STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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

Daniel F. Caruso
Chairman

March 26, 2008

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

RE: **EM-VER-051-080213** – Cellco Partnership d/b/a Verizon Wireless notice of intent to modify an existing telecommunications facility located at 3965 Congress Street, Fairfield, Connecticut.

Dear Attorney Baldwin:

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

The proposed modifications are to be implemented as specified here and in your notice dated February 13, 2008, including the placement of all necessary equipment and shelters within the tower compound. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

This decision is under the exclusive jurisdiction of the Council. Please be advised that the validity of this action shall expire one year from the date of this letter. Any additional change to this facility will require explicit notice to this agency pursuant to Regulations of Connecticut State Agencies Section 16-50j-73. Such notice shall include all relevant information regarding the proposed change with cumulative worst-case modeling of radio frequency exposure at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin 65. Any deviation from this format may result in the Council implementing enforcement proceedings pursuant to General Statutes § 16-50u including, without limitation, imposition of expenses resulting from such failure and of civil penalties in an amount not less than one thousand dollars per day for each day of construction or operation in material violation.

Thank you for your attention and cooperation.

Very truly yours,

S. Derek Phelps
Executive Director

SDP/MP

c: Honorable Kenneth A. Flatto, First Selectman, Town of Fairfield
Joseph E. Devonshuk, Town Planner, Town of Fairfield

ROBINSON & COLE

KENNETH C. BALDWIN

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

EM-VER-051-080213

ORIGINAL

February 13, 2008

RECEIVED
FEB 13 2008
CONNECTICUT
SITING COUNCIL

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**
3965 Congress Road, Fairfield, Connecticut

Dear Mr. Phelps:

Cellco Partnership d/b/a Verizon Wireless ("Cellco") currently maintains a wireless telecommunications facility at the above-referenced address. The Council approved Cellco's shared use of the existing 150-foot monopole tower on December 21, 2006. Cellco intends to modify its installation by replacing two (2) DB844H80E antennas with two (2) DB846F65ZAXY antennas at the 80-foot level on the existing tower. Attached behind Tab 1 are the specifications for the proposed replacement antennas.

Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Kenneth A. Flatto, First Selectman of the Town of Fairfield. The Town of Fairfield is the owner of the property on which the facility is located.

The planned modifications to the facility falls 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 structures. Cellco's replacement antennas will be located at the same 80-foot level on the existing 150-foot tower.

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 the modified facility is included behind Tab 2.

Also attached is a Structural Analysis Report confirming that the tower can support the proposed modifications. (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:
Kenneth A. Flatto, Fairfield First Selectman
Sandy M. Carter

ANDREW®

Vertically Polarized Directed Dipole® Panel Antennas

806 - 960 MHz

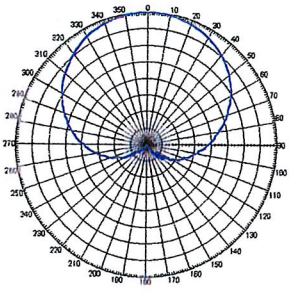
65° HORIZONTAL BEAMWIDTH

HORIZONTAL BEAMWIDTH	65°		65°	65°
FREQUENCY RANGE	806-960 MHz		806-896 MHz	806-896 MHz
	14.5 & 14.8 dBd / 0° Tilt		14.5 dBd / 0° Tilt	14.3 dBd / 5° Tilt
MODEL	DB846F65ZAXY		DB846H65E-SX	846H65T5E-SX
TYPE	Directed Dipole®, No Screen		Directed Dipole®	Directed Dipole®
ELECTRICAL SPECIFICATIONS				
Frequency Range (MHz)	806-896	870-960	806-896	806-896
Gain (dBd/dBi)	14.5 / 16.6	14.8 / 16.9	14.5 / 16.6	14.3 / 16.4
Horizontal Beamwidth (Deg.)	65	60	65	65
Elevation Beamwidth (Deg.)	11	10.5	11	10.5
USLS (dB)	>15	>15	N/A	N/A
Null Fill (dB) – Below Peak	N/A	N/A	N/A	N/A
Beam Tilt (Deg.)	0	0	0	5
VSWR	<1.33:1	<1.33:1	<1.5:1	<1.5:1
Front-To-Back Ratio (dB)	40	40	30	40
Isolation (dB)	N/A	N/A	N/A	N/A
Max. Input Power (Watts)	500	500	500	500
Polarization	Vertical	Vertical	Vertical	Vertical
Connector Location	Back	Back	Back	Back
Connector Type	7-16 DIN - Female	7-16 DIN - Female	7-16 DIN - Female	7-16 DIN - Female
Optional Connectors	N/A	N/A	N/A	N/A
MECHANICAL SPECIFICATIONS				
Length (inch/mm)	72 / 1,829	72 / 1,829	72 / 1,829	72 / 1,829
Width (inch/mm)	10 / 254	10 / 254	20.5 / 521	20.5 / 521
Depth (inch/mm)	8.5 / 216	8.5 / 216	9 / 229	9 / 229
Net Weight (lbs/kg)	21 / 9.5	21 / 9.5	24 / 10.9	24 / 10.9
Max. Flat Plate Area (ft²/m²)	1.61 / 0.15	1.61 / 0.15	4.95 / 0.46	4.95 / 0.46
Max. Wind Load at 100 mph (lbf/N)	87 / 386	87 / 386	273 / 1,214	273 / 1,214
Max. Wind Speed (mph/kmh)	125 / 201	125 / 201	125 / 201	125 / 201
Radome Material	ABS, UV Resistant	ABS, UV Resistant	ABS, UV Resistant	ABS, UV Resistant
Reflector Material	Pass. Aluminum	Pass. Aluminum	Pass. Aluminum	Pass. Aluminum
Radiator Material	Aluminum	Aluminum	Brass	Brass
Hardware Material	Galvanized Steel	Galvanized Steel	Galvanized Steel	Galvanized Steel
Color	Light Gray	Light Gray	Light Gray	Light Gray
Std. Mounting Hardware	DB380	DB380	DB380	DB380
Optional Downtilt Kit	DB5083	DB5083	DB5083	DB5083
Optional Special Mounting	DB5084-AZ	DB5084-AZ	DB5084-AZ	DB5084-AZ

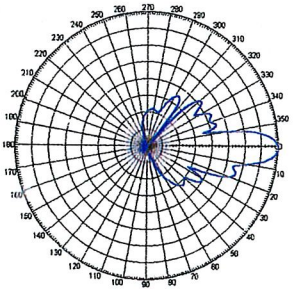
Specifications are subject to change. Please see our website for the latest information.

DB846F65ZAXY

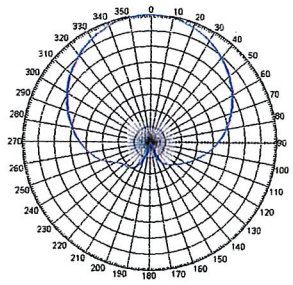
Azimuth Pattern

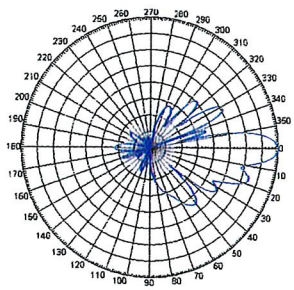


Elevation Pattern



DB846H65E-SX





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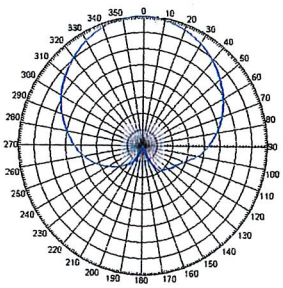
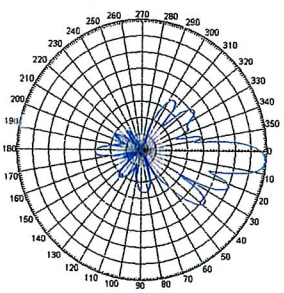




Scale: 10° radials, 5 dB per division

	General	Power	Density					
Site Name: Fairfield 2								
Tower Height: Verizon @ 80Ft.								
CARRIER	**# OF CHAN.**	**WATTS ERP**	**HEIGHT**	**CALC. POWER DENS**	**FREQ.**	**MAX. PERMISS. EXP.**	**FRACTION MPE**	**Total**
*Cingular	13	40	125	0.0120	850	0.5667	2.11%	
*Cingular GSM	3	296	128	0.0195	880	0.5867	3.32%	
*Cingular GSM	1	427	128	0.0094	1930	1.0000	0.94%	
*T-Mobile	12		113	0.0127	1930	1.0000	1.27%	
*Sprint CDMA	11	411	138	0.0854	1962.5	1.0000	8.54%	
*Sprint WiMAX	3	562	138	0.0318	2657	1.0000	3.18%	
*Nextel	18	100	156	0.0266	851	0.5673	4.69%	
*Town	1	40	108	0.0012	470.46	0.3136	0.39%	
*Town	1	40	108	0.0012	470.47	0.3136	0.39%	
*Town	1	40	108	0.0012	470.48	0.3137	0.39%	
Verizon	**9**	**285**	**80**	**0.1441**	**880**	**0.5866**	**24.57%**	
Verizon	**3**	**400**	**80**	**0.0674**	**1900**	**1.0000**	**6.74%**	
								56.53%
* Source: Siting Council								

NATCOMM INC.
CONSULTING ENGINEERS

Structural Analysis Report

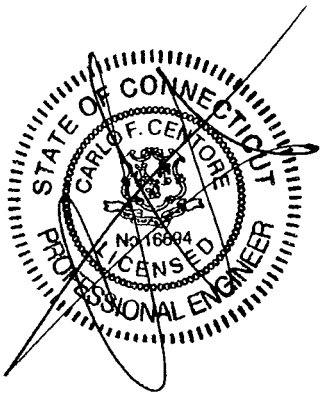
150' AGL Existing Monopole

3965 Congress Road
Fairfield, CT

Natcomm Project No. 08007.CO1

~~Date: January 28, 2008~~

Rev. 1: February 11, 2008



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

Natcomm, Inc.
Structural Monopole Analysis
150' AGL Existing Valmont Monopole
Fairfield, CT
Revision 1~February 11, 2008

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna exchange proposed by Verizon Wireless on the existing monopole (tower) located in Fairfield, Connecticut. The host tower is a 150-ft AGL, three section, twelve sided, tapered monopole originally designed and manufactured by Valmont Industries. The manufacturer's drawings and calculations were unavailable for use in this report. The tower geometry and section sizes were taken from a previous structural analysis report prepared by Walker Engineering, Inc. (WEI); job no. 0311-248, dated December 2, 2003. Since its construction, the tower has been structurally reinforced. Reinforcement sizes and locations were obtained from existing WEI tower reinforcement drawings S-1, S-2 and S-3; WEI job no. 0311-428RE, dated July 27, 2004. Both WEI's structural analysis and reinforcement drawings are available for reference in Section 4 of this report.

Verizon Wireless is proposing the replacement of two (2) existing Cellular antennas on their low profile platform. Refer to the Antenna and Appurtenance Summary below and "Antenna Replacement Details" drawing "ANT-1" available for reference in Section 4 of this report for a detailed description and layout of the Verizon Wireless existing and proposed antenna 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) Decibel DB810K omni-directional (whip) antenna mounted with a RAD center elevation of 157-ft above grade level.
  Coax Cables: One (1) 1-5/8" ∅ coax cable running on the inside of the existing tower.
- TOWN (Existing):
  Antennas: Two (2) 10-ft long by 3" ∅ omni-directional (whip) antennas mounted with a RAD center elevation of 154-ft above grade level.
  Coax Cables: Two (2) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- NEXTEL (Existing):
  Antennas: Twelve (12) Decibel DB844H90E-XY panel antennas mounted on three (3) 12-ft t-arms with a RAD center elevation of 149-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- SPRINT (Existing):
  Antennas: Six (6) Decibel DB844H90E-XY panel antennas mounted on a platform with rails with a RAD center elevation of 138-ft above grade level.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on the inside of the existing tower.

- AT&T/CINGULAR (Existing):
  Antennas: Six (6) Powerwave 7770.00 panel antennas and twelve (12) Powerwave LPG21401 TMA's mounted on a low profile platform with a RAD center elevation of 125-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the inside of the existing tower.
- T-MOBILE (Existing):
  Antennas: Three (3) RR65-18-02DP panel antennas and six (6) 10" by 8" by 3" TMA's mounted on a platform with rails with a RAD center elevation of 113-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the outside of the existing tower as specified in Section 3 of this report.
- TOWN (Existing):
  Antennas: Three (3) ASP-685 and one (1) 1142-2B omni-directional (whip) antenna mounted on standoffs with a RAD center mount elevation of 104-ft above grade level.
  Coax Cables: Four (4) 7/8" ∅ coax cables running on the inside of the existing tower.
- VERIZON (Existing Removed/Reconfigured):
  Antennas: Six (6) Decibel DB948F85T2E-M and six (6) Decibel DB844H80E-XY panel antennas mounted on a low profile platform with a RAD center elevation of 80-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the outside of the existing tower as specified in Section 3 of this report.
- **VERIZON (Proposed/Reconfigured):**
  Antennas: Two (2) Decibel DB846F65ZAXY (proposed), six (6) Decibel DB948F85T2E-M (existing to remain) and four (4) Decibel DB844H80E-XY (existing to remain) panel antennas mounted on a low profile platform with a RAD center elevation of 80-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on the outside of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antennas: One (1) GPS antenna mounted on a standoff with a RAD center elevation of 40-ft above grade level.
  Coax Cables: One (1) 1/2" ∅ coax cable running on the outside of the existing tower as specified in Section 3 of this report.

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 coax cables to be installed within tower.
- A new porthole will not be required.

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 90 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).

Tower Loading

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]*
	Fairfield; v = 110 mph (3 second gust) equivalent to v = 90 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	CT Building Code wind speed Controls	
Load Cases:	Load Case 1; 90 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 78 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 90 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1610.1.3 of State Bldg. Code 1999] 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 **96.1%** of its total capacity.

Foundation and Anchors

The existing foundation consists of a 6.5-ft ∅ by 36.5-ft deep reinforced concrete caisson bearing directly on existing sub grade. The sub grade conditions used in the analysis of the existing foundation were obtained from SAC Engineering, Inc. calculations, dated May 19, 1994, which are available for reference in Section 4 of this report. The monopole tower is connected to the pedestal by means of sixteen (16) 2 1/4" diameter, A615-GR75 anchor bolts embedded ±9.2-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:
  - Shear Force @ top of pedestal = **41.0** kips
  - Moment @ top of pedestal = **3,600.0** ft-kips
  - Axial Force @ top of pedestal = **42.0** kips
- The base plate, anchor bolts and the foundation are within allowable limits.
- Foundation resists two times the calculated wind load per the requirements of Section 3108.4.2 of the 2005 CT State Building Code Supplement to the 2003 International Building Code (IBC).

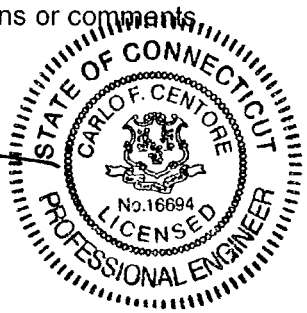
Conclusions

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

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

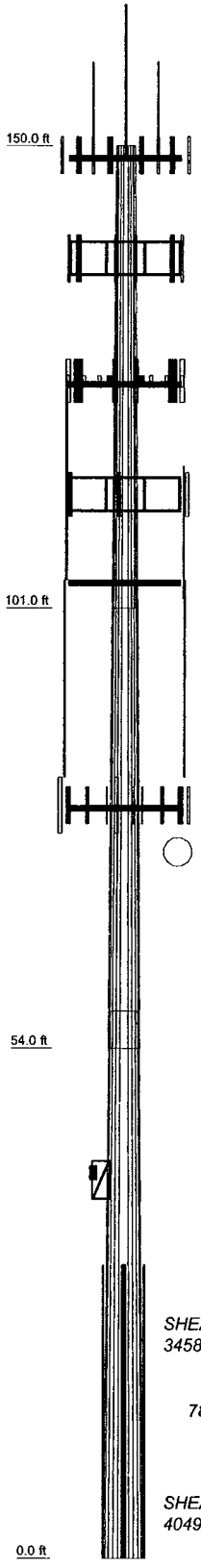
RISATower, is an integrated structural analysis and design software package for Designed specifically for the telecommunications industry, RISATower, formerly ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

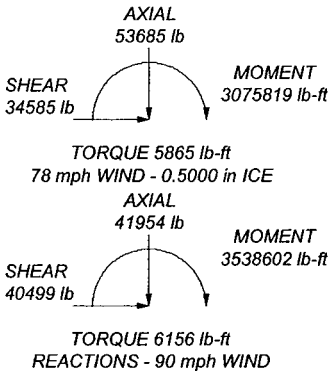
RISATower Features:

- 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.

