COHEN and WOLF P.C.
ATTORNEYS AT LAW

RACHEL A. SCHWARTZMAN

Please Reply To: Bridgeport
Writer's Direct Dial: (203) 337-4110
E-Mail: rschwartzman@cohenandwolf.com

November 26, 2014

Attorney Melanie Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06501

Re: Notice of Exempt Modification
SBA/T-Mobile co-location
Site ID CT11346C
160 Deer Run Road, Wilton, CT

Dear Attorney Bachman:

This office represents T-Mobile Northeast LLC ("T-Mobile") and has been retained to file exempt modification filings with the Connecticut Siting Council on its behalf.

In this case, SBA owns the existing lattice telecommunications tower and related facility at 160 Deer Run Road, Wilton, CT (41.239166/-73.47111100). T-Mobile intends to replace three (3) existing antennas with six (6) new antennas and related equipment at this existing telecommunications facility in Wilton ("Wilton Facility"). Please accept this letter as notification, pursuant to R.C.S.A. §16-50j-73, of construction which constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R. C.S.A. § 16-50j-73, a copy of this letter is being sent to the First Selectman, William B. Brennan, and the property owner, Westport Broadcasting Co., LLC.

The existing Wilton Facility consists of a 118 foot lattice tower.[1] T-Mobile plans to replace three (3) existing antennas, add three antennas on pipe masts attached to tower mounts, and replace existing tower-mounted amplifiers (TMAs) with three (3) TMAs at a centerline of 118 feet. T-Mobile will also replace an equipment cabinet on the existing concrete pad, install an equipment cabinet mounted to a proposed H-frame, install fiber cable, install coax cable, and reuse existing coax cable on the existing ice bridge. (See the plans revised to November 13, 2014 attached hereto as **Exhibit A**). The existing Wilton Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated November 6, 2014, and attached hereto as **Exhibit B.**

[1] The Wilton Facility was approved at a height of 118 feet with antenna tops not to exceed 122 feet (Docket No. 308), which is consistent with this filing. T-Mobile's antenna tops will not exceed 120 feet and 4 inches.

1115 Broad Street
P.O. Box 1821
Bridgeport, CT 06601-1821
Tel: (203) 368-0211
Fax: (203) 394-9901

158 Deer Hill Avenue
Danbury, CT 06810
Tel: (203) 792-2771
Fax: (203) 791-8149

320 Post Road West
Westport, CT 06880
Tel: (203) 222-1034
Fax: (203) 227-1373

657 Orange Center Road
Orange, CT 06477
Tel: (203) 298-4066
Fax: (203) 298-4068

COHEN and WOLF P.C. ATTORNEYS AT LAW

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

1. The proposed modification will not increase the height of the tower. T-Mobile's existing antennas are at a centerline of 118 feet; the replacement and additional antennas will be installed at the same 118 foot level. The enclosed tower drawing confirms that the proposed modification will not increase the height of the tower.

2. The proposed modifications will not require an extension on the site boundaries or lease area, as depicted on Sheet 1 of Exhibit A. T-Mobile's equipment will be located entirely within the existing compound area.

3. The proposed modification to the Facility will not increase the noise levels at the existing facility by six decibels or more.

4. The operation of the replacement and additional antennas and equipment will not increase the total radio frequency (RF) power density, measured at the base of the tower, to a level at or above the applicable standard. According to a Radio Frequency Emissions Analysis Report prepared by EBI dated November 13, 2014, T-Mobile's operations would add 8.03% of the FCC Standard. Therefore, the calculated "worst case" power density for the planned combined operation at the site including all of the proposed antennas would be 53.28% of the FCC Standard as calculated for a mixed frequency site as evidenced by the engineering exhibit attached hereto as **Exhibit C.**

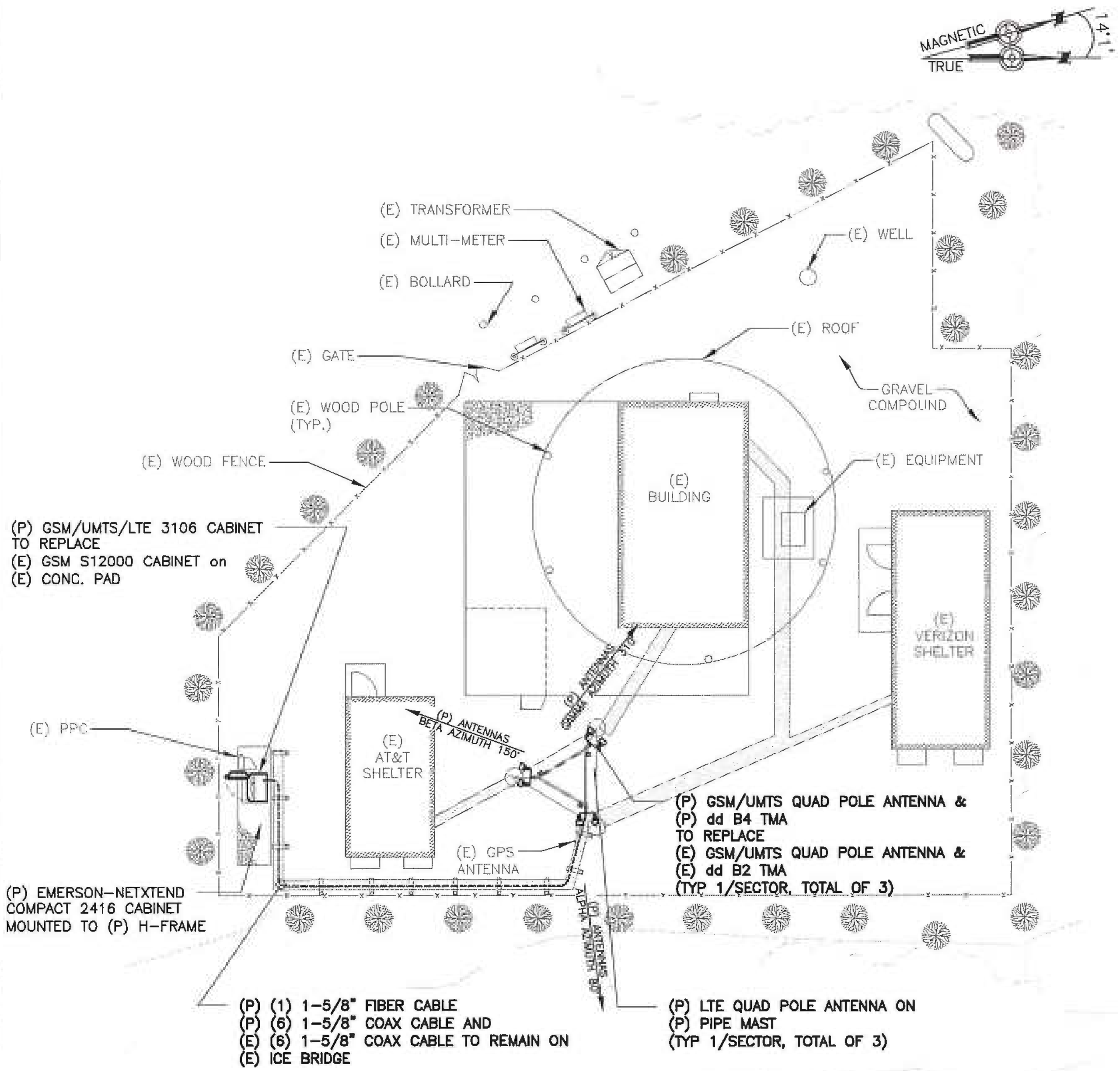
For the foregoing reasons, T-Mobile respectfully submits that the proposed replacement and additional antennas and equipment at the Wilton facility constitutes an exempt modification under R.C.S.A. § 16-50j-72(b)(2). Upon acknowledgement of this exempt modification, T-Mobile shall commence construction approximately sixty days from the receipt of the Council's decision.

Sincerely,

Rachel A. Schwartzman, Esq.

cc: Town of Wilton, First Selectman William B. Brennan
SBA
Westport Broadcasting Co., LLC
Sheldon Freincle, Northeast Site Solutions

EXHIBIT A



SITE PLAN (1 / LE-1)

N.T.S.

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.

MODERNIZATION CONFIGURATION **2C**

SUBMITTALS	
LE REV A	08.07.14
LE REV 0	08.15.14
LE REV 1	11.13.14

ATLANTIS GROUP
1340 Centre Street
Suite 203
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

SITE NUMBER:
CT11346C

SITE NAME:
CT346/ OPTASITEWILTONFT

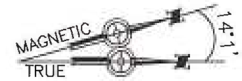
SITE ADDRESS:
160 DEER RUN RD.
WILTON, CT 06897

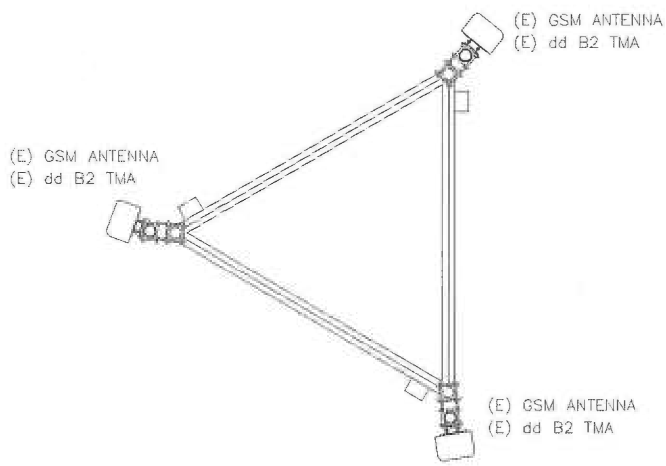
NORTHEAST SITE SOLUTIONS
54 MAIN STREET, UNIT 3
STURBRIDGE, MA 01566
(508) 434-5237

FOR

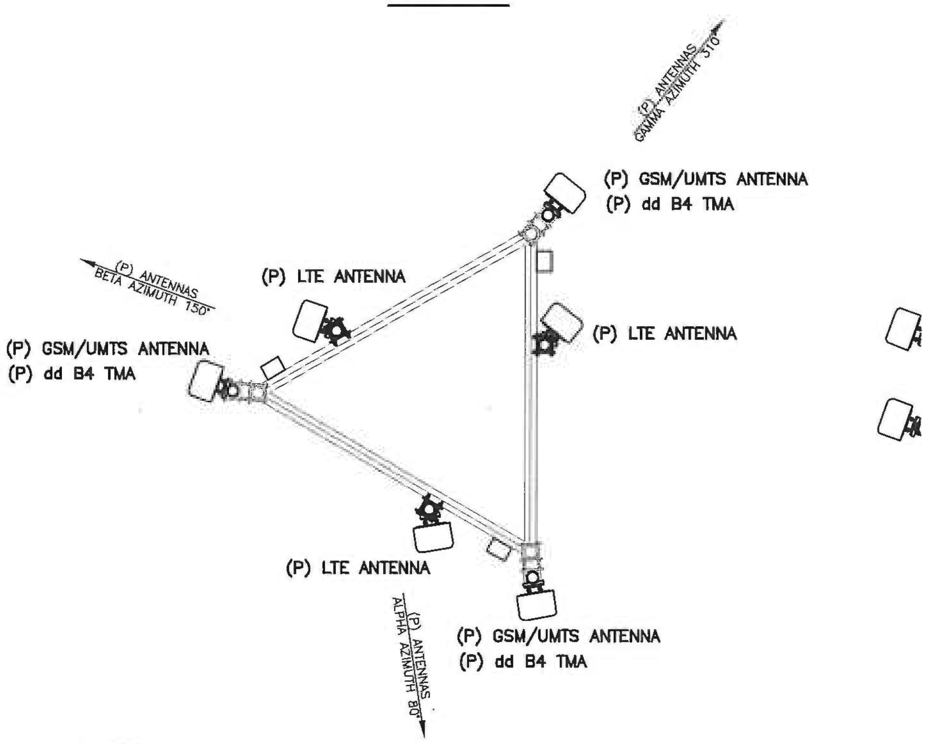
T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: MM | CHECKED BY: SM





EXISTING



PROPOSED

MODERNIZATION CONFIGURATION

2C

ANTENNA PLAN

N.T.S.

1 / LE-3

SUBMITTALS	
LE REV A	08.07.14
LE REV 0	08.15.14
LE REV 1	11.13.14

ATLANTIS GROUP
1340 Centre Street
Suite 203
Newton, MA 02459
Office: 617-965-0789
Fax: 617-213-5056

LEASE EXHIBIT

SITE NUMBER:
CT11346C
SITE NAME:
CT346/ OPTASITEWILTONFT
SITE ADDRESS:
160 DEER RUN RD.
WILTON, CT 06897

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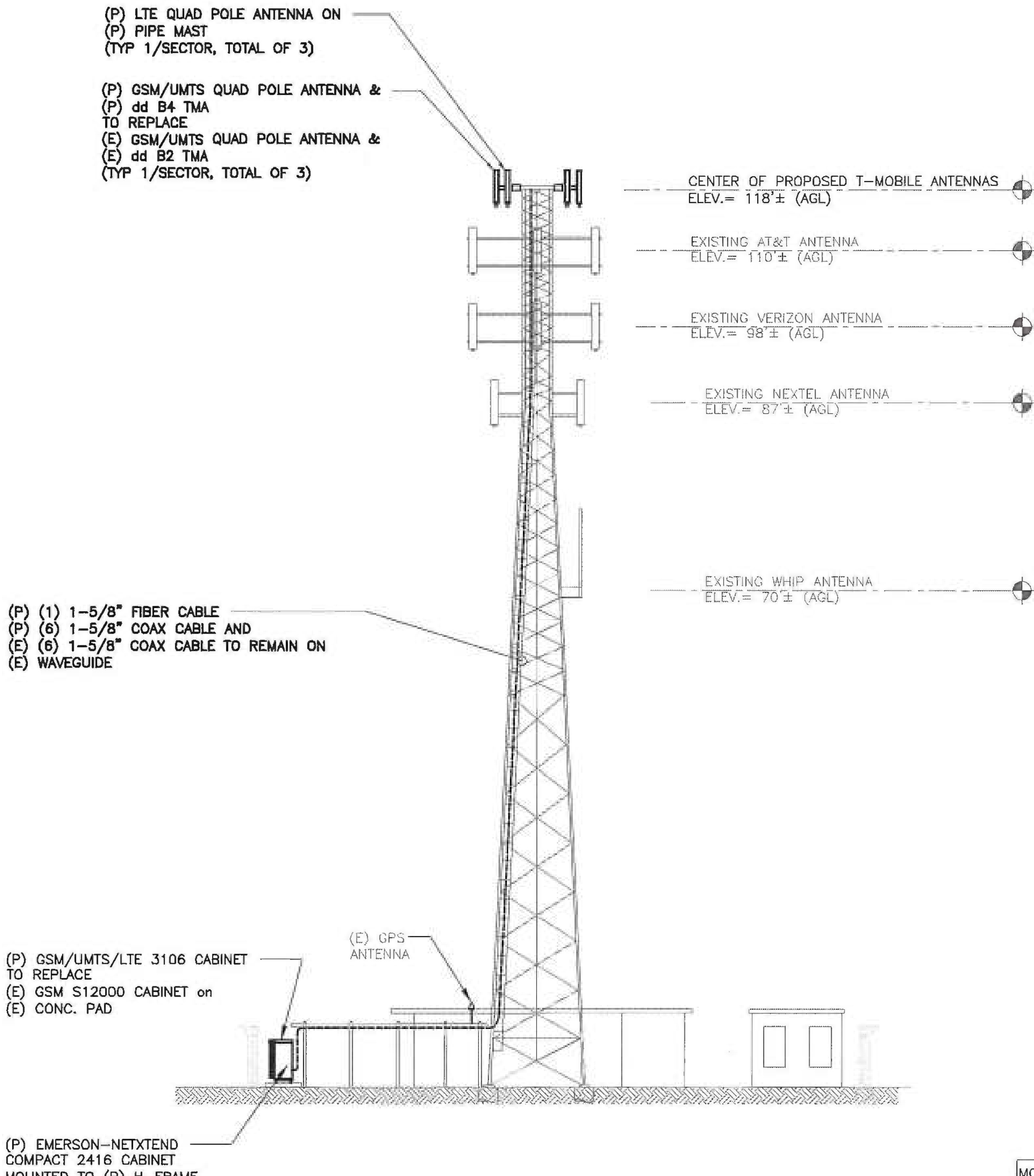

MODERNIZATION
CONFIGURATION
2C

SUBMITTALS	
LE REV A	08.07.14
LE REV 0	08.15.14
LE REV 1	11.13.14

ATLANTIS GROUP
1340 Centre Street
Suite 203
Newton, MA 02459
Office: 617-965-0789
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LEASE EXHIBIT

SITE NUMBER:
CT11346C
SITE NAME:
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160 DEER RUN RD.
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35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860) 692-7100
FAX: (860) 692-7159

DRAWN BY: MM	CHECKED BY: SM	PAGE 2 OF 3

EXHIBIT B

CENTEK engineering

Centered on Solutions™

Structural Analysis Report

118' Existing World Tower Lattice Tower

Proposed T-Mobile
Antenna Upgrade

T-Mobile Site Ref: CT11346C

SBA Site Management Site Ref: CT98078-L

160 Deer Run Road
Wilton, CT

Centek Project No. 14248.000

Date: November 6, 2014

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 20330
LICENSED
PROFESSIONAL ENGINEER

Prepared for:
SBA Site Management
1480 Route 9 North, Suite 303
Woodbridge, NJ 07095

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 upgrade proposed by T-Mobile on the existing self-supporting lattice tower, owned and operated by SBA located in Wilton, Connecticut.

