

ROBINSON & COLE

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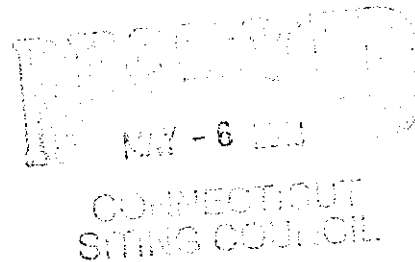
KENNETH C. BALDWIN

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Also admitted in Massachusetts

May 3, 2013

Melanie A. Bachman
Acting Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051



Re: **Notice of Exempt Modification – Facility Modification**
705 West Johnson Avenue, Cheshire, Connecticut

Dear Ms. Bachman:

Cellco Partnership d/b/a Verizon Wireless (“Cellco”) currently maintains twelve (12) antennas at the top of the existing 140-foot tower at 705 West Johnson Avenue in Cheshire. The tower and underlying property are owned by Northeast Utilities. The Council approved Cellco’s shared use of this tower in 2007. Cellco now intends to replace two (2) of its existing antennas with two (2) model BXA-70063-6CF LTE antennas at the same height on the tower. Attached behind Tab 1 are the specifications for the replacement antennas.



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Please accept this letter as notification pursuant to R.C.S.A. § 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.S.A. § 16-50j-73, a copy of this letter is being sent to Michael A. Milone, Cheshire’s Town Manager.

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

1. The proposed modifications will not result in an increase in the height of the existing tower. Cellco’s replacement antennas will be located at the top of the existing 140-foot tower.

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

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ROBINSON & COLE_{LLP}

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3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

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

5. The proposed modifications will not cause a change or alteration in the physical or environmental characteristics of the site.

6. The tower and its foundation can support Cellco's proposed antenna modifications. (See Structural Analysis Report attached behind Tab 3).

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

Sincerely,



Kenneth C. Baldwin

Enclosures

Copy to:

Michael A. Milone, Cheshire Town Manager

Sandy M. Carter



BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

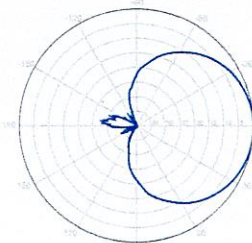
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz			
Frequency bands	696-806 MHz		806-900 MHz	
Polarization	±45°			
Horizontal beamwidth	65°		63°	
Vertical beamwidth	13°		11°	
Gain	14.0 dBd (16.1 dBi)		14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10			
Impedance	50Ω			
VSWR	≤1.35:1			
Upper sidelobe suppression (0°)	-18.3 dB		-18.2 dB	
Front-to-back ratio (+/-30°)	-33.4 dB		-36.3 dB	
Null fill	5% (-26.02 dB)			
Isolation between ports	< -25 dB			
Input power with EDIN connectors	500 W			
Input power with NE connectors	300 W			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1804 x 285 x 132 mm		71.0 x 11.2 x 5.2 in	
Depth with z-brackets	172 mm		6.8 in	
Weight without mounting brackets	7.9 kg		17 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.51 m ²	Side: 0.24 m ²	Front: 5.5 ft ²	Side: 2.6 ft ²
Wind load @ 161 km/hr (100 mph)	Front: 759 N	Side: 391 N	Front: 169 lbf	Side: 89 lbf
Mounting Options	Part Number	Fits Pipe Diameter		Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm	1.57-4.5 in	6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP			

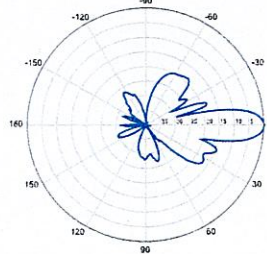


BXA-70063-6CF-EDIN-X



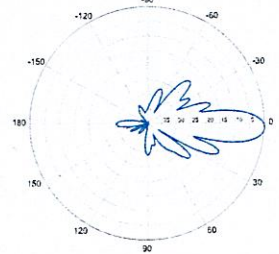
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

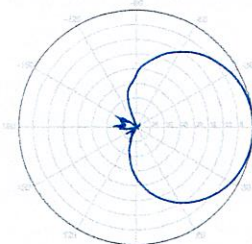


0° | Vertical | 750 MHz

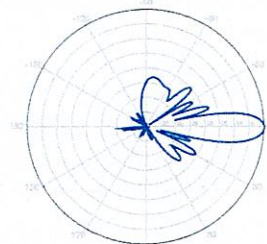
BXA-70063-6CF-EDIN-2



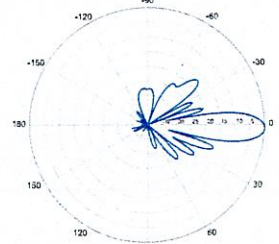
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



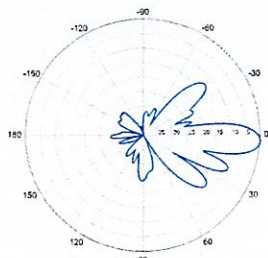
2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.

BXA-70063-6CF-EDIN-X

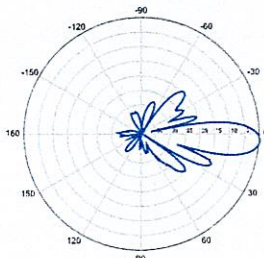
X-Pol | FET Panel | 63° | 14.5 dBd

BXA-70063-6CF-EDIN-3



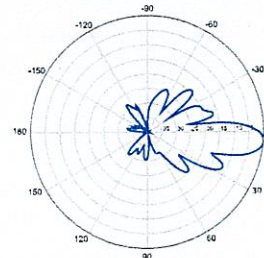
3° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-4

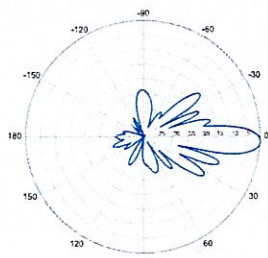


4° | Vertical | 750 MHz

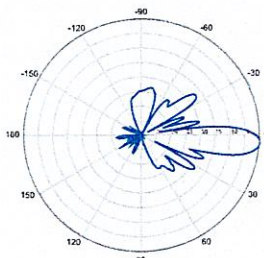
BXA-70063-6CF-EDIN-5



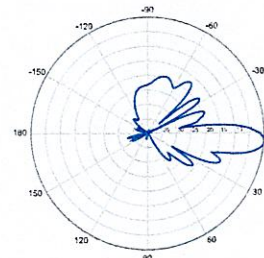
5° | Vertical | 750 MHz



3° | Vertical | 850 MHz

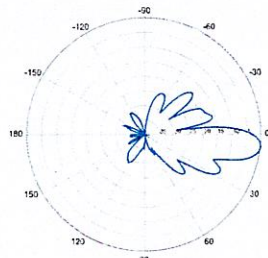


4° | Vertical | 850 MHz



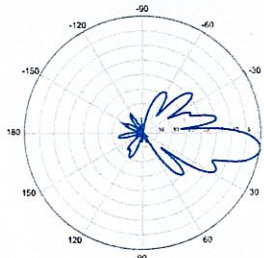
5° | Vertical | 850 MHz

BXA-70063-6CF-EDIN-6



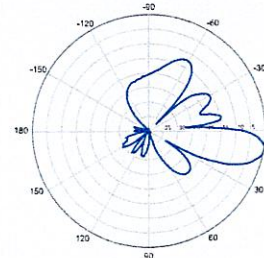
6° | Vertical | 750 MHz

BXA-70063-6CF-EDIN-8

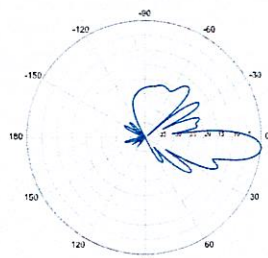


8° | Vertical | 750 MHz

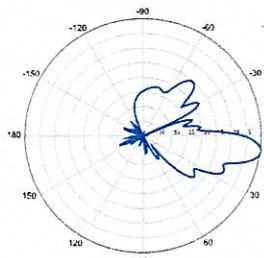
BXA-70063-6CF-EDIN-10



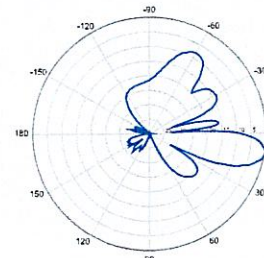
10° | Vertical | 750 MHz



6° | Vertical | 850 MHz



8° | Vertical | 850 MHz



10° | Vertical | 850 MHz

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Structural Analysis Report

140' Existing Lattice Tower

*Proposed Verizon Wireless
Antenna Upgrade*

Verizon Site Ref: Cheshire North 2

*705 West Johnson Ave.
Cheshire, CT*

Centek Project No. 13075.CO5

Date: April 22, 2013



Prepared for:

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

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Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna installation/modification proposed by Verizon Wireless on the existing lattice tower located in Cheshire, Connecticut.

The host tower is a 140-ft, three legged, lattice tower originally designed and manufactured by Central Tower drawing no. CT2397-1 dated 10/13/2004. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural report prepared by Centek Engineering job no. 11118.CO68 dated August 9, 2012.

Antenna and appurtenance inventory were taken from the aforementioned Centek structural report and a RF data sheet.

The tower consists of seven (7) vertical sections consisting of solid round pipe legs conforming to ASTM A572 Gr. 50 and lateral bracing conforming to ASTM A36. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 5-ft 0-in at the top and 14-ft 0-in at the bottom.

Verizon Wireless proposes the replacement of two (2) existing panel antennas with two (2) proposed panel antennas mounted to the existing three (3) T-Frames. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

The existing tower supports several communication antennas. The existing and proposed loads considered in the analysis consist of the following:

- Northeast Utilities (Reserved):
Antennas: Two (2) 1142-2C Omni-directional whip antennas leg mounted with an elevation of ± 140 -ft above grade level.
Coax Cable: Two (2) 7/8" $\varnothing$ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- Northeast Utilities (Existing):
Antennas: One (1) 1142-2C Omni-directional whip antennas leg mounted with an elevation of ± 140 -ft above grade level.
Coax Cable: One (1) 7/8" $\varnothing$ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- MetroPCS (Reserved):
Antennas: Six (6) Andrew HBX-6516DS panel antennas and six (6) Andrew ATM200-A20 Actuators mounted on three (3) sector mounts with a RAD center elevation of ± 120 -ft above grade level.
Coax Cable: 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.
- Northeast Utilities (Reserved):
Antennas: Two (2) 6-ft $\varnothing$ dishes leg mounted with an elevation of ± 110 -ft above grade level.
Coax Cable: Two (2) EW63 cables running on a leg/face of the existing tower as specified in Section 3 of this report.

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Structural Analysis - 140-ft Lattice Tower
Verizon Wireless Antenna Upgrade – Cheshire North 2
Cheshire, CT
April 22, 2013

- **AT&T (Existing):**
Antennas: Nine (9) KMW AM-X-CD-16-65-00T panel antennas and six (6) CCI DTMABP7819VG12A TMA's mounted on three (3) 12-ft T-Frames with a RAD center elevation of ± 98 -ft above grade level.
Coax Cable: 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.
- **AT&T (Existing):**
Antennas: Six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrester leg mounted with an elevation of 95-ft above grade level.
Coax Cables: One (1) fiber cable and two (2) dc control cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **Northeast Utilities (Reserved):**
Antennas: One (1) Andrew PL4-107 microwave dish leg mounted with an elevation of ± 78 -ft above grade level.
Coax Cable: One (1) WE65 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **Northeast Utilities (Existing):**
Antennas: One (1) Andrew PL4-107 microwave dish leg mounted with an elevation of ± 78 -ft above grade level.
Coax Cable: One (1) E65 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **Verizon (Existing to Remain):**
Antennas: Six (6) Antel LPA185080-12CF panel antennas, three (3) Andrew DB854DG65ESX panel antennas, one (1) Antel BXA-70063/6CF panel antenna and six (6) RFS FD9R6004/2C-3L Diplexers mounted on three (3) 12-ft T-Frames with a RAD center elevation of ± 138 -ft above grade level.
Coax Cable: 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.
- **Verizon (Existing to Remove):**
Antennas: Two (2) Powerwave P65-16-XL-2 panel antennas mounted on three (3) 12-ft T-Frames with a RAD center elevation of ± 138 -ft above grade level.
- **Verizon (Proposed):**
Antennas: Two (2) Antel BXA-70063/6CF panel antennas mounted on three (3) 12-ft T-Frames with a RAD center elevation of ± 138 -ft above grade level.

CEN TEK Engineering, Inc.

Structural Analysis - 140-ft Lattice Tower

Verizon Wireless Antenna Upgrade – Cheshire North 2

Cheshire, CT

April 22, 2013

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 should be routed as specified in section 3 of this report.

Analysis

The existing tower was analyzed using a comprehensive computer program entitled tnxTower. 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 85mph basic wind speed (fastest mile) with no ice and 85mph with ½ inch accumulative ice to determine stresses in members as per guidelines of Northeast Utilities Substation Standard (NU SUB-090), TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

Tower Loading

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

Basic Wind Speed:	New Haven; v = 85 mph (fastest mile)	[Section 16 of TIA/EIA-222-F-96]
	NU SUB-090; v = 85 mph (fastest mile)	[Northeast Utilities Substation Standard 090]
	Cheshire; v = 100 mph (3 second gust) equivalent to v = 80 mph (fastest mile)	[Appendix K of the 2005 CT Building Code Supplement]
	NU-SUB-090 wind speed controls	
Load Cases:	<u>Load Case 1</u> ; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design.	[Northeast Utilities Substation Standard 090]
	<u>Load Case 2</u> ; 85 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. This load case typically controls the design of lattice towers.	[Northeast Utilities Substation Standard 090]
	<u>Load Case 3</u> ; Seismic – not checked	[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software tnxTower. 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 tnxTower "Section Capacity Table", this tower was found to be at **81.0%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Diagonal Bolts (T7)	0'-0"-20'-0"	81.0%	PASS
Leg (T3)	80'-0"-100'-0"	68.5%	PASS

- The combined tower deflection was found to be within allowable limits as prescribed by Northeast Utilities.

Deflection (degrees)	Proposed	Allowable	Result
Sway (Tilt)	0.5084 ⁽¹⁾	0.5	PASS
Twist	0.1139	0.5	PASS
Combined	0.5210 ⁽¹⁾	0.5	PASS

Note 1: Under the proposed Load Case 2 the tower marginally exceeds NU-SUB-90 limitation of 0.5 degrees. Tower deflection approved by Northeast Utilities per Steve Florio on 8.9.12.

Foundation and Anchors

The existing foundation consists of a three (3) 4-ft Ø x 5-ft long reinforced concrete piers concentrically bearing on a 30-ft square x 2-ft 6-in thick reinforced concrete mat. The sub grade conditions used in the foundation analysis were derived from aforementioned structural report prepared by Centek Engineering job no. 11118.CO68 dated August 9, 2012. The base of the tower is connected to the foundation by means of (6) 1.25"Ø, ASTM A449 anchor bolts per leg embedded 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:

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Verizon Wireless Antenna Upgrade – Cheshire North 2
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- The tower reactions developed from the governing Load Case 2 were used in the verification of the foundation:

Location	Vector	Proposed Base Reactions
Base	Shear	34 kips
	Compression	42 kips
	Moment	2902 kip-ft
Leg	Shear	22 kips
	Uplift	223 kips
	Compression	253 kips

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	60.7%	PASS

- The foundation was found to be within allowable limits.

Foundation	Design Limit	IBC 2003/2005 CT State Building Code Section 3108.4.2 (FS) ⁽¹⁾	Proposed Loading (FS) ⁽¹⁾	Result
Reinforced concrete pier (3) on reinforced concrete mat	OM	2.0	2.22	PASS

Note 1: FS denotes Factor of Safety

Conclusion

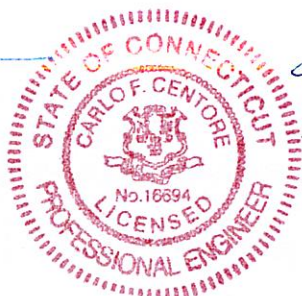
This analysis finds the subject tower **structurally adequate** to support the proposed modified antenna configuration.

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer



Prepared by:

Timothy J. Lynn, EIT
Structural Engineer

CENTEK Engineering, Inc.
Structural Analysis - 140-ft Lattice Tower
Verizon Wireless Antenna Upgrade – Cheshire North 2
Cheshire, CT
April 22, 2013

*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 CENTEK engineering, 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 CENTEK engineering, 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. CENTEK engineering, Inc. is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

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Structural Analysis - 140-ft Lattice Tower
Verizon Wireless Antenna Upgrade – Cheshire North 2
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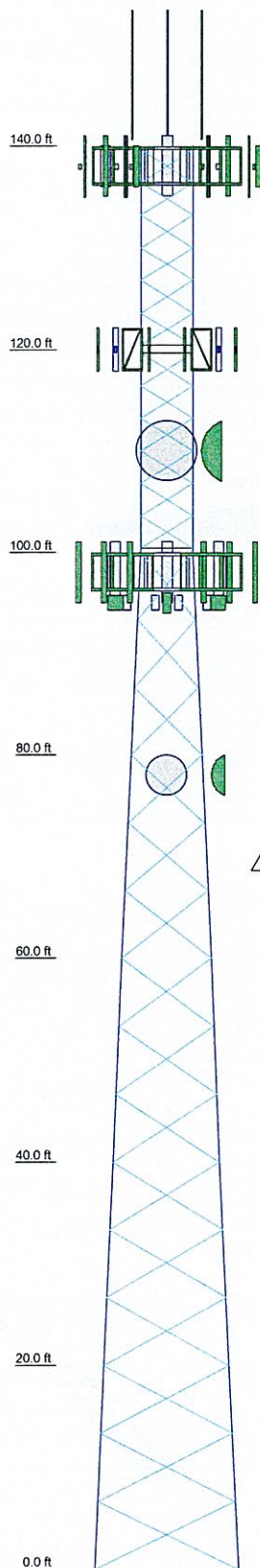
General Description of Structural Analysis Program

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

tnxTower Features:

- tnxTower 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.
- tnxTower contains unique features such as True Cable behavior, hog rod take-up, foundation stiffness and much more.

