

sdp
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foc
dm

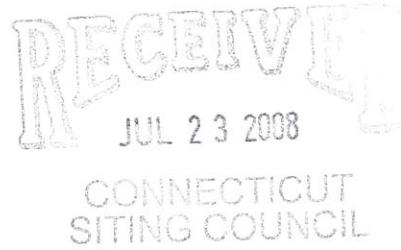
ROBINSON & COLE_{LLP}

KENNETH C. BALDWIN

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

ORIGINAL

July 21, 2008



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

Re: **TS-VER-065-080201**
Center Hill Road, Hartland, Connecticut

Dear Mr. Phelps:

On February 28, 2008, the Connecticut Siting Council (the "Council") granted the request of Cellco Partnership d/b/a Verizon Wireless ("Cellco") to share the Town of Hartland ("Town") owned wireless telecommunications facility at the above referenced location. Cellco was approved to install antennas at the top (180' level) of the tower. Cellco was recently informed by the Town that the top of the tower was no longer available. The 180-foot level is being reserved for Town emergency service antennas. Cellco now intends to install its antennas at the 170-foot level on the Town tower.

In an effort to keep the Council's records up-to-date, I have enclosed a new set of project plans, a new structural report and a new power density calculation table all showing Cellco antennas at the 170-foot level.

Please contact me with any questions.

Sincerely,

Kenneth C. Baldwin



Law Offices

BOSTON

HARTFORD

NEW LONDON

STAMFORD

WHITE PLAINS

NEW YORK CITY

SARASOTA

www.rc.com

Enclosures

Copy to:

Sandy M. Carter

HART1-1479420-1

d.b.s. verizon wireless

NATCOMMI
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83-2 N. Branford Rd.
Branford, CT 06405

1001

HARTLAND
CENTER HILL ROAD
HARTLAND, CT

PROJECT NO:	07076
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	10/24/07

TITLE SHEET

PAGE 1 OF 2

[illegible]

Cellco Partnership
d.b.a. Verizon Wireless

NETCOMM
COMMUNICATIONS

P: 703.483.0550
F: 703.483.0551
W: netcomm.com
E: info@net-eng.com
63-2 N. Branford Rd.
Branford, CT 06405



HARTLAND

CENTER HILL ROAD
HARTLAND, CT

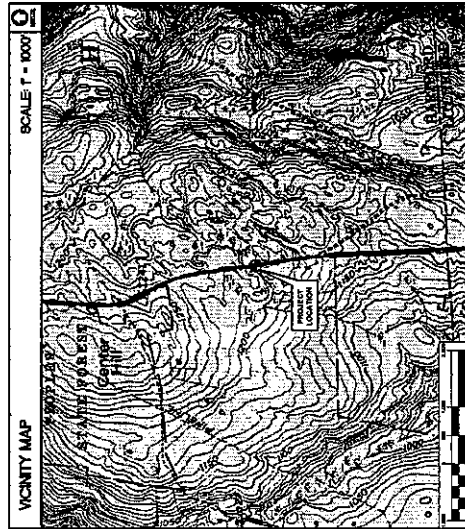
PROJECT NO:	07076
DRAWN BY:	DEB
CHECKED BY:	CFC
SCALE:	AS NOTED
DATE:	10/24/07

TITLE SHEET

T-1
DWG. 1 OF 2

SITE NAME: HARTLAND
SITE ADDRESS: COTTER HILL ROAD
HARTLAND, CT
LESSZÉ/ TENANT: GILDED PARTNERSHIP
GILDED PARTNERSHIP
1000 HARTLAND RD
B9 EAST ROCK DRIVE
EAST HARTFORD, CT 06106
CONTACT PERSON: SAGE CENTER
SAGE CENTER
1000 HARTLAND RD
(860) 963-8218
TOWER COORDINATES: LATITUDE: 41°-54'-43.37"
LONGITUDE: 72°-56'-55.79"
DATE OF ACQUISITION: 11/9/07

SHEET INDEX		
SHT. NO.	DESCRIPTION	REV. NO.
1-1	TITLE SHEET	00
6-1	CONCRETE PAVE AND CURB (PLAN)	00



SITE DIRECTIONS	FROM	TO	
		100 WEST 9TH AVE EAST NANTUCKET	100 WEST 9TH AVE WEST NANTUCKET
	1. TURN AT 95 E BAY DR	4.3 MI	4.3 MI
	2. TURN LEFT TO STAY ON E BAY DR	0.2 MI	0.2 MI
	3. TURN LEFT (RIGHT ONTO US-44 [CONVENT ROAD])	0.2 MI	0.2 MI
	4. AT END, TURN OFF ROAD	0.2 MI	0.2 MI
	5. AT END, TURN OFF ROAD	0.2 MI	0.2 MI
	6. KEEP STRAIGHT ONTO US-202 (US-44)	5.3 MI	5.3 MI
	7. KEEP RIGHT ONTO US-44 (ALBANY PIKE)	4.2 MI	4.2 MI
	8. TURN LEFT ONTO US-44 (ALBANY PIKE)	0.7 MI	0.7 MI
	9. TURN LEFT ONTO SP-11 (SP-118)	0.5 MI	0.5 MI
	10. KEEP STRAIGHT ONTO SP-11 (SP-118)	0.7 MI	0.7 MI
	11. KEEP STRAIGHT ONTO SP-11 (SP-118)	0.5 MI	0.5 MI
	12. TURN LEFT ONTO SP-11 (SP-118)	4.2 MI	4.2 MI
	13. TURN AT 95E (THRUWAY ON CENTER HALL RD)		

GENERAL NOTES

1. PROPOSED ANTENNA LOCATIONS AND HEIGHTS PROVIDED BY CELLO PARTNERSHIP.

PROJECT SCOPE

1. THE PROPOSED SCOPE OF WORK GENERALLY INCLUDES THE INSTALLATION OF A 12" X 48" IMPROVED RISER, GENERALLY SITUATED ON A CONCRETE, EXISTING TOWER BASE PLATE.
2. THE TYPE OF TOWER (E.G. LATTICE TOWER, PIPE TOWER) AND THE NUMBER OF TOWERS ON AN EXISTING 100' LATTICE TOWER AT A GAS CARRIER ELEVATION OF 180' ABOVE THE EXISTING TOWER BASE PLATE.
3. ELECTRICAL AND TIE-INS UNITS SHALL BE INSTALLED UNDERGROUND TO THE PROPOSED EQUIPMENT SHELTER FROM A PROPOSED UTILITY BACKBONE LOCATED OUTSIDE THE ENTRANCE TO THE EXISTING FENCED COMPOUND.



Structural Analysis Report

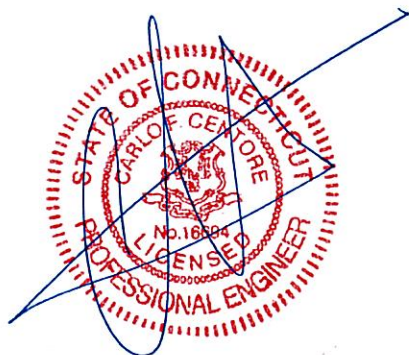
*180' Existing Self Supporting
Lattice Tower*

*Center Hill Road
Hartland, CT*

Natcomm Project No. 07076

~~Date: November 28, 2007~~

Rev. 1: April 21, 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

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

SECTION 2 – CONDITIONS & SOFTWARE

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

SECTION 3 – CALCULATIONS

- RISATower INPUT/OUTPUT SUMMARY.
- RISATower DETAILED OUTPUT.
- ANCHOR BOLT AND BASE PLATE ANALYSIS.
- PIER MAT FOUNDATION ANALYSIS.

SECTION 4 – REFERENCE MATERIALS

- VALMONT STRUCTURES DESIGN DOCUMENTS.

Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation proposed by Verizon Wireless on the existing self supporting lattice tower located in East Hartland, Connecticut. The host tower is a 180-ft, three legged, tapered lattice tower originally designed and manufactured by Valmont Structures; drawing no. 198204 dated April 4, 2006.

The tower is constructed of pipe legs, diagonal angle braces and horizontal angle braces. The tower members are all bolted together. The width of the tower face is 4-ft at the top and 20-ft at the base. The tower geometry and structure member sizes were taken from Valmont Structures' original design documents available in Section 4 of this report.

Antenna and Appurtenance Summary

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

- **UNKNOWN (Existing):**
Antenna: Two (2) 20' by 3" $\varnothing$ omnidirectional (whip) antennas and one (1) 10' Dipole antenna on the existing 6 Arm Halo Mount with an elevation of ± 180 -ft above the tower base.
Coax Cable: Three (3) 1-5/8" $\varnothing$ coax cables on a leg/face of the existing tower as specified in Section 3 of this report.
- **VERIZON (Proposed):**
Antennas: Six (6) Amphenol Antel, Inc. (Antel) LPA-80080/6CF and six (6) Antel LPA-185080/12CF panel antennas mounted on three (3) PiROD 12-ft lightweight T-Frames with a RAD center elevation of 170-ft above the existing tower base.
Coax Cables: Twelve (12) 1-5/8" $\varnothing$ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **FUTURE CARRIER:**
Antennas: Twelve (12) RR90-17-00DP panel antennas mounted on three (3) PiROD 12-ft lightweight T-Frames with a RAD center elevation of 160-ft above the existing tower base.
Coax Cables: Twelve (12) 1-5/8" $\varnothing$ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **FUTURE CARRIER:**
Antennas: Twelve (12) RR90-17-00DP panel antennas mounted on (3) PiROD 12-ft lightweight T-Frames with a RAD center elevation of 150-ft above the existing tower base.
Coax Cables: Twelve (12) 1-5/8" $\varnothing$ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- FUTURE CARRIER:

Antennas: Twelve (12) RR90-17-00DP panel antennas mounted on (3) PiROD 12-ft lightweight T-Frames with a RAD center elevation of 140-ft above the existing tower base.

Coax Cables: Twelve (12) 1-5/8" Ø coax cables running on a leg 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.
- 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 routed as specified in Section 3 of this report.

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 legs, and the model assumes that the leg members are subjected to bending, axial, and shear forces.

The existing tower was analyzed for 80mph 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 1/2" radial ice tower structure and its components.

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	Hartland; v = 90 mph (3 second gust) equivalent to v = 75 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	<i>TIA/EIA wind speed Controls</i>	
Load Cases:	<u>Load Case 1</u> ; 80 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]
	<u>Load Case 2</u> ; 69 mph wind speed w/ 1/2" 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 80 mph wind speed.	[Section 2.3.16 of TIA/EIA-222-F-96]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1610.1.3 of State Bldg. Code 2005] does not control in the design of this structure type

Tower Capacity

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

Calculated stresses were found to be within allowable limits. In Load Case 2, per RISATower "Section Capacity Table", this tower was found to be at **85.3%** of its total capacity.

Foundation and Anchors

The existing foundation consists of three (3) 5-ftØ reinforced concrete piers with a 28.5-ft square reinforced concrete pad concentrically bearing directly on existing sub grade. The sub grade conditions used in the analysis of the existing foundation were derived from Valmont Structures original design documents available in Section 4 of this report. Tower legs are connected to the three (3) piers by means of (6) 1 1/4"Ø, ASTM A687 anchor bolts per leg, embedded approximately 6-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 2 were used in the verification of the foundation and its anchors:
 - Uplift @ top of pedestal = 233.6 kips
 - Shear @ top of pedestal = 30.3 kips
 - Compression @ top of pedestal = 305.2 kips
- Base plates, anchor bolts and the foundation were found to be 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).

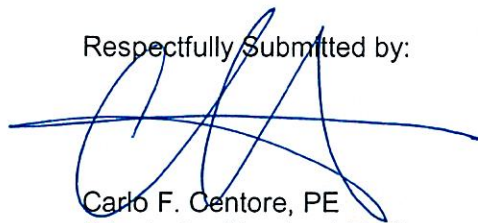
Conclusion

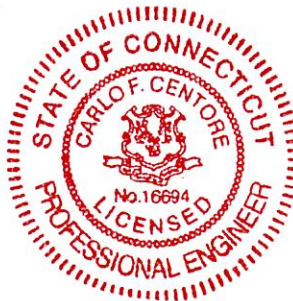
This analysis shows that the subject tower and 6 arm halo mount **is adequate** to support the proposed antennas and associated hardware.

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



Natcomm, Inc.
Structural Lattice Tower Analysis
180' Existing Valmont Lattice Tower
Hartland, CT
Revision 1 ~ April 21, 2008

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.

Natcomm, Inc.
Structural Lattice Tower Analysis
180' Existing Valmont Lattice Tower
Hartland, CT
Revision 1 ~ April 21, 2008

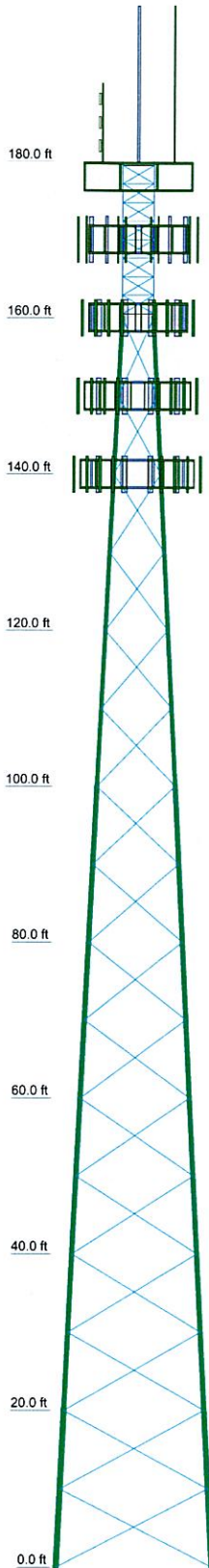
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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	11	12	13	14	15	16	17	18	19	20
Legs	SR 1 1/2	Pirod 105216	Pirod 105217	Pirod 105218	Pirod 105219	Pirod 105220	Pirod 105221	Pirod 105222	Pirod 105223	Pirod 105224
Leg Grade	SR 3/4	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50	A572-50
Diagonals	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x3/16
Diagonal Grade	A36	A36	A36	A36	A36	A36	A36	A36	A36	A36
Top Girts	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Bottom Girts	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Horizontal	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Face Width (ft)	20	20	20	20	20	20	20	20	20	20
# Panels @ (ft)	8 @ 2.375	10 @ 1.1	10 @ 1.1	10 @ 1.1	10 @ 1.1	10 @ 1.1	10 @ 1.1	10 @ 1.1	10 @ 1.1	10 @ 1.1
Weight (lb)	26973.5	3034.1	4213.7	4343.0	5293.3	5293.3	5293.3	5293.3	5293.3	5293.3



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
20' x 3" Dia Omni	180	PIROD 12' Lightweight T-Frame (Future)	160
20' x 3" Dia Omni	180	(4) RR90-17-00DP (Future)	160
10' Dipole	180	(4) RR90-17-00DP (Future)	160
6 Arm Halo Mount	178	(4) RR90-17-00DP (Future)	160
LPA-80080/6CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	150
LPA-185080/12CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	150
LPA-185080/12CF (Verizon)	170	(4) RR90-17-00DP (Future)	150
LPA-80080/6CF (Verizon)	170	(4) RR90-17-00DP (Future)	150
LPA-80080/6CF (Verizon)	170	(4) RR90-17-00DP (Future)	150
LPA-185080/12CF (Verizon)	170	(4) RR90-17-00DP (Future)	140
LPA-185080/12CF (Verizon)	170	(4) RR90-17-00DP (Future)	140
LPA-80080/6CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	140
LPA-80080/6CF (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	140
PIROD 12' Lightweight T-Frame (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	140
PIROD 12' Lightweight T-Frame (Verizon)	170	PIROD 12' Lightweight T-Frame (Future)	140
PIROD 12' Lightweight T-Frame (Future)	160		
PIROD 12' Lightweight T-Frame (Future)	160		

MATERIAL STRENGTH

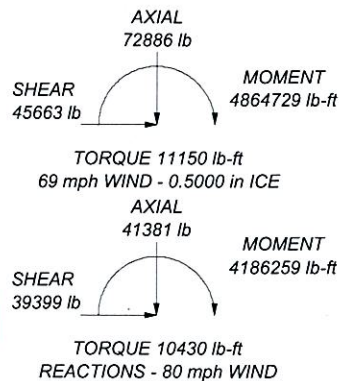
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 85.3%

MAX. CORNER REACTIONS AT BASE:

DOWN: 305160 lb
 UPLIFT: -233603 lb
 SHEAR: 30281 lb



NATCOMM		Job: 180' U20.0 Valmont Self-Support Lattice	
63-2 N. Branford Rd.		Project: 07076 - Center Hill Rd, Hartland, CT	
Branford, CT 06405		Client: Verizon	Drawn by: Staff
Phone: (203) 488-0580		Code: TIA/EIA-222-F	App'd: NTS
FAX: (203) 488-8587		Date: 04/13/08	Scale: NTS
		Path:	Dwg No. E-1

<i>RISA</i>Tower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 180' U20.0 Valmont Self-Support Lattice	Page 1 of 31
	Project 07076 - Center Hill Rd, Hartland, CT	Date 21:16:24 04/13/08
	Client Verizon	Designed by Staff

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 180.00 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 4.00 ft at the top and 20.00 ft at the base.

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

The following design criteria apply:

Basic wind speed of 80 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

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

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 50 mph.

Weld together tower sections have flange connections..

Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..

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 tower member design is 1.333.

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

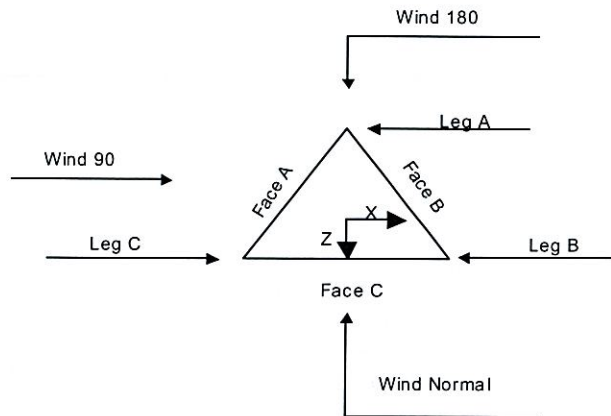
Options

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		

RISATower

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

Job	180' U20.0 Valmont Self-Support Lattice	Page	2 of 31
Project	07076 - Center Hill Rd, Hartland, CT	Date	21:16:24 04/13/08
Client	Verizon	Designed by	Staff



Triangular Tower

Tower Section Geometry

<i>Tower Section</i>	<i>Tower Elevation</i>	<i>Assembly Database</i>	<i>Description</i>	<i>Section Width</i>	<i>Number of Sections</i>	<i>Section Length</i>
	<i>ft</i>			<i>ft</i>		<i>ft</i>
T1	180.00-160.00	pirod	V4 106778	4.00	1	20.00
T2	160.00-140.00		U6.0 105245	4.00	1	20.00
T3	140.00-120.00	pirod	U8.0 105216	6.00	1	20.00
T4	120.00-100.00	pirod	U10.0 105217 L2 1/2x3/16	8.00	1	20.00
T5	100.00-80.00	pirod	U12.0 105218	10.00	1	20.00
T6	80.00-60.00	pirod	U14.0 105218	12.00	1	20.00
T7	60.00-40.00	pirod	U16.0 105219	14.00	1	20.00
T8	40.00-20.00	pirod	U18.0 105219	16.00	1	20.00
T9	20.00-0.00		U20.0 105219 L3.5x5/16	18.00	1	20.00

Tower Section Geometry (cont'd)

<i>Tower Section</i>	<i>Tower Elevation</i>	<i>Diagonal Spacing</i>	<i>Bracing Type</i>	<i>Has K Brace End Panels</i>	<i>Has Horizontals</i>	<i>Top Girt Offset</i>	<i>Bottom Girt Offset</i>
	<i>ft</i>	<i>ft</i>				<i>in</i>	<i>in</i>
T1	180.00-160.00	2.38	X Brace	No	Steps	6.0000	6.0000
T2	160.00-140.00	10.00	X Brace	No	No	0.0000	0.0000
T3	140.00-120.00	10.00	X Brace	No	No	0.0000	0.0000
T4	120.00-100.00	10.00	X Brace	No	No	0.0000	0.0000
T5	100.00-80.00	10.00	X Brace	No	No	0.0000	0.0000
T6	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000

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Tower Section	Tower Elevation <i>ft</i>	Diagonal Spacing <i>ft</i>	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset <i>in</i>	Bottom Girt Offset <i>in</i>
T7	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T8	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000
T9	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry (cont'd)

Tower Elevation <i>ft</i>	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 180.00-160.00	Solid Round	1 1/2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 160.00-140.00	Truss Leg	Pirol 105216	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T3 140.00-120.00	Truss Leg	Pirol 105216	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 120.00-100.00	Truss Leg	Pirol 105217	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 100.00-80.00	Truss Leg	Pirol 105218	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T6 80.00-60.00	Truss Leg	Pirol 105218	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)
T7 60.00-40.00	Truss Leg	Pirol 105219	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T8 40.00-20.00	Truss Leg	Pirol 105219	A572-50 (50 ksi)	Single Angle	L3x3x5/16	A36 (36 ksi)
T9 20.00-0.00	Truss Leg	Pirol 105220	A572-50 (50 ksi)	Single Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation <i>ft</i>	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 180.00-160.00	Solid Round	7/8	A572-50 (50 ksi)	Solid Round	7/8	A572-50 (50 ksi)

Tower Section Geometry (cont'd)

Tower Elevation <i>ft</i>	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 180.00-160.00	None	Solid Round		A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)

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Tower Section Geometry (cont'd)

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
ft	ft ²	in						
T1 180.00-160.00	0.00	0.0000	A36 (36 ksi)	1	1	1.02	36.0000	36.0000
T2 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T3 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T4 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T5 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T6 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T7 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T8 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000
T9 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1.05	36.0000	36.0000

Tower Section Geometry (cont'd)

Tower Elevation	Calc K Single Angles	Calc K Solid Rounds	Legs	K Factors ¹						
				X Brace Diags	K Brace Diags	Single Diags	Girts	Horiz.	Sec. Horiz.	Inner Brace
				X Y	X Y	X Y	X Y	X Y	X Y	X Y
T1 180.00-160.00	Yes	Yes	1	1	1	1	1	1	1	1
T2 160.00-140.00	Yes	Yes	1	1	1	1	1	1	1	1
T3 140.00-120.00	Yes	Yes	1	1	1	1	1	1	1	1
T4 120.00-100.00	Yes	Yes	1	1	1	1	1	1	1	1
T5 100.00-80.00	Yes	Yes	1	1	1	1	1	1	1	1
T6 80.00-60.00	Yes	Yes	1	1	1	1	1	1	1	1
T7 60.00-40.00	Yes	Yes	1	1	1	1	1	1	1	1
T8 40.00-20.00	Yes	Yes	1	1	1	1	1	1	1	1
T9 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1

¹Note: K factors are applied to member segment lengths. K-braces without inner supporting members will have the K factor in the out-of-plane direction applied to the overall length.