The host tower is a 118-ft, three legged, tapered lattice tower originally designed and manufactured by World Tower dated October 16, 2006. The tower geometry, structure member sizes and foundation information were taken from the original tower design documents.

Antenna and appurtenance inventory were taken from a previous structural analysis report prepared by Centek Enginnering job no; 11049.CO1 dated May 23, 2011, a tower mapping report prepared by Eastern Communications dated November 3, 2014 and a T-Mobile/SBA amendment application.

The tower is made of six (6) tapered vertical sections consisting of solid round steel legs conforming to ASTM A572-50. Diagonal and horizontal lateral support bracing consists of steel angle shapes conforming to ASTM A36. All connections were bolted connections. The width of the tower face is 5.5-ft at the top and 11.5-ft at the base.

T-Mobile proposes the removal of three (3) existing panel antennas and six (6) TMA's and the installation of six (6) panel antennas and three (3) TMA's on proposed replacement 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:

- UNKNOWN (Existing):
  Antenna: One (1) 12' x 3" Dia. Omni-directional whip antenna and one (1) 10' x 3" Dia. Omni-directional whip antenna pipe mounted to a leg of the existing tower with respective RAD center elevations of ±124-ft and ±123-ft above grade level.
  Coax Cable: Two (2) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing):
  Antennas: Six (6) Powerwave 7770 panel antennas, three (3) Powerwave P65-16-XLH-RR panel antennas, five (5) LGP21401 TMA's, one (1) Andrew E15Z01P13 TMA, six (6) Ericsson RRUS-11 remote radio heads and two (2) Raycap DC6-48-60-18-8F surge arrestors mounted on three (3) 14-ft Sector Frames with a RAD center elevation of ±110-ft above grade level.
  Coax Cables: Twelve (12) 1-5/8" ∅ coax cables, one (1) 3" flex conduit running on a leg/face of the existing tower as specified in Section 3 of this report.

- Verizon (Existing):
  Antennas: Three (3) Antel BXA185085/12CF panel antennas, three (3) Antel BXA80090/8CF panel antennas, three (3) RFS APX75-866512 panel antennas and six (6) RFS FD9R6004/2C-3L diplexers mounted on three (3) 14-ft Sector Frames with a RAD center elevation of ±98-ft above grade level.
  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.

- SPRINT (Existing):
  Antennas: Three (3) 60"x12"x5" panel antennas mounted on three (3) 3' side arms with a RAD center elevation of ±87-ft above grade level.
  Coax Cables: Nine (9) 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) 8"x3" Dia. Omni-directional whip antenna mounted on one (1) 4-ft side-arm with a elevation ±70-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- UNKNOWN (Existing):
  Antenna: Two (2) 10"x3" Dia. Omni-directional whip antennas mounted on one (1) 3-ft side-arm with respective RAD center elevations of ±68-ft and ±56-ft above grade level.
  Coax Cable: Two (2) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- UNKNOWN (Existing):
  Antenna: One (1) PR-850 paraflector flush mounted to the existing tower with a RAD center elevation of ±60-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- UNKNOWN (Existing):
  Antenna: One (1) PR-850 paraflector flush mounted to the existing tower with a RAD center elevation of ±58-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- UNKNOWN (Existing):
  Antenna: One (1) PR-850 paraflector flush mounted to the existing tower with a RAD center elevation of ±52-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cables running on a leg/face of the existing tower as specified in Section 3 of this report.

- T-MOBILE (Existing to Remain):
  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.
- T-MOBILE (Existing to Remove):
  Antennas: Three (3) RFS APXV18-20914 panel antennas and six (6) Powerwave TMA's pipe mounted to the existing tower with a RAD center elevation of ±118-ft above grade level.
- **T-MOBILE (Proposed):**
  Antennas: Three (3) Ericsson AIR 21 B2A/B4P panel antennas, three (3) Ericsson AIR B4A/B2P panel antennas and three (3) Ericsson KRY-112 TMA's mounted on three (3) proposed Site-Pro WiMax Tower Mounts p/n CWT01 with a RAD center elevation of 118-ft AGL.
  Coax Cable: Six (6) 1-5/8" ∅ coax cables and one (1) 1-5/8" ∅ fiber cable running on a face of the existing tower on a proposed cable ladder.

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 routed as specified in Section 3 of this report.**

Analysis

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

The existing tower was analyzed for the controlling basic wind speed (fastest mile) with no ice and a 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).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix K of the CSBC[1] and the wind speed data available in the TIA/EIA-222-F-96 Standard. The higher of the two wind speeds is utilized in preparation on the tower analysis.

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 on the tower structure and its components.

Basic Wind Speed:	Fairfield; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	Wilton; v = 100 mph (3 second gust) equivalent to v = 80 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	TIA/EIA wind speed controls.	
Load Cases:	<u>Load Case 1</u>; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	<u>Load Case 2</u>; 74 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. The 74 mph wind speed velocity represents 75% of the wind pressure generated by the 85 mph wind speed.	*[Section 2.3.16 of TIA/EIA-222-F-96]*
	<u>Load Case 3</u>; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

[1] The 2005 Connecticut State Building Code as amended by the 2009 CT State Supplement. (CSBC)

Tower Capacity

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

- Calculated stresses were found to be within allowable limits. In Load Case 1, per tnxtower "Section Capacity Table", this tower was found to be at **76.4%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Diagonal (T5)	20'-0"-40'-0"	76.4%	**PASS**
Leg (T5)	20'-0"-40'-0"	72.0%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 3-ft ∅ by 7.0-ft long reinforced concrete piers concentrically bearing directly on a 19-ft wide by 2.0-ft thick reinforced concrete mat footing. The sub grade conditions used in the analysis of the existing foundation were derived from the aforementioned World Tower design documents.

Tower legs are connected to the three (3) piers by means of (6) 1.00"∅, ASTM A449 anchor bolts per leg, embedded approximately 5-ft-10-in into the concrete foundation structure.

- The tower reactions developed from the governing Load Case 1 were used in the verification of the foundation:

Reactions	Vector	Proposed Base Reactions
Base	Shear	**24.3 kips**
	Compression	**36.4 kips**
	Moment	**1790 kip-ft**
Leg	Shear	**14.5 kips**
	Compression	**192 kips**
	Uplift	**161 kips**

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	62.4%	**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
Reinforced Concrete Mat	OTM[2]	2.0	2.19	**PASS**

Conclusion

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

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

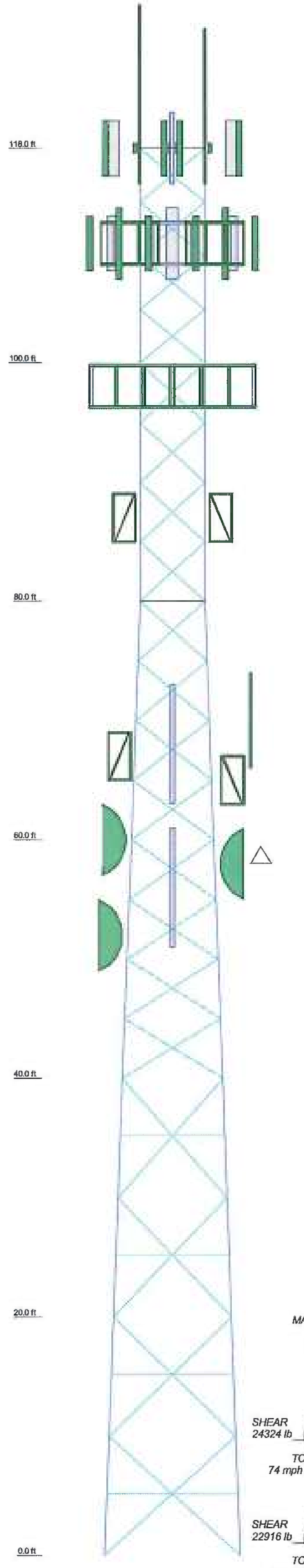
General Description of Structural Analysis Program

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

tnxTower Features:

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

Section	T6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Legs	SR 3 1/2	SR 3 1/4	SR 3	SR 2 3/4	SR 2 1/2	SR 1 3/4
Leg Grade			A572-50			
Diagonals	L3x3x1/4			L2x2x3/16		L2x2x1/8
Diagonal Grade			A36			
Top Girts		N.A.		L2x2x1/8	N.A.	L2x2x1/8
Sec. Horizontals	L2x2x1/8			N.A.		
Face Width (ft)	11.5	[illegible]	8.5	7		5.5
# Panels @ (ft)	4 @ 10			12 @ 5		4 @ 4.5
Weight (lb) 11402.2	3935.9	2587.9	1963.3	1788.7	[illegible]	760.3



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
12' x 3" Dia Omni	124	14-ft T-Frame Sector Mount (Verizon - Existing)	98
10' x 3" Dia Omni	123	14-ft T-Frame Sector Mount (Verizon - Existing)	98
6'x3" Pipe Mount	118	BXA-185085/12CF w/mount pipe (Verizon - Existing)	98
6'x3" Pipe Mount	118	BXA-80090/8 w/ mount pipe (Verizon - Existing)	98
6'x3" Pipe Mount	118	APX75-866512-CT0 w/ mount pipe (Verizon - Existing)	98
(2) AIR21 (T-Mobile - Proposed)	118	BXA-185085/12CF w/mount pipe (Verizon - Existing)	98
(2) AIR21 (T-Mobile - Proposed)	118	BXA-80090/8 w/ mount pipe (Verizon - Existing)	98
(2) AIR21 (T-Mobile - Proposed)	118	APX75-866512-CT0 w/ mount pipe (Verizon - Existing)	98
KRY 112 TMA (T-Mobile - Proposed)	118	BXA-185085/12CF w/mount pipe (Verizon - Existing)	98
KRY 112 TMA (T-Mobile - Proposed)	118	BXA-80090/8 w/ mount pipe (Verizon - Existing)	98
KRY 112 TMA (T-Mobile - Proposed)	118	APX75-866512-CT0 w/ mount pipe (Verizon - Existing)	98
Site Pro Compact Tower Mount (T-Mobile - Proposed)	118	(2) FD9R6004 Diplexer (Verizon - Existing)	98
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Site Pro Compact Tower Mount (T-Mobile - Proposed)	118	(2) FD9R6004 Diplexer (Verizon - Existing)	98
10'6" Site Pro T-Arm (ATI - Existing)	110	3' Sidearm (Sprint - Existing)	87
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10'6" Site Pro T-Arm (ATI - Existing)	110	3' Sidearm (Sprint - Existing)	87
(2) 7770.00 (ATI - Existing)	110	60"x12"x5" Panel (Sprint - Existing)	87
(2) 7770.00 (ATI - Existing)	110	60"x12"x5" Panel (Sprint - Existing)	87
(2) 7770.00 (ATI - Existing)	110	60"x12"x5" Panel (Sprint - Existing)	87
E15Z01P13 (ATI - Existing)	110	8' x 3" Dia Omni	74 - 66
LPG21401 TMA (ATI - Existing)	110	10' x 3" Dia Omni	73 - 63
(2) LPG21401 TMA (ATI - Existing)	110	3' Sidearm	67
(2) LPG21401 TMA (ATI - Existing)	110	4' Sidearm	65
P65-16-XLH-RR (ATI - Existing)	110	3' Sidearm	62
P65-16-XLH-RR (ATI - Existing)	110	10' x 3" Dia Omni	61 - 51
P65-16-XLH-RR (ATI - Existing)	110	PR-850	60
(2) RRUS-11 (ATI - Existing)	110	PR-850	[illegible]
(2) RRUS-11 (ATI - Existing)	110	PR-850	52
(2) RRUS-11 (ATI - Existing)	110		
(2) DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	110		
14-ft T-Frame Sector Mount (Verizon - Existing)	98		

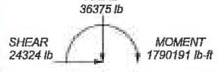
MATERIAL STRENGTH

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

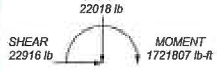
TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 74 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: 76.4%

