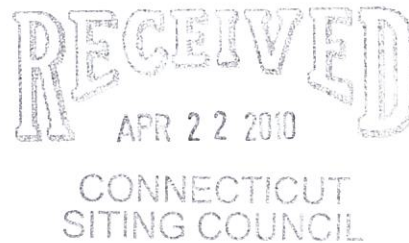


280 Trumbull Street
Hartford, CT 06103-3597
Main (860) 275-8200
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kbaldwin@rc.com
Direct (860) 275-8345

ORIGINAL

April 21, 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-057-091217 – 5 Perryridge Road, Greenwich, Connecticut

Dear Mr. Perrone:

On December 17, 2009, the Siting Council acknowledged receipt of Cellco's notice of exempt modification for the above-referenced telecommunications facility. This modification involved the replacement of six (6) existing PCS antennas with three (3) newer model PCS antennas and three (3) LTE antennas. In addition to the antenna modifications, Cellco has decided that it will install six (6) coax cable diplexers on the antenna mounting platform. Attached is an updated Structural Analysis for the antenna modifications and the installation of the diplexers. This analysis confirms that the tower can support the proposed additional loading.

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

Sincerely,

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

Kenneth C. Baldwin



Law Offices

BOSTON

PROVIDENCE

HARTFORD

NEW LONDON

STAMFORD

WHITE PLAINS

NEW YORK CITY

ALBANY

SARASOTA

www.rc.com

Attachment

Copy to:

Sandy M. Carter
Brian Ragozzine
Mark Gauger



Structural Analysis Report

164-ft Existing EEI Monopole

*Proposed Verizon Wireless
Antenna Change-Out*

*Verizon Wireless Site Ref:
Greenwich Hospital*

*5 Perryridge Road
Greenwich, CT*

Natcomm Project No. 10001-CO4

~~Date: December 1, 2009~~

Rev.1: April 19, 2010



Prepared for:

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

p: 203.488.0580
f: 203.488.8587
w: nat-eng.com
63-2 N. Branford Rd.
Branford, CT 06405

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Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation proposed by Verizon Wireless on the existing monopole (tower) owned and operated by Greenwich Hospital located in Greenwich, Connecticut.

The host tower is a 164-ft tall, five-section, eighteen sided, tapered monopole, originally designed and manufactured by Engineered Endeavors Incorporated (EEI); project no. 11030 dated August 21, 2002. The tower geometry, structure member sizes and foundation system information were obtained from the original manufacturers design documents and a previous structural analysis report prepared by Natcomm; job no; 08063, dated August 13, 2008. Antenna and appurtenance information were obtained from the aforementioned Natcomm structural report, the CT Siting Council Database and the Verizon RF data sheet.

The tower is made up of five (5) tapered vertical sections consisting of A572-65 pole sections. The bottom four (4) vertical tower sections are slip joint connected while the top section is flange connected. The diameter of the pole (flat-flat) is 47.0-in at the top and 76.0-in at the base.

Verizon Wireless is proposing the removal of six (6) panel antennas and installation of six (6) panel antennas mounted their existing platform. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing tower was designed to support several communication antennas. The existing, proposed and future loads considered in this analysis consist of the following:

- TOWN (EXISTING):
Antennas: One (1) PD1142-1, one (1) PD620-3, one (1) ALR8 and three (3) BMR10 panel antennas and one (1) camera mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 164-ft above grade level.
Coax Cables: Six (6) 1-5/8" $\varnothing$ coax cables running on the inside of the existing tower.
- TOWN (EXISTING):
Antennas: Two (2) 4 FT Dishes and one (1) 2 Ft Dish mounted on three 4'x4" pipe mounts with a RAD center elevation of 160-ft above grade level.
Coax Cables: Three (3) 1-5/8" $\varnothing$ coax cables running on the inside of the existing tower.
- SPRINT (EXISTING/RESERVED):
Antennas: Four (4) Decibel 950F65T2E-M (2 existing/2 reserved) and eight (8) Decibel DB980F90E-M (4 existing/4 reserved) panel antennas and one (1) GPS antenna mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 154-ft above grade level.
Coax Cables: Twelve (12) 1-5/8" $\varnothing$ and one (1) 1/2" $\varnothing$ coax cables running on the inside of the existing tower.

- **T-MOBILE (EXISTING/RESERVED):**
Antennas: Twelve (12) APX16PV-16PVL-X (6 existing/6 reserved) panel antennas and twelve (12) G20057A1 TMAs (6 existing/6 reserved) mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 144-ft above grade level.
Coax Cables: Twelve (12) 1-5/8" Ø coax cables running on the inside of the existing tower.
- **AT&T (PROPOSED):**
Antennas: Twelve (12) Powerwave 7770.00 panel antennas and twelve (12) LGP21401 tmas mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 134-ft above grade level.
Coax Cables: Twelve (12) 1-5/8" Ø coax cables running on the inside of the existing tower
- **NEXTEL (EXISTING):**
Antennas: Twelve (12) Decibel DB846G90A-XY panel antennas mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 114-ft above grade level.
Coax Cables: Twelve (12) 1-5/8" Ø coax cables running on the inside of the existing tower.
- **VERIZON (EXISTING TO REMAIN):**
Antennas: Six (6) Decibel 844G65T6ZAXY panel antennas mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 124-ft above grade level.
Coax Cables: Eighteen (18) 1-5/8" Ø coax cables running on the inside of the existing tower.
- **VERIZON (EXISTING TO REMOVE):**
Antennas: Six (6) Decibel 948F65T2E-M panel antennas mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 124-ft above grade level.
- **VERIZON (PROPOSED):**
Antennas: Three (3) Andrew LNX-6514DS-T4M panel antennas, three (3) RYMSA MG D3-800T0 panel antennas and six (6) Diplexers mounted on a PiROD 13-ft low profile platform with a RAD center elevation of 124-ft above grade level.

Primary Assumptions Used in the Analysis

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

Analysis

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

The existing tower was analyzed for 85 mph basic wind speed (fastest mile) with no ice and 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

T o w e r L o a d i n g

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

Basic Wind Speed:	Fairfield; v = 85 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	Greenwich; v = 100 mph (3 second gust) equivalent to v = 80 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	<i>EIA/TIA wind speed criteria controls.</i>	
Load Cases:	<u>Load Case 1</u> ; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design. This load case typically controls the design of monopole towers.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 2</u> ; 74 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 74 mph wind speed velocity represents 75% of the wind pressure generated by the 85 mph wind speed. This load case typically controls the design of lattice towers.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type

Tower Capacity

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

Calculated stresses were found to be within allowable limits. In Load Case 1, per RISATower "Section Capacity Table", this tower was found to be at **46.8%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L5)	1.5'-39.88'	46.8%	PASS

- The tower deflection (tilt) was found to be within allowable limits.

Deflection (degrees)	Proposed	Allowable ⁽¹⁾	Result
Tilt	1.38	1.9	PASS

(1) Allowable tilt taken from original EEI design documents job no. 11030 dated 8/21/02.

Foundation and Anchors

The existing foundation consists of a 9.0 Ø x 28.0-ft long reinforced concrete cassion. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned EEI design report; project no. 11030 dated August 21, 2002. The base of the tower is connected to the foundation by means of (30) 2.25"Ø, ASTM A615-75 anchor bolts embedded approximately 7-ft into the concrete foundation structure.

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

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

Base Reactions	Vector	Proposed Load (kips/ft-kips)
Base	Shear	43
	Axial	81
	Moment	4875

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	54.2%	PASS
	Lateral Deflection	0.56 in. ⁽¹⁾	PASS

(1) Lateral deflection typically limited to 1.0 in. for monopole tower structures.

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Compression	47.9%	PASS
Base Plate	Bending	37.6%	PASS
Flange Bolts	Tension	55.7%	PASS
Flange Plate	Bending	42.7%	PASS

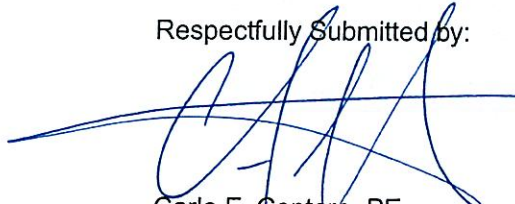
Conclusion

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:


 Carlo F. Centore, PE
 Principal - Structural Engineer



Prepared by:


 Timothy J. Lynn, EIT
 Structural Engineer

Standard Conditions for Furnishing of
Professional Engineering Services on
Existing Structures

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

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

General Description of Structural Analysis Program

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

RISATower Features:

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

LPILE Plus:

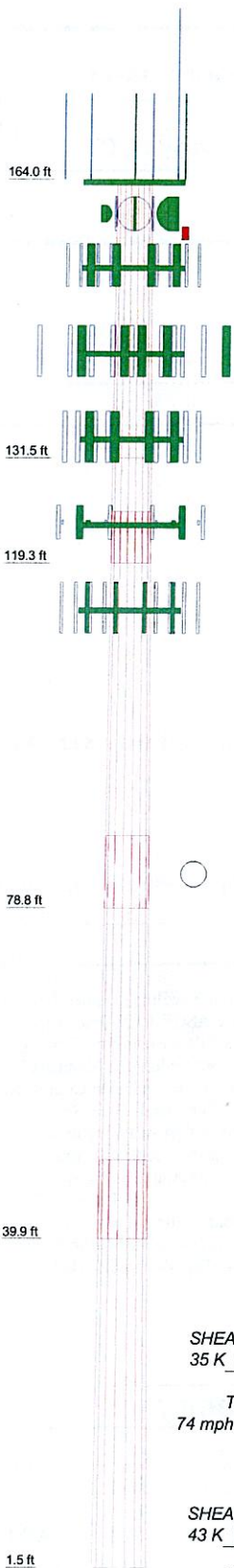
LPILE Plus is a special purpose program based on rational procedures for analyzing a pile under lateral loading. The program computes deflection, shear, bending moment, and soil response with respect to depth in nonlinear soils. Components of the stiffness matrix at the pile head may be computed internally by the program to help the users in their super-structure analysis. Several pile lengths may be automatically checked by the program in order to help the user produce a design with an optimum pile penetration.

Soil behavior is modeled with p-y curves internally generated by the computer program following published recommendations for various types of soils; alternatively, the user can manually introduce other p-y curves. Special procedures are programmed for developing p-y curves for layered soils and for rocks.

Several types of pile-head boundary conditions may be selected, and the properties of the pile can also vary as a function of depth. LPILE Plus has capabilities to compute the ultimate-moment capacity of a pile's section and can provide design information for rebar arrangement. The user may optionally ask the program to generate and take into account nonlinear values of flexural stiffness (EI) which are generated internally based on specified pile dimensions, material properties, and cracked/uncracked concrete behavior.

A single, user-friendly interface written for the Microsoft Windows® environment is provided for the preparation of input, analytical run, and for the graphical observation of data contained in the output file. The program has been written in 32-bit programming codes for compatibility with the latest versions of the Microsoft Windows operating system. The program produces plain-text input and output files that may be observed and/or edited for their inclusion in project reports.

Section	1	2	3	4	5
Length (ft)	32.50	12.21	46.50	47.33	47.63
Number of Sides	18	18	18	18	18
Thickness (in)	0.3125	0.3750	0.4375	0.5625	0.5625
Lap Splice (ft)		6.00	8.42	9.25	
Top Dia (in)	47.0000	53.4200	54.0585	60.4813	66.7412
Bot Dia (in)	53.4200	56.1500	62.9700	69.6600	76.0000
Grade			A572-65		
Weight (K)	5.5	2.7	12.8	18.5	20.5



DESIGNED APPURTENANCE LOADING

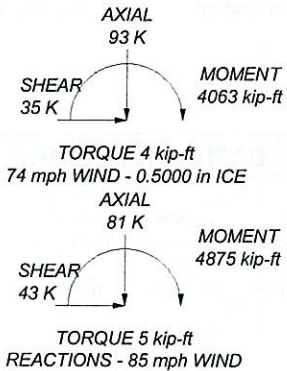
TYPE	ELEVATION	TYPE	ELEVATION
Low Profile Platform	164	Low Profile Platform (T-Mobile)	144
PD1142-1	164	(2) APX16PV-16PVL-X (T-Mobile)	144
PD620-3	164	(2) APX16PV-16PVL-X (T-Mobile Reserved)	144
ALR8	164	(2) 7770.00 (ATT)	134
BMR 10	164	7770.00 (ATT)	134
BMR 10	164	7770.00 (ATT)	134
BMR 10	164	(4) LGP21401 TMA (ATT)	134
Camera	164	(2) 7770.00 (ATT)	134
4"x4" Pipe Mount	160	7770.00 (ATT)	134
4"x4" Pipe Mount	160	7770.00 (ATT)	134
4"x4" Pipe Mount	160	7770.00 (ATT)	134
4 FT DISH	160	(4) LGP21401 TMA (ATT)	134
4 FT DISH	160	(2) 7770.00 (ATT)	134
2 FT DISH	160	7770.00 (ATT)	134
Low Profile Platform (Sprint)	154	Low Profile Platform (ATT)	134
950F65T2E-M (Sprint Reserved)	154	7770.00 (ATT)	134
950F65T2E-M (Sprint Reserved)	154	(4) LGP21401 TMA (ATT)	134
GPS (Sprint)	154	844G65T6ZAXY (Verizon Existing)	124
(2) DB980F90E-M (Sprint)	154	(2) Diplexer (Verizon Proposed)	124
DB980F90E-M (Sprint Reserved)	154	844G65T6ZAXY (Verizon Existing)	124
DB980F90E-M (Sprint Reserved)	154	MG D3-800TX (Verizon Proposed)	124
(2) DB980F90E-M (Sprint)	154	LNK-6514DS-TOM (Verizon Proposed)	124
DB980F90E-M (Sprint Reserved)	154	844G65T6ZAXY (Verizon Existing)	124
DB980F90E-M (Sprint Reserved)	154	(2) Diplexer (Verizon Proposed)	124
(2) 950F65T2E-M (Sprint)	154	844G65T6ZAXY (Verizon Existing)	124
(2) G20057A1 TMA (T-Mobile)	144	MG D3-800TX (Verizon Proposed)	124
(2) G20057A1 TMA (T-Mobile Reserved)	144	LNK-6514DS-TOM (Verizon Proposed)	124
(2) APX16PV-16PVL-X (T-Mobile)	144	844G65T6ZAXY (Verizon Existing)	124
(2) APX16PV-16PVL-X (T-Mobile Reserved)	144	(2) Diplexer (Verizon Proposed)	124
(2) G20057A1 TMA (T-Mobile)	144	844G65T6ZAXY (Verizon Existing)	124
(2) G20057A1 TMA (T-Mobile Reserved)	144	MG D3-800TX (Verizon Proposed)	124
(2) APX16PV-16PVL-X (T-Mobile)	144	LNK-6514DS-TOM (Verizon Proposed)	124
(2) APX16PV-16PVL-X (T-Mobile Reserved)	144	Low Profile Platform (Verizon)	124
(2) G20057A1 TMA (T-Mobile)	144	(4) DB846G90A-XY (Nextel)	114
(2) G20057A1 TMA (T-Mobile Reserved)	144	(4) DB846G90A-XY (Nextel)	114
(2) G20057A1 TMA (T-Mobile)	144	Low Profile Platform (Nextel)	114
(2) G20057A1 TMA (T-Mobile Reserved)	144	(4) DB846G90A-XY (Nextel)	114

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
5. Welds are fabricated with ER-70S-6 electrodes.
6. TOWER RATING: 46.8%



NATCOMM 63-2 North Branford Road Branford, CT 06405 Phone: 203.488.0580 FAX: 203.488.8587		Job: 164' EEI Monopole - Greenwich Hospital - Rev. 1 Project: 10001.CO4 - 5 Perryridge Road, Greenwich, CT Client: Verizon Wireless Drawn by: TJL App'd: Code: TIA/EIA-222-F Date: 04/19/10 Scale: NTS Path: Dwg No. E-1	
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RISATower NATCOMM 63-2 North Branford Road Branford, CT 06405 Phone: 203.488.0580 FAX: 203.488.8587	Job 164' EEI Monopole - Greenwich Hospital - Rev.1	Page 1 of 21
	Project 10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date 16:10:01 04/19/10
	Client Verizon Wireless	Designed by TJL

Tower Input Data

There is a pole section.

