

ROBINSON & COLI

EM-VER-057-091217

ORIGINAL

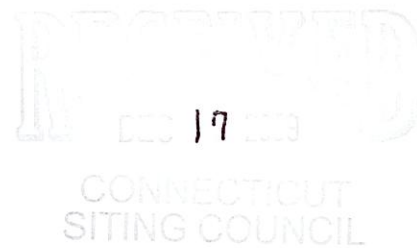
KENNETH C. BALDWIN

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Hartford, CT 06103-3597
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Fax (860) 275-8299
kbaldwin@rc.com
Direct (860) 275-8345

December 17, 2009

Via Hand Delivery

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



Re: **Notice of Exempt Modification – Antenna Swap
5 Perryridge Road, Greenwich, Connecticut**

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains wireless telecommunications antennas at the 124-foot level on the existing 164-foot tower at the above-referenced address. The tower and underlying property are owned by Greenwich Hospital. The Council approved Cellco’s shared use of the existing tower in 2002 in TS-VER-057-020919. Cellco now intends to modify its installation by replacing six of its PCS antennas with three (3) model MG D3-800T0 PCS antennas and three (3) model LNX-6514DS-T4M LTE (700 MHz) antennas, all at the same 124-foot level on the tower. Attached behind Tab 1 are the specifications for the proposed replacement antennas.



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Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Peter Tesei, First Selectman of the Town of Greenwich.

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

1. The proposed modifications will not result in any increase in the overall height of the existing tower. Cellco’s antennas will be located at the same 124-foot level on the existing 164-foot tower.

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ROBINSON & COLE_{LLP}

S. Derek Phelps
December 17, 2009
Page 2

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

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

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

Also attached is a Structural Analysis Report confirming that the tower and foundation can support Cellco's proposed antennas modification. (See Tab 3).

For the foregoing reasons, Cellco respectfully submits that the proposed modifications to the above-referenced telecommunications facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2).

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Peter Tesei, Greenwich First Selectman
Sandy M. Carter





1710-2170 MHz

Model # MG D3-800TX

XPoI GSM1800+PCS & UMTS Panel Antenna

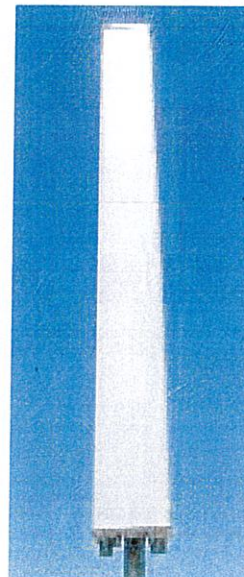
Beamwidth: H 65°/V 6.5°

Gain: 16.15 dBd/18.25 dBi

Length: 52.7 in

Electrical Specifications

Antenna model	MG D3-800TX		
Frequency range (MHz)	1710-1880	1850-1990	1920-2170
Impedance	50 ohms		
VSWR	1.4		
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°		
Upper sidelobe suppression (dB)	18		
Front-to-back ratio (db) @180°±30°	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 in (mm)	52.7 x 6.3 x 3.5 (1380 x 160 x 90)
Survival wind speed mph (kph)	124 (200)
Front windload lbs (N) @100 mph/160 kph	74 (335)
Lateral windload lbs (N) @100 mph/160 kph	42 (188)
Antenna weight lbs (kg)	15 (7)
Clamps weight lbs (kg)	7.7 (3.5)
Mast mounting in (cm)	2.0 to 5.3 (50 to 135)
Radome color	Gray
Grounding	All metallic parts DC grounded
Temperature range F (°C)	-67° to 140° (-55 to +60°)
Humidity	100%

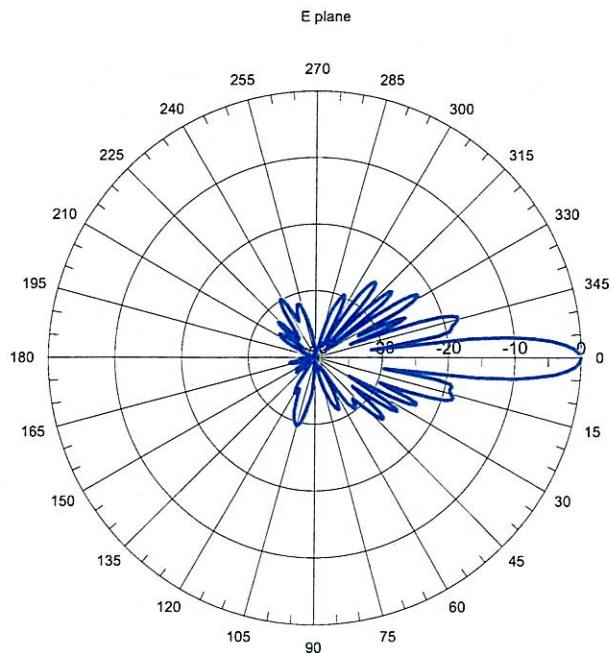
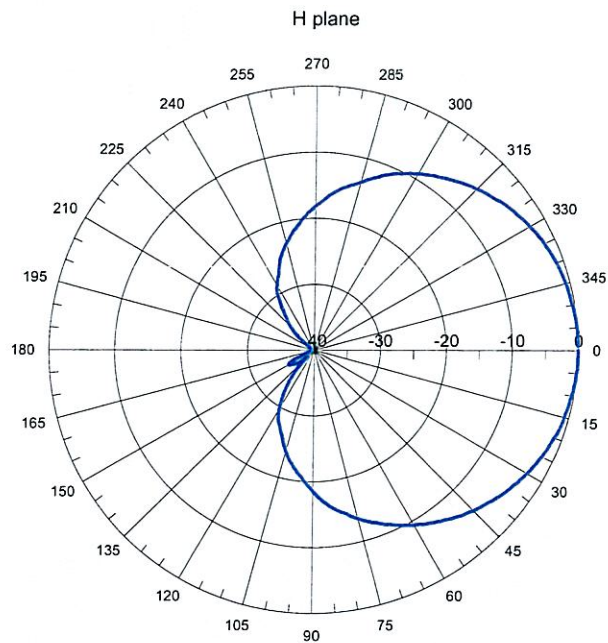
Shipping Specifications

Dimensions in (mm)	64 x 8.8 x 6.9 (1630 x 225 x 175)
Weight lbs (kg)	27 (12.5)
Material	Cardboard and foam

1710-2170 MHz

Model # MG D3-800TX

XPol GSM1800+PCS & UMTS Panel Antenna



Product Specifications



LNx-6512DS-T4M

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



- Continuous wideband operation
- Great solution to maximize network coverage and capacity
- Excellent gain, VSWR, front-to-back ratio, and PIM specifications for robust network performance
- Patented DualPol® technology
- Ideal choice for site collocations and tough zoning restrictions

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	65	65
Gain, dBd	12.4	13.3
Gain, dBi	14.5	15.4
Beamwidth, Vertical, degrees	18.7	16.2
Beam Tilt, degrees	4	4
Upper Sidelobe Suppression (USLS), typical, dB	20	20
Front-to-Back Ratio at 180°, dB	30	32
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-6512DS-T4M



Mechanical Specifications

Color	Light gray
Connector Interface	7-16 DIN Female
Connector Location	Bottom
Connector Quantity	2
Wind Loading, maximum	379.8 N @ 150 km/h 85.4 lbf @ 150 km/h
Wind Speed, maximum	241.0 km/h 149.8 mph

Dimensions

Depth	181.0 mm 7.1 in
Length	1232.0 mm 48.5 in
Width	301.0 mm 11.9 in
Net Weight	12.3 kg 27.1 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

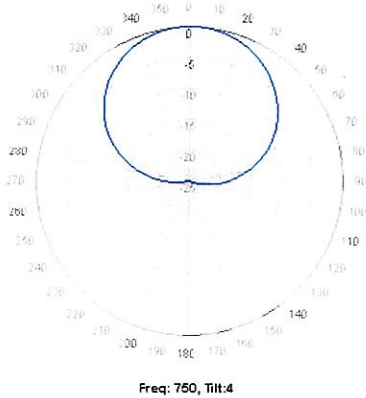
Downtilt Mounting Kit for panel Antennas

Product Specifications

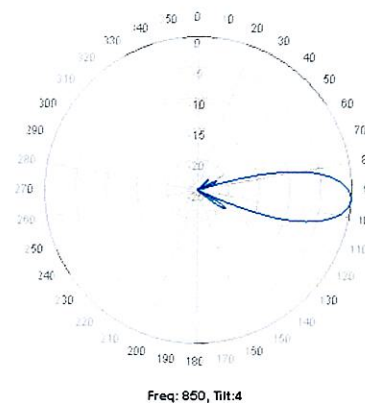
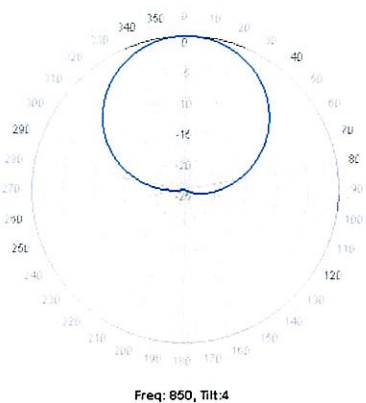
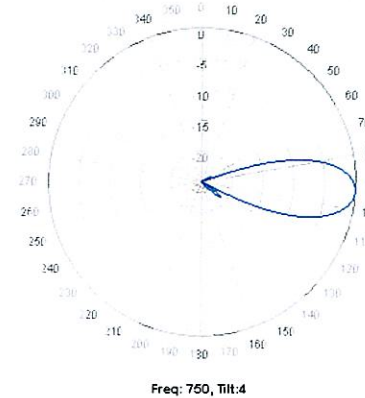
INX-6512DS-T4M



Horizontal Pattern



Vertical Pattern





Structural Analysis Report

164-ft Existing EEl 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



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

Table of Contents

SECTION 1 - REPORT

- INTRODUCTION.
- ANTENNA AND APPURTENANCE SUMMARY.
- PRIMARY ASSUMPTIONS USED IN THE ANALYSIS.
- ANALYSIS.
- TOWER LOADING.
- TOWER CAPACITY.
- FOUNDATION AND ANCHORS.
- CONCLUSION.

SECTION 2 – CONDITIONS & SOFTWARE

- STANDARD ENGINEERING CONDITIONS.
- GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM.

SECTION 3 – CALCULATIONS

- RISATower INPUT/OUTPUT SUMMARY.
- RISATower DETAILED OUTPUT.
- ANCHOR BOLT AND BASE PLATE ANALYSIS.
- FLANGE BOLT AND PLATE ANALYSIS.
- MathCAD CAISSON FOUNDATION ANALYSIS.
- L-PILE CAISSON ANALYSIS.
- L-PILE LATERAL DEFLECTION vs. DEPTH.
- L-PILE BENDING MOMENT vs. DEPTH.
- L-PILE SHEAR FORCE vs. DEPTH.

SECTION 4 – REFERENCE MATERIAL

- VERIZON RF DATA SHEET.
- ANTENNA DATA SHEETS.

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/6reserved) 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 and three (3) RYMSA MG D3-800T0 panel antennas 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 **46.7%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L5)	1.5'-39.88'	46.7%	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	44
	Axial	81
	Moment	4868

Natcomm, Inc.
Structural Monopole Analysis
164-ft Existing EEI Monopole
Greenwich, CT
December 01, 2009

- 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

Natcomm, Inc.
Structural Monopole Analysis
164-ft Existing EEI Monopole
Greenwich, CT
December 01, 2009

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.

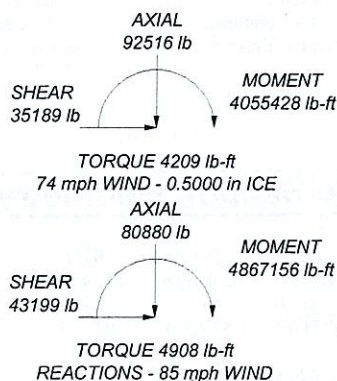
Several types of pile-head boundary conditions may be selected, and the properties of the pile can also vary as a function of depth. LPILE Plus has capabilities to compute the ultimate-moment capacity of a pile's section and can provide design information for rebar arrangement. The user may optionally 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.