Section	T1	T2	T3	T4	T5	T6	T7	
Legs	SR 1 3/4	SR 2 1/2	SR 3 1/2	SR 3 3/4	SR 4	SR 4 1/4	SR 4 1/2	
Leg Grade	SR 3/4	SR 7/8	L2x1/4	A572-50	L2 1/2x2 1/2x3/16	L2 1/2x2 1/2x1/4	L3x3x3/16	
Diagonals				A36				
Top Girts	SR 3/4	SR 7/8			N.A.			
Bottom Girts	SR 3/4	SR 7/8			N.A.			
Face Width (ft)					8.6	10.4	12.2	
# Panels @ (ft)					15 @ 0.66667			
Weight (K)	0.9	1.5	2.5	2.8	3.2	3.9	4.2	19.0



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
1142-2C (NU Existing)	140	(2) HBX-6516DS (MetroPCS Reserved)	120
1142-2C (NU Reserved)	140	(2) ATM200-A20 Actuator (MetroPCS Reserved)	120
1142-2C (NU Reserved)	140	(2) ATM200-A20 Actuator (MetroPCS Reserved)	120
Piord 12' T-Frame Sector Mount (1) (Verizon Existing)	138	(2) ATM200-A20 Actuator (MetroPCS Reserved)	120
Piord 12' T-Frame Sector Mount (1) (Verizon Existing)	138	(2) ATM200-A20 Actuator (MetroPCS Reserved)	120
Piord 12' T-Frame Sector Mount (1) (Verizon Existing)	138	6 FT DISH (NU Reserved)	110
DB854DG65ESX (Verizon Existing)	138	6 FT DISH (NU Reserved)	110
LPA-185080/12CF (Verizon Existing)	138	(3) AM-X-CD-16-65-00T-RET(72") (ATI Existing)	98
BXA-70063/6CF (Verizon Proposed)	138	(3) AM-X-CD-16-65-00T-RET(72") (ATI Existing)	98
LPA-185080/12CF (Verizon Existing)	138	(3) AM-X-CD-16-65-00T-RET(72") (ATI Existing)	98
DB854DG65ESX (Verizon Existing)	138	(3) AM-X-CD-16-65-00T-RET(72") (ATI Existing)	98
LPA-185080/12CF (Verizon Existing)	138	(2) DTMABP7819VG12A TMA (ATI Existing)	98
BXA-70063/6CF (Verizon Existing)	138	(2) DTMABP7819VG12A TMA (ATI Existing)	98
LPA-185080/12CF (Verizon Existing)	138	(2) DTMABP7819VG12A TMA (ATI Existing)	98
DB854DG65ESX (Verizon Existing)	138	Piord 12' T-Frame Sector Mount (1) (ATI Existing)	98
LPA-185080/12CF (Verizon Existing)	138	Piord 12' T-Frame Sector Mount (1) (ATI Existing)	98
BXA-70063/6CF (Verizon Proposed)	138	Piord 12' T-Frame Sector Mount (1) (ATI Existing)	98
LPA-185080/12CF (Verizon Existing)	138	DC6-48-60-18-8F Surge Arrestor (ATI Existing)	95
(2) FD9R6004/2C-3L Diplexer (Verizon Existing)	138	(2) RRUS-11 (ATI Existing)	95
(2) FD9R6004/2C-3L Diplexer (Verizon Existing)	138	(2) RRUS-11 (ATI Existing)	95
(2) FD9R6004/2C-3L Diplexer (Verizon Existing)	138	(2) RRUS-11 (ATI Existing)	95
Piord 4' Side Mount Standoff (1) (MetroPCS Reserved)	120	PL4-107 (NU Existing)	78
Piord 4' Side Mount Standoff (1) (MetroPCS Reserved)	120	PL4-107 (NU Reserved)	78
Piord 4' Side Mount Standoff (1) (MetroPCS Reserved)	120		
(2) HBX-6516DS (MetroPCS Reserved)	120		
(2) HBX-6516DS (MetroPCS Reserved)	120		

MATERIAL STRENGTH

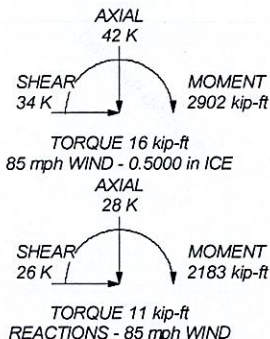
GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A36	36 ksi	58 ksi

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 85 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 85 mph wind.
4. TOWER RATING: 81%

MAX. CORNER REACTIONS AT BASE:

DOWN: 253 K
UPLIFT: -223 K
SHEAR: 22 K



Centek Engineering Inc.

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

Job: 13075.CO5 - Cheshire North 2

Project: 140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT

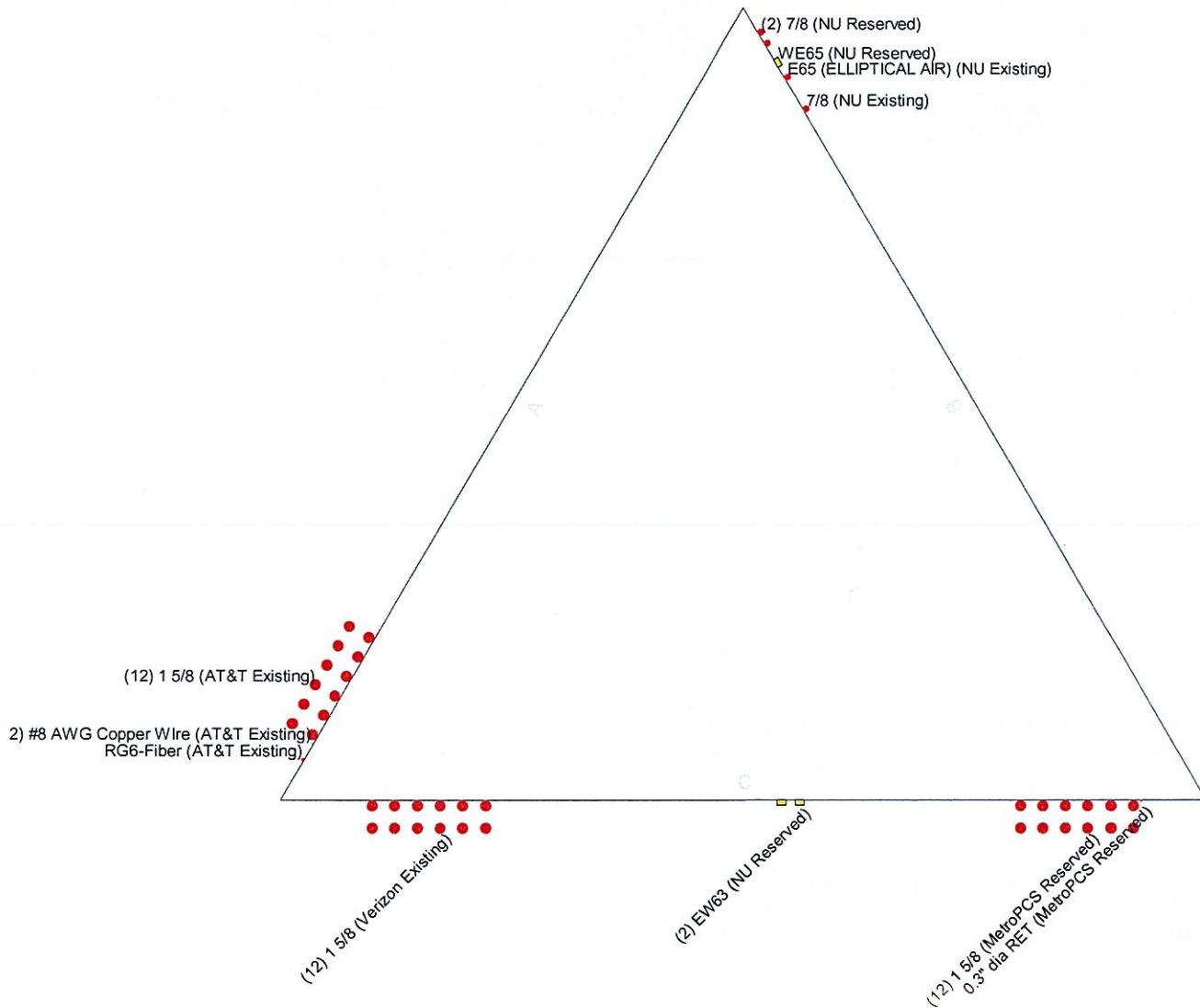
Client: Verizon Wireless Drawn by: TJL App'd:

Code: TIA/EIA-222-F Date: 04/22/13 Scale: NTS

Path: J:\Jobs\1307500 WCO5 - Cheshire North 2\Calcs\ERI\Final\140' Lattice Tower.dwg Dwg No. E-1

Feedline Plan

Round Flat App In Face App Out Face

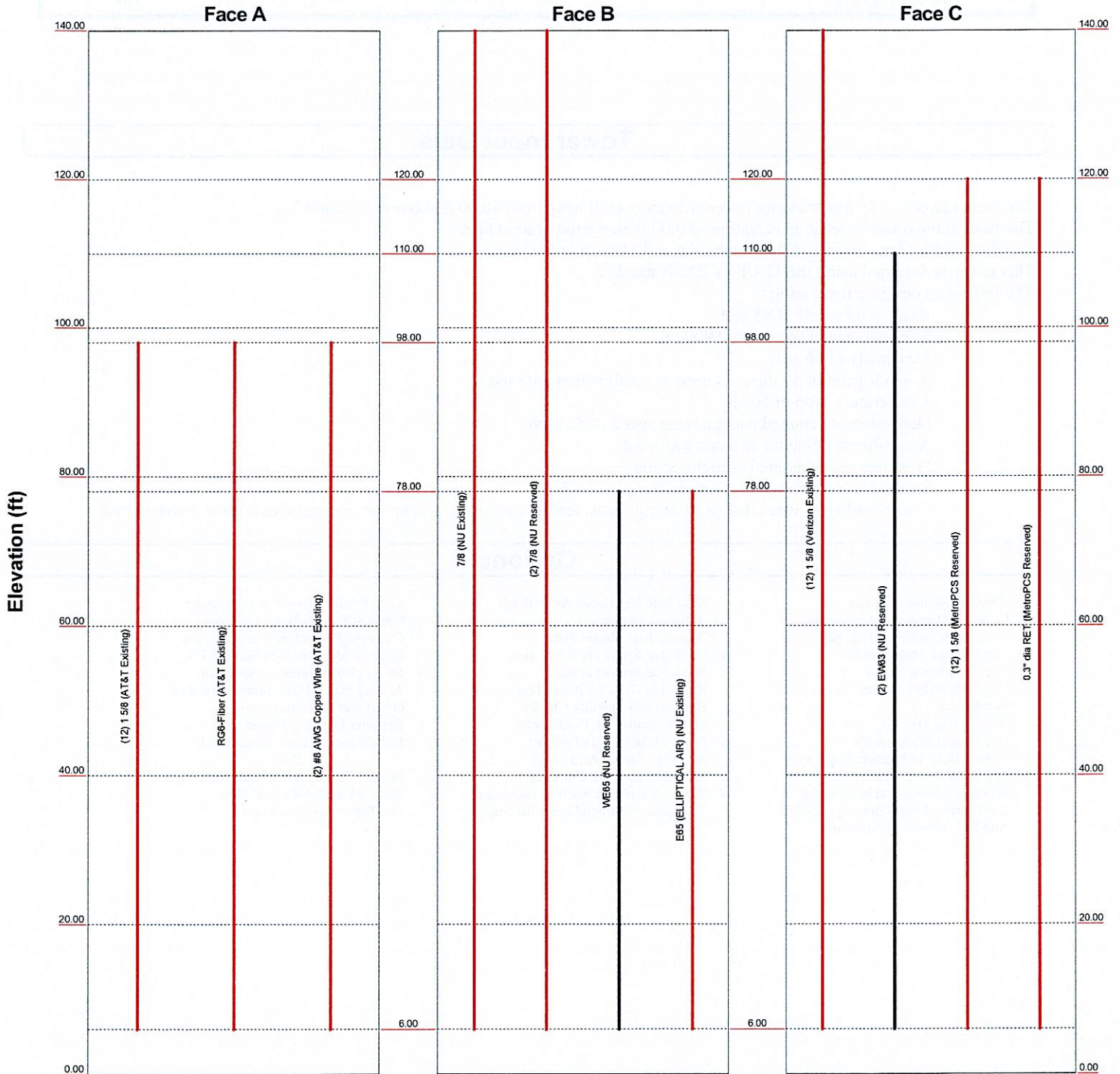


Centek Engineering Inc.		Job: 13075.CO5 - Cheshire North 2	
63-2 North Branford Rd.		Project: 140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	
Branford, CT 06405		Client: Verizon Wireless	Drawn by: TJL
Phone: (203) 488-0580		Date: 04/22/13	App'd:
FAX: (203) 488-8587		Code: TIA/EIA-222-F	Scale: NTS
		Path:	Dwg No. E-7

Feedline Distribution Chart

0' - 140'

Round Flat App In Face App Out Face Truss Leg



Centek Engineering Inc.		Job: 13075.CO5 - Cheshire North 2	
63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587		Project: 140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	
Client: Verizon Wireless	Drawn by: T.JL	App'd:	
Code: TIA/EIA-222-F	Date: 04/22/13	Scale: NTS	
Path:	J:\Users\1307500\W\CO5 - Cheshire North 2\Calc\ER\Files\140' Central Lattice Tower	Dwg No: E-7	

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13075.CO5 - Cheshire North 2	Page	1 of 31
	Project	140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date	12:04:20 04/22/13
	Client	Verizon Wireless	Designed by	TJL

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 140.00 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 5.00 ft at the top and 14.00 ft at the base.

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

The following design criteria apply:

Basic wind speed of 85 mph.

Nominal ice thickness of 0.5000 in.

Ice density of 56 pcf.

A wind speed of 85 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 85 mph.

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

Pressures are calculated at each section.

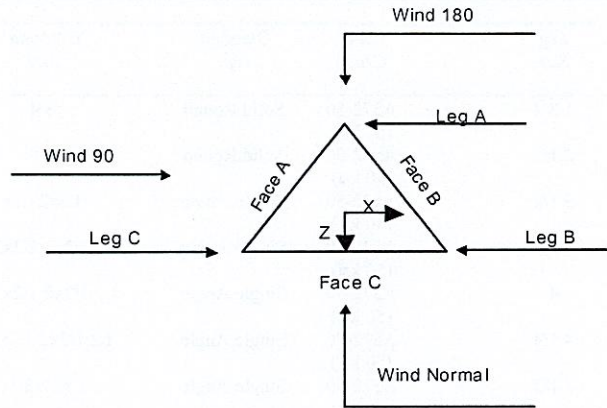
Stress ratio used in tower member design is 1.333.

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		

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	Client	Verizon Wireless	Designed by	TJL



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	140.00-120.00			5.00	1	20.00
T2	120.00-100.00			5.00	1	20.00
T3	100.00-80.00			5.00	1	20.00
T4	80.00-60.00			6.80	1	20.00
T5	60.00-40.00			8.60	1	20.00
T6	40.00-20.00			10.40	1	20.00
T7	20.00-0.00			12.20	1	20.00

Tower Section Geometry (cont'd)

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	140.00-120.00	3.21	X Brace	No	No	4.5000	4.5000
T2	120.00-100.00	3.21	X Brace	No	No	4.5000	4.5000
T3	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T4	80.00-60.00	6.67	X Brace	No	No	0.0000	0.0000
T5	60.00-40.00	6.67	X Brace	No	No	0.0000	0.0000
T6	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T7	20.00-0.00	6.67	X Brace	No	No	0.0000	0.0000

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13075.CO5 - Cheshire North 2	Page	3 of 31
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	Client	Verizon Wireless	Designed by	TJL

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 140.00-120.00	Solid Round	1 3/4	A572-50 (50 ksi)	Solid Round	3/4	A36 (36 ksi)
T2 120.00-100.00	Solid Round	2 1/2	A572-50 (50 ksi)	Solid Round	7/8	A36 (36 ksi)
T3 100.00-80.00	Solid Round	3 1/2	A572-50 (50 ksi)	Single Angle	L2x2x1/4	A36 (36 ksi)
T4 80.00-60.00	Solid Round	3 3/4	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T5 60.00-40.00	Solid Round	4	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T6 40.00-20.00	Solid Round	4 1/4	A572-50 (50 ksi)	Single Angle	L2 1/2x2 1/2x1/4	A36 (36 ksi)
T7 20.00-0.00	Solid Round	4 1/2	A572-50 (50 ksi)	Single Angle	L3x3x3/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 140.00-120.00	Solid Round	3/4	A36 (36 ksi)	Solid Round	3/4	A36 (36 ksi)
T2 120.00-100.00	Solid Round	7/8	A36 (36 ksi)	Solid Round	7/8	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontal in
T1 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	30.0000	30.0000
T2 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

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Tower Section Geometry (cont'd)

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors ¹							
			Legs	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	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00										
T2	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00										
T3	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00										
T4	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00										
T5	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00										
T6	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00										
T7 20.00-0.00	Yes	Yes	1	1	1	1	1	1	1	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.