MAX. CORNER REACTIONS AT BASE:
DOWN: 191875 lb
UPLIFT: -161073 lb
SHEAR: 14469 lb



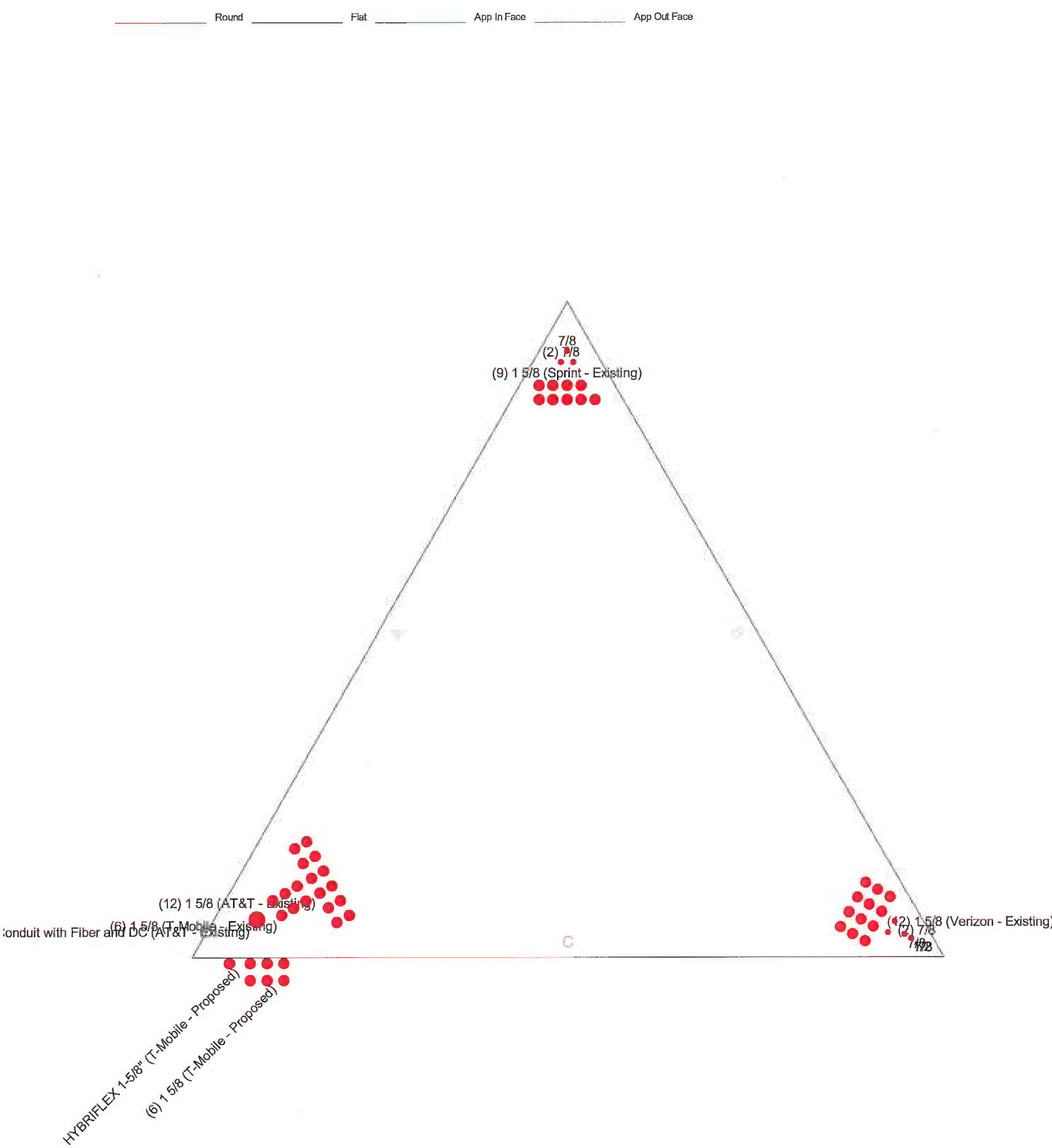
74 mph WIND - 0.5000 in ICE



REACTIONS - 85 mph WIND

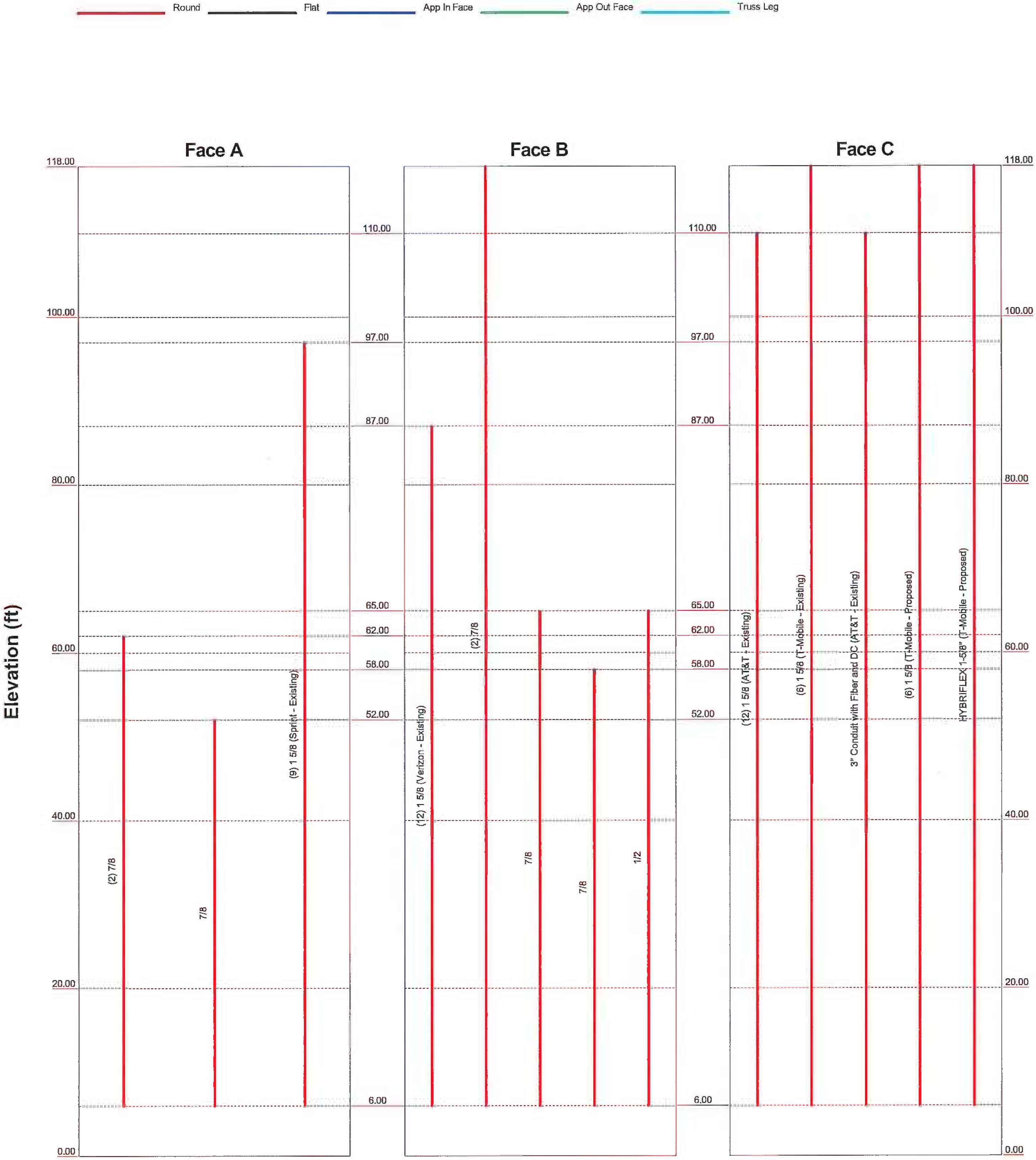
Centek Engineering Inc.	Job: 14248.000 - CT98078-L / CT11346C		
63-2 North Branford Rd.	Project: 118' World Tower Lattice - 160 Deer Run Rd., Wilton, CT		
Branford, CT 06405	Client: SBA / T-Mobile	Drawn by: TJL	App'd:
Phone: (203) 488-0580	Code: TIA/EIA-222-F	Date: 11/06/14	Scale: NTS
FAX: (203) 488-8587	Path: [illegible]		Dwg No. E-1

Feedline Plan



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: **14248.000 - CT98078-L / CT11346C** Project: **118' World Tower Lattice - 160 Deer Run Rd., Wilton, CT** Client: SBA / T-Mobile — Drawn by: TJL — App'd: Code: TIA/EIA-222-F — Date: 11/06/14 — Scale: NTS Path: — Dwg No. E-7

Feedline Distribution Chart
0' - 118'



Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: ***14248.000 - CT98078-L / CT11346C*** Project: ***118' World Tower Lattice - 160 Deer Run Rd., Wilton, CT*** Client: SBA / T-Mobile — Drawn by: TJL — App'd: Code: TIA/EIA-222-F — Date: 11/06/14 — Scale: NTS Path: — Dwg No. E-7

Tower Input Data

The main tower is a 3x free standing tower with an overall height of 118.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 5.50 ft at the top and 11.50 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

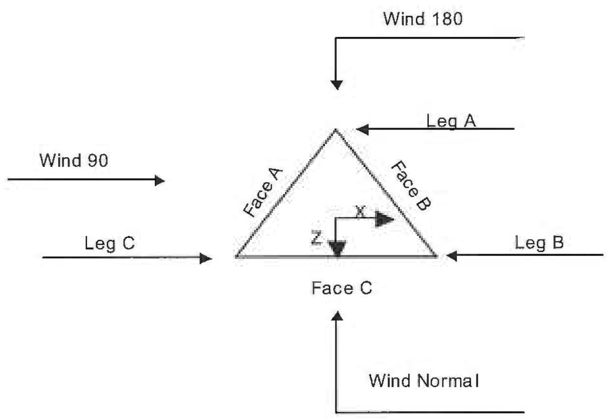
- Basic wind speed of 85 mph.
- Nominal ice thickness of 0.5000 in.
- Ice density of 56 pcf.
- A wind speed of 74 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 50 mph.
- Weld together tower sections have flange connections..
- Connections 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
Consider Moments - Horizontals
Consider Moments - Diagonals
Use Moment Magnification
√ Use Code Stress Ratios
√ Use Code Safety Factors - Guys
Escalate Ice
Always Use Max Kz
Use Special Wind Profile
√ Include Bolts In Member Capacity
Leg Bolts Are At Top Of Section
√ Secondary Horizontal Braces Leg
Use Diamond Inner Bracing (4 Sided)
Add IBC .6D+W Combination

Distribute Leg Loads As Uniform
Assume Legs Pinned
√ Assume Rigid Index Plate
√ Use Clear Spans For Wind Area
√ Use Clear Spans For KL/r
Retension Guys To Initial Tension
Bypass Mast Stability Checks
√ Use Azimuth Dish Coefficients
√ Project Wind Area of Appurt.
Autocalc Torque Arm Areas
SR Members Have Cut Ends
√ Sort Capacity Reports By Component
Triangulate Diamond Inner Bracing

Treat Feedline Bundles As Cylinder
Use ASCE 10 X-Brace Ly Rules
Calculate Redundant Bracing Forces
Ignore Redundant Members in FEA
SR Leg Bolts Resist Compression
√ All Leg Panels Have Same Allowable
Offset Girt At Foundation
√ Consider Feedline Torque
Include Angle Block Shear Check
Poles
Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation (ft)	Assembly Database	Description	Section Width (ft)	Number of Sections	Section Length (ft)
T1	118.00-100.00			5.50	1	18.00
T2	100.00-80.00			5.50	1	20.00
T3	80.00-60.00			5.50	1	20.00
T4	60.00-40.00			7.00	1	20.00
T5	40.00-20.00			8.50	1	20.00
T6	20.00-0.00			10.00	1	20.00

Tower Section Geometry *(cont'd)*

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)
T1	118.00-100.00	4.50	X Brace	No	No	0.0000	0.0000
T2	100.00-80.00	5.00	X Brace	No	No	0.0000	0.0000
T3	80.00-60.00	5.00	X Brace	No	No	0.0000	0.0000
T4	60.00-40.00	5.00	X Brace	No	No	0.0000	0.0000
T5	40.00-20.00	10.00	X Brace	No	Yes	0.0000	0.0000
T6	20.00-0.00	10.00	X Brace	No	Yes	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 118.00-100.00	Solid Round	1 3/4	A572-50 (50 ksi)	Equal Angle	L2x2x1/8	A36 (36 ksi)
T2 100.00-80.00	Solid Round	2 1/2	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T3 80.00-60.00	Solid Round	2 3/4	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T4 60.00-40.00	Solid Round	3	A572-50 (50 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T5 40.00-20.00	Solid Round	3 1/4	A572-50 (50 ksi)	Equal Angle	L3x3x1/4	A36 (36 ksi)
T6 20.00-0.00	Solid Round	3 1/2	A572-50 (50 ksi)	Equal Angle	L3x3x1/4	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 118.00-100.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T3 80.00-60.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Equal Angle		A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation *ft*	*Secondary Horizontal Type*	*Secondary Horizontal Size*	*Secondary Horizontal Grade*	*Inner Bracing Type*	*Inner Bracing Size*	*Inner Bracing Grade*
T5 40.00-20.00	Equal Angle	L2x2x1/8	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T6 20.00-0.00	Equal Angle	L2x2x1/8	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 118.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2	0.00	0.0000	A36	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*
100.00-80.00			(36 ksi)					
T3 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

			K Factors[1]							
Tower Elevation *ft*	*Calc K Single Angles*	*Calc K Solid Rounds*	*Legs*	*X Brace Diags* *X Y*	*K Brace Diags* *X Y*	*Single Diags* *X Y*	*Girts* *X Y*	*Horiz.* *X Y*	*Sec. Horiz.* *X Y*	*Inner Brace* *X Y*
T1 118.00-100.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 100.00-80.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 80.00-60.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 60.00-40.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 40.00-20.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 20.00-0.00	Yes	Yes	1	1 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*		*Diagonal*		*Top Girt*		*Bottom Girt*		*Mid Girt*		*Long Horizontal*		*Short Horizontal*	
	Net Width Deduct in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*	*Net Width Deduct* in	*U*
T1 118.00-100.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 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
T3 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
T4 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
T5 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
T6 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 118.00-100.00	Flange	0.7500 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T2 100.00-80.00	Flange	0.7500 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
T3 80.00-60.00	Flange	1.0000 A325N	4	0.6250 A325N	1	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T4 60.00-40.00	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
T5 40.00-20.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	1
T6 20.00-0.00	Flange	1.0000 A449	6	0.6250 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325X	0	0.6250 A325N	0	0.6250 A325N	1

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	*Face or Leg*	*Allow Shield*	*Component Type*	*Placement ft*	*Face Offset in*	*Lateral Offset (Frac FW)*	*#*	*# Per Row*	*Clear Spacing in*	*Width or Diameter in*	*Perimeter in*	*Weight plf*
1 5/8 (AT&T - Existing)	C	No	Ar (Leg)	110.00 - 6.00	0.0000	0.2	12	2	0.5000 1.0000	1.9800		1.04
1 5/8 (T-Mobile - Existing)	C	No	Ar (Leg)	118.00 - 6.00	0.0000	0.15	6	3	0.5000 1.0000	1.9800		1.04
1 5/8 (Verizon - Existing)	B	No	Ar (Leg)	87.00 - 6.00	0.0000	0.12	12	3	0.5000 1.0000	1.9800		1.04
7/8	B	No	Ar (Leg)	118.00 - 6.00	0.0000	0.08	2	1	1.1100	1.1100		0.54
7/8	B	No	Ar (Leg)	65.00 - 6.00	0.0000	0.06	1	1	1.1100	1.1100		0.54
7/8	B	No	Ar (Leg)	58.00 - 6.00	0.0000	0.05	1	1	1.1100	1.1100		0.54
1/2	B	No	Ar (Leg)	65.00 - 6.00	0.0000	0.05	1	1	2.5000 1.5000	0.5800		0.25
7/8	A	No	Ar (Leg)	62.00 - 6.00	0.0000	0.08	2	1	1.1100	1.1100		0.54
7/8	A	No	Ar (Leg)	52.00 - 6.00	0.0000	0.065	1	1	0.5000	1.1100		0.54
1 5/8 (Sprint - Existing)	A	No	Ar (Leg)	97.00 - 6.00	0.0000	0.12	9	2	0.5000	1.9800		1.04
3" Conduit with Fiber and DC (AT&T - Existing)	C	No	Ar (Leg)	110.00 - 6.00	0.0000	0.1	1	1	0.0000	3.0000		1.16
1 5/8 (T-Mobile - Proposed)	C	No	Ar (CfAe)	118.00 - 6.00	0.0000	0.4	6	3	1.0000	1.9800		1.04
HYBRIFLEX 1-5/8" (T-Mobile - Proposed)	C	No	Ar (CfAe)	118.00 - 6.00	0.0000	0.45	1	1	1.9800	1.9800		1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	*Tower Elevation ft*	*Face*	*A_R ft²*	*A_F ft²*	*C_AA_A In Face ft²*	*C_AA_A Out Face ft²*	*Weight lb*
T1	118.00-100.00	A	14.710	0.000	0.000	0.000	0.00
		B	1.665	0.000	0.000	0.000	19.44
		C	28.255	0.000	0.000	0.000	395.24
T2	100.00-80.00	A	27.110	0.000	0.000	0.000	159.12
		B	10.925	0.000	0.000	0.000	108.96
		C	40.015	0.000	0.000	0.000	560.40
T3	80.00-60.00	A	28.285	0.000	0.000	0.000	189.36
		B	19.239	0.000	0.000	0.000	275.15
		C	47.154	0.000	0.000	0.000	560.40
T4	60.00-40.00	A	31.060	0.000	0.000	0.000	215.28
		B	25.792	0.000	0.000	0.000	296.72
		C	50.932	0.000	0.000	0.000	560.40
T5	40.00-20.00	A	31.800	0.000	0.000	0.000	219.60
		B	26.717	0.000	0.000	0.000	297.80
		C	51.117	0.000	0.000	0.000	560.40
T6	20.00-0.00	A	22.260	0.000	0.000	0.000	153.72
		B	18.702	0.000	0.000	0.000	208.46
		C	35.782	0.000	0.000	0.000	392.28