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Tower Section Geometry (cont'd)

Tower Elevation ft	Truss-Leg K Factors					
	Truss-Legs Used As Leg Members			Truss-Legs Used As Inner Members		
	Leg Panels	X Brace Diagonals	Z Brace Diagonals	Leg Panels	X Brace Diagonals	Z Brace Diagonals
T2 160.00-140.00	1	0.5	0.85	1	0.5	0.85
T3 140.00-120.00	1	0.5	0.85	1	0.5	0.85
T4 120.00-100.00	1	0.5	0.85	1	0.5	0.85
T5 100.00-80.00	1	0.5	0.85	1	0.5	0.85
T6 80.00-60.00	1	0.5	0.85	1	0.5	0.85
T7 60.00-40.00	1	0.5	0.85	1	0.5	0.85
T8 40.00-20.00	1	0.5	0.85	1	0.5	0.85
T9 20.00-0.00	1	0.5	0.85	1	0.5	0.85

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1 180.00-160.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 160.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T7 60.00-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T8 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T9 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

Tower Section Geometry (cont'd)

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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 180.00-160.00	Flange	1.0000	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 160.00-140.00	Flange	1.0000	6	1.0000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 140.00-120.00	Flange	1.0000	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 120.00-100.00	Flange	1.0000	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 100.00-80.00	Flange	1.0000	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 80.00-60.00	Flange	1.0000	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325X		A325X		A325X		A325X		A325X	
T7 60.00-40.00	Flange	1.0000	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325X		A325X		A325X		A325X		A325X	
T8 40.00-20.00	Flange	1.0000	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325X		A325X		A325X		A325X		A325X	
T9 20.00-0.00	Flange	1.2500	6	1.2500	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8	A	No	Ar (Leg)	160.00 - 6.00	0.0000	0.08	24	12	0.5000 1.0000	1.9800		1.04
1 5/8	C	No	Ar (Leg)	150.00 - 6.00	0.0000	0.08	12	6	0.5000 1.0000	1.9800		1.04
1 5/8	A	No	Ar (Leg)	170.00 - 160.00	0.0000	0.08	12	12	0.5000 1.0000	1.9800		1.04
1 5/8	B	No	Ar (Leg)	140.00 - 6.00	0.0000	0.1	12	6	0.5000 1.0000	1.9800		1.04
1 5/8	B	No	Ar (Leg)	180.00 - 6.00	0.0000	0.02	3	2	0.5000 1.0000	1.9800		1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight lb
T1	180.00-160.00	A	19.800	0.000	0.000	0.000	124.80
		B	26.400	0.000	0.000	0.000	62.40
		C	6.600	0.000	0.000	0.000	0.00
T2	160.00-140.00	A	49.500	0.000	0.000	0.000	499.20
		B	46.200	0.000	0.000	0.000	62.40
		C	16.500	0.000	0.000	0.000	124.80
T3	140.00-120.00	A	59.400	0.000	0.000	0.000	499.20
		B	66.000	0.000	0.000	0.000	312.00
		C	46.200	0.000	0.000	0.000	249.60
T4	120.00-100.00	A	59.400	0.000	0.000	0.000	499.20

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Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	$C_A A_A$ In Face ft^2	$C_A A_A$ Out Face ft^2	Weight lb
T5	100.00-80.00	B	66.000	0.000	0.000	0.000	312.00
		C	46.200	0.000	0.000	0.000	249.60
		A	59.400	0.000	0.000	0.000	499.20
T6	80.00-60.00	B	66.000	0.000	0.000	0.000	312.00
		C	46.200	0.000	0.000	0.000	249.60
		A	59.400	0.000	0.000	0.000	499.20
T7	60.00-40.00	B	66.000	0.000	0.000	0.000	312.00
		C	46.200	0.000	0.000	0.000	249.60
		A	59.400	0.000	0.000	0.000	499.20
T8	40.00-20.00	B	66.000	0.000	0.000	0.000	312.00
		C	46.200	0.000	0.000	0.000	249.60
		A	59.400	0.000	0.000	0.000	499.20
T9	20.00-0.00	B	66.000	0.000	0.000	0.000	312.00
		C	46.200	0.000	0.000	0.000	249.60
		A	41.580	0.000	0.000	0.000	349.44
		B	46.200	0.000	0.000	0.000	218.40
		C	32.340	0.000	0.000	0.000	174.72

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	$C_A A_A$ In Face ft^2	$C_A A_A$ Out Face ft^2	Weight lb
T1	180.00-160.00	A	0.500	2.483	22.733	0.000	0.000	324.38
		B		7.450	26.867	0.000	0.000	156.53
		C		4.967	4.133	0.000	0.000	0.00
T2	160.00-140.00	A	0.500	7.450	55.800	0.000	0.000	1297.51
		B		9.933	49.600	0.000	0.000	156.53
		C		7.450	14.467	0.000	0.000	322.76
T3	140.00-120.00	A	0.500	9.933	66.133	0.000	0.000	1297.51
		B		14.900	70.267	0.000	0.000	802.05
		C		14.900	45.467	0.000	0.000	645.52
T4	120.00-100.00	A	0.500	9.933	66.133	0.000	0.000	1297.51
		B		14.900	70.267	0.000	0.000	802.05
		C		14.900	45.467	0.000	0.000	645.52
T5	100.00-80.00	A	0.500	9.933	66.133	0.000	0.000	1297.51
		B		14.900	70.267	0.000	0.000	802.05
		C		14.900	45.467	0.000	0.000	645.52
T6	80.00-60.00	A	0.500	9.933	66.133	0.000	0.000	1297.51
		B		14.900	70.267	0.000	0.000	802.05
		C		14.900	45.467	0.000	0.000	645.52
T7	60.00-40.00	A	0.500	9.933	66.133	0.000	0.000	1297.51
		B		14.900	70.267	0.000	0.000	802.05
		C		14.900	45.467	0.000	0.000	645.52
T8	40.00-20.00	A	0.500	9.933	66.133	0.000	0.000	1297.51
		B		14.900	70.267	0.000	0.000	802.05
		C		14.900	45.467	0.000	0.000	645.52
T9	20.00-0.00	A	0.500	6.953	46.293	0.000	0.000	908.26
		B		10.430	49.187	0.000	0.000	561.44
		C		10.430	31.827	0.000	0.000	451.87

Feed Line Center of Pressure

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Section	Elevation	CP _X	CP _Z	CP _X	CP _Z
	ft	in	in	Ice in	Ice in
T1	180.00-160.00	1.8051	-4.5378	0.7213	-3.6712
T2	160.00-140.00	-0.4396	-4.4254	-0.5907	-3.7949
T3	140.00-120.00	0.8935	-2.5792	0.3667	-2.5511
T4	120.00-100.00	1.1139	-3.2156	0.4582	-3.1873
T5	100.00-80.00	1.2900	-3.7239	0.5348	-3.7208
T6	80.00-60.00	1.4994	-4.3285	0.6221	-4.3277
T7	60.00-40.00	1.6667	-4.8112	0.6917	-4.8119
T8	40.00-20.00	1.8574	-5.3617	0.7713	-5.3660
T9	20.00-0.00	1.5890	-4.5871	0.6587	-4.5825

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight lb
6 Arm Halo Mount	C	None		0.0000	178.00	No Ice	41.70	41.70	2400.00
						1/2" Ice	53.60	53.60	3200.00
PiROD 12' Lightweight T- Frame (Verizon)	A	From Leg	1.50 0.00 0.00	0.0000	170.00	No Ice	10.20	10.20	253.00
						1/2" Ice	16.20	16.20	355.00
PiROD 12' Lightweight T- Frame (Verizon)	B	From Leg	1.50 0.00 0.00	0.0000	170.00	No Ice	10.20	10.20	253.00
						1/2" Ice	16.20	16.20	355.00
PiROD 12' Lightweight T- Frame (Verizon)	C	From Leg	1.50 0.00 0.00	0.0000	170.00	No Ice	10.20	10.20	253.00
						1/2" Ice	16.20	16.20	355.00
PiROD 12' Lightweight T- Frame (Future)	A	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice	10.20	10.20	253.00
						1/2" Ice	16.20	16.20	355.00
PiROD 12' Lightweight T- Frame (Future)	B	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice	10.20	10.20	253.00
						1/2" Ice	16.20	16.20	355.00
PiROD 12' Lightweight T- Frame (Future)	C	From Leg	1.50 0.00 0.00	0.0000	160.00	No Ice	10.20	10.20	253.00
						1/2" Ice	16.20	16.20	355.00
(4) RR90-17-00DP (Future)	A	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice	4.36	1.97	18.00
						1/2" Ice	4.77	2.31	40.42
(4) RR90-17-00DP (Future)	B	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice	4.36	1.97	18.00
						1/2" Ice	4.77	2.31	40.42
(4) RR90-17-00DP (Future)	C	From Leg	3.00 0.00 0.00	0.0000	160.00	No Ice	4.36	1.97	18.00
						1/2" Ice	4.77	2.31	40.42
PiROD 12' Lightweight T- Frame (Future)	A	From Leg	1.50 0.00 0.00	0.0000	150.00	No Ice	10.20	10.20	253.00
						1/2" Ice	16.20	16.20	355.00
PiROD 12' Lightweight T- Frame (Future)	B	From Leg	1.50 0.00 0.00	0.0000	150.00	No Ice	10.20	10.20	253.00
						1/2" Ice	16.20	16.20	355.00
PiROD 12' Lightweight T- Frame	C	From Leg	1.50 0.00	0.0000	150.00	No Ice	10.20	10.20	253.00
						1/2" Ice	16.20	16.20	355.00

<i>RISATower</i> <i>NATCOMM</i> 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' U20.0 Valmont Self-Support Lattice	Page 9 of 31
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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight lb
(Future)			0.00						
(4) RR90-17-00DP	A	From Leg	3.00	0.0000	150.00	No Ice	4.36	1.97	18.00
(Future)			0.00			1/2" Ice	4.77	2.31	40.42
(4) RR90-17-00DP	B	From Leg	3.00	0.0000	150.00	No Ice	4.36	1.97	18.00
(Future)			0.00			1/2" Ice	4.77	2.31	40.42
(4) RR90-17-00DP	C	From Leg	3.00	0.0000	150.00	No Ice	4.36	1.97	18.00
(Future)			0.00			1/2" Ice	4.77	2.31	40.42
PiROD 12' Lightweight T- Frame	A	From Leg	1.50	0.0000	140.00	No Ice	10.20	10.20	253.00
(Future)			0.00			1/2" Ice	16.20	16.20	355.00
PiROD 12' Lightweight T- Frame	B	From Leg	1.50	0.0000	140.00	No Ice	10.20	10.20	253.00
(Future)			0.00			1/2" Ice	16.20	16.20	355.00
PiROD 12' Lightweight T- Frame	C	From Leg	1.50	0.0000	140.00	No Ice	10.20	10.20	253.00
(Future)			0.00			1/2" Ice	16.20	16.20	355.00
(4) RR90-17-00DP	A	From Leg	3.00	0.0000	140.00	No Ice	4.36	1.97	18.00
(Future)			0.00			1/2" Ice	4.77	2.31	40.42
(4) RR90-17-00DP	B	From Leg	3.00	0.0000	140.00	No Ice	4.36	1.97	18.00
(Future)			0.00			1/2" Ice	4.77	2.31	40.42
(4) RR90-17-00DP	C	From Leg	3.00	0.0000	140.00	No Ice	4.36	1.97	18.00
(Future)			0.00			1/2" Ice	4.77	2.31	40.42
LPA-80080/6CF	A	From Leg	3.00	0.0000	170.00	No Ice	4.33	9.09	21.00
(Verizon)			-6.00			1/2" Ice	4.76	9.64	69.24
LPA-185080/12CF	A	From Leg	3.00	0.0000	170.00	No Ice	3.53	4.57	11.00
(Verizon)			-4.00			1/2" Ice	3.96	5.01	37.49
LPA-185080/12CF	A	From Leg	3.00	0.0000	170.00	No Ice	3.53	4.57	11.00
(Verizon)			4.00			1/2" Ice	3.96	5.01	37.49
LPA-80080/6CF	A	From Leg	3.00	0.0000	170.00	No Ice	4.33	9.09	21.00
(Verizon)			6.00			1/2" Ice	4.76	9.64	69.24
LPA-80080/6CF	B	From Leg	3.00	0.0000	170.00	No Ice	4.33	9.09	21.00
(Verizon)			-6.00			1/2" Ice	4.76	9.64	69.24
LPA-185080/12CF	B	From Leg	3.00	0.0000	170.00	No Ice	3.53	4.57	11.00
(Verizon)			-4.00			1/2" Ice	3.96	5.01	37.49
LPA-185080/12CF	B	From Leg	3.00	0.0000	170.00	No Ice	3.53	4.57	11.00
(Verizon)			4.00			1/2" Ice	3.96	5.01	37.49
LPA-80080/6CF	B	From Leg	3.00	0.0000	170.00	No Ice	4.33	9.09	21.00
(Verizon)			6.00			1/2" Ice	4.76	9.64	69.24
LPA-80080/6CF	C	From Leg	3.00	0.0000	170.00	No Ice	4.33	9.09	21.00
(Verizon)			-6.00			1/2" Ice	4.76	9.64	69.24
LPA-185080/12CF	C	From Leg	3.00	0.0000	170.00	No Ice	3.53	4.57	11.00
(Verizon)			-4.00			1/2" Ice	3.96	5.01	37.49

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' U20.0 Valmont Self-Support Lattice	Page	10 of 31
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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight lb
LPA-185080/12CF (Verizon)	C	From Leg	0.00 3.00 4.00 0.00	0.0000	170.00	No Ice 1/2" Ice	3.53 3.96	4.57 5.01	11.00 37.49
LPA-80080/6CF (Verizon)	C	From Leg	3.00 6.00 0.00	0.0000	170.00	No Ice 1/2" Ice	4.33 4.76	9.09 9.64	21.00 69.24
20' x 3" Dia Omni	A	From Leg	3.00 0.00 10.00	0.0000	180.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	50.00 93.17
20' x 3" Dia Omni	B	From Leg	3.00 0.00 10.00	0.0000	180.00	No Ice 1/2" Ice	6.00 8.03	6.00 8.03	50.00 93.17
10' Dipole	C	From Leg	3.00 0.00 5.00	0.0000	180.00	No Ice 1/2" Ice	4.00 6.00	4.00 6.00	50.00 71.79

Truss-Leg Properties

Section Designation	Area in ²	Area Ice in ²	Self Weight lb	Ice Weight lb	Equiv. Diameter in	Equiv. Diameter Ice in	Leg Area in ²
Pirod 105216	1998.0891	3357.4497	505.25	428.24	6.9378	11.6578	3.6816
Pirod 105216	1998.0891	3357.4497	505.25	428.24	6.9378	11.6578	3.6816
Pirod 105217	2130.7479	3520.4599	619.35	443.34	7.3984	12.2238	5.3014
Pirod 105218	2263.4687	3690.8612	754.52	458.46	7.8593	12.8155	7.2158
Pirod 105218	2263.4687	3690.8612	754.52	458.46	7.8593	12.8155	7.2158
Pirod 105219	2441.8688	3942.2854	944.27	485.72	8.4787	13.6885	9.4248
Pirod 105219	2441.8688	3942.2854	944.27	485.72	8.4787	13.6885	9.4248
Pirod 105220	2578.8005	4132.5504	1121.16	500.74	8.9542	14.3491	11.9282

Tower Pressures - No Ice

$$G_H = 1.121$$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg % %	C _{AA} In Face ft ²	C _{AA} Out Face ft ²
T1 180.00- 160.00	170.00	1.597	26	82.500	A	0.000	29.872	5.000	16.74	0.000	0.000
					B	0.000	36.472		13.71		
					C	0.000	18.367		27.22		
T2 160.00- 140.00	150.00	1.541	25	122.111	A	7.894	72.665	23.165	28.76	0.000	0.000
					B	7.894	69.365		29.98		
					C	7.894	39.665		48.71		
T3 140.00-	130.00	1.48	24	162.111	A	8.723	82.565	23.165	25.38	0.000	0.000

RISATower

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

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Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
120.00					B	8.723	89.165		23.66		
					C	8.723	69.365		29.66		
T4 120.00-100.00	110.00	1.411	23	202.528	A	9.970	84.103	24.703	26.26	0.000	0.000
					B	9.970	90.703		24.54		
					C	9.970	70.903		30.54		
T5 100.00-80.00	90.00	1.332	22	242.945	A	13.520	85.641	26.241	26.46	0.000	0.000
					B	13.520	92.241		24.81		
					C	13.520	72.441		30.53		
T6 80.00-60.00	70.00	1.24	20	282.945	A	15.144	85.641	26.241	26.04	0.000	0.000
					B	15.144	92.241		24.44		
					C	15.144	72.441		29.96		
T7 60.00-40.00	50.00	1.126	18	323.362	A	16.830	87.709	28.309	27.08	0.000	0.000
					B	16.830	94.309		25.47		
					C	16.830	74.509		30.99		
T8 40.00-20.00	30.00	1	16	363.362	A	18.566	87.709	28.309	26.64	0.000	0.000
					B	18.566	94.309		25.08		
					C	18.566	74.509		30.42		
T9 20.00-0.00	10.00	1	16	403.780	A	23.735	71.477	29.897	31.40	0.000	0.000
					B	23.735	76.097		29.95		
					C	23.735	62.237		34.78		