Section	1	2	3
Length (ft)	49.00	50.00	58.00
Number of Sides	12	12	12
Thickness (in)	0.2813	0.3750	0.4375
Lap Splice (ft)	3.00	4.00	
Top Dia (in)	23.3300	31.1413	38.6793
Bot Dia (in)	32.2500	40.1500	50.9100
Grade		A572-65	
Weight (lb)	4164.6	7246.1	12332.7

Total Weight: 23733.4





DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
DB810K (Town)	157	Platform w/ Handrails (T-Mobile)	113
10' x 3" Dia Omni (Town)	154	RR65-18-02DP (T-Mobile)	113
10' x 3" Dia Omni (Town)	154	Standoff (Town)	104
(4) DB844H90E-XY (Nextel)	149	Standoff (Town)	104
(4) DB844H90E-XY (Nextel)	149	Standoff (Town)	104
(4) DB844H90E-XY (Nextel)	149	ASP-685 (Town)	104 - 83
12' T-Arm (Nextel)	149	ASP-685 (Town)	104 - 83
12' T-Arm (Nextel)	149	Standoff (Town)	104
12' T-Arm (Nextel)	149	Low Profile Platform (Verizon)	80
Platform w/ Handrails (Sprint)	138	DB846F65ZAXY (Verizon)	80
(2) DB980H90E-M (Sprint)	138	DB846F65ZAXY (Verizon)	80
(2) DB980H90E-M (Sprint)	138	DB948F85T2E-M (Verizon)	80
(2) DB980H90E-M (Sprint)	138	DB948F85T2E-M (Verizon)	80
Low Profile Platform (ATT/Cingular)	125	DB844H80E-XY (Verizon)	80
(2) 7770.00 (ATT/Cingular)	125	DB844H80E-XY (Verizon)	80
(4) LPG21401 TMA (ATT/Cingular)	125	DB948F85T2E-M (Verizon)	80
(2) 7770.00 (ATT/Cingular)	125	DB948F85T2E-M (Verizon)	80
(4) LPG21401 TMA (ATT/Cingular)	125	DB844H80E-XY (Verizon)	80
(2) 7770.00 (ATT/Cingular)	125	DB844H80E-XY (Verizon)	80
(4) LPG21401 TMA (ATT/Cingular)	125	DB948F85T2E-M (Verizon)	80
ASP-685 (Town)	125 - 104	DB948F85T2E-M (Verizon)	80
1142-2B (Town)	114 - 104	Standoff	40
RR65-18-02DP (T-Mobile)	113	GPS	40
RR65-18-02DP (T-Mobile)	113	31'x5" Appurt (Reinf)	31 - 0
(2) TMA 10"x8"x3" (T-Mobile)	113	31'x5" Appurt (Reinf)	31 - 0
(2) TMA 10"x8"x3" (T-Mobile)	113	31'x5" Appurt (Reinf)	31 - 0
(2) TMA 10"x8"x3" (T-Mobile)	113		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 90 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 78 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: 96.1%

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

Job: 150' Valmont Monopole			
Project: 08007.CO1 - Fairfield, CT			
Client: Verizon	Drawn by: Staff	App'd:	
Code: TIA/EIA-222-F	Date: 02/07/08	Scale: NTS	
Path: C:\Mast Master\2165\Documents\Valmont\08007.CO1 Fairfield\08007.CO1 Fairfield.eri		Dwg No. E-1	

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 90 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 78 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	150.00-101.00	49.00	3.00	12	23.3300	32.2500	0.2813	1.1252	A572-65 (65 ksi)
L2	101.00-54.00	50.00	4.00	12	31.1413	40.1500	0.3750	1.5000	A572-65 (65 ksi)
L3	54.00-0.00	58.00		12	38.6793	50.9100	0.4375	1.7500	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	24.1530	20.8772	1415.6336	8.2514	12.0849	117.1403	2868.4575	10.2751	5.4986	19.547
	33.3877	28.9568	3777.3435	11.4448	16.7055	226.1138	7653.9221	14.2517	7.8891	28.045
L2	32.7994	37.1503	4488.4661	11.0143	16.1312	278.2478	9094.8492	18.2842	7.3409	19.576
	41.5663	48.0283	9698.4796	14.2395	20.7977	466.3246	19651.7490	23.6381	9.7552	26.014
L3	40.9170	53.8731	10056.2238	13.6906	20.0359	501.9108	20376.6359	26.5147	9.1936	21.014
	52.7059	71.1031	23119.8137	18.0692	26.3714	876.7009	46847.0106	34.9948	12.4714	28.506

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
L1 150.00-101.00				1	1	1		
L2 101.00-54.00				1	1	1		
L3 54.00-0.00				1	1	1		

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C_AA_A ft^2/ft	Weight plf
1 5/8 (Town)	A	No	Inside Pole	149.00 - 3.00	3	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Nextel)	B	No	Inside Pole	149.00 - 3.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (Sprint)	C	No	Inside Pole	138.00 - 3.00	6	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (ATT/Cingular)	A	No	Inside Pole	125.00 - 3.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
1 5/8 (T-Mobile)	A	No	CaAa (Out Of Face)	113.00 - 3.00	2	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (T-Mobile)	A	No	CaAa (Out Of Face)	113.00 - 3.00	16	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
1 5/8 (Verizon)	C	No	CaAa (Out Of Face)	80.00 - 3.00	2	No Ice	0.20	1.04
						1/2" Ice	0.30	2.55
1 5/8 (Verizon)	C	No	CaAa (Out Of Face)	80.00 - 3.00	10	No Ice	0.00	1.04
						1/2" Ice	0.00	2.55
7/8 (Town)	B	No	Inside Pole	104.00 - 3.00	4	No Ice	0.00	0.54
						1/2" Ice	0.00	0.54
1/2 (GPS)	B	No	CaAa (Out Of Face)	40.00 - 3.00	1	No Ice	0.06	0.25
						1/2" Ice	0.16	0.91

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	150.00-101.00	A	0.000	0.000	0.000	4.752	673.92
		B	0.000	0.000	0.000	0.000	605.52

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
		C	0.000	0.000	0.000	0.000	230.88
L2	101.00-54.00	A	0.000	0.000	0.000	18.612	1613.04
		B	0.000	0.000	0.000	0.000	688.08
		C	0.000	0.000	0.000	10.296	617.76
L3	54.00-0.00	A	0.000	0.000	0.000	20.196	1750.32
		B	0.000	0.000	0.000	2.146	755.89
		C	0.000	0.000	0.000	20.196	954.72

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L1	150.00-101.00	A	0.500	0.000	0.000	0.000	7.152	1000.08
		B		0.000	0.000	0.000	0.000	605.52
		C		0.000	0.000	0.000	0.000	230.88
L2	101.00-54.00	A	0.500	0.000	0.000	0.000	28.012	2890.50
		B		0.000	0.000	0.000	0.000	688.08
		C		0.000	0.000	0.000	15.496	1088.88
L3	54.00-0.00	A	0.500	0.000	0.000	0.000	30.396	3136.50
		B		0.000	0.000	0.000	5.846	780.31
		C		0.000	0.000	0.000	30.396	1878.84

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	150.00-101.00	0.0000	-0.1565	0.0000	-0.2234
L2	101.00-54.00	-0.2485	-0.3493	-0.3372	-0.4739
L3	54.00-0.00	-0.3552	-0.2051	-0.4311	-0.2489

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(4) DB844H90E-XY (Nextel)	A	From Face	4.00 0.00 0.00	0.0000	149.00	No Ice 1/2" Ice	2.87 3.18	3.73 4.10	10.00 35.38
(4) DB844H90E-XY (Nextel)	B	From Face	4.00 0.00 0.00	0.0000	149.00	No Ice 1/2" Ice	2.87 3.18	3.73 4.10	10.00 35.38
(4) DB844H90E-XY (Nextel)	C	From Face	4.00 0.00	0.0000	149.00	No Ice 1/2" Ice	2.87 3.18	3.73 4.10	10.00 35.38

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Offsets: Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
				0.00						
DB810K	C	From Face	3.00		0.0000	157.00	No Ice	4.08	4.08	35.00
(Town)			0.00				1/2" Ice	5.73	5.73	65.18
			0.00							
10' x 3" Dia Omni	B	From Face	3.00		0.0000	154.00	No Ice	3.00	3.00	30.00
(Town)			0.00				1/2" Ice	4.03	4.03	51.79
			0.00							
10' x 3" Dia Omni	A	From Face	3.00		0.0000	154.00	No Ice	3.00	3.00	30.00
(Town)			0.00				1/2" Ice	4.03	4.03	51.79
			0.00							
12' T-Arm	A	None			0.0000	149.00	No Ice	8.40	8.40	250.00
(Nextel)							1/2" Ice	9.80	9.80	375.00
12' T-Arm	B	None			0.0000	149.00	No Ice	8.40	8.40	250.00
(Nextel)							1/2" Ice	9.80	9.80	375.00
12' T-Arm	C	None			0.0000	149.00	No Ice	8.40	8.40	250.00
(Nextel)							1/2" Ice	9.80	9.80	375.00
Platform w/ Handrails	C	None			0.0000	138.00	No Ice	20.00	20.00	1500.00
(Sprint)							1/2" Ice	25.00	25.00	1800.00
(2) DB980H90E-M	A	From Face	3.00		0.0000	138.00	No Ice	3.80	2.19	8.50
(Sprint)			0.00				1/2" Ice	4.18	2.56	28.62
			0.00							
(2) DB980H90E-M	B	From Face	3.00		0.0000	138.00	No Ice	3.80	2.19	8.50
(Sprint)			0.00				1/2" Ice	4.18	2.56	28.62
			0.00							
(2) DB980H90E-M	C	From Face	3.00		0.0000	138.00	No Ice	3.80	2.19	8.50
(Sprint)			0.00				1/2" Ice	4.18	2.56	28.62
			0.00							
Low Profile Platform	C	None			0.0000	125.00	No Ice	15.70	15.70	1300.00
(ATT/Cingular)							1/2" Ice	20.10	20.10	1765.00
(2) 7770.00	A	From Face	3.00		0.0000	125.00	No Ice	5.88	2.93	35.00
(ATT/Cingular)			0.00				1/2" Ice	6.31	3.27	67.63
			0.00							
(4) LPG21401 TMA	A	From Face	3.00		0.0000	125.00	No Ice	0.95	0.37	17.50
(ATT/Cingular)			0.00				1/2" Ice	1.09	0.48	23.31
			0.00							
(2) 7770.00	B	From Face	3.00		0.0000	125.00	No Ice	5.88	2.93	35.00
(ATT/Cingular)			0.00				1/2" Ice	6.31	3.27	67.63
			0.00							
(4) LPG21401 TMA	B	From Face	3.00		0.0000	125.00	No Ice	0.95	0.37	17.50
(ATT/Cingular)			0.00				1/2" Ice	1.09	0.48	23.31
			0.00							
(2) 7770.00	C	From Face	3.00		0.0000	125.00	No Ice	5.88	2.93	35.00
(ATT/Cingular)			0.00				1/2" Ice	6.31	3.27	67.63
			0.00							
(4) LPG21401 TMA	C	From Face	3.00		0.0000	125.00	No Ice	0.95	0.37	17.50
(ATT/Cingular)			0.00				1/2" Ice	1.09	0.48	23.31
			0.00							
Platform w/ Handrails	C	None			0.0000	113.00	No Ice	20.00	20.00	1500.00
(T-Mobile)							1/2" Ice	25.00	25.00	1800.00
RR65-18-02DP	A	From Face	3.00		0.0000	113.00	No Ice	4.36	1.97	18.00
(T-Mobile)			6.00				1/2" Ice	4.77	2.31	40.42
			0.00							
RR65-18-02DP	B	From Face	3.00		0.0000	113.00	No Ice	4.36	1.97	18.00
(T-Mobile)			6.00				1/2" Ice	4.77	2.31	40.42
			0.00							
RR65-18-02DP	C	From Face	3.00		0.0000	113.00	No Ice	4.36	1.97	18.00
(T-Mobile)			6.00				1/2" Ice	4.77	2.31	40.42

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
			0.00						
(2) TMA 10"x8"x3"	A	From Face	3.00	0.0000	113.00	No Ice	0.78	0.29	15.00
(T-Mobile)			6.00			1/2" Ice	0.90	0.38	20.06
			0.00						
(2) TMA 10"x8"x3"	B	From Face	3.00	0.0000	113.00	No Ice	0.78	0.29	15.00
(T-Mobile)			6.00			1/2" Ice	0.90	0.38	20.06
			0.00						
(2) TMA 10"x8"x3"	C	From Face	3.00	0.0000	113.00	No Ice	0.78	0.29	15.00
(T-Mobile)			6.00			1/2" Ice	0.90	0.38	20.06
			0.00						
Standoff	A	None		0.0000	104.00	No Ice	2.72	2.72	50.00
(Town)						1/2" Ice	4.91	4.91	89.00
Standoff	A	None		0.0000	104.00	No Ice	2.72	2.72	50.00
(Town)						1/2" Ice	4.91	4.91	89.00
Standoff	B	None		0.0000	104.00	No Ice	2.72	2.72	50.00
(Town)						1/2" Ice	4.91	4.91	89.00
Standoff	C	None		0.0000	104.00	No Ice	2.72	2.72	50.00
(Town)						1/2" Ice	4.91	4.91	89.00
ASP-685	A	From Face	6.00	0.0000	125.00 - 104.00	No Ice	7.35	7.35	21.50
(Town)			0.00			1/2" Ice	9.49	9.49	73.33
			0.00						
ASP-685	A	From Face	6.00	0.0000	83.00 - 104.00	No Ice	7.35	7.35	21.50
(Town)			0.00			1/2" Ice	9.49	9.49	73.33
			0.00						
ASP-685	B	From Face	6.00	0.0000	83.00 - 104.00	No Ice	7.35	7.35	21.50
(Town)			0.00			1/2" Ice	9.49	9.49	73.33
			0.00						
1142-2B	B	From Face	6.00	0.0000	114.00 - 104.00	No Ice	1.12	1.12	10.00
(Town)			0.00			1/2" Ice	2.54	2.54	21.20
			0.00						
Low Profile Platform	C	None		0.0000	80.00	No Ice	15.70	15.70	1300.00
(Verizon)						1/2" Ice	20.10	20.10	1765.00
DB846F65ZAXY	A	From Face	3.00	0.0000	80.00	No Ice	7.03	6.16	21.00
(Verizon)			6.00			1/2" Ice	7.54	6.62	69.89
			0.00						
DB846F65ZAXY	A	From Face	3.00	0.0000	80.00	No Ice	7.03	6.16	21.00
(Verizon)			-6.00			1/2" Ice	7.54	6.62	69.89
			0.00						
DB948F85T2E-M	A	From Face	3.00	0.0000	80.00	No Ice	1.92	3.26	8.50
(Verizon)			4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
DB948F85T2E-M	A	From Face	3.00	0.0000	80.00	No Ice	1.92	3.26	8.50
(Verizon)			-4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
DB844H80E-XY	B	From Face	3.00	0.0000	80.00	No Ice	2.87	3.97	10.00
(Verizon)			6.00			1/2" Ice	3.18	4.34	36.27
			0.00						
DB844H80E-XY	B	From Face	3.00	0.0000	80.00	No Ice	2.87	3.97	10.00
(Verizon)			-6.00			1/2" Ice	3.18	4.34	36.27
			0.00						
DB948F85T2E-M	B	From Face	3.00	0.0000	80.00	No Ice	1.92	3.26	8.50
(Verizon)			4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
DB948F85T2E-M	B	From Face	3.00	0.0000	80.00	No Ice	1.92	3.26	8.50
(Verizon)			-4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
DB844H80E-XY	C	From Face	3.00	0.0000	80.00	No Ice	2.87	3.97	10.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(Verizon)			6.00 0.00			1/2" Ice	3.18	4.34	36.27
DB844H80E-XY	C	From Face	3.00	0.0000	80.00	No Ice	2.87	3.97	10.00
(Verizon)			-6.00 0.00			1/2" Ice	3.18	4.34	36.27
DB948F85T2E-M	C	From Face	3.00	0.0000	80.00	No Ice	1.92	3.26	8.50
(Verizon)			4.00 0.00			1/2" Ice	2.22	3.62	27.57
DB948F85T2E-M	C	From Face	3.00	0.0000	80.00	No Ice	1.92	3.26	8.50
(Verizon)			-4.00 0.00			1/2" Ice	2.22	3.62	27.57
Standoff	A	From Face	1.00	0.0000	40.00	No Ice	0.75	0.75	27.00
			0.00 0.00			1/2" Ice	0.95	0.95	35.41
GPS	A	From Face	2.00	0.0000	40.00	No Ice	1.00	1.00	10.00
			0.00 0.00			1/2" Ice	1.50	1.50	15.00
31'x5" Appurt	A	From Face	0.50	0.0000	31.00 - 0.00	No Ice	25.83	25.83	900.00
(Reinf)			0.00 0.00			1/2" Ice	29.33	29.33	1033.78
31'x5" Appurt	B	From Face	0.50	0.0000	31.00 - 0.00	No Ice	25.83	25.83	900.00
(Reinf)			0.00 0.00			1/2" Ice	29.33	29.33	1033.78
31'x5" Appurt	C	From Face	0.50	0.0000	31.00 - 0.00	No Ice	25.83	25.83	900.00
(Reinf)			0.00 0.00			1/2" Ice	29.33	29.33	1033.78

Tower Pressures - No Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 150.00-101.00	124.53	1.461	30	113.476	A	0.000	113.476	113.476	100.00	0.000	4.752
					B	0.000	113.476		100.00		
					C	0.000	113.476		100.00		
L2 101.00-54.00	77.09	1.274	26	140.671	A	0.000	140.671	140.671	100.00	0.000	28.908
					B	0.000	140.671		100.00		
					C	0.000	140.671		100.00		
L3 54.00-0.00	26.25	1	21	203.474	A	0.000	203.474	203.474	100.00	0.000	42.538
					B	0.000	203.474		100.00		
					C	0.000	203.474		100.00		

Tower Pressure - With Ice

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.00-101.00	124.53	1.461	23	0.5000	117.559	A	0.000	117.559	117.559	100.00	0.000	7.152
						B	0.000	117.559		100.00		
						C	0.000	117.559		100.00		
L2 101.00-54.00	77.09	1.274	20	0.5000	144.587	A	0.000	144.587	144.587	100.00	0.000	43.507
						B	0.000	144.587		100.00		
						C	0.000	144.587		100.00		
L3 54.00-0.00	26.25	1	16	0.5000	207.974	A	0.000	207.974	207.974	100.00	0.000	66.637
						B	0.000	207.974		100.00		
						C	0.000	207.974		100.00		

