A2$ $AT = 291.9\cdot k$

Number of Rebar: $n := 30$ *USER INPUT*

Area of Rebar: $Ar := 1.56in^2$ *USER INPUT* #11

Rebar Yield Strength: $fy := 60ksi$ *USER INPUT*

Area of Concrete: $Ag := \pi\cdot\frac{d^2}{4}$ $Ag = 44.2\,ft^{2.0}$

Concrete Comp Strength: $f'c := 4ksi$ *USER INPUT*

Axial Capacity: $Po := n\cdot Ar\cdot fy + (Ag - n\cdot Ar)\cdot 0.85\cdot f'c$ $Po = 24278.7\cdot k$

$AxialCheck := if(AT \le Po, "OK", "NO GOOD")$ $AxialCheck = "OK"$

LPILE Plus for Windows, Version 4

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This program is licensed to:

Matthew Kapinos

URS Corp

Name of input data file: P:\08\MathCAD\Foundation\Caisson Analysis.lpd

Name of output file: P:\08\MathCAD\Foundation\Caisson Analysis.lpo

Name of plot output file: P:\08\MathCAD\Foundation\Caisson Analysis.lpp

Name of runtime file: P:\08\MathCAD\Foundation\Caisson Analysis.lpr

Time and Date of Analysis

Date: June 23, 2010 Time: 15:28:37

Problem Title

176' EEI Monopole - Berlin Fire Department

Program Options

Units Used in Computations - US Customary Units, inches, pounds

Basic Program Options:

Analysis Type 3:
- Computations of Ultimate Bending Moment Capacity and Pile Response
  Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers
  (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip

- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:

- Number of pile increments	=	100
- Deflection tolerance for closure	=	1.0000E-05 in
- Maximum number of iterations allowed	=	100
- Maximum allowable deflection	=	1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length	=	468.00 in
Depth of ground surface below top of pile	=	48.00 in
Slope angle of ground surface	=	.00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	.000	90.000	3.2206E+06	6.3610E+03	3.0000E+06
2	468.000	90.000	3.2206E+06	6.3610E+03	3.0000E+06

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	48.000 in
Distance from top of pile to bottom of layer	=	60.000 in
p-y subgrade modulus k for top of soil layer	=	1.000 lbs/in**3
p-y subgrade modulus k for bottom of layer	=	1.000 lbs/in**3

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	60.000 in
Distance from top of pile to bottom of layer	=	132.000 in
p-y subgrade modulus k for top of soil layer	=	25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer	=	25.000 lbs/in**3

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	132.000 in
Distance from top of pile to bottom of layer	=	192.000 in
p-y subgrade modulus k for top of soil layer	=	35.000 lbs/in**3

p-y subgrade modulus k for bottom of layer = 35.000 lbs/in**3

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 192.000 in
Distance from top of pile to bottom of layer = 468.000 in
p-y subgrade modulus k for top of soil layer = 120.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 120.000 lbs/in**3

(Depth of lowest layer extends .00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 8 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	48.00	.03588
2	60.00	.03588
3	60.00	.03588
4	132.00	.03588
5	132.00	.03588
6	192.00	.03588
7	192.00	.03588
8	468.00	.03588

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 8 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50/k_rm	RQD %
1	48.000	.00000	30.00	------	------
2	60.000	.00000	30.00	------	------
3	60.000	.00000	32.00	------	------
4	132.000	.00000	32.00	------	------
5	132.000	.00000	34.00	------	------
6	192.000	.00000	34.00	------	------
7	192.000	.00000	36.00	------	------
8	468.000	.00000	36.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) E50 is reported for clay strata.
(3) k_rm is reported for rock strata.
(4) RQD is input and reported only for rock materials.
(5) Internal default values for E50 will be generated when input value is 0.

Static loading criteria was used for computation of p-y curves

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Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 2

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 27749.000 lbs
Bending moment at pile head = 40429447.000 in-lbs
Axial load at pile head = 60380.000 lbs

(Non-zero moment for this load indicates pile-head is free to rotate
under the applied pile-head load)

Load Case Number 2

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 31837.000 lbs
Bending moment at pile head = 44838565.000 in-lbs
Axial load at pile head = 50096.000 lbs

(Non-zero moment for this load indicates pile-head is free to rotate
under the applied pile-head load)

Computations of Ultimate Moment Capacity and Nonlinear Bending Stiffness

---

Pile Description:

The pile shape is a circular solid pile.

Outside Diameter = 90.000 In

Material Properties:

Compressive Strength of Concrete = 3. Kip/In**2
Yield stress for rebar = 60. Kip/In**2
Modulus of elasticity of steel = 29000. Kip/In**2
Number of reinforcing bars = 30
Area of single rebar = 1.56000 In**2
Number of rows of reinforcing bars = 15
Cover Thickness = 4.000 In

Ultimate squash load capacity = 18911.06 Kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement In**2	Distance to Centroidal Axis In
1	3.120000	40.7754
2	3.120000	38.9933
3	3.120000	35.5070
4	3.120000	30.4689
5	3.120000	24.0992
6	3.120000	16.6762

7	3.120000	8.5244
8	3.120000	.0000
9	3.120000	-8.5244
10	3.120000	-16.6762
11	3.120000	-24.0992
12	3.120000	-30.4689
13	3.120000	-35.5070
14	3.120000	-38.9933
15	3.120000	-40.7754

Axial Thrust Force = 60.380 Kip

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches
1.121E+07	1.121E+13	.00000100	.00004801	48.007
1.304E+07	2.608E+12	.00000500	.00012069	24.138
2.225E+07	2.472E+12	.00000900	.00020940	23.266
3.138E+07	2.414E+12	.00001300	.00029861	22.970
4.043E+07	2.378E+12	.00001700	.00038868	22.864
4.941E+07	2.353E+12	.00002100	.00047968	22.842
5.830E+07	2.332E+12	.00002500	.00057164	22.865
6.711E+07	2.314E+12	.00002900	.00066462	22.918
7.581E+07	2.297E+12	.00003300	.00075864	22.989
8.156E+07	2.204E+12	.00003700	.00084309	22.786
8.536E+07	2.082E+12	.00004100	.00092249	22.500
8.854E+07	1.967E+12	.00004500	.00099755	22.168
9.079E+07	1.853E+12	.00004900	.00106758	21.787
9.276E+07	1.750E+12	.00005300	.00113643	21.442
1.004E+08	1.210E+12	.00008300	.00161849	19.500
1.036E+08	9.171E+11	.00011300	.00205416	18.178
1.050E+08	7.344E+11	.00014300	.00247810	17.329
1.061E+08	6.132E+11	.00017300	.00289844	16.754
1.062E+08	5.225E+11	.00020300	.00334948	16.500
1.065E+08	4.571E+11	.00023300	.00379936	16.306
1.065E+08	4.049E+11	.00026300	.00423862	16.116

Ultimate moment capacity at concrete strain of 0.003 = 1.061E+08 In-lb

Axial Thrust Force = 50.096 Kip

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches
1.121E+07	1.121E+13	.00000100	.00004754	47.541
1.280E+07	2.560E+12	.00000500	.00011899	23.798
2.201E+07	2.445E+12	.00000900	.00020734	23.038
3.114E+07	2.395E+12	.00001300	.00029651	22.809
4.020E+07	2.364E+12	.00001700	.00038655	22.738
4.917E+07	2.342E+12	.00002100	.00047751	22.738
5.807E+07	2.323E+12	.00002500	.00056943	22.777
6.688E+07	2.306E+12	.00002900	.00066237	22.840
7.557E+07	2.290E+12	.00003300	.00075628	22.918
8.130E+07	2.197E+12	.00003700	.00084060	22.719
8.523E+07	2.079E+12	.00004100	.00092107	22.465
8.825E+07	1.961E+12	.00004500	.00099459	22.102
9.050E+07	1.847E+12	.00004900	.00106457	21.726

9.246E+07	1.745E+12	.00005300	.00113332	21.383
1.003E+08	1.208E+12	.00008300	.00161672	19.479
1.033E+08	9.143E+11	.00011300	.00204885	18.131
1.047E+08	7.321E+11	.00014300	.00247113	17.281
1.058E+08	6.114E+11	.00017300	.00289060	16.709
1.060E+08	5.223E+11	.00020300	.00334948	16.500
1.062E+08	4.557E+11	.00023300	.00378417	16.241
1.062E+08	4.038E+11	.00026300	.00422192	16.053

Ultimate moment capacity at concrete strain of 0.003 = 1.058E+08 In-lb

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Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 27749.000 lbs
Specified bending moment at pile head = 40429447.000 in-lbs
Specified axial load at pile head = 60380.000 lbs

(Non-zero moment for this load does not indicate free-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res p lbs/in
0.000	.992967	4.04E+07	27749.0	-.005913	574.4	2.36E+12	0.000
4.680	.965483	4.06E+07	27749.0	-.005832	576.2	2.36E+12	0.000
9.360	.938376	4.07E+07	27749.0	-.005752	578.1	2.36E+12	0.000
14.040	.911645	4.08E+07	27749.0	-.005671	579.9	2.36E+12	0.000
18.720	.885293	4.10E+07	27749.0	-.005590	581.7	2.36E+12	0.000
23.400	.859321	4.11E+07	27749.0	-.005509	583.6	2.36E+12	0.000
28.080	.833729	4.12E+07	27749.0	-.005427	585.4	2.36E+12	0.000
32.760	.808520	4.13E+07	27749.0	-.005346	587.2	2.36E+12	0.000
37.440	.783694	4.15E+07	27749.0	-.005264	589.1	2.36E+12	0.000
42.120	.759253	4.16E+07	27749.0	-.005181	590.9	2.36E+12	0.000
46.800	.735198	4.17E+07	27749.0	-.005099	592.8	2.36E+12	0.000
51.480	.711530	4.19E+07	27743.2	-.005016	594.6	2.36E+12	-2.476
56.160	.688251	4.20E+07	27724.3	-.004932	596.4	2.36E+12	-5.616
60.840	.665362	4.21E+07	27537.8	-.004849	598.3	2.36E+12	-74.068
65.520	.642864	4.23E+07	27021.0	-.004765	600.1	2.36E+12	-146.778
70.200	.620759	4.24E+07	26176.0	-.004681	601.8	2.36E+12	-214.360
74.880	.599047	4.25E+07	25026.3	-.004597	603.5	2.36E+12	-276.951
79.560	.577730	4.26E+07	23595.1	-.004513	605.1	2.36E+12	-334.690
84.240	.556808	4.27E+07	21904.6	-.004428	606.6	2.36E+12	-387.717
88.920	.536284	4.28E+07	19976.7	-.004343	608.0	2.36E+12	-436.170
93.600	.516158	4.29E+07	17832.4	-.004258	609.3	2.36E+12	-480.192
98.280	.496430	4.30E+07	15492.2	-.004173	610.4	2.36E+12	-519.921
102.960	.477102	4.31E+07	12975.7	-.004087	611.3	2.36E+12	-555.499
107.640	.458175	4.31E+07	10302.1	-.004002	612.1	2.36E+12	-587.068
112.320	.439648	4.32E+07	7489.8	-.003916	612.7	2.36E+12	-614.768
117.000	.421522	4.32E+07	4556.6	-.003830	613.1	2.36E+12	-638.740
121.680	.403798	4.32E+07	1519.6	-.003744	613.4	2.36E+12	-659.127
126.360	.386475	4.32E+07	-1604.8	-.003658	613.4	2.36E+12	-676.069
131.040	.369554	4.32E+07	-4800.7	-.003573	613.2	2.36E+12	-689.706
135.720	.353035	4.32E+07	-8540.9	-.003487	612.8	2.36E+12	-908.684
140.400	.336917	4.31E+07	-12825.6	-.003401	612.1	2.36E+12	-922.384
145.080	.321199	4.31E+07	-17164.8	-.003316	611.1	2.36E+12	-931.967
149.760	.305882	4.30E+07	-21539.7	-.003230	609.9	2.36E+12	-937.627

154.440	.290964	4.29E+07	-25932.3	-.003145	608.3	2.36E+12	-939.558
159.120	.276444	4.27E+07	-30325.6	-.003060	606.5	2.36E+12	-937.953
163.800	.262321	4.26E+07	-34703.7	-.002976	604.4	2.36E+12	-933.002
168.480	.248593	4.24E+07	-39051.2	-.002891	602.0	2.36E+12	-924.896
173.160	.235259	4.22E+07	-43353.8	-.002807	599.3	2.36E+12	-913.823
177.840	.222317	4.20E+07	-47598.0	-.002724	596.3	2.36E+12	-899.967
182.520	.209765	4.18E+07	-51771.4	-.002641	593.1	2.36E+12	-883.513
187.200	.197600	4.15E+07	-55862.1	-.002558	589.6	2.36E+12	-864.643
191.880	.185821	4.12E+07	-59859.2	-.002476	585.8	2.36E+12	-843.537
196.560	.174424	4.10E+07	-67087.5	-.002395	581.8	2.36E+12	-2245.463
201.240	.163406	4.06E+07	-77665.4	-.002314	577.1	2.36E+12	-2275.026
205.920	.152765	4.02E+07	-88365.5	-.002234	571.6	2.36E+12	-2297.667
210.600	.142497	3.98E+07	-99171.7	-.002155	565.5	2.37E+12	-2320.370
215.280	.132597	3.93E+07	-109935.3	-.002076	558.7	2.37E+12	-2279.452
219.960	.123061	3.88E+07	-120381.2	-.001999	551.2	2.37E+12	-2184.628
224.640	.113883	3.82E+07	-130373.7	-.001923	543.0	2.37E+12	-2085.657
229.320	.105058	3.75E+07	-139894.5	-.001849	534.1	2.37E+12	-1983.034
234.000	.096579	3.69E+07	-148927.5	-.001775	524.7	2.38E+12	-1877.233
238.680	.088441	3.62E+07	-157459.0	-.001703	514.7	2.38E+12	-1768.706
243.360	.080635	3.54E+07	-165477.2	-.001633	504.1	2.38E+12	-1657.884
248.040	.073155	3.46E+07	-172972.3	-.001564	493.0	2.38E+12	-1545.173
252.720	.065993	3.38E+07	-179936.5	-.001497	481.5	2.39E+12	-1430.956
257.400	.059140	3.29E+07	-186363.4	-.001432	469.5	2.39E+12	-1315.591
262.080	.052590	3.20E+07	-192248.5	-.001368	457.1	2.39E+12	-1199.413
266.760	.046333	3.11E+07	-197588.7	-.001307	444.4	2.40E+12	-1082.733
271.440	.040361	3.02E+07	-202382.4	-.001247	431.3	2.40E+12	-965.835
276.120	.034664	2.92E+07	-206629.0	-.001189	417.9	2.41E+12	-848.974
280.800	.029233	2.83E+07	-210329.4	-.001133	404.3	2.41E+12	-732.382
285.480	.024059	2.73E+07	-213485.3	-.001079	390.4	2.42E+12	-616.265
290.160	.019132	2.63E+07	-216099.2	-.001027	376.4	2.42E+12	-500.805
294.840	.014442	2.52E+07	-218174.7	-9.78E-04	362.2	2.43E+12	-386.159
299.520	.009980	2.42E+07	-219715.9	-9.30E-04	347.8	2.43E+12	-272.463
304.200	.005737	2.32E+07	-220727.4	-8.85E-04	333.4	2.44E+12	-159.829
308.880	.001701	2.22E+07	-221214.6	-8.41E-04	319.0	2.44E+12	-48.346
313.560	-.002136	2.11E+07	-221182.8	-8.00E-04	304.5	2.46E+12	61.917
318.240	-.005785	2.01E+07	-220637.9	-7.61E-04	290.1	2.47E+12	170.928
322.920	-.009256	1.90E+07	-219585.9	-7.24E-04	275.7	2.48E+12	278.674
327.600	-.012559	1.80E+07	-218032.5	-6.89E-04	261.4	2.50E+12	385.163
332.280	-.015703	1.70E+07	-215983.6	-6.56E-04	247.2	2.51E+12	490.421
336.960	-.018699	1.60E+07	-213444.9	-6.25E-04	233.1	2.52E+12	594.487
341.640	-.021556	1.50E+07	-210421.9	-5.97E-04	219.2	2.53E+12	697.418
346.320	-.024283	1.40E+07	-206919.6	-5.70E-04	205.6	2.54E+12	799.285
351.000	-.026889	1.31E+07	-202942.9	-5.45E-04	192.2	2.56E+12	900.171
355.680	-.029383	1.21E+07	-198496.1	-5.28E-04	179.1	6.19E+12	1000.173
360.360	-.031835	1.12E+07	-193578.2	-5.21E-04	166.2	1.12E+13	1101.490
365.040	-.034264	1.03E+07	-188181.5	-5.17E-04	153.7	1.12E+13	1204.788
369.720	-.036673	9.46E+06	-182296.7	-5.13E-04	141.6	1.12E+13	1310.095
374.400	-.039064	8.62E+06	-175914.2	-5.09E-04	129.9	1.12E+13	1417.437
379.080	-.041438	7.81E+06	-169024.6	-5.06E-04	118.6	1.12E+13	1526.845
383.760	-.043796	7.04E+06	-161618.1	-5.03E-04	107.8	1.12E+13	1638.348
388.440	-.046141	6.30E+06	-153684.7	-5.00E-04	97.4904	1.12E+13	1751.978
393.120	-.048474	5.60E+06	-145214.5	-4.97E-04	87.7109	1.12E+13	1867.768
397.800	-.050795	4.94E+06	-136462.2	-4.95E-04	78.5029	1.12E+13	1872.511
402.480	-.053107	4.32E+06	-127696.4	-4.93E-04	69.8679	1.12E+13	1873.574
407.160	-.055411	3.74E+06	-118933.3	-4.91E-04	61.8064	1.12E+13	1871.339
411.840	-.057707	3.21E+06	-110188.2	-4.90E-04	54.3175	1.12E+13	1865.876
416.520	-.059997	2.71E+06	-101476.1	-4.89E-04	47.3996	1.12E+13	1857.252
421.200	-.062282	2.26E+06	-92811.6	-4.88E-04	41.0501	1.12E+13	1845.531
425.880	-.064562	1.84E+06	-84209.0	-4.87E-04	35.2653	1.12E+13	1830.775
430.560	-.066839	1.47E+06	-75682.5	-4.86E-04	30.0409	1.12E+13	1813.047
435.240	-.069112	1.14E+06	-67120.1	-4.86E-04	25.3713	1.12E+13	1846.111
439.920	-.071384	842685.2	-58346.1	-4.85E-04	21.2666	1.12E+13	1903.430
444.600	-.073654	590607.1	-49303.2	-4.85E-04	17.7444	1.12E+13	1961.073

449.280	-.075923	381481.2	-39989.7	-4.85E-04	14.8224	1.12E+13	2019.043
453.960	-.078191	216577.1	-30404.2	-4.85E-04	12.5183	1.12E+13	2077.340
458.640	-.080458	97171.7	-20545.1	-4.85E-04	10.8499	1.12E+13	2135.963
463.320	-.082726	24549.0	-10410.8	-4.84E-04	9.8352	1.12E+13	2194.908
468.000	-.084993	0.0	0.0	-4.84E-04	9.4922	1.12E+13	2254.170

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.9930 in
Computed slope at pile head	=	-5.9126E-03
Maximum bending moment	=	43218966.772 lbs-in
Maximum shear force	=	-221214.553 lbs
Depth of maximum bending moment	=	126.360 in
Depth of maximum shear force	=	308.880 in
Number of iterations	=	10
Number of zero deflection points	=	1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 31837.000 lbs
Specified bending moment at pile head = 44838565.000 in-lbs
Specified axial load at pile head = 50096.000 lbs

