STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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

Daniel F. Caruso
Chairman

May 2, 2007

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

RE: **EM-VER-126-070412** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at Birdseye Road, Shelton, Connecticut.

Dear Attorney Baldwin:

At a public meeting held on May 1, 2007, the Connecticut Siting Council (Council) acknowledged 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 April 12, 2007, 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,

Daniel F. Caruso
Chairman

DFC/MP/laf

c: The Honorable Mark A. Lauretti, Mayor, City of Shelton
Richard Schultz, Planning Administrator, City of Shelton
Thomas J. Regan, Esq., Brown Rudnick Berlack Israels LLP
Christopher B. Fisher, Esq., Cuddy & Feder LLP

STATE OF CONNECTICUT

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Phone: (860) 827-2935 Fax: (860) 827-2950
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Daniel F. Caruso
Chairman

April 16, 2007

The Honorable Mark A. Lauretti
Mayor
City of Shelton
54 Hill Street
P. O. Box 364
Shelton, CT 06484

RE: **EM-VER-126-070412** - Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at Birdseye Road, Shelton, Connecticut.

Dear Mayor Lauretti:

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

The Council will consider this item at the next meeting scheduled for Tuesday, May 1, 2007 at 1:30 p.m. in Hearing Room One, Ten Franklin Square, New Britain, Connecticut.

If you have any questions or comments regarding this proposal, please call me or inform the Council by April 27, 2007.

Thank you for your cooperation and consideration.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/MP/laf

Enclosure: Notice of Intent

c: Richard Schultz, Planning Administrator, City of Shelton

ROBINSON & COLE LLP

KENNETH C. BALDWIN

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

EM-VER-126-070412

April 12, 2007

Via Hand Delivery

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

Re: **Notice of Exempt Modification**
Birdseye Road, Shelton, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") intends to install antennas on the existing 120-foot self-supporting monopole tower owned by Sprint Nextel off Birdseye Road in Shelton, Connecticut. 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, and pursuant to Siting Council directive a copy of this letter is being sent to Shelton Mayor, Mark A. Lauretti and to Rudolf Hudac & Karen E. McGuire, Trustees, Roberta G. Hudac Family Trust, owner of the property on which the tower is located.

The Sprint Nextel facility consists of a 120-foot self-supporting monopole tower capable of supporting multiple carriers within a fenced compound off Birdseye Road in Shelton. This tower is currently shared by Sprint Nextel at the 118-foot level and by AT&T at the 108-foot level. Cellco intends to install twelve (12) panel-type antennas at the 98-foot level on the tower and place a 12' x 30' equipment shelter at the base of the tower within the existing fenced compound. Attached behind Tab 1 are Project Plans for the proposed Cellco facility.

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

1. The proposed modification will not increase the overall height of the existing tower. Cellco's antennas will be mounted with their centerline at the 98-foot level on the 120-foot tower.

2. The proposed installation of a 12' x 30' equipment shelter will not require an extension of the fenced compound or leased area.

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

4. The operation of the 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. The cumulative worst-case RF power density calculations for the Sprint Nextel, AT&T and Cellco antennas would be 34.02% of the FCC standard. A copy of cumulative power density calculations table is attached behind Tab 2.

Also attached, behind Tab 3, is a Structural Analysis Report confirming that the existing tower can support the existing and proposed antennas and associated equipment.

For the foregoing reasons, Cellco respectfully submits that the proposed antenna installation at the facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,

Kenneth C. Baldwin

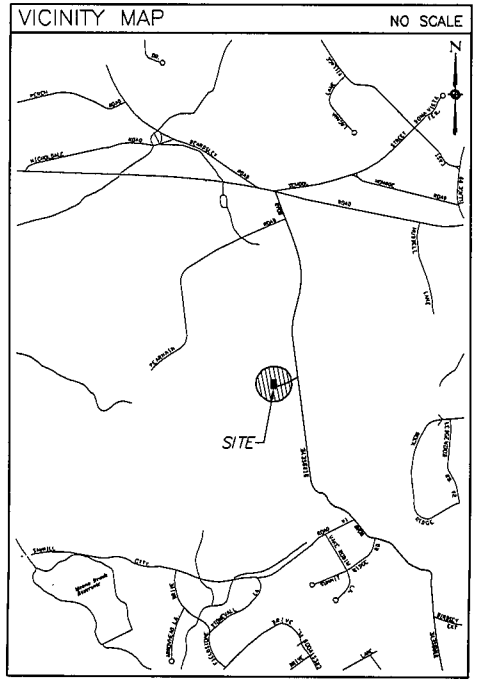
Attachments
Copy to:
Mark A. Lauretti, Shelton Mayor
Rudolf Hudac & Karen E. McGuire, Trustees, Roberta G. Hudac Family Trust
Sandy M. Carter

CELLCO PARTNERSHIP
DBA
verizon wireless

SHELTON NORTH

BIRDSEYE ROAD
SHELTON, CONNECTICUT

VICINITY MAP — NO SCALE



PROJECT SUMMARY

SITE NAME:	SHELTON NORTH
SITE ADDRESS:	BIRDSEYE ROAD SHELTON, CONNECTICUT
CONTACT PERSON	CELLCO PARTNERSHIP DBA VERIZON WIRELESS SANDY CARTER (860) 803-8219
PROPERTY OWNER:	RUDOLPH HUDAK
LATITUDE:	41°-19'-32.87" NAD 83
LONGITUDE:	73°-08'-55.31" NAD 83
JURISDICTION:	CONNECTICUT SITING COUNCIL
ARCHITECT:	URS CORPORATION A.E.S. 500 ENTERPRISE DRIVE, SUITE 3B ROCKY HILL, CT 06067
M/E/P ENGINEER:	URS CORPORATION A.E.S. 500 ENTERPRISE DRIVE, SUITE 3B ROCKY HILL, CT 06067
SURVEYOR:	URS CORPORATION A.E.S. 500 ENTERPRISE DRIVE, SUITE 3B ROCKY HILL, CT 06067

LEGEND

SYMBOL	DESCRIPTION
	SECTION OR DETAIL NUMBER SHEET WHERE DETAIL/SECTION OCCURS
	ELEVATION NUMBER SHEET WHERE ELEVATION OCCURS

ABBREVIATIONS

MIN.	MINIMUM
V.I.F.	VERIFY IN FIELD
O.C.	ON CENTER
PSF	POUND/SQUARE FOOT
TYP.	TYPICAL
TOC	TOP OF CONCRETE
TOW	TOP OF WALL
FT.	FEET
SQ.FT.	SQUARE FEET
N/A	NOT APPLICABLE

SHEET INDEX

SHT. NO.	DESCRIPTION
T-1	TITLE SHEET – GENERAL NOTES AND LEGENDS
SC-1	SITE PLAN AND TOWER ELEVATION

CELLCO PARTNERSHIP
DBA
verizon wireless

A&E FIRM
URS CORPORATION AES
500 ENTERPRISE DRIVE
SUITE 3B
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

A&E SEAL

PROJECT NO: 36931061

JOB NO: VZ1-236

DRAWN BY: JES

CHECKED BY:

ISSUED FOR

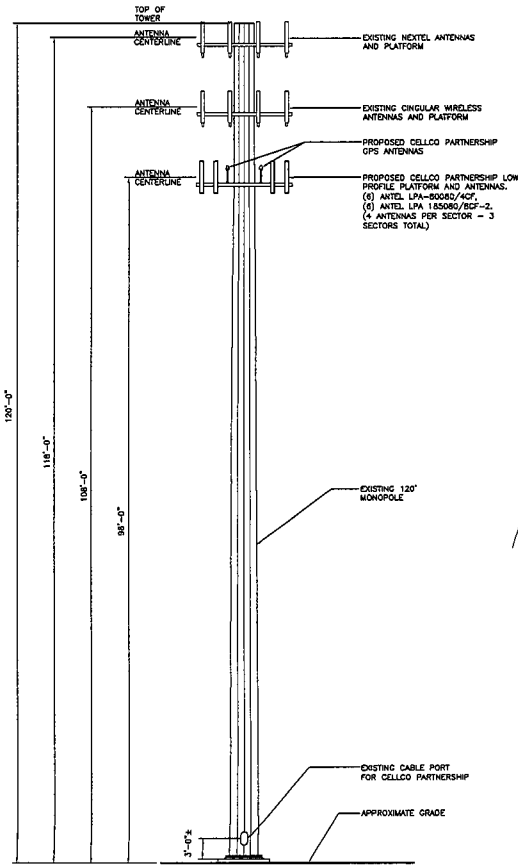
04-03-07	REVIEW
04-06-07	REVIEW
04-09-07	APPROVAL

SHELTON NORTH
BIRDSEYE ROAD
SHELTON, CONNECTICUT

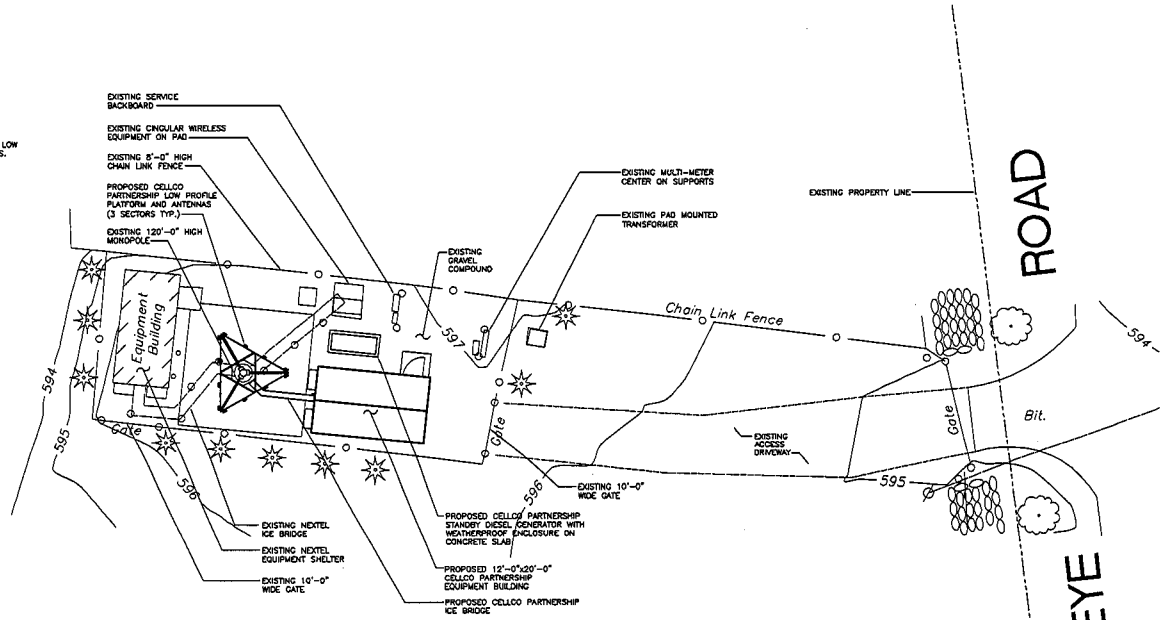
SCALE: AS NOTED

TITLE SHEET-
GENERAL NOTES
AND LEGEND

T-1



2 SC-1 TOWER ELEVATION
SCALE: 1/8"=1'-0"
0 4 8 16 24



1 SC-1 SITE PLAN
SCALE: 1"=10'-0"
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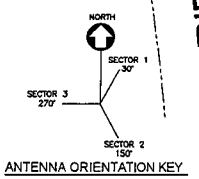


