STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

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

June 23, 2009

Thomas J. Regan, Esq.
Brown Rudnick LLP
City Place I, 185 Asylum Street
Hartford, CT 06103

RE: **EM-T-MOBILE-164-090515** - T-Mobile USA, Inc. notice of intent to modify an existing telecommunications facility located at 482 Pigeon Hill Road, Windsor, Connecticut.

Dear Attorney Regan:

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

The proposed modifications are to be implemented as specified here and in your notice dated May 15, 2009, including the placement of all necessary equipment and shelters within the tower compound. The modifications are in compliance with the exception criteria in Section 16-50j-72 (b) of the Regulations of Connecticut State Agencies as changes to an existing facility site that would not increase tower height, extend the boundaries of the tower site, increase noise levels at the tower site boundary by six decibels, and increase the total radio frequencies electromagnetic radiation power density measured at the tower site boundary to or above the standard adopted by the State Department of Environmental Protection pursuant to General Statutes § 22a-162. This facility has also been carefully modeled to ensure that radio frequency emissions are conservatively below State and federal standards applicable to the frequencies now used on this tower.

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

Thank you for your attention and cooperation.

Very truly yours,

S. Derek Phelps

S. Derek Phelps
Executive Director

SDP/MP/jb

c: The Honorable Donald Trinks, Mayor, Town of Windsor
Peter Souza, Town Manager, Town of Windsor
Eric Barz, Town Planner, Town of Windsor
Crown Castle

CONI EM-T-MOBILE-164-090515

In re:
T-Mobile USA, Inc. Notice to Make an Exempt Modification to an Existing Facility, 482 Pigeon Hill Road, Windsor, Connecticut. : EXEMPT MODIFICATION NO. _____
: May 15, 2009

ORIGINAL

NOTICE OF EXEMPT MODIFICATION

Pursuant to Conn. Agencies Regs. §§ 16-50j-73 and 16-50j-72(b), T-Mobile USA, Inc. ("T-Mobile") hereby gives notice to the Connecticut Siting Council ("Council") and the Town of Windsor of T-Mobile's intent to make an exempt modification to an existing lattice tower (the "Tower") located at 482 Pigeon Hill Road in Windsor, Connecticut. Specifically, T-Mobile plans to upgrade its wireless system in Connecticut by implementing its Universal Mobile Telecommunications System ("UMTS"). UMTS is a third-generation ("3G") technology that utilizes a code division multiple access ("CDMA") base to allow for fast and large data transfers. To accomplish this upgrade, T-Mobile must modify its antenna and equipment configurations at many of its existing sites.

Once the UMTS upgrade is complete, T-Mobile will operate on a more unified communication system, allowing international wireless telephones to function world-wide. Furthermore, UMTS will enhance GPS navigation capabilities and provide emergency responders with more advanced tracking capabilities. The proposed UMTS technology is compatible with the existing second-generation ("2G") Global System for Mobile Communication ("GSM") currently on the Tower and the proposed upgrade is expected to enhance the existing 2G system. In order to accomplish the upgrade at this site, T-Mobile plans to add UMTS technology and install associated equipment at the base of the Tower.

Under the Council's regulations (Conn. Agencies Regs. § 16-50j-72(b)), T-Mobile's plans do not constitute a modification subject to the Council's review because T-Mobile will not

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HARTFORD, CT 06103
(860) 509-6500

change the height of the Tower, will not increase the noise levels at the site, and will not increase the total radio frequency electromagnetic radiation power density at the site to levels above applicable standards.

The Tower is a 160-foot lattice tower located at 482 Pigeon Hill Road in Windsor, Connecticut (41.8666, -72.6748). The Tower is owned by Crown Castle International. There are multiple carriers located on the Tower. Currently, T-Mobile has 6 antennas and 6 Tower Mounted Amplifiers ("TMA") located on the Tower with a centerline of 145 feet. A site plan with Tower specifications is attached.

T-Mobile plans to add 3 UMTS antennas and 3 UMTS Twin TMA to the Tower. The proposed antennas and TMA will have the same centerline as the existing antennas and TMA - 145 feet. To confirm the Tower can support these changes, T-Mobile commissioned Natcomm Inc. to perform a structural analysis of the Tower (attached). According to the structural analysis, dated April 30, 2009, "...the subject tower **is adequate** to support the proposed antenna configuration" (Section 1-6, Structural Analysis Report, emphasis in original).

In addition, T-Mobile plans to locate 6, 1-5/8 inch coax cables to run under the existing ice bridge from the proposed equipment cabinet to the proposed antennas. T-Mobile also proposes to install the UMTS equipment cabinet on its existing 30-foot by 14-foot (approximately) concrete pad. Hence, no increase in the size of the concrete pad is necessary.

Therefore, excluding brief, minor, construction-related noise during the addition of the antennas and the installation of the equipment cabinet, T-Mobile's changes to the Tower will not increase noise levels at the site.

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HARTFORD, CT 06103
(860) 509-6500

The proposed antennas and TMA will not adversely impact the health and safety of the surrounding community or the people working on the Tower. The total radio frequency exposure measured around the Tower will be well below the National Council on Radiation

Protection and Measurements' ("NCRP") standard adopted by the Federal Communications Commission ("FCC"). The worst-case power density analysis measured at the base of the Tower indicates that T-Mobile's antennas will emit 5.066% of the NCRP's standard for maximum permissible exposure. A cumulative power density analysis indicates that together, all of the antennas on the Tower will emit only 20.106% of the NCRP's standard for maximum permissible exposure. Therefore, the power density levels will be well below the FCC mandated radio frequency exposure limits in all locations around the Tower, even with extremely conservative assumptions. The power density analysis is attached.

In conclusion, T-Mobile's proposed plan to add antennas and TMA at this site does not constitute a modification subject to the Council's jurisdiction because T-Mobile will not increase the height of the Tower, will not extend the boundaries of the site, will not increase the noise levels at the site, and the total radio frequency electromagnetic radiation power density will stay within all applicable standards. *See* Conn. Agencies Regs. § 16-50j-72.

T-Mobile USA, Inc.

By: _____

Thomas J. Regan
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(860) 509-6500

Certificate of Service

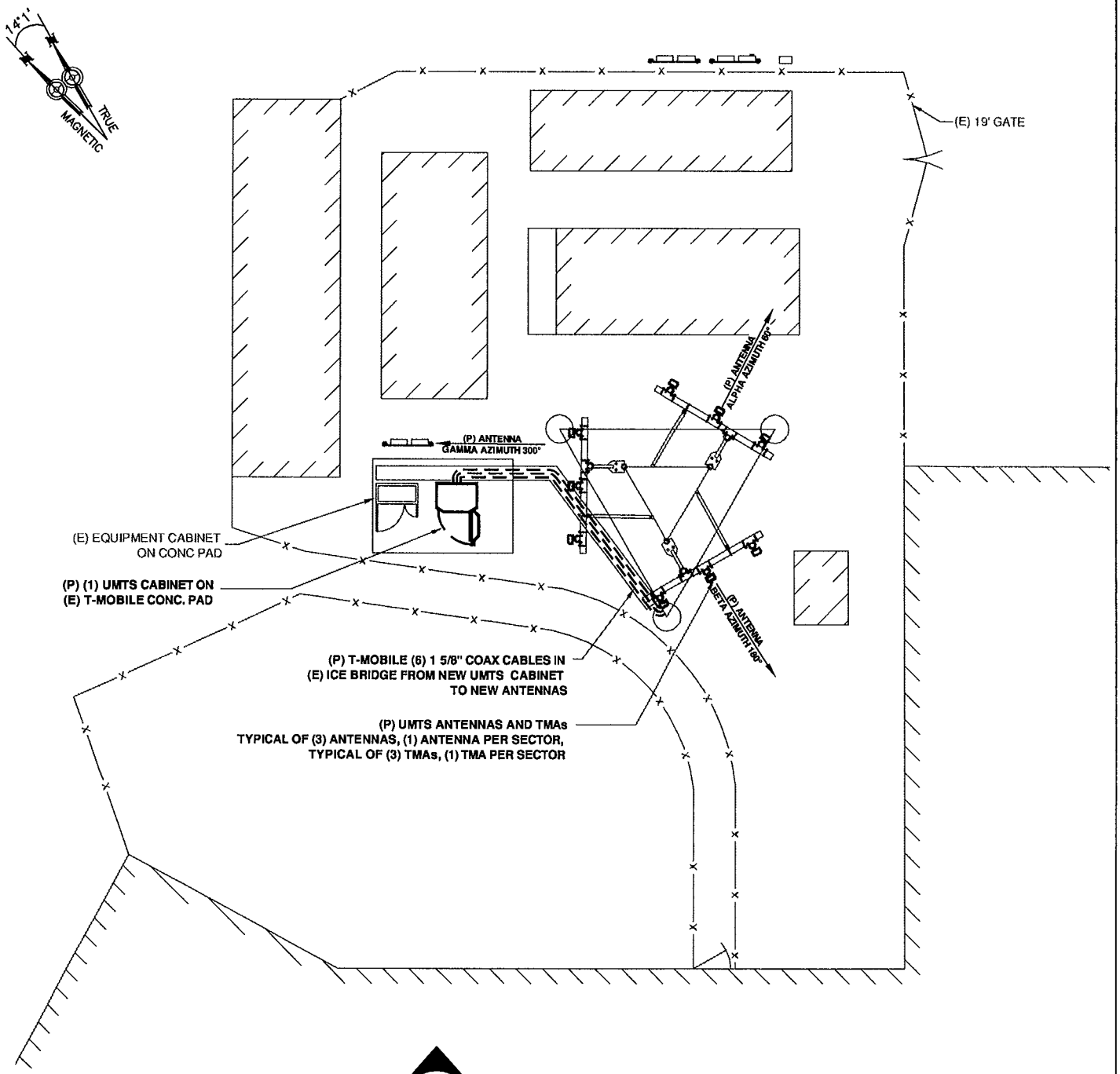
This is to certify that on this 15th day of May, 2009, the foregoing Notice of Exempt Modification was sent, via first class mail, to the following:

Town of Windsor
Mayor Donald Trinks
Town Hall
275 Broad Street
PO Box 472
Windsor, CT 06095

By: _____
Thomas J. Regan

40259786 v1 - 025064/0016

BROWN RUDNICK LLP
CITYPLACE I
185 ASYLUM STREET
HARTFORD, CT 06103
(860) 509-6500



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SHT-2

SITE PLAN

SCALE: 1/16" = 1'-0"

16 0 16 32 48

ALL EQUIPMENT LOCATIONS ARE APPROXIMATE AND ARE SUBJECT TO APPROVAL BY LESSEE/LICENSEE'S STRUCTURAL & RF ENGINEERS. LOCATIONS OF POWER & TELEPHONE FACILITIES ARE SUBJECT TO APPROVAL BY UTILITY COMPANIES.

TRANSCEND WIRELESS
10 INDUSTRIAL AVENUE
MAHWAH, NJ 07430
OFFICE: 201-316-2885
FAX: 201-684-0666

FOR

OMNIPOINT COMMUNICATIONS, INC.
DBA T-MOBILE USA, INC
35 GRIFIN ROAD SOUTH
BLOOMFIEL, CT 06002
OFFICE: (860) 692-7100
FAX:(860) 692-7159

ATLANTIS GROUP
15 Cypress St., Suite 300
Newton Centre, MA 02459
Office: 617-965-0789
Fax: 617-663-6032

SITE NAME:
WINDSOR I91/ X38

SITE NUMBER:
CT11227D

ADDRESS:
482 PIGEON HILL ROAD
WINDSOR, CT 06095

NUMBER	REVISION	DATE
0:	FINAL LE	03-13-09
A:	REVIEW	02-06-09

DRAWN BY: S.B.
DRAWING NO: LE-2

APPROVALS

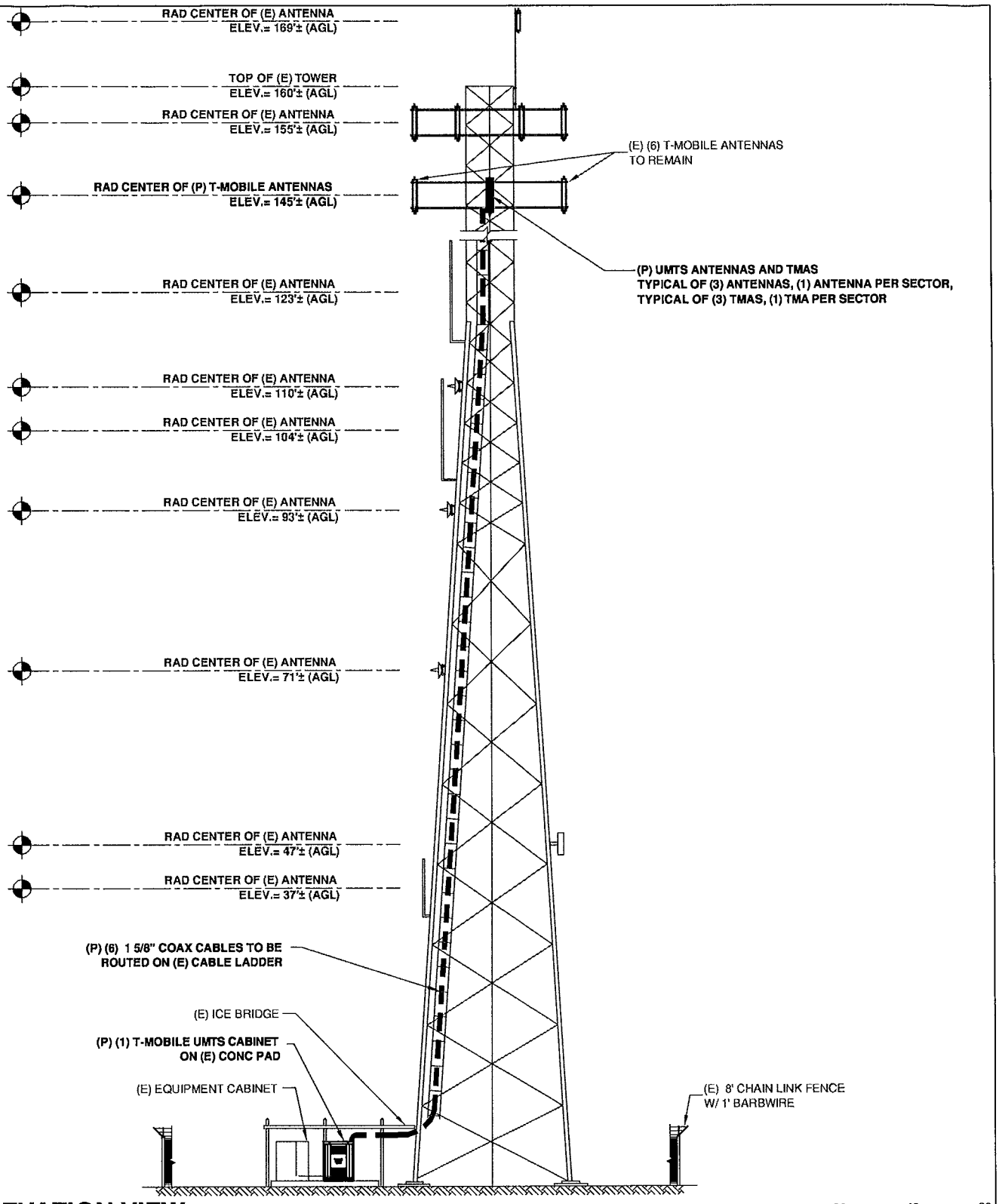
Site Owner — Date

Construction Manager — Date

RF Engineer — Date

Site Acquisition — Date

The above parties hereby approve and accept these documents and authorize the contractor to proceed with the construction described herein, all construction documents are subject to review by the local building department and any changes or modifications they may impose.



SOUTH ELEVATION VIEW

SCALE: 1" = 20'-0"

TRANSCEND WIRELESS
10 INDUSTRIAL AVENUE
MAHWAH, NJ 07430
OFFICE: 201-316-2085
FAX: 201-684-0066

FOR

OMNIPOINT COMMUNICATIONS, INC.
DBA T-MOBILE USA, INC
35 GRIFFIN ROAD SOUTH
BLOOMFIEL, CT 06002
OFFICE: (860) 692-7100
FAX:(860) 692-7159

ATLANTIS GROUP
15 Cypress St., Suite 300
Newton Centre, MA 02459
Office: 617-965-0789
Fax: 617-663-6032

SITE NAME:
WINDSOR I91/ X38

SITE NUMBER:
CT11227D

ADDRESS:
482 PIGEON HILL ROAD
WINDSOR, CT 06095

NUMBER	REVISION	DATE
0:	FINAL LE	03-13-09
A:	REVIEW	02-06-09

DRAWN BY: S.B.
DRAWING NO: LE-3

APPROVALS

Site Owner _____ Date _____

Construction Manager _____ Date _____

RF Engineer _____ Date _____

Site Acquisition _____ Date _____

The above parties hereby approve and accept these documents and authorize the contractor to proceed with the construction described herein, all construction documents are subject to review by the local building department and any changes or modifications they may impose.

NATCOMM INC.
CONSULTING ENGINEERS

Structural Analysis Report

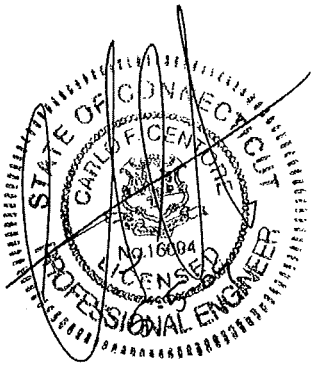
160' Existing ROHN Lattice Tower

T-Mobile Site Ref: CT-11-227D

482 Pigeon Hill Road
Windsor, CT

Natcomm Project No. 09009-CO.8

~~Date: April 6, 2009~~
Rev 1: April 30, 2009



Prepared for:

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

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

Table of Contents

Introduction

The purpose of this report is to summarize the results of the non-linear, P-Δ structural analysis of the antenna installation proposed by T-Mobile on the existing self supporting lattice tower located in Windsor, Connecticut.

The host tower is a 160-ft, three legged, tapered lattice tower originally designed and manufactured by UNR-ROHN. The manufacturer's drawings and calculations were unavailable for use in this report. The tower geometry and structure member sizes were taken from a structural analysis report prepared by Natcomm, Inc; project no. 08007.CO9, dated July 23, 2008. Foundation information was taken from a dispersive wave propagation testing report prepared by FDH Engineering; project no. 08-04006E N1, dated April 18, 2008. Antenna and appurtenance inventory were taken from the aforementioned Natcomm, Inc. structural analysis report, a Verizon tower site leasing form and site assessment information obtained by Natcomm personnel in March 2009.

The structural report prepared by FDH and the Verizon tower site leasing form are available for reference in Section 4 of this report.

The tower is made of eight (8) tapered vertical sections consisting of structural steel pipe legs. Diagonal lateral support bracing consists of structural steel angle shapes. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by welded and bolted gusset connections. The width of the tower face is 8.56-ft at the top and 22.85-ft at the base.