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	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	0.75	0.0000	1	0.0000	0.75
140.00-120.00														
T2	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
120.00-100.00														
T3	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
100.00-80.00														
T4 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
T5 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
T6 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
T7 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)

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	Page
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	Client Verizon Wireless	Designed by TJL

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 140.00-120.00	Flange	0.0000 A325N	0	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 120.00-100.00	Flange	0.0000 A325N	0	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 100.00-80.00	Flange	0.7500 A325N	4	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 80.00-60.00	Flange	1.1250 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 60.00-40.00	Flange	1.1250 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 40.00-20.00	Flange	1.2500 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 20.00-0.00	Flange	1.2500 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

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 (AT&T Existing)	A	Yes	Ar (CfAe)	98.00 - 6.00	0.0000	-0.36	12	6	1.9800	1.9800		1.04
1 5/8 (Verizon Existing)	C	Yes	Ar (CfAe)	140.00 - 6.00	0.0000	0.34	12	6	1.9800	1.9800		1.04
7/8 (NU Existing)	B	Yes	Ar (CfAe)	140.00 - 6.00	0.0000	-0.37	1	1	1.1100	1.1100		0.54
7/8 (NU Reserved)	B	Yes	Ar (CfAe)	140.00 - 6.00	0.0000	-0.46	2	2	1.1100	1.1100		0.54
WE65 (NU Reserved)	B	Yes	Af (CfAe)	78.00 - 6.00	0.0000	-0.43	1	1	1.5836	1.5836	5.1284	0.53
E65 (ELLIPTICAL AIR)	B	Yes	Ar (CfAe)	78.00 - 6.00	0.0000	-0.41	1	1	1.2000	1.2000		0.67
(NU Existing) EW63 (NU Reserved)	C	Yes	Af (CfAe)	110.00 - 6.00	0.0000	-0.05	2	2	1.5742	1.5742	5.0668	0.51
1 5/8 (MetroPCS Reserved)	C	Yes	Ar (CfAe)	120.00 - 6.00	0.0000	-0.36	12	6	1.9800	1.9800		1.04
0.3" dia RET (MetroPCS Reserved)	C	Yes	Ar (CfAe)	120.00 - 6.00	0.0000	-0.43	1	1	0.3000	0.3000		0.00
RG6-Fiber (AT&T Existing)	A	No	Ar (CfAe)	98.00 - 6.00	0.0000	-0.45	1	1	0.5000	0.5000		1.00
#8 AWG Copper Wre (AT&T Existing)	A	No	Ar (CfAe)	98.00 - 6.00	0.0000	-0.43	2	1	0.2500	0.1285		0.05

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Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_{AA} In Face ft^2	C_{AA} Out Face ft^2	Weight K
T1	140.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	5.550	0.000	0.000	0.000	0.03
		C	19.800	0.000	0.000	0.000	0.25
T2	120.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	5.550	0.000	0.000	0.000	0.03
		C	40.100	2.624	0.000	0.000	0.51
T3	100.00-80.00	A	18.763	0.000	0.000	0.000	0.24
		B	5.550	0.000	0.000	0.000	0.03
		C	40.100	5.247	0.000	0.000	0.52
T4	80.00-60.00	A	20.848	0.000	0.000	0.000	0.27
		B	7.350	2.375	0.000	0.000	0.05
		C	40.100	5.247	0.000	0.000	0.52
T5	60.00-40.00	A	20.848	0.000	0.000	0.000	0.27
		B	7.550	2.639	0.000	0.000	0.06
		C	40.100	5.247	0.000	0.000	0.52
T6	40.00-20.00	A	20.848	0.000	0.000	0.000	0.27
		B	7.550	2.639	0.000	0.000	0.06
		C	40.100	5.247	0.000	0.000	0.52
T7	20.00-0.00	A	14.593	0.000	0.000	0.000	0.19
		B	5.285	1.848	0.000	0.000	0.04
		C	28.070	3.673	0.000	0.000	0.36

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_{AA} In Face ft^2	C_{AA} Out Face ft^2	Weight K
T1	140.00-120.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		10.550	0.000	0.000	0.000	0.09
		C		29.800	0.000	0.000	0.000	0.61
T2	120.00-100.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		10.550	0.000	0.000	0.000	0.09
		C		61.767	3.735	0.000	0.000	1.27
T3	100.00-80.00	A	0.500	30.763	0.000	0.000	0.000	0.60
		B		10.550	0.000	0.000	0.000	0.09
		C		61.767	7.470	0.000	0.000	1.31
T4	80.00-60.00	A	0.500	34.181	0.000	0.000	0.000	0.66
		B		13.850	3.375	0.000	0.000	0.16
		C		61.767	7.470	0.000	0.000	1.31
T5	60.00-40.00	A	0.500	34.181	0.000	0.000	0.000	0.66
		B		14.217	3.750	0.000	0.000	0.16
		C		61.767	7.470	0.000	0.000	1.31
T6	40.00-20.00	A	0.500	34.181	0.000	0.000	0.000	0.66
		B		14.217	3.750	0.000	0.000	0.16
		C		61.767	7.470	0.000	0.000	1.31
T7	20.00-0.00	A	0.500	23.927	0.000	0.000	0.000	0.46
		B		9.952	2.625	0.000	0.000	0.11
		C		43.237	5.229	0.000	0.000	0.92

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	Client	Verizon Wireless	Designed by	TJL

Feed Line Shielding

Section	Elevation	Face	A_R	$A_{R_{Ice}}$	A_F	$A_{F_{Ice}}$
	ft		ft ²	ft ²	ft ²	ft ²
T1	140.00-120.00	A	0.000	0.000	0.000	0.000
		B	0.282	1.251	0.000	0.000
		C	1.006	3.533	0.000	0.000
T2	120.00-100.00	A	0.000	0.000	0.000	0.000
		B	0.329	1.340	0.000	0.000
		C	2.532	8.390	0.000	0.000
T3	100.00-80.00	A	0.000	1.016	1.350	2.033
		B	0.000	0.400	0.421	0.800
		C	0.000	2.666	3.437	5.331
T4	80.00-60.00	A	0.000	0.988	1.640	2.469
		B	0.000	0.587	0.806	1.468
		C	0.000	2.331	3.757	5.828
T5	60.00-40.00	A	0.000	0.911	1.514	2.278
		B	0.000	0.566	0.779	1.416
		C	0.000	2.151	3.466	5.377
T6	40.00-20.00	A	0.000	0.866	1.438	2.164
		B	0.000	0.538	0.740	1.345
		C	0.000	2.043	3.293	5.108
T7	20.00-0.00	A	0.000	0.585	1.167	1.756
		B	0.000	0.364	0.600	1.092
		C	0.000	1.382	2.672	4.146

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	$CP_{X_{Ice}}$	$CP_{Z_{Ice}}$
	ft	in	in	in	in
T1	140.00-120.00	-6.5615	3.8423	-5.2447	2.4805
T2	120.00-100.00	0.6331	7.3720	0.8224	6.2206
T3	100.00-80.00	-4.0915	7.7505	-4.3155	7.6273
T4	80.00-60.00	-4.9007	7.4267	-5.3037	7.4127
T5	60.00-40.00	-5.6584	8.4256	-6.1627	8.4534
T6	40.00-20.00	-6.3518	9.4392	-6.9585	9.5250
T7	20.00-0.00	-5.0518	7.4928	-5.7597	7.8585

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horiz Lateral Vert	Azimuth Adjustment	Placement	$C_A A_A$ Front	$C_A A_A$ Side	Weight
			ft ft ft	°	ft	ft ²	ft ²	K
1142-2C (NU Existing)	A	From Leg	1.00	0.0000	140.00	No Ice	2.09	0.02
			0.00			1/2" Ice	3.37	0.04
			7.00					
1142-2C	B	From Leg	1.00	0.0000	140.00	No Ice	2.09	0.02

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	Client	Verizon Wireless	Designed by	TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
(NU Reserved)			0.00		1/2" Ice	3.37	3.37	0.04
1142-2C	C	From Leg	7.00	0.0000	140.00	No Ice	2.09	0.02
(NU Reserved)			0.00		1/2" Ice	3.37	3.37	0.04
Pirol 12' T-Frame Sector Mount (1)	A	From Leg	2.00	0.0000	98.00	No Ice	13.60	0.47
(AT&T Existing)			0.00		1/2" Ice	18.40	18.40	0.60
Pirol 12' T-Frame Sector Mount (1)	B	From Leg	2.00	0.0000	98.00	No Ice	13.60	0.47
(AT&T Existing)			0.00		1/2" Ice	18.40	18.40	0.60
Pirol 12' T-Frame Sector Mount (1)	C	From Leg	2.00	0.0000	98.00	No Ice	13.60	0.47
(AT&T Existing)			0.00		1/2" Ice	18.40	18.40	0.60
(3)	A	From Leg	4.00	0.0000	98.00	No Ice	8.26	0.05
AM-X-CD-16-65-00T-RET(7 2")			0.00		1/2" Ice	8.81	5.09	0.10
(AT&T Existing)			0.00					
(3)	B	From Leg	4.00	0.0000	98.00	No Ice	8.26	0.05
AM-X-CD-16-65-00T-RET(7 2")			0.00		1/2" Ice	8.81	5.09	0.10
(AT&T Existing)			0.00					
(3)	C	From Leg	4.00	0.0000	98.00	No Ice	8.26	0.05
AM-X-CD-16-65-00T-RET(7 2")			0.00		1/2" Ice	8.81	5.09	0.10
(AT&T Existing)			0.00					
(2)DTMABP7819VG12A TMA	A	From Leg	4.00	0.0000	98.00	No Ice	1.59	0.02
(AT&T Existing)			0.00		1/2" Ice	1.76	0.70	0.03
(2)DTMABP7819VG12A TMA	B	From Leg	4.00	0.0000	98.00	No Ice	1.59	0.02
(AT&T Existing)			0.00		1/2" Ice	1.76	0.70	0.03
(2)DTMABP7819VG12A TMA	C	From Leg	4.00	0.0000	98.00	No Ice	1.59	0.02
(AT&T Existing)			0.00		1/2" Ice	1.76	0.70	0.03
(2)RRUS-11	A	From Face	0.00	0.0000	95.00	No Ice	2.99	0.05
(AT&T Existing)			0.00		1/2" Ice	3.23	1.41	0.07
(2)RRUS-11	B	From Face	0.00	0.0000	95.00	No Ice	2.99	0.05
(AT&T Existing)			0.00		1/2" Ice	3.23	1.41	0.07
(2)RRUS-11	C	From Face	0.00	0.0000	95.00	No Ice	2.99	0.05
(AT&T Existing)			0.00		1/2" Ice	3.23	1.41	0.07
DC6-48-60-18-8F Surge Arrestor	C	From Face	0.00	0.0000	95.00	No Ice	2.23	0.02
(AT&T Existing)			0.00		1/2" Ice	2.45	2.45	0.04
Pirol 12' T-Frame Sector Mount (1)	A	From Leg	2.00	0.0000	138.00	No Ice	13.60	0.47
(Verizon Existing)			0.00		1/2" Ice	18.40	18.40	0.60
Pirol 12' T-Frame Sector Mount (1)	B	From Leg	2.00	0.0000	138.00	No Ice	13.60	0.47
(Verizon Existing)			0.00		1/2" Ice	18.40	18.40	0.60
Pirol 12' T-Frame Sector Mount (1)	C	From Leg	2.00	0.0000	138.00	No Ice	13.60	0.47
(Verizon Existing)			0.00		1/2" Ice	18.40	18.40	0.60
DB854DG65ESX	A	From Leg	4.00	0.0000	138.00	No Ice	5.88	0.02

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	Client	Verizon Wireless	Designed by	TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
(Verizon Existing)			-6.00			1/2" Ice	6.28	3.06	0.05
LPA-185080/12CF	A	From Leg	0.00						
(Verizon Existing)			4.00	0.0000	138.00	No Ice	3.53	4.57	0.01
			-4.00			1/2" Ice	3.96	5.01	0.04
			0.00						
BXA-70063/6CF	A	From Leg	4.00	0.0000	138.00	No Ice	7.73	4.16	0.02
(Verizon Proposed)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
LPA-185080/12CF	A	From Leg	4.00	0.0000	138.00	No Ice	3.53	4.57	0.01
(Verizon Existing)			4.00			1/2" Ice	3.96	5.01	0.04
			0.00						
DB854DG65ESX	B	From Leg	4.00	0.0000	138.00	No Ice	5.88	2.75	0.02
(Verizon Existing)			-6.00			1/2" Ice	6.28	3.06	0.05
			0.00						
LPA-185080/12CF	B	From Leg	4.00	0.0000	138.00	No Ice	3.53	4.57	0.01
(Verizon Existing)			-4.00			1/2" Ice	3.96	5.01	0.04
			0.00						
BXA-70063/6CF	B	From Leg	4.00	0.0000	138.00	No Ice	7.73	4.16	0.02
(Verizon Existing)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
LPA-185080/12CF	B	From Leg	4.00	0.0000	138.00	No Ice	3.53	4.57	0.01
(Verizon Existing)			4.00			1/2" Ice	3.96	5.01	0.04
			0.00						
DB854DG65ESX	C	From Leg	4.00	0.0000	138.00	No Ice	5.88	2.75	0.02
(Verizon Existing)			-6.00			1/2" Ice	6.28	3.06	0.05
			0.00						
LPA-185080/12CF	C	From Leg	4.00	0.0000	138.00	No Ice	3.53	4.57	0.01
(Verizon Existing)			-4.00			1/2" Ice	3.96	5.01	0.04
			0.00						
BXA-70063/6CF	C	From Leg	4.00	0.0000	138.00	No Ice	7.73	4.16	0.02
(Verizon Proposed)			0.00			1/2" Ice	8.27	4.60	0.06
			0.00						
LPA-185080/12CF	C	From Leg	4.00	0.0000	138.00	No Ice	3.53	4.57	0.01
(Verizon Existing)			4.00			1/2" Ice	3.96	5.01	0.04
			0.00						
(2) FD9R6004/2C-3L	A	From Leg	4.00	0.0000	138.00	No Ice	0.37	0.08	0.00
Diplexer			0.00			1/2" Ice	0.45	0.14	0.01
(Verizon Existing)			0.00						
(2) FD9R6004/2C-3L	B	From Leg	4.00	0.0000	138.00	No Ice	0.37	0.08	0.00
Diplexer			0.00			1/2" Ice	0.45	0.14	0.01
(Verizon Existing)			0.00						
(2) FD9R6004/2C-3L	C	From Leg	4.00	0.0000	138.00	No Ice	0.37	0.08	0.00
Diplexer			0.00			1/2" Ice	0.45	0.14	0.01
(Verizon Existing)			0.00						
Pirot 4' Side Mount Standoff	A	From Leg	1.00	0.0000	120.00	No Ice	2.72	2.72	0.05
(1)			0.00			1/2" Ice	4.91	4.91	0.09
(MetroPCS Reserved)			0.00						
Pirot 4' Side Mount Standoff	B	From Leg	1.00	0.0000	120.00	No Ice	2.72	2.72	0.05
(1)			0.00			1/2" Ice	4.91	4.91	0.09
(MetroPCS Reserved)			0.00						
Pirot 4' Side Mount Standoff	C	From Leg	1.00	0.0000	120.00	No Ice	2.72	2.72	0.05
(1)			0.00			1/2" Ice	4.91	4.91	0.09
(MetroPCS Reserved)			0.00						
(2) HBX-6516DS	A	From Leg	2.00	0.0000	120.00	No Ice	3.33	1.99	0.01
(MetroPCS Reserved)			0.00			1/2" Ice	3.66	2.31	0.03
			0.00						
(2) HBX-6516DS	B	From Leg	2.00	0.0000	120.00	No Ice	3.33	1.99	0.01

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	Project 140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date 12:04:20 04/22/13
	Client Verizon Wireless	Designed by TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
(MetroPCS Reserved)			0.00		1/2" Ice	3.66	2.31	0.03
(2) HBX-6516DS (MetroPCS Reserved)	C	From Leg	0.00 2.00 0.00	0.0000	120.00	No Ice 1/2" Ice	3.33 3.66	1.99 2.31
(2) ATM200-A20 Actuator (MetroPCS Reserved)	A	From Leg	0.00 2.00 0.00	0.0000	120.00	No Ice 1/2" Ice	0.22 0.29	0.16 0.23
(2) ATM200-A20 Actuator (MetroPCS Reserved)	B	From Leg	0.00 2.00 0.00	0.0000	120.00	No Ice 1/2" Ice	0.22 0.29	0.16 0.23
(2) ATM200-A20 Actuator (MetroPCS Reserved)	C	From Leg	0.00 2.00 0.00	0.0000	120.00	No Ice 1/2" Ice	0.22 0.29	0.16 0.23

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft	Aperture Area ft ²	Weight K
6 FT DISH (NU Reserved)	A	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		110.00	6.00	No Ice 1/2" Ice	28.27 29.05
6 FT DISH (NU Reserved)	B	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		110.00	6.00	No Ice 1/2" Ice	28.27 29.05
PL4-107 (NU Existing)	A	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		78.00	4.00	No Ice 1/2" Ice	12.60 13.09
PL4-107 (NU Reserved)	B	Paraboloid w/o Radome	From Leg	1.00 0.00 0.00	0.0000		78.00	4.00	No Ice 1/2" Ice	12.60 13.09

Tower Pressures - No Ice

$$G_H = 1.138$$

Section Elevation	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 140.00-120.00	130.00	1.48	27	102.917	A	0.000	10.766	5.833	54.18	0.000	0.000
					B	0.000	16.034		36.38	0.000	0.000
					C	0.000	29.560		19.73	0.000	0.000
T2	110.00	1.411	26	104.167	A	0.000	14.014	8.333	59.47	0.000	0.000

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	Client	Verizon Wireless	Designed by	TJL

Section Elevation	z	K _z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _d A _A In Face ft ²	C _d A _A Out Face ft ²
ft	ft		psf	ft ²		ft ²	ft ²	ft ²			
120.00-100.00					B	0.000	19.235		43.32	0.000	0.000
					C	2.624	51.581		15.37	0.000	0.000
T3	90.00	1.332	25	123.839	A	7.141	30.445	11.682	31.08	0.000	0.000
100.00-80.00					B	8.071	17.232		46.17	0.000	0.000
					C	10.303	51.782		18.82	0.000	0.000
T4 80.00-60.00	70.00	1.24	23	160.256	A	10.587	33.364	12.517	28.48	0.000	0.000
					B	13.797	19.867		37.18	0.000	0.000
					C	13.718	52.617		18.87	0.000	0.000
T5 60.00-40.00	50.00	1.126	21	196.673	A	12.495	34.199	13.351	28.59	0.000	0.000
					B	15.869	20.901		36.31	0.000	0.000
					C	15.790	53.451		19.28	0.000	0.000
T6 40.00-20.00	30.00	1	18	233.091	A	14.457	35.033	14.186	28.66	0.000	0.000
					B	17.795	21.736		35.89	0.000	0.000
					C	17.850	54.286		19.67	0.000	0.000
T7 20.00-0.00	10.00	1	18	269.508	A	20.260	29.613	15.020	30.12	0.000	0.000
					B	22.674	20.305		34.95	0.000	0.000
					C	22.428	43.090		22.93	0.000	0.000

