



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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Internet: ct.gov/csc

Daniel F. Caruso

Chairman

August 9, 2010

Kenneth C. Baldwin, Esq.

Robinson & Cole LLP

280 Trumbull Street

Hartford, CT 06103-3597

RE: **EM-VER-077-100125** - Celco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 60 Adams Street, Manchester, Connecticut. Modification.

Dear Attorney Baldwin:

In addition to the Connecticut Siting Council (Council) acknowledgement dated February 24, 2010 (filing dated January 25, 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 15, 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 Louis A. Spadaccini, Mayor, Town of Manchester
Scott A. Shanley, General Manager, Town of Manchester
James Davis, Zoning Enforcement Officer, Town of Manchester
Pom Pom Gail LLC



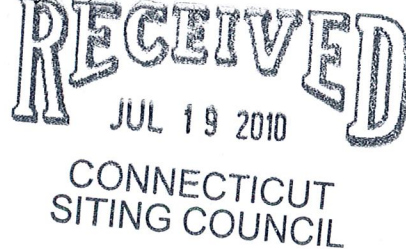
CONNECTICUT SITING COUNCIL

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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-077-100125 – 60 Adams Street, Manchester, Connecticut

Dear Mr. Perrone:

On February 24, 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) newer model PCS antennas and three (3) LTE antennas.

In addition to these antenna modifications, Cellco now intends to install six (6) coax cable diplexers on its antenna mounting platform. Attached to this letter is a Detailed Structural Analysis and Evaluation verifying that the tower can support the previously approved antenna modifications and the installation of the coax diplexers.

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



Law Offices

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www.rc.com

Sincerely,

A handwritten signature in blue ink, appearing to read "Kenneth C. Baldwin".

Kenneth C. Baldwin

Attachment
Copy to:

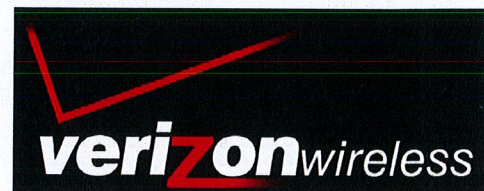
Sandy M. Carter
Brian Ragozzine
Mark Gauger

10511814-v1

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 140' MONOPOLE FOR PROPOSED ANTENNA ARRANGEMENT

60 Adams Street
Manchester, CT

prepared for



Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

URS

36915665
VZ5-054 (Rev 2)

June 29, 2010

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 - **ANCHOR BOLT AND BASE PLATE ANALYSIS**
 - **FOUNDATION ANALYSIS**

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 140' steel monopole structure, located at 60 Adams Street in Manchester, CT. The analysis was conducted in accordance with the 2005 Connecticut State Building Code which requires a three second gust wind speed of 100 mph which converts to a 80 mph fastest mile per 2003 IBC (Table 1609.3.1) and the TIA/EIA-222-F standard for a wind velocity of 80 mph (fastest mile). The wind speed from the Connecticut State Building Code governs the design at 80 mph (fastest mile) and 69 mph (fastest mile) concurrent with 1/2" 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 modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
<u>On the existing Verizon Platform:</u>		
<u>Remove:</u> (6) 950G65VTZE-M_2 antennas	Verizon (Existing)	@ 90'
<u>Install:</u> (3) BXA-70063-6CF-5 antennas (3) MG D3-900T2 antennas (6) FD9R6004/2C-3L diplexers	Verizon (Proposed)	@ 90'
Note: (6) Existing ALP6014 antennas and existing (12) 1-5/8" dia. coaxial cable to remain		

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 all the existing and 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) Tower geometry and structural member sizes taken from manufacturer design documents by Engineered Endeavors Incorporated, (EEI Project No. 4795); signed and sealed March 26, 1999.
- 3) Structural analysis performed by URS Corp project number 36911668 signed and sealed September 16, 2002.
- 4) Tower inventory taken from structural analysis performed by Malouf Engineering Intl., Inc. project ID CT00874M-07V0 signed and sealed August 17, 2007.
- 5) Antenna and mount configuration as specified on the following page of this report.

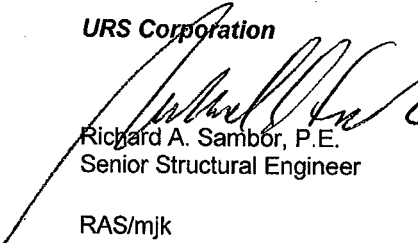
1. **EXECUTIVE SUMMARY** *(continued)*

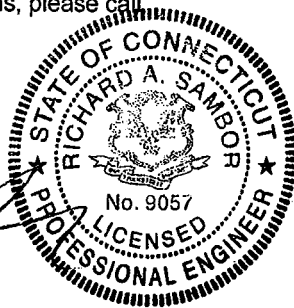
This report is only valid as per the assumptions and data utilized in this report for antenna inventory, mounts and associated cables. The user of this report shall field verify the assumption of the antenna and mount configuration as well as the physical condition of the tower. Notify the engineer in 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 60 Adams Street in Manchester, CT. The original structure is a 140' steel monopole designed by Engineered Endeavors Incorporated (EEI).

Tower geometry and structural member sizes taken from manufacturer design documents by Engineered Endeavors Incorporated, (EEI Project #: 4795); signed and sealed March 26, 1999.

The inventory is summarized in Table 1:

Table 1: Antenna and Mount Configuration

Antenna Type	Carrier	Mount	Antenna Centerline Elevation	Cable
---	Unknown (Existing)	(2) 4' Side Arms	139'	---
---	Unknown (Existing)	(1) 8' Side Arm	134'	---
(6) CSS DUO1417-8686 Antennas (3) Powerwave 7770 Antennas (6) TMAs (6) Duplexers (3) Powerwave 7060 CILOC (3) Powerwave 7020 RCU/RETs	AT&T (Existing)	13' Platform	125'	(12) 1 ¼" Coax
(6) DB980H90 Antennas	Sprint (Existing)	15' Low-Profile Platform	115'	(6) 1 ¼" Coax
(2) 6' Whip	Unknown (Existing)	(2) 4' Side Arm	107'	(2) 7/8" Coax
(12) DB844H90 Antennas	Sprint / Nextel (Existing)	15' Platform	100'	(12) 7/8" Coax
(6) ALP6014 Antennas	Verizon (Existing)	13' Platform	90'	(12) 1 5/8" Coax
(3) BXA-70063/6CF Antennas (3) MG D3-900T2 Antennas (6) FD9R6004/2C-3L Diplexers	Verizon (Proposed)	Same as Above	90'	Same as Above

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 arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done 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 Connecticut State Building Code requires a three second gust wind speed of 100 mph which converts to a 80 mph fastest mile per 2003 IBC (Table 1609.3.1). The TIA/EIA-222-F requires a basic wind speed of 80 mph fastest mile. In this case the wind speed from the Connecticut State Building Code governs the design.

The analysis was conducted using RISA Tower 5.3.1.0. 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. 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 found to be structurally adequate as shown in Table 2.

Table 2: Tower Component Stress vs. Capacity Table

Component / Section No.	Existing Component Size	Controlling Elevation	Stress (% Capacity)	Pass/Fail
L1	TP26.81x18x0.188	91.05'-140'	53.4	Pass
L2	TP34.84x25.733x0.313	45.05'-91.05'	79.4	Pass
L3	TP43x33.319x0.375	0-45.04'	82.0	Pass
Anchor Bolt	2.25" dia	Compression	98	Pass
Base Plate	1.75" Thick x 57" dia	Bending	81	Pass
Foundation	7' dia x 23' long caisson	Deflection (0.70")	93	Pass

Note: Maximum allowable deflection is 0.75" per TIA/EIA.

5. CONCLUSIONS

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 all the existing and 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

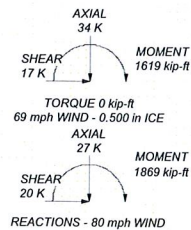
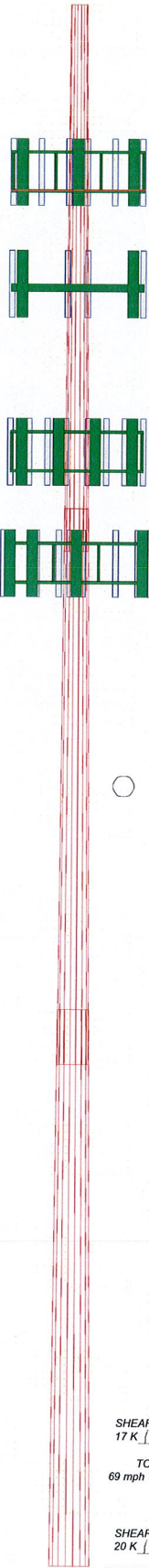
Section	1	2	3
Length (ft)	48,950	48,910	48,950
Number of Sides	18	18	18
Thickness (in)	0.188	0.313	0.375
Lap Splice (ft)	3,900	4,910	
Top Dia (in)	19,000	25,733	33,319
Bot Dia (in)	26,910	34,840	43,000
Grade		A572-65	
Weight (K)	2.2	5.0	7.6

140.0 R

91.0 R

45.0 R

0.0 R



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 4' Side arm (Unknown)	139	(2) 6' Whip (Unknown)	113 - 107
8' Side arm (Unknown)	134	(2) 4' Side arm (Unknown)	107
(2) DUOI1417-8686 (ATI)	125	(4) DB844H90 (Sprint / Nextel)	100
(2) DUOI1417-8686 (ATI)	125	(4) DB844H90 (Sprint / Nextel)	100
(2) DUOI1417-8686 (ATI)	125	(4) DB844H90 (Sprint / Nextel)	100
(2) TMA (Cingular) (ATI)	125	PIROD 15' Platform with handrail (Sprint / Nextel)	100
(2) TMA (Cingular) (ATI)	125	ALP 6014 (Verizon)	90
(2) Duplexer (ATI)	125	ALP 6014 (Verizon)	90
(2) Duplexer (ATI)	125	ALP 6014 (Verizon)	90
(2) Duplexer (ATI)	125	ALP 6014 (Verizon)	90
7770 w mount pipe (ATI)	125	ALP 6014 (Verizon)	90
7770 w mount pipe (ATI)	125	BXA-70063/ECF (Verizon)	90
7770 w mount pipe (ATI)	125	BXA-70063/ECF (Verizon)	90
7060 CILOC (ATI)	125	BXA-70063/ECF (Verizon)	90
7060 CILOC (ATI)	125	Ryma MG D3-900Tx (Verizon)	90
7060 CILOC (ATI)	125	Ryma MG D3-900Tx (Verizon)	90
7020 RCURE Tx (ATI)	125	Ryma MG D3-900Tx (Verizon)	90
7020 RCURE Tx (ATI)	125	PIROD 13' Platform w/handrail (Verizon)	90
7020 RCURE Tx (ATI)	125	FD9R6004/2C-3L Diplexer (Verizon)	90
PIROD 13' Platform w/handrail (ATI)	125	FD9R6004/2C-3L Diplexer (Verizon)	90
(2) DB880H90 (Sprint)	115	FD9R6004/2C-3L Diplexer (Verizon)	90
(2) DB880H90 (Sprint)	115	FD9R6004/2C-3L Diplexer (Verizon)	90
(2) DB880H90 (Sprint)	115	FD9R6004/2C-3L Diplexer (Verizon)	90
PIROD 15' Low Profile Platform (Sprint)	115	FD9R6004/2C-3L Diplexer (Verizon)	90

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices.
6. Installation per TIA/EIA-222-F and AISC Specifications.
7. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
8. TOWER RATING: 82%

RISA TOWER DETAILED OUTPUT

RISA Tower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	1 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.500 in.

Ice density of 56 pcf.

A wind speed of 69 mph is used in combination with ice.

Deflections calculated using a wind speed of 50 mph.

Weld together tower sections have flange connections..

Connections use galvanized A325 bolts, nuts and locking devices..

Installation per TIA/EIA-222-F and AISC Specifications..

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	140.000-91.050	48.950	3.900	18	18.000	26.810	0.188	0.563	A572-65 (65 ksi)
L2	91.050-45.040	49.910	4.910	18	25.733	34.840	0.313	0.938	A572-65 (65 ksi)
L3	45.040-0.000	49.950		18	33.319	43.000	0.375	1.125	A572-65 (65 ksi)

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	2 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

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	18.278	10.601	424.933	6.323	9.144	46.471	850.425	5.301	2.904	15.488
	27.224	15.844	1418.705	9.451	13.619	104.167	2839.277	7.923	4.455	23.758
L2	26.853	25.214	2058.499	9.024	13.072	157.469	4119.708	12.609	4.089	13.085
	35.377	34.247	5158.100	12.257	17.699	291.439	10322.988	17.127	5.692	18.214
L3	34.799	39.212	5376.605	11.695	16.926	317.652	10760.284	19.610	5.336	14.23
	43.663	50.734	11645.786	15.132	21.844	533.134	23306.896	25.372	7.040	18.773

Tower Elevation	Gusset Area (per face)	Gusset Thickness	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
ft	ft ²	in						
L1 140.000- 91.050				1	1	1		
L2 91.050- 45.040				1	1	1		
L3 45.040- 0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight klf
1 1/4 (AT&T)	C	No	Inside Pole	125.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 1/4 (Sprint)	C	No	Inside Pole	115.000 - 0.000	6	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
7/8 (Unknown)	C	No	Inside Pole	107.000 - 0.000	1	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
7/8 (Sprint / Nextel)	C	No	Inside Pole	100.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001
1 5/8 (Verizon)	C	No	Inside Pole	90.000 - 0.000	12	No Ice	0.000	0.001
						1/2" Ice	0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	140.000-91.050	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.430
L2	91.050-45.040	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	1.431
L3	45.040-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	1.413

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	3 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	140.000-91.050	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.430
L2	91.050-45.040	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	1.431
L3	45.040-0.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	1.413

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
(2) 4' Side arm (Unknown)	C	None		0.000	139.000	No Ice 1/2" Ice	1.920 2.580	0.069 0.082
8' Side arm (Unknown)	C	None		0.000	134.000	No Ice 1/2" Ice	3.840 5.160	0.139 0.164
(2) DUO1417-8686 (AT&T)	A	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice	6.533 6.940	0.020 0.062
(2) DUO1417-8686 (AT&T)	B	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice	6.533 6.940	0.020 0.062
(2) DUO1417-8686 (AT&T)	C	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice	6.533 6.940	0.020 0.062
(2) TMA (Cingular) (AT&T)	A	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice	1.225 1.378	0.020 0.027
(2) TMA (Cingular) (AT&T)	B	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice	1.225 1.378	0.020 0.027
(2) TMA (Cingular) (AT&T)	C	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice	1.225 1.378	0.020 0.027
(2) Duplexer (AT&T)	A	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.424 0.521	0.005 0.007
(2) Duplexer (AT&T)	B	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.424 0.521	0.005 0.007
(2) Duplexer (AT&T)	C	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.424 0.521	0.005 0.007
7770 w mount pipe (AT&T)	A	From Face	3.000 0.000	0.000	125.000	No Ice 1/2" Ice	5.882 6.314	0.052 0.095

<i>RISATower</i> URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	4 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

<i>Description</i>	<i>Face or Leg</i>	<i>Offset Type</i>	<i>Offsets: Horz Lateral Vert ft ft ft</i>	<i>Azimuth Adjustment °</i>	<i>Placement ft</i>		<i>C_AA_A Front ft²</i>	<i>C_AA_A Side ft²</i>	<i>Weight K</i>
7770 w mount pipe (AT&T)	B	From Face	0.000 3.000 0.000	0.000	125.000	No Ice 1/2" Ice	5.882 6.314	3.980 4.603	0.052 0.095
7770 w mount pipe (AT&T)	C	From Face	0.000 3.000 0.000	0.000	125.000	No Ice 1/2" Ice	5.882 6.314	3.980 4.603	0.052 0.095
7060 CILOC (AT&T)	A	From Face	0.000 3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.067 0.107	0.058 0.095	0.002 0.003
7060 CILOC (AT&T)	B	From Face	0.000 3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.067 0.107	0.058 0.095	0.002 0.003
7060 CILOC (AT&T)	C	From Face	0.000 3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.067 0.107	0.058 0.095	0.002 0.003
7020 RCU/RETs (AT&T)	A	From Face	0.000 3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.401 0.491	0.117 0.169	0.002 0.005
7020 RCU/RETs (AT&T)	B	From Face	0.000 3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.401 0.491	0.117 0.169	0.002 0.005
7020 RCU/RETs (AT&T)	C	From Face	0.000 3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.401 0.491	0.117 0.169	0.002 0.005
PiROD 13' Platform w/handrail (AT&T)	C	None	0.000	0.000	125.000	No Ice 1/2" Ice	31.300 40.200	31.300 40.200	1.822 2.452
(2) DB980H90 (Sprint)	A	From Face	0.000 3.000 0.000	0.000	115.000	No Ice 1/2" Ice	3.799 4.178	2.194 2.556	0.085 0.105
(2) DB980H90 (Sprint)	B	From Face	0.000 3.000 0.000	0.000	115.000	No Ice 1/2" Ice	3.799 4.178	2.194 2.556	0.085 0.105
(2) DB980H90 (Sprint)	C	From Face	0.000 3.000 0.000	0.000	115.000	No Ice 1/2" Ice	3.799 4.178	2.194 2.556	0.085 0.105
PiROD 15' Low Profile Platform (Sprint)	C	None	0.000	0.000	115.000	No Ice 1/2" Ice	17.300 22.100	17.300 22.100	1.500 2.030
(2) 6' Whip (Unknown)	C	None	0.000	0.000	113.000 -	No Ice 1/2" Ice	1.200 1.802	1.200 1.802	0.018 0.027
(2) 4' Side arm (Unknown)	C	None	0.000	0.000	107.000	No Ice 1/2" Ice	1.920 2.580	1.920 2.580	0.069 0.082
(4) DB844H90 (Sprint / Nextel)	A	From Face	0.000 3.000 0.000	0.000	100.000	No Ice 1/2" Ice	2.867 3.177	3.967 4.337	0.010 0.036
(4) DB844H90 (Sprint / Nextel)	B	From Face	0.000 3.000 0.000	0.000	100.000	No Ice 1/2" Ice	2.867 3.177	3.967 4.337	0.010 0.036
(4) DB844H90 (Sprint / Nextel)	C	From Face	0.000 3.000 0.000	0.000	100.000	No Ice 1/2" Ice	2.867 3.177	3.967 4.337	0.010 0.036
PiROD 15' Platform with handrail (Sprint / Nextel) ALP 6014	C	None	0.000	0.000	100.000	No Ice 1/2" Ice	33.800 43.600	33.800 43.600	2.043 2.748
	A	From Face	3.000	0.000	90.000	No Ice	7.560	7.560	0.019

RISATower

URS Corporation
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 Rocky Hill, CT
 Phone: (860) 529-8882
 FAX: (860) 529-3991

Job	140' Monopole	Page	5 of 22
Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
Client	Verizon Wireless	Designed by	Matthew Kapinos

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
(Verizon)			6.000 0.000			1/2" Ice 8.240	8.240	0.068
ALP 6014 (Verizon)	A	From Face	3.000 -6.000 0.000	0.000	90.000	No Ice 7.560 1/2" Ice 8.240	7.560 8.240	0.019 0.068
ALP 6014 (Verizon)	B	From Face	3.000 6.000 0.000	0.000	90.000	No Ice 7.560 1/2" Ice 8.240	7.560 8.240	0.019 0.068
ALP 6014 (Verizon)	B	From Face	3.000 -6.000 0.000	0.000	90.000	No Ice 7.560 1/2" Ice 8.240	7.560 8.240	0.019 0.068
ALP 6014 (Verizon)	C	From Face	3.000 6.000 0.000	0.000	90.000	No Ice 7.560 1/2" Ice 8.240	7.560 8.240	0.019 0.068
ALP 6014 (Verizon)	C	From Face	3.000 -6.000 0.000	0.000	90.000	No Ice 7.560 1/2" Ice 8.240	7.560 8.240	0.019 0.068
BXA-70063/6CF (Verizon)	A	From Face	3.000 0.000 0.000	0.000	90.000	No Ice 5.500 1/2" Ice 6.500	2.200 3.200	0.038 0.092
BXA-70063/6CF (Verizon)	B	From Face	3.000 0.000 0.000	0.000	90.000	No Ice 5.500 1/2" Ice 6.500	2.200 3.200	0.038 0.092
BXA-70063/6CF (Verizon)	C	From Face	3.000 0.000 0.000	0.000	90.000	No Ice 5.500 1/2" Ice 6.500	2.200 3.200	0.038 0.092
Ryma MG D3-900Tx (Verizon)	A	From Face	3.000 4.000 0.000	0.000	90.000	No Ice 5.381 1/2" Ice 5.863	5.024 5.957	0.047 0.089
Ryma MG D3-900Tx (Verizon)	B	From Face	3.000 4.000 0.000	0.000	90.000	No Ice 5.381 1/2" Ice 5.863	5.024 5.957	0.047 0.089
Ryma MG D3-900Tx (Verizon)	C	From Face	3.000 4.000 0.000	0.000	90.000	No Ice 5.381 1/2" Ice 5.863	5.024 5.957	0.047 0.089
PiROD 13' Platform w/handrail (Verizon)	C	None		0.000	90.000	No Ice 31.300 1/2" Ice 40.200	31.300 40.200	1.822 2.452
FD9R6004/2C-3L Diplexer (Verizon)	A	From Face	3.000 6.000 0.000	0.000	90.000	No Ice 0.367 1/2" Ice 0.451	0.085 0.136	0.003 0.005
FD9R6004/2C-3L Diplexer (Verizon)	A	From Face	3.000 -6.000 0.000	0.000	90.000	No Ice 0.367 1/2" Ice 0.451	0.085 0.136	0.003 0.005
FD9R6004/2C-3L Diplexer (Verizon)	B	From Face	3.000 6.000 0.000	0.000	90.000	No Ice 0.367 1/2" Ice 0.451	0.085 0.136	0.003 0.005
FD9R6004/2C-3L Diplexer (Verizon)	B	From Face	3.000 -6.000 0.000	0.000	90.000	No Ice 0.367 1/2" Ice 0.451	0.085 0.136	0.003 0.005
FD9R6004/2C-3L Diplexer (Verizon)	C	From Face	3.000 6.000 0.000	0.000	90.000	No Ice 0.367 1/2" Ice 0.451	0.085 0.136	0.003 0.005
FD9R6004/2C-3L Diplexer (Verizon)	C	From Face	3.000 -6.000 0.000	0.000	90.000	No Ice 0.367 1/2" Ice 0.451	0.085 0.136	0.003 0.005

<i>RISATower</i> URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	6 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L1 140.000- 91.050	114.289	1.426	0.023	91.394	A	0.000	91.394	91.394	100.00	0.000	0.000
					B	0.000	91.394		100.00	0.000	0.000
					C	0.000	91.394		100.00	0.000	0.000
L2 91.050- 45.040	67.555	1.227	0.020	117.488	A	0.000	117.488	117.488	100.00	0.000	0.000
					B	0.000	117.488		100.00	0.000	0.000
					C	0.000	117.488		100.00	0.000	0.000
L3 45.040- 0.000	21.699	1	0.016	145.011	A	0.000	145.011	145.011	100.00	0.000	0.000
					B	0.000	145.011		100.00	0.000	0.000
					C	0.000	145.011		100.00	0.000	0.000

Tower Pressure - With Ice

$$G_H = 1.690$$

Section Elevation	z	K _Z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		ksf	in	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L1 140.000- 91.050	114.289	1.426	0.017	0.500	95.473	A	0.000	95.473	95.473	100.00	0.000	0.000
						B	0.000	95.473		100.00	0.000	0.000
						C	0.000	95.473		100.00	0.000	0.000
L2 91.050- 45.040	67.555	1.227	0.015	0.500	121.322	A	0.000	121.322	121.322	100.00	0.000	0.000
						B	0.000	121.322		100.00	0.000	0.000
						C	0.000	121.322		100.00	0.000	0.000
L3 45.040-0.000	21.699	1	0.012	0.500	148.765	A	0.000	148.765	148.765	100.00	0.000	0.000
						B	0.000	148.765		100.00	0.000	0.000
						C	0.000	148.765		100.00	0.000	0.000

Tower Pressure - Service

$$G_H = 1.690$$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L1 140.000- 91.050	114.289	1.426	0.009	91.394	A	0.000	91.394	91.394	100.00	0.000	0.000
					B	0.000	91.394		100.00	0.000	0.000
					C	0.000	91.394		100.00	0.000	0.000
L2 91.050- 45.040	67.555	1.227	0.008	117.488	A	0.000	117.488	117.488	100.00	0.000	0.000
					B	0.000	117.488		100.00	0.000	0.000

RISATower

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Job

140' Monopole

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Project

Manchester Sand and Gravel

Date

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Client

Verizon Wireless

Designed by

Matthew Kapinos

Section Elevation	z	K _Z	q _z	A _G	F _{a c e}	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
L3 45.040-0.000	21.699	1	0.006	145.011	C	0.000	117.488		100.00	0.000	0.000
					A	0.000	145.011	145.011	100.00	0.000	0.000
					B	0.000	145.011		100.00	0.000	0.000
					C	0.000	145.011		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F _{a c e}	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	2.341	0.048	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	2.581	0.056	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	2.616	0.058	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	498.651 kip-ft	7.538		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F _{a c e}	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	2.341	0.048	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	2.581	0.056	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	2.616	0.058	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	498.651 kip-ft	7.538		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F _{a c e}	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	2.341	0.048	C
			B	1	0.65	1	1	1	91.394			

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	Page
	140' Monopole	8 of 22
	Project	Date
	Manchester Sand and Gravel	07:21:25 06/29/10
	Client	Designed by
	Verizon Wireless	Matthew Kapinos

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L2 91.050-45.040	1.431	5.049	C	1	0.65	1	1	1	91.394			
			A	1	0.65	1	1	1	117.488	2.581	0.056	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	2.616	0.058	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	498.651 kip-ft	7.538		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	2.341	0.048	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	2.581	0.056	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	2.616	0.058	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	498.651 kip-ft	7.538		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.894	A	1	0.65	1	1	1	95.473	1.819	0.037	C
			B	1	0.65	1	1	1	95.473			
			C	1	0.65	1	1	1	95.473			
L2 91.050-45.040	1.431	5.934	A	1	0.65	1	1	1	121.322	1.983	0.043	C
			B	1	0.65	1	1	1	121.322			
			C	1	0.65	1	1	1	121.322			
L3 45.040-0.000	1.413	8.732	A	1	0.65	1	1	1	148.765	1.996	0.044	C
			B	1	0.65	1	1	1	148.765			
			C	1	0.65	1	1	1	148.765			
Sum Weight:	3.274	17.560						OTM	385.158 kip-ft	5.798		

Tower Forces - With Ice - Wind 45 To Face

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	9 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.894	A	1	0.65	1	1	1	95.473	1.819	0.037	C
			B	1	0.65	1	1	1	95.473			
			C	1	0.65	1	1	1	95.473			
L2 91.050-45.040	1.431	5.934	A	1	0.65	1	1	1	121.322	1.983	0.043	C
			B	1	0.65	1	1	1	121.322			
			C	1	0.65	1	1	1	121.322			
L3 45.040-0.000	1.413	8.732	A	1	0.65	1	1	1	148.765	1.996	0.044	C
			B	1	0.65	1	1	1	148.765			
			C	1	0.65	1	1	1	148.765			
Sum Weight:	3.274	17.560						OTM	385.158 kip-ft	5.798		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.894	A	1	0.65	1	1	1	95.473	1.819	0.037	C
			B	1	0.65	1	1	1	95.473			
			C	1	0.65	1	1	1	95.473			
L2 91.050-45.040	1.431	5.934	A	1	0.65	1	1	1	121.322	1.983	0.043	C
			B	1	0.65	1	1	1	121.322			
			C	1	0.65	1	1	1	121.322			
L3 45.040-0.000	1.413	8.732	A	1	0.65	1	1	1	148.765	1.996	0.044	C
			B	1	0.65	1	1	1	148.765			
			C	1	0.65	1	1	1	148.765			
Sum Weight:	3.274	17.560						OTM	385.158 kip-ft	5.798		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.894	A	1	0.65	1	1	1	95.473	1.819	0.037	C
			B	1	0.65	1	1	1	95.473			
			C	1	0.65	1	1	1	95.473			
L2 91.050-45.040	1.431	5.934	A	1	0.65	1	1	1	121.322	1.983	0.043	C
			B	1	0.65	1	1	1	121.322			
			C	1	0.65	1	1	1	121.322			
L3 45.040-0.000	1.413	8.732	A	1	0.65	1	1	1	148.765	1.996	0.044	C
			B	1	0.65	1	1	1	148.765			
			C	1	0.65	1	1	1	148.765			
Sum Weight:	3.274	17.560						OTM	385.158 kip-ft	5.798		

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	10 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	0.914	0.019	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	1.008	0.022	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	1.022	0.023	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	194.785 kip-ft	2.944		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	0.914	0.019	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	1.008	0.022	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	1.022	0.023	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	194.785 kip-ft	2.944		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	0.914	0.019	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	1.008	0.022	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	1.022	0.023	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	194.785 kip-ft	2.944		