TYPE	ELEVATION	TYPE	ELEVATION
Low Profile Platform	164	(2) G20057A1 TMA (T-Mobile)	144
PD1142-1	164	(2) G20057A1 TMA (T-Mobile Reserved)	144
PD620-3	164		
ALR8	164	Low Profile Platform (T-Mobile)	144
BMR10	164	(2) APX16PV-16PVL-X (T-Mobile)	144
BMR10	164	(2) APX16PV-16PVL-X (T-Mobile Reserved)	144
BMR10	164		
Camera	164	(2) 7770.00 (ATT)	134
4"x4" Pipe Mount	160	7770.00 (ATT)	134
4"x4" Pipe Mount	160	(4) LGP21401 TMA (ATT)	134
4"x4" Pipe Mount	160	(2) 7770.00 (ATT)	134
4 FT DISH	160	7770.00 (ATT)	134
4 FT DISH	160	7770.00 (ATT)	134
2 FT DISH	160	(4) LGP21401 TMA (ATT)	134
Low Profile Platform (Sprint)	154	(2) 7770.00 (ATT)	134
950F65T2E-M (Sprint Reserved)	154	7770.00 (ATT)	134
950F65T2E-M (Sprint Reserved)	154	Low Profile Platform (ATT)	134
GPS (Sprint)	154	7770.00 (ATT)	134
(2) DB980F90E-M (Sprint)	154	(4) LGP21401 TMA (ATT)	134
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	LNX-6514DS-T0M (Verizon Proposed)	124
DB980F90E-M (Sprint Reserved)	154	844G65T6ZAXY (Verizon Existing)	124
DB980F90E-M (Sprint Reserved)	154	844G65T6ZAXY (Verizon Existing)	124
(2) 950F65T2E-M (Sprint)	154	MG D3-800TX (Verizon Proposed)	124
(2) G20057A1 TMA (T-Mobile)	144	LNX-6514DS-T0M (Verizon Proposed)	124
(2) G20057A1 TMA (T-Mobile Reserved)	144	844G65T6ZAXY (Verizon Existing)	124
(2) APX16PV-16PVL-X (T-Mobile)	144	844G65T6ZAXY (Verizon Existing)	124
(2) APX16PV-16PVL-X (T-Mobile Reserved)	144	MG D3-800TX (Verizon Proposed)	124
(2) G20057A1 TMA (T-Mobile)	144	LNX-6514DS-T0M (Verizon Proposed)	124
(2) G20057A1 TMA (T-Mobile Reserved)	144	Low Profile Platform (Verizon)	124
(2) APX16PV-16PVL-X (T-Mobile)	144	(4) DB846G90A-XY (Nextel)	114
(2) APX16PV-16PVL-X (T-Mobile Reserved)	144	(4) DB846G90A-XY (Nextel)	114
		Low Profile Platform (Nextel)	114
		(4) DB846G90A-XY (Nextel)	114

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

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: 46.7%



NATCOMM
 63-2 N. Branford Rd.
 Branford, CT 06405
 Phone: (203) 488-0580
 FAX: (203) 488-8587

Job: 164' EEI Monopole - Greenwich Hospital
Project: 10001.CO4 - 5 Perryridge Road, Greenwich, CT
 Client: Verizon Wireless
 Drawn by: TJL
 App'd:
 Code: TIA/EIA-222-F
 Date: 12/01/09
 Scale: NTS
 Path: \\nas001\proj\090909\090909\Greenwich Hospital\164' EEI Monopole - Greenwich Hospital\10001.CO4\10001.CO4.dwg
 Dwg No. E-

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 164' EEI Monopole - Greenwich Hospital	Page 1 of 21
	Project 10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date 11:54:12 12/01/09
	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 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	Page
	164' EEI Monopole - Greenwich Hospital	2 of 21
	Project 10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date 11:54:12 12/01/09
	Client Verizon Wireless	Designed by 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	27047.4664	19.0354	27.4617	984.9157	54130.5226	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	48524.0640	21.2712	30.7245	1579.3269	97111.9772	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
							7			
L5	69.5966	118.1537	65376.3628	23.4934	33.9045	1928.2499	130838.749	59.0881	10.7564	19.123
							5			
	77.1724	134.6842	96834.1984	26.7803	38.6080	2508.1382	193795.813	67.3549	12.3860	22.02
							7			

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals	Double Angle Stitch Bolt Spacing Horizontals
ft	ft ²	in					in	in
L1 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 _A A _A ft ² /ft	Weight plf
1 5/8 (Sprint)	A	No	Inside Pole	154.00 - 4.50	6	No Ice	0.00	1.04
1 5/8 (Sprint)	A	No	Inside Pole	154.00 - 4.50	6	1/2" Ice	0.00	1.04
1 5/8 (Sprint)	A	No	Inside Pole	154.00 - 4.50	6	No Ice	0.00	1.04
1 5/8 (Sprint)	A	No	Inside Pole	154.00 - 4.50	6	1/2" Ice	0.00	1.04
1 5/8 (T-Mobile)	B	No	Inside Pole	144.00 - 4.50	12	No Ice	0.00	1.04
1 5/8 (T-Mobile)	B	No	Inside Pole	144.00 - 4.50	12	1/2" Ice	0.00	1.04
1 5/8 (ATT)	C	No	Inside Pole	134.00 - 4.50	12	No Ice	0.00	1.04
1 5/8 (ATT)	C	No	Inside Pole	134.00 - 4.50	12	1/2" Ice	0.00	1.04
1 5/8 (Verizon)	A	No	Inside Pole	124.00 - 4.50	12	No Ice	0.00	1.04
1 5/8 (Verizon)	A	No	Inside Pole	124.00 - 4.50	12	1/2" Ice	0.00	1.04
1 5/8 (Verizon)	B	No	Inside Pole	124.00 - 4.50	6	No Ice	0.00	1.04
1 5/8 (Verizon)	B	No	Inside Pole	124.00 - 4.50	6	1/2" Ice	0.00	1.04
1 5/8 (Nextel)	C	No	Inside Pole	114.00 - 4.50	12	No Ice	0.00	1.04
1 5/8 (Nextel)	C	No	Inside Pole	114.00 - 4.50	12	1/2" Ice	0.00	1.04
1/2 (Sprint)	A	No	Inside Pole	154.00 - 4.50	1	No Ice	0.00	0.25
1/2 (Sprint)	A	No	Inside Pole	154.00 - 4.50	1	1/2" Ice	0.00	0.25
1 5/8	B	No	Inside Pole	160.00 - 4.50	3	No Ice	0.00	1.04

RISATower

NATCOMM
 63-2 N. Branford Rd.
 Branford, CT 06405
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Job	164' EEI Monopole - Greenwich Hospital	Page	3 of 21
Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
Client	Verizon Wireless	Designed by	TJL

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 lb
L1	164.00-131.50	A	0.000	0.000	0.000	0.000	286.43
		B	0.000	0.000	0.000	0.000	244.92
		C	0.000	0.000	0.000	0.000	234.00
L2	131.50-119.29	A	0.000	0.000	0.000	0.000	214.21
		B	0.000	0.000	0.000	0.000	219.87
		C	0.000	0.000	0.000	0.000	228.57
L3	119.29-78.79	A	0.000	0.000	0.000	0.000	1021.01
		B	0.000	0.000	0.000	0.000	884.52
		C	0.000	0.000	0.000	0.000	1197.58
L4	78.79-39.88	A	0.000	0.000	0.000	0.000	980.92
		B	0.000	0.000	0.000	0.000	849.79
		C	0.000	0.000	0.000	0.000	1213.99
L5	39.88-1.50	A	0.000	0.000	0.000	0.000	891.93
		B	0.000	0.000	0.000	0.000	772.70
		C	0.000	0.000	0.000	0.000	1103.86

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 lb
L1	164.00-131.50	A	0.500	0.000	0.000	0.000	0.000	286.43
		B		0.000	0.000	0.000	0.000	244.92
		C		0.000	0.000	0.000	0.000	234.00
L2	131.50-119.29	A	0.500	0.000	0.000	0.000	0.000	214.21
		B		0.000	0.000	0.000	0.000	219.87
		C		0.000	0.000	0.000	0.000	228.57
L3	119.29-78.79	A	0.500	0.000	0.000	0.000	0.000	1021.01
		B		0.000	0.000	0.000	0.000	884.52
		C		0.000	0.000	0.000	0.000	1197.58
L4	78.79-39.88	A	0.500	0.000	0.000	0.000	0.000	980.92
		B		0.000	0.000	0.000	0.000	849.79
		C		0.000	0.000	0.000	0.000	1213.99
L5	39.88-1.50	A	0.500	0.000	0.000	0.000	0.000	891.93
		B		0.000	0.000	0.000	0.000	772.70
		C		0.000	0.000	0.000	0.000	1103.86

Feed Line Center of Pressure

Fee

Section	Elevation ft	CP _X in	CP _Z in	CP _X Ice in	CP _Z Ice in
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RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	Page
	164' EEI Monopole - Greenwich Hospital	4 of 21
	Project 10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date 11:54:12 12/01/09
	Client Verizon Wireless	Designed by TJL

Section	Elevation	CP _x	CP _z	CP _x Ice	CP _z Ice
	ft	in	in	in	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 _{AA} Front	C _{AA} Side	Weight lb
Low Profile Platform (Sprint)	C	None		0.0000	154.00	No Ice 15.70	15.70	1300.00
(2) DB980F90E-M (Sprint)	A	From Face	4.00 0.00 0.00	0.0000	154.00	1/2" Ice 20.10 No Ice 3.90 1/2" Ice 4.28	20.10 2.29 2.65	1765.00 8.50 29.47
DB980F90E-M (Sprint Reserved)	A	From Face	4.00 -2.00 0.00	0.0000	154.00	No Ice 3.90 1/2" Ice 4.28	2.29 2.65	8.50 29.47
DB980F90E-M (Sprint Reserved)	A	From Face	4.00 2.00 0.00	0.0000	154.00	No Ice 3.90 1/2" Ice 4.28	2.29 2.65	8.50 29.47
(2) DB980F90E-M (Sprint)	B	From Face	4.00 0.00 0.00	0.0000	154.00	No Ice 3.90 1/2" Ice 4.28	2.29 2.65	8.50 29.47
DB980F90E-M (Sprint Reserved)	B	From Face	4.00 -2.00 0.00	0.0000	154.00	No Ice 3.90 1/2" Ice 4.28	2.29 2.65	8.50 29.47
DB980F90E-M (Sprint Reserved)	B	From Face	4.00 2.00 0.00	0.0000	154.00	No Ice 3.90 1/2" Ice 4.28	2.29 2.65	8.50 29.47
(2) 950F65T2E-M (Sprint)	C	From Face	4.00 0.00 0.00	0.0000	154.00	No Ice 6.42 1/2" Ice 6.88	4.24 4.62	16.00 56.06
950F65T2E-M (Sprint Reserved)	C	From Face	4.00 -2.00 0.00	0.0000	154.00	No Ice 6.42 1/2" Ice 6.88	4.24 4.62	16.00 56.06
950F65T2E-M (Sprint Reserved)	C	From Face	4.00 2.00 0.00	0.0000	154.00	No Ice 6.42 1/2" Ice 6.88	4.24 4.62	16.00 56.06
GPS (Sprint)	C	From Face	4.00 -6.00 3.00	0.0000	154.00	No Ice 1.00 1/2" Ice 1.50	1.00 1.50	10.00 15.00
Low Profile Platform (T-Mobile)	C	None		0.0000	144.00	No Ice 15.70	15.70	1300.00
(2) APX16PV-16PVL-X (T-Mobile)	A	From Face	4.00 -6.00 0.00	0.0000	144.00	1/2" Ice 20.10 No Ice 6.70 1/2" Ice 7.13	20.10 2.00 2.33	1765.00 40.00 71.34
(2) APX16PV-16PVL-X (T-Mobile Reserved)	A	From Face	4.00 1.00 0.00	0.0000	144.00	No Ice 6.70 1/2" Ice 7.13	2.00 2.33	40.00 71.34
(2) G20057A1 TMA	A	From Face	4.00	0.0000	144.00	No Ice	0.82	11.00

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	164' EEI Monopole - Greenwich Hospital	Page	5 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
	Client	Verizon Wireless	Designed by	TJL