Tower Pressure - With Ice

$$G_H = 1.121$$

Section Elevation	z	K _Z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
T1 180.00-160.00	170.00	1.597	20	0.5000	84.167	A	22.733	22.543	8.333	18.41	0.000	0.000
						B	26.867	27.510		15.33		
						C	4.133	28.982		25.16		
T2 160.00-140.00	150.00	1.541	19	0.5000	123.780	A	63.694	49.532	38.924	34.38	0.000	0.000
						B	57.494	52.015		35.54		
						C	22.360	49.532		54.14		
T3 140.00-120.00	130.00	1.48	18	0.5000	163.780	A	74.856	52.346	38.924	30.60	0.000	0.000
						B	78.989	57.313		28.56		
						C	54.189	57.313		34.91		
T4 120.00-100.00	110.00	1.411	17	0.5000	204.197	A	76.104	54.735	40.814	31.19	0.000	0.000
						B	80.237	59.702		29.17		
						C	55.437	59.702		35.45		
T5 100.00-80.00	90.00	1.332	16	0.5000	244.614	A	79.653	57.229	42.789	31.26	0.000	0.000
						B	83.786	62.196		29.31		
						C	58.986	62.196		35.31		
T6 80.00-60.00	70.00	1.24	15	0.5000	284.614	A	81.278	57.771	42.789	30.77	0.000	0.000
						B	85.411	62.737		28.88		
						C	60.611	62.737		34.69		
T7 60.00-40.00	50.00	1.126	14	0.5000	325.031	A	82.963	61.248	45.704	31.69	0.000	0.000
						B	87.097	66.214		29.81		
						C	62.297	66.214		35.56		
T8 40.00-20.00	30.00	1	12	0.5000	365.031	A	84.700	61.826	45.704	31.19	0.000	0.000
						B	88.833	66.793		29.37		
						C	64.033	66.793		34.94		
T9 20.00-0.00	10.00	1	12	0.5000	405.448	A	70.028	61.645	47.910	36.39	0.000	0.000
						B	72.921	65.121		34.71		
						C	55.561	65.121		39.70		

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Tower Pressure - Service

$$G_H = 1.121$$

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
T1 180.00-160.00	170.00	1.597	10	82.500	A	0.000	29.872	5.000	16.74	0.000	0.000
					B	0.000	36.472		13.71		
					C	0.000	18.367		27.22		
T2 160.00-140.00	150.00	1.541	10	122.111	A	7.894	72.665	23.165	28.76	0.000	0.000
					B	7.894	69.365		29.98		
					C	7.894	39.665		48.71		
T3 140.00-120.00	130.00	1.48	9	162.111	A	8.723	82.565	23.165	25.38	0.000	0.000
					B	8.723	89.165		23.66		
					C	8.723	69.365		29.66		
T4 120.00-100.00	110.00	1.411	9	202.528	A	9.970	84.103	24.703	26.26	0.000	0.000
					B	9.970	90.703		24.54		
					C	9.970	70.903		30.54		
T5 100.00-80.00	90.00	1.332	9	242.945	A	13.520	85.641	26.241	26.46	0.000	0.000
					B	13.520	92.241		24.81		
					C	13.520	72.441		30.53		
T6 80.00-60.00	70.00	1.24	8	282.945	A	15.144	85.641	26.241	26.04	0.000	0.000
					B	15.144	92.241		24.44		
					C	15.144	72.441		29.96		
T7 60.00-40.00	50.00	1.126	7	323.362	A	16.830	87.709	28.309	27.08	0.000	0.000
					B	16.830	94.309		25.47		
					C	16.830	74.509		30.99		
T8 40.00-20.00	30.00	1	6	363.362	A	18.566	87.709	28.309	26.64	0.000	0.000
					B	18.566	94.309		25.08		
					C	18.566	74.509		30.42		
T9 20.00-0.00	10.00	1	6	403.780	A	23.735	71.477	29.897	31.40	0.000	0.000
					B	23.735	76.097		29.95		
					C	23.735	62.237		34.78		

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 180.00-160.00	187.20	803.42	A	0.362	2.144	0.637	1	1	19.024	1423.43	71.17	B
			B	0.442	1.987	0.67	1	1	24.424			
			C	0.223	2.522	0.595	1	1	10.933			
T2 160.00-140.00	686.40	1951.13	A	0.66	1.779	0.792	1	1	65.441	3295.39	164.77	A
			B	0.633	1.787	0.774	1	1	61.592			
			C	0.389	2.085	0.647	1	1	33.571			
T3 140.00-120.00	1060.80	1990.73	A	0.563	1.831	0.732	1	1	69.137	3726.58	186.33	B
			B	0.604	1.802	0.756	1	1	76.127			
			C	0.482	1.925	0.688	1	1	56.468			
T4 120.00-100.00	1060.80	2381.77	A	0.464	1.95	0.68	1	1	67.163	3605.09	180.25	B
			B	0.497	1.904	0.696	1	1	73.101			
			C	0.399	2.065	0.651	1	1	56.151			
T5 100.00-80.00	1060.80	2962.37	A	0.408	2.048	0.655	1	1	69.612	3666.58	183.33	B
			B	0.435	1.998	0.667	1	1	75.012			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T6 80.00- 60.00	1060.80	3034.06	C	0.354	2.163	0.634	1	1	59.437	3571.73	178.59	B
			A	0.356	2.157	0.635	1	1	69.501			
			B	0.38	2.106	0.643	1	1	74.498			
T7 60.00- 40.00	1060.80	4213.69	C	0.31	2.271	0.619	1	1	59.976	3448.07	172.40	B
			A	0.323	2.236	0.623	1	1	71.499			
			B	0.344	2.186	0.63	1	1	76.268			
T8 40.00- 20.00	1060.80	4343.02	C	0.282	2.344	0.611	1	1	62.332	3205.68	160.28	B
			A	0.292	2.316	0.614	1	1	72.387			
			B	0.311	2.268	0.619	1	1	76.964			
T9 20.00-0.00	742.56	5293.34	C	0.256	2.419	0.603	1	1	63.530	3120.82	156.04	B
			A	0.236	2.481	0.598	1	1	66.503			
			B	0.247	2.446	0.601	1	1	69.482			
Sum Weight:	7980.96	26973.54	C	0.213	2.553	0.593	1	1	60.648			
								OTM	2497101.5 4 lb-ft	29063.37		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 180.00- 160.00	187.20	803.42	A	0.362	2.144	0.637	0.8	1	19.024	1423.43	71.17	B
			B	0.442	1.987	0.67	0.8	1	24.424			
			C	0.223	2.522	0.595	0.8	1	10.933			
T2 160.00- 140.00	686.40	1951.13	A	0.66	1.779	0.792	0.8	1	63.863	3215.89	160.79	A
			B	0.633	1.787	0.774	0.8	1	60.014			
			C	0.389	2.085	0.647	0.8	1	31.992			
T3 140.00- 120.00	1060.80	1990.73	A	0.563	1.831	0.732	0.8	1	67.392	3641.18	182.06	B
			B	0.604	1.802	0.756	0.8	1	74.382			
			C	0.482	1.925	0.688	0.8	1	54.724			
T4 120.00- 100.00	1060.80	2381.77	A	0.464	1.95	0.68	0.8	1	65.169	3506.75	175.34	B
			B	0.497	1.904	0.696	0.8	1	71.107			
			C	0.399	2.065	0.651	0.8	1	54.157			
T5 100.00- 80.00	1060.80	2962.37	A	0.408	2.048	0.655	0.8	1	66.908	3534.41	176.72	B
			B	0.435	1.998	0.667	0.8	1	72.308			
			C	0.354	2.163	0.634	0.8	1	56.733			
T6 80.00- 60.00	1060.80	3034.06	A	0.356	2.157	0.635	0.8	1	66.473	3426.51	171.33	B
			B	0.38	2.106	0.643	0.8	1	71.469			
			C	0.31	2.271	0.619	0.8	1	56.947			
T7 60.00- 40.00	1060.80	4213.69	A	0.323	2.236	0.623	0.8	1	68.133	3295.90	164.79	B
			B	0.344	2.186	0.63	0.8	1	72.902			
			C	0.282	2.344	0.611	0.8	1	58.966			
T8 40.00- 20.00	1060.80	4343.02	A	0.292	2.316	0.614	0.8	1	68.674	3051.02	152.55	B
			B	0.311	2.268	0.619	0.8	1	73.251			
			C	0.256	2.419	0.603	0.8	1	59.817			
T9 20.00-0.00	742.56	5293.34	A	0.236	2.481	0.598	0.8	1	61.756	2907.61	145.38	B
			B	0.247	2.446	0.601	0.8	1	64.735			
			C	0.213	2.553	0.593	0.8	1	55.902			
Sum Weight:	7980.96	26973.54						OTM	2426816.4 5 lb-ft	28002.70		

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' U20.0 Valmont Self-Support Lattice	Page 14 of 31
	Project	07076 - Center Hill Rd, Hartland, CT	Date 21:16:24 04/13/08
	Client	Verizon	Designed by Staff

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 180.00- 160.00	187.20	803.42	A	0.362	2.144	0.637	0.85	1	19.024	1423.43	71.17	B
			B	0.442	1.987	0.67	0.85	1	24.424			
			C	0.223	2.522	0.595	0.85	1	10.933			
T2 160.00- 140.00	686.40	1951.13	A	0.66	1.779	0.792	0.85	1	64.257	3235.76	161.79	A
			B	0.633	1.787	0.774	0.85	1	60.408			
			C	0.389	2.085	0.647	0.85	1	32.387			
T3 140.00- 120.00	1060.80	1990.73	A	0.563	1.831	0.732	0.85	1	67.828	3662.53	183.13	B
			B	0.604	1.802	0.756	0.85	1	74.818			
			C	0.482	1.925	0.688	0.85	1	55.160			
T4 120.00- 100.00	1060.80	2381.77	A	0.464	1.95	0.68	0.85	1	65.667	3531.34	176.57	B
			B	0.497	1.904	0.696	0.85	1	71.605			
			C	0.399	2.065	0.651	0.85	1	54.655			
T5 100.00- 80.00	1060.80	2962.37	A	0.408	2.048	0.655	0.85	1	67.584	3567.45	178.37	B
			B	0.435	1.998	0.667	0.85	1	72.984			
			C	0.354	2.163	0.634	0.85	1	57.409			
T6 80.00- 60.00	1060.80	3034.06	A	0.356	2.157	0.635	0.85	1	67.230	3462.82	173.14	B
			B	0.38	2.106	0.643	0.85	1	72.226			
			C	0.31	2.271	0.619	0.85	1	57.704			
T7 60.00- 40.00	1060.80	4213.69	A	0.323	2.236	0.623	0.85	1	68.975	3333.94	166.70	B
			B	0.344	2.186	0.63	0.85	1	73.744			
			C	0.282	2.344	0.611	0.85	1	59.808			
T8 40.00- 20.00	1060.80	4343.02	A	0.292	2.316	0.614	0.85	1	69.602	3089.69	154.48	B
			B	0.311	2.268	0.619	0.85	1	74.179			
			C	0.256	2.419	0.603	0.85	1	60.745			
T9 20.00-0.00	742.56	5293.34	A	0.236	2.481	0.598	0.85	1	62.943	2960.91	148.05	B
			B	0.247	2.446	0.601	0.85	1	65.922			
			C	0.213	2.553	0.593	0.85	1	57.088			
Sum Weight:	7980.96	26973.54						OTM	2444387.7 2 lb-ft	28267.87		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 180.00- 160.00	480.91	1088.77	A	0.538	1.856	0.718	1	1	38.910	1898.39	94.92	B
			B	0.646	1.783	0.783	1	1	48.403			
			C	0.393	2.077	0.649	1	1	22.941			
T2 160.00- 140.00	1776.81	3550.45	A	0.915	1.946	0.997	1	1	113.063	4669.86	233.49	A
			B	0.885	1.903	0.969	1	1	107.905			
			C	0.581	1.817	0.742	1	1	59.115			
T3 140.00- 120.00	2745.09	3618.62	A	0.777	1.801	0.878	1	1	120.797	4954.80	247.74	B
			B	0.832	1.843	0.923	1	1	131.902			
			C	0.681	1.776	0.806	1	1	100.406			
T4 120.00- 100.00	2745.09	4089.79	A	0.641	1.784	0.779	1	1	118.764	4435.74	221.79	B
			B	0.685	1.776	0.81	1	1	128.567			
			C	0.564	1.831	0.732	1	1	99.148			
T5 100.00- 80.00	2745.09	4824.60	A	0.56	1.835	0.73	1	1	121.413	4324.96	216.25	B
			B	0.597	1.806	0.752	1	1	130.535			
			C	0.495	1.906	0.695	1	1	102.223			
T6 80.00- 60.00	2745.09	4946.27	A	0.489	1.915	0.692	1	1	121.239	4156.22	207.81	B
			B	0.521	1.875	0.708	1	1	129.840			

RISATower NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' U20.0 Valmont Self-Support Lattice	Page 15 of 31
	Project	07076 - Center Hill Rd, Hartland, CT	Date 21:16:24 04/13/08
	Client	Verizon	Designed by Staff

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T7 60.00-40.00	2745.09	6260.79	C	0.433	2.002	0.666	1	1	102.381	3981.29	199.06	B
			A	0.444	1.984	0.67	1	1	124.023			
			B	0.472	1.94	0.683	1	1	132.352			
T8 40.00-20.00	2745.09	6445.33	C	0.395	2.073	0.65	1	1	105.318	3692.39	184.62	B
			A	0.401	2.061	0.652	1	1	125.021			
			B	0.426	2.014	0.663	1	1	133.097			
T9 20.00-0.00	1921.56	7597.94	C	0.358	2.152	0.636	1	1	106.481	3441.46	172.07	B
			A	0.325	2.232	0.624	1	1	108.481			
			B	0.34	2.194	0.629	1	1	113.890			
Sum Weight:	20649.82	42422.56	C	0.298	2.302	0.615	1	1	95.623	35555.12		
								OTM	3179694.1 9 lb-ft			

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 180.00-160.00	480.91	1088.77	A	0.538	1.856	0.718	0.8	1	34.363	1687.65	84.38	B
			B	0.646	1.783	0.783	0.8	1	43.030			
			C	0.393	2.077	0.649	0.8	1	22.115			
T2 160.00-140.00	1776.81	3550.45	A	0.915	1.946	0.997	0.8	1	100.325	4143.71	207.19	A
			B	0.885	1.903	0.969	0.8	1	96.407			
			C	0.581	1.817	0.742	0.8	1	54.643			
T3 140.00-120.00	2745.09	3618.62	A	0.777	1.801	0.878	0.8	1	105.826	4361.37	218.07	B
			B	0.832	1.843	0.923	0.8	1	116.105			
			C	0.681	1.776	0.806	0.8	1	89.568			
T4 120.00-100.00	2745.09	4089.79	A	0.641	1.784	0.779	0.8	1	103.543	3882.09	194.10	B
			B	0.685	1.776	0.81	0.8	1	112.520			
			C	0.564	1.831	0.732	0.8	1	88.060			
T5 100.00-80.00	2745.09	4824.60	A	0.56	1.835	0.73	0.8	1	105.483	3769.75	188.49	B
			B	0.597	1.806	0.752	0.8	1	113.778			
			C	0.495	1.906	0.695	0.8	1	90.426			
T6 80.00-60.00	2745.09	4946.27	A	0.489	1.915	0.692	0.8	1	104.984	3609.42	180.47	B
			B	0.521	1.875	0.708	0.8	1	112.758			
			C	0.433	2.002	0.666	0.8	1	90.259			
T7 60.00-40.00	2745.09	6260.79	A	0.444	1.984	0.67	0.8	1	107.431	3457.29	172.86	B
			B	0.472	1.94	0.683	0.8	1	114.932			
			C	0.395	2.073	0.65	0.8	1	92.858			
T8 40.00-20.00	2745.09	6445.33	A	0.401	2.061	0.652	0.8	1	108.081	3199.51	159.98	B
			B	0.426	2.014	0.663	0.8	1	115.330			
			C	0.358	2.152	0.636	0.8	1	93.674			
T9 20.00-0.00	1921.56	7597.94	A	0.325	2.232	0.624	0.8	1	94.476	3000.77	150.04	B
			B	0.34	2.194	0.629	0.8	1	99.306			
			C	0.298	2.302	0.615	0.8	1	84.511			
Sum Weight:	20649.82	42422.56						OTM	2793258.5 5 lb-ft	31111.55		

Tower Forces - With Ice - Wind 90 To Face

<i>RISATower</i> NATCOMM 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' U20.0 Valmont Self-Support Lattice	Page	16 of 31
	Project	07076 - Center Hill Rd, Hartland, CT	Date	21:16:24 04/13/08
	Client	Verizon	Designed by	Staff

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 180.00- 160.00	480.91	1088.77	A	0.538	1.856	0.718	0.85	1	35.500	1740.33	87.02	B
			B	0.646	1.783	0.783	0.85	1	44.373			
			C	0.393	2.077	0.649	0.85	1	22.321			
T2 160.00- 140.00	1776.81	3550.45	A	0.915	1.946	0.997	0.85	1	103.509	4275.24	213.76	A
			B	0.885	1.903	0.969	0.85	1	99.281			
			C	0.581	1.817	0.742	0.85	1	55.761			
T3 140.00- 120.00	2745.09	3618.62	A	0.777	1.801	0.878	0.85	1	109.569	4509.73	225.49	B
			B	0.832	1.843	0.923	0.85	1	120.054			
			C	0.681	1.776	0.806	0.85	1	92.277			
T4 120.00- 100.00	2745.09	4089.79	A	0.641	1.784	0.779	0.85	1	107.348	4020.50	201.03	B
			B	0.685	1.776	0.81	0.85	1	116.532			
			C	0.564	1.831	0.732	0.85	1	90.832			
T5 100.00- 80.00	2745.09	4824.60	A	0.56	1.835	0.73	0.85	1	109.465	3908.55	195.43	B
			B	0.597	1.806	0.752	0.85	1	117.967			
			C	0.495	1.906	0.695	0.85	1	93.375			
T6 80.00- 60.00	2745.09	4946.27	A	0.489	1.915	0.692	0.85	1	109.048	3746.12	187.31	B
			B	0.521	1.875	0.708	0.85	1	117.029			
			C	0.433	2.002	0.666	0.85	1	93.289			
T7 60.00- 40.00	2745.09	6260.79	A	0.444	1.984	0.67	0.85	1	111.579	3588.29	179.41	B
			B	0.472	1.94	0.683	0.85	1	119.287			
			C	0.395	2.073	0.65	0.85	1	95.973			
T8 40.00- 20.00	2745.09	6445.33	A	0.401	2.061	0.652	0.85	1	112.316	3322.73	166.14	B
			B	0.426	2.014	0.663	0.85	1	119.772			
			C	0.358	2.152	0.636	0.85	1	96.876			
T9 20.00-0.00	1921.56	7597.94	A	0.325	2.232	0.624	0.85	1	97.977	3110.94	155.55	B
			B	0.34	2.194	0.629	0.85	1	102.952			
			C	0.298	2.302	0.615	0.85	1	87.289			
Sum Weight:	20649.82	42422.56						OTM	2889867.4 6 lb-ft	32222.45		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 180.00- 160.00	187.20	803.42	A	0.362	2.144	0.637	1	1	19.024	556.03	27.80	B
			B	0.442	1.987	0.67	1	1	24.424			
			C	0.223	2.522	0.595	1	1	10.933			
T2 160.00- 140.00	686.40	1951.13	A	0.66	1.779	0.792	1	1	65.441	1287.26	64.36	A
			B	0.633	1.787	0.774	1	1	61.592			
			C	0.389	2.085	0.647	1	1	33.571			
T3 140.00- 120.00	1060.80	1990.73	A	0.563	1.831	0.732	1	1	69.137	1455.69	72.78	B
			B	0.604	1.802	0.756	1	1	76.127			
			C	0.482	1.925	0.688	1	1	56.468			
T4 120.00- 100.00	1060.80	2381.77	A	0.464	1.95	0.68	1	1	67.163	1408.24	70.41	B
			B	0.497	1.904	0.696	1	1	73.101			
			C	0.399	2.065	0.651	1	1	56.151			
T5 100.00- 80.00	1060.80	2962.37	A	0.408	2.048	0.655	1	1	69.612	1432.26	71.61	B
			B	0.435	1.998	0.667	1	1	75.012			
			C	0.354	2.163	0.634	1	1	59.437			
T6 80.00- 60.00	1060.80	3034.06	A	0.356	2.157	0.635	1	1	69.501	1395.21	69.76	B
			B	0.38	2.106	0.643	1	1	74.498			
			C	0.31	2.271	0.619	1	1	59.976			
T7 60.00- 40.00	1060.80	4213.69	A	0.323	2.236	0.623	1	1	71.499	1346.90	67.35	B
			B	0.344	2.186	0.63	1	1	76.268			