ANTENNA ORIENTATION KEY

CELLCO PARTNERSHIP
DBA
verizon wireless

A&E FIRM
DBS CORPORATION AES
500 ENTERPRISE DRIVE
SUITE 3B
ROCKY HILL, CONNECTICUT
1-(860)-529-8882

A&E SEAL

PROJECT NO: 36931061
JOB NO: VZ1-236
DRAWN BY: JES
CHECKED BY:

ISSUED FOR	
04-03-07	REVIEW
04-06-07	REVIEW
04-09-07	APPROVAL

SHELTON
NORTH
BIRDSEYE ROAD
SHELTON, CONNECTICUT

SCALE: AS NOTED

SITE PLAN AND
TOWER ELEVATION

SC-1

	General	Power	Density					
Site Name: Shelton N								
Tower Height: Verizon @ 98Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
AT&T	12	250	108	0.0925	1945	1.0000	9.25%	
Nextel	9	100	120	0.0225	860	0.5733	3.92%	
VZW PCS	**3**	**400**	**98**	**0.0449**	**1900**	**1.0000**	**4.49%**	
VZW	**9**	**285**	**98**	**0.0960**	**880**	**0.5866**	**16.37%**	
								34.02%
* Source: Siting Council								

DETAILED STRUCTURAL ANALYSIS AND EVALUATION OF 118' MONOPOLE TOWER FOR NEW ANTENNA ARRANGEMENT

Shelton North
162 Birdseye Road
Shelton, Connecticut

prepared for

Verizon Wireless
99 East River Drive
East Hartford, Connecticut 06108

prepared by

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

36931061.00008
VZ1-236

April 4, 2007

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report summarizes the structural analysis of the existing 118' steel monopole structure located at 162 Birdseye Road, Shelton 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 85 mph (fastest mile) and 74 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 Wireless modification is as follows:

Proposed Antenna and Mount	Carrier	Antenna Center Elevation
Install: **(1) Valmont 15' Low Profile Platform,** **(6) Antel LPA-80080/4CF antennas, and** **(6) Antel LPA 185080/8CF-2 antennas with** **(12) 1 5/8" coax cables (within monopole)**	**Verizon Wireless (Proposed)**	**@ 98'-0"**

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 for all the existing and proposed antenna loading with the wind load classification specified above.**

This analysis is based on:

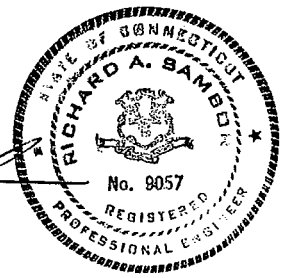
1) The tower structure's theoretical capacity, not including any assessment of the condition of the tower.
2) Tower geometry and structural member sizes taken from manufacturer design documents by Summit Manufacturing, LLC., (Summit Job #: 12218); prepared by Paul J. Ford and Company, (Project #29202-0129); signed and sealed March 7, 2002.
3) Antenna and mount configuration as specified on the following page of this report.

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

If you should have any questions, please call.

Sincerely,

URS Corporation



Richard A. Sambor, P.E.
Manager Facilities Design

RAS/jek

cc: AA, DR, ICA – URS, CF/Book

2. INTRODUCTION

The subject tower is located at 162 Birdseye Road, Shelton CT The structure is a 118' steel monopole designed by Paul J Summit Manufacturing, Inc.

The tower geometry and structure member sizes were taken from manufacturer design documents by Summit Manufacturing, LLC., (Summit Job #: 12218); prepared by Paul J. Ford and Company, (Project #29202-0129); signed and sealed March 7, 2002.

The inventory is summarized in the table below:

Antenna Type	*Carrier*	*Mount*	*Antenna Centerline Elevation*	*Cable*
(12) Decibel DB844H90 antennas	Nextel (existing)	(1) 14' Platform with rails (existing)	120'	(12) 1 1/4" coax cables (within monopole)
(3) Allgon 7250.02 antennas and (6) TMA's	Cingular (existing)	Chain mount (existing)	108.5'	(6) 1 1/4" coax cables (within monopole)
(6) Antel LPA-80080/4CF, (6) Antel LPA 185080/8CF-2 and (6) TMA's	**Verizon (proposed)**	**(1) 15' Low Profile Platform**	**98'**	**(12) 1 5/8" coax cables (within monopole)**

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 4.7. Two load conditions were evaluated as shown below which were compared to allowable stresses according to AISC and TIA/EIA.

Load Condition 1 = 85 mph (fastest mile) Wind Load (without ice) + Tower Dead Load
Load Condition 2 = 74 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.

5. CONCLUSIONS

The results of the analysis indicate that the tower structure is in compliance with the proposed loading conditions. **The tower and its foundation are structurally adequate under the wind load classification specified above and the proposed antenna loadings.**

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.

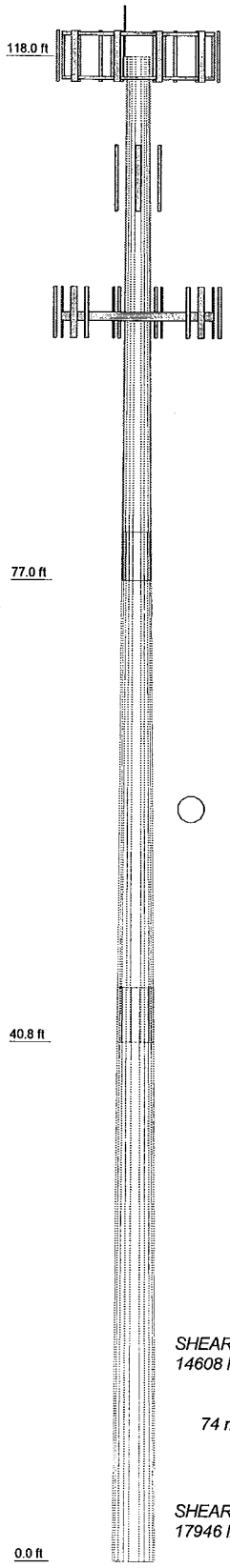
The owner shall refer to TIA/EIA-222-F for recommendations for maintenance and inspection. The frequency of the inspection and maintenance intervals is to be determined by the owner based upon actual site and environmental conditions. It is recommended that a complete and thorough inspection of the entire 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.

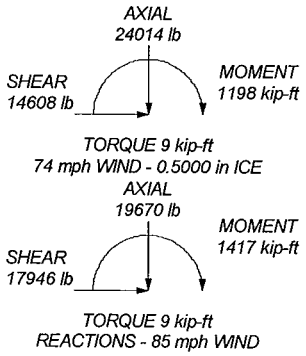
6. DRAWINGS AND DATA

RISA TOWER INPUT/OUTPUT SUMMARY

Section	1	2	3
Length (ft)	41.00	40.00	45.00
Number of Sides	12	12	12
Thickness (in)	0.1875	0.3125	0.3750
Lap Splice (ft)	3.75	4.25	
Top Dia (in)	22.0000	27.7713	33.0448
Bot Dia (in)	28.7650	34.3710	40.4700
Grade		A607-65	
Weight (lb)	2122.2	4212.8	6727.0

13062.0





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod 5/8x4' (None)	120	(2) LPA-80080/4CF (Verizon)	98
(4) DB844H90 (Nextel)	118	(2) LPA-80080/4CF (Verizon)	98
(4) DB844H90 (Nextel)	118	(2) LPA-80080/4CF (Verizon)	98
(4) DB844H90 (Nextel)	118	LPA-185080/8CF_2 (Verizon)	98
PiROD 15' Platform w/handrails (Monopole) (Nextel)	118	LPA-185080/8CF_2 (Verizon)	98
		LPA-185080/8CF_2 (Verizon)	98
7250.02 w/Mount Pipe (Cingular)	108.5	LPA-185080/8CF_2 (Verizon)	98
7250.02 w/Mount Pipe (Cingular)	108.5	LPA-185080/8CF_2 (Verizon)	98
7250.02 w/Mount Pipe (Cingular)	108.5	LPA-185080/8CF_2 (Verizon)	98
(2) TMA 10"x8"x3" (Cingular)	108.5	PiROD 15' Low Profile Platform (Verizon)	98
(2) TMA 10"x8"x3" (Cingular)	108.5		
(2) TMA 10"x8"x3" (Cingular)	108.5		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Fairfield County, Connecticut.
2. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
3. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
4. Deflections are based upon a 50 mph wind.
5. TOWER RATING: 69.8%

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

Job: ***118' Monopole***			
Project: ***Shelton, CT***			
Client: Verizon Wireless	Drawn by: Staff	App'd:	
Code: TIA/EIA-222-F	Date: 04/04/07	Scale: NTS	
Path: P:\08\ERI Files\VZ1-236 36931061.eri		Dwg No. E-1	