Tower Pressure - With Ice

$$G_H = 1.138$$

Section Elevation	z	K _z	q _z	t _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _d A _A In Face ft ²	C _d A _A Out Face ft ²
ft	ft		psf	in	ft ²		ft ²	ft ²	ft ²			
T1	130.00	1.48	27	0.5000	104.583	A	0.000	20.676	9.167	44.34	0.000	0.000
140.00-120.00						B	0.000	29.975		30.58	0.000	0.000
						C	0.000	46.943		19.53	0.000	0.000
T2	110.00	1.411	26	0.5000	105.833	A	0.000	23.839	11.667	48.94	0.000	0.000
120.00-100.00						B	0.000	33.049		35.30	0.000	0.000
						C	3.735	77.215		14.41	0.000	0.000
T3 100.00-80.00	90.00	1.332	25	0.5000	125.508	A	6.459	49.013	15.020	27.08	0.000	0.000
						B	7.692	29.416		40.48	0.000	0.000
						C	10.630	78.367		16.88	0.000	0.000
T4 80.00-60.00	70.00	1.24	23	0.5000	161.925	A	9.759	53.939	15.855	24.89	0.000	0.000
						B	14.134	34.008		32.93	0.000	0.000
						C	13.869	80.181		16.86	0.000	0.000
T5 60.00-40.00	50.00	1.126	21	0.5000	198.342	A	11.731	55.562	16.689	24.80	0.000	0.000
						B	16.343	35.943		31.92	0.000	0.000
						C	16.101	81.908		17.03	0.000	0.000
T6 40.00-20.00	30.00	1	18	0.5000	234.759	A	13.731	57.197	17.524	24.71	0.000	0.000
						B	18.301	37.560		31.37	0.000	0.000
						C	18.257	83.605		17.20	0.000	0.000
T7 20.00-0.00	10.00	1	18	0.5000	271.176	A	19.671	48.842	18.358	26.80	0.000	0.000
						B	22.960	35.088		31.63	0.000	0.000
						C	22.510	67.355		20.43	0.000	0.000

Tower Pressure - Service

$$G_H = 1.138$$

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	Project 140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT Client Verizon Wireless	Date 12:04:20 04/22/13 Designed by TJL

Section Elevation	z	K _Z	q _z	A _G	F a c e	A _F	A _R	A _{leg}	Leg %	C _A A _A In Face	C _A A _A Out Face
ft	ft		psf	ft ²		ft ²	ft ²	ft ²		ft ²	ft ²
T1 140.00-120.00	130.00	1.48	27	102.917	A	0.000	10.766	5.833	54.18	0.000	0.000
					B	0.000	16.034		36.38	0.000	0.000
					C	0.000	29.560		19.73	0.000	0.000
T2 120.00-100.00	110.00	1.411	26	104.167	A	0.000	14.014	8.333	59.47	0.000	0.000
					B	0.000	19.235		43.32	0.000	0.000
					C	2.624	51.581		15.37	0.000	0.000
T3 100.00-80.00	90.00	1.332	25	123.839	A	7.141	30.445	11.682	31.08	0.000	0.000
					B	8.071	17.232		46.17	0.000	0.000
					C	10.303	51.782		18.82	0.000	0.000
T4 80.00-60.00	70.00	1.24	23	160.256	A	10.587	33.364	12.517	28.48	0.000	0.000
					B	13.797	19.867		37.18	0.000	0.000
					C	13.718	52.617		18.87	0.000	0.000
T5 60.00-40.00	50.00	1.126	21	196.673	A	12.495	34.199	13.351	28.59	0.000	0.000
					B	15.869	20.901		36.31	0.000	0.000
					C	15.790	53.451		19.28	0.000	0.000
T6 40.00-20.00	30.00	1	18	233.091	A	14.457	35.033	14.186	28.66	0.000	0.000
					B	17.795	21.736		35.89	0.000	0.000
					C	17.850	54.286		19.67	0.000	0.000
T7 20.00-0.00	10.00	1	18	269.508	A	20.260	29.613	15.020	30.12	0.000	0.000
					B	22.674	20.305		34.95	0.000	0.000
					C	22.428	43.090		22.93	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 140.00-120.00	0.28	0.86	A	0.105	2.946	0.576	1	1	6.197	1.31	65.66	C
			B	0.156	2.75	0.582	1	1	9.338			
			C	0.287	2.331	0.612	1	1	18.093			
T2 120.00-100.00	0.54	1.50	A	0.135	2.829	0.579	1	1	8.117	2.18	108.97	C
			B	0.185	2.648	0.587	1	1	11.298			
			C	0.52	1.875	0.708	1	1	39.148			
T3 100.00-80.00	0.80	2.48	A	0.304	2.287	0.617	1	1	25.926	2.47	123.63	C
			B	0.204	2.582	0.591	1	1	18.261			
			C	0.501	1.898	0.698	1	1	46.456			
T4 80.00-60.00	0.85	2.82	A	0.274	2.367	0.608	1	1	30.885	2.57	128.40	C
			B	0.21	2.563	0.593	1	1	25.568			
			C	0.414	2.037	0.657	1	1	48.307			
T5 60.00-40.00	0.85	3.21	A	0.237	2.476	0.599	1	1	32.972	2.55	127.46	C
			B	0.187	2.64	0.588	1	1	28.156			
			C	0.352	2.167	0.633	1	1	49.636			
T6 40.00-20.00	0.85	3.86	A	0.212	2.555	0.593	1	1	35.232	2.46	122.97	C
			B	0.17	2.701	0.585	1	1	30.503			
			C	0.309	2.271	0.619	1	1	51.444			
T7 20.00-0.00	0.59	4.23	A	0.185	2.647	0.587	1	1	37.657	2.50	124.94	C
			B	0.159	2.737	0.583	1	1	34.511			
			C	0.243	2.458	0.6	1	1	48.288			
Sum Weight:	4.75	18.96						OTM	1038.97 kip-ft	16.04		

Tower Forces - No Ice - Wind 45 To Face

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13075.CO5 - Cheshire North 2	Page	13 of 31
	Project	140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date	12:04:20 04/22/13
	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 140.00-120.00	0.28	0.86	A	0.105	2.946	0.576	0.825	1	6.197	1.31	65.66	C
			B	0.156	2.75	0.582	0.825	1	9.338			
			C	0.287	2.331	0.612	0.825	1	18.093			
T2 120.00-100.00	0.54	1.50	A	0.135	2.829	0.579	0.825	1	8.117	2.15	107.69	C
			B	0.185	2.648	0.587	0.825	1	11.298			
			C	0.52	1.875	0.708	0.825	1	38.689			
T3 100.00-80.00	0.80	2.48	A	0.304	2.287	0.617	0.825	1	24.676	2.38	118.83	C
			B	0.204	2.582	0.591	0.825	1	16.848			
			C	0.501	1.898	0.698	0.825	1	44.653			
T4 80.00-60.00	0.85	2.82	A	0.274	2.367	0.608	0.825	1	29.032	2.44	122.02	C
			B	0.21	2.563	0.593	0.825	1	23.154			
			C	0.414	2.037	0.657	0.825	1	45.907			
T5 60.00-40.00	0.85	3.21	A	0.237	2.476	0.599	0.825	1	30.785	2.41	120.37	C
			B	0.187	2.64	0.588	0.825	1	25.379			
			C	0.352	2.167	0.633	0.825	1	46.873			
T6 40.00-20.00	0.85	3.86	A	0.212	2.555	0.593	0.825	1	32.702	2.31	115.50	C
			B	0.17	2.701	0.585	0.825	1	27.389			
			C	0.309	2.271	0.619	0.825	1	48.321			
T7 20.00-0.00	0.59	4.23	A	0.185	2.647	0.587	0.825	1	34.111	2.30	114.79	C
			B	0.159	2.737	0.583	0.825	1	30.543			
			C	0.243	2.458	0.6	0.825	1	44.363			
Sum Weight:	4.75	18.96						OTM	1004.99 kip-ft	15.30		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 140.00-120.00	0.28	0.86	A	0.105	2.946	0.576	0.8	1	6.197	1.31	65.66	C
			B	0.156	2.75	0.582	0.8	1	9.338			
			C	0.287	2.331	0.612	0.8	1	18.093			
T2 120.00-100.00	0.54	1.50	A	0.135	2.829	0.579	0.8	1	8.117	2.15	107.51	C
			B	0.185	2.648	0.587	0.8	1	11.298			
			C	0.52	1.875	0.708	0.8	1	38.624			
T3 100.00-80.00	0.80	2.48	A	0.304	2.287	0.617	0.8	1	24.497	2.36	118.14	C
			B	0.204	2.582	0.591	0.8	1	16.646			
			C	0.501	1.898	0.698	0.8	1	44.396			
T4 80.00-60.00	0.85	2.82	A	0.274	2.367	0.608	0.8	1	28.767	2.42	121.10	C
			B	0.21	2.563	0.593	0.8	1	22.809			
			C	0.414	2.037	0.657	0.8	1	45.564			
T5 60.00-40.00	0.85	3.21	A	0.237	2.476	0.599	0.8	1	30.473	2.39	119.35	C
			B	0.187	2.64	0.588	0.8	1	24.982			
			C	0.352	2.167	0.633	0.8	1	46.478			
T6 40.00-20.00	0.85	3.86	A	0.212	2.555	0.593	0.8	1	32.340	2.29	114.44	C
			B	0.17	2.701	0.585	0.8	1	26.944			
			C	0.309	2.271	0.619	0.8	1	47.874			
T7 20.00-0.00	0.59	4.23	A	0.185	2.647	0.587	0.8	1	33.605	2.27	113.33	C
			B	0.159	2.737	0.583	0.8	1	29.976			
			C	0.243	2.458	0.6	0.8	1	43.802			
Sum Weight:	4.75	18.96						OTM	1000.13 kip-ft	15.19		

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13075.CO5 - Cheshire North 2	Page	14 of 31
	Project	140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date	12:04:20 04/22/13
	Client	Verizon Wireless	Designed by	TJL

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1	0.28	0.86	A	0.105	2.946	0.576	0.85	1	6.197	1.31	65.66	C
140.00-120.00			B	0.156	2.75	0.582	0.85	1	9.338			
			C	0.287	2.331	0.612	0.85	1	18.093			
T2	0.54	1.50	A	0.135	2.829	0.579	0.85	1	8.117	2.16	107.88	C
120.00-100.00			B	0.185	2.648	0.587	0.85	1	11.298			
			C	0.52	1.875	0.708	0.85	1	38.755			
T3	0.80	2.48	A	0.304	2.287	0.617	0.85	1	24.854	2.39	119.52	C
100.00-80.00			B	0.204	2.582	0.591	0.85	1	17.050			
			C	0.501	1.898	0.698	0.85	1	44.911			
T4	0.85	2.82	A	0.274	2.367	0.608	0.85	1	29.297	2.46	122.93	C
80.00-60.00			B	0.21	2.563	0.593	0.85	1	23.499			
			C	0.414	2.037	0.657	0.85	1	46.250			
T5	0.85	3.21	A	0.237	2.476	0.599	0.85	1	31.098	2.43	121.38	C
60.00-40.00			B	0.187	2.64	0.588	0.85	1	25.775			
			C	0.352	2.167	0.633	0.85	1	47.268			
T6	0.85	3.86	A	0.212	2.555	0.593	0.85	1	33.063	2.33	116.57	C
40.00-20.00			B	0.17	2.701	0.585	0.85	1	27.834			
			C	0.309	2.271	0.619	0.85	1	48.767			
T7 20.00-0.00	0.59	4.23	A	0.185	2.647	0.587	0.85	1	34.618	2.32	116.24	C
			B	0.159	2.737	0.583	0.85	1	31.110			
			C	0.243	2.458	0.6	0.85	1	44.924			
Sum Weight:	4.75	18.96						OTM	1009.84 kip-ft	15.40		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1	0.70	1.13	A	0.198	2.604	0.59	1	1	12.197	1.94	97.14	C
140.00-120.00			B	0.287	2.332	0.612	1	1	18.342			
			C	0.449	1.975	0.673	1	1	31.581			
T2	1.36	1.82	A	0.225	2.514	0.596	1	1	14.205	3.77	188.56	C
120.00-100.00			B	0.312	2.264	0.62	1	1	20.482			
			C	0.765	1.794	0.868	1	1	70.787			
T3	2.00	2.94	A	0.442	1.987	0.67	1	1	39.280	3.76	187.81	C
100.00-80.00			B	0.296	2.308	0.615	1	1	25.771			
			C	0.709	1.777	0.826	1	1	75.396			
T4	2.13	3.40	A	0.393	2.077	0.649	1	1	44.761	3.48	173.95	C
80.00-60.00			B	0.297	2.303	0.615	1	1	35.052			
			C	0.581	1.817	0.742	1	1	73.368			
T5	2.14	3.86	A	0.339	2.197	0.629	1	1	46.664	3.30	165.03	C
60.00-40.00			B	0.264	2.397	0.605	1	1	38.105			
			C	0.494	1.908	0.695	1	1	72.989			
T6	2.14	4.58	A	0.302	2.29	0.617	1	1	48.996	3.11	155.70	C
40.00-20.00			B	0.238	2.474	0.599	1	1	40.795			
			C	0.434	2.001	0.666	1	1	73.939			
T7 20.00-0.00	1.50	5.14	A	0.253	2.43	0.603	1	1	49.100	3.02	150.83	C
			B	0.214	2.55	0.593	1	1	43.781			

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13075.CO5 - Cheshire North 2	Page	15 of 31
	Project	140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date	12:04:20 04/22/13
	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
Sum Weight:	11.97	22.86	C	0.331	2.216	0.626	1	1 OTM	64.675 1537.59 kip-ft	22.38		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 140.00-120.00	0.70	1.13	A	0.198	2.604	0.59	0.825	1	12.197	1.94	97.14	C
			B	0.287	2.332	0.612	0.825	1	18.342			
			C	0.449	1.975	0.673	0.825	1	31.581			
T2 120.00-100.00	1.36	1.82	A	0.225	2.514	0.596	0.825	1	14.205	3.74	186.81	C
			B	0.312	2.264	0.62	0.825	1	20.482			
			C	0.765	1.794	0.868	0.825	1	70.133			
T3 100.00-80.00	2.00	2.94	A	0.442	1.987	0.67	0.825	1	38.149	3.66	183.17	C
			B	0.296	2.308	0.615	0.825	1	24.425			
			C	0.709	1.777	0.826	0.825	1	73.536			
T4 80.00-60.00	2.13	3.40	A	0.393	2.077	0.649	0.825	1	43.053	3.36	168.20	C
			B	0.297	2.303	0.615	0.825	1	32.579			
			C	0.581	1.817	0.742	0.825	1	70.941			
T5 60.00-40.00	2.14	3.86	A	0.339	2.197	0.629	0.825	1	44.611	3.17	158.66	C
			B	0.264	2.397	0.605	0.825	1	35.245			
			C	0.494	1.908	0.695	0.825	1	70.172			
T6 40.00-20.00	2.14	4.58	A	0.302	2.29	0.617	0.825	1	46.593	2.98	148.97	C
			B	0.238	2.474	0.599	0.825	1	37.592			
			C	0.434	2.001	0.666	0.825	1	70.744			
T7 20.00-0.00	1.50	5.14	A	0.253	2.43	0.603	0.825	1	45.658	2.83	141.65	C
			B	0.214	2.55	0.593	0.825	1	39.763			
			C	0.331	2.216	0.626	0.825	1	60.735			
Sum Weight:	11.97	22.86						OTM	1505.12 kip-ft	21.69		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 140.00-120.00	0.70	1.13	A	0.198	2.604	0.59	0.8	1	12.197	1.94	97.14	C
			B	0.287	2.332	0.612	0.8	1	18.342			
			C	0.449	1.975	0.673	0.8	1	31.581			
T2 120.00-100.00	1.36	1.82	A	0.225	2.514	0.596	0.8	1	14.205	3.73	186.57	C
			B	0.312	2.264	0.62	0.8	1	20.482			
			C	0.765	1.794	0.868	0.8	1	70.040			
T3 100.00-80.00	2.00	2.94	A	0.442	1.987	0.67	0.8	1	37.988	3.65	182.51	C
			B	0.296	2.308	0.615	0.8	1	24.233			
			C	0.709	1.777	0.826	0.8	1	73.270			
T4 80.00-60.00	2.13	3.40	A	0.393	2.077	0.649	0.8	1	42.809	3.35	167.37	C
			B	0.297	2.303	0.615	0.8	1	32.225			

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	13075.CO5 - Cheshire North 2	Page	16 of 31
	Project	140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date	12:04:20 04/22/13
	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T5	2.14	3.86	C	0.581	1.817	0.742	0.8	1	70.594			
60.00-40.00			A	0.339	2.197	0.629	0.8	1	44.317	3.15	157.75	C
			B	0.264	2.397	0.605	0.8	1	34.836			
			C	0.494	1.908	0.695	0.8	1	69.769			
T6	2.14	4.58	A	0.302	2.29	0.617	0.8	1	46.250	2.96	148.01	C
40.00-20.00			B	0.238	2.474	0.599	0.8	1	37.134			
			C	0.434	2.001	0.666	0.8	1	70.288			
T7 20.00-0.00	1.50	5.14	A	0.253	2.43	0.603	0.8	1	45.166	2.81	140.33	C
			B	0.214	2.55	0.593	0.8	1	39.189			
			C	0.331	2.216	0.626	0.8	1	60.173			
Sum Weight:	11.97	22.86						OTM	1500.48 kip-ft	21.59		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1	0.70	1.13	A	0.198	2.604	0.59	0.85	1	12.197	1.94	97.14	C
140.00-120.00			B	0.287	2.332	0.612	0.85	1	18.342			
			C	0.449	1.975	0.673	0.85	1	31.581			
T2	1.36	1.82	A	0.225	2.514	0.596	0.85	1	14.205	3.74	187.06	C
120.00-100.00			B	0.312	2.264	0.62	0.85	1	20.482			
			C	0.765	1.794	0.868	0.85	1	70.226			
T3	2.00	2.94	A	0.442	1.987	0.67	0.85	1	38.311	3.68	183.83	C
100.00-80.00			B	0.296	2.308	0.615	0.85	1	24.617			
			C	0.709	1.777	0.826	0.85	1	73.802			
T4	2.13	3.40	A	0.393	2.077	0.649	0.85	1	43.297	3.38	169.02	C
80.00-60.00			B	0.297	2.303	0.615	0.85	1	32.932			
			C	0.581	1.817	0.742	0.85	1	71.287			
T5	2.14	3.86	A	0.339	2.197	0.629	0.85	1	44.904	3.19	159.57	C
60.00-40.00			B	0.264	2.397	0.605	0.85	1	35.653			
			C	0.494	1.908	0.695	0.85	1	70.574			
T6	2.14	4.58	A	0.302	2.29	0.617	0.85	1	46.937	3.00	149.94	C
40.00-20.00			B	0.238	2.474	0.599	0.85	1	38.050			
			C	0.434	2.001	0.666	0.85	1	71.201			
T7 20.00-0.00	1.50	5.14	A	0.253	2.43	0.603	0.85	1	46.150	2.86	142.96	C
			B	0.214	2.55	0.593	0.85	1	40.337			
			C	0.331	2.216	0.626	0.85	1	61.298			
Sum Weight:	11.97	22.86						OTM	1509.76 kip-ft	21.79		