<i>RISATower</i> <i>NATCOMM</i> 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' U20.0 Valmont Self-Support Lattice	Page 17 of 31
	Project	07076 - Center Hill Rd, Hartland, CT	Date 21:16:24 04/13/08
	Client	Verizon	Designed by Staff

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T8 40.00- 20.00	1060.80	4343.02	C	0.282	2.344	0.611	1	1	62.332	1252.22	62.61	B
			A	0.292	2.316	0.614	1	1	72.387			
			B	0.311	2.268	0.619	1	1	76.964			
T9 20.00-0.00	742.56	5293.34	C	0.256	2.419	0.603	1	1	63.530	1219.07	60.95	B
			A	0.236	2.481	0.598	1	1	66.503			
			B	0.247	2.446	0.601	1	1	69.482			
Sum Weight:	7980.96	26973.54	C	0.213	2.553	0.593	1	1	60.648	11352.88		
								OTM	975430.29			
									lb-ft			

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 180.00- 160.00	187.20	803.42	A	0.362	2.144	0.637	0.8	1	19.024	556.03	27.80	B
			B	0.442	1.987	0.67	0.8	1	24.424			
			C	0.223	2.522	0.595	0.8	1	10.933			
T2 160.00- 140.00	686.40	1951.13	A	0.66	1.779	0.792	0.8	1	63.863	1256.21	62.81	A
			B	0.633	1.787	0.774	0.8	1	60.014			
			C	0.389	2.085	0.647	0.8	1	31.992			
T3 140.00- 120.00	1060.80	1990.73	A	0.563	1.831	0.732	0.8	1	67.392	1422.34	71.12	B
			B	0.604	1.802	0.756	0.8	1	74.382			
			C	0.482	1.925	0.688	0.8	1	54.724			
T4 120.00- 100.00	1060.80	2381.77	A	0.464	1.95	0.68	0.8	1	65.169	1369.83	68.49	B
			B	0.497	1.904	0.696	0.8	1	71.107			
			C	0.399	2.065	0.651	0.8	1	54.157			
T5 100.00- 80.00	1060.80	2962.37	A	0.408	2.048	0.655	0.8	1	66.908	1380.63	69.03	B
			B	0.435	1.998	0.667	0.8	1	72.308			
			C	0.354	2.163	0.634	0.8	1	56.733			
T6 80.00- 60.00	1060.80	3034.06	A	0.356	2.157	0.635	0.8	1	66.473	1338.48	66.92	B
			B	0.38	2.106	0.643	0.8	1	71.469			
			C	0.31	2.271	0.619	0.8	1	56.947			
T7 60.00- 40.00	1060.80	4213.69	A	0.323	2.236	0.623	0.8	1	68.133	1287.46	64.37	B
			B	0.344	2.186	0.63	0.8	1	72.902			
			C	0.282	2.344	0.611	0.8	1	58.966			
T8 40.00- 20.00	1060.80	4343.02	A	0.292	2.316	0.614	0.8	1	68.674	1191.80	59.59	B
			B	0.311	2.268	0.619	0.8	1	73.251			
			C	0.256	2.419	0.603	0.8	1	59.817			
T9 20.00-0.00	742.56	5293.34	A	0.236	2.481	0.598	0.8	1	61.756	1135.79	56.79	B
			B	0.247	2.446	0.601	0.8	1	64.735			
			C	0.213	2.553	0.593	0.8	1	55.902			
Sum Weight:	7980.96	26973.54						OTM	947975.17	10938.55		
									lb-ft			

Tower Forces - Service - Wind 90 To Face

RISATower

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

Job	180' U20.0 Valmont Self-Support Lattice	Page	18 of 31
Project	07076 - Center Hill Rd, Hartland, CT	Date	21:16:24 04/13/08
Client	Verizon	Designed by	Staff

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	lb	lb							ft ²	lb	plf	
T1 180.00- 160.00	187.20	803.42	A	0.362	2.144	0.637	0.85	1	19.024	556.03	27.80	B
			B	0.442	1.987	0.67	0.85	1	24.424			
			C	0.223	2.522	0.595	0.85	1	10.933			
T2 160.00- 140.00	686.40	1951.13	A	0.66	1.779	0.792	0.85	1	64.257	1263.97	63.20	A
			B	0.633	1.787	0.774	0.85	1	60.408			
			C	0.389	2.085	0.647	0.85	1	32.387			
T3 140.00- 120.00	1060.80	1990.73	A	0.563	1.831	0.732	0.85	1	67.828	1430.68	71.53	B
			B	0.604	1.802	0.756	0.85	1	74.818			
			C	0.482	1.925	0.688	0.85	1	55.160			
T4 120.00- 100.00	1060.80	2381.77	A	0.464	1.95	0.68	0.85	1	65.667	1379.43	68.97	B
			B	0.497	1.904	0.696	0.85	1	71.605			
			C	0.399	2.065	0.651	0.85	1	54.655			
T5 100.00- 80.00	1060.80	2962.37	A	0.408	2.048	0.655	0.85	1	67.584	1393.54	69.68	B
			B	0.435	1.998	0.667	0.85	1	72.984			
			C	0.354	2.163	0.634	0.85	1	57.409			
T6 80.00- 60.00	1060.80	3034.06	A	0.356	2.157	0.635	0.85	1	67.230	1352.66	67.63	B
			B	0.38	2.106	0.643	0.85	1	72.226			
			C	0.31	2.271	0.619	0.85	1	57.704			
T7 60.00- 40.00	1060.80	4213.69	A	0.323	2.236	0.623	0.85	1	68.975	1302.32	65.12	B
			B	0.344	2.186	0.63	0.85	1	73.744			
			C	0.282	2.344	0.611	0.85	1	59.808			
T8 40.00- 20.00	1060.80	4343.02	A	0.292	2.316	0.614	0.85	1	69.602	1206.91	60.35	B
			B	0.311	2.268	0.619	0.85	1	74.179			
			C	0.256	2.419	0.603	0.85	1	60.745			
T9 20.00-0.00	742.56	5293.34	A	0.236	2.481	0.598	0.85	1	62.943	1156.61	57.83	B
			B	0.247	2.446	0.601	0.85	1	65.922			
			C	0.213	2.553	0.593	0.85	1	57.088			
Sum Weight:	7980.96	26973.54						OTM	954838.95 lb-ft	11042.14		

Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M _x	Sum of Overturning Moments, M _z	Sum of Torques
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Leg Weight	18844.43					
Bracing Weight	8129.11					
Total Member Self-Weight	26973.54					
Total Weight	41380.50			-10458.15	-2170.41	
Wind 0 deg - No Ice		0.00	-39398.66	-10458.15	-2170.41	
Wind 30 deg - No Ice		19301.58	-33431.31	-4167862.06	-2170.41	3216.99
Wind 60 deg - No Ice		33201.67	-19168.99	-3565224.04	-2054515.45	-2207.52
Wind 90 deg - No Ice		38603.15	0.00	-2054017.56	-3541719.13	-6884.58
Wind 120 deg - No Ice		34120.24	19699.33	-10458.15	-4106860.50	-9833.45
Wind 150 deg - No Ice		19301.58	33431.31	2068243.80	-3602587.81	-10370.71
Wind 180 deg - No Ice		0.00	38337.99	3544307.74	-2054515.45	-7625.93
Wind 210 deg - No Ice		-19301.58	33431.31	4076660.66	-2170.41	-3098.76
Wind 240 deg - No Ice		-34120.24	19699.33	3544307.74	2050174.63	2207.52
Wind 270 deg - No Ice		-38603.15	0.00	2068243.80	3598246.99	7153.72
Wind 300 deg - No Ice		-33201.67	-19168.99	-10458.15	4102519.68	9833.45
Wind 330 deg - No Ice		-19301.58	-33431.31	-2054017.56	3537378.31	9983.33
Member Ice	15449.03			-3565224.04	2050174.63	7625.93
Total Weight Ice	72885.90					
Wind 0 deg - Ice		0.00	-45663.45	-27524.12	-5491.20	
Wind 30 deg - Ice		21165.38	-36659.52	-4829232.48	-5491.20	1486.04
				-3934928.23	-2261432.02	-4176.34

<i>RISATower</i> <i>NATCOMM</i> 63-2 N. Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	180' U20.0 Valmont Self-Support Lattice	Page 19 of 31
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Load Case	Vertical Forces <i>lb</i>	Sum of Forces <i>X</i> <i>lb</i>	Sum of Forces <i>Z</i> <i>lb</i>	Sum of Overturning Moments, <i>M_x</i> <i>lb-ft</i>	Sum of Overturning Moments, <i>M_z</i> <i>lb-ft</i>	Sum of Torques <i>lb-ft</i>
Wind 60 deg - Ice		35697.46	-20609.94	-2235160.48	-3829229.55	-8297.67
Wind 90 deg - Ice		42330.77	0.00	-27524.12	-4517372.84	-10711.96
Wind 120 deg - Ice		39545.71	22831.72	2373330.07	-4163892.63	-10976.09
Wind 150 deg - Ice		21165.38	36659.52	3879880.00	-2261432.02	-6535.62
Wind 180 deg - Ice		0.00	41219.88	4387748.61	-5491.20	-1320.83
Wind 210 deg - Ice		-21165.38	36659.52	3879880.00	2250449.62	4176.34
Wind 240 deg - Ice		-39545.71	22831.72	2373330.07	4152910.22	9490.06
Wind 270 deg - Ice		-42330.77	0.00	-27524.12	4506390.43	10711.96
Wind 300 deg - Ice		-35697.46	-20609.94	-2235160.48	3818247.14	9618.50
Wind 330 deg - Ice		-21165.38	-36659.52	-3934928.23	2250449.62	6535.62
Total Weight	41380.50			-10458.15	-2170.41	
Wind 0 deg - Service		0.00	-15390.10	-1623985.90	0.00	1256.64
Wind 30 deg - Service		7539.68	-13059.11	-1388580.43	-801697.28	-862.31
Wind 60 deg - Service		12969.40	-7487.89	-798265.39	-1382636.22	-2689.29
Wind 90 deg - Service		15079.36	0.00	0.00	-1603394.57	-3841.19
Wind 120 deg - Service		13328.22	7695.05	811992.95	-1406413.05	-4051.06
Wind 150 deg - Service		7539.68	13059.11	1388580.43	-801697.28	-2978.88
Wind 180 deg - Service		0.00	14975.78	1596530.79	0.00	-1210.45
Wind 210 deg - Service		-7539.68	13059.11	1388580.43	801697.28	862.31
Wind 240 deg - Service		-13328.22	7695.05	811992.95	1406413.05	2794.42
Wind 270 deg - Service		-15079.36	0.00	0.00	1603394.57	3841.19
Wind 300 deg - Service		-12969.40	-7487.89	-798265.39	1382636.22	3899.74
Wind 330 deg - Service		-7539.68	-13059.11	-1388580.43	801697.28	2978.88

Load Combinations

Comb. No.	Description
1	Dead Only
2	Dead+Wind 0 deg - No Ice
3	Dead+Wind 30 deg - No Ice
4	Dead+Wind 60 deg - No Ice
5	Dead+Wind 90 deg - No Ice
6	Dead+Wind 120 deg - No Ice
7	Dead+Wind 150 deg - No Ice
8	Dead+Wind 180 deg - No Ice
9	Dead+Wind 210 deg - No Ice
10	Dead+Wind 240 deg - No Ice
11	Dead+Wind 270 deg - No Ice
12	Dead+Wind 300 deg - No Ice
13	Dead+Wind 330 deg - No Ice
14	Dead+Ice+Temp
15	Dead+Wind 0 deg+Ice+Temp
16	Dead+Wind 30 deg+Ice+Temp
17	Dead+Wind 60 deg+Ice+Temp
18	Dead+Wind 90 deg+Ice+Temp
19	Dead+Wind 120 deg+Ice+Temp
20	Dead+Wind 150 deg+Ice+Temp
21	Dead+Wind 180 deg+Ice+Temp
22	Dead+Wind 210 deg+Ice+Temp
23	Dead+Wind 240 deg+Ice+Temp
24	Dead+Wind 270 deg+Ice+Temp
25	Dead+Wind 300 deg+Ice+Temp
26	Dead+Wind 330 deg+Ice+Temp
27	Dead+Wind 0 deg - Service
28	Dead+Wind 30 deg - Service

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Comb. No.	Description
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
T1	180 - 160	Leg	Max Tension	4	20848.48	237.39	-136.85
			Max. Compression	15	-25494.71	19.92	1256.26
			Max. Mx	23	-25193.88	1071.94	-655.39
			Max. My	15	-25494.71	19.92	1256.26
			Max. Vy	23	-2668.28	1071.94	-655.39
			Max. Vx	15	-3106.01	19.92	1256.26
		Diagonal	Max Tension	26	2594.51	0.00	0.00
			Max. Compression	20	-2631.30	0.00	0.00
			Max. Mx	19	324.71	-2.67	-0.02
			Max. My	5	-2030.60	-0.50	0.98
			Max. Vy	15	3.46	-2.65	0.09
			Max. Vx	5	0.42	0.00	0.00
		Horizontal	Max Tension	21	564.56	0.00	0.00
			Max. Compression	2	-364.50	0.00	0.00
			Max. Mx	14	116.11	4.59	0.00
			Max. My	18	59.23	0.00	-0.00
			Max. Vy	14	-4.59	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
		Top Girt	Max Tension	23	137.46	0.00	0.00
			Max. Compression	17	-175.62	0.00	0.00
			Max. Mx	14	6.55	5.85	0.00
			Max. My	18	30.22	0.00	-0.00
			Max. Vy	14	-5.85	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
		Bottom Girt	Max Tension	21	510.82	0.00	0.00
			Max. Compression	2	-421.17	0.00	0.00
			Max. Mx	14	58.33	5.85	0.00
			Max. My	18	59.82	0.00	-0.00
			Max. Vy	14	-5.85	0.00	0.00
			Max. Vx	18	0.00	0.00	0.00
T2	160 - 140	Leg	Max Tension	17	43457.00	-2111.98	46.52
			Max. Compression	15	-54013.51	3170.45	-2.06
			Max. Mx	15	-54013.51	3170.45	-2.06
			Max. My	18	-3420.59	-186.58	3151.81
			Max. Vy	21	-751.96	-2089.57	11.00
			Max. Vx	18	903.50	-186.61	3151.81
		Diagonal	Max Tension	20	6557.30	0.00	0.00
			Max. Compression	20	-6702.73	0.00	0.00
			Max. Mx	15	5307.10	58.69	1.18
			Max. My	26	-5436.67	-21.76	-20.53
			Max. Vy	15	-18.44	58.69	1.18
			Max. Vx	26	4.59	0.00	0.00
		Leg	Max Tension	17	79572.54	-3278.39	47.01
			Max Tension	17	79572.54	-3278.39	47.01
T3	140 - 120	Leg	Max Tension	17	79572.54	-3278.39	47.01
			Max Tension	17	79572.54	-3278.39	47.01

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T4	120 - 100	Diagonal	Max. Compression	15	-97590.36	3813.67	0.48
			Max. Mx	15	-97590.36	3813.67	0.48
			Max. My	18	-6985.84	-114.71	4088.53
			Max. Vy	21	-753.87	-2845.67	-0.94
			Max. Vx	24	-596.09	117.85	-2326.86
			Max Tension	20	7080.95	0.00	0.00
			Max. Compression	20	-7363.38	0.00	0.00
			Max. Mx	15	5627.91	79.33	-2.93
			Max. My	25	-6151.58	-14.04	-10.41
			Max. Vy	15	-23.47	79.33	-2.93
		Leg	Max. Vx	25	2.39	0.00	0.00
			Max Tension	17	111689.76	-3709.93	31.41
			Max. Compression	15	-137021.91	4253.80	-2.02
			Max. Mx	15	-137021.91	4253.80	-2.02
			Max. My	18	-10511.13	-18.51	4227.23
			Max. Vy	21	154.06	-4042.94	8.85
			Max. Vx	18	-165.67	-18.51	4227.23
			Max Tension	20	6726.35	0.00	0.00
			Max. Compression	20	-6906.93	0.00	0.00
			T5	100 - 80	Diagonal	Max. Mx	15
Max. My	19	-409.77				38.26	7.05
Max. Vy	15	-22.57				65.09	-3.38
Max. Vx	19	1.70				0.00	0.00
Max Tension	17	139731.24				-3880.45	24.10
Max. Compression	15	-173127.88				4212.27	2.74
Max. Mx	15	-155106.33				4253.80	-2.02
Max. My	18	-11182.48				-18.53	4227.23
Max. Vy	21	-137.03				-4042.94	8.85
Max. Vx	24	-184.12				-18.53	-4219.92
Leg	Max Tension	20			6676.80	0.00	0.00
	Max. Compression	20			-6880.07	0.00	0.00
	Max. Mx	15			5620.46	86.55	-4.65
	Max. My	18			-3285.40	35.19	9.79
	Max. Vy	17			30.25	82.13	6.80
	Max. Vx	18			-2.08	0.00	0.00
	Max Tension	17			164728.77	-3569.60	19.08
	Max. Compression	15			-206264.00	5359.89	-10.18
	Max. Mx	15			-206264.00	5359.89	-10.18
	Max. My	18			-15923.77	39.05	4667.38
T6	80 - 60	Diagonal	Max. Vy	23	-267.30	5342.27	-80.06
			Max. Vx	24	151.81	39.05	-4659.89
			Max Tension	20	6721.66	0.00	0.00
			Max. Compression	20	-6982.15	0.00	0.00
			Max. Mx	15	5674.40	94.95	-6.52
			Max. My	25	-5839.29	18.65	-10.75
			Max. Vy	17	33.35	88.49	8.20
			Max. Vx	25	2.15	0.00	0.00
			Max Tension	17	187791.69	-3626.67	14.84
			Max. Compression	15	-238495.26	3554.54	3.45
		Leg	Max. Mx	15	-221782.46	5359.89	-10.18
			Max. My	18	-16637.66	39.03	4667.38
			Max. Vy	21	-240.50	-4868.15	15.69
			Max. Vx	24	-211.12	39.04	-4659.89
			Max Tension	20	7082.99	0.00	0.00
			Max. Compression	20	-7327.60	0.00	0.00
			Max. Mx	15	6192.51	131.12	-10.23
			Max. My	25	-5979.47	58.39	-14.87
			Max. Vy	17	49.90	129.06	12.01
			Max. Vx	25	2.85	0.00	0.00
T7	60 - 40	Diagonal	Max Tension	17	208172.29	-1534.14	23.21
			Max. Compression	15	-269678.73	-298.92	-2.11

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T9	20 - 0	Diagonal	Max. Mx	17	207581.58	-9330.64	43.60
			Max. My	16	-20368.13	2053.78	-4319.99
			Max. Vy	21	883.05	-9302.45	8.41
			Max. Vx	18	208.11	2078.78	4300.27
			Max Tension	20	8217.64	0.00	0.00
			Max. Compression	20	-7730.93	0.00	0.00
			Max. Mx	15	7222.51	140.11	-11.90
			Max. My	25	-6517.93	70.60	-16.29
		Leg	Max. Vy	17	53.96	135.91	12.58
			Max. Vx	25	2.97	0.00	0.00
			Max Tension	17	225409.77	4335.29	30.74
			Max. Compression	15	-300607.57	-0.00	0.07
			Max. Mx	15	-282042.53	12182.46	8.92
			Max. My	16	-25634.69	8076.44	-6692.57
			Max. Vy	21	-1478.61	-9302.45	8.40
			Max. Vx	18	764.02	8103.57	6657.42
		Diagonal	Max Tension	20	11454.12	0.00	0.00
			Max. Compression	20	-9747.27	0.00	0.00
			Max. Mx	17	2957.42	215.78	22.15
			Max. My	25	-8839.81	137.48	-26.59
			Max. Vy	17	70.18	215.78	22.15
			Max. Vx	25	4.16	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	23	302488.71	20897.70	-12410.22
	Max. H _x	10	254472.81	22183.16	-13054.83
	Max. H _z	17	-233602.53	-26112.57	15331.94
	Min. Vert	17	-233602.53	-26112.57	15331.94
	Min. H _x	17	-233602.53	-26112.57	15331.94
	Min. H _z	10	254472.81	22183.16	-13054.83
Leg B	Max. Vert	19	303041.58	-20882.93	-12458.97
	Max. H _x	25	-233050.14	26086.03	15354.48
	Max. H _z	25	-233050.14	26086.03	15354.48
	Min. Vert	25	-233050.14	26086.03	15354.48
	Min. H _x	6	254690.76	-22139.96	-13138.70
	Min. H _z	6	254690.76	-22139.96	-13138.70
Leg A	Max. Vert	15	305160.40	49.60	24358.99
	Max. H _x	24	25895.73	1912.39	-4207.51
	Max. H _z	2	255487.25	94.23	25759.61
	Min. Vert	21	-230931.34	-32.78	-30223.38
	Min. H _x	19	-113740.35	-1909.66	-18551.90
	Min. H _z	21	-230931.34	-32.78	-30223.38