(Non-zero moment for this load does not indicate free-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res p lbs/in
0.000	1.123	4.48E+07	31837.0	-.006646	634.4	2.35E+12	0.000
4.680	1.092	4.50E+07	31837.0	-.006557	636.5	2.35E+12	0.000
9.360	1.061	4.51E+07	31837.0	-.006467	638.6	2.35E+12	0.000
14.040	1.031	4.53E+07	31837.0	-.006377	640.7	2.35E+12	0.000
18.720	1.002	4.54E+07	31837.0	-.006287	642.8	2.35E+12	0.000
23.400	.972292	4.56E+07	31837.0	-.006196	644.9	2.35E+12	0.000
28.080	.943505	4.57E+07	31837.0	-.006105	647.0	2.35E+12	0.000
32.760	.915145	4.59E+07	31837.0	-.006014	649.1	2.35E+12	0.000
37.440	.887212	4.60E+07	31837.0	-.005923	651.2	2.35E+12	0.000
42.120	.859708	4.62E+07	31837.0	-.005831	653.3	2.35E+12	0.000
46.800	.832635	4.63E+07	31837.0	-.005739	655.4	2.35E+12	0.000
51.480	.805994	4.65E+07	31830.4	-.005646	657.5	2.35E+12	-2.805
56.160	.779787	4.66E+07	31809.0	-.005553	659.6	2.35E+12	-6.363
60.840	.754015	4.68E+07	31612.5	-.005460	661.7	2.35E+12	-77.604
65.520	.728680	4.69E+07	31054.0	-.005367	663.8	2.35E+12	-161.087
70.200	.703782	4.71E+07	30108.3	-.005273	665.8	2.35E+12	-243.030

74.880	.679324	4.72E+07	28804.7	-.005179	667.7	2.35E+12	-314.065
79.560	.655307	4.74E+07	27181.5	-.005085	669.6	2.35E+12	-379.632
84.240	.631731	4.75E+07	25263.8	-.004990	671.3	2.35E+12	-439.887
88.920	.608600	4.76E+07	23076.2	-.004895	672.9	2.35E+12	-494.986
93.600	.585912	4.77E+07	20642.4	-.004800	674.4	2.35E+12	-545.085
98.280	.563670	4.78E+07	17985.5	-.004705	675.7	2.35E+12	-590.343
102.960	.541875	4.79E+07	15127.8	-.004609	676.8	2.34E+12	-630.915
107.640	.520526	4.79E+07	12090.8	-.004514	677.7	2.34E+12	-666.960
112.320	.499625	4.80E+07	8895.3	-.004418	678.4	2.34E+12	-698.636
117.000	.479173	4.80E+07	5561.4	-.004322	678.9	2.34E+12	-726.100
121.680	.459169	4.80E+07	2108.5	-.004226	679.1	2.34E+12	-749.511
126.360	.439614	4.80E+07	-1444.9	-.004130	679.2	2.34E+12	-769.026
131.040	.420508	4.80E+07	-5080.9	-.004035	679.0	2.34E+12	-784.802
135.720	.401850	4.80E+07	-9337.6	-.003939	678.5	2.34E+12	-1034.331
140.400	.383641	4.79E+07	-14215.7	-.003843	677.8	2.34E+12	-1050.303
145.080	.365880	4.79E+07	-19157.6	-.003747	676.7	2.34E+12	-1061.609
149.760	.348566	4.78E+07	-24141.9	-.003652	675.3	2.35E+12	-1068.466
154.440	.331698	4.76E+07	-29148.5	-.003557	673.6	2.35E+12	-1071.092
159.120	.315275	4.75E+07	-34158.0	-.003462	671.5	2.35E+12	-1069.702
163.800	.299295	4.73E+07	-39152.0	-.003367	669.1	2.35E+12	-1064.509
168.480	.283757	4.71E+07	-44113.4	-.003273	666.4	2.35E+12	-1055.724
173.160	.268659	4.69E+07	-49025.7	-.003179	663.4	2.35E+12	-1043.557
177.840	.253999	4.67E+07	-53873.6	-.003086	660.0	2.35E+12	-1028.217
182.520	.239774	4.64E+07	-58642.8	-.002993	656.3	2.35E+12	-1009.907
187.200	.225981	4.61E+07	-63319.9	-.002901	652.4	2.35E+12	-988.831
191.880	.212619	4.58E+07	-67892.3	-.002810	648.1	2.35E+12	-965.189
196.560	.199684	4.55E+07	-75626.7	-.002719	643.5	2.35E+12	-2340.114
201.240	.187173	4.51E+07	-86652.6	-.002628	638.2	2.35E+12	-2371.789
205.920	.175081	4.47E+07	-97809.9	-.002539	632.2	2.35E+12	-2396.302
210.600	.163406	4.42E+07	-109082.3	-.002451	625.4	2.35E+12	-2420.946
215.280	.152142	4.37E+07	-120458.9	-.002363	617.9	2.36E+12	-2440.851
219.960	.141284	4.31E+07	-131911.7	-.002277	609.7	2.36E+12	-2453.542
224.640	.130826	4.24E+07	-143259.5	-.002193	600.7	2.36E+12	-2395.941
229.320	.120762	4.17E+07	-154199.9	-.002109	591.0	2.36E+12	-2279.448
234.000	.111085	4.10E+07	-164586.3	-.002027	580.5	2.36E+12	-2159.179
238.680	.101788	4.02E+07	-174402.2	-.001947	569.5	2.36E+12	-2035.639
243.360	.092864	3.94E+07	-183633.4	-.001868	557.8	2.37E+12	-1909.312
248.040	.084303	3.85E+07	-192267.9	-.001791	545.5	2.37E+12	-1780.652
252.720	.076098	3.76E+07	-200295.8	-.001716	532.6	2.37E+12	-1650.086
257.400	.068240	3.66E+07	-207709.2	-.001643	519.3	2.38E+12	-1518.013
262.080	.060719	3.56E+07	-214501.8	-.001572	505.5	2.38E+12	-1384.807
266.760	.053526	3.46E+07	-220669.1	-.001503	491.2	2.38E+12	-1250.811
271.440	.046650	3.35E+07	-226208.3	-.001436	476.6	2.39E+12	-1116.342
276.120	.040083	3.25E+07	-231117.7	-.001372	461.7	2.39E+12	-981.690
280.800	.033813	3.14E+07	-235397.1	-.001309	446.4	2.39E+12	-847.116
285.480	.027830	3.03E+07	-239047.4	-.001249	430.9	2.40E+12	-712.852
290.160	.022123	2.91E+07	-242070.6	-.001191	415.1	2.41E+12	-579.100
294.840	.016682	2.80E+07	-244469.4	-.001136	399.2	2.41E+12	-446.033
299.520	.011495	2.69E+07	-246247.4	-.001082	383.2	2.42E+12	-313.796
304.200	.006551	2.57E+07	-247408.7	-.001032	367.0	2.42E+12	-182.509
308.880	.001839	2.45E+07	-247958.1	-9.83E-04	350.8	2.43E+12	-52.269
313.560	-.002652	2.34E+07	-247900.6	-9.37E-04	334.6	2.44E+12	76.855
318.240	-.006932	2.22E+07	-247241.5	-8.93E-04	318.4	2.44E+12	204.815
322.920	-.011013	2.11E+07	-245986.3	-8.52E-04	302.3	2.46E+12	331.586
327.600	-.014907	1.99E+07	-244140.6	-8.13E-04	286.3	2.47E+12	457.180
332.280	-.018624	1.88E+07	-241709.7	-7.77E-04	270.4	2.49E+12	581.633
336.960	-.022175	1.77E+07	-238699.0	-7.42E-04	254.6	2.50E+12	704.997
341.640	-.025572	1.66E+07	-235113.4	-7.10E-04	239.1	2.51E+12	827.344
346.320	-.028824	1.55E+07	-230957.3	-6.81E-04	223.9	2.53E+12	948.758
351.000	-.031942	1.44E+07	-226234.9	-6.53E-04	208.9	2.54E+12	1069.339
355.680	-.034937	1.33E+07	-220950.0	-6.28E-04	194.3	2.55E+12	1189.200
360.360	-.037816	1.23E+07	-215105.4	-6.10E-04	180.1	5.17E+12	1308.464
365.040	-.040644	1.13E+07	-208699.5	-6.02E-04	166.2	1.06E+13	1429.127

369.720	-.043448	1.04E+07	-201723.3	-5.97E-04	152.8	1.12E+13	1552.129
374.400	-.046232	9.44E+06	-194165.9	-5.93E-04	139.8	1.12E+13	1677.545
379.080	-.048998	8.55E+06	-186015.8	-5.89E-04	127.4	1.12E+13	1805.409
383.760	-.051747	7.70E+06	-177261.5	-5.86E-04	115.5	1.12E+13	1935.754
388.440	-.054480	6.89E+06	-168027.8	-5.83E-04	104.2	1.12E+13	2010.246
393.120	-.057201	6.13E+06	-158594.5	-5.80E-04	93.5161	1.12E+13	2021.080
397.800	-.059909	5.41E+06	-149118.9	-5.78E-04	83.4566	1.12E+13	2028.330
402.480	-.062607	4.73E+06	-139617.6	-5.75E-04	74.0178	1.12E+13	2032.069
407.160	-.065295	4.10E+06	-130106.8	-5.74E-04	65.2009	1.12E+13	2032.365
411.840	-.067976	3.52E+06	-120602.5	-5.72E-04	57.0059	1.12E+13	2029.278
416.520	-.070649	2.97E+06	-111120.5	-5.71E-04	49.4320	1.12E+13	2022.865
421.200	-.073317	2.48E+06	-101676.2	-5.70E-04	42.4771	1.12E+13	2013.182
425.880	-.075980	2.02E+06	-92284.7	-5.69E-04	36.1383	1.12E+13	2000.281
430.560	-.078639	1.61E+06	-82960.9	-5.68E-04	30.4116	1.12E+13	1984.217
435.240	-.081295	1.25E+06	-73586.7	-5.67E-04	25.2922	1.12E+13	2021.852
439.920	-.083948	924391.4	-63976.2	-5.67E-04	20.7915	1.12E+13	2085.196
444.600	-.086600	647950.8	-54068.3	-5.66E-04	16.9290	1.12E+13	2148.951
449.280	-.089250	418577.3	-43861.1	-5.66E-04	13.7240	1.12E+13	2213.120
453.960	-.091900	237676.4	-33352.6	-5.66E-04	11.1964	1.12E+13	2277.703
458.640	-.094549	106662.7	-22540.8	-5.66E-04	9.3658	1.12E+13	2342.700
463.320	-.097198	26959.7	-11423.9	-5.66E-04	8.2522	1.12E+13	2408.107
468.000	-.099847	0.0	0.0	-5.66E-04	7.8755	1.12E+13	2473.919

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection	=	1.1226 in
Computed slope at pile head	=	-6.6463E-03
Maximum bending moment	=	48044029.882 lbs-in
Maximum shear force	=	-247958.096 lbs
Depth of maximum bending moment	=	126.360 in
Depth of maximum shear force	=	308.880 in
Number of iterations	=	11
Number of zero deflection points	=	1

Summary of Pile-head Response

Definition of symbols for pile-head boundary conditions:

y = pile-head displacment, in
M = pile-head moment, lbs-in
V = pile-head shear force, lbs
S = pile-head slope, radians
R = rotational stiffness of pile-head, in-lbs/rad

BC Type	Boundary Condition	Boundary Condition	Axial Load	Pile Head Deflection	Maximum Moment	Maximum Shear

	1	2	lbs	in	in-lbs	lbs
1	V= 27749.000	M= 4.04E+07	60380.0000	.9930	4.322E+07	-2.212E+05
1	V= 31837.000	M= 4.48E+07	50096.0000	1.1226	4.804E+07	-2.480E+05

The analysis ended normally.

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

April 6, 2010

Kenneth C. Baldwin, Esq.
Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597

RE: **EM-VER-007-100224** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 1657 Wilbur Cross Parkway, Berlin, 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.

The proposed modifications are to be implemented as specified here and in your notice dated February 24, 2010, including the placement of all necessary equipment and shelters within the tower compound. 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. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/MP/laf

c: The Honorable Adam P. Salina, Mayor, Town of Berlin
Denise McNair, Interim Town Manager, Town of Berlin
Hellyn Riggins, Town Planner, Town of Berlin
Berlin Volunteer Fire Department

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CSC
CONNECTICUT SITING COUNCIL

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
Internet: ct.gov/csc

Daniel F. Caruso
Chairman

February 26, 2010

The Honorable Adam P. Salina
Mayor
Town of Berlin
240 Kensington Road
Kensington, CT 06037

RE: **EM-VER-007-100224** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 1657 Wilbur Cross Parkway, Berlin, Connecticut.

Dear Mayor Salina:

The Connecticut Siting Council (Council) received this request to modify an existing telecommunications facility, pursuant to Regulations of Connecticut State Agencies Section 16-50j-72.

If you have any questions or comments regarding this proposal, please call me or inform the Council by March 12, 2010.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/jbw

Enclosure: Notice of Intent

c: Denise McNair, Interim Town Manager, Town of Berlin
Hellyn Riggins, Town Planner, Town of Berlin

ROBINSON & COLE LLP

EM-VER-007-100224

KENNETH C. BALDWIN

280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

February 24, 2010

Via Hand Delivery

ORIGINAL

S. Derek Phelps
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: **Notice of Exempt Modification – Antenna Swap**
1657 Wilbur Cross Parkway, Berlin, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains wireless telecommunications antennas at the 114-foot level on the existing 176-foot tower at the above-referenced address. The tower and underlying property are owned the Berlin Volunteer Fire Department. The Council approved Cellco's use of the existing tower in 2006 (EM-VER-123-007-010-099-060308). Cellco now intends to modify its installation by replacing six (6) of its PCS antennas with two (2) model MG D3-900T0 PCS antennas; one (1) model BXA-185060/12CF_2 PCS antenna; and three (3) model LNX-6514DS-T4M_4 LTE antennas, all at the same 114-foot level on the tower. Attached behind Tab 1 are the specifications for the proposed 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 Denise McNair, Town Manager for the Town of Berlin. A copy of this letter is also being sent to the Berlin Volunteer Fire Department.

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 any increase in the height of the existing tower. Cellco's antennas will be located at the same 114-foot level on the existing 176-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.

4. The operation of the replacement antennas will not increase radio frequency (RF) power density levels at the facility to a level at or above the Federal Communications Commission (FCC) adopted safety standard. A cumulative power density table for Cellco's modified facility is included behind Tab 2.

Also attached is a Structural Analysis and Evaluation Report confirming that the tower and foundation can support Cellco's proposed antennas modification. (See 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:

Denise McNair, Berlin Town Manager
Berlin Volunteer Fire Department
Sandy M. Carter

Slant +/- 45° Dual Polarized, Panel 60° / 20.5 dBi

BXA-185060/12CF __ 2°

When ordering replace "__" with connector type.

Mechanical specifications

Length	1840 mm	72.4 in
Width	154 mm	6.1 in
Depth	105 mm	4.1 in
Depth with t-bracket	133 mm	5.2 in
[4] Weight	6.8 kg	15.0 lbs
Wind Area		
Fore/Aft	0.28 m^2	3.1 ft^2
Side	0.19 m^2	2.1 ft^2

Rated Wind Velocity (Safety factor 2.0)
>201 km/hr >125 mph

Wind Load @ 100 mph (161 km/hr)

Fore/Aft	460 N	103.4 lbs
Side	304 N	68.3 lbs

Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiberglass radome.

Mounting and Downtilting

Mounting brackets attach to a pipe diameter of Ø50-102 mm (2.0-4.0 in).

Mounting bracket kit #26799997
Downtilt bracket kit #26799999

The downtilt bracket kit includes the mounting bracket kit.

Electrical specifications

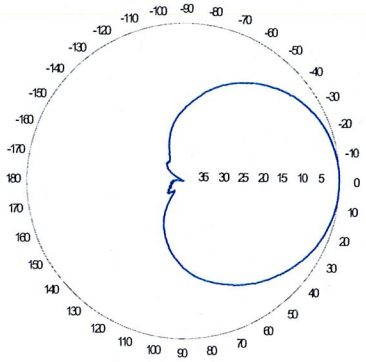
Frequency Range	1850-1990 MHz
Impedance	50Ω
[3] Connector(s)	NE or E-DIN 2 ports / center
[1] VSWR	≤ 1.4:1
Polarization	Slant ± 45°
[1] Isolation Between Ports	< -30 dB
[1] Gain	20.5 dBi
[2] Power Rating	250 W
[1] Half Power Angle	
H-Plane	60°
E-Plane	5°
[1] Electrical Downtilt	2°
[1] Null Fill	5%
Lightning Protection	Direct Ground

Patented Dipole Design: U.S. Patent No. 6,597,324 B2

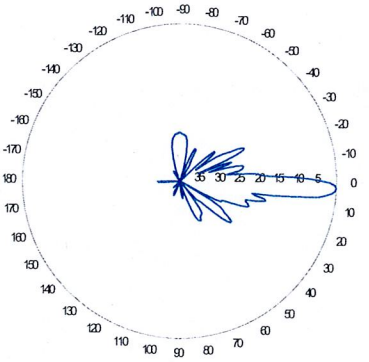
1) Typical values.
2) Power rating limited by connector only.
3) NE indicates an elongated N connector. E-DIN indicates an elongated DIN connector.
4) The antenna weight listed above does not include the bracket weight.

Improvements to mechanical and/or electrical performance of the antenna may be made without notice.

Radiation pattern[1]



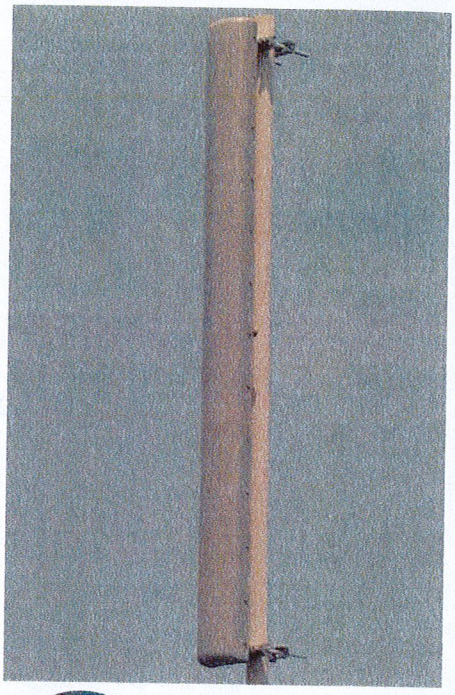
Horizontal



Vertical

Radiation patterns for all antennas are measured with the antenna mounted on a fiberglass pole.

Mounting on a metal pole will typically improve the Front-to-Back ratio.



Amphenol Antel's Exclusive 3T (True Transmission Line Technology) Antenna Design:

- Watercut brass feedline assembly for consistent performance.
- Unique feedline design eliminates the need for conventional solder joints in the signal path.
- A non-collinear system with access to every radiating element for broad band-width and superior performance.
- Air as insulation for virtually no internal signal loss.

This Amphenol Antel antenna is under a five-year limited warranty for repair or replacement.

Antenna available with center-fed connectors only.

CF Denotes a Center-Fed Connector.