T-Mobile proposes the installation of six (6) additional panel antennas on three (3) existing 12' T-Frame mounts. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna 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:

- AT&T (Existing):
  Antennas: Three (3) RS90-12-00NA-2 panel antennas and six (6) TMA's mounted on a 10-ft x 4-in ∅ pipe with a RAD center elevation of ±169-ft above the existing tower base.
  Coax Cables: Nine (9) 1-1/4" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 14-ft x 3-in ∅ omnidirectional (whip) antenna mounted with an elevation of ±167-ft above the tower base.
  Coax Cable: One (1) 5/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- VERIZON (Existing):
  Antennas: Six (6) Antel LPA-80063-4CF and six (6) Decibel DB948F85T2E-M panel antennas mounted on three (3) 12-ft T-Frames with a RAD center elevation of ±155-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- T-MOBILE (Existing):
  Antennas: Six (6) RFS APXV18-206516S-C-A20 panel antennas and six (6) TMA's mounted on three (3) 12-ft T-Frames with a RAD center elevation of ±145-ft above the existing tower base.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 14-ft x 3-in ∅ omnidirectional (whip) antenna on a 4-ft side mount standoff with an elevation of ±116-ft above the tower base.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 8-ft ∅ dish antenna on a 4-ft x 4-in ∅ pipe mount with an elevation of ±110-ft above the tower base.
  Coax Cable: One (1) EW52 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 6-ft ∅ dish antenna on a 4-ft x 4-in ∅ pipe mount with an elevation of ±101-ft above the tower base.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 14-ft x 3-in ∅ omnidirectional (whip) antenna on a 4-ft side mount standoff with an elevation of ±97-ft above the tower base.
  Coax Cable: One (1) 7/8" ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 6-ft ∅ dish antenna on a 4-ft x 4-in ∅ pipe mount with an elevation of ±93-ft above the tower base.
  Coax Cable: One (1) EW52 cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- UNKNOWN (Existing):
  Antenna: One (1) 10-ft ∅ dish antenna on a 6-ft 8-in x 4-in ∅ pipe mount with an elevation of ±71-ft above the tower base.
  Coax Cable: One (1) EW52 cable running on a leg/face of the existing tower as specified in Section 3 of this report.

- UNKNOWN (Existing):
  Antenna: One (1) empty 4-ft side mount standoff ±47-ft above the tower base.
  Coax Cables: Not applicable.
- UNKNOWN (Existing):
  Antenna: One (1) 8-ft x 3-in ∅ omnidirectional (whip) antenna on a 4-ft side mount standoff with an elevation of ±37-ft above the tower base.
  Coax Cable: One (1) 7/8-in ∅ coax cable running on a leg/face of the existing tower as specified in Section 3 of this report.
- **T-MOBILE (Proposed):**
  Antennas: Three (3) RFS APX16DWV-16DWVS-C-A20 panel antennas and three (3) TMA's mounted on three (3) existing 12' Frames with a RAD center elevation of ±145-ft above the existing tower base.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- **All coax cables to be routed as specified in Section 3 of this report.**

Analysis

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

The existing tower was analyzed for 80 mph basic wind speed (fastest mile) with no ice and 75% reduction of wind force with ½ inch accumulative ice to determine stresses in members as per guidelines of TIA/EIA-222-F-96 entitled "Structural Standards for Steel Antenna Towers and Antenna Supporting Structures", the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Allowable Stress Design (ASD).

Tower Loading

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

Basic Wind Speed:	Hartford; v = 80 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Windsor; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA wind speed Controls	
Load Cases:	Load Case 1; 80 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 2; 69 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 69 mph wind speed velocity represents 75% of the wind pressure generated by the 80 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

Tower Capacity

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

Calculated stresses were found to be within allowable limits. In Load Case 2, per RISATower "Section Capacity Table", this tower was found to be at **97.1%** of its total capacity.

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Leg (T3)	100.00'-120.00'	97.1%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 3-ft ∅ reinforced concrete piers on three (3) 8-ft square reinforced concrete pads concentrically bearing directly on existing sub grade. The existing foundation locations and dimensions were taken from the aforementioned FDH dispersive wave propagation testing report available in Section 4 of this report. Allowable soil bearing pressure was assumed to be 4,500 psi for the analysis. Tower legs are connected to the three (3) piers by means of (6) 7/8" ∅, ASTM A354 Grade BC 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:

- The tower leg reactions developed from the governing Load Case 2 were used in the verification of the foundation:

Leg Reactions	Vector	Proposed Load (kips)
Leg	Shear	**20.6**
	Compression	**178**
	Uplift	**145**

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

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	70.4%	**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
Reinf. Conc. Pad and Pier	Uplift	2.0	2.06	**PASS**

Note 1: FS denotes Factor of Safety

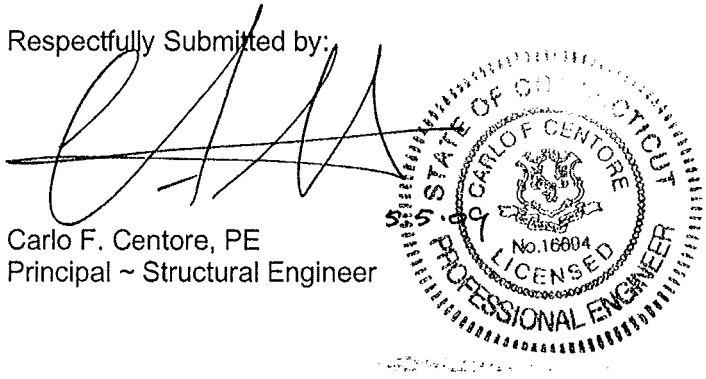
Conclusion

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Carlo F. Centore, PE
Principal ~ Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

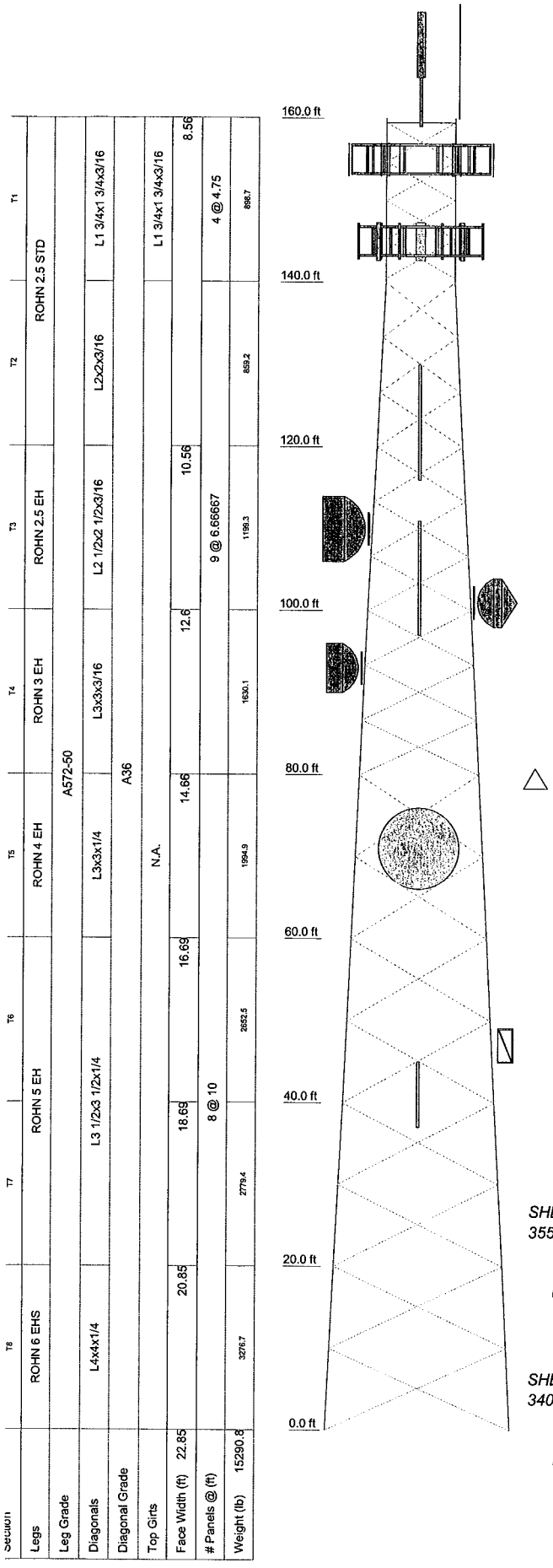
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Natcomm, Inc. or generated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

GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

RISATower Features:

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



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
RS90-12-00NA-2 (ATT)	169	APX16DWV-16DWVS-C-A20 (T-Mobile - Proposed)	145
RS90-12-00NA-2 (ATT)	169	APX16DWV-16DWVS-C-A20 (T-Mobile - Proposd)	145
RS90-12-00NA-2 (ATT)	169	APX16DWV-16DWVS-C-A20 (T-Mobile - Proposed)	145
(2) TMA 10"x8"x3" (ATT)	169	DTMA-1819-DD-12 (T-Mobile - Proposed)	145
(2) TMA 10"x8"x3" (ATT)	169	DTMA-1819-DD-12 (T-Mobile - Proposed)	145
(2) TMA 10"x8"x3" (ATT)	169	DTMA-1819-DD-12 (T-Mobile - Proposed)	145
14' x 3" Dia Omni (Unknown)	167	(2) TMA 10"x8"x3" (T-Mobile - Existing)	145
10'0"x4" Pipe Mount (ATT)	164	(2) TMA 10"x8"x3" (T-Mobile - Existing)	145
12' T-Frame (Verizon)	155	(2) TMA 10"x8"x3" (T-Mobile - Existing)	145
12' T-Frame (Verizon)	155	12' Frame (T-Mobile)	145
LPA-80063-4CF (Verizon)	155	14' x 3" Dia Omni (Unknown)	130 - 116
DB948F85T2E-M (Verizon)	155	4' Side Mount Standoff (Unknown)	116
DB948F85T2E-M (Verizon)	155	14' x 3" Dia Omni (Unknown)	111 - 97
LPA-80063-4CF (Verizon)	155	4'x4" Pipe Mount (Unknown)	110
LPA-80063-4CF (Verizon)	155	8 FT DISH (Unknown)	110
DB948F85T2E-M (Verizon)	155	4'x4" Pipe Mount (Unknown)	101
DB948F85T2E-M (Verizon)	155	6 FT DISH (Unknown)	101
LPA-80063-4CF (Verizon)	155	4' Side Mount Standoff (Unknown)	97
12' T-Frame (Verizon)	155	4'x4" Pipe Mount (Unknown)	93
12' Frame (T-Mobile)	145	6 FT DISH (Unknown)	93
12' Frame (T-Mobile)	145	10 FT DISH (Unknown)	71
(2) APXV18-206516S-C-A20 (T-Mobile - Existing)	145	6'8"x4" Pipe Mount (Unknown)	71
(2) APXV18-206516S-C-A20 (T-Mobile - Existing)	145	4' Side Mount Standoff (Unknown)	47
(2) APXV18-206516S-C-A20 (T-Mobile - Existing)	145	8' x 3" Dia Omni (Unknown)	45 - 37
		4' Side Mount Standoff (Unknown)	37

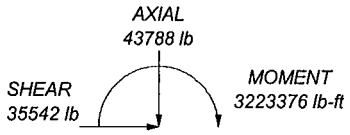
MATERIAL STRENGTH

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

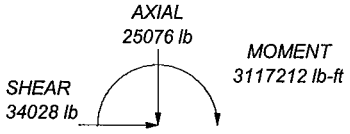
TOWER DESIGN NOTES

1. Tower designed for a 80 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 69 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 50 mph wind.
4. Weld together tower sections have flange connections.
5. Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications.
6. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
7. Welds are fabricated with ER-70S-6 electrodes.
8. TOWER RATING: 97.1%

MAX. CORNER REACTIONS AT BASE:
DOWN: 177463 lb
UPLIFT: -144238 lb
SHEAR: 20575 lb



TORQUE 9521 lb-ft
69 mph WIND - 0.5000 in ICE

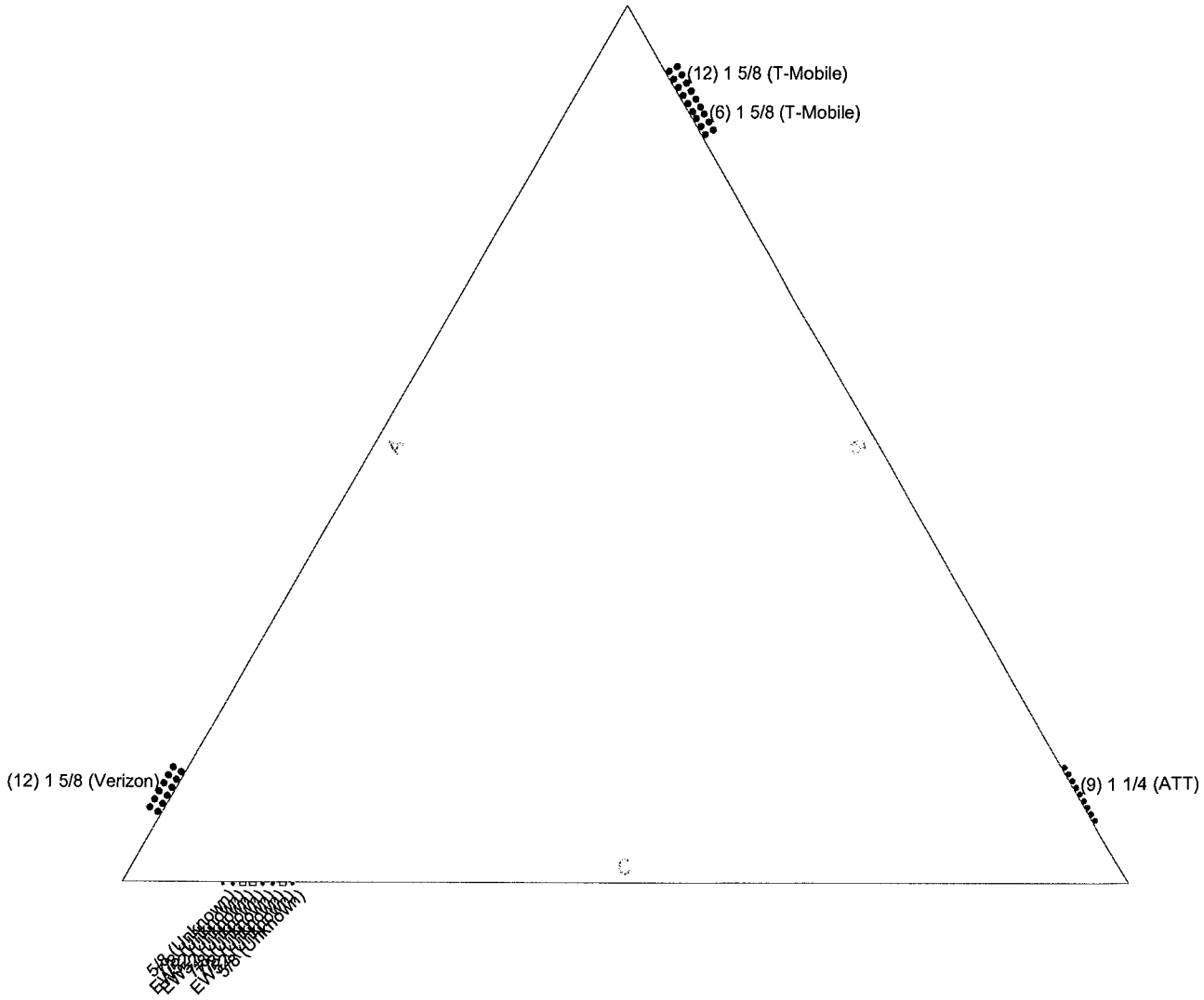


TORQUE 16887 lb-ft
REACTIONS - 80 mph WIND

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

Job: 160' ROHN SSV Self-Support Lattice ~ Re			
Project: 09009.CO8 - 482 Pigeon Hill Road, Windsor, CT			
Client: T-Mobile	Drawn by: Staff	App'd:	
Code: TIA/EIA-222-F	Date: 04/30/09	Scale: NTS	
Path: J:\Jobs\09000s\09009.WMCG-08 - 482 Pigeon Hill Rd , Windsor, CT\Revit\USERS Files\100 Lattice Windsor - Rev 1.rvt		Dwg No. E-1	

Round _____ Flat _____ App In Face _____ App Out Face _____



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

Job: ***160' ROHN SSV Self-Support Lattice ~ Re***		
Project: ***09009.CO8 - 482 Pigeon Hill Road, Windsor, CT***		
Client: T-Mobile	Drawn by: Staff	App'd:
Code: TIA/EIA-222-F	Date: 04/30/09	Scale: NTS
Path: J:\Jobs\09000\900 WI\CO-08 - 482 Pigeon Hill Rd , Windsor, CT\Rev(1)\EIS FFiles\160 Lattice Windsor ~ Rev 1.wl		Dwg No. E-7

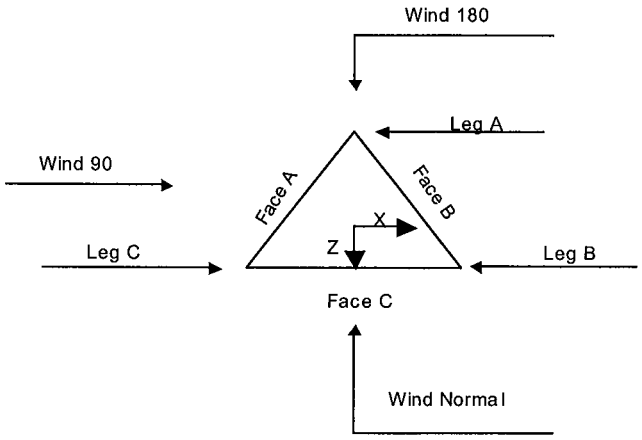
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 160.00 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 8.56 ft at the top and 22.85 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 80 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 69 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 50 mph.
Weld together tower sections have flange connections..
Connections use galvanized A325 bolts, nuts and locking devices. Installation per TIA/EIA-222 and AISC Specifications..
Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
Welds are fabricated with ER-70S-6 electrodes..
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	160.00-140.00			8.56	1	20.00
T2	140.00-120.00			8.56	1	20.00
T3	120.00-100.00			10.56	1	20.00
T4	100.00-80.00			12.60	1	20.00
T5	80.00-60.00			14.66	1	20.00
T6	60.00-40.00			16.69	1	20.00
T7	40.00-20.00			18.69	1	20.00
T8	20.00-0.00			20.85	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	160.00-140.00	4.75	X Brace	No	No	6.0000	6.0000
T2	140.00-120.00	6.67	X Brace	No	No	0.0000	0.0000
T3	120.00-100.00	6.67	X Brace	No	No	0.0000	0.0000
T4	100.00-80.00	6.67	X Brace	No	No	0.0000	0.0000
T5	80.00-60.00	10.00	X Brace	No	No	0.0000	0.0000
T6	60.00-40.00	10.00	X Brace	No	No	0.0000	0.0000
T7	40.00-20.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T8	20.00-0.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 160.00-140.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 140.00-120.00	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T3 120.00-100.00	Pipe	ROHN 2.5 EH	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 100.00-80.00	Pipe	ROHN 3 EH	A572-50 (50 ksi)	Equal Angle	L3x3x3/16	A36 (36 ksi)
T5 80.00-60.00	Pipe	ROHN 4 EH	A572-50 (50 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)
T6 60.00-40.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T7 40.00-20.00	Pipe	ROHN 5 EH	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x1/4	A36 (36 ksi)
T8 20.00-0.00	Pipe	ROHN 6 EHS	A572-50 (50 ksi)	Equal Angle	L4x4x1/4	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 160.00-140.00	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)	Equal Angle		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 Horizontals in
T1 160.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in
T5 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry (cont'd)