Tower Forces - Service - Wind Normal To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1	0.28	0.86	A	0.105	2.946	0.576	1	1	6.197	1.31	65.66	C
140.00-120.00			B	0.156	2.75	0.582	1	1	9.338			

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	Project	140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date	12:04:20 04/22/13
	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T2	0.54	1.50	C	0.287	2.331	0.612	1	1	18.093			
120.00-100.00			A	0.135	2.829	0.579	1	1	8.117	2.18	108.97	C
			B	0.185	2.648	0.587	1	1	11.298			
T3	0.80	2.48	C	0.52	1.875	0.708	1	1	39.148			
100.00-80.00			A	0.304	2.287	0.617	1	1	25.926	2.47	123.63	C
			B	0.204	2.582	0.591	1	1	18.261			
T4	0.85	2.82	C	0.501	1.898	0.698	1	1	46.456			
80.00-60.00			A	0.274	2.367	0.608	1	1	30.885	2.57	128.40	C
			B	0.21	2.563	0.593	1	1	25.568			
T5	0.85	3.21	C	0.414	2.037	0.657	1	1	48.307			
60.00-40.00			A	0.237	2.476	0.599	1	1	32.972	2.55	127.46	C
			B	0.187	2.64	0.588	1	1	28.156			
T6	0.85	3.86	C	0.352	2.167	0.633	1	1	49.636			
40.00-20.00			A	0.212	2.555	0.593	1	1	35.232	2.46	122.97	C
			B	0.17	2.701	0.585	1	1	30.503			
T7 20.00-0.00	0.59	4.23	C	0.309	2.271	0.619	1	1	51.444			
			A	0.185	2.647	0.587	1	1	37.657	2.50	124.94	C
			B	0.159	2.737	0.583	1	1	34.511			
Sum Weight:	4.75	18.96	C	0.243	2.458	0.6	1	1	48.288			
								OTM	1038.97 kip-ft	16.04		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1	0.28	0.86	A	0.105	2.946	0.576	0.825	1	6.197	1.31	65.66	C
140.00-120.00			B	0.156	2.75	0.582	0.825	1	9.338			
			C	0.287	2.331	0.612	0.825	1	18.093			
T2	0.54	1.50	A	0.135	2.829	0.579	0.825	1	8.117	2.15	107.69	C
120.00-100.00			B	0.185	2.648	0.587	0.825	1	11.298			
			C	0.52	1.875	0.708	0.825	1	38.689			
T3	0.80	2.48	A	0.304	2.287	0.617	0.825	1	24.676	2.38	118.83	C
100.00-80.00			B	0.204	2.582	0.591	0.825	1	16.848			
			C	0.501	1.898	0.698	0.825	1	44.653			
T4	0.85	2.82	A	0.274	2.367	0.608	0.825	1	29.032	2.44	122.02	C
80.00-60.00			B	0.21	2.563	0.593	0.825	1	23.154			
			C	0.414	2.037	0.657	0.825	1	45.907			
T5	0.85	3.21	A	0.237	2.476	0.599	0.825	1	30.785	2.41	120.37	C
60.00-40.00			B	0.187	2.64	0.588	0.825	1	25.379			
			C	0.352	2.167	0.633	0.825	1	46.873			
T6	0.85	3.86	A	0.212	2.555	0.593	0.825	1	32.702	2.31	115.50	C
40.00-20.00			B	0.17	2.701	0.585	0.825	1	27.389			
			C	0.309	2.271	0.619	0.825	1	48.321			
T7 20.00-0.00	0.59	4.23	A	0.185	2.647	0.587	0.825	1	34.111	2.30	114.79	C
			B	0.159	2.737	0.583	0.825	1	30.543			
			C	0.243	2.458	0.6	0.825	1	44.363			
Sum Weight:	4.75	18.96						OTM	1004.99 kip-ft	15.30		

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	Client	Verizon Wireless	Designed by	TJL

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 140.00-120.00	0.28	0.86	A	0.105	2.946	0.576	0.8	1	6.197	1.31	65.66	C
			B	0.156	2.75	0.582	0.8	1	9.338			
			C	0.287	2.331	0.612	0.8	1	18.093			
T2 120.00-100.00	0.54	1.50	A	0.135	2.829	0.579	0.8	1	8.117	2.15	107.51	C
			B	0.185	2.648	0.587	0.8	1	11.298			
			C	0.52	1.875	0.708	0.8	1	38.624			
T3 100.00-80.00	0.80	2.48	A	0.304	2.287	0.617	0.8	1	24.497	2.36	118.14	C
			B	0.204	2.582	0.591	0.8	1	16.646			
			C	0.501	1.898	0.698	0.8	1	44.396			
T4 80.00-60.00	0.85	2.82	A	0.274	2.367	0.608	0.8	1	28.767	2.42	121.10	C
			B	0.21	2.563	0.593	0.8	1	22.809			
			C	0.414	2.037	0.657	0.8	1	45.564			
T5 60.00-40.00	0.85	3.21	A	0.237	2.476	0.599	0.8	1	30.473	2.39	119.35	C
			B	0.187	2.64	0.588	0.8	1	24.982			
			C	0.352	2.167	0.633	0.8	1	46.478			
T6 40.00-20.00	0.85	3.86	A	0.212	2.555	0.593	0.8	1	32.340	2.29	114.44	C
			B	0.17	2.701	0.585	0.8	1	26.944			
			C	0.309	2.271	0.619	0.8	1	47.874			
T7 20.00-0.00	0.59	4.23	A	0.185	2.647	0.587	0.8	1	33.605	2.27	113.33	C
			B	0.159	2.737	0.583	0.8	1	29.976			
			C	0.243	2.458	0.6	0.8	1	43.802			
Sum Weight:	4.75	18.96						OTM	1000.13 kip-ft	15.19		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
T1 140.00-120.00	0.28	0.86	A	0.105	2.946	0.576	0.85	1	6.197	1.31	65.66	C
			B	0.156	2.75	0.582	0.85	1	9.338			
			C	0.287	2.331	0.612	0.85	1	18.093			
T2 120.00-100.00	0.54	1.50	A	0.135	2.829	0.579	0.85	1	8.117	2.16	107.88	C
			B	0.185	2.648	0.587	0.85	1	11.298			
			C	0.52	1.875	0.708	0.85	1	38.755			
T3 100.00-80.00	0.80	2.48	A	0.304	2.287	0.617	0.85	1	24.854	2.39	119.52	C
			B	0.204	2.582	0.591	0.85	1	17.050			
			C	0.501	1.898	0.698	0.85	1	44.911			
T4 80.00-60.00	0.85	2.82	A	0.274	2.367	0.608	0.85	1	29.297	2.46	122.93	C
			B	0.21	2.563	0.593	0.85	1	23.499			
			C	0.414	2.037	0.657	0.85	1	46.250			
T5 60.00-40.00	0.85	3.21	A	0.237	2.476	0.599	0.85	1	31.098	2.43	121.38	C
			B	0.187	2.64	0.588	0.85	1	25.775			
			C	0.352	2.167	0.633	0.85	1	47.268			
T6 40.00-20.00	0.85	3.86	A	0.212	2.555	0.593	0.85	1	33.063	2.33	116.57	C
			B	0.17	2.701	0.585	0.85	1	27.834			
			C	0.309	2.271	0.619	0.85	1	48.767			
T7 20.00-0.00	0.59	4.23	A	0.185	2.647	0.587	0.85	1	34.618	2.32	116.24	C
			B	0.159	2.737	0.583	0.85	1	31.110			
			C	0.243	2.458	0.6	0.85	1	44.924			
Sum Weight:	4.75	18.96						OTM	1009.84	15.40		

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	Client	Verizon Wireless	Designed by	TJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	R _R	D _F	-D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
									kip-ft			

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M _x kip-ft	Sum of Overturning Moments, M _z kip-ft	Sum of Torques kip-ft
Leg Weight	14.44					
Bracing Weight	4.52					
Total Member Self-Weight	18.96			8.41	4.42	
Total Weight	28.35			8.41	4.42	
Wind 0 deg - No Ice		-1.54	-26.01	-2162.80	159.61	-5.40
Wind 30 deg - No Ice		12.13	-21.09	-1758.36	-1010.60	-0.14
Wind 45 deg - No Ice		17.34	-16.89	-1404.70	-1453.75	2.56
Wind 60 deg - No Ice		20.93	-12.08	-1007.88	-1755.86	5.61
Wind 90 deg - No Ice		24.33	0.04	12.77	-2033.16	9.99
Wind 120 deg - No Ice		21.75	14.34	1228.42	-1798.31	11.33
Wind 135 deg - No Ice		16.98	18.80	1614.04	-1417.43	9.64
Wind 150 deg - No Ice		11.98	22.52	1919.44	-995.23	7.75
Wind 180 deg - No Ice		0.20	25.26	2151.05	-15.45	2.51
Wind 210 deg - No Ice		-11.61	22.03	1869.38	966.90	-2.92
Wind 225 deg - No Ice		-17.51	17.84	1517.49	1480.35	-5.42
Wind 240 deg - No Ice		-22.50	12.99	1092.79	1882.61	-5.92
Wind 270 deg - No Ice		-24.88	-0.96	-88.53	2097.31	-6.93
Wind 300 deg - No Ice		-21.78	-12.80	-1080.12	1850.06	-8.11
Wind 315 deg - No Ice		-18.26	-17.60	-1475.96	1556.15	-8.29
Wind 330 deg - No Ice		-13.52	-21.63	-1812.82	1159.60	-7.75
Member Ice	3.90					
Total Weight Ice	42.02			20.77	10.96	
Wind 0 deg - Ice		-1.59	-34.06	-2854.11	170.83	-7.76
Wind 30 deg - Ice		16.16	-28.08	-2353.86	-1354.85	-0.47
Wind 45 deg - Ice		23.05	-22.59	-1888.02	-1944.25	3.33
Wind 60 deg - Ice		27.93	-16.13	-1346.72	-2357.61	7.43
Wind 90 deg - Ice		32.40	0.04	25.27	-2728.44	13.47
Wind 120 deg - Ice		28.70	18.40	1596.66	-2398.83	15.48
Wind 135 deg - Ice		22.68	24.56	2127.89	-1906.84	13.74
Wind 150 deg - Ice		16.00	29.56	2544.01	-1339.02	11.48
Wind 180 deg - Ice		0.20	33.38	2869.12	-9.51	4.79
Wind 210 deg - Ice		-15.62	29.04	2492.44	1322.67	-2.69
Wind 225 deg - Ice		-23.23	23.57	2028.43	1984.48	-6.27
Wind 240 deg - Ice		-29.47	17.02	1456.95	2498.49	-7.72
Wind 270 deg - Ice		-32.96	-0.99	-79.09	2807.34	-10.31
Wind 300 deg - Ice		-28.80	-16.86	-1421.13	2467.47	-12.22
Wind 315 deg - Ice		-24.01	-23.32	-1961.43	2062.55	-12.35
Wind 330 deg - Ice		-17.59	-28.64	-2409.96	1521.16	-11.48
Total Weight	28.35			8.41	4.42	
Wind 0 deg - Service		-1.54	-26.01	-2171.71	154.29	-5.40
Wind 30 deg - Service		12.13	-21.09	-1767.27	-1015.92	-0.14
Wind 45 deg - Service		17.34	-16.89	-1413.60	-1459.08	2.56
Wind 60 deg - Service		20.93	-12.08	-1016.79	-1761.18	5.61
Wind 90 deg - Service		24.33	0.04	3.87	-2038.48	9.99
Wind 120 deg - Service		21.75	14.34	1219.52	-1803.64	11.33
Wind 135 deg - Service		16.98	18.80	1605.14	-1422.75	9.64
Wind 150 deg - Service		11.98	22.52	1910.54	-1000.55	7.75
Wind 180 deg - Service		0.20	25.26	2142.15	-20.78	2.51

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	Project 140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date 12:04:20 04/22/13
	Client Verizon Wireless	Designed by TJL

Load Case	Vertical Forces <i>K</i>	Sum of Forces <i>X</i> <i>K</i>	Sum of Forces <i>Z</i> <i>K</i>	Sum of Overturning Moments, <i>M_x</i> <i>kip-ft</i>	Sum of Overturning Moments, <i>M_z</i> <i>kip-ft</i>	Sum of Torques <i>kip-ft</i>
Wind 210 deg - Service		-11.61	22.03	1860.48	961.58	-2.92
Wind 225 deg - Service		-17.51	17.84	1508.59	1475.03	-5.42
Wind 240 deg - Service		-22.50	12.99	1083.88	1877.29	-5.92
Wind 270 deg - Service		-24.88	-0.96	-97.44	2091.98	-6.93
Wind 300 deg - Service		-21.78	-12.80	-1089.02	1844.74	-8.11
Wind 315 deg - Service		-18.26	-17.60	-1484.87	1550.82	-8.29
Wind 330 deg - Service		-13.52	-21.63	-1821.72	1154.27	-7.75

Load Combinations

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

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	Project	140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date	12:04:20 04/22/13
	Client	Verizon Wireless	Designed by	TJL

Comb. No.	Description
45	Dead+Wind 225 deg - Service
46	Dead+Wind 240 deg - Service
47	Dead+Wind 270 deg - Service
48	Dead+Wind 300 deg - Service
49	Dead+Wind 315 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	140 - 120	Leg	Max Tension	27	20.62	-0.01	0.43
			Max. Compression	30	-23.56	0.42	-0.24
			Max. Mx	31	-0.87	-0.81	-0.00
			Max. My	27	-1.44	0.02	0.81
			Max. Vy	31	-2.27	0.44	-0.07
			Max. Vx	19	-2.45	-0.02	0.48
		Diagonal	Max Tension	28	2.58	0.00	0.00
			Max. Compression	28	-2.58	0.00	0.00
			Max. Mx	30	0.08	-0.00	0.00
			Max. My	28	-2.00	-0.00	0.00
			Max. Vy	25	-0.00	-0.00	-0.00
			Max. Vx	28	0.00	0.00	0.00
		Top Girt	Max Tension	5	0.07	0.00	0.00
			Max. Compression	19	-0.08	0.00	0.00
			Max. Mx	18	-0.01	0.01	0.00
			Max. My	23	-0.00	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
		Bottom Girt	Max Tension	27	0.89	0.00	0.00
			Max. Compression	30	-0.89	0.00	0.00
			Max. Mx	18	0.01	0.01	0.00
			Max. My	24	0.48	0.00	-0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	24	0.00	0.00	0.00
T2	120 - 100	Leg	Max Tension	27	64.47	-0.05	-2.13
			Max. Compression	24	-69.77	-1.93	-1.07
			Max. Mx	30	-69.71	1.94	-1.04
			Max. My	19	-69.02	0.03	2.20
			Max. Vy	30	-6.16	1.94	-1.04
			Max. Vx	19	-7.00	0.03	2.20
		Diagonal	Max Tension	26	5.03	0.00	0.00
			Max. Compression	26	-5.03	0.00	0.00
			Max. Mx	29	3.60	-0.00	-0.00
			Max. My	29	-4.43	-0.00	-0.00
			Max. Vy	29	0.01	-0.00	-0.00
			Max. Vx	29	0.00	-0.00	-0.00
		Top Girt	Max Tension	19	1.01	0.00	0.00
			Max. Compression	22	-1.00	0.00	0.00
			Max. Mx	18	-0.00	0.01	0.00
			Max. My	23	-0.05	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00
			Max. Vx	23	-0.00	0.00	0.00
		Bottom Girt	Max Tension	30	0.35	0.00	0.00
			Max. Compression	22	-0.48	0.00	0.00
			Max. Mx	18	-0.04	0.01	0.00
			Max. My	23	-0.05	0.00	0.00
			Max. Vy	18	-0.01	0.00	0.00

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	Project	140' Lattice Tower - 705 West Johnson Ave., Cheshire, CT	Date	12:04:20 04/22/13
	Client	Verizon Wireless	Designed by	TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft			
T3	100 - 80	Leg	Max. Vx	23	-0.00	0.00	0.00			
			Max Tension	27	99.96	-0.11	-0.03			
			Max. Compression	30	-110.18	0.26	0.02			
			Max. Mx	24	-76.26	2.20	-0.04			
			Max. My	23	-3.30	-0.05	-1.11			
			Max. Vy	32	-1.23	-2.13	0.02			
		Diagonal	Max. Vx	34	0.95	0.10	0.76			
			Max Tension	23	6.21	0.00	0.00			
			Max. Compression	23	-6.24	0.00	0.00			
			Max. Mx	30	4.88	0.03	0.00			
			Max. My	23	-5.93	-0.01	-0.01			
			Max. Vy	27	0.01	0.03	-0.00			
			Max. Vx	23	0.00	0.00	0.00			
			T4	80 - 60	Leg	Max Tension	27	137.39	-0.20	-0.03
Max. Compression	30	-151.70				0.24	0.01			
Max. Mx	32	112.11				-0.33	-0.00			
Max. My	25	18.96				-0.04	-0.37			
Max. Vy	34	-0.23				-0.31	-0.13			
Max. Vx	24	-0.26				-0.11	-0.36			
Diagonal	Max Tension	23			5.91	0.00	0.00			
	Max. Compression	23			-6.01	0.00	0.00			
	Max. Mx	30			4.27	0.04	0.00			
	Max. My	23			-5.91	-0.01	-0.01			
	Max. Vy	27			0.02	0.04	-0.00			
	Max. Vx	23			0.00	0.00	0.00			
	T5	60 - 40			Leg	Max Tension	27	168.66	-0.13	-0.01
						Max. Compression	30	-187.64	0.18	0.02
Max. Mx			32	166.99		-0.46	0.04			
Max. My			26	-16.82		-0.14	-0.35			
Max. Vy			22	0.09		-0.45	-0.02			
Max. Vx			33	-0.07		-0.06	0.34			
Diagonal			Max Tension	23	5.82	0.00	0.00			
			Max. Compression	23	-5.92	0.00	0.00			
			Max. Mx	27	4.54	0.04	-0.00			
			Max. My	23	-5.85	0.01	-0.01			
			Max. Vy	27	0.02	0.04	-0.00			
			Max. Vx	23	0.00	0.00	0.00			
			T6	40 - 20	Leg	Max Tension	27	196.21	-0.66	-0.01
						Max. Compression	30	-219.36	0.87	0.00
Max. Mx	19	-216.35				0.88	-0.01			
Max. My	26	-17.22				-0.14	-0.35			
Max. Vy	22	-0.21				-0.66	-0.01			
Max. Vx	33	0.07				-0.06	0.34			
Diagonal	Max Tension	23			6.08	0.00	0.00			
	Max. Compression	23			-6.44	0.00	0.00			
	Max. Mx	27			4.08	0.06	-0.00			
	Max. My	24			-5.95	0.02	-0.01			
	Max. Vy	27			0.03	0.06	-0.00			
	Max. Vx	24			0.00	0.00	0.00			
	T7	20 - 0			Leg	Max Tension	27	218.75	0.93	-0.01
						Max. Compression	30	-250.06	-0.00	-0.00
Max. Mx			19	-235.58		1.49	-0.02			
Max. My			26	-23.72		1.21	-0.58			
Max. Vy			22	-0.39		-1.37	-0.01			
Max. Vx			26	-0.14		1.21	-0.58			
Diagonal			Max Tension	23	7.34	0.00	0.00			
			Max. Compression	23	-7.15	0.00	0.00			
			Max. Mx	27	3.40	0.09	-0.01			
			Max. My	23	-7.13	0.05	-0.01			
			Max. Vy	27	0.03	0.09	-0.01			
			Max. Vx	23	0.00	0.00	0.00			