1850-1990 MHz

Amphenol Antel, Inc. 1300 Capital Drive Rockford, Illinois 61109 USA Tel. (815) 399-0001
Toll-Free (888) 417-9562 Fax. (815) 399-0156 antel@antelinc.com www.antelinc.com

Amphenol Antel, Inc. The Antenna Technology Company

Revision Date: 7/11/07

SINGLE-BAND PANEL ANTENNA

BROADBAND 1700-2170 MHZ

MGD3-900TX

1710-1880	1850-1990	1920-2170
H68º V5.5º	H64º V5.3º	H62º V5º
Fixed Tilt 0º,2º,4º,6º	Fixed Tilt 0º,2º,4º,6º	Fixed Tilt 0º,2º,4º,6º

ELECTRICAL SPECIFICATIONS

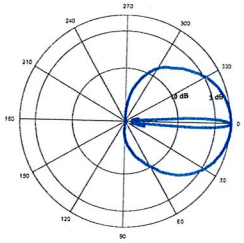
BROADBAND *1710-2170 MHz*

Antenna Model	MGD3-900TX		
Polarization	± 45º		
Frequency	1710 - 1880	1850 - 1990	1920 - 2170
Horizontal Beamwidth	68º	64º	62º
Vertical Beamwidth	5.5º	5.3º	5º
Gain (dBi)	18.6	18.8	19.3
Vertical Electrical Tilt	FIXED 0º, 2º, 4º, 6º	FIXED 0º, 2º, 4º, 6º	FIXED 0º, 2º, 4º, 6º
Upper Sidelobe Suppression for the 1st lobe above main beam (dB)	20	20	20
Front-to-Back Ratio /Cpol @ ± 20º (dB)	> 30	> 30	> 30
VSWR	< 1.4 : 1	< 1.4 : 1	< 1.4 : 1
Cross Polar Ratio @ ± 60º (dB)	> 10	> 10	> 10
Isolation Between Ports (dB)	> 30	> 30	> 30
Maximum Power Per Input (W)	250		
Intermodulation (dBc)	< - 150		
Impedance (Ω)	50		

MECHANICAL SPECIFICATIONS

Connectors	2 X 7/16 Female
Connector Position	Bottom
Survival Wind Speed mph (km/h)	124 (200)
Front Windload lbs (N) @ 160 km/h	108 (480)
Lateral Windload lbs (N) @ 160 km/h	56 (250)
Radome Color	Grey, paintable
Temperature Range F (ºC)	-67º to 140º (-55º to +60º)
Humidity	100%
Antenna Weight lbs (kg)	24.25 (11)
Antenna Dimension (mm) H X W X D	73 X 6.29 X 3.54 (1860 X 160 X 90)

H&V Pattern



RYMSA Telecom Group (Headquarters)
Ctra. Campo Real, km. 2,200
28500 Arganda del Rey (Madrid) Spain
Phone: +34 91 876 06 50
Fax: +34 91 875 23 32
telecomcomercial@rymsa.com

RYMSA TELECOM GROUP
www.rymsawireless.com

RYMSA México: telecom.comercial@rymsa.com
Phone: + 52 55 1106 2623
RYMSA Wireless U.S.A.: sales@rymsawireless.com
Phone: + 1 888 622 6095

Product Specifications

ANDREW®
A CommScope Company

LNX-6514DS-T4M

DualPol® Antenna, 698–896 MHz, 65° horizontal beamwidth, fixed electrical tilt

- Broadband, providing future-ready single antenna for application in 700 MHz and existing 850 MHz cellular operation
- Air dielectric design provides superior PIM performance with repeatable antenna-to-antenna gain and pattern consistency
- Single piece radome provides long term mechanical stability
- Proven core design technology, with over 1,000,000 similar antennas deployed
- Exceptional USLS pattern shaping for optimizing coverage and interference mitigation for LTE applications
- Specifically designed to have physical dimensions similar to most existing cellular antennas

CHARACTERISTICS

General Specifications

Antenna Type	DualPol®
Brand	DualPol®
Operating Frequency Band	698 – 896 MHz

Electrical Specifications

Frequency Band, MHz	**698–806**	**806–896**
Beamwidth, Horizontal, degrees	66	64
Gain, dBd	13.8	14.5
Gain, dBi	15.9	16.6
Beamwidth, Vertical, degrees	12.0	11.0
Beam Tilt, degrees	4	4
Upper Sidelobe Suppression (USLS), typical, dB	18	18
Front-to-Back Ratio at 180°, dB	33	33
Isolation, dB	30	30
VSWR | Return Loss, db	1.35:1 | 16.5	1.35:1 | 16.5
Intermodulation Products, 3rd Order, 2 x 20 W, dBc	-150	-150
Input Power, maximum, watts	500	500
Polarization	±45°	±45°
Impedance, ohms	50	50
Lightning Protection	dc Ground	dc Ground

Join the Evolution

Product Specifications

LNX-6514DS-T4M

ANDREW®
A CommScope Company

Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity	2
Wind Loading, maximum	617.7 N @ 150 km/h 138.9 lbf @ 150 km/h
Wind Speed, maximum	241.4 km/h | 150.0 mph

Dimensions

Depth	181.0 mm | 7.1 in
Length	1847.0 mm | 72.7 in
Width	301.0 mm | 11.9 in
Net Weight	17.0 kg | 37.5 lb

Regulatory Compliance/Certifications

Agency
RoHS 2002/95/EC
China RoHS SJ/T 11364-2006

Classification
Compliant by Exemption
Above Maximum Concentration Value (MCV)

INCLUDED PRODUCTS

MTG-L-STD
Downtilt Mounting Kit for panel Antennas

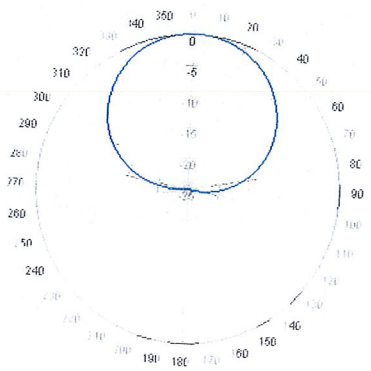
Join the Evolution

Product Specifications

LNX-6514DS-T4M

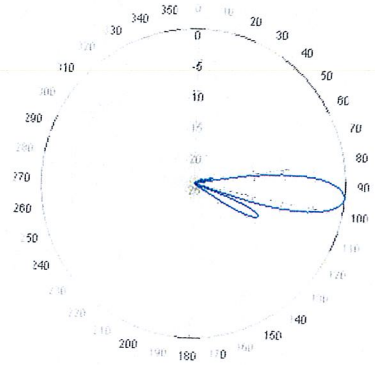
ANDREW®
A CommScope Company

Horizontal Pattern

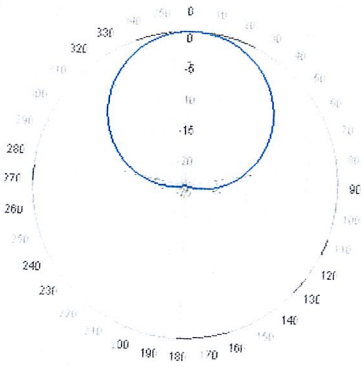


Freq: 750, Tilt 0

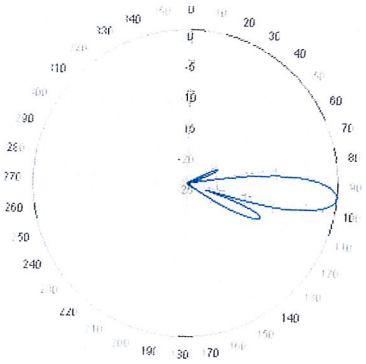
Vertical Pattern



Freq: 750, Tilt 0



Freq: 850, Tilt 0



Freq: 850, Tilt 0

Join the Evolution

	General	Power	Density					
Site Name: Berlin 4								
Tower Height: Verizon @ 114Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Sprint	11	477.09	147.5	0.0867	1962.5	1.0000	8.67%	
*Police Channel	1	200	180	0.0022	809	0.5393	0.41%	
*Fire Main	1	100	180	0.0011	154	0.2	0.55%	
*Fire Intercity	1	30	100	0.0011	154	0.2	0.54%	
*Highway	1	50	160	0.0007	156	0.2	0.35%	
*Fire Ground	1	5	130	0.0001	156	0.2	0.05%	
*SP Hotline	1	80.77	180	0.0009	45	0.2	0.45%	
*RAFS	1	30	180	0.0003	465	0.3100	0.11%	
*960 Link	1	20.5	100	0.0007	960	0.6400	0.12%	
*Pocket	3	631	124	0.0443	2130	1.0000	4.43%	
*Cingular GSM	4	787	170	0.0392	1900	1.0000	3.92%	
*Cingular UMTS	1	500	170	0.0062	880	0.5867	1.06%	
*T-Mobile GSM	8	123	160	0.0138	1945	1.0000	1.38%	
*T-Mobile UMTS	2	490	160	0.0138	2100	1.0000	1.38%	
Verizon	**7**	**264**	**114**	**0.0511**	**1970**	**1.0000**	**5.11%**	
Verizon	**9**	**426**	**114**	**0.1061**	**869**	**0.5793**	**18.31%**	
Verizon	**1**	**721**	**114**	**0.01994825**	**757**	**0.497333**	**4.01%**	
								50.85%
* Source: Siting Council								

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 176' MONOPOLE FOR PROPOSED ANTENNA ARRANGEMENT

Site: Berlin Fire Department
Address: 1657 Wilbur Cross Parkway,
Berlin, CT

prepared for

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

URS CORPORATION
500 ENTERPRISE DRIVE, SUITE 3B
ROCKY HILL, CT 06067
TEL. 860-529-8882

36931194.00000
VZ5-047 (Rev 1)

January 20, 2010

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 176' steel tapered monopole structure, located at 1657 Wilbur Cross Parkway in Berlin, CT. The analysis was conducted in accordance with the 2005 Connecticut State Building Code and the TIA/EIA-222-F standard for a wind velocity of 80 mph (fastest mile) and 69 mph (fastest mile) concurrent with 0.5" ice. The antenna loading considered in the analysis consists of all existing and proposed antennas, transmission lines, and ancillary items as outlined in the Introduction Section of this report.

The proposed Verizon Wireless installation is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Remove: **(6) LPA-185080 / 8CF 2 panel antennas (two per sector)** **Install:** **(3) LNX-6514DS-T4M-750_4 panel antennas (One per Sector)** **(1) BXA-185060/12CF 2 panel antenna (Alpha Sector)** **(2) MG D3-900T0 panel antenna (Beta and Gamma Sectors)** **Mounted on existing platform**	**Verizon Wireless (Existing)** **Verizon Wireless (Proposed)**	**@ 114'** (113' above base plate)

The results of the analysis indicate that the tower structure has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

This analysis is based on:

1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Geotechnical investigation and report performed by Dr. Clarence Welti, P.E., P.C. dated June 11, 2002.
3) Tower geometry and structural member sizes utilized in the preparation of this report obtained from manufacturers original design documents for a 176' tapered steel monopole, prepared by Engineered Endeavors, Inc., EEI Job #: 11129, signed and sealed September 16, 2002.
4) Foundation geometry utilized in the preparation of this report obtained from manufacturers original design documents for a 176; tapered steel monopole, prepared by Engineered Endeavors, Inc., EEI Job # 11129, signed and sealed September 20, 2002.
5) Previous structural analysis performed by URS Corp, project number VS1-034 / 36922118, signed and sealed September 29, 2005.
6) Previous structural analysis performed by URS Corp, project number VZ1-005 / 36912556, signed and sealed February 21, 2006.
7) Previous structural analysis performed by Natcomm Consulting Engineers, Inc., project number 08007.C05, signed and sealed February 14, 2008.
8) Site documentation and visual verification of existing appurtenances conducted from grade by URS during July 2008.

1. EXECUTIVE SUMMARY - continued

9) Previous structural analysis performed by URS Corp, project number PWS-002 / 36923532, signed and sealed July 18, 2008.

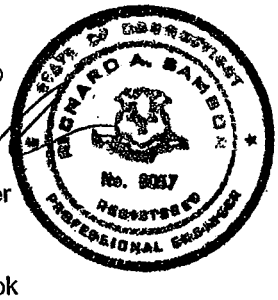
10) Antenna and mount configuration as specified within Section 2 and 6 of this report.

This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration as well as the physical condition of the tower. Notify the engineer in writing immediately if any of the information in this report is found to be other than specified.

If you should have any questions, please call.

Sincerely,

URS Corporation



Richard A. Sambor, P.E.
Senior Structural Engineer

RAS/kab
cc: MJE, ICA – URS, CF/Book

2. INTRODUCTION

The subject tower is located at 1657 Wilbur Cross Parkway in Berlin, CT. The structure is an existing 176' steel tapered monopole structure, designed and manufactured by Engineered Endeavors, Inc.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(2) Dipole antennas	Town (existing)	Low-Profile Platform	176'	(2) 1 5/8" (within monopole)
(2) Grid Dishes				(2) 1 5/8" (within monopole)
(2) Omni antennas				(2) 1 5/8" (within monopole)
(1) 4- Bay Dipole antenna	Town (reserved)			(1) 1 5/8" (within monopole)
(3) Powerwave 7770 panel antennas and (6) Powerwave LGP21401 TMA's	AT&T/Cingular (existing)	Cluster/Pipe Mounted	170'	(6) 1 5/8" (within monopole)
(6) EMS DR65-19-00DPQ antennas and (6) Decibel PCS 1900 TMA's	T-Mobile (existing)	(3) T-Arms	160'	(12) 1 5/8" (within monopole)
(3) EMS DR65-19-00DPQ antennas and (6) Decibel PCS 1900 TMA's	*T-Mobile (reserved)*			*(12) 1 5/8" (within monopole)*
(1) 4- Bay Dipole antenna and (1) Grid Dish	Town (existing)	T-Arm (listed above)	160'	(2) 1 5/8" (within monopole)
(12) Dapa 48000 antennas (6 existing, 6 reserved)	Sprint/Nextel (existing and reserved)	Low-Profile Platform	150'	(12) 1 5/8" (within monopole)
(1) 2-Bay Dipole antenna	Town (existing)	6' Extension Arm	130'	(1) 1 5/8" (within monopole)
(3) Kathrein 742 213 panel antennas	Pocket Wireless (existing)	Flush mount assembly	124'	(6) 1 5/8" (Andrew AVA7-50 exterior of monopole)
(4) Antel LPA 80063/6CF & (2)RWA80013	Verizon (existing)	Low-Profile Platform (existing)	114'	(12) 1 5/8" (within monopole) (existing)
(3) LNX-6514DS-T4M-750_4 (1) BXA-185060/12CF 2 & (2) MG D3-900T0	**Verizon (proposed)**			
(1) 4-Bay Dipole antenna	Town (existing)	6' Extension Arm	100'	(1) 1 5/8" (within monopole)
(1) Grid Dish				(1) 1 5/8" (within monopole)
(1) GPS antenna	Sprint/Nextel (existing)	Standoff Mount	75'	(1) 1/2" (within monopole)
(1) VIC-100 GPS antenna	T-Mobile (reserved)	Standoff Mount	60'	(1) 1/2" (within monopole)
(1) Scanner antenna	Town (existing)	Standoff Mount	60'	(1) 1/2" (within monopole)

Note: Base of structure established as 1.0ft above average grade.

This structural analysis of the communications tower was performed by URS Corporation (URS) for Verizon Wireless. The purpose of this analysis was to investigate the structural integrity of the existing tower with its existing and proposed antenna loads. This analysis was conducted to evaluate stress on the tower and the effect of forces to the foundation of the tower resulting from existing and proposed antenna arrangement.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was conducted in accordance with the 2005 Connecticut State Building Code, TIA/EIA-222-F - Structural Standard for Steel Antenna Towers and Antenna Supporting Structures, and the American Institute of Steel Construction (AISC) Manual of Steel Construction - Allowable Stress Design (ASD).

The analysis was conducted using RISA Tower 5.3. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Load Condition 1 = 80 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 69 mph (fastest mile) Wind Load (with ice) + Ice Load + Tower Dead Load

Please note that wind pressure is a function of velocity squared. Under Load Condition 2, a 25 percent reduction in wind pressure is allowed by code to account for the unlikelihood of the full wind pressure and ice load occurring at the same time. The same results may be achieved by utilizing a lower wind pressure without taking the 25 percent reduction, as shown above.

The TIA/EIA standard permits a one-third increase in allowable stresses for towers and monopoles less than 700 feet tall. For the purposes of this analysis, in computing the load capacity the allowable stresses of the tower members were increased by one-third.

4. FINDINGS AND EVALUATION

Combined axial and bending stresses on the monopole structure were evaluated to compare with allowable stresses in accordance with AISC. The calculated stresses under the proposed loading were **BELOW** the allowable stresses (see table below). Detailed analysis and calculations for the proposed load condition are provided in section 6 of this report. Additionally, the anchor bolts, base plate and foundation were all found to be within the allowable limits. An analysis of the foundation was not conducted since the proposed reactions were below the original design.

TABLE 1: Proposed Tower Base Reactions vs. Original Design Reactions

Base Reactions	Proposed Reactions	Original Design Reactions
Axial Load (kips)	58.1	49.6
Shear (kips)	29.9	34.94
O.T. Moment (ft-kips)	3483	4306.5

Note: Original design reactions based on TIA/EIA 222-F with a wind speed of 85mph and 0.5in ice.

TABLE 2: Proposed Tower Component Stress vs. Capacity Summary

Component (Section No.)	Controlling Component / Elevation	Stress Ratio (% capacity)	Pass/Fail	Comments:
Pole Shaft (L3)	43'-86.13'	69.0%	Pass	
Anchor Bolts	Compression	69%	Pass	
Base Plate	Bending	69%	Pass	
Caisson Foundation	Flexure	55%	Pass	

5. CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis indicate that the tower structure has the capacity to support the proposed loading conditions. **The tower and its foundation are considered structurally adequate with the wind load classification specified above and the proposed antenna loading.**

Limitations/Assumptions:

This report is based on the following:

1. Tower inventory as listed in this report.
2. Tower is properly installed and maintained.
3. All members are as specified in the original design documents and are in good condition.
4. All required members are in place.
5. All bolts are in place and are properly tightened.
6. Tower is in plumb condition.
7. All member protective coatings are in good condition.
8. All tower members were properly designed, detailed, fabricated, and installed and have been properly maintained since erection.
9. Foundations were properly constructed to support original design loads as specified in the original design documents.
10. All coaxial cable is installed within the monopole unless specified otherwise.

URS is not responsible for any modifications completed prior to or hereafter in which URS is not or was not directly involved. Modifications include but are not limited to:

A. Adding antennas
B. Removing/replacing antennas
C. Adding coaxial cables

URS hereby states that this document represents the entire report and that it assumes no liability for any factual changes that may occur after the date of this report. All representations, recommendations, and conclusions are based upon information contained and set forth herein. If you are aware of any information which conflicts with that which is contained herein, or you are aware of any defects arising from original design, material, fabrication, or erection deficiencies, you should disregard this report and immediately contact URS. URS disclaims all liability for any representation, recommendation, or conclusion not expressly stated herein.

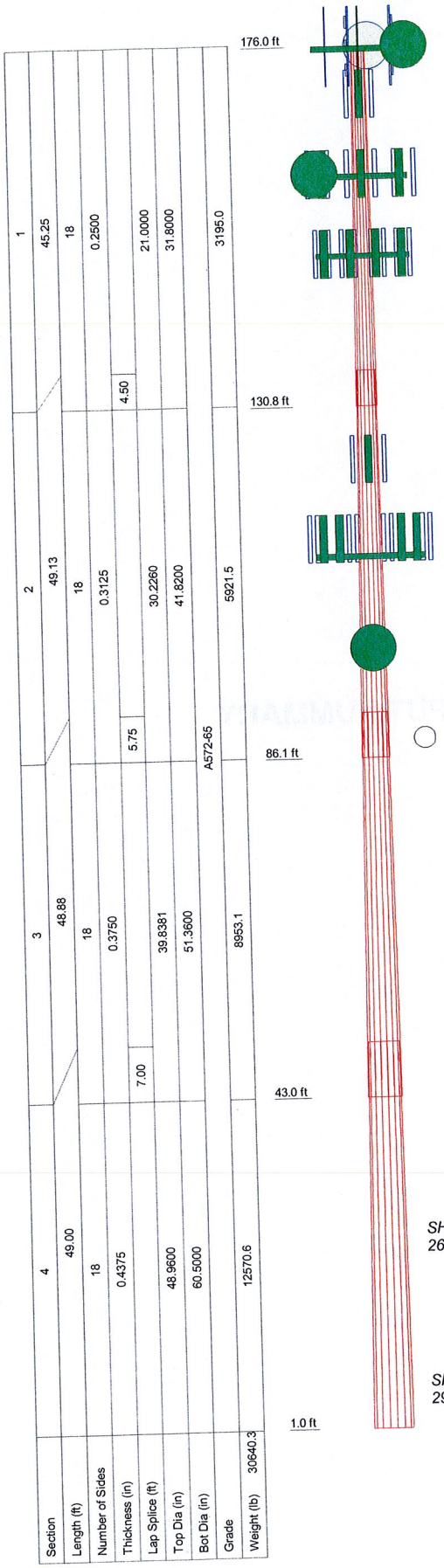
Ongoing and Periodic Inspection and Maintenance:

After the Contractor has successfully completed the installation and the work has been accepted, the owner will be responsible for the ongoing and periodic inspection and maintenance of the tower.