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	11 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000- 91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	0.914	0.019	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050- 45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	1.008	0.022	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040- 0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	1.022	0.023	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	194.785 kip-ft	2.944		

Discrete Appurtenance Pressures - No Ice $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _A A _C Front ft ²	C _A A _C Side ft ²
4' Side arm	0.000	0.139	0.000	0.000	139.000	1.508	0.025	3.840	3.840
8' Side arm	0.000	0.139	0.000	0.000	134.000	1.492	0.024	3.840	3.840
DUO1417-8686	300.000	0.040	-3.345	-1.931	125.000	1.463	0.024	13.067	8.400
DUO1417-8686	60.000	0.040	3.345	-1.931	125.000	1.463	0.024	13.067	8.400
DUO1417-8686	180.000	0.040	0.000	3.862	125.000	1.463	0.024	13.067	8.400
TMA (Cingular)	300.000	0.040	-3.345	-1.931	125.000	1.463	0.024	2.450	0.681
TMA (Cingular)	60.000	0.040	3.345	-1.931	125.000	1.463	0.024	2.450	0.681
TMA (Cingular)	180.000	0.040	0.000	3.862	125.000	1.463	0.024	2.450	0.681
Duplexer	300.000	0.010	-3.345	-1.931	125.000	1.463	0.024	0.849	0.372
Duplexer	60.000	0.010	3.345	-1.931	125.000	1.463	0.024	0.849	0.372
Duplexer	180.000	0.010	0.000	3.862	125.000	1.463	0.024	0.849	0.372
7770 w mount pipe	300.000	0.052	-3.345	-1.931	125.000	1.463	0.024	5.882	3.980
7770 w mount pipe	60.000	0.052	3.345	-1.931	125.000	1.463	0.024	5.882	3.980
7770 w mount pipe	180.000	0.052	0.000	3.862	125.000	1.463	0.024	5.882	3.980
7060 CILOC	300.000	0.002	-3.345	-1.931	125.000	1.463	0.024	0.067	0.058
7060 CILOC	60.000	0.002	3.345	-1.931	125.000	1.463	0.024	0.067	0.058
7060 CILOC	180.000	0.002	0.000	3.862	125.000	1.463	0.024	0.067	0.058
7020 RCU/RETs	300.000	0.002	-3.345	-1.931	125.000	1.463	0.024	0.401	0.117
7020 RCU/RETs	60.000	0.002	3.345	-1.931	125.000	1.463	0.024	0.401	0.117
7020 RCU/RETs	180.000	0.002	0.000	3.862	125.000	1.463	0.024	0.401	0.117
PiROD 13' Platform w/handrail	0.000	1.822	0.000	0.000	125.000	1.463	0.024	31.300	31.300
DB980H90	300.000	0.170	-3.410	-1.969	115.000	1.429	0.023	7.597	4.389
DB980H90	60.000	0.170	3.410	-1.969	115.000	1.429	0.023	7.597	4.389
DB980H90	180.000	0.170	0.000	3.937	115.000	1.429	0.023	7.597	4.389
PiROD 15' Low Profile Platform	0.000	1.500	0.000	0.000	115.000	1.429	0.023	17.300	17.300
6' Whip	0.000	0.036	0.000	0.000	110.000	1.411	0.023	2.400	2.400
4' Side arm	0.000	0.139	0.000	0.000	107.000	1.399	0.023	3.840	3.840
DB844H90	300.000	0.040	-3.507	-2.025	100.000	1.373	0.022	11.467	15.867
DB844H90	60.000	0.040	3.507	-2.025	100.000	1.373	0.022	11.467	15.867
DB844H90	180.000	0.040	0.000	4.050	100.000	1.373	0.022	11.467	15.867
PiROD 15' Platform with	0.000	2.043	0.000	0.000	100.000	1.373	0.022	33.800	33.800

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page 12 of 22
	Project	Manchester Sand and Gravel	Date 07:21:25 06/29/10
	Client	Verizon Wireless	Designed by Matthew Kapinos

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _{AC} Front ft ²	C _{AC} Side ft ²
handrail									
ALP 6014	300.000	0.019	-0.559	-7.251	90.000	1.332	0.022	7.560	7.560
ALP 6014	300.000	0.019	-6.559	3.141	90.000	1.332	0.022	7.560	7.560
ALP 6014	60.000	0.019	6.559	3.141	90.000	1.332	0.022	7.560	7.560
ALP 6014	60.000	0.019	0.559	-7.251	90.000	1.332	0.022	7.560	7.560
ALP 6014	180.000	0.019	-6.000	4.110	90.000	1.332	0.022	7.560	7.560
ALP 6014	180.000	0.019	6.000	4.110	90.000	1.332	0.022	7.560	7.560
BXA-70063/6CF	300.000	0.038	-3.559	-2.055	90.000	1.332	0.022	5.500	2.200
BXA-70063/6CF	60.000	0.038	3.559	-2.055	90.000	1.332	0.022	5.500	2.200
BXA-70063/6CF	180.000	0.038	0.000	4.110	90.000	1.332	0.022	5.500	2.200
Ryma MG D3-900Tx	300.000	0.047	-1.559	-5.519	90.000	1.332	0.022	5.381	5.024
Ryma MG D3-900Tx	60.000	0.047	5.559	1.409	90.000	1.332	0.022	5.381	5.024
Ryma MG D3-900Tx	180.000	0.047	-4.000	4.110	90.000	1.332	0.022	5.381	5.024
PiROD 13' Platform w/handrail	0.000	1.822	0.000	0.000	90.000	1.332	0.022	31.300	31.300
FD9R6004/2C-3L Duplexer	300.000	0.003	-0.559	-7.251	90.000	1.332	0.022	0.367	0.085
FD9R6004/2C-3L Duplexer	300.000	0.003	-6.559	3.141	90.000	1.332	0.022	0.367	0.085
FD9R6004/2C-3L Duplexer	60.000	0.003	6.559	3.141	90.000	1.332	0.022	0.367	0.085
FD9R6004/2C-3L Duplexer	60.000	0.003	0.559	-7.251	90.000	1.332	0.022	0.367	0.085
FD9R6004/2C-3L Duplexer	180.000	0.003	-6.000	4.110	90.000	1.332	0.022	0.367	0.085
FD9R6004/2C-3L Duplexer	180.000	0.003	6.000	4.110	90.000	1.332	0.022	0.367	0.085
Sum Weight:		9.095							

Discrete Appurtenance Pressures - With Ice $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _{AC} Front ft ²	C _{AC} Side ft ²	t _z in
4' Side arm	0.000	0.164	0.000	0.000	139.000	1.508	0.018	5.160	5.160	0.500
8' Side arm	0.000	0.164	0.000	0.000	134.000	1.492	0.018	5.160	5.160	0.500
DUO1417-8686	300.000	0.125	-3.345	-1.931	125.000	1.463	0.018	13.879	9.148	0.500
DUO1417-8686	60.000	0.125	3.345	-1.931	125.000	1.463	0.018	13.879	9.148	0.500
DUO1417-8686	180.000	0.125	0.000	3.862	125.000	1.463	0.018	13.879	9.148	0.500
TMA (Cingular)	300.000	0.054	-3.345	-1.931	125.000	1.463	0.018	2.757	0.903	0.500
TMA (Cingular)	60.000	0.054	3.345	-1.931	125.000	1.463	0.018	2.757	0.903	0.500
TMA (Cingular)	180.000	0.054	0.000	3.862	125.000	1.463	0.018	2.757	0.903	0.500
Duplexer	300.000	0.014	-3.345	-1.931	125.000	1.463	0.018	1.041	0.533	0.500
Duplexer	60.000	0.014	3.345	-1.931	125.000	1.463	0.018	1.041	0.533	0.500
Duplexer	180.000	0.014	0.000	3.862	125.000	1.463	0.018	1.041	0.533	0.500
7770 w mount pipe	300.000	0.095	-3.345	-1.931	125.000	1.463	0.018	6.314	4.603	0.500
7770 w mount pipe	60.000	0.095	3.345	-1.931	125.000	1.463	0.018	6.314	4.603	0.500
7770 w mount pipe	180.000	0.095	0.000	3.862	125.000	1.463	0.018	6.314	4.603	0.500
7060 CILOC	300.000	0.003	-3.345	-1.931	125.000	1.463	0.018	0.107	0.095	0.500
7060 CILOC	60.000	0.003	3.345	-1.931	125.000	1.463	0.018	0.107	0.095	0.500
7060 CILOC	180.000	0.003	0.000	3.862	125.000	1.463	0.018	0.107	0.095	0.500
7020 RCU/RETs	300.000	0.005	-3.345	-1.931	125.000	1.463	0.018	0.491	0.169	0.500
7020 RCU/RETs	60.000	0.005	3.345	-1.931	125.000	1.463	0.018	0.491	0.169	0.500
7020 RCU/RETs	180.000	0.005	0.000	3.862	125.000	1.463	0.018	0.491	0.169	0.500
PiROD 13' Platform w/handrail	0.000	2.452	0.000	0.000	125.000	1.463	0.018	40.200	40.200	0.500
DB980H90	300.000	0.210	-3.410	-1.969	115.000	1.429	0.017	8.356	5.112	0.500

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	13 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _A C _C Front ft ²	C _A C _C Side ft ²	t _z in
DB980H90	60.000	0.210	3.410	-1.969	115.000	1.429	0.017	8.356	5.112	0.500
DB980H90	180.000	0.210	0.000	3.937	115.000	1.429	0.017	8.356	5.112	0.500
PiROD 15' Low Profile Platform	0.000	2.030	0.000	0.000	115.000	1.429	0.017	22.100	22.100	0.500
6' Whip	0.000	0.055	0.000	0.000	110.000	1.411	0.017	3.605	3.605	0.500
4' Side arm	0.000	0.164	0.000	0.000	107.000	1.399	0.017	5.160	5.160	0.500
DB844H90	300.000	0.145	-3.507	-2.025	100.000	1.373	0.017	12.707	17.349	0.500
DB844H90	60.000	0.145	3.507	-2.025	100.000	1.373	0.017	12.707	17.349	0.500
DB844H90	180.000	0.145	0.000	4.050	100.000	1.373	0.017	12.707	17.349	0.500
PiROD 15' Platform with handrail	0.000	2.748	0.000	0.000	100.000	1.373	0.017	43.600	43.600	0.500
ALP 6014	300.000	0.068	-0.559	-7.251	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	300.000	0.068	-6.559	3.141	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	60.000	0.068	6.559	3.141	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	60.000	0.068	0.559	-7.251	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	180.000	0.068	-6.000	4.110	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	180.000	0.068	6.000	4.110	90.000	1.332	0.016	8.240	8.240	0.500
BXA-70063/6CF	300.000	0.092	-3.559	-2.055	90.000	1.332	0.016	6.500	3.200	0.500
BXA-70063/6CF	60.000	0.092	3.559	-2.055	90.000	1.332	0.016	6.500	3.200	0.500
BXA-70063/6CF	180.000	0.092	0.000	4.110	90.000	1.332	0.016	6.500	3.200	0.500
Rymsa MG D3-900Tx	300.000	0.089	-1.559	-5.519	90.000	1.332	0.016	5.863	5.957	0.500
Rymsa MG D3-900Tx	60.000	0.089	5.559	1.409	90.000	1.332	0.016	5.863	5.957	0.500
Rymsa MG D3-900Tx	180.000	0.089	-4.000	4.110	90.000	1.332	0.016	5.863	5.957	0.500
PiROD 13' Platform w/handrail	0.000	2.452	0.000	0.000	90.000	1.332	0.016	40.200	40.200	0.500
FD9R6004/2C-3L Diplexer	300.000	0.005	-0.559	-7.251	90.000	1.332	0.016	0.451	0.136	0.500
FD9R6004/2C-3L Diplexer	300.000	0.005	-6.559	3.141	90.000	1.332	0.016	0.451	0.136	0.500
FD9R6004/2C-3L Diplexer	60.000	0.005	6.559	3.141	90.000	1.332	0.016	0.451	0.136	0.500
FD9R6004/2C-3L Diplexer	60.000	0.005	0.559	-7.251	90.000	1.332	0.016	0.451	0.136	0.500
FD9R6004/2C-3L Diplexer	180.000	0.005	-6.000	4.110	90.000	1.332	0.016	0.451	0.136	0.500
FD9R6004/2C-3L Diplexer	180.000	0.005	6.000	4.110	90.000	1.332	0.016	0.451	0.136	0.500
Sum Weight:		13.157								

Discrete Appurtenance Pressures - Service $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _A C _C Front ft ²	C _A C _C Side ft ²
4' Side arm	0.000	0.139	0.000	0.000	139.000	1.508	0.010	3.840	3.840
8' Side arm	0.000	0.139	0.000	0.000	134.000	1.492	0.010	3.840	3.840
DUO1417-8686	300.000	0.040	-3.345	-1.931	125.000	1.463	0.009	13.067	8.400
DUO1417-8686	60.000	0.040	3.345	-1.931	125.000	1.463	0.009	13.067	8.400
DUO1417-8686	180.000	0.040	0.000	3.862	125.000	1.463	0.009	13.067	8.400
TMA (Cingular)	300.000	0.040	-3.345	-1.931	125.000	1.463	0.009	2.450	0.681
TMA (Cingular)	60.000	0.040	3.345	-1.931	125.000	1.463	0.009	2.450	0.681
TMA (Cingular)	180.000	0.040	0.000	3.862	125.000	1.463	0.009	2.450	0.681
Duplexer	300.000	0.010	-3.345	-1.931	125.000	1.463	0.009	0.849	0.372
Duplexer	60.000	0.010	3.345	-1.931	125.000	1.463	0.009	0.849	0.372
Duplexer	180.000	0.010	0.000	3.862	125.000	1.463	0.009	0.849	0.372
7770 w mount pipe	300.000	0.052	-3.345	-1.931	125.000	1.463	0.009	5.882	3.980
7770 w mount pipe	60.000	0.052	3.345	-1.931	125.000	1.463	0.009	5.882	3.980

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	14 of 22
	Project	Manchester Sand and Gravel	Date	07:21:25 06/29/10
	Client	Verizon Wireless	Designed by	Matthew Kapinos

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _{AAc} Front ft ²	C _{AAc} Side ft ²
7770 w mount pipe	180.000	0.052	0.000	3.862	125.000	1.463	0.009	5.882	3.980
7060 CILOC	300.000	0.002	-3.345	-1.931	125.000	1.463	0.009	0.067	0.058
7060 CILOC	60.000	0.002	3.345	-1.931	125.000	1.463	0.009	0.067	0.058
7060 CILOC	180.000	0.002	0.000	3.862	125.000	1.463	0.009	0.067	0.058
7020 RCU/REts	300.000	0.002	-3.345	-1.931	125.000	1.463	0.009	0.401	0.117
7020 RCU/REts	60.000	0.002	3.345	-1.931	125.000	1.463	0.009	0.401	0.117
7020 RCU/REts	180.000	0.002	0.000	3.862	125.000	1.463	0.009	0.401	0.117
PiROD 13' Platform w/handrail	0.000	1.822	0.000	0.000	125.000	1.463	0.009	31.300	31.300
DB980H90	300.000	0.170	-3.410	-1.969	115.000	1.429	0.009	7.597	4.389
DB980H90	60.000	0.170	3.410	-1.969	115.000	1.429	0.009	7.597	4.389
DB980H90	180.000	0.170	0.000	3.937	115.000	1.429	0.009	7.597	4.389
PiROD 15' Low Profile Platform	0.000	1.500	0.000	0.000	115.000	1.429	0.009	17.300	17.300
6' Whip	0.000	0.036	0.000	0.000	110.000	1.411	0.009	2.400	2.400
4' Side arm	0.000	0.139	0.000	0.000	107.000	1.399	0.009	3.840	3.840
DB844H90	300.000	0.040	-3.507	-2.025	100.000	1.373	0.009	11.467	15.867
DB844H90	60.000	0.040	3.507	-2.025	100.000	1.373	0.009	11.467	15.867
DB844H90	180.000	0.040	0.000	4.050	100.000	1.373	0.009	11.467	15.867
PiROD 15' Platform with handrail	0.000	2.043	0.000	0.000	100.000	1.373	0.009	33.800	33.800
ALP 6014	300.000	0.019	-0.559	-7.251	90.000	1.332	0.009	7.560	7.560
ALP 6014	300.000	0.019	-6.559	3.141	90.000	1.332	0.009	7.560	7.560
ALP 6014	60.000	0.019	6.559	3.141	90.000	1.332	0.009	7.560	7.560
ALP 6014	60.000	0.019	0.559	-7.251	90.000	1.332	0.009	7.560	7.560
ALP 6014	180.000	0.019	-6.000	4.110	90.000	1.332	0.009	7.560	7.560
ALP 6014	180.000	0.019	6.000	4.110	90.000	1.332	0.009	7.560	7.560
BXA-70063/6CF	300.000	0.038	-3.559	-2.055	90.000	1.332	0.009	5.500	2.200
BXA-70063/6CF	60.000	0.038	3.559	-2.055	90.000	1.332	0.009	5.500	2.200
BXA-70063/6CF	180.000	0.038	0.000	4.110	90.000	1.332	0.009	5.500	2.200
Rymsa MG D3-900Tx	300.000	0.047	-1.559	-5.519	90.000	1.332	0.009	5.381	5.024
Rymsa MG D3-900Tx	60.000	0.047	5.559	1.409	90.000	1.332	0.009	5.381	5.024
Rymsa MG D3-900Tx	180.000	0.047	-4.000	4.110	90.000	1.332	0.009	5.381	5.024
PiROD 13' Platform w/handrail	0.000	1.822	0.000	0.000	90.000	1.332	0.009	31.300	31.300
FD9R6004/2C-3L	300.000	0.003	-0.559	-7.251	90.000	1.332	0.009	0.367	0.085
Diplexer									
FD9R6004/2C-3L	300.000	0.003	-6.559	3.141	90.000	1.332	0.009	0.367	0.085
Diplexer									
FD9R6004/2C-3L	60.000	0.003	6.559	3.141	90.000	1.332	0.009	0.367	0.085
Diplexer									
FD9R6004/2C-3L	60.000	0.003	0.559	-7.251	90.000	1.332	0.009	0.367	0.085
Diplexer									
FD9R6004/2C-3L	180.000	0.003	-6.000	4.110	90.000	1.332	0.009	0.367	0.085
Diplexer									
FD9R6004/2C-3L	180.000	0.003	6.000	4.110	90.000	1.332	0.009	0.367	0.085
Diplexer									
Sum Weight:		9.095							

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	14.896					
Bracing Weight	0.000					

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	15 of 22
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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
Total Member Self-Weight	14.896			0.000	0.000	
Total Weight	27.265			0.000	0.000	
Wind 0 deg - No Ice		0.000	-19.692	-1796.692	0.000	0.000
Wind 30 deg - No Ice		9.846	-17.053	-1555.981	-898.346	0.000
Wind 45 deg - No Ice		13.924	-13.924	-1270.453	-1270.453	0.000
Wind 60 deg - No Ice		17.053	-9.846	-898.346	-1555.981	0.000
Wind 90 deg - No Ice		19.692	0.000	0.000	-1796.692	0.000
Wind 120 deg - No Ice		17.053	9.846	898.346	-1555.981	0.000
Wind 135 deg - No Ice		13.924	13.924	1270.453	-1270.453	0.000
Wind 150 deg - No Ice		9.846	17.053	1555.981	-898.346	0.000
Wind 180 deg - No Ice		0.000	19.692	1796.692	0.000	0.000
Wind 210 deg - No Ice		-9.846	17.053	1555.981	898.346	0.000
Wind 225 deg - No Ice		-13.924	13.924	1270.453	1270.453	0.000
Wind 240 deg - No Ice		-17.053	9.846	898.346	1555.981	0.000
Wind 270 deg - No Ice		-19.692	0.000	0.000	1796.692	0.000
Wind 300 deg - No Ice		-17.053	-9.846	-898.346	1555.981	0.000
Wind 315 deg - No Ice		-13.924	-13.924	-1270.453	1270.453	0.000
Wind 330 deg - No Ice		-9.846	-17.053	-1555.981	898.346	0.000
Member Ice	2.664					
Total Weight Ice	33.991			0.000	0.000	
Wind 0 deg - Ice		0.000	-16.537	-1533.091	0.000	0.000
Wind 30 deg - Ice		8.269	-14.322	-1327.696	-766.545	0.000
Wind 45 deg - Ice		11.694	-11.694	-1084.059	-1084.059	0.000
Wind 60 deg - Ice		14.322	-8.269	-766.545	-1327.696	0.000
Wind 90 deg - Ice		16.537	0.000	0.000	-1533.091	0.000
Wind 120 deg - Ice		14.322	8.269	766.545	-1327.696	0.000
Wind 135 deg - Ice		11.694	11.694	1084.059	-1084.059	0.000
Wind 150 deg - Ice		8.269	14.322	1327.696	-766.545	0.000
Wind 180 deg - Ice		0.000	16.537	1533.091	0.000	0.000
Wind 210 deg - Ice		-8.269	14.322	1327.696	766.545	0.000
Wind 225 deg - Ice		-11.694	11.694	1084.059	1084.059	0.000
Wind 240 deg - Ice		-14.322	8.269	766.545	1327.696	0.000
Wind 270 deg - Ice		-16.537	0.000	0.000	1533.091	0.000
Wind 300 deg - Ice		-14.322	-8.269	-766.545	1327.696	0.000
Wind 315 deg - Ice		-11.694	-11.694	-1084.059	1084.059	0.000
Wind 330 deg - Ice		-8.269	-14.322	-1327.696	766.545	0.000
Total Weight	27.265			0.000	0.000	
Wind 0 deg - Service		0.000	-7.692	-701.833	0.000	0.000
Wind 30 deg - Service		3.846	-6.661	-607.805	-350.916	0.000
Wind 45 deg - Service		5.439	-5.439	-496.271	-496.271	0.000
Wind 60 deg - Service		6.661	-3.846	-350.916	-607.805	0.000
Wind 90 deg - Service		7.692	0.000	0.000	-701.833	0.000
Wind 120 deg - Service		6.661	3.846	350.916	-607.805	0.000
Wind 135 deg - Service		5.439	5.439	496.271	-496.271	0.000
Wind 150 deg - Service		3.846	6.661	607.805	-350.916	0.000
Wind 180 deg - Service		0.000	7.692	701.833	0.000	0.000
Wind 210 deg - Service		-3.846	6.661	607.805	350.916	0.000
Wind 225 deg - Service		-5.439	5.439	496.271	496.271	0.000
Wind 240 deg - Service		-6.661	3.846	350.916	607.805	0.000
Wind 270 deg - Service		-7.692	0.000	0.000	701.833	0.000
Wind 300 deg - Service		-6.661	-3.846	-350.916	607.805	0.000
Wind 315 deg - Service		-5.439	-5.439	-496.271	496.271	0.000
Wind 330 deg - Service		-3.846	-6.661	-607.805	350.916	0.000

Load Combinations

RISATower

URS Corporation
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 Rocky Hill, CT
 Phone: (860) 529-8882
 FAX: (860) 529-3991

Job

140' Monopole

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Project

Manchester Sand and Gravel

Date

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Client

Verizon Wireless

Designed by

Matthew Kapinos

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
 19 Dead+Wind 0 deg+Ice
 20 Dead+Wind 30 deg+Ice
 21 Dead+Wind 45 deg+Ice
 22 Dead+Wind 60 deg+Ice
 23 Dead+Wind 90 deg+Ice
 24 Dead+Wind 120 deg+Ice
 25 Dead+Wind 135 deg+Ice
 26 Dead+Wind 150 deg+Ice
 27 Dead+Wind 180 deg+Ice
 28 Dead+Wind 210 deg+Ice
 29 Dead+Wind 225 deg+Ice
 30 Dead+Wind 240 deg+Ice
 31 Dead+Wind 270 deg+Ice
 32 Dead+Wind 300 deg+Ice
 33 Dead+Wind 315 deg+Ice
 34 Dead+Wind 330 deg+Ice
 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	140 - 91.05	Pole	Max Tension	27	0.000	0.000	0.000
			Max. Compression	18	-12.746	0.000	0.000
			Max. Mx	6	-8.446	-223.664	0.000

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L2	91.05 - 45.04	Pole	Max. My	2	-8.446	0.000	223.664
			Max. Vy	6	11.089	-223.664	0.000
			Max. Vx	2	-11.089	0.000	223.664
			Max. Torque	26			0.000
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-23.022	0.000	0.000
			Max. Mx	6	-16.782	-938.741	0.000
			Max. My	2	-16.782	0.000	938.741
			Max. Vy	6	17.493	-938.741	0.000
			Max. Vx	2	-17.493	0.000	938.741
L3	45.04 - 0	Pole	Max. Torque	20			-0.000
			Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-33.991	0.000	0.000
			Max. Mx	6	-27.246	-1869.064	0.000
			Max. My	10	-27.246	0.000	-1869.064
			Max. Vy	6	19.717	-1869.064	0.000
			Max. Vx	2	-19.717	0.000	1869.064
			Max. Torque	20			-0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	23	33.991	-16.537	0.000
	Max. H _x	14	27.265	19.692	0.000
	Max. H _y	2	27.265	0.000	19.692
	Max. M _x	2	1869.064	0.000	19.692
	Max. M _y	6	1869.064	-19.692	0.000
	Max. Torsion	34	0.000	8.269	14.322
	Min. Vert	1	27.265	0.000	0.000
	Min. H _x	6	27.265	-19.692	0.000
	Min. H _y	10	27.265	0.000	-19.692
	Min. M _x	10	-1869.064	0.000	-19.692
	Min. M _y	14	-1869.064	19.692	0.000
	Min. Torsion	20	-0.000	-8.269	14.322

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _y K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Dead Only	27.265	0.000	0.000	0.000	0.000	0.000
Dead+Wind 0 deg - No Ice	27.265	0.000	-19.692	-1869.064	0.000	0.000
Dead+Wind 30 deg - No Ice	27.265	9.846	-17.053	-1618.664	-934.536	0.000
Dead+Wind 45 deg - No Ice	27.265	13.924	-13.924	-1321.634	-1321.634	0.000
Dead+Wind 60 deg - No Ice	27.265	17.053	-9.846	-934.536	-1618.664	-0.000
Dead+Wind 90 deg - No Ice	27.265	19.692	0.000	0.000	-1869.064	0.000
Dead+Wind 120 deg - No Ice	27.265	17.053	9.846	934.536	-1618.664	0.000
Dead+Wind 135 deg - No Ice	27.265	13.924	13.924	1321.634	-1321.634	0.000
Dead+Wind 150 deg - No Ice	27.265	9.846	17.053	1618.664	-934.536	-0.000
Dead+Wind 180 deg - No Ice	27.265	0.000	19.692	1869.064	0.000	0.000
Dead+Wind 210 deg - No Ice	27.265	-9.846	17.053	1618.664	934.536	0.000

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	Client	Designed by
	Verizon Wireless	Matthew Kapinos

Load Combination	Vertical K	Shear _x K	Shear _y K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Dead+Wind 225 deg - No Ice	27.265	-13.924	13.924	1321.634	1321.634	0.000
Dead+Wind 240 deg - No Ice	27.265	-17.053	9.846	934.536	1618.664	-0.000
Dead+Wind 270 deg - No Ice	27.265	-19.692	0.000	0.000	1869.064	0.000
Dead+Wind 300 deg - No Ice	27.265	-17.053	-9.846	-934.536	1618.664	0.000
Dead+Wind 315 deg - No Ice	27.265	-13.924	-13.924	-1321.634	1321.634	0.000
Dead+Wind 330 deg - No Ice	27.265	-9.846	-17.053	-1618.664	934.536	-0.000
Dead+Ice	33.991	0.000	0.000	0.000	0.000	0.000
Dead+Wind 0 deg+Ice	33.991	0.000	-16.537	-1618.716	0.000	0.000
Dead+Wind 30 deg+Ice	33.991	8.269	-14.322	-1401.871	-809.371	0.000
Dead+Wind 45 deg+Ice	33.991	11.694	-11.694	-1144.623	-1144.623	0.000
Dead+Wind 60 deg+Ice	33.991	14.322	-8.269	-809.371	-1401.871	-0.000
Dead+Wind 90 deg+Ice	33.991	16.537	0.000	0.000	-1618.716	0.000
Dead+Wind 120 deg+Ice	33.991	14.322	8.269	809.371	-1401.871	0.000
Dead+Wind 135 deg+Ice	33.991	11.694	11.694	1144.623	-1144.623	0.000
Dead+Wind 150 deg+Ice	33.991	8.269	14.322	1401.871	-809.371	-0.000
Dead+Wind 180 deg+Ice	33.991	0.000	16.537	1618.716	0.000	0.000
Dead+Wind 210 deg+Ice	33.991	-8.269	14.322	1401.871	809.371	0.000
Dead+Wind 225 deg+Ice	33.991	-11.694	11.694	1144.623	1144.623	0.000
Dead+Wind 240 deg+Ice	33.991	-14.322	8.269	809.371	1401.871	-0.000
Dead+Wind 270 deg+Ice	33.991	-16.537	0.000	0.000	1618.716	0.000
Dead+Wind 300 deg+Ice	33.991	-14.322	-8.269	-809.371	1401.871	0.000
Dead+Wind 315 deg+Ice	33.991	-11.694	-11.694	-1144.623	1144.623	0.000
Dead+Wind 330 deg+Ice	33.991	-8.269	-14.322	-1401.871	809.371	-0.000
Dead+Wind 0 deg - Service	27.265	0.000	-7.692	-730.905	0.000	0.000
Dead+Wind 30 deg - Service	27.265	3.846	-6.661	-632.982	-365.452	0.000
Dead+Wind 45 deg - Service	27.265	5.439	-5.439	-516.830	-516.830	0.000
Dead+Wind 60 deg - Service	27.265	6.661	-3.846	-365.452	-632.982	-0.000
Dead+Wind 90 deg - Service	27.265	7.692	0.000	0.000	-730.905	0.000
Dead+Wind 120 deg - Service	27.265	6.661	3.846	365.452	-632.982	0.000
Dead+Wind 135 deg - Service	27.265	5.439	5.439	516.830	-516.830	0.000
Dead+Wind 150 deg - Service	27.265	3.846	6.661	632.982	-365.452	-0.000
Dead+Wind 180 deg - Service	27.265	0.000	7.692	730.905	0.000	0.000
Dead+Wind 210 deg - Service	27.265	-3.846	6.661	632.982	365.452	0.000
Dead+Wind 225 deg - Service	27.265	-5.439	5.439	516.830	516.830	0.000
Dead+Wind 240 deg - Service	27.265	-6.661	3.846	365.452	632.982	-0.000
Dead+Wind 270 deg - Service	27.265	-7.692	0.000	0.000	730.905	0.000
Dead+Wind 300 deg - Service	27.265	-6.661	-3.846	-365.452	632.982	0.000
Dead+Wind 315 deg - Service	27.265	-5.439	-5.439	-516.830	516.830	0.000
Dead+Wind 330 deg - Service	27.265	-3.846	-6.661	-632.982	365.452	-0.000