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

The following design criteria apply:

Basic wind speed of 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.

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

Welds are fabricated with ER-70S-6 electrodes..

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

Pressures are calculated at each section.

Stress ratio used in pole design is 1.333.

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

Options

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

Tapered Pole Section Geometry

Section	Elevation 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	164.00-131.50	32.50	0.00	18	47.0000	53.4200	0.3125	1.2500	A572-65 (65 ksi)
L2	131.50-119.29	12.21	6.00	18	53.4200	56.1500	0.3750	1.5000	A572-65 (65 ksi)
L3	119.29-78.79	46.50	8.42	18	54.0585	62.9700	0.4375	1.7500	A572-65 (65 ksi)
L4	78.79-39.88	47.33	9.25	18	60.4813	69.6600	0.5625	2.2500	A572-65 (65 ksi)
L5	39.88-1.50	47.63		18	66.7412	76.0000	0.5625	2.2500	A572-65 (65 ksi)

RISATower NATCOMM 63-2 North Branford Road Branford, CT 06405 Phone: 203.488.0580 FAX: 203.488.8587	Job	Page
	164' EEI Monopole - Greenwich Hospital - Rev.1	2 of 21
	Project	Date
	10001.CO4 - 5 Perryridge Road, Greenwich, CT	16:10:01 04/19/10
	Client	Designed by
	Verizon Wireless	TJL

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	47.7251	46.3082	12752.5270	16.5741	23.8760	534.1149	25521.8341	23.1585	7.7220	24.71
	54.2441	52.6760	18769.9004	18.8532	27.1374	691.6627	37564.4987	26.3430	8.8519	28.326
L2	54.2441	63.1368	22444.4518	18.8310	27.1374	827.0684	44918.4365	31.5744	8.7419	23.312
	57.0162	66.3862	26091.2194	19.8001	28.5242	914.7047	52216.7704	33.1994	9.2224	24.593
L3	56.0600	74.4594	27047.4669	19.0354	27.4617	984.9157	54130.5236	37.2368	8.7443	19.987
	63.9414	86.8342	42898.2727	22.1990	31.9888	1341.0421	85852.9920	43.4253	10.3127	23.572
L4	63.0724	106.9776	48524.0652	21.2712	30.7245	1579.3269	97111.9796	53.4990	9.6547	17.164
	70.7346	123.3649	74413.8720	24.5296	35.3873	2102.8424	148925.659	61.6942	11.2702	20.036
L5	69.5966	118.1537	65376.3617	23.4934	33.9045	1928.2498	130838.747	59.0881	10.7564	19.123
	77.1724	134.6842	96834.1984	26.7803	38.6080	2508.1382	193795.813	67.3549	12.3860	22.02

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 Horizontal in
ft	ft ²	in						
L1 164.00- 131.50				1	1	1		
L2 131.50- 119.29				1	1	1		
L3 119.29- 78.79				1	1	1		
L4 78.79-39.88				1	1	1		
L5 39.88-1.50				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	C _{AA}	Weight plf
						ft ² /ft	
1 5/8 (Sprint)	A	No	Inside Pole	154.00 - 4.50	6	No Ice	0.00
						1/2" Ice	0.00
1 5/8 (Sprint)	A	No	Inside Pole	154.00 - 4.50	6	No Ice	0.00
						1/2" Ice	0.00
1 5/8 (T-Mobile)	B	No	Inside Pole	144.00 - 4.50	12	No Ice	0.00
						1/2" Ice	0.00
1 5/8 (ATT)	C	No	Inside Pole	134.00 - 4.50	12	No Ice	0.00
						1/2" Ice	0.00
1 5/8 (Verizon)	A	No	Inside Pole	124.00 - 4.50	12	No Ice	0.00
						1/2" Ice	0.00
1 5/8 (Verizon)	B	No	Inside Pole	124.00 - 4.50	6	No Ice	0.00
						1/2" Ice	0.00
1 5/8 (Nextel)	C	No	Inside Pole	114.00 - 4.50	12	No Ice	0.00
						1/2" Ice	0.00
1/2 (Sprint)	A	No	Inside Pole	154.00 - 4.50	1	No Ice	0.00
						1/2" Ice	0.00
1 5/8	B	No	Inside Pole	160.00 - 4.50	3	No Ice	0.00

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Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_{AA} ft ² /ft	Weight plf
1 5/8	C	No	Inside Pole	164.00 - 4.50	6	1/2" Ice	0.00	1.04
						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} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	164.00-131.50	A	0.000	0.000	0.000	0.000	0.29
		B	0.000	0.000	0.000	0.000	0.24
		C	0.000	0.000	0.000	0.000	0.23
L2	131.50-119.29	A	0.000	0.000	0.000	0.000	0.21
		B	0.000	0.000	0.000	0.000	0.22
		C	0.000	0.000	0.000	0.000	0.23
L3	119.29-78.79	A	0.000	0.000	0.000	0.000	1.02
		B	0.000	0.000	0.000	0.000	0.88
		C	0.000	0.000	0.000	0.000	1.20
L4	78.79-39.88	A	0.000	0.000	0.000	0.000	0.98
		B	0.000	0.000	0.000	0.000	0.85
		C	0.000	0.000	0.000	0.000	1.21
L5	39.88-1.50	A	0.000	0.000	0.000	0.000	0.89
		B	0.000	0.000	0.000	0.000	0.77
		C	0.000	0.000	0.000	0.000	1.10

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} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	164.00-131.50	A	0.500	0.000	0.000	0.000	0.000	0.29
		B		0.000	0.000	0.000	0.000	0.24
		C		0.000	0.000	0.000	0.000	0.23
L2	131.50-119.29	A	0.500	0.000	0.000	0.000	0.000	0.21
		B		0.000	0.000	0.000	0.000	0.22
		C		0.000	0.000	0.000	0.000	0.23
L3	119.29-78.79	A	0.500	0.000	0.000	0.000	0.000	1.02
		B		0.000	0.000	0.000	0.000	0.88
		C		0.000	0.000	0.000	0.000	1.20
L4	78.79-39.88	A	0.500	0.000	0.000	0.000	0.000	0.98
		B		0.000	0.000	0.000	0.000	0.85
		C		0.000	0.000	0.000	0.000	1.21
L5	39.88-1.50	A	0.500	0.000	0.000	0.000	0.000	0.89
		B		0.000	0.000	0.000	0.000	0.77
		C		0.000	0.000	0.000	0.000	1.10

Feed Line Center of Pressure

Section	Elevation ft	CP_x in	CP_z in	CP_x Ice in	CP_z Ice in
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Section	Elevation	CP _X	CP _Z	CP _X	CP _Z
	ft	in	in	Ice in	Ice in
L1	164.00-131.50	0.0000	0.0000	0.0000	0.0000
L2	131.50-119.29	0.0000	0.0000	0.0000	0.0000
L3	119.29-78.79	0.0000	0.0000	0.0000	0.0000
L4	78.79-39.88	0.0000	0.0000	0.0000	0.0000
L5	39.88-1.50	0.0000	0.0000	0.0000	0.0000

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
Low Profile Platform (Sprint)	C	None		0.0000	154.00	No Ice 15.70 1/2" Ice 20.10	15.70 20.10	1.30 1.76
(2) DB980F90E-M (Sprint)	A	From Face	4.00 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.90 4.28	2.29 2.65	0.01 0.03
DB980F90E-M (Sprint Reserved)	A	From Face	4.00 -2.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.90 4.28	2.29 2.65	0.01 0.03
DB980F90E-M (Sprint Reserved)	A	From Face	4.00 2.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.90 4.28	2.29 2.65	0.01 0.03
(2) DB980F90E-M (Sprint)	B	From Face	4.00 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.90 4.28	2.29 2.65	0.01 0.03
DB980F90E-M (Sprint Reserved)	B	From Face	4.00 -2.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.90 4.28	2.29 2.65	0.01 0.03
DB980F90E-M (Sprint Reserved)	B	From Face	4.00 2.00 0.00	0.0000	154.00	No Ice 1/2" Ice 3.90 4.28	2.29 2.65	0.01 0.03
(2) 950F65T2E-M (Sprint)	C	From Face	4.00 0.00 0.00	0.0000	154.00	No Ice 1/2" Ice 6.42 6.88	4.24 4.62	0.02 0.06
950F65T2E-M (Sprint Reserved)	C	From Face	4.00 -2.00 0.00	0.0000	154.00	No Ice 1/2" Ice 6.42 6.88	4.24 4.62	0.02 0.06
950F65T2E-M (Sprint Reserved)	C	From Face	4.00 2.00 0.00	0.0000	154.00	No Ice 1/2" Ice 6.42 6.88	4.24 4.62	0.02 0.06
GPS (Sprint)	C	From Face	4.00 -6.00 3.00	0.0000	154.00	No Ice 1/2" Ice 1.00 1.50	1.00 1.50	0.01 0.01
Low Profile Platform (T-Mobile)	C	None		0.0000	144.00	No Ice 15.70 1/2" Ice 20.10	15.70 20.10	1.30 1.76
(2) APX16PV-16PVL-X (T-Mobile)	A	From Face	4.00 -6.00 0.00	0.0000	144.00	No Ice 1/2" Ice 6.70 7.13	2.00 2.33	0.04 0.07
(2) APX16PV-16PVL-X (T-Mobile Reserved)	A	From Face	4.00 1.00 0.00	0.0000	144.00	No Ice 1/2" Ice 6.70 7.13	2.00 2.33	0.04 0.07
(2) G20057A1 TMA	A	From Face	4.00	0.0000	144.00	No Ice	0.82	0.01

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	Verizon Wireless	TJL

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
(T-Mobile)			0.00		1/2" Ice	0.95	0.49	0.02
(2) G20057A1 TMA (T-Mobile Reserved)	A	From Face	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.01 0.02
(2) APX16PV-16PVL-X (T-Mobile)	B	From Face	4.00 -6.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.70 7.13	0.04 0.07
(2) APX16PV-16PVL-X (T-Mobile Reserved)	B	From Face	4.00 1.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.70 7.13	0.04 0.07
(2) G20057A1 TMA (T-Mobile)	B	From Face	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.01 0.02
(2) G20057A1 TMA (T-Mobile Reserved)	B	From Face	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.01 0.02
(2) APX16PV-16PVL-X (T-Mobile)	C	From Face	4.00 -6.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.70 7.13	0.04 0.07
(2) APX16PV-16PVL-X (T-Mobile Reserved)	C	From Face	4.00 1.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.70 7.13	0.04 0.07
(2) G20057A1 TMA (T-Mobile)	C	From Face	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.01 0.02
(2) G20057A1 TMA (T-Mobile Reserved)	C	From Face	4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.01 0.02
Low Profile Platform (ATT)	C	None		0.0000	134.00	No Ice 1/2" Ice	15.70 20.10	1.30 1.76
(2) 7770.00 (ATT)	A	From Face	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	0.04 0.07
7770.00 (ATT)	A	From Face	4.00 -2.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	0.04 0.07
7770.00 (ATT)	A	From Face	4.00 2.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	0.04 0.07
(4) LGP21401 TMA (ATT)	A	From Face	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.29 1.45	0.01 0.02
(2) 7770.00 (ATT)	B	From Face	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	0.04 0.07
7770.00 (ATT)	B	From Face	4.00 -2.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	0.04 0.07
7770.00 (ATT)	B	From Face	4.00 2.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	0.04 0.07
(4) LGP21401 TMA (ATT)	B	From Face	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.29 1.45	0.01 0.02
(2) 7770.00 (ATT)	C	From Face	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	0.04 0.07

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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
7770.00 (ATT)	C	From Face	0.00 4.00 -2.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
7770.00 (ATT)	C	From Face	4.00 2.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	0.04 0.07
(4) LGP21401 TMA (ATT)	C	From Face	4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.29 1.45	0.36 0.48	0.01 0.02
Low Profile Platform (Verizon)	C	None		0.0000	124.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1.30 1.76
844G65T6ZAXY (Verizon Existing)	A	From Face	4.00 -6.00 0.00	0.0000	124.00	No Ice 1/2" Ice	4.67 5.05	3.73 4.10	0.01 0.04
MG D3-800TX (Verizon Proposed)	A	From Face	4.00 -4.00 0.00	0.0000	124.00	No Ice 1/2" Ice	3.45 3.80	2.22 2.55	0.00 0.02
LNx-6514DS-T0M (Verizon Proposed)	A	From Face	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	0.04 0.09
844G65T6ZAXY (Verizon Existing)	A	From Face	4.00 6.00 0.00	0.0000	124.00	No Ice 1/2" Ice	4.67 5.05	3.73 4.10	0.01 0.04
(2) Diplexer (Verizon Proposed)	A	From Face	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	0.35 0.43	0.12 0.17	0.01 0.01
844G65T6ZAXY (Verizon Existing)	B	From Face	4.00 -6.00 0.00	0.0000	124.00	No Ice 1/2" Ice	4.67 5.05	3.73 4.10	0.01 0.04
MG D3-800TX (Verizon Proposed)	B	From Face	4.00 -4.00 0.00	0.0000	124.00	No Ice 1/2" Ice	3.45 3.80	2.22 2.55	0.00 0.02
LNx-6514DS-T0M (Verizon Proposed)	B	From Face	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	0.04 0.09
844G65T6ZAXY (Verizon Existing)	B	From Face	4.00 6.00 0.00	0.0000	124.00	No Ice 1/2" Ice	4.67 5.05	3.73 4.10	0.01 0.04
(2) Diplexer (Verizon Proposed)	B	From Face	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	0.35 0.43	0.12 0.17	0.01 0.01
844G65T6ZAXY (Verizon Existing)	C	From Face	4.00 -6.00 0.00	0.0000	124.00	No Ice 1/2" Ice	4.67 5.05	3.73 4.10	0.01 0.04
MG D3-800TX (Verizon Proposed)	C	From Face	4.00 -4.00 0.00	0.0000	124.00	No Ice 1/2" Ice	3.45 3.80	2.22 2.55	0.00 0.02
LNx-6514DS-T0M (Verizon Proposed)	C	From Face	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	8.41 8.96	5.41 5.86	0.04 0.09
844G65T6ZAXY (Verizon Existing)	C	From Face	4.00 6.00 0.00	0.0000	124.00	No Ice 1/2" Ice	4.67 5.05	3.73 4.10	0.01 0.04
(2) Diplexer (Verizon Proposed)	C	From Face	4.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	0.35 0.43	0.12 0.17	0.01 0.01

RISATower

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Client

Verizon Wireless

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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
Low Profile Platform (Nextel)	C	None		0.0000	114.00	No Ice	15.70	15.70	1.30
(4) DB846G90A-XY (Nextel)	A	From Face	4.00 0.00 0.00	0.0000	114.00	1/2" Ice	20.10 4.99 5.44	20.10 5.87 6.32	1.76 0.02 0.05
(4) DB846G90A-XY (Nextel)	B	From Face	4.00 0.00 0.00	0.0000	114.00	No Ice	4.99 5.44	5.87 6.32	0.02 0.05
(4) DB846G90A-XY (Nextel)	C	From Face	4.00 0.00 0.00	0.0000	114.00	No Ice	4.99 5.44	5.87 6.32	0.02 0.05
Low Profile Platform	C	None		0.0000	164.00	No Ice	15.70	15.70	1.30
4'x4" Pipe Mount	A	From Face	0.50 0.00 0.00	0.0000	160.00	1/2" Ice	20.10 1.32 1.58	20.10 1.32 1.58	1.76 0.04 0.06
4'x4" Pipe Mount	B	From Face	0.50 0.00 0.00	0.0000	160.00	No Ice	1.32 1.58	1.32 1.58	0.04 0.06
4'x4" Pipe Mount	C	From Face	0.50 0.00 0.00	0.0000	160.00	No Ice	1.32 1.58	1.32 1.58	0.04 0.06
PD1142-1	A	From Face	4.00 0.00 5.00	0.0000	164.00	No Ice	1.32 3.21	1.32 3.21	0.01 0.02
PD620-3	B	From Face	4.00 0.00 10.00	0.0000	164.00	No Ice	3.83 5.99	3.83 5.99	0.05 0.08
ALR8	C	From Face	4.00 0.00 5.00	0.0000	164.00	No Ice	8.10 10.80	8.10 10.80	0.10 0.15
BMR10	A	From Face	4.00 -6.00 5.00	0.0000	164.00	No Ice	8.64 10.80	8.64 10.80	0.10 0.15
BMR10	B	From Face	4.00 -6.00 5.00	0.0000	164.00	No Ice	8.64 10.80	8.64 10.80	0.10 0.15
BMR10	C	From Face	4.00 -6.00 5.00	0.0000	164.00	No Ice	8.64 10.80	8.64 10.80	0.10 0.15
Camera	C	From Face	4.00 0.00 0.00	0.0000	164.00	No Ice	3.00 4.00	3.00 4.00	0.10 0.15