The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire tower structural system be performed at least yearly and more frequently as conditions warrant. According to TIA/EIA-222-F section 14.1, Note 1: It is recommended that the structure be inspected after severe wind and/or ice storms or other extreme loading conditions.

6. DRAWINGS AND DATA

RISA TOWER INPUT/OUTPUT SUMMARY



Section	1	2	3	4
Length (ft)	45.25	49.13	48.88	49.00
Number of Sides	18	18	18	18
Thickness (in)	0.2500	0.3125	0.3750	0.4375
Lap Splice (ft)	21.0000	30.2260	39.8381	48.9600
Top Dia (in)	31.8000	41.8200	51.3600	60.5000
Bot Dia (in)	3195.0	5921.5	8953.1	12570.6
Grade	A572-65			
Weight (lb)	30640.3			

4.50 | 5.75 | 7.00

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' Low Profile Platform (Town)	176	(4) 48000 (Sprint/Nextel)	150
4 Bay Dipole (Town)	176	(4) 48000 (Sprint/Nextel)	150
Omni (Town)	176	(4) 48000 (Sprint/Nextel)	150
Grid Dish (Town)	176	2 Bay Dipole (Town)	130
Dipole (Town)	176	6' Side Mount Standoff (Town)	130
Grid Dish (Town)	176	Valmont Uni-Tri Bracket (Pocket Wireless)	125.5
Omni (Town)	176	742 213 w/mount pipe (Pocket Wireless)	124
4 Bay Dipole (reserved) (Town)	176	742 213 w/mount pipe (Pocket Wireless)	124
7770.00 w/ mount pipe (ATI/Cingular)	170	742 213 w/mount pipe (Pocket Wireless)	124
7770.00 w/ mount pipe (ATI/Cingular)	170	Valmont Uni-Tri Bracket (Pocket Wireless)	122.5
7770.00 w/ mount pipe (ATI/Cingular)	170	LPA-80063/6CF (Verizon)	114
LPG 21401 TMA (ATI/Cingular)	170	LPA-80063/6CF (Verizon)	114
LPG 21401 TMA (ATI/Cingular)	170	LPA-80063/6CF (Verizon)	114
LPG 21401 TMA (ATI/Cingular)	170	LPA-80063/6CF (Verizon)	114
Valmont T-Arm (1) (T-Mobile)	160	RWA80013 (Verizon)	114
Valmont T-Arm (1) (T-Mobile)	160	RWA80013 (Verizon)	114
Valmont T-Arm (1) (T-Mobile)	160	BXA-185060/12CF 2 (Verizon)	114
(2) DR65-19-00DPQ (T-Mobile)	160	LNX-6514DS-T4M (Verizon)	114
(2) DR65-19-00DPQ (T-Mobile)	160	Rymsa MG D3-900Tx (Verizon)	114
(2) DR65-19-00DPQ (T-Mobile)	160	LNX-6514DS-T4M (Verizon)	114
DR65-19-00DPQ (T-Mobile (reserved))	160	Rymsa MG D3-900Tx (Verizon)	114
DR65-19-00DPQ (T-Mobile (reserved))	160	LNX-6514DS-T4M (Verizon)	114
DR65-19-00DPQ (T-Mobile (reserved))	160	Andrew 12'-6" Low Profile Platform (Verizon)	112
(2) TMA 10"x8"x3" (T-Mobile)	160	4 Bay Dipole (Town)	100
(2) TMA 10"x8"x3" (T-Mobile)	160	Grid Dish (Town)	100
(2) TMA 10"x8"x3" (T-Mobile)	160	6' Side Mount Standoff (Town)	100
(2) TMA 10"x8"x3" (T-Mobile (reserved))	160	GPS (Sprint/Nextel)	75
(2) TMA 10"x8"x3" (T-Mobile (reserved))	160	Side Mount Standoff (Sprint/Nextel)	75
(2) TMA 10"x8"x3" (T-Mobile (reserved))	160	Scanner Antenna (Town (reserved))	60
2 Bay Dipole (Town)	160	GPS (T-Mobile (reserved))	60
Grid Dish (Town)	160	Side Mount Standoff (T-Mobile (reserved))	60
Low Profile Platform (Sprint/Nextel)	150	Side Mount Standoff (Town (reserved))	60

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 69%

URS Corporation
500 Enterprise Drive, Suite 3B
Rocky Hill, CT 06067
Phone: (860) 529-8882
FAX: (860) 529-3991

Job: 176' EEI Monopole, Berlin, CT			
Project: Berlin Fire Department			
Client: Verizon Wireless	Drawn by: Kevin Barker	App'd:	
Code: TIA/EIA-222-F	Date: 01/20/10	Scale: NTS	
Path: P:\08\ERI Files\176_EEI_Monopole.eri		Dwg No. E-1	

RISA TOWER DETAILED OUTPUT

Tower Input Data

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

Tower is located in Hartford County, Connecticut.
Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 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.
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 ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	176.01-130.76	45.25	4.50	18	21.0000	31.8000	0.2500	1.0000	A572-65 (65 ksi)
L2	130.76-86.13	49.13	5.75	18	30.2260	41.8200	0.3125	1.2500	A572-65 (65 ksi)
L3	86.13-43.00	48.88	7.00	18	39.8381	51.3600	0.3750	1.5000	A572-65 (65 ksi)
L4	43.00-1.00	49.00		18	48.9600	60.5000	0.4375	1.7500	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	21.3240	16.4651	895.6507	7.3663	10.6680	83.9568	1792.4800	8.2341	3.2560	13.024
	32.2906	25.0349	3148.3461	11.2003	16.1544	194.8909	6300.8349	12.5198	5.1568	20.627
L2	31.7706	29.6704	3354.2439	10.6193	15.3548	218.4493	6712.9014	14.8380	4.7698	15.263
	42.4651	41.1703	8961.3641	14.7352	21.2446	421.8192	17934.5198	20.5890	6.8103	21.793
L3	41.8289	46.9709	9241.6269	14.0094	20.2377	456.6531	18495.4142	23.4899	6.3515	16.937
	52.1523	60.6849	19929.7987	18.0997	26.0909	763.8607	39885.8215	30.3482	8.3794	22.345
L4	51.3893	67.3795	20042.4648	17.2255	24.8717	805.8353	40111.3019	33.6962	7.8470	17.936
	61.4333	83.4043	38013.0437	21.3222	30.7340	1236.8401	76076.1060	41.7101	9.8780	22.578

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 176.01-130.76				1	1	1		
L2 130.76-86.13				1	1	1		
L3 86.13-43.00				1	1	1		
L4 43.00-1.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8 (Town)	C	No	Inside Pole	176.00 - 21.00	7	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (AT&T/Cingular)	C	No	Inside Pole	171.00 - 9.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (T-Mobile)	C	No	Inside Pole	161.00 - 9.00	24	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Town)	C	No	Inside Pole	161.00 - 21.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Sprint/Nextel)	C	No	Inside Pole	151.00 - 9.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Town)	C	No	Inside Pole	131.00 - 21.00	1	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Town)	C	No	Inside Pole	101.00 - 21.00	2	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1/2 (Sprint/Nextel)	C	No	Inside Pole	76.00 - 9.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2 (Town)	C	No	Inside Pole	61.00 - 21.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1/2 (T-Mobile)	C	No	Inside Pole	61.00 - 13.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
1 5/8 (Verizon)	C	No	Inside Pole	111.00 - 21.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
AVA7-50 (1-5/8 LOW DENSI. FOAM) (Pocket Wireless)	C	No	CaAa (Out Of Face)	124.00 - 4.00	1	No Ice	0.20	0.72
						1/2" Ice	0.30	2.23
AVA7-50 (1-5/8 LOW	C	No	CaAa (Out Of	124.00 - 4.00	5	No Ice	0.00	0.72

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
DENSI. FOAM) (Pocket Wireless)			Face)			1/2" Ice	0.00	2.23

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 lb
L1	176.01-130.76	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	1650.98
L2	130.76-86.13	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	7.498	2918.50
L3	86.13-43.00	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	8.540	3164.01
L4	43.00-1.00	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	7.722	2224.22

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 lb
L1	176.01-130.76	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	1650.98
L2	130.76-86.13	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	11.285	3262.72
L3	86.13-43.00	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	12.853	3556.05
L4	43.00-1.00	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	11.622	2578.72

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	176.01-130.76	0.0000	0.0000	0.0000	0.0000
L2	130.76-86.13	-0.2114	0.1220	-0.3023	0.1745
L3	86.13-43.00	-0.2446	0.1412	-0.3523	0.2034
L4	43.00-1.00	-0.2283	0.1318	-0.3314	0.1913

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 lb
12' Low Profile Platform (Town)	C	None		0.0000	176.00	No Ice	15.70	15.70	1300.00
						1/2" Ice	20.10	20.10	1765.00
4 Bay Dipole (Town)	C	From Face	4.00 6.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
Omni (Town)	C	From Face	4.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
Grid Dish (Town)	C	From Face	4.00 -6.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
Dipole (Town)	B	From Face	4.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
Grid Dish (Town)	B	From Face	4.00 -6.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
Omni (Town)	A	From Face	4.00 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
4 Bay Dipole (reserved) (Town)	A	From Face	4.00 6.00 0.00	0.0000	176.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
7770.00 w/ mount pipe (AT&T/Cingular)	A	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	5.99 6.45	4.26 4.91	63.95 110.64
7770.00 w/ mount pipe (AT&T/Cingular)	B	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	5.99 6.45	4.26 4.91	63.95 110.64
7770.00 w/ mount pipe (AT&T/Cingular)	C	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	5.99 6.45	4.26 4.91	63.95 110.64
LPG 21401 TMA (AT&T/Cingular)	A	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	17.50 23.31
LPG 21401 TMA (AT&T/Cingular)	B	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	17.50 23.31
LPG 21401 TMA (AT&T/Cingular)	C	From Face	1.00 0.00 0.00	0.0000	170.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	17.50 23.31
Valmont T-Arm (1) (T-Mobile)	A	From Face	2.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	336.00 412.00
Valmont T-Arm (1) (T-Mobile)	B	From Face	2.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	336.00 412.00
Valmont T-Arm (1) (T-Mobile)	C	From Face	2.00 0.00 0.00	0.0000	160.00	No Ice 1/2" Ice	10.54 14.45	10.54 14.45	336.00 412.00
(2) DR65-19-00DPQ (T-Mobile)	A	From Face	4.00 0.00	0.0000	160.00	No Ice 1/2" Ice	8.40 8.95	3.53 3.97	32.00 73.77

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 lb
			0.00						
(2) DR65-19-00DPQ	B	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	32.00
(T-Mobile)			0.00			1/2" Ice	8.95	3.97	73.77
			0.00						
(2) DR65-19-00DPQ	C	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	32.00
(T-Mobile)			0.00			1/2" Ice	8.95	3.97	73.77
			0.00						
DR65-19-00DPQ	A	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	32.00
(T-Mobile (reserved))			0.00			1/2" Ice	8.95	3.97	73.77
			0.00						
DR65-19-00DPQ	B	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	32.00
(T-Mobile (reserved))			0.00			1/2" Ice	8.95	3.97	73.77
			0.00						
DR65-19-00DPQ	C	From Face	4.00	0.0000	160.00	No Ice	8.40	3.53	32.00
(T-Mobile (reserved))			0.00			1/2" Ice	8.95	3.97	73.77
			0.00						
(2) TMA 10"x8"x3"	A	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	15.00
(T-Mobile)			0.00			1/2" Ice	0.90	0.38	20.06
			0.00						
(2) TMA 10"x8"x3"	B	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	15.00
(T-Mobile)			0.00			1/2" Ice	0.90	0.38	20.06
			0.00						
(2) TMA 10"x8"x3"	C	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	15.00
(T-Mobile)			0.00			1/2" Ice	0.90	0.38	20.06
			0.00						
(2) TMA 10"x8"x3"	A	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	15.00
(T-Mobile (reserved))			0.00			1/2" Ice	0.90	0.38	20.06
			0.00						
(2) TMA 10"x8"x3"	B	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	15.00
(T-Mobile (reserved))			0.00			1/2" Ice	0.90	0.38	20.06
			0.00						
(2) TMA 10"x8"x3"	C	From Face	3.00	0.0000	160.00	No Ice	0.78	0.29	15.00
(T-Mobile (reserved))			0.00			1/2" Ice	0.90	0.38	20.06
			0.00						
2 Bay Dipole	C	From Face	4.00	0.0000	160.00	No Ice	0.00	0.00	0.00
(Town)			6.00			1/2" Ice	0.00	0.00	0.00
			0.00						
Grid Dish	C	From Face	4.00	0.0000	160.00	No Ice	5.40	5.40	50.00
(Town)			6.00			1/2" Ice	9.00	9.00	80.00
			0.00						
Low Profile Platform	C	None		0.0000	150.00	No Ice	17.30	17.30	1500.00
(Sprint/Nextel)						1/2" Ice	22.10	22.10	2030.00
(4) 48000	A	From Face	3.00	0.0000	150.00	No Ice	4.51	1.82	18.30
(Sprint/Nextel)			0.00			1/2" Ice	4.91	2.15	40.88
			0.00						
(4) 48000	B	From Face	3.00	0.0000	150.00	No Ice	4.51	1.82	18.30
(Sprint/Nextel)			0.00			1/2" Ice	4.91	2.15	40.88
			0.00						
(4) 48000	C	From Face	3.00	0.0000	150.00	No Ice	4.51	1.82	18.30
(Sprint/Nextel)			0.00			1/2" Ice	4.91	2.15	40.88
			0.00						
2 Bay Dipole	C	From Face	6.00	0.0000	130.00	No Ice	5.40	5.40	50.00
(Town)			0.00			1/2" Ice	9.00	9.00	80.00
			0.00						
6' Side Mount Standoff	C	From Face	3.00	0.0000	130.00	No Ice	4.97	4.97	70.00
(Town)			0.00			1/2" Ice	6.12	6.12	130.00
			0.00						

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 lb
6' Side Mount Standoff (Town)	C	From Face	3.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
4 Bay Dipole (Town)	C	From Face	6.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
Grid Dish (Town)	C	From Face	6.00 0.00 0.00	0.0000	100.00	No Ice 1/2" Ice	5.40 9.00	5.40 9.00	50.00 80.00
Side Mount Standoff (Sprint/Nextel)	B	From Face	1.50 0.00 0.00	0.0000	75.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
GPS (Sprint/Nextel)	B	From Face	3.00 0.00 0.00	0.0000	75.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	15.00 30.00
Side Mount Standoff (T-Mobile (reserved))	B	From Face	1.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
GPS (T-Mobile (reserved))	B	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	15.00 30.00
Side Mount Standoff (Town (reserved))	C	From Face	1.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	4.97 6.12	4.97 6.12	70.00 130.00
Scanner Antenna (Town (reserved))	C	From Face	3.00 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	1.00 1.50	1.00 1.50	15.00 30.00
Andrew 12'-6" Low Profile Platform (Verizon)	C	None		0.0000	112.00	No Ice 1/2" Ice	14.45 19.00	14.45 19.00	1300.00 1690.00
LPA-80063/6CF (Verizon)	A	From Face	4.00 6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	7.40 8.00	6.50 7.00	27.00 35.10
LPA-80063/6CF (Verizon)	A	From Face	4.00 -6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	7.40 8.00	6.50 7.00	27.00 35.10
LPA-80063/6CF (Verizon)	B	From Face	4.00 6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	7.40 8.00	6.50 7.00	27.00 35.10
LPA-80063/6CF (Verizon)	B	From Face	4.00 -6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	7.40 8.00	6.50 7.00	27.00 35.10
RWA80013 (Verizon)	C	From Face	4.00 6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	5.44 6.04	5.44 6.04	14.00 47.00
RWA80013 (Verizon)	C	From Face	4.00 -6.00 0.00	0.0000	114.00	No Ice 1/2" Ice	5.44 6.04	5.44 6.04	14.00 47.00
Valmont Uni-Tri Bracket (Pocket Wireless)	C	None		0.0000	125.50	No Ice 1/2" Ice	1.75 1.94	1.75 1.94	290.00 306.29
Valmont Uni-Tri Bracket (Pocket Wireless)	C	None		0.0000	122.50	No Ice 1/2" Ice	1.75 1.94	1.75 1.94	290.00 306.29
742 213 w/mount pipe (Pocket Wireless)	A	From Face	1.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	5.28 5.82	4.53 5.87	47.55 88.36
742 213 w/mount pipe (Pocket Wireless)	B	From Face	1.00 0.00	0.0000	124.00	No Ice 1/2" Ice	5.28 5.82	4.53 5.87	47.55 88.36

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 lb
742 213 w/mount pipe (Pocket Wireless)	C	From Face	0.00 1.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	5.28 5.82	4.53 5.87	47.55 88.36
BXA-185060/12CF 2 (Verizon)	A	From Face	4.00 4.00 0.00	0.0000	114.00	No Ice 1/2" Ice	3.10 3.60	2.10 2.60	36.90 77.81
LNX-6514DS-T4M (Verizon)	A	From Face	4.00 -4.00 0.00	0.0000	114.00	No Ice 1/2" Ice	8.52 9.11	9.95 11.12	61.23 139.61
Rymsa MG D3-900Tx (Verizon)	B	From Face	4.00 4.00 0.00	0.0000	114.00	No Ice 1/2" Ice	5.38 5.86	5.02 5.96	47.29 88.82
LNX-6514DS-T4M (Verizon)	B	From Face	4.00 -4.00 0.00	0.0000	114.00	No Ice 1/2" Ice	8.52 9.11	9.95 11.12	61.23 139.61
Rymsa MG D3-900Tx (Verizon)	C	From Face	4.00 4.00 0.00	0.0000	114.00	No Ice 1/2" Ice	5.38 5.86	5.02 5.96	47.29 88.82
LNX-6514DS-T4M (Verizon)	C	From Face	4.00 -4.00 0.00	0.0000	114.00	No Ice 1/2" Ice	8.52 9.11	9.95 11.12	61.23 139.61

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 176.01-130.76	152.08	1.547	25	99.550	A	0.000	99.550	99.550	100.00	0.000	0.000
					B	0.000	99.550		100.00	0.000	0.000
					C	0.000	99.550		100.00	0.000	0.000
L2 130.76-86.13	107.70	1.402	23	135.950	A	0.000	135.950	135.950	100.00	0.000	0.000
					B	0.000	135.950		100.00	0.000	0.000
					C	0.000	135.950		100.00	0.000	7.498
L3 86.13-43.00	64.29	1.21	20	166.326	A	0.000	166.326	166.326	100.00	0.000	0.000
					B	0.000	166.326		100.00	0.000	0.000
					C	0.000	166.326		100.00	0.000	8.540
L4 43.00-1.00	21.38	1	16	194.440	A	0.000	194.440	194.440	100.00	0.000	0.000
					B	0.000	194.440		100.00	0.000	0.000
					C	0.000	194.440		100.00	0.000	7.722