RISA TOWER DETAILED OUTPUT

Tower Input Data

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

Tower is located in Fairfield County, Connecticut.
Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 74 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	118.00-77.00	41.00	3.75	12	22.0000	28.7650	0.1875	0.7500	A607-65 (65 ksi)
L2	77.00-40.75	40.00	4.25	12	27.7713	34.3710	0.3125	1.2500	A607-65 (65 ksi)
L3	40.75-0.00	45.00		12	33.0448	40.4700	0.3750	1.5000	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	22.7761	13.1693	799.7595	7.8089	11.3960	70.1790	1620.5296	6.4815	5.3935	28.765
	29.7797	17.2537	1798.5222	10.2307	14.9003	120.7040	3644.2935	8.4917	7.2065	38.435
L2	29.3915	27.6304	2659.0967	9.8302	14.3855	184.8455	5388.0509	13.5988	6.6052	21.137
	35.5835	34.2714	5074.2095	12.1929	17.8042	285.0011	10281.7241	16.8673	8.3739	26.797
L3	34.9365	39.4488	5374.1723	11.6958	17.1172	313.9634	10889.5300	19.4155	7.8510	20.936
	41.8976	48.4147	9934.4480	14.3540	20.9635	473.8935	20129.8851	23.8282	9.8410	26.243

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 118.00-77.00				1.02	1	1		
L2 77.00-40.75				1.02	1	1		
L3 40.75-0.00				1.02	1	1		

Monopole Base Plate Data

Base Plate Data	
Base plate is square	√
Base plate is grouted	
Anchor bolt grade	A615-75
Anchor bolt size	2.2500 in
Number of bolts	12
Embedment length	0.0000 in
f'_c	3 ksi
Grout space	3.0000 in
Base plate grade	A572-50
Base plate thickness	3.2500 in
Bolt circle diameter	48.0000 in
Outer diameter	46.0000 in
Inner diameter	36.0000 in
Corner clipped	9.0000 in
Base plate type	Plain Plate

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 1/4 (Nextel)	A	No	Inside Pole	118.00 - 0.00	12	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
1 1/4 (Cingular)	A	No	Inside Pole	108.50 - 0.00	6	No Ice	0.00	0.66
						1/2" Ice	0.00	0.66
1 5/8 (Verizon)	A	No	Inside Pole	98.00 - 0.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	118.00-77.00	A	0.000	0.000	0.000	0.000	711.54
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	77.00-40.75	A	0.000	0.000	0.000	0.000	883.05
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L3	40.75-0.00	A	0.000	0.000	0.000	0.000	992.67
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	118.00-77.00	A	0.500	0.000	0.000	0.000	0.000	711.54
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	77.00-40.75	A	0.500	0.000	0.000	0.000	0.000	883.05
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L3	40.75-0.00	A	0.500	0.000	0.000	0.000	0.000	992.67
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Lightning Rod 5/8x4'	A	From Face	0.25	0.0000	120.00	No Ice	0.25	0.25	31.00
(None)			0.00			1/2" Ice	0.66	0.66	33.82
			0.00						
(4) DB844H90	A	From Face	3.50	0.0000	118.00	No Ice	2.87	3.97	10.00
(Nextel)			0.00			1/2" Ice	3.18	4.34	36.27
			0.00						
(4) DB844H90	B	From Face	3.50	0.0000	118.00	No Ice	2.87	3.97	10.00
(Nextel)			0.00			1/2" Ice	3.18	4.34	36.27
			0.00						
(4) DB844H90	C	From Face	3.50	0.0000	118.00	No Ice	2.87	3.97	10.00
(Nextel)			0.00			1/2" Ice	3.18	4.34	36.27
			0.00						
PiROD 15' Platform	C	From Face	3.00	0.0000	118.00	No Ice	33.80	33.80	2043.00
w/handrails (Monopole)			0.00			1/2" Ice	43.60	43.60	2748.00
(Nextel)			0.00						
7250.02 w/Mount Pipe	A	From Face	1.00	0.0000	108.50	No Ice	4.45	3.54	40.95
(Cingular)			0.00			1/2" Ice	5.03	4.72	76.25
			0.00						
7250.02 w/Mount Pipe	B	From Face	1.00	0.0000	108.50	No Ice	4.45	3.54	40.95

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(Cingular)			0.00 0.00			1/2" Ice	5.03	4.72	76.25
7250.02 w/Mount Pipe	C	From Face	1.00	0.0000	108.50	No Ice	4.45	3.54	40.95
(Cingular)			0.00 0.00			1/2" Ice	5.03	4.72	76.25
(2) TMA 10"x8"x3"	A	From Face	0.50	0.0000	108.50	No Ice	0.78	0.29	15.00
(Cingular)			0.00 0.00			1/2" Ice	0.90	0.38	20.06
(2) TMA 10"x8"x3"	B	From Face	0.50	0.0000	108.50	No Ice	0.78	0.29	15.00
(Cingular)			0.00 0.00			1/2" Ice	0.90	0.38	20.06
(2) TMA 10"x8"x3"	C	From Face	0.50	0.0000	108.50	No Ice	0.78	0.29	15.00
(Cingular)			0.00 0.00			1/2" Ice	0.90	0.38	20.06
(2) LPA-80080/4CF	A	From Face	3.50	0.0000	98.00	No Ice	2.62	6.06	12.00
(Verizon)			0.00 0.00			1/2" Ice	2.92	6.45	45.12
(2) LPA-80080/4CF	B	From Face	3.50	0.0000	98.00	No Ice	2.62	6.06	12.00
(Verizon)			0.00 0.00			1/2" Ice	2.92	6.45	45.12
(2) LPA-80080/4CF	C	From Face	3.50	0.0000	98.00	No Ice	2.62	6.06	12.00
(Verizon)			0.00 0.00			1/2" Ice	2.92	6.45	45.12
LPA-185080/8CF_2	A	From Face	3.50	0.0000	98.00	No Ice	2.09	2.79	7.00
(Verizon)			-4.00 0.00			1/2" Ice	2.39	3.09	25.04
LPA-185080/8CF_2	B	From Face	3.50	0.0000	98.00	No Ice	2.09	2.79	7.00
(Verizon)			-4.00 0.00			1/2" Ice	2.39	3.09	25.04
LPA-185080/8CF_2	C	From Face	3.50	0.0000	98.00	No Ice	2.09	2.79	7.00
(Verizon)			-4.00 0.00			1/2" Ice	2.39	3.09	25.04
LPA-185080/8CF_2	A	From Face	3.50	0.0000	98.00	No Ice	2.09	2.79	7.00
(Verizon)			4.00 0.00			1/2" Ice	2.39	3.09	25.04
LPA-185080/8CF_2	B	From Face	3.50	0.0000	98.00	No Ice	2.09	2.79	7.00
(Verizon)			4.00 0.00			1/2" Ice	2.39	3.09	25.04
LPA-185080/8CF_2	C	From Face	3.50	0.0000	98.00	No Ice	2.09	2.79	7.00
(Verizon)			4.00 0.00			1/2" Ice	2.39	3.09	25.04
PiROD 15' Low Profile	C	From Face	3.00	0.0000	98.00	No Ice	17.30	17.30	1500.00
Platform			0.00			1/2" Ice	22.10	22.10	2030.00
(Verizon)			0.00						

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 118.00-77.00	96.90	1.36	25	86.724	A	0.000	86.724	86.724	100.00	0.000	0.000
					B	0.000	86.724		100.00		
					C	0.000	86.724		100.00		
L2 77.00-40.75	58.70	1.179	22	94.795	A	0.000	94.795	94.795	100.00	0.000	0.000
					B	0.000	94.795		100.00		
					C	0.000	94.795		100.00		
L3 40.75-0.00	19.76	1	18	126.013	A	0.000	126.013	126.013	100.00	0.000	0.000
					B	0.000	126.013		100.00		
					C	0.000	126.013		100.00		

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 118.00-77.00	96.90	1.36	19	0.5000	90.140	A	0.000	90.140	90.140	100.00	0.000	0.000
						B	0.000	90.140		100.00		
						C	0.000	90.140		100.00		
L2 77.00-40.75	58.70	1.179	16	0.5000	97.816	A	0.000	97.816	97.816	100.00	0.000	0.000
						B	0.000	97.816		100.00		
						C	0.000	97.816		100.00		
L3 40.75-0.00	19.76	1	14	0.5000	129.408	A	0.000	129.408	129.408	100.00	0.000	0.000
						B	0.000	129.408		100.00		
						C	0.000	129.408		100.00		