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-27.265	0.000	0.000	27.265	0.000	0.000%
2	0.000	-27.265	-19.692	0.000	27.265	19.692	0.000%
3	9.846	-27.265	-17.053	-9.846	27.265	17.053	0.000%
4	13.924	-27.265	-13.924	-13.924	27.265	13.924	0.000%
5	17.053	-27.265	-9.846	-17.053	27.265	9.846	0.000%
6	19.692	-27.265	0.000	-19.692	27.265	0.000	0.000%
7	17.053	-27.265	9.846	-17.053	27.265	-9.846	0.000%
8	13.924	-27.265	13.924	-13.924	27.265	-13.924	0.000%
9	9.846	-27.265	17.053	-9.846	27.265	-17.053	0.000%
10	0.000	-27.265	19.692	0.000	27.265	-19.692	0.000%
11	-9.846	-27.265	17.053	9.846	27.265	-17.053	0.000%
12	-13.924	-27.265	13.924	13.924	27.265	-13.924	0.000%
13	-17.053	-27.265	9.846	17.053	27.265	-9.846	0.000%

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	Client	Verizon Wireless	Designed by	Matthew Kapinos

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
14	-19.692	-27.265	0.000	19.692	27.265	0.000	0.000%
15	-17.053	-27.265	-9.846	17.053	27.265	9.846	0.000%
16	-13.924	-27.265	-13.924	13.924	27.265	13.924	0.000%
17	-9.846	-27.265	-17.053	9.846	27.265	17.053	0.000%
18	0.000	-33.991	0.000	0.000	33.991	0.000	0.000%
19	0.000	-33.991	-16.537	0.000	33.991	16.537	0.000%
20	8.269	-33.991	-14.322	-8.269	33.991	14.322	0.000%
21	11.694	-33.991	-11.694	-11.694	33.991	11.694	0.000%
22	14.322	-33.991	-8.269	-14.322	33.991	8.269	0.000%
23	16.537	-33.991	0.000	-16.537	33.991	0.000	0.000%
24	14.322	-33.991	8.269	-14.322	33.991	-8.269	0.000%
25	11.694	-33.991	11.694	-11.694	33.991	-11.694	0.000%
26	8.269	-33.991	14.322	-8.269	33.991	-14.322	0.000%
27	0.000	-33.991	16.537	0.000	33.991	-16.537	0.000%
28	-8.269	-33.991	14.322	8.269	33.991	-14.322	0.000%
29	-11.694	-33.991	11.694	11.694	33.991	-11.694	0.000%
30	-14.322	-33.991	8.269	14.322	33.991	-8.269	0.000%
31	-16.537	-33.991	0.000	16.537	33.991	0.000	0.000%
32	-14.322	-33.991	-8.269	14.322	33.991	8.269	0.000%
33	-11.694	-33.991	-11.694	11.694	33.991	11.694	0.000%
34	-8.269	-33.991	-14.322	8.269	33.991	14.322	0.000%
35	0.000	-27.265	-7.692	0.000	27.265	7.692	0.000%
36	3.846	-27.265	-6.661	-3.846	27.265	6.661	0.000%
37	5.439	-27.265	-5.439	-5.439	27.265	5.439	0.000%
38	6.661	-27.265	-3.846	-6.661	27.265	3.846	0.000%
39	7.692	-27.265	0.000	-7.692	27.265	0.000	0.000%
40	6.661	-27.265	3.846	-6.661	27.265	-3.846	0.000%
41	5.439	-27.265	5.439	-5.439	27.265	-5.439	0.000%
42	3.846	-27.265	6.661	-3.846	27.265	-6.661	0.000%
43	0.000	-27.265	7.692	0.000	27.265	-7.692	0.000%
44	-3.846	-27.265	6.661	3.846	27.265	-6.661	0.000%
45	-5.439	-27.265	5.439	5.439	27.265	-5.439	0.000%
46	-6.661	-27.265	3.846	6.661	27.265	-3.846	0.000%
47	-7.692	-27.265	0.000	7.692	27.265	0.000	0.000%
48	-6.661	-27.265	-3.846	6.661	27.265	3.846	0.000%
49	-5.439	-27.265	-5.439	5.439	27.265	5.439	0.000%
50	-3.846	-27.265	-6.661	3.846	27.265	6.661	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	0.00032236
3	Yes	5	0.00000001	0.00050238
4	Yes	5	0.00000001	0.00056333
5	Yes	5	0.00000001	0.00050238
6	Yes	4	0.00000001	0.00032236
7	Yes	5	0.00000001	0.00050238
8	Yes	5	0.00000001	0.00056333
9	Yes	5	0.00000001	0.00050238
10	Yes	4	0.00000001	0.00032236
11	Yes	5	0.00000001	0.00050238
12	Yes	5	0.00000001	0.00056333
13	Yes	5	0.00000001	0.00050238
14	Yes	4	0.00000001	0.00032236

<i>RISATower</i> URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	20 of 22
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15	Yes	5	0.00000001	0.00050238
16	Yes	5	0.00000001	0.00056333
17	Yes	5	0.00000001	0.00050238
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00083098
20	Yes	5	0.00000001	0.00080384
21	Yes	5	0.00000001	0.00091447
22	Yes	5	0.00000001	0.00080384
23	Yes	4	0.00000001	0.00083098
24	Yes	5	0.00000001	0.00080384
25	Yes	5	0.00000001	0.00091447
26	Yes	5	0.00000001	0.00080384
27	Yes	4	0.00000001	0.00083098
28	Yes	5	0.00000001	0.00080384
29	Yes	5	0.00000001	0.00091447
30	Yes	5	0.00000001	0.00080384
31	Yes	4	0.00000001	0.00083098
32	Yes	5	0.00000001	0.00080384
33	Yes	5	0.00000001	0.00091447
34	Yes	5	0.00000001	0.00080384
35	Yes	4	0.00000001	0.00007752
36	Yes	4	0.00000001	0.00090336
37	Yes	5	0.00000001	0.00005452
38	Yes	4	0.00000001	0.00090336
39	Yes	4	0.00000001	0.00007752
40	Yes	4	0.00000001	0.00090336
41	Yes	5	0.00000001	0.00005452
42	Yes	4	0.00000001	0.00090336
43	Yes	4	0.00000001	0.00007752
44	Yes	4	0.00000001	0.00090336
45	Yes	5	0.00000001	0.00005452
46	Yes	4	0.00000001	0.00090336
47	Yes	4	0.00000001	0.00007752
48	Yes	4	0.00000001	0.00090336
49	Yes	5	0.00000001	0.00005452
50	Yes	4	0.00000001	0.00090336

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 91.05	36.051	39	2.043	0.000
L2	94.95 - 45.04	17.595	39	1.711	0.000
L3	49.95 - 0	4.852	39	0.901	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
139.000	(2) 4' Side arm	39	35.620	2.039	0.000	37108
134.000	8' Side arm	39	33.464	2.022	0.000	30923
125.000	(2) DUO1417-8686	39	29.614	1.985	0.000	12369
115.000	(2) DB980H90	39	25.430	1.927	0.000	7420
113.000	(2) 6' Whip	39	24.610	1.912	0.000	6871

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Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
110.000	(2) 6' Whip	39	23.395	1.888	0.000	6183
107.000	(2) 6' Whip	39	22.196	1.860	0.000	5621
100.000	(4) DB844H90	39	19.478	1.782	0.000	4637
90.000	ALP 6014	39	15.820	1.629	0.000	3792

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 91.05	92.050	6	5.219	0.000
L2	94.95 - 45.04	44.950	6	4.372	0.000
L3	49.95 - 0	12.402	6	2.303	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
139.000	(2) 4' Side arm	6	90.949	5.208	0.000	14744
134.000	8' Side arm	6	85.449	5.155	0.000	12286
125.000	(2) DUO1417-8686	6	75.624	5.048	0.000	4913
115.000	(2) DB980H90	6	64.948	4.893	0.000	2945
113.000	(2) 6' Whip	6	62.857	4.855	0.000	2727
110.000	(2) 6' Whip	6	59.754	4.794	0.000	2453
107.000	(2) 6' Whip	6	56.696	4.726	0.000	2230
100.000	(4) DB844H90	6	49.758	4.537	0.000	1838
90.000	ALP 6014	6	40.420	4.183	0.000	1500

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
L1	140 - 91.05 (1)	TP26.81x18x0.188	48.950	0.000	0.0	39.000	15.426	-8.446	601.613	0.014
L2	91.05 - 45.04 (2)	TP34.84x25.733x0.313	49.910	0.000	0.0	39.000	33.358	-16.782	1300.970	0.013
L3	45.04 - 0 (3)	TP43x33.319x0.375	49.950	0.000	0.0	39.000	50.734	-27.246	1978.640	0.014

Pole Bending Design Data

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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	140 - 91.05 (1)	TP26.81x18x0.188	223.667	27.186	39.000	0.697	0.000	0.000	39.000	0.000
L2	91.05 - 45.04 (2)	TP34.84x25.733x0.313	938.750	40.749	39.000	1.045	0.000	0.000	39.000	0.000
L3	45.04 - 0 (3)	TP43x33.319x0.375	1869.07 5	42.070	39.000	1.079	0.000	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	140 - 91.05 (1)	TP26.81x18x0.188	11.089	0.719	26.000	0.055	0.000	0.000	26.000	0.000
L2	91.05 - 45.04 (2)	TP34.84x25.733x0.313	17.493	0.524	26.000	0.040	0.000	0.000	26.000	0.000
L3	45.04 - 0 (3)	TP43x33.319x0.375	19.718	0.389	26.000	0.030	0.000	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Ratio $\frac{f_v}{F_v}$	Ratio $\frac{f_{vt}}{F_{vt}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	140 - 91.05 (1)	0.014	0.697	0.000	0.055	0.000	0.712 ✓	1.333	H1-3+VT ✓
L2	91.05 - 45.04 (2)	0.013	1.045	0.000	0.040	0.000	1.058 ✓	1.333	H1-3+VT ✓
L3	45.04 - 0 (3)	0.014	1.079	0.000	0.030	0.000	1.093 ✓	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	140 - 91.05	Pole	TP26.81x18x0.188	1	-8.446	801.950	53.4	Pass
L2	91.05 - 45.04	Pole	TP34.84x25.733x0.313	2	-16.782	1734.193	79.4	Pass
L3	45.04 - 0	Pole	TP43x33.319x0.375	3	-27.246	2637.527	82.0	Pass
							Summary	
							Pole (L3)	82.0
							RATING =	82.0
								Pass

ANCHOR BOLT AND BASE PLATE ANALYSIS

ANCHOR BOLT AND BASE PLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment: OM := 1869·ft·kips user input
Shear Force: Shear := 20·kips user input
Axial Force: Axial := 27·kips user input

Anchor Bolt Data:

Use ASTM A615 Grade 75 user input
Number of Anchor Bolts = N $N_w := 12$ user input
Diameter of Bolt Circle: $D_{bc} := 51\text{in}$ user input
Bolt "Column" Distance: $L_w := 6\text{in}$ user input
Bolt Ultimate Strength: $F_u := 100\text{ksi}$ user input
Bolt Yield Strength: $F_y := 75\text{ksi}$ user input
Bolt Modulus: $E := 29000\text{ksi}$ user input
Anchor Bolt Diameter $D := 2.25\text{in}$ user input
Threads per Inch: $n := 4.5$ user input

Base Plate Data:

Use ASTM A871 Grade 60 user input
Plate Yield Strength: $F_{y_{bp}} := 60\text{ksi}$ user input
Base Plate Thickness: PlateThickness := 1.75·in user input
Base Plate Diameter: $D_{bp} := 57\text{in}$ user input
Outer Pole Diameter: $D_{pole} := 43\text{in}$ 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: $i := 1 \dots N$

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

$d_1 = 12.75 \cdot \text{in}$	$d_7 = -12.75 \cdot \text{in}$
$d_2 = 22.08 \cdot \text{in}$	$d_8 = -22.08 \cdot \text{in}$
$d_3 = 25.50 \cdot \text{in}$	$d_9 = -25.50 \cdot \text{in}$
$d_4 = 22.08 \cdot \text{in}$	$d_{10} = -22.08 \cdot \text{in}$
$d_5 = 12.75 \cdot \text{in}$	$d_{11} = -12.75 \cdot \text{in}$
$d_6 = 0.00 \cdot \text{in}$	etc.

Critical Distances For Bending in Plate:

Outer Pole Radius: $R_{pole} := \frac{D_{pole}}{2}$ $R_{pole} = 21.50 \cdot \text{in}$

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

$MA_1 = 0.00 \cdot \text{in}$	$MA_7 = 0.00 \cdot \text{in}$
$MA_2 = 0.58 \cdot \text{in}$	$MA_8 = 0.00 \cdot \text{in}$
$MA_3 = 4.00 \cdot \text{in}$	$MA_9 = 0.00 \cdot \text{in}$
$MA_4 = 0.58 \cdot \text{in}$	$MA_{10} = 0.00 \cdot \text{in}$
$MA_5 = 0.00 \cdot \text{in}$	$MA_{11} = 0.00 \cdot \text{in}$
$MA_6 = 0.00 \cdot \text{in}$	etc.

Effective Width of Baseplate for Bending: $\text{EffectiveWidth} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2} \right)^2 - \left(\frac{D_{pole}}{2} \right)^2}$ $\text{EffectiveWidth} = 29.93 \cdot \text{in}$

Anchor Bolt Analysis:

Polar Moment of Inertia I_p :

$$I_p := \sum_i (d_i)^2 \quad I_p = 3.902 \times 10^3 \cdot \text{in}^2$$

Gross Area of Bolt:

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

Net Area of Bolt:

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

Net Diameter:

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

Radius of Gyration of Bolt:

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

Section Modulus of Bolt:

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

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{\text{Shear}}{N} \right) \cdot l \quad M_x = 0.833 \cdot \text{ft} \cdot \text{kips}$$

$$f_{bx} := \frac{M_x}{S_x} \quad f_{bx} = 12.1 \cdot \text{ksi}$$

Allowable Bending

$$F_{bx} := 1.333 \cdot 0.60 \cdot F_y \quad F_{bx} = 60.0 \cdot \text{ksi}$$

Note: 1.333 increase allowed per TIA/EIA

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

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

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

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

Note: 1.333 increase allowed per TIA/EIA

Applied Tension:

$$\text{MaxTension} := \frac{\text{OM} \cdot R_{bc}}{I_p} - \frac{\text{Axial}}{N} \quad \text{MaxTension} = 144.3 \cdot \text{kips}$$

Check Stresses:

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

$$\frac{\text{MaxTension}}{F_{\text{net.area}}} = 0.74$$

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

Condition = "OK"

Job 140' EEI Monopole - Manchester, CT
 Description Anchor Bolt and Base Plate Analysis

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Computed by MJK

Checked by _____

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Date 06/29/10

Date _____

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:

$$l := \begin{cases} 1 & \text{if } l > 2 \cdot D_n \\ 0.00 \text{ in} & \text{otherwise} \end{cases} \quad l = 6.00 \cdot \text{in}$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0 \text{ ksi} & \text{otherwise} \end{cases} \quad f_{bx} = 12.1 \cdot \text{ksi}$$

Allowable Compressive Force:

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} \quad C_c = 87.36$$

$$F_a := \begin{cases} \frac{\left[1 - \frac{\left(\frac{K \cdot l}{r} \right)^2}{2 \cdot C_c^2} \right] \cdot F_y}{\frac{5}{3} + \frac{3 \cdot \left(\frac{K \cdot l}{r} \right)}{8 \cdot C_c} - \frac{\left(\frac{K \cdot l}{r} \right)^3}{8 \cdot C_c^3}} & \text{if } \frac{K \cdot l}{r} \leq C_c \\ \frac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r} \right)^2} & \text{if } \frac{K \cdot l}{r} > C_c \end{cases} \quad F_a = 44.0 \cdot \text{ksi}$$

$$F_a := 1.333 \cdot F_a \quad \text{Note: 1.333 increase allowed per TIA/EIA} \quad F_a = 58.6 \cdot \text{ksi}$$

Applied Compressive Force:

$$\text{MaxCompression} := \frac{OM \cdot R_{bc}}{I_p} + \frac{\text{Axial}}{N} \quad \text{MaxCompression} = 148.8 \cdot \text{kips}$$

$$f_a := \frac{\text{MaxCompression}}{A_n} \quad f_a = 45.8 \cdot \text{ksi}$$

Check Combined Stresses:

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} = 0.98$$

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

Condition = "OK"

Job 140' EEI Monopole - Manchester, CT
 Description Anchor Bolt and Base Plate Analysis

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Base Plate Analysis:

Force from Bolt(s):

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

$$C_1 = 75.5 \cdot \text{kips}$$

$$C_7 = -71.0 \cdot \text{kips}$$

$$C_2 = 129.2 \cdot \text{kips}$$

$$C_8 = -124.7 \cdot \text{kips}$$

$$C_3 = 148.8 \cdot \text{kips}$$

$$C_9 = -144.3 \cdot \text{kips}$$

$$C_4 = 129.2 \cdot \text{kips}$$

$$C_{10} = -124.7 \cdot \text{kips}$$

$$C_5 = 75.5 \cdot \text{kips}$$

$$C_{11} = -71.0 \cdot \text{kips}$$

$$C_6 = 2.3 \cdot \text{kips}$$

etc.

Bending Stress in Plate:

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

$$f_{bp} = 48.8 \cdot \text{ksi}$$

Check Stresses:

$$\frac{f_{bp}}{1.333 \cdot 0.75 F_{y_{bp}}} = 0.81$$

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

Condition = "OK"

FOUNDATION ANALYSIS

Job 140' EEI Monopole - Manchester, CT

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Description Caisson Foundation Evaluation

Computed by MJK

Date 06/29/10

Checked by _____

Date _____

Check Foundation Depth

TIA/EIA-222-F 7.2.5

Shear Force:

$$S := 20.0k$$

USER INPUT

Overtuning Moment:

$$M := 1869ft \cdot k$$

USER INPUT

Foundation Diameter:

$$d := 6.0ft$$

USER INPUT

Overall Length of
Caisson:

$$L_c := 23.0ft$$

USER INPUT

Depth From Top of
Caisson to Grade:

$$L_{pag} := 1.0ft$$

USER INPUT

Depth of Caisson Below
Ground Level:

$$LD := L_c - L_{pag} \quad LD = 22.0ft$$

USER INPUT

Depth Required:

$$LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d} \right) + 2ft \cdot \left(\frac{M \cdot ft}{3 \cdot k \cdot d} + \frac{S \cdot ft}{2k} + \frac{S^2 \cdot ft^3}{18k^2 \cdot d^2} \right)^{.5} \quad LD1 = 24.5ft$$

DepthCheck := if(LD1 ≤ LD, "OK", "NO GOOD") DepthCheck = "NO GOOD"

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:

$$Mu := 1960ft \cdot k \quad \text{USER INPUT-FROM LPILE}$$

Moment Capacity:

$$Mn := 3492.5ft \cdot k \quad \text{USER INPUT-FROM LPILE}$$

Factor of Safety:

$$FS := \frac{Mn}{Mu} \quad FS = 1.8$$

Factor of Safety
Required

$$FS_{reqd} := 1.3 \quad FOSCheck := \text{if}(FS \geq FS_{reqd}, "OK", "NO GOOD") \quad FOSCheck = "OK"$$

Factor of Safety Ratio:

$$FS_{ratio} := \left(\frac{FS_{reqd}}{FS} \right) = 0.73$$

Axial Capacity:

Applied Axial Load:

$$A1 := 34k$$

USER INPUT

Concrete Weight:

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

$$A2 = 93.3 \cdot k$$

Total Axial Load:

$$AT := A1 + A2$$

$$AT = 127.3 \cdot k$$

Number of Rebar:

$$n := 14$$

USER INPUT

Area of Rebar:

$$Ar := 1.56in^2$$

USER INPUT

#11

Rebar Yield Strength:

$$fy := 60ksi$$

USER INPUT

Area of Concrete:

$$Ag := \pi \frac{d^2}{4}$$

$$Ag = 28.3 ft^{2.0}$$

Concrete Comp Strength:

$$fc := 4ksi$$

USER INPUT

Axial Capacity:

$$Po := n \cdot Ar \cdot fy + (Ag - n \cdot Ar) \cdot 0.85 \cdot fc$$

$$Po = 15079.3 \cdot k$$

AxialCheck := if(AT ≤ Po, "OK", "NO GOOD")

AxialCheck = "OK"

140' EEI Monopole - Manchester, CT.lpo

LPILE Plus for Windows, Version 4

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

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This program is licensed to:

Matthew Kapinos

URS Corp

Name of input data file: P:\08\MathCAD\LPile\140' EEI Monopole - Manchester, CT.lpd

Name of output file: P:\08\MathCAD\LPile\140' EEI Monopole - Manchester, CT.lpo

Name of plot output file: P:\08\MathCAD\LPile\140' EEI Monopole - Manchester, CT.lpp

Name of runtime file: P:\08\MathCAD\LPile\140' EEI Monopole - Manchester, CT.lpr

Time and Date of Analysis

Date: June 28, 2010 Time: 15:17:53

Problem Title

140' EEI Monopole - Manchester, CT

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

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- 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 = 276.00 in
- Depth of ground surface below top of pile = 12.00 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	72.000	1.6377E+06	4.5360E+03	3.6050E+06
2	276.000	72.000	1.6377E+06	4.5360E+03	3.6050E+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 = 12.000 in
- Distance from top of pile to bottom of layer = 48.000 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 = 48.000 in
- Distance from top of pile to bottom of layer = 180.000 in
- p-y subgrade modulus k for top of soil layer = 100.000 lbs/in**3
- p-y subgrade modulus k for bottom of layer = 100.000 lbs/in**3

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

- Distance from top of pile to top of layer = 180.000 in
- Distance from top of pile to bottom of layer = 204.000 in
- p-y subgrade modulus k for top of soil layer = 300.000 lbs/in**3

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p-y subgrade modulus k for bottom of layer = 300.000 lbs/in**3

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 204.000 in
Distance from top of pile to bottom of layer = 432.000 in
p-y subgrade modulus k for top of soil layer = 300.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 300.000 lbs/in**3

(Depth of lowest layer extends 156.00 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	.07200
2	48.00	.07200
3	48.00	.07200
4	180.00	.07200
5	180.00	.07200
6	204.00	.07200
7	204.00	.03640
8	432.00	.03640

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	34.00	-----	-----
2	48.000	.00000	34.00	-----	-----
3	48.000	.00000	34.00	-----	-----
4	180.000	.00000	34.00	-----	-----
5	180.000	.00000	34.00	-----	-----
6	204.000	.00000	34.00	-----	-----
7	204.000	.00000	34.00	-----	-----
8	432.000	.00000	34.00	-----	-----

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 = 17000.000 lbs

Bending moment at pile head = 19428000.000 in-lbs

Axial load at pile head = 34000.000 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 = 20000.000 lbs

Bending moment at pile head = 22428000.000 in-lbs

Axial load at pile head = 27000.000 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 = 72.000 In

Material Properties:

Compressive Strength of Concrete = 4. Kip/In**2

Yield stress for rebar = 60. Kip/In**2

Modulus of elasticity of steel = 29000. Kip/In**2

Number of reinforcing bars = 14

Area of single rebar = 1.56000 In**2

Number of rows of reinforcing bars = 7

Cover Thickness = 4.000 In

Ultimate squash load capacity = 15079.26 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement In**2	Distance to Centroidal Axis In
1	3.120000	31.1977
2	3.120000	25.0186
3	3.120000	13.8843
4	3.120000	.0000
5	3.120000	-13.8843
6	3.120000	-25.0186

7

Axial Thrust Force =

Bending Moment in-lbs	Bending Stiffness lb-in ²	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches
5.103E+06	5.103E+12	.00000100	.00003837	38.369
5.108E+06	1.021E+12	.00000500	.00008709	17.419
7.359E+06	8.177E+11	.00000900	.00014888	16.543
1.028E+07	7.911E+11	.00001300	.00021047	16.190
1.319E+07	7.762E+11	.00001700	.00027242	16.025
1.609E+07	7.663E+11	.00002100	.00033474	15.940
1.898E+07	7.590E+11	.00002500	.00039744	15.898
2.184E+07	7.533E+11	.00002900	.00046055	15.881
2.470E+07	7.485E+11	.00003300	.00052406	15.881
2.754E+07	7.443E+11	.00003700	.00058801	15.892
3.020E+07	7.365E+11	.00004100	.00065118	15.883
3.202E+07	7.116E+11	.00004500	.00070862	15.747
3.317E+07	6.770E+11	.00004900	.00076355	15.583
3.415E+07	6.443E+11	.00005300	.00081343	15.348
3.818E+07	4.600E+11	.00008300	.00115512	13.917
3.985E+07	3.527E+11	.00011300	.00145779	12.901
4.071E+07	2.847E+11	.00014300	.00173308	12.119
4.146E+07	2.397E+11	.00017300	.00202601	11.711
4.190E+07	2.064E+11	.00020300	.00229370	11.299
4.198E+07	1.802E+11	.00023300	.00254014	10.902
4.209E+07	1.600E+11	.00026300	.00283367	10.774
4.211E+07	1.437E+11	.00029300	.00307265	10.487
4.212E+07	1.304E+11	.00032300	.00331628	10.267
4.214E+07	1.194E+11	.00035300	.00356234	10.092
4.214E+07	1.100E+11	.00038300	.00381018	9.94825745

Ultimate moment capacity at concrete strain of 0.003 =

Axial Thrust Force =

Bending Moment in-lbs	Bending Stiffness lb-in ²	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches
5.102E+06	5.102E+12	.00000100	.00003790	37.901
5.108E+06	1.020E+12	.00000500	.00008488	16.975
7.210E+06	8.011E+11	.00000900	.00014644	16.271
1.014E+07	7.796E+11	.00001300	.00020800	16.000
1.305E+07	7.675E+11	.00001700	.00026992	15.878
1.595E+07	7.593E+11	.00002100	.00033221	15.820
1.883E+07	7.532E+11	.00002500	.00039489	15.796
2.170E+07	7.483E+11	.00002900	.00045796	15.792
2.455E+07	7.441E+11	.00003300	.00052145	15.801
2.739E+07	7.404E+11	.00003700	.00058537	15.821
3.004E+07	7.328E+11	.00004100	.00064841	15.815
3.187E+07	7.082E+11	.00004500	.00070583	15.685
3.300E+07	6.736E+11	.00004900	.00076028	15.516
3.398E+07	6.412E+11	.00005300	.00081014	15.286
3.800E+07	4.579E+11	.00008300	.00115099	13.867
3.966E+07	3.510E+11	.00011300	.00145246	12.854
4.052E+07	2.834E+11	.00014300	.00172758	12.081

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4.128E+07	2.386E+11	.00017300	.00201888	11.670
4.171E+07	2.055E+11	.00020300	.00228534	11.258
4.179E+07	1.793E+11	.00023300	.00253156	10.865
4.189E+07	1.593E+11	.00026300	.00282125	10.727
4.192E+07	1.431E+11	.00029300	.00305986	10.443
4.193E+07	1.298E+11	.00032300	.00330298	10.226
4.194E+07	1.188E+11	.00035300	.00354867	10.053
4.195E+07	1.095E+11	.00038300	.00379630	9.91200256
4.196E+07	1.016E+11	.00041300	.00404579	9.79609680