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
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Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft²	Weight K	
4 FT DISH	A	Paraboloid w/Shroud (HP)	From Leg	1.00	Worst		160.00	4.00	No Ice	12.56	0.17
				0.00					1/2" Ice	13.09	0.24
				0.00							
4 FT DISH	B	Paraboloid w/Shroud (HP)	From Leg	1.00	Worst		160.00	4.00	No Ice	12.56	0.17
				0.00					1/2" Ice	13.09	0.24
				0.00							
2 FT DISH	C	Paraboloid w/Shroud (HP)	From Leg	1.00	Worst		160.00	2.00	No Ice	3.14	0.03
				0.00					1/2" Ice	3.41	0.04
				0.00							

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 ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
L1 164.00- 131.50	147.53	1.534	28	135.985	A	0.000	135.985	135.985	100.00	0.000	0.000
					B	0.000	135.985		100.00	0.000	0.000
					C	0.000	135.985		100.00	0.000	0.000
L2 131.50- 119.29	125.34	1.464	27	55.744	A	0.000	55.744	55.744	100.00	0.000	0.000
					B	0.000	55.744		100.00	0.000	0.000
					C	0.000	55.744		100.00	0.000	0.000
L3 119.29- 78.79	98.89	1.368	25	199.426	A	0.000	199.426	199.426	100.00	0.000	0.000
					B	0.000	199.426		100.00	0.000	0.000
					C	0.000	199.426		100.00	0.000	0.000
L4 78.79-39.88	59.42	1.183	22	213.639	A	0.000	213.639	213.639	100.00	0.000	0.000
					B	0.000	213.639		100.00	0.000	0.000
					C	0.000	213.639		100.00	0.000	0.000
L5 39.88-1.50	20.36	1	18	231.142	A	0.000	231.142	231.142	100.00	0.000	0.000
					B	0.000	231.142		100.00	0.000	0.000
					C	0.000	231.142		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 ft ²	C _A A _A Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
L1 164.00- 131.50	147.53	1.534	21	0.5000	138.694	A	0.000	138.694	138.694	100.00	0.000	0.000
						B	0.000	138.694		100.00	0.000	0.000
						C	0.000	138.694		100.00	0.000	0.000
L2 131.50- 119.29	125.34	1.464	20	0.5000	56.761	A	0.000	56.761	56.761	100.00	0.000	0.000
						B	0.000	56.761		100.00	0.000	0.000
						C	0.000	56.761		100.00	0.000	0.000
L3 119.29-78.79	98.89	1.368	19	0.5000	202.801	A	0.000	202.801	202.801	100.00	0.000	0.000
						B	0.000	202.801		100.00	0.000	0.000
						C	0.000	202.801		100.00	0.000	0.000
L4 78.79-39.88	59.42	1.183	16	0.5000	216.881	A	0.000	216.881	216.881	100.00	0.000	0.000

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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 ft ²	C _A A _A Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
L5 39.88-1.50	20.36	1	14	0.5000	234.341	B	0.000	216.881	234.341	100.00	0.000	0.000
						C	0.000	216.881		100.00	0.000	0.000
						A	0.000	234.341		100.00	0.000	0.000
						B	0.000	234.341		100.00	0.000	0.000
						C	0.000	234.341		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 ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
L1 164.00-131.50	147.53	1.534	10	135.985	A	0.000	135.985	135.985	100.00	0.000	0.000
					B	0.000	135.985		100.00	0.000	0.000
					C	0.000	135.985		100.00	0.000	0.000
L2 131.50-119.29	125.34	1.464	9	55.744	A	0.000	55.744	55.744	100.00	0.000	0.000
					B	0.000	55.744		100.00	0.000	0.000
					C	0.000	55.744		100.00	0.000	0.000
L3 119.29-78.79	98.89	1.368	9	199.426	A	0.000	199.426	199.426	100.00	0.000	0.000
					B	0.000	199.426		100.00	0.000	0.000
					C	0.000	199.426		100.00	0.000	0.000
L4 78.79-39.88	59.42	1.183	8	213.639	A	0.000	213.639	213.639	100.00	0.000	0.000
					B	0.000	213.639		100.00	0.000	0.000
					C	0.000	213.639		100.00	0.000	0.000
L5 39.88-1.50	20.36	1	6	231.142	A	0.000	231.142	231.142	100.00	0.000	0.000
					B	0.000	231.142		100.00	0.000	0.000
					C	0.000	231.142		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	plf	
L1 164.00-131.50	0.77	5.47	A	1	0.65	1	1	1	135.985	4.24	130.34	C
			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2 131.50-119.29	0.66	2.69	A	1	0.65	1	1	1	55.744	1.66	135.82	C
			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3 119.29-78.79	3.10	12.76	A	1	0.65	1	1	1	199.426	5.53	136.63	C
			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4 78.79-39.88	3.04	18.55	A	1	0.65	1	1	1	213.639	5.11	131.31	C
			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.77	20.49	A	1	0.65	1	1	1	231.142	4.70	122.36	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10.34	59.96						OTM	1747.41	21.23		

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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	plf	
									kip-ft			

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	plf	
L1 164.00-131.50	0.77	5.47	A	1	0.65	1	1	1	135.985	4.24	130.34	C
			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2 131.50-119.29	0.66	2.69	A	1	0.65	1	1	1	55.744	1.66	135.82	C
			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3 119.29-78.79	3.10	12.76	A	1	0.65	1	1	1	199.426	5.53	136.63	C
			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4 78.79-39.88	3.04	18.55	A	1	0.65	1	1	1	213.639	5.11	131.31	C
			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.77	20.49	A	1	0.65	1	1	1	231.142	4.70	122.36	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10.34	59.96						OTM	1747.41 kip-ft	21.23		

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	plf	
L1 164.00-131.50	0.77	5.47	A	1	0.65	1	1	1	135.985	4.24	130.34	C
			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2 131.50-119.29	0.66	2.69	A	1	0.65	1	1	1	55.744	1.66	135.82	C
			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3 119.29-78.79	3.10	12.76	A	1	0.65	1	1	1	199.426	5.53	136.63	C
			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4 78.79-39.88	3.04	18.55	A	1	0.65	1	1	1	213.639	5.11	131.31	C
			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.77	20.49	A	1	0.65	1	1	1	231.142	4.70	122.36	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10.34	59.96						OTM	1747.41 kip-ft	21.23		

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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	plf	
L1 164.00- 131.50	0.77	6.49	A	1	0.65	1	1	1	138.694	3.24	99.70	C
			B	1	0.65	1	1	1	138.694			
			C	1	0.65	1	1	1	138.694			
L2 131.50- 119.29	0.66	3.11	A	1	0.65	1	1	1	56.761	1.27	103.72	C
			B	1	0.65	1	1	1	56.761			
			C	1	0.65	1	1	1	56.761			
L3 119.29- 78.79	3.10	14.25	A	1	0.65	1	1	1	202.801	4.22	104.21	C
			B	1	0.65	1	1	1	202.801			
			C	1	0.65	1	1	1	202.801			
L4 78.79- 39.88	3.04	20.14	A	1	0.65	1	1	1	216.881	3.89	99.98	C
			B	1	0.65	1	1	1	216.881			
			C	1	0.65	1	1	1	216.881			
L5 39.88-1.50	2.77	22.21	A	1	0.65	1	1	1	234.341	3.57	93.04	C
			B	1	0.65	1	1	1	234.341			
			C	1	0.65	1	1	1	234.341			
Sum Weight:	10.34	66.20						OTM	1333.74 kip-ft	16.19		

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	plf	
L1 164.00- 131.50	0.77	6.49	A	1	0.65	1	1	1	138.694	3.24	99.70	C
			B	1	0.65	1	1	1	138.694			
			C	1	0.65	1	1	1	138.694			
L2 131.50- 119.29	0.66	3.11	A	1	0.65	1	1	1	56.761	1.27	103.72	C
			B	1	0.65	1	1	1	56.761			
			C	1	0.65	1	1	1	56.761			
L3 119.29- 78.79	3.10	14.25	A	1	0.65	1	1	1	202.801	4.22	104.21	C
			B	1	0.65	1	1	1	202.801			
			C	1	0.65	1	1	1	202.801			
L4 78.79- 39.88	3.04	20.14	A	1	0.65	1	1	1	216.881	3.89	99.98	C
			B	1	0.65	1	1	1	216.881			
			C	1	0.65	1	1	1	216.881			
L5 39.88-1.50	2.77	22.21	A	1	0.65	1	1	1	234.341	3.57	93.04	C
			B	1	0.65	1	1	1	234.341			
			C	1	0.65	1	1	1	234.341			
Sum Weight:	10.34	66.20						OTM	1333.74 kip-ft	16.19		

Tower Forces - With Ice - Wind 90 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	plf	
L1 164.00-131.50	0.77	6.49	A	1	0.65	1	1	1	138.694	3.24	99.70	C
			B	1	0.65	1	1	1	138.694			
			C	1	0.65	1	1	1	138.694			
L2 131.50-119.29	0.66	3.11	A	1	0.65	1	1	1	56.761	1.27	103.72	C
			B	1	0.65	1	1	1	56.761			
			C	1	0.65	1	1	1	56.761			
L3 119.29-78.79	3.10	14.25	A	1	0.65	1	1	1	202.801	4.22	104.21	C
			B	1	0.65	1	1	1	202.801			
			C	1	0.65	1	1	1	202.801			
L4 78.79-39.88	3.04	20.14	A	1	0.65	1	1	1	216.881	3.89	99.98	C
			B	1	0.65	1	1	1	216.881			
			C	1	0.65	1	1	1	216.881			
L5 39.88-1.50	2.77	22.21	A	1	0.65	1	1	1	234.341	3.57	93.04	C
			B	1	0.65	1	1	1	234.341			
			C	1	0.65	1	1	1	234.341			
Sum Weight:	10.34	66.20						OTM	1333.74 kip-ft	16.19		

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	plf	
L1 164.00-131.50	0.77	5.47	A	1	0.65	1	1	1	135.985	1.47	45.10	C
			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2 131.50-119.29	0.66	2.69	A	1	0.65	1	1	1	55.744	0.57	47.00	C
			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3 119.29-78.79	3.10	12.76	A	1	0.65	1	1	1	199.426	1.91	47.28	C
			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4 78.79-39.88	3.04	18.55	A	1	0.65	1	1	1	213.639	1.77	45.44	C
			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.77	20.49	A	1	0.65	1	1	1	231.142	1.63	42.34	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10.34	59.96						OTM	604.64 kip-ft	7.35		

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	plf	
L1 164.00-131.50	0.77	5.47	A	1	0.65	1	1	1	135.985	1.47	45.10	C
			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			

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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	plf	
L2 131.50- 119.29	0.66	2.69	A	1	0.65	1	1	1	55.744	0.57	47.00	C
			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3 119.29- 78.79	3.10	12.76	A	1	0.65	1	1	1	199.426	1.91	47.28	C
			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4 78.79- 39.88	3.04	18.55	A	1	0.65	1	1	1	213.639	1.77	45.44	C
			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.77	20.49	A	1	0.65	1	1	1	231.142	1.63	42.34	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10.34	59.96						OTM	604.64 kip-ft	7.35		

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	plf	
L1 164.00- 131.50	0.77	5.47	A	1	0.65	1	1	1	135.985	1.47	45.10	C
			B	1	0.65	1	1	1	135.985			
			C	1	0.65	1	1	1	135.985			
L2 131.50- 119.29	0.66	2.69	A	1	0.65	1	1	1	55.744	0.57	47.00	C
			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3 119.29- 78.79	3.10	12.76	A	1	0.65	1	1	1	199.426	1.91	47.28	C
			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4 78.79- 39.88	3.04	18.55	A	1	0.65	1	1	1	213.639	1.77	45.44	C
			B	1	0.65	1	1	1	213.639			
			C	1	0.65	1	1	1	213.639			
L5 39.88-1.50	2.77	20.49	A	1	0.65	1	1	1	231.142	1.63	42.34	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10.34	59.96						OTM	604.64 kip-ft	7.35		

Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M _x	Sum of Overturning Moments, M _z	Sum of Torques
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	59.96					
Bracing Weight	0.00					
Total Member Self-Weight	59.96			1.03	-0.66	
Total Weight	80.93			1.03	-0.66	
Wind 0 deg - No Ice		0.00	-43.26	-4806.29	-0.66	2.46
Wind 30 deg - No Ice		21.58	-37.47	-4162.23	-2395.78	4.24

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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 60 deg - No Ice		37.37	-21.63	-2402.63	-4149.14	4.89
Wind 90 deg - No Ice		43.15	0.00	1.03	-4790.91	4.22
Wind 120 deg - No Ice		37.37	21.63	2404.69	-4149.14	2.43
Wind 150 deg - No Ice		21.58	37.47	4164.29	-2395.78	-0.02
Wind 180 deg - No Ice		0.00	43.26	4808.35	-0.66	-2.46
Wind 210 deg - No Ice		-21.58	37.47	4164.29	2394.47	-4.24
Wind 240 deg - No Ice		-37.37	21.63	2404.69	4147.82	-4.89
Wind 270 deg - No Ice		-43.15	0.00	1.03	4789.59	-4.22
Wind 300 deg - No Ice		-37.37	-21.63	-2402.63	4147.82	-2.43
Wind 330 deg - No Ice		-21.58	-37.47	-4162.23	2394.47	0.02
Member Ice	6.24					
Total Weight Ice	92.58			1.91	-0.90	
Wind 0 deg - Ice		0.00	-35.25	-3990.37	-0.90	2.04
Wind 30 deg - Ice		17.58	-30.53	-3455.50	-1989.94	3.59
Wind 60 deg - Ice		30.45	-17.63	-1994.23	-3446.03	4.18
Wind 90 deg - Ice		35.16	0.00	1.91	-3978.99	3.65
Wind 120 deg - Ice		30.45	17.63	1998.05	-3446.03	2.14
Wind 150 deg - Ice		17.58	30.53	3459.33	-1989.94	0.06
Wind 180 deg - Ice		0.00	35.25	3994.19	-0.90	-2.04
Wind 210 deg - Ice		-17.58	30.53	3459.33	1988.14	-3.59
Wind 240 deg - Ice		-30.45	17.63	1998.05	3444.23	-4.18
Wind 270 deg - Ice		-35.16	0.00	1.91	3977.19	-3.65
Wind 300 deg - Ice		-30.45	-17.63	-1994.23	3444.23	-2.14
Wind 330 deg - Ice		-17.58	-30.53	-3455.50	1988.14	-0.06
Total Weight	80.93			1.03	-0.66	
Wind 0 deg - Service		0.00	-14.97	-1662.40	-0.66	0.85
Wind 30 deg - Service		7.47	-12.96	-1439.55	-829.42	1.47
Wind 60 deg - Service		12.93	-7.49	-830.69	-1436.12	1.69
Wind 90 deg - Service		14.93	0.00	1.03	-1658.18	1.46
Wind 120 deg - Service		12.93	7.49	832.74	-1436.12	0.84
Wind 150 deg - Service		7.47	12.96	1441.60	-829.42	-0.01
Wind 180 deg - Service		0.00	14.97	1664.46	-0.66	-0.85
Wind 210 deg - Service		-7.47	12.96	1441.60	828.11	-1.47
Wind 240 deg - Service		-12.93	7.49	832.74	1434.80	-1.69
Wind 270 deg - Service		-14.93	0.00	1.03	1656.87	-1.46
Wind 300 deg - Service		-12.93	-7.49	-830.69	1434.80	-0.84
Wind 330 deg - Service		-7.47	-12.96	-1439.55	828.11	0.01