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	Client	Verizon Wireless	Designed by	TJL

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

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	30	253.32	16.72	-9.26
	Max. H _x	30	253.32	16.72	-9.26
	Max. H _z	21	-203.44	-17.29	10.46
	Min. Vert	22	-210.66	-18.17	10.14
	Min. H _x	22	-210.66	-18.17	10.14
	Min. H _z	30	253.32	16.72	-9.26
Leg B	Max. Vert	24	251.97	-16.83	-9.04
	Max. H _x	32	-221.61	18.90	10.35
	Max. H _z	33	-214.95	18.14	10.53
	Min. Vert	32	-221.61	18.90	10.35
	Min. H _x	24	251.97	-16.83	-9.04
	Min. H _z	24	251.97	-16.83	-9.04
Leg A	Max. Vert	19	250.17	-0.27	19.08
	Max. H _x	31	20.55	1.67	-0.73
	Max. H _z	19	250.17	-0.27	19.08
	Min. Vert	27	-223.41	0.18	-21.57
	Min. H _x	23	11.92	-1.54	-1.37
	Min. H _z	27	-223.41	0.18	-21.57

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	28.35	0.00	0.00	8.41	4.42	0.00
Dead+Wind 0 deg - No Ice	28.35	-1.54	-26.01	-2167.81	159.99	-5.42
Dead+Wind 30 deg - No Ice	28.35	12.13	-21.09	-1762.45	-1012.95	-0.14
Dead+Wind 45 deg - No Ice	28.35	17.34	-16.89	-1407.97	-1457.15	2.57
Dead+Wind 60 deg - No Ice	28.35	20.93	-12.08	-1010.23	-1759.96	5.62
Dead+Wind 90 deg - No Ice	28.35	24.33	0.04	12.81	-2037.90	10.01
Dead+Wind 120 deg - No Ice	28.35	21.75	14.34	1231.28	-1802.48	11.35
Dead+Wind 135 deg - No Ice	28.35	16.98	18.80	1617.80	-1420.73	9.66
Dead+Wind 150 deg - No Ice	28.35	11.98	22.52	1923.91	-997.54	7.77
Dead+Wind 180 deg - No Ice	28.35	0.20	25.26	2156.06	-15.49	2.52
Dead+Wind 210 deg - No Ice	28.35	-11.61	22.03	1873.73	969.15	-2.92
Dead+Wind 225 deg - No Ice	28.35	-17.51	17.84	1521.03	1483.79	-5.43
Dead+Wind 240 deg - No Ice	28.35	-22.50	12.99	1095.32	1886.97	-5.94
Dead+Wind 270 deg - No Ice	28.35	-24.88	-0.96	-88.74	2102.18	-6.95
Dead+Wind 300 deg - No Ice	28.35	-21.78	-12.80	-1082.63	1854.37	-8.14
Dead+Wind 315 deg - No Ice	28.35	-18.26	-17.60	-1479.40	1559.77	-8.31
Dead+Wind 330 deg - No Ice	28.35	-13.52	-21.63	-1817.03	1162.30	-7.77
Dead+Ice+Temp	42.02	0.00	0.00	20.78	10.96	-0.00
Dead+Wind 0 deg+Ice+Temp	42.02	-1.59	-34.06	-2863.33	171.46	-7.80
Dead+Wind 30 deg+Ice+Temp	42.02	16.16	-28.08	-2361.54	-1359.28	-0.46
Dead+Wind 45 deg+Ice+Temp	42.02	23.05	-22.59	-1894.18	-1950.62	3.37
Dead+Wind 60 deg+Ice+Temp	42.02	27.93	-16.13	-1351.11	-2365.33	7.48
Dead+Wind 90 deg+Ice+Temp	42.02	32.40	0.04	25.37	-2737.36	13.54

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Load Combination	Vertical K	Shear _x K	Shear _y K	Overturning Moment, M _x kip-ft	Overturning Moment, M _y kip-ft	Torque kip-ft
Dead+Wind 120 deg+Ice+Temp	42.02	28.70	18.40	1601.87	-2406.63	15.55
Dead+Wind 135 deg+Ice+Temp	42.02	22.68	24.56	2134.80	-1913.10	13.81
Dead+Wind 150 deg+Ice+Temp	42.02	16.00	29.56	2552.30	-1343.38	11.54
Dead+Wind 180 deg+Ice+Temp	42.02	0.20	33.38	2878.48	-9.55	4.82
Dead+Wind 210 deg+Ice+Temp	42.02	-15.62	29.04	2500.56	1326.96	-2.69
Dead+Wind 225 deg+Ice+Temp	42.02	-23.23	23.57	2034.95	1991.01	-6.30
Dead+Wind 240 deg+Ice+Temp	42.02	-29.47	17.02	1461.74	2506.50	-7.77
Dead+Wind 270 deg+Ice+Temp	42.02	-32.96	-0.99	-79.35	2816.49	-10.39
Dead+Wind 300 deg+Ice+Temp	42.02	-28.80	-16.86	-1425.76	2475.54	-12.30
Dead+Wind 315 deg+Ice+Temp	42.02	-24.01	-23.32	-1967.83	2069.29	-12.43
Dead+Wind 330 deg+Ice+Temp	42.02	-17.59	-28.64	-2417.81	1526.13	-11.55
Dead+Wind 0 deg - Service	28.35	-1.54	-26.01	-2167.81	159.99	-5.42
Dead+Wind 30 deg - Service	28.35	12.13	-21.09	-1762.45	-1012.95	-0.14
Dead+Wind 45 deg - Service	28.35	17.34	-16.89	-1407.97	-1457.15	2.57
Dead+Wind 60 deg - Service	28.35	20.93	-12.08	-1010.23	-1759.96	5.62
Dead+Wind 90 deg - Service	28.35	24.33	0.04	12.81	-2037.90	10.01
Dead+Wind 120 deg - Service	28.35	21.75	14.34	1231.28	-1802.48	11.35
Dead+Wind 135 deg - Service	28.35	16.98	18.80	1617.80	-1420.73	9.66
Dead+Wind 150 deg - Service	28.35	11.98	22.52	1923.91	-997.54	7.77
Dead+Wind 180 deg - Service	28.35	0.20	25.26	2156.06	-15.49	2.52
Dead+Wind 210 deg - Service	28.35	-11.61	22.03	1873.73	969.15	-2.92
Dead+Wind 225 deg - Service	28.35	-17.51	17.84	1521.03	1483.79	-5.43
Dead+Wind 240 deg - Service	28.35	-22.50	12.99	1095.32	1886.97	-5.94
Dead+Wind 270 deg - Service	28.35	-24.88	-0.96	-88.74	2102.18	-6.95
Dead+Wind 300 deg - Service	28.35	-21.78	-12.80	-1082.63	1854.37	-8.14
Dead+Wind 315 deg - Service	28.35	-18.26	-17.60	-1479.40	1559.77	-8.31
Dead+Wind 330 deg - Service	28.35	-13.52	-21.63	-1817.03	1162.30	-7.77

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-28.35	0.00	0.00	28.35	0.00	0.000%
2	-1.54	-28.35	-26.01	1.54	28.35	26.01	0.000%
3	12.13	-28.35	-21.09	-12.13	28.35	21.09	0.000%
4	17.34	-28.35	-16.89	-17.34	28.35	16.89	0.000%
5	20.93	-28.35	-12.08	-20.93	28.35	12.08	0.000%
6	24.33	-28.35	0.04	-24.33	28.35	-0.04	0.000%
7	21.75	-28.35	14.34	-21.75	28.35	-14.34	0.000%
8	16.98	-28.35	18.80	-16.98	28.35	-18.80	0.000%
9	11.98	-28.35	22.52	-11.98	28.35	-22.52	0.000%
10	0.20	-28.35	25.26	-0.20	28.35	-25.26	0.000%
11	-11.61	-28.35	22.03	11.61	28.35	-22.03	0.000%
12	-17.51	-28.35	17.84	17.51	28.35	-17.84	0.000%
13	-22.50	-28.35	12.99	22.50	28.35	-12.99	0.000%
14	-24.88	-28.35	-0.96	24.88	28.35	0.96	0.000%
15	-21.78	-28.35	-12.80	21.78	28.35	12.80	0.000%
16	-18.26	-28.35	-17.60	18.26	28.35	17.60	0.000%
17	-13.52	-28.35	-21.63	13.52	28.35	21.63	0.000%
18	0.00	-42.02	0.00	0.00	42.02	0.00	0.000%
19	-1.59	-42.02	-34.06	1.59	42.02	34.06	0.000%
20	16.16	-42.02	-28.08	-16.16	42.02	28.08	0.000%
21	23.05	-42.02	-22.59	-23.05	42.02	22.59	0.000%
22	27.93	-42.02	-16.13	-27.93	42.02	16.13	0.000%
23	32.40	-42.02	0.04	-32.40	42.02	-0.04	0.000%
24	28.70	-42.02	18.40	-28.70	42.02	-18.40	0.000%
25	22.68	-42.02	24.56	-22.68	42.02	-24.56	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
26	16.00	-42.02	29.56	-16.00	42.02	-29.56	0.000%
27	0.20	-42.02	33.38	-0.20	42.02	-33.38	0.000%
28	-15.62	-42.02	29.04	15.62	42.02	-29.04	0.000%
29	-23.23	-42.02	23.57	23.23	42.02	-23.57	0.000%
30	-29.47	-42.02	17.02	29.47	42.02	-17.02	0.000%
31	-32.96	-42.02	-0.99	32.96	42.02	0.99	0.000%
32	-28.80	-42.02	-16.86	28.80	42.02	16.86	0.000%
33	-24.01	-42.02	-23.32	24.01	42.02	23.32	0.000%
34	-17.59	-42.02	-28.64	17.59	42.02	28.64	0.000%
35	-1.54	-28.35	-26.01	1.54	28.35	26.01	0.000%
36	12.13	-28.35	-21.09	-12.13	28.35	21.09	0.000%
37	17.34	-28.35	-16.89	-17.34	28.35	16.89	0.000%
38	20.93	-28.35	-12.08	-20.93	28.35	12.08	0.000%
39	24.33	-28.35	0.04	-24.33	28.35	-0.04	0.000%
40	21.75	-28.35	14.34	-21.75	28.35	-14.34	0.000%
41	16.98	-28.35	18.80	-16.98	28.35	-18.80	0.000%
42	11.98	-28.35	22.52	-11.98	28.35	-22.52	0.000%
43	0.20	-28.35	25.26	-0.20	28.35	-25.26	0.000%
44	-11.61	-28.35	22.03	11.61	28.35	-22.03	0.000%
45	-17.51	-28.35	17.84	17.51	28.35	-17.84	0.000%
46	-22.50	-28.35	12.99	22.50	28.35	-12.99	0.000%
47	-24.88	-28.35	-0.96	24.88	28.35	0.96	0.000%
48	-21.78	-28.35	-12.80	21.78	28.35	12.80	0.000%
49	-18.26	-28.35	-17.60	18.26	28.35	17.60	0.000%
50	-13.52	-28.35	-21.63	13.52	28.35	21.63	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	0.00000001
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	0.00000001
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	0.00000001
16	Yes	4	0.00000001	0.00000001
17	Yes	4	0.00000001	0.00000001
18	Yes	4	0.00000001	0.00000001
19	Yes	4	0.00000001	0.00000094
20	Yes	4	0.00000001	0.00000109
21	Yes	4	0.00000001	0.00000101
22	Yes	4	0.00000001	0.00000091
23	Yes	4	0.00000001	0.00000194
24	Yes	4	0.00000001	0.00000104
25	Yes	4	0.00000001	0.00000179
26	Yes	4	0.00000001	0.00000129

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27	Yes	4	0.00000001	0.00000098
28	Yes	4	0.00000001	0.00000123
29	Yes	4	0.00000001	0.00000115
30	Yes	4	0.00000001	0.00000095
31	Yes	4	0.00000001	0.00000112
32	Yes	4	0.00000001	0.00000120
33	Yes	4	0.00000001	0.00000116
34	Yes	4	0.00000001	0.00000128
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
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001
48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	7.319	40	0.4679	0.0967
T2	120 - 100	5.364	40	0.4248	0.0888
T3	100 - 80	3.639	40	0.3346	0.0724
T4	80 - 60	2.313	40	0.2584	0.0547
T5	60 - 40	1.309	40	0.1830	0.0389
T6	40 - 20	0.607	40	0.1145	0.0237
T7	20 - 0	0.190	40	0.0533	0.0122

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	1142-2C	40	7.319	0.4679	0.0967	81130
138.00	Pirot 12' T-Frame Sector Mount (1)	40	7.119	0.4649	0.0961	81130
120.00	Pirot 4' Side Mount Standoff (1)	40	5.364	0.4248	0.0888	20352
110.00	6 FT DISH	40	4.458	0.3820	0.0814	13704
98.00	Pirot 12' T-Frame Sector Mount (1)	40	3.488	0.3259	0.0706	10673
95.00	(2) RRUS-11	40	3.270	0.3136	0.0678	11254
78.00	PL4-107	40	2.199	0.2510	0.0531	16276

Maximum Tower Deflections - Design Wind

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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	140 - 120	9.732	30	0.6206	0.1313
T2	120 - 100	7.137	30	0.5646	0.1228
T3	100 - 80	4.841	30	0.4458	0.1024
T4	80 - 60	3.075	30	0.3444	0.0777
T5	60 - 40	1.739	30	0.2441	0.0546
T6	40 - 20	0.803	30	0.1527	0.0329
T7	20 - 0	0.250	24	0.0711	0.0169

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
140.00	1142-2C	30	9.732	0.6206	0.1313	64544
138.00	Pirol 12' T-Frame Sector Mount (1)	30	9.468	0.6168	0.1307	64544
120.00	Pirol 4' Side Mount Standoff (1)	30	7.137	0.5646	0.1228	16081
110.00	6 FT DISH	30	5.932	0.5084	0.1139	10448
98.00	Pirol 12' T-Frame Sector Mount (1)	30	4.641	0.4343	0.1000	8013
95.00	(2) RRUS-11	30	4.351	0.4180	0.0963	8449
78.00	PL4-107	30	2.924	0.3346	0.0753	12216

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load Allowable	Allowable Ratio	Criteria
T1	140	Diagonal	A325N	0.7500	1	2.58	9.28	0.278 ✓	1.333	Bolt Shear
T2	120	Diagonal	A325N	0.7500	1	5.03	9.28	0.542 ✓	1.333	Bolt Shear
T3	100	Leg	A325N	0.7500	4	17.75	19.43	0.914 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	6.21	9.06	0.685 ✓	1.333	Member Bearing
T4	80	Leg	A325N	1.1250	6	18.85	43.74	0.431 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	5.91	6.80	0.870 ✓	1.333	Member Bearing
T5	60	Leg	A325N	1.1250	6	24.73	43.74	0.566 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	5.82	6.80	0.857 ✓	1.333	Member Bearing
T6	40	Leg	A325N	1.2500	6	29.72	54.00	0.550 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	6.44	9.28	0.694 ✓	1.333	Bolt Shear
T7	20	Leg	A325N	1.2500	6	33.93	54.00	0.628 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	7.34	6.80	1.080 ✓	1.333	Member Bearing

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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 K	Allow. P _a K	Ratio P P _a
T1	140 - 120	1 3/4	20.00	3.21	88.0 K=1.00	17.365	2.4053	-23.56	41.77	0.564 ✓
T2	120 - 100	2 1/2	20.00	3.21	61.6 K=1.00	22.442	4.9087	-69.77	110.16	0.633 ✓
T3	100 - 80	3 1/2	20.03	6.68	91.6 K=1.00	16.602	9.6211	-110.18	159.73	0.690 ✓
T4	80 - 60	3 3/4	20.03	6.68	85.4 K=1.00	17.901	11.0447	-151.71	197.71	0.767 ✓
T5	60 - 40	4	20.03	6.68	80.1 K=1.00	18.991	12.5664	-187.64	238.65	0.786 ✓
T6	40 - 20	4 1/4	20.03	6.68	75.4 K=1.00	19.917	14.1863	-219.36	282.55	0.776 ✓
T7	20 - 0	4 1/2	20.03	6.68	71.2 K=1.00	20.713	15.9043	-250.06	329.43	0.759 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
T1	140 - 120	3/4	5.94	2.88	138.4 K=0.75	7.794	0.4418	-2.58	3.44	0.749 ✓
T2	120 - 100	7/8	5.94	2.85	117.1 K=0.75	10.692	0.6013	-5.03	6.43	0.782 ✓
T3	100 - 80	L2x2x1/4	9.31	4.52	138.6 K=1.00	7.772	0.9380	-5.97	7.29	0.819 ✓
T4	80 - 60	L2 1/2x2 1/2x3/16	10.65	5.17	125.3 K=1.00	9.506	0.9020	-5.92	8.57	0.690 ✓
T5	60 - 40	L2 1/2x2 1/2x3/16	12.10	5.89	142.7 K=1.00	7.335	0.9020	-5.80	6.62	0.877 ✓
T6	40 - 20	L2 1/2x2 1/2x1/4	13.64	6.64	162.4 K=1.00	5.664	1.1900	-6.44	6.74	0.955 ✓
T7	20 - 0	L3x3x3/16	14.70	7.16	144.2 K=1.00	7.178	1.0900	-7.15	7.82	0.914 ✓