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 118.00-77.00	96.90	1.36	9	86.724	A	0.000	86.724	86.724	100.00	0.000	0.000
					B	0.000	86.724		100.00		
					C	0.000	86.724		100.00		
L2 77.00-40.75	58.70	1.179	8	94.795	A	0.000	94.795	94.795	100.00	0.000	0.000
					B	0.000	94.795		100.00		
					C	0.000	94.795		100.00		
L3 40.75-0.00	19.76	1	6	126.013	A	0.000	126.013	126.013	100.00	0.000	0.000
					B	0.000	126.013		100.00		
					C	0.000	126.013		100.00		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 118.00-77.00	711.54	2122.21	A	1	1.03	1	1	1	86.724	3790.59	92.45	C
			B	1	1.03	1	1	1	86.724			
			C	1	1.03	1	1	1	86.724			
L2 77.00-40.75	883.05	4212.76	A	1	1.03	1	1	1	94.795	3582.06	98.82	C
			B	1	1.03	1	1	1	94.795			
			C	1	1.03	1	1	1	94.795			
L3 40.75-0.00	992.67	6727.05	A	1	1.03	1	1	1	126.013	4057.10	99.56	C
			B	1	1.03	1	1	1	126.013			
			C	1	1.03	1	1	1	126.013			
Sum Weight:	2587.26	13062.02						OTM	657.74 kip-ft	11429.75		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 118.00-77.00	711.54	2122.21	A	1	1.03	1	1	1	86.724	3790.59	92.45	C
			B	1	1.03	1	1	1	86.724			
			C	1	1.03	1	1	1	86.724			
L2 77.00-40.75	883.05	4212.76	A	1	1.03	1	1	1	94.795	3582.06	98.82	C
			B	1	1.03	1	1	1	94.795			
			C	1	1.03	1	1	1	94.795			
L3 40.75-0.00	992.67	6727.05	A	1	1.03	1	1	1	126.013	4057.10	99.56	C
			B	1	1.03	1	1	1	126.013			
			C	1	1.03	1	1	1	126.013			
Sum Weight:	2587.26	13062.02						OTM	657.74 kip-ft	11429.75		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 118.00-77.00	711.54	2122.21	A	1	1.03	1	1	1	86.724	3790.59	92.45	C
			B	1	1.03	1	1	1	86.724			
			C	1	1.03	1	1	1	86.724			
L2 77.00-40.75	883.05	4212.76	A	1	1.03	1	1	1	94.795	3582.06	98.82	C
			B	1	1.03	1	1	1	94.795			
			C	1	1.03	1	1	1	94.795			
L3 40.75-0.00	992.67	6727.05	A	1	1.03	1	1	1	126.013	4057.10	99.56	C
			B	1	1.03	1	1	1	126.013			
			C	1	1.03	1	1	1	126.013			
Sum Weight:	2587.26	13062.02						OTM	657.74 kip-ft	11429.75		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1 118.00-77.00	711.54	2122.21	A	1	1.03	1	1	1	86.724	3790.59	92.45	C
			B	1	1.03	1	1	1	86.724			
			C	1	1.03	1	1	1	86.724			
L2 77.00-40.75	883.05	4212.76	A	1	1.03	1	1	1	94.795	3582.06	98.82	C
			B	1	1.03	1	1	1	94.795			
			C	1	1.03	1	1	1	94.795			
L3 40.75-0.00	992.67	6727.05	A	1	1.03	1	1	1	126.013	4057.10	99.56	C
			B	1	1.03	1	1	1	126.013			
			C	1	1.03	1	1	1	126.013			
Sum Weight:	2587.26	13062.02						OTM	657.74 kip-ft	11429.75		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1 118.00-77.00	711.54	2786.63	A	1	1.03	1	1	1	90.140	2954.95	72.07	C
			B	1	1.03	1	1	1	90.140			
			C	1	1.03	1	1	1	90.140			
L2 77.00-40.75	883.05	4936.33	A	1	1.03	1	1	1	97.816	2772.16	76.47	C
			B	1	1.03	1	1	1	97.816			
			C	1	1.03	1	1	1	97.816			
L3 40.75-0.00	992.67	7686.58	A	1	1.03	1	1	1	129.408	3124.83	76.68	C
			B	1	1.03	1	1	1	129.408			
			C	1	1.03	1	1	1	129.408			
Sum Weight:	2587.26	15409.54						OTM	510.80 kip-ft	8851.94		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1 118.00-77.00	711.54	2786.63	A	1	1.03	1	1	1	90.140	2954.95	72.07	C
			B	1	1.03	1	1	1	90.140			
			C	1	1.03	1	1	1	90.140			
L2 77.00-40.75	883.05	4936.33	A	1	1.03	1	1	1	97.816	2772.16	76.47	C
			B	1	1.03	1	1	1	97.816			
			C	1	1.03	1	1	1	97.816			
L3 40.75-0.00	992.67	7686.58	A	1	1.03	1	1	1	129.408	3124.83	76.68	C
			B	1	1.03	1	1	1	129.408			
			C	1	1.03	1	1	1	129.408			
Sum Weight:	2587.26	15409.54						OTM	510.80 kip-ft	8851.94		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 118.00-77.00	711.54	2786.63	A	1	1.03	1	1	1	90.140	2954.95	72.07	C
			B	1	1.03	1	1	1	90.140			
			C	1	1.03	1	1	1	90.140			
L2 77.00-40.75	883.05	4936.33	A	1	1.03	1	1	1	97.816	2772.16	76.47	C
			B	1	1.03	1	1	1	97.816			
			C	1	1.03	1	1	1	97.816			
L3 40.75-0.00	992.67	7686.58	A	1	1.03	1	1	1	129.408	3124.83	76.68	C
			B	1	1.03	1	1	1	129.408			
			C	1	1.03	1	1	1	129.408			
Sum Weight:	2587.26	15409.54						OTM	510.80 kip-ft	8851.94		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 118.00-77.00	711.54	2786.63	A	1	1.03	1	1	1	90.140	2954.95	72.07	C
			B	1	1.03	1	1	1	90.140			
			C	1	1.03	1	1	1	90.140			
L2 77.00-40.75	883.05	4936.33	A	1	1.03	1	1	1	97.816	2772.16	76.47	C
			B	1	1.03	1	1	1	97.816			
			C	1	1.03	1	1	1	97.816			
L3 40.75-0.00	992.67	7686.58	A	1	1.03	1	1	1	129.408	3124.83	76.68	C
			B	1	1.03	1	1	1	129.408			
			C	1	1.03	1	1	1	129.408			
Sum Weight:	2587.26	15409.54						OTM	510.80 kip-ft	8851.94		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 118.00-77.00	711.54	2122.21	A	1	1.03	1	1	1	86.724	1311.62	31.99	C
			B	1	1.03	1	1	1	86.724			
			C	1	1.03	1	1	1	86.724			
L2 77.00-40.75	883.05	4212.76	A	1	1.03	1	1	1	94.795	1239.47	34.19	C
			B	1	1.03	1	1	1	94.795			
			C	1	1.03	1	1	1	94.795			
L3 40.75-0.00	992.67	6727.05	A	1	1.03	1	1	1	126.013	1403.84	34.45	C
			B	1	1.03	1	1	1	126.013			
			C	1	1.03	1	1	1	126.013			
Sum Weight:	2587.26	13062.02						OTM	227.59	3954.93		

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
									kip-ft			

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1 118.00-77.00	711.54	2122.21	A	1	1.03	1	1	1	86.724	1311.62	31.99	C
			B	1	1.03	1	1	1	86.724			
			C	1	1.03	1	1	1	86.724			
L2 77.00-40.75	883.05	4212.76	A	1	1.03	1	1	1	94.795	1239.47	34.19	C
			B	1	1.03	1	1	1	94.795			
			C	1	1.03	1	1	1	94.795			
L3 40.75-0.00	992.67	6727.05	A	1	1.03	1	1	1	126.013	1403.84	34.45	C
			B	1	1.03	1	1	1	126.013			
			C	1	1.03	1	1	1	126.013			
Sum Weight:	2587.26	13062.02						OTM	227.59 kip-ft	3954.93		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1 118.00-77.00	711.54	2122.21	A	1	1.03	1	1	1	86.724	1311.62	31.99	C
			B	1	1.03	1	1	1	86.724			
			C	1	1.03	1	1	1	86.724			
L2 77.00-40.75	883.05	4212.76	A	1	1.03	1	1	1	94.795	1239.47	34.19	C
			B	1	1.03	1	1	1	94.795			
			C	1	1.03	1	1	1	94.795			
L3 40.75-0.00	992.67	6727.05	A	1	1.03	1	1	1	126.013	1403.84	34.45	C
			B	1	1.03	1	1	1	126.013			
			C	1	1.03	1	1	1	126.013			
Sum Weight:	2587.26	13062.02						OTM	227.59 kip-ft	3954.93		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	lb	lb							ft^2	lb	plf	
L1 118.00-77.00	711.54	2122.21	A	1	1.03	1	1	1	86.724	1311.62	31.99	C
			B	1	1.03	1	1	1	86.724			
			C	1	1.03	1	1	1	86.724			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L2 77.00-40.75	883.05	4212.76	A	1	1.03	1	1	1	94.795	1239.47	34.19	C
			B	1	1.03	1	1	1	94.795			
			C	1	1.03	1	1	1	94.795			
L3 40.75-0.00	992.67	6727.05	A	1	1.03	1	1	1	126.013	1403.84	34.45	C
			B	1	1.03	1	1	1	126.013			
			C	1	1.03	1	1	1	126.013			
Sum Weight:	2587.26	13062.02						OTM	227.59 kip-ft	3954.93		

Discrete Appurtenance Pressures - No Ice $G_H = 1.690$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Lightning Rod 5/8x4'	300.0000	31.00	-1.01	-0.58	120.00	1.446	27	0.25	0.25
DB844H90	300.0000	40.00	-3.82	-2.21	118.00	1.439	27	11.47	15.87
DB844H90	60.0000	40.00	3.82	-2.21	118.00	1.439	27	11.47	15.87
DB844H90	180.0000	40.00	0.00	4.42	118.00	1.439	27	11.47	15.87
PiROD 15' Platform w/handrails (Monopole)	180.0000	2043.00	0.00	3.92	118.00	1.439	27	33.80	33.80
7250.02 w/Mount Pipe	300.0000	40.95	-1.72	-0.99	108.50	1.405	26	4.45	3.54
7250.02 w/Mount Pipe	60.0000	40.95	1.72	-0.99	108.50	1.405	26	4.45	3.54
7250.02 w/Mount Pipe	180.0000	40.95	0.00	1.98	108.50	1.405	26	4.45	3.54
TMA 10"x8"x3"	300.0000	30.00	-1.28	-0.74	108.50	1.405	26	1.56	0.58
TMA 10"x8"x3"	60.0000	30.00	1.28	-0.74	108.50	1.405	26	1.56	0.58
TMA 10"x8"x3"	180.0000	30.00	0.00	1.48	108.50	1.405	26	1.56	0.58
LPA-80080/4CF	300.0000	24.00	-3.94	-2.28	98.00	1.365	25	5.24	12.11
LPA-80080/4CF	60.0000	24.00	3.94	-2.28	98.00	1.365	25	5.24	12.11
LPA-80080/4CF	180.0000	24.00	0.00	4.55	98.00	1.365	25	5.24	12.11
LPA-185080/8CF_2	300.0000	7.00	-5.94	1.19	98.00	1.365	25	2.09	2.79
LPA-185080/8CF_2	60.0000	7.00	1.94	-5.74	98.00	1.365	25	2.09	2.79
LPA-185080/8CF_2	180.0000	7.00	4.00	4.55	98.00	1.365	25	2.09	2.79
LPA-185080/8CF_2	300.0000	7.00	-1.94	-5.74	98.00	1.365	25	2.09	2.79
LPA-185080/8CF_2	60.0000	7.00	5.94	1.19	98.00	1.365	25	2.09	2.79
LPA-185080/8CF_2	180.0000	7.00	-4.00	4.55	98.00	1.365	25	2.09	2.79
PiROD 15' Low Profile Platform	180.0000	1500.00	0.00	4.05	98.00	1.365	25	17.30	17.30
	Sum Weight:	4020.85							

Discrete Appurtenance Pressures - With Ice $G_H = 1.690$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
Lightning Rod 5/8x4'	300.0000	33.82	-1.01	-0.58	120.00	1.446	20	0.66	0.66	0.5000
DB844H90	300.0000	145.06	-3.82	-2.21	118.00	1.439	20	12.71	17.35	0.5000
DB844H90	60.0000	145.06	3.82	-2.21	118.00	1.439	20	12.71	17.35	0.5000
DB844H90	180.0000	145.06	0.00	4.42	118.00	1.439	20	12.71	17.35	0.5000
PiROD 15' Platform w/handrails (Monopole)	180.0000	2748.00	0.00	3.92	118.00	1.439	20	43.60	43.60	0.5000
7250.02 w/Mount Pipe	300.0000	76.25	-1.72	-0.99	108.50	1.405	19	5.03	4.72	0.5000
7250.02 w/Mount Pipe	60.0000	76.25	1.72	-0.99	108.50	1.405	19	5.03	4.72	0.5000