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

[1]Note: 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 Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1 160.00-140.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 140.00-120.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 120.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

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
T4 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 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
T6 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
T7 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
T8 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)*

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 160.00-140.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 140.00-120.00	Flange	0.6250 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T3 120.00-100.00	Flange	0.7500 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 100.00-80.00	Flange	0.8750 A325N	4	0.5000 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 80.00-60.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 60.00-40.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T7 40.00-20.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0
T8 20.00-0.00	Flange	0.8750 A354-BC	6	0.6250 A325X	1	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	0	0.6250 A325X	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 (Verizon)	A	Yes	Ar (CfAe)	155.00 - 3.00	0.0000	-0.4	12	6	0.5000	1.9800		1.04
1 5/8 (T-Mobile)	B	Yes	Ar (CfAe)	145.00 - 3.00	0.0000	-0.4	12	6	0.5000	1.9800		1.04
1 1/4 (ATT)	B	Yes	Ar (CfAe)	160.00 - 3.00	0.0000	0.4	9	9	0.5000 1.5500	1.5500		0.66
5/8 (Unknown)	C	Yes	Ar (CfAe)	160.00 - 3.00	0.0000	0.4	1	1	0.8800	0.8800		0.40
7/8 (Unknown)	C	Yes	Ar (CfAe)	101.00 - 3.00	0.0000	0.39	1	1	1.1100	1.1100		0.54
EW52 (Unknown)	C	Yes	Af (CfAe)	110.00 - 3.00	0.0000	0.38	1	1	1.7426	1.7426	5.5505	0.59

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
EW52 (Unknown)	C	Yes	Af (CfAe)	93.00 - 3.00	0.0000	0.37	1	1	1.7426	1.7426	5.5505	0.59
7/8 (Unknown)	C	Yes	Ar (CfAe)	116.00 - 3.00	0.0000	0.36	1	1	1.1100	1.1100		0.54
7/8 (Unknown)	C	Yes	Ar (CfAe)	97.00 - 3.00	0.0000	0.35	1	1	1.1100	1.1100		0.54
EW52 (Unknown)	C	Yes	Af (CfAe)	71.00 - 3.00	0.0000	0.34	1	1	1.7426	1.7426	5.5505	0.59
5/8 (Unknown)	C	Yes	Ar (CfAe)	37.00 - 3.00	0.0000	0.33	1	1	0.8800	0.8800		0.40
1 5/8 (T-Mobile)	B	Yes	Ar (CfAe)	145.00 - 3.00	0.0000	-0.36	6	3	0.5000	1.9800		1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	160.00-140.00	A	14.850	0.000	0.000	0.000	187.20
		B	30.675	0.000	0.000	0.000	212.40
		C	1.467	0.000	0.000	0.000	8.00
T2	140.00-120.00	A	19.800	0.000	0.000	0.000	249.60
		B	52.950	0.000	0.000	0.000	493.20
		C	1.467	0.000	0.000	0.000	8.00
T3	120.00-100.00	A	19.800	0.000	0.000	0.000	249.60
		B	52.950	0.000	0.000	0.000	493.20
		C	3.039	1.452	0.000	0.000	23.08
T4	100.00-80.00	A	19.800	0.000	0.000	0.000	249.60
		B	52.950	0.000	0.000	0.000	493.20
		C	6.739	4.792	0.000	0.000	58.25
T5	80.00-60.00	A	19.800	0.000	0.000	0.000	249.60
		B	52.950	0.000	0.000	0.000	493.20
		C	7.017	7.406	0.000	0.000	70.49
T6	60.00-40.00	A	19.800	0.000	0.000	0.000	249.60
		B	52.950	0.000	0.000	0.000	493.20
		C	7.017	8.713	0.000	0.000	75.80
T7	40.00-20.00	A	19.800	0.000	0.000	0.000	249.60
		B	52.950	0.000	0.000	0.000	493.20
		C	8.263	8.713	0.000	0.000	82.60
T8	20.00-0.00	A	16.830	0.000	0.000	0.000	212.16
		B	45.008	0.000	0.000	0.000	419.22
		C	7.211	7.406	0.000	0.000	71.23

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T1	160.00-140.00	A	0.500	3.725	15.500	0.000	0.000	450.40
		B		6.733	34.567	0.000	0.000	577.71
		C		3.133	0.000	0.000	0.000	24.86
T2	140.00-120.00	A	0.500	4.967	20.667	0.000	0.000	600.53
		B		14.183	56.267	0.000	0.000	1255.71
		C		3.133	0.000	0.000	0.000	24.86

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
T3	120.00-100.00	A	0.500	4.967	20.667	0.000	0.000	600.53
		B		14.183	56.267	0.000	0.000	1255.71
		C		6.122	2.008	0.000	0.000	71.13
T4	100.00-80.00	A	0.500	4.967	20.667	0.000	0.000	600.53
		B		14.183	56.267	0.000	0.000	1255.71
		C		13.156	6.625	0.000	0.000	178.93
T5	80.00-60.00	A	0.500	4.967	20.667	0.000	0.000	600.53
		B		14.183	56.267	0.000	0.000	1255.71
		C		13.683	10.239	0.000	0.000	220.17
T6	60.00-40.00	A	0.500	4.967	20.667	0.000	0.000	600.53
		B		14.183	56.267	0.000	0.000	1255.71
		C		13.683	12.046	0.000	0.000	238.51
T7	40.00-20.00	A	0.500	4.967	20.667	0.000	0.000	600.53
		B		14.183	56.267	0.000	0.000	1255.71
		C		16.347	12.046	0.000	0.000	259.64
T8	20.00-0.00	A	0.500	4.222	17.567	0.000	0.000	510.45
		B		12.056	47.827	0.000	0.000	1067.35
		C		14.294	10.239	0.000	0.000	223.86

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	160.00-140.00	A	0.000	0.813	1.099	1.423
		B	0.000	1.746	2.270	3.056
		C	0.000	0.133	0.109	0.232
T2	140.00-120.00	A	0.000	0.782	1.209	1.565
		B	0.000	2.150	3.232	4.300
		C	0.000	0.096	0.090	0.191
T3	120.00-100.00	A	0.000	0.740	1.429	1.850
		B	0.000	2.034	3.821	5.085
		C	0.000	0.243	0.324	0.607
T4	100.00-80.00	A	0.000	0.714	1.654	2.141
		B	0.000	1.962	4.423	5.885
		C	0.000	0.576	0.963	1.729
T5	80.00-60.00	A	0.000	0.507	1.175	1.521
		B	0.000	1.393	3.142	4.180
		C	0.000	0.501	0.856	1.503
T6	60.00-40.00	A	0.000	0.491	1.327	1.718
		B	0.000	1.349	3.549	4.722
		C	0.000	0.525	1.054	1.836
T7	40.00-20.00	A	0.000	0.479	1.295	1.676
		B	0.000	1.316	3.462	4.606
		C	0.000	0.562	1.110	1.965
T8	20.00-0.00	A	0.000	0.399	1.234	1.598
		B	0.000	1.098	3.300	4.391
		C	0.000	0.476	1.072	1.903

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	160.00-140.00	3.1585	3.6939	2.6371	3.3798
T2	140.00-120.00	2.3979	-4.6012	2.0943	-2.0650
T3	120.00-100.00	1.5012	-4.0123	1.0404	-1.2061
T4	100.00-80.00	-0.7559	-2.1251	-1.6210	0.9339
T5	80.00-60.00	-1.8888	-1.6147	-2.9784	1.9228
T6	60.00-40.00	-2.2781	-1.1981	-3.4257	2.3311
T7	40.00-20.00	-2.9040	-0.8888	-4.3947	3.1352
T8	20.00-0.00	-2.5771	-0.6938	-3.9938	2.8897

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	Placement		C_AA_A Front	C_AA_A Side	Weight
			ft / ft / ft	°	ft		ft^2	ft^2	lb
10'0"x4" Pipe Mount (ATT)	C	None		0.0000	164.00	No Ice	4.50	4.50	110.00
						1/2" Ice	5.24	5.24	141.31
RS90-12-00NA-2 (ATT)	A	None		0.0000	169.00	No Ice	11.47	7.58	36.00
						1/2" Ice	12.08	8.17	101.59
RS90-12-00NA-2 (ATT)	B	None		0.0000	169.00	No Ice	11.47	7.58	36.00
						1/2" Ice	12.08	8.17	101.59
RS90-12-00NA-2 (ATT)	C	None		0.0000	169.00	No Ice	11.47	7.58	36.00
						1/2" Ice	12.08	8.17	101.59
(2) TMA 10"x8"x3" (ATT)	A	None		0.0000	169.00	No Ice	0.78	0.29	15.00
						1/2" Ice	0.90	0.38	20.06
(2) TMA 10"x8"x3" (ATT)	B	None		0.0000	169.00	No Ice	0.78	0.29	15.00
						1/2" Ice	0.90	0.38	20.06
(2) TMA 10"x8"x3" (ATT)	C	None		0.0000	169.00	No Ice	0.78	0.29	15.00
						1/2" Ice	0.90	0.38	20.06
12' T-Frame (Verizon)	A	From Leg	1.50 0.00 0.00	0.0000	155.00	No Ice	12.00	5.00	300.00
						1/2" Ice	16.20	7.50	400.00
12' T-Frame (Verizon)	B	From Leg	1.50 0.00 0.00	0.0000	155.00	No Ice	12.00	5.00	300.00
						1/2" Ice	16.20	7.50	400.00
12' T-Frame (Verizon)	C	From Leg	1.50 0.00 0.00	0.0000	155.00	No Ice	12.00	5.00	300.00
						1/2" Ice	16.20	7.50	400.00
LPA-80063-4CF (Verizon)	A	From Leg	3.00 -6.00 0.00	0.0000	155.00	No Ice	7.00	6.08	20.00
						1/2" Ice	7.41	6.48	72.62
DB948F85T2E-M (Verizon)	A	From Leg	3.00 -4.00 0.00	0.0000	155.00	No Ice	1.92	3.26	8.50
						1/2" Ice	2.22	3.62	27.57
DB948F85T2E-M (Verizon)	A	From Leg	3.00 4.00 0.00	0.0000	155.00	No Ice	1.92	3.26	8.50
						1/2" Ice	2.22	3.62	27.57
LPA-80063-4CF (Verizon)	A	From Leg	3.00 6.00 0.00	0.0000	155.00	No Ice	7.00	6.08	20.00
						1/2" Ice	7.41	6.48	72.62
LPA-80063-4CF (Verizon)	B	From Leg	3.00 -6.00 0.00	0.0000	155.00	No Ice	7.00	6.08	20.00
						1/2" Ice	7.41	6.48	72.62

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
DB948F85T2E-M	B	From Leg	3.00	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			-4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
DB948F85T2E-M	B	From Leg	3.00	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
LPA-80063-4CF	B	From Leg	3.00	0.0000	155.00	No Ice	7.00	6.08	20.00
(Verizon)			6.00			1/2" Ice	7.41	6.48	72.62
			0.00						
LPA-80063-4CF	C	From Leg	3.00	0.0000	155.00	No Ice	7.00	6.08	20.00
(Verizon)			-6.00			1/2" Ice	7.41	6.48	72.62
			0.00						
DB948F85T2E-M	C	From Leg	3.00	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			-4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
DB948F85T2E-M	C	From Leg	3.00	0.0000	155.00	No Ice	1.92	3.26	8.50
(Verizon)			4.00			1/2" Ice	2.22	3.62	27.57
			0.00						
LPA-80063-4CF	C	From Leg	3.00	0.0000	155.00	No Ice	7.00	6.08	20.00
(Verizon)			6.00			1/2" Ice	7.41	6.48	72.62
			0.00						
12' Frame	A	From Leg	0.50	0.0000	145.00	No Ice	10.50	3.00	250.00
(T-Mobile)			0.00			1/2" Ice	14.00	4.00	350.00
			0.00						
12' Frame	B	From Leg	0.50	0.0000	145.00	No Ice	10.50	3.00	250.00
(T-Mobile)			0.00			1/2" Ice	14.00	4.00	350.00
			0.00						
12' Frame	C	From Leg	0.50	0.0000	145.00	No Ice	10.50	3.00	250.00
(T-Mobile)			0.00			1/2" Ice	14.00	4.00	350.00
			0.00						
(2) APXV18-206516S-C-A20	A	From Leg	1.00	0.0000	145.00	No Ice	3.51	2.00	18.70
(T-Mobile - Existing)			0.00			1/2" Ice	3.85	2.33	38.28
			0.00						
(2) APXV18-206516S-C-A20	B	From Leg	1.00	0.0000	145.00	No Ice	3.51	2.00	18.70
(T-Mobile - Existing)			0.00			1/2" Ice	3.85	2.33	38.28
			0.00						
(2) APXV18-206516S-C-A20	C	From Leg	1.00	0.0000	145.00	No Ice	3.51	2.00	18.70
(T-Mobile - Existing)			0.00			1/2" Ice	3.85	2.33	38.28
			0.00						
APX16DWV-16DWVS-C-	A	From Leg	1.00	0.0000	145.00	No Ice	7.07	2.15	40.70
A20			0.00			1/2" Ice	7.52	2.49	73.65
(T-Mobile - Proposed)			0.00						
APX16DWV-16DWVS-C-	B	From Leg	1.00	0.0000	145.00	No Ice	7.07	2.15	40.70
A20			0.00			1/2" Ice	7.52	2.49	73.65
(T-Mobile - Proposd)			0.00						
APX16DWV-16DWVS-C-	C	From Leg	1.00	0.0000	145.00	No Ice	7.07	2.15	40.70
A20			0.00			1/2" Ice	7.52	2.49	73.65
(T-Mobile - Proposed)			0.00						
DTMA-1819-DD-12	A	From Leg	1.00	0.0000	145.00	No Ice	0.71	0.41	14.30
(T-Mobile - Proposed)			0.00			1/2" Ice	0.83	0.52	19.33
			0.00						
DTMA-1819-DD-12	B	From Leg	1.00	0.0000	145.00	No Ice	0.71	0.41	14.30
(T-Mobile - Proposed)			0.00			1/2" Ice	0.83	0.52	19.33
			0.00						
DTMA-1819-DD-12	C	From Leg	1.00	0.0000	145.00	No Ice	0.71	0.41	14.30
(T-Mobile - Proposed)			0.00			1/2" Ice	0.83	0.52	19.33
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral / Vert ft / ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
(2) TMA 10"x8"x3" (T-Mobile - Existing)	A	From Leg	1.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice	0.78 0.90	0.29 0.38	15.00 20.06
(2) TMA 10"x8"x3" (T-Mobile - Existing)	B	From Leg	1.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice	0.78 0.90	0.29 0.38	15.00 20.06
(2) TMA 10"x8"x3" (T-Mobile - Existing)	C	From Leg	1.00 0.00 0.00	0.0000	145.00	No Ice 1/2" Ice	0.78 0.90	0.29 0.38	15.00 20.06
4' Side Mount Standoff (Unknown)	A	From Leg	2.00 0.00 0.00	0.0000	116.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	50.00 89.00
14' x 3" Dia Omni (Unknown)	A	From Leg	4.00 0.00 0.00	0.0000	130.00 - 116.00	No Ice 1/2" Ice	4.20 5.63	4.20 5.63	40.00 70.34
4' Side Mount Standoff (Unknown)	A	From Leg	2.00 0.00 0.00	0.0000	97.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	50.00 89.00
14' x 3" Dia Omni (Unknown)	A	From Leg	4.00 0.00 0.00	0.0000	111.00 - 97.00	No Ice 1/2" Ice	4.20 5.63	4.20 5.63	40.00 70.34
6'8"x4" Pipe Mount (Unknown)	A	From Leg	0.50 0.00 0.00	0.0000	71.00	No Ice 1/2" Ice	2.60 3.01	2.60 3.01	72.00 93.13
4' Side Mount Standoff (Unknown)	A	From Leg	2.00 0.00 0.00	0.0000	37.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	50.00 89.00
8' x 3" Dia Omni (Unknown)	A	From Leg	4.00 0.00 0.00	0.0000	45.00 - 37.00	No Ice 1/2" Ice	2.40 3.19	2.40 3.19	25.00 42.51
14' x 3" Dia Omni (Unknown)	B	From Leg	0.50 0.00 0.00	0.0000	167.00	No Ice 1/2" Ice	4.20 5.63	4.20 5.63	40.00 70.34
4'x4" Pipe Mount (Unknown)	B	From Leg	0.50 0.00 0.00	0.0000	101.00	No Ice 1/2" Ice	1.32 1.58	1.32 1.58	44.00 56.99
4' Side Mount Standoff (Unknown)	B	From Leg	2.00 0.00 0.00	0.0000	47.00	No Ice 1/2" Ice	2.72 4.91	2.72 4.91	50.00 89.00
4'x4" Pipe Mount (Unknown)	C	From Leg	0.50 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	1.32 1.58	1.32 1.58	44.00 56.99
4'x4" Pipe Mount (Unknown)	C	From Leg	0.50 0.00 0.00	0.0000	93.00	No Ice 1/2" Ice	1.32 1.58	1.32 1.58	44.00 56.99

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral / Vert	Azimuth Adjustment	3 dB Beam Width	Elevation	Outside Diameter		Aperture Area	Weight
				ft	°	°	ft	ft		ft²	lb
10 FT DISH (Unknown)	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	-5.0000		71.00	10.00	No Ice 1/2" Ice	78.54 79.81	317.00 726.71
6 FT DISH (Unknown)	B	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	-60.0000		101.00	6.00	No Ice 1/2" Ice	28.27 29.05	143.00 292.13
8 FT DISH (Unknown)	C	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	-30.0000		110.00	8.00	No Ice 1/2" Ice	50.30 51.29	251.00 514.30
6 FT DISH (Unknown)	C	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	0.0000		93.00	6.00	No Ice 1/2" Ice	28.27 29.05	143.00 292.13