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 lb
(T-Mobile)			0.00			1/2" Ice	0.95	0.49	16.41
(2) G20057A1 TMA (T-Mobile Reserved)	A	From Face	0.00 4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	11.00 16.41
(2) APX16PV-16PVL-X (T-Mobile)	B	From Face	0.00 4.00 -6.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	40.00 71.34
(2) APX16PV-16PVL-X (T-Mobile Reserved)	B	From Face	0.00 4.00 1.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	40.00 71.34
(2) G20057A1 TMA (T-Mobile)	B	From Face	0.00 4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	11.00 16.41
(2) G20057A1 TMA (T-Mobile Reserved)	B	From Face	0.00 4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	11.00 16.41
(2) APX16PV-16PVL-X (T-Mobile)	C	From Face	0.00 4.00 -6.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	40.00 71.34
(2) APX16PV-16PVL-X (T-Mobile Reserved)	C	From Face	0.00 4.00 1.00 0.00	0.0000	144.00	No Ice 1/2" Ice	6.70 7.13	2.00 2.33	40.00 71.34
(2) G20057A1 TMA (T-Mobile)	C	From Face	0.00 4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	11.00 16.41
(2) G20057A1 TMA (T-Mobile Reserved)	C	From Face	0.00 4.00 0.00 0.00	0.0000	144.00	No Ice 1/2" Ice	0.82 0.95	0.39 0.49	11.00 16.41
Low Profile Platform (ATT)	C	None		0.0000	134.00	No Ice	15.70	15.70	1300.00
(2) 7770.00 (ATT)	A	From Face	0.00 4.00 0.00 0.00	0.0000	134.00	1/2" Ice No Ice 1/2" Ice	20.10 5.88 6.31	20.10 2.93 3.27	1765.00 35.00 67.63
7770.00 (ATT)	A	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	35.00 67.63
7770.00 (ATT)	A	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	35.00 67.63
(4) LGP21401 TMA (ATT)	A	From Face	0.00 4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.29 1.45	0.36 0.48	14.10 21.26
(2) 7770.00 (ATT)	B	From Face	0.00 4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
7770.00 (ATT)	B	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	35.00 67.63
7770.00 (ATT)	B	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	35.00 67.63
(4) LGP21401 TMA (ATT)	B	From Face	0.00 4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	1.29 1.45	0.36 0.48	14.10 21.26
(2) 7770.00 (ATT)	C	From Face	0.00 4.00 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63

<i>RISATower</i> NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	164' EEI Monopole - Greenwich Hospital	Page	6 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
	Client	Verizon Wireless	Designed by	TJL

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 lb
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	35.00 67.63
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	35.00 67.63
(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	14.10 21.26
Low Profile Platform (Verizon)	C	None		0.0000	124.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
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	12.00 44.76
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	0.02 20.09
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	37.50 88.01
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	12.00 44.76
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	12.00 44.76
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	0.02 20.09
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	37.50 88.01
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	12.00 44.76
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	12.00 44.76
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	0.02 20.09
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	37.50 88.01
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	12.00 44.76
Low Profile Platform (Nextel)	C	None		0.0000	114.00	No Ice 1/2" Ice	15.70 20.10	15.70 20.10	1300.00 1765.00
(4) DB846G90A-XY (Nextel)	A	From Face	4.00 0.00 0.00	0.0000	114.00	No Ice 1/2" Ice	4.99 5.44	5.87 6.32	15.40 53.75
(4) DB846G90A-XY (Nextel)	B	From Face	4.00 0.00 0.00	0.0000	114.00	No Ice 1/2" Ice	4.99 5.44	5.87 6.32	15.40 53.75
(4) DB846G90A-XY	C	From Face	4.00	0.0000	114.00	No Ice	4.99	5.87	15.40

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	164' EEI Monopole - Greenwich Hospital	Page	7 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
	Client	Verizon Wireless	Designed by	TJL

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 lb
(Nextel)			0.00 0.00			1/2" Ice	5.44	6.32	53.75
Low Profile Platform	C	None		0.0000	164.00	No Ice	15.70	15.70	1300.00
4'x4" Pipe Mount	A	From Face	0.50 0.00 0.00	0.0000	160.00	1/2" Ice	20.10	20.10	1765.00
4'x4" Pipe Mount	B	From Face	0.50 0.00 0.00	0.0000	160.00	No Ice	1.32	1.32	44.00
4'x4" Pipe Mount	C	From Face	0.50 0.00 0.00	0.0000	160.00	1/2" Ice	1.58	1.58	56.99
PD1142-1	A	From Face	4.00 0.00 5.00	0.0000	164.00	No Ice	1.32	1.32	10.00
PD620-3	B	From Face	4.00 0.00 10.00	0.0000	164.00	1/2" Ice	3.21	3.21	23.85
ALR8	C	From Face	4.00 0.00 5.00	0.0000	164.00	No Ice	3.83	3.83	53.00
BMR10	A	From Face	4.00 -6.00 5.00	0.0000	164.00	1/2" Ice	5.99	5.99	83.13
BMR10	B	From Face	4.00 -6.00 5.00	0.0000	164.00	No Ice	8.10	8.10	100.00
BMR10	C	From Face	4.00 -6.00 5.00	0.0000	164.00	1/2" Ice	10.80	10.80	150.00
Camera	C	From Face	4.00 0.00 0.00	0.0000	164.00	No Ice	8.64	8.64	100.00
						1/2" Ice	10.80	10.80	150.00

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 lb
4 FT DISH	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	Worst		160.00	4.00	No Ice 1/2" Ice	12.56 13.09
4 FT DISH	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	Worst		160.00	4.00	No Ice 1/2" Ice	12.56 13.09
2 FT DISH	C	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	Worst		160.00	2.00	No Ice 1/2" Ice	3.14 3.41

RISA Tower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	164' EEI Monopole - Greenwich Hospital	Page	8 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
	Client	Verizon Wireless	Designed by	TJL

Tower Pressures - No Ice

$$G_H = 1.690$$

Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		psf	ft ²		ft ²	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	C _A A _A Out Face
ft	ft		psf	in	ft ²		ft ²	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
						B	0.000	216.881		100.00	0.000	0.000
						C	0.000	216.881		100.00	0.000	0.000
L5 39.88-1.50	20.36	1	14	0.5000	234.341	A	0.000	234.341	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

$$G_H = 1.690$$

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	Page
	164' EEI Monopole - Greenwich Hospital	9 of 21
	Project	Date
	10001.CO4 - 5 Perryridge Road, Greenwich, CT	11:54:12 12/01/09
	Client	Designed by
	Verizon Wireless	TJL

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	lb	lb							ft ²	lb	plf	
L1 164.00- 131.50	765.35	5473.37	A	1	0.65	1	1	1	135.985	4235.93	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	662.65	2690.72	A	1	0.65	1	1	1	55.744	1658.33	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	3103.11	12760.73	A	1	0.65	1	1	1	199.426	5533.58	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	3044.71	18548.81	A	1	0.65	1	1	1	213.639	5109.35	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	2768.49	20489.35	A	1	0.65	1	1	1	231.142	4696.32	122.36	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10344.30	59962.98						OTM	1747413.4 0 lb-ft	21233.52		

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	lb	lb							ft ²	lb	plf	
L1 164.00- 131.50	765.35	5473.37	A	1	0.65	1	1	1	135.985	4235.93	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	662.65	2690.72	A	1	0.65	1	1	1	55.744	1658.33	135.82	C
			B	1	0.65	1	1	1	55.744			
			C	1	0.65	1	1	1	55.744			
L3 119.29-	3103.11	12760.73	A	1	0.65	1	1	1	199.426	5533.58	136.63	C

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	164' EEI Monopole - Greenwich Hospital	Page	10 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
	Client	Verizon Wireless	Designed by	TJL

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	lb	lb							ft ²	lb	plf	
78.79			B	1	0.65	1	1	1	199.426			
			C	1	0.65	1	1	1	199.426			
L4 78.79-39.88	3044.71	18548.81	A	1	0.65	1	1	1	213.639	5109.35	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	2768.49	20489.35	A	1	0.65	1	1	1	231.142	4696.32	122.36	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10344.30	59962.98						OTM	1747413.4 0 lb-ft	21233.52		

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	lb	lb							ft ²	lb	plf	
L1 164.00-131.50	765.35	5473.37	A	1	0.65	1	1	1	135.985	4235.93	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	662.65	2690.72	A	1	0.65	1	1	1	55.744	1658.33	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	3103.11	12760.73	A	1	0.65	1	1	1	199.426	5533.58	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	3044.71	18548.81	A	1	0.65	1	1	1	213.639	5109.35	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	2768.49	20489.35	A	1	0.65	1	1	1	231.142	4696.32	122.36	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10344.30	59962.98						OTM	1747413.4 0 lb-ft	21233.52		

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	lb	lb							ft ²	lb	plf	
L1 164.00-131.50	765.35	6490.50	A	1	0.65	1	1	1	138.694	3240.22	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	662.65	3107.32	A	1	0.65	1	1	1	56.761	1266.45	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	3103.11	14250.18	A	1	0.65	1	1	1	202.801	4220.43	104.21	C
			B	1	0.65	1	1	1	202.801			
			C	1	0.65	1	1	1	202.801			
L4 78.79-	3044.71	20143.03	A	1	0.65	1	1	1	216.881	3890.18	99.98	C

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	Page
	164' EEI Monopole - Greenwich Hospital	11 of 21
	Project	Date
	10001.CO4 - 5 Perryridge Road, Greenwich, CT	11:54:12 12/01/09
	Client	Designed by
	Verizon Wireless	TJL

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	lb	lb							ft ²	lb	plf	
39.88			B	1	0.65	1	1	1	216.881			
			C	1	0.65	1	1	1	216.881			
L5 39.88-1.50	2768.49	22213.04	A	1	0.65	1	1	1	234.341	3570.98	93.04	C
			B	1	0.65	1	1	1	234.341			
			C	1	0.65	1	1	1	234.341			
Sum Weight:	10344.30	66204.07						OTM	1333741.5	16188.26		
									2 lb-ft			

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	lb	lb							ft ²	lb	plf	
L1 164.00-131.50	765.35	6490.50	A	1	0.65	1	1	1	138.694	3240.22	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	662.65	3107.32	A	1	0.65	1	1	1	56.761	1266.45	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	3103.11	14250.18	A	1	0.65	1	1	1	202.801	4220.43	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	3044.71	20143.03	A	1	0.65	1	1	1	216.881	3890.18	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	2768.49	22213.04	A	1	0.65	1	1	1	234.341	3570.98	93.04	C
			B	1	0.65	1	1	1	234.341			
			C	1	0.65	1	1	1	234.341			
Sum Weight:	10344.30	66204.07						OTM	1333741.5	16188.26		
									2 lb-ft			

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
L1 164.00-131.50	765.35	6490.50	A	1	0.65	1	1	1	138.694	3240.22	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	662.65	3107.32	A	1	0.65	1	1	1	56.761	1266.45	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	3103.11	14250.18	A	1	0.65	1	1	1	202.801	4220.43	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	3044.71	20143.03	A	1	0.65	1	1	1	216.881	3890.18	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	2768.49	22213.04	A	1	0.65	1	1	1	234.341	3570.98	93.04	C

RISA Tower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	164' EEI Monopole - Greenwich Hospital	Page	12 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
	Client	Verizon Wireless	Designed by	TJL

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	lb	lb							ft ²	lb	plf	
Sum Weight:	10344.30	66204.07	B C	1 1	0.65 0.65	1 1	1 1	1 1	234.341 234.341 OTM 1333741.5 2 lb-ft	16188.26		

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	lb	lb							ft ²	lb	plf	
L1 164.00-131.50	765.35	5473.37	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	135.985 135.985 135.985	1465.72	45.10	C
L2 131.50-119.29	662.65	2690.72	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	55.744 55.744 55.744	573.82	47.00	C
L3 119.29-78.79	3103.11	12760.73	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	199.426 199.426 199.426	1914.74	47.28	C
L4 78.79-39.88	3044.71	18548.81	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	213.639 213.639 213.639	1767.94	45.44	C
L5 39.88-1.50	2768.49	20489.35	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	231.142 231.142 231.142 OTM 604641.31 lb-ft	1625.02	42.34	C
Sum Weight:	10344.30	59962.98								7347.24		

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	lb	lb							ft ²	lb	plf	
L1 164.00-131.50	765.35	5473.37	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	135.985 135.985 135.985	1465.72	45.10	C
L2 131.50-119.29	662.65	2690.72	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	55.744 55.744 55.744	573.82	47.00	C
L3 119.29-78.79	3103.11	12760.73	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	199.426 199.426 199.426	1914.74	47.28	C
L4 78.79-39.88	3044.71	18548.81	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	213.639 213.639 213.639	1767.94	45.44	C
L5 39.88-1.50	2768.49	20489.35	A B C	1 1 1	0.65 0.65 0.65	1 1 1	1 1 1	1 1 1	231.142 231.142 231.142 OTM 604641.31	1625.02	42.34	C
Sum Weight:	10344.30	59962.98								7347.24		