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	41380.50	0.00	-0.00	-10408.79	-2170.43	0.01

RISATower

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

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Load Combination	Vertical lb	Shear _x lb	Shear _y lb	Overturning Moment, M _x lb-ft	Overturning Moment, M _y lb-ft	Torque lb-ft
Dead+Wind 0 deg - No Ice	41380.50	0.00	-39398.66	-4186258.66	-2184.60	3227.68
Dead+Wind 30 deg - No Ice	41380.50	19301.58	-33431.31	-3581019.44	-2063644.26	-2217.28
Dead+Wind 60 deg - No Ice	41380.50	33201.67	-19168.99	-2063131.34	-3557475.89	-6931.41
Dead+Wind 90 deg - No Ice	41380.86	38603.36	-0.55	-10489.15	-4125108.25	-9899.89
Dead+Wind 120 deg - No Ice	41380.50	34120.24	19699.33	2077422.56	-3618544.75	-10430.48
Dead+Wind 150 deg - No Ice	41380.50	19301.58	33431.31	3560105.46	-2063655.92	-7653.83
Dead+Wind 180 deg - No Ice	41380.50	0.00	38337.99	4094863.80	-2186.94	-3108.80
Dead+Wind 210 deg - No Ice	41380.50	-19301.58	33431.31	3560111.02	2059285.93	2217.82
Dead+Wind 240 deg - No Ice	41380.50	-34120.24	19699.33	2077427.57	3614182.93	7202.79
Dead+Wind 270 deg - No Ice	41380.86	-38603.36	-0.55	-10490.98	4120751.58	9899.88
Dead+Wind 300 deg - No Ice	41380.50	-33201.67	-19168.99	-2063139.21	3553116.92	10040.20
Dead+Wind 330 deg - No Ice	41380.50	-19301.58	-33431.31	-3581026.64	2059278.82	7653.27
Dead+Ice+Temp	72885.89	-0.00	0.00	-27499.85	-5497.66	-0.16
Dead+Wind 0 deg+Ice+Temp	72885.89	-0.00	-45663.33	-4864726.32	-5527.76	1516.79
Dead+Wind 30 deg+Ice+Temp	72885.89	21165.36	-36659.43	-3964152.44	-2278269.91	-4217.81
Dead+Wind 60 deg+Ice+Temp	72885.90	35697.46	-20609.93	-2251834.70	-3857859.13	-8434.80
Dead+Wind 90 deg+Ice+Temp	72885.89	42330.68	-0.02	-27714.96	-4551002.47	-10905.60
Dead+Wind 120 deg+Ice+Temp	72885.89	39545.60	22831.67	2390847.45	-4194569.28	-11150.06
Dead+Wind 150 deg+Ice+Temp	72885.89	21165.32	36659.46	3908847.62	-2278264.06	-6628.41
Dead+Wind 180 deg+Ice+Temp	72885.90	-0.00	41219.87	4420655.08	-5531.50	-1350.11
Dead+Wind 210 deg+Ice+Temp	72885.89	-21165.32	36659.46	3908847.98	2267202.74	4218.57
Dead+Wind 240 deg+Ice+Temp	72885.89	-39545.60	22831.67	2390846.02	4183512.76	9633.28
Dead+Wind 270 deg+Ice+Temp	72885.89	-42330.68	-0.02	-27720.24	4539950.22	10905.59
Dead+Wind 300 deg+Ice+Temp	72885.90	-35697.46	-20609.93	-2251841.83	3846807.35	9784.92
Dead+Wind 330 deg+Ice+Temp	72885.89	-21165.36	-36659.43	-3964158.08	2267216.31	6627.67
Dead+Wind 0 deg - Service	41380.50	-0.00	-15390.10	-1641668.57	-2179.03	1260.86
Dead+Wind 30 deg - Service	41380.50	7539.68	-13059.11	-1405238.39	-807458.01	-870.48
Dead+Wind 60 deg - Service	41380.50	12969.40	-7487.89	-812295.20	-1390998.74	-2707.95
Dead+Wind 90 deg - Service	41380.50	15079.36	-0.00	-10462.66	-1612735.51	-3865.39
Dead+Wind 120 deg - Service	41380.50	13328.22	7695.05	805147.47	-1414852.26	-4074.49
Dead+Wind 150 deg - Service	41380.50	7539.68	13059.11	1384328.31	-807457.65	-2994.13
Dead+Wind 180 deg - Service	41380.50	0.00	14975.78	1593218.74	-2180.08	-1214.51
Dead+Wind 210 deg - Service	41380.50	-7539.68	13059.11	1384328.96	803098.11	870.55
Dead+Wind 240 deg - Service	41380.50	-13328.22	7695.05	805147.80	1410494.27	2813.63
Dead+Wind 270 deg - Service	41380.50	-15079.36	-0.00	-10463.38	1608378.61	3865.39
Dead+Wind 300 deg - Service	41380.50	-12969.40	-7487.89	-812296.78	1386641.81	3922.46
Dead+Wind 330 deg - Service	41380.50	-7539.68	-13059.10	-1405240.43	803099.10	2992.59

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
1	0.00	-41380.50	-0.00	-0.00	41380.50	0.00	0.000%
2	0.00	-41380.50	-39398.66	-0.00	41380.50	39398.66	0.000%
3	19301.58	-41380.50	-33431.31	-19301.58	41380.50	33431.31	0.000%
4	33201.67	-41380.50	-19168.99	-33201.67	41380.50	19168.99	0.000%
5	38603.15	-41380.50	-0.00	-38603.36	41380.86	0.55	0.001%
6	34120.24	-41380.50	19699.33	-34120.24	41380.50	-19699.33	0.000%
7	19301.58	-41380.50	33431.31	-19301.58	41380.50	-33431.31	0.000%
8	0.00	-41380.50	38337.99	-0.00	41380.50	-38337.99	0.000%
9	-19301.58	-41380.50	33431.31	19301.58	41380.50	-33431.31	0.000%
10	-34120.24	-41380.50	19699.33	34120.24	41380.50	-19699.33	0.000%
11	-38603.15	-41380.50	-0.00	38603.36	41380.86	0.55	0.001%
12	-33201.67	-41380.50	-19168.99	33201.67	41380.50	19168.99	0.000%
13	-19301.58	-41380.50	-33431.31	19301.58	41380.50	33431.31	0.000%
14	0.00	-72885.90	-0.00	0.00	72885.89	-0.00	0.000%
15	-0.00	-72885.90	-45663.45	0.00	72885.89	45663.33	0.000%

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Load Comb.	Sum of Applied Forces				Sum of Reactions		% Error
	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	
16	21165.38	-72885.90	-36659.52	-21165.36	72885.89	36659.43	0.000%
17	35697.46	-72885.90	-20609.94	-35697.46	72885.90	20609.93	0.000%
18	42330.77	-72885.90	-0.00	-42330.68	72885.89	0.02	0.000%
19	39545.71	-72885.90	22831.72	-39545.60	72885.89	-22831.67	0.000%
20	21165.38	-72885.90	36659.52	-21165.32	72885.89	-36659.46	0.000%
21	0.00	-72885.90	41219.88	0.00	72885.90	-41219.87	0.000%
22	-21165.38	-72885.90	36659.52	21165.32	72885.89	-36659.46	0.000%
23	-39545.71	-72885.90	22831.72	39545.60	72885.89	-22831.67	0.000%
24	-42330.77	-72885.90	-0.00	42330.68	72885.89	0.02	0.000%
25	-35697.46	-72885.90	-20609.94	35697.46	72885.90	20609.93	0.000%
26	-21165.38	-72885.90	-36659.52	21165.36	72885.89	36659.43	0.000%
27	-0.00	-41380.50	-15390.10	0.00	41380.50	15390.10	0.000%
28	7539.68	-41380.50	-13059.11	-7539.68	41380.50	13059.11	0.000%
29	12969.40	-41380.50	-7487.89	-12969.40	41380.50	7487.89	0.000%
30	15079.36	-41380.50	-0.00	-15079.36	41380.50	0.00	0.000%
31	13328.22	-41380.50	7695.05	-13328.22	41380.50	-7695.05	0.000%
32	7539.68	-41380.50	13059.11	-7539.68	41380.50	-13059.11	0.000%
33	0.00	-41380.50	14975.78	-0.00	41380.50	-14975.78	0.000%
34	-7539.68	-41380.50	13059.11	7539.68	41380.50	-13059.11	0.000%
35	-13328.22	-41380.50	7695.05	13328.22	41380.50	-7695.05	0.000%
36	-15079.36	-41380.50	-0.00	15079.36	41380.50	0.00	0.000%
37	-12969.40	-41380.50	-7487.89	12969.40	41380.50	7487.89	0.000%
38	-7539.68	-41380.50	-13059.11	7539.68	41380.50	13059.10	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	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000114
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000114
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000121
16	Yes	4	0.00000001	0.00000174
17	Yes	4	0.00000001	0.00000178
18	Yes	4	0.00000001	0.00000200
19	Yes	4	0.00000001	0.00000133
20	Yes	4	0.00000001	0.00000172
21	Yes	4	0.00000001	0.00000177
22	Yes	4	0.00000001	0.00000175
23	Yes	4	0.00000001	0.00000130
24	Yes	4	0.00000001	0.00000200
25	Yes	4	0.00000001	0.00000179
26	Yes	4	0.00000001	0.00000172
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001

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29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	7.144	27	0.3978	0.0384
T2	160 - 140	5.491	27	0.3637	0.0295
T3	140 - 120	4.015	27	0.3140	0.0191
T4	120 - 100	2.804	27	0.2411	0.0131
T5	100 - 80	1.876	27	0.1838	0.0090
T6	80 - 60	1.165	27	0.1399	0.0063
T7	60 - 40	0.638	27	0.0953	0.0039
T8	40 - 20	0.288	27	0.0609	0.0024
T9	20 - 0	0.079	27	0.0267	0.0011

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	20' x 3" Dia Omni	27	7.144	0.3978	0.0384	97122
178.00	6 Arm Halo Mount	27	6.976	0.3946	0.0376	97122
170.00	PiROD 12' Lightweight T-Frame	27	6.305	0.3816	0.0342	48561
160.00	PiROD 12' Lightweight T-Frame	27	5.491	0.3637	0.0295	24926
150.00	PiROD 12' Lightweight T-Frame	27	4.724	0.3421	0.0241	20420
140.00	PiROD 12' Lightweight T-Frame	27	4.015	0.3140	0.0191	17709

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	180 - 160	20.763	15	1.1344	0.0999
T2	160 - 140	16.047	15	1.0434	0.0804
T3	140 - 120	11.799	15	0.9089	0.0541
T4	120 - 100	8.275	15	0.7049	0.0370
T5	100 - 80	5.548	15	0.5405	0.0254
T6	80 - 60	3.451	15	0.4126	0.0175
T7	60 - 40	1.892	15	0.2818	0.0108
T8	40 - 20	0.853	15	0.1803	0.0068

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T9	20 - 0	0.233	15	0.0790	0.0031

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
180.00	20' x 3" Dia Omni	15	20.763	1.1344	0.0999	37295
178.00	6 Arm Halo Mount	15	20.283	1.1259	0.0982	37295
170.00	PiROD 12' Lightweight T-Frame	15	18.373	1.0912	0.0912	18647
160.00	PiROD 12' Lightweight T-Frame	15	16.047	1.0434	0.0804	9544
150.00	PiROD 12' Lightweight T-Frame	15	13.844	0.9856	0.0670	7624
140.00	PiROD 12' Lightweight T-Frame	15	11.799	0.9089	0.0541	6491

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load Allowable	Allowable Ratio	Criteria
T2	160	Leg	A325N	1.0000	6	4443.26	34556.70	0.129 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.0000	1	6557.30	8156.25	0.804 ✓	1.333	Member Bearing
T9	20	Leg	A325N	1.2500	6	36919.80	53993.70	0.684 ✓	1.333	Bolt Tension
		Diagonal	A325N	1.2500	1	11454.10	16992.20	0.674 ✓	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

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 P P _a
T1	180 - 160	1 1/2	20.00	2.38	76.0 K=1.00	19.800	1.7672	-25494.70	34989.80	0.729 ✓
T2	160 - 140	PiROD 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-54013.50	92228.10	0.586 ✓
T3	140 - 120	PiROD 105216	20.03	10.02	45.4 K=1.00	25.051	3.6816	-97590.40	92228.10	1.058 ✓
T4	120 - 100	PiROD 105217	20.03	10.02	37.8 K=1.00	26.132	5.3014	-137022.00	138539.00	0.989 ✓
T5	100 - 80	PiROD 105218	20.03	10.02	32.4	26.848	7.2158	-173128.00	193727.00	0.894 ✓

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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 $\frac{P}{P_a}$
T6	80 - 60	Pirol 105218	20.03	10.02	K=1.00 32.4	26.848	7.2158	-206264.00	193727.00	1.065 ✓
T7	60 - 40	Pirol 105219	20.03	10.02	K=1.00 28.4	27.351	9.4248	-238495.00	257781.00	0.925 ✓
T8	40 - 20	Pirol 105219	20.03	10.02	K=1.00 28.4	27.351	9.4248	-269679.00	257781.00	1.046 ✓
T9	20 - 0	Pirol 105220	20.03	10.02	K=1.00 25.2	27.723	11.9282	-300608.00	330691.00	0.909 ✓

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L _d ft	Kl/r	F _a ksi	A in ²	Actual V lb	Allow. V _a lb	Stress Ratio
T2	160 - 140	0.5	1.48	121.0	10.133	0.1963	746.16	2226.75	0.335 ✓
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	753.87	2226.75	0.339 ✓
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	185.43	2258.95	0.082 ✓
T5	100 - 80	0.5	1.46	119.0	10.423	0.1963	193.50	2290.46	0.084 ✓
T6	80 - 60	0.5	1.46	119.0	10.423	0.1963	268.39	2290.46	0.117 ✓
T7	60 - 40	0.625	1.45	94.4	13.671	0.3068	249.03	4694.36	0.053 ✓
T8	40 - 20	0.625	1.45	94.4	13.671	0.3068	883.05	4694.36	0.188 ✓
T9	20 - 0	0.625	1.43	93.6	13.766	0.3068	1479.07	4726.89	0.313 ✓

Diagonal Design Data (Compression)

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 $\frac{P}{P_a}$
T1	180 - 160	3/4	4.65	2.25	129.8 K=0.90	8.865	0.4418	-2631.30	3916.38	0.672 ✓
T2	160 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	121.3 K=1.00	10.097	0.9020	-6702.73	9107.43	0.736 ✓
T3	140 - 120	L2 1/2x2 1/2x3/16	12.50	5.84	136.4 K=0.96	8.027	0.9020	-7286.36	7240.08	1.006 ✓
T4	120 - 100	L2 1/2x2 1/2x3/16	13.80	6.54	149.3 K=0.94	6.697	0.9020	-6868.74	6040.72	1.137 ✓
T5	100 - 80	L3x3x3/16	15.24	7.29	140.4 K=0.96	7.571	1.0900	-6874.60	8251.92	0.833 ✓

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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 $\frac{P}{P_a}$
T6	80 - 60	L3x3x3/16	16.80	8.09	152.7 K=0.94	6.402	1.0900	-6982.15	6978.45	1.001 ✓
T7	60 - 40	L3x3x5/16	18.45	8.93	167.2 K=0.92	5.343	1.7800	-7233.70	9510.22	0.761 ✓
T8	40 - 20	L3x3x5/16	19.30	9.36	174.0 K=0.91	4.933	1.7800	-7730.93	8781.58	0.880 ✓
T9	20 - 0	L3 1/2x3 1/2x5/16	21.03	10.01	174.1 K=1.00	4.928	2.0900	-9747.27	10300.30	0.946 ✓

Horizontal Design Data (Compression)

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 $\frac{P}{P_a}$
T1	180 - 160	3/4	4.00	3.88	173.6 K=0.70	4.955	0.4418	-364.50	2189.09	0.167 ✓

Top Girt Design Data (Compression)

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 $\frac{P}{P_a}$
T1	180 - 160	7/8	4.00	3.88	148.8 K=0.70	6.744	0.6013	-175.62	4055.56	0.043 ✓

Bottom Girt Design Data (Compression)

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 $\frac{P}{P_a}$
T1	180 - 160	7/8	4.00	3.88	148.8 K=0.70	6.744	0.6013	-421.17	4055.56	0.104 ✓

Tension Checks**Leg Design Data (Tension)**

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 $\frac{P}{P_a}$
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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 $\frac{P}{P_a}$
T1	180 - 160	1 1/2	20.00	2.38	76.0	30.000	1.7672	20848.50	53014.40	0.393
T2	160 - 140	Pirol 105216	20.03	10.02	45.4	30.000	3.6816	42989.20	110447.00	0.389
T3	140 - 120	Pirol 105216	20.03	10.02	45.4	30.000	3.6816	79572.50	110447.00	0.720
T4	120 - 100	Pirol 105217	20.03	10.02	37.8	30.000	5.3014	111690.00	159043.00	0.702
T5	100 - 80	Pirol 105218	20.03	10.02	32.4	30.000	7.2158	139731.00	216475.00	0.645
T6	80 - 60	Pirol 105218	20.03	10.02	32.4	30.000	7.2158	164729.00	216475.00	0.761
T7	60 - 40	Pirol 105219	20.03	10.02	28.4	30.000	9.4248	187792.00	282743.00	0.664
T8	40 - 20	Pirol 105219	20.03	10.02	28.4	30.000	9.4248	208172.00	282743.00	0.736
T9	20 - 0	Pirol 105220	20.03	10.02	25.2	30.000	11.9282	225410.00	357847.00	0.630

Truss-Leg Diagonal Data

Section No.	Elevation ft	Diagonal Size	L _d ft	Kl/r	F _a ksi	A in ²	Actual V lb	Allow. V _a lb	Stress Ratio
T2	160 - 140	0.5	1.48	121.0	10.133	0.1963	746.16	2226.75	0.335
T3	140 - 120	0.5	1.48	121.0	10.133	0.1963	753.87	2226.75	0.339
T4	120 - 100	0.5	1.47	120.0	10.279	0.1963	185.43	2258.95	0.082
T5	100 - 80	0.5	1.46	119.0	10.423	0.1963	193.50	2290.46	0.084
T6	80 - 60	0.5	1.46	119.0	10.423	0.1963	268.39	2290.46	0.117
T7	60 - 40	0.625	1.45	94.4	13.671	0.3068	249.03	4694.36	0.053
T8	40 - 20	0.625	1.45	94.4	13.671	0.3068	883.05	4694.36	0.188
T9	20 - 0	0.625	1.43	93.6	13.766	0.3068	1479.07	4726.89	0.313

Diagonal Design Data (Tension)

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 $\frac{P}{P_a}$
T1	180 - 160	3/4	4.65	2.25	144.2	30.000	0.4418	2594.51	13253.60	0.196