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 176.01-130.76	152.08	1.547	19	0.5000	103.321	A	0.000	103.321	103.321	100.00	0.000	0.000
						B	0.000	103.321		100.00	0.000	0.000
						C	0.000	103.321		100.00	0.000	0.000
L2 130.76-86.13	107.70	1.402	17	0.5000	139.669	A	0.000	139.669	139.669	100.00	0.000	0.000
						B	0.000	139.669		100.00	0.000	0.000
						C	0.000	139.669		100.00	0.000	11.285
L3 86.13-43.00	64.29	1.21	15	0.5000	169.920	A	0.000	169.920	169.920	100.00	0.000	0.000
						B	0.000	169.920		100.00	0.000	0.000
						C	0.000	169.920		100.00	0.000	12.853
L4 43.00-1.00	21.38	1	12	0.5000	197.940	A	0.000	197.940	197.940	100.00	0.000	0.000
						B	0.000	197.940		100.00	0.000	0.000
						C	0.000	197.940		100.00	0.000	11.622

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 176.01-130.76	152.08	1.547	10	99.550	A	0.000	99.550	99.550	100.00	0.000	0.000
					B	0.000	99.550		100.00	0.000	0.000
					C	0.000	99.550		100.00	0.000	0.000
L2 130.76-86.13	107.70	1.402	9	135.950	A	0.000	135.950	135.950	100.00	0.000	0.000
					B	0.000	135.950		100.00	0.000	0.000
					C	0.000	135.950		100.00	0.000	7.498
L3 86.13-43.00	64.29	1.21	8	166.326	A	0.000	166.326	166.326	100.00	0.000	0.000
					B	0.000	166.326		100.00	0.000	0.000
					C	0.000	166.326		100.00	0.000	8.540
L4 43.00-1.00	21.38	1	6	194.440	A	0.000	194.440	194.440	100.00	0.000	0.000
					B	0.000	194.440		100.00	0.000	0.000
					C	0.000	194.440		100.00	0.000	7.722

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3195.01	A	1	0.65	1	1	1	99.550	2769.59	61.21	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2918.50	5921.54	A	1	0.65	1	1	1	135.950	3714.44	83.23	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3164.01	8953.11	A	1	0.65	1	1	1	166.326	3887.67	90.14	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2224.22	12570.61	A	1	0.65	1	1	1	194.440	3713.31	88.41	C
			B	1	0.65	1	1	1	194.440			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
Sum Weight:	9957.71	30640.27	C	1	0.65	1	1	1 OTM	194.440 1136493.5 9 lb-ft	14085.01		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3195.01	A	1	0.65	1	1	1	99.550	2769.59	61.21	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2918.50	5921.54	A	1	0.65	1	1	1	135.950	3714.44	83.23	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3164.01	8953.11	A	1	0.65	1	1	1	166.326	3887.67	90.14	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2224.22	12570.61	A	1	0.65	1	1	1	194.440	3713.31	88.41	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	9957.71	30640.27						OTM	1136493.5 9 lb-ft	14085.01		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3195.01	A	1	0.65	1	1	1	99.550	2769.59	61.21	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2918.50	5921.54	A	1	0.65	1	1	1	135.950	3714.44	83.23	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3164.01	8953.11	A	1	0.65	1	1	1	166.326	3887.67	90.14	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2224.22	12570.61	A	1	0.65	1	1	1	194.440	3713.31	88.41	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	9957.71	30640.27						OTM	1136493.5 9 lb-ft	14085.01		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3195.01	A	1	0.65	1	1	1	99.550	2769.59	61.21	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2918.50	5921.54	A	1	0.65	1	1	1	135.950	3714.44	83.23	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3164.01	8953.11	A	1	0.65	1	1	1	166.326	3887.67	90.14	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2224.22	12570.61	A	1	0.65	1	1	1	194.440	3713.31	88.41	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	9957.71	30640.27						OTM	1136493.5 9 lb-ft	14085.01		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3946.24	A	1	0.65	1	1	1	103.321	2155.87	47.64	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	3262.72	6942.16	A	1	0.65	1	1	1	139.669	2966.12	66.46	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	3556.05	10198.24	A	1	0.65	1	1	1	169.920	3081.94	71.46	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2578.72	14023.59	A	1	0.65	1	1	1	197.940	2913.21	69.36	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	11048.47	35110.23						OTM	896626.29 lb-ft	11117.15		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3946.24	A	1	0.65	1	1	1	103.321	2155.87	47.64	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	3262.72	6942.16	A	1	0.65	1	1	1	139.669	2966.12	66.46	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	3556.05	10198.24	A	1	0.65	1	1	1	169.920	3081.94	71.46	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L4 43.00-1.00	2578.72	14023.59	A	1	0.65	1	1	1	197.940	2913.21	69.36	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	11048.47	35110.23						OTM	896626.29 lb-ft	11117.15		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3946.24	A	1	0.65	1	1	1	103.321	2155.87	47.64	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	3262.72	6942.16	A	1	0.65	1	1	1	139.669	2966.12	66.46	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	3556.05	10198.24	A	1	0.65	1	1	1	169.920	3081.94	71.46	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2578.72	14023.59	A	1	0.65	1	1	1	197.940	2913.21	69.36	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	11048.47	35110.23						OTM	896626.29 lb-ft	11117.15		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3946.24	A	1	0.65	1	1	1	103.321	2155.87	47.64	C
			B	1	0.65	1	1	1	103.321			
			C	1	0.65	1	1	1	103.321			
L2 130.76-86.13	3262.72	6942.16	A	1	0.65	1	1	1	139.669	2966.12	66.46	C
			B	1	0.65	1	1	1	139.669			
			C	1	0.65	1	1	1	139.669			
L3 86.13-43.00	3556.05	10198.24	A	1	0.65	1	1	1	169.920	3081.94	71.46	C
			B	1	0.65	1	1	1	169.920			
			C	1	0.65	1	1	1	169.920			
L4 43.00-1.00	2578.72	14023.59	A	1	0.65	1	1	1	197.940	2913.21	69.36	C
			B	1	0.65	1	1	1	197.940			
			C	1	0.65	1	1	1	197.940			
Sum Weight:	11048.47	35110.23						OTM	896626.29 lb-ft	11117.15		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3195.01	A	1	0.65	1	1	1	99.550	1081.87	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2918.50	5921.54	A	1	0.65	1	1	1	135.950	1450.95	32.51	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3164.01	8953.11	A	1	0.65	1	1	1	166.326	1518.62	35.21	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2224.22	12570.61	A	1	0.65	1	1	1	194.440	1450.51	34.54	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	9957.71	30640.27						OTM	443942.81 lb-ft	5501.96		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3195.01	A	1	0.65	1	1	1	99.550	1081.87	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2918.50	5921.54	A	1	0.65	1	1	1	135.950	1450.95	32.51	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3164.01	8953.11	A	1	0.65	1	1	1	166.326	1518.62	35.21	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2224.22	12570.61	A	1	0.65	1	1	1	194.440	1450.51	34.54	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	9957.71	30640.27						OTM	443942.81 lb-ft	5501.96		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3195.01	A	1	0.65	1	1	1	99.550	1081.87	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2918.50	5921.54	A	1	0.65	1	1	1	135.950	1450.95	32.51	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L3 86.13-43.00	3164.01	8953.11	A	1	0.65	1	1	1	166.326	1518.62	35.21	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2224.22	12570.61	A	1	0.65	1	1	1	194.440	1450.51	34.54	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	9957.71	30640.27						OTM	443942.81 lb-ft	5501.96		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 176.01-130.76	1650.98	3195.01	A	1	0.65	1	1	1	99.550	1081.87	23.91	C
			B	1	0.65	1	1	1	99.550			
			C	1	0.65	1	1	1	99.550			
L2 130.76-86.13	2918.50	5921.54	A	1	0.65	1	1	1	135.950	1450.95	32.51	C
			B	1	0.65	1	1	1	135.950			
			C	1	0.65	1	1	1	135.950			
L3 86.13-43.00	3164.01	8953.11	A	1	0.65	1	1	1	166.326	1518.62	35.21	C
			B	1	0.65	1	1	1	166.326			
			C	1	0.65	1	1	1	166.326			
L4 43.00-1.00	2224.22	12570.61	A	1	0.65	1	1	1	194.440	1450.51	34.54	C
			B	1	0.65	1	1	1	194.440			
			C	1	0.65	1	1	1	194.440			
Sum Weight:	9957.71	30640.27						OTM	443942.81 lb-ft	5501.96		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	30640.27					
Bracing Weight	0.00					
Total Member Self-Weight	30640.27			2155.40	599.36	
Total Weight	48756.75			2155.40	599.36	
Wind 0 deg - No Ice		-10.99	-29844.52	-3360808.19	1841.73	22.61
Wind 30 deg - No Ice		14954.60	-25840.61	-2909635.31	-1684536.65	3331.47
Wind 45 deg - No Ice		21154.69	-21095.49	-2374940.47	-2383185.94	4699.71
Wind 60 deg - No Ice		25913.12	-14912.74	-1678250.47	-2919384.20	5747.67
Wind 90 deg - No Ice		29928.24	10.99	3397.77	-3371824.51	6623.78
Wind 120 deg - No Ice		25924.11	14931.78	1684713.12	-2920626.56	5725.06
Wind 135 deg - No Ice		21170.23	21111.04	2381008.25	-2384942.91	4667.73
Wind 150 deg - No Ice		14973.64	25851.61	2915188.49	-1686688.50	3292.31
Wind 180 deg - No Ice		10.99	29844.52	3365118.99	-643.01	-22.61
Wind 210 deg - No Ice		-14954.60	25840.61	2913946.12	1685735.37	-3331.47
Wind 225 deg - No Ice		-21154.69	21095.49	2379251.27	2384384.66	-4699.71

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 240 deg - No Ice		-25913.12	14912.74	1682561.27	2920582.91	-5747.67
Wind 270 deg - No Ice		-29928.24	-10.99	913.03	3373023.23	-6623.78
Wind 300 deg - No Ice		-25924.11	-14931.78	-1680402.32	2921825.28	-5725.06
Wind 315 deg - No Ice		-21170.23	-21111.04	-2376697.44	2386141.63	-4667.73
Wind 330 deg - No Ice		-14973.64	-25851.61	-2910877.68	1687887.22	-3292.31
Member Ice	4469.95					
Total Weight Ice	58083.13			4686.86	2121.82	
Wind 0 deg - Ice		-14.01	-25943.76	-3002573.63	3705.21	-429.68
Wind 30 deg - Ice		12997.43	-22460.94	-2598885.42	-1504395.38	3467.12
Wind 45 deg - Ice		18388.39	-18335.10	-2120647.80	-2129234.86	5125.67
Wind 60 deg - Ice		22526.21	-12959.74	-1497572.13	-2608825.91	6434.91
Wind 90 deg - Ice		26019.12	14.01	6270.25	-3013655.09	7678.47
Wind 120 deg - Ice		22540.23	12984.01	1509688.36	-2610409.29	6864.59
Wind 135 deg - Ice		18408.21	18354.91	2132260.77	-2131474.11	5733.33
Wind 150 deg - Ice		13021.70	22474.96	2609842.54	-1507137.89	4211.35
Wind 180 deg - Ice		14.01	25943.76	3011947.35	538.43	429.68
Wind 210 deg - Ice		-12997.43	22460.94	2608259.15	1508639.02	-3467.12
Wind 225 deg - Ice		-18388.39	18335.10	2130021.52	2133478.50	-5125.67
Wind 240 deg - Ice		-22526.21	12959.74	1506945.85	2613069.55	-6434.91
Wind 270 deg - Ice		-26019.12	-14.01	3103.47	3017898.73	-7678.47
Wind 300 deg - Ice		-22540.23	-12984.01	-1500314.64	2614652.93	-6864.59
Wind 315 deg - Ice		-18408.21	-18354.91	-2122887.05	2135717.75	-5733.33
Wind 330 deg - Ice		-13021.70	-22474.96	-2600468.81	1511381.53	-4211.35
Total Weight	48756.75			2155.40	599.36	
Wind 0 deg - Service		-4.29	-11658.02	-1312002.94	217.43	8.83
Wind 30 deg - Service		5841.64	-10093.99	-1135763.54	-658524.12	1301.36
Wind 45 deg - Service		8263.55	-8240.42	-926898.37	-931434.00	1835.82
Wind 60 deg - Service		10122.31	-5825.29	-654753.83	-1140886.44	2245.18
Wind 90 deg - Service		11690.72	4.29	2140.01	-1317620.94	2587.42
Wind 120 deg - Service		10126.61	5832.73	658903.82	-1141371.74	2236.35
Wind 135 deg - Service		8269.62	8246.50	930894.10	-932120.32	1823.33
Wind 150 deg - Service		5849.08	10098.28	1139558.26	-659364.69	1286.06
Wind 180 deg - Service		4.29	11658.02	1315312.36	-753.17	-8.83
Wind 210 deg - Service		-5841.64	10093.99	1139072.96	657988.39	-1301.36
Wind 225 deg - Service		-8263.55	8240.42	930207.78	930898.27	-1835.82
Wind 240 deg - Service		-10122.31	5825.29	658063.25	1140350.71	-2245.18
Wind 270 deg - Service		-11690.72	-4.29	1169.41	1317085.21	-2587.42
Wind 300 deg - Service		-10126.61	-5832.73	-655594.40	1140836.01	-2236.35
Wind 315 deg - Service		-8269.62	-8246.50	-927584.68	931584.58	-1823.33
Wind 330 deg - Service		-5849.08	-10098.28	-1136248.84	658828.95	-1286.06

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 45 deg - No Ice
5	Dead+Wind 60 deg - No Ice
6	Dead+Wind 90 deg - No Ice
7	Dead+Wind 120 deg - No Ice
8	Dead+Wind 135 deg - No Ice
9	Dead+Wind 150 deg - No Ice
10	Dead+Wind 180 deg - No Ice
11	Dead+Wind 210 deg - No Ice

Comb. No.	Description
12	Dead+Wind 225 deg - No Ice
13	Dead+Wind 240 deg - No Ice
14	Dead+Wind 270 deg - No Ice
15	Dead+Wind 300 deg - No Ice
16	Dead+Wind 315 deg - No Ice
17	Dead+Wind 330 deg - No Ice
18	Dead+Ice+Temp
19	Dead+Wind 0 deg+Ice+Temp
20	Dead+Wind 30 deg+Ice+Temp
21	Dead+Wind 45 deg+Ice+Temp
22	Dead+Wind 60 deg+Ice+Temp
23	Dead+Wind 90 deg+Ice+Temp
24	Dead+Wind 120 deg+Ice+Temp
25	Dead+Wind 135 deg+Ice+Temp
26	Dead+Wind 150 deg+Ice+Temp
27	Dead+Wind 180 deg+Ice+Temp
28	Dead+Wind 210 deg+Ice+Temp
29	Dead+Wind 225 deg+Ice+Temp
30	Dead+Wind 240 deg+Ice+Temp
31	Dead+Wind 270 deg+Ice+Temp
32	Dead+Wind 300 deg+Ice+Temp
33	Dead+Wind 315 deg+Ice+Temp
34	Dead+Wind 330 deg+Ice+Temp
35	Dead+Wind 0 deg - Service
36	Dead+Wind 30 deg - Service
37	Dead+Wind 45 deg - Service
38	Dead+Wind 60 deg - Service
39	Dead+Wind 90 deg - Service
40	Dead+Wind 120 deg - Service
41	Dead+Wind 135 deg - Service
42	Dead+Wind 150 deg - Service
43	Dead+Wind 180 deg - Service
44	Dead+Wind 210 deg - Service
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	176.01 - 130.76	Pole	Max Tension	18	0.00	-0.00	0.00
			Max. Compression	18	-12436.06	501.72	-5.60
			Max. Mx	14	-8561.17	326948.80	-96.91
			Max. My	2	-8564.19	235.12	326627.35
			Max. Vy	14	-12826.84	326948.80	-96.91
			Max. Vx	10	12826.17	227.25	-326605.21
			Max. Torque	19			1737.89
L2	130.76 - 86.13	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-25886.03	1101.56	-3607.42
			Max. Mx	14	-19421.62	1091739.08	-1446.06
			Max. My	10	-19427.33	180.85	-1091109.39
			Max. Vy	14	-22125.15	1091739.08	-1446.06

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vx	10	22040.09	180.85	-
			Max. Torque	23			1091109.39
L3	86.13 - 43	Pole	Max Tension	1	0.00	0.00	-7479.13
			Max. Compression	18	-39261.10	978.78	0.00
			Max. Mx	14	-31433.79	2103427.77	-4137.22
			Max. My	10	-31437.01	-499.42	-1255.90
							-
			Max. Vy	14	-26289.24	2103427.77	2099645.14
			Max. Vx	10	26204.23	-499.42	-1255.90
							-
			Max. Torque	23			2099645.14
L4	43 - 1	Pole	Max Tension	1	0.00	0.00	-7522.06
			Max. Compression	18	-58083.13	2177.24	0.00
			Max. Mx	14	-48741.60	3483329.84	-4829.14
			Max. My	10	-48741.68	-657.31	-947.57
							-
			Max. Vy	14	-29952.92	3483329.84	3475233.28
			Max. Vx	10	29869.15	-657.31	-947.57
							-
			Max. Torque	23			3475233.28
							-7573.48

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	31	58083.13	26019.14	14.01
	Max. H_x	14	48756.75	29928.24	10.99
	Max. H_z	2	48756.76	10.99	29844.53
	Max. M_x	2	3470736.60	10.99	29844.53
	Max. M_z	6	3482083.24	-29928.24	-10.99
	Max. Torsion	31	7573.00	26019.14	14.01
	Min. Vert	1	48756.75	0.00	0.00
	Min. H_x	6	48756.75	-29928.24	-10.99
	Min. H_z	10	48756.76	-10.99	-29844.53
	Min. M_x	10	-3475233.28	-10.99	-29844.53
	Min. M_z	14	-3483329.84	29928.24	10.99
	Min. Torsion	23	-7573.49	-26019.14	-14.01

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	48756.75	0.00	0.00	2155.40	599.36	0.00
Dead+Wind 0 deg - No Ice	48756.76	-10.99	-29844.53	-3470736.60	1897.64	42.71
Dead+Wind 30 deg - No Ice	48756.75	14954.60	-25840.61	-3004815.35	-1739621.16	3309.41
Dead+Wind 45 deg - No Ice	48756.75	21154.69	-21095.49	-2452631.70	-2461114.09	4657.96
Dead+Wind 60 deg - No Ice	48756.75	25913.12	-14912.74	-1733154.05	-3014844.71	5688.98
Dead+Wind 90 deg - No Ice	48756.75	29928.24	10.99	3501.52	-3482083.24	6543.88
Dead+Wind 120 deg - No Ice	48756.75	25924.11	14931.78	1739825.47	-3016140.58	5645.30
Dead+Wind 135 deg - No Ice	48756.75	21170.23	21111.04	2458908.31	-2462942.50	4596.38