Tower Pressure - Service

$G_H = 1.690$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
L1 150.00-101.00	124.53	1.461	9	113.476	A	0.000	113.476	113.476	100.00	0.000	4.752
					B	0.000	113.476		100.00		
					C	0.000	113.476		100.00		
L2 101.00-54.00	77.09	1.274	8	140.671	A	0.000	140.671	140.671	100.00	0.000	28.908
					B	0.000	140.671		100.00		
					C	0.000	140.671		100.00		
L3 54.00-0.00	26.25	1	7	203.474	A	0.000	203.474	203.474	100.00	0.000	42.538
					B	0.000	203.474		100.00		
					C	0.000	203.474		100.00		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 150.00-101.00	1510.32	4154.56	A	1	1.03	1	1	1	113.476	6218.48	126.91	C
			B	1	1.03	1	1	1	113.476			
			C	1	1.03	1	1	1	113.476			
L2 101.00-54.00	2918.88	7246.10	A	1	1.03	1	1	1	140.671	7728.10	164.43	C
			B	1	1.03	1	1	1	140.671			
			C	1	1.03	1	1	1	140.671			
L3 54.00-0.00	3460.93	12332.73	A	1	1.03	1	1	1	203.474	9075.16	168.06	C
			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7890.13	23733.39						OTM	1608323.74 lb-ft	23021.74		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 150.00-101.00	1510.32	4154.56	A	1	1.03	1	1	1	113.476	6218.48	126.91	C
			B	1	1.03	1	1	1	113.476			
			C	1	1.03	1	1	1	113.476			
L2 101.00-54.00	2918.88	7246.10	A	1	1.03	1	1	1	140.671	7728.10	164.43	C
			B	1	1.03	1	1	1	140.671			
			C	1	1.03	1	1	1	140.671			
L3 54.00-0.00	3460.93	12332.73	A	1	1.03	1	1	1	203.474	9075.16	168.06	C
			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7890.13	23733.39						OTM	1608323.74 lb-ft	23021.74		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 150.00-101.00	1510.32	4154.56	A	1	1.03	1	1	1	113.476	6218.48	126.91	C
			B	1	1.03	1	1	1	113.476			
			C	1	1.03	1	1	1	113.476			
L2 101.00-54.00	2918.88	7246.10	A	1	1.03	1	1	1	140.671	7728.10	164.43	C
			B	1	1.03	1	1	1	140.671			
			C	1	1.03	1	1	1	140.671			
L3 54.00-0.00	3460.93	12332.73	A	1	1.03	1	1	1	203.474	9075.16	168.06	C
			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7890.13	23733.39						OTM	1608323.74 lb-ft	23021.74		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 150.00-101.00	1836.48	5022.48	A	1	1.03	1	1	1	117.559	4917.15	100.35	C
			B	1	1.03	1	1	1	117.559			
			C	1	1.03	1	1	1	117.559			
L2 101.00-54.00	4667.46	8317.71	A	1	1.03	1	1	1	144.587	6417.50	136.54	C
			B	1	1.03	1	1	1	144.587			
			C	1	1.03	1	1	1	144.587			
L3 54.00-0.00	5795.65	13878.40	A	1	1.03	1	1	1	207.974	7582.11	140.41	C
			B	1	1.03	1	1	1	207.974			
			C	1	1.03	1	1	1	207.974			
Sum Weight:	12299.59	27218.60						OTM	1306049.92 lb-ft	18916.76		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 150.00-101.00	1836.48	5022.48	A	1	1.03	1	1	1	117.559	4917.15	100.35	C
			B	1	1.03	1	1	1	117.559			
			C	1	1.03	1	1	1	117.559			
L2 101.00-54.00	4667.46	8317.71	A	1	1.03	1	1	1	144.587	6417.50	136.54	C
			B	1	1.03	1	1	1	144.587			
			C	1	1.03	1	1	1	144.587			
L3 54.00-0.00	5795.65	13878.40	A	1	1.03	1	1	1	207.974	7582.11	140.41	C
			B	1	1.03	1	1	1	207.974			
			C	1	1.03	1	1	1	207.974			
Sum Weight:	12299.59	27218.60						OTM	1306049.92 lb-ft	18916.76		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 150.00-101.00	1836.48	5022.48	A	1	1.03	1	1	1	117.559	4917.15	100.35	C
			B	1	1.03	1	1	1	117.559			
			C	1	1.03	1	1	1	117.559			
L2 101.00-54.00	4667.46	8317.71	A	1	1.03	1	1	1	144.587	6417.50	136.54	C
			B	1	1.03	1	1	1	144.587			
			C	1	1.03	1	1	1	144.587			
L3 54.00-0.00	5795.65	13878.40	A	1	1.03	1	1	1	207.974	7582.11	140.41	C
			B	1	1.03	1	1	1	207.974			
			C	1	1.03	1	1	1	207.974			
Sum Weight:	12299.59	27218.60						OTM	1306049.92 lb-ft	18916.76		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
L1 150.00-101.00	1510.32	4154.56	A	1	1.03	1	1	1	113.476	1919.28	39.17	C
			B	1	1.03	1	1	1	113.476			
			C	1	1.03	1	1	1	113.476			
L2 101.00-54.00	2918.88	7246.10	A	1	1.03	1	1	1	140.671	2385.22	50.75	C
			B	1	1.03	1	1	1	140.671			
			C	1	1.03	1	1	1	140.671			
L3 54.00-0.00	3460.93	12332.73	A	1	1.03	1	1	1	203.474	2800.98	51.87	C
			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7890.13	23733.39						OTM	496396.22	7105.48		

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

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 150.00-101.00	1510.32	4154.56	A	1	1.03	1	1	1	113.476	1919.28	39.17	C
			B	1	1.03	1	1	1	113.476			
			C	1	1.03	1	1	1	113.476			
L2 101.00-54.00	2918.88	7246.10	A	1	1.03	1	1	1	140.671	2385.22	50.75	C
			B	1	1.03	1	1	1	140.671			
			C	1	1.03	1	1	1	140.671			
L3 54.00-0.00	3460.93	12332.73	A	1	1.03	1	1	1	203.474	2800.98	51.87	C
			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7890.13	23733.39						OTM	496396.22 lb-ft	7105.48		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
L1 150.00-101.00	1510.32	4154.56	A	1	1.03	1	1	1	113.476	1919.28	39.17	C
			B	1	1.03	1	1	1	113.476			
			C	1	1.03	1	1	1	113.476			
L2 101.00-54.00	2918.88	7246.10	A	1	1.03	1	1	1	140.671	2385.22	50.75	C
			B	1	1.03	1	1	1	140.671			
			C	1	1.03	1	1	1	140.671			
L3 54.00-0.00	3460.93	12332.73	A	1	1.03	1	1	1	203.474	2800.98	51.87	C
			B	1	1.03	1	1	1	203.474			
			C	1	1.03	1	1	1	203.474			
Sum Weight:	7890.13	23733.39						OTM	496396.22 lb-ft	7105.48		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	23733.39					
Bracing Weight	0.00					
Total Member Self-Weight	23733.39			-2915.81	1712.90	

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
Total Weight	41948.02			-2915.81	1712.90	
Wind 0 deg - No Ice		-77.19	-40365.21	-3426417.50	7888.49	-3339.75
Wind 30 deg - No Ice		20160.32	-34918.70	-2964667.45	-1708255.21	-5508.60
Wind 60 deg - No Ice		34995.89	-20115.75	-1709318.44	-2966214.33	-6201.42
Wind 90 deg - No Ice		40454.35	77.19	3259.78	-3428919.75	-5232.57
Wind 120 deg - No Ice		35073.09	20249.46	1714183.25	-2972389.92	-2861.67
Wind 150 deg - No Ice		20294.03	34995.89	2965011.42	-1718951.64	276.02
Wind 180 deg - No Ice		77.19	40365.21	3420585.89	-4462.69	3339.75
Wind 210 deg - No Ice		-20160.32	34918.70	2958835.83	1711681.01	5508.60
Wind 240 deg - No Ice		-34995.89	20115.75	1703486.82	2969640.13	6201.42
Wind 270 deg - No Ice		-40454.35	-77.19	-9091.39	3432345.55	5232.57
Wind 300 deg - No Ice		-35073.09	-20249.46	-1720014.87	2975815.72	2861.67
Wind 330 deg - No Ice		-20294.03	-34995.89	-2970843.04	1722377.44	-276.02
Member Ice	3485.21					
Total Weight Ice	53664.53			-7339.80	4278.32	
Wind 0 deg - Ice		-60.89	-34479.63	-2948647.73	9149.42	-2890.84
Wind 30 deg - Ice		17222.24	-29829.79	-2552151.65	-1464969.48	-5075.64
Wind 60 deg - Ice		29890.68	-17187.08	-1473775.28	-2545404.61	-5900.42
Wind 90 deg - Ice		34549.94	60.89	-2468.71	-2942654.26	-5144.19
Wind 120 deg - Ice		29951.57	17292.55	1467532.65	-2550275.70	-3009.58
Wind 150 deg - Ice		17327.70	29890.68	2542343.14	-1473406.46	-68.56
Wind 180 deg - Ice		60.89	34479.63	2933968.13	-592.77	2890.84
Wind 210 deg - Ice		-17222.24	29829.79	2537472.04	1473526.13	5075.64
Wind 240 deg - Ice		-29890.68	17187.08	1459095.68	2553961.26	5900.42
Wind 270 deg - Ice		-34549.94	-60.89	-12210.89	2951210.91	5144.19
Wind 300 deg - Ice		-29951.57	-17292.55	-1482212.26	2558832.35	3009.58
Wind 330 deg - Ice		-17327.70	-29890.68	-2557022.74	1481963.11	68.56
Total Weight	41948.02			-2915.81	1712.90	
Wind 0 deg - Service		-23.83	-12458.40	-1057017.59	2160.53	-1030.79
Wind 30 deg - Service		6222.32	-10777.38	-914502.14	-527513.45	-1700.18
Wind 60 deg - Service		10801.20	-6208.57	-527048.74	-915772.44	-1914.02
Wind 90 deg - Service		12485.91	23.83	1524.78	-1058582.75	-1614.99
Wind 120 deg - Service		10825.03	6249.83	529587.59	-917678.49	-883.23
Wind 150 deg - Service		6263.59	10801.20	915645.66	-530814.82	85.19
Wind 180 deg - Service		23.83	12458.40	1056255.06	-1651.56	1030.79
Wind 210 deg - Service		-6222.32	10777.38	913739.62	528022.42	1700.18
Wind 240 deg - Service		-10801.20	6208.57	526286.22	916281.40	1914.02
Wind 270 deg - Service		-12485.91	-23.83	-2287.31	1059091.72	1614.99
Wind 300 deg - Service		-10825.03	-6249.83	-530350.11	918187.45	883.23
Wind 330 deg - Service		-6263.59	-10801.20	-916408.18	531323.78	-85.19

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

Comb. No.	Description
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
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	150 - 101	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-14669.14	357.90	1037.70
			Max. Mx	11	-9910.65	474761.80	434.73
			Max. My	2	-9911.56	32.50	475046.16
			Max. Vy	11	-17260.22	474761.80	434.73
			Max. Vx	2	-17259.76	32.50	475046.16
			Max. Torque	9			-2368.18
L2	101 - 54	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-29713.77	1682.39	4387.16
			Max. Mx	11	-21265.64	1556071.82	3377.75
			Max. My	2	-21271.38	2343.26	1555081.23
			Max. Vy	11	-28882.09	1556071.82	3377.75
			Max. Vx	2	-28791.85	2343.26	1555081.23
			Max. Torque	10			-5686.57
L3	54 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	14	-53685.48	4396.04	7603.50
			Max. Mx	11	-41910.20	3533692.62	9305.26
			Max. My	2	-41910.38	8059.88	3527655.15
			Max. Vy	11	-40499.88	3533692.62	9305.26
			Max. Vx	2	-40410.67	8059.88	3527655.15
			Max. Torque	10			-6156.19

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	24	53685.49	34549.95	60.89
	Max. H_x	11	41954.16	40454.35	77.19
	Max. H_z	2	41954.16	77.20	40365.21
	Max. M_x	2	3527655.15	77.20	40365.21
	Max. M_z	5	3530179.71	-40454.35	-77.19
	Max. Torsion	4	6154.81	-34995.89	20115.75
	Min. Vert	1	41954.16	0.00	0.00
	Min. H_x	5	41954.16	-40454.35	-77.19
	Min. H_z	8	41954.16	-77.19	-40365.21
	Min. M_x	8	-3521646.63	-77.19	-40365.21
	Min. M_z	11	-3533692.62	40454.35	77.19
	Min. Torsion	10	-6156.19	34995.89	-20115.75

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	41954.16	0.00	0.00	-2915.81	1712.90	0.00
Dead+Wind 0 deg - No Ice	41954.16	-77.20	-40365.21	-3527655.15	8058.84	-3317.37
Dead+Wind 30 deg - No Ice	41954.16	20160.32	-34918.70	-3052281.34	-1758770.39	-5468.73
Dead+Wind 60 deg - No Ice	41954.16	34995.89	-20115.75	-1759841.20	-3053856.78	-6154.81
Dead+Wind 90 deg - No Ice	41954.16	40454.35	77.19	3331.67	-3530179.71	-5192.23
Dead+Wind 120 deg - No Ice	41954.16	35073.09	20249.46	1764793.75	-3060143.13	-2838.79
Dead+Wind 150 deg - No Ice	41954.16	20294.03	34995.89	3052584.12	-1769688.18	275.16
Dead+Wind 180 deg - No Ice	41954.16	77.19	40365.21	3521646.63	-4576.54	3316.07
Dead+Wind 210 deg - No Ice	41954.16	-20160.32	34918.70	3046293.31	1762243.41	5468.87
Dead+Wind 240 deg - No Ice	41954.16	-34995.89	20115.75	1753871.51	3057342.97	6156.19
Dead+Wind 270 deg - No Ice	41954.16	-40454.35	-77.19	-9303.62	3533692.62	5193.46
Dead+Wind 300 deg - No Ice	41954.16	-35073.09	-20249.46	-1770786.13	3063660.86	2838.75
Dead+Wind 330 deg - No Ice	41954.16	-20294.03	-34995.89	-3058594.83	1773192.75	-276.57
Dead+Ice+Temp	53685.48	-0.00	-0.00	-7603.50	4396.04	-0.05
Dead+Wind 0 deg+Ice+Temp	53685.49	-60.89	-34479.64	-3067122.67	9442.97	-2876.60
Dead+Wind 30 deg+Ice+Temp	53685.48	17222.24	-29829.80	-2654717.28	-1523865.43	-5046.54
Dead+Wind 60 deg+Ice+Temp	53685.48	29890.69	-17187.09	-1533028.50	-2647660.13	-5864.36
Dead+Wind 90 deg+Ice+Temp	53685.49	34549.95	60.89	-2625.65	-3060822.42	-5111.07
Dead+Wind 120 deg+Ice+Temp	53685.48	29951.57	17292.55	1526419.08	-2652660.59	-2988.62
Dead+Wind 150 deg+Ice+Temp	53685.48	17327.70	29890.69	2644413.46	-1532546.26	-65.39
Dead+Wind 180 deg+Ice+Temp	53685.49	60.89	34479.64	3051799.32	-601.00	2875.84
Dead+Wind 210 deg+Ice+Temp	53685.48	-17222.24	29829.80	2639408.97	1532700.05	5046.81
Dead+Wind 240 deg+Ice+Temp	53685.48	-29890.69	17187.09	1517734.23	2656504.11	5865.29
Dead+Wind 270 deg+Ice+Temp	53685.49	-34549.95	-60.89	-12669.62	3069683.11	5111.86
Dead+Wind 300 deg+Ice+Temp	53685.48	-29951.57	-17292.55	-1541729.39	2661528.64	2988.47
Dead+Wind 330 deg+Ice+Temp	53685.48	-17327.70	-29890.69	-2659737.82	1541404.94	64.37
Dead+Wind 0 deg - Service	41954.16	-23.83	-12458.40	-1092061.59	3708.74	-1030.59
Dead+Wind 30 deg - Service	41954.16	6222.32	-10777.38	-945180.77	-542202.54	-1699.21
Dead+Wind 60 deg - Service	41954.16	10801.20	-6208.57	-545847.18	-942359.00	-1912.54
Dead+Wind 90 deg - Service	41954.16	12485.91	23.83	-1062.99	-1089539.40	-1613.46
Dead+Wind 120 deg - Service	41954.16	10825.03	6249.83	543197.28	-944308.10	-882.11
Dead+Wind 150 deg - Service	41954.16	6263.59	10801.20	941100.64	-545580.11	85.59
Dead+Wind 180 deg - Service	41954.16	23.83	12458.40	1086029.99	-193.39	1030.43
Dead+Wind 210 deg - Service	41954.16	-6222.32	10777.38	939151.13	545717.02	1699.22
Dead+Wind 240 deg - Service	41954.16	-10801.20	6208.57	539819.29	945874.74	1912.70
Dead+Wind 270 deg - Service	41954.16	-12485.91	-23.83	-4965.11	1093057.28	1613.61

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 300 deg - Service	41954.16	-10825.03	-6249.83	-549227.34	947826.85	882.11
Dead+Wind 330 deg - Service	41954.16	-6263.59	-10801.20	-947132.46	549097.60	-85.76

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-41954.16	0.00	0.00	41954.16	0.00	0.000%
2	-77.19	-41954.16	-40365.21	77.20	41954.16	40365.21	0.000%
3	20160.32	-41954.16	-34918.70	-20160.32	41954.16	34918.70	0.000%
4	34995.89	-41954.16	-20115.75	-34995.89	41954.16	20115.75	0.000%
5	40454.35	-41954.16	77.19	-40454.35	41954.16	-77.19	0.000%
6	35073.09	-41954.16	20249.46	-35073.09	41954.16	-20249.46	0.000%
7	20294.03	-41954.16	34995.89	-20294.03	41954.16	-34995.89	0.000%
8	77.19	-41954.16	40365.21	-77.19	41954.16	-40365.21	0.000%
9	-20160.32	-41954.16	34918.70	20160.32	41954.16	-34918.70	0.000%
10	-34995.89	-41954.16	20115.75	34995.89	41954.16	-20115.75	0.000%
11	-40454.35	-41954.16	-77.19	40454.35	41954.16	77.19	0.000%
12	-35073.09	-41954.16	-20249.46	35073.09	41954.16	20249.46	0.000%
13	-20294.03	-41954.16	-34995.89	20294.03	41954.16	34995.89	0.000%
14	0.00	-53685.48	0.00	0.00	53685.48	0.00	0.000%
15	-60.89	-53685.48	-34479.63	60.89	53685.49	34479.64	0.000%
16	17222.24	-53685.48	-29829.79	-17222.24	53685.48	29829.80	0.000%
17	29890.68	-53685.48	-17187.08	-29890.69	53685.48	17187.09	0.000%
18	34549.94	-53685.48	60.89	-34549.95	53685.49	-60.89	0.000%
19	29951.57	-53685.48	17292.55	-29951.57	53685.48	-17292.55	0.000%
20	17327.70	-53685.48	29890.68	-17327.70	53685.48	-29890.69	0.000%
21	60.89	-53685.48	34479.63	-60.89	53685.49	-34479.64	0.000%
22	-17222.24	-53685.48	29829.79	17222.24	53685.48	-29829.80	0.000%
23	-29890.68	-53685.48	17187.08	29890.69	53685.48	-17187.09	0.000%
24	-34549.94	-53685.48	-60.89	34549.95	53685.49	60.89	0.000%
25	-29951.57	-53685.48	-17292.55	29951.57	53685.48	17292.55	0.000%
26	-17327.70	-53685.48	-29890.68	17327.70	53685.48	29890.69	0.000%
27	-23.83	-41954.16	-12458.40	23.83	41954.16	12458.40	0.000%
28	6222.32	-41954.16	-10777.38	-6222.32	41954.16	10777.38	0.000%
29	10801.20	-41954.16	-6208.57	-10801.20	41954.16	6208.57	0.000%
30	12485.91	-41954.16	23.83	-12485.91	41954.16	-23.83	0.000%
31	10825.03	-41954.16	6249.83	-10825.03	41954.16	-6249.83	0.000%
32	6263.59	-41954.16	10801.20	-6263.59	41954.16	-10801.20	0.000%
33	23.83	-41954.16	12458.40	-23.83	41954.16	-12458.40	0.000%
34	-6222.32	-41954.16	10777.38	6222.32	41954.16	-10777.38	0.000%
35	-10801.20	-41954.16	6208.57	10801.20	41954.16	-6208.57	0.000%
36	-12485.91	-41954.16	-23.83	12485.91	41954.16	23.83	0.000%
37	-10825.03	-41954.16	-6249.83	10825.03	41954.16	6249.83	0.000%
38	-6263.59	-41954.16	-10801.20	6263.59	41954.16	10801.20	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00066988

3	Yes	5	0.00000001	0.00025762
4	Yes	5	0.00000001	0.00030188
5	Yes	4	0.00000001	0.00098853
6	Yes	5	0.00000001	0.00026590
7	Yes	5	0.00000001	0.00027529
8	Yes	4	0.00000001	0.00061048
9	Yes	5	0.00000001	0.00029821
10	Yes	5	0.00000001	0.00025498
11	Yes	5	0.00000001	0.00003699
12	Yes	5	0.00000001	0.00028890
13	Yes	5	0.00000001	0.00027848
14	Yes	4	0.00000001	0.00001140
15	Yes	5	0.00000001	0.00011776
16	Yes	5	0.00000001	0.00050030
17	Yes	5	0.00000001	0.00056592
18	Yes	5	0.00000001	0.00013113
19	Yes	5	0.00000001	0.00050654
20	Yes	5	0.00000001	0.00052402
21	Yes	5	0.00000001	0.00011628
22	Yes	5	0.00000001	0.00055660
23	Yes	5	0.00000001	0.00049382
24	Yes	5	0.00000001	0.00013299
25	Yes	5	0.00000001	0.00055023
26	Yes	5	0.00000001	0.00052993
27	Yes	4	0.00000001	0.00010046
28	Yes	4	0.00000001	0.00036341
29	Yes	4	0.00000001	0.00052478
30	Yes	4	0.00000001	0.00015409
31	Yes	4	0.00000001	0.00037773
32	Yes	4	0.00000001	0.00040771
33	Yes	4	0.00000001	0.00009713
34	Yes	4	0.00000001	0.00050646
35	Yes	4	0.00000001	0.00035829
36	Yes	4	0.00000001	0.00015725
37	Yes	4	0.00000001	0.00046573
38	Yes	4	0.00000001	0.00042284