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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 $\frac{P}{P_a}$
T2	160 - 140	L2 1/2x2 1/2x3/16	11.42	5.00	80.1	21.600	0.9020	6557.30	19483.20	0.337 ✓
T3	140 - 120	L2 1/2x2 1/2x3/16	11.93	5.59	86.2	21.600	0.9020	7080.95	19483.20	0.363 ✓
T4	120 - 100	L2 1/2x2 1/2x3/16	13.13	6.22	96.0	21.600	0.9020	6726.35	19483.20	0.345 ✓
T5	100 - 80	L3x3x3/16	14.50	6.93	88.6	21.600	1.0900	6676.80	23544.00	0.284 ✓
T6	80 - 60	L3x3x3/16	16.01	7.70	98.4	21.600	1.0900	6721.66	23544.00	0.285 ✓
T7	60 - 40	L3x3x5/16	18.45	8.93	116.2	21.600	1.7800	7082.99	38448.00	0.184 ✓
T8	40 - 20	L3x3x5/16	20.16	9.79	127.4	21.600	1.7800	8217.64	38448.00	0.214 ✓
T9	20 - 0	L3 1/2x3 1/2x5/16	21.92	10.45	118.6	21.600	2.0900	11454.10	45144.00	0.254 ✓

Horizontal Design Data (Tension)

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 $\frac{P}{P_a}$
T1	180 - 160	3/4	4.00	3.88	248.0	30.000	0.4418	564.56	13253.60	0.043 ✓

Top Girt Design Data (Tension)

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 $\frac{P}{P_a}$
T1	180 - 160	7/8	4.00	3.88	212.6	30.000	0.6013	137.46	18039.60	0.008 ✓

Bottom Girt Design Data (Tension)

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 $\frac{P}{P_a}$
T1	180 - 160	7/8	4.00	3.88	212.6	30.000	0.6013	510.82	18039.60	0.028 ✓

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Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P _{allow} lb	% Capacity	Pass Fail
T1	180 - 160	Leg	1 1/2	3	-25494.70	46641.40	54.7	Pass
T2	160 - 140	Leg	Pirod 105216	67	-54013.50	122940.05	43.9	Pass
T3	140 - 120	Leg	Pirod 105216	82	-97590.40	122940.05	79.4	Pass
T4	120 - 100	Leg	Pirod 105217	97	-137022.00	184672.48	74.2	Pass
T5	100 - 80	Leg	Pirod 105218	112	-173128.00	258238.08	67.0	Pass
T6	80 - 60	Leg	Pirod 105218	127	-206264.00	258238.08	79.9	Pass
T7	60 - 40	Leg	Pirod 105219	142	-238495.00	343622.06	69.4	Pass
T8	40 - 20	Leg	Pirod 105219	157	-269679.00	343622.06	78.5	Pass
T9	20 - 0	Leg	Pirod 105220	172	-300608.00	440811.08	68.2	Pass
T1	180 - 160	Diagonal	3/4	12	-2631.30	5220.53	50.4	Pass
T2	160 - 140	Diagonal	L2 1/2x2 1/2x3/16	70	-6702.73	12140.20	55.2	Pass
							60.3 (b)	
T3	140 - 120	Diagonal	L2 1/2x2 1/2x3/16	85	-7286.36	9651.03	75.5	Pass
T4	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	100	-6868.74	8052.28	85.3	Pass
T5	100 - 80	Diagonal	L3x3x3/16	115	-6874.60	10999.81	62.5	Pass
T6	80 - 60	Diagonal	L3x3x3/16	130	-6982.15	9302.27	75.1	Pass
T7	60 - 40	Diagonal	L3x3x5/16	145	-7233.70	12677.12	57.1	Pass
T8	40 - 20	Diagonal	L3x3x5/16	166	-7730.93	11705.85	66.0	Pass
T9	20 - 0	Diagonal	L3 1/2x3 1/2x5/16	181	-9747.27	13730.30	71.0	Pass
T1	180 - 160	Horizontal	3/4	16	-364.50	2918.06	12.5	Pass
T1	180 - 160	Top Girt	7/8	5	-175.62	5406.06	3.2	Pass
T1	180 - 160	Bottom Girt	7/8	7	-421.17	5406.06	7.8	Pass
							Summary	
							Leg (T6)	79.9 Pass
							Diagonal (T4)	85.3 Pass
							Horizontal (T1)	12.5 Pass
							Top Girt (T1)	3.2 Pass
							Bottom Girt (T1)	7.8 Pass
							Bolt Checks	60.3 Pass
							RATING =	85.3 Pass

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ANCHOR BOLT ANALYSIS

Input Data

Max Pier Reactions:

Uplift:	Uplift := 234·kips	<i>user input</i>
Shear:	Shear := 31·kips	<i>user input</i>
Compression:	Compression := 306·kips	<i>user input</i>

Anchor Bolt Data:

Use ASTM A687

Number of Anchor Bolts = N	$N := 6$	<i>user input</i>
Bolt Ultimate Strength:	$F_u := 150\text{·ksi}$	<i>user input</i>
Bolt Yield Strength:	$F_y := 105\text{·ksi}$	<i>user input</i>
Bolt Modulus:	$E := 29000\text{·ksi}$	<i>user input</i>
Thickness of Anchor Bolts	$D := 1.25\text{in}$	<i>user input</i>
Threads per Inch:	$n := 8$	<i>user input</i>
Coefficient of Friction:	$\mu := 0.55$	<i>user input</i> (for baseplate with grout ASCE 10-97)

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Anchor Bolt Area:

Gross Area of Bolt:

$$A_g := \frac{\pi}{4} \cdot D^2 \quad A_g = 1.227 \cdot \text{in}^2$$

Net Area of Bolt:

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 \quad A_n = 1.000 \cdot \text{in}^2$$

Check Tensile Forces:

Maximum Tensile Force (Gross Area):

$$\text{AllowableTension} := 1.33 \cdot (0.33 \cdot A_g \cdot F_u) \quad \text{AllowableTension} = 80.8 \cdot \text{kips}$$

Note: 1.33 increase allowed per TIA/EIA

Maximum Tensile Force (Net Area):

$$F_{\text{net.area}} := 1.33 \cdot (0.60 \cdot A_n \cdot F_y) \quad F_{\text{net.area}} = 83.8 \cdot \text{kips}$$

Note: 1.33 increase allowed per TIA/EIA

Applied Tension:

$$\text{MaxTension} := \frac{\text{Uplift}}{N} \quad \text{MaxTension} = 39.0 \cdot \text{kips}$$

Check Stresses:

$$\frac{\text{MaxTension}}{F_{\text{net.area}}} = 0.47$$

$$\text{Condition1} := \text{if} \left(\frac{\text{MaxTension}}{F_{\text{net.area}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right)$$

$$\boxed{\text{Condition1} = \text{"OK"}}$$

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Check Anchor Bolt Area:

Based on the ASCE 10-97 Design of Latticed Steel Transmission Structures

Required Area:

$$A_{s1} := \frac{\text{Uplift}}{F_y} + \frac{\text{Shear}}{\mu \cdot 0.85 \cdot F_y} \quad A_{s1} = 2.9 \cdot \text{in}^2$$

$$A_{s2} := \left\lceil \frac{\text{Shear} - (0.3 \cdot \text{Compression})}{\mu \cdot 0.85 \cdot F_y} \right\rceil \quad A_{s2} = 1.2 \cdot \text{in}^2$$

Provided Area:

$$A_{\text{provided}} := A_n \cdot N \quad A_{\text{provided}} = 6.0 \cdot \text{in}^2$$

$$\text{Condition2} := \text{if} \left(\frac{A_{s1}}{A_{\text{provided}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right) \quad \frac{A_{s1}}{A_{\text{provided}}} = 0.5$$

Condition2 = "OK"

$$\text{Condition3} := \text{if} \left(\frac{A_{s2}}{A_{\text{provided}}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right) \quad \frac{A_{s2}}{A_{\text{provided}}} = 0.2$$

Condition3 = "OK"

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PIER AND MAT FOUNDATION ANALYSIS - 3 PIERS

TOWER FORCES:

Moment Caused by Tower $M_t := 4865 \cdot \text{kip} \cdot \text{ft}$
Shear at Base of Tower $S_t := 45.7 \cdot \text{kip}$
Max Compressive Force $C_t := 306 \cdot \text{kip}$
Max Uplift $U_t := 234 \cdot \text{kip}$
Height of Tower $H_t := 180 \cdot \text{ft}$
Width of Tower at Base $W_t := 20 \cdot \text{ft}$
Weight of Tower $WT_t := 73 \cdot \text{kip}$

FOOTING DIMENSIONS:

Width of Footing $W_f := 28.5 \cdot \text{ft}$
Overall Depth of Footing $D_f := 6 \cdot \text{ft}$
Length of Pier $L_p := 3.75 \cdot \text{ft}$
Extension of Pier Above Grade $L_{pag} := 0.5 \cdot \text{ft}$
Diameter of Pier $d_p := 5.0 \cdot \text{ft}$
Thickness of Footing $T_f := 2.75 \cdot \text{ft}$
Reinforcement Cover: $C_{vr} := 3 \cdot \text{in}$

MATERIAL PROPERTIES:

Compressive Strength of Concrete $f_c := 3500 \cdot \text{psi}$
Yield Strength of Steel Reinforcement $f_y := 60000 \cdot \text{psi}$
Internal Friction Angle of Soil $\phi_s := 30 \cdot \text{deg}$
Allowable Bearing Capacity $q_s := 3000 \cdot \text{psf}$
Coefficient of Lateral Soil Pressure $K_p := \frac{1 + \sin(\phi_s)}{1 - \sin(\phi_s)}$
Unit Weight of Soil $\gamma_s := 120 \cdot \text{pcf}$
Unit Weight of Concrete $\gamma_c := 150 \cdot \text{pcf}$
Depth to Neglect $n := 0 \cdot \text{ft}$
Cohesion of Clay Type Soil $c := 0 \cdot \text{ksf}$
Note: Use 0 for Sandy Soil
 $K_p = 3$

What is Position of Center of Tower with respect to Center of Pad?

1=Offset
2=Not Offset

$Pos_{tower} := 1$

STEEL REINFORCING:

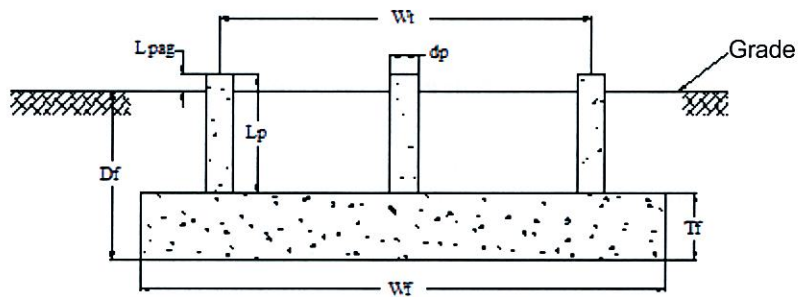
PIER REINFORCEMENT:

Bar Size $BS_{pier} := 8$
Number of Bars $NB_{pier} := 18$
Bar Diameter $d_{bpier} := 1.0 \cdot \text{in}$
Bar Area $A_{bpier} := 0.79 \cdot \text{in}^2$

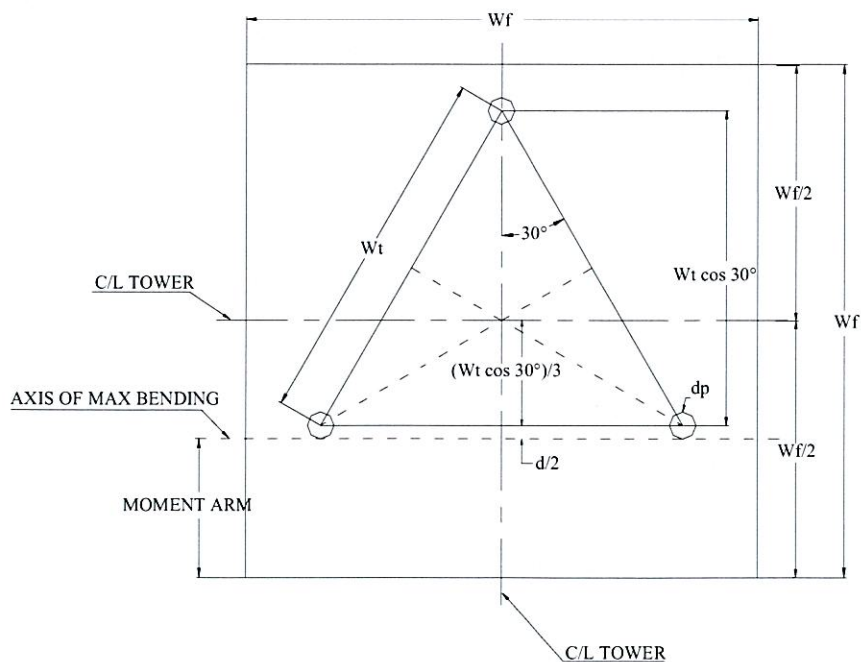
PAD REINFORCEMENT:

Bar Size $BS_{pad} := 9$
Number of Bars $NB_{pad} := 35$
Bar Diameter $d_{bpad} := 1.128 \cdot \text{in}$
Bar Area $A_{bpad} := 1.00 \cdot \text{in}^2$

FOUNDATION OVERVIEW



ELEVATION



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STABILITY OF FOOTING

Factor of Safety Req'd: $FS_{req} := 2.0$

Passive Pressure:

$$P_{pn} := K_p \cdot \gamma_s \cdot n + c \cdot 2 \cdot \sqrt{K_p} \quad P_{pn} = 0 \cdot \text{ksf}$$

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} \quad P_{pt} = 1.17 \cdot \text{ksf}$$

$$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] \quad P_{top} = 1.17 \cdot \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} \quad P_{bot} = 2.16 \cdot \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} \quad P_{ave} = 1.665 \cdot \text{ksf}$$

Shear:

$$T_{pp} := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] \quad T_{pp} = 2.75 \cdot \text{ft}$$

$$A_{pp} := W_f \cdot T_{pp} \quad A_{pp} = 78.375 \cdot \text{ft}^2$$

Ultimate Shear:

$$S_u := P_{ave} \cdot A_{pp} \quad S_u = 130.4944 \cdot \text{kip}$$

Weight of Concrete Pad:

$$WT_c := (W_f^2 \cdot T_f) \cdot \gamma_c \quad WT_c = 335.0531 \cdot \text{kip}$$

Weight of Soil above Footing:

$$WT_{s1} := W_f^2 \cdot (|D_f - T_f|) \cdot \gamma_s \quad WT_{s1} = 316.7775 \cdot \text{kip}$$

Weight of Soil Wedge at back face:

$$WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\phi_s)}{2} \cdot W_f \right] \cdot \gamma_s \quad WT_{s2} = 35.5417 \cdot \text{kip}$$

Distance to center of Tower Leg from Edge of Footing:

$$X_{t1} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot \text{deg})}{2} \quad X_{t2} := \frac{W_f}{2} - \frac{W_t \cdot \cos(30 \cdot \text{deg})}{3}$$

$$X_t := \text{if}(\text{Pos}_{tower} = 1, X_{t1}, X_{t2}) \quad X_t = 5.5897 \cdot \text{ft}$$

Additional Offset of Footing:

$$X_{off1} := \frac{W_f}{2} - \left(\frac{W_t \cdot \cos(30 \cdot \text{deg})}{3} + X_t \right) \quad X_{off2} := 0$$

$$X_{off} := \text{if}(\text{Pos}_{tower} = 1, X_{off1}, X_{off2}) \quad X_{off} = 2.8868 \cdot \text{ft}$$

Resisting Moment:

$$M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + WT_t \cdot \left(\frac{W_f}{2} - X_{off} \right) + S_u \cdot \frac{T_{pp}}{3} + WT_{s2} \cdot \left(W_f + \frac{T_{pp} \cdot \tan(\phi_s)}{3} \right)$$

$$M_r = 11269.4714 \cdot \text{kip} \cdot \text{ft}$$

Overtaking Moment:

$$M_{ot} := M_t + S_t \cdot (L_p + T_f) + WT_t \cdot X_{off} \quad M_{ot} = 5372.7828 \cdot \text{kip} \cdot \text{ft}$$

Factor of Safety:

$$FS := \frac{M_r}{M_{ot}} \quad FS = 2.0975$$

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

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BEARING PRESSURE CHECK:

Pressure Applied:

$$\text{LOAD}_{\text{tot}} := \text{WT}_c + \text{WT}_{s1} + \text{WT}_t$$

$$\text{LOAD}_{\text{tot}} = 724.8306 \cdot \text{kip}$$

$$A_{\text{mat}} := W_f^2$$

$$A_{\text{mat}} = 812.25 \cdot \text{ft}^2$$

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

$$S = 3858.1875 \cdot \text{ft}^3$$

$$P_{\text{max}} := \frac{\text{LOAD}_{\text{tot}}}{A_{\text{mat}}} + \frac{M_{\text{ot}}}{S}$$

$$P_{\text{max}} = 2.2849 \cdot \text{ksf}$$

$$P_{\text{min}} := \frac{\text{LOAD}_{\text{tot}}}{A_{\text{mat}}} - \frac{M_{\text{ot}}}{S}$$

$$P_{\text{min}} = -0.5002 \cdot \text{ksf}$$

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

$$\text{MaxPressure} = \text{"Okay"}$$

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

$$\text{MinPressure} = \text{"No Good"}$$

Distance to Resultant of Pressure Distribution:

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

$$X_p = 7.7939 \cdot \text{ft}$$

Distance to Kern:

$$X_k := \frac{W_f}{3}$$

$$X_k = 9.5 \cdot \text{ft}$$

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

Eccentricity:

$$e := \frac{M_{\text{ot}}}{\text{LOAD}_{\text{tot}}}$$

$$e = 7.4125$$

Adjusted Soil Pressure:

$$q_a := \frac{2 \cdot \text{LOAD}_{\text{tot}}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e \right)}$$

$$q_a = 2.4797 \cdot \text{ksf}$$

Revised Maximum:

$$q_{\text{max}} := \text{if}(X_p < X_k, q_a, P_{\text{max}})$$

$$q_{\text{max}} = 2.4797 \cdot \text{kip}$$

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

$$\text{PressureCheck} = \text{"Okay"}$$

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CHECK PUNCHING AND BEAM SHEAR:

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

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

$$\phi_c := .85 \quad (\text{ACI 9.3.2.3})$$

$$d := T_f - C_{vr} - .5 \cdot \text{in}$$

$$d = 29.5 \cdot \text{in}$$

Factored load: $FL := LF \cdot \frac{C_t}{W_f^2}$ $FL = 0.4898 \cdot \text{ksf}$

$$V_{req} := \frac{FL \cdot (X_t - 0.5 \cdot d_p - d) \cdot W_f}{\phi_c} \quad V_{req} = 10.3685 \cdot \text{kip}$$

ACI 11.3.1.1 $V_{Avail} := 2 \cdot \sqrt{f_c \cdot \text{psi}} \cdot W_f \cdot d$ $V_{Avail} = 1193.7466 \cdot \text{kip}$

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

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

$$b_o := (d_p + d) \cdot \pi \quad b_o = 23.431 \cdot \text{ft}$$

$$V_{req} := FL \cdot \frac{W_f^2 - (d_p + d)^2 \cdot \frac{\pi}{4}}{\phi_c} \quad V_{req} = 442.8273 \cdot \text{kip}$$

$$V_{Avail} := 4 \cdot \sqrt{f_c \cdot \text{psi}} \cdot b_o \cdot d \quad V_{Avail} = 1962.8582 \cdot \text{kip}$$

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

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TENSILE REINFORCEMENT IN PAD:

$$\phi_m := .90 \text{ per ACI 9.3.2.2}$$

Applied Moments:

$$M_{nT} := LF \cdot \left[U_t \cdot \left(W_t \cdot \sin(60 \cdot \text{deg}) - \frac{d_p}{2} \right) + S_t \cdot (D_f + L_{\text{pag}}) \right] - W_{T_t} \cdot X_{\text{off}}$$

$$M_{nS} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} \right)^2 \cdot W_t \cdot [\gamma_s \cdot (T_{pp} - T_f)] + W_{T_{s2}} \cdot \left[\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} + (D_f - n) \cdot \tan(\phi_s) \right] \right]$$

$$M_{nC} := -1 \cdot \left[\frac{1}{2} \cdot \left(\frac{W_f}{2} + \frac{W_t}{3} \cdot \cos(30 \cdot \text{deg}) - \frac{d_p}{2} \right)^2 \cdot W_t \cdot (\gamma_c \cdot T_f) \right]$$