Ultimate moment capacity at concrete strain of 0.003 = 4.191E+07 In-lb

 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 = 17000.000 lbs
 Specified bending moment at pile head = 19428000.000 in-lbs
 Specified axial load at pile head = 34000.000 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	.597461	1.94E+07	17000.0	-.005523	434.6	7.52E+11	0.000
2.760	.582317	1.95E+07	17000.0	-.005451	435.6	7.52E+11	0.000
5.520	.567370	1.95E+07	17000.0	-.005380	436.7	7.52E+11	0.000
8.280	.552621	1.96E+07	17000.0	-.005308	437.7	7.52E+11	0.000
11.040	.538070	1.96E+07	17000.0	-.005236	438.7	7.52E+11	0.000
13.800	.523718	1.97E+07	16998.7	-.005164	439.8	7.52E+11	-.942692
16.560	.509565	1.97E+07	16994.2	-.005092	440.8	7.52E+11	-2.324
19.320	.495612	1.98E+07	16986.0	-.005019	441.9	7.52E+11	-3.628
22.080	.481859	1.98E+07	16974.3	-.004947	442.9	7.52E+11	-4.857
24.840	.468307	1.99E+07	16959.3	-.004874	443.9	7.51E+11	-6.013
27.600	.454957	1.99E+07	16941.2	-.004801	445.0	7.51E+11	-7.097
30.360	.441808	1.99E+07	16920.2	-.004727	446.0	7.51E+11	-8.112
33.120	.428861	2.00E+07	16896.5	-.004654	447.1	7.51E+11	-9.058
35.880	.416117	2.00E+07	16870.3	-.004581	448.1	7.51E+11	-9.937
38.640	.403577	2.01E+07	16841.7	-.004507	449.1	7.51E+11	-10.751
41.400	.391240	2.01E+07	16811.0	-.004433	450.2	7.51E+11	-11.502
44.160	.379107	2.02E+07	16778.3	-.004359	451.2	7.51E+11	-12.192
46.920	.367179	2.02E+07	16743.8	-.004284	452.2	7.51E+11	-12.822
49.680	.355457	2.03E+07	14816.8	-.004210	453.2	7.51E+11	-1383.557
52.440	.343940	2.03E+07	10929.0	-.004135	454.0	7.51E+11	-1433.658
55.200	.332629	2.03E+07	6910.5	-.004061	454.6	7.51E+11	-1478.317
57.960	.321525	2.04E+07	2776.0	-.003986	454.9	7.51E+11	-1517.707
60.720	.310628	2.04E+07	-1460.2	-.003911	454.9	7.51E+11	-1551.999
63.480	.299936	2.03E+07	-5784.2	-.003836	454.7	7.51E+11	-1581.365
66.240	.289452	2.03E+07	-10182.8	-.003761	454.2	7.51E+11	-1605.976
69.000	.279173	2.03E+07	-14642.9	-.003687	453.5	7.51E+11	-1625.999
71.760	.269101	2.02E+07	-19152.2	-.003612	452.5	7.51E+11	-1641.606
74.520	.259234	2.02E+07	-23698.7	-.003538	451.2	7.51E+11	-1652.961
77.280	.249571	2.01E+07	-28270.9	-.003464	449.6	7.51E+11	-1660.233
80.040	.240113	2.00E+07	-32857.8	-.003390	447.8	7.51E+11	-1663.584
82.800	.230858	1.99E+07	-37448.7	-.003317	445.6	7.51E+11	-1663.177
85.560	.221805	1.98E+07	-42033.5	-.003244	443.2	7.51E+11	-1659.174

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88.320	.212953	1.97E+07	-46602.6	-.003171	440.6	7.52E+11	-1651.731
91.080	.204300	1.96E+07	-51146.6	-.003099	437.6	7.52E+11	-1641.006
93.840	.195846	1.94E+07	-55656.6	-.003028	434.4	7.52E+11	-1627.151
96.600	.187588	1.93E+07	-60124.3	-.002957	430.9	7.52E+11	-1610.318
99.360	.179525	1.91E+07	-64541.7	-.002886	427.1	7.53E+11	-1590.654
102.120	.171656	1.89E+07	-68901.0	-.002817	423.0	7.53E+11	-1568.305
104.880	.163977	1.87E+07	-73195.2	-.002748	418.7	7.53E+11	-1543.411
107.640	.156488	1.85E+07	-77417.3	-.002680	414.2	7.54E+11	-1516.111
110.400	.149186	1.83E+07	-81561.0	-.002612	409.4	7.54E+11	-1486.539
113.160	.142068	1.81E+07	-85620.1	-.002546	404.3	7.55E+11	-1454.828
115.920	.135133	1.78E+07	-89588.9	-.002480	399.0	7.55E+11	-1421.102
118.680	.128377	1.76E+07	-93462.0	-.002416	393.4	7.56E+11	-1385.487
121.440	.121798	1.73E+07	-97234.3	-.002352	387.6	7.56E+11	-1348.101
124.200	.115393	1.70E+07	-100901.2	-.002290	381.6	7.57E+11	-1309.059
126.960	.109160	1.67E+07	-104458.2	-.002228	375.4	7.58E+11	-1268.471
129.720	.103094	1.64E+07	-107901.2	-.002168	369.0	7.58E+11	-1226.444
132.480	.097194	1.61E+07	-111226.3	-.002108	362.3	7.59E+11	-1183.081
135.240	.091456	1.58E+07	-114430.1	-.002050	355.5	7.60E+11	-1138.477
138.000	.085877	1.55E+07	-117509.1	-.001993	348.4	7.61E+11	-1092.726
140.760	.080453	1.52E+07	-120460.4	-.001938	341.2	7.61E+11	-1045.914
143.520	.075181	1.48E+07	-123281.2	-.001883	333.8	7.62E+11	-998.125
146.280	.070057	1.45E+07	-125968.8	-.001830	326.3	7.63E+11	-949.436
149.040	.065078	1.42E+07	-128521.0	-.001778	318.6	7.64E+11	-899.920
151.800	.060240	1.38E+07	-130935.4	-.001728	310.7	7.65E+11	-849.644
154.560	.055539	1.34E+07	-133210.0	-.001679	302.7	7.66E+11	-798.672
157.320	.050972	1.31E+07	-135343.1	-.001631	294.5	7.67E+11	-747.060
160.080	.046534	1.27E+07	-137333.0	-.001585	286.3	7.69E+11	-694.864
162.840	.042222	1.23E+07	-139178.0	-.001540	277.9	7.71E+11	-642.127
165.600	.038032	1.19E+07	-140876.9	-.001497	269.4	7.72E+11	-588.894
168.360	.033959	1.15E+07	-142428.1	-.001455	260.8	7.74E+11	-535.199
171.120	.029999	1.11E+07	-143830.6	-.001415	252.1	7.76E+11	-481.075
173.880	.026149	1.07E+07	-145083.1	-.001376	243.3	7.77E+11	-426.548
176.640	.022404	1.03E+07	-146184.6	-.001339	234.5	7.79E+11	-371.640
179.400	.018760	9.92E+06	-147134.0	-.001303	225.6	7.81E+11	-316.368
182.160	.015212	9.51E+06	-148676.2	-.001269	216.7	7.84E+11	-801.131
184.920	.011757	9.10E+06	-150649.6	-.001236	207.6	7.87E+11	-628.918
187.680	.008390	8.68E+06	-152146.5	-.001205	198.4	7.90E+11	-455.767
190.440	.005107	8.26E+06	-153164.2	-.001175	189.1	7.93E+11	-281.657
193.200	.001903	7.84E+06	-153699.9	-.001147	179.8	7.97E+11	-106.549
195.960	-.001225	7.41E+06	-153750.9	-.001121	170.5	8.00E+11	69.606
198.720	-.004284	6.99E+06	-153314.1	-.001096	161.1	8.24E+11	246.872
201.480	-.007277	6.57E+06	-152386.4	-.001074	151.9	8.68E+11	425.426
204.240	-.010213	6.15E+06	-150969.0	-.001054	142.7	9.12E+11	601.657
207.000	-.013098	5.73E+06	-149058.9	-.001037	133.6	9.55E+11	782.435
209.760	-.015937	5.33E+06	-146647.2	-.001021	124.6	9.98E+11	965.220
212.520	-.018735	4.93E+06	-143727.9	-.001013	115.8	5.10E+12	1150.209
215.280	-.021526	4.53E+06	-140292.3	-.001010	107.1	5.10E+12	1339.375
218.040	-.024310	4.15E+06	-136328.7	-.001008	98.7435	5.10E+12	1532.735
220.800	-.027088	3.78E+06	-131825.7	-.001005	90.6025	5.10E+12	1730.311
223.560	-.029860	3.42E+06	-126771.6	-.001004	82.7514	5.10E+12	1932.121
226.320	-.032628	3.08E+06	-121154.6	-.001002	75.2237	5.10E+12	2138.188
229.080	-.035390	2.75E+06	-115117.9	-.001000	68.0541	5.10E+12	2236.207
231.840	-.038149	2.45E+06	-108888.4	-9.99E-04	61.2590	5.10E+12	2277.909
234.600	-.040903	2.15E+06	-102549.2	-9.98E-04	54.8453	5.10E+12	2315.719
237.360	-.043655	1.88E+06	-96110.6	-9.96E-04	48.8194	5.10E+12	2349.954
240.120	-.046404	1.62E+06	-89582.0	-9.95E-04	43.1870	5.10E+12	2380.875
242.880	-.049150	1.39E+06	-82972.4	-9.95E-04	37.9533	5.10E+12	2408.698
245.640	-.051894	1.17E+06	-76290.0	-9.94E-04	33.1229	5.10E+12	2433.606
248.400	-.054637	964603.1	-69542.7	-9.93E-04	28.7001	5.10E+12	2455.752
251.160	-.057378	782111.8	-62737.9	-9.93E-04	24.6884	5.10E+12	2475.267
253.920	-.060118	618476.1	-55882.7	-9.93E-04	21.0913	5.10E+12	2492.263
256.680	-.062857	473825.5	-48984.0	-9.92E-04	17.9115	5.10E+12	2506.837
259.440	-.065595	348270.8	-42048.2	-9.92E-04	15.1515	5.10E+12	2519.074

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262.200	-.068333	241905.5	-35081.8	-9.92E-04	12.8133	5.10E+12	2529.048
264.960	-.071071	154805.4	-28090.9	-9.92E-04	10.8986	5.10E+12	2536.823
267.720	-.073808	87029.8	-21081.5	-9.92E-04	9.4087	5.10E+12	2542.457
270.480	-.076545	38621.7	-14059.4	-9.92E-04	8.3446	5.10E+12	2546.000
273.240	-.079282	9607.9	-7030.4	-9.92E-04	7.7068	5.10E+12	2547.499
276.000	-.082019	0.0	0.0	-9.92E-04	7.4956	5.10E+12	2546.993

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	=	.5975 in
Computed slope at pile head	=	-5.5226E-03
Maximum bending moment	=	20354040.828 lbs-in
Maximum shear force	=	-153750.861 lbs
Depth of maximum bending moment	=	60.720 in
Depth of maximum shear force	=	195.960 in
Number of iterations	=	11
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 = 20000.000 lbs
Specified bending moment at pile head = 22428000.000 in-lbs
Specified axial load at pile head = 27000.000 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	.701607	2.24E+07	20000.0	-.006467	499.0	7.47E+11	0.000
2.760	.683872	2.25E+07	20000.0	-.006384	500.2	7.47E+11	0.000
5.520	.666365	2.25E+07	20000.0	-.006301	501.4	7.47E+11	0.000
8.280	.649089	2.26E+07	20000.0	-.006218	502.6	7.47E+11	0.000
11.040	.632043	2.27E+07	20000.0	-.006134	503.9	7.47E+11	0.000
13.800	.615228	2.27E+07	19998.5	-.006050	505.1	7.47E+11	-1.107
16.560	.598644	2.28E+07	19993.2	-.005966	506.3	7.47E+11	-2.730
19.320	.582293	2.28E+07	19983.5	-.005882	507.5	7.47E+11	-4.262
22.080	.566174	2.29E+07	19969.8	-.005798	508.8	7.47E+11	-5.707
24.840	.550289	2.29E+07	19952.1	-.005713	510.0	7.46E+11	-7.066
27.600	.534638	2.30E+07	19930.9	-.005628	511.2	7.46E+11	-8.340
30.360	.519222	2.30E+07	19906.2	-.005543	512.4	7.46E+11	-9.533
33.120	.504040	2.31E+07	19878.4	-.005458	513.6	7.46E+11	-10.645
35.880	.489095	2.32E+07	19847.6	-.005372	514.9	7.46E+11	-11.680
38.640	.474385	2.32E+07	19814.0	-.005287	516.1	7.46E+11	-12.638

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41.400	.459913	2.33E+07	19777.9	-.005201	517.3	7.46E+11	-13.521
44.160	.445678	2.33E+07	19739.5	-.005114	518.5	7.46E+11	-14.333
46.920	.431682	2.34E+07	19698.9	-.005028	519.7	7.46E+11	-15.074
49.680	.417924	2.34E+07	17433.2	-.004941	520.9	7.46E+11	-1626.699
52.440	.404405	2.35E+07	12862.1	-.004855	521.8	7.46E+11	-1685.696
55.200	.391126	2.35E+07	8137.0	-.004768	522.5	7.46E+11	-1738.295
57.960	.378087	2.35E+07	3275.3	-.004681	522.8	7.46E+11	-1784.698
60.720	.365288	2.35E+07	-1706.2	-.004594	522.9	7.46E+11	-1825.104
63.480	.352730	2.35E+07	-6791.3	-.004507	522.6	7.46E+11	-1859.711
66.240	.340412	2.35E+07	-11964.1	-.004420	522.1	7.46E+11	-1888.718
69.000	.328333	2.34E+07	-17209.5	-.004333	521.2	7.46E+11	-1912.323
71.760	.316494	2.34E+07	-22512.9	-.004246	520.0	7.46E+11	-1930.721
74.520	.304894	2.33E+07	-27860.2	-.004160	518.5	7.46E+11	-1944.107
77.280	.293532	2.32E+07	-33237.8	-.004074	516.6	7.46E+11	-1952.673
80.040	.282407	2.31E+07	-38632.6	-.003988	514.5	7.46E+11	-1956.612
82.800	.271518	2.30E+07	-44032.1	-.003903	512.0	7.46E+11	-1956.110
85.560	.260865	2.29E+07	-49424.4	-.003818	509.1	7.47E+11	-1951.356
88.320	.250445	2.27E+07	-54798.0	-.003733	506.0	7.47E+11	-1942.532
91.080	.240256	2.26E+07	-60141.9	-.003650	502.5	7.47E+11	-1929.820
93.840	.230299	2.24E+07	-65445.5	-.003566	498.7	7.47E+11	-1913.398
96.600	.220569	2.22E+07	-70698.9	-.003484	494.6	7.47E+11	-1893.441
99.360	.211067	2.20E+07	-75892.6	-.003402	490.1	7.48E+11	-1870.120
102.120	.201788	2.18E+07	-81017.6	-.003322	485.4	7.48E+11	-1843.604
104.880	.192732	2.16E+07	-86065.2	-.003241	480.3	7.48E+11	-1814.056
107.640	.183895	2.13E+07	-91027.2	-.003162	474.9	7.49E+11	-1781.637
110.400	.175275	2.11E+07	-95896.0	-.003084	469.3	7.49E+11	-1746.502
113.160	.166870	2.08E+07	-100664.4	-.003007	463.3	7.50E+11	-1708.803
115.920	.158676	2.05E+07	-105325.3	-.002931	457.1	7.50E+11	-1668.688
118.680	.150690	2.02E+07	-109872.4	-.002856	450.5	7.51E+11	-1626.297
121.440	.142909	1.99E+07	-114299.5	-.002782	443.7	7.51E+11	-1581.770
124.200	.135331	1.96E+07	-118601.0	-.002710	436.7	7.52E+11	-1535.238
126.960	.127951	1.93E+07	-122771.4	-.002639	429.3	7.52E+11	-1486.830
129.720	.120766	1.89E+07	-126805.9	-.002569	421.8	7.53E+11	-1436.668
132.480	.113772	1.86E+07	-130699.6	-.002500	414.0	7.54E+11	-1384.868
135.240	.106966	1.82E+07	-134448.2	-.002433	405.9	7.55E+11	-1331.543
138.000	.100343	1.78E+07	-138047.7	-.002367	397.7	7.55E+11	-1276.798
140.760	.093900	1.74E+07	-141494.3	-.002303	389.2	7.56E+11	-1220.734
143.520	.087633	1.70E+07	-144784.5	-.002240	380.5	7.57E+11	-1163.445
146.280	.081537	1.66E+07	-147915.0	-.002178	371.6	7.58E+11	-1105.021
149.040	.075609	1.62E+07	-150882.8	-.002119	362.6	7.59E+11	-1045.543
151.800	.069843	1.58E+07	-153685.0	-.002060	353.3	7.60E+11	-985.091
154.560	.064236	1.54E+07	-156319.2	-.002004	343.9	7.61E+11	-923.734
157.320	.058783	1.49E+07	-158782.9	-.001949	334.4	7.62E+11	-861.538
160.080	.053479	1.45E+07	-161073.8	-.001896	324.7	7.63E+11	-798.561
162.840	.048319	1.41E+07	-163190.0	-.001844	314.8	7.65E+11	-734.857
165.600	.043300	1.36E+07	-165129.3	-.001794	304.9	7.66E+11	-670.472
168.360	.038416	1.31E+07	-166890.1	-.001746	294.8	7.67E+11	-605.448
171.120	.033662	1.27E+07	-168470.5	-.001700	284.6	7.69E+11	-539.819
173.880	.029034	1.22E+07	-169869.1	-.001655	274.3	7.71E+11	-473.615
176.640	.024527	1.17E+07	-171084.1	-.001612	264.0	7.73E+11	-406.858
179.400	.020135	1.13E+07	-172114.2	-.001571	253.6	7.75E+11	-339.563
182.160	.015854	1.08E+07	-173735.0	-.001532	243.1	7.77E+11	-834.927
184.920	.011679	1.03E+07	-175749.3	-.001495	232.5	7.79E+11	-624.715
187.680	.007604	9.82E+06	-177181.4	-.001459	221.8	7.82E+11	-413.063
190.440	.003626	9.33E+06	-178027.4	-.001425	211.0	7.86E+11	-199.940
193.200	-2.63E-04	8.84E+06	-178283.0	-.001393	200.2	7.89E+11	14.709
195.960	-.004066	8.34E+06	-177944.0	-.001363	189.4	7.93E+11	230.952
198.720	-.007789	7.85E+06	-177005.8	-.001335	178.6	7.96E+11	448.871
201.480	-.011436	7.37E+06	-175463.8	-.001309	167.9	8.00E+11	668.564
204.240	-.015014	6.89E+06	-173320.6	-.001285	157.3	8.35E+11	884.458
207.000	-.018529	6.41E+06	-170572.6	-.001263	146.9	8.84E+11	1106.849
209.760	-.021988	5.94E+06	-167207.4	-.001245	136.6	9.33E+11	1331.716
212.520	-.025399	5.49E+06	-163217.7	-.001228	126.6	9.81E+11	1559.333

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215.280	-.028767	5.04E+06	-158595.7	-.001219	116.8	5.10E+12	1789.946
218.040	-.032128	4.61E+06	-153330.2	-.001216	107.4	5.10E+12	2025.662
220.800	-.035482	4.20E+06	-147407.0	-.001214	98.2356	5.10E+12	2266.503
223.560	-.038830	3.80E+06	-141002.6	-.001212	89.4839	5.10E+12	2374.352
226.320	-.042172	3.42E+06	-134378.0	-.001210	81.1298	5.10E+12	2426.073
229.080	-.045509	3.06E+06	-127614.6	-.001208	73.1819	5.10E+12	2474.956
231.840	-.048841	2.72E+06	-120722.0	-.001207	65.6485	5.10E+12	2519.712
234.600	-.052169	2.39E+06	-113711.0	-.001205	58.5370	5.10E+12	2560.689
237.360	-.055494	2.09E+06	-106591.8	-.001204	51.8543	5.10E+12	2598.171
240.120	-.058815	1.80E+06	-99373.6	-.001203	45.6067	5.10E+12	2632.392
242.880	-.062134	1.54E+06	-92065.2	-.001202	39.7999	5.10E+12	2663.548
245.640	-.065451	1.30E+06	-84674.8	-.001201	34.4391	5.10E+12	2691.806
248.400	-.068766	1.07E+06	-77210.3	-.001201	29.5290	5.10E+12	2717.304
251.160	-.072079	869853.0	-69679.0	-.001200	25.0740	5.10E+12	2740.163
253.920	-.075390	688065.2	-62088.1	-.001200	21.0778	5.10E+12	2760.485
256.680	-.078701	527305.7	-54444.5	-.001199	17.5439	5.10E+12	2778.358
259.440	-.082011	387710.6	-46754.8	-.001199	14.4753	5.10E+12	2793.860
262.200	-.085320	269398.0	-39025.5	-.001199	11.8744	5.10E+12	2807.058
264.960	-.088629	172468.4	-31262.9	-.001199	9.7437	5.10E+12	2818.009
267.720	-.091938	97005.2	-23473.1	-.001199	8.0848	5.10E+12	2826.765
270.480	-.095247	43075.3	-15662.2	-.001199	6.8993	5.10E+12	2833.371
273.240	-.098555	10728.8	-7835.9	-.001199	6.1882	5.10E+12	2837.867
276.000	-.101863	0.0	0.0	-.001199	5.9524	5.10E+12	2840.288

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	=	.7016 in
Computed slope at pile head	=	-6.4674E-03
Maximum bending moment	=	23515148.413 lbs-in
Maximum shear force	=	-178282.996 lbs
Depth of maximum bending moment	=	60.720 in
Depth of maximum shear force	=	193.200 in
Number of iterations	=	12
Number of zero deflection points	=	1

Summary of Pile-head Response

Definition of symbols for pile-head boundary conditions:

y = pile-head displacement, 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	Boundary	Boundary	Axial	Pile Head	Maximum	Maximum
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140' EEI Monopole - Manchester, CT.lpo						
Type	Condition 1	Condition 2	Load lbs	Deflection in	Moment in-lbs	Shear lbs
1	V= 17000.000	M= 1.94E+07	34000.0000	.5975	2.035E+07	-1.538E+05
1	V= 20000.000	M= 2.24E+07	27000.0000	.7016	2.352E+07	-1.783E+05

The analysis ended normally.



Daniel F. Caruso
Chairman

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

February 24, 2010

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

RE: **EM-VER-077-100125** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 60 Adams Street, Manchester, Connecticut.

Dear Attorney Baldwin:

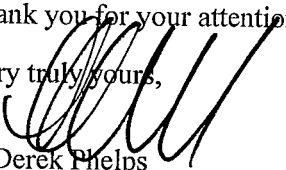
The Connecticut Siting Council (Council) hereby acknowledges your notice to modify this existing telecommunications facility, pursuant to Section 16-50j-73 of the Regulations of Connecticut State Agencies.

The proposed modifications are to be implemented as specified here and in your notice dated January 25, 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 Louis A. Spadaccini, Mayor, Town of Manchester
Scott A. Shanley, General Manager, Town of Manchester
James Davis, Zoning Enforcement Officer, Town of Manchester
Pom Pom Gail LLC

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

ORIGINAL

January 25, 2010

Via Hand Delivery

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

RECEIVED
JAN 25 2010
CONNECTICUT
SITING COUNCIL

Re: **Notice of Exempt Modification – Antenna Swap**
60 Adams Street, Manchester, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains wireless telecommunications antennas at the 90-foot level on the existing 140-foot tower at the above-referenced address. The tower and underlying property are owned by Pom Pom Gali LLC. The Council approved Cellco’s use of the existing tower in 1998 (TS-BAM/SCLP-077-981208). Cellco now intends to modify its installation by replacing six (6) of its existing PCS with three (3) model MG D3-900T2 PCS antennas; one (1) model BXA-70063/6CF_5 LTE (700 MHz) antenna; one (1) model BXA-70063/6CF_6 LTE (700 MHz) antenna; and one (1) model BXA-70063/6CF_4 LTE (700 MHz) antenna, all at the same 90-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 Louis A. Spadaccini, Mayor for the Town of Manchester. A copy of this letter is being sent to Pom Pom Gali LLC, the owner of the property on which the tower is located.

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 overall height of the existing tower. Cellco’s antennas will be located at the same 90-foot level on the existing 140-foot tower.

*Law Offices*

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S. Derek Phelps
January 25, 2010
Page 2

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

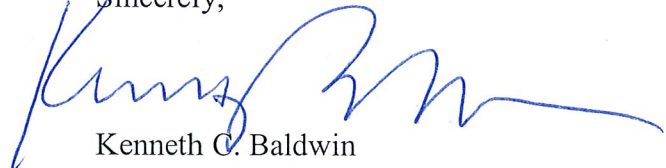
3. The proposed modifications will not increase noise levels at the facility by six decibels or more.

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 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:

Louis A. Spadaccini, Manchester Mayor
Pom Pom Gali LLC
Sandy M. Carter





SINGLE-BAND PANEL ANTENNA

BROADBAND 1700-2170 MHz

MGD3-900TX

1710-1880	1850-1990	1920-2170
H68° V5.5°	H64° V5.3°	H62° V5°
Fixed Tilt	Fixed Tilt	Fixed Tilt
0°, 2°, 4°, 6°	0°, 2°, 4°, 6°	0°, 2°, 4°, 6°

ELECTRICAL SPECIFICATIONS

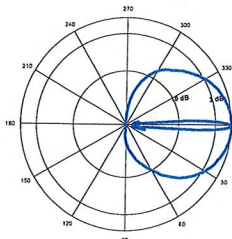
BROADBAND 1710-2170 MHz

Antenna Model	MGD3-900TX		
Polarization	± 45°		
Frequency	1710 - 1880	1850 - 1990	1920 - 2170
Horizontal Beamwidth	68°	64°	62°
Vertical Beamwidth	5.5°	5.3°	5°
Gain (dBi)	18.6	18.8	19.3
Vertical Electrical Tilt	FIXED 0°, 2°, 4°, 6°	FIXED 0°, 2°, 4°, 6°	FIXED 0°, 2°, 4°, 6°
Upper Sidelobe Suppression for the 1 st lobe above main beam (dB)	20	20	20
Front-to-Back Ratio /Cpol @ ± 20° (dB)	> 30	> 30	> 30
VSWR	< 1.4 : 1	< 1.4 : 1	< 1.4 : 1
Cross Polar Ratio @ ± 60° (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 (°C)	-67° to 140° (-55° to +60°)
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)

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Phone: +52 (55) 5511-1000

RYMSA Wireless U.S.A.: sales@rymsawireless.com

Phone: +1 (888) 422-1000



Mechanical specifications

Length	1804 mm	71.0 in
Width	285 mm	11.2 in
Depth	114 mm	4.5 in
Depth with z-bracket	154 mm	6.1 in
Weight ⁴⁾	7.9 kg	17.0 lbs
Wind Area Fore/Aft	0.51 m ²	5.5 ft ²
Wind Area Side	0.21 m ²	2.2 ft ²
Max Wind Survivability	>201 km/hr	>125 mph
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	753 N	169 lbf
Side	351 N	79 lbf

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

Mounting & Downtilting

Mounting hardware attaches to pipe diameter $\varnothing 50$ -160 mm; $\varnothing 2.0$ -6.3 in

Mounting Bracket Kit	36210003
Downtilt Bracket Kit	36210004
Mechanical Downtilt	0-14°

Electrical specifications

Frequency Range	696-900 MHz
Impedance	50 Ω
Connector ³⁾	NE or E-DIN Female 2 ports / Center
VSWR ¹⁾	$\leq 1.35:1$
Polarization	Slant $\pm 45^\circ$
Isolation Between Ports ¹⁾	< -25 dB
Gain ¹⁾	14.5 dBd 16.5 dBi
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	63°
Vertical Beamwidth	11°
Electrical downtilt ⁵⁾	6°
Null fill ¹⁾	5%
Lightning protection	Direct ground

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

1) Typical values.

2) Power rating limited by connector only.

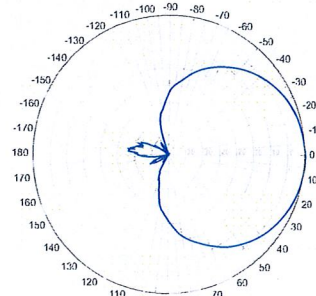
3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.

4) Antenna weight does not include brackets.

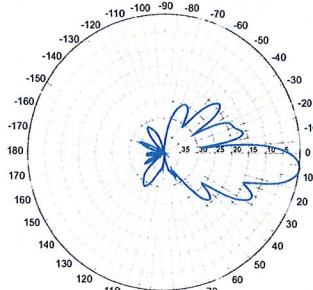
5) Add'l downtilts may be available. Check website for details.