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 101	29.805	37	1.6008	0.0064
L2	104 - 54	15.227	37	1.3349	0.0060
L3	58 - 0	4.818	37	0.7715	0.0024

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
157.00	DB810K	37	29.805	1.6008	0.0064	54227
154.00	10' x 3" Dia Omni	37	29.805	1.6008	0.0064	54227
149.00	(4) DB844H90E-XY	37	29.472	1.5974	0.0064	54227
138.00	Platform w/ Handrails	37	25.827	1.5586	0.0066	22594
125.00	Low Profile Platform	37	21.607	1.4991	0.0066	10844

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
119.75	ASP-685	37	19.951	1.4677	0.0065	8962
114.50	ASP-685	37	18.331	1.4305	0.0064	7636
114.00	1142-2B	37	18.179	1.4266	0.0064	7530
113.00	Platform w/ Handrails	37	17.876	1.4187	0.0064	7327
109.25	ASP-685	37	16.754	1.3866	0.0062	6652
109.00	1142-2B	37	16.680	1.3843	0.0062	6611
104.00	Standoff	37	15.227	1.3349	0.0060	5914
98.75	ASP-685	37	13.756	1.2751	0.0057	5397
93.50	ASP-685	37	12.346	1.2088	0.0053	4979
88.25	ASP-685	37	11.003	1.1385	0.0048	4619
83.00	ASP-685	37	9.731	1.0665	0.0044	4307
80.00	Low Profile Platform	37	9.038	1.0254	0.0041	4147
40.00	Standoff	37	2.576	0.6857	0.0019	4726
31.00	31'x5" Appurt	37	1.787	0.6809	0.0018	6098
25.83	31'x5" Appurt	37	1.409	0.6868	0.0019	7318
20.67	31'x5" Appurt	37	1.074	0.6977	0.0020	9147
15.50	31'x5" Appurt	37	0.775	0.7126	0.0021	12196
10.33	31'x5" Appurt	37	0.502	0.7306	0.0022	18294
5.17	31'x5" Appurt	37	0.247	0.7505	0.0023	36588
0.00	31'x5" Appurt	0	0.000	0.7715	0.0024	37808

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	150 - 101	96.071	12	5.1648	0.0208
L2	104 - 54	49.118	12	4.3080	0.0193
L3	58 - 0	15.553	12	2.4909	0.0079

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
157.00	DB810K	12	96.071	5.1648	0.0208	17064
154.00	10' x 3" Dia Omni	12	96.071	5.1648	0.0208	17064
149.00	(4) DB844H90E-XY	12	95.000	5.1523	0.0208	17064
138.00	Platform w/ Handrails	12	83.263	5.0095	0.0212	7109
125.00	Low Profile Platform	12	69.672	4.8066	0.0212	3410
119.75	ASP-685	12	64.336	4.7061	0.0210	2817
114.50	ASP-685	12	59.117	4.5911	0.0206	2399
114.00	1142-2B	12	58.627	4.5793	0.0206	2366
113.00	Platform w/ Handrails	12	57.651	4.5553	0.0205	2301
109.25	ASP-685	12	54.038	4.4593	0.0201	2089
109.00	1142-2B	12	53.800	4.4525	0.0200	2076
104.00	Standoff	12	49.118	4.3080	0.0193	1856
98.75	ASP-685	12	44.377	4.1358	0.0183	1691
93.50	ASP-685	12	39.832	3.9457	0.0172	1558
88.25	ASP-685	12	35.501	3.7415	0.0159	1444
83.00	ASP-685	12	31.401	3.5272	0.0145	1346
80.00	Low Profile Platform	12	29.167	3.4018	0.0136	1295

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
40.00	Standoff	12	8.319	1.8640	0.0049	1467
31.00	31'x5" Appurt	12	5.771	1.5920	0.0040	1893
25.83	31'x5" Appurt	12	4.551	1.4452	0.0036	2271
20.67	31'x5" Appurt	12	3.471	1.3039	0.0033	2838
15.50	31'x5" Appurt	12	2.505	1.1670	0.0030	3784
10.33	31'x5" Appurt	12	1.623	1.0333	0.0028	5676
5.17	31'x5" Appurt	12	0.797	0.9019	0.0026	11351
0.00	31'x5" Appurt	0	0.000	0.7715	0.0024	11729

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
L1	150 - 101 (1)	TP32.25x23.33x0.2813	49.00	150.00	160.0	5.833	28.4621	-9909.78	166006.00	0.060
L2	101 - 54 (2)	TP40.15x31.1413x0.375	50.00	150.00	128.7	9.010	47.1581	-21262.00	424880.00	0.050
L3	54 - 0 (3)	TP50.91x38.6793x0.4375	58.00	150.00	99.6	15.048	71.1031	-41910.10	1069970.00	0.039

Pole Bending Design Data

Section No.	Elevation ft	Size	Actual M_x lb-ft	Actual f_{bx} ksi	Allow. F_{bx} ksi	Ratio $\frac{f_{bx}}{F_{bx}}$	Actual M_y lb-ft	Actual f_{by} ksi	Allow. F_{by} ksi	Ratio $\frac{f_{by}}{F_{by}}$
L1	150 - 101 (1)	TP32.25x23.33x0.2813	475056.67	-26.099	39.000	0.669	0.00	0.000	39.000	0.000
L2	101 - 54 (2)	TP40.15x31.1413x0.375	1557841.67	-41.588	39.000	1.066	0.00	0.000	39.000	0.000
L3	54 - 0 (3)	TP50.91x38.6793x0.4375	3538600.00	-48.435	39.000	1.242	0.00	0.000	39.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P}{P_a}$	Ratio $\frac{f_{bx}}{F_{bx}}$	Ratio $\frac{f_{by}}{F_{by}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	150 - 101 (1)	TP32.25x23.33x0.2813	0.060	0.669	0.000	0.729 ✔	1.333	H1-3 ✔
L2	101 - 54 (2)	TP40.15x31.1413x0.375	0.050	1.066	0.000	1.116 ✔	1.333	H1-3 ✔
L3	54 - 0 (3)	TP50.91x38.6793x0.4375	0.039	1.242	0.000	1.281 ✔	1.333	H1-3 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
L1	150 - 101	Pole	TP32.25x23.33x0.2813	1	-9909.78	221285.99	54.7	Pass
L2	101 - 54	Pole	TP40.15x31.1413x0.375	2	-21262.00	566365.02	83.8	Pass
L3	54 - 0	Pole	TP50.91x38.6793x0.4375	3	-41910.10	1426269.95	96.1	Pass
							Summary	
						Pole (L3)	96.1	Pass
						RATING =	**96.1**	**Pass**

ANCHOR BOLT AND BASE PLATE ANALYSIS

Input Data

Tower Reactions:

Overturning Moment:	$OM := 3600 \cdot ft \cdot kips$	*user input*
Shear Force:	$Shear := 41 \cdot kips$	*user input*
Axial Force:	$Axial := 42 \cdot kips$	*user input*

Anchor Bolt Data:

Use ASTM A615 Grade 75

Number of Anchor Bolts = N	$N := 16$	*user input*
Diameter of Bolt Circle:	$D_{bc} := 56.91in$	*user input*
Bolt "Column" Distance:	$l := 3.0in$	*user input*
Bolt Ultimate Strength:	$F_u := 100 \cdot ksi$	*user input*
Bolt Yield Strength:	$Fy := 75 \cdot ksi$	*user input*
Bolt Modulus:	$E := 29000 \cdot ksi$	*user input*
Anchor Bolt Diameter	$D := 2.25in$	*user input*
Threads per Inch:	$n := 4.5$	*user input*

Base Plate Data:

Use ASTM A871 (60 ksi)		*user input*
Plate Yield Strength:	$Fy_{bp} := 36 \cdot ksi$	*user input*
Base Plate Thickness:	$PlateThickness := 2.625 \cdot in$	*user input*
Base Plate Diameter:	$D_{bp} := 62.91 \cdot in$	*user input*
Outer Pole Diameter:	$D_{pole} := 50.91in$	*user input*

Geometric Layout Data:

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

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

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

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

$d_1 = 10.89 \cdot in$ $d_7 = 10.89 \cdot in$

$d_2 = 20.12 \cdot in$ $d_8 = 0.00 \cdot in$

$d_3 = 26.29 \cdot in$ $d_9 = -10.89 \cdot in$

$d_4 = 28.46 \cdot in$ $d_{10} = -20.12 \cdot in$

$d_5 = 26.29 \cdot in$ $d_{11} = -26.29 \cdot in$

$d_6 = 20.12 \cdot in$ etc.

Critical Distances For Bending in Plate:

Outer Pole Radius: $R_{pole} := \frac{D_{pole}}{2}$ $R_{pole} = 25.45 \cdot in$

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

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

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

$MA_3 = 0.83 \cdot in$ $MA_9 = 0.00 \cdot in$

$MA_4 = 3.00 \cdot in$ $MA_{10} = 0.00 \cdot in$

$MA_5 = 0.83 \cdot in$ $MA_{11} = 0.00 \cdot in$

$MA_6 = 0.00 \cdot in$ etc.

Effective Width of Baseplate for Bending: $EffectiveWidth := .8 \cdot 2 \cdot \sqrt{\left(\frac{D_{bp}}{2}\right)^2 - \left(\frac{D_{pole}}{2}\right)^2}$ $EffectiveWidth = 29.57 \cdot in$

Anchor Bolt Analysis:

Polar Moment of Inertia I_p:

$$I_p := \sum_i \left(d_i\right)^2 \qquad I_p = 6.477 \times 10^3 \cdot in^2$$

Gross Area of Bolt:

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

Net Area of Bolt:

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

Net Diameter:

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

Radius of Gyration of Bolt:

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

Section Modulus of Bolt:

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

Anchor Bolt Bending Stress:

Maximum Applied Bending:

$$M_x := \left(\frac{Shear}{N}\right) \cdot l \qquad M_x = 0.641 \cdot ft \cdot kips$$

$$f_{bx} := \frac{M_x}{S_x} \qquad f_{bx} = 9.3 \cdot ksi$$

Allowable Bending

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

Note: 1.333 increase allowed per TIA/EIA

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

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

Note: 1.333 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

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

Note: 1.333 increase allowed per TIA/EIA

Applied Tension:

$$MaxTension := \frac{OM \cdot R_{bc}}{I_p} - \frac{Axial}{N} \qquad MaxTension = 187.1 \cdot kips$$

Check Stresses:

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

$$\frac{MaxTension}{F_{net.area}} = 0.96$$

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

$Condition = "OK"$

Check Compression & Combined Stresses (if required):

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

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

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

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

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

Allowable Compressive Force:

$$K := 0.65$$

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

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

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

Applied Compressive Force:

$$\text{MaxCompression} := \frac{OM \cdot R_{bc}}{I_p} + \frac{\text{Axial}}{N} \qquad \text{MaxCompression} = 192.4 \cdot \text{kips}$$

$$f_a := \frac{\text{MaxCompression}}{A_n} \qquad f_a = 59.2 \cdot \text{ksi}$$

Check Combined Stresses:

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_{bx}} = 0.99$$

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

Base Plate Analysis:

Force from Bolt(s):

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

$C_1 = 75.2 \cdot kips$ $C_7 = 75.2 \cdot kips$

$C_2 = 136.8 \cdot kips$ $C_8 = 2.6 \cdot kips$

$C_3 = 178.0 \cdot kips$ $C_9 = -70.0 \cdot kips$

$C_4 = 192.4 \cdot kips$ $C_{10} = -131.6 \cdot kips$

$C_5 = 178.0 \cdot kips$ $C_{11} = -172.7 \cdot kips$

$C_6 = 136.8 \cdot kips$ etc.

Bending Stress in Plate:

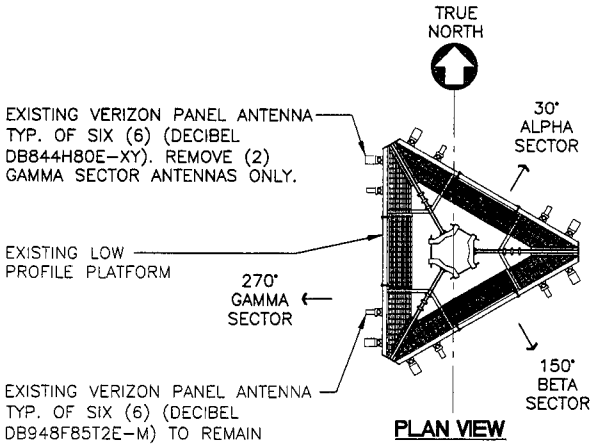
$$f_{bp} := \sum_i \frac{6 \cdot C_i \cdot MA_i}{EffectiveWidth \cdot PlateThickness^2} \qquad f_{bp} = 25.7 \cdot ksi$$

Check Stresses:

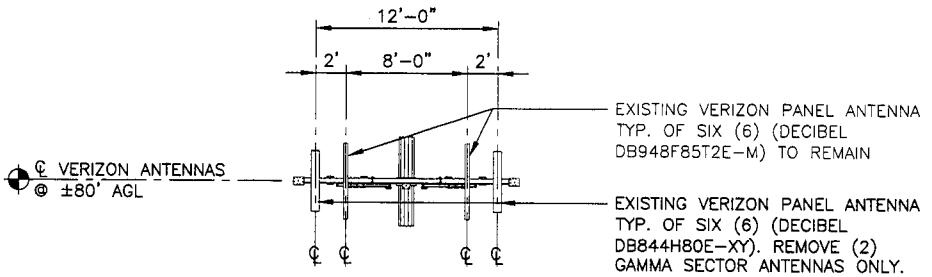
$$\frac{f_{bp}}{1.333 \cdot 0.75 Fy_{bp}} = 0.72$$

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

Condition = "OK"



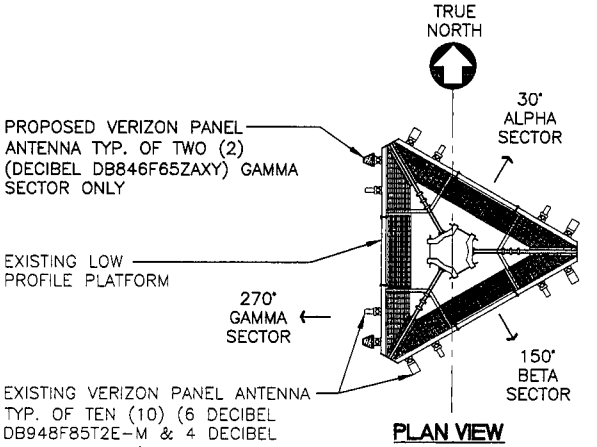
PLAN VIEW



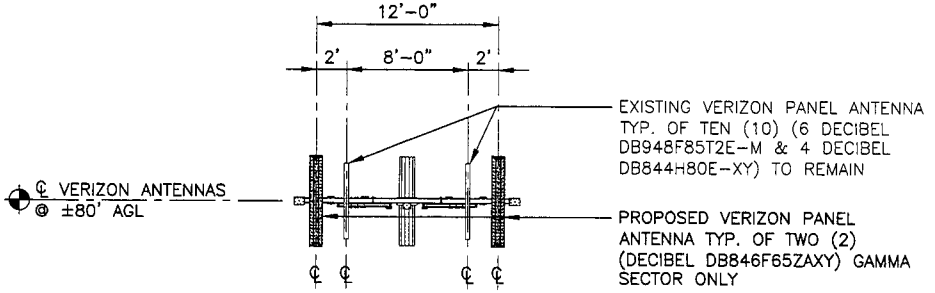
TYPICAL SECTOR ELEVATION

1 ANT-1 EXISTING ANTENNA MOUNTING CONFIGURATION

NOT TO SCALE



PLAN VIEW



GAMMA SECTOR ELEVATION

2 ANT-1 PROPOSED ANTENNA MOUNTING CONFIGURATION

NOT TO SCALE

REVISIONS		
00	02/11/08	ANTENNA LAYOUT

Cellco Partnership
d.b.a. verizon wireless

NATCOMM
CONSULTING ENGINEERS
P: 203.488.0580
F: 203.488.8587
W: natcomm.com
E: info@nat-eng.com
63-2 N. Branford Rd.
Branford, CT 06405

PROFESSIONAL ENGINEER SEAL

FAIRFIELD I

3965 CONGRESS ROAD
FAIRFIELD, CT

PROJECT NO:	06007.CO1
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	01/25/08

ANTENNA REPLACEMENT DETAILS

ANT-1

DWG. 1 OF 1

WALKER ENGINEERING, INC.

8451 DUNWOODY PLACE
NORTHRIDGE 400, BLDG. 8
DUNWOODY, GA 30350
(770) 641-7306 FAX (770) 587-2196

CIVIL • STRUCTURAL
N 33° 59' 13.6" W 84° 20' 26.8"

Mr. **Al Janeiro**
Natcomm, LLC
63-2 North Branford Road
Branford, CT 06405

12/02/03
CT496A
Fairfield II

Sub: Structural Analysis of 150-ft Valmont Monopole
3965 Congress Road, Fairfield, CT

Dear Mr. Janeiro:

Walker Engineering has performed a Level-Two finite element, P-Δ structural analysis of the above subject monopole in accordance with your Authorization for Services for the addition of the ***Verizon Wireless*** proposed antennas outlined below. This analysis consists of determining the forces on the monopole caused by existing, proposed, and future loads. The existing, proposed, and future loads were provided by your office, in conjunction with field observations by Walker Engineering.

The subject monopole is a 150-foot, three-section, twelve sided, tapered monopole, designed and manufactured by Valmont Industries. The manufacturer's drawings are unavailable. The monopole geometry and section sizes were obtained from previous analysis reports by Tectonic Engineering Consultants, P.C. Work Order No.: 2323.083, dated 09/22/99 and Paul J Ford and Company Design No.: Arcnet 506-254B, 12/03/98. These data and are assumed to be accurate. The monopole has also been assumed to be in good condition and capable of supporting its full original design capacity. The existing monopole was reinforced from the base to an elevation of 30-ft AGL. This reinforcement has been considered in this analysis.

Our analysis was performed in accordance with TIA/EIA-222-**F** for an 85 mph[1] base windload, and 75% of the base windload with ½" radial ice, as specified by Natcomm LLC.