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 150 deg - No Ice	48756.75	14973.64	25851.61	3010574.82	-1741853.29	3234.30
Dead+Wind 180 deg - No Ice	48756.76	10.99	29844.53	3475233.28	-657.30	-42.95
Dead+Wind 210 deg - No Ice	48756.75	-14954.60	25840.61	3009302.66	1740883.99	-3308.66
Dead+Wind 225 deg - No Ice	48756.75	-21154.69	21095.49	2457107.29	2462381.74	-4656.99
Dead+Wind 240 deg - No Ice	48756.75	-25913.12	14912.74	1737617.06	3016110.69	-5688.03
Dead+Wind 270 deg - No Ice	48756.75	-29928.24	-10.99	946.57	3483329.84	-6543.57
Dead+Wind 300 deg - No Ice	48756.75	-25924.11	-14931.78	-1735368.00	3017364.65	-5645.92
Dead+Wind 315 deg - No Ice	48756.75	-21170.23	-21111.04	-2454439.12	2464161.75	-4597.30
Dead+Wind 330 deg - No Ice	48756.75	-14973.64	-25851.61	-3006093.04	1743074.21	-3235.27
Dead+Ice+Temp	58083.13	-0.00	0.00	4829.14	2177.24	0.06
Dead+Wind 0 deg+Ice+Temp	58083.13	-14.01	-25943.77	-3131062.52	3850.49	-399.97
Dead+Wind 30 deg+Ice+Temp	58083.13	12997.43	-22460.96	-2710101.67	-1568769.55	3440.80
Dead+Wind 45 deg+Ice+Temp	58083.13	18388.40	-18335.11	-2211398.00	-2220340.85	5072.95
Dead+Wind 60 deg+Ice+Temp	58083.13	22526.23	-12959.75	-1561656.45	-2720450.61	6359.28
Dead+Wind 90 deg+Ice+Temp	58083.13	26019.14	14.01	6553.65	-3142605.46	7573.49
Dead+Wind 120 deg+Ice+Temp	58083.13	22540.24	12984.02	1574338.13	-2722115.29	6758.31
Dead+Wind 135 deg+Ice+Temp	58083.13	18408.22	18354.92	2223572.81	-2222689.41	5637.41
Dead+Wind 150 deg+Ice+Temp	58083.13	13021.70	22474.97	2721612.36	-1571636.44	4132.43
Dead+Wind 180 deg+Ice+Temp	58083.13	14.01	25943.77	3140951.03	569.28	399.66
Dead+Wind 210 deg+Ice+Temp	58083.13	-12997.43	22460.96	2719979.27	1573218.91	-3440.07
Dead+Wind 225 deg+Ice+Temp	58083.13	-18388.40	18335.11	2221260.72	2224797.04	-5071.95
Dead+Wind 240 deg+Ice+Temp	58083.13	-22526.23	12959.75	1571502.83	2724905.30	-6358.26
Dead+Wind 270 deg+Ice+Temp	58083.13	-26019.14	-14.01	3272.43	3147035.89	-7573.00
Dead+Wind 300 deg+Ice+Temp	58083.13	-22540.24	-12984.02	-1564501.13	2726516.14	-6758.75
Dead+Wind 315 deg+Ice+Temp	58083.13	-18408.22	-18354.92	-2213720.93	2227083.43	-5638.23
Dead+Wind 330 deg+Ice+Temp	58083.13	-13021.70	-22474.97	-2711744.15	1576031.96	-4133.38
Dead+Wind 0 deg - Service	48756.75	-4.29	-11658.02	-1355377.15	1125.13	14.58
Dead+Wind 30 deg - Service	48756.75	5841.64	-10093.99	-1173239.59	-679658.24	1296.40
Dead+Wind 45 deg - Service	48756.75	8263.55	-8240.43	-957383.53	-961699.79	1825.82
Dead+Wind 60 deg - Service	48756.75	10122.31	-5825.29	-676129.73	-1178160.68	2230.79
Dead+Wind 90 deg - Service	48756.75	11690.72	4.29	2753.20	-1360809.32	2567.40
Dead+Wind 120 deg - Service	48756.75	10126.61	5832.73	681504.12	-1178662.98	2216.06
Dead+Wind 135 deg - Service	48756.75	8269.63	8246.50	962601.04	-962409.39	1805.01
Dead+Wind 150 deg - Service	48756.75	5849.08	10098.29	1178252.14	-680526.09	1270.96
Dead+Wind 180 deg - Service	48756.75	4.29	11658.02	1359892.45	126.62	-14.61
Dead+Wind 210 deg - Service	48756.75	-5841.64	10093.99	1177753.46	680913.44	-1296.25
Dead+Wind 225 deg - Service	48756.75	-8263.55	8240.43	961895.61	962955.72	-1825.63
Dead+Wind 240 deg - Service	48756.75	-10122.31	5825.29	680639.90	1179416.36	-2230.62
Dead+Wind 270 deg - Service	48756.75	-11690.72	-4.29	1754.69	1362062.04	-2567.33
Dead+Wind 300 deg - Service	48756.75	-10126.61	-5832.73	-676994.80	1179912.26	-2216.14
Dead+Wind 315 deg - Service	48756.75	-8269.63	-8246.50	-958089.93	963657.93	-1805.15
Dead+Wind 330 deg - Service	48756.75	-5849.08	-10098.29	-1173739.11	681774.88	-1271.12

Solution Summary

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
1	0.00	-48756.75	0.00	0.00	48756.75	0.00	0.000%
2	-10.99	-48756.75	-29844.52	10.99	48756.76	29844.53	0.000%
3	14954.60	-48756.75	-25840.61	-14954.60	48756.75	25840.61	0.000%
4	21154.69	-48756.75	-21095.49	-21154.69	48756.75	21095.49	0.000%
5	25913.12	-48756.75	-14912.74	-25913.12	48756.75	14912.74	0.000%
6	29928.24	-48756.75	10.99	-29928.24	48756.75	-10.99	0.000%
7	25924.11	-48756.75	14931.78	-25924.11	48756.75	-14931.78	0.000%
8	21170.23	-48756.75	21111.04	-21170.23	48756.75	-21111.04	0.000%
9	14973.64	-48756.75	25851.61	-14973.64	48756.75	-25851.61	0.000%
10	10.99	-48756.75	29844.52	-10.99	48756.76	-29844.53	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
11	-14954.60	-48756.75	25840.61	14954.60	48756.75	-25840.61	0.000%
12	-21154.69	-48756.75	21095.49	21154.69	48756.75	-21095.49	0.000%
13	-25913.12	-48756.75	14912.74	25913.12	48756.75	-14912.74	0.000%
14	-29928.24	-48756.75	-10.99	29928.24	48756.75	10.99	0.000%
15	-25924.11	-48756.75	-14931.78	25924.11	48756.75	14931.78	0.000%
16	-21170.23	-48756.75	-21111.04	21170.23	48756.75	21111.04	0.000%
17	-14973.64	-48756.75	-25851.61	14973.64	48756.75	25851.61	0.000%
18	0.00	-58083.13	0.00	0.00	58083.13	-0.00	0.000%
19	-14.01	-58083.13	-25943.76	14.01	58083.13	25943.77	0.000%
20	12997.43	-58083.13	-22460.94	-12997.43	58083.13	22460.96	0.000%
21	18388.39	-58083.13	-18335.10	-18388.40	58083.13	18335.11	0.000%
22	22526.21	-58083.13	-12959.74	-22526.23	58083.13	12959.75	0.000%
23	26019.12	-58083.13	14.01	-26019.14	58083.13	-14.01	0.000%
24	22540.23	-58083.13	12984.01	-22540.24	58083.13	-12984.02	0.000%
25	18408.21	-58083.13	18354.91	-18408.22	58083.13	-18354.92	0.000%
26	13021.70	-58083.13	22474.96	-13021.70	58083.13	-22474.97	0.000%
27	14.01	-58083.13	25943.76	-14.01	58083.13	-25943.77	0.000%
28	-12997.43	-58083.13	22460.94	12997.43	58083.13	-22460.96	0.000%
29	-18388.39	-58083.13	18335.10	18388.40	58083.13	-18335.11	0.000%
30	-22526.21	-58083.13	12959.74	22526.23	58083.13	-12959.75	0.000%
31	-26019.12	-58083.13	-14.01	26019.14	58083.13	14.01	0.000%
32	-22540.23	-58083.13	-12984.01	22540.24	58083.13	12984.02	0.000%
33	-18408.21	-58083.13	-18354.91	18408.22	58083.13	18354.92	0.000%
34	-13021.70	-58083.13	-22474.96	13021.70	58083.13	22474.97	0.000%
35	-4.29	-48756.75	-11658.02	4.29	48756.75	11658.02	0.000%
36	5841.64	-48756.75	-10093.99	-5841.64	48756.75	10093.99	0.000%
37	8263.55	-48756.75	-8240.42	-8263.55	48756.75	8240.43	0.000%
38	10122.31	-48756.75	-5825.29	-10122.31	48756.75	5825.29	0.000%
39	11690.72	-48756.75	4.29	-11690.72	48756.75	-4.29	0.000%
40	10126.61	-48756.75	5832.73	-10126.61	48756.75	-5832.73	0.000%
41	8269.62	-48756.75	8246.50	-8269.63	48756.75	-8246.50	0.000%
42	5849.08	-48756.75	10098.28	-5849.08	48756.75	-10098.29	0.000%
43	4.29	-48756.75	11658.02	-4.29	48756.75	-11658.02	0.000%
44	-5841.64	-48756.75	10093.99	5841.64	48756.75	-10093.99	0.000%
45	-8263.55	-48756.75	8240.42	8263.55	48756.75	-8240.43	0.000%
46	-10122.31	-48756.75	5825.29	10122.31	48756.75	-5825.29	0.000%
47	-11690.72	-48756.75	-4.29	11690.72	48756.75	4.29	0.000%
48	-10126.61	-48756.75	-5832.73	10126.61	48756.75	5832.73	0.000%
49	-8269.62	-48756.75	-8246.50	8269.63	48756.75	8246.50	0.000%
50	-5849.08	-48756.75	-10098.28	5849.08	48756.75	10098.29	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	4	0.00000001	0.00032412
3	Yes	5	0.00000001	0.00031621
4	Yes	5	0.00000001	0.00034554
5	Yes	5	0.00000001	0.00028576
6	Yes	5	0.00000001	0.00005752
7	Yes	5	0.00000001	0.00033887
8	Yes	5	0.00000001	0.00034887
9	Yes	5	0.00000001	0.00028958
10	Yes	4	0.00000001	0.00031534
11	Yes	5	0.00000001	0.00029755

12	Yes	5	0.00000001	0.00034706
13	Yes	5	0.00000001	0.00033237
14	Yes	5	0.00000001	0.00005705
15	Yes	5	0.00000001	0.00028236
16	Yes	5	0.00000001	0.00034793
17	Yes	5	0.00000001	0.00032729
18	Yes	4	0.00000001	0.00000519
19	Yes	5	0.00000001	0.00019242
20	Yes	5	0.00000001	0.00062791
21	Yes	5	0.00000001	0.00069653
22	Yes	5	0.00000001	0.00058670
23	Yes	5	0.00000001	0.00022466
24	Yes	5	0.00000001	0.00067273
25	Yes	5	0.00000001	0.00070687
26	Yes	5	0.00000001	0.00059213
27	Yes	5	0.00000001	0.00019288
28	Yes	5	0.00000001	0.00060797
29	Yes	5	0.00000001	0.00070305
30	Yes	5	0.00000001	0.00065902
31	Yes	5	0.00000001	0.00022437
32	Yes	5	0.00000001	0.00058216
33	Yes	5	0.00000001	0.00070372
34	Yes	5	0.00000001	0.00065301
35	Yes	4	0.00000001	0.00007915
36	Yes	4	0.00000001	0.00069188
37	Yes	4	0.00000001	0.00075745
38	Yes	4	0.00000001	0.00057570
39	Yes	4	0.00000001	0.00028451
40	Yes	4	0.00000001	0.00080660
41	Yes	4	0.00000001	0.00078116
42	Yes	4	0.00000001	0.00058499
43	Yes	4	0.00000001	0.00007897
44	Yes	4	0.00000001	0.00061448
45	Yes	4	0.00000001	0.00076786
46	Yes	4	0.00000001	0.00077586
47	Yes	4	0.00000001	0.00028400
48	Yes	4	0.00000001	0.00056879
49	Yes	4	0.00000001	0.00077528
50	Yes	4	0.00000001	0.00074527

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176.01 - 130.76	36.347	46	1.8305	0.0059
L2	135.26 - 86.13	21.438	46	1.5710	0.0072
L3	91.88 - 43	9.447	46	1.0182	0.0043
L4	50 - 1	2.668	47	0.4990	0.0015

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	12' Low Profile Platform	46	36.343	1.8304	0.0059	39131

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
170.00	7770.00 w/ mount pipe	46	34.048	1.8009	0.0061	32555
160.00	Valmont T-Arm (1)	46	30.259	1.7486	0.0067	12220
150.00	Low Profile Platform	46	26.569	1.6877	0.0071	7521
130.00	2 Bay Dipole	46	19.727	1.5190	0.0072	4761
125.50	Valmont Uni-Tri Bracket	46	18.318	1.4701	0.0070	4728
124.00	742 213 w/mount pipe	46	17.860	1.4531	0.0069	4718
122.50	Valmont Uni-Tri Bracket	46	17.408	1.4356	0.0069	4707
114.00	LPA-80063/6CF	46	14.953	1.3300	0.0063	4645
112.00	Andrew 12'-6" Low Profile Platform	46	14.403	1.3037	0.0061	4631
100.00	6' Side Mount Standoff	46	11.319	1.1371	0.0050	4546
75.00	Side Mount Standoff	47	6.126	0.7717	0.0029	4323
60.00	Side Mount Standoff	47	3.836	0.5862	0.0019	4182

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	176.01 - 130.76	92.799	14	4.6740	0.0178
L2	135.26 - 86.13	54.762	14	4.0113	0.0213
L3	91.88 - 43	24.150	14	2.6020	0.0126
L4	50 - 1	6.821	14	1.2759	0.0045

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
176.00	12' Low Profile Platform	14	92.789	4.6739	0.0180	15517
170.00	7770.00 w/ mount pipe	14	86.935	4.6000	0.0186	12909
160.00	Valmont T-Arm (1)	14	77.270	4.4682	0.0199	4844
150.00	Low Profile Platform	14	67.855	4.3131	0.0211	2980
130.00	2 Bay Dipole	14	50.396	3.8756	0.0210	1882
125.50	Valmont Uni-Tri Bracket	14	46.801	3.7481	0.0206	1868
124.00	742 213 w/mount pipe	14	45.632	3.7035	0.0204	1863
122.50	Valmont Uni-Tri Bracket	14	44.477	3.6580	0.0202	1859
114.00	LPA-80063/6CF	14	38.211	3.3844	0.0185	1832
112.00	Andrew 12'-6" Low Profile Platform	14	36.806	3.3168	0.0180	1826
100.00	6' Side Mount Standoff	14	28.931	2.8947	0.0148	1791
75.00	Side Mount Standoff	14	15.661	2.0111	0.0086	1697
60.00	Side Mount Standoff	14	9.809	1.5413	0.0059	1639

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 lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	176.01 - 130.76 (1)	TP31.8x21x0.25	45.25	0.00	0.0	39.000	24.1827	-8561.17	943125.00	0.009
L2	130.76 - 86.13 (2)	TP41.82x30.226x0.3125	49.13	0.00	0.0	39.000	39.8244	-19423.50	1553150.00	0.013
L3	86.13 - 43 (3)	TP51.36x39.8381x0.375	48.88	0.00	0.0	39.000	58.7209	-31433.80	2290120.00	0.014
L4	43 - 1 (4)	TP60.5x48.96x0.4375	49.00	0.00	0.0	39.000	83.4043	-48741.60	3252770.00	0.015

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	176.01 - 130.76 (1)	TP31.8x21x0.25	326949.17	21.581	39.000	0.553	0.00	0.000	39.000	0.000
L2	130.76 - 86.13 (2)	TP41.82x30.226x0.3125	1091866.67	33.205	39.000	0.851	0.00	0.000	39.000	0.000
L3	86.13 - 43 (3)	TP51.36x39.8381x0.375	2103425.00	35.300	39.000	0.905	0.00	0.000	39.000	0.000
L4	43 - 1 (4)	TP60.5x48.96x0.4375	3483333.33	33.796	39.000	0.867	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V lb	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T lb-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	176.01 - 130.76 (1)	TP31.8x21x0.25	12826.80	0.530	26.000	0.041	180.93	0.006	26.000	0.000
L2	130.76 - 86.13 (2)	TP41.82x30.226x0.3125	22094.70	0.555	26.000	0.043	5060.62	0.075	26.000	0.003
L3	86.13 - 43 (3)	TP51.36x39.8381x0.375	26289.20	0.448	26.000	0.034	6499.05	0.053	26.000	0.002
L4	43 - 1 (4)	TP60.5x48.96x0.4375	29952.90	0.359	26.000	0.028	6543.57	0.031	26.000	0.001

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	176.01 - 130.76 (1)	0.009	0.553	0.000	0.041	0.000	0.563 ✔	1.333	H1-3+VT ✔
L2	130.76 - 86.13 (2)	0.013	0.851	0.000	0.043	0.003	0.865 ✔	1.333	H1-3+VT ✔
L3	86.13 - 43 (3)	0.014	0.905	0.000	0.034	0.002	0.919 ✔	1.333	H1-3+VT ✔
L4	43 - 1 (4)	0.015	0.867	0.000	0.028	0.001	0.882 ✔	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

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	176.01 - 130.76	Pole	TP31.8x21x0.25	1	-8561.17	1257185.57	42.2	Pass
L2	130.76 - 86.13	Pole	TP41.82x30.226x0.3125	2	-19423.50	2070348.86	64.9	Pass
L3	86.13 - 43	Pole	TP51.36x39.8381x0.375	3	-31433.80	3052729.83	69.0	Pass
L4	43 - 1	Pole	TP60.5x48.96x0.4375	4	-48741.60	4335942.23	66.1	Pass
							Summary	
						Pole (L3)	69.0	Pass
						RATING =	**69.0**	**Pass**

ANCHOR BOLT AND
BASE PLATE ANALYSIS

URS

Job	176' EEI Monopole - Berlin, CT			Page	of
Description	Anchor Bolt and Base Plate Analysis	Project No.	VZ5-047 (Rev 1)	Sheet	1 of 6
		Computed by	KAB	Date	01/20/10
		Checked by		Date	

ANCHOR BOLT AND BASE PLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	$OM := 3483\,ft\cdot kips$	*user input*
Shear Force:	$Shear := 29.9\cdot kips$	*user input*
Axial Force:	$Axial := 48.7\cdot kips$	*user input*

Anchor Bolt Data:

Use ASTM A615 Grade 75		*user input*
Number of Anchor Bolts = N	$N := 18$	*user input*
Diameter of Bolt Circle:	$D_{bc} := 70.00in$	*user input*
Bolt "Column" Distance:	$l := 3.0in$	*user input*
Bolt Ultimate Strength:	$F_u := 100\cdot ksi$	*user input*
Bolt Yield Strength:	$Fy := 75\cdot ksi$	*user input*
Bolt Modulus:	$E := 29000\cdot ksi$	*user input*
Anchor Bolt Diameter	$D := 2.25in$	*user input*
Threads per Inch:	$n := 4.5$	*user input*

Base Plate Data:

Use ASTM A572 Grade 60		*user input*
Plate Yield Strength:	$Fy_{bp} := 60\cdot ksi$	*user input*
Base Plate Thickness:	$PlateThickness := 2.00\cdot in$	*user input*
Base Plate Diameter:	$D_{bp} := 76.00in$	*user input*
Outer Pole Diameter:	$D_{pole} := 60.50in$	*user input*

Geometric Layout Data:

Distance from the center of gravity of the group to bolt in question = d(i)

Radius of Bolt Circle: $R_{bc} := \frac{D_{bc}}{2}$

Distance to Bolts: $i := 1 .. N$

$$d_i := \left| \begin{array}{l} \theta \leftarrow 2 \cdot \pi \cdot \left(\frac{i}{N}\right) \\ d \leftarrow R_{bc} \cdot \sin(\theta) \end{array} \right.$$

$d_1 = 11.97 \cdot in$ $d_7 = 22.50 \cdot in$

$d_2 = 22.50 \cdot in$ $d_8 = 11.97 \cdot in$

$d_3 = 30.31 \cdot in$ $d_9 = 0.00 \cdot in$

$d_4 = 34.47 \cdot in$ $d_{10} = -11.97 \cdot in$

$d_5 = 34.47 \cdot in$ $d_{11} = -22.50 \cdot in$

$d_6 = 30.31 \cdot in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius: $R_{pole} := \frac{D_{pole}}{2}$ $R_{pole} = 30.25 \cdot in$

Moment Arms of Bolts about Neutral Axis: $MA_i := if\left(d_i \geq R_{pole}, d_i - R_{pole}, 0in\right)$

$MA_1 = 0.00 \cdot in$ $MA_7 = 0.00 \cdot in$

$MA_2 = 0.00 \cdot in$ $MA_8 = 0.00 \cdot in$

$MA_3 = 0.06 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 4.22 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 4.22 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.06 \cdot in$ etc.