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp

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Comb. No.	Description
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	164 - 131.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-18.46	-0.90	-1.91
			Max. Mx	5	-13.40	-354.99	-0.96
			Max. My	8	-13.40	-0.62	-357.90
			Max. Vy	5	19.60	-354.99	-0.96
			Max. Vx	8	19.71	-0.62	-357.90
			Max. Torque	4			-4.91
			Max Tension	1	0.00	0.00	0.00
L2	131.5 - 119.29	Pole	Max. Compression	14	-20.35	-0.90	-1.91
			Max. Mx	5	-15.08	-479.36	-0.97
			Max. My	8	-15.08	-0.62	-482.98
			Max. Vy	5	20.46	-479.36	-0.97
			Max. Vx	8	20.57	-0.62	-482.98
			Max. Torque	4			-4.91
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-40.98	-0.90	-1.91
L3	119.29 - 78.79	Pole	Max. Mx	5	-32.42	-1579.69	-1.02
			Max. My	8	-32.42	-0.65	-1587.65
			Max. Vy	5	32.73	-1579.69	-1.02
			Max. Vx	8	32.85	-0.65	-1587.65
			Max. Torque	4			-4.91
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-62.65	-0.90	-1.91
			Max. Mx	5	-52.72	-2925.48	-1.05
L4	78.79 - 39.88	Pole	Max. My	8	-52.72	-0.67	-2937.79
			Max. Vy	5	37.81	-2925.48	-1.05
			Max. Vx	8	37.92	-0.67	-2937.79
			Max. Torque	4			-4.91
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-62.65	-0.90	-1.91
			Max. Mx	5	-52.72	-2925.48	-1.05
			Max. My	8	-52.72	-0.67	-2937.79
L5	39.88 - 1.5	Pole	Max. Vy	5	37.81	-2925.48	-1.05
			Max. Vx	8	37.92	-0.67	-2937.79

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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
			Max. Compression	14	-92.58	-0.90	-1.91
			Max. M _x	5	-80.92	-4857.45	-1.05
			Max. M _y	8	-80.92	-0.67	-4875.16
			Max. V _y	5	43.17	-4857.45	-1.05
			Max. V _x	8	43.28	-0.67	-4875.16
			Max. Torque	4			-4.91

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	21	92.58	0.00	-35.25
	Max. H _x	11	80.93	43.15	-0.00
	Max. H _z	2	80.93	0.00	43.26
	Max. M _x	2	4873.06	0.00	43.26
	Max. M _z	5	4857.45	-43.15	-0.00
	Max. Torsion	10	4.91	37.37	-21.63
	Min. Vert	33	80.93	0.00	-14.97
	Min. H _x	5	80.93	-43.15	-0.00
	Min. H _z	8	80.93	0.00	-43.26
	Min. M _x	8	-4875.16	0.00	-43.26
	Min. M _z	11	-4856.11	43.15	-0.00
	Min. Torsion	4	-4.91	-37.37	21.63

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	80.93	0.00	0.00	1.03	-0.66	0.00
Dead+Wind 0 deg - No Ice	80.93	0.00	-43.26	-4873.06	-0.67	2.46
Dead+Wind 30 deg - No Ice	80.93	21.58	-37.47	-4220.05	-2429.06	4.25
Dead+Wind 60 deg - No Ice	80.93	37.37	-21.63	-2436.01	-4206.77	4.91
Dead+Wind 90 deg - No Ice	80.93	43.15	0.00	1.05	-4857.45	4.25
Dead+Wind 120 deg - No Ice	80.93	37.37	21.63	2438.11	-4206.77	2.45
Dead+Wind 150 deg - No Ice	80.93	21.58	37.47	4222.16	-2429.06	-0.01
Dead+Wind 180 deg - No Ice	80.93	0.00	43.26	4875.16	-0.67	-2.46
Dead+Wind 210 deg - No Ice	80.93	-21.58	37.47	4222.16	2427.72	-4.25
Dead+Wind 240 deg - No Ice	80.93	-37.37	21.63	2438.11	4205.42	-4.91
Dead+Wind 270 deg - No Ice	80.93	-43.15	0.00	1.05	4856.11	-4.25
Dead+Wind 300 deg - No Ice	80.93	-37.37	-21.63	-2436.00	4205.42	-2.45
Dead+Wind 330 deg - No Ice	80.93	-21.58	-37.47	-4220.05	2427.72	0.01
Dead+Ice+Temp	92.58	0.00	0.00	1.91	-0.90	0.00
Dead+Wind 0 deg+Ice+Temp	92.58	0.00	-35.25	-4059.31	-0.93	2.04
Dead+Wind 30 deg+Ice+Temp	92.58	17.58	-30.53	-3515.21	-2024.33	3.61
Dead+Wind 60 deg+Ice+Temp	92.58	30.45	-17.63	-2028.68	-3505.57	4.21
Dead+Wind 90 deg+Ice+Temp	92.58	35.16	0.00	1.96	-4047.75	3.68
Dead+Wind 120 deg+Ice+Temp	92.58	30.45	17.63	2032.61	-3505.57	2.17
Dead+Wind 150 deg+Ice+Temp	92.58	17.58	30.53	3519.14	-2024.33	0.07
Dead+Wind 180 deg+Ice+Temp	92.58	0.00	35.25	4063.25	-0.93	-2.04
Dead+Wind 210 deg+Ice+Temp	92.58	-17.58	30.53	3519.14	2022.48	-3.61
Dead+Wind 240 deg+Ice+Temp	92.58	-30.45	17.63	2032.60	3503.72	-4.21

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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 270 deg+Ice+Temp	92.58	-35.16	0.00	1.96	4045.89	-3.68
Dead+Wind 300 deg+Ice+Temp	92.58	-30.45	-17.63	-2028.68	3503.72	-2.17
Dead+Wind 330 deg+Ice+Temp	92.58	-17.58	-30.53	-3515.21	2022.48	-0.07
Dead+Wind 0 deg - Service	80.93	0.00	-14.97	-1685.64	-0.67	0.85
Dead+Wind 30 deg - Service	80.93	7.47	-12.96	-1459.66	-841.02	1.47
Dead+Wind 60 deg - Service	80.93	12.93	-7.49	-842.29	-1456.19	1.70
Dead+Wind 90 deg - Service	80.93	14.93	0.00	1.05	-1681.36	1.47
Dead+Wind 120 deg - Service	80.93	12.93	7.49	844.40	-1456.19	0.85
Dead+Wind 150 deg - Service	80.93	7.47	12.96	1461.77	-841.02	-0.00
Dead+Wind 180 deg - Service	80.93	0.00	14.97	1687.74	-0.67	-0.85
Dead+Wind 210 deg - Service	80.93	-7.47	12.96	1461.77	839.67	-1.47
Dead+Wind 240 deg - Service	80.93	-12.93	7.49	844.40	1454.85	-1.70
Dead+Wind 270 deg - Service	80.93	-14.93	0.00	1.05	1680.02	-1.47
Dead+Wind 300 deg - Service	80.93	-12.93	-7.49	-842.29	1454.85	-0.85
Dead+Wind 330 deg - Service	80.93	-7.47	-12.96	-1459.66	839.67	0.00

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	0.00	-80.93	0.00	0.00	80.93	0.00	0.000%
2	0.00	-80.93	-43.26	0.00	80.93	43.26	0.000%
3	21.58	-80.93	-37.47	-21.58	80.93	37.47	0.000%
4	37.37	-80.93	-21.63	-37.37	80.93	21.63	0.000%
5	43.15	-80.93	0.00	-43.15	80.93	-0.00	0.000%
6	37.37	-80.93	21.63	-37.37	80.93	-21.63	0.000%
7	21.58	-80.93	37.47	-21.58	80.93	-37.47	0.000%
8	0.00	-80.93	43.26	0.00	80.93	-43.26	0.000%
9	-21.58	-80.93	37.47	21.58	80.93	-37.47	0.000%
10	-37.37	-80.93	21.63	37.37	80.93	-21.63	0.000%
11	-43.15	-80.93	0.00	43.15	80.93	-0.00	0.000%
12	-37.37	-80.93	-21.63	37.37	80.93	21.63	0.000%
13	-21.58	-80.93	-37.47	21.58	80.93	37.47	0.000%
14	0.00	-92.58	0.00	0.00	92.58	0.00	0.000%
15	0.00	-92.58	-35.25	0.00	92.58	35.25	0.000%
16	17.58	-92.58	-30.53	-17.58	92.58	30.53	0.000%
17	30.45	-92.58	-17.63	-30.45	92.58	17.63	0.000%
18	35.16	-92.58	0.00	-35.16	92.58	0.00	0.000%
19	30.45	-92.58	17.63	-30.45	92.58	-17.63	0.000%
20	17.58	-92.58	30.53	-17.58	92.58	-30.53	0.000%
21	0.00	-92.58	35.25	0.00	92.58	-35.25	0.000%
22	-17.58	-92.58	30.53	17.58	92.58	-30.53	0.000%
23	-30.45	-92.58	17.63	30.45	92.58	-17.63	0.000%
24	-35.16	-92.58	0.00	35.16	92.58	0.00	0.000%
25	-30.45	-92.58	-17.63	30.45	92.58	17.63	0.000%
26	-17.58	-92.58	-30.53	17.58	92.58	30.53	0.000%
27	0.00	-80.93	-14.97	0.00	80.93	14.97	0.000%
28	7.47	-80.93	-12.96	-7.47	80.93	12.96	0.000%
29	12.93	-80.93	-7.49	-12.93	80.93	7.49	0.000%
30	14.93	-80.93	0.00	-14.93	80.93	0.00	0.000%
31	12.93	-80.93	7.49	-12.93	80.93	-7.49	0.000%
32	7.47	-80.93	12.96	-7.47	80.93	-12.96	0.000%
33	0.00	-80.93	14.97	0.00	80.93	-14.97	0.000%
34	-7.47	-80.93	12.96	7.47	80.93	-12.96	0.000%
35	-12.93	-80.93	7.49	12.93	80.93	-7.49	0.000%
36	-14.93	-80.93	0.00	14.93	80.93	0.00	0.000%
37	-12.93	-80.93	-7.49	12.93	80.93	7.49	0.000%

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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	
38	-7.47	-80.93	-12.96	7.47	80.93	12.96	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	0.00008180
3	Yes	4	0.00000001	0.00053151
4	Yes	4	0.00000001	0.00040393
5	Yes	4	0.00000001	0.00013532
6	Yes	4	0.00000001	0.00049512
7	Yes	4	0.00000001	0.00045487
8	Yes	4	0.00000001	0.00008186
9	Yes	4	0.00000001	0.00040742
10	Yes	4	0.00000001	0.00054404
11	Yes	4	0.00000001	0.00013526
12	Yes	4	0.00000001	0.00042161
13	Yes	4	0.00000001	0.00045303
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00002055
16	Yes	5	0.00000001	0.00002686
17	Yes	5	0.00000001	0.00002615
18	Yes	5	0.00000001	0.00002064
19	Yes	5	0.00000001	0.00002667
20	Yes	5	0.00000001	0.00002643
21	Yes	5	0.00000001	0.00002059
22	Yes	5	0.00000001	0.00002620
23	Yes	5	0.00000001	0.00002697
24	Yes	5	0.00000001	0.00002062
25	Yes	5	0.00000001	0.00002618
26	Yes	5	0.00000001	0.00002637
27	Yes	4	0.00000001	0.00001606
28	Yes	4	0.00000001	0.00004187
29	Yes	4	0.00000001	0.00003099
30	Yes	4	0.00000001	0.00002243
31	Yes	4	0.00000001	0.00003641
32	Yes	4	0.00000001	0.00003105
33	Yes	4	0.00000001	0.00001609
34	Yes	4	0.00000001	0.00003003
35	Yes	4	0.00000001	0.00004397
36	Yes	4	0.00000001	0.00002240
37	Yes	4	0.00000001	0.00002877
38	Yes	4	0.00000001	0.00003078

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	164 - 131.5	10.300	33	0.4793	0.0026
L2	131.5 - 119.29	7.097	33	0.4520	0.0015

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L3	125.29 - 78.79	6.516	33	0.4410	0.0014
L4	87.21 - 39.88	3.345	33	0.3354	0.0007
L5	49.13 - 1.5	1.127	33	0.2045	0.0003

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.00	Low Profile Platform	33	10.300	0.4793	0.0026	219447
160.00	4 FT DISH	33	9.898	0.4774	0.0025	219447
154.00	Low Profile Platform	33	9.297	0.4743	0.0023	109723
144.00	Low Profile Platform	33	8.305	0.4672	0.0019	54861
134.00	Low Profile Platform	33	7.334	0.4558	0.0016	36606
124.00	Low Profile Platform	33	6.397	0.4385	0.0013	29066
114.00	Low Profile Platform	33	5.500	0.4164	0.0011	25595

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	164 - 131.5	29.733	8	1.3823	0.0076
L2	131.5 - 119.29	20.491	8	1.3048	0.0044
L3	125.29 - 78.79	18.814	8	1.2730	0.0039
L4	87.21 - 39.88	9.659	8	0.9687	0.0020
L5	49.13 - 1.5	3.255	8	0.5907	0.0010

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.00	Low Profile Platform	8	29.733	1.3823	0.0076	76818
160.00	4 FT DISH	8	28.574	1.3770	0.0071	76818
154.00	Low Profile Platform	8	26.840	1.3682	0.0065	38409
144.00	Low Profile Platform	8	23.977	1.3480	0.0055	19204
134.00	Low Profile Platform	8	21.178	1.3155	0.0046	12811
124.00	Low Profile Platform	8	18.471	1.2656	0.0038	10100
114.00	Low Profile Platform	8	15.883	1.1999	0.0032	8886

Compression Checks

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Pole Design Data

Section No.	Elevation ft	Size	L ft	L _a ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
L1	164 - 131.5 (1)	TP53.42x47x0.3125	32.50	162.50	103.4	13.959	52.6760	-13.40	735.30	0.018
L2	131.5 - 119.29 (2)	TP56.15x53.42x0.375	12.21	162.50	100.9	14.665	64.7894	-15.08	950.11	0.016
L3	119.29 - 78.79 (3)	TP62.97x54.0585x0.4375	46.50	162.50	90.2	18.264	84.5934	-32.42	1545.03	0.021
L4	78.79 - 39.88 (4)	TP69.66x60.4813x0.5625	47.33	162.50	81.6	21.155	120.1620	-52.72	2542.07	0.021
L5	39.88 - 1.5 (5)	TP76x66.7412x0.5625	47.63	162.50	72.8	23.922	134.6840	-80.92	3221.92	0.025

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	164 - 131.5 (1)	TP53.42x47x0.3125	357.90	-6.209	36.775	0.169	0.00	0.000	36.775	0.000
L2	131.5 - 119.29 (2)	TP56.15x53.42x0.375	482.98	-6.653	39.000	0.171	0.00	0.000	39.000	0.000
L3	119.29 - 78.79 (3)	TP62.97x54.0585x0.4375	1587.65	-14.972	39.000	0.384	0.00	0.000	39.000	0.000
L4	78.79 - 39.88 (4)	TP69.66x60.4813x0.5625	2937.79	-17.674	39.000	0.453	0.00	0.000	39.000	0.000
L5	39.88 - 1.5 (5)	TP76x66.7412x0.5625	4875.16	-23.325	39.000	0.598	0.00	0.000	39.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio P P _a	Ratio f _{bx} F _{bx}	Ratio f _{by} F _{by}	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	164 - 131.5 (1)	TP53.42x47x0.3125	0.018	0.169	0.000	0.187 ✓	1.333	H1-3 ✓
L2	131.5 - 119.29 (2)	TP56.15x53.42x0.375	0.016	0.171	0.000	0.186 ✓	1.333	H1-3 ✓
L3	119.29 - 78.79 (3)	TP62.97x54.0585x0.4375	0.021	0.384	0.000	0.405 ✓	1.333	H1-3 ✓
L4	78.79 - 39.88 (4)	TP69.66x60.4813x0.5625	0.021	0.453	0.000	0.474 ✓	1.333	H1-3 ✓
L5	39.88 - 1.5 (5)	TP76x66.7412x0.5625	0.025	0.598	0.000	0.623 ✓	1.333	H1-3 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
L1	164 - 131.5	Pole	TP53.42x47x0.3125	1	-13.40	980.15	14.0	Pass
L2	131.5 - 119.29	Pole	TP56.15x53.42x0.375	2	-15.08	1266.50	14.0	Pass
L3	119.29 - 78.79	Pole	TP62.97x54.0585x0.4375	3	-32.42	2059.52	30.4	Pass
L4	78.79 - 39.88	Pole	TP69.66x60.4813x0.5625	4	-52.72	3388.58	35.6	Pass