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	Page
	164' EEI Monopole - Greenwich Hospital	13 of 21
	Project	Date
	10001.CO4 - 5 Perryridge Road, Greenwich, CT	11:54:12 12/01/09
	Client	Designed by
	Verizon Wireless	TJL

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	lb	lb							ft ²	lb	plf	
									lb-ft			

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	lb	lb							ft ²	lb	plf	
L1 164.00- 131.50	765.35	5473.37	A	1	0.65	1	1	1	135.985	1465.72	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	662.65	2690.72	A	1	0.65	1	1	1	55.744	573.82	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	3103.11	12760.73	A	1	0.65	1	1	1	199.426	1914.74	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	3044.71	18548.81	A	1	0.65	1	1	1	213.639	1767.94	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	2768.49	20489.35	A	1	0.65	1	1	1	231.142	1625.02	42.34	C
			B	1	0.65	1	1	1	231.142			
			C	1	0.65	1	1	1	231.142			
Sum Weight:	10344.30	59962.98						OTM	604641.31 lb-ft	7347.24		

Force Totals

Load Case	Vertical Forces	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M _x lb-ft	Sum of Overturning Moments, M _z lb-ft	Sum of Torques lb-ft
	lb					
Leg Weight	59962.98					
Bracing Weight	0.00					
Total Member Self-Weight	59962.98			1028.74	-657.51	
Total Weight	80879.83			1028.74	-657.51	
Wind 0 deg - No Ice		0.00	-43199.49	-4798464.82	-657.51	2459.72
Wind 30 deg - No Ice		21543.79	-37411.86	-4155454.61	-2391870.82	4241.53
Wind 60 deg - No Ice		37314.94	-21599.75	-2398718.04	-4142360.45	4886.83
Wind 90 deg - No Ice		43087.58	0.00	1028.74	-4783084.13	4222.70
Wind 120 deg - No Ice		37314.94	21599.75	2400775.52	-4142360.45	2427.10
Wind 150 deg - No Ice		21543.79	37411.86	4157512.09	-2391870.82	-18.83
Wind 180 deg - No Ice		0.00	43199.49	4800522.30	-657.51	-2459.72
Wind 210 deg - No Ice		-21543.79	37411.86	4157512.09	2390555.80	-4241.53
Wind 240 deg - No Ice		-37314.94	21599.75	2400775.52	4141045.44	-4886.83
Wind 270 deg - No Ice		-43087.58	0.00	1028.74	4781769.12	-4222.70
Wind 300 deg - No Ice		-37314.94	-21599.75	-2398718.04	4141045.44	-2427.10
Wind 330 deg - No Ice		-21543.79	-37411.86	-4155454.61	2390555.80	18.83
Member Ice	6241.09					
Total Weight Ice	92515.84			1910.47	-900.21	
Wind 0 deg - Ice		0.00	-35188.71	-3982760.73	-900.21	2039.37

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	164' EEI Monopole - Greenwich Hospital	Page	14 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
	Client	Verizon Wireless	Designed by	TJL

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 30 deg - Ice		17547.83	-30474.32	-3448916.02	-1986140.87	3590.15
Wind 60 deg - Ice		30393.74	-17594.36	-1990425.13	-3439437.89	4178.96
Wind 90 deg - Ice		35095.67	0.00	1910.47	-3971381.52	3648.02
Wind 120 deg - Ice		30393.74	17594.36	1994246.08	-3439437.89	2139.60
Wind 150 deg - Ice		17547.83	30474.32	3452736.96	-1986140.87	57.87
Wind 180 deg - Ice		0.00	35188.71	3986581.68	-900.21	-2039.37
Wind 210 deg - Ice		-17547.83	30474.32	3452736.96	1984340.44	-3590.15
Wind 240 deg - Ice		-30393.74	17594.36	1994246.08	3437637.46	-4178.96
Wind 270 deg - Ice		-35095.67	0.00	1910.47	3969581.09	-3648.02
Wind 300 deg - Ice		-30393.74	-17594.36	-1990425.13	3437637.46	-2139.60
Wind 330 deg - Ice		-17547.83	-30474.32	-3448916.02	1984340.44	-57.87
Total Weight	80879.83			1028.74	-657.51	
Wind 0 deg - Service		0.00	-14947.92	-1659695.68	-657.51	851.12
Wind 30 deg - Service		7454.60	-12945.28	-1437200.79	-828066.96	1467.66
Wind 60 deg - Service		12911.74	-7473.96	-829333.47	-1433772.71	1690.94
Wind 90 deg - Service		14909.20	0.00	1028.74	-1655476.41	1461.14
Wind 120 deg - Service		12911.74	7473.96	831390.95	-1433772.71	839.83
Wind 150 deg - Service		7454.60	12945.28	1439258.27	-828066.96	-6.52
Wind 180 deg - Service		0.00	14947.92	1661753.15	-657.51	-851.12
Wind 210 deg - Service		-7454.60	12945.28	1439258.27	826751.94	-1467.66
Wind 240 deg - Service		-12911.74	7473.96	831390.95	1432457.70	-1690.94
Wind 270 deg - Service		-14909.20	0.00	1028.74	1654161.39	-1461.14
Wind 300 deg - Service		-12911.74	-7473.96	-829333.47	1432457.70	-839.83
Wind 330 deg - Service		-7454.60	-12945.28	-1437200.79	826751.94	6.52

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
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

RISATower

NATCOMM
 63-2 N. Branford Rd.
 Branford, CT 06405
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Job	164' EEI Monopole - Greenwich Hospital	Page	15 of 21
Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
Client	Verizon Wireless	Designed by	TJL

Comb. No.	Description
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 lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
L1	164 - 131.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-18455.42	-900.21	-1910.47
			Max. Mx	5	-13400.37	-354981.75	-959.82
			Max. My	8	-13395.75	-617.50	-357895.78
			Max. Vy	5	19597.69	-354981.75	-959.82
			Max. Vx	8	19710.99	-617.50	-357895.78
			Max. Torque	4			-4910.59
			Max Tension	1	0.00	0.00	0.00
L2	131.5 - 119.29	Pole	Max. Compression	14	-20353.38	-900.21	-1910.47
			Max. Mx	5	-15081.41	-479346.59	-967.90
			Max. My	8	-15076.87	-622.26	-482964.48
			Max. Vy	5	20460.29	-479346.59	-967.90
			Max. Vx	8	20573.70	-622.26	-482964.48
			Max. Torque	4			-4910.45
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-40919.98	-900.21	-1910.47
L3	119.29 - 78.79	Pole	Max. Mx	5	-32377.39	-	-1016.72
			Max. My	8	-32373.19	1577262.94 -651.09	-
			Max. Vy	5	32666.30	-	1585222.77 -1016.72
			Max. Vx	8	32780.48	1577262.94 -651.09	-
			Max. Torque	4			1585222.77 -4910.28
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-62582.49	-900.21	-1910.47
			Max. Mx	5	-52674.94	-	-1045.07
L4	78.79 - 39.88	Pole	Max. My	8	-52672.24	2920558.96 -667.96	-
			Max. Vy	5	37740.60	-	2932870.69 -1045.07
			Max. Vx	8	37854.64	2920558.96 -667.96	-
			Max. Torque	4			2932870.69 -4909.48
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-92515.84	-900.21	-1910.47
			Max. Mx	5	-80868.99	-	-1050.55
			Max. My	8	-80868.92	4849448.67 -671.39	-
L5	39.88 - 1.5	Pole					4867156.38

RISA Tower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	164' EEI Monopole - Greenwich Hospital	Page	16 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
	Client	Verizon Wireless	Designed by	TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vy	5	43107.93	-	-1050.55
			Max. Vx	8	43219.92	-671.39	-
			Max. Torque	4			4867156.38 -4908.64

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	21	92515.84	0.00	-35188.72
	Max. H _x	11	80879.83	43087.58	-0.00
	Max. H _z	2	80879.83	-0.00	43199.50
	Max. M _x	2	4865050.97	-0.00	43199.50
	Max. M _z	5	4849448.67	-43087.58	-0.00
	Max. Torsion	10	4907.06	37314.94	-21599.75
	Min. Vert	33	80879.83	0.00	-14947.92
	Min. H _x	5	80879.83	-43087.58	-0.00
	Min. H _z	8	80879.83	-0.00	-43199.50
	Min. M _x	8	-4867156.38	-0.00	-43199.50
	Min. M _z	11	-4848103.42	43087.58	-0.00
	Min. Torsion	4	-4908.17	-37314.94	21599.75

Tower Mast Reaction Summary

Load Combination	Vertical lb	Shear _x lb	Shear _z lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _z lb-ft	Torque lb-ft
Dead Only	80879.83	0.00	0.00	1028.74	-657.51	0.00
Dead+Wind 0 deg - No Ice	80879.83	0.00	-43199.50	-4865050.97	-671.20	2458.95
Dead+Wind 30 deg - No Ice	80879.83	21543.79	-37411.86	-4213118.86	-2425056.89	4253.64
Dead+Wind 60 deg - No Ice	80879.83	37314.94	-21599.75	-2432003.23	-4199833.49	4908.17
Dead+Wind 90 deg - No Ice	80879.83	43087.58	0.00	1050.22	-4849448.67	4247.17
Dead+Wind 120 deg - No Ice	80879.83	37314.94	21599.75	2434104.92	-4199835.65	2448.13
Dead+Wind 150 deg - No Ice	80879.83	21543.79	37411.86	4215223.03	-2425059.05	-6.47
Dead+Wind 180 deg - No Ice	80879.83	0.00	43199.50	4867156.38	-671.20	-2458.92
Dead+Wind 210 deg - No Ice	80879.83	-21543.79	37411.86	4215221.81	2423715.93	-4252.51
Dead+Wind 240 deg - No Ice	80879.83	-37314.94	21599.75	2434103.70	4198491.11	-4907.06
Dead+Wind 270 deg - No Ice	80879.83	-43087.58	0.00	1050.23	4848103.42	-4247.14
Dead+Wind 300 deg - No Ice	80879.83	-37314.94	-21599.75	-2432002.01	4198488.95	-2449.19
Dead+Wind 330 deg - No Ice	80879.83	-21543.79	-37411.86	-4213117.64	2423713.77	5.41
Dead+Ice+Temp	92515.84	0.00	0.00	1910.47	-900.21	0.00
Dead+Wind 0 deg+Ice+Temp	92515.84	-0.00	-35188.72	-4051495.01	-925.21	2039.69
Dead+Wind 30 deg+Ice+Temp	92515.84	17547.83	-30474.32	-3508435.76	-2020424.21	3607.70
Dead+Wind 60 deg+Ice+Temp	92515.84	30393.74	-17594.36	-2024767.36	-3498802.25	4208.70
Dead+Wind 90 deg+Ice+Temp	92515.84	35095.67	-0.00	1964.34	-4039927.58	3681.66
Dead+Wind 120 deg+Ice+Temp	92515.84	30393.74	17594.36	2028697.10	-3498804.09	2168.12
Dead+Wind 150 deg+Ice+Temp	92515.84	17547.83	30474.32	3512367.62	-2020426.04	73.98
Dead+Wind 180 deg+Ice+Temp	92515.84	-0.00	35188.72	4055427.92	-925.21	-2039.63
Dead+Wind 210 deg+Ice+Temp	92515.84	-17547.83	30474.32	3512366.56	2018575.01	-3606.72
Dead+Wind 240 deg+Ice+Temp	92515.84	-30393.74	17594.36	2028696.04	3496951.82	-4207.73
Dead+Wind 270 deg+Ice+Temp	92515.84	-35095.67	-0.00	1964.35	4038074.69	-3681.60