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 K	Allow. P _a K	Ratio P P _a
T1	140 - 120	3/4	5.00	4.85	217.5	3.158	0.4418	-0.08	1.40	0.060

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio P P _a
					K=0.70					✓
T2	120 - 100	KL/R > 200 (C) - 4 7/8	5.00	4.79	184.0 K=0.70	4.411	0.6013	-1.00	2.65	0.378 ✓

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 K	Allow. P _a K	Ratio P P _a
T1	140 - 120	3/4	5.00	4.85	217.5 K=0.70	3.158	0.4418	-0.89	1.40	0.638 ✓
T2	120 - 100	KL/R > 200 (C) - 8 7/8	5.00	4.79	184.0 K=0.70	4.411	0.6013	-0.48	2.65	0.181 ✓

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 K	Allow. P _a K	Ratio P P _a
T1	140 - 120	1 3/4	20.00	3.21	88.0	30.000	2.4053	20.62	72.16	0.286 ✓
T2	120 - 100	2 1/2	20.00	3.21	61.6	30.000	4.9087	64.47	147.26	0.438 ✓
T3	100 - 80	3 1/2	20.03	6.68	91.6	30.000	9.6211	99.96	288.63	0.346 ✓
T4	80 - 60	3 3/4	20.03	6.68	85.4	30.000	11.0447	137.39	331.34	0.415 ✓
T5	60 - 40	4	20.03	6.68	80.1	30.000	12.5664	168.66	376.99	0.447 ✓
T6	40 - 20	4 1/4	20.03	6.68	75.4	30.000	14.1863	196.21	425.59	0.461 ✓
T7	20 - 0	4 1/2	20.03	6.68	71.2	30.000	15.9043	218.75	477.13	0.458 ✓

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	F _a ksi	A in ²	Actual P K	Allow. P _a K	Ratio 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 K	Allow. P _a K	Ratio P P _a
T1	140 - 120	3/4	5.94	2.88	184.6	21.600	0.4418	2.58	9.54	0.270 ✓
T2	120 - 100	7/8	5.94	2.85	156.2	21.600	0.6013	5.03	12.99	0.387 ✓
T3	100 - 80	L2x2x1/4	8.90	4.32	88.1	21.600	0.9380	6.21	20.26	0.307 ✓
T4	80 - 60	L2 1/2x2 1/2x3/16	9.74	4.73	75.2	21.600	0.9020	5.91	19.48	0.304 ✓
T5	60 - 40	L2 1/2x2 1/2x3/16	12.10	5.89	93.0	21.600	0.9020	5.82	19.48	0.299 ✓
T6	40 - 20	L2 1/2x2 1/2x1/4	13.12	6.39	101.9	21.600	1.1900	6.08	25.70	0.236 ✓
T7	20 - 0	L3x3x3/16	15.24	7.43	96.8	21.600	1.0900	7.34	23.54	0.312 ✓

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 K	Allow. P _a K	Ratio P P _a
T1	140 - 120	3/4	5.00	4.85	310.7	21.600	0.4418	0.07	9.54	0.008 ✓
T2	120 - 100	7/8	5.00	4.79	262.9	21.600	0.6013	1.01	12.99	0.078 ✓

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 K	Allow. P _a K	Ratio P P _a
T1	140 - 120	3/4	5.00	4.85	310.7	21.600	0.4418	0.89	9.54	0.093 ✓
T2	120 - 100	7/8	5.00	4.79	262.9	21.600	0.6013	0.35	12.99	0.027 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
T1	140 - 120	Leg	1 3/4	1	-23.56	55.68	42.3	Pass
T2	120 - 100	Leg	2 1/2	47	-69.77	146.85	47.5	Pass
T3	100 - 80	Leg	3 1/2	91	-110.18	212.92	51.7	Pass
							68.5 (b)	
T4	80 - 60	Leg	3 3/4	112	-151.71	263.55	57.6	Pass
T5	60 - 40	Leg	4	133	-187.64	318.12	59.0	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	SF*P _{allow} K	% Capacity	Pass Fail
T6	40 - 20	Leg	4 1/4	154	-219.36	376.64	58.2	Pass
T7	20 - 0	Leg	4 1/2	175	-250.06	439.13	56.9	Pass
T1	140 - 120	Diagonal	3/4	15	-2.58	4.59	56.2	Pass
T2	120 - 100	Diagonal	7/8	57	-5.03	8.57	58.7	Pass
T3	100 - 80	Diagonal	L2x2x1/4	95	-5.97	9.72	61.5	Pass
T4	80 - 60	Diagonal	L2 1/2x2 1/2x3/16	116	-5.92	11.43	51.8	Pass
							65.3 (b)	
T5	60 - 40	Diagonal	L2 1/2x2 1/2x3/16	137	-5.80	8.82	65.8	Pass
T6	40 - 20	Diagonal	L2 1/2x2 1/2x1/4	158	-6.44	8.98	71.7	Pass
T7	20 - 0	Diagonal	L3x3x3/16	185	-7.15	10.43	68.6	Pass
							81.0 (b)	
T1	140 - 120	Top Girt	3/4	4	-0.08	1.86	4.5	Pass
T2	120 - 100	Top Girt	7/8	50	-1.00	3.54	28.4	Pass
T1	140 - 120	Bottom Girt	3/4	8	-0.89	1.86	47.9	Pass
T2	120 - 100	Bottom Girt	7/8	53	-0.48	3.54	13.6	Pass
							Summary	
							Leg (T3)	Pass
							Diagonal (T7)	Pass
							Top Girt (T2)	Pass
							Bottom Girt (T1)	Pass
							Bolt Checks	Pass
							RATING =	81.0 Pass

Tower Anchor Bolt Analysis**Max Leg Reactions:**

Uplift = Uplift := 223 kips (User Input)

Shear = Shear := 22 kips (User Input)

Compression = Compression := 253 kips (User Input)

Anchor Bolt Data:

ASTMA449

Number of Anchor Bolts = N := 6 (User Input)

Bolt Ultimate Strength = $F_u := 105 \text{ ksi}$ (User Input)Bolt Yield Strength = $F_y := 81 \text{ ksi}$ (User Input)

Diameter of Bolts = D := 1.25 in (User Input)

Threads per Inch = n := 7 (User Input)

Coefficient of Friction = $\mu := 0.55$ (User Input)**Anchor Bolt Area:**Gross Area of Bolt = $A_g := \frac{\pi}{4} \cdot D^2 = 1.227 \cdot \text{in}^2$ Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 = 0.969 \cdot \text{in}^2$ (AISC 13th Ed. pg. 7-83)

Subject:

Anchor Bolt Analysis

Location:

Cheshire, CT

Rev. 0: 4/22/13

Prepared by: T.J.L. Checked by: C.F.C.
 Job No. 13075.CO5

Check Tensile Force:

Maximum Tensile Force (Gross Area) =

$$F_{\text{gross.area}} := 1.33 \cdot (0.33 \cdot A_g \cdot F_u) = 56.6 \text{ kips}$$

Maximum Tensile Force (Net Area) =

$$F_{\text{net.area}} := 1.3 \cdot (0.60 \cdot A_n \cdot F_y) = 61.2 \text{ kips}$$

Allowable Tension =

$$\text{AllowableTension} := \begin{cases} F_{\text{gross.area}} & \text{if } F_{\text{gross.area}} < F_{\text{net.area}} \\ F_{\text{net.area}} & \text{if } F_{\text{net.area}} < F_{\text{gross.area}} \end{cases}$$

$$\text{AllowableTension} = 56.6 \text{ kips}$$

Applied Tension =

$$\text{MaxTension} := \frac{\text{Uplift}}{N} = 37.17 \text{ kips}$$

$$\frac{\text{MaxTension}}{F_{\text{net.area}}} = 60.7\%$$

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

Condition1 = "OK"

Check Anchor Bolt Area:

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

Required Area =

$$A_{s1} := \frac{\text{Uplift}}{F_y} + \frac{\text{Shear}}{\mu \cdot 85 \cdot F_y} = 3.3 \text{ in}^2$$

$$A_{s2} := \left[\frac{\text{Shear} - (0.3 \cdot \text{Compression})}{\mu \cdot 85 \cdot F_y} \right] = -1.423 \text{ in}^2$$

Provided Area =

$$A_{\text{sprovided}} := A_n \cdot N = 5.8 \text{ in}^2$$

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

Condition2 = "OK"

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

Condition3 = "OK"

Mat Foundation Analysis:**Input Data:**Tower Data

Overturning Moment =	OM := 2902-ft-kips	(User Input from RISATower)
Shear Force =	S _t := 34-kip	(User Input from RISATower)
Axial Force =	WT _t := 42-kip	(User Input from RISATower)
Max Compression Force =	C _t := 254-kip	(User Input from RISATower)
Max Uplift Force =	U _t := 224-kip	(User Input from RISATower)
Tower Height =	H _t := 140-ft	(User Input)
Tower Width =	W _t := 14-ft	(User Input)
Tower Position on Foundation (1=offset, 2=centered) =	Pos _t := 1	(User Input)

Footing Data:

Overall Depth of Footing =	D _f := 7-ft	(User Input)
Thickness of Footing =	T _f := 2.5-ft	(User Input)
Width of Footing =	W _f := 30-ft	(User Input)
Length of Pier =	L _p := 5-ft	(User Input)
Extension of Pier Above Grade =	L _{pag} := 0.5-ft	(User Input)
Diameter of Pier =	d _p := 4-ft	(User Input)

Material Properties:

Concrete Compressive Strength =	f _c := 4000-psi	(User Input)
Steel Reinforcement Yield Strength =	f _y := 60000-psi	(User Input)
Internal Friction Angle of Soil =	Φ _s := 34-deg	(User Input)
Allowable Soil Bearing Capacity =	q _s := 3000-psf	(User Input)
Unit Weight of Soil =	γ _{soil} := 120-pcf	(User Input)
Unit Weight of Concrete =	γ _{conc} := 150-pcf	(User Input)
Foundation Bouyancy =	Bouyancy := 1	(User Input) (Yes=1 / No=0)
Depth to Neglect =	n := 0-ft	(User Input)
Cohesion of Clay Type Soil =	c := 0-ksf	(User Input) (Use 0 for Sandy Soil)
Seismic Zone Factor =	Z := 2	(User Input) (UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	μ := 0.45	(User Input)

Pier Reinforcement:

Bar Size =	$BS_{pier} := 7$	(User Input)	
Bar Diameter =	$d_{bpier} := 0.875 \cdot \text{in}$	(User Input)	
Number of Bars =	$NB_{pier} := 26$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3.0 \cdot \text{in}$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot \text{in}$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 10$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.27 \cdot \text{in}$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 29$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 10$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.27 \cdot \text{in}$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 29$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot \text{in}$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area =	$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.601 \cdot \text{in}^2$	
Pad Top Reinforcement Bar Area =	$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 1.267 \cdot \text{in}^2$	
Pad Bottom Reinforcement Bar Area =	$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 1.267 \cdot \text{in}^2$	
Coefficient of Lateral Soil Pressure =	$K_p := \frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)} = 3.537$	
Load Factor =	$LF := \begin{cases} 1.333 & \text{if } H_t \leq 700 \cdot \text{ft} \\ 1.7 & \text{if } H_t \geq 1200 \cdot \text{ft} \\ 1.333 + \left(\frac{H_t - 700 \cdot \text{ft}}{1200 \cdot \text{ft} - 700 \cdot \text{ft}} \right) \cdot 0.4 & \text{otherwise} \end{cases}$	= 1.333

Stability of Footing:

Adjusted Concrete Unit Weight =

$$\gamma_c := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{conc}} - 62.4 \text{pcf}, \gamma_{\text{conc}}) = 87.6 \text{pcf}$$

Adjusted Soil Unit Weight =

$$\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{soil}} - 62.4 \text{pcf}, \gamma_{\text{soil}}) = 57.6 \text{pcf}$$

Passive Pressure =

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

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 0.917 \text{ksf}$$

$$P_{top} := \text{if}(n < (D_f - T_f), P_{pt}, P_{pn}) = 0.917 \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.426 \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.171 \text{ksf}$$

$$T_p := \text{if}(n < (D_f - T_f), T_f, (D_f - n)) = 2.5$$

$$A_p := W_f \cdot T_p = 75$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 87.862 \text{kip}$$

Weight of Concrete Pad =

$$WT_{pad} := (W_f^2 \cdot T_f) \cdot \gamma_c = 197.1 \text{kip}$$

Weight of Concrete Piers =

$$WT_{pier} := 3 \cdot \left[\left(L_p \cdot \frac{d_p^2 \cdot \pi}{4} \right) \cdot \gamma_c \right] = 16.512 \text{kip}$$

Total Weight of Concrete =

$$WT_c := WT_{pad} + WT_{pier} = 214 \text{kip}$$

Weight of Soil Above Footing =

$$WT_{s1} := \left(W_f^2 - 3 \cdot \frac{d_p^2 \cdot \pi}{4} \right) \cdot (L_p - L_{pag}) \cdot \gamma_s = 224 \text{kip}$$

Weight of Soil Above Footing =

$$WT_{s2} := \left[\frac{\tan(\Phi_s) \cdot (L_p - L_{pag})^2}{2} \cdot W_f \right] \cdot \gamma_s = 12 \text{kip}$$

Tower Offset =

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

$$X_t := \text{if}(Pos_t, X_{t1}, X_{t2}) = 8.938$$

$$X_{off} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \text{deg}))}{3} + X_t \right] = 2.021$$

Resisting Moment =

$$M_r := (WT_c + WT_{s1}) \cdot \frac{W_f}{2} + S_u \cdot \frac{T_f}{3} + WT_{s2} \left[W_f + \frac{\tan(\Phi_s) \cdot (L_p - L_{pag})}{3} \right] = 6996 \text{kip-ft}$$

Overturing Moment =

$$M_{ot} := OM + S_t \cdot (L_p + T_f) = 3157 \text{kip-ft}$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 2.22$$

Factor of Safety Required =

$$FS_{req} := 2$$

$$\text{OverTurning_Moment_Check} := \text{if}(FS \geq FS_{req}, \text{"Okay"}, \text{"No Good"})$$

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

Bearing Pressure Caused by Footing:

Total Load =	$Load_{tot} := WT_c + WT_{s1} + WT_t = 479 \text{ kip}$	
Area of the Mat =	$A_{mat} := W_f^2 = 900$	
Section Modulus of Mat =	$S := \frac{W_f^3}{6} = 4500 \cdot ft^3$	
Maximum Pressure in Mat =	$P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 1.234 \text{ ksf}$	
	$Max_Pressure_Check := \text{if}(P_{max} < q_s, \text{"Okay"}, \text{"No Good"})$	
	$Max_Pressure_Check = \text{"Okay"}$	
Minimum Pressure in Mat =	$P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.169 \text{ ksf}$	
	$Min_Pressure_Check := \text{if}[(P_{min} \geq 0) \cdot (P_{min} < q_s), \text{"Okay"}, \text{"No Good"}]$	
	$Min_Pressure_Check = \text{"No Good"}$	
Distance to Resultant of Pressure Distribution =	$X_p := \frac{P_{max}}{P_{max} - P_{min}} \cdot \frac{1}{3} = 8.794$	
	$X_k := \frac{W_f}{6} = 5$	Since Resultant Force is Not in Kern, Area to which Pressure is Applied Must be Reduced.
Distance to Kern =		
Eccentricity =	$e := \frac{M_{ot}}{Load_{tot}} = 6.589$	
Adjusted Soil Pressure =	$P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e \right)} = 1.266 \text{ ksf}$	
	$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 1.266 \text{ ksf}$	
	$Pressure_Check := \text{if}(q_{adj} < q_s, \text{"Okay"}, \text{"No Good"})$	
	$Pressure_Check = \text{"Okay"}$	

Concrete Bearing Capacity:

Strength Reduction Factor =	$\Phi_c := 0.65$	(ACI-2008 9.3.2.2)
Bearing Strength Between Pier and Pad =	$P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 3.999 \times 10^3 \text{ kips}$	(ACI-2008 10.14)
	$Bearing_Check := \text{if}(P_b > LF \cdot C_t, \text{"Okay"}, \text{"No Good"})$	
	$Bearing_Check = \text{"Okay"}$	

Shear Strength of Concrete:

Beam Shear:

(Critical section located at a distance d from the face of Pier)

(ACI 11.3.1.1)

$$\phi_c := 0.85$$

(ACI 9.3.2.5)

$$d := T_f - C_{vpad} - d_{bbot} = 25.73 \text{ in}$$

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

$$d_2 := d_1 - d$$

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

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

$$V_{req} := LF \cdot \left[(q_{adj} - \text{Slope} \cdot d_1) + \left(\frac{\text{Slope} \cdot d_1}{2} \right) \right] \cdot W_f \cdot d_1 = 488.566 \text{ kip}$$

$$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot \text{psi}} \cdot W_f \cdot d = 996 \text{ kip}$$

(ACI-2008 11.2.1.1)

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

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

Punching Shear:

(Critical Section Located at a distance of d/2 from the face of pier)

(ACI 11.11.1.2)

Critical Perimeter of Punching Shear =

$$b_o := (d_p + d) \cdot \pi = 19.3$$

Area Included Inside Perimeter =

$$A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 29.6$$

Area Outside of Perimeter =

$$A_{out} := A_{mat} - A_{bo} = 870.4$$

Guess Value =

$$v_u := 1 \text{ ksf}$$

(From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given

$$d^2 + d_p \cdot d = \frac{\text{Load}_{tot}}{\pi \cdot v_u}$$

$$v_u := \text{Find}(v_u) = 1.2 \times 10^4 \text{ lbf}$$

$$V_u := v_u \cdot d \cdot W_f = 744.7 \text{ kips}$$

Required Shear Strength =

$$V_{req} := LF \cdot V_u = 992.6 \text{ kips}$$

Available Shear Strength =

$$V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot \text{psi}} \cdot b_o \cdot d = 1281.6 \text{ kip} \quad (\text{ACI-2008 11.11.2.1})$$