<i>RISATower</i> <i>NATCOMM</i> 63-2 North Branford Road Branford, CT 06405 Phone: 203.488.0580 FAX: 203.488.8587	Job	164' EEI Monopole - Greenwich Hospital - Rev.1	Page	21 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	16:10:01 04/19/10
	Client	Verizon Wireless	Designed by	TJL

<i>Section No.</i>	<i>Elevation ft</i>	<i>Component Type</i>	<i>Size</i>	<i>Critical Element</i>	<i>P K</i>	<i>SF*P_{allow} K</i>	<i>% Capacity</i>	<i>Pass Fail</i>
L5	39.88 - 1.5	Pole	TP76x66.7412x0.5625	5	-80.92	4294.82	46.8	Pass
							Summary	
							Pole (L5)	Pass
							RATING = 46.8	Pass

Program Version 5.3.1.0 - 10/3/2008 File:J:\Jobs\1000100.WI\CO4 - Greenwich Hospital; 5 Perryridge Rd., Greenwich, CT/Rev (1)/Calcs/ERI Files\164 EEI Monopole Greenwich.eri



Subject:

Anchor Bolt and Baseplate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 1: 4/19/10

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001. CO4

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 4875-ft-kips	(Input From RisaTower)
Shear Force =	Shear := 43-kips	(Input From RisaTower)
Axial Force =	Axial := 81-kips	(Input From RisaTower)

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts =	N := 30	(User Input)
Diameter of Bolt Circle =	$D_{bc} := 86.00\text{-in}$	(User Input)
Bolt "Column" Distance =	$l := 3.0\text{-in}$	(User Input)
Bolt Ultimate Strenght =	$F_u := 100\text{-ksi}$	(User Input)
Bolt Yeild Strenght =	$F_y := 75\text{-ksi}$	(User Input)
Bolt Modulus =	$E := 29000\text{-ksi}$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25\text{-in}$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)

Base Plate Data:

Use ASTM A572 GR 60

Plate Yield Strength =	$F_{y_{bp}} := 60\text{-ksi}$	(User Input)
Base Plate Thickness =	$t_{bp} := 3.0\text{-in}$	(User Input)
Base Plate Diameter =	$D_{bp} := 92.00\text{-in}$	(User Input)
Outer Pole Diameter =	$D_{pole} := 76.00\text{-in}$	(User Input)

Subject:

Anchor Bolt and Baseplate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 1: 4/19/10

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001. CO4

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 43 \cdot \text{in}$

Distance to Bolts = $i := 1 \dots N$

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

$d_1 = 8.94 \cdot \text{in}$	$d_7 = 42.76 \cdot \text{in}$
$d_2 = 17.49 \cdot \text{in}$	$d_8 = 42.76 \cdot \text{in}$
$d_3 = 25.27 \cdot \text{in}$	$d_9 = 40.90 \cdot \text{in}$
$d_4 = 31.96 \cdot \text{in}$	$d_{10} = 37.24 \cdot \text{in}$
$d_5 = 37.24 \cdot \text{in}$	$d_{11} = 31.96 \cdot \text{in}$
$d_6 = 40.90 \cdot \text{in}$	etc.

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 38 \cdot \text{in}$

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

$MA_1 = 0.00 \cdot \text{in}$	$MA_7 = 4.76 \cdot \text{in}$
$MA_2 = 0.00 \cdot \text{in}$	$MA_8 = 4.76 \cdot \text{in}$
$MA_3 = 0.00 \cdot \text{in}$	$MA_9 = 2.90 \cdot \text{in}$
$MA_4 = 0.00 \cdot \text{in}$	$MA_{10} = 0.00 \cdot \text{in}$
$MA_5 = 0.00 \cdot \text{in}$	$MA_{11} = 0.00 \cdot \text{in}$
$MA_6 = 2.90 \cdot \text{in}$	etc

Effective Width of Baseplate for Bending =

$$B_{eff} := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2} \right)^2 - \left(\frac{D_{pole}}{2} \right)^2} = 41.5 \cdot \text{in}$$

Subject:

Anchor Bolt and Baseplate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 1: 4/19/10

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001. CO4

Anchor Bolt Analysis:

Calculated Anchor Bolt Properties:

Polar Moment of Inertia =

$$I_p := \sum_i (d_i)^2 = 2.773 \times 10^4 \cdot \text{in}^2$$

Gross Area of Bolt =

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

Net Area of Bolt =

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

Net Diameter =

$$D_n := \frac{2 \cdot \sqrt{A_n}}{\sqrt{\pi}} = 2.033 \cdot \text{in}$$

Radius of Gyration of Bolt =

$$r := \frac{D_n}{4} = 0.508 \cdot \text{in}$$

Section Modulus of Bolt =

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

Check Anchor Bolt Tension Force:

Maximum Tensile Force =

$$T_{\text{Max}} := \text{OM} \cdot \frac{R_{bc}}{I_p} - \frac{\text{Axial}}{N} = 88 \cdot \text{kips}$$

Allowable Tensile Force =

$$T_{\text{ALL.Gross}} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 174.9 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

$$T_{\text{ALL.Net}} := 1.333 \cdot (0.60 \cdot A_n \cdot F_y) = 194.812 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Bolt Tension % of Capacity =

$$\frac{T_{\text{Max}}}{T_{\text{ALL.Net}}} = 45.2\% \quad \text{Bolts are "upset bolts". Use net area per AISC}$$

Condition1 =

$$\text{Condition1} := \text{if} \left(\frac{T_{\text{Max}}}{T_{\text{ALL.Net}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

Condition1 = "OK"

Check Anchor Bolt Bending Stress:

Maximum Bending Moment =

$$M_x := \left(\frac{\text{Shear}}{N} \right) \cdot l = 0.358 \cdot \text{ft} \cdot \text{kips}$$

Maximum Bending Stress =

$$f_{bx} := \frac{M_x}{S_x} = 5.2 \cdot \text{ksi}$$

Allowable Bending Stress =

$$F_{bx} := 1.333 \cdot 0.6 \cdot F_y = 60 \cdot \text{ksi} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Check Combined Stress Requirement:

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.

$$l := \begin{cases} l & \text{if } l > 2 \cdot D_n = 0 \cdot \text{in} \\ 0 & \text{otherwise} \end{cases}$$

$$f_{bx} := \begin{cases} f_{bx} & \text{if } l > 2 \cdot D_n = 0 \cdot \text{ksi} \\ 0 & \text{otherwise} \end{cases}$$

Check Anchor Bolt Compression/Combined Stress:

Maximum Compressive Force =

$$C_{\text{Max}} := 0M \cdot \frac{R_{bc}}{I_p} + \frac{\text{Axial}}{N} = 93.4 \cdot \text{kips}$$

Maximum Compressive Stress =

$$f_a := \frac{C_{\text{Max}}}{A_n} = 28.8 \cdot \text{ksi}$$

$$K := 0.65$$

$$C_c := \sqrt{\frac{2 \cdot \pi^2 \cdot E}{F_y}} = 87.364$$

$$F_a := \begin{cases} \frac{\left[1 - \frac{\left(\frac{K \cdot l}{r} \right)^2}{2 \cdot C_c^2} \right] \cdot F_y}{\frac{5}{3} + \frac{3 \cdot \left(\frac{K \cdot l}{r} \right)}{8 \cdot C_c} - \frac{\left(\frac{K \cdot l}{r} \right)^3}{8 \cdot C_c^3}} \cdot F_y & \text{if } \frac{K \cdot l}{r} \leq C_c = 45 \cdot \text{ksi} \\ \frac{12 \cdot \pi^2 \cdot E}{23 \cdot \left(\frac{K \cdot l}{r} \right)^2} & \text{if } \frac{K \cdot l}{r} > C_c \end{cases}$$

Allowable Compressive Stress =

$$F_a := 1.333 \cdot F_a = 60 \cdot \text{ksi} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Combined Stress % of Capacity =

$$\left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \right) = 47.9 \cdot \%$$

Condition 2 =

$$\text{Condition2} := \text{if } \left(\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

Condition2 = "OK"

Subject:

Anchor Bolt and Baseplate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 1: 4/19/10

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001. CO4

Base Plate Analysis:

Force from Bolts =

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

$$C_1 = 21.6 \text{ kips}$$

$$C_7 = 92.9 \text{ kips}$$

$$C_2 = 39.6 \text{ kips}$$

$$C_8 = 92.9 \text{ kips}$$

$$C_3 = 56.0 \text{ kips}$$

$$C_9 = 89.0 \text{ kips}$$

$$C_4 = 70.1 \text{ kips}$$

$$C_{10} = 81.2 \text{ kips}$$

$$C_5 = 81.2 \text{ kips}$$

$$C_{11} = 70.1 \text{ kips}$$

$$C_6 = 89.0 \text{ kips}$$

etc.

Maximum Bending Stress in Plate =

$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot M A_i}{(B_{eff} t_{bp})^2} = 22.5 \text{ ksi}$$

Allowable Bending Stress in Plate =

$$F_{bp} := 1.33 \cdot 0.75 \cdot F_y = 59.9 \text{ ksi}$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} = 37.6 \%$$

Condition3 =

$$\text{Condition3} := \text{if} \left(\frac{f_{bp}}{F_{bp}} < 1.00, \text{"Ok"}, \text{"Overstressed"} \right)$$

Condition3 = "Ok"



Subject:

Flange Bolt and Plate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 1: 4/19/10

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001. CO4

Flange Bolt and Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	OM := 358-ft-kips	(Input From RisaTower)
Shear Force =	Shear := 20-kips	(Input From RisaTower)
Axial Force =	Axial := 19-kips	(Input From RisaTower)

Flange Bolt Data:

Use ASTM A325

Number of Flange Bolts =	N := 12	(User Input)
Diameter of Bolt Circle =	D _{bc} := 58.00-in	(User Input)
Bolt Ultimate Strenght =	F _u := 120-ksi	(User Input)
Bolt Yeild Strenght =	F _y := 92-ksi	(User Input)
Bolt Modulus =	E := 29000-ksi	(User Input)
Diameter of Flange Bolts =	D := 1.00-in	(User Input)

Flange Plate Data:

Use ASTM A36

Plate Yield Strength =	F _{ybp} := 36.00-ksi	(User Input)
Flange Plate Thickness =	t _{bp} := 1.00-in	(User Input)
Flange Plate Diameter =	D _{bp} := 61.00-in	(User Input)
Outer Pole Diameter =	D _{pole} := 53.42-in	(User Input)

Subject:

Flange Bolt and Plate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 1: 4/19/10

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001. CO4

Geometric Layout Data:

Distance from Bolts to Centroid of Pole:

Radius of Bolt Circle =: $R_{bc} := \frac{D_{bc}}{2} = 29\text{-in}$

Distance to Bolts = $i := 1 \dots N$

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

$d_1 = 14.50\text{-in}$	$d_7 = -14.50\text{-in}$
$d_2 = 25.11\text{-in}$	$d_8 = -25.11\text{-in}$
$d_3 = 29.00\text{-in}$	$d_9 = -29.00\text{-in}$
$d_4 = 25.11\text{-in}$	$d_{10} = -25.11\text{-in}$
$d_5 = 14.50\text{-in}$	$d_{11} = -14.50\text{-in}$
$d_6 = 0.00\text{-in}$	etc.

Critical Distances For Bending in Plate:

Outer Pole Radius = $R_{pole} := \frac{D_{pole}}{2} = 26.7\text{-in}$

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

$MA_1 = 0.00\text{-in}$	$MA_7 = 0.00\text{-in}$
$MA_2 = 0.00\text{-in}$	$MA_8 = 0.00\text{-in}$
$MA_3 = 2.29\text{-in}$	$MA_9 = 0.00\text{-in}$
$MA_4 = 0.00\text{-in}$	$MA_{10} = 0.00\text{-in}$
$MA_5 = 0.00\text{-in}$	$MA_{11} = 0.00\text{-in}$
$MA_6 = 0.00\text{-in}$	etc

Effective Width of Plate for Bending =

$$B_{eff} := .8 \cdot \sqrt{\left(\frac{D_{bp}}{2} \right)^2 - \left(\frac{D_{pole}}{2} \right)^2} = 23.6\text{-in}$$

Subject:

Flange Bolt and Plate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 1: 4/19/10

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001. CO4

Flange Bolt Analysis:

Calculated Flange Bolt Properties:

Polar Moment of Inertia =

$$I_p := \sum_i (d_i)^2 = 5.046 \times 10^3 \cdot \text{in}^2$$

Gross Area of Bolt =

$$A_g := \frac{\pi}{4} \cdot D^2 = 0.785 \cdot \text{in}^2$$

Check Flange Bolt Tension Force:

Maximum Tensile Force =

$$T_{\text{Max}} := \text{OM} \cdot \frac{R_{bc}}{I_p} - \frac{\text{Axial}}{N} = 23.1 \cdot \text{kips}$$

Allowable Tensile Force =

$$T_{\text{ALL.Gross}} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 41.5 \cdot \text{kips} \quad (1.333 \text{ increase allowed per TIA/EIA})$$

Bolt Tension % of Capacity =

$$\frac{T_{\text{Max}}}{T_{\text{ALL.Gross}}} = 55.7\%$$

Condition1 =

$$\text{Condition1} := \text{if} \left(\frac{T_{\text{Max}}}{T_{\text{ALL.Gross}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

Condition1 = "OK"

Subject:

Flange Bolt and Plate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 1: 4/19/10

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 10001. CO4

Flange Plate Analysis:

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

$C_1 = 13.9 \cdot \text{kips}$

$C_7 = -10.8 \cdot \text{kips}$

$C_2 = 23.0 \cdot \text{kips}$

$C_8 = -19.8 \cdot \text{kips}$

$C_3 = 26.3 \cdot \text{kips}$

$C_9 = -23.1 \cdot \text{kips}$

$C_4 = 23.0 \cdot \text{kips}$

$C_{10} = -19.8 \cdot \text{kips}$

$C_5 = 13.9 \cdot \text{kips}$

$C_{11} = -10.8 \cdot \text{kips}$

$C_6 = 1.6 \cdot \text{kips}$

etc.

Maximum Bending Stress in Plate = $f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{(B_{eff} t_{bp})^2} = 15.3 \cdot \text{ksi}$

Allowable Bending Stress in Plate = $F_{bp} := 1.33 \cdot 0.75 \cdot F_{y_{bp}} = 35.9 \cdot \text{ksi}$

Plate Bending Stress % of Capacity = $\frac{f_{bp}}{F_{bp}} = 42.7 \cdot \%$

Condition3 = $\text{Condition2} := \text{if} \left(\frac{f_{bp}}{F_{bp}} < 1.00, "Ok", "Overstressed" \right)$

Condition2 = "Ok"

Subject:

CAISSON FOUNDATION

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 1: 4/19/10

Prepared by: TJL Checked by: C.F.C.

Caisson Foundation:

Input Data:

Shear Force =	$S := 43.3k$	USER INPUT-FROM RISATower
Overturning Moment =	$M := 4875ft \cdot k$	USER INPUT-FROM RISATower
Applied Axial Load =	$A1 := 81.0k$	USER INPUT-FROM RISATower
Bending Moment =	$Mu := 5106ft \cdot k$	USER INPUT-FROM LPILE
Moment Capacity =	$Mn := 12301ft \cdot k$	USER INPUT-FROM LPILE
Foundation Diameter =	$d := 9.0ft$	USER INPUT
Overall Length of Caisson =	$L_c := 28.0ft$	USER INPUT
Depth From Top of Caisson to Grade =	$L_{pag} := 1.0ft$	USER INPUT
Number of Rebar =	$n := 33$	USER INPUT
Area of Rebar =	$Ar := 1.560in^2$	USER INPUT
Rebar Yield Strength =	$fy := 60ksi$	USER INPUT
Concrete Comp Strength =	$f'c := 3ksi$	USER INPUT

Check Foundation Depth:

Depth of Caisson Below Ground Level = $LD := L_c - L_{pag} = 27ft$ (TIA/EIA-222-F 7.2.5)

Depth Required = $LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d} \right) + 2ft^5 \left(\frac{M \cdot ft}{3 \cdot kd} + \frac{S \cdot ft}{2k} + \frac{S^2 \cdot ft^3}{18k^2 \cdot d^2} \right)^{.5} = 32.13ft$

DepthCheck := if($LD1 \leq LD$, "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.