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	*Tower Elevation ft*	*Face or Leg*	*Ice Thickness in*	*A_R ft²*	*A_F ft²*	*C_AA_A In Face ft²*	*C_AA_A Out Face ft²*	*Weight lb*
T1	118.00-100.00	A	0.500	10.287	9.507	0.000	0.000	0.00
		B		3.165	0.000	0.000	0.000	54.85
		C		22.392	18.447	0.000	0.000	1027.61
T2	100.00-80.00	A	0.500	20.822	15.913	0.000	0.000	385.15
		B		9.477	6.407	0.000	0.000	284.61
		C		31.788	25.227	0.000	0.000	1452.26
T3	80.00-60.00	A	0.500	21.918	16.533	0.000	0.000	459.21
		B		15.339	12.400	0.000	0.000	712.16
		C		36.554	30.600	0.000	0.000	1452.26
T4	60.00-40.00	A	0.500	27.193	16.533	0.000	0.000	532.34
		B		28.392	12.400	0.000	0.000	776.08
		C		44.332	30.600	0.000	0.000	1452.26
T5	40.00-20.00	A	0.500	28.600	16.533	0.000	0.000	544.53
		B		30.150	12.400	0.000	0.000	779.13
		C		44.683	30.600	0.000	0.000	1452.26
T6	20.00-0.00	A	0.500	20.020	11.573	0.000	0.000	381.17
		B		21.105	8.680	0.000	0.000	545.39
		C		31.278	21.420	0.000	0.000	1016.58

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	118.00-100.00	-6.9782	5.3438	-4.4459	3.8577
T2	100.00-80.00	-5.5946	3.7449	-3.7692	3.1014
T3	80.00-60.00	-3.9824	4.1125	-2.6548	3.3744
T4	60.00-40.00	-3.5245	4.3060	-1.5978	3.3829
T5	40.00-20.00	-3.7805	4.4636	-1.7152	3.4946
T6	20.00-0.00	-3.4804	4.0929	-1.6013	3.2502

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight lb
6'x3" Pipe Mount	A	From Leg	0.00 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	1.77 2.13	1.77 2.13	34.74 47.98
6'x3" Pipe Mount	B	From Leg	0.00 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	1.77 2.13	1.77 2.13	34.74 47.98
10' x 3" Dia Omni	B	From Leg	0.00 0.00 0.00	0.0000	123.00	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	30.00 51.79
6'x3" Pipe Mount	C	From Leg	0.00 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	1.77 2.13	1.77 2.13	34.74 47.98
12' x 3" Dia Omni	C	From Leg	0.00 0.00 0.00	0.0000	124.00	No Ice 1/2" Ice	3.60 4.83	3.60 4.83	35.00 61.06
(2) AIR21 (T-Mobile - Proposed)	A	From Leg	0.50 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	83.00 124.90
(2) AIR21 (T-Mobile - Proposed)	B	From Leg	0.50 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	83.00 124.90
(2) AIR21 (T-Mobile - Proposed)	C	From Leg	0.50 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	83.00 124.90
KRY 112 TMA (T-Mobile - Proposed)	A	From Leg	0.50 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	25.00 31.29
KRY 112 TMA (T-Mobile - Proposed)	B	From Leg	0.50 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	25.00 31.29
KRY 112 TMA (T-Mobile - Proposed)	C	From Leg	0.50 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	0.78 0.90	0.49 0.59	25.00 31.29
Site Pro Compact Tower Mount (T-Mobile - Proposed)	A	From Leg	0.50 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	2.85 4.05	2.85 4.05	150.00 200.00
Site Pro Compact Tower Mount (T-Mobile - Proposed)	B	From Leg	0.50 0.00 0.00	0.0000	118.00	No Ice 1/2" Ice	2.85 4.05	2.85 4.05	150.00 200.00
Site Pro Compact Tower	C	From Leg	0.50	0.0000	118.00	No Ice	2.85	2.85	150.00

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft* *ft* *ft*	*Azimuth Adjustment* °	*Placement* *ft*		C_AA_A *Front* *ft²*	C_AA_A *Side* *ft²*	*Weight* *lb*
Mount (T-Mobile - Proposed)			0.00 0.00			1/2" Ice	4.05	4.05	200.00
10'6" Site Pro T-Arm (AT&T - Existing)	A	From Leg	1.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	4.50 5.65	4.50 5.65	250.00 350.00
10'6" Site Pro T-Arm (AT&T - Existing)	B	From Leg	1.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	4.50 5.65	4.50 5.65	250.00 350.00
10'6" Site Pro T-Arm (AT&T - Existing)	C	From Leg	1.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	4.50 5.65	4.50 5.65	250.00 350.00
(2) 7770.00 (AT&T - Existing)	A	From Leg	2.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
(2) 7770.00 (AT&T - Existing)	B	From Leg	2.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
(2) 7770.00 (AT&T - Existing)	C	From Leg	2.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	5.88 6.31	2.93 3.27	35.00 67.63
E15Z01P13 (AT&T - Existing)	A	From Leg	0.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	0.91 1.05	0.70 0.82	24.00 31.50
LPG21401 TMA (AT&T - Existing)	A	From Leg	0.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	17.50 23.31
(2) LPG21401 TMA (AT&T - Existing)	B	From Leg	0.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	17.50 23.31
(2) LPG21401 TMA (AT&T - Existing)	C	From Leg	0.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	0.95 1.09	0.37 0.48	17.50 23.31
P65-16-XLH-RR (AT&T - Existing)	A	From Leg	2.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	8.40 8.95	4.70 5.15	60.00 107.28
P65-16-XLH-RR (AT&T - Existing)	B	From Leg	2.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	8.40 8.95	4.70 5.15	60.00 107.28
P65-16-XLH-RR (AT&T - Existing)	C	From Leg	2.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	8.40 8.95	4.70 5.15	60.00 107.28
(2) RRUS-11 (AT&T - Existing)	A	From Leg	0.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
(2) RRUS-11 (AT&T - Existing)	B	From Leg	0.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
(2) RRUS-11 (AT&T - Existing)	C	From Leg	0.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	2.99 3.23	1.25 1.41	50.00 69.57
(2) DC6-48-60-18-8F Surge Arrestor (AT&T - Existing)	C	From Leg	0.00 0.00 0.00	0.0000	110.00	No Ice 1/2" Ice	2.23 2.45	2.23 2.45	20.00 39.36
14-ft T-Frame Sector Mount (Verizon - Existing)	A	From Leg	1.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	16.30 20.60	16.30 20.60	510.00 720.00
14-ft T-Frame Sector Mount	B	From Leg	1.00	0.0000	98.00	No Ice	16.30	16.30	510.00

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* ft ft ft	*Azimuth Adjustment* °	*Placement* ft		*C_AA_A Front* ft²	*C_AA_A Side* ft²	*Weight* lb
(Verizon - Existing)			0.00 0.00			1/2" Ice	20.60	20.60	720.00
14-ft T-Frame Sector Mount (Verizon - Existing)	C	From Leg	1.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	16.30 20.60	16.30 20.60	510.00 720.00
BXA-185085/12CF w/mount pipe (Verizon - Existing)	A	From Leg	2.00 -5.00 0.00	0.0000	98.00	No Ice 1/2" Ice	4.79 5.24	5.04 5.98	34.90 75.81
BXA-80090/8 w/ mount pipe (Verizon - Existing)	A	From Leg	2.00 5.00 0.00	0.0000	98.00	No Ice 1/2" Ice	11.11 11.76	8.26 9.37	62.90 134.74
APX75-866512-CT0 w/ mount pipe (Verizon - Existing)	A	From Leg	2.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	6.37 6.83	3.95 4.59	58.95 105.80
BXA-185085/12CF w/mount pipe (Verizon - Existing)	B	From Leg	2.00 -5.00 0.00	0.0000	98.00	No Ice 1/2" Ice	4.79 5.24	5.04 5.98	34.90 75.81
BXA-80090/8 w/ mount pipe (Verizon - Existing)	B	From Leg	2.00 5.00 0.00	0.0000	98.00	No Ice 1/2" Ice	11.11 11.76	8.26 9.37	62.90 134.74
APX75-866512-CT0 w/ mount pipe (Verizon - Existing)	B	From Leg	2.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	6.37 6.83	3.95 4.59	58.95 105.80
BXA-185085/12CF w/mount pipe (Verizon - Existing)	C	From Leg	2.00 -5.00 0.00	0.0000	98.00	No Ice 1/2" Ice	4.79 5.24	5.04 5.98	34.90 75.81
BXA-80090/8 w/ mount pipe (Verizon - Existing)	C	From Leg	2.00 5.00 0.00	0.0000	98.00	No Ice 1/2" Ice	11.11 11.76	8.26 9.37	62.90 134.74
APX75-866512-CT0 w/ mount pipe (Verizon - Existing)	C	From Leg	2.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	6.37 6.83	3.95 4.59	58.95 105.80
(2) FD9R6004 Diplexer (Verizon - Existing)	A	From Leg	2.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	0.37 0.45	0.09 0.15	4.00 6.30
(2) FD9R6004 Diplexer (Verizon - Existing)	B	From Leg	2.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	0.37 0.45	0.09 0.15	4.00 6.30
(2) FD9R6004 Diplexer (Verizon - Existing)	C	From Leg	2.00 0.00 0.00	0.0000	98.00	No Ice 1/2" Ice	0.37 0.45	0.09 0.15	4.00 6.30
3' Sidearm (Sprint - Existing)	A	From Leg	1.50 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice	2.30 3.13	2.30 3.13	40.50 57.38
3' Sidearm (Sprint - Existing)	B	From Leg	1.50 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice	2.30 3.13	2.30 3.13	40.50 57.38
3' Sidearm (Sprint - Existing)	C	From Leg	1.50 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice	2.30 3.13	2.30 3.13	40.50 57.38
60"x12"x5" Panel (Sprint - Existing)	A	From Leg	3.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice	7.00 7.47	3.26 3.64	35.00 72.53
60"x12"x5" Panel (Sprint - Existing)	B	From Leg	3.00 0.00 0.00	0.0000	87.00	No Ice 1/2" Ice	7.00 7.47	3.26 3.64	35.00 72.53
60"x12"x5" Panel	C	From Leg	3.00	0.0000	87.00	No Ice	7.00	3.26	35.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft²	C_AA_A Side ft²	Weight lb
(Sprint - Existing)			0.00 0.00			1/2" Ice	7.47	3.64	72.53
3' Sidearm	A	From Leg	1.50 0.00 0.00	0.0000	62.00	No Ice 1/2" Ice	3.08 4.66	3.08 4.66	70.00 100.00
10' x 3" Dia Omni	A	From Leg	3.00 0.00 0.00	0.0000	73.00 - 63.00	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	30.00 51.79
10' x 3" Dia Omni	A	From Leg	3.00 0.00 0.00	0.0000	51.00 - 61.00	No Ice 1/2" Ice	3.00 4.03	3.00 4.03	30.00 51.79
4' Sidearm	B	From Leg	2.00 0.00 0.00	0.0000	65.00	No Ice 1/2" Ice	2.76 4.74	2.76 4.74	70.00 100.00
8' x 3" Dia Omni	B	From Leg	4.00 0.00 0.00	0.0000	74.00 - 66.00	No Ice 1/2" Ice	2.40 3.19	2.40 3.19	25.00 42.51
3' Sidearm	C	From Leg	1.50 0.00 0.00	0.0000	67.00	No Ice 1/2" Ice	3.08 4.66	3.08 4.66	70.00 100.00
PR-850	B	From Leg	0.50 0.00 0.00	0.0000	58.00	No Ice 1/2" Ice	6.35 11.43	6.35 11.43	38.00 49.40
PR-850	C	From Leg	0.50 0.00 0.00	0.0000	60.00	No Ice 1/2" Ice	6.35 11.43	6.35 11.43	38.00 49.40
PR-850	C	From Leg	0.50 0.00 0.00	0.0000	52.00	No Ice 1/2" Ice	6.35 11.43	6.35 11.43	38.00 49.40

Tower Pressures - No Ice

$G_H = 1.150$

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 118.00-100.00	109.00	1.407	26	101.625	A	10.116	19.960	5.250	17.46	0.000	0.000
					B	10.116	6.915		30.83	0.000	0.000
					C	10.116	33.505		12.04	0.000	0.000
T2 100.00-80.00	90.00	1.332	25	114.167	A	9.549	35.443	8.333	18.52	0.000	0.000
					B	9.549	19.258		28.93	0.000	0.000
					C	9.549	48.348		14.39	0.000	0.000
T3 80.00-60.00	70.00	1.24	23	129.587	A	11.173	37.460	9.175	18.87	0.000	0.000
					B	11.173	28.414		23.18	0.000	0.000
					C	11.173	56.329		13.59	0.000	0.000
T4 60.00-40.00	50.00	1.126	21	160.004	A	11.909	41.069	10.009	18.89	0.000	0.000
					B	11.909	35.801		20.98	0.000	0.000
					C	11.909	60.941		13.74	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T5 40.00-20.00	30.00	1	18	190.420	A	16.223	42.643	10.843	18.42	0.000	0.000
					B	16.223	37.560		20.16	0.000	0.000
					C	16.223	61.960		13.87	0.000	0.000
T6 20.00-0.00	10.00	1	18	220.837	A	17.776	33.938	11.678	22.58	0.000	0.000
					B	17.776	30.379		24.25	0.000	0.000
					C	17.776	47.459		17.90	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.150$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 118.00-100.00	109.00	1.407	20	0.5000	103.125	A	19.623	23.595	8.250	19.09	0.000	0.000
						B	10.116	16.473		31.03	0.000	0.000
						C	28.563	35.700		12.84	0.000	0.000
T2 100.00-80.00	90.00	1.332	18	0.5000	115.833	A	25.463	37.263	11.667	18.60	0.000	0.000
						B	15.956	25.918		27.86	0.000	0.000
						C	34.776	48.230		14.06	0.000	0.000
T3 80.00-60.00	70.00	1.24	17	0.5000	131.254	A	27.706	40.017	12.512	18.47	0.000	0.000
						B	23.573	33.437		21.95	0.000	0.000
						C	41.773	54.652		12.98	0.000	0.000
T4 60.00-40.00	50.00	1.126	16	0.5000	161.671	A	28.442	46.494	13.346	17.81	0.000	0.000
						B	24.309	47.692		18.54	0.000	0.000
						C	42.509	63.632		12.57	0.000	0.000
T5 40.00-20.00	30.00	1	14	0.5000	192.088	A	32.757	48.686	14.180	17.41	0.000	0.000
						B	28.623	50.236		17.98	0.000	0.000
						C	46.823	64.769		12.71	0.000	0.000
T6 20.00-0.00	10.00	1	14	0.5000	222.505	A	29.350	41.540	15.014	21.18	0.000	0.000
						B	26.456	42.625		21.73	0.000	0.000
						C	39.196	52.798		16.32	0.000	0.000