Tower Pressures - No Ice

$G_H = 1.129$

Section Elevation	z	K_Z	q_z	A_G	Face	A_F	A_R	A_{leg}	Leg %	C_AA_A In Face	C_AA_A Out Face
ft	ft		psf	ft²		ft²	ft²	ft²		ft²	ft²
T1 160.00-140.00	150.00	1.541	25	175.992	A	11.216	24.433	9.583	26.88	0.000	0.000
					B	10.045	40.258		19.05	0.000	0.000
					C	12.206	11.050		41.21	0.000	0.000
T2 140.00-120.00	130.00	1.48	24	195.998	A	10.160	29.399	9.599	24.27	0.000	0.000
					B	8.136	62.549		13.58	0.000	0.000
					C	11.279	11.066		42.96	0.000	0.000
T3 120.00-100.00	110.00	1.411	23	236.398	A	14.933	29.400	9.600	21.65	0.000	0.000
					B	12.540	62.550		12.78	0.000	0.000
					C	17.490	12.639		31.86	0.000	0.000
T4 100.00-80.00	90.00	1.332	22	278.441	A	20.638	31.487	11.687	22.42	0.000	0.000
					B	17.869	64.637		14.17	0.000	0.000
					C	26.121	18.426		26.24	0.000	0.000
T5 80.00-60.00	70.00	1.24	20	321.010	A	17.003	34.826	15.026	28.99	0.000	0.000
					B	15.036	67.976		18.10	0.000	0.000
					C	24.728	22.042		32.13	0.000	0.000
T6 60.00-40.00	50.00	1.126	18	363.083	A	21.793	38.374	18.574	30.87	0.000	0.000
					B	19.571	71.524		20.39	0.000	0.000
					C	30.779	25.591		32.95	0.000	0.000
T7 40.00-20.00	30.00	1	16	404.685	A	23.951	38.379	18.579	29.81	0.000	0.000
					B	21.784	71.529		19.91	0.000	0.000
					C	32.849	26.843		31.13	0.000	0.000
T8 20.00-0.00	10.00	1	16	448.055	A	30.032	38.950	22.120	32.07	0.000	0.000
					B	27.966	67.128		23.26	0.000	0.000
					C	37.600	29.331		33.05	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.129$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 160.00-140.00	150.00	1.541	19	0.5000	177.658	A	26.392	22.866	12.917	26.22	0.000	0.000
						B	43.825	24.941		18.78	0.000	0.000
						C	12.083	22.955		36.87	0.000	0.000
T2 140.00-120.00	130.00	1.48	18	0.5000	197.666	A	30.470	22.807	12.938	24.28	0.000	0.000
						B	63.335	30.656		13.77	0.000	0.000
						C	11.177	21.660		39.40	0.000	0.000
T3 120.00-100.00	110.00	1.411	17	0.5000	238.067	A	35.179	23.710	12.939	21.97	0.000	0.000
						B	67.544	31.633		13.05	0.000	0.000
						C	17.763	25.364		30.00	0.000	0.000
T4 100.00-80.00	90.00	1.332	16	0.5000	280.110	A	40.818	26.710	15.026	22.25	0.000	0.000
						B	72.674	34.679		14.00	0.000	0.000
						C	27.188	35.037		24.15	0.000	0.000
T5 80.00-60.00	70.00	1.24	15	0.5000	322.678	A	37.323	28.884	18.365	27.74	0.000	0.000
						B	70.264	37.214		17.09	0.000	0.000
						C	26.913	37.606		28.46	0.000	0.000
T6 60.00-40.00	50.00	1.126	14	0.5000	364.752	A	42.069	32.995	21.913	29.19	0.000	0.000
						B	74.665	41.353		18.89	0.000	0.000
						C	33.330	41.678		29.21	0.000	0.000
T7 40.00-20.00	30.00	1	12	0.5000	406.354	A	44.236	33.620	21.919	28.15	0.000	0.000
						B	76.906	41.999		18.43	0.000	0.000
						C	35.326	44.917		27.32	0.000	0.000
T8 20.00-0.00	10.00	1	12	0.5000	449.724	A	47.235	37.098	25.459	30.19	0.000	0.000
						B	74.702	44.234		21.41	0.000	0.000
						C	39.602	47.094		29.37	0.000	0.000

Tower Pressure - Service

$G_H = 1.129$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1 160.00-140.00	150.00	1.541	10	175.992	A	11.216	24.433	9.583	26.88	0.000	0.000
					B	10.045	40.258		19.05	0.000	0.000
					C	12.206	11.050		41.21	0.000	0.000
T2 140.00-120.00	130.00	1.48	9	195.998	A	10.160	29.399	9.599	24.27	0.000	0.000
					B	8.136	62.549		13.58	0.000	0.000
					C	11.279	11.066		42.96	0.000	0.000
T3 120.00-100.00	110.00	1.411	9	236.398	A	14.933	29.400	9.600	21.65	0.000	0.000
					B	12.540	62.550		12.78	0.000	0.000
					C	17.490	12.639		31.86	0.000	0.000
T4 100.00-80.00	90.00	1.332	9	278.441	A	20.638	31.487	11.687	22.42	0.000	0.000
					B	17.869	64.637		14.17	0.000	0.000
					C	26.121	18.426		26.24	0.000	0.000
T5 80.00-60.00	70.00	1.24	8	321.010	A	17.003	34.826	15.026	28.99	0.000	0.000
					B	15.036	67.976		18.10	0.000	0.000
					C	24.728	22.042		32.13	0.000	0.000
T6 60.00-40.00	50.00	1.126	7	363.083	A	21.793	38.374	18.574	30.87	0.000	0.000
					B	19.571	71.524		20.39	0.000	0.000
					C	30.779	25.591		32.95	0.000	0.000
T7 40.00-20.00	30.00	1	6	404.685	A	23.951	38.379	18.579	29.81	0.000	0.000
					B	21.784	71.529		19.91	0.000	0.000
					C	32.849	26.843		31.13	0.000	0.000
T8 20.00-0.00	10.00	1	6	448.055	A	30.032	38.950	22.120	32.07	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					B	27.966	67.128		23.26	0.000	0.000
					C	37.600	29.331		33.05	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 160.00-140.00	407.60	898.74	A	0.203	2.587	0.591	1	1	25.654	2307.06	115.35	B
			B	0.286	2.334	0.612	1	1	34.669			
			C	0.132	2.838	0.579	1	1	18.603			
T2 140.00-120.00	750.80	859.16	A	0.202	2.59	0.591	1	1	27.528	2816.67	140.83	B
			B	0.361	2.147	0.636	1	1	47.938			
			C	0.114	2.908	0.577	1	1	17.660			
T3 120.00-100.00	765.88	1199.35	A	0.188	2.638	0.588	1	1	32.218	3018.07	150.90	B
			B	0.318	2.25	0.621	1	1	51.413			
			C	0.127	2.856	0.578	1	1	24.799			
T4 100.00-80.00	801.05	1630.05	A	0.187	2.639	0.588	1	1	39.149	3272.34	163.62	B
			B	0.296	2.306	0.615	1	1	57.607			
			C	0.16	2.735	0.583	1	1	36.864			
T5 80.00-60.00	813.29	1994.93	A	0.161	2.73	0.583	1	1	37.316	3102.46	155.12	B
			B	0.259	2.412	0.604	1	1	56.100			
			C	0.146	2.787	0.581	1	1	37.530			
T6 60.00-40.00	818.60	2652.49	A	0.166	2.715	0.584	1	1	44.204	3176.22	158.81	B
			B	0.251	2.435	0.602	1	1	62.636			
			C	0.155	2.752	0.582	1	1	45.680			
T7 40.00-20.00	825.40	2779.43	A	0.154	2.757	0.582	1	1	46.292	2978.58	148.93	B
			B	0.231	2.497	0.597	1	1	64.495			
			C	0.148	2.781	0.581	1	1	48.447			
T8 20.00-0.00	702.61	3276.67	A	0.154	2.757	0.582	1	1	52.704	3203.32	160.17	B
			B	0.212	2.556	0.593	1	1	67.771			
			C	0.149	2.774	0.581	1	1	54.653			
Sum Weight:	5885.23	15290.82						OTM	1836097.99 lb-ft	23874.73		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 160.00-140.00	407.60	898.74	A	0.203	2.587	0.591	0.8	1	23.411	2173.37	108.67	B
			B	0.286	2.334	0.612	0.8	1	32.661			
			C	0.132	2.838	0.579	0.8	1	16.162			
T2 140.00-120.00	750.80	859.16	A	0.202	2.59	0.591	0.8	1	25.496	2721.06	136.05	B
			B	0.361	2.147	0.636	0.8	1	46.311			
			C	0.114	2.908	0.577	0.8	1	15.404			
T3 120.00-100.00	765.88	1199.35	A	0.188	2.638	0.588	0.8	1	29.232	2870.84	143.54	B
			B	0.318	2.25	0.621	0.8	1	48.905			
			C	0.127	2.856	0.578	0.8	1	21.301			
T4 100.00-80.00	801.05	1630.05	A	0.187	2.639	0.588	0.8	1	35.021	3069.33	153.47	B
			B	0.296	2.306	0.615	0.8	1	54.033			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.16	2.735	0.583	0.8	1	31.640			
T5 80.00-60.00	813.29	1994.93	A	0.161	2.73	0.583	0.8	1	33.916	2936.16	146.81	B
			B	0.259	2.412	0.604	0.8	1	53.093			
			C	0.146	2.787	0.581	0.8	1	32.585			
T6 60.00-40.00	818.60	2652.49	A	0.166	2.715	0.584	0.8	1	39.845	2977.74	148.89	B
			B	0.251	2.435	0.602	0.8	1	58.722			
			C	0.155	2.752	0.582	0.8	1	39.524			
T7 40.00-20.00	825.40	2779.43	A	0.154	2.757	0.582	0.8	1	41.501	2777.38	138.87	B
			B	0.231	2.497	0.597	0.8	1	60.138			
			C	0.148	2.781	0.581	0.8	1	41.877			
T8 20.00-0.00	702.61	3276.67	A	0.154	2.757	0.582	0.8	1	46.698	2938.95	146.95	B
			B	0.212	2.556	0.593	0.8	1	62.177			
			C	0.149	2.774	0.581	0.8	1	47.133			
Sum Weight:	5885.23	15290.82						OTM	1738903.78 lb-ft	22464.82		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 160.00-140.00	407.60	898.74	A	0.203	2.587	0.591	0.85	1	23.972	2206.79	110.34	B
			B	0.286	2.334	0.612	0.85	1	33.163			
			C	0.132	2.838	0.579	0.85	1	16.772			
T2 140.00-120.00	750.80	859.16	A	0.202	2.59	0.591	0.85	1	26.004	2744.96	137.25	B
			B	0.361	2.147	0.636	0.85	1	46.718			
			C	0.114	2.908	0.577	0.85	1	15.968			
T3 120.00-100.00	765.88	1199.35	A	0.188	2.638	0.588	0.85	1	29.978	2907.65	145.38	B
			B	0.318	2.25	0.621	0.85	1	49.532			
			C	0.127	2.856	0.578	0.85	1	22.175			
T4 100.00-80.00	801.05	1630.05	A	0.187	2.639	0.588	0.85	1	36.053	3120.08	156.00	B
			B	0.296	2.306	0.615	0.85	1	54.926			
			C	0.16	2.735	0.583	0.85	1	32.946			
T5 80.00-60.00	813.29	1994.93	A	0.161	2.73	0.583	0.85	1	34.766	2977.73	148.89	B
			B	0.259	2.412	0.604	0.85	1	53.845			
			C	0.146	2.787	0.581	0.85	1	33.821			
T6 60.00-40.00	818.60	2652.49	A	0.166	2.715	0.584	0.85	1	40.935	3027.36	151.37	B
			B	0.251	2.435	0.602	0.85	1	59.701			
			C	0.155	2.752	0.582	0.85	1	41.063			
T7 40.00-20.00	825.40	2779.43	A	0.154	2.757	0.582	0.85	1	42.699	2827.68	141.38	B
			B	0.231	2.497	0.597	0.85	1	61.227			
			C	0.148	2.781	0.581	0.85	1	43.519			
T8 20.00-0.00	702.61	3276.67	A	0.154	2.757	0.582	0.85	1	48.200	3005.04	150.25	B
			B	0.212	2.556	0.593	0.85	1	63.576			
			C	0.149	2.774	0.581	0.85	1	49.013			
Sum Weight:	5885.23	15290.82						OTM	1763202.33 lb-ft	22817.29		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 160.00-140.00	1052.97	1476.69	A	0.277	2.358	0.609	1	1	40.322	2678.86	133.94	B
			B	0.387	2.09	0.646	1	1	59.947			
			C	0.197	2.605	0.59	1	1	25.623			
T2 140.00-120.00	1881.11	1389.70	A	0.27	2.38	0.607	1	1	44.315	3347.54	167.38	B
			B	0.475	1.934	0.685	1	1	84.343			
			C	0.166	2.713	0.584	1	1	23.828			
T3 120.00-100.00	1927.38	1882.94	A	0.247	2.445	0.601	1	1	49.434	3513.86	175.69	B
			B	0.417	2.032	0.659	1	1	88.375			
			C	0.181	2.66	0.587	1	1	32.645			
T4 100.00-80.00	2035.17	2518.62	A	0.241	2.465	0.6	1	1	56.834	3684.21	184.21	B
			B	0.383	2.098	0.645	1	1	95.039			
			C	0.222	2.524	0.595	1	1	48.041			
T5 80.00-60.00	2076.42	2784.44	A	0.205	2.579	0.591	1	1	54.407	3559.21	177.96	B
			B	0.333	2.212	0.627	1	1	93.582			
			C	0.2	2.596	0.59	1	1	49.116			
T6 60.00-40.00	2094.75	3632.13	A	0.206	2.577	0.592	1	1	61.588	3525.98	176.30	B
			B	0.318	2.249	0.622	1	1	100.370			
			C	0.206	2.577	0.592	1	1	57.985			
T7 40.00-20.00	2115.88	3827.45	A	0.192	2.624	0.589	1	1	64.029	3298.46	164.92	B
			B	0.293	2.316	0.614	1	1	102.680			
			C	0.197	2.604	0.59	1	1	61.823			
T8 20.00-0.00	1801.67	4545.56	A	0.188	2.638	0.588	1	1	69.046	3371.54	168.58	B
			B	0.264	2.395	0.606	1	1	101.493			
			C	0.193	2.62	0.589	1	1	67.339			
Sum Weight:	14985.35	22057.53						OTM	2113224.8 2 lb-ft	26979.65		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 160.00-140.00	1052.97	1476.69	A	0.277	2.358	0.609	0.8	1	35.044	2287.18	114.36	B
			B	0.387	2.09	0.646	0.8	1	51.182			
			C	0.197	2.605	0.59	0.8	1	23.206			
T2 140.00-120.00	1881.11	1389.70	A	0.27	2.38	0.607	0.8	1	38.221	2844.79	142.24	B
			B	0.475	1.934	0.685	0.8	1	71.676			
			C	0.166	2.713	0.584	0.8	1	21.593			
T3 120.00-100.00	1927.38	1882.94	A	0.247	2.445	0.601	0.8	1	42.398	2976.74	148.84	B
			B	0.417	2.032	0.659	0.8	1	74.866			
			C	0.181	2.66	0.587	0.8	1	29.092			
T4 100.00-80.00	2035.17	2518.62	A	0.241	2.465	0.6	0.8	1	48.670	3120.76	156.04	B
			B	0.383	2.098	0.645	0.8	1	80.504			
			C	0.222	2.524	0.595	0.8	1	42.603			
T5 80.00-60.00	2076.42	2784.44	A	0.205	2.579	0.591	0.8	1	46.942	3024.73	151.24	B
			B	0.333	2.212	0.627	0.8	1	79.529			
			C	0.2	2.596	0.59	0.8	1	43.733			
T6 60.00-40.00	2094.75	3632.13	A	0.206	2.577	0.592	0.8	1	53.175	3001.38	150.07	B
			B	0.318	2.249	0.622	0.8	1	85.437			
			C	0.206	2.577	0.592	0.8	1	51.319			
T7 40.00-20.00	2115.88	3827.45	A	0.192	2.624	0.589	0.8	1	55.182	2804.36	140.22	B
			B	0.293	2.316	0.614	0.8	1	87.299			
			C	0.197	2.604	0.59	0.8	1	54.757			
T8 20.00-0.00	1801.67	4545.56	A	0.188	2.638	0.588	0.8	1	59.599	2875.23	143.76	B
			B	0.264	2.395	0.606	0.8	1	86.552			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
Sum Weight:	14985.35	22057.53	C	0.193	2.62	0.589	0.8	1 OTM	59.418 1795892.97 lb-ft	22935.18		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 160.00-140.00	1052.97	1476.69	A	0.277	2.358	0.609	0.85	1	36.363	2385.10	119.25	B
			B	0.387	2.09	0.646	0.85	1	53.373			
			C	0.197	2.605	0.59	0.85	1	23.810			
T2 140.00-120.00	1881.11	1389.70	A	0.27	2.38	0.607	0.85	1	39.744	2970.48	148.52	B
			B	0.475	1.934	0.685	0.85	1	74.843			
			C	0.166	2.713	0.584	0.85	1	22.151			
T3 120.00-100.00	1927.38	1882.94	A	0.247	2.445	0.601	0.85	1	44.157	3111.02	155.55	B
			B	0.417	2.032	0.659	0.85	1	78.243			
			C	0.181	2.66	0.587	0.85	1	29.980			
T4 100.00-80.00	2035.17	2518.62	A	0.241	2.465	0.6	0.85	1	50.711	3261.63	163.08	B
			B	0.383	2.098	0.645	0.85	1	84.138			
			C	0.222	2.524	0.595	0.85	1	43.963			
T5 80.00-60.00	2076.42	2784.44	A	0.205	2.579	0.591	0.85	1	48.809	3158.35	157.92	B
			B	0.333	2.212	0.627	0.85	1	83.042			
			C	0.2	2.596	0.59	0.85	1	45.079			
T6 60.00-40.00	2094.75	3632.13	A	0.206	2.577	0.592	0.85	1	55.278	3132.53	156.63	B
			B	0.318	2.249	0.622	0.85	1	89.170			
			C	0.206	2.577	0.592	0.85	1	52.986			
T7 40.00-20.00	2115.88	3827.45	A	0.192	2.624	0.589	0.85	1	57.394	2927.89	146.39	B
			B	0.293	2.316	0.614	0.85	1	91.144			
			C	0.197	2.604	0.59	0.85	1	56.524			
T8 20.00-0.00	1801.67	4545.56	A	0.188	2.638	0.588	0.85	1	61.961	2999.31	149.97	B
			B	0.264	2.395	0.606	0.85	1	90.287			
			C	0.193	2.62	0.589	0.85	1	61.398			
Sum Weight:	14985.35	22057.53						OTM	1875225.93 lb-ft	23946.30		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 160.00-140.00	407.60	898.74	A	0.203	2.587	0.591	1	1	25.654	901.19	45.06	B
			B	0.286	2.334	0.612	1	1	34.669			
			C	0.132	2.838	0.579	1	1	18.603			
T2 140.00-120.00	750.80	859.16	A	0.202	2.59	0.591	1	1	27.528	1100.26	55.01	B
			B	0.361	2.147	0.636	1	1	47.938			
			C	0.114	2.908	0.577	1	1	17.660			
T3 120.00-100.00	765.88	1199.35	A	0.188	2.638	0.588	1	1	32.218	1178.94	58.95	B
			B	0.318	2.25	0.621	1	1	51.413			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
			C	0.127	2.856	0.578	1	1	24.799			
T4 100.00-80.00	801.05	1630.05	A	0.187	2.639	0.588	1	1	39.149	1278.26	63.91	B
			B	0.296	2.306	0.615	1	1	57.607			
			C	0.16	2.735	0.583	1	1	36.864			
T5 80.00-60.00	813.29	1994.93	A	0.161	2.73	0.583	1	1	37.316	1211.90	60.59	B
			B	0.259	2.412	0.604	1	1	56.100			
			C	0.146	2.787	0.581	1	1	37.530			
T6 60.00-40.00	818.60	2652.49	A	0.166	2.715	0.584	1	1	44.204	1240.71	62.04	B
			B	0.251	2.435	0.602	1	1	62.636			
			C	0.155	2.752	0.582	1	1	45.680			
T7 40.00-20.00	825.40	2779.43	A	0.154	2.757	0.582	1	1	46.292	1163.51	58.18	B
			B	0.231	2.497	0.597	1	1	64.495			
			C	0.148	2.781	0.581	1	1	48.447			
T8 20.00-0.00	702.61	3276.67	A	0.154	2.757	0.582	1	1	52.704	1251.30	62.56	B
			B	0.212	2.556	0.593	1	1	67.771			
			C	0.149	2.774	0.581	1	1	54.653			
Sum Weight:	5885.23	15290.82						OTM	717225.78 lb-ft	9326.07		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 160.00-140.00	407.60	898.74	A	0.203	2.587	0.591	0.8	1	23.411	848.97	42.45	B
			B	0.286	2.334	0.612	0.8	1	32.661			
			C	0.132	2.838	0.579	0.8	1	16.162			
T2 140.00-120.00	750.80	859.16	A	0.202	2.59	0.591	0.8	1	25.496	1062.91	53.15	B
			B	0.361	2.147	0.636	0.8	1	46.311			
			C	0.114	2.908	0.577	0.8	1	15.404			
T3 120.00-100.00	765.88	1199.35	A	0.188	2.638	0.588	0.8	1	29.232	1121.42	56.07	B
			B	0.318	2.25	0.621	0.8	1	48.905			
			C	0.127	2.856	0.578	0.8	1	21.301			
T4 100.00-80.00	801.05	1630.05	A	0.187	2.639	0.588	0.8	1	35.021	1198.96	59.95	B
			B	0.296	2.306	0.615	0.8	1	54.033			
			C	0.16	2.735	0.583	0.8	1	31.640			
T5 80.00-60.00	813.29	1994.93	A	0.161	2.73	0.583	0.8	1	33.916	1146.94	57.35	B
			B	0.259	2.412	0.604	0.8	1	53.093			
			C	0.146	2.787	0.581	0.8	1	32.585			
T6 60.00-40.00	818.60	2652.49	A	0.166	2.715	0.584	0.8	1	39.845	1163.18	58.16	B
			B	0.251	2.435	0.602	0.8	1	58.722			
			C	0.155	2.752	0.582	0.8	1	39.524			
T7 40.00-20.00	825.40	2779.43	A	0.154	2.757	0.582	0.8	1	41.501	1084.91	54.25	B
			B	0.231	2.497	0.597	0.8	1	60.138			
			C	0.148	2.781	0.581	0.8	1	41.877			
T8 20.00-0.00	702.61	3276.67	A	0.154	2.757	0.582	0.8	1	46.698	1148.03	57.40	B
			B	0.212	2.556	0.593	0.8	1	62.177			
			C	0.149	2.774	0.581	0.8	1	47.133			
Sum Weight:	5885.23	15290.82						OTM	679259.29 lb-ft	8775.32		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	F a c e	e	C_F	R_R	D_F	D_R	A_E ft²	F lb	w plf	Ctrl. Face
T1 160.00-140.00	407.60	898.74	A	0.203	2.587	0.591	0.85	1	23.972	862.03	43.10	B
			B	0.286	2.334	0.612	0.85	1	33.163			
			C	0.132	2.838	0.579	0.85	1	16.772			
T2 140.00-120.00	750.80	859.16	A	0.202	2.59	0.591	0.85	1	26.004	1072.25	53.61	B
			B	0.361	2.147	0.636	0.85	1	46.718			
			C	0.114	2.908	0.577	0.85	1	15.968			
T3 120.00-100.00	765.88	1199.35	A	0.188	2.638	0.588	0.85	1	29.978	1135.80	56.79	B
			B	0.318	2.25	0.621	0.85	1	49.532			
			C	0.127	2.856	0.578	0.85	1	22.175			
T4 100.00-80.00	801.05	1630.05	A	0.187	2.639	0.588	0.85	1	36.053	1218.78	60.94	B
			B	0.296	2.306	0.615	0.85	1	54.926			
			C	0.16	2.735	0.583	0.85	1	32.946			
T5 80.00-60.00	813.29	1994.93	A	0.161	2.73	0.583	0.85	1	34.766	1163.18	58.16	B
			B	0.259	2.412	0.604	0.85	1	53.845			
			C	0.146	2.787	0.581	0.85	1	33.821			
T6 60.00-40.00	818.60	2652.49	A	0.166	2.715	0.584	0.85	1	40.935	1182.56	59.13	B
			B	0.251	2.435	0.602	0.85	1	59.701			
			C	0.155	2.752	0.582	0.85	1	41.063			
T7 40.00-20.00	825.40	2779.43	A	0.154	2.757	0.582	0.85	1	42.699	1104.56	55.23	B
			B	0.231	2.497	0.597	0.85	1	61.227			
			C	0.148	2.781	0.581	0.85	1	43.519			
T8 20.00-0.00	702.61	3276.67	A	0.154	2.757	0.582	0.85	1	48.200	1173.85	58.69	B
			B	0.212	2.556	0.593	0.85	1	63.576			
			C	0.149	2.774	0.581	0.85	1	49.013			
Sum Weight:	5885.23	15290.82						OTM	688750.91 lb-ft	8913.01		