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

Radiation-pattern ¹⁾
750 MHz

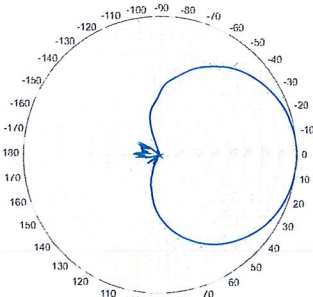


Horizontal

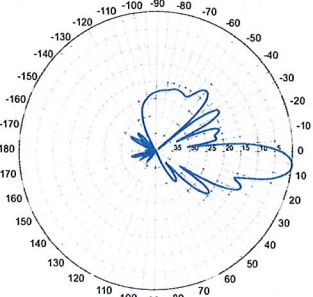


Vertical

850 MHz



Horizontal

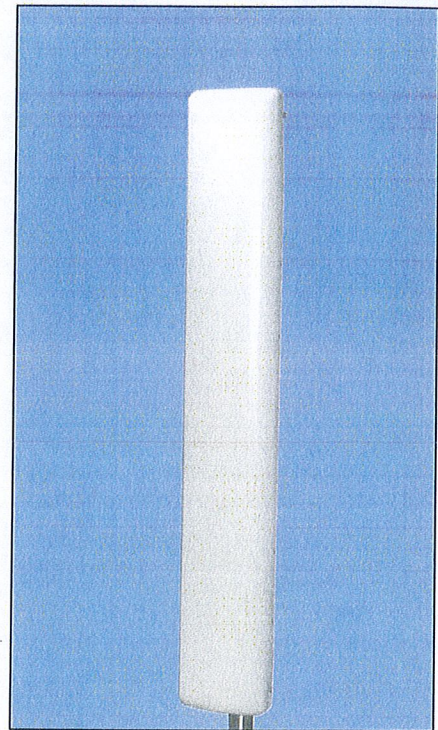


Vertical

696-900 MHz

BXA-70063/6CF __ 6°

When ordering replace " __ " with connector type.



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3T 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 bandwidth and superior performance.
- Air as insulation for virtually no internal signal loss.

Warranty:

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

Revision Date: 04/15/09

Mechanical specifications

Length	1804 mm	71.0 in
Width	285 mm	11.2 in
Depth	114 mm	4.5 in
Depth with z-bracket	154 mm	6.1 in
Weight ⁴⁾	7.9 kg	17.0 lbs
Wind Area Fore/Aft	0.51 m ²	5.5 ft ²
Wind Area Side	0.21 m ²	2.2 ft ²
Max Wind Survivability	>201 km/hr	>125 mph
Wind Load @ 100 mph (161 km/hr)		
Fore/Aft	753 N	169 lbf
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Antenna consisting of aluminum alloy with brass feedlines covered by a UV safe fiber-glass radome.

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Mounting hardware attaches to pipe diameter $\varnothing 50$ -160 mm; $\varnothing 2.0$ -6.3 in

Mounting Bracket Kit	36210003
Downtilt Bracket Kit	36210004
Mechanical Downtilt	0-14°

Electrical specifications

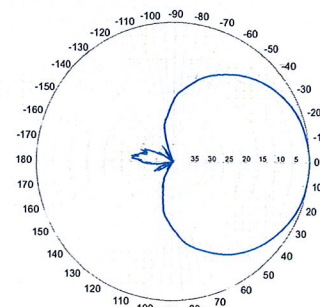
Frequency Range	696-900 MHz
Impedance	50 Ω
Connector ³⁾	NE or E-DIN Female 2 ports / Center
VSWR ¹⁾	$\leq 1.35:1$
Polarization	Slant $\pm 45^\circ$
Isolation Between Ports ¹⁾	< -25 dB
Gain ¹⁾	14.5 dBd 16.5 dBi
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	63°
Vertical Beamwidth	11°
Electrical downtilt ⁵⁾	5°
Null fill ¹⁾	5%
Lightning protection	Direct ground

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

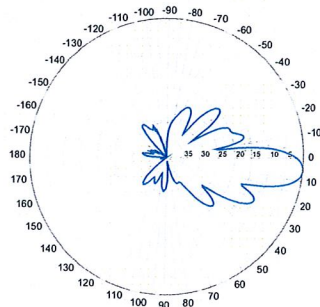
- 1) Typical values.
- 2) Power rating limited by connector only.
- 3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.
- 4) Antenna weight does not include brackets.
- 5) Add'l downtilts may be available. Check website for details.

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

Radiation-pattern¹⁾
750 MHz

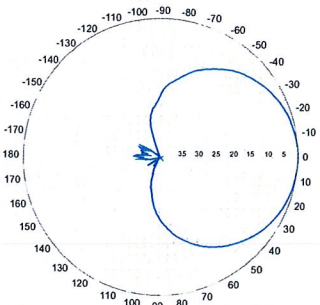


Horizontal

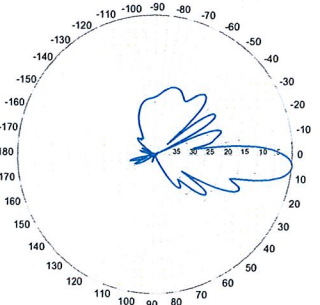


Vertical

850 MHz



Horizontal

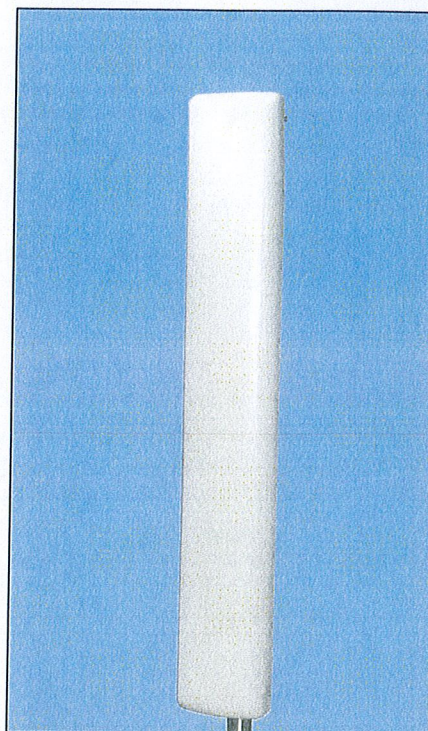


Vertical

696-900 MHz

BXA-70063/6CF ___ 5°

When ordering replace "___" with connector type.



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- Air as insulation for virtually no internal signal loss.

Warranty:

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

Revision Date 05/07/09

Mechanical specifications

Length	1804 mm	71.0 in
Width	285 mm	11.2 in
Depth	114 mm	4.5 in
Depth with z-bracket	154 mm	6.1 in
Weight ⁴⁾	7.9 kg	17.0 lbs
Wind Area Fore/Aft	0.51 m ²	5.5 ft ²
Wind Area Side	0.21 m ²	2.2 ft ²
Max Wind Survivability	>201 km/hr	>125 mph
Wind Load @ 100 mph (161 km/hr)		
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Mounting hardware attaches to pipe diameter $\varnothing 50$ -160 mm; $\varnothing 2.0$ -6.3 in

Mounting Bracket Kit	36210003
Downtilt Bracket Kit	36210004

Electrical specifications

Frequency Range	696-900 MHz
Impedance	50 Ω
Connector ³⁾	NE or E-DIN Female 2 ports / Center
VSWR ¹⁾	$\leq 1.35:1$
Polarization	Slant $\pm 45^\circ$
Isolation Between Ports ¹⁾	< -25 dB
Gain ¹⁾	14.5 dBd 16.5 dBi
Power Rating ²⁾	500 W
Half Power Angle ¹⁾	
Horizontal Beamwidth	63°
Vertical Beamwidth	11°
Electrical downtilt ⁵⁾	4°
Null fill ¹⁾	5%
Lightning protection	Direct ground

Patented Dipole Design: U.S. Patent No. 6,608,600 B2

1) Typical values.

2) Power rating limited by connector only.

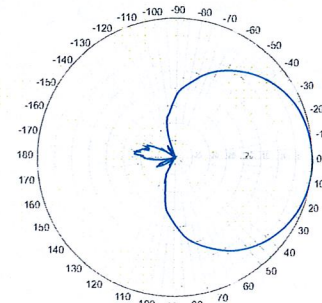
3) NE indicates an elongated N connector.
E-DIN indicates an elongated DIN connector.

4) Antenna weight does not include brackets.

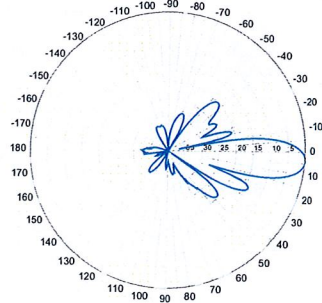
5) Add'l downtilts may be available. Check website for details.

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

Radiation-pattern¹⁾
750 MHz

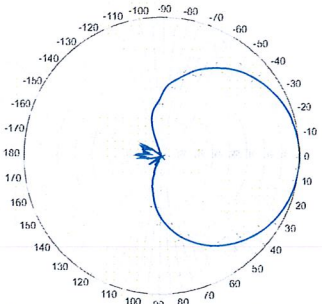


Horizontal

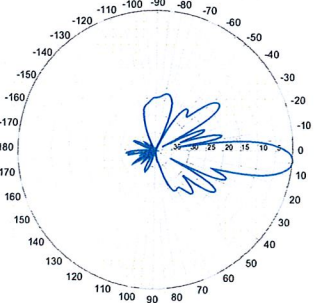


Vertical

850 MHz



Horizontal

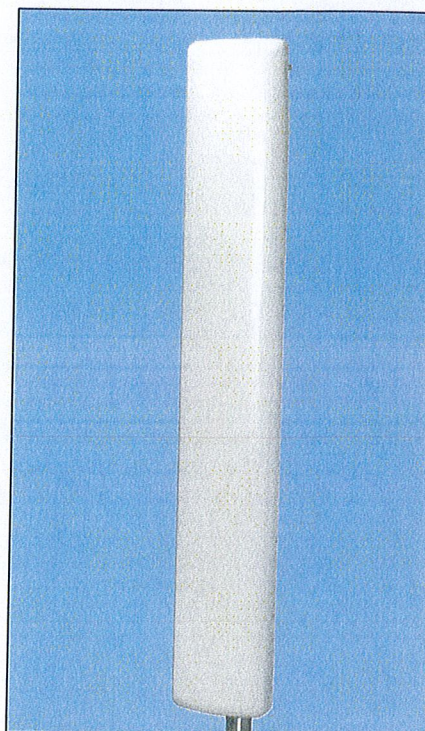


Vertical

696-900 MHz

BXA-70063/6CF __ 4°

When ordering replace " __ " with connector type.



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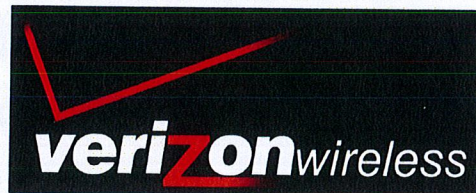
Revision Date: 04/09/09

Site Name: Manchester W Tower Height: Verizon @ 90'		General	Power	Density				
CARRIER	# OF CHAN.	WATTS ERP	HEIGHT	CALC. POWER DENS	FREQ.	MAX. PERMISS. EXP.	FRACTION MPE	Total
*Cingular UMTS	1	500	127	0.0111	880	0.5867	1.90%	
*Cingular GSM	5	296	127	0.0330	880	0.5867	5.62%	
*Cingular GSM	3	501	127	0.0335	1900	1.0000	3.35%	
*Nextel	9	100	100	0.0324	851	0.5673	5.70%	
*PageNet				0.0249	935	0.6233	3.99%	
*Sprint	11	412	115	0.1232	1962.5	1.0000	12.32%	
Verizon	3	448	90	0.0597	1970	1.0000	5.97%	
Verizon	9	281	90	0.1123	869	0.5793	19.38%	
Verizon	1	903	90	0.0401	757	0.4973	8.06%	
* Source: Siting Council								66.3%

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF AN EXISTING 140' MONOPOLE FOR PROPOSED ANTENNA ARRANGEMENT

60 Adams Street
Manchester, CT

prepared for



Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

URS

36915665
VZ5-054 (Rev 1)

January 11, 2010

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- 2. INTRODUCTION**
- 3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS**
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 - **RISA TOWER INPUT / OUTPUT SUMMARY**
 - **RISA TOWER DETAILED OUTPUT**
 - **ANCHOR BOLT AND BASE PLATE ANALYSIS**
 - **FOUNDATION ANALYSIS**

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 140' steel monopole structure, located at 60 Adams Street in Manchester, 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 ½" 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 modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
<u>On the existing Verizon Platform:</u>		
<u>Remove:</u> (6) 950G65VTZE-M_2 antennas	Verizon (Existing)	@ 90'
<u>Install:</u> (3) BXA-70063-6CF-5 antennas (3) MG D3-900T2 antennas	Verizon (Proposed)	@ 90'
Note: (6) Existing ALP6014 antennas and existing (12) 1-5/8" dia. coaxial cable to remain		

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 all the existing and 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) Tower geometry and structural member sizes taken from manufacturer design documents by Engineered Endeavors Incorporated, (EEI Project No. 4795); signed and sealed March 26, 1999.
- 3) Structural analysis performed by URS Corp project number 36911668 signed and sealed September 16, 2002.
- 4) Tower inventory taken from structural analysis performed by Malouf Engineering Intl., Inc. project ID CT00874M-07V0 signed and sealed August 17, 2007.
- 5) Antenna and mount configuration as specified on the following page of this report.

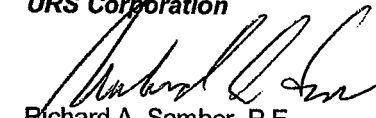
1. **EXECUTIVE SUMMARY** *(continued)*

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: DR, ICA – URS, CF/Book

2. INTRODUCTION

The subject tower is located at 60 Adams Street in Manchester, CT. The original structure is a 140' steel monopole designed by Engineered Endeavors Incorporated (EEI).

Tower geometry and structural member sizes taken from manufacturer design documents by Engineered Endeavors Incorporated, (EEI Project #: 4795); signed and sealed March 26, 1999.

The inventory is summarized in Table 1:

Table 1: Antenna and Mount Configuration

Antenna Type	Carrier	Mount	Antenna Centerline Elevation	Cable
---	Unknown (Existing)	(2) 4' Side Arms	139'	---
---	Unknown (Existing)	(1) 8' Side Arm	134'	---
(6) CSS DUO1417-8686 Antennas (3) Powerwave 7770 Antennas (6) TMAs (6) Duplexers (3) Powerwave 7060 CILOC (3) Powerwave 7020 RCU/RETs	AT&T (Existing)	13' Platform	125'	(12) 1 1/4" Coax
(6) DB980H90 Antennas	Sprint (Existing)	15' Low-Profile Platform	115'	(6) 1 1/4" Coax
(2) 6' Whip	Unknown (Existing)	(2) 4' Side Arm	107'	(2) 7/8" Coax
(12) DB844H90 Antennas	Sprint / Nextel (Existing)	15' Platform	100'	(12) 7/8" Coax
(6) ALP6014 Antennas	Verizon (Existing)	13' Platform	90'	(12) 1 5/8" Coax
(3) BXA-70063/6CF (3) MG D3-900T2	Verizon (Proposed)	Same as Above	90'	Same as Above

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 arrangements.

3. ANALYSIS METHODOLOGY AND LOADING CONDITIONS

The structural analysis was done 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 5.3.1.0. 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. 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 found to be structurally adequate as shown in Table 2.

Table 2: Tower Component Stress vs. Capacity Table

Component / Section No.	Existing Component Size	Controlling Elevation	Stress (% Capacity)	Pass/Fail
L1	TP26.81x18x0.188	91.05'-140'	53.5	Pass
L2	TP34.84x25.733x0.313	45.05'-91.05'	79.3	Pass
L3	TP43x33.319x0.375	0-45.04'	81.9	Pass
Anchor Bolt	2.25" dia	Compression	98	Pass
Base Plate	1.75" Thick x 57" dia	Bending	81	Pass
Foundation	7' dia x 23' long caisson	Deflection (0.70")	93	Pass

Note: Maximum allowable deflection is 0.75" per TIA/EIA.

5. CONCLUSIONS

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 all the existing and 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

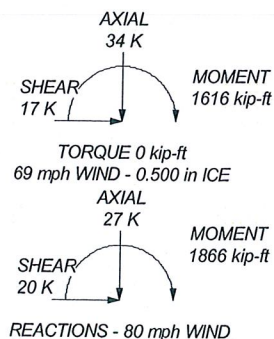
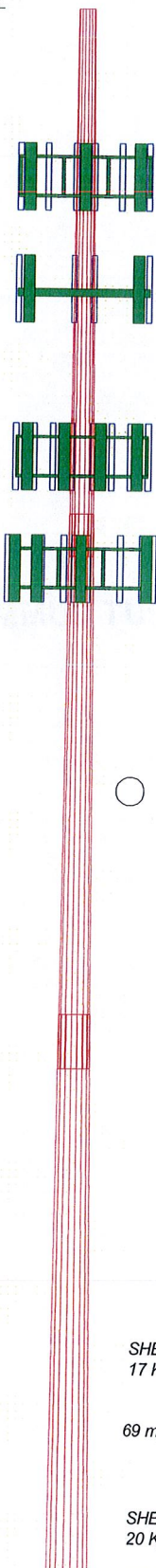
Section	1	2	3	14.9
Length (ft)	48.950	49.910	49.950	7.6
Number of Sides	18	18	18	18
Thickness (in)	0.188	0.313	0.375	0.375
Lap Splice (ft)				33.319
Top Dia (in)	18.000	25.733	43.000	43.000
Bot Dia (in)	26.810	34.840		
Grade		A572-65		
Weight (K)	2.2	5.0		

140.0 ft

91.0 ft

45.0 ft

0.0 ft



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) 4' Side arm (Unknown)	139	(2) DB980H90 (Sprint)	115
8' Side arm (Unknown)	134	PIROD 15' Low Profile Platform (Sprint)	115
(2) DUO1417-8686 (ATI)	125	(2) 6' Whip (Unknown)	113 - 107
(2) DUO1417-8686 (ATI)	125	(2) 4' Side arm (Unknown)	107
(2) TMA (Cingular) (ATI)	125	(4) DB844H90 (Sprint / Nextel)	100
(2) TMA (Cingular) (ATI)	125	(4) DB844H90 (Sprint / Nextel)	100
(2) TMA (Cingular) (ATI)	125	(4) DB844H90 (Sprint / Nextel)	100
(2) Duplexer (ATI)	125	PIROD 15' Platform with handrail (Sprint / Nextel)	100
(2) Duplexer (ATI)	125	ALP 6014 (Verizon)	90
(2) Duplexer (ATI)	125	ALP 6014 (Verizon)	90
7770 w mount pipe (ATI)	125	ALP 6014 (Verizon)	90
7770 w mount pipe (ATI)	125	ALP 6014 (Verizon)	90
7770 w mount pipe (ATI)	125	ALP 6014 (Verizon)	90
7060 CILOC (ATI)	125	ALP 6014 (Verizon)	90
7060 CILOC (ATI)	125	ALP 6014 (Verizon)	90
7020 RCUI/RETs (ATI)	125	BXA-70063/6CF (Verizon)	90
7020 RCUI/RETs (ATI)	125	BXA-70063/6CF (Verizon)	90
7020 RCUI/RETs (ATI)	125	BXA-70063/6CF (Verizon)	90
PIROD 13' Platform w/handrail (ATI)	125	Rymsa MG D3-900Tx (Verizon)	90
(2) DB980H90 (Sprint)	115	Rymsa MG D3-900Tx (Verizon)	90
(2) DB980H90 (Sprint)	115	Rymsa MG D3-900Tx (Verizon)	90
		PIROD 13' Platform w/handrail (Verizon)	90

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices.
6. Installation per TIA/EIA-222-F and AISC Specifications.
7. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
8. TOWER RATING: 81.9%

URS Corporation

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

Job: 140' Monopole

Project: Manchester Sand and Gravel

Client: Verizon Wireless Drawn by: Kevin Barker App'd:

Code: TIA/EIA-222-F Date: 01/12/10 Scale: NTS

Path: P:\08\ERI Files\140' EEI Monopole Manchester, CT.eri Dwg No. E-1

RISA TOWER DETAILED OUTPUT

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	1 of 22
	Project	Manchester Sand and Gravel	Date	13:20:15 01/12/10
	Client	Verizon Wireless	Designed by	Kevin Barker

Tower Input Data

There is a pole section.

This tower is designed using the TIA/EIA-222-F standard.

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.500 in.

Ice density of 56 pcf.

A wind speed of 69 mph is used in combination with ice.

Deflections calculated using a wind speed of 50 mph.

Weld together tower sections have flange connections..

Connections use galvanized A325 bolts, nuts and locking devices..

Installation per TIA/EIA-222-F and AISC Specifications..

Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..

A non-linear (P-delta) analysis was used.

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	140.000-91.050	48.950	3.900	18	18.000	26.810	0.188	0.563	A572-65 (65 ksi)
L2	91.050-45.040	49.910	4.910	18	25.733	34.840	0.313	0.938	A572-65 (65 ksi)
L3	45.040-0.000	49.950		18	33.319	43.000	0.375	1.125	A572-65 (65 ksi)

RISATower

URS Corporation
 500 Enterprise Drive, Suite 3B
 Rocky Hill, CT 06067
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Job

140' Monopole

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Project

Manchester Sand and Gravel

Date

13:20:15 01/12/10

Client

Verizon Wireless

Designed by

Kevin Barker

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	18.278	10.601	424.933	6.323	9.144	46.471	850.425	5.301	2.904	15.488
	27.224	15.844	1418.705	9.451	13.619	104.167	2839.277	7.923	4.455	23.758
L2	26.853	25.214	2058.499	9.024	13.072	157.469	4119.708	12.609	4.089	13.085
	35.377	34.247	5158.100	12.257	17.699	291.439	10322.988	17.127	5.692	18.214
L3	34.799	39.212	5376.605	11.695	16.926	317.652	10760.284	19.610	5.336	14.23
	43.663	50.734	11645.786	15.132	21.844	533.134	23306.896	25.372	7.040	18.773

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 140.000- 91.050				1	1	1		
L2 91.050- 45.040				1	1	1		
L3 45.040- 0.000				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight klf
1 1/4 (AT&T)	C	No	Inside Pole	125.000 - 0.000	12	No Ice 0.000	0.001
1 1/4 (Sprint)	C	No	Inside Pole	115.000 - 0.000	6	1/2" Ice 0.000	0.001
7/8 (Unknown)	C	No	Inside Pole	107.000 - 0.000	1	No Ice 0.000	0.001
7/8 (Sprint / Nextel)	C	No	Inside Pole	100.000 - 0.000	12	1/2" Ice 0.000	0.001
1 5/8 (Verizon)	C	No	Inside Pole	90.000 - 0.000	12	No Ice 0.000	0.001
						1/2" Ice 0.000	0.001

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	140.000-91.050	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.430
L2	91.050-45.040	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	1.431
L3	45.040-0.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	1.413

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	3 of 22
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	Client	Verizon Wireless	Designed by	Kevin Barker

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 _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	140.000-91.050	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.430
L2	91.050-45.040	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	1.431
L3	45.040-0.000	A	0.500	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	1.413

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
(2) 4' Side arm (Unknown)	C	None		0.000	139.000	No Ice 1.920 1/2" Ice 2.580	1.920	0.069
8' Side arm (Unknown)	C	None		0.000	134.000	No Ice 3.840 1/2" Ice 5.160	3.840	0.139
(2) DUO1417-8686 (AT&T)	A	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 6.533 1/2" Ice 6.940	4.200	0.020 0.062
(2) DUO1417-8686 (AT&T)	B	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 6.533 1/2" Ice 6.940	4.200	0.020 0.062
(2) DUO1417-8686 (AT&T)	C	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 6.533 1/2" Ice 6.940	4.200	0.020 0.062
(2) TMA (Cingular) (AT&T)	A	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1.225 1/2" Ice 1.378	0.340	0.020 0.027
(2) TMA (Cingular) (AT&T)	B	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1.225 1/2" Ice 1.378	0.340	0.020 0.027
(2) TMA (Cingular) (AT&T)	C	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 1.225 1/2" Ice 1.378	0.340	0.020 0.027
(2) Duplexer (AT&T)	A	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 0.424 1/2" Ice 0.521	0.186	0.005 0.007
(2) Duplexer (AT&T)	B	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 0.424 1/2" Ice 0.521	0.186	0.005 0.007
(2) Duplexer (AT&T)	C	From Face	3.000 0.000 0.000	0.000	125.000	No Ice 0.424 1/2" Ice 0.521	0.186	0.005 0.007
7770 w mount pipe	A	From Face	3.000	0.000	125.000	No Ice 5.981	4.116	0.053

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
(AT&T)			0.000 0.000			1/2" Ice	6.439	4.769	0.097
7770 w mount pipe (AT&T)	B	From Face	3.000 0.000	0.000	125.000	No Ice 1/2" Ice	5.981 6.439	4.116 4.769	0.053 0.097
7770 w mount pipe (AT&T)	C	From Face	3.000 0.000	0.000	125.000	No Ice 1/2" Ice	5.981 6.439	4.116 4.769	0.053 0.097
7060 CILOC (AT&T)	A	From Face	3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.067 0.107	0.058 0.095	0.002 0.003
7060 CILOC (AT&T)	B	From Face	3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.067 0.107	0.058 0.095	0.002 0.003
7060 CILOC (AT&T)	C	From Face	3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.067 0.107	0.058 0.095	0.002 0.003
7020 RCU/RETs (AT&T)	A	From Face	3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.401 0.491	0.117 0.169	0.002 0.005
7020 RCU/RETs (AT&T)	B	From Face	3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.401 0.491	0.117 0.169	0.002 0.005
7020 RCU/RETs (AT&T)	C	From Face	3.000 0.000	0.000	125.000	No Ice 1/2" Ice	0.401 0.491	0.117 0.169	0.002 0.005
PiROD 13' Platform w/handrail (AT&T)	C	None	0.000	0.000	125.000	No Ice 1/2" Ice	31.300 40.200	31.300 40.200	1.822 2.452
(2) DB980H90 (Sprint)	A	From Face	3.000 0.000	0.000	115.000	No Ice 1/2" Ice	3.799 4.178	2.194 2.556	0.085 0.105
(2) DB980H90 (Sprint)	B	From Face	3.000 0.000	0.000	115.000	No Ice 1/2" Ice	3.799 4.178	2.194 2.556	0.085 0.105
(2) DB980H90 (Sprint)	C	From Face	3.000 0.000	0.000	115.000	No Ice 1/2" Ice	3.799 4.178	2.194 2.556	0.085 0.105
PiROD 15' Low Profile Platform (Sprint)	C	None	0.000	0.000	115.000	No Ice 1/2" Ice	17.300 22.100	17.300 22.100	1.500 2.030
(2) 6' Whip (Unknown)	C	None	0.000	0.000	113.000 - 107.000	No Ice 1/2" Ice	1.200 1.802	1.200 1.802	0.018 0.027
(2) 4' Side arm (Unknown)	C	None	0.000	0.000	107.000	No Ice 1/2" Ice	1.920 2.580	1.920 2.580	0.069 0.082
(4) DB844H90 (Sprint / Nextel)	A	From Face	3.000 0.000	0.000	100.000	No Ice 1/2" Ice	2.867 3.177	3.967 4.337	0.010 0.036
(4) DB844H90 (Sprint / Nextel)	B	From Face	3.000 0.000	0.000	100.000	No Ice 1/2" Ice	2.867 3.177	3.967 4.337	0.010 0.036
(4) DB844H90 (Sprint / Nextel)	C	From Face	3.000 0.000	0.000	100.000	No Ice 1/2" Ice	2.867 3.177	3.967 4.337	0.010 0.036
PiROD 15' Platform with handrail (Sprint / Nextel)	C	None	0.000	0.000	100.000	No Ice 1/2" Ice	33.800 43.600	33.800 43.600	2.043 2.748

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
ALP 6014 (Verizon)	A	From Face	3.000 6.000 0.000	0.000	90.000	No Ice 1/2" Ice	7.560 8.240	7.560 8.240	0.019 0.068
ALP 6014 (Verizon)	A	From Face	3.000 -6.000 0.000	0.000	90.000	No Ice 1/2" Ice	7.560 8.240	7.560 8.240	0.019 0.068
ALP 6014 (Verizon)	B	From Face	3.000 6.000 0.000	0.000	90.000	No Ice 1/2" Ice	7.560 8.240	7.560 8.240	0.019 0.068
ALP 6014 (Verizon)	B	From Face	3.000 -6.000 0.000	0.000	90.000	No Ice 1/2" Ice	7.560 8.240	7.560 8.240	0.019 0.068
ALP 6014 (Verizon)	C	From Face	3.000 6.000 0.000	0.000	90.000	No Ice 1/2" Ice	7.560 8.240	7.560 8.240	0.019 0.068
ALP 6014 (Verizon)	C	From Face	3.000 -6.000 0.000	0.000	90.000	No Ice 1/2" Ice	7.560 8.240	7.560 8.240	0.019 0.068
BXA-70063/6CF (Verizon)	A	From Face	3.000 0.000 0.000	0.000	90.000	No Ice 1/2" Ice	5.500 6.500	2.200 3.200	0.038 0.092
BXA-70063/6CF (Verizon)	B	From Face	3.000 0.000 0.000	0.000	90.000	No Ice 1/2" Ice	5.500 6.500	2.200 3.200	0.038 0.092
BXA-70063/6CF (Verizon)	C	From Face	3.000 0.000 0.000	0.000	90.000	No Ice 1/2" Ice	5.500 6.500	2.200 3.200	0.038 0.092
Ryma MG D3-900Tx (Verizon)	A	From Face	3.000 4.000 0.000	0.000	90.000	No Ice 1/2" Ice	5.381 5.863	5.024 5.957	0.047 0.089
Ryma MG D3-900Tx (Verizon)	B	From Face	3.000 4.000 0.000	0.000	90.000	No Ice 1/2" Ice	5.381 5.863	5.024 5.957	0.047 0.089
Ryma MG D3-900Tx (Verizon)	C	From Face	3.000 4.000 0.000	0.000	90.000	No Ice 1/2" Ice	5.381 5.863	5.024 5.957	0.047 0.089
PiROD 13' Platform w/handrail (Verizon)	C	None		0.000	90.000	No Ice 1/2" Ice	31.300 40.200	31.300 40.200	1.822 2.452

Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation	z	K _Z	q _t	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		ksf	ft ²		ft ²	ft ²	ft ²			
L1 140.000- 91.050	114.289	1.426	0.023	91.394	A	0.000	91.394	91.394	100.00	0.000	0.000
					B	0.000	91.394		100.00	0.000	0.000

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Section Elevation ft	z ft	K _z	q _z ksf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L2 91.050-45.040	67.555	1.227	0.020	117.488	C	0.000	91.394		100.00	0.000	0.000
					A	0.000	117.488	117.488	100.00	0.000	0.000
					B	0.000	117.488		100.00	0.000	0.000
					C	0.000	117.488		100.00	0.000	0.000
L3 45.040-0.000	21.699	1	0.016	145.011	A	0.000	145.011	145.011	100.00	0.000	0.000
					B	0.000	145.011		100.00	0.000	0.000
					C	0.000	145.011		100.00	0.000	0.000

Tower Pressure - With Ice

$$G_H = 1.690$$

Section Elevation ft	z ft	K _z	q _z ksf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 140.000-91.050	114.289	1.426	0.017	0.500	95.473	A	0.000	95.473	95.473	100.00	0.000	0.000
						B	0.000	95.473		100.00	0.000	0.000
						C	0.000	95.473		100.00	0.000	0.000
L2 91.050-45.040	67.555	1.227	0.015	0.500	121.322	A	0.000	121.322	121.322	100.00	0.000	0.000
						B	0.000	121.322		100.00	0.000	0.000
						C	0.000	121.322		100.00	0.000	0.000
L3 45.040-0.000	21.699	1	0.012	0.500	148.765	A	0.000	148.765	148.765	100.00	0.000	0.000
						B	0.000	148.765		100.00	0.000	0.000
						C	0.000	148.765		100.00	0.000	0.000

Tower Pressure - Service

$$G_H = 1.690$$

Section Elevation ft	z ft	K _z	q _z ksf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
L1 140.000-91.050	114.289	1.426	0.009	91.394	A	0.000	91.394	91.394	100.00	0.000	0.000
					B	0.000	91.394		100.00	0.000	0.000
					C	0.000	91.394		100.00	0.000	0.000
L2 91.050-45.040	67.555	1.227	0.008	117.488	A	0.000	117.488	117.488	100.00	0.000	0.000
					B	0.000	117.488		100.00	0.000	0.000
					C	0.000	117.488		100.00	0.000	0.000
L3 45.040-0.000	21.699	1	0.006	145.011	A	0.000	145.011	145.011	100.00	0.000	0.000
					B	0.000	145.011		100.00	0.000	0.000
					C	0.000	145.011		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	2.341	0.048	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	2.581	0.056	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	2.616	0.058	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	498.651 kip-ft	7.538		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	2.341	0.048	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	2.581	0.056	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	2.616	0.058	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	498.651 kip-ft	7.538		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	2.341	0.048	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	2.581	0.056	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	2.616	0.058	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	498.651 kip-ft	7.538		

RISA Tower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	8 of 22
	Project	Manchester Sand and Gravel	Date	13:20:15 01/12/10
	Client	Verizon Wireless	Designed by	Kevin Barker

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	2.341	0.048	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	2.581	0.056	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	2.616	0.058	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	498.651 kip-ft	7.538		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.894	A	1	0.65	1	1	1	95.473	1.819	0.037	C
			B	1	0.65	1	1	1	95.473			
			C	1	0.65	1	1	1	95.473			
L2 91.050-45.040	1.431	5.934	A	1	0.65	1	1	1	121.322	1.983	0.043	C
			B	1	0.65	1	1	1	121.322			
			C	1	0.65	1	1	1	121.322			
L3 45.040-0.000	1.413	8.732	A	1	0.65	1	1	1	148.765	1.996	0.044	C
			B	1	0.65	1	1	1	148.765			
			C	1	0.65	1	1	1	148.765			
Sum Weight:	3.274	17.560						OTM	385.158 kip-ft	5.798		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.894	A	1	0.65	1	1	1	95.473	1.819	0.037	C
			B	1	0.65	1	1	1	95.473			
			C	1	0.65	1	1	1	95.473			
L2 91.050-45.040	1.431	5.934	A	1	0.65	1	1	1	121.322	1.983	0.043	C
			B	1	0.65	1	1	1	121.322			
			C	1	0.65	1	1	1	121.322			
L3 45.040-0.000	1.413	8.732	A	1	0.65	1	1	1	148.765	1.996	0.044	C
			B	1	0.65	1	1	1	148.765			
			C	1	0.65	1	1	1	148.765			
Sum Weight:	3.274	17.560						OTM	385.158 kip-ft	5.798		

RISA Tower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	9 of 22
	Project	Manchester Sand and Gravel	Date	13:20:15 01/12/10
	Client	Verizon Wireless	Designed by	Kevin Barker

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.894	A	1	0.65	1	1	1	95.473	1.819	0.037	C
			B	1	0.65	1	1	1	95.473			
			C	1	0.65	1	1	1	95.473			
L2 91.050-45.040	1.431	5.934	A	1	0.65	1	1	1	121.322	1.983	0.043	C
			B	1	0.65	1	1	1	121.322			
			C	1	0.65	1	1	1	121.322			
L3 45.040-0.000	1.413	8.732	A	1	0.65	1	1	1	148.765	1.996	0.044	C
			B	1	0.65	1	1	1	148.765			
			C	1	0.65	1	1	1	148.765			
Sum Weight:	3.274	17.560						OTM	385.158 kip-ft	5.798		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.894	A	1	0.65	1	1	1	95.473	1.819	0.037	C
			B	1	0.65	1	1	1	95.473			
			C	1	0.65	1	1	1	95.473			
L2 91.050-45.040	1.431	5.934	A	1	0.65	1	1	1	121.322	1.983	0.043	C
			B	1	0.65	1	1	1	121.322			
			C	1	0.65	1	1	1	121.322			
L3 45.040-0.000	1.413	8.732	A	1	0.65	1	1	1	148.765	1.996	0.044	C
			B	1	0.65	1	1	1	148.765			
			C	1	0.65	1	1	1	148.765			
Sum Weight:	3.274	17.560						OTM	385.158 kip-ft	5.798		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	0.914	0.019	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	1.008	0.022	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	1.022	0.023	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	194.785	2.944		

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	10 of 22
	Project	Manchester Sand and Gravel	Date	13:20:15 01/12/10
	Client	Verizon Wireless	Designed by	Kevin Barker

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
									kip-ft			

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	0.914	0.019	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	1.008	0.022	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	1.022	0.023	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	194.785 kip-ft	2.944		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	0.914	0.019	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			
L2 91.050-45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	1.008	0.022	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040-0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	1.022	0.023	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	194.785 kip-ft	2.944		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L1 140.000-91.050	0.430	2.202	A	1	0.65	1	1	1	91.394	0.914	0.019	C
			B	1	0.65	1	1	1	91.394			
			C	1	0.65	1	1	1	91.394			

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	11 of 22
	Project	Manchester Sand and Gravel	Date	13:20:15 01/12/10
	Client	Verizon Wireless	Designed by	Kevin Barker

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	klf	
L2 91.050- 45.040	1.431	5.049	A	1	0.65	1	1	1	117.488	1.008	0.022	C
			B	1	0.65	1	1	1	117.488			
			C	1	0.65	1	1	1	117.488			
L3 45.040- 0.000	1.413	7.644	A	1	0.65	1	1	1	145.011	1.022	0.023	C
			B	1	0.65	1	1	1	145.011			
			C	1	0.65	1	1	1	145.011			
Sum Weight:	3.274	14.896						OTM	194.785 kip-ft	2.944		

Discrete Appurtenance Pressures - No Ice $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _A Ac Front ft ²	C _A Ac Side ft ²
4' Side arm	0.000	0.139	0.000	0.000	139.000	1.508	0.025	3.840	3.840
8' Side arm	0.000	0.139	0.000	0.000	134.000	1.492	0.024	3.840	3.840
DUO1417-8686	300.000	0.040	-3.345	-1.931	125.000	1.463	0.024	13.067	8.400
DUO1417-8686	60.000	0.040	3.345	-1.931	125.000	1.463	0.024	13.067	8.400
DUO1417-8686	180.000	0.040	0.000	3.862	125.000	1.463	0.024	13.067	8.400
TMA (Cingular)	300.000	0.040	-3.345	-1.931	125.000	1.463	0.024	2.450	0.681
TMA (Cingular)	60.000	0.040	3.345	-1.931	125.000	1.463	0.024	2.450	0.681
TMA (Cingular)	180.000	0.040	0.000	3.862	125.000	1.463	0.024	2.450	0.681
Duplexer	300.000	0.010	-3.345	-1.931	125.000	1.463	0.024	0.849	0.372
Duplexer	60.000	0.010	3.345	-1.931	125.000	1.463	0.024	0.849	0.372
Duplexer	180.000	0.010	0.000	3.862	125.000	1.463	0.024	0.849	0.372
7770 w mount pipe	300.000	0.053	-3.345	-1.931	125.000	1.463	0.024	5.981	4.116
7770 w mount pipe	60.000	0.053	3.345	-1.931	125.000	1.463	0.024	5.981	4.116
7770 w mount pipe	180.000	0.053	0.000	3.862	125.000	1.463	0.024	5.981	4.116
7060 CILOC	300.000	0.002	-3.345	-1.931	125.000	1.463	0.024	0.067	0.058
7060 CILOC	60.000	0.002	3.345	-1.931	125.000	1.463	0.024	0.067	0.058
7060 CILOC	180.000	0.002	0.000	3.862	125.000	1.463	0.024	0.067	0.058
7020 RCU/RETs	300.000	0.002	-3.345	-1.931	125.000	1.463	0.024	0.401	0.117
7020 RCU/RETs	60.000	0.002	3.345	-1.931	125.000	1.463	0.024	0.401	0.117
7020 RCU/RETs	180.000	0.002	0.000	3.862	125.000	1.463	0.024	0.401	0.117
PiROD 13' Platform w/handrail	0.000	1.822	0.000	0.000	125.000	1.463	0.024	31.300	31.300
DB980H90	300.000	0.170	-3.410	-1.969	115.000	1.429	0.023	7.597	4.389
DB980H90	60.000	0.170	3.410	-1.969	115.000	1.429	0.023	7.597	4.389
DB980H90	180.000	0.170	0.000	3.937	115.000	1.429	0.023	7.597	4.389
PiROD 15' Low Profile Platform	0.000	1.500	0.000	0.000	115.000	1.429	0.023	17.300	17.300
6' Whip	0.000	0.036	0.000	0.000	110.000	1.411	0.023	2.400	2.400
4' Side arm	0.000	0.139	0.000	0.000	107.000	1.399	0.023	3.840	3.840
DB844H90	300.000	0.040	-3.507	-2.025	100.000	1.373	0.022	11.467	15.867
DB844H90	60.000	0.040	3.507	-2.025	100.000	1.373	0.022	11.467	15.867
DB844H90	180.000	0.040	0.000	4.050	100.000	1.373	0.022	11.467	15.867
PiROD 15' Platform with handrail	0.000	2.043	0.000	0.000	100.000	1.373	0.022	33.800	33.800
ALP 6014	300.000	0.019	-0.559	-7.251	90.000	1.332	0.022	7.560	7.560
ALP 6014	300.000	0.019	-6.559	3.141	90.000	1.332	0.022	7.560	7.560
ALP 6014	60.000	0.019	6.559	3.141	90.000	1.332	0.022	7.560	7.560
ALP 6014	60.000	0.019	0.559	-7.251	90.000	1.332	0.022	7.560	7.560
ALP 6014	180.000	0.019	-6.000	4.110	90.000	1.332	0.022	7.560	7.560
ALP 6014	180.000	0.019	6.000	4.110	90.000	1.332	0.022	7.560	7.560
BXA-70063/6CF	300.000	0.038	-3.559	-2.055	90.000	1.332	0.022	5.500	2.200
BXA-70063/6CF	60.000	0.038	3.559	-2.055	90.000	1.332	0.022	5.500	2.200

RISATower URS Corporation 500 Enterprise Drive, Suite 3B Rocky Hill, CT 06067 Phone: (860) 529-8882 FAX: (860) 529-3991	Job	140' Monopole	Page	12 of 22
	Project	Manchester Sand and Gravel	Date	13:20:15 01/12/10
	Client	Verizon Wireless	Designed by	Kevin Barker

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _y ft	z ft	K _z	q _z ksf	C _A Ac Front ft ²	C _A Ac Side ft ²
BXA-70063/6CF	180.000	0.038	0.000	4.110	90.000	1.332	0.022	5.500	2.200
Ryma MG D3-900Tx	300.000	0.047	-1.559	-5.519	90.000	1.332	0.022	5.381	5.024
Ryma MG D3-900Tx	60.000	0.047	5.559	1.409	90.000	1.332	0.022	5.381	5.024
Ryma MG D3-900Tx	180.000	0.047	-4.000	4.110	90.000	1.332	0.022	5.381	5.024
PiROD 13' Platform w/handrail	0.000	1.822	0.000	0.000	90.000	1.332	0.022	31.300	31.300
Sum Weight:		9.080							

Discrete Appurtenance Pressures - With Ice $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _y ft	z ft	K _z	q _z ksf	C _A Ac Front ft ²	C _A Ac Side ft ²	t _z in
4' Side arm	0.000	0.164	0.000	0.000	139.000	1.508	0.018	5.160	5.160	0.500
8' Side arm	0.000	0.164	0.000	0.000	134.000	1.492	0.018	5.160	5.160	0.500
DUO1417-8686	300.000	0.125	-3.345	-1.931	125.000	1.463	0.018	13.879	9.148	0.500
DUO1417-8686	60.000	0.125	3.345	-1.931	125.000	1.463	0.018	13.879	9.148	0.500
DUO1417-8686	180.000	0.125	0.000	3.862	125.000	1.463	0.018	13.879	9.148	0.500
TMA (Cingular)	300.000	0.054	-3.345	-1.931	125.000	1.463	0.018	2.757	0.903	0.500
TMA (Cingular)	60.000	0.054	3.345	-1.931	125.000	1.463	0.018	2.757	0.903	0.500
TMA (Cingular)	180.000	0.054	0.000	3.862	125.000	1.463	0.018	2.757	0.903	0.500
Duplexer	300.000	0.014	-3.345	-1.931	125.000	1.463	0.018	1.041	0.533	0.500
Duplexer	60.000	0.014	3.345	-1.931	125.000	1.463	0.018	1.041	0.533	0.500
Duplexer	180.000	0.014	0.000	3.862	125.000	1.463	0.018	1.041	0.533	0.500
7770 w mount pipe	300.000	0.097	-3.345	-1.931	125.000	1.463	0.018	6.439	4.769	0.500
7770 w mount pipe	60.000	0.097	3.345	-1.931	125.000	1.463	0.018	6.439	4.769	0.500
7770 w mount pipe	180.000	0.097	0.000	3.862	125.000	1.463	0.018	6.439	4.769	0.500
7060 CILOC	300.000	0.003	-3.345	-1.931	125.000	1.463	0.018	0.107	0.095	0.500
7060 CILOC	60.000	0.003	3.345	-1.931	125.000	1.463	0.018	0.107	0.095	0.500
7060 CILOC	180.000	0.003	0.000	3.862	125.000	1.463	0.018	0.107	0.095	0.500
7020 RCU/RETs	300.000	0.005	-3.345	-1.931	125.000	1.463	0.018	0.491	0.169	0.500
7020 RCU/RETs	60.000	0.005	3.345	-1.931	125.000	1.463	0.018	0.491	0.169	0.500
7020 RCU/RETs	180.000	0.005	0.000	3.862	125.000	1.463	0.018	0.491	0.169	0.500
PiROD 13' Platform w/handrail	0.000	2.452	0.000	0.000	125.000	1.463	0.018	40.200	40.200	0.500
DB980H90	300.000	0.210	-3.410	-1.969	115.000	1.429	0.017	8.356	5.112	0.500
DB980H90	60.000	0.210	3.410	-1.969	115.000	1.429	0.017	8.356	5.112	0.500
DB980H90	180.000	0.210	0.000	3.937	115.000	1.429	0.017	8.356	5.112	0.500
PiROD 15' Low Profile Platform	0.000	2.030	0.000	0.000	115.000	1.429	0.017	22.100	22.100	0.500
6' Whip	0.000	0.055	0.000	0.000	110.000	1.411	0.017	3.605	3.605	0.500
4' Side arm	0.000	0.164	0.000	0.000	107.000	1.399	0.017	5.160	5.160	0.500
DB844H90	300.000	0.145	-3.507	-2.025	100.000	1.373	0.017	12.707	17.349	0.500
DB844H90	60.000	0.145	3.507	-2.025	100.000	1.373	0.017	12.707	17.349	0.500
DB844H90	180.000	0.145	0.000	4.050	100.000	1.373	0.017	12.707	17.349	0.500
PiROD 15' Platform with handrail	0.000	2.748	0.000	0.000	100.000	1.373	0.017	43.600	43.600	0.500
ALP 6014	300.000	0.068	-0.559	-7.251	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	300.000	0.068	-6.559	3.141	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	60.000	0.068	6.559	3.141	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	60.000	0.068	0.559	-7.251	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	180.000	0.068	-6.000	4.110	90.000	1.332	0.016	8.240	8.240	0.500
ALP 6014	180.000	0.068	6.000	4.110	90.000	1.332	0.016	8.240	8.240	0.500
BXA-70063/6CF	300.000	0.092	-3.559	-2.055	90.000	1.332	0.016	6.500	3.200	0.500
BXA-70063/6CF	60.000	0.092	3.559	-2.055	90.000	1.332	0.016	6.500	3.200	0.500
BXA-70063/6CF	180.000	0.092	0.000	4.110	90.000	1.332	0.016	6.500	3.200	0.500
Ryma MG D3-900Tx	300.000	0.089	-1.559	-5.519	90.000	1.332	0.016	5.863	5.957	0.500

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Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _y ft	z ft	K _z	q _z ksf	C _{AC} Front ft ²	C _{AC} Side ft ²	t _z in
Ryma MG D3-900Tx	60.000	0.089	5.559	1.409	90.000	1.332	0.016	5.863	5.957	0.500
Ryma MG D3-900Tx	180.000	0.089	-4.000	4.110	90.000	1.332	0.016	5.863	5.957	0.500
PiROD 13' Platform w/handrail	0.000	2.452	0.000	0.000	90.000	1.332	0.016	40.200	40.200	0.500
Sum Weight:		13.135								

Discrete Appurtenance Pressures - Service $G_H = 1.690$

Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _y ft	z ft	K _z	q _z ksf	C _{AC} Front ft ²	C _{AC} Side ft ²
4' Side arm	0.000	0.139	0.000	0.000	139.000	1.508	0.010	3.840	3.840
8' Side arm	0.000	0.139	0.000	0.000	134.000	1.492	0.010	3.840	3.840
DUO1417-8686	300.000	0.040	-3.345	-1.931	125.000	1.463	0.009	13.067	8.400
DUO1417-8686	60.000	0.040	3.345	-1.931	125.000	1.463	0.009	13.067	8.400
DUO1417-8686	180.000	0.040	0.000	3.862	125.000	1.463	0.009	13.067	8.400
TMA (Cingular)	300.000	0.040	-3.345	-1.931	125.000	1.463	0.009	2.450	0.681
TMA (Cingular)	60.000	0.040	3.345	-1.931	125.000	1.463	0.009	2.450	0.681
TMA (Cingular)	180.000	0.040	0.000	3.862	125.000	1.463	0.009	2.450	0.681
Duplexer	300.000	0.010	-3.345	-1.931	125.000	1.463	0.009	0.849	0.372
Duplexer	60.000	0.010	3.345	-1.931	125.000	1.463	0.009	0.849	0.372
Duplexer	180.000	0.010	0.000	3.862	125.000	1.463	0.009	0.849	0.372
7770 w mount pipe	300.000	0.053	-3.345	-1.931	125.000	1.463	0.009	5.981	4.116
7770 w mount pipe	60.000	0.053	3.345	-1.931	125.000	1.463	0.009	5.981	4.116
7770 w mount pipe	180.000	0.053	0.000	3.862	125.000	1.463	0.009	5.981	4.116
7060 CILOC	300.000	0.002	-3.345	-1.931	125.000	1.463	0.009	0.067	0.058
7060 CILOC	60.000	0.002	3.345	-1.931	125.000	1.463	0.009	0.067	0.058
7060 CILOC	180.000	0.002	0.000	3.862	125.000	1.463	0.009	0.067	0.058
7020 RCU/RETs	300.000	0.002	-3.345	-1.931	125.000	1.463	0.009	0.401	0.117
7020 RCU/RETs	60.000	0.002	3.345	-1.931	125.000	1.463	0.009	0.401	0.117
7020 RCU/RETs	180.000	0.002	0.000	3.862	125.000	1.463	0.009	0.401	0.117
PiROD 13' Platform w/handrail	0.000	1.822	0.000	0.000	125.000	1.463	0.009	31.300	31.300
DB980H90	300.000	0.170	-3.410	-1.969	115.000	1.429	0.009	7.597	4.389
DB980H90	60.000	0.170	3.410	-1.969	115.000	1.429	0.009	7.597	4.389
DB980H90	180.000	0.170	0.000	3.937	115.000	1.429	0.009	7.597	4.389
PiROD 15' Low Profile Platform	0.000	1.500	0.000	0.000	115.000	1.429	0.009	17.300	17.300
6' Whip	0.000	0.036	0.000	0.000	110.000	1.411	0.009	2.400	2.400
4' Side arm	0.000	0.139	0.000	0.000	107.000	1.399	0.009	3.840	3.840
DB844H90	300.000	0.040	-3.507	-2.025	100.000	1.373	0.009	11.467	15.867
DB844H90	60.000	0.040	3.507	-2.025	100.000	1.373	0.009	11.467	15.867
DB844H90	180.000	0.040	0.000	4.050	100.000	1.373	0.009	11.467	15.867
PiROD 15' Platform with handrail	0.000	2.043	0.000	0.000	100.000	1.373	0.009	33.800	33.800
ALP 6014	300.000	0.019	-0.559	-7.251	90.000	1.332	0.009	7.560	7.560
ALP 6014	300.000	0.019	-6.559	3.141	90.000	1.332	0.009	7.560	7.560
ALP 6014	60.000	0.019	6.559	3.141	90.000	1.332	0.009	7.560	7.560
ALP 6014	60.000	0.019	0.559	-7.251	90.000	1.332	0.009	7.560	7.560
ALP 6014	180.000	0.019	-6.000	4.110	90.000	1.332	0.009	7.560	7.560
ALP 6014	180.000	0.019	6.000	4.110	90.000	1.332	0.009	7.560	7.560
BXA-70063/6CF	300.000	0.038	-3.559	-2.055	90.000	1.332	0.009	5.500	2.200
BXA-70063/6CF	60.000	0.038	3.559	-2.055	90.000	1.332	0.009	5.500	2.200
BXA-70063/6CF	180.000	0.038	0.000	4.110	90.000	1.332	0.009	5.500	2.200
Ryma MG D3-900Tx	300.000	0.047	-1.559	-5.519	90.000	1.332	0.009	5.381	5.024
Ryma MG D3-900Tx	60.000	0.047	5.559	1.409	90.000	1.332	0.009	5.381	5.024
Ryma MG D3-900Tx	180.000	0.047	-4.000	4.110	90.000	1.332	0.009	5.381	5.024

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Description	Aiming Azimuth °	Weight K	Offset _x ft	Offset _z ft	z ft	K _z	q _z ksf	C _{AAc} Front ft ²	C _{AAc} Side ft ²
PiROD 13' Platform w/handrail	0.000	1.822	0.000	0.000	90.000	1.332	0.009	31.300	31.300
Sum Weight:		9.080							

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	14.896					
Bracing Weight	0.000					
Total Member Self-Weight	14.896					
Total Weight	27.250			0.000	0.000	
Wind 0 deg - No Ice		0.000	-19.656	-1793.985	0.000	0.000
Wind 30 deg - No Ice		9.828	-17.023	-1553.637	-896.993	0.000
Wind 45 deg - No Ice		13.899	-13.899	-1268.539	-1268.539	0.000
Wind 60 deg - No Ice		17.023	-9.828	-896.993	-1553.637	0.000
Wind 90 deg - No Ice		19.656	0.000	0.000	-1793.985	0.000
Wind 120 deg - No Ice		17.023	9.828	896.993	-1553.637	0.000
Wind 135 deg - No Ice		13.899	13.899	1268.539	-1268.539	0.000
Wind 150 deg - No Ice		9.828	17.023	1553.637	-896.993	0.000
Wind 180 deg - No Ice		0.000	19.656	1793.985	0.000	0.000
Wind 210 deg - No Ice		-9.828	17.023	1553.637	896.993	0.000
Wind 225 deg - No Ice		-13.899	13.899	1268.539	1268.539	0.000
Wind 240 deg - No Ice		-17.023	9.828	896.993	1553.637	0.000
Wind 270 deg - No Ice		-19.656	0.000	0.000	1793.985	0.000
Wind 300 deg - No Ice		-17.023	-9.828	-896.993	1553.637	0.000
Wind 315 deg - No Ice		-13.899	-13.899	-1268.539	1268.539	0.000
Wind 330 deg - No Ice		-9.828	-17.023	-1553.637	896.993	0.000
Member Ice	2.664					
Total Weight Ice	33.969			0.000	0.000	
Wind 0 deg - Ice		0.000	-16.502	-1530.385	0.000	0.000
Wind 30 deg - Ice		8.251	-14.291	-1325.352	-765.193	0.000
Wind 45 deg - Ice		11.669	-11.669	-1082.146	-1082.146	0.000
Wind 60 deg - Ice		14.291	-8.251	-765.193	-1325.352	0.000
Wind 90 deg - Ice		16.502	0.000	0.000	-1530.385	0.000
Wind 120 deg - Ice		14.291	8.251	765.193	-1325.352	0.000
Wind 135 deg - Ice		11.669	11.669	1082.146	-1082.146	0.000
Wind 150 deg - Ice		8.251	14.291	1325.352	-765.193	0.000
Wind 180 deg - Ice		0.000	16.502	1530.385	0.000	0.000
Wind 210 deg - Ice		-8.251	14.291	1325.352	765.193	0.000
Wind 225 deg - Ice		-11.669	11.669	1082.146	1082.146	0.000
Wind 240 deg - Ice		-14.291	8.251	765.193	1325.352	0.000
Wind 270 deg - Ice		-16.502	0.000	0.000	1530.385	0.000
Wind 300 deg - Ice		-14.291	-8.251	-765.193	1325.352	0.000
Wind 315 deg - Ice		-11.669	-11.669	-1082.146	1082.146	0.000
Wind 330 deg - Ice		-8.251	-14.291	-1325.352	765.193	0.000
Total Weight	27.250			0.000	0.000	
Wind 0 deg - Service		0.000	-7.678	-700.775	0.000	0.000
Wind 30 deg - Service		3.839	-6.649	-606.889	-350.388	0.000
Wind 45 deg - Service		5.429	-5.429	-495.523	-495.523	0.000
Wind 60 deg - Service		6.649	-3.839	-350.388	-606.889	0.000
Wind 90 deg - Service		7.678	0.000	0.000	-700.775	0.000
Wind 120 deg - Service		6.649	3.839	350.388	-606.889	0.000
Wind 135 deg - Service		5.429	5.429	495.523	-495.523	0.000
Wind 150 deg - Service		3.839	6.649	606.889	-350.388	0.000

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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 180 deg - Service		0.000	7.678	700.775	0.000	0.000
Wind 210 deg - Service		-3.839	6.649	606.889	350.388	0.000
Wind 225 deg - Service		-5.429	5.429	495.523	495.523	0.000
Wind 240 deg - Service		-6.649	3.839	350.388	606.889	0.000
Wind 270 deg - Service		-7.678	0.000	0.000	700.775	0.000
Wind 300 deg - Service		-6.649	-3.839	-350.388	606.889	0.000
Wind 315 deg - Service		-5.429	-5.429	-495.523	495.523	0.000
Wind 330 deg - Service		-3.839	-6.649	-606.889	350.388	0.000

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
19	Dead+Wind 0 deg+Ice
20	Dead+Wind 30 deg+Ice
21	Dead+Wind 45 deg+Ice
22	Dead+Wind 60 deg+Ice
23	Dead+Wind 90 deg+Ice
24	Dead+Wind 120 deg+Ice
25	Dead+Wind 135 deg+Ice
26	Dead+Wind 150 deg+Ice
27	Dead+Wind 180 deg+Ice
28	Dead+Wind 210 deg+Ice
29	Dead+Wind 225 deg+Ice
30	Dead+Wind 240 deg+Ice
31	Dead+Wind 270 deg+Ice
32	Dead+Wind 300 deg+Ice
33	Dead+Wind 315 deg+Ice
34	Dead+Wind 330 deg+Ice
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