Existing, future, and proposed loads consist of the following:

at 149 ft Nextel: Twelve existing Decibel DB844H90E-XY panel antennas on three T-arm mounts, fed by twelve 1-5/8"Ø coax cables routed inside the monopole.

[1] The minimum wind speed specified by EIA-222-F for Fairfield County, GA is 85 mph.

at 149 ft — Town: One existing Decibel DB810K omni antenna on one of the above T-arm mounts, fed by one 1-5/8"Ø coax cable routed inside the monopole.

at 138 ft — Sprint: Six existing Decibel DB980H90E-M panel antennas on a platform mount, fed by six 1-5/8"Ø coax cables routed inside the monopole.

at 125 ft — Cingular: Nine existing Celwave ALP868013-42T4 panel antennas on a platform mount, fed by nine 1-5/8"Ø coax cables routed outside the monopole.

at 113 ft — T-Mobile: Three existing EMS RR65-18-02-DP2 panel antennas on a platform mount, fed by six 1-1/4"Ø coax cables routed inside the monopole.

at 104 ft — Town: Three existing Decibel ASP-685 omni antennas (two inverted and one upright) and one Celwave PD1142 omni antennas on three standoff mounts, fed by four 7/8"Ø coax cables routed outside the monopole.

at 90 ft — AT&T: Nine existing Allgon 7262.01 panel antennas with nine Nokia MHA's on three T-arm mounts, fed by nine 1-1/4"Ø coax cables routed inside the monopole.

at 80 ft — ***Verizon (Proposed):*** Twelve CSS SA15-86 panel antennas on a platform mount, fed by twelve 1-5/8"Ø coax cables routed on the outside face of the monopole.

at 40 ft — Existing: One GPS antenna on a pipe arm mount, fed by six 1/2"Ø coax cable routed outside the monopole.

Note: The analysis ***assumes*** that the coax cables (existing, future, and proposed) are installed inside the monopole (unless otherwise noted) per *Walker Engineering Job No. 0311-428, dated 11/24/03. Please notify the undersigned prior to altering the cable routing configuration or if the coax configuration is different than the above assumptions.* Placement of small cables for beacons, ground rods, etc. are not critical.

Monopole Summary:

This analysis shows that the existing reinforcement connections at about 15-ft AGL are overstressed. The subject monopole **is not adequate** to support the existing, future, and proposed loads.

A copy of the full analysis is enclosed. A summary of the controlling load cases is provided below:

Monopole Section	Elevation	CSI[2]
Section 5 (Top)	101 ft to 150 ft	0.48
Section 4	54 ft to 101 ft	0.82
Section 3	30 ft to 54 ft	0.87
Section 2	15 ft to 30 ft	0.84
Section 1 (Bottom)	0 ft to 15 ft	0.78
Reinforcement Connections	15-ft AGL	**1.35**

Foundation Summary:

The existing + proposed foundation reactions at the base of the monopole are greater than the original foundation design loads. The original monopole foundation design drawings and site soil report are ***not available.*** Therefore, it is ***not possible*** to determine the ***allowable capacities*** without ***further investigations.***

Foundation Loads	Design[3] Reactions	Existing/ Proposed	% of Reactions
O.T. Moment (OTM)	3,556 k-ft	3,676 k-ft	***103 %***
Base Shear (horiz.)	29.8 k	40.5 k	***136 %***
Axial Load (vert.)	39.1 k	39.7 k	***102 %***

Monopole Recommendations:

Monopole:

1) Reinforce the overstressed monopole reinforcing connections at elevation 30-ft to support the proposed and existing loads.

Foundation:

1) Provide the original Geotechnical Site Soils Report and the original foundation design file in order to calculate the capacity of the existing foundation.

2) Reinforce the foundation by installing helical anchors with mechanical connections to the existing foundation to account for the added loads. *This option requires excavating a portion of the foundation or mapping the foundation to determine the existing dimensions.*

---

[2] **"Combined Stress Index"** Ratio of calculated loads verses total allowable loads; should be less than, or equal to, 1.00.

[3] Foundation reactions from Paul J Ford and Company Design No.: Arcnet 506-254B, 12/03/98.

3) Reinforce the foundation by installing a concrete reinforcing ring with mechanical connections to the existing foundation to account for the added loads. *This option requires excavating a portion of the foundation or mapping the foundation to determine the existing dimensions.*

4) Provide a new Geotechnical Site Soils Report and perform foundation mapping in order to calculate the capacity of the existing foundation. The foundation may require reinforcing, depending on the foundation analysis results.

Note: *Contractor **shall** provide the existing monopole foundation dimensions and a Geotechnical Site Soils Report, for the above options, to the undersigned for verifying assumptions prior to installation of the proposed equipment.*

As future loads are installed, the monopole should be re-evaluated on a case-by-case basis.

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

Walker Engineering Inc. appreciates the opportunity to be of service in this matter. Please do not hesitate to give me a call if you have any questions or comments.

Very truly yours,

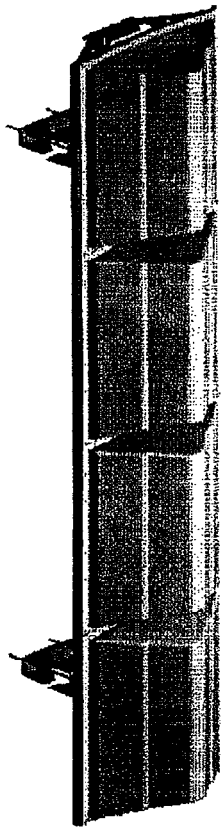
Jim Walker, P.E.

encl

CSS Antenna

Directing our energies for you.

Stripline Array
SA15-86
806-900 MHz



86° Azimuth Beam
8° Elevation Beam
15.0 dBd Gain
96"x14"x9"

- Stripline Feed Eliminates Internal Cabling Network
- Anti-Corrosion Design for Superb IM Performance
- Equalized Aerodynamic Design
- 10 Year Warranty

CSS Antenna, Inc. 10552 Philadelphia Road, White Marsh, MD 21162, Tel: 410-344-1010 Fax: 410-344-1007 www.cssantenna.com

Directing our energies for you.

Stripline Array SA15-86

Electrical Specifications

Frequency Range	806-900 MHz
Gain	15.0 dBd ±0.5 dB
Electrical Downtilt Options	0, 2 or 4 Degrees
VSWR	1.40:1 Maximum
Front-to-Back at Horizon	> 27 dB
Upper Side Lobe Suppression	< -13 dB
Elevation Beam (3-dB Points)	8 Degrees (±1 Degree)
Azimuth Beam (3-dB Points)	86 Degrees (±4 Degrees)
Polarization	Vertical
Impedance	50 Ohms
Power Input Rating	500 CW
Intermodulation Specification	<153dBc (<-110dBm at 2x20W)

Mechanical Specifications

Input Connector (female)	7/16 DIN or N-Type (Silver Finish)
Antenna Dimensions	96 x 14 x 9 Inches (LxWxD)
Antenna Weight	42.5 lbs (bracket weight 10.5 lbs)
Lightning Protection	Direct Ground
RF Distribution	Silver Plated Brass
Radome	Ultra High-Strength Luran
Weatherability	UV Stabilized, ASTM D1925
Radome Water Absorption	ASTM D570, 0.45%
Environmental	MIL-STD-810E
Wind Survival	120 mph
Front Wind Load at 100 mph	248 lbs (tested)
Front Flat Plate Equivalent	5.08 sq-ft. (c=2)
Mounting Brackets	Fits 2.5 to 3 Inch Schedule 40 Pipe
Mechanical Downtilt Range	0-6 Degrees in 1 Degree Increments
Clamps/Bolts	Hot Dip Galvanized Steel/Stainless Steel

Ordering Information

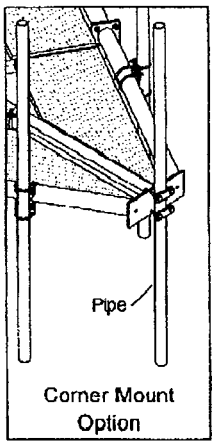
Model	Options
SA15-86-xD	7/16 DIN Connector, x=Electrical Downtilt in Degrees (0, 2 or 4)
SA15-86-xN	N-Type Connector, x=Electrical Downtilt in Degrees (0, 2 or 4)

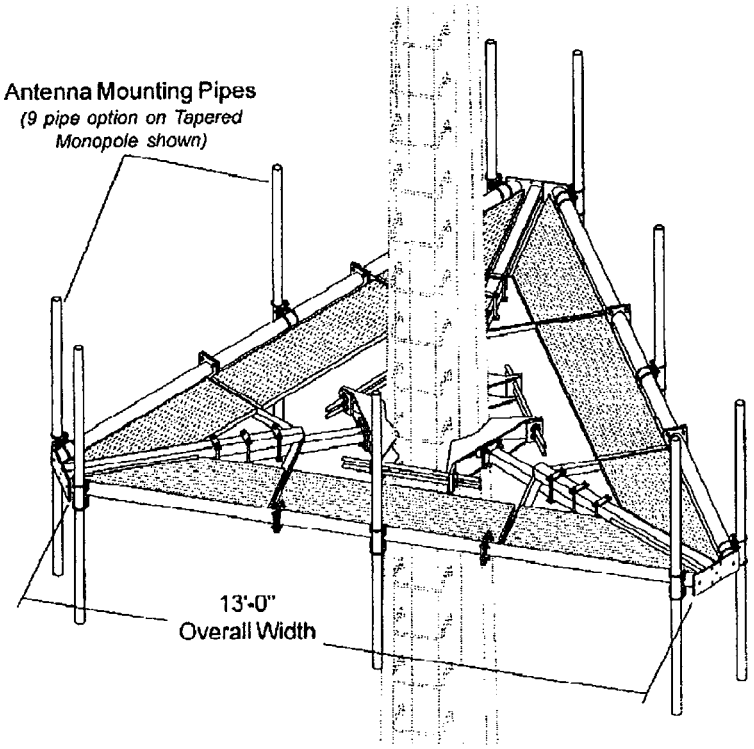
CSS Antenna, Inc.
Tel: 410-344-1010 Fax: 410-344-1007
www.cssantenna.com

13' LOW PROFILE PLATFORM

(Dwg.# 140575 Rev E/08/08/2001)

Add antenna mounting to new or existing monopoles





13' Low Profile Platform mounts are ideal for co-locate applications fiting a wide variety of monopoles and tapered poles. Approximate mount capacity would be 240 sq. ft. distributed around the mount considering 90 mph basic windspeed with ½" radial ice at 150' elevation[1].

[1] Capacity of mount is provided for comparison purposes only and is valid for conditions specified. **Call PiRod for capacity on your specific installation.** Actual load capacity is dependent on basic windspeed, ice load, height of mount and other factors specific to individual installations. All PiRod antenna mounts are designed and manufactured in accordance with ANSI/EIA-222-F standards.

Low Profile Platforms fit on a wide range of Monopole/Tapered Pole diameters

Description	Part Number	Price
13' Low Profile Platform to fit 12" to 54" **monopoles** (no antenna mounting pipes)	852206	3,200.00
13' Low Profile Platform to fit 12" to 54" **monopoles** (includes 9-84" antenna mounting pipes)	852207	3,800.00
13' Low Profile Platform to fit 12" to 54" **monopoles** (includes 12-84" antenna mounting pipes)	852208	4,000.00
Corner Mount Option - Lightweight	852215	150.00
Corner Mount Option - Heavy Duty	852216	200.00

Weight and Areas[2]	Weight, No Ice (lbs.)	Weight, ½" Ice (lbs.)	Area, No Ice (C_AA_f)	Area, ½" Ice (C_AA_f)
13' Low Profile Platform	1,300	1,765	15.7 sq. ft.	20.1 sq. ft.

[2]All areas presented are computed in accordance with ANSI/TIA/EIA-222-F 1996. All areas do not include cross arms, pipemounts or antenna mounting pipes.

All of the above information, including but not limited to: prices, areas, dimensions, is subject to change without notice.

PiROD INC.

1545 Pidco Drive, P.O. Box 128, Plymouth, IN 46563 • Phone (877) GO PIROD • Fax (219) 936-8925 • www.pirod.com

NatComm LLC **Monopole** **MHWE Job No.: 0311-428**

Monopole by: N/A **Job/File No.: N/A** **Dwg/Design No.: N/A** **Dated: N/A**

SITE: Fairfield II **Location: Fairfield, CT** **150 ft. Monopole** **SITE ID: CT496A**

POLE SECTION PROPETIES & STRESS SUMMARIES

MONOPOLE DATA:

TAPERED: No DL Factor = 1.05

No. Sides or Round: 12 Ht = 150 ft Wt = 490 pcf

Original Design Criteria: EIA-222-F-1996 Gh = 1.69

Current Design Criteria: EIA-222-F-1996 PER AISC-72 WIND = 85 mph w/o ice load case

SECTIONS from bottom	ELEV (ft)	WALL t (in)	OD or FACE (in)	D (in)	Do/t	WIND FACE Ae (ft^2)	X-AREA in^2	I (in^4)	Approximate S (in^3)	r (in)	weight (lb)	EIA Kz	EIA TABLE 1 C
1st @ bottom	0	0.4375	61.583	61.15	139.76	75.26	131.00	41,721	1,364.0	17.84	6,914	1.00	426.46
1st @ top	15	0.4375	58.830	58.39	133.47		127.00	36,535	1,247.0	16.95			
2nd @ bottom	15	0.4375	57.003	56.57	129.29	69.61	96.00	28,879	978.0	17.32	5,038	1.00	394.43
2nd @ top	30	0.4375	54.366	53.93	123.27		92.00	24,833	881.0	16.39			
3rd @ bottom	30	0.4375	44.139	43.70	99.89	83.91	61.56	15,008	649.8	15.65	5,015	1.07	307.60
3rd @ top	54	0.4375	39.771	39.33	89.90		55.41	10,942	525.8	14.08			
4th @ bottom	54	0.3750	40.521	40.15	107.06	79.68	48.48	9,972	470.3	14.37	4,085	1.22	299.43
4th @ top	79	0.3750	35.970	35.60	94.92		42.98	6,951	369.3	12.74			
5th @ bottom	79	0.3750	35.970	35.60	94.92	62.27	42.98	6,951	369.3	12.74	3,188	1.33	277.68
5th @ top	101	0.3750	31.966	31.59	84.24		38.15	4,859	290.5	11.31			
6th @ bottom	101	0.2813	32.528	32.25	114.63	63.03	29.21	3,877	227.8	11.54	2,425	1.42	255.65
6th @ top	126	0.2813	27.978	27.70	98.46		25.09	2,456	167.8	9.92			
7th @ bottom	126	0.2813	27.978	27.70	98.46	51.59	25.09	2,456	167.8	9.92	1,982	1.50	224.14
7th @ top	150	0.2813	23.610	23.33	82.93		21.13	1,468	118.8	8.35			

Total Wt = 28,646

NatComm LLC **Monopole** MHWE Job No.: 0311-428

Monopole by: N/A Job/File No.: N/A Dwg/Design No.: N/A Dated: N/A

SITE: Fairfield II Location: Fairfield, CT 150 ft. Monopole SITE ID: CT496A

MONOPOLE GRAVITY and WIND LOADS

	Cf	Fpole<= lb	Fpole<= psf	Fpole<= plf	SECT WT. plf
1st @ bottom	1.20	2,823	37.51	188.19	460.91
2nd @ bottom	1.20	2,611	37.51	174.06	335.85
3rd @ bottom	1.03	2,894	34.49	120.59	208.97
4th @ bottom	1.03	3,134	39.33	125.36	163.38
5th @ bottom	1.03	2,671	42.88	121.39	144.93
6th @ bottom	1.03	2,888	45.82	115.52	97.00
7th @ bottom	1.03	2,500	48.45	104.15	82.57

MONOPOLE ANTENNAS and MOUNTS: GRAVITY and WIND LOADS

AT (ft)	EPA	Wt	Qz	Kz	F(lb)==>	
63	50.00		22.20	1.20	1,876	Cingular Coax Cables on Outside
149	58.13	1.19	28.45	1.54	2,795	Nextel and Town Exisitng
138	62.02	2.06	27.84	1.50	2,918	Sprint Existing
125	48.56	1.61	27.06	1.46	2,221	Cingular Existing
113	62.33	2.05	26.29	1.42	2,769	T-Mobile Existing
105	21.95	0.32	25.74	1.39	955	Town Existing
90	49.62	1.23	24.64	1.33	2,066	AT&T Existing
80	143.00	2.60	23.82	1.29	5,757	Verizon Proposed
40	1.50	0.03	19.54	1.06	50	Existing GPS

NatComm LLC **Monopole** **MHWE Job No.: 0311-428**

Monopole by: N/A **Job/File No.: N/A** **Dwg/Design No.: N/A** **Dated: N/A**

SITE: Fairfield II **Location: Fairfield, CT** **150 ft. Monopole** **SITE ID: CT496A**

STRESS CALCULATIONS - EXISTING, FUTURE, AND PROPOSED LOADS

SECTION No.	M ft-kip	c in	I in^4	P kip	A in^2	Fb(Mc/I) (ksi)	Fc (P/A) (ksi)	Fy (ksi)	w/t	(Fy)^.5*w/t	Fb(all) EIA Tbl 5 (ksi)	Fc(all) (ksi)	CSI
1	3,676	30.79	41,721	39.62	131.00	32.56	0.30	55.00	35.04	259.89	31.81	26.74	1.03
	3,088	29.42	36,535	32.71	127.00	29.83	0.26	55.00	33.36	247.39	32.58	26.96	0.93
2	3,088	28.50	28,879	32.45	96.00	36.57	0.34	55.00	32.24	239.09	33.00	27.12	1.12
	2,538	27.18	24,833	27.41	92.00	33.34	0.30	55.00	30.62	227.11	33.00	27.37	1.02
3	2,538	22.07	15,008	26.92	61.56	44.79	0.44	65.00	24.36	196.38	39.00	32.63	1.16
	1,722	19.89	10,942	21.87	55.41	37.55	0.39	65.00	21.68	174.81	39.00	33.36	0.97
4	1,722	20.26	9,972	20.90	48.48	41.98	0.43	65.00	26.28	211.87	39.00	32.18	1.09
	950	17.99	6,951	16.83	42.98	29.50	0.39	65.00	23.03	185.65	39.00	32.97	0.77
5	950	17.99	6,951	15.75	42.98	29.50	0.37	65.00	23.03	185.65	39.00	32.97	0.77
	488	15.98	4,859	8.72	38.15	19.26	0.23	65.00	20.16	162.57	39.00	33.86	0.50
6	488	16.26	3,877	7.96	29.21	24.57	0.27	65.00	28.31	228.24	39.00	31.77	0.64
	136	13.99	2,456	1.55	25.09	9.29	0.06	65.00	23.98	193.29	39.00	32.72	0.24
7	136	13.99	2,456	1.20	25.09	9.29	0.05	65.00	23.98	193.29	39.00	32.72	0.24
	1	11.81	1,468	4.05	21.13	0.10	0.19	65.00	19.81	159.74	39.00	33.98	0.01

CSI with 1/3 WIND LOAD INCREASE:

Section No.	CSI
1	**0.78**
	0.69
2	**0.84**
	0.77
3	**0.87**
	0.73

Section No.	CSI
4	**0.82**
	0.58
5	**0.58**
	0.38
6	**0.48**
	0.18

Section No.	CSI
7	**0.18**
	0.01

PROGRAM : General Frame Analysis v2.05 PAGE NO. 1
WALKER ENGINEERING, Inc. TIME : Fri Nov 21 17:19:33 2003
JOB : NatComm-014; 0311-428 JOB NO. : 87
RUN : Fairfield II; CT496A; 150-ft Monopole

N O D A L I N F O R M A T I O N

NODE NO	NODAL COORDINATES X	Y	SUPPORT CONDITIONS CODE	PX STIFF	PY STIFF	M STIFF
Units :	Ft	Ft		K /In	K /In	K -In /Deg
1	0.000	0.000	F			
2	0.000	15.000				
3	0.000	30.000				
4	0.000	54.000				
5	0.000	79.000				
6	0.000	101.000				
7	0.000	126.000				
8	0.000	150.000				

E L E M E N T I N F O R M A T I O N

ELEM NO	NE NODE	PE NODE	ELEM LENGTH	BETA ANGLE	PROP TYPE	ELEM TYPE	NE HINGE	PE HINGE
		Units : Ft		Deg				
1	1	2	15.000	90.00	1	NPBEAM		
2	2	3	15.000	90.00	2	NPBEAM		
3	3	4	24.000	90.00	3	NPBEAM		
4	4	5	25.000	90.00	4	NPBEAM		
5	5	6	22.000	90.00	5	NPBEAM		
6	6	7	25.000	90.00	6	NPBEAM		
7	7	8	24.000	90.00	7	NPBEAM		

P R O P E R T Y I N F O R M A T I O N

PROP NO	SECTION NAME	MODULUS	AREA	I	DIST
	Units :	K /In 2	In2	In4	Ft
1	1	2.9e+004	131	4.17e+004	0.00
			127	3.65e+004	15.00
2	2	2.9e+004	96	2.89e+004	0.00
			92	2.48e+004	15.00
3	3	2.9e+004	61.6	1.5e+004	0.00
			55.4	1.09e+004	24.00
4	4	2.9e+004	48.5	9.97e+003	0.00
			43	6.95e+003	25.00
5	5	2.9e+004	43	6.95e+003	0.00

PROGRAM : General Frame Analysis v2.05 PAGE NO. 2
WALKER ENGINEERING, Inc. TIME : Fri Nov 21 17:19:38 2003
JOB : NatComm-014; 0311-428 JOB NO. : 87
RUN : Fairfield II; CT496A; 150-ft Monopole

P R O P E R T Y I N F O R M A T I O N

PROP NO	SECTION NAME	MODULUS	AREA	I	DIST
			38.2	4.86e+003	22.00
6 6		2.9e+004	29.2	3.88e+003	0.00
			25.1	2.46e+003	25.00
7 7		2.9e+004	25.1	2.46e+003	0.00
			21.1	1.47e+003	24.00

E L E M E N T L O A D I N F O R M A T I O N

REC NO	LOAD CASE	LOAD TYPE	LOAD SYS	DIST SPEC		DIST	PX	PY	M
					Units :	Ft	K /Ft	K /Ft	Ft-K /Ft
Description : DL+WL									
Element List : 1									
1	1	UNIF	GLO	FRAC	B	0.00	0.19	-0.46	0.00
					E	1.00	0.19	-0.46	0.00
Description : DL+WL									
Element List : 2									
2	1	UNIF	GLO	FRAC	B	0.00	0.17	-0.34	0.00
					E	1.00	0.17	-0.34	0.00
Description : DL+WL									
Element List : 3									
3	1	UNIF	GLO	FRAC	B	0.00	0.12	-0.21	0.00
					E	1.00	0.12	-0.21	0.00
Description : DL+WL									
Element List : 4									
4	1	UNIF	GLO	FRAC	B	0.00	0.13	-0.16	0.00
					E	1.00	0.13	-0.16	0.00
Description : DL+WL									
Element List : 5									
5	1	UNIF	GLO	FRAC	B	0.00	0.12	-0.14	0.00
					E	1.00	0.12	-0.14	0.00
Description : DL+WL									
Element List : 6									
6	1	UNIF	GLO	FRAC	B	0.00	0.12	-0.10	0.00
					E	1.00	0.12	-0.10	0.00

PROGRAM : General Frame Analysis v2.05 PAGE NO. 3
WALKER ENGINEERING, Inc. TIME : Fri Nov 21 17:19:38 2003
JOB : NatComm-014; 0311-428 JOB NO. : 87
RUN : Fairfield II; CT496A; 150-ft Monopole

ELEMENT LOAD INFORMATION

REC NO	LOAD CASE	ELEMENT LOAD TYPE	LOAD SYS	DIST SPEC		DIST	PX	PY	M
Description : DL+WL									
Element List : 7									
7	1	UNIF	GLO	FRAC	B	0.00	0.10	-0.08	0.00
					E	1.00	0.10	-0.08	0.00
Description : EQ@149'									
Element List : 7									
8	1	CONC	GLO	DIST	B	23.00	2.80	-1.19	0.00
Description : EQ@138'									
Element List : 7									
9	1	CONC	GLO	DIST	B	12.00	2.92	-2.06	0.00
Description : EQ@125'									
Element List : 6									
10	1	CONC	GLO	DIST	B	24.00	2.22	-1.61	0.00
Description : EQ@113'									
Element List : 6									
11	1	CONC	GLO	DIST	B	12.00	2.77	-2.05	0.00
Description : EQ@105'									
Element List : 6									
12	1	CONC	GLO	DIST	B	4.00	0.97	-0.32	0.00
Description : EQ@90'									
Element List : 5									
13	1	CONC	GLO	DIST	B	11.00	2.04	-1.23	0.00
Description : EQ@80'									
Element List : 5									
14	1	CONC	GLO	DIST	B	1.00	5.76	-2.60	0.00
Description : EQ@40'									
Element List : 3									
15	1	CONC	GLO	DIST	B	10.00	0.05	-0.03	0.00
Description : WL-COAX									
Element List : 3,4,5,6									
16	1	UNIF	GLO	FRAC	B	0.00	0.01	0.00	0.00
					E	1.00	0.01	0.00	0.00

PROGRAM : General Frame Analysis v2.05 PAGE NO. 4
WALKER ENGINEERING, Inc. TIME : Fri Nov 21 17:19:38 2003
JOB : NatComm-014; 0311-428 JOB NO. : 87
RUN : Fairfield II; CT496A; 150-ft Monopole

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
	Units :	In	In	Deg

LOAD COMBINATIONS:

COMB 1 : 1.00 X CASE 1

1	1	0.0000	0.0000	0.0000
2	1	0.5681	-0.0017	-0.3590
3	1	2.3817	-0.0037	-0.7920
4	1	9.0895	-0.0080	-1.8625
5	1	21.7174	-0.0127	2.9187
6	1	36.8650	-0.0159	-3.6202
7	1	57.6010	-0.0193	-4.2205
8	1	79.3586	-0.0207	-4.3746

E L E M E N T R E P O R T S

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
		Units :	K	K	K -Ft	K -Ft /In	Ft

SIGN CONVENTION : BEAM DESIGNERS

LOAD COMBINATIONS:

COMB 1 : 1.00 X CASE 1

1	1	1	-39.7450	40.4918	-3594.2616	
		2	-32.8300	37.6688	-3008.0571	

PROGRAM : General Frame Analysis v2.05 PAGE NO. 5
WALKER ENGINEERING, Inc. TIME : Fri Nov 21 17:19:38 2003
JOB : NatComm-014; 0311-428 JOB NO. : 87
RUN : Fairfield II; CT496A; 150-ft Monopole

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL DIST
2	1	2	-32.8300	37.6688	-3008.0571	
		3	-27.7900	35.0573	-2462.6113	
3	1	3	-27.7900	35.0573	-2462.6113	
		4	-22.7440	31.7529	-1660.9889	
4	1	4	-22.7440	31.7529	-1660.9889	
		5	-18.6690	28.2429	-911.0414	
5	1	5	18.6690	28.2429	-911.0414	
		6	-11.6460	17.4421	-466.1064	
6	1	6	-11.6460	17.4421	-466.1064	
		7	-5.2390	8.2196	-129.4352	
7	1	7	-5.2390	8.2196	-129.4352	
		8	0.0000	0.0000	0.0000	

R E A C T I O N S

NODE NO	LOAD COMB	PX	PY	MOMENT
	Units :	K	K	K -Ft

LOAD COMBINATIONS:

COMB 1 : 1.00 X CASE 1

1	1	-40.4918	39.7450	3594.2616

PROGRAM : General Frame Analysis v2.05 PAGE NO. 6
WALKER ENGINEERING, Inc. TIME : Fri Nov 21 17:19:38 2003
JOB : NatComm-014; 0311-428 JOB NO. : 87
RUN : Fairfield II; CT496A; 150-ft Monopole

P-D E L T A A N A L Y S I S R E S U L T S

LC#	CONVERGE	CYCLE	D-NORM	CONVERGE-TOL	MAX CYCLE	AXIAL FORCE	POWER
1	YES	3	3.2644e-004	1.0000e-003	30	Y	0.0

PROGRAM : General Frame Analysis v2.05 PAGE NO. 7
WALKER ENGINEERING, Inc. TIME : Fri Nov 21 17:19:38 2003
JOB : NatComm-014; 0311-428 JOB NO. : 87
RUN : Fairfield II; CT496A; 150-ft Monopole

N O D A L D I S P L A C E M E N T S

NODE NO	LOAD COMB	DX	DY	ROTATION
Units :		In	In	Deg

LOAD COMBINATIONS:

COMB 1 : 1.00 X CASE 1

1	1	0.0000	0.0000	0.0000
2	1	0.5816	-0.0027	-0.3677
3	1	2.4415	0.0143	-0.8130
4	1	9.3423	-0.1011	-1.9192
5	1	22.3728	-0.3886	-3.0168
6	1	38.0379	-0.8567	-3.7494
7	1	59.5166	-1.6296	-4.3784
8	1	82.0734	-2.5155	4.5414

E L E M E N T R E P O R T S

ELEM NO	LOAD COMB	NODE NO	SIGN CONVENTION : BEAM DESIGNERS AXIAL	SHEAR	MOMENT	MAX MOM/DEFL	DIST
Units :			K	K	K -Ft	K -Ft /In	Ft

LOAD COMBINATIONS:

COMB 1 : 1.00 X CASE 1

1	1	1	-39.6184	40.6089	-3675.5503	
		2	-32.7034	37.7859	-3087.5893	

PROGRAM : General Frame Analysis v2.05 PAGE NO. 8
WALKER ENGINEERING, Inc. TIME : Fri Nov 21 17:19:38 2003
JOB : NatComm-014; 0311-428 JOB NO. : 87
RUN : Fairfield II; CT496A; 150-ft Monopole

E L E M E N T R E P O R T S
SIGN CONVENTION : BEAM DESIGNERS

ELEM NO	LOAD COMB	NODE NO	AXIAL	SHEAR	MOMENT	MAX MOM/DEFL DIST
2	1	2	-32.4460	37.9805	3087.5925	
		3	-27.4060	35.3690	-2537.4710	
3	1	3	-26.9163	35.6533	-2537.4772	
		4	-21.8703	32.3489	-1721.5502	
4	1	4	-20.8985	32.6252	-1721.5962	
		5	-16.8235	29.1152	-949.8411	
5	1	5	-15.7460	29.0406	-949.8956	
		6	-8.7230	18.2398	-487.4119	
6	1	6	-7.9618	18.0619	-487.4692	
		7	-1.5548	8.8394	-135.3037	
7	1	7	-1.1815	8.4607	-135.2490	
		8	4.0575	0.2411	-0.0266	

R E A C T I O N S

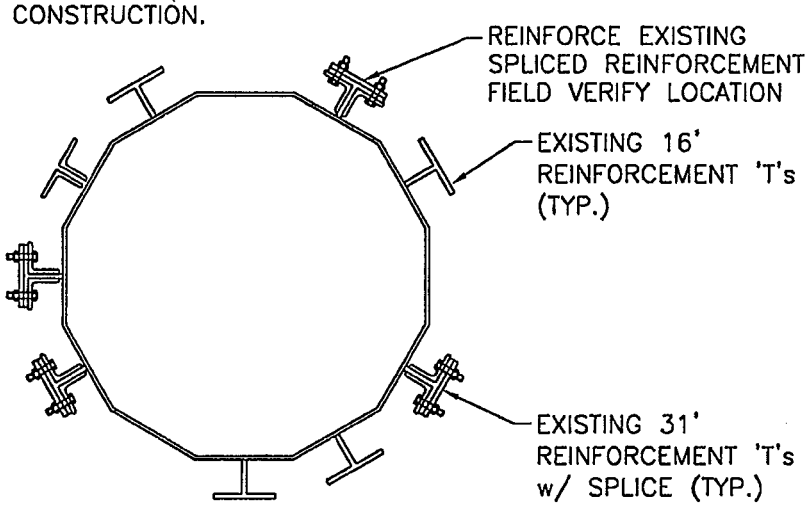
NODE NO	LOAD COMB	PX	PY	MOMENT
	Units :	K	K	K -Ft

LOAD COMBINATIONS:

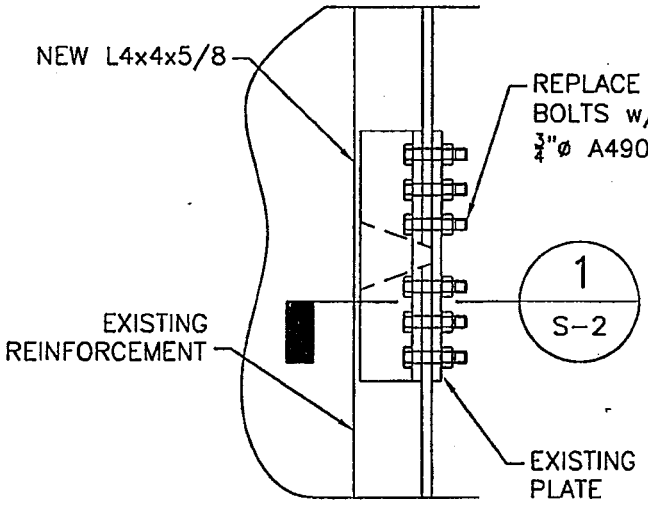
COMB 1 : 1.00 X CASE 1

1	1	-40.4807	39.7494	3675.5503

VERIFY LOCATION & DETAIL OF ALL EXISTING MEMBERS PRIOR TO CONSTRUCTION.



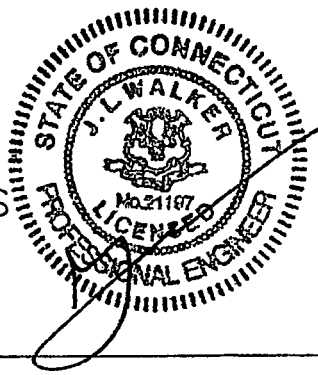
PLAN



TYPICL SPLICE SECTION

SCOPE OF WORK

- PROVIDE NEW L4x4x$\frac{5}{8}$ ANGLES BEHIND EXISTING SPLICE PLATE
- REPLACE EXISTING ¾"ø A325 BOLTS w/ NEW ¾"ø A490 BOLTS



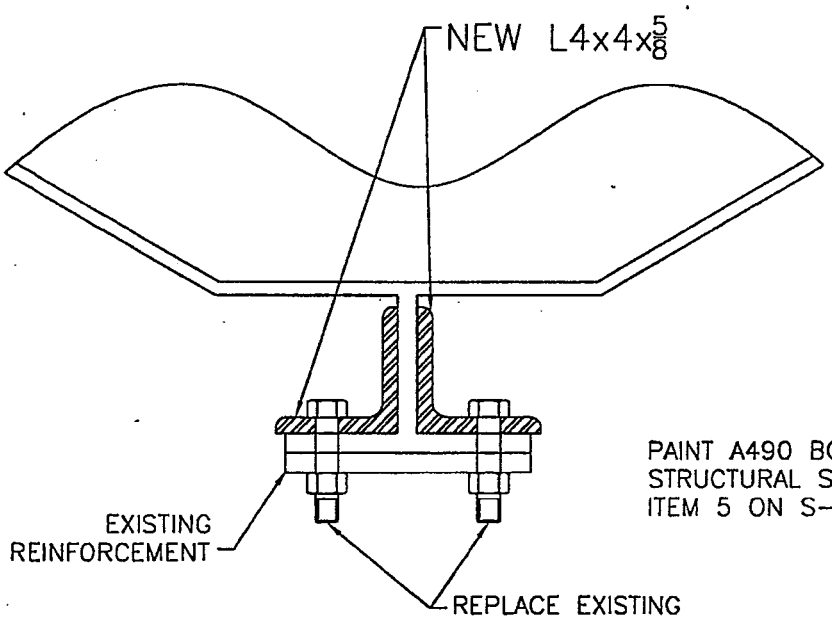
WALKER ENGINEERING, INCORPORATED
8451 Dunwoody Place, Northridge 400, Bldg. 8, Dunwoody, GA 30350
(770) 641-7306 Fax: (770) 587-2196 www.walkerengineer.com

REV.	DATE	BY

ENGINEER: JLW
DRAWN BY: DBT
CHECKED BY: JLW
ORIG. ISSUE DATE: 07/29/04

NATCOMM, LLC
150ft VALMONT MONOPOLE
REINFORCEMENT DETAILS
3965 CONGRESS ROAD
FAIRFIELD, CT

SITE NAME: FAIRFIELD II
SITE No: CT496A
JOB No: 0311-428RE
SHEET No: S-1
SCALE: NONE



1 / S-2 DETAIL NTS

RECEIVED
JUL 30 2004
NATCOM

STATE OF CONNECTICUT
J.L.WALKER
No.21197
LICENSED
PROFESSIONAL ENGINEER

REV.	DATE	BY

ENGINEER: JLW
DRAWN BY: DBT
CHECKED BY: JLW
ORIG. ISSUE DATE: 07/29/04

WALKER ENGINEERING INCORPORATED
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NATCOMM, LLC
150ft VALMONT MONOPOLE
REINFORCEMENT DETAILS
3965 CONGRESS ROAD
FAIRFIELD, CT

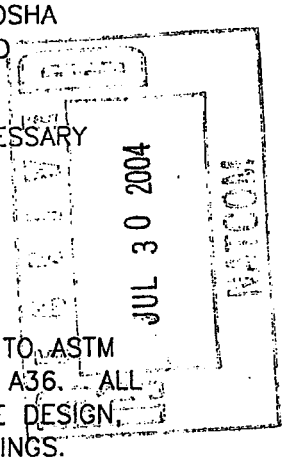
SITE NAME: FAIRFIELD II
SITE No: CT496A
JOB No: 0311-428RE
SHEET No.: S-2
SCALE: NONE

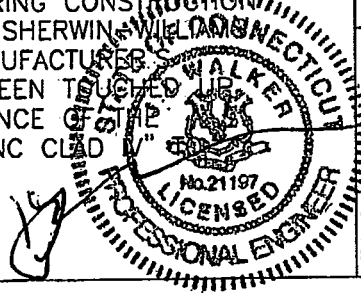
GENERAL NOTES

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS PRIOR TO FABRICATION. ALL DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER FOR RESOLUTION.
2. THE SIZE AND SPACING OF STRUCTURAL ELEMENTS SHALL NOT BE CHANGED WITHOUT THE ENGINEER'S APPROVAL.
3. DETAILS SHOWN ARE TYPICAL; THEREFORE, SIMILAR DETAILS APPLY TO SIMILAR CONDITIONS UNLESS OTHERWISE NOTED.
4. THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.
5. ALL STRUCTURAL AND NON-STRUCTURAL ITEMS SHALL BE TEMPORARILY BRACED DURING CONSTRUCTION UNTIL ALL STRUCTURAL ELEMENTS THAT ARE REQUIRED FOR STABILITY, SUCH AS LATERAL BRACING, ANCHOR BOLTS, ETC., HAVE BEEN INSTALLED.
6. CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS OF EXISTING UTILITIES, GROUND DRAINS, DRAIN PIPES, VENTS, OR ANY OTHER DEVICES ON, OR NEAR TOWER BEFORE COMMENCING WORK. CONTRACTOR SHALL PROTECT EXISTING FACILITIES, UTILITIES, COAX AND UTILITY LINES FROM DAMAGE. NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICTS ARISING FROM THIS VERIFICATION.
7. INCORRECTLY FABRICATED, DAMAGED, MISFITTING OR NONCONFORMING MATERIALS OR CONDITIONS SHALL BE REPORTED TO THE OWNER PRIOR TO REMEDIAL OR CORRECTIVE ACTION. THIS INCLUDES ITEMS NOT VERIFIED PRIOR TO FABRICATION.
8. CONTRACTOR(S) SHALL COOPERATE WITH THE OWNER'S REPRESENTATIVE, AND COORDINATE HIS WORK WITH THE WORK OF OTHERS.
9. CONSTRUCTION SHALL BE IN ACCORDANCE WITH APPLICABLE OSHA REGULATIONS, STATE BUILDING CODE, LOCAL ORDINANCES, AND TIA/EIA-222F (1996).
10. CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIALS NECESSARY FOR CONSTRUCTION.
11. DESIGN WIND SPEED IS 85 MPH PER TIA/EIA-222F (1996).