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

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

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor =

$$\phi_m := .90$$

(ACI-2008 9.3.2.1)

$$M_{nT} := LF \cdot \left[U_t \cdot \left(W_t \cdot \sin(60 \cdot \text{deg}) - \frac{d_p}{2} \right) + S_t \cdot (D_f + L_{pag}) \right] - W_{T_t} \cdot X_{off} = 3278 \cdot \text{ft} \cdot \text{k}$$

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

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

Design Moment =

$$M_n := \frac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 3.148 \times 10^3 \cdot \text{kips} \cdot \text{ft}$$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot \text{psi} \leq f_c \leq 4000 \cdot \text{psi} \\ 0.65 & \text{if } f_c > 8000 \cdot \text{psi} \end{cases} = 0.85$$

$$\left[\left[\left[\frac{f_c}{\text{psi}} - 4000 \right] \right] \cdot 0.5 \right] \text{ otherwise} \quad (\text{ACI-2008 10.2.7.3})$$

$$b_{eff} := W_t \cdot \cos(30 \cdot \text{deg}) + d_p = 193.492 \cdot \text{in}$$

$$d := T_f - C_{vr_pad} - d_{bbot} = 25.73 \cdot \text{in}$$

$$A_s := \frac{M_n}{(f_y \cdot d)} = 24.467 \cdot \text{in}^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 2.231 \cdot \text{in}$$

$$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2} \right)} = 25.576 \cdot \text{in}^2$$

$$\rho := \frac{A_s}{b_{eff} \cdot d} = 0.00514$$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \text{ psi} \\ .0020 & \text{otherwise} \end{cases} = 0.0018 \quad (\text{ACI-2008 7.12.2.1})$$

Check Bottom Bars:

$$A_s := \begin{cases} (\rho \cdot b_{eff} \cdot d) & \text{if } (\rho \cdot b_{eff} \cdot d) > \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \\ \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d & \text{otherwise} \end{cases} = 25.576 \cdot \text{in}^2$$

$$A_{sprov} := A_{bbot} \cdot NB_{bot} = 36.7 \cdot \text{in}^2$$

$$Pad_Reinforcement_Bot := \text{if}(A_{sprov} > A_s, \text{"Okay"}, \text{"No Good"})$$

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

Check top Bars:

$$A_s := \text{if} \left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d \right) = 25.6 \cdot \text{in}^2$$

$$A_{sprov} := A_{btop} \cdot NB_{top} = 36.7 \cdot \text{in}^2$$

$$Pad_Reinforcement_Top := \text{if}(A_{sprov} > A_s, \text{"Okay"}, \text{"No Good"})$$

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

Development Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot C_{vpad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 11.33 \cdot \text{in}$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

$$k_{tr} := 0 \quad (\text{ACI-2008 12.2.3})$$

$$L_{dbt} := \frac{3 f_y \alpha_{pad} \beta_{pad} \gamma_{pad} \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 38.3 \cdot \text{in}$$

Minimum Development Length =

$$L_{dbmin} := 12 \cdot \text{in} \quad (\text{ACI-2008 12.2.1})$$

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - C_{vpad} = 93 \cdot \text{in}$$

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

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

Steel Reinforcement in Pier:

Area of Pier =

$$A_p := \frac{\pi \cdot d_p^2}{4} = 1809.56 \cdot \text{in}^2$$

$$A_{smin} := 0.01 \cdot 0.05 \cdot A_p = 0.9 \cdot \text{in}^2 \quad (\text{ACI-2008 10.8.4 \& 10.9.1})$$

$$A_{sprov} := NB_{pier} \cdot A_{bpier} = 15.63 \cdot \text{in}^2$$

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

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

Bar Spacing In Pier =

$$B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 4.925 \cdot \text{in}$$

Diameter of Reinforcement Cage =

$$\text{Diam}_{cage} := d_p - 2 \cdot C_{vr_{pier}} = 42 \cdot \text{in}$$

Maximum Moment in Pier =

$$M_p := \left[S_t \left(L_p + \frac{A_{BP}}{2} \right) \right] \cdot LF = 2991.3 \cdot \text{in-kips}$$

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

$$(D \ N \ n \ P_u \ M_{xu}) := \left(d_p \cdot 12 \ NB_{pier} \ BS_{pier} \frac{C_t \cdot 1.333}{\text{kips}} \frac{M_p}{\text{in-kips}} \right)$$

$$(D \ N \ n \ P_u \ M_{xu}) = (48 \ 26 \ 7 \ 338.6 \ 2991.3)$$

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

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

$$(\phi P_n \ \phi M_{xn} \ f_{sp} \ \rho) = (2319.5 \ 20492 \ -39.8 \ 0)$$

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

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

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

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

Development Length Pier Reinforcement:

Available Length in Foundation:

$$L_{\text{pier}} := L_p - C_{\text{vr pier}} = 57 \cdot \text{in}$$

$$L_{\text{pad}} := T_f - C_{\text{vr pad}} = 27 \cdot \text{in}$$

Tension:

(ACI-2008 12.2.3)

Spacing or Cover Dimension =

$$c := \text{if} \left(C_{\text{vr pier}} < \frac{B_{\text{SPier}}}{2}, C_{\text{vr pier}}, \frac{B_{\text{SPier}}}{2} \right) = 2.462 \cdot \text{in}$$

Transverse Reinforcement =

$$k_{\text{tr}} := 0$$

(ACI-2008 12.2.3)

$$L_{\text{dbt}} := \frac{3 \cdot f_y \cdot \alpha_{\text{pier}} \cdot \beta_{\text{pier}} \cdot \gamma_{\text{pier}} \cdot \lambda_{\text{pier}}}{40 \cdot \sqrt{f_c \cdot \text{psi}} \cdot \left(\frac{c + k_{\text{tr}}}{d_{\text{bpier}}} \right)} \cdot d_{\text{bpier}} = 22.12 \cdot \text{in}$$

Minimum Development Length =

Pier reinforcement bars are standard 90 degree hooks
and therefore development in the pad is computed
as follows:

$$L_{\text{dh}} := \frac{1200 \cdot d_{\text{bpier}}}{\sqrt{\frac{f_c}{\text{psi}}}} \cdot .7 = 11.621 \cdot \text{in} \quad (\text{ACI } 12.2.1)$$

$$L_{\text{db}} := \max(L_{\text{dbt}}, L_{\text{dbmin}})$$

$$L_{\text{tension_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbt}}, \text{"Okay"}, \text{"No Good"})$$

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

Compression:

(ACI-2008 12.3.2)

$$L_{\text{dbc1}} := \frac{.02 \cdot d_{\text{bpier}} \cdot f_y}{\sqrt{f_c \cdot \text{psi}}} = 16.602 \cdot \text{in}$$

$$L_{\text{dbmin}} := 0.0003 \cdot \frac{\text{in}^2}{l_b} \cdot (d_{\text{bpier}} \cdot f_y) = 15.75 \cdot \text{in}$$

$$L_{\text{dbc}} := \text{if}(L_{\text{dbc1}} \geq L_{\text{dbmin}}, L_{\text{dbc1}}, L_{\text{dbmin}}) = 16.602 \cdot \text{in}$$

$$L_{\text{compression_Check}} := \text{if}(L_{\text{pier}} + L_{\text{pad}} > L_{\text{dbc}}, \text{"Okay"}, \text{"No Good"})$$

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

Tie Size and Spacing in Column:

Minimum Tie Size =

$$Tie_{min} := \text{if}(BS_{pier} \leq 10, 3, 4) = 3$$

Used #3 Ties

Seismic Factor =

$$z := \text{if}(Z \leq 2, 1, 0.5) = 1$$

(ACI-2008 21.10.5)

$$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 14 \text{ in}$$

$$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 18 \text{ in}$$

$$s_{lim3} := D_f \cdot z = 84 \text{ in}$$

$$s_{lim4} := 18 \text{ in}$$

Maximum Spacing =

$$s_{tie} := \min \begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix} = 14 \text{ in}$$

Number of Ties Required =

$$n_{tie} := \frac{L_{pier} - 3 \text{ in}}{s_{tie}} + 1 = 4.857$$

Check Anchor Steel Embedment:

Depth Available =

$$D_{ab} := L_{st} - A_{BP} = 5 \text{ ft}$$

Length of Anchor Bolt =

$$L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot \text{in}}{\sqrt{f_c \cdot \text{psi}}} = 10.87 \text{ ft}$$

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

Depth_Check = "No Good"

Note: Anchor plate is provided

SITE NAME	CHESHIRE NORTH 2 CT			ECP - CELL #	2	396
LATITUDE	41-33-21.07 N			LONGITUDE	72-55-01.88 W	
Additional Comments: 2013 LTE ANTMO. Alpha and gamma antenna swap. Beta azimuth and mech tilt change.				SAVE BUTTON		
				STRUCTURE TYPE	LATTICE	
700 Mhz - LTE Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	eNodeB		eNodeB		eNodeB	
ANTENNA TYPE	P65-16-XL-2		BXA-70063-6CF		P65-16-XL-2	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	0		120		240	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	136		136		136	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
MCPA BRICKS (QTY)						
RRH - QTY/MODEL						
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						
700 Mhz - LTE Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	eNodeB		eNodeB		eNodeB	
ANTENNA TYPE	BXA-70063-6CF-2		BXA-70063-6CF		BXA-70063-6CF-2	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	0		150		240	
DOWN TILT (MECH/DEG)	0		2		0	
RAD CTR (FT AGL)	136		136		136	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
MCPA BRICKS (QTY)						
RRH - QTY/MODEL						
SECTOR DISTRIBUTION BOX						
MAIN DISTRIBUTION BOX						
850 Cellular - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Modcell		Cellular Modcell		Cellular Modcell	
ANTENNA TYPE	DB854DG65ESX		DB854DG65ESX		DB854DG65ESX	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	0		120		240	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	136		136		136	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L
DIPLEX WITH LTE CABLE						
MCPA BRICKS (QTY)						
850 Cellular - Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	Cellular Modcell		Cellular Modcell		Cellular Modcell	
ANTENNA TYPE	DB854DG65ESX		DB854DG65ESX		DB854DG65ESX	
QTY OF ANTENNAS PER FACE	1		1		1	
ORIENTATION (DEG)	0		120		240	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	136		136		136	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L	2	FD9R6004/2C-3L
DIPLEX WITH LTE CABLE						
MCPA BRICKS (QTY)						
1900 PCS - Current Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Modcell 4.0B		PCS Modcell 4.0B		PCS Modcell 4.0B	
ANTENNA TYPE	LPA-185080-12CF-2		LPA-185080-12CF-2		LPA-185080-12CF-2	
QTY OF ANTENNAS PER FACE	2		2		2	
ORIENTATION (DEG)	0		120		240	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	136		136		136	
TMA - QTY / MODEL						
DIPLEXER - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	DIPLEX with Cellular Cable		DIPLEX with Cellular Cable		DIPLEX with Cellular Cable	
MCPA BRICKS (QTY)						
1900 PCS - Future Config	ALPHA		BETA		GAMMA	
EQUIPMENT TYPE	PCS Modcell 4.0B		PCS Modcell 4.0B		PCS Modcell 4.0B	
ANTENNA TYPE	LPA-185080-12CF-2		LPA-185080-12CF-2		LPA-185080-12CF-2	
QTY OF ANTENNAS PER FACE	2		2		2	
ORIENTATION (DEG)	0		120		240	
DOWN TILT (MECH/DEG)	0		0		0	
RAD CTR (FT AGL)	136		136		136	
TMA - QTY / MODEL						
DIPLEX WITH CELLULAR CABLE	DIPLEX with Cellular Cable		DIPLEX with Cellular Cable		DIPLEX with Cellular Cable	
MCPA BRICKS (QTY)						

NUMBER OF CABLE'S NEEDED							ESTIMATED CABLE LENGTH							
MAINLINE SIZE		1 5/8"		TOTAL # OF MAINLINES		12		MAINLINE (FT)						
JUMPER SIZE		1/2 "		TOTAL # OF TOP JUMPERS		18		TOP JUMPER (FT)			12			
Equipment Cable Ordering		MAIN CABLE		12		+		0		TOP JUMPER #		12	+	6
TX / RX FREQUENCIES							TX POWER OUTPUT							
Cellular A-Band				PCS F-Band		700 Mhz C - B		Cellular (Watts)			20			
TX - 869-880,890-891.5 MHz				TX - 1970-1975		TX - 746-757		PCS (Watts)			16			
RX - 824-835,845-846.5 MHz				RX - 1890-1895		RX - 776-787		LTE (Watts)			40			
ALPHA				BETA				GAMMA						
Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code	Ant.	Freq.	Func.	Color Code			
A1-A	800	Tx1/Rx0	RED	A5-A	800	Tx2/Rx0	BLUE	A9-A	800	Tx3/Rx0	GREEN			
A1-B	1900	Tx1/Rx0	RED/	A5-B	1900	Tx2/Rx0	BLUE/ WHITE	A9-B	1900	Tx3/Rx0	GREEN/WHITE			
A2	700	Tx1/Rx0	RED/	A6	700	Tx2/Rx0	BLUE/ ORANGE	A10	700	Tx3/Rx0	GREEN/ORANGE			
A3	700	Tx4/Rx1	RED/RED/ ORANGE	A7	700	Tx5/Rx1	BLUE/BLUE/ ORANGE	A11	700	Tx6/Rx1	GREEN/GREEN/ ORANGE			
A4-B	1900	Tx4/Rx1	RED/RED/ WHITE	A8-B	1900	Tx5/Rx1	BLUE/BLUE/ WHITE	A12-B	1900	Tx6/Rx1	GREEN/GREEN/ WHITE			
A4-A	800	Tx4/Rx1	RED/RED	A8-A	800	Tx5/Rx1	BLUE/BLUE	A12-A	800	Tx6/Rx1	GREEN/GREEN			
RF ENGINEER				RF MANAGER				INITIALS		DATE				
Prepared By : Justin Kober				Robert Hesselbach				JK		4/22/2013				

Beta antenna can be moved down to the end position of platform to achieve desired azimuth, slide other antennas over a spot.

BXA-70063-6CF-EDIN-X

X-Pol | FET Panel | 63° | 14.5 dBd

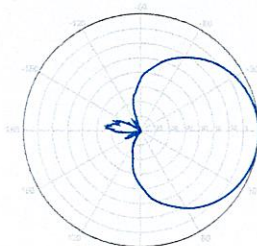
Replace "X" with desired electrical downtilt.

Antenna is also available with NE connector(s). Replace "EDIN" with "NE" in the model number when ordering.

Electrical Characteristics	696-900 MHz			
Frequency bands	696-806 MHz		806-900 MHz	
Polarization	±45°			
Horizontal beamwidth	65°		63°	
Vertical beamwidth	13°		11°	
Gain	14.0 dBd (16.1 dBi)		14.5 dBd (16.6 dBi)	
Electrical downtilt (X)	0, 2, 3, 4, 5, 6, 8, 10			
Impedance	50Ω			
VSWR	≤1.35:1			
Upper sidelobe suppression (0°)	-18.3 dB		-18.2 dB	
Front-to-back ratio (+/-30°)	-33.4 dB		-36.3 dB	
Null fill	5% (-26.02 dB)			
Isolation between ports	< -25 dB			
Input power with EDIN connectors	500 W			
Input power with NE connectors	300 W			
Lightning protection	Direct Ground			
Connector(s)	2 Ports / EDIN or NE / Female / Center (Back)			
Mechanical Characteristics				
Dimensions Length x Width x Depth	1804 x 285 x 132 mm		71.0 x 11.2 x 5.2 in	
Depth with z-brackets	172 mm		6.8 in	
Weight without mounting brackets	7.9 kg		17 lbs	
Survival wind speed	> 201 km/hr		> 125 mph	
Wind area	Front: 0.51 m ²	Side: 0.24 m ²	Front: 5.5 ft ²	Side: 2.6 ft ²
Wind load @ 161 km/hr (100 mph)	Front: 759 N	Side: 391 N	Front: 169 lbf	Side: 89 lbf
Mounting Options	Part Number	Fits Pipe Diameter		Weight
3-Point Mounting & Downtilt Bracket Kit	36210008	40-115 mm 1.57-4.5 in		6.9 kg 15.2 lbs
Concealment Configurations	For concealment configurations, order BXA-70063-6CF-EDIN-X-FP			

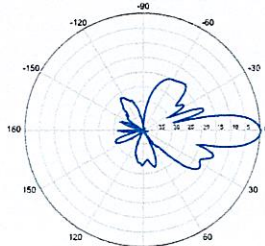


BXA-70063-6CF-EDIN-X



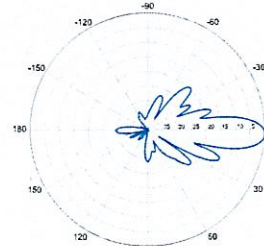
Horizontal | 750 MHz

BXA-70063-6CF-EDIN-0

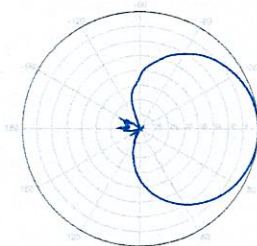


0° | Vertical | 750 MHz

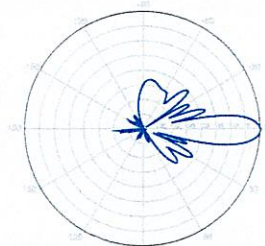
BXA-70063-6CF-EDIN-2



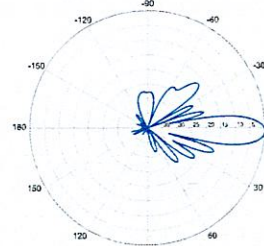
2° | Vertical | 750 MHz



Horizontal | 850 MHz



0° | Vertical | 850 MHz



2° | Vertical | 850 MHz

Quoted performance parameters are provided to offer typical or range values only and may vary as a result of normal manufacturing and operational conditions. Extreme operational conditions and/or stress on structural supports is beyond our control. Such conditions may result in damage to this product. Improvements to product may be made without notice.