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Comb. No.	Description
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	140 - 91.05	Pole	Max Tension	23	0.000	0.000	0.000
			Max. Compression	18	-12.753	0.000	0.000
			Max. Mx	6	-8.448	-224.092	0.000
			Max. My	10	-8.448	0.000	-224.092
			Max. Vy	6	11.103	-224.092	0.000
			Max. Vx	10	11.103	0.000	-224.092
			Max. Torque	28			-0.000
L2	91.05 - 45.04	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-23.000	0.000	0.000
			Max. Mx	6	-16.770	-937.742	0.000
			Max. My	10	-16.770	0.000	-937.742
			Max. Vy	6	17.456	-937.742	0.000
			Max. Vx	10	17.456	0.000	-937.742
			Max. Torque	34			0.000
L3	45.04 - 0	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	18	-33.969	0.000	0.000
			Max. Mx	6	-27.231	-1866.240	0.000
			Max. My	10	-27.231	0.000	-1866.240
			Max. Vy	6	19.682	-1866.240	0.000
			Max. Vx	2	-19.682	0.000	1866.240
			Max. Torque	24			-0.000

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	19	33.969	0.000	16.502
	Max. H _x	14	27.250	19.656	0.000
	Max. H _z	2	27.250	0.000	19.656
	Max. M _x	2	1866.240	0.000	19.656
	Max. M _z	6	1866.240	-19.656	0.000
	Max. Torsion	34	0.000	8.251	14.291
	Min. Vert	1	27.250	0.000	0.000
	Min. H _x	6	27.250	-19.656	0.000
	Min. H _z	10	27.250	0.000	-19.656
	Min. M _x	10	-1866.240	0.000	-19.656
	Min. M _z	14	-1866.240	19.656	0.000
	Min. Torsion	24	-0.000	-14.291	-8.251

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Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _y K	Shear _x K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Dead Only	27.250	0.000	0.000	0.000	0.000	0.000
Dead+Wind 0 deg - No Ice	27.250	0.000	-19.656	-1866.240	0.000	0.000
Dead+Wind 30 deg - No Ice	27.250	9.828	-17.023	-1616.219	-933.124	0.000
Dead+Wind 45 deg - No Ice	27.250	13.899	-13.899	-1319.637	-1319.637	0.000
Dead+Wind 60 deg - No Ice	27.250	17.023	-9.828	-933.124	-1616.219	-0.000
Dead+Wind 90 deg - No Ice	27.250	19.656	0.000	0.000	-1866.240	0.000
Dead+Wind 120 deg - No Ice	27.250	17.023	9.828	933.124	-1616.219	0.000
Dead+Wind 135 deg - No Ice	27.250	13.899	13.899	1319.637	-1319.637	0.000
Dead+Wind 150 deg - No Ice	27.250	9.828	17.023	1616.219	-933.124	-0.000
Dead+Wind 180 deg - No Ice	27.250	0.000	19.656	1866.240	0.000	0.000
Dead+Wind 210 deg - No Ice	27.250	-9.828	17.023	1616.219	933.124	0.000
Dead+Wind 225 deg - No Ice	27.250	-13.899	13.899	1319.637	1319.637	0.000
Dead+Wind 240 deg - No Ice	27.250	-17.023	9.828	933.124	1616.219	-0.000
Dead+Wind 270 deg - No Ice	27.250	-19.656	0.000	0.000	1866.240	0.000
Dead+Wind 300 deg - No Ice	27.250	-17.023	-9.828	-933.124	1616.219	0.000
Dead+Wind 315 deg - No Ice	27.250	-13.899	-13.899	-1319.637	1319.637	0.000
Dead+Wind 330 deg - No Ice	27.250	-9.828	-17.023	-1616.219	933.124	-0.000
Dead+Ice	33.969	0.000	0.000	0.000	0.000	0.000
Dead+Wind 0 deg+Ice	33.969	0.000	-16.502	-1615.858	0.000	0.000
Dead+Wind 30 deg+Ice	33.969	8.251	-14.291	-1399.396	-807.942	0.000
Dead+Wind 45 deg+Ice	33.969	11.669	-11.669	-1142.602	-1142.602	0.000
Dead+Wind 60 deg+Ice	33.969	14.291	-8.251	-807.942	-1399.396	-0.000
Dead+Wind 90 deg+Ice	33.969	16.502	0.000	0.000	-1615.858	0.000
Dead+Wind 120 deg+Ice	33.969	14.291	8.251	807.942	-1399.396	0.000
Dead+Wind 135 deg+Ice	33.969	11.669	11.669	1142.602	-1142.602	0.000
Dead+Wind 150 deg+Ice	33.969	8.251	14.291	1399.396	-807.942	-0.000
Dead+Wind 180 deg+Ice	33.969	0.000	16.502	1615.858	0.000	0.000
Dead+Wind 210 deg+Ice	33.969	-8.251	14.291	1399.396	807.942	0.000
Dead+Wind 225 deg+Ice	33.969	-11.669	11.669	1142.602	1142.602	0.000
Dead+Wind 240 deg+Ice	33.969	-14.291	8.251	807.942	1399.396	-0.000
Dead+Wind 270 deg+Ice	33.969	-16.502	0.000	0.000	1615.858	0.000
Dead+Wind 300 deg+Ice	33.969	-14.291	-8.251	-807.942	1399.396	0.000
Dead+Wind 315 deg+Ice	33.969	-11.669	-11.669	-1142.602	1142.602	0.000
Dead+Wind 330 deg+Ice	33.969	-8.251	-14.291	-1399.396	807.942	-0.000
Dead+Wind 0 deg - Service	27.250	0.000	-7.678	-729.800	0.000	0.000
Dead+Wind 30 deg - Service	27.250	3.839	-6.649	-632.025	-364.900	0.000
Dead+Wind 45 deg - Service	27.250	5.429	-5.429	-516.049	-516.049	0.000
Dead+Wind 60 deg - Service	27.250	6.649	-3.839	-364.900	-632.025	-0.000
Dead+Wind 90 deg - Service	27.250	7.678	0.000	0.000	-729.800	0.000
Dead+Wind 120 deg - Service	27.250	6.649	3.839	364.900	-632.025	0.000
Dead+Wind 135 deg - Service	27.250	5.429	5.429	516.049	-516.049	0.000
Dead+Wind 150 deg - Service	27.250	3.839	6.649	632.025	-364.900	-0.000
Dead+Wind 180 deg - Service	27.250	0.000	7.678	729.800	0.000	0.000
Dead+Wind 210 deg - Service	27.250	-3.839	6.649	632.025	364.900	0.000
Dead+Wind 225 deg - Service	27.250	-5.429	5.429	516.049	516.049	0.000
Dead+Wind 240 deg - Service	27.250	-6.649	3.839	364.900	632.025	-0.000
Dead+Wind 270 deg - Service	27.250	-7.678	0.000	0.000	729.800	0.000
Dead+Wind 300 deg - Service	27.250	-6.649	-3.839	-364.900	632.025	0.000
Dead+Wind 315 deg - Service	27.250	-5.429	-5.429	-516.049	516.049	0.000
Dead+Wind 330 deg - Service	27.250	-3.839	-6.649	-632.025	364.900	-0.000

Solution Summary

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.000	-27.250	0.000	0.000	27.250	0.000	0.000%
2	0.000	-27.250	-19.656	0.000	27.250	19.656	0.000%
3	9.828	-27.250	-17.023	-9.828	27.250	17.023	0.000%
4	13.899	-27.250	-13.899	-13.899	27.250	13.899	0.000%
5	17.023	-27.250	-9.828	-17.023	27.250	9.828	0.000%
6	19.656	-27.250	0.000	-19.656	27.250	0.000	0.000%
7	17.023	-27.250	9.828	-17.023	27.250	-9.828	0.000%
8	13.899	-27.250	13.899	-13.899	27.250	-13.899	0.000%
9	9.828	-27.250	17.023	-9.828	27.250	-17.023	0.000%
10	0.000	-27.250	19.656	0.000	27.250	-19.656	0.000%
11	-9.828	-27.250	17.023	9.828	27.250	-17.023	0.000%
12	-13.899	-27.250	13.899	13.899	27.250	-13.899	0.000%
13	-17.023	-27.250	9.828	17.023	27.250	-9.828	0.000%
14	-19.656	-27.250	0.000	19.656	27.250	0.000	0.000%
15	-17.023	-27.250	-9.828	17.023	27.250	9.828	0.000%
16	-13.899	-27.250	-13.899	13.899	27.250	13.899	0.000%
17	-9.828	-27.250	-17.023	9.828	27.250	17.023	0.000%
18	0.000	-33.969	0.000	0.000	33.969	0.000	0.000%
19	0.000	-33.969	-16.502	0.000	33.969	16.502	0.000%
20	8.251	-33.969	-14.291	-8.251	33.969	14.291	0.000%
21	11.669	-33.969	-11.669	-11.669	33.969	11.669	0.000%
22	14.291	-33.969	-8.251	-14.291	33.969	8.251	0.000%
23	16.502	-33.969	0.000	-16.502	33.969	0.000	0.000%
24	14.291	-33.969	8.251	-14.291	33.969	-8.251	0.000%
25	11.669	-33.969	11.669	-11.669	33.969	-11.669	0.000%
26	8.251	-33.969	14.291	-8.251	33.969	-14.291	0.000%
27	0.000	-33.969	16.502	0.000	33.969	-16.502	0.000%
28	-8.251	-33.969	14.291	8.251	33.969	-14.291	0.000%
29	-11.669	-33.969	11.669	-11.669	33.969	-11.669	0.000%
30	-14.291	-33.969	8.251	14.291	33.969	-8.251	0.000%
31	-16.502	-33.969	0.000	16.502	33.969	0.000	0.000%
32	-14.291	-33.969	-8.251	14.291	33.969	8.251	0.000%
33	-11.669	-33.969	-11.669	-11.669	33.969	11.669	0.000%
34	-8.251	-33.969	-14.291	8.251	33.969	14.291	0.000%
35	0.000	-27.250	-7.678	0.000	27.250	7.678	0.000%
36	3.839	-27.250	-6.649	-3.839	27.250	6.649	0.000%
37	5.429	-27.250	-5.429	-5.429	27.250	5.429	0.000%
38	6.649	-27.250	-3.839	-6.649	27.250	3.839	0.000%
39	7.678	-27.250	0.000	-7.678	27.250	0.000	0.000%
40	6.649	-27.250	3.839	-6.649	27.250	-3.839	0.000%
41	5.429	-27.250	5.429	-5.429	27.250	-5.429	0.000%
42	3.839	-27.250	6.649	-3.839	27.250	-6.649	0.000%
43	0.000	-27.250	7.678	0.000	27.250	-7.678	0.000%
44	-3.839	-27.250	6.649	3.839	27.250	-6.649	0.000%
45	-5.429	-27.250	5.429	5.429	27.250	-5.429	0.000%
46	-6.649	-27.250	3.839	6.649	27.250	-3.839	0.000%
47	-7.678	-27.250	0.000	7.678	27.250	0.000	0.000%
48	-6.649	-27.250	-3.839	6.649	27.250	3.839	0.000%
49	-5.429	-27.250	-5.429	5.429	27.250	5.429	0.000%
50	-3.839	-27.250	-6.649	3.839	27.250	6.649	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001

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2	Yes	4	0.00000001	0.00032169
3	Yes	5	0.00000001	0.00050118
4	Yes	5	0.00000001	0.00056199
5	Yes	5	0.00000001	0.00050118
6	Yes	4	0.00000001	0.00032169
7	Yes	5	0.00000001	0.00050118
8	Yes	5	0.00000001	0.00056199
9	Yes	5	0.00000001	0.00050118
10	Yes	4	0.00000001	0.00032169
11	Yes	5	0.00000001	0.00050118
12	Yes	5	0.00000001	0.00056199
13	Yes	5	0.00000001	0.00050118
14	Yes	4	0.00000001	0.00032169
15	Yes	5	0.00000001	0.00050118
16	Yes	5	0.00000001	0.00056199
17	Yes	5	0.00000001	0.00050118
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00082942
20	Yes	5	0.00000001	0.00080173
21	Yes	5	0.00000001	0.00091208
22	Yes	5	0.00000001	0.00080173
23	Yes	4	0.00000001	0.00082942
24	Yes	5	0.00000001	0.00080173
25	Yes	5	0.00000001	0.00091208
26	Yes	5	0.00000001	0.00080173
27	Yes	4	0.00000001	0.00082942
28	Yes	5	0.00000001	0.00080173
29	Yes	5	0.00000001	0.00091208
30	Yes	5	0.00000001	0.00080173
31	Yes	4	0.00000001	0.00082942
32	Yes	5	0.00000001	0.00080173
33	Yes	5	0.00000001	0.00091208
34	Yes	5	0.00000001	0.00080173
35	Yes	4	0.00000001	0.00007733
36	Yes	4	0.00000001	0.00090111
37	Yes	5	0.00000001	0.00005436
38	Yes	4	0.00000001	0.00090111
39	Yes	4	0.00000001	0.00007733
40	Yes	4	0.00000001	0.00090111
41	Yes	5	0.00000001	0.00005436
42	Yes	4	0.00000001	0.00090111
43	Yes	4	0.00000001	0.00007733
44	Yes	4	0.00000001	0.00090111
45	Yes	5	0.00000001	0.00005436
46	Yes	4	0.00000001	0.00090111
47	Yes	4	0.00000001	0.00007733
48	Yes	4	0.00000001	0.00090111
49	Yes	5	0.00000001	0.00005436
50	Yes	4	0.00000001	0.00090111

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 91.05	36.023	39	2.042	0.000
L2	94.95 - 45.04	17.574	39	1.710	0.000
L3	49.95 - 0	4.845	39	0.900	0.000

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Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
ft						
139.000	(2) 4' Side arm	39	35.591	2.039	0.000	37030
134.000	8' Side arm	39	33.436	2.021	0.000	30858
125.000	(2) DUO1417-8686	39	29.587	1.984	0.000	12343
115.000	(2) DB980H90	39	25.405	1.926	0.000	7405
113.000	(2) 6' Whip	39	24.586	1.911	0.000	6856
110.000	(2) 6' Whip	39	23.370	1.887	0.000	6170
107.000	(2) 6' Whip	39	22.173	1.859	0.000	5609
100.000	(4) DB844H90	39	19.456	1.780	0.000	4627
90.000	ALP 6014	39	15.801	1.628	0.000	3786

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	140 - 91.05	91.977	6	5.217	0.000
L2	94.95 - 45.04	44.896	6	4.368	0.000
L3	49.95 - 0	12.385	6	2.300	0.000

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
ft						
139.000	(2) 4' Side arm	6	90.876	5.206	0.000	14712
134.000	8' Side arm	6	85.377	5.153	0.000	12260
125.000	(2) DUO1417-8686	6	75.556	5.046	0.000	4902
115.000	(2) DB980H90	6	64.883	4.890	0.000	2939
113.000	(2) 6' Whip	6	62.793	4.853	0.000	2721
110.000	(2) 6' Whip	6	59.692	4.791	0.000	2448
107.000	(2) 6' Whip	6	56.635	4.723	0.000	2225
100.000	(4) DB844H90	6	49.701	4.534	0.000	1834
90.000	ALP 6014	6	40.370	4.180	0.000	1498

Compression Checks

Pole Design Data

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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 P P _a
L1	140 - 91.05 (1)	TP26.81x18x0.188	48.950	0.000	0.0	39.000	15.426	-8.448	601.613	0.014
L2	91.05 - 45.04 (2)	TP34.84x25.733x0.313	49.910	0.000	0.0	39.000	33.358	-16.770	1300.970	0.013
L3	45.04 - 0 (3)	TP43x33.319x0.375	49.950	0.000	0.0	39.000	50.734	-27.232	1978.640	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M _x kip-ft	Actual f _{bx} ksi	Allow. F _{bx} ksi	Ratio f _{bx} F _{bx}	Actual M _y kip-ft	Actual f _{by} ksi	Allow. F _{by} ksi	Ratio f _{by} F _{by}
L1	140 - 91.05 (1)	TP26.81x18x0.188	224.094	27.238	39.000	0.698	0.000	0.000	39.000	0.000
L2	91.05 - 45.04 (2)	TP34.84x25.733x0.313	937.750	40.706	39.000	1.044	0.000	0.000	39.000	0.000
L3	45.04 - 0 (3)	TP43x33.319x0.375	1866.25 0	42.006	39.000	1.077	0.000	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 f _v F _v	Actual T kip-ft	Actual f _{vt} ksi	Allow. F _{vt} ksi	Ratio f _{vt} F _{vt}
L1	140 - 91.05 (1)	TP26.81x18x0.188	11.103	0.720	26.000	0.055	0.000	0.000	26.000	0.000
L2	91.05 - 45.04 (2)	TP34.84x25.733x0.313	17.456	0.523	26.000	0.040	0.000	0.000	26.000	0.000
L3	45.04 - 0 (3)	TP43x33.319x0.375	19.682	0.388	26.000	0.030	0.000	0.000	26.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P P _a	Ratio f _{bx} F _{bx}	Ratio f _{by} F _{by}	Ratio f _v F _v	Ratio f _{vt} F _{vt}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	140 - 91.05 (1)	0.014	0.698	0.000	0.055	0.000	0.713 ✓	1.333	H1-3+VT ✓
L2	91.05 - 45.04 (2)	0.013	1.044	0.000	0.040	0.000	1.057 ✓	1.333	H1-3+VT ✓
L3	45.04 - 0 (3)	0.014	1.077	0.000	0.030	0.000	1.091 ✓	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	140 - 91.05	Pole	TP26.81x18x0.188	I	-8.448	801.950	53.5	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
L2	91.05 - 45.04	Pole	TP34.84x25.733x0.313	2	-16.770	1734.193	79.3	Pass
L3	45.04 - 0	Pole	TP43x33.319x0.375	3	-27.232	2637.527	81.9	Pass
							Summary	
							Pole (L3)	81.9 Pass
							RATING =	81.9 Pass

ANCHOR BOLT AND BASE PLATE ANALYSIS

ANCHOR BOLT AND BASE PLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	OM := 1866·ft·kips	user input
Shear Force:	Shear := 20·kips	user input
Axial Force:	Axial := 27·kips	user input

Anchor Bolt Data:

Use ASTM A615 Grade 75		user input
Number of Anchor Bolts = N	N _{an} := 12	user input
Diameter of Bolt Circle:	D _{bc} := 51in	user input
Bolt "Column" Distance:	L _w := 6in	user input
Bolt Ultimate Strength:	F _u := 100·ksi	user input
Bolt Yield Strength:	F _y := 75·ksi	user input
Bolt Modulus:	E := 29000·ksi	user input
Anchor Bolt Diameter	D := 2.25in	user input
Threads per Inch:	n := 4.5	user input

Base Plate Data:

Use ASTM A871 Grade 60		user input
Plate Yield Strength:	F _{ybp} := 60·ksi	user input
Base Plate Thickness:	PlateThickness := 1.75·in	user input
Base Plate Diameter:	D _{bp} := 57·in	user input
Outer Pole Diameter:	D _{pole} := 43in	user input

Job 140' EEI Monopole - Manchester, CT
 Description Anchor Bolt and Base Plate Analysis

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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: $i := 1..N$

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

$d_1 = 12.75 \cdot \text{in}$ $d_7 = -12.75 \cdot \text{in}$

$d_2 = 22.08 \cdot \text{in}$ $d_8 = -22.08 \cdot \text{in}$

$d_3 = 25.50 \cdot \text{in}$ $d_9 = -25.50 \cdot \text{in}$

$d_4 = 22.08 \cdot \text{in}$ $d_{10} = -22.08 \cdot \text{in}$

$d_5 = 12.75 \cdot \text{in}$ $d_{11} = -12.75 \cdot \text{in}$

$d_6 = 0.00 \cdot \text{in}$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius: $R_{pole} := \frac{D_{pole}}{2}$ $R_{pole} = 21.50 \cdot \text{in}$

Moment Arms of Bolts
about Neutral Axis:

$MA_i := \text{if}(d_i \geq R_{pole}, d_i - R_{pole}, 0 \text{ in})$

$MA_1 = 0.00 \cdot \text{in}$ $MA_7 = 0.00 \cdot \text{in}$

$MA_2 = 0.58 \cdot \text{in}$ $MA_8 = 0.00 \cdot \text{in}$

$MA_3 = 4.00 \cdot \text{in}$ $MA_9 = 0.00 \cdot \text{in}$

$MA_4 = 0.58 \cdot \text{in}$ $MA_{10} = 0.00 \cdot \text{in}$

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

$MA_6 = 0.00 \cdot \text{in}$ etc.

Effective Width of Baseplate
for Bending:

EffectiveWidth := $.8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2} \right)^2 - \left(\frac{D_{pole}}{2} \right)^2}$

EffectiveWidth = $29.93 \cdot \text{in}$

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Anchor Bolt Analysis:

Polar Moment of Inertia I_p :

$$I_p := \sum_i (d_i)^2 \quad I_p = 3.902 \times 10^3 \cdot \text{in}^2$$

Gross Area of Bolt:

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

Net Area of Bolt:

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

Net Diameter:

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

Radius of Gyration of Bolt:

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

Section Modulus of Bolt:

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

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{\text{Shear}}{N} \right) \cdot l \quad M_x = 0.833 \cdot \text{ft} \cdot \text{kips}$$

$$f_{bx} := \frac{M_x}{S_x} \quad f_{bx} = 12.1 \cdot \text{ksi}$$

Allowable Bending

$$F_{bx} := 1.333 \cdot 0.60 \cdot F_y \quad F_{bx} = 60.0 \cdot \text{ksi}$$

Note: 1.333 increase allowed per TIA/EIA

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Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$\text{AllowableTension} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u)$$

$$\text{AllowableTension} = 174.9 \cdot \text{kips}$$

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{\text{net.area}} := 1.333 \cdot (0.60 \cdot A_n \cdot F_y)$$

$$F_{\text{net.area}} = 194.8 \cdot \text{kips}$$

Note: 1.333 increase allowed per TIA/EIA

Applied Tension:

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

$$\text{MaxTension} = 144.1 \cdot \text{kips}$$

Check Stresses:

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

$$\frac{\text{MaxTension}}{F_{\text{net.area}}} = 0.74$$

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

Condition = "OK"

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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:

$$l_w := \begin{cases} 1 & \text{if } l > 2 \cdot D_n \\ 0.00 \text{ in} & \text{otherwise} \end{cases} \quad l = 6.00 \text{ in}$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n \\ 0.0 \text{ ksi} & \text{otherwise} \end{cases} \quad f_{bx} = 12.1 \text{ ksi}$$

Allowable Compressive Force:

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} \quad C_c = 87.36$$

$$F_a := \begin{cases} \frac{\left[1 - \frac{\left(\frac{K \cdot l}{r} \right)^2}{2 \cdot C_c^2} \right] \cdot F_y}{\frac{5}{3} + \frac{3 \cdot \left(\frac{K \cdot l}{r} \right)}{8 \cdot C_c} - \frac{\left(\frac{K \cdot l}{r} \right)^3}{8 \cdot C_c^3}} & \text{if } \frac{K \cdot l}{r} \leq C_c \\ \frac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r} \right)^2} & \text{if } \frac{K \cdot l}{r} > C_c \end{cases} \quad F_a = 44.0 \text{ ksi}$$

$$F_a := 1.333 \cdot F_a \quad \text{Note: 1.333 increase allowed per TIA/EIA} \quad F_a = 58.6 \text{ ksi}$$

Applied Compressive Force:

$$\text{MaxCompression} := \frac{OM \cdot R_{bc}}{I_p} + \frac{\text{Axial}}{N} \quad \text{MaxCompression} = 148.6 \text{ kips}$$

$$f_a := \frac{\text{MaxCompression}}{A_n} \quad f_a = 45.8 \text{ ksi}$$

Check Combined Stresses:

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} = 0.98$$

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

Condition = "OK"

Job 140' EEI Monopole - Manchester, CT
 Description Anchor Bolt and Base Plate Analysis

Project No. VZ5-054 (Rev 1)
 Computed by KAB
 Checked by _____

Page _____ of _____
 Sheet 6 of 6
 Date 01/12/10
 Date _____

Base Plate Analysis:

Force from Bolt(s):

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

$$C_1 = 75.4 \cdot \text{kips}$$

$$C_7 = -70.9 \cdot \text{kips}$$

$$C_2 = 129.0 \cdot \text{kips}$$

$$C_8 = -124.5 \cdot \text{kips}$$

$$C_3 = 148.6 \cdot \text{kips}$$

$$C_9 = -144.1 \cdot \text{kips}$$

$$C_4 = 129.0 \cdot \text{kips}$$

$$C_{10} = -124.5 \cdot \text{kips}$$

$$C_5 = 75.4 \cdot \text{kips}$$

$$C_{11} = -70.9 \cdot \text{kips}$$

$$C_6 = 2.3 \cdot \text{kips}$$

etc.