STRUCTURAL STEEL:

1. USE ASTM STEEL. STRUCTURAL PIPE, PLATE SHALL CONFORM TO ASTM A572 GRADE 50, ALL OTHER STEEL SHALL CONFORM TO ASTM A36. ALL STEEL WORK SHALL CONFORM TO AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS.
2. ALL BOLT HOLES SHALL BE 1/16" LARGER IN DIAMETER THAN THE BOLT.
3. ALL BOLTS SHALL BE ASTM A490 NON-GALVANIZED WITH NUTS AND PAL NUTS. SEE PAINT SPECIFICATION BELOW.
4. ALL STEEL MATERIAL TO BE HOT DIPPED GALVANIZED AFTER FABRICATION.
5. REPAIR OF GALVANIZED COATING: ALL AREAS DAMAGED DURING CONSTRUCTION SHALL BE COATED w/A ZINC-RICH PAINT. REPAIR USING SHERWIN-WILLIAMS "ZINC CLAD IV" APPLIED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS (404-297-7310). AREAS THAT HAVE BEEN TOUCHED UP SHALL BE INSPECTED AS PART OF THE ROUTINE MAINTENANCE OF THE STRUCTURE BY THE TOWER OWNER. PAINT OVER THE "ZINC CLAD IV" TO MATCH EXISTING COLOR AFTER FINAL INSPECTION.





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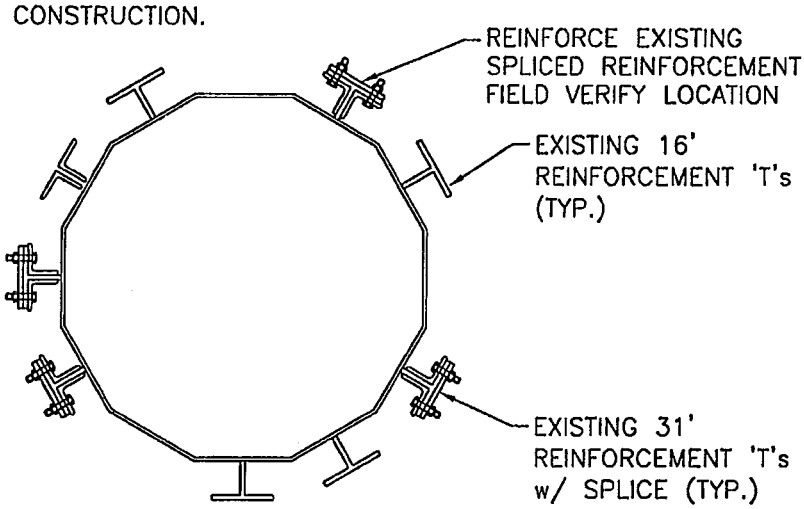
REV.	DATE	BY

ENGINEER: JLW
DRAWN BY: DBT
CHECKED BY: JLW
ORIG. ISSUE DATE: 07/29/04

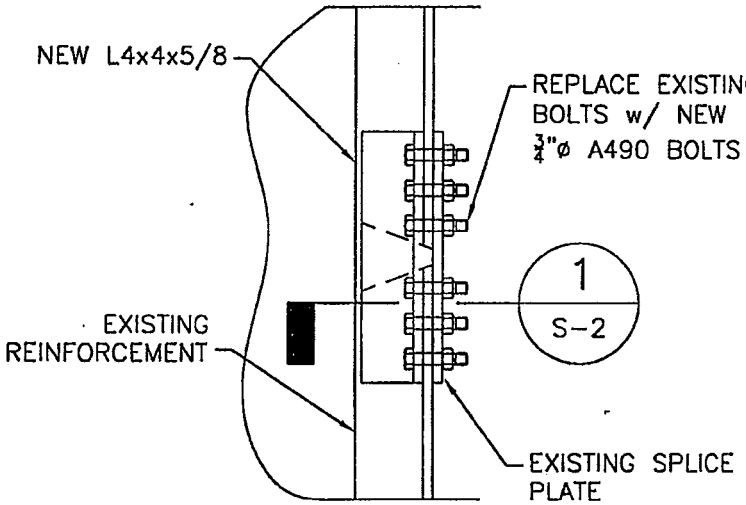
NATCOMM, LLC
150ft VALMONT MONOPOLE
REINFORCEMENT DETAILS
3965 CONGRESS ROAD
FAIRFIELD, CT

SITE NAME: FAIRFIELD II
SITE No: CT496A
JOB No: 0311-428RE
SCALE: NONE
SHEET No: S-3

VERIFY LOCATION & DETAIL OF ALL EXISTING MEMBERS PRIOR TO CONSTRUCTION.



PLAN



TYPICL SPLICE SECTION

SCOPE OF WORK

- PROVIDE NEW L4x4x$\frac{5}{8}$ ANGLES BEHIND EXISTING SPLICE PLATE
- REPLACE EXISTING $\frac{3}{4}$"ø A325 BOLTS w/ NEW $\frac{3}{4}$"ø A490 BOLTS

STATE OF CONNECTICUT J. L. WALKER No. 21187 LICENSED PROFESSIONAL ENGINEER

WALKER ENGINEERING INCORPORATED
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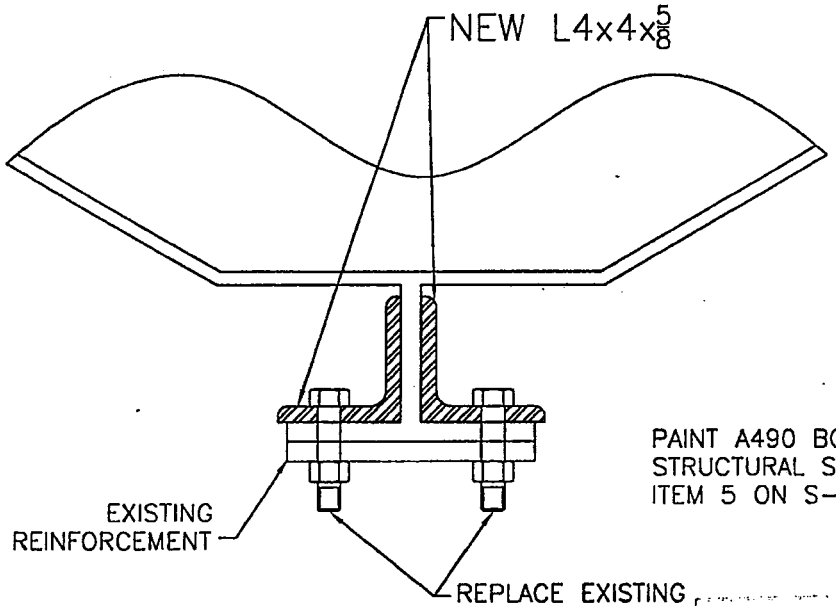
REV.	DATE	BY

ENGINEER: JLW
DRAWN BY: DBT
CHECKED BY: JLW
ORIG. ISSUE DATE: 07/29/04

NATCOMM, LLC
150ft VALMONT MONOPOLE
REINFORCEMENT DETAILS
3965 CONGRESS ROAD
FAIRFIELD, CT

SITE NAME: FAIRFIELD II
SITE No: CT496A
JOB No: 0311-428RE
SHEET No.: S-1
SCALE: NONE



PAINT A490 BOLTS PER STRUCTURAL STEEL ITEM 5 ON S-3

1 / S-2 DETAIL NTS

RECEIVED
JUL 30 2004
NATCOM

REV.	DATE	BY

ENGINEER: JLW
DRAWN BY: DBT
CHECKED BY: JLW
ORIG. ISSUE DATE: 07/29/04

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NATCOMM, LLC
150ft VALMONT MONOPOLE
REINFORCEMENT DETAILS
3965 CONGRESS ROAD
FAIRFIELD, CT

STATE OF CONNECTICUT
J.L.WALKER
No.21197
LICENSED
PROFESSIONAL ENGINEER

SITE NAME: FAIRFIELD II
SITE No: CT496A
JOB No: 0311-428RE
SHEET No: S-2
SCALE: NONE

GENERAL NOTES

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11. DESIGN WIND SPEED IS 85 MPH PER TIA/EIA-222F (1996).

STRUCTURAL STEEL:

1. USE ASTM STEEL. STRUCTURAL PIPE, PLATE SHALL CONFORM TO ASTM A572 GRADE 50, ALL OTHER STEEL SHALL CONFORM TO ASTM A36. ALL STEEL WORK SHALL CONFORM TO AISC SPECIFICATION FOR THE DESIGN, FABRICATION, AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS.
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RECEIVED JUL 30 2004

STATE OF CONNECTICUT — DANIEL T. WALKER — No.21197 — LICENSED PROFESSIONAL ENGINEER

REV.	DATE	BY

ENGINEER: JLW
DRAWN BY: DBT
CHECKED BY: JLW
ORIG. ISSUE DATE: 07/29/04

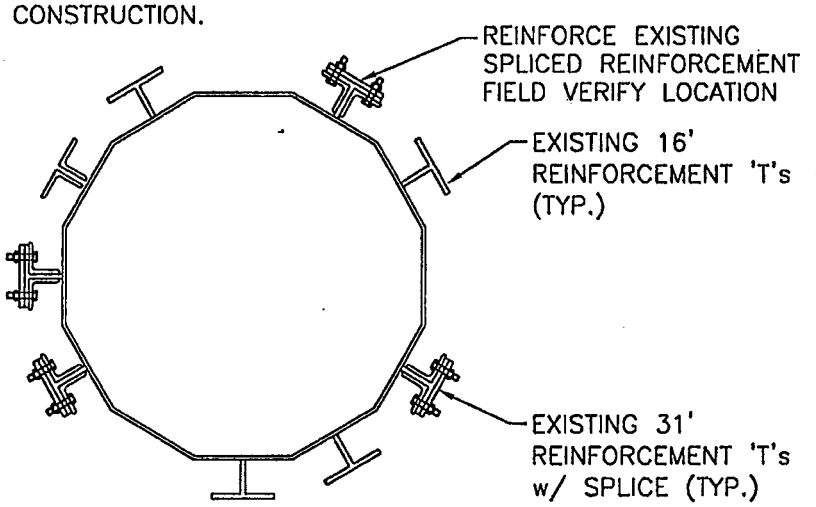
WALKER ENGINEERING INCORPORATED
8451 Dunwoody Place, Northridge 400, Bldg. 8, Dunwoody, GA 30350
(770) 641-7306 Fax: (770) 587-2196 www.walkerengineer.com

NATCOMM, LLC
150ft VALMONT MONOPOLE
REINFORCEMENT DETAILS
3965 CONGRESS ROAD
FAIRFIELD, CT

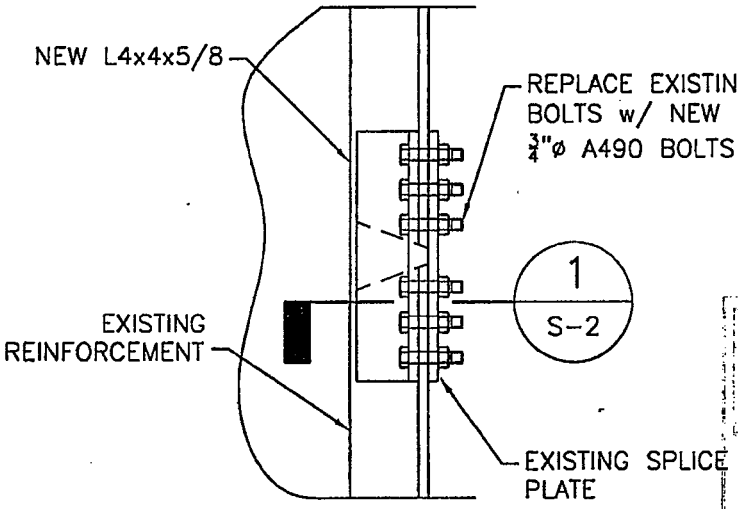
SITE NAME:	SITE No:	JOB No:	SCALE:
FAIRFIELD II	CT496A	0311-428RE	NONE

SHEET No.: S-3

VERIFY LOCATION & DETAIL OF ALL EXISTING MEMBERS PRIOR TO CONSTRUCTION.



PLAN



TYPICL SPLICE SECTION

SCOPE OF WORK

- PROVIDE NEW L4x4x$\frac{5}{8}$ ANGLES BEHIND EXISTING SPLICE PLATE
- REPLACE EXISTING $\frac{3}{4}$"ø A325 BOLTS w/ NEW $\frac{3}{4}$"ø A490 BOLTS

STATE OF CONNECTICUT
J.L. WALKER
No. 21197
LICENSED
PROFESSIONAL ENGINEER

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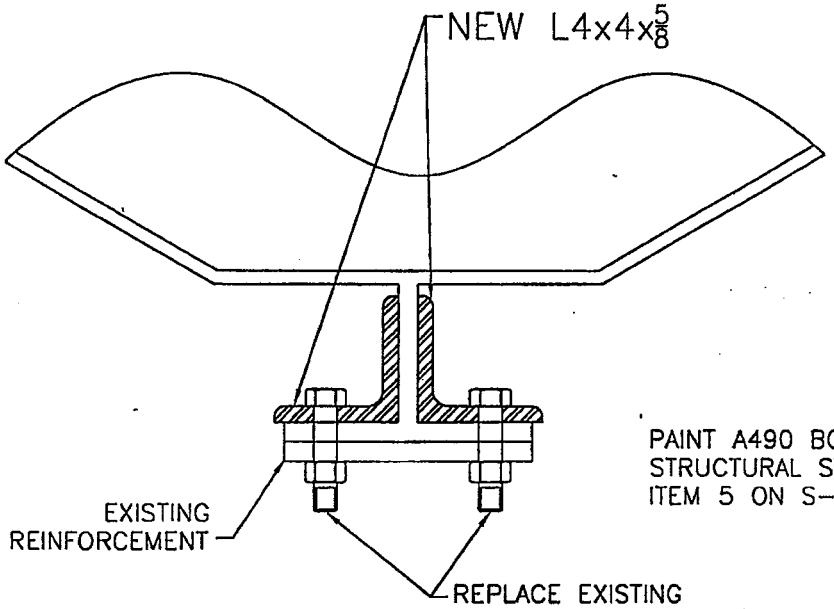
3965 CONGRESS ROAD
FAIRFIELD, CT

SITE NAME: FAIRFIELD II
SITE No: CT496A
JOB No: 0311-428RE
SHEET No.: S-1
SCALE: NONE



PAINT A490 BOLTS PER STRUCTURAL STEEL ITEM 5 ON S-3

1 / S-2 DETAIL NTS

RECEIVED
JUL 30 2004
NATCOM

STATE OF CONNECTICUT
J.L.WALKER
No.21197
LICENSED
PROFESSIONAL ENGINEER

NATCOMM, LLC
150ft VALMONT MONOPOLE
REINFORCEMENT DETAILS
3965 CONGRESS ROAD
FAIRFIELD, CT

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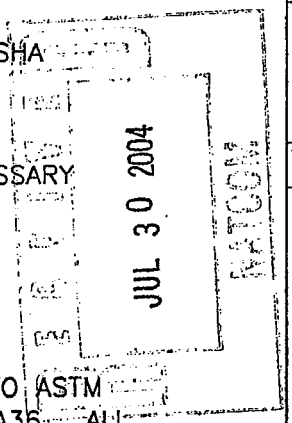
SITE NAME: FAIRFIELD II
SITE No: CT496A
JOB No: 0311-428RE
SHEET No: S-2
SCALE: NONE

GENERAL NOTES

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS PRIOR TO FABRICATION. ALL DISCREPANCIES SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER FOR RESOLUTION.
2. THE SIZE AND SPACING OF STRUCTURAL ELEMENTS SHALL NOT BE CHANGED WITHOUT THE ENGINEER'S APPROVAL.
3. DETAILS SHOWN ARE TYPICAL; THEREFORE, SIMILAR DETAILS APPLY TO SIMILAR CONDITIONS UNLESS OTHERWISE NOTED.
4. THESE DRAWINGS DO NOT INCLUDE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY.
5. ALL STRUCTURAL AND NON-STRUCTURAL ITEMS SHALL BE TEMPORARILY BRACED DURING CONSTRUCTION UNTIL ALL STRUCTURAL ELEMENTS THAT ARE REQUIRED FOR STABILITY, SUCH AS LATERAL BRACING, ANCHOR BOLTS, ETC., HAVE BEEN INSTALLED.
6. CONTRACTOR SHALL VERIFY THE EXACT LOCATIONS OF EXISTING UTILITIES, GROUND DRAINS, DRAIN PIPES, VENTS, OR ANY OTHER DEVICES ON, OR NEAR TOWER BEFORE COMMENCING WORK. CONTRACTOR SHALL PROTECT EXISTING FACILITIES, UTILITIES, COAX AND UTILITY LINES FROM DAMAGE. NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICTS ARISING FROM THIS VERIFICATION.
7. INCORRECTLY FABRICATED, DAMAGED, MISFITTING OR NONCONFORMING MATERIALS OR CONDITIONS SHALL BE REPORTED TO THE OWNER PRIOR TO REMEDIAL OR CORRECTIVE ACTION. THIS INCLUDES ITEMS NOT VERIFIED PRIOR TO FABRICATION.
8. CONTRACTOR(S) SHALL COOPERATE WITH THE OWNER'S REPRESENTATIVE, AND COORDINATE HIS WORK WITH THE WORK OF OTHERS.
9. CONSTRUCTION SHALL BE IN ACCORDANCE WITH APPLICABLE OSHA REGULATIONS, STATE BUILDING CODE, LOCAL ORDINANCES, AND TIA/EIA-222F (1996).
10. CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIALS NECESSARY FOR CONSTRUCTION.
11. DESIGN WIND SPEED IS 85 MPH PER TIA/EIA-222F (1996).