Tower Pressure - Service

$G_H = 1.150$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1 118.00-100.00	109.00	1.407	9	101.625	A	10.116	19.960	5.250	17.46	0.000	0.000
					B	10.116	6.915		30.83	0.000	0.000
					C	10.116	33.505		12.04	0.000	0.000
T2 100.00-80.00	90.00	1.332	9	114.167	A	9.549	35.443	8.333	18.52	0.000	0.000
					B	9.549	19.258		28.93	0.000	0.000
					C	9.549	48.348		14.39	0.000	0.000
T3 80.00-60.00	70.00	1.24	8	129.587	A	11.173	37.460	9.175	18.87	0.000	0.000
					B	11.173	28.414		23.18	0.000	0.000
					C	11.173	56.329		13.59	0.000	0.000
T4 60.00-40.00	50.00	1.126	7	160.004	A	11.909	41.069	10.009	18.89	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
					B	11.909	35.801		20.98	0.000	0.000
					C	11.909	60.941		13.74	0.000	0.000
T5 40.00-20.00	30.00	1	6	190.420	A	16.223	42.643	10.843	18.42	0.000	0.000
					B	16.223	37.560		20.16	0.000	0.000
					C	16.223	61.960		13.87	0.000	0.000
T6 20.00-0.00	10.00	1	6	220.837	A	17.776	33.938	11.678	22.58	0.000	0.000
					B	17.776	30.379		24.25	0.000	0.000
					C	17.776	47.459		17.90	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 ft^2	F lb	w plf	Ctrl. Face
T1 118.00-100.00	414.68	750.28	A	0.296	2.307	0.615	1	1	22.385	1945.88	108.10	C
			B	0.168	2.708	0.584	1	1	14.157			
			C	0.429	2.009	0.664	1	1	32.362			
T2 100.00-80.00	828.48	1436.23	A	0.394	2.076	0.649	1	1	32.560	2327.98	116.40	C
			B	0.252	2.431	0.602	1	1	21.152			
			C	0.507	1.891	0.701	1	1	43.449			
T3 80.00-60.00	1024.91	1708.65	A	0.375	2.115	0.642	1	1	35.216	2524.63	126.23	C
			B	0.305	2.281	0.618	1	1	28.722			
			C	0.521	1.874	0.708	1	1	51.076			
T4 60.00-40.00	1072.40	1983.27	A	0.331	2.217	0.626	1	1	37.615	2498.78	124.94	C
			B	0.298	2.301	0.615	1	1	33.939			
			C	0.455	1.965	0.676	1	1	53.088			
T5 40.00-20.00	1077.80	2587.89	A	0.309	2.272	0.619	1	1	42.608	2472.04	123.60	C
			B	0.282	2.344	0.611	1	1	39.161			
			C	0.411	2.043	0.656	1	1	56.868			
T6 20.00-0.00	754.46	2935.87	A	0.234	2.486	0.598	1	1	38.070	2304.99	115.25	C
			B	0.218	2.537	0.594	1	1	35.829			
			C	0.295	2.308	0.615	1	1	46.940			
Sum Weight:	5172.73	11402.19						OTM	820493.54 lb-ft	14074.30		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1 118.00-100.00	414.68	750.28	A	0.296	2.307	0.615	0.8	1	20.362	1824.23	101.35	C
			B	0.168	2.708	0.584	0.8	1	12.134			
			C	0.429	2.009	0.664	0.8	1	30.339			
T2 100.00-80.00	828.48	1436.23	A	0.394	2.076	0.649	0.8	1	30.650	2225.65	111.28	C
			B	0.252	2.431	0.602	0.8	1	19.242			
			C	0.507	1.891	0.701	0.8	1	41.540			
T3 80.00-60.00	1024.91	1708.65	A	0.375	2.115	0.642	0.8	1	32.982	2414.18	120.71	C
			B	0.305	2.281	0.618	0.8	1	26.487			
			C	0.521	1.874	0.708	0.8	1	48.841			
T4 60.00-40.00	1072.40	1983.27	A	0.331	2.217	0.626	0.8	1	35.233	2386.68	119.33	C
			B	0.298	2.301	0.615	0.8	1	31.557			

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	R_R	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
			C	0.455	1.965	0.676	0.8	1	50.706			
T5 40.00-20.00	1077.80	2587.89	A	0.309	2.272	0.619	0.8	1	39.364	2330.99	116.55	C
			B	0.282	2.344	0.611	0.8	1	35.916			
			C	0.411	2.043	0.656	0.8	1	53.623			
T6 20.00-0.00	754.46	2935.87	A	0.234	2.486	0.598	0.8	1	34.515	2130.41	106.52	C
			B	0.218	2.537	0.594	0.8	1	32.274			
			C	0.295	2.308	0.615	0.8	1	43.385			
Sum Weight:	5172.73	11402.19						OTM	778709.39 lb-ft	13312.14		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	R_R	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
T1 118.00-100.00	414.68	750.28	A	0.296	2.307	0.615	0.85	1	20.868	1854.64	103.04	C
			B	0.168	2.708	0.584	0.85	1	12.639			
			C	0.429	2.009	0.664	0.85	1	30.845			
T2 100.00-80.00	828.48	1436.23	A	0.394	2.076	0.649	0.85	1	31.127	2251.23	112.56	C
			B	0.252	2.431	0.602	0.85	1	19.720			
			C	0.507	1.891	0.701	0.85	1	42.017			
T3 80.00-60.00	1024.91	1708.65	A	0.375	2.115	0.642	0.85	1	33.540	2441.79	122.09	C
			B	0.305	2.281	0.618	0.85	1	27.046			
			C	0.521	1.874	0.708	0.85	1	49.400			
T4 60.00-40.00	1072.40	1983.27	A	0.331	2.217	0.626	0.85	1	35.828	2414.70	120.74	C
			B	0.298	2.301	0.615	0.85	1	32.153			
			C	0.455	1.965	0.676	0.85	1	51.302			
T5 40.00-20.00	1077.80	2587.89	A	0.309	2.272	0.619	0.85	1	40.175	2366.25	118.31	C
			B	0.282	2.344	0.611	0.85	1	36.727			
			C	0.411	2.043	0.656	0.85	1	54.434			
T6 20.00-0.00	754.46	2935.87	A	0.234	2.486	0.598	0.85	1	35.403	2174.06	108.70	C
			B	0.218	2.537	0.594	0.85	1	33.163			
			C	0.295	2.308	0.615	0.85	1	44.274			
Sum Weight:	5172.73	11402.19						OTM	789155.43 lb-ft	13502.68		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation *ft*	*Add Weight* *lb*	*Self Weight* *lb*	*Face*	*e*	C_F	R_R	D_F	D_R	A_E ft^2	*F* *lb*	*w* *plf*	*Ctrl. Face*
T1 118.00-100.00	1082.46	1186.88	A	0.419	2.027	0.66	1	1	35.185	2251.18	125.07	C
			B	0.258	2.414	0.604	1	1	20.064			
			C	0.623	1.791	0.768	1	1	55.982			
T2 100.00-80.00	2122.02	1891.80	A	0.542	1.852	0.72	1	1	52.275	2829.91	141.50	C
			B	0.362	2.145	0.637	1	1	32.457			
			C	0.717	1.778	0.832	1	1	74.898			
T3 80.00-60.00	2623.64	2232.24	A	0.516	1.88	0.706	1	1	55.949	3100.80	155.04	C
			B	0.434	2	0.666	1	1	45.849			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			C	0.735	1.782	0.845	1	1	87.968			
T4 60.00-40.00	2760.68	2540.67	A	0.464	1.952	0.68	1	1	60.038	2966.34	148.32	C
			B	0.445	1.981	0.671	1	1	56.318			
			C	0.657	1.78	0.79	1	1	92.767			
T5 40.00-20.00	2775.92	3276.78	A	0.424	2.018	0.662	1	1	64.971	2750.93	137.55	C
			B	0.411	2.044	0.656	1	1	61.576			
			C	0.581	1.817	0.742	1	1	94.890			
T6 20.00-0.00	1943.14	3685.91	A	0.319	2.248	0.622	1	1	55.178	2402.73	120.14	C
			B	0.31	2.269	0.619	1	1	52.848			
			C	0.413	2.038	0.657	1	1	73.894			
Sum Weight:	13307.86	14814.27						OTM	971998.06 lb-ft	16301.88		

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 ft^2	F lb	w plf	Ctrl. Face
T1 118.00-100.00	1082.46	1186.88	A	0.419	2.027	0.66	0.8	1	31.261	2021.46	112.30	C
			B	0.258	2.414	0.604	0.8	1	18.041			
			C	0.623	1.791	0.768	0.8	1	50.269			
T2 100.00-80.00	2122.02	1891.80	A	0.542	1.852	0.72	0.8	1	47.183	2567.11	128.36	C
			B	0.362	2.145	0.637	0.8	1	29.266			
			C	0.717	1.778	0.832	0.8	1	67.943			
T3 80.00-60.00	2623.64	2232.24	A	0.516	1.88	0.706	0.8	1	50.408	2806.30	140.32	C
			B	0.434	2	0.666	0.8	1	41.135			
			C	0.735	1.782	0.845	0.8	1	79.613			
T4 60.00-40.00	2760.68	2540.67	A	0.464	1.952	0.68	0.8	1	54.349	2694.48	134.72	C
			B	0.445	1.981	0.671	0.8	1	51.456			
			C	0.657	1.78	0.79	0.8	1	84.265			
T5 40.00-20.00	2775.92	3276.78	A	0.424	2.018	0.662	0.8	1	58.420	2479.44	123.97	C
			B	0.411	2.044	0.656	0.8	1	55.851			
			C	0.581	1.817	0.742	0.8	1	85.525			
T6 20.00-0.00	1943.14	3685.91	A	0.319	2.248	0.622	0.8	1	49.308	2147.83	107.39	C
			B	0.31	2.269	0.619	0.8	1	47.557			
			C	0.413	2.038	0.657	0.8	1	66.055			
Sum Weight:	13307.86	14814.27						OTM	878406.52 lb-ft	14716.63		

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 ft^2	F lb	w plf	Ctrl. Face
T1 118.00-100.00	1082.46	1186.88	A	0.419	2.027	0.66	0.85	1	32.242	2078.89	115.49	C
			B	0.258	2.414	0.604	0.85	1	18.547			
			C	0.623	1.791	0.768	0.85	1	51.697			
T2 100.00-80.00	2122.02	1891.80	A	0.542	1.852	0.72	0.85	1	48.456	2632.81	131.64	C
			B	0.362	2.145	0.637	0.85	1	30.063			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			C	0.717	1.778	0.832	0.85	1	69.681			
T3 80.00-60.00	2623.64	2232.24	A	0.516	1.88	0.706	0.85	1	51.793	2879.93	144.00	C
			B	0.434	2	0.666	0.85	1	42.314			
			C	0.735	1.782	0.845	0.85	1	81.702			
T4 60.00-40.00	2760.68	2540.67	A	0.464	1.952	0.68	0.85	1	55.771	2762.45	138.12	C
			B	0.445	1.981	0.671	0.85	1	52.671			
			C	0.657	1.78	0.79	0.85	1	86.390			
T5 40.00-20.00	2775.92	3276.78	A	0.424	2.018	0.662	0.85	1	60.057	2547.31	127.37	C
			B	0.411	2.044	0.656	0.85	1	57.282			
			C	0.581	1.817	0.742	0.85	1	87.866			
T6 20.00-0.00	1943.14	3685.91	A	0.319	2.248	0.622	0.85	1	50.775	2211.55	110.58	C
			B	0.31	2.269	0.619	0.85	1	48.879			
			C	0.413	2.038	0.657	0.85	1	68.015			
Sum Weight:	13307.86	14814.27						OTM	901804.41 lb-ft	15112.94		

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 ft^2	F lb	w plf	Ctrl. Face
T1 118.00-100.00	414.68	750.28	A	0.296	2.307	0.615	1	1	22.385	673.32	37.41	C
			B	0.168	2.708	0.584	1	1	14.157			
			C	0.429	2.009	0.664	1	1	32.362			
T2 100.00-80.00	828.48	1436.23	A	0.394	2.076	0.649	1	1	32.560	805.53	40.28	C
			B	0.252	2.431	0.602	1	1	21.152			
			C	0.507	1.891	0.701	1	1	43.449			
T3 80.00-60.00	1024.91	1708.65	A	0.375	2.115	0.642	1	1	35.216	873.58	43.68	C
			B	0.305	2.281	0.618	1	1	28.722			
			C	0.521	1.874	0.708	1	1	51.076			
T4 60.00-40.00	1072.40	1983.27	A	0.331	2.217	0.626	1	1	37.615	864.63	43.23	C
			B	0.298	2.301	0.615	1	1	33.939			
			C	0.455	1.965	0.676	1	1	53.088			
T5 40.00-20.00	1077.80	2587.89	A	0.309	2.272	0.619	1	1	42.608	855.38	42.77	C
			B	0.282	2.344	0.611	1	1	39.161			
			C	0.411	2.043	0.656	1	1	56.868			
T6 20.00-0.00	754.46	2935.87	A	0.234	2.486	0.598	1	1	38.070	797.57	39.88	C
			B	0.218	2.537	0.594	1	1	35.829			
			C	0.295	2.308	0.615	1	1	46.940			
Sum Weight:	5172.73	11402.19						OTM	283907.80 lb-ft	4870.00		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1 118.00-100.00	414.68	750.28	A	0.296	2.307	0.615	0.8	1	20.362	631.22	35.07	C
			B	0.168	2.708	0.584	0.8	1	12.134			