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2	t_z in
7250.02 w/Mount Pipe	180.0000	76.25	0.00	1.98	108.50	1.405	19	5.03	4.72	0.5000
TMA 10"x8"x3"	300.0000	40.11	-1.28	-0.74	108.50	1.405	19	1.80	0.76	0.5000
TMA 10"x8"x3"	60.0000	40.11	1.28	-0.74	108.50	1.405	19	1.80	0.76	0.5000
TMA 10"x8"x3"	180.0000	40.11	0.00	1.48	108.50	1.405	19	1.80	0.76	0.5000
LPA-80080/4CF	300.0000	90.25	-3.94	-2.28	98.00	1.365	19	5.84	12.91	0.5000
LPA-80080/4CF	60.0000	90.25	3.94	-2.28	98.00	1.365	19	5.84	12.91	0.5000
LPA-80080/4CF	180.0000	90.25	0.00	4.55	98.00	1.365	19	5.84	12.91	0.5000
LPA-185080/8CF_2	300.0000	25.04	-5.94	1.19	98.00	1.365	19	2.39	3.09	0.5000
LPA-185080/8CF_2	60.0000	25.04	1.94	-5.74	98.00	1.365	19	2.39	3.09	0.5000
LPA-185080/8CF_2	180.0000	25.04	4.00	4.55	98.00	1.365	19	2.39	3.09	0.5000
LPA-185080/8CF_2	300.0000	25.04	-1.94	-5.74	98.00	1.365	19	2.39	3.09	0.5000
LPA-185080/8CF_2	60.0000	25.04	5.94	1.19	98.00	1.365	19	2.39	3.09	0.5000
LPA-185080/8CF_2	180.0000	25.04	-4.00	4.55	98.00	1.365	19	2.39	3.09	0.5000
PiROD 15' Low Profile Platform	180.0000	2030.00	0.00	4.05	98.00	1.365	19	22.10	22.10	0.5000
	Sum Weight:	6017.06								

Discrete Appurtenance Pressures - Service $G_H = 1.690$

Description	Aiming Azimuth °	Weight lb	$Offset_x$ ft	$Offset_z$ ft	z ft	K_z	q_z psf	C_AA_C Front ft^2	C_AA_C Side ft^2
Lightning Rod 5/8x4'	300.0000	31.00	-1.01	-0.58	120.00	1.446	9	0.25	0.25
DB844H90	300.0000	40.00	-3.82	-2.21	118.00	1.439	9	11.47	15.87
DB844H90	60.0000	40.00	3.82	-2.21	118.00	1.439	9	11.47	15.87
DB844H90	180.0000	40.00	0.00	4.42	118.00	1.439	9	11.47	15.87
PiROD 15' Platform w/handrails (Monopole)	180.0000	2043.00	0.00	3.92	118.00	1.439	9	33.80	33.80
7250.02 w/Mount Pipe	300.0000	40.95	-1.72	-0.99	108.50	1.405	9	4.45	3.54
7250.02 w/Mount Pipe	60.0000	40.95	1.72	-0.99	108.50	1.405	9	4.45	3.54
7250.02 w/Mount Pipe	180.0000	40.95	0.00	1.98	108.50	1.405	9	4.45	3.54
TMA 10"x8"x3"	300.0000	30.00	-1.28	-0.74	108.50	1.405	9	1.56	0.58
TMA 10"x8"x3"	60.0000	30.00	1.28	-0.74	108.50	1.405	9	1.56	0.58
TMA 10"x8"x3"	180.0000	30.00	0.00	1.48	108.50	1.405	9	1.56	0.58
LPA-80080/4CF	300.0000	24.00	-3.94	-2.28	98.00	1.365	9	5.24	12.11
LPA-80080/4CF	60.0000	24.00	3.94	-2.28	98.00	1.365	9	5.24	12.11
LPA-80080/4CF	180.0000	24.00	0.00	4.55	98.00	1.365	9	5.24	12.11
LPA-185080/8CF_2	300.0000	7.00	-5.94	1.19	98.00	1.365	9	2.09	2.79
LPA-185080/8CF_2	60.0000	7.00	1.94	-5.74	98.00	1.365	9	2.09	2.79
LPA-185080/8CF_2	180.0000	7.00	4.00	4.55	98.00	1.365	9	2.09	2.79
LPA-185080/8CF_2	300.0000	7.00	-1.94	-5.74	98.00	1.365	9	2.09	2.79
LPA-185080/8CF_2	60.0000	7.00	5.94	1.19	98.00	1.365	9	2.09	2.79
LPA-185080/8CF_2	180.0000	7.00	-4.00	4.55	98.00	1.365	9	2.09	2.79
PiROD 15' Low Profile Platform	180.0000	1500.00	0.00	4.05	98.00	1.365	9	17.30	17.30
	Sum Weight:	4020.85							

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	13062.02					
Bracing Weight	0.00					
Total Member Self-Weight	13062.02			14.06	0.03	
Total Weight	19670.13			14.06	0.03	
Wind 0 deg - No Ice		0.00	-17945.83	-1356.79	0.03	-0.01
Wind 30 deg - No Ice		8972.91	-15541.54	-1173.13	-685.40	4.46
Wind 45 deg - No Ice		12689.62	-12689.62	-955.28	-969.31	6.31
Wind 60 deg - No Ice		15541.54	-8972.91	-671.37	-1187.17	7.74
Wind 90 deg - No Ice		17945.83	0.00	14.06	-1370.83	8.94
Wind 120 deg - No Ice		15541.54	8972.91	699.49	-1187.17	7.75
Wind 135 deg - No Ice		12689.62	12689.62	983.41	-969.31	6.33
Wind 150 deg - No Ice		8972.91	15541.54	1201.26	-685.40	4.48
Wind 180 deg - No Ice		0.00	17945.83	1384.92	0.03	0.01
Wind 210 deg - No Ice		-8972.91	15541.54	1201.26	685.46	-4.46
Wind 225 deg - No Ice		-12689.62	12689.62	983.41	969.38	-6.31
Wind 240 deg - No Ice		-15541.54	8972.91	699.49	1187.23	-7.74
Wind 270 deg - No Ice		-17945.83	0.00	14.06	1370.89	-8.94
Wind 300 deg - No Ice		-15541.54	-8972.91	-671.37	1187.23	-7.75
Wind 315 deg - No Ice		-12689.62	-12689.62	-955.28	969.38	-6.33
Wind 330 deg - No Ice		-8972.91	-15541.54	-1173.13	685.46	-4.48
Member Ice	2347.53					
Total Weight Ice	24013.86			18.97	0.03	
Wind 0 deg - Ice		0.00	-14608.01	-1122.65	0.03	-0.02
Wind 30 deg - Ice		7304.00	-12650.90	-969.70	-570.78	4.29
Wind 45 deg - Ice		10329.42	-10329.42	-788.27	-807.21	6.08
Wind 60 deg - Ice		12650.90	-7304.00	-551.84	-988.64	7.45
Wind 90 deg - Ice		14608.01	0.00	18.97	-1141.58	8.62
Wind 120 deg - Ice		12650.90	7304.00	589.78	-988.64	7.47
Wind 135 deg - Ice		10329.42	10329.42	826.22	-807.21	6.11
Wind 150 deg - Ice		7304.00	12650.90	1007.64	-570.78	4.33
Wind 180 deg - Ice		0.00	14608.01	1160.59	0.03	0.02
Wind 210 deg - Ice		-7304.00	12650.90	1007.64	570.84	-4.29
Wind 225 deg - Ice		-10329.42	10329.42	826.22	807.28	-6.08
Wind 240 deg - Ice		-12650.90	7304.00	589.78	988.71	-7.45
Wind 270 deg - Ice		-14608.01	0.00	18.97	1141.65	-8.62
Wind 300 deg - Ice		-12650.90	-7304.00	-551.84	988.71	-7.47
Wind 315 deg - Ice		-10329.42	-10329.42	-788.27	807.28	-6.11
Wind 330 deg - Ice		-7304.00	-12650.90	-969.70	570.84	-4.33
Total Weight	19670.13			14.06	0.03	
Wind 0 deg - Service		0.00	-6209.63	-460.28	0.03	-0.00
Wind 30 deg - Service		3104.81	-5377.70	-396.73	-237.14	1.54
Wind 45 deg - Service		4390.87	-4390.87	-321.35	-335.38	2.18
Wind 60 deg - Service		5377.70	-3104.81	-223.11	-410.76	2.68
Wind 90 deg - Service		6209.63	0.00	14.06	-474.31	3.09
Wind 120 deg - Service		5377.70	3104.81	251.24	-410.76	2.68
Wind 135 deg - Service		4390.87	4390.87	349.48	-335.38	2.19
Wind 150 deg - Service		3104.81	5377.70	424.86	-237.14	1.55
Wind 180 deg - Service		0.00	6209.63	488.41	0.03	0.00
Wind 210 deg - Service		-3104.81	5377.70	424.86	237.20	-1.54
Wind 225 deg - Service		-4390.87	4390.87	349.48	335.44	-2.18
Wind 240 deg - Service		-5377.70	3104.81	251.24	410.83	-2.68
Wind 270 deg - Service		-6209.63	0.00	14.06	474.38	-3.09
Wind 300 deg - Service		-5377.70	-3104.81	-223.11	410.83	-2.68
Wind 315 deg - Service		-4390.87	-4390.87	-321.35	335.44	-2.19
Wind 330 deg - Service		-3104.81	-5377.70	-396.73	237.20	-1.55

Load Combinations

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

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	118 - 77	Pole	Max Tension	18	0.00	-0.00	0.00
			Max. Compression	18	-9164.37	0.04	-19.53
			Max. Mx	14	-6052.71	257.94	-14.09
			Max. My	10	-6040.98	0.03	-272.23
			Max. Vy	14	-10256.73	257.94	-14.09
			Max. Vx	10	10263.68	0.03	-272.23
			Max. Torque	6			-9.45
L2	77 - 40.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-14648.70	0.04	-19.96
			Max. Mx	14	-10948.97	688.21	-14.51
			Max. My	10	-10942.97	0.03	-702.71
			Max. Vy	14	-13791.55	688.21	-14.51
			Max. Vx	10	13796.34	0.03	-702.71
			Max. Torque	6			-9.45
L3	40.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-24013.86	0.04	-20.17
			Max. Mx	14	-19656.58	1402.31	-14.67
			Max. My	10	-19656.44	0.03	-1416.93
			Max. Vy	14	-17960.67	1402.31	-14.67
			Max. Vx	10	17960.83	0.03	-1416.93
			Max. Torque	6			-9.43