Effective Width of Baseplate for Bending: $EffectiveWidth := .9 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2}$ $EffectiveWidth = 41.40 \cdot in$

Anchor Bolt Analysis:

Polar Moment of Inertia I_p:

$$I_p := \sum_i \left(d_i\right)^2 \qquad I_p = 1.103 \times 10^4 \cdot in^2$$

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \qquad A_g = 3.976 \cdot in^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot in}{n}\right)^2 \qquad A_n = 3.248 \cdot in^2$$

Net Diameter:

$$D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} \qquad D_n = 2.03 \cdot in$$

Radius of Gyration of Bolt:

$$r := \frac{D_n}{4} \qquad r = 0.51 \cdot in$$

Section Modulus of Bolt:

$$S_x := \frac{\pi \cdot D_n^{\,3}}{32} \qquad S_x = 0.826 \cdot in^3$$

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{Shear}{N}\right) \cdot l \qquad M_x = 0.415 \cdot ft \cdot kips$$

$$f_{bx} := \frac{M_x}{S_x} \qquad f_{bx} = 6.0 \cdot ksi$$

Allowable Bending

$$F_{bx} := 1.333 \cdot 0.60 \cdot Fy \qquad F_{bx} = 60.0 \cdot ksi$$

Note: 1.333 increase allowed per TIA/EIA

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$AllowableTension := 1.333 \cdot (0.33 \cdot A_g \cdot F_u)$ $AllowableTension = 174.9 \cdot kips$

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$F_{net.area} := 1.333 \cdot (0.60 \cdot A_n \cdot Fy)$ $F_{net.area} = 194.8 \cdot kips$

Note: 1.333 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{OM \cdot R_{bc}}{I_p} - \frac{Axial}{N} \qquad MaxTension = 130.0 \cdot kips$$

Check Stresses:

Note: Bolts supplied are "upset bolts." Use net area for checking per AISC.

$$\frac{MaxTension}{F_{net.area}} = 0.67$$

$$Condition := if\left(\frac{MaxTension}{F_{net.area}} \le 1.00, "OK", "Overstressed"\right)$$

Condition = "OK"

Check Compression & Combined Stresses (if required):

Check to see if a complete combined stress analysis is required:

Per ASCE Manual 72: "If the clearance between the base plate and concrete does not exceed two times the bolt diameter a bending stress analysis of the bolts is NOT normally required."

Set the clear space between the plate and bolt to zero and remove bending stresses if a combined stress analysis is not required:

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n \\ 0.00\,in & \text{otherwise} \end{cases} \qquad l = 0.00 \cdot in$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0\,ksi & \text{otherwise} \end{cases} \qquad f_{bx} = 0.0 \cdot ksi$$

Allowable Compressive Force:

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{Fy}} \qquad C_c = 87.36$$

$$F_a := \begin{cases} \dfrac{\left[1 - \dfrac{\left(\frac{K \cdot l}{r}\right)^2}{2 \cdot C_c^{\,2}}\right] \cdot Fy}{\dfrac{5}{3} + \dfrac{3 \cdot \left(\frac{K \cdot l}{r}\right)}{8 \cdot C_c} - \dfrac{\left(\frac{K \cdot l}{r}\right)^3}{8 \cdot C_c^{\,3}}} & \text{if } \dfrac{K \cdot l}{r} \le C_c \\ \dfrac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r}\right)^2} & \text{if } \dfrac{K \cdot l}{r} > C_c \end{cases} \qquad F_a = 45.0 \cdot ksi$$

$$F_a := 1.333 \cdot F_a \qquad \text{Note: 1.333 increase allowed per TIA/EIA} \qquad F_a = 60.0 \cdot ksi$$

Applied Compressive Force:

$$MaxCompression := \frac{OM \cdot R_{bc}}{I_p} + \frac{Axial}{N} \qquad MaxCompression = 135.4 \cdot kips$$

$$f_a := \frac{MaxCompression}{A_n} \qquad f_a = 41.7 \cdot ksi$$

Check Combined Stresses:

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} = 0.69$$

$$Condition := if\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \le 1.00, \text{"OK"}, \text{"Overstressed"}\right) \qquad \boxed{Condition = \text{"OK"}}$$

Base Plate Analysis:

Force from Bolt(s):

$$C_i := \frac{OM \cdot d_i}{I_p} + \frac{Axial}{N}$$

$C_1 = 48.1 \cdot kips$ $C_7 = 88.0 \cdot kips$

$C_2 = 88.0 \cdot kips$ $C_8 = 48.1 \cdot kips$

$C_3 = 117.6 \cdot kips$ $C_9 = 2.7 \cdot kips$

$C_4 = 133.4 \cdot kips$ $C_{10} = -42.7 \cdot kips$

$C_5 = 133.4 \cdot kips$ $C_{11} = -82.6 \cdot kips$

$C_6 = 117.6 \cdot kips$ etc.

Bending Stress in Plate:

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{EffectiveWidth \cdot PlateThickness^2}$$

$f_{bp} = 41.3 \cdot ksi$

Check Stresses:

$$\frac{f_{bp}}{1.333 \cdot 0.75 Fy_{bp}} = 0.69$$

$$Condition := if\left(\frac{f_{bp}}{1.333 \cdot 0.75 Fy_{bp}} < 1.00, "OK", "Overstressed"\right)$$

Condition = "OK"

FOUNDATION ANALYSIS

Check Foundation Depth TIA/EIA-222-F 7.2.5

Shear Force: $S := 29.9k$ *USER INPUT*

Overturning Moment: $M := 3483ft \cdot k$ *USER INPUT*

Foundation Diameter: $d := 7.5ft$ *USER INPUT*

Overall Length of Caisson: $L_c := 39ft$ *USER INPUT*

Depth From Top of Caisson to Grade: $L_{pag} := 4ft$ *USER INPUT*

Depth of Caisson Below Ground Level: $LD := L_c - L_{pag}$ $LD = 35.0\,ft$ *USER INPUT*

Depth Required:

$$LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d}\right) + 2ft \cdot .5\left(\frac{M \cdot ft}{3 \cdot k\,d} + \frac{S \cdot ft}{2k} + \frac{S^2\,ft^3}{18k^2\,d^2}\right)^{.5} \qquad LD1 = 29.5\,ft$$

$DepthCheck := if(LD1 \le LD, "OK", "NO GOOD")$ $DepthCheck = "OK"$

Note: Result not applicable. Actual soil is better than normal soil as defined in TIA/EIA 222 F. Refer to L-Pile analysis.

Moment Capacity:

Bending Moment: $Mu := 3733ft \cdot k$ *USER INPUT--FROM LPILE*

Moment Capacity: $Mn := 8833ft \cdot k$ *USER INPUT--FROM LPILE*

Factor of Safety: $FS := \frac{Mn}{Mu}$ $FS = 2.4$

Factor of Safety Required $FS_{reqd} := 1.3$ $FOSCheck := if(FS \ge FS_{reqd}, "OK", "NO GOOD")$ $FOSCheck = "OK"$

Factor of Safety Ratio: $FS_{ratio} := \left(\frac{FS_{reqd}}{FS}\right) = 0.55$

Axial Capacity:

Applied Axial Load: $A1 := 58k$ *USER INPUT*

Concrete Weight: $A2 := .150\frac{k}{ft^3}\cdot LD\cdot\pi\frac{d^2}{4}$ $A2 = 231.9\cdot k$

Total Axial Load: $AT := A1 + A2$ $AT = 289.9\cdot k$

Number of Rebar: $n := 30$ *USER INPUT*

Area of Rebar: $Ar := 1.56in^2$ *USER INPUT* #11

Rebar Yield Strength: $fy := 60ksi$ *USER INPUT*

Area of Concrete: $Ag := \pi\cdot\frac{d^2}{4}$ $Ag = 44.2\,ft^{2.0}$

Concrete Comp Strength: $f'c := 4ksi$ *USER INPUT*

Axial Capacity: $Po := n\cdot Ar\cdot fy + (Ag - n\cdot Ar)\cdot 0.85\cdot f'c$ $Po = 24278.7\cdot k$

$AxialCheck := if(AT \le Po, "OK", "NO GOOD")$ $AxialCheck = "OK"$

LPILE Plus for Windows, Version 4

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

This program is licensed to:

Software Coordinator

URS Corp

Name of input data file: P:\08\MathCAD\Foundation\Caisson Analysis.lpd

Name of output file: P:\08\MathCAD\Foundation\Caisson Analysis.lpo

Name of plot output file: P:\08\MathCAD\Foundation\Caisson Analysis.lpp

Name of runtime file: P:\08\MathCAD\Foundation\Caisson Analysis.lpr

Time and Date of Analysis

Date: January 20, 2010 Time: 17:30:14

Problem Title

176' EEI Monopole - Berlin Fire Department

Program Options

Units Used in Computations - US Customary Units, inches, pounds

Basic Program Options:

Analysis Type 3:
- Computations of Ultimate Bending Moment Capacity and Pile Response
  Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers
  (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip

- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Deflection tolerance for closure = 1.0000E-05 in
- Maximum number of iterations allowed = 100
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 1

Pile Structural Properties and Geometry

Pile Length = 468.00 in
Depth of ground surface below top of pile = 48.00 in
Slope angle of ground surface = .00 deg.

Structural properties of pile defined using 2 points

Point	Depth X in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	.000	90.000	3.2206E+06	6.3610E+03	3.0000E+06
2	468.000	90.000	3.2206E+06	6.3610E+03	3.0000E+06

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 48.000 in
Distance from top of pile to bottom of layer = 60.000 in
p-y subgrade modulus k for top of soil layer = 1.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 1.000 lbs/in**3

Layer 2 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 60.000 in
Distance from top of pile to bottom of layer = 132.000 in
p-y subgrade modulus k for top of soil layer = 25.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 25.000 lbs/in**3

Layer 3 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 132.000 in
Distance from top of pile to bottom of layer = 192.000 in
p-y subgrade modulus k for top of soil layer = 35.000 lbs/in**3

p-y subgrade modulus k for bottom of layer = 35.000 lbs/in**3

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 192.000 in
Distance from top of pile to bottom of layer = 468.000 in
p-y subgrade modulus k for top of soil layer = 120.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 120.000 lbs/in**3

(Depth of lowest layer extends .00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Distribution of effective unit weight of soil with depth
is defined using 8 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	.00	.03588
2	60.00	.03588
3	60.00	.03588
4	132.00	.03588
5	132.00	.03588
6	192.00	.03588
7	192.00	.03588
8	468.00	.03588

Shear Strength of Soils

Distribution of shear strength parameters with depth
defined using 8 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50/k_rm	RQD %
1	.000	.00000	30.00	------	------
2	60.000	.00000	30.00	------	------
3	60.000	.00000	32.00	------	------
4	132.000	.00000	32.00	------	------
5	132.000	.00000	34.00	------	------
6	192.000	.00000	34.00	------	------
7	192.000	.00000	36.00	------	------
8	468.000	.00000	36.00	------	------

Notes:

(1) Cohesion = uniaxial compressive strength for rock materials.
(2) E50 is reported for clay strata.
(3) k_rm is reported for rock strata.
(4) RQD is input and reported only for rock materials.
(5) Internal default values for E50 will be generated when input value is 0.

Static loading criteria was used for computation of p-y curves

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Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 2

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 26019.000 lbs
Bending moment at pile head = 37764456.000 in-lbs
Axial load at pile head = 58083.000 lbs

(Non-zero moment for this load indicates pile-head is free to rotate under the applied pile-head load)

Load Case Number 2

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Shear force at pile head = 29928.000 lbs
Bending moment at pile head = 41799960.000 in-lbs
Axial load at pile head = 48757.000 lbs

(Non-zero moment for this load indicates pile-head is free to rotate under the applied pile-head load)

Computations of Ultimate Moment Capacity and Nonlinear Bending Stiffness

---

Pile Description:

The pile shape is a circular solid pile.

Outside Diameter = 90.000 In

Material Properties:

Compressive Strength of Concrete = 3. Kip/In**2
Yield stress for rebar = 60. Kip/In**2
Modulus of elasticity of steel = 29000. Kip/In**2
Number of reinforcing bars = 30
Area of single rebar = 1.56000 In**2
Number of rows of reinforcing bars = 15
Cover Thickness = 4.000 In

Ultimate squash load capacity = 18911.06 Kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement In**2	Distance to Centroidal Axis In
1	3.120000	40.7754
2	3.120000	38.9933
3	3.120000	35.5070
4	3.120000	30.4689
5	3.120000	24.0992
6	3.120000	16.6762

7	3.120000	8.5244
8	3.120000	.0000
9	3.120000	-8.5244
10	3.120000	-16.6762
11	3.120000	-24.0992
12	3.120000	-30.4689
13	3.120000	-35.5070
14	3.120000	-38.9933
15	3.120000	-40.7754

Axial Thrust Force = 58.083 Kip

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches
1.121E+07	1.121E+13	.00000100	.00004793	47.927
1.299E+07	2.598E+12	.00000500	.00012027	24.054
2.219E+07	2.466E+12	.00000900	.00020894	23.216
3.132E+07	2.410E+12	.00001300	.00029814	22.934
4.038E+07	2.375E+12	.00001700	.00038821	22.836
4.936E+07	2.350E+12	.00002100	.00047919	22.819
5.825E+07	2.330E+12	.00002500	.00057115	22.846
6.706E+07	2.312E+12	.00002900	.00066412	22.901
7.575E+07	2.296E+12	.00003300	.00075811	22.973
8.150E+07	2.203E+12	.00003700	.00084253	22.771
8.536E+07	2.082E+12	.00004100	.00092249	22.500
8.847E+07	1.966E+12	.00004500	.00099689	22.153
9.073E+07	1.852E+12	.00004900	.00106691	21.774
9.269E+07	1.749E+12	.00005300	.00113574	21.429
1.004E+08	1.210E+12	.00008300	.00161849	19.500
1.036E+08	9.165E+11	.00011300	.00205304	18.168
1.049E+08	7.339E+11	.00014300	.00247653	17.318
1.060E+08	6.128E+11	.00017300	.00289672	16.744
1.060E+08	5.223E+11	.00020300	.00334948	16.500
1.064E+08	4.568E+11	.00023300	.00379592	16.292
1.064E+08	4.047E+11	.00026300	.00423483	16.102

Ultimate moment capacity at concrete strain of 0.003 = 1.060E+08 In-lb

Axial Thrust Force = 48.757 Kip

Bending Moment in-lbs	Bending Stiffness lb-in2	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches
1.121E+07	1.121E+13	.00000100	.00004748	47.476
1.277E+07	2.554E+12	.00000500	.00011873	23.745
2.198E+07	2.442E+12	.00000900	.00020707	23.008
3.111E+07	2.393E+12	.00001300	.00029624	22.788
4.017E+07	2.363E+12	.00001700	.00038628	22.722
4.914E+07	2.340E+12	.00002100	.00047723	22.725
5.804E+07	2.322E+12	.00002500	.00056914	22.766
6.685E+07	2.305E+12	.00002900	.00066207	22.830
7.554E+07	2.289E+12	.00003300	.00075598	22.908
8.126E+07	2.196E+12	.00003700	.00084027	22.710
8.519E+07	2.078E+12	.00004100	.00092071	22.456
8.821E+07	1.960E+12	.00004500	.00099420	22.093
9.047E+07	1.846E+12	.00004900	.00106419	21.718

9.242E+07	1.744E+12	.00005300	.00113290	21.375
1.003E+08	1.208E+12	.00008300	.00161612	19.471
1.033E+08	9.139E+11	.00011300	.00204815	18.125
1.047E+08	7.318E+11	.00014300	.00247025	17.274
1.057E+08	6.111E+11	.00017300	.00288959	16.703
1.060E+08	5.223E+11	.00020300	.00334948	16.500
1.061E+08	4.556E+11	.00023300	.00378225	16.233
1.061E+08	4.036E+11	.00026300	.00421975	16.045

Ultimate moment capacity at concrete strain of 0.003 = 1.058E+08 In-lb

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Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 26019.000 lbs
Specified bending moment at pile head = 37764456.000 in-lbs
Specified axial load at pile head = 58083.000 lbs

(Non-zero moment for this load does not indicate free-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res p lbs/in
0.000	.879533	3.78E+07	26019.0	-.005367	536.8	2.37E+12	0.000
4.680	.854589	3.79E+07	26019.0	-.005292	538.5	2.37E+12	0.000
9.360	.829995	3.80E+07	26019.0	-.005218	540.2	2.37E+12	0.000
14.040	.805752	3.81E+07	26019.0	-.005142	542.0	2.37E+12	0.000
18.720	.781862	3.83E+07	26019.0	-.005067	543.7	2.37E+12	0.000
23.400	.758326	3.84E+07	26019.0	-.004991	545.4	2.37E+12	0.000
28.080	.735145	3.85E+07	26019.0	-.004915	547.1	2.37E+12	0.000
32.760	.712319	3.86E+07	26019.0	-.004839	548.8	2.37E+12	0.000
37.440	.689851	3.87E+07	26019.0	-.004763	550.6	2.37E+12	0.000
42.120	.667741	3.89E+07	26019.0	-.004686	552.3	2.37E+12	0.000
46.800	.645992	3.90E+07	26019.0	-.004609	554.0	2.37E+12	0.000
51.480	.624603	3.91E+07	26013.9	-.004532	555.7	2.37E+12	-2.174
56.160	.603576	3.92E+07	25997.3	-.004454	557.4	2.37E+12	-4.925
60.840	.582912	3.94E+07	25750.1	-.004376	559.1	2.37E+12	-100.697
65.520	.562613	3.95E+07	25133.1	-.004298	560.8	2.36E+12	-163.016
70.200	.542680	3.96E+07	24235.1	-.004220	562.5	2.36E+12	-220.734
74.880	.523113	3.97E+07	23077.5	-.004142	564.0	2.36E+12	-273.980
79.560	.503914	3.98E+07	21680.8	-.004063	565.5	2.36E+12	-322.882
84.240	.485085	3.99E+07	20065.1	-.003984	566.9	2.36E+12	-367.572
88.920	.466625	4.00E+07	18249.9	-.003905	568.2	2.36E+12	-408.180
93.600	.448536	4.01E+07	16253.8	-.003825	569.3	2.36E+12	-444.835
98.280	.430819	4.02E+07	14095.2	-.003746	570.3	2.36E+12	-477.670
102.960	.413474	4.02E+07	11791.5	-.003666	571.2	2.36E+12	-506.815
107.640	.396502	4.03E+07	9359.7	-.003587	571.9	2.36E+12	-532.402
112.320	.379903	4.03E+07	6816.2	-.003507	572.4	2.36E+12	-554.563
117.000	.363678	4.03E+07	4176.7	-.003427	572.8	2.36E+12	-573.429
121.680	.347828	4.04E+07	1456.3	-.003347	573.0	2.36E+12	-589.132
126.360	.332351	4.04E+07	-1330.5	-.003267	573.0	2.36E+12	-601.804
131.040	.317249	4.03E+07	-4169.8	-.003187	572.9	2.36E+12	-611.576
135.720	.302520	4.03E+07	-7740.6	-.003107	572.5	2.36E+12	-914.390
140.400	.288166	4.03E+07	-12028.8	-.003027	571.9	2.36E+12	-918.205
145.080	.274185	4.02E+07	-16326.9	-.002948	571.0	2.36E+12	-918.567
149.760	.260577	4.01E+07	-20619.0	-.002868	569.8	2.36E+12	-915.660