RISATower

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Job

164' EEI Monopole - Greenwich Hospital

Page

17 of 21

Project

10001.CO4 - 5 Perryridge Road, Greenwich, CT

Date

11:54:12 12/01/09

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Load Combination	Vertical lb	Shear _x lb	Shear _y lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _y lb-ft	Torque lb-ft
Dead+Wind 300 deg+Ice+Temp	92515.84	-30393.74	-17594.36	-2024766.29	3496949.97	-2168.98
Dead+Wind 330 deg+Ice+Temp	92515.84	-17547.83	-30474.32	-3508434.70	2018573.16	-74.84
Dead+Wind 0 deg - Service	80879.83	0.00	-14947.92	-1682864.86	-672.86	851.43
Dead+Wind 30 deg - Service	80879.83	7454.60	-12945.28	-1457262.82	-839632.83	1472.72
Dead+Wind 60 deg - Service	80879.83	12911.74	-7473.96	-840906.26	-1453794.38	1699.35
Dead+Wind 90 deg - Service	80879.83	14909.20	-0.00	1052.77	-1678593.27	1470.60
Dead+Wind 120 deg - Service	80879.83	12911.74	7473.96	843011.95	-1453794.63	847.80
Dead+Wind 150 deg - Service	80879.83	7454.60	12945.28	1459368.81	-839633.09	-2.11
Dead+Wind 180 deg - Service	80879.83	0.00	14947.92	1684970.99	-672.86	-851.40
Dead+Wind 210 deg - Service	80879.83	-7454.60	12945.28	1459368.66	838287.28	-1472.56
Dead+Wind 240 deg - Service	80879.83	-12911.74	7473.96	843011.80	1452448.65	-1699.19
Dead+Wind 270 deg - Service	80879.83	-14909.20	-0.00	1052.77	1677247.21	-1470.57
Dead+Wind 300 deg - Service	80879.83	-12911.74	-7473.96	-840906.11	1452448.39	-847.90
Dead+Wind 330 deg - Service	80879.83	-7454.60	-12945.28	-1457262.67	838287.02	2.01

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-80879.83	0.00	0.00	80879.83	0.00	0.000%
2	0.00	-80879.83	-43199.49	-0.00	80879.83	43199.50	0.000%
3	21543.79	-80879.83	-37411.86	-21543.79	80879.83	37411.86	0.000%
4	37314.94	-80879.83	-21599.75	-37314.94	80879.83	21599.75	0.000%
5	43087.58	-80879.83	0.00	-43087.58	80879.83	-0.00	0.000%
6	37314.94	-80879.83	21599.75	-37314.94	80879.83	-21599.75	0.000%
7	21543.79	-80879.83	37411.86	-21543.79	80879.83	-37411.86	0.000%
8	0.00	-80879.83	43199.49	-0.00	80879.83	-43199.50	0.000%
9	-21543.79	-80879.83	37411.86	21543.79	80879.83	-37411.86	0.000%
10	-37314.94	-80879.83	21599.75	37314.94	80879.83	-21599.75	0.000%
11	-43087.58	-80879.83	0.00	43087.58	80879.83	-0.00	0.000%
12	-37314.94	-80879.83	-21599.75	37314.94	80879.83	21599.75	0.000%
13	-21543.79	-80879.83	-37411.86	21543.79	80879.83	37411.86	0.000%
14	0.00	-92515.84	0.00	0.00	92515.84	0.00	0.000%
15	0.00	-92515.84	-35188.71	0.00	92515.84	35188.72	0.000%
16	17547.83	-92515.84	-30474.32	-17547.83	92515.84	30474.32	0.000%
17	30393.74	-92515.84	-17594.36	-30393.74	92515.84	17594.36	0.000%
18	35095.67	-92515.84	0.00	-35095.67	92515.84	0.00	0.000%
19	30393.74	-92515.84	17594.36	-30393.74	92515.84	-17594.36	0.000%
20	17547.83	-92515.84	30474.32	-17547.83	92515.84	-30474.32	0.000%
21	0.00	-92515.84	35188.71	0.00	92515.84	-35188.72	0.000%
22	-17547.83	-92515.84	30474.32	17547.83	92515.84	-30474.32	0.000%
23	-30393.74	-92515.84	17594.36	30393.74	92515.84	-17594.36	0.000%
24	-35095.67	-92515.84	0.00	35095.67	92515.84	0.00	0.000%
25	-30393.74	-92515.84	-17594.36	30393.74	92515.84	17594.36	0.000%
26	-17547.83	-92515.84	-30474.32	17547.83	92515.84	30474.32	0.000%
27	0.00	-80879.83	-14947.92	0.00	80879.83	14947.92	0.000%
28	7454.60	-80879.83	-12945.28	-7454.60	80879.83	12945.28	0.000%
29	12911.74	-80879.83	-7473.96	-12911.74	80879.83	7473.96	0.000%
30	14909.20	-80879.83	0.00	-14909.20	80879.83	0.00	0.000%
31	12911.74	-80879.83	7473.96	-12911.74	80879.83	-7473.96	0.000%
32	7454.60	-80879.83	12945.28	-7454.60	80879.83	-12945.28	0.000%
33	0.00	-80879.83	14947.92	0.00	80879.83	-14947.92	0.000%
34	-7454.60	-80879.83	12945.28	7454.60	80879.83	-12945.28	0.000%
35	-12911.74	-80879.83	7473.96	12911.74	80879.83	-7473.96	0.000%
36	-14909.20	-80879.83	0.00	14909.20	80879.83	0.00	0.000%
37	-12911.74	-80879.83	-7473.96	12911.74	80879.83	7473.96	0.000%
38	-7454.60	-80879.83	-12945.28	7454.60	80879.83	12945.28	0.000%

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	164' EEI Monopole - Greenwich Hospital	Page	18 of 21
	Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
	Client	Verizon Wireless	Designed by	TJL

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	0.00008157
3	Yes	4	0.00000001	0.00052875
4	Yes	4	0.00000001	0.00040158
5	Yes	4	0.00000001	0.00013495
6	Yes	4	0.00000001	0.00049244
7	Yes	4	0.00000001	0.00045228
8	Yes	4	0.00000001	0.00008163
9	Yes	4	0.00000001	0.00040503
10	Yes	4	0.00000001	0.00054126
11	Yes	4	0.00000001	0.00013488
12	Yes	4	0.00000001	0.00041914
13	Yes	4	0.00000001	0.00045045
14	Yes	4	0.00000001	0.00000001
15	Yes	5	0.00000001	0.00002046
16	Yes	5	0.00000001	0.00002672
17	Yes	5	0.00000001	0.00002601
18	Yes	5	0.00000001	0.00002055
19	Yes	5	0.00000001	0.00002653
20	Yes	5	0.00000001	0.00002630
21	Yes	5	0.00000001	0.00002050
22	Yes	5	0.00000001	0.00002607
23	Yes	5	0.00000001	0.00002683
24	Yes	5	0.00000001	0.00002053
25	Yes	5	0.00000001	0.00002604
26	Yes	5	0.00000001	0.00002623
27	Yes	4	0.00000001	0.00001600
28	Yes	4	0.00000001	0.00004168
29	Yes	4	0.00000001	0.00003085
30	Yes	4	0.00000001	0.00002236
31	Yes	4	0.00000001	0.00003623
32	Yes	4	0.00000001	0.00003088
33	Yes	4	0.00000001	0.00001604
34	Yes	4	0.00000001	0.00002988
35	Yes	4	0.00000001	0.00004377
36	Yes	4	0.00000001	0.00002232
37	Yes	4	0.00000001	0.00002862
38	Yes	4	0.00000001	0.00003061

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	164 - 131.5	10.284	33	0.4786	0.0026
L2	131.5 - 119.29	7.085	33	0.4513	0.0015
L3	125.29 - 78.79	6.505	33	0.4403	0.0014
L4	87.21 - 39.88	3.339	33	0.3349	0.0007
L5	49.13 - 1.5	1.125	33	0.2042	0.0003

RISATower

NATCOMM
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Job	164' EEI Monopole - Greenwich Hospital	Page	19 of 21
Project	10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date	11:54:12 12/01/09
Client	Verizon Wireless	Designed by	TJL

Critical Deflections and Radius of Curvature - Service Wind

<i>Elevation</i>	<i>Appurtenance</i>	<i>Gov. Load Comb.</i>	<i>Deflection</i>	<i>Tilt</i>	<i>Twist</i>	<i>Radius of Curvature</i>
<i>ft</i>			<i>in</i>	<i>°</i>	<i>°</i>	<i>ft</i>
164.00	Low Profile Platform	33	10.284	0.4786	0.0026	219442
160.00	4 FT DISH	33	9.882	0.4767	0.0025	219442
154.00	Low Profile Platform	33	9.282	0.4736	0.0023	109721
144.00	Low Profile Platform	33	8.291	0.4665	0.0019	54860
134.00	Low Profile Platform	33	7.323	0.4551	0.0016	36605
124.00	Low Profile Platform	33	6.386	0.4378	0.0013	29081
114.00	Low Profile Platform	33	5.491	0.4158	0.0011	25618

Maximum Tower Deflections - Design Wind

<i>Section No.</i>	<i>Elevation</i>	<i>Horz. Deflection</i>	<i>Gov. Load Comb.</i>	<i>Tilt</i>	<i>Twist</i>
	<i>ft</i>	<i>in</i>		<i>°</i>	<i>°</i>
L1	164 - 131.5	29.687	8	1.3804	0.0076
L2	131.5 - 119.29	20.458	8	1.3028	0.0044
L3	125.29 - 78.79	18.783	8	1.2711	0.0039
L4	87.21 - 39.88	9.643	8	0.9671	0.0020
L5	49.13 - 1.5	3.250	8	0.5897	0.0010

Critical Deflections and Radius of Curvature - Design Wind

<i>Elevation</i>	<i>Appurtenance</i>	<i>Gov. Load Comb.</i>	<i>Deflection</i>	<i>Tilt</i>	<i>Twist</i>	<i>Radius of Curvature</i>
<i>ft</i>			<i>in</i>	<i>°</i>	<i>°</i>	<i>ft</i>
164.00	Low Profile Platform	8	29.687	1.3804	0.0076	76816
160.00	4 FT DISH	8	28.529	1.3751	0.0071	76816
154.00	Low Profile Platform	8	26.797	1.3663	0.0065	38408
144.00	Low Profile Platform	8	23.939	1.3460	0.0055	19203
134.00	Low Profile Platform	8	21.143	1.3136	0.0046	12811
124.00	Low Profile Platform	8	18.441	1.2637	0.0038	10105
114.00	Low Profile Platform	8	15.857	1.1980	0.0032	8894

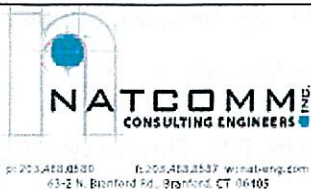
Compression Checks**Pole Design Data**

<i>Section No.</i>	<i>Elevation</i>	<i>Size</i>	<i>L</i>	<i>L_u</i>	<i>Kl/r</i>	<i>F_a</i>	<i>A</i>	<i>Actual P</i>	<i>Allow. P_a</i>	<i>Ratio P/P_a</i>
	<i>ft</i>		<i>ft</i>	<i>ft</i>		<i>ksi</i>	<i>in²</i>	<i>lb</i>	<i>lb</i>	
L1	164 - 131.5 (1)	TP53.42x47x0.3125	32.50	162.50	103.4	13.959	52.6760	-13395.80	735298.00	0.018

<i>RISATower</i> <i>NATCOMM</i> 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 164' EEI Monopole - Greenwich Hospital	Page 21 of 21
	Project 10001.CO4 - 5 Perryridge Road, Greenwich, CT	Date 11:54:12 12/01/09
	Client Verizon Wireless	Designed by TJL

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
						Pole (L5)	46.7	Pass
						RATING =	46.7	Pass

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Subject:

Anchor Bolt and Baseplate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 0: 12/1/09

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 := 4868-ft-kips	(Input From RisaTower)
Shear Force =	Shear := 44-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 =	$I := 3.0\text{-in}$	(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. 0: 12/1/09

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. 0: 12/1/09

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 =

$$T_{\text{Max}} := OM \cdot \frac{R_{bc}}{I_p} - \frac{\text{Axial}}{N} = 87.9 \cdot \text{kips}$$

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 =

$$\frac{T_{\text{Max}}}{T_{\text{ALL.Net}}} = 45.1\% \quad \text{Bolts are "upset bolts". Use net area per AISC}$$

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 =

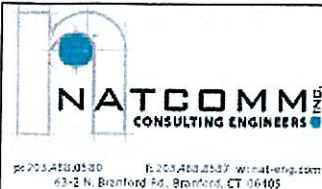
$$M_x := \left(\frac{\text{Shear}}{N} \right) \cdot l = 0.367 \cdot \text{ft-kips}$$

Maximum Bending Stress =

$$f_{bx} := \frac{M_x}{S_x} = 5.3 \cdot \text{ksi}$$

Allowable Bending Stress =

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



Subject:

Anchor Bolt and Baseplate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 0: 12/1/09

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

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 =

$$C_{\text{Max}} := OM \cdot \frac{R_{bc}}{I_p} + \frac{\text{Axial}}{N} = 93.3 \cdot \text{kips}$$

Maximum Compressive Stress =

$$f_a := \frac{C_{\text{Max}}}{A_n} = 28.7 \cdot \text{ksi}$$

$$K := 0.65$$

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

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

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. 0: 12/1/09

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

Base Plate Analysis:

Force from Bolts =

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

$$C_1 = 21.5 \text{ kips}$$

$$C_7 = 92.8 \text{ kips}$$

$$C_2 = 39.5 \text{ kips}$$

$$C_8 = 92.8 \text{ kips}$$

$$C_3 = 55.9 \text{ kips}$$

$$C_9 = 88.8 \text{ kips}$$

$$C_4 = 70.0 \text{ kips}$$

$$C_{10} = 81.1 \text{ kips}$$

$$C_5 = 81.1 \text{ kips}$$

$$C_{11} = 70.0 \text{ kips}$$

$$C_6 = 88.8 \text{ kips}$$

etc.