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	27	24013.86	-0.00	-14608.01
	Max. H_x	14	19670.13	17945.83	-0.00
	Max. H_z	2	19670.13	0.00	17945.83
	Max. M_x	2	1387.61	0.00	17945.83
	Max. M_z	6	1402.24	-17945.83	-0.00
	Max. Torsion	14	9.42	17945.83	-0.00
	Min. Vert	1	19670.13	0.00	-0.00
	Min. H_x	6	19670.13	-17945.83	-0.00
	Min. H_z	10	19670.13	0.00	-17945.83
	Min. M_x	10	-1416.93	0.00	-17945.83
	Min. M_z	14	-1402.31	17945.83	-0.00
	Min. Torsion	6	-9.42	-17945.83	-0.00

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	19670.13	-0.00	0.00	14.70	0.03	0.00
Dead+Wind 0 deg - No Ice	19670.13	-0.00	-17945.83	-1387.61	0.03	-0.01
Dead+Wind 30 deg - No Ice	19670.13	8972.91	-15541.54	-1199.74	-701.11	4.70
Dead+Wind 45 deg - No Ice	19670.13	12689.62	-12689.62	-976.89	-991.53	6.66
Dead+Wind 60 deg - No Ice	19670.13	15541.54	-8972.91	-686.47	-1214.38	8.16
Dead+Wind 90 deg - No Ice	19670.13	17945.83	0.00	14.67	-1402.24	9.42
Dead+Wind 120 deg - No Ice	19670.13	15541.54	8972.91	715.80	-1214.37	8.17
Dead+Wind 135 deg - No Ice	19670.13	12689.62	12689.62	1006.22	-991.52	6.67

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	kip-ft	kip-ft	kip-ft
Dead+Wind 150 deg - No Ice	19670.13	8972.91	15541.54	1229.07	-701.10	4.72
Dead+Wind 180 deg - No Ice	19670.13	-0.00	17945.83	1416.93	0.03	0.01
Dead+Wind 210 deg - No Ice	19670.13	-8972.91	15541.54	1229.07	701.17	-4.70
Dead+Wind 225 deg - No Ice	19670.13	-12689.62	12689.62	1006.22	991.59	-6.65
Dead+Wind 240 deg - No Ice	19670.13	-15541.54	8972.91	715.80	1214.43	-8.15
Dead+Wind 270 deg - No Ice	19670.13	-17945.83	0.00	14.67	1402.31	-9.42
Dead+Wind 300 deg - No Ice	19670.13	-15541.54	-8972.91	-686.47	1214.44	-8.17
Dead+Wind 315 deg - No Ice	19670.13	-12689.62	-12689.62	-976.89	991.60	-6.67
Dead+Wind 330 deg - No Ice	19670.13	-8972.91	-15541.54	-1199.74	701.17	-4.72
Dead+Ice+Temp	24013.86	-0.00	0.00	20.17	0.04	0.00
Dead+Wind 0 deg+Ice+Temp	24013.86	0.00	-14608.01	-1157.57	0.04	-0.02
Dead+Wind 30 deg+Ice+Temp	24013.86	7304.00	-12650.91	-999.79	-588.81	4.58
Dead+Wind 45 deg+Ice+Temp	24013.86	10329.42	-10329.42	-812.63	-832.72	6.49
Dead+Wind 60 deg+Ice+Temp	24013.86	12650.91	-7304.00	-568.72	-1019.88	7.95
Dead+Wind 90 deg+Ice+Temp	24013.86	14608.01	-0.00	20.13	-1177.66	9.20
Dead+Wind 120 deg+Ice+Temp	24013.86	12650.91	7304.00	608.97	-1019.88	7.98
Dead+Wind 135 deg+Ice+Temp	24013.86	10329.42	10329.42	852.88	-832.72	6.52
Dead+Wind 150 deg+Ice+Temp	24013.86	7304.00	12650.91	1040.03	-588.81	4.62
Dead+Wind 180 deg+Ice+Temp	24013.86	0.00	14608.01	1197.81	0.04	0.02
Dead+Wind 210 deg+Ice+Temp	24013.86	-7304.00	12650.91	1040.03	588.88	-4.58
Dead+Wind 225 deg+Ice+Temp	24013.86	-10329.42	10329.42	852.88	832.79	-6.48
Dead+Wind 240 deg+Ice+Temp	24013.86	-12650.91	7304.00	608.97	1019.95	-7.95
Dead+Wind 270 deg+Ice+Temp	24013.86	-14608.01	-0.00	20.13	1177.73	-9.20
Dead+Wind 300 deg+Ice+Temp	24013.86	-12650.91	-7304.00	-568.72	1019.95	-7.98
Dead+Wind 315 deg+Ice+Temp	24013.86	-10329.42	-10329.42	-812.63	832.80	-6.52
Dead+Wind 330 deg+Ice+Temp	24013.86	-7304.00	-12650.91	-999.79	588.89	-4.62
Dead+Wind 0 deg - Service	19670.13	-0.00	-6209.63	-470.79	0.03	-0.00
Dead+Wind 30 deg - Service	19670.13	3104.81	-5377.70	-405.74	-242.72	1.63
Dead+Wind 45 deg - Service	19670.13	4390.87	-4390.87	-328.59	-343.27	2.31
Dead+Wind 60 deg - Service	19670.13	5377.70	-3104.81	-228.04	-420.42	2.84
Dead+Wind 90 deg - Service	19670.13	6209.63	0.00	14.71	-485.47	3.28
Dead+Wind 120 deg - Service	19670.13	5377.70	3104.82	257.46	-420.42	2.84
Dead+Wind 135 deg - Service	19670.13	4390.87	4390.87	358.01	-343.27	2.32
Dead+Wind 150 deg - Service	19670.13	3104.81	5377.70	435.16	-242.72	1.64
Dead+Wind 180 deg - Service	19670.13	-0.00	6209.63	500.21	0.03	0.00
Dead+Wind 210 deg - Service	19670.13	-3104.81	5377.70	435.16	242.78	-1.63
Dead+Wind 225 deg - Service	19670.13	-4390.87	4390.87	358.01	343.33	-2.31
Dead+Wind 240 deg - Service	19670.13	-5377.70	3104.82	257.46	420.49	-2.83
Dead+Wind 270 deg - Service	19670.13	-6209.63	0.00	14.71	485.53	-3.28
Dead+Wind 300 deg - Service	19670.13	-5377.70	-3104.81	-228.04	420.49	-2.84
Dead+Wind 315 deg - Service	19670.13	-4390.87	-4390.87	-328.59	343.33	-2.32
Dead+Wind 330 deg - Service	19670.13	-3104.81	-5377.70	-405.74	242.78	-1.64

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-19670.13	0.00	0.00	19670.13	-0.00	0.000%
2	0.00	-19670.13	-17945.83	0.00	19670.13	17945.83	0.000%
3	8972.91	-19670.13	-15541.54	-8972.91	19670.13	15541.54	0.000%
4	12689.62	-19670.13	-12689.62	-12689.62	19670.13	12689.62	0.000%
5	15541.54	-19670.13	-8972.91	-15541.54	19670.13	8972.91	0.000%
6	17945.83	-19670.13	0.00	-17945.83	19670.13	-0.00	0.000%
7	15541.54	-19670.13	8972.91	-15541.54	19670.13	-8972.91	0.000%
8	12689.62	-19670.13	12689.62	-12689.62	19670.13	-12689.62	0.000%
9	8972.91	-19670.13	15541.54	-8972.91	19670.13	-15541.54	0.000%
10	0.00	-19670.13	17945.83	0.00	19670.13	-17945.83	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
11	-8972.91	-19670.13	15541.54	8972.91	19670.13	-15541.54	0.000%
12	-12689.62	-19670.13	12689.62	12689.62	19670.13	-12689.62	0.000%
13	-15541.54	-19670.13	8972.91	15541.54	19670.13	-8972.91	0.000%
14	-17945.83	-19670.13	0.00	17945.83	19670.13	-0.00	0.000%
15	-15541.54	-19670.13	-8972.91	15541.54	19670.13	8972.91	0.000%
16	-12689.62	-19670.13	-12689.62	12689.62	19670.13	12689.62	0.000%
17	-8972.91	-19670.13	-15541.54	8972.91	19670.13	15541.54	0.000%
18	0.00	-24013.86	0.00	0.00	24013.86	-0.00	0.000%
19	0.00	-24013.86	-14608.01	-0.00	24013.86	14608.01	0.000%
20	7304.00	-24013.86	-12650.90	-7304.00	24013.86	12650.91	0.000%
21	10329.42	-24013.86	-10329.42	-10329.42	24013.86	10329.42	0.000%
22	12650.90	-24013.86	-7304.00	-12650.91	24013.86	7304.00	0.000%
23	14608.01	-24013.86	0.00	-14608.01	24013.86	0.00	0.000%
24	12650.90	-24013.86	7304.00	-12650.91	24013.86	-7304.00	0.000%
25	10329.42	-24013.86	10329.42	-10329.42	24013.86	-10329.42	0.000%
26	7304.00	-24013.86	12650.90	-7304.00	24013.86	-12650.91	0.000%
27	0.00	-24013.86	14608.01	-0.00	24013.86	-14608.01	0.000%
28	-7304.00	-24013.86	12650.90	7304.00	24013.86	-12650.91	0.000%
29	-10329.42	-24013.86	10329.42	10329.42	24013.86	-10329.42	0.000%
30	-12650.90	-24013.86	7304.00	12650.91	24013.86	-7304.00	0.000%
31	-14608.01	-24013.86	0.00	14608.01	24013.86	0.00	0.000%
32	-12650.90	-24013.86	-7304.00	12650.91	24013.86	7304.00	0.000%
33	-10329.42	-24013.86	-10329.42	10329.42	24013.86	10329.42	0.000%
34	-7304.00	-24013.86	-12650.90	7304.00	24013.86	12650.91	0.000%
35	0.00	-19670.13	-6209.63	0.00	19670.13	6209.63	0.000%
36	3104.81	-19670.13	-5377.70	-3104.81	19670.13	5377.70	0.000%
37	4390.87	-19670.13	-4390.87	-4390.87	19670.13	4390.87	0.000%
38	5377.70	-19670.13	-3104.81	-5377.70	19670.13	3104.81	0.000%
39	6209.63	-19670.13	0.00	-6209.63	19670.13	-0.00	0.000%
40	5377.70	-19670.13	3104.81	-5377.70	19670.13	-3104.82	0.000%
41	4390.87	-19670.13	4390.87	-4390.87	19670.13	-4390.87	0.000%
42	3104.81	-19670.13	5377.70	-3104.81	19670.13	-5377.70	0.000%
43	0.00	-19670.13	6209.63	0.00	19670.13	-6209.63	0.000%
44	-3104.81	-19670.13	5377.70	3104.81	19670.13	-5377.70	0.000%
45	-4390.87	-19670.13	4390.87	4390.87	19670.13	-4390.87	0.000%
46	-5377.70	-19670.13	3104.81	5377.70	19670.13	-3104.82	0.000%
47	-6209.63	-19670.13	0.00	6209.63	19670.13	-0.00	0.000%
48	-5377.70	-19670.13	-3104.81	5377.70	19670.13	3104.81	0.000%
49	-4390.87	-19670.13	-4390.87	4390.87	19670.13	4390.87	0.000%
50	-3104.81	-19670.13	-5377.70	3104.81	19670.13	5377.70	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	0.00002571
3	Yes	5	0.00000001	0.00010407
4	Yes	5	0.00000001	0.00010492
5	Yes	5	0.00000001	0.00007403
6	Yes	5	0.00000001	0.00008457
7	Yes	5	0.00000001	0.00013726
8	Yes	5	0.00000001	0.00011238
9	Yes	5	0.00000001	0.00007233
10	Yes	4	0.00000001	0.00002702
11	Yes	5	0.00000001	0.00007235