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
			C	0.429	2.009	0.664	0.8	1	30.339			
T2 100.00-80.00	828.48	1436.23	A	0.394	2.076	0.649	0.8	1	30.650	770.12	38.51	C
			B	0.252	2.431	0.602	0.8	1	19.242			
			C	0.507	1.891	0.701	0.8	1	41.540			
T3 80.00-60.00	1024.91	1708.65	A	0.375	2.115	0.642	0.8	1	32.982	835.36	41.77	C
			B	0.305	2.281	0.618	0.8	1	26.487			
			C	0.521	1.874	0.708	0.8	1	48.841			
T4 60.00-40.00	1072.40	1983.27	A	0.331	2.217	0.626	0.8	1	35.233	825.84	41.29	C
			B	0.298	2.301	0.615	0.8	1	31.557			
			C	0.455	1.965	0.676	0.8	1	50.706			
T5 40.00-20.00	1077.80	2587.89	A	0.309	2.272	0.619	0.8	1	39.364	806.57	40.33	C
			B	0.282	2.344	0.611	0.8	1	35.916			
			C	0.411	2.043	0.656	0.8	1	53.623			
T6 20.00-0.00	754.46	2935.87	A	0.234	2.486	0.598	0.8	1	34.515	737.17	36.86	C
			B	0.218	2.537	0.594	0.8	1	32.274			
			C	0.295	2.308	0.615	0.8	1	43.385			
Sum Weight:	5172.73	11402.19						OTM	269449.62 lb-ft	4606.28		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight lb	Self Weight lb	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F lb	w plf	Ctrl. Face
T1 118.00-100.00	414.68	750.28	A	0.296	2.307	0.615	0.85	1	20.868	641.74	35.65	C
			B	0.168	2.708	0.584	0.85	1	12.639			
			C	0.429	2.009	0.664	0.85	1	30.845			
T2 100.00-80.00	828.48	1436.23	A	0.394	2.076	0.649	0.85	1	31.127	778.97	38.95	C
			B	0.252	2.431	0.602	0.85	1	19.720			
			C	0.507	1.891	0.701	0.85	1	42.017			
T3 80.00-60.00	1024.91	1708.65	A	0.375	2.115	0.642	0.85	1	33.540	844.91	42.25	C
			B	0.305	2.281	0.618	0.85	1	27.046			
			C	0.521	1.874	0.708	0.85	1	49.400			
T4 60.00-40.00	1072.40	1983.27	A	0.331	2.217	0.626	0.85	1	35.828	835.54	41.78	C
			B	0.298	2.301	0.615	0.85	1	32.153			
			C	0.455	1.965	0.676	0.85	1	51.302			
T5 40.00-20.00	1077.80	2587.89	A	0.309	2.272	0.619	0.85	1	40.175	818.77	40.94	C
			B	0.282	2.344	0.611	0.85	1	36.727			
			C	0.411	2.043	0.656	0.85	1	54.434			
T6 20.00-0.00	754.46	2935.87	A	0.234	2.486	0.598	0.85	1	35.403	752.27	37.61	C
			B	0.218	2.537	0.594	0.85	1	33.163			
			C	0.295	2.308	0.615	0.85	1	44.274			
Sum Weight:	5172.73	11402.19						OTM	273064.16 lb-ft	4672.21		

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	7763.98					
Bracing Weight	3638.21					
Total Member Self-Weight	11402.19			4172.23	4372.12	
Total Weight	22018.39			4172.23	4372.12	
Wind 0 deg - No Ice		0.00	-22907.91	-1704634.66	4372.12	-5888.14
Wind 30 deg - No Ice		11173.70	-19343.79	-1448558.34	-834973.60	-2097.31
Wind 60 deg - No Ice		19188.40	-11072.87	-829339.14	-1440370.78	2018.76
Wind 90 deg - No Ice		22347.40	0.00	4172.23	-1674319.33	5636.18
Wind 120 deg - No Ice		19848.46	11453.95	858575.67	-1476556.92	8004.54
Wind 150 deg - No Ice		11173.70	19343.79	1456902.80	-834973.60	7733.48
Wind 180 deg - No Ice		0.00	22145.74	1671194.97	4372.12	5605.03
Wind 210 deg - No Ice		-11173.70	19343.79	1456902.80	843717.84	2097.31
Wind 240 deg - No Ice		-19848.46	11453.95	858575.67	1485301.16	-2116.40
Wind 270 deg - No Ice		-22347.40	0.00	4172.23	1683063.57	-5636.18
Wind 300 deg - No Ice		-19188.40	-11072.87	-829339.14	1449115.02	-7623.79
Wind 330 deg - No Ice		-11173.70	-19343.79	-1448558.34	843717.84	-7733.48
Member Ice	3412.08					
Total Weight Ice	36374.93			11221.96	11123.57	
Wind 0 deg - Ice		0.00	-24317.80	-1753016.51	11123.57	-4278.01
Wind 30 deg - Ice		11568.79	-20030.18	-1455863.89	-836378.19	-762.26
Wind 60 deg - Ice		19694.51	-11366.28	-824101.51	-1436529.38	2646.82
Wind 90 deg - Ice		23137.58	0.00	11221.96	-1683879.96	5441.17
Wind 120 deg - Ice		21067.38	12158.90	893341.19	-1517582.03	7143.04
Wind 150 deg - Ice		11568.79	20030.18	1478307.80	-836378.19	6203.44
Wind 180 deg - Ice		0.00	22732.55	1681868.89	11123.57	3936.19
Wind 210 deg - Ice		-11568.79	20030.18	1478307.80	858625.34	762.26
Wind 240 deg - Ice		-21067.38	12158.90	893341.19	1539829.18	-2865.03
Wind 270 deg - Ice		-23137.58	0.00	11221.96	1706127.11	-5441.17
Wind 300 deg - Ice		-19694.51	-11366.28	-824101.51	1458776.53	-6583.01
Wind 330 deg - Ice		-11568.79	-20030.18	-1455863.89	858625.34	-6203.44
Total Weight	22018.39			4172.23	4372.12	
Wind 0 deg - Service		0.00	-7926.61	-591186.31	81.47	-2037.42
Wind 30 deg - Service		3866.33	-6693.35	-502578.59	-290349.58	-725.71
Wind 60 deg - Service		6639.58	-3831.44	-288315.89	-499829.57	698.53
Wind 90 deg - Service		7732.66	0.00	96.35	-580780.63	1950.23
Wind 120 deg - Service		6867.98	3963.31	295737.68	-512350.73	2769.74
Wind 150 deg - Service		3866.33	6693.35	502771.29	-290349.58	2675.95
Wind 180 deg - Service		0.00	7662.89	576920.83	81.47	1939.46
Wind 210 deg - Service		-3866.33	6693.35	502771.29	290512.51	725.71
Wind 240 deg - Service		-6867.98	3963.31	295737.68	512513.66	-732.32
Wind 270 deg - Service		-7732.66	0.00	96.35	580943.56	-1950.23
Wind 300 deg - Service		-6639.58	-3831.44	-288315.89	499992.51	-2637.99
Wind 330 deg - Service		-3866.33	-6693.35	-502578.59	290512.51	-2675.95

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

Comb. No.	*Description*
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
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	118 - 100	Leg	Max Tension	8	11399.09	7.01	130.79
			Max. Compression	23	-14513.45	206.11	-116.39
			Max. Mx	11	-977.56	-412.41	1.49
			Max. My	2	292.98	-14.24	-428.07
			Max. Vy	11	-691.92	291.97	-16.89
			Max. Vx	2	-704.33	-14.24	271.14
		Diagonal	Max Tension	11	2565.57	0.00	0.00
			Max. Compression	5	-2582.62	0.00	0.00
			Max. Mx	24	968.74	15.32	2.30
			Max. My	11	-2528.12	-0.25	8.55
			Max. Vy	24	-9.27	15.32	2.30
			Max. Vx	11	-2.41	-0.25	8.55
		Top Girt	Max Tension	10	534.18	0.00	0.00
			Max. Compression	12	-561.12	0.00	0.00
			Max. Mx	14	-12.41	-13.56	0.00
			Max. My	19	-254.45	0.00	-0.00
			Max. Vy	14	9.86	0.00	0.00
			Max. Vx	19	0.00	0.00	0.00
T2	100 - 80	Leg	Max Tension	8	49126.23	10.38	-129.62
			Max. Compression	23	-55744.12	97.51	-50.58
			Max. Mx	5	-1911.39	989.11	-7.64
			Max. My	2	7199.43	46.64	-994.72
			Max. Vy	11	623.86	244.60	-32.53

Section No.	*Elevation ft*	*Component Type*	*Condition*	*Gov. Load Comb.*	*Force lb*	*Major Axis Moment lb-ft*	*Minor Axis Moment lb-ft*
			Max. Vx	2	629.46	-13.48	262.64
		Diagonal	Max Tension	11	5615.26	0.00	0.00
			Max. Compression	11	-5705.94	0.00	0.00
			Max. Mx	23	4448.78	24.50	-1.48
			Max. My	7	-4963.99	-8.32	-8.57
			Max. Vy	23	-12.65	24.50	-1.48
			Max. Vx	7	2.31	-8.32	-8.57
T3	80 - 60	Leg	Max Tension	8	82662.53	-88.79	-24.30
			Max. Compression	23	-93440.02	82.29	4.77
			Max. Mx	21	76937.86	-172.69	29.12
			Max. My	9	-2863.99	-13.70	190.89
			Max. Vy	15	66.28	103.13	25.08
			Max. Vx	22	101.85	17.26	130.05
		Diagonal	Max Tension	18	4175.34	0.00	0.00
			Max. Compression	18	-4113.89	0.00	0.00
			Max. Mx	23	3268.85	22.88	2.00
			Max. My	12	-3444.35	-1.79	7.68
			Max. Vy	23	-12.66	22.17	1.40
			Max. Vx	12	-2.19	0.00	0.00
		Top Girt	Max Tension	23	64.84	0.00	0.00
			Max. Compression	12	-158.44	0.00	0.00
			Max. Mx	14	-18.02	-13.55	0.00
			Max. My	19	-76.13	0.00	0.29
			Max. Vy	14	9.86	0.00	0.00
			Max. Vx	19	-0.21	0.00	0.00
T4	60 - 40	Leg	Max Tension	8	110891.51	-115.06	3.68
			Max. Compression	23	-128045.98	-175.85	12.98
			Max. Mx	23	-119083.17	292.12	3.17
			Max. My	26	-9788.05	-131.99	273.98
			Max. Vy	17	-163.73	-169.73	-5.08
			Max. Vx	20	-171.14	-41.65	-50.46
		Diagonal	Max Tension	18	4766.84	0.00	0.00
			Max. Compression	18	-4808.64	0.00	0.00
			Max. Mx	23	3313.55	26.72	1.22
			Max. My	19	-3994.19	-7.54	-4.22
			Max. Vy	23	-14.32	26.72	1.22
			Max. Vx	19	1.10	0.00	0.00
T5	40 - 20	Leg	Max Tension	8	132670.40	206.37	-18.93
			Max. Compression	23	-155968.98	-495.50	12.47
			Max. Mx	23	-155713.70	672.47	-10.26
			Max. My	7	-6182.72	-12.07	-754.09
			Max. Vy	23	234.49	672.47	-10.26
			Max. Vx	7	-240.86	-12.07	-754.09
		Diagonal	Max Tension	18	6269.62	0.00	0.00
			Max. Compression	18	-6563.78	0.00	0.00
			Max. Mx	21	4116.64	112.67	4.16
			Max. My	24	-6456.99	-15.50	28.59
			Max. Vy	21	33.82	112.67	4.16
			Max. Vx	24	-4.99	0.00	0.00
		Secondary Horizontal	Max Tension	25	366.12	0.00	0.00
			Max. Compression	10	-345.15	0.00	0.00
			Max. Mx	14	36.10	-41.39	0.00
			Max. My	19	138.99	0.00	0.90
			Max. Vy	14	17.23	0.00	0.00
			Max. Vx	19	-0.37	0.00	0.00
T6	20 - 0	Leg	Max Tension	8	155510.78	204.94	-16.37
			Max. Compression	23	-185262.84	-0.00	-0.02
			Max. Mx	10	-160886.86	675.85	-1.08
			Max. My	7	-7118.72	-17.65	-945.46
			Max. Vy	23	-252.89	671.20	-3.08

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force lb	Major Axis Moment lb-ft	Minor Axis Moment lb-ft
			Max. Vx	7	-274.64	-17.64	-945.46
		Diagonal	Max Tension	18	6163.93	0.00	0.00
			Max. Compression	18	-6354.83	0.00	0.00
			Max. Mx	21	3898.26	121.23	2.48
			Max. My	24	-6248.61	12.91	26.46
			Max. Vy	21	36.71	121.23	2.48
			Max. Vx	24	-4.38	0.00	0.00
		Secondary Horizontal	Max Tension	8	405.40	0.00	0.00
			Max. Compression	23	-424.14	0.00	0.00
			Max. Mx	14	-33.43	-55.33	0.00
			Max. My	25	-228.24	0.00	1.20
			Max. Vy	14	-19.92	0.00	0.00
			Max. Vx	25	-0.43	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Leg C	Max. Vert	23	191875.38	12604.59	-7104.57
	Max. H_x	23	191875.38	12604.59	-7104.57
	Max. H_z	16	-134507.51	-9939.05	6693.29
	Min. Vert	4	-160152.68	-11157.00	6323.82
	Min. H_x	17	-155094.07	-11800.79	6662.22
	Min. H_z	23	191875.38	12604.59	-7104.57
Leg B	Max. Vert	19	189927.31	-12698.36	-6892.54
	Max. H_x	25	-157043.38	11916.24	6510.21
	Max. H_z	25	-157043.38	11916.24	6510.21
	Min. Vert	12	-160916.86	11306.05	6083.92
	Min. H_x	19	189927.31	-12698.36	-6892.54
	Min. H_z	19	189927.31	-12698.36	-6892.54
Leg A	Max. Vert	15	189127.04	-230.46	14429.75
	Max. H_x	24	10990.64	1349.84	-116.21
	Max. H_z	15	189127.04	-230.46	14429.75
	Min. Vert	8	-161073.23	282.32	-12831.05
	Min. H_x	18	10989.40	-1378.22	-113.07
	Min. H_z	21	-157696.76	189.39	-13579.80

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	22018.39	0.00	-0.00	4172.21	4372.11	0.00
Dead+Wind 0 deg - No Ice	22018.38	-0.10	-22907.94	-1710800.41	4412.54	-5913.20
Dead+Wind 30 deg - No Ice	22018.37	11173.30	-19343.95	-1453814.82	-837995.51	-2094.48
Dead+Wind 60 deg - No Ice	22018.40	19188.40	-11072.84	-832345.57	-1445604.74	2025.13
Dead+Wind 90 deg - No Ice	22018.37	22347.33	0.50	4204.04	-1680392.00	5644.41
Dead+Wind 120 deg - No Ice	22018.38	19848.41	11454.11	861706.67	-1481885.48	8035.63
Dead+Wind 150 deg - No Ice	22018.38	11173.94	19343.60	1462204.28	-837977.24	7781.02
Dead+Wind 180 deg - No Ice	22018.40	-0.06	22145.72	1677271.23	4407.00	5630.60
Dead+Wind 210 deg - No Ice	22018.37	-11174.05	19343.51	1462189.13	846785.88	2094.07

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+Wind 240 deg - No Ice	22018.38	-19848.46	11454.02	861686.19	1490676.05	-2121.46
Dead+Wind 270 deg - No Ice	22018.37	-22347.33	0.51	4199.12	1689175.54	-5643.99
Dead+Wind 300 deg - No Ice	22018.40	-19188.43	-11072.79	-832334.72	1454399.05	-7654.77
Dead+Wind 330 deg - No Ice	22018.38	-11173.41	-19343.90	-1453798.58	846808.21	-7780.98
Dead+Ice+Temp	36374.93	-0.00	0.00	11280.98	11192.57	-0.00
Dead+Wind 0 deg+Ice+Temp	36374.91	0.00	-24317.66	-1762815.26	11252.46	-4346.90
Dead+Wind 30 deg+Ice+Temp	36374.91	11568.24	-20030.46	-1463993.15	-841036.71	-775.89
Dead+Wind 60 deg+Ice+Temp	36374.93	19694.54	-11366.21	-828701.74	-1444567.87	2663.57
Dead+Wind 90 deg+Ice+Temp	36374.90	23137.53	0.77	11309.40	-1693281.92	5483.04
Dead+Wind 120 deg+Ice+Temp	36374.91	21067.28	12158.80	898420.20	-1526023.74	7230.88
Dead+Wind 150 deg+Ice+Temp	36374.91	11569.20	20029.92	1486598.38	-841021.38	6302.87
Dead+Wind 180 deg+Ice+Temp	36374.93	-0.09	22732.54	1691304.24	11212.60	4000.44
Dead+Wind 210 deg+Ice+Temp	36374.90	-11569.34	20029.82	1486580.48	863441.46	774.76
Dead+Wind 240 deg+Ice+Temp	36374.91	-21067.27	12158.80	898373.49	1548453.58	-2883.17
Dead+Wind 270 deg+Ice+Temp	36374.90	-23137.53	0.81	11297.13	1715688.85	-5481.99
Dead+Wind 300 deg+Ice+Temp	36374.93	-19694.58	-11366.13	-828700.75	1466985.54	-6663.23
Dead+Wind 330 deg+Ice+Temp	36374.91	-11568.36	-20030.40	-1463987.44	863471.39	-6302.67
Dead+Wind 0 deg - Service	22018.39	-0.00	-7926.61	-589242.28	4394.97	-2046.56
Dead+Wind 30 deg - Service	22018.39	3866.33	-6693.35	-500315.64	-287094.17	-730.93
Dead+Wind 60 deg - Service	22018.39	6639.58	-3831.44	-285273.63	-497342.73	700.84
Dead+Wind 90 deg - Service	22018.39	7732.66	0.01	4192.87	-578584.78	1959.26
Dead+Wind 120 deg - Service	22018.39	6867.98	3963.31	300908.39	-509901.83	2781.15
Dead+Wind 150 deg - Service	22018.39	3866.33	6693.35	508695.17	-287095.23	2687.29
Dead+Wind 180 deg - Service	22018.39	-0.00	7662.88	583117.91	4393.35	1949.00
Dead+Wind 210 deg - Service	22018.39	-3866.34	6693.35	508692.70	295881.17	730.89
Dead+Wind 240 deg - Service	22018.39	-6867.98	3963.31	300905.00	518686.21	-734.49
Dead+Wind 270 deg - Service	22018.39	-7732.66	0.01	4191.16	587368.86	-1959.22
Dead+Wind 300 deg - Service	22018.39	-6639.58	-3831.44	-285273.31	506128.58	-2649.76
Dead+Wind 330 deg - Service	22018.39	-3866.33	-6693.35	-500314.56	295882.55	-2687.29