Maximum Bending Stress in Plate =

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

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 =

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

Condition3 = "Ok"



Subject:

Flange Bolt and Plate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 0: 12/1/09

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)

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 =

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

Subject:

Flange Bolt and Plate Analysis

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 0: 12/1/09

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 =

$$T_{\text{ALL.Gross}} := 1.333 \cdot (0.33 \cdot A_g \cdot F_u) = 41.5 \cdot \text{kips}$$

(1.333 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:

Location:

Rev. 0: 12/1/09

Flange Bolt and Plate Analysis

164-ft EEI Monopole
Greenwich, CT

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

Flange Plate Analysis:

Force from Bolts =

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

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

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

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

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

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

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

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

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

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

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

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

etc.

Maximum Bending Stress in Plate =

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

Allowable Bending Stress in Plate =

$$F_{bp} := 1.33 \cdot 0.75 \cdot F_y = 35.9\text{-ksi}$$

Plate Bending Stress % of Capacity =

$$\frac{f_{bp}}{F_{bp}} = 42.7\%$$

Condition3 =

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

Condition2 = "Ok"

Subject:

CAISSON FOUNDATION

Location:

164-ft EEI Monopole
Greenwich, CT

Rev. 0: 12/01/09

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

Caisson Foundation:

Input Data:

Shear Force =	$S := 44.0k$	USER INPUT-FROM RISATower
Overtuning Moment =	$M := 4868ft \cdot k$	USER INPUT-FROM RISATower
Applied Axial Load =	$A1 := 81.0k$	USER INPUT-FROM RISATower
Bending Moment =	$Mu := 5097ft \cdot k$	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 =	$fc := 3ksi$	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 = $LD1 := 2.0ft + \left(\frac{S \cdot ft^2}{3k \cdot d} \right) + 2ft \cdot \left(\frac{M \cdot ft}{3 \cdot kd} + \frac{S \cdot ft}{2k} + \frac{S^2 \cdot ft^3}{18k^2 \cdot d^2} \right)^{.5} = 32.17ft$

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

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

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

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

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

AxialCheck = "OK"

Greenwich Hospital 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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This program is licensed to:

Staff
Natcomm, Inc.

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

Time and Date of Analysis

Date: December 1, 2009 Time: 13:53:59

Problem Title

Greenwich Hospital

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:

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- 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 = 43199.000 lbs
 Bending moment at pile head = 58405872.000 in-lbs
 Axial load at pile head = 80880.000 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 = 80880.00 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
-----	-----	-----	-----	-----	-----
11414128.	2.282826E+13	5.000000E-07	.00002978	59.56348783	91.54090405
804.84939					
22713328.	2.271333E+13	.00000100	.00005691	56.90895063	173.34435
1532.71721					
33889212.	2.259281E+13	.00000150	.00008400	55.99895757	253.65096
2259.49112					
44950042.	2.247502E+13	.00000200	.00011116	55.58193308	332.80041
2988.46740					
55888741.	2.235550E+13	.00000250	.00013827	55.30890459	410.39726
3715.78969					
55888741.	1.862958E+13	.00000300	.00008459	28.19667667	251.38378
6589.96206					
55888741.	1.596821E+13	.00000350	.00009682	27.66146010	286.45809
7742.61355					
55888741.	1.397219E+13	.00000400	.00010905	27.26362842	321.30492
8894.84967					
55888741.	1.241972E+13	.00000450	.00012150	26.99999839	356.48342
10041.10960					
55888741.	1.117775E+13	.00000500	.00013383	26.76625675	391.05118
11190.68098					
55888741.	1.016159E+13	.00000550	.00014605	26.55475920	425.02414
12343.48294					
55888741.	9.314790E+12	.00000600	.00015829	26.38110977	458.77215
13495.83275					
55888741.	8.598268E+12	.00000650	.00017054	26.23658913	492.29440
14647.72762					

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55888741.	7.984106E+12	.00000700	.00018280	26.11497241	525.59015
15799.16409					
55888741.	7.451832E+12	.00000750	.00019509	26.01168913	558.65853
16950.13993					
55888741.	6.986093E+12	.00000800	.00020739	25.92332107	591.49886
18100.65065					
55888741.	6.575146E+12	.00000850	.00021970	25.84724826	624.11032
19250.69326					
55888741.	6.209860E+12	.00000900	.00023203	25.78143328	656.49209
20400.26469					
55888741.	5.883025E+12	.00000950	.00024438	25.72426683	688.64329
21549.36209					
55888741.	5.588874E+12	.00001000	.00025674	25.67446464	720.56314
22697.98167					
55888741.	5.322737E+12	.00001050	.00026913	25.63098711	752.25084
23846.11966					
55888741.	5.080795E+12	.00001100	.00028152	25.59298450	783.70560
24993.77201					
55888741.	4.859890E+12	.00001150	.00029394	25.55974871	814.92644
26140.93669					
55888741.	4.657395E+12	.00001200	.00030637	25.53069395	845.91249
27287.61021					
55888741.	4.471099E+12	.00001250	.00031882	25.50533420	876.66306
28433.78688					
55888741.	4.299134E+12	.00001300	.00033128	25.48324782	907.17712
29579.46492					
55888741.	4.139907E+12	.00001350	.00034377	25.46408397	937.45389
30724.63929					
56842573.	4.060184E+12	.00001400	.00035627	25.44753689	967.49241
31869.30701					
58753670.	4.051977E+12	.00001450	.00036878	25.43334264	997.29169
33013.46523					
60662583.	4.044172E+12	.00001500	.00038132	25.42127913	1026.85098
34157.10820					
62569301.	4.036729E+12	.00001550	.00039387	25.41115004	1056.16939
35300.23151					
64473789.	4.029612E+12	.00001600	.00040644	25.40277511	1085.24569
36442.83462					
66376061.	4.022792E+12	.00001650	.00041903	25.39601272	1114.07933
37584.90900					
68276081.	4.016240E+12	.00001700	.00043164	25.39072126	1142.66902
38726.45433					
70173850.	4.009934E+12	.00001750	.00044427	25.38678807	1171.01403
39867.46379					
72069342.	4.003852E+12	.00001800	.00045691	25.38410372	1199.11319
41007.93541					
73962551.	3.997976E+12	.00001850	.00046958	25.38257807	1226.96565
42147.86324					
75853452.	3.992287E+12	.00001900	.00048226	25.38212425	1254.57027
43287.24474					
77742056.	3.986772E+12	.00001950	.00049496	25.38267463	1281.92635
44426.07151					
81512238.	3.976207E+12	.00002050	.00052042	25.38650483	1335.88789
46702.05454					
85272986.	3.966185E+12	.00002150	.00054596	25.39360839	1388.84205
48975.77447					
89024169.	3.956630E+12	.00002250	.00057158	25.40360552	1440.78025
51247.19434					
92765661.	3.947475E+12	.00002350	.00059728	25.41618401	1491.69379
53516.27518					
96497327.	3.938666E+12	.00002450	.00062306	25.43108314	1541.57367
55782.97765					
1.002190E+08	3.930158E+12	.00002550	.00064893	25.44808728	1590.41083

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58047.25933					
1.038925E+08	3.920470E+12	.00002650	.00067479	25.46377176	1638.03407
60000.00000					
1.067931E+08	3.883386E+12	.00002750	.00069900	25.41810554	1681.40450
60000.00000					
1.092241E+08	3.832423E+12	.00002850	.00072218	25.33975714	1721.88377
60000.00000					
1.113439E+08	3.774370E+12	.00002950	.00074468	25.24332315	1760.18783
60000.00000					
1.135610E+08	3.723312E+12	.00003050	.00076860	25.20000011	1800.02423
60000.00000					
1.149638E+08	3.649643E+12	.00003150	.00079061	25.09861261	1835.64010
60000.00000					
1.165337E+08	3.585653E+12	.00003250	.00081155	24.97067124	1868.65566
60000.00000					
1.179020E+08	3.519464E+12	.00003350	.00083191	24.83317369	1899.97452
60000.00000					
1.192295E+08	3.455929E+12	.00003450	.00085220	24.70142144	1930.43736
60000.00000					
1.203854E+08	3.391137E+12	.00003550	.00087197	24.56240791	1959.37932
60000.00000					
1.215377E+08	3.329800E+12	.00003650	.00089177	24.43214267	1987.69008
60000.00000					
1.225225E+08	3.267266E+12	.00003750	.00091103	24.29413015	2014.51056
60000.00000					
1.234954E+08	3.207674E+12	.00003850	.00093029	24.16346902	2040.68554
60000.00000					
1.244136E+08	3.149711E+12	.00003950	.00094939	24.03530234	2065.98132
60000.00000					
1.252273E+08	3.092032E+12	.00004050	.00096814	23.90459937	2090.15275
60000.00000					
1.260381E+08	3.037064E+12	.00004150	.00098691	23.78106433	2113.75206
60000.00000					
1.268211E+08	2.984026E+12	.00004250	.00100562	23.66168779	2136.64057
60000.00000					
1.274929E+08	2.930871E+12	.00004350	.00102390	23.53798860	2158.38579
60000.00000					
1.281621E+08	2.880048E+12	.00004450	.00104222	23.42061406	2179.58435
60000.00000					
1.288288E+08	2.831402E+12	.00004550	.00106470	23.39999861	2205.03779
60000.00000					
1.295442E+08	2.785897E+12	.00004650	.00108308	23.29212552	2224.99321
60000.00000					
1.300780E+08	2.738483E+12	.00004750	.00110037	23.16558427	2243.15083
60000.00000					
1.306096E+08	2.692981E+12	.00004850	.00111768	23.04491061	2260.81996
60000.00000					
1.311390E+08	2.649274E+12	.00004950	.00113502	22.92975694	2277.99798
60000.00000					
1.316664E+08	2.607255E+12	.00005050	.00115240	22.81980139	2294.68214
60000.00000					
1.321285E+08	2.565602E+12	.00005150	.00116944	22.70752198	2310.51064
60000.00000					
1.325535E+08	2.524829E+12	.00005250	.00118630	22.59614056	2325.66697
60000.00000					
1.329766E+08	2.485543E+12	.00005350	.00120319	22.48948735	2340.35518
60000.00000					
1.333977E+08	2.447664E+12	.00005450	.00122011	22.38730484	2354.57257
60000.00000					
1.338168E+08	2.411114E+12	.00005550	.00123706	22.28935808	2368.31663
60000.00000					
1.342339E+08	2.375822E+12	.00005650	.00125404	22.19542176	2381.58445
60000.00000					