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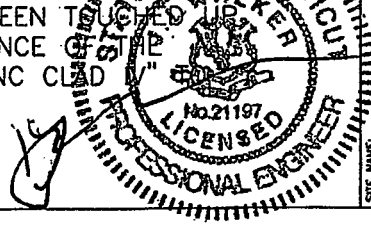

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ENGINEER: JLW
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NATCOMM, LLC
150ft VALMONT MONOPOLE
REINFORCEMENT DETAILS
3965 CONGRESS ROAD
FAIRFIELD, CT

SITE NAME: FAIRFIELD II
SITE No: CT496A
JOB No: 0311-428RE
SHEET No: S-3
SCALE: NONE

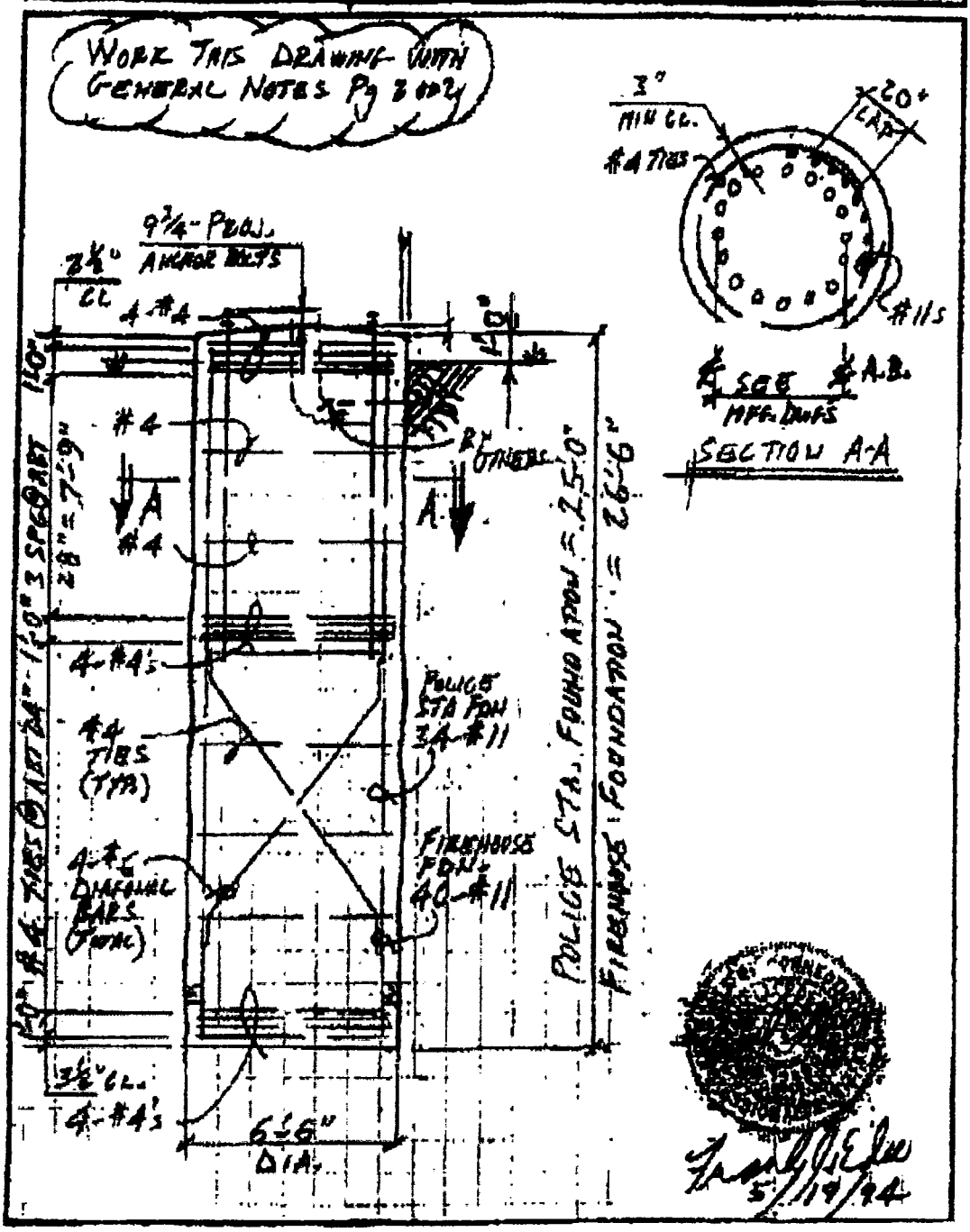
SAE STRUCTURAL, ARCHITECTURAL & ENGINEERING, INC.

PROJECT: FOUNDATION DESIGNS / NEXTEL COMM

SUBJECT: POLICE STA. & FIREHOUSE FOUNDATION / FAIRFIELD, CT

BY: EJE DATE: 5/19/94 CHK'D BY: DATE: PROJ. NO: SHEET: 1 OF 2

WORK THIS DRAWING WITH GENERAL NOTES Pg 2 of 2



SAC	PROJECT: GENERAL NOTES FOR			
	SUBJECT: AUGERED FOUNDATIONS			
BY:	DATE:	CHK'D BY:	DATE:	PROJ. NO.: SHEET: 2 OF 2

NOTES:

1. WORK THIS DRAWING WITH SHEET 1 OF 2
2. WORK THESE SHEETS WITH APPLIED EARTH TECHNOLOGIES SOIL REPORTS FOR THESE SITES
3. CONCRETE OPERATIONS SHALL START AS SOON AS POSSIBLE AFTER COMPLETION OF DRILLING
4. THE BOTTOM OF THE DRILLED HOLE SHALL BE CLEAN WITH NO MORE THAN 4" OF STANDING WATER PRIOR TO POURING CONCRETE.
5. A TEMPORARY STEEL CASING SHALL BE INSTALLED AS THE PIER IS DRILLED. THE CASING SHALL BE REMOVED AS THE CONCRETE IS POURED. THE REMOVAL SHALL BE COORDINATED WITH THE CONCRETE POURING TO KEEP THE CASING BELOW THE SURFACE OF THE WET CONCRETE.
6. ALL CONCRETE SHALL BE IN ACCORD WITH ACI 318-83 FOR f'_c = 3000PSI & ALL REINFORCING SHALL BE IN ACCORD WITH ASTM A615 GRADE 60 (f_y = 60,000PSI) MAX. SLUMP IS 4"
7. THE CONTRACTOR SHALL NOTIFY THE ENGINEER 7 DAYS PRIOR TO AUGERING THE HOLE
8. SEAL THE LINER INTO THE ROCK AT THE BOTTOM WHEN DEWATERING THE HOLE.

A

SNC STRUCTURAL, ARCHITECTURAL & CONSULTING	PROJECT: FOUNDATION DESIGN / NEXTEL COMM.				
	SUBJECT: POLICE STA. IN FAIRFIELD, CT.				
VALMONT # 11625-94	BY: EE	DATE: 5/18/94	CHK'D BY:	DATE:	PROJ. NO.:	SHEET: 1 OF 8

OBJECT: DESIGN AN ANCHORED FOUNDATION GIVEN THE SUPER-STRUCTURE DATA FROM VALMONT AND AND GEOTECHNICAL DATA FROM APPLIED EARTH TECHNOLOGIES

SUPERSTRUCTURE DATA: (FROM VALMONT)

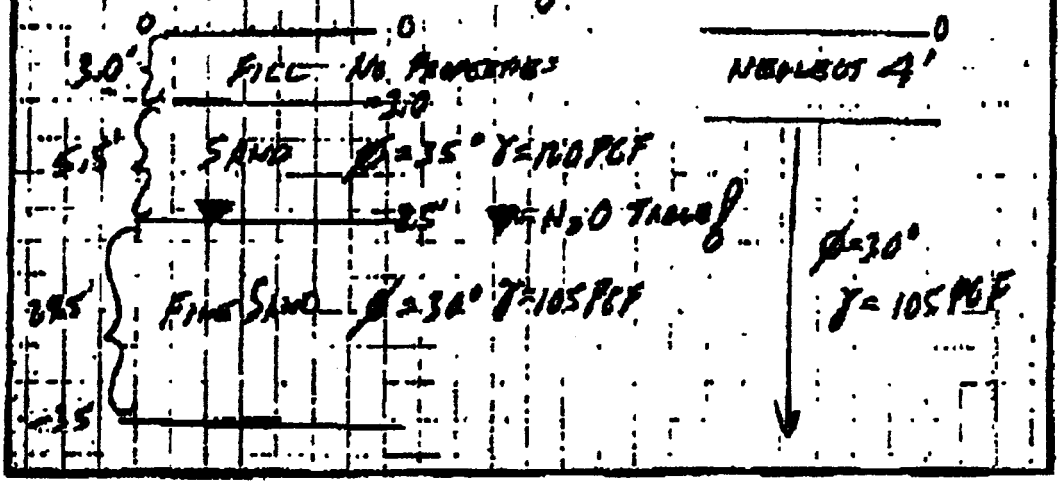
GLM = 39319 in-K = 3276.5 K'-ft × (OLF = 2.0) = 6553 K-ft
AXIAL = 37.1 K × " " = 74.2 K
SHEAR = 28.3 K × " " = 56.6 K

BASE PL: 62.91" × 62.91" × 3 3/4" THICK W/ 16.86" OUTSIDE PLAT OF A 12 SIDED BASE PL

ANCHOR BOLTS: 16 BOLTS 2 1/4" ϕ W/ 9 3/4" PROJ.
ANCHOR BOLT CIRCLE = 56.91"
TEMPLATE DIA. = 62.91"
(3" EA SIDE OF CTR)
BOLT LENGTH = 120"

GEOTECHNICAL DATA: (APPLIED EARTH TECHNOLOGIES)

SOIL PROFILE FROM Pg 3

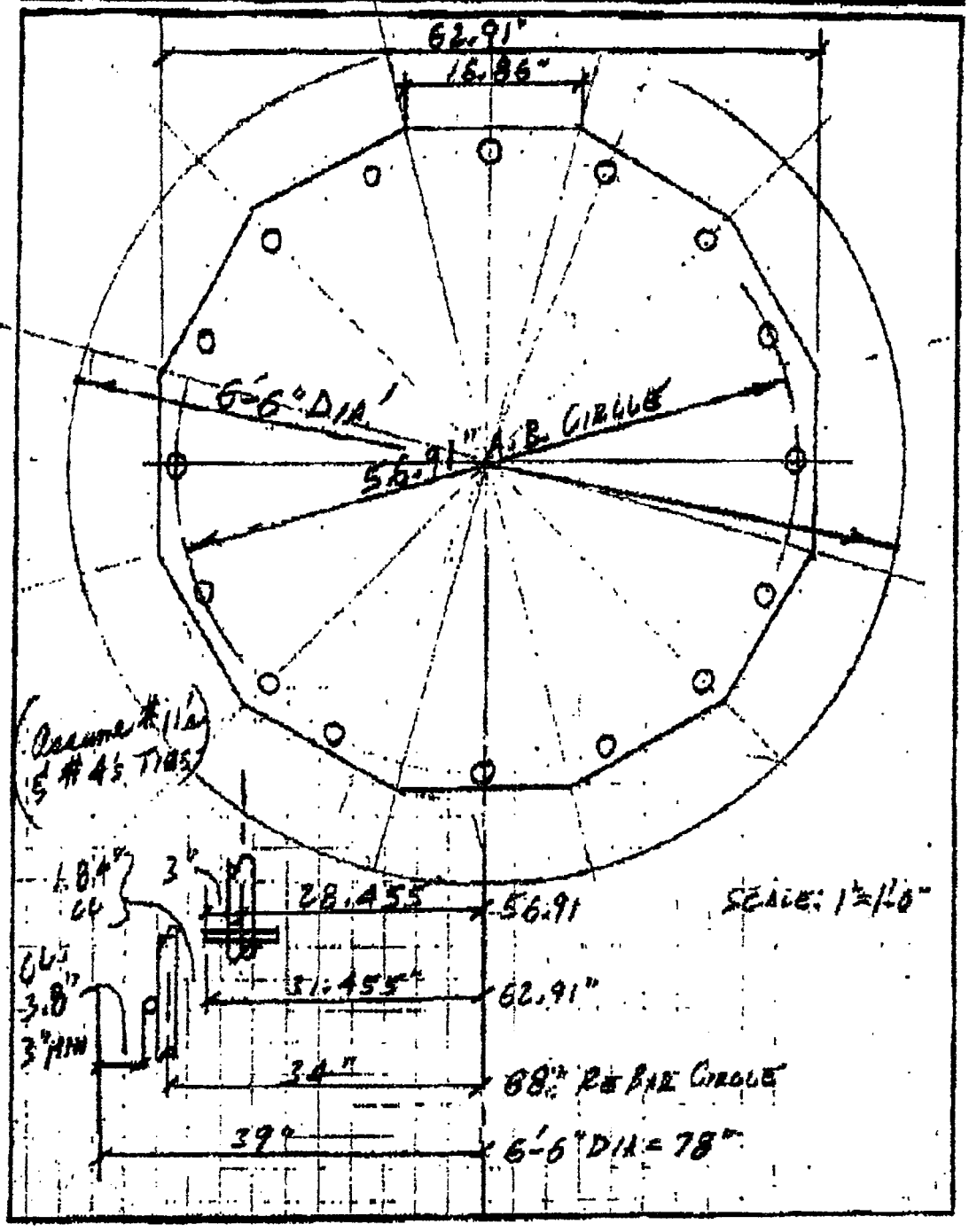


A

PROJECT:

SUBJECT:

BY: DATE: CHK'D BY: DATE: PROJ. NO: SHEET 2 OF 8



3 OF 8

AUGER FOUNDATION DESIGN

Nextel Communications
Police Stn. in Fairfield, CT

LOADING DATA FOR FOUNDATION ANALYSIS

VERTICAL REACTION	:	37.10 KIPS	VERT. OVERLOAD FACTOR	:	2.0
HORIZONTAL REACTION	:	28.30 KIPS	HORZ. OVERLOAD FACTOR	:	2.0
MOMENT REACTION	:	3276.5 FT K.	MOM. OVERLOAD FACTOR	:	2.0

FOUNDATION PROJECTION ABOVE GRADE : 1.0 FT.

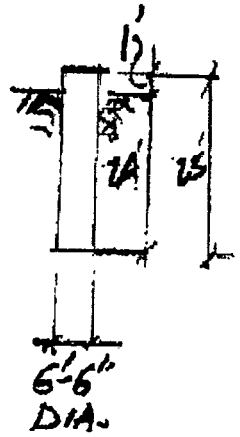
SOIL TYPE	: GRANULAR				
FRICTION ANGLE	: 30.0 DEG.	AUGER DIAMETER	:	6.5 FT.	
EFF. UNIT WEIGHT	: 105.0 PCF.	NEGLECT TOP SOIL	:	4.0 FT.	

FOUNDATION ANALYSIS FOR THE ABOVE PARAMETERS

DEPTH TO BALANCE LATERAL PRESSURES	:	19.81 FT.
REQUIRED AUGER FOUNDATION DEPTH	:	23.81 FT.
TOTAL DEPTH OF CONCRETE FOUNDATION	:	24.81 FT.

DEPTH BELOW (FT.) TOP/CONCRETE	AXIAL (KIP.) NO OLF	SHEAR (KIP.) WITH OLF	MOMENT (FT. KIP) WITH OLF
0.0	37.1	56.6	6553.0
1.0	42.1	56.6	6609.6
2.0	47.1	56.6	6666.2
3.0	52.0	56.6	6722.8
4.0	57.0	56.6	6779.4
5.0	62.0	56.6	6836.0
6.0	67.0	53.5	6891.6
7.0	71.9	44.1	6941.0
8.0	76.9	29.0	6978.2
9.0	81.9	7.5	6996.9
10.0	86.9	-20.2	6991.0
11.0	91.9	-54.0	6954.5
12.0	96.8	-93.9	6881.1
13.0	101.8	-140.0	6764.8
14.0	106.8	-192.2	6599.1
15.0	111.8	-250.5	6378.3
16.0	116.7	-315.0	6096.0
17.0	121.7	-385.7	5746.2
18.0	126.7	-462.4	5322.6
19.0	131.7	-545.4	4819.2
20.0	136.6	-634.4	4229.8
21.0	141.6	-728.6	3548.2
22.0	146.6	-831.0	2768.5
23.0	151.6	-938.5	1884.3
24.0	156.6	-1052.1	889.5
24.81	160.6	-1148.5	0.0

MAX. MOMENT IS 6998.2 KIPS AT 9.3 FT. BELOW TOP/CONC.
ACTUAL AXIAL LOAD @ POINT OF MAX. MOMENT 81.4 KIPS



A

AUGER FOUNDATION DESIGN

4 OF 8

Nextel Communications
Police Sta. in Fairfield, CT

DESIGN OF REINFORCING STEEL

FY = REINFORCING STEEL YIELD STRENGTH : 60.0 KSI
F'C = CONCRETE COMPRESSIVE STRENGTH : 3.000 KSI

AXIAL LOAD (KIPS)	CAIS. DIA. (INCHES)	REBAR CAGE (INCHES)	REBAR AREA (SQ. IN.)	MOMENT (FT.K.)
83.40	78.00	68.00	51.04	6945.5
83.40	78.00	68.00	51.54	7001.7
83.40	78.00	68.00	52.04	7057.8
83.40	78.00	68.00	52.54	7113.9
83.40	78.00	68.00	53.04	7169.8
83.40	78.00	68.00	53.54	7225.7
83.40	78.00	68.00	54.04	7281.5
83.40	78.00	68.00	54.54	7337.2
83.40	78.00	68.00	55.04	7392.8
83.40	78.00	68.00	55.54	7448.4
83.40	78.00	68.00	56.04	7503.9
83.40	78.00	68.00	56.54	7559.3
83.40	78.00	68.00	57.04	7614.6
83.40	78.00	68.00	57.54	7669.9
83.40	78.00	68.00	58.04	7725.1

TRY 34-#11 BARS

$A_s = 34(1.56) = 53.04$ □"

MIN 10' > 6

!