Solution Summary

Load Comb.	*Sum of Applied Forces* PX lb	PY lb	PZ lb	*Sum of Reactions* PX lb	PY lb	PZ lb	*% Error*
1	0.00	-22018.39	-0.00	-0.00	22018.39	0.00	0.000%
2	0.00	-22018.39	-22907.91	0.10	22018.38	22907.94	0.000%
3	11173.70	-22018.39	-19343.79	-11173.30	22018.37	19343.95	0.001%
4	19188.40	-22018.39	-11072.87	-19188.40	22018.40	11072.84	0.000%
5	22347.40	-22018.39	-0.00	-22347.33	22018.37	-0.50	0.002%
6	19848.46	-22018.39	11453.95	-19848.41	22018.38	-11454.11	0.001%
7	11173.70	-22018.39	19343.79	-11173.94	22018.38	-19343.60	0.001%
8	0.00	-22018.39	22145.74	0.06	22018.40	-22145.72	0.000%
9	-11173.70	-22018.39	19343.79	11174.05	22018.37	-19343.51	0.001%
10	-19848.46	-22018.39	11453.95	19848.46	22018.38	-11454.02	0.000%
11	-22347.40	-22018.39	-0.00	22347.33	22018.37	-0.51	0.002%
12	-19188.40	-22018.39	-11072.87	19188.43	22018.40	11072.79	0.000%
13	-11173.70	-22018.39	-19343.79	11173.41	22018.38	19343.90	0.001%
14	0.00	-36374.93	-0.00	0.00	36374.93	-0.00	0.000%
15	0.00	-36374.93	-24317.80	-0.00	36374.91	24317.66	0.000%
16	11568.79	-36374.93	-20030.18	-11568.24	36374.91	20030.46	0.001%
17	19694.51	-36374.93	-11366.28	-19694.54	36374.93	11366.21	0.000%
18	23137.58	-36374.93	-0.00	-23137.53	36374.90	-0.77	0.002%
19	21067.38	-36374.93	12158.90	-21067.28	36374.91	-12158.80	0.000%
20	11568.79	-36374.93	20030.18	-11569.20	36374.91	-20029.92	0.001%
21	0.00	-36374.93	22732.55	0.09	36374.93	-22732.54	0.000%
22	-11568.79	-36374.93	20030.18	11569.34	36374.90	-20029.82	0.002%
23	-21067.38	-36374.93	12158.90	21067.27	36374.91	-12158.80	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
24	-23137.58	-36374.93	-0.00	23137.53	36374.90	-0.81	0.002%
25	-19694.51	-36374.93	-11366.28	19694.58	36374.93	11366.13	0.000%
26	-11568.79	-36374.93	-20030.18	11568.36	36374.91	20030.40	0.001%
27	0.00	-22018.39	-7926.61	0.00	22018.39	7926.61	0.000%
28	3866.33	-22018.39	-6693.35	-3866.33	22018.39	6693.35	0.000%
29	6639.58	-22018.39	-3831.44	-6639.58	22018.39	3831.44	0.000%
30	7732.66	-22018.39	-0.00	-7732.66	22018.39	-0.01	0.000%
31	6867.98	-22018.39	3963.31	-6867.98	22018.39	-3963.31	0.000%
32	3866.33	-22018.39	6693.35	-3866.33	22018.39	-6693.35	0.000%
33	-0.00	-22018.39	7662.89	0.00	22018.39	-7662.88	0.000%
34	-3866.33	-22018.39	6693.35	3866.34	22018.39	-6693.35	0.000%
35	-6867.98	-22018.39	3963.31	6867.98	22018.39	-3963.31	0.000%
36	-7732.66	-22018.39	-0.00	7732.66	22018.39	-0.01	0.000%
37	-6639.58	-22018.39	-3831.44	6639.58	22018.39	3831.44	0.000%
38	-3866.33	-22018.39	-6693.35	3866.33	22018.39	6693.35	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	0.00000622
3	Yes	4	0.00000001	0.00001436
4	Yes	4	0.00000001	0.00000799
5	Yes	4	0.00000001	0.00001547
6	Yes	4	0.00000001	0.00000654
7	Yes	4	0.00000001	0.00001266
8	Yes	4	0.00000001	0.00000819
9	Yes	4	0.00000001	0.00001464
10	Yes	4	0.00000001	0.00000616
11	Yes	4	0.00000001	0.00001570
12	Yes	4	0.00000001	0.00000832
13	Yes	4	0.00000001	0.00001261
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000842
16	Yes	4	0.00000001	0.00001344
17	Yes	4	0.00000001	0.00000511
18	Yes	4	0.00000001	0.00001496
19	Yes	4	0.00000001	0.00000857
20	Yes	4	0.00000001	0.00001277
21	Yes	4	0.00000001	0.00000535
22	Yes	4	0.00000001	0.00001417
23	Yes	4	0.00000001	0.00000877
24	Yes	4	0.00000001	0.00001553
25	Yes	4	0.00000001	0.00000552
26	Yes	4	0.00000001	0.00001260
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	118 - 100	3.093	35	0.2124	0.0394
T2	100 - 80	2.286	35	0.2020	0.0343
T3	80 - 60	1.455	35	0.1701	0.0255
T4	60 - 40	0.808	35	0.1228	0.0160
T5	40 - 20	0.353	35	0.0776	0.0076
T6	20 - 0	0.095	35	0.0364	0.0034

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
124.00	12' x 3" Dia Omni	35	3.093	0.2124	0.0394	373258
123.00	10' x 3" Dia Omni	35	3.093	0.2124	0.0394	373258
118.00	6'x3" Pipe Mount	35	3.093	0.2124	0.0394	373258
110.00	10'6" Site Pro T-Arm	35	2.732	0.2091	0.0373	233287
98.00	14-ft T-Frame Sector Mount	35	2.198	0.1999	0.0335	74320
87.00	3' Sidearm	35	1.730	0.1838	0.0288	30355
74.00	8' x 3" Dia Omni	35	1.240	0.1566	0.0226	23126
73.00	10' x 3" Dia Omni	35	1.206	0.1543	0.0222	23328
70.00	8' x 3" Dia Omni	35	1.107	0.1471	0.0207	23955
68.00	10' x 3" Dia Omni	35	1.043	0.1422	0.0198	24393
67.00	3' Sidearm	35	1.012	0.1398	0.0193	24617
66.00	8' x 3" Dia Omni	35	0.982	0.1374	0.0189	24846
65.00	4' Sidearm	35	0.952	0.1349	0.0184	25080
63.00	10' x 3" Dia Omni	35	0.893	0.1300	0.0174	25540
62.00	3' Sidearm	35	0.864	0.1276	0.0170	25738
61.00	10' x 3" Dia Omni	35	0.836	0.1252	0.0165	25893
60.00	PR-850	35	0.808	0.1228	0.0160	25988
58.00	PR-850	35	0.754	0.1180	0.0151	25972
56.00	10' x 3" Dia Omni	35	0.702	0.1133	0.0142	25772
52.00	PR-850	35	0.603	0.1041	0.0123	25257
51.00	10' x 3" Dia Omni	35	0.580	0.1019	0.0119	25130

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	118 - 100	8.961	23	0.6066	0.1138
T2	100 - 80	6.658	23	0.5786	0.0991
T3	80 - 60	4.275	23	0.4909	0.0737
T4	60 - 40	2.396	23	0.3585	0.0463

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T5	40 - 20	1.053	23	0.2290	0.0221
T6	20 - 0	0.285	23	0.1081	0.0099

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
124.00	12' x 3" Dia Omni	23	8.961	0.6066	0.1138	136674
123.00	10' x 3" Dia Omni	23	8.961	0.6066	0.1138	136674
118.00	6'x3" Pipe Mount	23	8.961	0.6066	0.1138	136674
110.00	10'6" Site Pro T-Arm	23	7.932	0.5978	0.1079	85421
98.00	14-ft T-Frame Sector Mount	23	6.406	0.5729	0.0969	26785
87.00	3' Sidearm	23	5.066	0.5288	0.0833	10698
74.00	8' x 3" Dia Omni	23	3.653	0.4536	0.0655	8111
73.00	10' x 3" Dia Omni	23	3.554	0.4470	0.0641	8180
70.00	8' x 3" Dia Omni	23	3.267	0.4270	0.0600	8398
68.00	10' x 3" Dia Omni	23	3.082	0.4133	0.0573	8549
67.00	3' Sidearm	23	2.991	0.4065	0.0559	8627
66.00	8' x 3" Dia Omni	23	2.902	0.3996	0.0545	8706
65.00	4' Sidearm	23	2.815	0.3927	0.0532	8787
63.00	10' x 3" Dia Omni	23	2.643	0.3790	0.0504	8946
62.00	3' Sidearm	23	2.560	0.3721	0.0491	9014
61.00	10' x 3" Dia Omni	23	2.477	0.3653	0.0477	9067
60.00	PR-850	23	2.396	0.3585	0.0463	9098
58.00	PR-850	23	2.238	0.3450	0.0436	9089
56.00	10' x 3" Dia Omni	23	2.084	0.3317	0.0409	9015
52.00	PR-850	23	1.793	0.3054	0.0356	8826
51.00	10' x 3" Dia Omni	23	1.724	0.2989	0.0343	8780

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	118	Leg	A325N	0.7500	4	2849.77	19438.50	0.147 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	2565.57	4078.13	0.629 ✔	1.333	Member Bearing
		Top Girt	A325N	0.6250	1	534.18	4078.13	0.131 ✔	1.333	Member Bearing
T2	100	Leg	A325N	0.7500	4	12281.60	19438.60	0.632 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	5615.26	6117.19	0.918 ✔	1.333	Member Bearing
T3	80	Leg	A325N	1.0000	4	20669.00	34557.50	0.598 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4175.34	6117.19	0.683 ✔	1.333	Member Bearing
		Top Girt	A325N	0.6250	1	158.43	5437.50	0.029 ✔	1.333	Member Bearing
T4	60	Leg	A325N	1.0000	4	27722.90	34557.50	0.802 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	4766.84	6117.19	0.779 ✔	1.333	Member Bearing
T5	40	Leg	A325N	1.0000	6	22088.50	34557.50	0.639 ✔	1.333	Bolt Tension

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
		Diagonal	A325N	0.6250	1	6563.78	6442.72	1.019 ✔	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	366.12	4078.13	0.090 ✔	1.333	Member Bearing
T6	20	Leg	A449	1.0000	6	25890.00	31101.80	0.832 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.6250	1	6354.83	6442.72	0.986 ✔	1.333	Bolt Shear
		Secondary Horizontal	A325N	0.6250	1	405.40	4078.13	0.099 ✔	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	118 - 100	1 3/4	18.00	4.50	123.4 K=1.00	9.802	2.4053	-14513.40	23576.80	0.616 ✔
T2	100 - 80	2 1/2	20.00	5.00	96.0 K=1.00	15.618	4.9087	-55744.10	76666.70	0.727 ✔
T3	80 - 60	2 3/4	20.02	5.00	87.4 K=1.00	17.502	5.9396	-93440.00	103952.00	0.899 ✔
T4	60 - 40	3	20.02	5.00	80.1 K=1.00	18.997	7.0686	-128046.00	134285.00	0.954 ✔
T5	40 - 20	3 1/4	20.02	5.22	77.0 K=1.00	19.598	8.2958	-155969.00	162580.00	0.959 ✔
T6	20 - 0	3 1/2	20.02	5.19	71.1 K=1.00	20.730	9.6211	-185263.00	199447.00	0.929 ✔

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	118 - 100	L2x2x1/8	7.11	3.32	105.2 K=1.05	12.113	0.4844	-2582.62	5867.03	0.440 ✔
T2	100 - 80	L2x2x3/16	7.43	3.44	108.6 K=1.04	11.861	0.7150	-5705.94	8480.94	0.673 ✔
T3	80 - 60	L2x2x3/16	8.45	4.06	123.8 K=1.00	9.733	0.7150	-4085.86	6959.27	0.587 ✔
T4	60 - 40	L2x2x3/16	9.38	4.52	137.7 K=1.00	7.878	0.7150	-4808.64	5633.03	0.854 ✔
T5	40 - 20	L3x3x1/4	13.37	6.64	134.6 K=1.00	8.248	1.4400	-6563.78	11877.80	0.553 ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T6	20 - 0	L3x3x1/4	14.41	7.13	144.6 K=1.00	7.140	1.4400	-6354.83	10281.40	0.618 ✔

Secondary Horizontal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T5	40 - 20	L2x2x1/8	9.61	9.07	273.7 K=1.00	1.993	0.4844	-345.15	965.26	0.358 ✔
		KL/R > 250 (C) - 125								
T6	20 - 0	L2x2x1/8	10.36	9.80	295.8 K=1.00	1.707	0.4844	-424.14	826.76	0.513 ✔
		KL/R > 250 (C) - 155								

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	118 - 100	L2x2x1/8	5.50	5.08	153.4 K=1.00	6.342	0.4844	-561.12	3072.13	0.183 ✔
T3	80 - 60	L2x2x1/8	5.50	5.02	151.6 K=1.00	6.501	0.4844	-158.43	3149.09	0.050 ✔

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	118 - 100	1 3/4	18.00	4.50	123.4	30.000	2.4053	11399.10	72158.50	0.158 ✔
T2	100 - 80	2 1/2	20.00	5.00	96.0	30.000	4.9087	49126.20	147262.00	0.334 ✔
T3	80 - 60	2 3/4	20.02	5.00	87.4	30.000	5.9396	82675.90	178187.00	0.464 ✔
T4	60 - 40	3	20.02	5.00	80.1	30.000	7.0686	110892.00	212058.00	0.523 ✔
T5	40 - 20	3 1/4	20.02	5.22	77.0	30.000	8.2958	132670.00	248873.00	0.533 ✔
T6	20 - 0	3 1/2	20.02	5.19	71.1	30.000	9.6211	155511.00	288634.00	0.539