Force Totals

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Leg Weight	6548.69					
Bracing Weight	8742.14					
Total Member Self-Weight	15290.82			-12974.39	7870.18	
Total Weight	25075.25			-12974.39	7870.18	
Wind 0 deg - No Ice		881.22	-34016.80	-3109331.43	-84431.60	-7938.75
Wind 30 deg - No Ice		16314.23	-29017.15	-2674706.44	-1505484.89	-10372.30
Wind 60 deg - No Ice		27651.54	-17329.75	-1610233.62	-2549589.12	-14895.39
Wind 90 deg - No Ice		32157.76	-1080.21	-128891.59	-2949671.57	-16850.61
Wind 120 deg - No Ice		28174.19	17277.64	1537414.89	-2560199.33	-5940.37
Wind 150 deg - No Ice		15199.73	28921.81	2623793.98	-1379368.24	256.94
Wind 180 deg - No Ice		-676.93	32887.51	2998078.97	81187.63	4470.68
Wind 210 deg - No Ice		-16181.49	29222.75	2654871.06	1505608.55	7654.28
Wind 240 deg - No Ice		-28455.17	18080.79	1626352.62	2610691.79	11766.93
Wind 270 deg - No Ice		-32149.25	457.29	45407.84	2964077.17	14816.31
Wind 300 deg - No Ice		-27225.86	-16031.58	-1469514.39	2520522.91	6108.63
Wind 330 deg - No Ice		-15145.53	-28497.87	-2623672.64	1390044.02	-3125.37
Member Ice	6766.71					
Total Weight Ice	43788.28			-27149.04	16814.70	
Wind 0 deg - Ice		676.62	-35535.51	-3211370.71	-54019.87	-7965.92
Wind 30 deg - Ice		16129.12	-28510.61	-2611885.08	-1457928.91	-7586.32

Load Case	Vertical Forces lb	Sum of Forces X lb	Sum of Forces Z lb	Sum of Overturning Moments, M_x lb-ft	Sum of Overturning Moments, M_z lb-ft	Sum of Torques lb-ft
Wind 60 deg - Ice		26828.18	-16531.26	-1535397.25	-2435900.22	-9264.11
Wind 90 deg - Ice		31893.45	-828.01	-115973.81	-2879363.16	-9427.82
Wind 120 deg - Ice		29795.16	17969.20	1566288.97	-2654304.60	-243.95
Wind 150 deg - Ice		15271.95	28435.29	2538295.53	-1361041.21	3305.10
Wind 180 deg - Ice		-520.11	31705.30	2848837.80	73107.96	4906.96
Wind 210 deg - Ice		-16027.26	28666.97	2562214.76	1479590.93	5495.26
Wind 240 deg - Ice		-30011.72	18587.76	1634701.05	2714674.43	6579.86
Wind 270 deg - Ice		-31886.98	352.01	17695.23	2911987.53	7867.51
Wind 300 deg - Ice		-26501.56	-15535.02	-1427464.04	2435164.14	1054.34
Wind 330 deg - Ice		-15232.59	-28111.30	-2572644.74	1390992.38	-5504.10
Total Weight	25075.25			-12974.39	7870.18	
Wind 0 deg - Service		344.23	-13287.81	-1213010.28	-34758.83	-3101.07
Wind 30 deg - Service		6372.75	-11334.82	-1043234.89	-589857.77	-4051.68
Wind 60 deg - Service		10801.38	-6769.43	-627425.20	-997710.99	-5818.51
Wind 90 deg - Service		12561.63	-421.96	-48775.97	-1153993.19	-6582.27
Wind 120 deg - Service		11005.54	6749.08	602125.00	-1001855.60	-2320.46
Wind 150 deg - Service		5937.39	11297.58	1026491.83	-540593.45	100.37
Wind 180 deg - Service		-264.43	12846.68	1172696.91	29936.18	1746.36
Wind 210 deg - Service		-6320.89	11415.14	1038631.32	586350.61	2989.95
Wind 240 deg - Service		-11115.30	7062.81	636866.30	1018023.75	4596.46
Wind 270 deg - Service		-12558.30	178.63	19309.75	1156064.91	5787.62
Wind 300 deg - Service		-10635.10	-6262.34	-572456.75	982801.53	2386.18
Wind 330 deg - Service		-5916.22	-11131.98	-1023299.82	541208.21	-1220.85

Load Combinations

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

Comb. No.	Description
29	Dead+Wind 60 deg - Service
30	Dead+Wind 90 deg - Service
31	Dead+Wind 120 deg - Service
32	Dead+Wind 150 deg - Service
33	Dead+Wind 180 deg - Service
34	Dead+Wind 210 deg - Service
35	Dead+Wind 240 deg - Service
36	Dead+Wind 270 deg - Service
37	Dead+Wind 300 deg - Service
38	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
T1	160 - 140	Leg	Max Tension	8	12665.12	20.51	1015.02
			Max. Compression	10	-15299.67	800.26	-436.49
			Max. Mx	10	-15295.86	-952.82	513.71
			Max. My	2	-15240.50	-21.21	-1082.57
			Max. Vy	10	-3508.16	800.26	-436.49
			Max. Vx	2	-3989.10	18.74	911.06
		Diagonal	Max Tension	5	3040.89	0.00	0.00
			Max. Compression	11	-3049.77	0.00	0.00
			Max. Mx	20	1431.81	16.10	-0.07
			Max. My	5	-3038.63	2.82	-3.76
			Max. Vy	20	11.56	16.10	-0.07
			Max. Vx	5	-0.77	0.00	0.00
		Top Girt	Max Tension	12	62.42	0.00	0.00
			Max. Compression	19	-154.99	0.00	0.00
			Max. Mx	14	-50.31	-35.32	0.00
			Max. My	18	-35.25	0.00	0.00
			Max. Vy	14	16.51	0.00	0.00
			Max. Vx	18	-0.00	0.00	0.00
T2	140 - 120	Leg	Max Tension	12	26383.00	-15.98	-74.94
			Max. Compression	15	-30843.58	-29.02	-62.49
			Max. Mx	10	-18172.14	911.29	22.09
			Max. My	3	-1284.64	14.16	-333.36
			Max. Vy	19	191.46	901.39	-6.53
			Max. Vx	5	74.37	16.44	306.61
		Diagonal	Max Tension	13	3048.77	0.00	0.00
			Max. Compression	7	-3138.84	0.00	0.00
			Max. Mx	23	2624.87	26.62	-1.95
			Max. My	24	-2866.26	6.10	5.80
			Max. Vy	17	15.65	25.62	2.21
			Max. Vx	24	-1.42	0.00	0.00
T3	120 - 100	Leg	Max Tension	12	43157.54	-223.24	149.15
			Max. Compression	15	-51448.00	115.92	-111.85
			Max. Mx	4	36842.34	588.50	194.80
			Max. My	2	17604.27	-271.88	-878.12
			Max. Vy	4	300.85	-365.48	194.80
			Max. Vx	2	-424.80	-271.88	501.92
		Diagonal	Max Tension	3	4461.17	0.00	0.00
			Max. Compression	3	-4533.85	0.00	0.00
			Max. Mx	15	3928.41	53.47	-3.17
			Max. My	22	-3532.61	9.17	-7.82
			Max. Vy	15	-24.01	53.47	-3.17
			Max. Vx	22	1.72	0.00	0.00
T4	100 - 80	Leg	Max Tension	4	63093.07	-77.72	-36.09

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Compression	15	-75006.00	91.92	-10.30
			Max. Mx	21	55393.04	-346.23	8.28
			Max. My	11	-2298.47	-4.97	-277.73
			Max. Vy	4	-341.70	-158.91	67.31
			Max. Vx	7	-374.87	-1.38	-217.41
		Diagonal	Max Tension	3	5074.60	0.00	0.00
			Max. Compression	3	-5116.77	0.00	0.00
			Max. Mx	19	4065.46	77.57	4.36
			Max. My	21	-4004.58	25.94	-10.18
			Max. Vy	19	-31.87	77.57	4.36
			Max. Vx	21	2.06	0.00	0.00
T5	80 - 60	Leg	Max Tension	4	81718.24	-390.83	198.84
			Max. Compression	15	-97997.29	-83.90	11.58
			Max. Mx	8	79712.78	-561.29	7.44
			Max. My	11	-2703.54	19.72	-584.36
			Max. Vy	8	806.63	-561.29	7.45
			Max. Vx	11	845.81	19.78	-584.36
		Diagonal	Max Tension	9	6723.34	0.00	0.00
			Max. Compression	3	-6836.09	0.00	0.00
			Max. Mx	25	3998.14	105.91	9.93
			Max. My	16	-5928.35	49.74	13.53
			Max. Vy	25	41.52	95.24	-10.84
			Max. Vx	16	-2.51	0.00	0.00
T6	60 - 40	Leg	Max Tension	4	102330.61	-360.65	-9.86
			Max. Compression	15	-123573.42	-340.30	-6.14
			Max. Mx	17	92025.17	-1109.05	35.10
			Max. My	5	-9392.21	-30.56	408.16
			Max. Vy	21	199.78	-1101.55	3.77
			Max. Vx	16	-95.49	486.44	-372.95
		Diagonal	Max Tension	22	7122.32	0.00	0.00
			Max. Compression	3	-7040.02	0.00	0.00
			Max. Mx	23	5128.77	154.57	-12.26
			Max. My	18	-3925.94	114.03	17.43
			Max. Vy	17	54.11	152.59	-12.93
			Max. Vx	18	-3.05	0.00	0.00
T7	40 - 20	Leg	Max Tension	4	121373.75	-281.28	19.43
			Max. Compression	15	-148300.13	-908.60	8.63
			Max. Mx	17	109261.89	-1817.75	5.77
			Max. My	5	-11581.28	-44.92	518.76
			Max. Vy	21	305.94	-1811.32	-8.62
			Max. Vx	5	94.04	-44.94	518.75
		Diagonal	Max Tension	22	7566.00	0.00	0.00
			Max. Compression	22	-7377.81	0.00	0.00
			Max. Mx	17	4962.15	185.97	-16.64
			Max. My	17	-6343.38	130.72	23.17
			Max. Vy	17	60.46	185.97	-16.64
			Max. Vx	17	-3.65	0.00	0.00
T8	20 - 0	Leg	Max Tension	4	139673.51	-508.86	36.77
			Max. Compression	15	-172539.73	-0.00	0.02
			Max. Mx	15	-158907.16	2116.94	33.04
			Max. My	3	-6021.86	-61.95	-1034.41
			Max. Vy	21	-359.68	-1811.32	-8.62
			Max. Vx	13	162.46	-72.27	1011.13
		Diagonal	Max Tension	22	8799.20	0.00	0.00
			Max. Compression	22	-8518.95	0.00	0.00
			Max. Mx	17	3867.98	289.40	21.85
			Max. My	17	-7569.74	214.88	32.41
			Max. Vy	17	79.10	289.40	21.85
			Max. Vx	17	-4.49	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	23	175281.92	16713.02	-9985.03
	Max. H_x	10	164042.38	17426.92	-10556.04
	Max. H_z	16	-115671.24	-14581.69	10162.69
	Min. Vert	4	-144238.35	-15673.19	9584.56
	Min. H_x	17	-131329.56	-16868.25	10061.16
	Min. H_z	10	164042.38	17426.92	-10556.04
Leg B	Max. Vert	19	170896.58	-16532.49	-9639.05
	Max. H_x	25	-128561.67	16605.04	9631.49
	Max. H_z	25	-128561.67	16605.04	9631.49
	Min. Vert	12	-139401.39	15295.96	9043.29
	Min. H_x	6	159576.00	-17178.12	-10187.36
	Min. H_z	6	159576.00	-17178.12	-10187.36
Leg A	Max. Vert	15	177463.03	-268.39	19636.75
	Max. H_x	11	6060.09	3011.82	438.95
	Max. H_z	2	165825.46	-271.41	20572.94
	Min. Vert	8	-143474.65	154.62	-18499.93
	Min. H_x	5	14886.56	-3080.75	1361.42
	Min. H_z	21	-129886.45	145.17	-19721.60