Design Moment: $M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} \quad M_n = 2968.0213 \cdot \text{kips} \cdot \text{ft}$

Required Reinforcement:

ACI 10.2.7.3 $\beta := \text{if} \left[f_c \leq 4000 \cdot \text{psi}, .85, \text{if} \left[f_c \geq 8000 \cdot \text{psi}, .65, .85 - \left(\frac{\frac{f_c}{\text{psi}} - 4000}{1000} \right) \cdot .05 \right] \right] \quad \beta = 0.85$

Effective Width: $b_{\text{eff}} := W_t \cdot \cos(30 \cdot \text{deg}) + d_p \quad b_{\text{eff}} = 267.8461 \cdot \text{in}$

$$A_s := \frac{M_n}{\phi_m \cdot f_y \cdot d} \quad A_s = 22.358 \cdot \text{in}^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{\text{eff}}} \quad a = 1.6835 \cdot \text{in}$$

$$A_{s_{\text{req}}} := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2} \right)} \quad A_s = 20.7132 \cdot \text{in}^2$$

$$\rho := \frac{A_s}{b_{\text{eff}} \cdot d} \quad \rho = 0.0026$$

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Temperature and Shrinkage:
(ACI 7.12.2.1b)

$$\rho_{sh} := \text{if}(f_y \geq 60000 \cdot \text{psi}, 0.0018, 0.0020)$$

$$\rho_{sh} = 0.0018$$

Area Required:

$$A_s := \text{if}\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right)$$

$$A_s = 20.7132 \cdot \text{in}^2$$

Area Provided:

$$A_{s_{prov}} := A_{bpad} \cdot NB_{pad}$$

$$A_{s_{prov}} = 35 \cdot \text{in}^2$$

$$\text{PadReinforcement} := \text{if}(A_{s_{prov}} > A_s, \text{"Okay"}, \text{"No Good"})$$

$$\text{PadReinforcement} = \text{"Okay"}$$

DEVELOPMENT LENGTH OF PAD REINFORCEMENT:

TENSION (ACI 12.2.3)

Bar Spacing:

$$B_{sPad} := \frac{W_f - 2 \cdot C_{vr} - NB_{pad} \cdot d_{bpad}}{NB_{pad} - 1}$$

$$B_{sPad} = 8.7212 \cdot \text{in}$$

Development Length Factors:

Reinforcement Location Factor

$$\alpha := 1.0$$

Coating Factor

$$\beta := 1.0$$

Concrete strength Factor

$$\lambda := 1.0$$

Reinforcement Size Factor

$$\gamma := 1.0$$

Spacing or Cover Dimension:

$$c := \text{if}\left(C_{vr} < \frac{B_{sPad}}{2}, C_{vr}, \frac{B_{sPad}}{2}\right) \quad c = 3 \cdot \text{in}$$

Transverse Reinforcement Index A_s allowed by ACI 12.2.4

$$k_{tr} := 0$$

Development Length:

$$L_{dbt} := \frac{3}{40} \cdot \frac{f_y}{\sqrt{f_c \cdot \text{psi}}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{c + k_{tr}} \cdot d_{bpad}$$

$$L_{dbt} = 32.2608 \cdot \text{in}$$

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

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

$$L_{dbtCheck} = \text{"Use } L_{dbt}\text{"}$$

Available Length in Pad:

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - C_{vr}$$

$$L_{Pad} = 48 \cdot \text{in}$$

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

$$L_{padTension} = \text{"Okay"}$$

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Job 180' Valmont Lattice – Hartland
Description Foundation Analysis

Project No. 07076
Computed by JEK

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Date 4/13/2008

REINFORCEMENT IN PIER:

Pier Area: $A_p := \frac{\pi \cdot d_p^2}{4}$ $A_p = 2827.4334 \cdot \text{in}^2$

(ACI 10.8.4 and 10.9.1) $A_{smin} := 0.01 \cdot 0.5 \cdot A_p$ $A_{smin} = 14.1372 \cdot \text{in}^2$

$A_{sprov} := N_{bpier} \cdot A_{bpier}$ $A_{sprov} = 14.22 \cdot \text{in}^2$

SteelAreaCheck := if($A_{sprov} > A_{smin}$, "Okay", "No Good") SteelAreaCheck = "Okay"

NOTE: Anchor Bolts are not accounted for in reinforcement calculation and will provide additional reinforcement to satisfy minimum requirement of steel.

Bar Spacing In Pier: $B_{sPier} := \frac{d_p \cdot \pi}{N_{bpier}} - d_{bpier}$ $B_{sPier} = 9.472 \cdot \text{in}$

Diameter of Reinforcement Cage: $Diam_{cage} := d_p - 2 \cdot C_{vr}$ $Diam_{cage} = 54 \cdot \text{in}$

Maximum Moment in Pier: $M_p := (S_t \cdot L_p) \cdot LF$ $M_p = 2673.45 \cdot \text{kips} \cdot \text{in}$

Pier Check evaluated from outside program and results are listed below;

(defined variables)

$$(f_c \ f_y \ c1 \ Spiral) = (3 \ 60 \ 4 \ 0)$$

The required input is column diameter in inches, number of reinforcing bars, bar size number, factored axial load in kips and moment in kip inches:

$$(D \ N \ n \ P_u \ M_{xu}) := (60 \ 18 \ 8 \ 305 \ 2675)$$

Clears any previous output:

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := (0 \ 0 \ 0 \ 0)$$

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) := \phi P'_n (D, N, n, P_u, M_{xu})^T$$

The Output is given as useable axial load in kips, moment capacity in kip inches, splicing stress in ksi, and reinforcement ratio:

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) = (3758.1315 \ 32960.6613 \ -32.6039 \ 0.005)$$

Column size and reinforcement may be changed to match capacity to the applied load.

$$\text{AxialLoadCheck} := \text{if}(\phi P_n \geq P_u, \text{"Okay"}, \text{"No Good"})$$

$$\text{AxialLoadCheck} = \text{"Okay"}$$

$$\text{BendingCheck} := \text{if}(\phi M_{xn} \geq M_{xu}, \text{"Okay"}, \text{"No Good"})$$

$$\text{BendingCheck} = \text{"Okay"}$$

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Job 180' Valmont Lattice – Hartland
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DEVELOPMENT LENGTH OF PIER REINFORCEMENT:

TENSION (ACI 12.2.3)

Spacing and Cover: $C_{vr} = 3 \cdot \text{in}$ $B_{sPier} = 9.472 \cdot \text{in}$

Factors for development:

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

Spacing or Cover Dimension: $c := \text{if} \left(C_{vr} < \frac{B_{sPier}}{2}, C_{vr}, \frac{B_{sPier}}{2} \right)$ $c = 3 \cdot \text{in}$

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

$$L_{dbt} := \frac{3}{40} \cdot \frac{f_y}{\sqrt{f_c \cdot \text{psi}}} \cdot \frac{\alpha \cdot \beta \cdot \gamma \cdot \lambda}{c + k_{tr}} \cdot d_{bpier} \quad L_{dbt} = 25.3546 \cdot \text{in}$$

Minimum Development Length: (ACI 12.2.1)

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

$$L_{dbtCheck} := \text{if} (L_{dbt} \geq L_{dbmin}, \text{"Use } L_{dbt}\text{"}, \text{"Use } L_{dbmin}\text{"}) \quad L_{dbtCheck} = \text{"Use } L_{dbt}\text{"}$$

COMPRESSION: (ACI 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot \text{psi}}} \quad L_{dbc1} = 20.2837 \cdot \text{in}$$

$$L_{dbmin} := 0.0003 \cdot \frac{\text{in}^2}{\text{lb}} \cdot (d_{bpier} \cdot f_y) \quad L_{dbmin} = 18 \cdot \text{in}$$

$$L_{dbc} := \text{if} (L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}) \quad L_{dbc} = 20.2837 \cdot \text{in}$$

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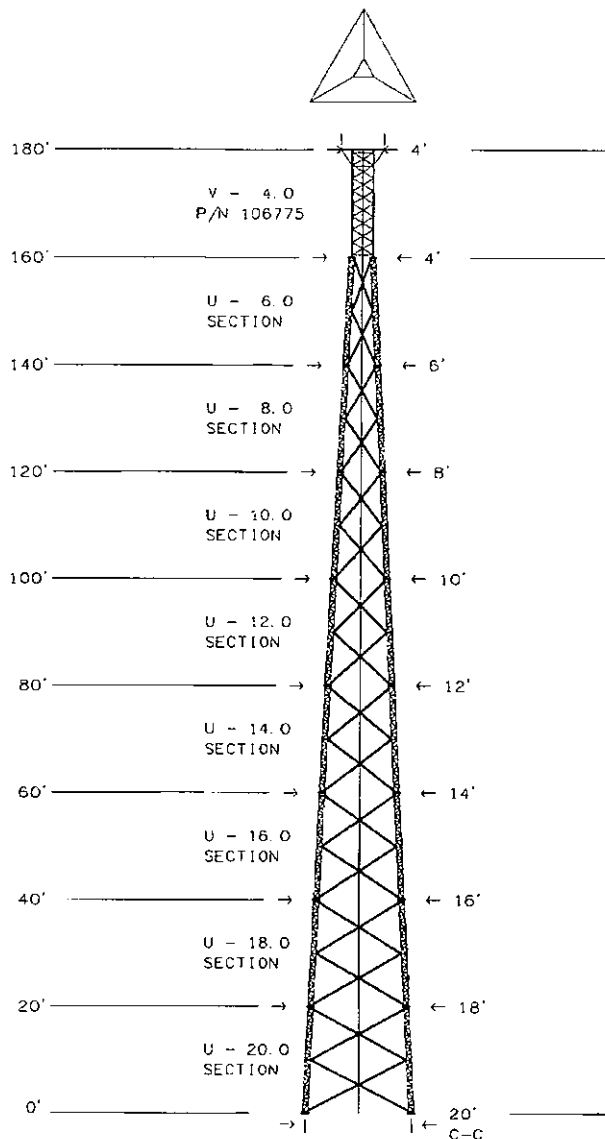
Job 180' Valmont Lattice – Hartland
Description Foundation Analysis

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Available Length in Pier: $L_{\text{pier}} := L_p - 3 \cdot \text{in}$ $L_{\text{pier}} = 42 \cdot \text{in}$
 $L_{\text{piertension}} := \text{if}(L_{\text{pier}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$ $L_{\text{piertension}} = \text{"Okay"}$
 $L_{\text{piercompression}} := \text{if}(L_{\text{pier}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$ $L_{\text{piercompression}} = \text{"Okay"}$

Available Length in Pad: $L_{\text{pad}} := T_f - 3 \cdot \text{in}$ $L_{\text{pad}} = 30 \cdot \text{in}$
 $L_{\text{padtension}} := \text{if}(L_{\text{pad}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$ $L_{\text{padtension}} = \text{"Okay"}$
 $L_{\text{padcompression}} := \text{if}(L_{\text{pad}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$ $L_{\text{padcompression}} = \text{"Okay"}$



FABRICATED SECTIONS
SEE PAGE 2

12" BREAKDOWN
LEG SECTIONS
SEE PAGE 3

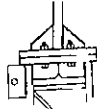
ROADRUNNER INSTALLATION SVCS.
EAST HARTLAND, CT
U-20.0 X 180'

A FOUNDATION PER SOIL REPORT		TMW	04/12/2006	CONNECTICUT, C. O. A. PEC. 797	
REV	DESCRIPTION OF REVISIONS	INI	DATE	APPROVED/ENG. TMW 4/12/2006	
VALMONT STRUCTURES IS A DIVISION OF VALMONT INDUSTRIES, INC. ENGINEERING PROVIDED BY PIROD, INC., WHOLLY OWNED BY VALMONT INDUSTRIES, INC.				APPROVED/FOUND N/A	STRUCTURES
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Printed from 198204_010A.DWG - 04/10/2006 08:46 @ 04/12/2006 16:35				DRAWN BY TMW	DRAWING NO. 198204
				ENG. FILE NO. A-121935-ARCHIVE F-1008742	PAGE 1 OF 9

FABRICATED SECTION DATA 160' - 180' ELEVATION									
SECT LEN	SEC #	SECTION PART#	LEG SIZE	BRACE SIZE	SECT WT * DIAM	BOLTS AT BOTTOM			
20'	V- 4.0	105775	1- 1/2 "	3/4 "	828# 1 "	3-1/2"	18		

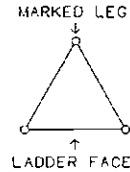
• THE WEIGHTS LISTED ARE THEORETICAL. THE ACTUAL WEIGHTS WILL VARY. ALL WEIGHTS SHOULD BE CONFIRMED IN THE FIELD PRIOR TO ERECTION.

FABRICATED SECTIONS
TRANSITION SIDE VIEW
AT 160' ELEVATION



USE 1 FLATWASHER UNDER EACH
LOCKNUT ON LEG CONNECTION.

FABRICATED SECTIONS
GENERAL SECTION ASSEMBLY
TOP VIEW



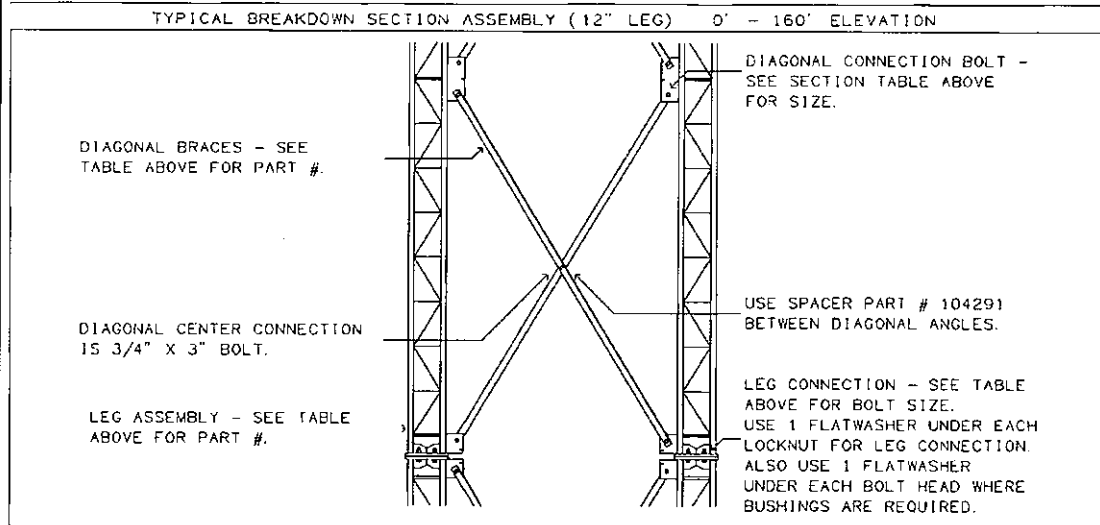
THE MARKED LEG OF EACH SECTION IS STAMPED WITH THE 6 DIGITS OF THE TOWER SERIAL #. ASSEMBLE THE TOWER WITH MARKED LEGS TOGETHER. THE MARKED LEG MAY ALSO CONTAIN JOINT NUMBERS STARTING WITH 1 AT THE TOP OF THE BASE SECTION. IF SO, ERECT WITH JOINTS IN THE PROPER SEQUENCE.

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		CONNECTICUT C.O.A. PEC 797	
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BREAKDOWN SECTION DATA (12" LEG) 0' - 160' ELEVATION													
SEC #	SECTION LENGTH	LEG SIZE	LEG PART#	TOP DIAG PART#	BOT DIAG PART#	DIAGONAL ANGLE	FACE	THICK	WEIGHT	DIAM	LENGTH	DIAG CONNECT	DIAG LENGTH
U- 6.0	20'	1- 1/4"	195554	105898	105556	2-1/2"	3/16"	1921#	1 "	3-1/2"	1 "	2-1/4"	
U- 8.0	20'	1- 1/4"	195554	105558	105561	2-1/2"	3/16"	1950#	1 "	3-1/2"	1 "	2-1/4"	
U-10.0	20'	1- 1/2"	195555	105564	105567	2-1/2"	3/16"	2346#	1 "	3-1/2"	1 "	2-1/4"	
U-12.0	20'	1- 3/4"	195557	105571	105574	3"	3/16"	2914#	1 "	3-1/2"	1 "	2-1/4"	
U-14.0	20'	1- 3/4"	195557	105576	105579	3"	3/16"	2980#	1 "	4-1/4"	1 "	2-1/4"	
U-16.0	20'	2 "	195559	113411	113412	3"	5/16"	4215#	1-1/4"	4-1/2"	1-1/4"	2-3/4"	
U-18.0	20'	2 "	195559	128185	128186	3"	5/16"	4335#	1-1/4"	4-1/2"	1-1/4"	2-3/4"	
U-20.0	20'	2- 1/4"	195560	105598	105601	3-1/2"	5/16"	5256#			1-1/4"	2-3/4"	

* THE WEIGHTS LISTED ARE THEORETICAL. THE ACTUAL WEIGHTS WILL VARY. ALL WEIGHTS SHOULD BE CONFIRMED IN THE FIELD PRIOR TO ERECTION.

+ USE 1 FLATWASHER UNDER EACH LOCKNUT, FOR LEG CONNECTION ONLY. ALSO USE 1 FLATWASHER UNDER EACH BOLT HEAD WHERE BUSHINGS ARE REQUIRED.



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From: F1008742 DFT - 04/10/2006 08:45		CONNECTICUT C.O.A. PEG. 797	
Printed from 198204_0309 DWG - 04/10/2006 08:46 @ 04/12/2006 15:38		APPROVED/ENG. TMH 4/12/2006	
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		198204	
		PAGE 3 OF 9	

GENERAL NOTES

1. TOWER DESIGN CONFORMS TO STANDARD TIA-222-G UTILIZING AN 100 MPH 3-SEC GUST BASIC WIND SPEED WITH A STRUCTURE CLASS II, EXPOSURE B CRITERIA AND TOPOGRAPHIC CATEGORY 3. CREST HEIGHT=300'. WITH NO ICE.
TOWER DESIGN CONFORMS TO STANDARD TIA-222-G UTILIZING AN 40 MPH 3-SEC GUST BASIC WIND SPEED WITH A STRUCTURE CLASS II, EXPOSURE B CRITERIA AND TOPOGRAPHIC CATEGORY 3. CREST HEIGHT=300'. WITH 1" RADIAL ICE.
2. NO TWIST AND SWAY LIMITATIONS SPECIFIED OR USED FOR THIS TOWER.
3. MATERIAL: (A) SOLID RODS TO ASTM A572 GRADE 50.
(B) ANGLES TO ASTM A36.
(C) PIPE TO ASTM A500 GRADE B.
(D) STEEL PLATES TO ASTM A36.
(E) CONNECTION BOLTS TO ASTM A325 OR ASTM A449 ($F_u=120$ KSI AND $F_y=92$ KSI) AND ANCHOR BOLTS TO ASTM A687 ($F_u=150$ KSI AND $F_y=105$ KSI).
4. BASE REACTIONS PER TIA-222-G FOR 100 MPH BASIC WIND SPEED WITH NO ICE:
TOTAL WEIGHT = 53.1 KIPS. MAXIMUM COMPRESSION = 395.6 KIPS PER LEG.
MOMENT = 6545.2 KIP-FT. MAXIMUM UPLIFT = 354.8 KIPS PER LEG.
MAXIMUM SHEAR = 67.4 KIPS TOTAL.
5. BASE REACTIONS PER TIA-222-G FOR 40 MPH BASIC WIND SPEED WITH ICE:
TOTAL WEIGHT = 223.2 KIPS.
MOMENT = 1441.5 KIP-FT.
MAXIMUM SHEAR = 13.8 KIPS TOTAL.
6. FINISH: ALL BOLTS ARE GALVANIZED IN ACCORDANCE WITH ASTM A153 (HOT DIPPED) OR ASTM B695 CLASS 50 (MECHANICAL). ALL OTHER STRUCTURAL MATERIALS ARE GALVANIZED IN ACCORDANCE WITH ASTM 123.
7. ANTENNAS: 180'-(5) DECIBEL -DB809K ON (1) 6 ARM HALO MOUNT WITH 1-5/8" LINES
180'-(4) DECIBEL -DB224 ON SAME HALO MOUNT WITH 7/8" LINES
180'-(2) DECIBEL -BD420 ON SAME HALO MOUNT WITH 1-1/4" LINES
180'-(1) SCALA -PR950 ON SAME HALO MOUNT WITH 1-5/8" LINE
170'-(12) EMS -FV90-1700 ON (3) 12' T-FRAMES WITH 1-5/8" LINES
160'-(12) EMS -FV90-1700 ON (3) 12' T-FRAMES WITH 1-5/8" LINES
150'-(12) EMS -FV90-1700 ON (3) 12' T-FRAMES WITH 1-5/8" LINES
140'-(12) EMS -FV90-1700 ON (3) 12' T-FRAMES WITH 1-5/8" LINES
130'-(12) EMS -FV90-1700 ON (3) 12' T-FRAMES WITH 1-5/8" LINES

NOTE: (A) ELEVATIONS ARE TO THE BOTTOM OF THE ANTENNAS, EXCEPT FOR MICROWAVE DISHES, WHICH ARE TO THE CENTERLINE.
(B) ALL TRANSMISSION LINES MUST BE PLACED ON PIROD SUPPLIED LINE BRACKETS PART # 125495 MOUNTED INSIDE THE TOWER WITH LINES PLACED IN A BACK-TO-BACK CONFIGURATION FOR WIND SHELTERING.
8. REMOVE FOUNDATION TEMPLATE PRIOR TO ERECTING TOWER. INSTALL BASE SECTION WITH MINIMUM OF 2" CLEARANCE ABOVE CONCRETE. SEE BASE SECTION PLACEMENT ON PAGE 7. PACK NON-SHRINK STRUCTURAL GROUT UNDER BASE SECTION AFTER LEVELING TOWER.
9. MIN. WELDS 5/16" UNLESS OTHERWISE SPECIFIED. ALL WELDING TO CONFORM TO AWS D1.1
10. ALL BOLTS AND NUTS MUST BE IN PLACE BEFORE THE ADJOINING SECTIONS ARE INSTALLED
11. ALL STRUCTURAL BOLTS ARE TO BE TIGHTENED TO A SNUG TIGHT CONDITION AS DEFINED BY AISC SPECIFICATION UNLESS OTHERWISE NOTED. A MORE QUANTITATIVE ALTERNATIVE APPROACH TO ACHIEVING A SNUG TIGHT CONDITION IS TO TIGHTEN USING THE TORQUE VALUES FROM DRAWING 123107-A.
12. EIA GROUNDING FOR TOWER.