154.440	.247340	4.00E+07	-24890.2	-.002789	568.3	2.36E+12	-909.662
159.120	.234475	3.99E+07	-29126.6	-.002710	566.5	2.36E+12	-900.753
163.800	.221979	3.97E+07	-33314.9	-.002631	564.5	2.36E+12	-889.109
168.480	.209852	3.96E+07	-37442.7	-.002552	562.2	2.36E+12	-874.908
173.160	.198091	3.94E+07	-41498.4	-.002474	559.6	2.37E+12	-858.322
177.840	.186695	3.92E+07	-45471.4	-.002396	556.8	2.37E+12	-839.524
182.520	.175661	3.90E+07	-49351.6	-.002319	553.7	2.37E+12	-818.683
187.200	.164989	3.87E+07	-53129.9	-.002242	550.3	2.37E+12	-795.968
191.880	.154675	3.85E+07	-56797.9	-.002166	546.8	2.37E+12	-771.545
196.560	.144716	3.82E+07	-64380.2	-.002090	542.9	2.37E+12	-2468.776
201.240	.135111	3.79E+07	-75728.2	-.002015	538.4	2.37E+12	-2380.797
205.920	.125856	3.75E+07	-86654.1	-.001941	533.0	2.37E+12	-2288.393
210.600	.116947	3.71E+07	-97138.4	-.001867	527.0	2.37E+12	-2192.084
215.280	.108381	3.66E+07	-107164.1	-.001794	520.4	2.37E+12	-2092.374
219.960	.100151	3.61E+07	-116716.2	-.001723	513.0	2.38E+12	-1989.746
224.640	.092254	3.55E+07	-125782.3	-.001652	505.1	2.38E+12	-1884.666
229.320	.084684	3.49E+07	-134352.0	-.001583	496.6	2.38E+12	-1777.578
234.000	.077435	3.42E+07	-142416.8	-.001515	487.5	2.38E+12	-1668.906
238.680	.070501	3.36E+07	-149970.2	-.001449	478.0	2.38E+12	-1559.052
243.360	.063875	3.28E+07	-157007.6	-.001384	467.9	2.39E+12	-1448.399
248.040	.057551	3.21E+07	-163526.2	-.001320	457.5	2.39E+12	-1337.304
252.720	.051520	3.13E+07	-169524.5	-.001258	446.6	2.39E+12	-1226.105
257.400	.045776	3.05E+07	-175003.0	-.001198	435.3	2.40E+12	-1115.114
262.080	.040311	2.97E+07	-179963.2	-.001139	423.7	2.40E+12	-1004.620
266.760	.035116	2.88E+07	-184408.0	-.001082	411.8	2.41E+12	-894.885
271.440	.030184	2.79E+07	-188341.6	-.001027	399.6	2.41E+12	-786.151
276.120	.025506	2.71E+07	-191769.2	-9.73E-04	387.1	2.41E+12	-678.635
280.800	.021074	2.61E+07	-194697.0	-9.22E-04	374.5	2.42E+12	-572.531
285.480	.016878	2.52E+07	-197131.8	-8.72E-04	361.7	2.42E+12	-468.013
290.160	.012910	2.43E+07	-199081.6	-8.24E-04	348.7	2.43E+12	-365.232
294.840	.009161	2.34E+07	-200554.8	-7.79E-04	335.7	2.43E+12	-264.317
299.520	.005622	2.24E+07	-201560.3	-7.35E-04	322.5	2.44E+12	-165.375
304.200	.002285	2.15E+07	-202107.5	-6.93E-04	309.3	2.45E+12	-68.496
308.880	-8.60E-04	2.05E+07	-202206.3	-6.52E-04	296.1	2.46E+12	26.260
313.560	-.003822	1.96E+07	-201866.8	-6.14E-04	282.9	2.47E+12	118.862
318.240	-.006610	1.86E+07	-201098.9	-5.78E-04	269.7	2.48E+12	209.291
322.920	-.009234	1.77E+07	-199912.9	-5.44E-04	256.6	2.49E+12	297.551
327.600	-.011703	1.68E+07	-198318.8	-5.12E-04	243.5	2.51E+12	383.659
332.280	-.014024	1.59E+07	-196326.8	-4.81E-04	230.6	2.52E+12	467.648
336.960	-.016208	1.49E+07	-193946.5	-4.53E-04	217.9	2.53E+12	549.566
341.640	-.018262	1.40E+07	-191187.5	-4.26E-04	205.3	2.54E+12	629.475
346.320	-.020195	1.32E+07	-188059.1	-4.01E-04	192.9	2.55E+12	707.448
351.000	-.022015	1.23E+07	-184570.2	-3.83E-04	180.7	5.29E+12	783.571
355.680	-.023785	1.14E+07	-180724.4	-3.75E-04	168.7	1.00E+13	859.901
360.360	-.025529	1.06E+07	-176519.0	-3.71E-04	157.1	1.12E+13	937.304
365.040	-.027253	9.77E+06	-171948.5	-3.66E-04	145.7	1.12E+13	1015.896
369.720	-.028957	8.98E+06	-167007.4	-3.62E-04	134.6	1.12E+13	1095.701
374.400	-.030644	8.21E+06	-161689.8	-3.59E-04	123.8	1.12E+13	1176.748
379.080	-.032315	7.46E+06	-155990.0	-3.56E-04	113.4	1.12E+13	1259.065
383.760	-.033972	6.75E+06	-149901.9	-3.53E-04	103.4	1.12E+13	1342.683
388.440	-.035615	6.06E+06	-143419.4	-3.50E-04	93.8233	1.12E+13	1427.633
393.120	-.037247	5.41E+06	-136536.1	-3.47E-04	84.6648	1.12E+13	1513.948
397.800	-.038867	4.78E+06	-129245.6	-3.45E-04	75.9695	1.12E+13	1601.659
402.480	-.040479	4.20E+06	-121572.1	-3.43E-04	67.7644	1.12E+13	1677.599
407.160	-.042082	3.65E+06	-113768.9	-3.42E-04	60.0726	1.12E+13	1657.101
411.840	-.043679	3.13E+06	-106068.4	-3.40E-04	52.8880	1.12E+13	1633.710
416.520	-.045269	2.65E+06	-98403.5	-3.39E-04	46.2034	1.12E+13	1641.884
421.200	-.046854	2.21E+06	-90605.2	-3.38E-04	40.0212	1.12E+13	1690.733
425.880	-.048434	1.81E+06	-82578.2	-3.37E-04	34.3564	1.12E+13	1739.615
430.560	-.050011	1.44E+06	-74322.3	-3.37E-04	29.2240	1.12E+13	1788.542
435.240	-.051586	1.11E+06	-65837.3	-3.36E-04	24.6389	1.12E+13	1837.525
439.920	-.053158	821980.6	-57122.9	-3.36E-04	20.6162	1.12E+13	1886.574
444.600	-.054728	575396.9	-48178.8	-3.35E-04	17.1708	1.12E+13	1935.696

449.280	-.056298	371209.5	-39004.6	-3.35E-04	14.3178	1.12E+13	1984.893
453.960	-.057866	210496.0	-29600.0	-3.35E-04	12.0723	1.12E+13	2034.169
458.640	-.059435	94335.7	-19964.6	-3.35E-04	10.4492	1.12E+13	2083.523
463.320	-.061003	23809.4	-10098.1	-3.35E-04	9.4638	1.12E+13	2132.953
468.000	-.062571	0.0	0.0	-3.35E-04	9.1311	1.12E+13	2182.456

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	.8795 in
Computed slope at pile head	=	-5.3672E-03
Maximum bending moment	=	40358025.084 lbs-in
Maximum shear force	=	-202206.346 lbs
Depth of maximum bending moment	=	126.360 in
Depth of maximum shear force	=	308.880 in
Number of iterations	=	8
Number of zero deflection points	=	1

Computed Values of Load Distribution and Deflection
for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Shear and Moment (BC Type 1)
Specified shear force at pile head = 29928.000 lbs
Specified bending moment at pile head = 41799960.000 in-lbs
Specified axial load at pile head = 48757.000 lbs

(Non-zero moment for this load does not indicate free-head conditions)

Depth X in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res p lbs/in
0.000	.986149	4.18E+07	29928.0	-.006003	591.7	2.36E+12	0.000
4.680	.958249	4.19E+07	29928.0	-.005920	593.7	2.36E+12	0.000
9.360	.930739	4.21E+07	29928.0	-.005836	595.7	2.36E+12	0.000
14.040	.903620	4.22E+07	29928.0	-.005753	597.6	2.36E+12	0.000
18.720	.876894	4.24E+07	29928.0	-.005669	599.6	2.36E+12	0.000
23.400	.850561	4.25E+07	29928.0	-.005585	601.6	2.36E+12	0.000
28.080	.824623	4.26E+07	29928.0	-.005500	603.6	2.36E+12	0.000
32.760	.799081	4.28E+07	29928.0	-.005415	605.5	2.36E+12	0.000
37.440	.773937	4.29E+07	29928.0	-.005330	607.5	2.36E+12	0.000
42.120	.749192	4.31E+07	29928.0	-.005245	609.5	2.36E+12	0.000
46.800	.724848	4.32E+07	29928.0	-.005159	611.5	2.36E+12	0.000
51.480	.700906	4.34E+07	29922.3	-.005073	613.4	2.35E+12	-2.439
56.160	.677367	4.35E+07	29903.7	-.004986	615.4	2.35E+12	-5.527
60.840	.654232	4.36E+07	29626.3	-.004900	617.4	2.35E+12	-113.018
65.520	.631504	4.38E+07	28933.6	-.004813	619.3	2.35E+12	-182.977
70.200	.609183	4.39E+07	27925.6	-.004726	621.2	2.35E+12	-247.784

74.880	.587271	4.40E+07	26626.1	-.004638	623.0	2.35E+12	-307.582
79.560	.565768	4.42E+07	25058.1	-.004551	624.7	2.35E+12	-362.515
84.240	.544677	4.43E+07	23244.0	-.004463	626.3	2.35E+12	-412.728
88.920	.523998	4.44E+07	21205.6	-.004374	627.8	2.35E+12	-458.366
93.600	.503732	4.45E+07	18964.0	-.004286	629.1	2.35E+12	-499.576
98.280	.483881	4.46E+07	16539.6	-.004197	630.3	2.35E+12	-536.502
102.960	.464444	4.46E+07	13952.1	-.004109	631.3	2.35E+12	-569.292
107.640	.445423	4.47E+07	11220.4	-.004020	632.1	2.35E+12	-598.091
112.320	.426819	4.47E+07	8362.9	-.003931	632.8	2.35E+12	-623.048
117.000	.408631	4.48E+07	5397.3	-.003842	633.2	2.35E+12	-644.308
121.680	.390860	4.48E+07	2340.5	-.003753	633.5	2.35E+12	-662.019
126.360	.373507	4.48E+07	-791.2	-.003663	633.6	2.35E+12	-676.327
131.040	.356571	4.48E+07	-3982.3	-.003574	633.4	2.35E+12	-687.379
135.720	.340052	4.48E+07	-7995.9	-.003485	633.1	2.35E+12	-1027.832
140.400	.323950	4.47E+07	-12816.4	-.003396	632.4	2.35E+12	-1032.226
145.080	.308265	4.46E+07	-17648.4	-.003307	631.4	2.35E+12	-1032.740
149.760	.292995	4.45E+07	-22474.3	-.003218	630.1	2.35E+12	-1029.577
154.440	.278140	4.44E+07	-27277.2	-.003130	628.5	2.35E+12	-1022.937
159.120	.263699	4.43E+07	-32041.3	-.003042	626.6	2.35E+12	-1013.021
163.800	.249671	4.41E+07	-36751.8	-.002954	624.3	2.35E+12	-1000.026
168.480	.236053	4.40E+07	-41394.8	-.002866	621.8	2.35E+12	-984.147
173.160	.222845	4.37E+07	-45957.2	-.002779	618.9	2.35E+12	-965.581
177.840	.210043	4.35E+07	-50426.8	-.002692	615.8	2.35E+12	-944.518
182.520	.197647	4.33E+07	-54792.4	-.002606	612.4	2.35E+12	-921.148
187.200	.185653	4.30E+07	-59043.8	-.002520	608.6	2.36E+12	-895.659
191.880	.174059	4.27E+07	-63171.3	-.002435	604.7	2.36E+12	-868.236
196.560	.162862	4.24E+07	-71704.2	-.002350	600.4	2.36E+12	-2778.329
201.240	.152059	4.21E+07	-84475.4	-.002267	595.3	2.36E+12	-2679.438
205.920	.141647	4.16E+07	-96772.0	-.002183	589.4	2.36E+12	-2575.517
210.600	.131622	4.12E+07	-108571.8	-.002101	582.7	2.36E+12	-2467.146
215.280	.121978	4.06E+07	-119855.4	-.002020	575.2	2.36E+12	-2354.888
219.960	.112711	4.00E+07	-130605.8	-.001940	567.0	2.36E+12	-2239.281
224.640	.103815	3.94E+07	-140808.5	-.001862	558.1	2.37E+12	-2120.846
229.320	.095284	3.87E+07	-150451.4	-.001785	548.6	2.37E+12	-2000.077
234.000	.087111	3.80E+07	-159524.8	-.001709	538.4	2.37E+12	-1877.444
238.680	.079290	3.72E+07	-168021.0	-.001635	527.7	2.37E+12	-1753.395
243.360	.071811	3.64E+07	-175934.3	-.001562	516.5	2.38E+12	-1628.352
248.040	.064669	3.56E+07	-183261.0	-.001491	504.7	2.38E+12	-1502.713
252.720	.057854	3.47E+07	-189999.1	-.001422	492.5	2.38E+12	-1376.849
257.400	.051359	3.38E+07	-196148.6	-.001355	479.9	2.38E+12	-1251.108
262.080	.045174	3.29E+07	-201710.5	-.001289	466.9	2.39E+12	-1125.809
266.760	.039290	3.19E+07	-206687.9	-.001226	453.5	2.39E+12	-1001.248
271.440	.033699	3.09E+07	-211084.6	-.001164	439.9	2.39E+12	-877.694
276.120	.028391	2.99E+07	-214906.0	-.001105	425.9	2.40E+12	-755.390
280.800	.023356	2.89E+07	-218158.5	-.001048	411.8	2.40E+12	-634.549
285.480	.018585	2.79E+07	-220849.2	-9.92E-04	397.4	2.41E+12	-515.357
290.160	.014067	2.69E+07	-222986.4	-9.39E-04	382.9	2.42E+12	-397.978
294.840	.009793	2.58E+07	-224578.9	-8.88E-04	368.2	2.42E+12	-282.549
299.520	.005752	2.48E+07	-225635.9	-8.40E-04	353.5	2.43E+12	-169.186
304.200	.001934	2.37E+07	-226167.5	-7.93E-04	338.7	2.43E+12	-57.981
308.880	-.001670	2.26E+07	-226183.8	-7.48E-04	323.9	2.44E+12	50.997
313.560	-.005071	2.16E+07	-225695.5	-7.06E-04	309.2	2.45E+12	157.699
318.240	-.008278	2.05E+07	-224713.2	-6.66E-04	294.4	2.46E+12	262.105
322.920	-.011303	1.95E+07	-223247.5	-6.28E-04	279.8	2.47E+12	364.225
327.600	-.014156	1.84E+07	-221309.3	-5.92E-04	265.2	2.48E+12	464.085
332.280	-.016846	1.74E+07	-218908.9	-5.58E-04	250.8	2.50E+12	561.731
336.960	-.019383	1.64E+07	-216056.5	-5.27E-04	236.6	2.51E+12	657.224
341.640	-.021777	1.54E+07	-212762.1	-4.97E-04	222.6	2.52E+12	750.637
346.320	-.024038	1.44E+07	-209035.2	-4.70E-04	208.8	2.53E+12	842.061
351.000	-.026174	1.34E+07	-204884.9	-4.44E-04	195.3	2.55E+12	931.596
355.680	-.028195	1.25E+07	-200319.6	-4.25E-04	182.0	4.18E+12	1019.355
360.360	-.030150	1.16E+07	-195344.0	-4.15E-04	169.1	9.34E+12	1106.986
365.040	-.032079	1.06E+07	-189955.5	-4.10E-04	156.5	1.12E+13	1195.804

369.720	-.033986	9.77E+06	-184148.1	-4.06E-04	144.2	1.12E+13	1286.000
374.400	-.035875	8.93E+06	-177915.2	-4.02E-04	132.4	1.12E+13	1377.606
379.080	-.037746	8.11E+06	-171250.3	-3.98E-04	121.0	1.12E+13	1470.654
383.760	-.039601	7.32E+06	-164146.4	-3.95E-04	110.0	1.12E+13	1565.178
388.440	-.041442	6.57E+06	-156596.7	-3.92E-04	99.4875	1.12E+13	1661.212
393.120	-.043270	5.86E+06	-148593.9	-3.89E-04	89.5029	1.12E+13	1758.793
397.800	-.045087	5.18E+06	-140193.4	-3.87E-04	80.0565	1.12E+13	1831.154
402.480	-.046894	4.55E+06	-131664.3	-3.85E-04	71.1706	1.12E+13	1813.755
407.160	-.048691	3.95E+06	-123224.0	-3.83E-04	62.8397	1.12E+13	1793.213
411.840	-.050481	3.39E+06	-114886.9	-3.82E-04	55.0575	1.12E+13	1769.644
416.520	-.052265	2.87E+06	-106582.3	-3.80E-04	47.8169	1.12E+13	1779.340
421.200	-.054042	2.39E+06	-98131.9	-3.79E-04	41.1209	1.12E+13	1831.929
425.880	-.055815	1.96E+06	-89435.2	-3.78E-04	34.9854	1.12E+13	1884.600
430.560	-.057585	1.56E+06	-80491.8	-3.78E-04	29.4268	1.12E+13	1937.366
435.240	-.059351	1.20E+06	-71301.3	-3.77E-04	24.4610	1.12E+13	1990.236
439.920	-.061115	890268.7	-61863.0	-3.77E-04	20.1042	1.12E+13	2043.220
444.600	-.062877	623211.6	-52176.4	-3.76E-04	16.3728	1.12E+13	2096.323
449.280	-.064637	402069.0	-42241.1	-3.76E-04	13.2829	1.12E+13	2149.549
453.960	-.066398	228006.6	-32056.4	-3.76E-04	10.8508	1.12E+13	2202.901
458.640	-.068157	102193.0	-21621.7	-3.76E-04	9.0929	1.12E+13	2256.378
463.320	-.069917	25799.5	-10936.4	-3.76E-04	8.0255	1.12E+13	2309.976
468.000	-.071676	0.0	0.0	-3.76E-04	7.6650	1.12E+13	2363.693

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection	=	.9861 in
Computed slope at pile head	=	-6.0029E-03
Maximum bending moment	=	44796303.692 lbs-in
Maximum shear force	=	-226183.845 lbs
Depth of maximum bending moment	=	126.360 in
Depth of maximum shear force	=	308.880 in
Number of iterations	=	8
Number of zero deflection points	=	1

Summary of Pile-head Response

Definition of symbols for pile-head boundary conditions:

y = pile-head displacment, in
M = pile-head moment, lbs-in
V = pile-head shear force, lbs
S = pile-head slope, radians
R = rotational stiffness of pile-head, in-lbs/rad

BC Type	Boundary Condition	Boundary Condition	Axial Load	Pile Head Deflection	Maximum Moment	Maximum Shear

	1	2	lbs	in	in-lbs	lbs
1	V= 26019.000 M=	3.78E+07	58083.0000	.8795	4.036E+07	-2.022E+05
1	V= 29928.000 M=	4.18E+07	48757.0000	.9861	4.480E+07	-2.262E+05

The analysis ended normally.