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	25075.25	-0.00	-0.00	-12973.98	7869.89	0.09
Dead+Wind 0 deg - No Ice	25075.25	881.22	-34016.80	-3116064.93	-84575.13	-7978.93
Dead+Wind 30 deg - No Ice	25075.25	16314.23	-29017.15	-2680508.77	-1508759.34	-10428.49
Dead+Wind 60 deg - No Ice	25075.25	27651.54	-17329.75	-1613727.17	-2555150.22	-14951.64
Dead+Wind 90 deg - No Ice	25075.57	32157.92	-1080.74	-129181.29	-2956108.65	-16887.27
Dead+Wind 120 deg - No Ice	25075.25	28174.19	17277.64	1540706.76	-2565794.30	-5962.12
Dead+Wind 150 deg - No Ice	25075.25	15199.73	28921.81	2629466.54	-1382397.99	262.74
Dead+Wind 180 deg - No Ice	25075.25	-676.93	32887.51	3004576.12	81362.03	4501.99
Dead+Wind 210 deg - No Ice	25075.25	-16181.49	29222.75	2660598.24	1508913.27	7705.21
Dead+Wind 240 deg - No Ice	25075.25	-28455.17	18080.79	1629812.44	2616405.92	11827.24
Dead+Wind 270 deg - No Ice	25075.22	-32149.25	457.28	45480.60	2970556.34	14856.89
Dead+Wind 300 deg - No Ice	25075.25	-27225.86	-16031.58	-1472707.29	2526043.58	6135.09
Dead+Wind 330 deg - No Ice	25075.63	-15146.07	-28497.77	-2629364.51	1393109.09	-3127.78
Dead+Ice+Temp	43788.28	0.00	0.00	-27243.40	16879.39	0.76
Dead+Wind 0 deg+Ice+Temp	43788.28	676.62	-35535.51	-3222921.79	-54121.93	-8041.70
Dead+Wind 30 deg+Ice+Temp	43788.28	16129.12	-28510.60	-2621295.12	-1463203.01	-7680.59
Dead+Wind 60 deg+Ice+Temp	43788.28	26828.16	-16531.26	-1540926.05	-2444747.04	-9376.19
Dead+Wind 90 deg+Ice+Temp	43788.27	31893.44	-827.97	-116390.74	-2889793.15	-9520.83
Dead+Wind 120 deg+Ice+Temp	43788.28	29795.16	17969.20	1571875.26	-2663943.62	-295.36
Dead+Wind 150 deg+Ice+Temp	43788.28	15271.94	28435.29	2547417.37	-1365990.96	3327.77
Dead+Wind 180 deg+Ice+Temp	43788.28	-520.11	31705.29	2859118.82	73368.60	4970.23
Dead+Wind 210 deg+Ice+Temp	43788.28	-16027.26	28666.97	2571407.53	1484974.61	5586.35
Dead+Wind 240 deg+Ice+Temp	43788.28	-30011.70	18587.75	1640466.45	2724547.44	6705.81
Dead+Wind 270 deg+Ice+Temp	43788.27	-31886.97	352.05	17747.69	2922540.70	7964.90
Dead+Wind 300 deg+Ice+Temp	43788.28	-26501.55	-15535.02	-1432615.92	2444033.71	1105.44
Dead+Wind 330 deg+Ice+Temp	43788.27	-15232.54	-28111.32	-2581915.95	1396070.73	-5515.25
Dead+Wind 0 deg - Service	25075.25	344.23	-13287.81	-1225147.40	-28234.57	-3115.93

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 30 deg - Service	25075.25	6372.75	-11334.82	-1055003.19	-584561.59	-4073.17
Dead+Wind 60 deg - Service	25075.25	10801.38	-6769.43	-638284.80	-993311.81	-5840.83
Dead+Wind 90 deg - Service	25075.25	12561.63	-421.96	-58378.79	-1149934.96	-6599.30
Dead+Wind 120 deg - Service	25075.25	11005.54	6749.08	593923.64	-997464.42	-2329.80
Dead+Wind 150 deg - Service	25075.25	5937.39	11297.58	1019222.01	-535197.54	103.80
Dead+Wind 180 deg - Service	25075.25	-264.43	12846.68	1165751.29	36587.54	1759.25
Dead+Wind 210 deg - Service	25075.25	-6320.89	11415.14	1031384.23	594229.18	3010.81
Dead+Wind 240 deg - Service	25075.25	-11115.30	7062.81	628733.80	1026848.22	4620.12
Dead+Wind 270 deg - Service	25075.25	-12558.30	178.63	9850.13	1165189.74	5805.96
Dead+Wind 300 deg - Service	25075.25	-10635.10	-6262.34	-583202.25	991553.40	2395.90
Dead+Wind 330 deg - Service	25075.25	-5916.22	-11131.98	-1035028.27	548994.65	-1223.49

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	lb	lb	lb	lb	lb	lb	
1	-0.00	-25075.25	-0.00	0.00	25075.25	0.00	0.000%
2	881.22	-25075.25	-34016.80	-881.22	25075.25	34016.80	0.000%
3	16314.23	-25075.25	-29017.15	-16314.23	25075.25	29017.15	0.000%
4	27651.54	-25075.25	-17329.75	-27651.54	25075.25	17329.75	0.000%
5	32157.76	-25075.25	-1080.21	-32157.92	25075.57	1080.74	0.002%
6	28174.19	-25075.25	17277.64	-28174.19	25075.25	-17277.64	0.000%
7	15199.73	-25075.25	28921.81	-15199.73	25075.25	-28921.81	0.000%
8	-676.93	-25075.25	32887.51	676.93	25075.25	-32887.51	0.000%
9	-16181.49	-25075.25	29222.75	16181.49	25075.25	-29222.75	0.000%
10	-28455.17	-25075.25	18080.79	28455.17	25075.25	-18080.79	0.000%
11	-32149.25	-25075.25	457.29	32149.25	25075.22	-457.28	0.000%
12	-27225.86	-25075.25	-16031.58	27225.86	25075.25	16031.58	0.000%
13	-15145.53	-25075.25	-28497.87	15146.07	25075.63	28497.77	0.002%
14	-0.00	-43788.28	-0.00	-0.00	43788.28	-0.00	0.000%
15	676.62	-43788.28	-35535.51	-676.62	43788.28	35535.51	0.000%
16	16129.12	-43788.28	-28510.61	-16129.12	43788.28	28510.60	0.000%
17	26828.16	-43788.28	-16531.26	-26828.16	43788.28	16531.26	0.000%
18	31893.45	-43788.28	-828.01	-31893.44	43788.27	827.97	0.000%
19	29795.16	-43788.28	17969.20	-29795.16	43788.28	-17969.20	0.000%
20	15271.95	-43788.28	28435.29	-15271.94	43788.28	-28435.29	0.000%
21	-520.11	-43788.28	31705.30	520.11	43788.28	-31705.29	0.000%
22	-16027.26	-43788.28	28666.97	16027.26	43788.28	-28666.97	0.000%
23	-30011.70	-43788.28	18587.76	30011.70	43788.28	-18587.75	0.000%
24	-31886.98	-43788.28	352.01	31886.97	43788.27	-352.05	0.000%
25	-26501.56	-43788.28	-15535.02	26501.55	43788.28	15535.02	0.000%
26	-15232.59	-43788.28	-28111.30	15232.54	43788.27	28111.32	0.000%
27	344.23	-25075.25	-13287.81	-344.23	25075.25	13287.81	0.000%
28	6372.75	-25075.25	-11334.82	-6372.75	25075.25	11334.82	0.000%
29	10801.38	-25075.25	-6769.43	-10801.38	25075.25	6769.43	0.000%
30	12561.63	-25075.25	-421.96	-12561.63	25075.25	421.96	0.000%
31	11005.54	-25075.25	6749.08	-11005.54	25075.25	-6749.08	0.000%
32	5937.39	-25075.25	11297.58	-5937.39	25075.25	-11297.58	0.000%
33	-264.43	-25075.25	12846.68	264.43	25075.25	-12846.68	0.000%
34	-6320.89	-25075.25	11415.14	6320.89	25075.25	-11415.14	0.000%
35	-11115.30	-25075.25	7062.81	11115.30	25075.25	-7062.81	0.000%
36	-12558.30	-25075.25	178.63	12558.30	25075.25	-178.63	0.000%
37	-10635.10	-25075.25	-6262.34	10635.10	25075.25	6262.34	0.000%
38	-5916.22	-25075.25	-11131.98	5916.22	25075.25	11131.98	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	0.00000177
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000198
9	Yes	4	0.00000001	0.00000169
10	Yes	4	0.00000001	0.00000001
11	Yes	4	0.00000001	0.00000190
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000199
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000237
16	Yes	4	0.00000001	0.00000288
17	Yes	4	0.00000001	0.00000380
18	Yes	4	0.00000001	0.00000444
19	Yes	4	0.00000001	0.00000246
20	Yes	4	0.00000001	0.00000389
21	Yes	4	0.00000001	0.00000466
22	Yes	4	0.00000001	0.00000417
23	Yes	4	0.00000001	0.00000249
24	Yes	4	0.00000001	0.00000509
25	Yes	4	0.00000001	0.00000414
26	Yes	4	0.00000001	0.00000489
27	Yes	4	0.00000001	0.00000001
28	Yes	4	0.00000001	0.00000001
29	Yes	4	0.00000001	0.00000001
30	Yes	4	0.00000001	0.00000001
31	Yes	4	0.00000001	0.00000001
32	Yes	4	0.00000001	0.00000001
33	Yes	4	0.00000001	0.00000001
34	Yes	4	0.00000001	0.00000001
35	Yes	4	0.00000001	0.00000001
36	Yes	4	0.00000001	0.00000001
37	Yes	4	0.00000001	0.00000001
38	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 140	4.253	27	0.2368	0.0095
T2	140 - 120	3.243	27	0.2253	0.0112
T3	120 - 100	2.338	27	0.1892	0.0117
T4	100 - 80	1.598	27	0.1488	0.0097
T5	80 - 60	1.018	27	0.1104	0.0084
T6	60 - 40	0.591	27	0.0793	0.0062
T7	40 - 20	0.284	27	0.0538	0.0038
T8	20 - 0	0.085	27	0.0264	0.0016

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
169.00	RS90-12-00NA-2	27	4.253	0.2368	0.0095	168242
167.00	14' x 3" Dia Omni	27	4.253	0.2368	0.0095	168242
164.00	10'0"x4" Pipe Mount	27	4.253	0.2368	0.0095	168242
155.00	12' T-Frame	27	3.996	0.2354	0.0099	168242
145.00	12' Frame	27	3.489	0.2302	0.0108	56081
130.00	14' x 3" Dia Omni	27	2.772	0.2094	0.0118	32698
123.00	14' x 3" Dia Omni	27	2.464	0.1954	0.0118	28235
116.00	4' Side Mount Standoff	27	2.177	0.1810	0.0114	27415
111.00	14' x 3" Dia Omni	27	1.985	0.1709	0.0109	28464
110.00	8 FT DISH	27	1.947	0.1689	0.0108	28684
104.00	14' x 3" Dia Omni	27	1.733	0.1568	0.0101	30081
101.00	6 FT DISH	27	1.631	0.1508	0.0098	30694
97.00	4' Side Mount Standoff	27	1.501	0.1428	0.0095	30852
93.00	6 FT DISH	27	1.377	0.1349	0.0092	30575
71.00	10 FT DISH	27	0.809	0.0953	0.0075	34148
47.00	4' Side Mount Standoff	27	0.379	0.0627	0.0046	46058
45.00	8' x 3" Dia Omni	27	0.351	0.0602	0.0044	46771
41.00	8' x 3" Dia Omni	27	0.296	0.0551	0.0039	47628
37.00	4' Side Mount Standoff	27	0.246	0.0499	0.0034	45366

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	160 - 140	10.992	15	0.6028	0.0242
T2	140 - 120	8.422	15	0.5761	0.0287
T3	120 - 100	6.098	15	0.4885	0.0300
T4	100 - 80	4.180	15	0.3865	0.0248
T5	80 - 60	2.670	15	0.2878	0.0214
T6	60 - 40	1.554	15	0.2071	0.0158
T7	40 - 20	0.748	15	0.1410	0.0097
T8	20 - 0	0.226	15	0.0692	0.0042

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
169.00	RS90-12-00NA-2	15	10.992	0.6028	0.0242	65751
167.00	14' x 3" Dia Omni	15	10.992	0.6028	0.0242	65751
164.00	10'0"x4" Pipe Mount	15	10.992	0.6028	0.0242	65751
155.00	12' T-Frame	15	10.339	0.5995	0.0254	65751
145.00	12' Frame	15	9.050	0.5878	0.0277	21917
130.00	14' x 3" Dia Omni	15	7.216	0.5379	0.0301	12782
123.00	14' x 3" Dia Omni	15	6.423	0.5038	0.0302	11071
116.00	4' Side Mount Standoff	15	5.681	0.4680	0.0292	10795

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
111.00	14' x 3" Dia Omni	15	5.183	0.4426	0.0280	11196
110.00	8 FT DISH	15	5.087	0.4375	0.0277	11280
104.00	14' x 3" Dia Omni	15	4.531	0.4069	0.0259	11812
101.00	6 FT DISH	15	4.266	0.3916	0.0251	12041
97.00	4' Side Mount Standoff	15	3.928	0.3712	0.0242	12049
93.00	6 FT DISH	15	3.606	0.3509	0.0235	11907
71.00	10 FT DISH	15	2.123	0.2488	0.0192	13184
47.00	4' Side Mount Standoff	15	0.999	0.1640	0.0118	17790
45.00	8' x 3" Dia Omni	15	0.924	0.1576	0.0112	18067
41.00	8' x 3" Dia Omni	15	0.782	0.1444	0.0100	18392
37.00	4' Side Mount Standoff	15	0.650	0.1306	0.0088	17474

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt lb	Allowable Load lb	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	160	Leg	A325N	0.6250	4	3166.28	13357.30	0.237 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3049.77	4123.34	0.740 ✓	1.333	Bolt Shear
T2	140	Leg	A325N	0.6250	4	6595.75	13499.00	0.489 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	3138.84	4123.34	0.761 ✓	1.333	Bolt Shear
T3	120	Leg	A325N	0.7500	4	10789.40	19438.40	0.555 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	4533.85	4123.34	1.100 ✓	1.333	Bolt Shear
T4	100	Leg	A325N	0.8750	4	15773.30	26458.10	0.596 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	5116.77	4123.34	1.241 ✓	1.333	Bolt Shear
T5	80	Leg	A325N	1.0000	4	20429.60	34557.50	0.591 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	6836.09	6442.72	1.061 ✓	1.333	Bolt Shear
T6	60	Leg	A325N	1.0000	4	25582.70	34557.50	0.740 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	7122.32	6442.72	1.105 ✓	1.333	Bolt Shear
T7	40	Leg	A325N	1.0000	6	20229.00	34557.50	0.585 ✓	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	7566.00	6442.72	1.174 ✓	1.333	Bolt Shear
T8	20	Leg	A354-BC	0.8750	6	23278.90	24804.50	0.938 ✓	1.333	Bolt Tension
		Diagonal	A325X	0.6250	1	8799.20	8156.25	1.079 ✓	1.333	Member Bearing

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	ROHN 2.5 STD	20.00	4.75	60.2 K=1.00	22.690	1.7040	-15299.70	38664.10	0.396 ✓
T2	140 - 120	ROHN 2.5 STD	20.03	6.68	84.6 K=1.00	18.081	1.7040	-30843.60	30810.90	1.001 ✓
T3	120 - 100	ROHN 2.5 EH	20.03	6.68	86.7 K=1.00	17.634	2.2535	-51448.00	39739.10	1.295 ✓
T4	100 - 80	ROHN 3 EH	20.04	6.68	70.5 K=1.00	20.840	3.0159	-75006.00	62852.20	1.193 ✓
T5	80 - 60	ROHN 4 EH	20.03	10.02	81.4 K=1.00	18.730	4.4074	-97997.30	82552.50	1.187 ✓
T6	60 - 40	ROHN 5 EH	20.03	10.02	65.4 K=1.00	21.782	6.1120	-123573.00	133128.00	0.928 ✓
T7	40 - 20	ROHN 5 EH	20.04	10.02	65.4 K=1.00	21.778	6.1120	-148300.00	133108.00	1.114 ✓
T8	20 - 0	ROHN 6 EHS	20.03	10.02	54.0 K=1.00	23.713	6.7133	-172540.00	159191.00	1.084 ✓

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	L1 3/4x1 3/4x3/16	9.79	4.64	162.2 K=1.00	5.674	0.6211	-3049.77	3523.97	0.865 ✓
T2	140 - 120	L2x2x3/16	12.21	6.05	184.1 K=1.00	4.404	0.7150	-3138.84	3148.80	0.997 ✓
T3	120 - 100	L2 1/2x2 1/2x3/16	13.96	6.92	167.8 K=1.00	5.305	0.9020	-4533.85	4784.90	0.948 ✓
T4	100 - 80	L3x3x3/16	15.79	7.81	157.3 K=1.00	6.038	1.0900	-5116.77	6581.15	0.777 ✓
T5	80 - 60	L3x3x1/4	19.03	9.46	191.7 K=1.00	4.065	1.4400	-6836.09	5854.11	1.168 ✓
T6	60 - 40	L3 1/2x3 1/2x1/4	20.76	10.27	177.5 K=1.00	4.740	1.6900	-7040.02	8010.53	0.879 ✓
T7	40 - 20	L3 1/2x3 1/2x1/4	22.64	11.23	194.1 K=1.00	3.962	1.6900	-6993.03	6696.23	1.044 ✓
T8	20 - 0	L4x4x1/4	23.58	11.63	175.5 K=1.00	4.848	1.9400	-8518.95	9405.52	0.906 ✓

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	L1 3/4x1 3/4x3/16	8.56	8.32	225.0 K=0.77	2.950	0.6211	-154.99	1832.26	0.085 ✓

KL/R > 200 (C) - 6

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	ROHN 2.5 STD	20.00	4.75	60.2	30.000	1.7040	12665.10	51121.50	0.248 ✔
T2	140 - 120	ROHN 2.5 STD	20.03	6.68	84.6	30.000	1.7040	26383.00	51121.50	0.516 ✔
T3	120 - 100	ROHN 2.5 EH	20.03	6.68	86.7	30.000	2.2535	43157.50	67606.20	0.638 ✔
T4	100 - 80	ROHN 3 EH	20.04	6.68	70.5	30.000	3.0159	63093.10	90477.90	0.697 ✔
T5	80 - 60	ROHN 4 EH	20.03	10.02	81.4	30.000	4.4074	81718.20	132223.00	0.618 ✔
T6	60 - 40	ROHN 5 EH	20.03	10.02	65.4	30.000	6.1120	102331.00	183359.00	0.558 ✔
T7	40 - 20	ROHN 5 EH	20.04	10.02	65.4	30.000	6.1120	121374.00	183359.00	0.662 ✔
T8	20 - 0	ROHN 6 EHS	20.03	10.02	54.0	30.000	6.7133	139674.00	201398.00	0.694 ✔

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	L1 3/4x1 3/4x3/16	9.79	4.64	106.3	21.600	0.6211	3040.89	13415.60	0.227 ✔
T2	140 - 120	L2x2x3/16	12.21	6.05	119.8	21.600	0.7150	3048.77	15444.00	0.197 ✔
T3	120 - 100	L2 1/2x2 1/2x3/16	13.96	6.92	108.5	21.600	0.9020	4461.17	19483.20	0.229 ✔
T4	100 - 80	L3x3x3/16	15.79	7.81	101.3	21.600	1.0900	5074.60	23544.00	0.216 ✔
T5	80 - 60	L3x3x1/4	19.03	9.46	123.7	21.600	1.4400	6723.34	31104.00	0.216 ✔
T6	60 - 40	L3 1/2x3 1/2x1/4	20.76	10.27	114.5	21.600	1.6900	7122.32	36504.00	0.195 ✔
T7	40 - 20	L3 1/2x3 1/2x1/4	22.64	11.23	125.1	21.600	1.6900	7566.00	36504.00	0.207 ✔
T8	20 - 0	L4x4x1/4	24.49	12.08	117.3	21.600	1.9400	8799.20	41904.00	0.210 ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
										✔