Check Moment Capacity:

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

Factor of Safety Required = $FS_{reqd} := 1.3$

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

FOSCheck = "OK"

Check Axial Capacity:

Concrete Weight = $A2 := .150 \frac{k}{ft^3} \cdot LD \cdot \pi \frac{d^2}{4} = 257.6 \cdot kips$

Total Axial Load = $AT := A1 + A2 = 338.6 \cdot kips$

Area of Concrete = $Ag := \pi \frac{d^2}{4} = 63.62ft^2$

Axial Capacity = $Po := n \cdot Ar \cdot fy + (Ag - n \cdot Ar) \cdot 0.85 \cdot f'c = 26317.8 \cdot kips$

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

AxialCheck = "OK"

Greenwich Hospiatl Caisson Analysis.lpo

LPILE Plus for Windows, Version 5.0 (5.0.39)

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

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Staff
Natcomm, Inc.

Path to file locations: J:\Jobs\1000100.WI\C04 - Greenwich Hospital; 5
Perryridge Rd., Greenwich, CT\Rev (1)\Calcs\Foundation\
Name of input data file: Greenwich Hospiatl Caisson Analysis.lpd
Name of output file: Greenwich Hospiatl Caisson Analysis.lpo
Name of plot output file: Greenwich Hospiatl Caisson Analysis.lpp
Name of runtime file: Greenwich Hospiatl Caisson Analysis.lpr

Time and Date of Analysis

Date: April 19, 2010 Time: 16:44:35

Problem Title

Greenwich Hospital - Rev.1

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:

- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:

- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:

Greenwich Hospital Caisson Analysis.lpo

- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-04 in
- 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) = 8

Pile Structural Properties and Geometry

Pile Length = 336.00 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	0.0000	108.00000	6678285.	9160.9000	3600000.
2	336.0000	108.00000	6678285.	9160.9000	3600000.

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 = 20.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 20.000 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 = 72.000 in
 p-y subgrade modulus k for top of soil layer = 90.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 90.000 lbs/in**3

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

Distance from top of pile to top of layer = 72.000 in
 Distance from top of pile to bottom of layer = 132.000 in
 p-y subgrade modulus k for top of soil layer = 150.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 150.000 lbs/in**3

Layer 4 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 132.000 in

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Distance from top of pile to bottom of layer = 360.000 in
p-y subgrade modulus k for top of soil layer = 250.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 250.000 lbs/in**3

(Depth of lowest layer extends 24.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	12.00	.05800
2	48.00	.05800
3	48.00	.06900
4	72.00	.06900
5	72.00	.06900
6	132.00	.06900
7	132.00	.07500
8	360.00	.07500

Shear Strength of Soils

Shear strength parameters with depth defined using 8 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	12.000	.00000	20.00	-----	-----
2	48.000	.00000	20.00	-----	-----
3	48.000	.00000	30.00	-----	-----
4	72.000	.00000	30.00	-----	-----
5	72.000	.00000	35.00	-----	-----
6	132.000	.00000	35.00	-----	-----
7	132.000	.00000	42.00	-----	-----
8	360.000	.00000	42.00	-----	-----

Notes:

- (1) Cohesion = uniaxial compressive strength for rock materials.
- (2) Values of E50 are reported for clay strata.
- (3) Default values will be generated for E50 when input values are 0.
- (4) RQD and k_rm are reported only for weak rock strata.

Loading Type

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 = 1

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)

Shear force at pile head = 43263.000 lbs

Bending moment at pile head = 58501948.000 in-lbs

Axial load at pile head = 80928.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 108.0000 in

Material Properties:

Compressive Strength of Concrete = 3.000 kip/in**2

Yield Stress of Reinforcement = 60. kip/in**2

Modulus of Elasticity of Reinforcement = 29000. kip/in**2

Number of Reinforcing Bars = 33

Area of Single Bar = 1.56000 in**2

Number of Rows of Reinforcing Bars = 33

Area of Steel = 51.480 in**2

Area of Shaft = 9160.884 in**2

Percentage of Steel Reinforcement = .562 percent

Cover Thickness (edge to bar center) = 4.000 in

Unfactored Axial Squash Load Capacity = 26317.78 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.560	49.943
2	1.560	49.491
3	1.560	48.591
4	1.560	47.250
5	1.560	45.482
6	1.560	43.301
7	1.560	40.729
8	1.560	37.787

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9	1.560	34.504
10	1.560	30.908
11	1.560	27.032
12	1.560	22.911
13	1.560	18.583
14	1.560	14.087
15	1.560	9.463
16	1.560	4.753
17	1.560	0.000
18	1.560	-4.753
19	1.560	-9.463
20	1.560	-14.087
21	1.560	-18.583
22	1.560	-22.911
23	1.560	-27.032
24	1.560	-30.908
25	1.560	-34.504
26	1.560	-37.787
27	1.560	-40.729
28	1.560	-43.301
29	1.560	-45.482
30	1.560	-47.250
31	1.560	-48.591
32	1.560	-49.491
33	1.560	-49.943

Axial Thrust Force = 80928.00 lbs

Bending Max. Steel Moment Stress in-lbs psi	Bending Stiffness lb-in ²	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi
11414133.	2.282827E+13	5.000000E-07	.00002978	59.56674832	91.54594535
804.89667					
22713329.	2.271333E+13	.00000100	.00005691	56.91059214	173.34934
1532.76481					
33889213.	2.259281E+13	.00000150	.00008400	56.00006157	253.65591
2259.53914					
44950041.	2.247502E+13	.00000200	.00011117	55.58276671	332.80531
2988.51575					
55888739.	2.235550E+13	.00000250	.00013827	55.30957407	410.40209
3715.83822					
55888739.	1.862958E+13	.00000300	.00008460	28.19899088	251.40454
6589.76072					
55888739.	1.596821E+13	.00000350	.00009682	27.66344923	286.47875
7742.41165					
55888739.	1.397218E+13	.00000400	.00010906	27.26537293	321.32547
8894.64731					
55888739.	1.241972E+13	.00000450	.00012150	26.99999839	356.48342
10041.10960					
55888739.	1.117775E+13	.00000500	.00013384	26.76777273	391.07315
11190.46116					
55888739.	1.016159E+13	.00000550	.00014606	26.55614001	425.04598
12343.26270					
55888739.	9.314790E+12	.00000600	.00015829	26.38237792	458.79385
13495.61209					
55888739.	8.598268E+12	.00000650	.00017055	26.23776394	492.31600
14647.50617					

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55888739.	7.984106E+12	.00000700	.00018281	26.11606354	525.61158	
15798.94260						
55888739.	7.451832E+12	.00000750	.00019510	26.01271266	558.67989	
16949.91731						
55888739.	6.986092E+12	.00000800	.00020739	25.92428344	591.52011	
18100.42738						
55888739.	6.575146E+12	.00000850	.00021971	25.84815592	624.13144	
19250.46952						
55888739.	6.209860E+12	.00000900	.00023204	25.78228945	656.51300	
20400.04123						
55888739.	5.883025E+12	.00000950	.00024439	25.72508115	688.66410	
21549.13774						
55888739.	5.588874E+12	.00001000	.00025675	25.67524356	720.58392	
22697.75579						
55888739.	5.322737E+12	.00001050	.00026913	25.63173062	752.27149	
23845.89327						
55888739.	5.080794E+12	.00001100	.00028153	25.59369260	783.72602	
24993.54612						
55888739.	4.859890E+12	.00001150	.00029394	25.56042784	814.94673	
26140.71019						
55888739.	4.657395E+12	.00001200	.00030638	25.53134733	845.93267	
27287.38283						
55888739.	4.471099E+12	.00001250	.00031882	25.50596184	876.68308	
28433.55936						
55888739.	4.299134E+12	.00001300	.00033129	25.48385614	907.19711	
29579.23558						
55888739.	4.139907E+12	.00001350	.00034377	25.46466976	937.47370	
30724.40995						
56843995.	4.060285E+12	.00001400	.00035627	25.44810015	967.51197	
31869.07832						
58755104.	4.052076E+12	.00001450	.00036879	25.43389302	997.31130	
33013.23379						
60664008.	4.044267E+12	.00001500	.00038133	25.42181021	1026.87037	
34156.87719						
62570723.	4.036821E+12	.00001550	.00039388	25.41166502	1056.18863	
35300.00002						
64475215.	4.029701E+12	.00001600	.00040645	25.40327722	1085.26487	
36442.60164						
66377479.	4.022878E+12	.00001650	.00041904	25.39649874	1114.09828	
37584.67644						
68277497.	4.016323E+12	.00001700	.00043165	25.39119440	1142.68784	
38726.22107						
70175263.	4.010015E+12	.00001750	.00044428	25.38724834	1171.03268	
39867.23020						
72070748.	4.003930E+12	.00001800	.00045692	25.38455111	1199.13165	
41007.70187						
73963959.	3.998052E+12	.00001850	.00046959	25.38301581	1226.98402	
42147.62839						
75854861.	3.992361E+12	.00001900	.00048227	25.38255233	1254.58853	
43287.00886						
77743452.	3.986844E+12	.00001950	.00049497	25.38308984	1281.94433	
44425.83671						
81513638.	3.976275E+12	.00002050	.00052043	25.38690394	1335.90567	
46701.81726						
85274382.	3.966250E+12	.00002150	.00054597	25.39399141	1388.85955	
48975.53565						
89025556.	3.956691E+12	.00002250	.00057159	25.40397245	1440.79740	
51246.95492						
92767047.	3.947534E+12	.00002350	.00059729	25.41653806	1491.71067	
53516.03389						
96498707.	3.938723E+12	.00002450	.00062307	25.43142432	1541.59023	
55782.73525						
1.002204E+08	3.930212E+12	.00002550	.00064893	25.44841558	1590.42700	

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1.038939E+08	3.920523E+12	.00002650	.00067480	25.46409363	1638.05014
60000.00000					
1.067946E+08	3.883440E+12	.00002750	.00069901	25.41842419	1681.42061
60000.00000					
1.092256E+08	3.832477E+12	.00002850	.00072219	25.34007257	1721.89990
60000.00000					
1.113455E+08	3.774423E+12	.00002950	.00074469	25.24362892	1760.20364
60000.00000					
1.135610E+08	3.723312E+12	.00003050	.00076860	25.20000011	1800.02423
60000.00000					
1.149654E+08	3.649694E+12	.00003150	.00079062	25.09893769	1835.65717
60000.00000					
1.165353E+08	3.585702E+12	.00003250	.00081156	24.97098666	1868.67235
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1.179037E+08	3.519513E+12	.00003350	.00083192	24.83348590	1899.99116
60000.00000					
1.192312E+08	3.455977E+12	.00003450	.00085221	24.70173043	1930.45391
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1.215394E+08	3.329846E+12	.00003650	.00089178	24.43243557	1987.70589
60000.00000					
1.225242E+08	3.267312E+12	.00003750	.00091104	24.29441983	2014.52623
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1.252290E+08	3.092074E+12	.00004050	.00096815	23.90487295	2090.16757
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1.281639E+08	2.880087E+12	.00004450	.00104223	23.42086834	2179.59793
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1.288288E+08	2.831402E+12	.00004550	.00106470	23.39999861	2205.03779
60000.00000					
1.295460E+08	2.785936E+12	.00004650	.00108310	23.29240555	2225.00785
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1.300797E+08	2.738521E+12	.00004750	.00110038	23.16585785	2243.16503
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1.306114E+08	2.693018E+12	.00004850	.00111769	23.04518098	2260.83387
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1.311408E+08	2.649309E+12	.00004950	.00113504	22.93002087	2278.01142
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1.321303E+08	2.565637E+12	.00005150	.00116945	22.70777947	2310.52344
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1.325553E+08	2.524863E+12	.00005250	.00118631	22.59639484	2325.67944
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1.329784E+08	2.485577E+12	.00005350	.00120320	22.48973840	2340.36731
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1.333995E+08	2.447697E+12	.00005450	.00122012	22.38755268	2354.58435
60000.00000					
1.338186E+08	2.411146E+12	.00005550	.00123707	22.28959948	2368.32789
60000.00000					
1.342357E+08	2.375854E+12	.00005650	.00125405	22.19565994	2381.59534
60000.00000					

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1.345770E+08 60000.00000	2.340470E+12	.00005750	.00127057	22.09691173	2393.99827
1.349098E+08 60000.00000	2.306150E+12	.00005850	.00128707	22.00126308	2405.91472
1.352407E+08 60000.00000	2.272953E+12	.00005950	.00130360	21.90931910	2417.37870
1.358971E+08 60000.00000	2.209709E+12	.00006150	.00133675	21.73583704	2438.93924
1.367504E+08 60000.00000	2.153550E+12	.00006350	.00137160	21.60000032	2459.59723
1.371990E+08 60000.00000	2.094641E+12	.00006550	.00141019	21.52957946	2480.09592
1.376805E+08 60000.00000	2.039711E+12	.00006750	.00144129	21.35246998	2494.54147
1.381560E+08 60000.00000	1.987857E+12	.00006950	.00147251	21.18715042	2507.36209
1.386255E+08 60000.00000	1.938819E+12	.00007150	.00150384	21.03266162	2518.53951
1.390650E+08 60000.00000	1.892041E+12	.00007350	.00153503	20.88473564	2527.98150
1.394188E+08 60000.00000	1.846606E+12	.00007550	.00156549	20.73502332	2535.57166
1.397670E+08 60000.00000	1.803445E+12	.00007750	.00159607	20.59444231	2541.58333
1.401096E+08 60000.00000	1.762384E+12	.00007950	.00162675	20.46232313	2545.99844
1.404464E+08 60000.00000	1.723268E+12	.00008150	.00165755	20.33806068	2548.79850
1.407773E+08 60000.00000	1.685956E+12	.00008350	.00168846	20.22111422	2549.96459
1.410699E+08 60000.00000	1.649940E+12	.00008550	.00171916	20.10710961	2545.99137
1.413065E+08 60000.00000	1.614932E+12	.00008750	.00174931	19.99209756	2541.01847
1.415407E+08 60000.00000	1.581460E+12	.00008950	.00177957	19.88346165	2543.55145
1.415407E+08 60000.00000	1.546893E+12	.00009150	.00181170	19.79999882	2547.09008
1.417490E+08 60000.00000	1.516032E+12	.00009350	.00185130	19.79999882	2549.59126
1.423513E+08 60000.00000	1.490589E+12	.00009550	.00188523	19.74060827	2548.59261
1.425577E+08 60000.00000	1.462130E+12	.00009750	.00191465	19.63742155	2544.37926
1.427627E+08 60000.00000	1.434801E+12	.00009950	.00194416	19.53927201	2540.15038
1.429564E+08 60000.00000	1.408438E+12	.00010150	.00197357	19.44401282	2539.77626
1.431008E+08 60000.00000	1.382616E+12	.00010350	.00200213	19.34427005	2543.30559
1.432439E+08 60000.00000	1.357762E+12	.00010550	.00203078	19.24909455	2546.10068
1.433858E+08 60000.00000	1.333821E+12	.00010750	.00205951	19.15824813	2548.15220
1.435264E+08 60000.00000	1.310743E+12	.00010950	.00208833	19.07150227	2549.45044
1.436657E+08 60000.00000	1.288482E+12	.00011150	.00211723	18.98864776	2549.98551
1.438017E+08 60000.00000	1.266975E+12	.00011350	.00214633	18.91039592	2547.15396
1.439364E+08 60000.00000	1.246202E+12	.00011550	.00217551	18.83561057	2543.61371
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60000.00000					
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60000.00000					
1.446387E+08	1.134421E+12	.00012750	.00234961	18.42828387	2544.81837
60000.00000					
1.447291E+08	1.117599E+12	.00012950	.00237821	18.36458033	2546.84171
60000.00000					
1.448188E+08	1.101284E+12	.00013150	.00240688	18.30326825	2548.37148
60000.00000					
1.449079E+08	1.085452E+12	.00013350	.00243561	18.24424142	2549.40211
60000.00000					
1.449963E+08	1.070084E+12	.00013550	.00246439	18.18740970	2549.92799
60000.00000					
1.450831E+08	1.055150E+12	.00013750	.00249331	18.13314646	2548.64882
60000.00000					
1.451683E+08	1.040633E+12	.00013950	.00252234	18.08128113	2545.76670
60000.00000					
1.455127E+08	1.014026E+12	.00014350	.00258300	18.00000054	2539.54654
60000.00000					
1.466286E+08	9.940921E+11	.00014750	.00265500	18.00000054	2531.33751
60000.00000					
1.476109E+08	9.743296E+11	.00015150	.00272700	18.00000054	2536.11274
60000.00000					
1.476109E+08	9.492664E+11	.00015550	.00279161	17.95249325	2542.59046
60000.00000					
1.476109E+08	9.254604E+11	.00015950	.00284904	17.86230022	2546.22982
60000.00000					
1.476109E+08	9.028191E+11	.00016350	.00290562	17.77137655	2548.58970
60000.00000					
1.476109E+08	8.812593E+11	.00016750	.00296239	17.68590206	2549.81715
60000.00000					
1.476109E+08	8.607051E+11	.00017150	.00302048	17.61214668	2547.89887
60000.00000					
1.476109E+08	8.410879E+11	.00017550	.00307948	17.54688531	2543.23389
60000.00000					
1.476109E+08	8.223450E+11	.00017950	.00313859	17.48519665	2538.54800
60000.00000					
1.476109E+08	8.044192E+11	.00018350	.00319783	17.42685860	2533.84083
60000.00000					
1.476109E+08	7.872583E+11	.00018750	.00325719	17.37167484	2529.11178
60000.00000					
1.476109E+08	7.708143E+11	.00019150	.00331668	17.31946188	2524.36038
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1.476109E+08	7.550431E+11	.00019550	.00337630	17.27005559	2519.58600
60000.00000					
1.476109E+08	7.399044E+11	.00019950	.00343701	17.22813910	2525.91152
60000.00000					
1.476109E+08	7.253608E+11	.00020350	.00349848	17.19154626	2532.13975
60000.00000					
1.476109E+08	7.113780E+11	.00020750	.00356013	17.15723544	2537.47803
60000.00000					
1.476109E+08	6.979240E+11	.00021150	.00362130	17.12199765	2541.78712
60000.00000					
1.476109E+08	6.849695E+11	.00021550	.00368094	17.08094698	2544.97865
60000.00000					
1.476109E+08	6.724872E+11	.00021950	.00374074	17.04210430	2547.40472
60000.00000					