12	Yes	5	0.00000001	0.00011231
13	Yes	5	0.00000001	0.00013718
14	Yes	5	0.00000001	0.00008458
15	Yes	5	0.00000001	0.00007410
16	Yes	5	0.00000001	0.00010504
17	Yes	5	0.00000001	0.00010425
18	Yes	4	0.00000001	0.00008769
19	Yes	5	0.00000001	0.00006813
20	Yes	5	0.00000001	0.00021616
21	Yes	5	0.00000001	0.00022768
22	Yes	5	0.00000001	0.00018310
23	Yes	5	0.00000001	0.00019149
24	Yes	5	0.00000001	0.00028547
25	Yes	5	0.00000001	0.00025204
26	Yes	5	0.00000001	0.00018394
27	Yes	5	0.00000001	0.00007278
28	Yes	5	0.00000001	0.00018390
29	Yes	5	0.00000001	0.00025176
30	Yes	5	0.00000001	0.00028516
31	Yes	5	0.00000001	0.00019152
32	Yes	5	0.00000001	0.00018335
33	Yes	5	0.00000001	0.00022805
34	Yes	5	0.00000001	0.00021671
35	Yes	4	0.00000001	0.00001171
36	Yes	4	0.00000001	0.00034563
37	Yes	4	0.00000001	0.00037848
38	Yes	4	0.00000001	0.00036050
39	Yes	4	0.00000001	0.00053839
40	Yes	4	0.00000001	0.00058589
41	Yes	4	0.00000001	0.00044107
42	Yes	4	0.00000001	0.00024366
43	Yes	4	0.00000001	0.00001346
44	Yes	4	0.00000001	0.00024299
45	Yes	4	0.00000001	0.00044042
46	Yes	4	0.00000001	0.00058544
47	Yes	4	0.00000001	0.00053857
48	Yes	4	0.00000001	0.00036120
49	Yes	4	0.00000001	0.00037939
50	Yes	4	0.00000001	0.00034678

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	118 - 77	19.596	43	1.4458	0.0474
L2	80.75 - 40.75	9.407	43	1.0691	0.0181
L3	45 - 0	2.997	43	0.6048	0.0069

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
120.00	Lightning Rod 5/8x4'	43	19.596	1.4458	0.0474	29728
118.00	(4) DB844H90	43	19.596	1.4458	0.0474	29728

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
108.50	7250.02 w/Mount Pipe	43	16.832	1.3635	0.0390	15646
98.00	(2) LPA-80080/4CF	43	13.860	1.2656	0.0301	7431

Maximum Tower Deflections - Design Wind

Section No.	Elevation	Horz. Deflection	Gov. Load Comb.	Tilt	Twist
	ft	in		°	°
L1	118 - 77	54.087	10	3.8733	0.1367
L2	80.75 - 40.75	26.345	10	2.9662	0.0520
L3	45 - 0	8.450	10	1.7006	0.0199

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
120.00	Lightning Rod 5/8x4'	10	54.087	3.8733	0.1367	11836
118.00	(4) DB844H90	10	54.087	3.8733	0.1367	11836
108.50	7250.02 w/Mount Pipe	10	46.593	3.6743	0.1121	6229
98.00	(2) LPA-80080/4CF	10	38.520	3.4381	0.0864	2957

Base Plate Design Data

Plate Thickness	Number of Anchor Bolts	Anchor Bolt Size	Actual / Allowable Ratio Bolt Tension	Actual / Allowable Ratio Bolt Compression	Actual / Allowable Ratio Plate Stress	Actual / Allowable Ratio Stiffener Stress	Controlling Condition	Ratio
in		in	lb	lb	ksi	ksi		
3.2500	12	2.2500	116439.64 174903.70 0.67	119715.71 290340.15 0.41	24.166 37.500 0.64		Bolt T	0.67 ✓

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L_u	Kl/r	F_a	A	Actual P	Allow. P_a	Ratio $\frac{P}{P_a}$
	ft		ft	ft		ksi	in^2	lb	lb	

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	118 - 77 (1)	TP28.765x22x0.1875	41.00	0.00	0.0	34.465	16.8801	-6040.98	581776.00	0.010
L2	77 - 40.75 (2)	TP34.371x27.7713x0.3125	40.00	0.00	0.0	39.000	33.5658	-10943.00	1309060.00	0.008
L3	40.75 - 0 (3)	TP40.47x33.0448x0.375	45.00	0.00	0.0	39.000	48.4147	-19656.40	1888170.00	0.010

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x kip-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y kip-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	118 - 77 (1)	TP28.765x22x0.1875	272.23	28.279	34.465	0.821	0.00	0.000	34.465	0.000
L2	77 - 40.75 (2)	TP34.371x27.7713x0.3125	702.71	30.851	39.000	0.791	0.00	0.000	39.000	0.000
L3	40.75 - 0 (3)	TP40.47x33.0448x0.375	1416.93	35.880	39.000	0.920	0.00	0.000	39.000	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V lb	Actual f_v ksi	Allow. F_v ksi	Ratio $\frac{f_v}{F_v}$	Actual T kip-ft	Actual f_{vt} ksi	Allow. F_{vt} ksi	Ratio $\frac{f_{vt}}{F_{vt}}$
L1	118 - 77 (1)	TP28.765x22x0.1875	10263.70	0.608	26.000	0.048	0.01	0.001	26.000	0.000
L2	77 - 40.75 (2)	TP34.371x27.7713x0.3125	13796.30	0.411	26.000	0.032	0.01	0.000	26.000	0.000
L3	40.75 - 0 (3)	TP40.47x33.0448x0.375	17960.80	0.371	26.000	0.029	0.01	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	118 - 77 (1)	0.010	0.821	0.000	0.048	0.000	0.831 ✔	1.333	H1-3+VT ✔
L2	77 - 40.75 (2)	0.008	0.791	0.000	0.032	0.000	0.800 ✔	1.333	H1-3+VT ✔
L3	40.75 - 0 (3)	0.010	0.920	0.000	0.029	0.000	0.931 ✔	1.333	H1-3+VT ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	118 - 77	Pole	TP28.765x22x0.1875	1	-6040.98	775507.38	62.4	Pass
L2	77 - 40.75	Pole	TP34.371x27.7713x0.3125	2	-10943.00	1744976.91	60.0	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L3	40.75 - 0	Pole	TP40.47x33.0448x0.375	3	-19656.40	2516930.51	69.8	Pass
							Summary	
						Pole (L3)	69.8	Pass
						Base Plate	49.9	Pass
						RATING =	**69.8**	**Pass**

FOUNDATION ANALYSIS

URS

Job	120' Monopole - Shelton, CT	Project No.	VZ1-236	Page	of
Description	Spread Footing w/ Reverse Pier Analysis	Computed by	JEK	Sheet 1	of 6
		Checked by		Date 04/04/07	
				Date	

MONOPOLE FOUNDATION ANALYSIS

TOWER FORCES:

Moment Caused by Tower	$M_t := 1450 \cdot ft \cdot kips$
Shear at Base of Tower	$S_t := 18.0kip$
Max Compressive Force	$C_t := 19 \cdot kip$
Height of Tower	$H_t := 120 \cdot ft$
Base Plate Bolt Circle	$MP := 4ft$

FOOTING DIMENSIONS:

Overall Depth of Pad	$D_f := 3.5ft$
Length of Pier	$L_p := 3 \cdot ft$
Extension of Pad Above Grade	$L_{pag} := 0.5 \cdot ft$
Diameter of Pier	$d_p := 6 \cdot ft$
Thickness of Footing	$T_f := 4.0 \cdot ft$
Width of Footing:	$W_f := 22.0ft$
Length of Anchor Bolts:	$L_{st} := 72in$
Projection of anchor bolts above pier	$A_{BP} := 12 \cdot in$
Anchor bolts area	$A_{anchor} := 3.97 \cdot in^2$

PROPERTIES:

Compressive Strength of Concrete	$fc := 4000psi$
Yield Strength of Steel Reinforcement	$fy := 60000 \cdot psi$
Yield Strength of Anchor Bolt	$fya := 75000 \cdot psi$
Internal Friction Angle of Soil	$\phi_s := 30 \cdot deg$
Allowable Bearing Capacity	$q_s := 6000 \cdot psf$
Unit Weight of Soil	$\gamma_s := 120 \cdot pcf$
Unit Weight of Concrete	$\gamma_c := 150 \cdot pcf$
Depth to Neglect	$n := 0ft$
Cohesion of Clay Type Soil Note: Use 0 for Sandy Soil	$c := 0 \cdot ksf$
Seismic Zone Factor: UBC Fig 23-2	$Z := 2$
Coefficient of Friction between Concrete:	$\mu := 0.45$
Clear Cover of Reinforcement Pier:	$Cvr_{pier} := 3 \cdot in$
Clear Cover of Reinforcement Pad:	$Cvr_{pad} := 3 \cdot in$
Anchor Bolt Diameter	$d_{anchor} := 2.25in$