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T1	160 - 140	L1 3/4x1 3/4x3/16	8.56	8.32	186.0	21.600	0.6211	62.42	13415.60	0.005 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	$SF*P_{allow}$ lb	% Capacity	Pass Fail
T1	160 - 140	Leg	ROHN 2.5 STD	1	-15299.70	51539.25	29.7	Pass
T2	140 - 120	Leg	ROHN 2.5 STD	33	-30843.60	41070.93	75.1	Pass
T3	120 - 100	Leg	ROHN 2.5 EH	54	-51448.00	52972.22	97.1	Pass
T4	100 - 80	Leg	ROHN 3 EH	75	-75006.00	83781.98	89.5	Pass
T5	80 - 60	Leg	ROHN 4 EH	96	-97997.30	110042.48	89.1	Pass
T6	60 - 40	Leg	ROHN 5 EH	111	-123573.00	177459.62	69.6	Pass
T7	40 - 20	Leg	ROHN 5 EH	126	-148300.00	177432.96	83.6	Pass
T8	20 - 0	Leg	ROHN 6 EHS	141	-172540.00	212201.59	81.3	Pass
T1	160 - 140	Diagonal	L1 3/4x1 3/4x3/16	7	-3049.77	4697.45	64.9	Pass
T2	140 - 120	Diagonal	L2x2x3/16	36	-3138.84	4197.35	74.8	Pass
T3	120 - 100	Diagonal	L2 1/2x2 1/2x3/16	59	-4533.85	6378.27	71.1 82.5 (b)	Pass
T4	100 - 80	Diagonal	L3x3x3/16	80	-5116.77	8772.67	58.3 93.1 (b)	Pass
T5	80 - 60	Diagonal	L3x3x1/4	101	-6836.09	7803.53	87.6	Pass
T6	60 - 40	Diagonal	L3 1/2x3 1/2x1/4	116	-7040.02	10678.04	65.9 82.9 (b)	Pass
T7	40 - 20	Diagonal	L3 1/2x3 1/2x1/4	131	-6993.03	8926.07	78.3 88.1 (b)	Pass
T8	20 - 0	Diagonal	L4x4x1/4	153	-8518.95	12537.56	67.9 80.9 (b)	Pass
T1	160 - 140	Top Girt	L1 3/4x1 3/4x3/16	6	-154.99	2442.40	6.3	Pass
							Summary	
							Leg (T3) 97.1	Pass
							Diagonal (T4) 93.1	Pass
							Top Girt (T1) 6.3	Pass
							Bolt Checks 93.1	Pass
							RATING = 97.1	**Pass**

NATCOMM INC. CONSULTING ENGINEERS
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63-2 N. Branford Rd., Branford, CT 06405

Subject:	Lattice Tower Pad and Pier Foundation Check
Location:	Windsor, CT
Rev. 1: 04/30/09	Prepared by: TJL. Checked by: C.F.C. Job No. 09009.CO8

Pad and Pier Foundation:

Input Data:

Tower Data

Max Uplift Force =	Uplift := 145·kips	(User Input from RISATower)	
Max Shear Force =	Shear := 20.6·kips	(User Input from RISATower)	
Max Compressive Force =	Compression := 178·kips	(User Input from RISATower)	
Tower Height =	$H_t := 160 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 11.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 9.5 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 2.0 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 3.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 3.5 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 8.0 \cdot ft$	(User Input)	

Material Properties:

Internal Friction Angle of Soil =	$\phi := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 4500 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	Bouyancy := 0	(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 =	$\mu = 0.45$	(User Input)	

Calculated Factors:

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin(\phi)}{1 - \sin(\phi)} = 3$$

Load Factor =

$$LF := \begin{cases} 1.333 \text{ if } H_t \le 700 \cdot ft \\ 1.7 \text{ if } H_t \ge 1200 \cdot ft \\ 1.333 + \left(\frac{H_t - 700ft}{1200ft - 700ft} \right) \cdot 0.4 \text{ otherwise} \end{cases} = 1.333$$

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := \text{if}(\text{Bouyancy} = 1, \gamma_{conc} - 62.4\text{pcf}, \gamma_{conc}) = 150 \cdot \text{pcf}$

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}) = 120 \cdot \text{pcf}$

Cross Sectional Area 1 of Resisting Pyramid = $B_1 := W_f^2 = 64$

Cross Sectional Area 2 of Resisting Pyramid = $B_2 := \left[2\left(D_f - n\right) \cdot \tan\left(\gamma_s\right) + W_f\right]^2 = 428.561$

Volume of Concrete = $V_{conc} := \left[\left(W_f^2 \cdot T_f\right) + \frac{d_p^2 \cdot \gamma_c}{4} L_p\right] = 291.152 \cdot \text{ft}^3$

Volume of Soil = $V_{soil} := \left[\frac{\left(D_f - n\right)}{3} \cdot \left(B_1 + B_2 + \sqrt{B_1 \cdot B_2}\right)\right] - V_{conc} = 2122.15$

Weight of Concrete = $WT_c := V_{conc} \cdot \gamma_c = 43.673 \cdot \text{kip}$

Weight of Soil = $WT_s := V_{soil} \cdot \gamma_s = 254.66 \cdot \text{kip}$

Total Weight = $WT_{tot} := WT_c + WT_s = 298.331 \cdot \text{kip}$

Factor of Safety Actual = $FS := \frac{WT_{tot}}{\text{Uplift}} = 2.06$

Factor of Safety Required = $FS_{req} := 2$

$\text{Uplift\_Check} := \text{if}\left(FS \geq FS_{req}, \text{"Okay"}, \text{"No Good"}\right)$

$\text{Uplift\_Check} = \text{"Okay"}$

Bearing Pressure Caused by Footing:

Weight of Soil Above Footing = $WT_{soil} := \left[\left(W_f^2 - \frac{\gamma_p^2}{4}\right) \cdot \left(L_p - L_{pag} - n\right)\right] \cdot \gamma_s = 51.238 \cdot \text{kips}$

Area of the Mat = $A_{mat} := W_f^2 = 64$

Maximum Pressure in Mat = $P_{max} := \frac{WT_c + WT_{soil} + \text{Compression}}{A_{mat}} = 4.264 \cdot \text{ksf}$

$\text{Max\_Pressure\_Check} := \text{if}\left(P_{max} < q_s, \text{"Okay"}, \text{"No Good"}\right)$

$\text{Max\_Pressure\_Check} = \text{"Okay"}$

FDH ENGINEERING

Dispersive Wave Propagation Testing of an Existing Tower Foundation

Report Prepared for
Natcomm, Inc.

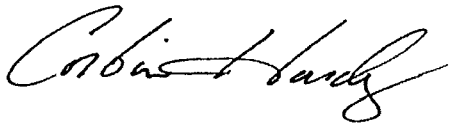
Site Name: Windsor, CT
Site ID: 08007.CO9
480-482 Pigeon Hill Rd. – Windsor, CT
Lat: 41-51-59.85
Lon: 72-40-29.13

FDH Project Number 08-04006E N1

Prepared By:

Brian Peele
NDT Signal Analyst

Reviewed By:



Corbin Hardy
Director of NDT Technology

FDH Engineering, Inc.
PO Box 99556
Raleigh, NC 27615
(919)-755-1012
info@fdh-inc.com

4/18/2008

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Report Submitted by: Brian Peele, BSMSE
NDT Signal Analyst
FDH Engineering, Inc.
2730 Rowland Road, Suite 100 – Raleigh, NC 27615
Tel: (919) 755-1012 Fax: (919) 755-1031

Client: Natcomm, Inc.
Attn: Mr. Dan Bolan
63-2 North Branford Road - Branford, CT 06405-
Tel: (203) 488-0580 Fax: (203) 488-8587

Project Location: 480-482 Pigeon Hill Rd. - Windsor, CT

Foundation Type: Concrete Pad and Pier

Number of Foundations Tested: Three (3)

Scope of Work

Field crews from FDH Engineering, Inc. performed a nondestructive *Dispersive Wave* investigation of a concrete tower foundation in Connecticut. These tests were conducted to collect data used for determining the foundations' overall, in-situ sizes. The data acquired was transmitted to FDH's offices in Raleigh, NC where it was post-processed and analyzed. Contained herein are the results from this analysis.

The FDH Testing Methodology

FDH's method of dispersive wave testing is conducted by temporarily mounting accelerometers (gages) on the foundation's top, and then striking the foundation with a hand-held hammer. The waves created by the blow propagate up and down the foundation's length with the reflections being recorded and stored on a digital storage oscilloscope each time they pass the gages. The data then is analyzed by digital signal processing techniques using special software designed by FDH. This analysis permits computation of the time needed for a select group of frequencies to travel from the gages to the bottom of the concrete and back. The foundation's vertical dimension is then computed from the product of frequency velocity and the corresponding time required for travel. FDH's method of rebar determinations is conducted using FDH's proprietary software and field capabilities to obtain a three-dimensional view of the reinforcing steel within the concrete.

DISCUSSION

The concrete lengths shown in *Appendix – Drawing No. S-1* are considered to be from the foundation's top surface to its bottom surface. If there is a break or other significant fracture in the concrete, or a major void, a strong return would be found on the record at the approximate location of the apparent damage. The computed length then would be the distance from the foundation's top to the location of such a material anomaly.

GENERAL COMMENTS/LIMITATIONS

Professional judgments are incorporated into this report. These are based on our evaluations of field information gathered, on our understanding of the characteristics of the project, and on our experience and capabilities using dispersive wave propagation methods. We do not guarantee performance of this project in any respect, only that our work and judgments rendered meet the standard of care of our profession.

Several factors are mentioned below that could potentially affect the results of our investigation, either the wave propagation testing or the manual probing/digging operations that may have been used.

If any portion of the foundations have been modified in the past by pouring additional concrete above the original (old) concrete, then there exists the possibility of not being able to identify the dimensions of the original foundation located beneath the new pour. Such modifications could create cold joints through which wave energy may not pass, and the dimensions of any original block may be obscured by the new pour, or completely encompassed by it. The presence of "toes" at the bottom of anchor blocks, if applicable for this project, might not be detected.

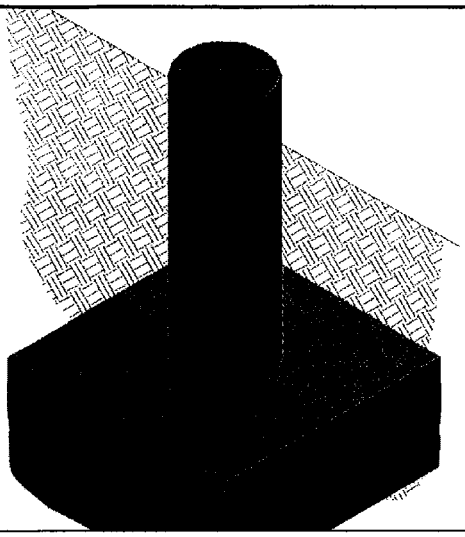
If foundations are embedded into rock the computed concrete thicknesses (depths) could be affected by the underlying rock. Multiple wave reflections could be present in the data due to uneven concrete surfaces that may exist between concrete and rock. Some wave energy could extend into the rock that could induce a slight error in the thickness (depth) calculations.

The presence of overspill concrete near the top of foundations can cause an error in the lateral dimensions determined for a foundations. Overspill concrete can encompass a larger area above the actual installed foundation size. Also, uneven concrete surfaces below grade, if they exist, make determination of foundation concrete sizes difficult. In these cases, average concrete dimensions are reported.

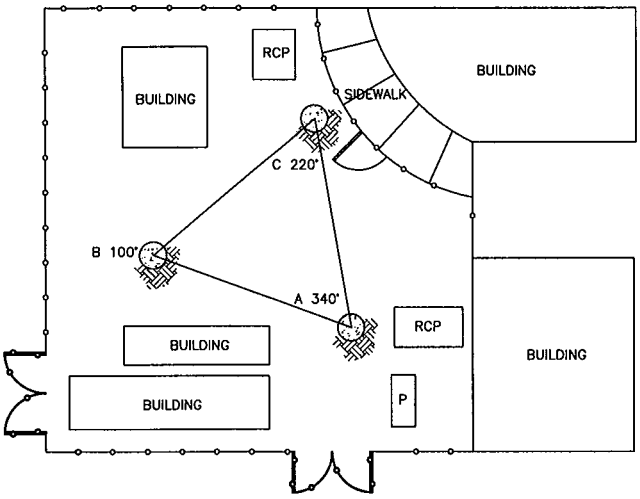
Every attempt is made to identify whether driven or cast-in-place piles exist beneath a foundation. Where piles are identified they are reported. If not reported, we do not guarantee they do not exist, only that they were not located. The client should be aware of this possibility and know that FDH has made every attempt to locate any suspected piles. Locating piles is a difficult operation without excavations, shoring, and dewatering operations where water table is high.

Wave propagation testing uses the fact that wave energy is mechanically generated and allowed to travel up and down a foundation's vertical length. Wave reflections, used for thickness or depth computations, are caused by energy encountering either the bottom of the concrete, voids, fractures, breaks, cold joints, soil intrusion, or varying material properties. If such areas are present, a strong return would be found on the record at the approximate location of the apparent interface. The computed length (thickness) then would be the distance from the foundation's top to the location of such a material anomaly.

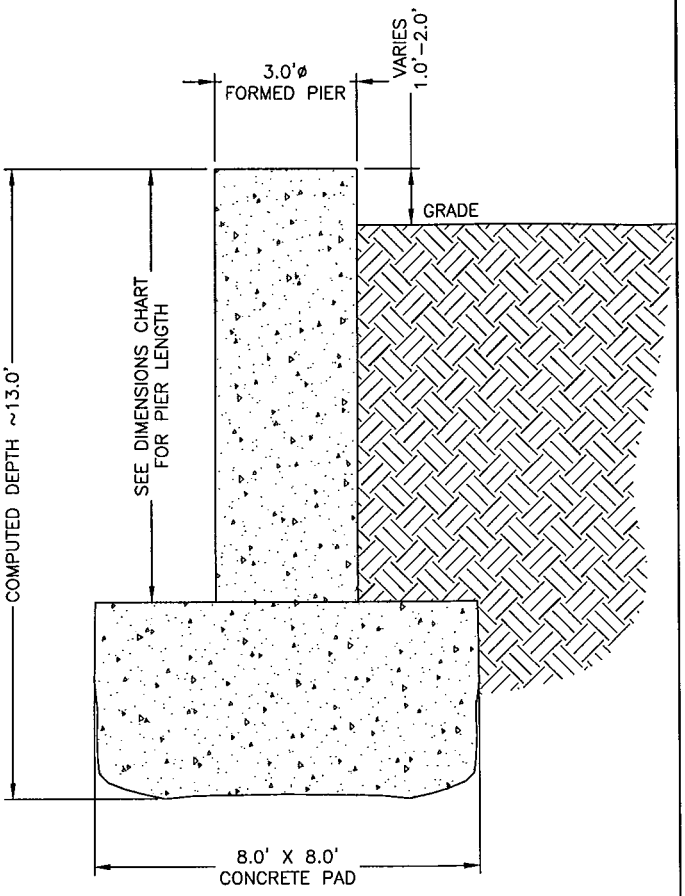
Appendix

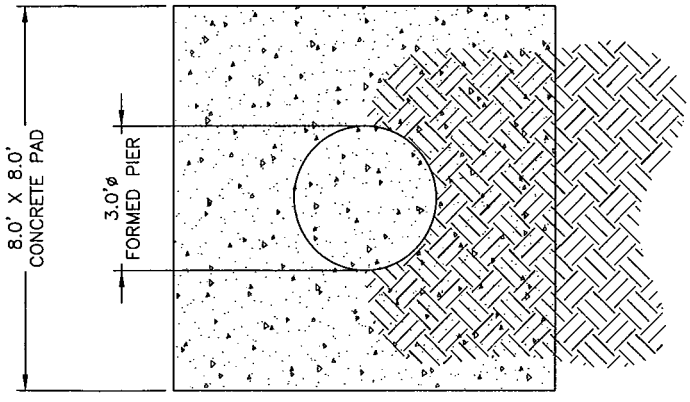


ISOMETRIC CLOSE-UP SCALE: NTS



SITE PLAN SCALE: NTS





PLAN VIEW SCALE: NTS

FOUNDATION PROFILE SCALE: NTS

FOUNDATION DIMENSIONS

AZIMUTH	PIER LENGTH
A 340°	9.0'
B 100°	9.5'
C 220°	9.5'

SITE NOTES: FACE WIDTH: 23.5'

PREPARED BY:
FDH ENGINEERING
2730 ROWLAND RD. STE. 100
RALEIGH, NC 27615
PHONE: (919) 755-1012
FAX: (919) 755-1031

PREPARED BY:
NATCOMM
63-2 NORTH BRANFORD RD.
BRANFORD, CT 06405
PHONE: (203) 488-0580
FAX: (203) 488-8587

DRAWING TITLE:
DISPERSIVE WAVE
FOUNDATION RESULTS

PROJECT NO:	DRAWN:	PC:	APPV'D:	DATE:
08-04006N	BLS	EBP	CCH	04/18/08

PROJECT NAME:
WINDSOR
08007.CO9

ADDRESS:
480-482 PIGEON HILL RD.
WINDSOR, CT 06095

LAT: 41° 51' 59.85"
LONG: 72° 40' 29.13"

REV. NO:	DATE:
A	04/18/08

DRAWING NO:
S-1

UMTS RFDS v2.0

T-Mobile

Site ID	CT11227D	Site Type	Co-Location.
Address	482 Pigeon Hill Road, Windsor, CT 06095	Latitude	0
		Longitude	0

TMO UMTS Engineer	M Lucey

GSM Impacted?

Alpha	
Beta	
Gamma	
Delta	

History (approvals)	Date
RFDS	02/11/09
GSM RF Acceptance	

RFDS Revision	1

Site Leasing/Zoning	Preliminary Leasing	Preliminary Zoning
* # of Sectors	Information not available	---
* # of Antennas	Information not available	Information not available
Antenna Model	Information not available	---
Antenna Size	---	Information not available
* # of TMA	Information not available	---
* # of Feeders	Information not available	Information not available
Feeder Diameter	Information not available	Information not available
Leased area (sq ft)	Information not available	Information not available
* # of Cabinets	Information not available	Information not available
Cabinet Model	Information not available	---
Site Comments	UMTS overlay on existing mounts. Tie in and upgrade RET's.	