Greenwich Hospital Caisson Analysis.lpo
1.476109E+08 6.604516E+11 .00022350 .00380070 17.00537306 2549.04722
60000.00000

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 147610.93014
in-kip

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 = 43263.000 lbs
Specified moment at pile head = 58501948.000 in-lbs
Specified axial load at pile head = 80928.000 lbs

Non-zero moment for this load case indicates the pile-head may rotate under
the applied pile-head loading, but is not a free-head (zero moment)condition.

Depth Es* F/L	Deflect. X 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
Y							
0.000	.563464	5.85E+07	43263.	-.003852	481.875	4.05E+12	0.000
0.000							
26.880	.465181	5.97E+07	42182.	-.003460	491.300	4.05E+12	-138.438
999.936							
53.760	.377545	6.07E+07	33828.	-.003060	499.895	4.04E+12	-777.981
6923.717							
80.640	.300752	6.13E+07	1177.278	-.002654	504.242	4.04E+12	-1745.676
19503.							
107.520	.234892	6.06E+07	-58955.	-.002248	498.481	4.04E+12	-2632.089
37651.							
134.400	.179820	5.80E+07	-1.33E+05	-.001853	477.837	4.06E+12	-3408.967
63698.							
161.280	.132953	5.32E+07	-2.26E+05	-.001697	438.877	2.24E+13	-3413.931
86277.							
188.160	.088164	4.59E+07	-3.11E+05	-.001637	380.243	2.25E+13	-2856.291
1.09E+05							
215.040	.044846	3.66E+07	-3.75E+05	-.001588	305.181	2.26E+13	-1754.268
1.31E+05							
241.920	.002699	2.61E+07	-4.01E+05	-.001550	220.122	2.27E+13	-123.726
1.54E+05							
268.800	-.038615	1.56E+07	-3.76E+05	-.001526	134.590	2.28E+13	2029.488
1.77E+05							
295.680	-.079431	6.47E+06	-2.87E+05	-.001513	61.166	2.28E+13	4708.463
1.99E+05							
322.560	-.120033	8.25E+05	-1.18E+05	-.001509	15.507	2.28E+13	7921.902
2.22E+05							

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:

Greenwich Hospital Caisson Analysis.lpo

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = .56346407 in
 Computed slope at pile head = -.00385172
 Maximum bending moment = 61268018. lbs-in
 Maximum shear force = -400915.81603 lbs
 Depth of maximum bending moment = 80.64000000 in
 Depth of maximum shear force = 245.28000 in
 Number of iterations = 63
 Number of zero deflection points = 1

Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement in
 Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
 Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
 Type 4 = Deflection and Moment, S = Pile-head Slope, radians
 Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 43263.	M= 5.85E+07	80928.0000	.5634641	6.1268E+07	-400916.

Computed Pile-head Stiffness Matrix Members K22, K23, K32, K33 for Superstructure

Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
.00115426	4326.30006	874429.06953	3748115.	7.575667E+08
.00347467	13023.46070	2632294.	3748115.	7.575667E+08
.00550722	20641.69684	4172087.	3748115.	7.575667E+08
.00694934	26046.92140	5264588.	3748115.	7.575667E+08
.00806793	30239.53930	6111997.	3748115.	7.575667E+08
.00898189	33665.15755	6804381.	3748115.	7.575667E+08
.00975463	36561.47651	7389783.	3748115.	7.575667E+08
.01042401	39070.38211	7896881.	3748115.	7.575667E+08
.01101444	41283.39369	8344174.	3748115.	7.575667E+08
.01154260	43263.00000	8744291.	3748115.	7.575667E+08

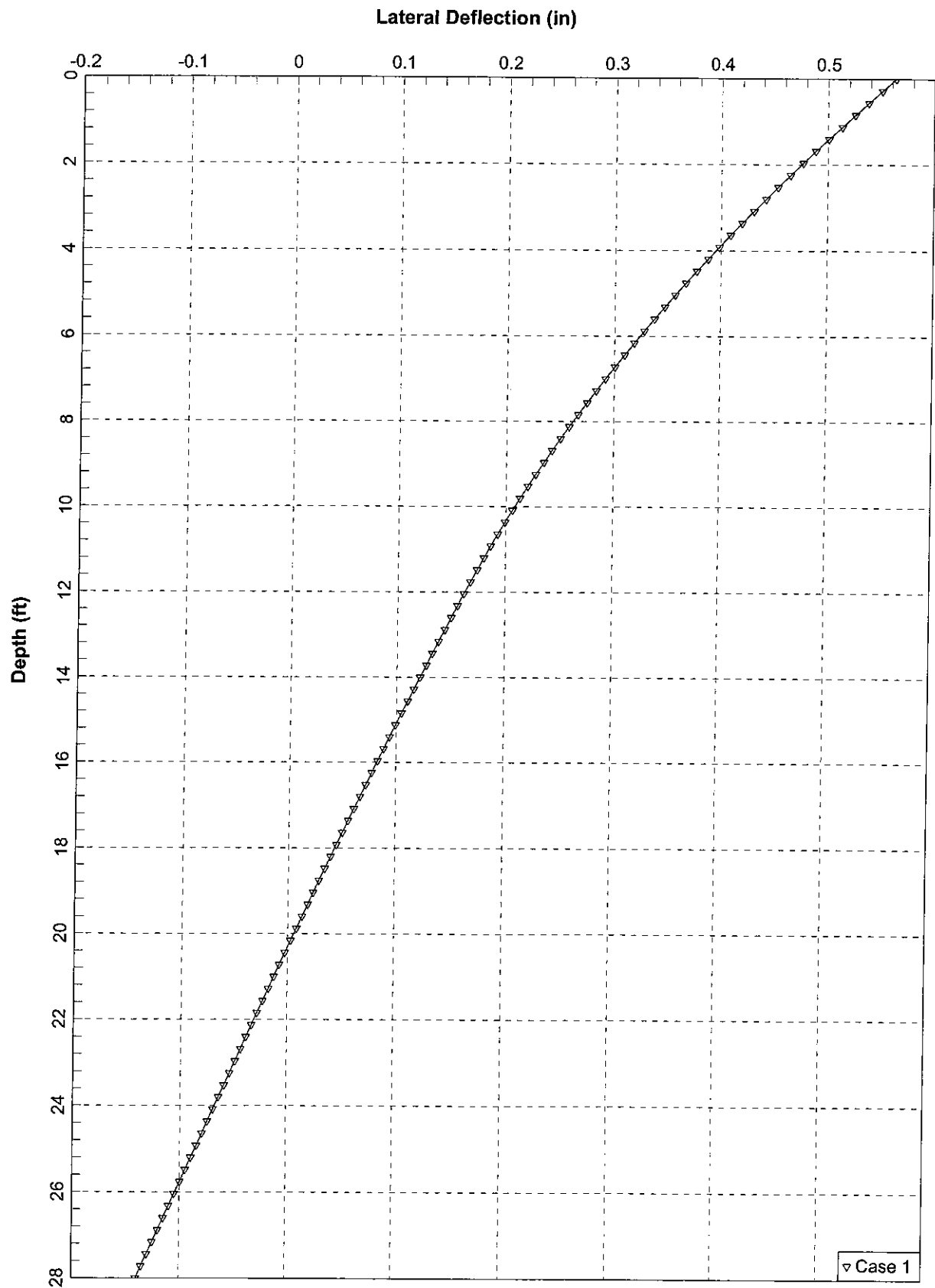
Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
.00003160	23939.33409	5850195.	7.575667E+08	1.851310E+11
.00009523	72066.77141	17610841.	7.567544E+08	1.849269E+11
.00015125	114236.31824	27912523.	7.552579E+08	1.845398E+11

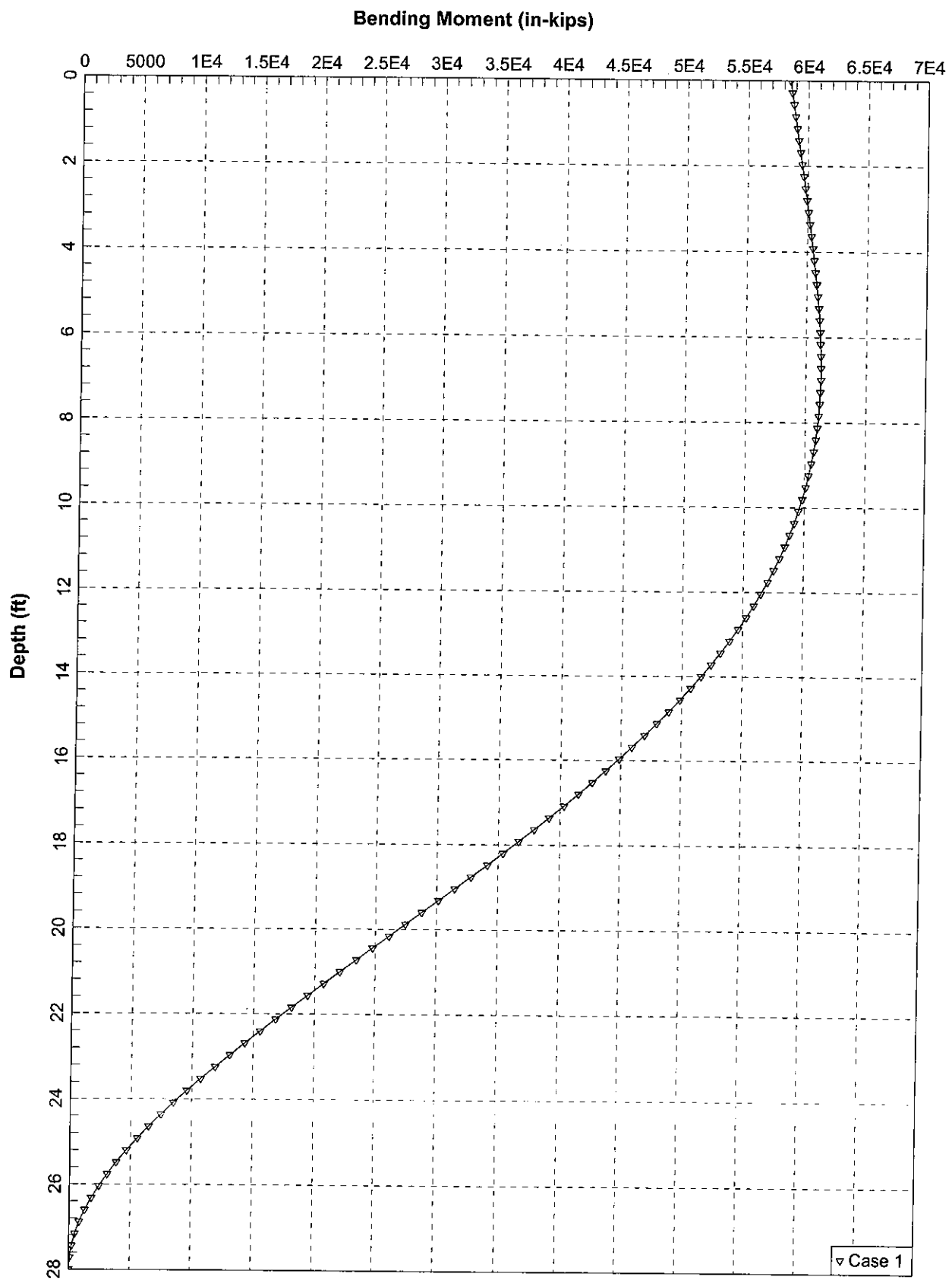
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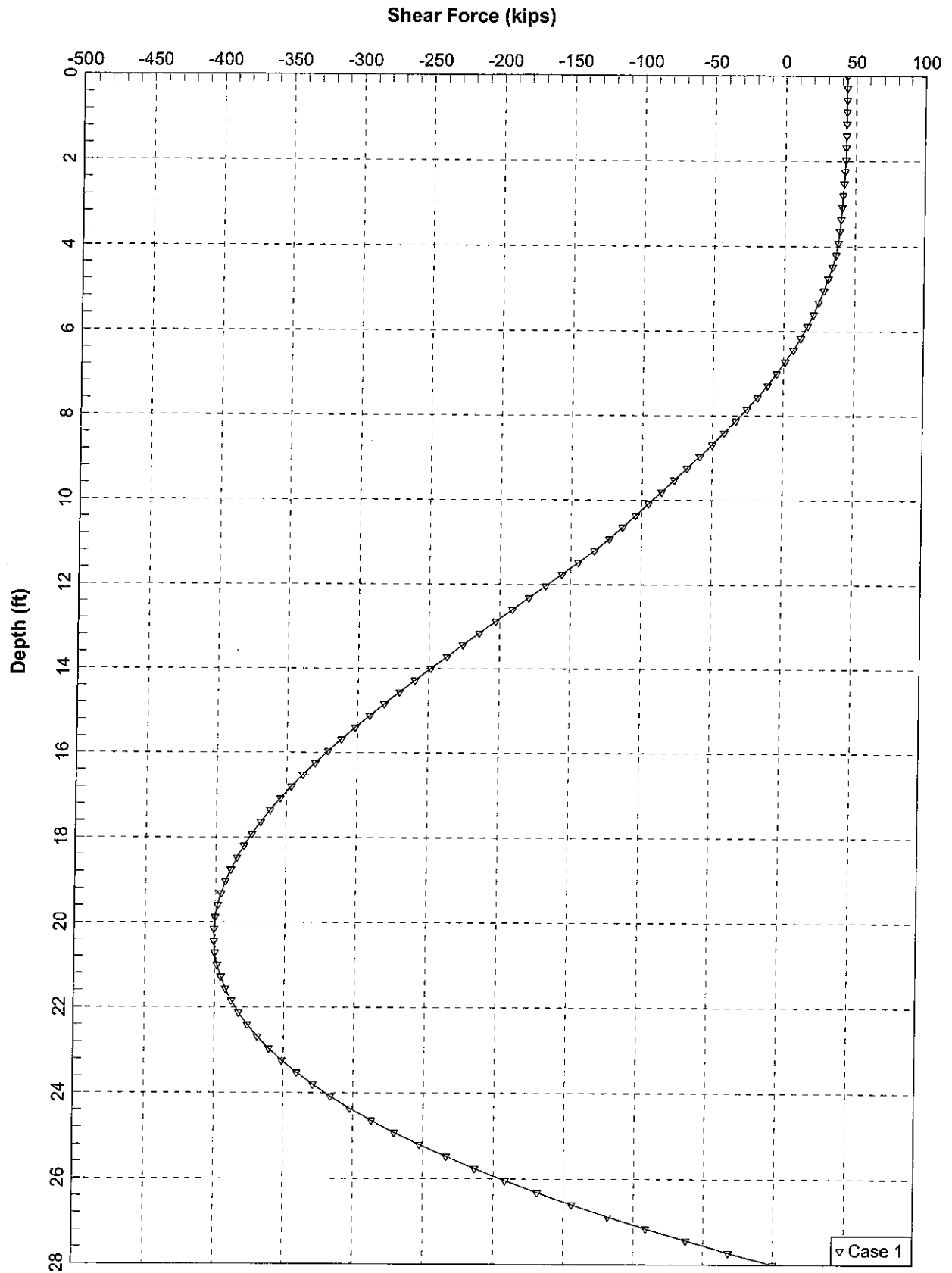
.00019117	144164.03223	35221682.	7.540985E+08	1.842389E+11
.00022224	167382.33072	40891107.	7.531599E+08	1.839952E+11
.00024768	186356.10987	45523364.	7.524132E+08	1.838007E+11
.00026923	202400.27478	49439882.	7.517610E+08	1.836310E+11
.00028794	216299.97406	52832523.	7.511868E+08	1.834817E+11
.00030447	228561.61068	55825046.	7.506894E+08	1.833522E+11
.00032213	239538.87859	58501948.	7.436171E+08	1.816116E+11

K22 = abs(Shear Reaction/Top y)
 K23 = abs(Shear Reaction/Top Rotation)
 K32 = abs(Moment Reaction/Top y)
 K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.