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1.345752E+08	2.340438E+12	.00005750	.00127056	22.09667355	2393.98760
60000.00000					
1.349079E+08	2.306119E+12	.00005850	.00128706	22.00102812	2405.90443
60000.00000					
1.352389E+08	2.272922E+12	.00005950	.00130359	21.90908736	2417.36880
60000.00000					
1.358953E+08	2.209680E+12	.00006150	.00133674	21.73561174	2438.93013
60000.00000					
1.367504E+08	2.153550E+12	.00006350	.00137160	21.60000032	2459.59723
60000.00000					
1.371972E+08	2.094613E+12	.00006550	.00141017	21.52932841	2480.08734
60000.00000					
1.376787E+08	2.039684E+12	.00006750	.00144127	21.35222214	2494.53370
60000.00000					
1.381542E+08	1.987830E+12	.00006950	.00147249	21.18690902	2507.35526
60000.00000					
1.386237E+08	1.938793E+12	.00007150	.00150382	21.03242666	2518.53363
60000.00000					
1.390631E+08	1.892015E+12	.00007350	.00153501	20.88450068	2527.97645
60000.00000					
1.394169E+08	1.846582E+12	.00007550	.00156548	20.73479480	2535.56757
60000.00000					
1.397651E+08	1.803421E+12	.00007750	.00159605	20.59422022	2541.58021
60000.00000					
1.401077E+08	1.762361E+12	.00007950	.00162674	20.46210104	2545.99624
60000.00000					
1.404445E+08	1.723246E+12	.00008150	.00165753	20.33784503	2548.79730
60000.00000					
1.407755E+08	1.685934E+12	.00008350	.00168845	20.22090179	2549.96438
60000.00000					
1.410680E+08	1.649918E+12	.00008550	.00171914	20.10689718	2545.99456
60000.00000					
1.413047E+08	1.614911E+12	.00008750	.00174929	19.99189156	2541.02164
60000.00000					
1.415389E+08	1.581440E+12	.00008950	.00177955	19.88325888	2543.54857
60000.00000					
1.415389E+08	1.546873E+12	.00009150	.00181170	19.79999882	2547.09008
60000.00000					
1.417490E+08	1.516032E+12	.00009350	.00185130	19.79999882	2549.59126
60000.00000					
1.423494E+08	1.490569E+12	.00009550	.00188521	19.74037009	2548.59660
60000.00000					
1.425558E+08	1.462111E+12	.00009750	.00191463	19.63718659	2544.38327
60000.00000					
1.427608E+08	1.434782E+12	.00009950	.00194413	19.53904027	2540.15443
60000.00000					
1.429545E+08	1.408419E+12	.00010150	.00197354	19.44378108	2539.77157
60000.00000					
1.430989E+08	1.382598E+12	.00010350	.00200211	19.34403831	2543.30172
60000.00000					
1.432420E+08	1.357744E+12	.00010550	.00203076	19.24886924	2546.09776
60000.00000					
1.433839E+08	1.333804E+12	.00010750	.00205949	19.15802604	2548.15018
60000.00000					
1.435245E+08	1.310726E+12	.00010950	.00208831	19.07128018	2549.44932
60000.00000					
1.436638E+08	1.288465E+12	.00011150	.00211721	18.98843211	2549.98533
60000.00000					
1.437998E+08	1.266959E+12	.00011350	.00214631	18.91018027	2547.15825
60000.00000					
1.439345E+08	1.246186E+12	.00011550	.00217549	18.83539814	2543.61801
60000.00000					
1.440684E+08	1.226114E+12	.00011750	.00220473	18.76368016	2540.06709

Greenwich Hospital Caisson Analysis.lpo

60000.00000					
1.442016E+08	1.206708E+12	.00011950	.00223404	18.69487828	2536.50536
60000.00000					
1.443341E+08	1.187935E+12	.00012150	.00226341	18.62885731	2535.66907
60000.00000					
1.444541E+08	1.169669E+12	.00012350	.00229254	18.56309706	2539.30739
60000.00000					
1.445458E+08	1.151759E+12	.00012550	.00232103	18.49428231	2542.30245
60000.00000					
1.446368E+08	1.134406E+12	.00012750	.00234958	18.42808110	2544.81469
60000.00000					
1.447272E+08	1.117585E+12	.00012950	.00237819	18.36438078	2546.83884
60000.00000					
1.448169E+08	1.101269E+12	.00013150	.00240685	18.30306870	2548.36939
60000.00000					
1.449060E+08	1.085438E+12	.00013350	.00243558	18.24404508	2549.40085
60000.00000					
1.449944E+08	1.070070E+12	.00013550	.00246437	18.18721658	2549.92755
60000.00000					
1.450812E+08	1.055136E+12	.00013750	.00249328	18.13295335	2548.65348
60000.00000					
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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					
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60000.00000					
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60000.00000					
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60000.00000					
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60000.00000					
1.476109E+08	6.724872E+11	.00021950	.00374069	17.04185325	2547.39918
60000.00000					

Greenwich Hospital Caisson Analysis.lpo
 1.476109E+08 6.604516E+11 .00022350 .00380064 17.00512201 2549.04380
 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 = 43199.000 lbs
 Specified moment at pile head = 58405872.000 in-lbs
 Specified axial load at pile head = 80880.000 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*h	Deflect. y	Moment M	Shear V	Slope S	Total Stress	Flx. Rig. EI	Soil Res. p
F/L in	in	lbs-in	lbs	Rad.	lbs/in**2	lbs-in**2	lbs/in
0.000	.562004	5.84E+07	43199.	-.003842	481.093	4.05E+12	0.000
0.000							
26.880	.463980	5.96E+07	42121.	-.003450	490.504	4.05E+12	-138.080
999.936							
53.760	.376586	6.06E+07	33781.	-.003051	499.087	4.04E+12	-777.434
6936.482							
80.640	.300015	6.12E+07	1153.790	-.002646	503.425	4.04E+12	-1744.457
19537.							
107.520	.234359	6.05E+07	-58916.	-.002240	497.664	4.04E+12	-2626.116
37651.							
134.400	.179472	5.79E+07	-1.33E+05	-.001847	477.046	4.06E+12	-3402.373
63698.							
161.280	.132717	5.31E+07	-2.26E+05	-.001694	438.146	2.24E+13	-3407.868
86277.							
188.160	.088006	4.59E+07	-3.11E+05	-.001634	379.608	2.25E+13	-2851.175
1.09E+05							
215.040	.044764	3.66E+07	-3.74E+05	-.001585	304.671	2.26E+13	-1751.051
1.31E+05							
241.920	.002691	2.61E+07	-4.00E+05	-.001548	219.756	2.27E+13	-123.333
1.54E+05							
268.800	-.038551	1.55E+07	-3.76E+05	-.001523	134.369	2.28E+13	2026.144
1.77E+05							
295.680	-.079296	6.46E+06	-2.87E+05	-.001510	61.071	2.28E+13	4700.463
1.99E+05							
322.560	-.119827	8.24E+05	-1.18E+05	-.001507	15.490	2.28E+13	7908.309
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.
 rep

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 = .56200391 in
 Computed slope at pile head = -.00384173
 Maximum bending moment = 61167723. lbs-in
 Maximum shear force = -400235.37862 lbs
 Depth of maximum bending moment = 80.64000000 in
 Depth of maximum shear force = 245.28000 in
 Number of iterations = 66
 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= 43199.	M= 5.84E+07	80880.0000	.5620039	6.1168E+07	-400235.

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
.00115255	4319.90006	873135.41593	3748115.	7.575665E+08
.00346953	13004.19478	2628399.	3748115.	7.575665E+08
.00549907	20611.16108	4165915.	3748115.	7.575665E+08
.00693906	26008.38957	5256799.	3748115.	7.575665E+08
.00805600	30194.80522	6102955.	3748115.	7.575665E+08
.00896860	33615.35586	6794314.	3748115.	7.575665E+08
.00974020	36507.39023	7378850.	3748115.	7.575665E+08
.01040859	39012.58435	7885198.	3748115.	7.575665E+08
.01099815	41222.32217	8331829.	3748115.	7.575665E+08
.01152553	43199.00000	8731354.	3748115.	7.575665E+08

Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
.00003155	23900.01932	5840587.	7.575665E+08	1.851310E+11
.00009507	71948.39882	17581919.	7.567588E+08	1.849280E+11
.00015100	114048.64604	27866683.	7.552654E+08	1.845418E+11

```

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.00019086 143927.16437 35163839. 7.541075E+08 1.842412E+11
.00022187 167107.28414 40823953. 7.531711E+08 1.839981E+11
.00024727 186049.86328 45448602. 7.524248E+08 1.838037E+11
.00026879 202067.64146 49358688. 7.517746E+08 1.836346E+11
.00028747 215944.47117 52745758. 7.512014E+08 1.834855E+11
.00030396 228185.94098 55733366. 7.507044E+08 1.833561E+11
.00032139 239144.46259 58405872. 7.440870E+08 1.817272E+11

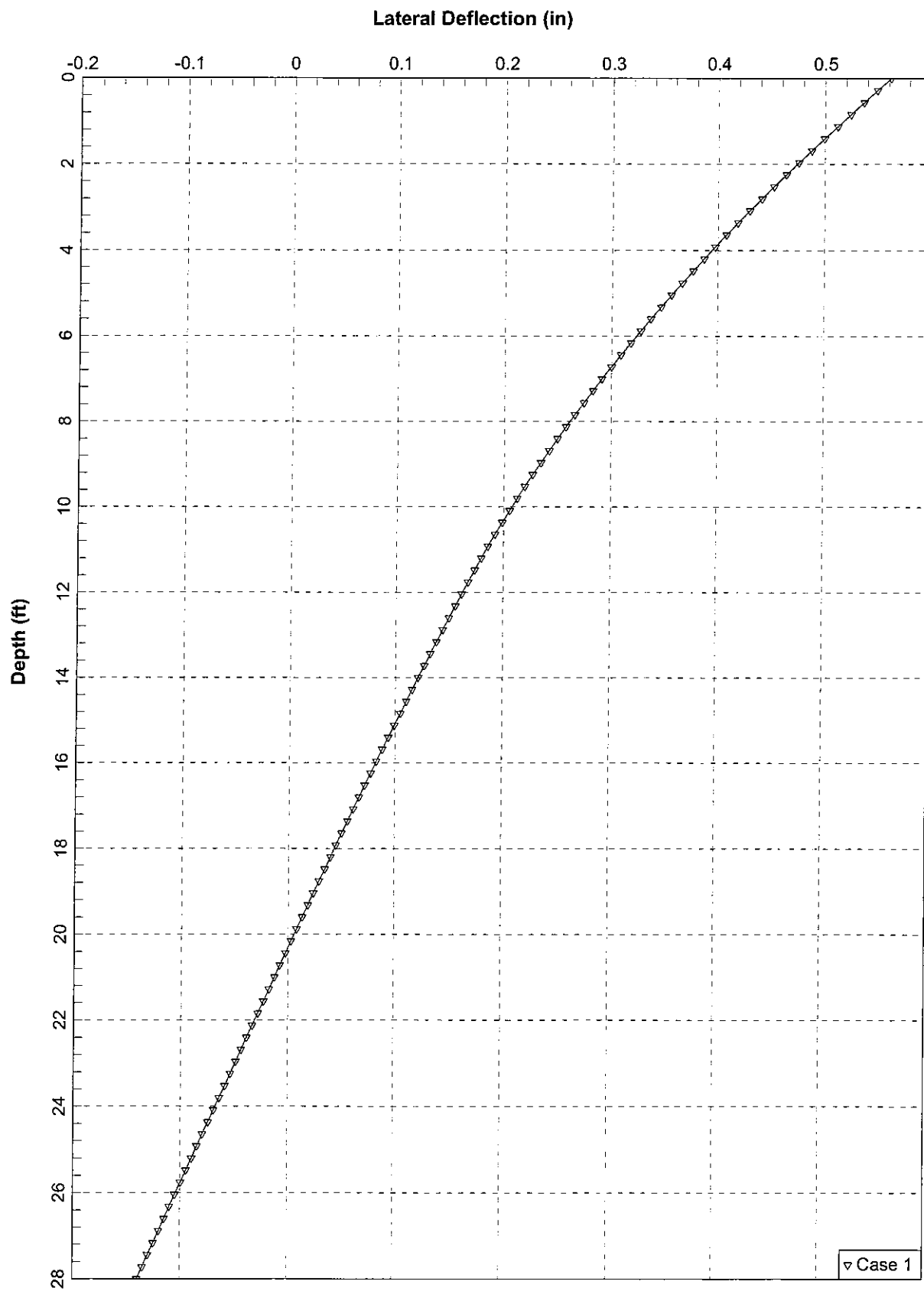
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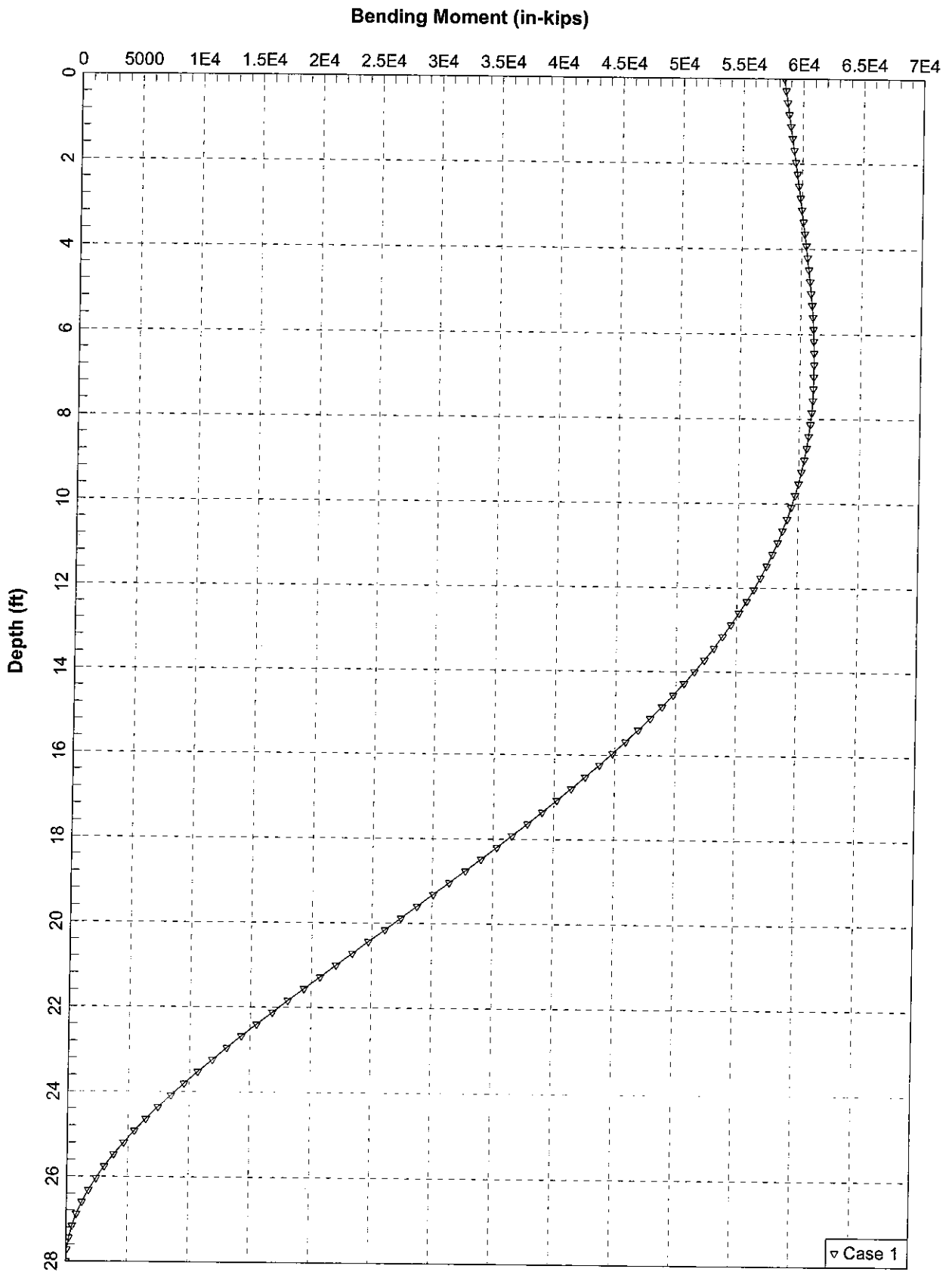
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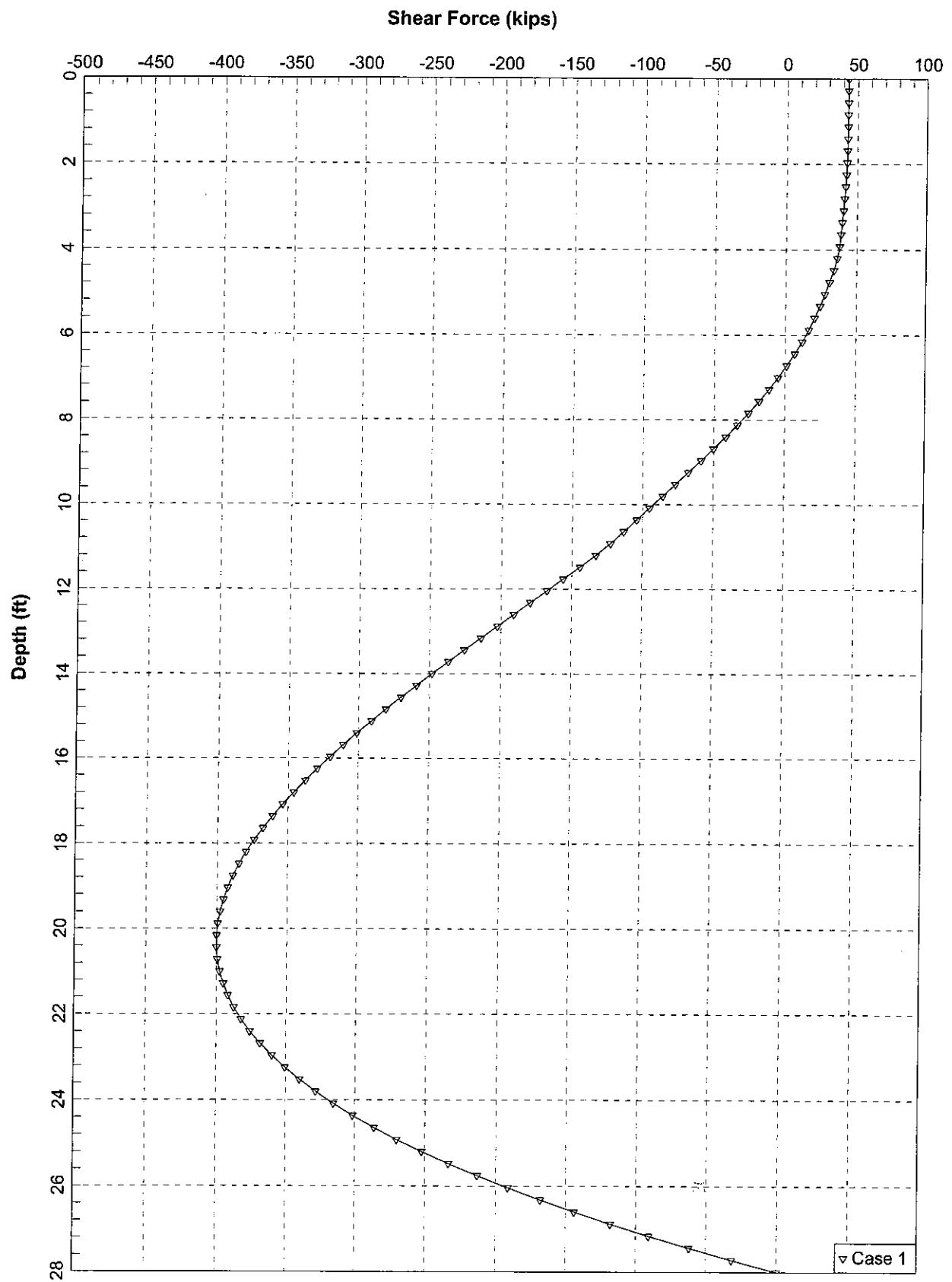
K22 = abs(Shear Reaction/Top y)
K23 = abs(Shear Reaction/Top Rotation)
K32 = abs(Moment Reaction/Top y)
K33 = abs(Moment Reaction/Top Rotation)

```

The analysis ended normally.



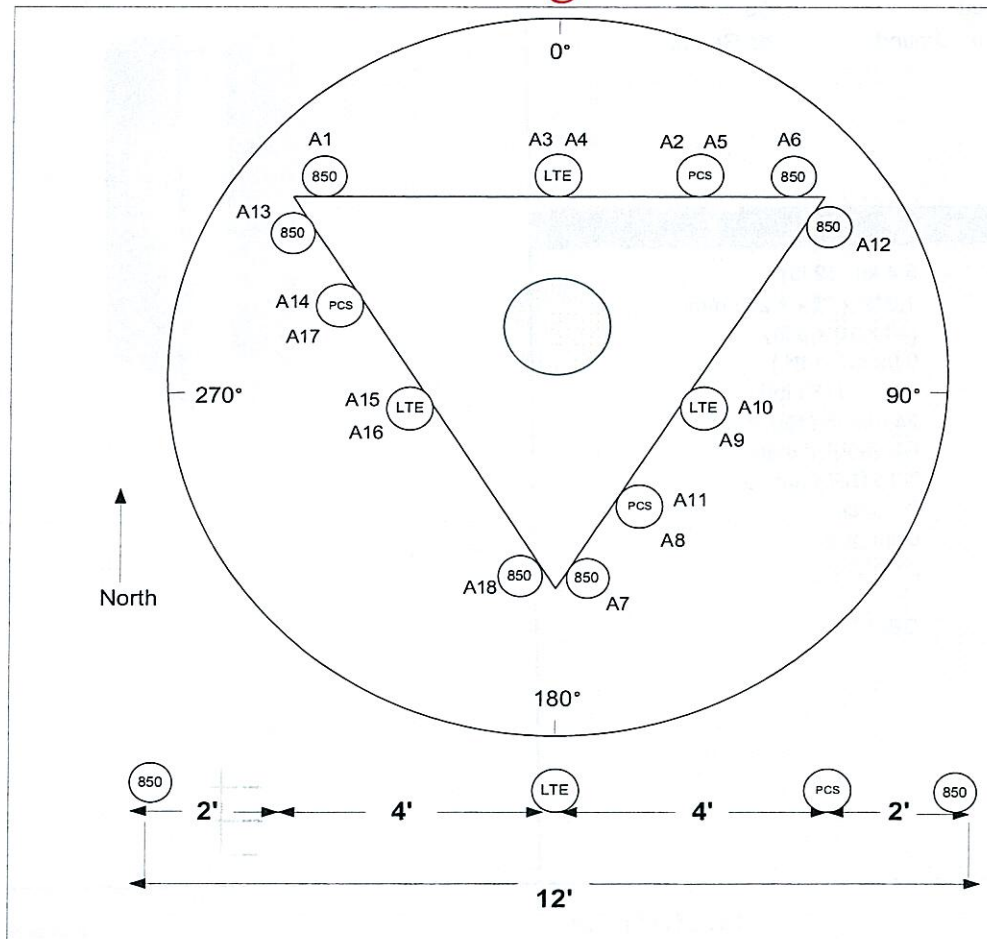




SITE NAME		GREENWICH CT		ECP - CELL #		5		89		
LATITUDE			41-02-02.17 N		LONGITUDE			73-37-51.00 W		
Additional Comments:					STRUCTURE TYPE		MONOPOLE			
700 Mhz - LTE ANTENNA ADD			ALPHA		BETA		GAMMA			
EQUIPMENT TYPE			Lucent		Lucent		Lucent			
ANTENNA TYPE			LNX-6514DS-T4M		LNX-6514DS-T4M		LNX-6514DS-T4M			
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™

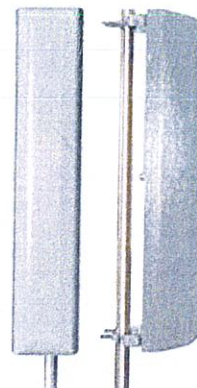
- Exceptional azimuth roll-off, reducing sector-to-sector interference and softer hand-offs
- Air dielectric feed system, no screws, rivets, welds or solder in RF element feed path
- Strong upper side lobe suppression
- Low profile appearance and low wind loading for easier zoning approvals

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



MG D3-800Tx

Xpol GSM1800+PCS & UMTS Panel Antenna

15.9 dBd/18 dBi

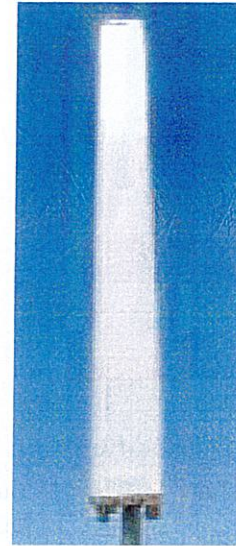
WIDE BAND 1710-2170 MHz

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		

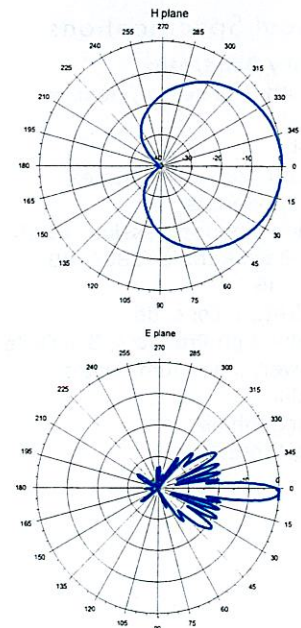


Mechanical & Environmental Specifications

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.comercial@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

LNK6514DS-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