ROADRUNNER INSTALLATION SVCS.
EAST HARTLAND, CT
U-20.0 X 180'

CONNECTICUT C.O.A. REC 797	
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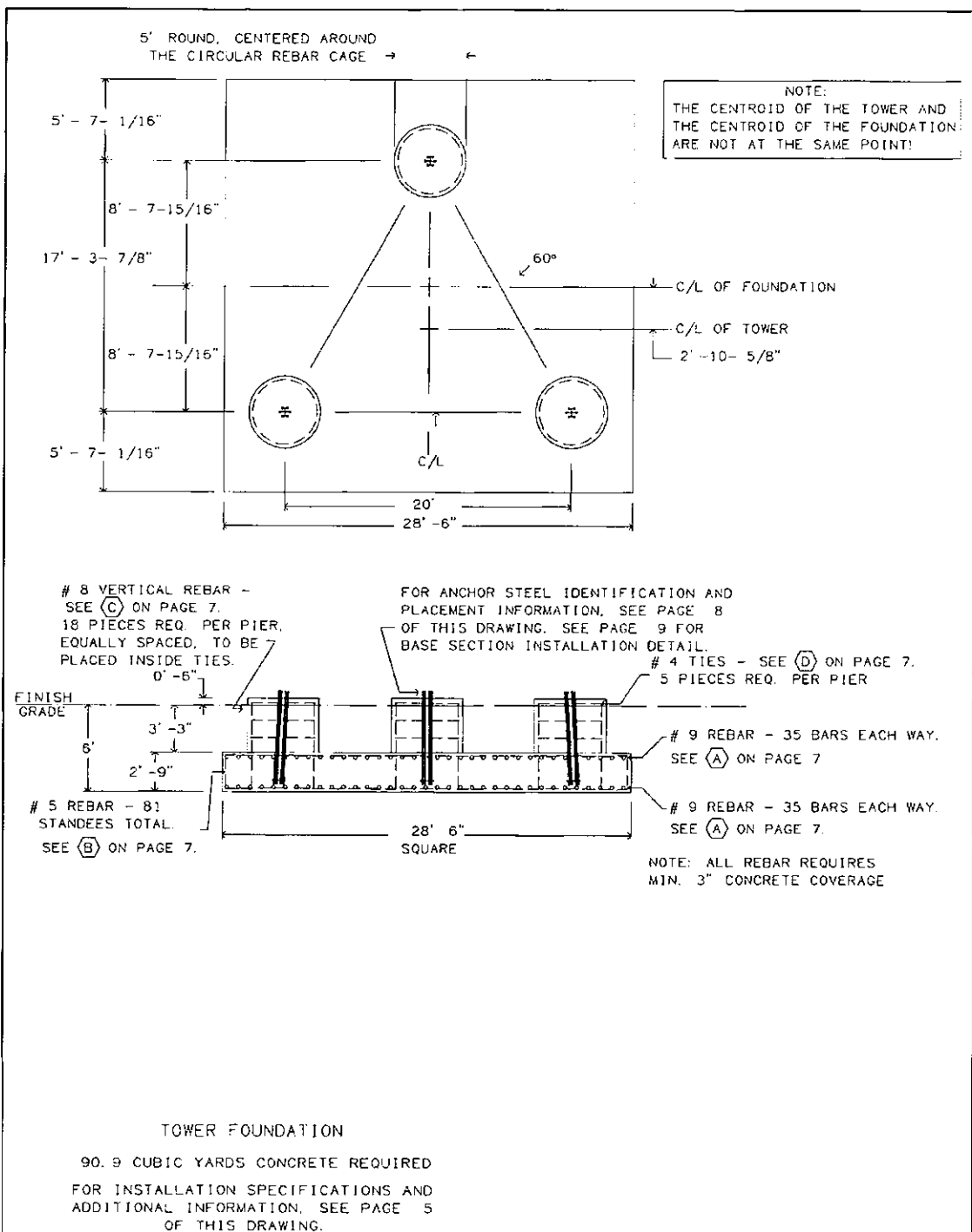
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PAGE 4 OF 9

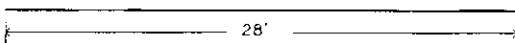
FOUNDATION NOTES

1. SOIL AS PER REPORT DR CLARENCE WELTI, DATED: 9/22/05
2. CONCRETE TO BE 3500 PSI @28 DAYS. REINFORCING BAR TO CONFORM TO ASTM A615 GRADE 60 SPECIFICATIONS. CONCRETE INSTALLATION TO CONFORM TO ACI-318 (2002) BUILDING REQUIREMENTS FOR REINFORCED CONCRETE. ALL CONCRETE TO BE PLACED AGAINST UNDISTURBED EARTH FREE OF WATER AND ALL FOREIGN OBJECTS AND MATERIALS. A MINIMUM OF THREE INCHES OF CONCRETE SHALL COVER ALL REINFORCEMENT. WELDING OF REBAR NOT PERMITTED.
3. A COLD JOINT IS PERMISSIBLE UPON CONSULTATION WITH PIROD. ALL COLD JOINTS SHALL BE COATED WITH BONDING AGENTS PRIOR TO SECOND POUR.
4. ALL FILL SHOULD BE PLACED IN LOOSE LEVEL LIFTS OF NO MORE THAN 12" THICK. FILL MATERIALS SHOULD BE CLEAN AND FREE OF ORGANIC AND FROZEN MATERIALS OR ANY OTHER DELETERIOUS MATERIALS. COMPACT FILL TO 95% OF MODIFIED PROCTOR MAXIMUM DRY DENSITY IN ACCORDANCE WITH ASTM D1557.
5. BENDING, STRAIGHTENING OR REALIGNING (HOT OR COLD) OF THE ANCHOR BOLTS BY ANY METHOD IS PROHIBITED.
6. CROWN TOP OF FOUNDATION FOR PROPER DRAINAGE
7. FOUNDATION IS TO BEAR ON BEDROCK/INSITU CLAY AT APPROXIMATELY 6.0' BELOW GRADE. THE BEARING SURFACE IS TO BE FREE OF ANY LOOSE MATERIAL & SUBSEQUENTLY INSPECTED BY A QUALIFIED ON-SITE GEOTECHNICAL ENGINEER.
8. DIFFICULTIES DURING EXCAVATION MAY ARISE DUE TO THE PRESENCE OF BOULDERS, COBBLES, AND/OR SHALLOW BEDROCK. THE BOULDERS, COBBLES, AND/OR ROCK MUST BE REMOVED FROM THE EXCAVATION.
9. PNEUMATIC HAMMERS, RIPPERS, AND/OR BLASTING MAY BE REQUIRED TO REMOVE MATERIAL FROM THE EXCAVATION.
10. THE FOUNDATION MUST BEAR ENTIRELY ON COMPETENT BEDROCK OR SOIL. THE FOUNDATION IS NOT TO BEAR ON ANY COMBINATION OF SOIL AND BEDROCK AS THIS MAY CAUSE EXCESSIVE DIFFERENTIAL SETTLEMENT.
11. THE TOWER FOUNDATION MUST BEAR BELOW ALL EXISTING UNCONTROLLED FILL AT THIS SITE. A QUALIFIED ON-SITE GEOTECHNICAL ENGINEER MUST INSPECT THE BEARING SURFACE TO ENSURE THAT THE CAPACITY MEETS OR EXCEEDS THAT DISCLOSED IN THE REFERENCED SOIL REPORT.
12. ANY FILL DETECTED BENEATH THE BEARING SHOULD BE REMOVED AND REPLACED WITH COMPACTED FILL, AS DETAILED IN THE SOIL REPORT AND AS DIRECTED BY THE ON-SITE GEOTECHNICAL ENGINEER.
13. THE ON-SITE GEOTECHNICAL ENGINEER SHALL CONFIRM THAT THE INSITU SOIL STRENGTHS MEET OR EXCEED THOSE PARAMETERS GIVEN IN THE SOIL REPORT

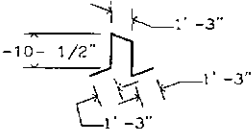
ROADRUNNER INSTALLATION SVCS. EAST HARTLAND, CT U-20.0 X 180'		CONNECTICUT C.O.A. REC. 797 valmont STRUCTURES	
A	FOUNDATION PER SOIL REPORT	TMM	04/12/2006
REV	DESCRIPTION OF REVISIONS	INI	DATE
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		198204	5 OF 9



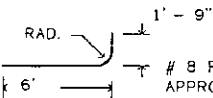
				ROADRUNNER INSTALLATION SVCS. EAST HARTLAND, CT U-20.0 X 180'				
				CONNECTICUT C.O.A. REC. /97		 STRUCTURES		
A	FOUNDATION PER SOIL REPORT	TMW	04/12/2006	APPROVED/ENG.	TMW			4/12/2006
REV	DESCRIPTION OF REVISIONS	INI	DATE	APPROVED/FOUND.	TMW			4/12/2006
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						PAGE	6 OF 9	

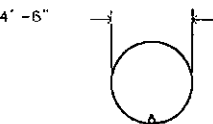
(A)  # 9 REBAR - 140 PIECES REQ. TOTAL
APPROX WT = 95.2# EACH, 13328# TOTAL

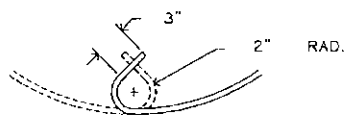
REBAR SUPPORTS MAY CONSIST OF ANY
ACCEPTABLE MEANS OF SECURELY SUPPORTING
THE TOP REINFORCEMENT GRID ABOVE THE
BOTTOM REINFORCEMENT GRID WHILE MAIN-
TAINING A SEPARATION OF 2'-3"
(OUTSIDE REBAR TO OUTSIDE REBAR).

(B) 

5 REBAR - 81 PIECES REQUIRED TOTAL
TYPE 26 STANDEE PLACED BETWEEN REBAR
GRIDS ON NOMINAL 4' SPACING THROUGHOUT
APPROX UNBENT LENGTH = 7' - 5- 3/4"
APPROX WT = 7.8# EACH, 632# TOTAL

(C)  # 8 REBAR - 54 PIECES REQUIRED TOTAL
APPROX UNBENT LENGTH = 7' - 7- 3/8"
APPROX WT = 20.3# EACH, 1096# TOTAL

(D)  # 4 REBAR - 15 PIECES REQUIRED TOTAL
WITH 135 DEGREE HOOK ON EACH END
APPROX UNBENT LENGTH = 15' - 5- 1/8"
APPROX WT = 10.3# EACH, 155# TOTAL

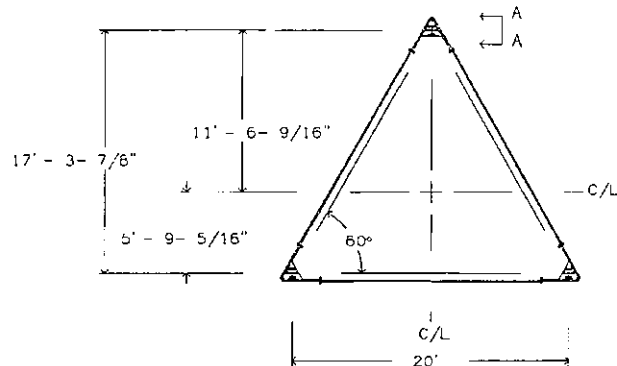

DETAIL OF 135 DEGREE HOOKS

PLACE CIRCULAR TIES SO THAT HOOKS ON
ADJACENT TIES ARE 180 DEGREES APART
AND HOOKS ENCIRCLE A VERTICAL BAR.
PLACE ONE TIE AT TOP OF PAD AND TWO
TIES AT TOP OF PIER REBAR. EQUALLY
SPACE REMAINING TIES ALONG PIER.

REBAR DETAIL

TOTAL APPROX REBAR WEIGHT = 15211#
REINFORCING BAR TO CONFORM TO
ASTM A615 GRADE 60 SPECIFICATIONS.

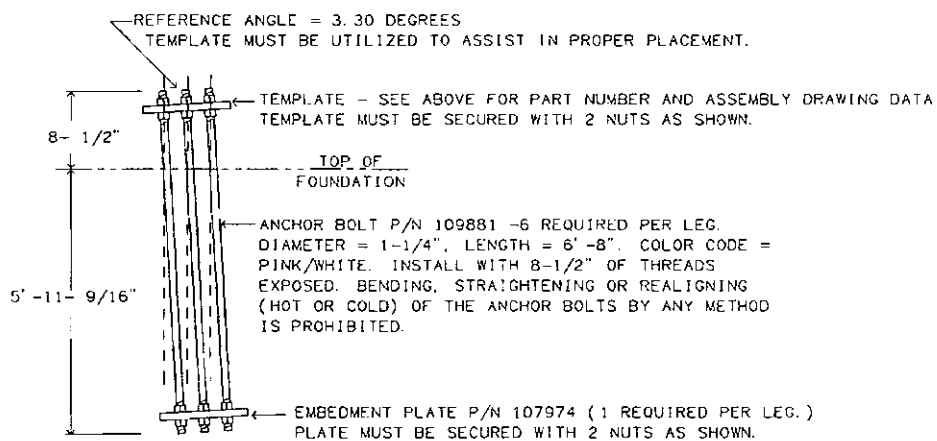
				ROADRUNNER INSTALLATION SVCS. EAST HARTLAND, CT U-20.0 X 180'				
				CONNECTICUT C.O.A. PEC 797				
A	FOUNDATION PER SOIL REPORT		TW	04/12/2006	APPROVED/ENG.	TW	4/12/2006	 STRUCTURES
REV	DESCRIPTION OF REVISIONS		INI	DATE	APPROVED/FOUND.	TW	4/12/2006	
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Printed from 198204_D70A.DWG - 04/12/2006 11:24 @ 04/12/2006 16:37					ENG. FILE NO	A-121935-	198204	
					ARCHIVE	F-1008742	PAGE	7 OF 9



TOWER ANCHOR STEEL PLACEMENT - TOP VIEW

TEMPLATE ASSEMBLY P/N 159427 INCLUDES CORNER PLATE P/N 158387. IS REQUIRED FOR INSTALLATION AND MUST BE PLACED AS SHOWN. SEE DRAWING # 159394 FOR TEMPLATE ASSEMBLY DETAILS. CENTER OF TEMPLATE MUST BE PLACED OVER CENTER OF FOUNDATION $\pm 3"$. EACH LEG MUST BE CENTERED IN PIER WITHIN $\pm 10\%$ OF PIER DIAMETER. TEMPLATE MUST BE LEVEL ± 1 DEGREE. INSTALL TEMPLATE WITH SUFFICIENT SPACE BENEATH (2" MINIMUM) TO PERMIT FINISHING OF CONCRETE AND TO FACILITATE TEMPLATE REMOVAL PRIOR TO TOWER ERECTION.

SEE PAGE 9 FOR BASE SECTION INSTALLATION DETAIL.



VIEW A - A - ANCHOR BOLT INSTALLATION DETAIL (NOT TO SCALE)

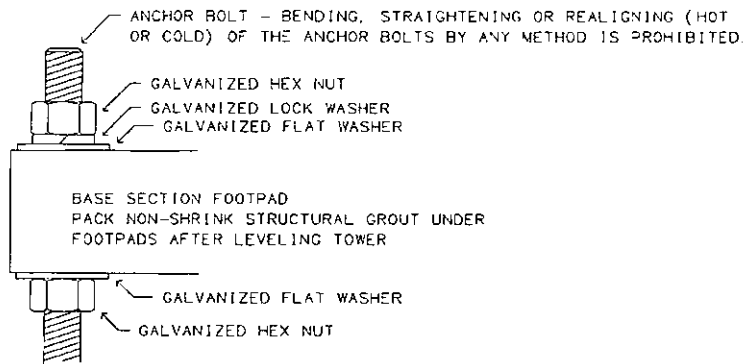
ATTENTION CONTRACTOR INSTALLING THE ANCHOR BOLTS!

1-1/4" DIAMETER ANCHOR BOLTS FOR TAPERED TOWER.

VERIFY THE PART NUMBERS AND SIZES FOR ALL COMPONENTS ON THIS PAGE AND PAGE 9.

IF THERE ARE ANY DISCREPANCIES, PLEASE NOTIFY PIROD, INC., PRIOR TO INSTALLATION!!

				ROADRUNNER INSTALLATION SVCS. EAST HARTLAND, CT U-20.0 X 180'	
FOUNDATION PER SOIL REPORT		TMW 04/12/2006		CONNECTICUT C.O.A. REC. 797	
REV	DESCRIPTION OF REVISIONS	INITIAL	DATE	APPROVED/ENG.	TMW 4/12/2006
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				ARCHIVE	F-1008742
				DRAWING NO 198204	
				PAGE 8 OF 9	



BASE SECTION INSTALLATION DETAIL

				ROADRUNNER INSTALLATION SVCS. EAST HARTLAND, CT U-20.0 X 180'			
				CONNECTICUT C. O. A. REC. 797			
A	FOUNDATION PER SOIL REPORT	TMW	04/12/2006	APPROVED/ENG.	TMW	4/12/2006	valmont  VALMONT STRUCTURES
REV	DESCRIPTION OF REVISIONS	INI	DATE	APPROVED/FOUND.	TMW	4/12/2006	
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General Power Density

Site Name: Hartland, CT
Cumulative Power Density

Operator	Operating Frequency (MHz)	Number of Trans	ERP Per Trans (watts)	Total ERP (watts)	Distance to Target (feet)	Calculated Power Density (mW/cm ²)	Maximum Permissible Exposure (mW/cm ²)	Fraction of MPE (%)
VZW	1970	3	485	1455	170	0.0181	1.0	1.81%
VZW	875	9	300	2700	170	0.0336	0.583	5.76%

Total Percentage of Maximum Permissible Exposure

7.57%

*Guidelines adopted by the FCC on August 1, 1996, 47 CFR Part 1 based on NCRP Report 86, 1986 and generally on ANSI/IEEE C95.1-1992

MHz = Megahertz

mW/cm² = milliwatts per square centimeter

ERP = Effective Radiated Power

Absolute worst case maximum values used.