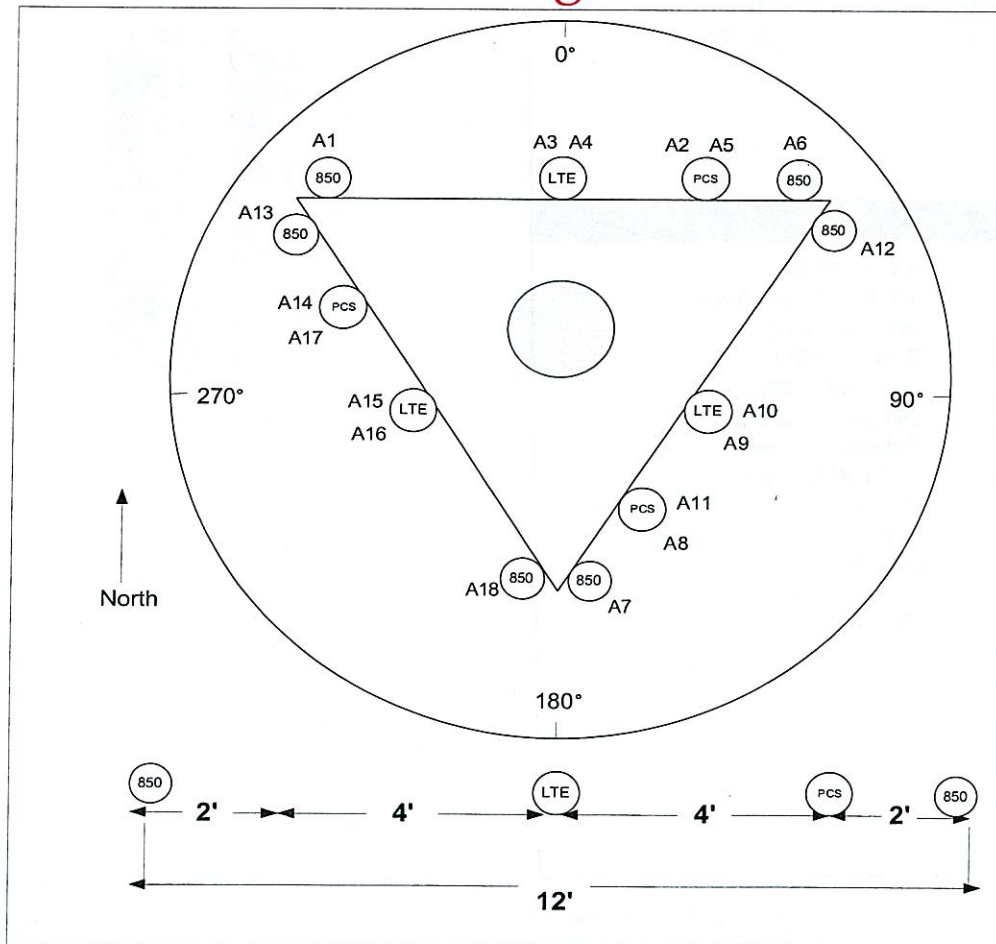




SITE NAME	GREENWICH CT		ECP - CELL #	5	89
LATITUDE	41-02-02.17 N		LONGITUDE	73-37-51.00 W	
Additional Comments:			ORIENTATION		
			STRUCTURE TYPE	MONOPOLE	
700 Mhz - LTE ANTENNA ADD	ALPHA	BETA	GAMMA		
EQUIPMENT TYPE	Lucent	Lucent	Lucent		
ANTENNA TYPE	LNx-6514DS-T4M	LNx-6514DS-T4M	LNx-6514DS-T4M		
QTY OF ANTENNAS PER FACE	1	1	1		
ORIENTATION (DEG)	30	150	270		
DOWN TILT (MECH/DEG)	0	0	0		
RAD CTR (FT AGL)	124	124	124		
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
MCPA BRICKS (QTY)					
850 Cellular - Current Config	ALPHA	BETA	GAMMA		
EQUIPMENT TYPE	Modcell 4.0 HD	Modcell 4.0 HD	Modcell 4.0 HD		
ANTENNA TYPE	DB844G65A-XY	DB844G65A-XY	DB844G65A-XY		
QTY OF ANTENNAS PER FACE	2	2	2		
ORIENTATION (DEG)	30	150	270		
DOWN TILT (MECH/DEG)	0	0	0		
RAD CTR (FT AGL)	124	124	124		
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
MCPA BRICKS (QTY)					
850 Cellular - Future Config	ALPHA	BETA	GAMMA		
EQUIPMENT TYPE	Modcell 4.0 HD	Modcell 4.0 HD	Modcell 4.0 HD		
ANTENNA TYPE	DB844G65A-XY	DB844G65A-XY	DB844G65A-XY		
QTY OF ANTENNAS PER FACE	2	2	2		
ORIENTATION (DEG)	30	150	270		
DOWN TILT (MECH/DEG)	0	0	0		
RAD CTR (FT AGL)	124	124	124		
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
MCPA BRICKS (QTY)					
1900 Cellular - Current Config	ALPHA	BETA	GAMMA		
EQUIPMENT TYPE	PCS Modcell 4.0	PCS Modcell 4.0	PCS Modcell 4.0		
ANTENNA TYPE	948F65T2E-M_2	948F65T2E-M_2	948F65T2E-M_2		
QTY OF ANTENNAS PER FACE	2	2	2		
ORIENTATION (DEG)	30	150	270		
DOWN TILT (MECH/DEG)	0	0	0		
RAD CTR (FT AGL)	124	124	124		
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
MCPA BRICKS (QTY)					
1900 Cellular - Future Config	ALPHA	BETA	GAMMA		
EQUIPMENT TYPE	PCS Modcell 4.0	PCS Modcell 4.0	PCS Modcell 4.0		
ANTENNA TYPE	MG D3-800T0	MG D3-800T0	MG D3-800T0		
QTY OF ANTENNAS PER FACE	1	1	1		
ORIENTATION (DEG)	30	150	270		
DOWN TILT (MECH/DEG)	0	0	0		
RAD CTR (FT AGL)	124	124	124		
TMA - QTY / MODEL					
DIPLEXER - QTY / MODEL					
MCPA BRICKS (QTY)					

NUMBER OF CABLE'S NEEDED								ESTIMATED CABLE LENGTH			
MAINLINE SIZE		1 5/8"		TOTAL # OF MAINLINES		18		MAINLINE (FT)		154	
JUMPER SIZE		1/2 "		TOTAL # OF TOP JUMPERS		18		TOP JUMPER (FT)		10	
TX / RX FREQUENCIES								TX POWER OUTPUT			
Cellular A-Band				PCS F-Band		700 Mhz C - Blo		Cellular (Watts)		20	
TX - 869-880,890-891.5 MHz				TX - 1970-1975		TX - 746-757		PCS (Watts)		16	
RX - 824-835,845-846.5 MHz				RX - 1890-1895		RX - 776-787		LTE (Watts)		40	
ALPHA				BETA				GAMMA			
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code
A1	800	Tx1/Rx0	RED	A7	800	Tx2/Rx0	BLUE	A13	800	Tx3/Rx0	GREEN
A2	1900	Tx1/Rx0	RED/ WHITE	A8	1900	Tx2/Rx0	BLUE/ WHITE	A14	1900	Tx3/Rx0	GREEN/WHITE
A3	700	Tx1/Rx0	RED/ ORANGE	A9	700	Tx2/Rx0	BLUE/ ORANGE	A15	700	Tx3/Rx0	GREEN/ORANGE
A4	700	Tx4/Rx1	RED/RED/ ORANGE	A10	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A16	700	Tx6/Rx1	GREEN/GREEN/ ORANGE
A5	1900	Tx4/Rx1	RED/RED/ WHITE	A11	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A17	1900	Tx6/Rx1	GREEN/GREEN/ WHITE
A6	800	Tx4/Rx1	RED/RED	A12	800	Tx5/Rx1	BLUE/BLUE	A18	800	Tx6/Rx1	GREEN/GREEN
RF ENGINEER						RF MANAGER		INITIALS		DATE	
Prepared By : Dany Bustamante						Steve Weatherbee		DB		11/16/2009	

Site Configuration





DB844G65ZAXY

Directed Dipole™ Antenna

Base Station Antenna
Directed Dipole™

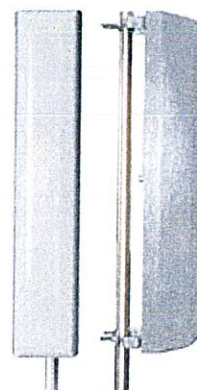
- Exceptional azimuth roll-off, reducing sector-to-sector interference and softer hand-offs
- Air dielectric feed system, no screws, rivets, welds or solder in RF element feed path
- Strong upper side lobe suppression
- Low profile appearance and low wind loading for easier zoning approvals

ELECTRICAL

Frequency (MHz) :	806 - 896	870 - 960
Polarization :	Vertical	Vertical
Gain (dBd/dBi) :	13.5/15.6	13.8/15.9
Azimuth BW (Deg.):	65	65
Elevation BW (Deg.):	15	15
Beam Tilt (Deg.):	0	0
USLS* (dB) :	15	15
Null Fill (dB) :	<20-25	<20-25
Front-To-Back Ratio* (dB) :	40	40
VSWR :	<1.33:1	<1.33:1
PIM3 @ 2 x 20w (dBc) :	-150	-150
Max. Input Power (Watts) :	500	500
Impedance (Ohms) :	50	50
Lightning Protection :	dc Ground	dc Ground

MECHANICAL

Weight :	5.4 kg (12 lb)
Dimensions (LxWxD) :	1,219 x 254 x 203 mm (48 x 10 x 8 in)
Max. Wind Area :	0.09 m ² (1 ft ²)
Max. Wind Load (@ 100 mph) :	235.7 N (53 lbf)
Max. Wind Speed :	241 km/h (150 mph)
Hardware Material :	Galvanized steel
Connector Type :	7-16 DIN Female (1, Back)
Color :	Light gray
Standard Mounting Hardware :	DB380
Standard Downtilt Mounting Hardware :	DB5083



Andrew Corporation
2601 Telecom Parkway
Richardson, Texas U.S.A 75082-3521
Tel: 214.631.0310

Fax: 214.631.4706
Toll Free Tel: 1.800.676.5342
Fax: 1.800.229.4706
www.andrew.com

* - Indicates Typical
10/11/2007
dbtech@andrew.com

Information correct at date of issue but may be subject to change without notice.



MG D3-800Tx

Xpol GSM1800+PCS & UMTS Panel Antenna

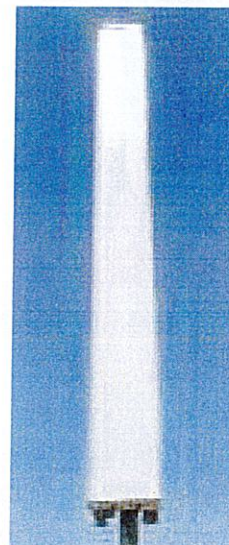
15.9 dBd/18 dBi

WIDE BAND 1710-2170 MHz

H 65° V 6.5°

Electrical Specifications

Antenna Model	MG D3-800Tx		
Frequency Range (MHz)	1710-1880	1850-1990	1920-2170
Impedance	50 Ohms		
VSWR	1.40:1		
Polarization	±45°		
Isolation between Ports (dB)	30		
Average Gain (dBd/dBi)	15.7/17.8	15.9/18	16.15/18.25
Horizontal Beamwidth (deg)	65°±5°		
Vertical Beamwidth (deg)	6.5°±0.5°	6.3°±0.5°	6.3°±0.5°
Electrical Tilt (deg)	Fixed 0°-14°		
Sidelobe Suppression (dB)	18	18	18
Front to Back Ratio (dB) @180°±20°	30		
Polarization Isolation (dB) @3 dB Beamwidth	20		
Maximum Power per Input (w)	250		
Intermodulation Products (dBc)	-150		
Connectors	2 x 7/16 Female		
Connector Position	Antenna Bottom		

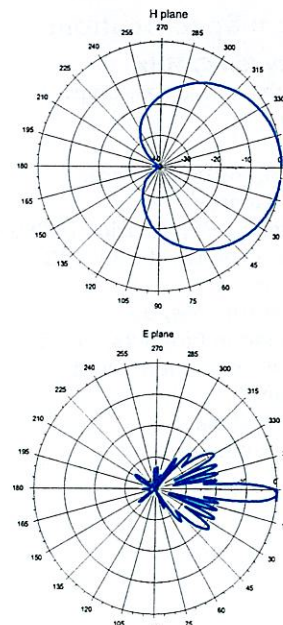


Mechanical & Environmental Specifications

Dimensions (mm)	1380 x 160 x 90
Survival Wind Speed	200 km/h
Front Windload (N) @ 160 km/h	335
Lateral Windload (N) @ 160 km/h	188
Antenna Weight (kg)	7
Clamps Weight (kg)	2
Mast Mounting	50 to 135 mm
Radome Color	Grey
Grounding	All metallic parts are DC grounded
Temperature Range	-55 to +60°C
Humidity	100 %

Shipping Specifications

Dimensions (mm)	1580 x 340 x 210
Weight (kg)	12
Material	Cardboard and Foam



Ctra. Campo Real, Km 2,100
28500 Arganda del Rey
Madrid-Spain



Phone: 34 91 876 06 81
Fax: 34 91 876 07 09
E-mail: telecom.commercial@rymsa.com
Web: www.rymsa.com

Product Specifications



LNX-6514DS-T4M

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



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

CHARACTERISTICS

General Specifications

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

Electrical Specifications

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

Product Specifications

INX-6514DS-T4M



Mechanical Specifications

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

Dimensions

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

Regulatory Compliance/Certifications

Agency

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

Classification

Compliant by Exemption
Above Maximum Concentration Value (MCV)



INCLUDED PRODUCTS



MTG-L-STD

Downtilt Mounting Kit for panel Antennas