PAD REINFORCEMENT:

TOP:	Bar Size	$BS_{top} := 9$	Bar Diameter	$d_{btop} := 1.128 \cdot in$
	Number of Bars	$NB_{top} := 24$	Bar Area	$A_{btop} := 1.00 \cdot in^2$
BOTTOM:	Bar Size	$BS_{bot} := 9$	Bar Diameter	$d_{bbot} := 1.128 \cdot in$
	Number of Bars	$NB_{bot} := 24$	Bar Area	$A_{bot} := 1.00 \cdot in^2$

Coefficient of Lateral Soil Pressure: $K_p := \frac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)}$ $K_p = 3$

Load Factor (EIA 3.1.1): $LF := if\left[H_t \le 700 \cdot ft, 1.3, if\left[H_t \ge 1200, 1.7, 1.3 + \left(\frac{H_t - 700}{1200 - 700}\right) \cdot 0.4\right]\right]$ $LF = 1.3$

CHECK ANCHOR STEEL EMBEDMENT

Depth: $D_{ab} := L_{st} - A_{BP}$ $D_{ab} = 5\,ft$ $L_{anchor} := \frac{(0.11 \cdot fy) \cdot in}{\sqrt{f'c \cdot psi}}$ $L_{anchor} = 8.70\,ft$

$DepthCheck := if(D_{ab} \geq L_{anchor}, "Okay", "No Good")$

DepthCheck = "No Good" **Note:** anchor plate is provided

STABILITY OF FOOTING

Weight of Concrete Pad: $WT_c := \left[\left(W_f^2 \cdot T_f\right) + d_p^2 L_p\right] \cdot \gamma_c$ $WT_c = 306.6\,kip$

Total Weight: $WT_{tot} := WT_c + C_t$ $WT_{tot} = 325.6\,kip$

Resisting Moment: $M_r := \left(WT_{tot}\right) \cdot \frac{W_f}{2}$ $M_r = 3581.6\,kip \cdot ft$

Overturning Moment: $M_{ot} := M_t + S_t \cdot \left(T_f\right)$ $M_{ot} = 1522\,kip \cdot ft$

Factor of Safety: $FS := \frac{M_r}{M_{ot}}$ $FS_{req} := 2$ $FS = 2.35$

$SafetyCheck := if(FS > FS_{req}, "Okay", "No Good")$ SafetyCheck = "Okay"

URS

Job	120' Monopole - Shelton, CT	Project No.	VZ1-236	Page	of
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BEARING PRESSURE CAUSED BY FOOTING

$A_{mat} := W_f^2$ $\quad A_{mat} = 484\ ft^2$

$S := \frac{W_f^3}{6}$ $\quad S = 1774.6667\ ft^3$

$P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S}$ $\quad P_{max} = 1.5304\ ksf$

$P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S}$ $\quad P_{min} = -0.1849\ ksf$

$MaxPressure := if(P_{max} < q_s, "Okay", "No Good")$ $\quad MaxPressure = "Okay"$

$MinPressure := if[(P_{min} \geq 0)\cdot(P_{min} < q_s), "Okay", "No Good"]$ $\quad MinPressure = "No Good"$

Distance to Resultant of Pressure Distribution:

$X_p := \frac{P_{max}}{\frac{P_{max}-P_{min}}{W_f}} \cdot \frac{1}{3}$ $\quad X_p = 6.5428\ ft$

Distance to Kern: $X_k := \frac{W_f}{6}$ $\quad X_k = 3.6667\ ft$

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

$e := \frac{M_{ot}}{WT_{tot}}$ $\quad e = 4.6744$

Adjusted Soil Pressure: $P_a := \frac{2\cdot WT_{tot}}{3\cdot W_f\left(\frac{W_f}{2} - e\right)}$ $\quad P_a = 1.5598\ ksf$

Eccentricity: $q_{adj} := if\left(P_{min} < 0, P_a, \frac{P_{max}}{ft^2}\right)$ $\quad q_{adj} = 1.5598\ ksf$

$PressureCheck := if(q_{adj} < q_s, "Okay", "No Good")$ $\quad PressureCheck = "Okay"$

CONCRETE BEARING CAPACITY (ACI 10.17)

$\phi_c := 0.75$ (ACI 9.3.2.2)

$P_b := \phi_c \cdot 0.85 \cdot fc \cdot \frac{d_p^2 \cdot \pi}{4}$ $P_b = 10382.3354\,kip$

$BearingCheck := if(P_b > LF \cdot C_t, "Okay", "No Good")$ $BearingCheck = "Okay"$

SHEAR STRENGTH OF CONCRETE

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

$\phi_{vv} := .85$ (ACI 9.3.2.3)

$d := T_f - Cvr_{pad} - d_{bbot}$ $d = 43.872\,in$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$ $d_1 = 8\,ft$

$d_2 := d_1 - d$ $d_2 = 4.344\,ft$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$ $L = 18.9767\,ft$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$ $Slope = 0.0822\,kcf$

$V_{req} := LF \cdot \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \, d_1$ $V_{req} = 281.6587\,kip$

ACI 11.3.1.1 $V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{fc \cdot psi} \cdot W_f \, d$ $V_{Avail} = 1245.2894\,kip$

$BeamShearCheck := if(V_{req} < V_{Avail}, "Okay", "No Good")$ $BeamShearCheck = "Okay"$

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.12.2.1)

$b_o := (d_p + d) \cdot \pi$ $b_o = 30.3352\,ft$

Area included inside bo: $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4}$ $A_{bo} = 73.2292\,ft^2$

Area outside of bo: $A_{out} := A_{mat} - A_{bo}$ $A_{out} = 410.7708\,ft^2$

Guess Value: $v_u := 1ksf$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

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

$v_u := Find(v_u)$ $v_u = 2.9358\ ksf$

$V_u := v_u \cdot d \cdot W_f$ $V_u = 236.135\ kips$

$V_{req} := LF \cdot V_u$ $V_{req} = 306.9754\ kips$

$V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f'c \cdot psi} \cdot b_o \cdot d$ $V_{Avail} = 3434.1932\ kips$

$PunchingShearCheck := if(V_{req} < V_{Avail}, "Okay", "No Good")$ $PunchingShearCheck = "Okay"$

STEEL REINFORCEMENT IN THE PAD $\phi_m := .90$ ACI 9.3.2.2

Take Maximum Bending at face of Pier:

$q_b := q_{adj} - d_1 \cdot Slope$ $q_b = 0.9022\ ksf$

$M_n := \frac{LF}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^2}{3} + q_b \cdot \frac{d_1^2}{2} \right] \cdot W_f$ $M_n = 1363.2625\ kip \cdot ft$

ACI 10.2.7.3 $\beta := if\left[f'c \le 4000 \cdot psi, .85, if\left[f'c \ge 8000 \cdot psi, .65, .85 - \left(\frac{\frac{f'c}{psi} - 4000}{1000} \right) \cdot .05 \right] \right]$ $\beta = 0.85$

$R_u := \frac{M_n}{\phi_m \cdot W_f \cdot d^2}$ $R_u = 5151.1\ lbf$

$\rho := \frac{0.85 \cdot f'c}{fy} \left(1 - \sqrt{1 - \frac{2 \cdot R_u}{0.85 \cdot f'c}} \right)$ $\rho = 0.0006$

$\rho_{min} := 1.333 \cdot \rho$ $\rho_{min} = 0.0008$

URS

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Temperature and Shrinkage: $\rho_{sh} := if(fy \geq 60000 \cdot psi, 0.0018, 0.0020)$ $\rho_{sh} = 0.0018$

(ACI 7.12.2.1b)

FOR BOTTOM BARS: $As := \max(\rho, \rho_{min}, \rho_{sh}) \cdot W_f \, d$ $As = 20.848\ in^2$

$As_{prov} := A_{bot} \cdot NB_{bot}$ $As_{prov} = 24\ in^2$

$PadReinforcement := if(As_{prov} > As, "Okay", "No Good")$ $PadReinforcement = "Okay"$

FOR TOP BARS: $As := \rho_{sh} \cdot (W_f \, d)$ $As = 20.848\ in^2$

$As_{prov} := A_{btop} \cdot NB_{top}$ $As_{prov} = 24\ in^2$

$PadReinforcement := if(As_{prov} > As, "Okay", "No Good")$ $PadReinforcement = "Okay"$

TENSION (ACI 12.2.3) **DEVELOPMENT LENGTH OF PAD REINFORCEMENT**

Bar Spacing: $B_{sPad} := \dfrac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1}$ $B_{sPad} = 10.0403\ in$

Development Length Factors:

Reinforcement Location Factor	$\alpha := 1.0$	
Coating Factor	$\beta := 1.0$	
Concrete strength Factor	$\lambda := 1.0$	
Reinforcement Size Factor	$\gamma := 1.0$	

Spacing or Cover Dimension: $c := if\left(Cvr_{pad} < \dfrac{B_{sPad}}{2}, Cvr_{pad}, \dfrac{B_{sPad}}{2}\right)$ $c = 3\ in$

Transverse Reinforcement Index As allowed by ACI 12.2.4 $k_{tr} := 0$

$$L_{dbt} := \frac{3}{40} \cdot \frac{fy}{\sqrt{f'c \cdot psi}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{\frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot}$$

$L_{dbt} = 30.1772\ in$

$L_{dbmin} := 12 \cdot in$

Minimum Development Length: (ACI 12.2.1) $L_{dbtCheck} := if(L_{dbt} \geq L_{dbmin}, "Use\ L.dbt", "Use\ L.dbmin")$ $L_{dbtCheck} = "Use\ L.dbt"$

Available Length in Pad: $L_{Pad} := \dfrac{W_f}{2} - \dfrac{d_p}{2} - Cvr_{pad}$ $L_{Pad} = 93\ in$

$LpadTension := if(L_{Pad} > L_{dbt}, "Okay", "No Good")$ $LpadTension = "Okay"$