* Legend: Config under threshold | Config meets threshold | Config above threshold | Text / Not checked

GSM Information

Existing Configuration / Proposed Configuration

Alpha	Beta	Gamma	Delta		Alpha	Beta	Gamma	Delta
145	145	145		Ant. Height (ft)	145	145	145	
YES	YES	YES		RET deployed	YES	YES	YES	
1 5/8"	1 5/8"	1 5/8"		Feeder Type	1 5/8"	1 5/8"	1 5/8"	
175	175	175		Feeder Length (ft)	175	175	175	
3	2	4		# Current TRX	3	2	4	
3	2	4		# Forec. TRX	3	2	4	
				# of Nortel HePA				

S12000 outdoor	Cabinet Type	S12000 outdoor
1	Cabinet #	1

UMTS Information

Existing Configuration / Proposed Configuration

Alpha	Beta	Gamma	Delta		Alpha	Beta	Gamma	Delta
---	---	---	---	Ant. Height (ft)	145	145	145	
---	---	---	---	RET deployed	YES	YES	YES	
---	---	---	---	Feeder Type	1 5/8"	1 5/8"	1 5/8"	
---	---	---	---	Feeder Length (ft)	175	175	175	

---	Cabinet Type	RBS 3106
---	Cabinet #	1

UMTS RFDS v2.0

T-Mobile

Site ID	CT11227D	Site Type	Co-Location.
Address	482 Pigeon Hill Road, Windsor, CT 06095	Latitude	0
		Longitude	0

TMO UMTS Engineer: M Lucey

GSM Impacted?

Alpha	
Beta	
Gamma	
Delta	

History (approvals)	Date
RFDS	02/11/09
GSM RF Acceptance	

RFDS Revision: 1

ALPHA

Existing Configuration					Proposed Configuration			
X	X	X	X	Mount	X	X		X
GSM Dual pole APX18-206516S-C-ACU RFS 60 -/-/- 0			GSM Dual pole APX18-206516S-C-ACU RFS 60 -/-/- 0	Antenna Deployed / Ant. Type / Ant. Model / Ant. Vendor / Azimuth / E-Tilt (sw) / M-Tilt	GSM Dual pole APX18-206516S-C-ACU RFS 60 -/-/- 0	UMTS Quad pole APX16DWV-16DWVS-A20 RFS		GSM Dual pole APX18-206516S-C-ACU RFS 60 -/-/- 0
1 dTMA GHz 2			1 dTMA GHz 2	TMA # / TMA Type / Used Feeders	1 dTMA GHz 2	1 RFS - T AWS 2		1 dTMA GHz 2

GSM Lost Spatial Diversity

Req	OK	
		Add new Mount
		Relocate GSM antenna
		Swap GSM antenna
		Consolidate GSM feeders
X		Add Twin TMA
		Swap single TMA with twin TMA
		Add Booster
X		Add two new feeders for UMTS
		Reuse GSM feeders for UMTS

Comments

BETA

Existing Configuration					Proposed Configuration			
X	X	X	X	Mount	X	X		X
GSM Dual pole APX18-206516S-C-ACU RFS 100 -/-/- 0			GSM Dual pole APX18-206516S-C-ACU RFS 100 -/-/- 0	Antenna Deployed / Ant. Type / Ant. Model / Ant. Vendor / Azimuth / E-Tilt (sw) / M-Tilt	GSM Dual pole APX18-206516S-C-ACU RFS 100 -/-/- 0	UMTS Quad pole APX16DWV-16DWVS-A20 RFS		GSM Dual pole APX18-206516S-C-ACU RFS 100 -/-/- 0
1 dTMA GHz 2			1 dTMA GHz 2	TMA # / TMA Type / Used Feeders	1 dTMA GHz 2	1 RFS - T AWS 2		1 dTMA GHz 2

GSM Lost Spatial Diversity

Req	OK	
		Add new Mount
		Relocate GSM antenna
		Swap GSM antenna
		Consolidate GSM feeders
X		Add Twin TMA
		Swap single TMA with twin TMA
		Add Booster
X		Add two new feeders for UMTS
		Reuse GSM feeders for UMTS

Comments

UMTS RFDS v2.0

T-Mobile

Site ID	CT11227D	Site Type	Co-Location.
Address	482 Pigeon Hill Road, Windsor, CT 06095	Latitude	0
		Longitude	0

TMO UMTS Engineer	M Lucey

GSM Impacted?

Alpha	
Beta	
Gamma	
Delta	

History (approvals)	Date
RFDS	02/11/09
GSM RF Acceptance	

RFDS Revision	1

GAMMA

Existing Configuration					Proposed Configuration			
				Mount				
GSM Dual pole APX18-206516S-C-ACU RFS 320 -/-/-			GSM Dual pole APX18-206516S-C-ACU RFS 320 -/-/-	Antenna Deployed Ant. Type Ant. Model Ant. Vendor Azimuth E-Tilt (sw) M-Tilt	GSM Dual pole APX18-206516S-C-ACU RFS 320 -/-/-	UMTS Quad pole RFS		GSM Dual pole APX18-206516S-C-ACU RFS 320 -/-/-
1 dTMA 1.9 GHz 2			1 dTMA 1.9 GHz 2	TMA # TMA Type Used Feeders	1 dTMA 1.9 GHz 2	1 RFS - Twin AWS 2		1 dTMA 1.9 GHz 2

☐ GSM Lost Spatial Diversity

Req	OK	
		Add new Mount
		Relocate GSM antenna
		Swap GSM antenna
		Consolidate GSM feeders
X		Add Twin TMA
		Swap single TMA with twin TMA
		Add Booster
X		Add two new feeders for UMTS
		Reuse GSM feeders for UMTS

Comments

DELTA

Existing Configuration					Proposed Configuration			
				Mount				
				Antenna Deployed Ant. Type Ant. Model Ant. Vendor Azimuth E-Tilt (sw) M-Tilt				
				TMA # TMA Type Used Feeders				

☐ GSM Lost Spatial Diversity

Req	OK	
		Add new Mount
		Relocate GSM antenna
		Swap GSM antenna
		Consolidate GSM feeders
		Add Twin TMA
		Swap single TMA with twin TMA
		Add Booster
		Add two new feeders for UMTS
		Reuse GSM feeders for UMTS

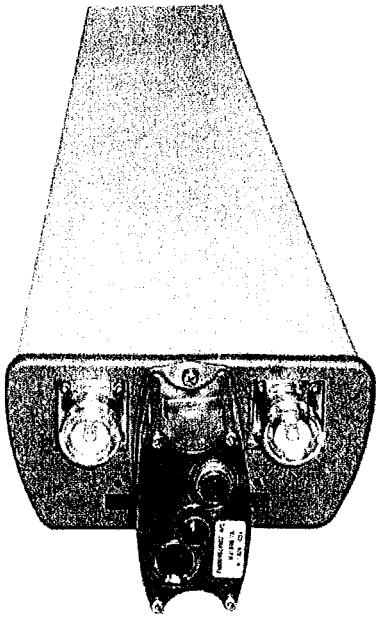
Comments

Product Data Sheet APXV18-206516S-C-A20

Optimizer® Panel Dual Polarized Antenna equipped with AISG 2.0 ACU motor

Product Description

This X-Polarized variable tilt antenna provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features a wide downtilt range. This antenna is optimized for performance across the entire AWS frequency band (1710-2155 MHz). The antenna comes pre-connected with one antenna control unit (ACU).



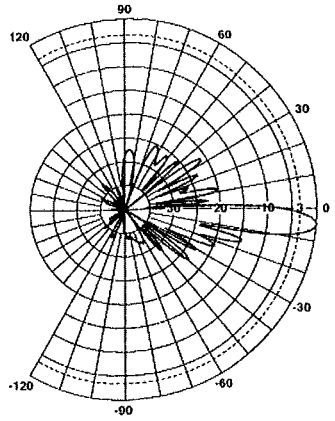
Features/Benefits

- **Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.**
- **High Suppression of all Upper Sidelobes (Typically <-18dB).**
- **Gain tracking – difference between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz) <1dB.**
- **Azimuth horizontal beamwidth difference <6deg between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz)**
- **Low profile for low visual impact.**
- **Dual polarization; Broadband design.**
- **Includes AISG 2.0 Compatible ACU-A20-N antenna control unit**

Technical Specifications

Electrical Specifications

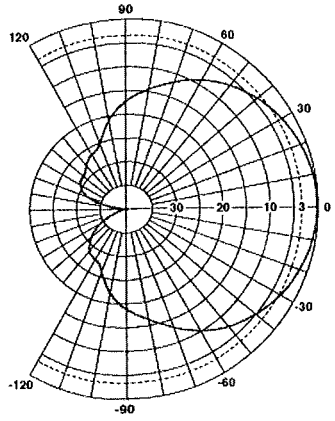
Frequency Range, MHz	1710-2170
Antenna Type	Panel Dual Polarized
Electrical Down Tilt Option	Variable
Gain, dBi (dBd)	18.4 (16.3)
Electrical Downtilt, deg	0-10 , 0-10
Horizontal Beamwidth, deg	65
VSWR	< 1.5:1
Vertical Beamwidth, deg	5.9 to 7.7
1st Upper Sidelobe Suppression, dB	> 18
Upper Sidelobe Suppression, dB	> 18 all
Polarization	Dual pol +/-45°
Front-To-Back Ratio, dB	>26 (typically 28)
Maximum Power Input, W	300
Isolation between Ports, dB	> 30
Lightning Protection	Direct Ground
3rd Order IMP @ 2 x 43 dBm, dBc	> 150 (155 Typical)



Vertical Pattern

Mechanical Specifications

Rated Wind Speed, km/h (mph)	160 (100)
Survival Wind Speed, km/h (mph)	200 (125)
Max Wind Loading Area, m² (ft²)	0.29 (2.9)
Maximum Thrust @ Rated Wind, N (lbf)	380 (185)
Front Thrust @ Rated Wind, N (lbf)	380 (185)
Reflector Material	Aluminum
Radiating Element Material	Brass
Radome Material	Fiberglass
Connector Type	(2) 7-16 DIN Female
Connector Location	Bottom
Mount Type	Downtilt
Mounting Hardware	APM40-2
Weight w/o Mtg Hardware, kg (lb)	8.5 (18.7)
Packing Dimensions, HxWxD, mm (in)	1439 x 237 x 260 (56.6 x 9.3 x 10.3)
Dimensions - HxWxD, mm (in)	1349 x 175 x 80 (53.1 x 6.9 x 3.15)
Shipping Weight, kg (lb)	14.5 (31.9)



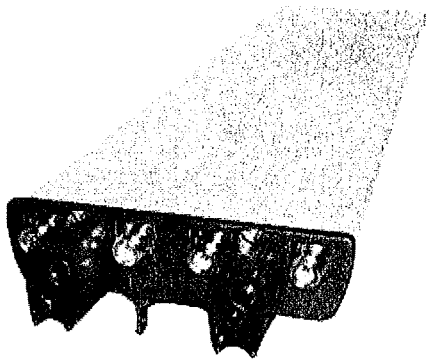
Horizontal Pattern

Product Data Sheet **APX16DWV-16DWVS-C-A20**

Optimizer® Side-by-Side Dual Polarized Antenna, 1710-2200, 65deg, 18.4dBi, 1.4m, VET, 0-10deg RET

Product Description

A combination of two X-Polarized antennas in a single radome, this pair of variable tilt antennas provides exceptional suppression of all upper sidelobes at all downtilt angles. It also features a wide downtilt range. This antenna is optimized for performance across the entire frequency band (1710-2200 MHz). The antenna comes pre-connected with two antenna control units (ACU).



Features/Benefits

- **Variable electrical downtilt - provides enhanced precision in controlling intercell interference. The tilt is infield adjustable 0-10 deg.**
- **High Suppression of all Upper Sidelobes (Typically <-20dB).**
- **Gain tracking – difference between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz) <1dB.**
- **Two X-Polarised panels in a single radome.**
- **Azimuth horizontal beamwidth difference <4deg between AWS UL (1710-1755 MHz) and DL (2110-2155 MHz).**
- **Low profile for low visual impact.**
- **Dual polarization; Broadband design.**
- **Includes (2) AISG 2.0 Compatible ACU-A20-N antenna control units.**

Technical Specifications

Electrical Specifications

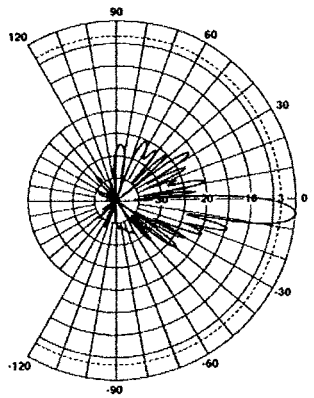
Frequency Range, MHz	1710-2200
Horizontal Beamwidth, deg	65
Vertical Beamwidth, deg	5.9 to 7.7
Electrical Downtilt, deg	0-10
Gain, dBi (dBd)	18.4 (16.3)
1st Upper Sidelobe Suppression, dB	> 18 (typically > 20)
Upper Sidelobe Suppression, dB	> 18 all (typically > 20)
Front-To-Back Ratio, dB	>26 (typically 28)
Polarization	Dual pol +/-45°
VSWR	< 1.5:1
Isolation between Ports, dB	> 30
3rd Order IMP @ 2 x 43 dBm, dBc	> 150 (155 Typical)
Impedance, Ohms	50
Maximum Power Input, W	300
Lightning Protection	Direct Ground
Connector Type	(4) 7-16 Long Neck Female

Mechanical Specifications

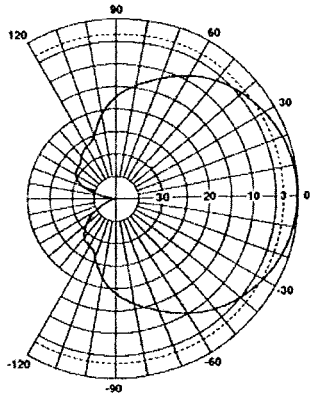
Dimensions - HxWxD, mm (in)	1420 x 331 x 80 (55.9 x 13 x 3.15)
Weight w/o Mtg Hardware, kg (lb)	18.5 (40.7)
Survival Wind Speed, km/h (mph)	200 (125)
Rated Wind Speed, km/h (mph)	160 (100)
Max Wind Loading Area, m² (ft²)	0.47 (5.03)
Front Thrust @ Rated Wind, N (lbf)	756 (170)
Maximum Thrust @ Rated Wind, N (lbf)	756 (170)
Wind Load - Side @ Rated Wind, N (lbf)	231 (52)
Wind Load - Rear @ Rated Wind, N (lbf)	408 (92)
Radome Material	Fiberglass
Radome Color	Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Shipping Weight, kg (lb)	24.5 (53.9)
Packing Dimensions, HxWxD, mm (in)	1520 x 408 x 198 (59.8 x 16 x 7.8)

Ordering Information

Mounting Hardware	APM40-2
Mounting Hardware Weight, kg (lb)	3.4 (7.5)



Vertical Pattern



Horizontal Pattern

T-Mobile

T-Mobile USA Inc.
35 Griffin Rd South, Bloomfield, CT 06002-1853
Phone: (860) 692-7100
Fax: (860) 692-7159

Technical Memo

To: Transcend
From: Farid Marbouh - Radio Frequency Engineer
cc: Jason Overbey
Subject: Power Density Report for CT11227D
Date: May 8, 2009

1. Introduction:

This report is the result of an Electromagnetic Field Intensities (EMF - Power Densities) study for the T-Mobile antenna installation on a Self Support Tower at 482 Pigeon Hill Road, Windsor, CT. This study incorporates the most conservative consideration for determining the practical combined worst case power density levels that would be theoretically encountered from locations surrounding the transmitting location.

2. Discussion:

The following assumptions were used in the calculations:

1) The emissions from T-Mobile transmitters are in the (1935-1944.8), (2140-2145), (2110-2120)MHz frequency Band.
2) The antenna array consists of three sectors, with 3 antennas per sector.
3) The model number for GSM antenna is APXV18-206516.
3) The model number for UMTS antenna is APX16DWV-16DWV.
4) GSM antenna center line height is 145 ft.
4) UMTS antenna center line height is 145 ft.
5) The maximum transmit power from any GSM sector is 2130.69 Watts Effective Radiated Power (EiRP) assuming 8 channels per sector.
5) The maximum transmit power from any UMTS sector is 2330.72 Watts Effective Radiated Power (EiRP) assuming 2 channels per sector.
6) All the antennas are simultaneously transmitting and receiving, 24 hours a day.
7) Power levels emitting from the antennas are increased by a factor of 2.56 to account for possible in-phase reflections from the surrounding environment. This is rarely the case, and if so, is never continuous.
8) The average ground level of the studied area does not change significantly with respect to the transmitting location.

Equations given in "FCC OET Bulletin 65, Edition 97-01" were then used with the above information to perform the calculations.

3. Conclusion:

Based on the above worst case assumptions, the power density calculation from the T-Mobile antenna installation on a Self Support Tower at 482 Pigeon Hill Road, Windsor, CT, is 0.05066 mW/cm^2. This value represents 5.066% of the Maximum Permissible Exposure (MPE) standard of 1 milliwatt per square centimeter (mW/cm^2) set forth in the FCC/ANSI/IEEE C95.1-1991. Furthermore, the proposed antenna location for T-Mobile will not interfere with existing public safety communications, AM or FM radio broadcasts, TV, Police Communications, HAM Radio communications or any other signals in the area. The combined Power Density from other carriers is 15.04%. The combined Power Density for the site is 20.106% of the M.P.E. standard.

Connecticut Market

T · · Mobile · ·

Worst Case Power Density

Site:	CT11227D
Site Address:	482 Pigeon Hill Road
Town:	Windsor
Tower Height:	162 ft.
Tower Style:	Self Support Tower

GSM Data		UMTS Data	
Base Station TX output	20 W	Base Station TX output	40 W
Number of channels	8	Number of channels	2
Antenna Model	APXV18-206516	Antenna Model	APX16DWV-16DWV
Cable Size	1 5/8 in.	Cable Size	1 5/8 in.
Cable Length	160 ft.	Cable Length	160 ft.
Antenna Height	145.0 ft.	Antenna Height	145.0 ft.
Ground Reflection	1.6	Ground Reflection	1.6
Frequency	1945.0 MHz	Frequency	2.1 GHz
Jumper & Connector loss	4.50 dB	Jumper & Connector loss	1.50 dB
Antenna Gain	17.6 dBi	Antenna Gain	18.0 dBi
Cable Loss per foot	0.0116 dB	Cable Loss per foot	0.0116 dB
Total Cable Loss	1.8560 dB	Total Cable Loss	1.8560 dB
Total Attenuation	6.3560 dB	Total Attenuation	3.3560 dB
Total EIRP per Channel (In Watts)	54.25 dBm 266.34 W	Total EIRP per Channel (In Watts)	60.66 dBm 1165.36 W
Total EIRP per Sector (In Watts)	63.29 dBm 2130.69 W	Total EIRP per Sector (In Watts)	63.67 dBm 2330.72 W
nsg	11.2440	nsg	14.6440
Power Density (S) =	0.024194 mW/cm^2	Power Density (S) =	0.026466 mW/cm^2
T-Mobile Worst Case % MPE =		5.0660%	

Equation Used :

$$S = \frac{(1000)(grf)^2(Power)*10^{(nsg/10)}}{4\pi (R)^2}$$

Office of Engineering and Technology (OET) Bulletin 65, Edition 97-01, August 1997

Co-Location Total

Carrier	% of Standard
Verizon	7.5100 %
Cingular	5.7800 %
Sprint	
AT&T Wireless	
Nextel	
MetroPCS	
Other Antenna Systems	1.7500 %
Total Excluding T-Mobile	**15.0400 %**
T-Mobile	5.0660
Total % MPE for Site	**20.1060%**