Bending Stress in Plate:

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

$$f_{bp} = 48.8 \cdot \text{ksi}$$

Check Stresses:

$$\frac{f_{bp}}{1.333 \cdot 0.75 F_{y_{bp}}} = 0.81$$

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

Condition = "OK"

FOUNDATION ANALYSIS

Job 140' EEI Monopole - Manchester, CT

Project No. VZ5-054 (Rev 1)

Page 1 of 2

Description Caisson Foundation Evaluation

Computed by KAB

Date 01/12/10

Checked by _____

Date _____

Check Foundation Depth

TIA/EIA-222-F 7.2.5

Shear Force:

$$S_x := 20.0k$$

USER INPUT

Overturning Moment:

$$M := 1866ft \cdot k$$

USER INPUT

Foundation Diameter:

$$d := 7.0ft$$

USER INPUT

Overall Length of
Caisson:

$$L_c := 23.0ft$$

USER INPUT

Depth From Top of
Caisson to Grade:

$$L_{pag} := 1.0ft$$

USER INPUT

Depth of Caisson Below
Ground Level:

$$LD := L_c - L_{pag}$$

$$LD = 22.0ft$$

USER INPUT

Depth Required:

$$LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d} \right) + 2ft^{.5} \left(\frac{M \cdot ft}{3 \cdot k \cdot d} + \frac{S \cdot ft}{2k} + \frac{S^2 \cdot ft^3}{18k^2 \cdot d^2} \right)^{.5} \quad LD1 = 22.9ft$$

DepthCheck := if(LD1 ≤ LD, "OK", "NO GOOD") DepthCheck = "NO GOOD"

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:

$$M_u := 1956.6ft \cdot k \quad \text{USER INPUT-FROM LPILE}$$

Moment Capacity:

$$M_n := 3508.3ft \cdot k \quad \text{USER INPUT-FROM LPILE}$$

Factor of Safety:

$$FS := \frac{M_n}{M_u} \quad FS = 1.8$$

Factor of Safety
Required

$$FS_{reqd} := 1.3 \quad FOSCheck := \text{if}(FS \geq FS_{reqd}, "OK", "NO GOOD") \quad FOSCheck = "OK"$$

Factor of Safety Ratio:

$$FS_{ratio} := \left(\frac{FS_{reqd}}{FS} \right) = 0.73$$

Job 140' EEI Monopole - Manchester, CT
 Description Caisson Foundation Evaluation

Project No. VZ5-054 (Rev 1)
 Computed by KAB
 Checked by _____

Page _____ of _____
 Sheet 2 of 2
 Date 01/12/10
 Date _____

Axial Capacity:

Applied Axial Load:

$$A1 := 34k \quad \text{USER INPUT}$$

Concrete Weight:

$$A2 := .150 \frac{k}{ft^3} \cdot LD \cdot \pi \frac{d^2}{4} \quad A2 = 127.0 \cdot k$$

Total Axial Load:

$$AT := A1 + A2 \quad AT = 161.0 \cdot k$$

Number of Rebar:

$$n := 14 \quad \text{USER INPUT}$$

Area of Rebar:

$$Ar := 1.56in^2 \quad \text{USER INPUT} \quad \#101$$

Rebar Yield Strength:

$$fy := 60ksi \quad \text{USER INPUT}$$

Area of Concrete:

$$Ag := \pi \frac{d^2}{4} \quad Ag = 38.5 ft^{2.0}$$

Concrete Comp Strength:

$$fc := 4ksi \quad \text{USER INPUT}$$

Axial Capacity:

$$Po := n \cdot Ar \cdot fy + (Ag - n \cdot Ar) \cdot 0.85 \cdot fc \quad Po = 20078.2 \cdot k$$

AxialCheck := if(AT ≤ Po, "OK", "NO GOOD")

$$\text{AxialCheck} = \text{"OK"}$$

140' EEI Monopole - Manchester, CT.lpo

LPILE Plus for Windows, Version 4

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

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This program is licensed to:

Software Coordinator

URS Corp

Name of input data file: P:\08\MathCAD\LPile\140' EEI Monopole - Manchester, CT.lpd

Name of output file: P:\08\MathCAD\LPile\140' EEI Monopole - Manchester, CT.lpo

Name of plot output file: P:\08\MathCAD\LPile\140' EEI Monopole - Manchester, CT.lpp

Name of runtime file: P:\08\MathCAD\LPile\140' EEI Monopole - Manchester, CT.lpr

Time and Date of Analysis

Date: January 12, 2010 Time: 13:29:57

Problem Title

140' EEI Monopole - Manchester, CT

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

140' EEI Monopole - Manchester, CT.lpo

- 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 = 276.00 in
- Depth of ground surface below top of pile = 12.00 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	72.000	1.6377E+06	4.5360E+03	3.6050E+06
2	276.000	72.000	1.6377E+06	4.5360E+03	3.6050E+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 = 12.000 in
- Distance from top of pile to bottom of layer = 48.000 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 = 48.000 in
- Distance from top of pile to bottom of layer = 180.000 in
- p-y subgrade modulus k for top of soil layer = 100.000 lbs/in**3
- p-y subgrade modulus k for bottom of layer = 100.000 lbs/in**3

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

- Distance from top of pile to top of layer = 180.000 in
- Distance from top of pile to bottom of layer = 204.000 in
- p-y subgrade modulus k for top of soil layer = 300.000 lbs/in**3

140' EEI Monopole - Manchester, CT.lpo
p-y subgrade modulus k for bottom of layer = 300.000 lbs/in**3

Layer 4 is sand, p-y criteria by Reese et al., 1974
Distance from top of pile to top of layer = 204.000 in
Distance from top of pile to bottom of layer = 432.000 in
p-y subgrade modulus k for top of soil layer = 300.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 300.000 lbs/in**3

(Depth of lowest layer extends 156.00 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	.07200
2	48.00	.07200
3	48.00	.07200
4	180.00	.07200
5	180.00	.07200
6	204.00	.07200
7	204.00	.03640
8	432.00	.03640

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	34.00	-----	-----
2	48.000	.00000	34.00	-----	-----
3	48.000	.00000	34.00	-----	-----
4	180.000	.00000	34.00	-----	-----
5	180.000	.00000	34.00	-----	-----
6	204.000	.00000	34.00	-----	-----
7	204.000	.00000	34.00	-----	-----
8	432.000	.00000	34.00	-----	-----

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 = 17000.000 lbs
 Bending moment at pile head = 19392000.000 in-lbs
 Axial load at pile head = 34000.000 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 = 20000.000 lbs
 Bending moment at pile head = 22392000.000 in-lbs
 Axial load at pile head = 27000.000 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 = 72.000 In

Material Properties:

Compressive Strength of Concrete = 4. Kip/In**2
 Yield stress for rebar = 60. Kip/In**2
 Modulus of elasticity of steel = 29000. Kip/In**2
 Number of reinforcing bars = 14
 Area of single rebar = 1.56000 In**2
 Number of rows of reinforcing bars = 7
 Cover Thickness = 4.000 In

Ultimate squash load capacity = 15079.26 Kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement In**2	Distance to Centroidal Axis In
1	3.120000	31.1977
2	3.120000	25.0186
3	3.120000	13.8843
4	3.120000	.0000
5	3.120000	-13.8843
6	3.120000	-25.0186

7

3.120000

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-31.1977

Axial Thrust Force = 34.000 kip

Bending Moment in-lbs	Bending Stiffness lb-in ²	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches
5.103E+06	5.103E+12	.00000100	.00003837	38.369
5.108E+06	1.021E+12	.00000500	.00008709	17.419
7.359E+06	8.177E+11	.00000900	.00014888	16.543
1.028E+07	7.911E+11	.00001300	.00021047	16.190
1.319E+07	7.762E+11	.00001700	.00027242	16.025
1.609E+07	7.663E+11	.00002100	.00033474	15.940
1.898E+07	7.590E+11	.00002500	.00039744	15.898
2.184E+07	7.533E+11	.00002900	.00046055	15.881
2.470E+07	7.485E+11	.00003300	.00052406	15.881
2.754E+07	7.443E+11	.00003700	.00058801	15.892
3.020E+07	7.365E+11	.00004100	.00065118	15.883
3.202E+07	7.116E+11	.00004500	.00070862	15.747
3.317E+07	6.770E+11	.00004900	.00076355	15.583
3.415E+07	6.443E+11	.00005300	.00081343	15.348
3.818E+07	4.600E+11	.00008300	.00115512	13.917
3.985E+07	3.527E+11	.00011300	.00145779	12.901
4.071E+07	2.847E+11	.00014300	.00173308	12.119
4.146E+07	2.397E+11	.00017300	.00202601	11.711
4.190E+07	2.064E+11	.00020300	.00229370	11.299
4.198E+07	1.802E+11	.00023300	.00254014	10.902
4.209E+07	1.600E+11	.00026300	.00283367	10.774
4.211E+07	1.437E+11	.00029300	.00307265	10.487
4.212E+07	1.304E+11	.00032300	.00331628	10.267
4.214E+07	1.194E+11	.00035300	.00356234	10.092
4.214E+07	1.100E+11	.00038300	.00381018	9.94825745

Ultimate moment capacity at concrete strain of 0.003 = 4.210E+07 In-lb

Axial Thrust Force = 27.000 kip

Bending Moment in-lbs	Bending Stiffness lb-in ²	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches
5.102E+06	5.102E+12	.00000100	.00003790	37.901
5.108E+06	1.020E+12	.00000500	.00008488	16.975
7.210E+06	8.011E+11	.00000900	.00014644	16.271
1.014E+07	7.796E+11	.00001300	.00020800	16.000
1.305E+07	7.675E+11	.00001700	.00026992	15.878
1.595E+07	7.593E+11	.00002100	.00033221	15.820
1.883E+07	7.532E+11	.00002500	.00039489	15.796
2.170E+07	7.483E+11	.00002900	.00045796	15.792
2.455E+07	7.441E+11	.00003300	.00052145	15.801
2.739E+07	7.404E+11	.00003700	.00058537	15.821
3.004E+07	7.328E+11	.00004100	.00064841	15.815
3.187E+07	7.082E+11	.00004500	.00070583	15.685
3.300E+07	6.736E+11	.00004900	.00076028	15.516
3.398E+07	6.412E+11	.00005300	.00081014	15.286
3.800E+07	4.579E+11	.00008300	.00115099	13.867
3.966E+07	3.510E+11	.00011300	.00145246	12.854
4.052E+07	2.834E+11	.00014300	.00172758	12.081

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4.128E+07	2.386E+11	.00017300	.00201888	11.670	
4.171E+07	2.055E+11	.00020300	.00228534	11.258	
4.179E+07	1.793E+11	.00023300	.00253156	10.865	
4.189E+07	1.593E+11	.00026300	.00282125	10.727	
4.192E+07	1.431E+11	.00029300	.00305986	10.443	
4.193E+07	1.298E+11	.00032300	.00330298	10.226	
4.194E+07	1.188E+11	.00035300	.00354867	10.053	
4.195E+07	1.095E+11	.00038300	.00379630	9.91200256	
4.196E+07	1.016E+11	.00041300	.00404579	9.79609680	

Ultimate moment capacity at concrete strain of 0.003 = 4.191E+07 In-lb

 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 = 17000.000 lbs
 Specified bending moment at pile head = 19392000.000 in-lbs
 Specified axial load at pile head = 34000.000 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	.596390	1.94E+07	17000.0	-.005512	433.8	7.52E+11	0.000
2.760	.581274	1.94E+07	17000.0	-.005441	434.8	7.52E+11	0.000
5.520	.566355	1.95E+07	17000.0	-.005370	435.9	7.52E+11	0.000
8.280	.551633	1.95E+07	17000.0	-.005298	436.9	7.52E+11	0.000
11.040	.537108	1.96E+07	17000.0	-.005226	438.0	7.52E+11	0.000
13.800	.522783	1.96E+07	16998.7	-.005154	439.0	7.52E+11	-.941009
16.560	.508656	1.97E+07	16994.2	-.005082	440.0	7.52E+11	-2.319
19.320	.494728	1.97E+07	16986.0	-.005010	441.1	7.52E+11	-3.621
22.080	.481001	1.98E+07	16974.3	-.004937	442.1	7.52E+11	-4.848
24.840	.467473	1.98E+07	16959.3	-.004865	443.2	7.51E+11	-6.002
27.600	.454147	1.99E+07	16941.3	-.004792	444.2	7.51E+11	-7.085
30.360	.441022	1.99E+07	16920.3	-.004719	445.2	7.51E+11	-8.097
33.120	.428099	2.00E+07	16896.7	-.004646	446.3	7.51E+11	-9.041
35.880	.415379	2.00E+07	16870.5	-.004572	447.3	7.51E+11	-9.919
38.640	.402861	2.01E+07	16842.0	-.004499	448.3	7.51E+11	-10.732
41.400	.390546	2.01E+07	16811.4	-.004425	449.4	7.51E+11	-11.482
44.160	.378436	2.01E+07	16778.7	-.004351	450.4	7.51E+11	-12.171
46.920	.366530	2.02E+07	16744.3	-.004277	451.4	7.51E+11	-12.799
49.680	.354829	2.02E+07	14820.7	-.004202	452.4	7.51E+11	-1381.113
52.440	.343333	2.03E+07	10939.8	-.004128	453.2	7.51E+11	-1431.127
55.200	.332043	2.03E+07	6928.3	-.004053	453.8	7.51E+11	-1475.710
57.960	.320959	2.03E+07	2801.1	-.003979	454.1	7.51E+11	-1515.033
60.720	.310081	2.03E+07	-1427.6	-.003904	454.1	7.51E+11	-1549.268
63.480	.299409	2.03E+07	-5744.1	-.003829	453.9	7.51E+11	-1578.586
66.240	.288944	2.03E+07	-10134.9	-.003755	453.5	7.51E+11	-1603.156
69.000	.278684	2.03E+07	-14587.2	-.003680	452.7	7.51E+11	-1623.149
71.760	.268630	2.02E+07	-19088.6	-.003606	451.7	7.51E+11	-1638.732
74.520	.258781	2.01E+07	-23627.1	-.003532	450.4	7.51E+11	-1650.072
77.280	.249136	2.01E+07	-28191.3	-.003458	448.9	7.51E+11	-1657.335
80.040	.239695	2.00E+07	-32770.2	-.003384	447.0	7.51E+11	-1660.684
82.800	.230456	1.99E+07	-37353.1	-.003311	444.9	7.51E+11	-1660.284
85.560	.221419	1.98E+07	-41930.0	-.003238	442.5	7.52E+11	-1656.292

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88.320	.212583	1.97E+07	-46491.1	-.003165	439.8	7.52E+11	-1648.868
91.080	.203947	1.95E+07	-51027.2	-.003093	436.9	7.52E+11	-1638.167
93.840	.195508	1.94E+07	-55529.5	-.003022	433.6	7.52E+11	-1624.343
96.600	.187265	1.92E+07	-59989.5	-.002951	430.1	7.53E+11	-1607.545
99.360	.179217	1.91E+07	-64399.3	-.002881	426.4	7.53E+11	-1587.922
102.120	.171362	1.89E+07	-68751.1	-.002812	422.3	7.53E+11	-1565.618
104.880	.163697	1.87E+07	-73038.0	-.002743	418.0	7.54E+11	-1540.775
107.640	.156222	1.85E+07	-77252.9	-.002675	413.5	7.54E+11	-1513.530
110.400	.148933	1.82E+07	-81389.5	-.002608	408.7	7.54E+11	-1484.018
113.160	.141828	1.80E+07	-85441.7	-.002541	403.6	7.55E+11	-1452.369
115.920	.134905	1.78E+07	-89403.8	-.002476	398.3	7.55E+11	-1418.711
118.680	.128162	1.75E+07	-93270.4	-.002411	392.8	7.56E+11	-1383.167
121.440	.121595	1.73E+07	-97036.5	-.002348	387.0	7.57E+11	-1345.854
124.200	.115202	1.70E+07	-100697.3	-.002285	381.0	7.57E+11	-1306.889
126.960	.108980	1.67E+07	-104248.4	-.002224	374.8	7.58E+11	-1266.382
129.720	.102926	1.64E+07	-107685.7	-.002164	368.4	7.58E+11	-1224.439
132.480	.097036	1.61E+07	-111005.4	-.002104	361.7	7.59E+11	-1181.161
135.240	.091309	1.58E+07	-114204.0	-.002046	354.9	7.60E+11	-1136.645
138.000	.085740	1.55E+07	-117278.1	-.001990	347.9	7.61E+11	-1090.985
140.760	.080326	1.52E+07	-120224.8	-.001934	340.7	7.62E+11	-1044.267
143.520	.075064	1.48E+07	-123041.1	-.001880	333.3	7.62E+11	-996.573
146.280	.069950	1.45E+07	-125724.6	-.001827	325.8	7.63E+11	-947.981
149.040	.064980	1.41E+07	-128272.8	-.001775	318.1	7.64E+11	-898.564
151.800	.060151	1.38E+07	-130683.6	-.001725	310.2	7.65E+11	-848.389
154.560	.055459	1.34E+07	-132955.0	-.001676	302.2	7.66E+11	-797.519
157.320	.050900	1.30E+07	-135085.1	-.001628	294.1	7.68E+11	-746.013
160.080	.046471	1.27E+07	-137072.2	-.001582	285.8	7.69E+11	-693.922
162.840	.042167	1.23E+07	-138914.8	-.001537	277.5	7.71E+11	-641.293
165.600	.037985	1.19E+07	-140611.4	-.001494	269.0	7.72E+11	-588.168
168.360	.033920	1.15E+07	-142160.8	-.001452	260.4	7.74E+11	-534.584
171.120	.029968	1.11E+07	-143561.7	-.001412	251.7	7.76E+11	-480.571
173.880	.026125	1.07E+07	-144813.0	-.001373	243.0	7.77E+11	-426.157
176.640	.022387	1.03E+07	-145913.6	-.001336	234.2	7.79E+11	-371.364
179.400	.018750	9.91E+06	-146862.5	-.001300	225.3	7.81E+11	-316.208
182.160	.015210	9.50E+06	-148404.2	-.001266	216.4	7.84E+11	-800.999
184.920	.011762	9.09E+06	-150377.8	-.001233	207.3	7.87E+11	-629.149
187.680	.008402	8.67E+06	-151875.8	-.001202	198.1	7.90E+11	-456.366
190.440	.005125	8.25E+06	-152895.6	-.001173	188.9	7.93E+11	-282.627
193.200	.001928	7.83E+06	-153434.6	-.001145	179.6	7.97E+11	-107.896
195.960	-.001195	7.40E+06	-153489.8	-.001119	170.2	8.00E+11	67.879
198.720	-.004247	6.98E+06	-153058.3	-.001094	160.9	8.25E+11	244.760
201.480	-.007235	6.56E+06	-152136.9	-.001072	151.7	8.69E+11	422.928
204.240	-.010165	6.14E+06	-150727.0	-.001052	142.5	9.13E+11	598.790
207.000	-.013043	5.73E+06	-148825.4	-.001035	133.4	9.56E+11	779.179
209.760	-.015877	5.32E+06	-146423.1	-.001019	124.4	9.98E+11	961.570
212.520	-.018669	4.92E+06	-143514.5	-.001010	115.6	5.10E+12	1146.162
215.280	-.021454	4.53E+06	-140090.6	-.001008	107.0	5.10E+12	1334.922
218.040	-.024233	4.15E+06	-136139.9	-.001006	98.6352	5.10E+12	1527.867
220.800	-.027005	3.78E+06	-131650.9	-.001003	90.5054	5.10E+12	1725.019
223.560	-.029772	3.42E+06	-126612.0	-.001001	82.6643	5.10E+12	1926.396
226.320	-.032533	3.08E+06	-121011.4	-10.0E-03	75.1459	5.10E+12	2132.021
229.080	-.035290	2.75E+06	-114986.7	-9.98E-04	67.9845	5.10E+12	2233.663
231.840	-.038043	2.44E+06	-108764.3	-9.97E-04	61.1971	5.10E+12	2275.338
234.600	-.040792	2.15E+06	-102432.2	-9.96E-04	54.7907	5.10E+12	2313.120
237.360	-.043538	1.88E+06	-96000.8	-9.94E-04	48.7717	5.10E+12	2347.326
240.120	-.046282	1.62E+06	-89479.6	-9.93E-04	43.1457	5.10E+12	2378.217
242.880	-.049022	1.38E+06	-82877.3	-9.93E-04	37.9180	5.10E+12	2406.010
245.640	-.051761	1.16E+06	-76202.4	-9.92E-04	33.0932	5.10E+12	2430.887
248.400	-.054498	963480.5	-69462.6	-9.91E-04	28.6754	5.10E+12	2453.002
251.160	-.057234	781199.7	-62665.5	-9.91E-04	24.6684	5.10E+12	2472.485
253.920	-.059968	617753.1	-55818.0	-9.91E-04	21.0754	5.10E+12	2489.450
256.680	-.062701	473270.2	-48927.0	-9.90E-04	17.8993	5.10E+12	2503.994
259.440	-.065434	347861.7	-41999.2	-9.90E-04	15.1425	5.10E+12	2516.200

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262.200	-.068166	241620.6	-35040.7	-9.90E-04	12.8070	5.10E+12	2526.144
264.960	-.070898	154622.7	-28057.9	-9.90E-04	10.8946	5.10E+12	2533.890
267.720	-.073630	86926.8	-21056.6	-9.90E-04	9.4065	5.10E+12	2539.494
270.480	-.076361	38575.9	-14042.8	-9.90E-04	8.3436	5.10E+12	2543.009
273.240	-.079093	9596.5	-7022.0	-9.90E-04	7.7065	5.10E+12	2544.480
276.000	-.081824	0.0	0.0	-9.90E-04	7.4956	5.10E+12	2543.947

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	=	.5964 in
Computed slope at pile head	=	-5.5125E-03
Maximum bending moment	=	20318227.766 lbs-in
Maximum shear force	=	-153489.775 lbs
Depth of maximum bending moment	=	60.720 in
Depth of maximum shear force	=	195.960 in
Number of iterations	=	11
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 = 20000.000 lbs
 Specified bending moment at pile head = 22392000.000 in-lbs
 Specified axial load at pile head = 27000.000 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	.700516	2.24E+07	20000.0	-.006457	498.2	7.47E+11	0.000
2.760	.682809	2.24E+07	20000.0	-.006374	499.4	7.47E+11	0.000
5.520	.665330	2.25E+07	20000.0	-.006291	500.6	7.47E+11	0.000
8.280	.648081	2.26E+07	20000.0	-.006208	501.9	7.47E+11	0.000
11.040	.631062	2.26E+07	20000.0	-.006125	503.1	7.47E+11	0.000
13.800	.614274	2.27E+07	19998.5	-.006041	504.3	7.47E+11	-1.106
16.560	.597717	2.27E+07	19993.2	-.005957	505.5	7.47E+11	-2.726
19.320	.581391	2.28E+07	19983.6	-.005873	506.8	7.47E+11	-4.256
22.080	.565298	2.28E+07	19969.8	-.005789	508.0	7.47E+11	-5.698
24.840	.549439	2.29E+07	19952.2	-.005704	509.2	7.47E+11	-7.055
27.600	.533812	2.29E+07	19931.0	-.005619	510.4	7.46E+11	-8.327
30.360	.518420	2.30E+07	19906.4	-.005534	511.6	7.46E+11	-9.518
33.120	.503263	2.31E+07	19878.6	-.005449	512.8	7.46E+11	-10.629
35.880	.488341	2.31E+07	19847.8	-.005364	514.1	7.46E+11	-11.662
38.640	.473655	2.32E+07	19814.3	-.005278	515.3	7.46E+11	-12.618

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41.400	.459206	2.32E+07	19778.2	-.005192	516.5	7.46E+11	-13.501
44.160	.444993	2.33E+07	19739.9	-.005106	517.7	7.46E+11	-14.311
46.920	.431019	2.33E+07	19699.3	-.005020	518.9	7.46E+11	-15.051
49.680	.417283	2.34E+07	17437.2	-.004934	520.1	7.46E+11	-1624.204
52.440	.403785	2.34E+07	12873.1	-.004847	521.0	7.46E+11	-1683.113
55.200	.390527	2.35E+07	8155.2	-.004760	521.7	7.46E+11	-1735.635
57.960	.377509	2.35E+07	3300.9	-.004673	522.0	7.46E+11	-1781.969
60.720	.364731	2.35E+07	-1673.0	-.004586	522.1	7.46E+11	-1822.316
63.480	.352192	2.35E+07	-6750.3	-.004500	521.8	7.46E+11	-1856.874
66.240	.339893	2.34E+07	-11915.2	-.004413	521.3	7.46E+11	-1885.841
69.000	.327834	2.34E+07	-17152.7	-.004326	520.4	7.46E+11	-1909.414
71.760	.316013	2.33E+07	-22448.0	-.004240	519.2	7.46E+11	-1927.788
74.520	.304432	2.33E+07	-27787.2	-.004153	517.7	7.46E+11	-1941.158
77.280	.293087	2.32E+07	-33156.6	-.004067	515.9	7.46E+11	-1949.716
80.040	.281980	2.31E+07	-38543.2	-.003982	513.7	7.46E+11	-1953.653
82.800	.271109	2.30E+07	-43934.6	-.003896	511.2	7.46E+11	-1953.158
85.560	.260472	2.29E+07	-49318.8	-.003812	508.4	7.47E+11	-1948.416
88.320	.250068	2.27E+07	-54684.3	-.003727	505.2	7.47E+11	-1939.612
91.080	.239896	2.26E+07	-60020.1	-.003644	501.7	7.47E+11	-1926.925
93.840	.229954	2.24E+07	-65315.8	-.003561	498.0	7.47E+11	-1910.535
96.600	.220240	2.22E+07	-70561.4	-.003479	493.8	7.48E+11	-1890.615
99.360	.210752	2.20E+07	-75747.3	-.003397	489.4	7.48E+11	-1867.337
102.120	.201489	2.18E+07	-80864.7	-.003316	484.7	7.48E+11	-1840.868
104.880	.192447	2.15E+07	-85904.8	-.003236	479.6	7.49E+11	-1811.373
107.640	.183624	2.13E+07	-90859.5	-.003157	474.2	7.49E+11	-1779.011
110.400	.175018	2.10E+07	-95721.2	-.003079	468.6	7.49E+11	-1743.938
113.160	.166626	2.08E+07	-100482.5	-.003002	462.6	7.50E+11	-1706.305
115.920	.158445	2.05E+07	-105136.6	-.002926	456.4	7.50E+11	-1666.259
118.680	.150472	2.02E+07	-109677.1	-.002852	449.9	7.51E+11	-1623.943
121.440	.142704	1.99E+07	-114097.9	-.002778	443.1	7.51E+11	-1579.493
124.200	.135137	1.96E+07	-118393.2	-.002706	436.1	7.52E+11	-1533.042
126.960	.127769	1.92E+07	-122557.7	-.002634	428.7	7.52E+11	-1484.718
129.720	.120595	1.89E+07	-126586.4	-.002565	421.2	7.53E+11	-1434.643
132.480	.113613	1.85E+07	-130474.6	-.002496	413.4	7.54E+11	-1382.933
135.240	.106818	1.82E+07	-134218.1	-.002429	405.4	7.55E+11	-1329.701
138.000	.100206	1.78E+07	-137812.6	-.002363	397.1	7.55E+11	-1275.052
140.760	.093773	1.74E+07	-141254.5	-.002299	388.7	7.56E+11	-1219.086
143.520	.087516	1.70E+07	-144540.3	-.002236	380.0	7.57E+11	-1161.897
146.280	.081431	1.66E+07	-147666.7	-.002175	371.1	7.58E+11	-1103.575
149.040	.075512	1.62E+07	-150630.6	-.002115	362.1	7.59E+11	-1044.203
151.800	.069756	1.58E+07	-153429.3	-.002057	352.8	7.60E+11	-983.857
154.560	.064158	1.54E+07	-156060.2	-.002000	343.5	7.61E+11	-922.609
157.320	.058713	1.49E+07	-158521.0	-.001946	333.9	7.62E+11	-860.524
160.080	.053418	1.45E+07	-160809.3	-.001892	324.2	7.63E+11	-797.659
162.840	.048268	1.40E+07	-162923.0	-.001841	314.4	7.65E+11	-734.069
165.600	.043257	1.36E+07	-164860.4	-.001791	304.5	7.66E+11	-669.801
168.360	.038381	1.31E+07	-166619.5	-.001743	294.4	7.67E+11	-604.894
171.120	.033635	1.27E+07	-168198.6	-.001697	284.3	7.69E+11	-539.385
173.880	.029015	1.22E+07	-169596.1	-.001652	274.0	7.71E+11	-473.302
176.640	.024515	1.17E+07	-170810.4	-.001609	263.7	7.73E+11	-406.667
179.400	.020131	1.13E+07	-171840.1	-.001568	253.3	7.75E+11	-339.497
182.160	.015857	1.08E+07	-173461.1	-.001529	242.8	7.77E+11	-835.110
184.920	.011690	1.03E+07	-175476.4	-.001492	232.2	7.79E+11	-625.290
187.680	.007622	9.81E+06	-176910.7	-.001456	221.5	7.82E+11	-414.036
190.440	.003650	9.32E+06	-177759.9	-.001423	210.8	7.86E+11	-201.314
193.200	-2.31E-04	8.83E+06	-178019.9	-.001391	200.0	7.89E+11	12.928
195.960	-.004027	8.34E+06	-177686.3	-.001361	189.2	7.93E+11	228.759
198.720	-.007743	7.85E+06	-176754.8	-.001333	178.4	7.96E+11	446.261
201.480	-.011384	7.36E+06	-175220.5	-.001307	167.7	8.00E+11	665.530
204.240	-.014955	6.88E+06	-173086.3	-.001282	157.2	8.36E+11	881.017
207.000	-.018464	6.40E+06	-170348.4	-.001261	146.7	8.85E+11	1102.978
209.760	-.021917	5.94E+06	-166994.5	-.001242	136.5	9.34E+11	1327.411
212.520	-.025322	5.48E+06	-163017.3	-.001226	126.5	9.81E+11	1554.589

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215.280	-.028684	5.04E+06	-158409.0	-.001217	116.7	5.10E+12	1784.756
218.040	-.032039	4.61E+06	-153158.4	-.001214	107.3	5.10E+12	2020.018
220.800	-.035387	4.19E+06	-147251.5	-.001212	98.1408	5.10E+12	2260.395
223.560	-.038728	3.80E+06	-140858.9	-.001210	89.3980	5.10E+12	2371.900
226.320	-.042064	3.42E+06	-134241.1	-.001208	81.0524	5.10E+12	2423.598
229.080	-.045395	3.06E+06	-127484.5	-.001206	73.1126	5.10E+12	2472.455
231.840	-.048721	2.71E+06	-120598.8	-.001204	65.5869	5.10E+12	2517.183
234.600	-.052043	2.39E+06	-113594.9	-.001203	58.4826	5.10E+12	2558.130
237.360	-.055362	2.09E+06	-106482.8	-.001202	51.8068	5.10E+12	2595.580
240.120	-.058677	1.80E+06	-99271.8	-.001201	45.5655	5.10E+12	2629.769
242.880	-.061990	1.54E+06	-91970.7	-.001200	39.7647	5.10E+12	2660.892
245.640	-.065301	1.29E+06	-84587.7	-.001199	34.4094	5.10E+12	2689.117
248.400	-.068609	1.07E+06	-77130.6	-.001198	29.5044	5.10E+12	2714.582
251.160	-.071916	868943.4	-69606.8	-.001198	25.0540	5.10E+12	2737.407
253.920	-.075222	687344.0	-62023.6	-.001198	21.0620	5.10E+12	2757.696
256.680	-.078526	526751.7	-54387.7	-.001197	17.5317	5.10E+12	2775.536
259.440	-.081830	387302.2	-46705.9	-.001197	14.4663	5.10E+12	2791.005
262.200	-.085134	269113.4	-38984.6	-.001197	11.8682	5.10E+12	2804.170
264.960	-.088436	172285.7	-31230.0	-.001197	9.7397	5.10E+12	2815.088
267.720	-.091739	96902.2	-23448.3	-.001197	8.0825	5.10E+12	2823.812
270.480	-.095042	43029.4	-15645.5	-.001197	6.8983	5.10E+12	2830.386
273.240	-.098344	10717.3	-7827.5	-.001197	6.1880	5.10E+12	2834.851
276.000	-.101646	0.0	0.0	-.001197	5.9524	5.10E+12	2837.242

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	=	.7005 in
Computed slope at pile head	=	-6.4571E-03
Maximum bending moment	=	23479342.984 lbs-in
Maximum shear force	=	-178019.873 lbs
Depth of maximum bending moment	=	60.720 in
Depth of maximum shear force	=	193.200 in
Number of iterations	=	12
Number of zero deflection points	=	1

Summary of Pile-head Response

Definition of symbols for pile-head boundary conditions:

y = pile-head displacement, 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	Boundary	Boundary	Axial	Pile Head	Maximum	Maximum
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Type	Condition 1	Condition 2	140' EEI Monopole - Load lbs	Manchester, CT. lpo Deflection in	Moment in-lbs	Shear lbs
1	V= 17000.000	M= 1.94E+07	34000.0000	.5964	2.032E+07	-1.535E+05
1	V= 20000.000	M= 2.24E+07	27000.0000	.7005	2.348E+07	-1.780E+05

The analysis ended normally.