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 $\frac{P}{P_a}$
										✔

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	118 - 100	L2x2x1/8	7.11	3.32	66.3	21.600	0.4844	2565.57	10462.50	0.245 ✔
T2	100 - 80	L2x2x3/16	7.43	3.44	69.5	21.600	0.7150	5615.26	15444.00	0.364 ✔
T3	80 - 60	L2x2x3/16	8.45	4.06	81.7	21.600	0.7150	4175.34	15444.00	0.270 ✔
T4	60 - 40	L2x2x3/16	9.70	4.68	93.6	21.600	0.7150	4766.84	15444.00	0.309 ✔
T5	40 - 20	L3x3x1/4	13.88	6.88	90.5	21.600	1.4400	6269.62	31104.00	0.202 ✔
T6	20 - 0	L3x3x1/4	14.96	7.40	97.2	21.600	1.4400	6163.93	31104.00	0.198 ✔

Secondary Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P lb	Allow. P_a lb	Ratio $\frac{P}{P_a}$
T5	40 - 20	L2x2x1/8	9.61	9.07	179.0	21.600	0.4844	366.12	10462.50	0.035 ✔
T6	20 - 0	L2x2x1/8	10.36	9.80	193.0	21.600	0.4844	405.40	10462.50	0.039 ✔

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	118 - 100	L2x2x1/8	5.50	5.08	102.6	21.600	0.4844	534.18	10462.50	0.051 ✔
T3	80 - 60	L2x2x1/8	5.50	5.02	101.4	21.600	0.4844	64.84	10462.50	0.006 ✔

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	SF*P_{allow} lb	% Capacity	Pass Fail
T1	118 - 100	Leg	1 3/4	1	-14513.40	31427.87	46.2	Pass
T2	100 - 80	Leg	2 1/2	31	-55744.10	102196.71	54.5	Pass
T3	80 - 60	Leg	2 3/4	58	-93440.00	138568.01	67.4	Pass
T4	60 - 40	Leg	3	88	-128046.00	179001.90	71.5	Pass
T5	40 - 20	Leg	3 1/4	115	-155969.00	216719.13	72.0	Pass
T6	20 - 0	Leg	3 1/2	136	-185263.00	265862.84	69.7	Pass
T1	118 - 100	Diagonal	L2x2x1/8	8	-2582.62	7820.75	33.0 47.2 (b)	Pass
T2	100 - 80	Diagonal	L2x2x3/16	34	-5705.94	11305.09	50.5 68.9 (b)	Pass
T3	80 - 60	Diagonal	L2x2x3/16	65	-4085.86	9276.71	44.0 51.2 (b)	Pass
T4	60 - 40	Diagonal	L2x2x3/16	98	-4808.64	7508.83	64.0	Pass
T5	40 - 20	Diagonal	L3x3x1/4	128	-6563.78	15833.11	41.5 76.4 (b)	Pass
T6	20 - 0	Diagonal	L3x3x1/4	149	-6354.83	13705.11	46.4 74.0 (b)	Pass
T5	40 - 20	Secondary Horizontal	L2x2x1/8	125	-345.15	1286.69	26.8	Pass
T6	20 - 0	Secondary Horizontal	L2x2x1/8	155	-424.14	1102.07	38.5	Pass
T1	118 - 100	Top Girt	L2x2x1/8	6	-561.12	4095.15	13.7	Pass
T3	80 - 60	Top Girt	L2x2x1/8	63	-158.43	4197.74	3.8	Pass
							Summary	
						Leg (T5)	72.0	Pass
						Diagonal (T5)	76.4	Pass
						Secondary Horizontal (T6)	38.5	Pass
						Top Girt (T1)	13.7	Pass
						Bolt Checks	76.4	Pass
						RATING =	**76.4**	**Pass**

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 1790 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 24.3 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 36.4 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 192 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 161 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 118 \cdot ft$	(User Input)	
Tower Width =	$W_t := 11.5 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 8.5 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 7.0 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 3.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 2.0 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 19.0 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Allowable Soil Bearing Capacity =	$q_s := 6000 \cdot psf$	(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 =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.5$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0\cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 16$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3\cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Pad Reinforcement:

Bar Size =	$BS_{top} := 9$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 1.125\cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 26$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 9$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.125\cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 26$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0\cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $$A_{bpier} := \frac{\pi\cdot d_{bpier}^{2}}{4} = 0.785\cdot in^{2}$$

Pad Top Reinforcement Bar Area = $$A_{btop} := \frac{\pi\cdot d_{btop}^{2}}{4} = 0.994\cdot in^{2}$$

Pad Bottom Reinforcement Bar Area = $$A_{bbot} := \frac{\pi\cdot d_{bbot}^{2}}{4} = 0.994\cdot in^{2}$$

Coefficient of Lateral Soil Pressure = $$K_p := \frac{1+\sin(\Phi_s)}{1-\sin(\Phi_s)} = 3$$

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

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 2.34 \cdot \text{ksf}$

$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 2.34 \cdot \text{ksf}$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 3.06 \cdot \text{ksf}$

$P_{ave} := \dfrac{P_{top} + P_{bot}}{2} = 2.7 \cdot \text{ksf}$

$T_p := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] = 2$

$A_p := W_f \cdot T_p = 38$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 102.6 \cdot \text{kip}$

Weight of Concrete = $WT_c := \left[\left(W_f^{\,2} \cdot T_f \right) + (3) \cdot \left(\dfrac{d_p^{\,2} \cdot \pi}{4} \cdot L_p \right) \right] \cdot \gamma_c = 130.566 \cdot \text{kip}$

Weight of Soil Above Footing = $WT_{s1} := \left[\left[W_f^{\,2} - (3) \cdot \left(\dfrac{d_p^{\,2} \cdot \pi}{4} \right) \right] \cdot \left(\left| L_p - L_{pag} - n \right| \right) \right] \cdot \gamma_s = 265.04 \cdot \text{kip}$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left[\dfrac{(L_p - L_{pag})^2 \cdot \tan(\Phi_s)}{2} \cdot W_f \right] \cdot \gamma_s = 27.808 \cdot \text{kip}$

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

$X_t := \text{if}(\text{Pos}_t, X_{t1}, X_{t2}) = 4.52$

$X_{off} := \dfrac{W_f}{2} - \left[\dfrac{(W_t \cdot \cos(30 \cdot \text{deg}))}{3} + X_t \right] = 1.66$

Total Weight = $WT_{tot} := WT_c + WT_{s1} = 395.6 \cdot \text{kip}$

Resisting Moment = $M_r := (WT_{tot}) \cdot \dfrac{W_f}{2} + S_u \cdot \dfrac{T_f}{3} + WT_{s2} \cdot \left[W_f + \dfrac{(L_p - L_{pag}) \cdot \tan(\Phi_s)}{3} \right] = 4390 \cdot \text{kip} \cdot \text{ft}$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 2008.7 \cdot \text{kip} \cdot \text{ft}$

Factor of Safety Actual = $FS := \dfrac{M_r}{M_{ot}} = 2.19$

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

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

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 150.201 \cdot kips$

Shear_Check := if($S_p > S_t$, "Okay", "No Good")

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 432 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 361$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 1143.17 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.954 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.56 \cdot ksf$

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

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 5.323$

Distance to Kern = $X_k := \frac{W_f}{6} = 3.167$

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

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 5.078$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \left(\frac{W_f}{2} - e\right)} = 3.139 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 3.139 \cdot ksf$

Pressure_Check := if($q_{adj} < q_s$, "Okay", "No Good")

Pressure_Check = "Okay"

Concrete Bearing Capacity:

Strength Reduction Factor = $\Phi_c := 0.65$ (ACI-2008 9.3.2.2)

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.687 \times 10^3 \cdot kips$ (ACI-2008 10.14)

Bearing_Check := if($P_b > LF \cdot C_t$, "Okay" , "No Good")

Bearing_Check = "Okay"

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 19.875 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.709 \cdot ksf$

$V_{req} := FL \cdot (X_t - .5 \cdot d_p - d) \cdot W_f = 18.375 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 422 \cdot kip$ (ACI-2008 11.2.1.1)

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

Beam_Shear_Check = "Okay"

Punching Shear: (Critical Section Located at a distance of d/2 from the face of pier) (ACI 11.11.1.2)

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 14.6$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 17$

Required Shear Strength = $V_{req} := FL \cdot (W_f^2 - A_{bo}) = 244 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 649.7 \cdot kip$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

Strength Reduction Factor = $\phi_m := .90$ (ACI-2008 9.3.2.1)

$$M_{nT} := LF \cdot \left[U_t \cdot \left(W_t \cdot \sin(60 \cdot deg) - \frac{d_p}{2} \right) + S_t \cdot \left(D_f + L_{pag} \right) \right] - WT_t \cdot X_{off} = 2 \times 10^6 \, lbf$$

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

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

Design Moment = $M_n := \dfrac{M_{nT} + M_{nS} + M_{nC}}{\phi_m} = 1.527 \times 10^3 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\dfrac{\left(\dfrac{f_c}{psi} - 4000 \right)}{1000} \right] \cdot 0.5 \right] & \text{otherwise} \end{cases} = 0.85$$

(ACI-200810.2.7.3)

$$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 155.512 \cdot in$$

$$A_s := \frac{M_n}{\left(f_y \cdot d \right)} = 15.366 \cdot in^2$$

$$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 2.325 \cdot in$$

$$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2} \right)} = 16.321 \cdot in^2$$

$$\rho := \frac{A_s}{b_{eff} d} = 0.06336 \cdot in$$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 16.3 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 25.8 \cdot in^2$$

Pad_Reinforcement_Bot := if(As_prov > As, "Okay", "No Good")

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 16.3 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 25.8 \cdot in^2$$

Pad_Reinforcement_Top := if(As_prov > As, "Okay", "No Good")

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 7.71 \cdot in$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

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

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 34.7 \cdot in$$

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 42 \cdot in$$

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

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 1017.88 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 5.09 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 12.57 \cdot in^2$

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

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 6.069 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 30 \cdot in$

Maximum Moment in Pier = $M_p := S_f(L_p) \cdot LF = 2720.9 \cdot in \cdot kips$

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

$$\begin{pmatrix} D & N & n & P_u & M_{xu} \end{pmatrix} := \begin{pmatrix} d_p \cdot 12 & NB_{pier} & BS_{pier} & \frac{C_t \cdot 1.333}{kips} & \frac{M_p}{in \cdot kips} \end{pmatrix}$$

$$\begin{pmatrix} D & N & n & P_u & M_{xu} \end{pmatrix} = \begin{pmatrix} 36 & 16 & 8 & 255.936 & 2.721 \times 10^3 \end{pmatrix}$$

$$\begin{pmatrix} \phi P_n & \phi M_{xn} & f_{sp} & \rho \end{pmatrix} := \begin{pmatrix} 0 & 0 & 0 & 0 \end{pmatrix}$$

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

$$\begin{pmatrix} \phi P_n & \phi M_{xn} & f_{sp} & \rho \end{pmatrix} = \begin{pmatrix} 1.018 \times 10^3 & 1.082 \times 10^4 & -58.479 & 0.012 \end{pmatrix}$$

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

Axial_Load_Check = "Okay"

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

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 81 \cdot in$

$L_{pad} := T_f - Cvr_{pad} = 21 \cdot in$

Tension: (ACI-2008 12.2.3)

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

Transverse Reinforcement = $k_{tr} := 0$ (ACI-2008 12.2.3)

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 27.39 \cdot in$$

Minimum Development Length = $L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 15.336 \cdot in$ (ACI 12.2.1)

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

$L_{db} := max\left(L_{dbt}, L_{dbmin}\right) = 27.386 \cdot in$

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

$L_{tension\_Check} = \text{"Okay"}$

Compression: (ACI-2008 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 21.909 \cdot in$$

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

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 21.909 \cdot in$

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

$L_{compression\_Check} = \text{"Okay"}$

Tie Size and Spacing in Column:

Minimum Tie Size = $Tie_{min} := if(BS_{pier} \le 10, 3, 4) = 3$

Used #4 Ties

Seismic Factor = $z := if(Z \le 2, 1, 0.5) = 1$ (ACI-2008 21.10.5)

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

$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 24 \cdot in$

$s_{lim3} := D_f \cdot z = 102 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing = $s_{tie} := min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) = 16 \cdot in$

Number of Ties Required = $n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 5.875$

Check Anchor Steel Embedment:

Depth Available = $D_{ab} := L_{st} - A_{BP} = 5.83 \cdot ft$

Length of Anchor Bolt = $L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot in}{\sqrt{f_c \cdot psi}} = 12.55 \cdot ft$

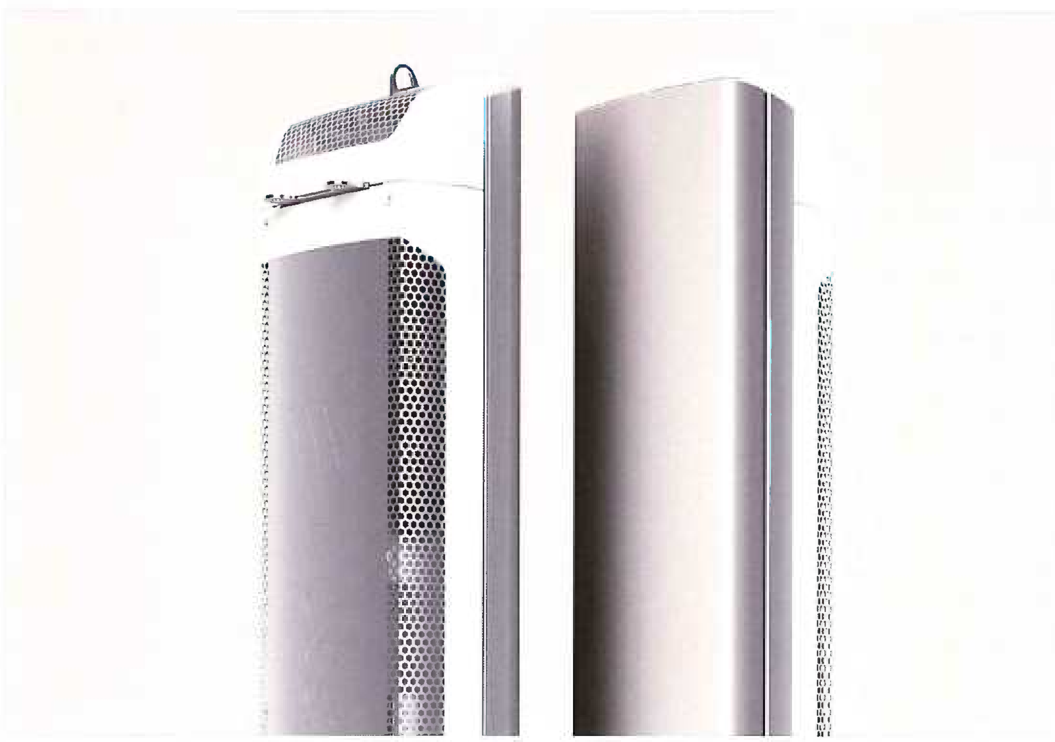
$Depth\_Check := if(D_{ab} \ge L_{anchor}, "Okay", "No Good")$

$Depth\_Check = "No Good"$

Note: OK, Anchor plate is provided

DATA-SHEET FOR

AIR 21, 1.3 M, B2A B4P



The Antenna-Integrated Radio (AIR) is a single tower-mounted unit that can replace the antenna/s and radio for one sector. Additional electronics such as ASC? and a RET Actuator and control are also included. A passive antenna function for an extra band is optional.

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ANTENNA-INTEGRATED RADIO

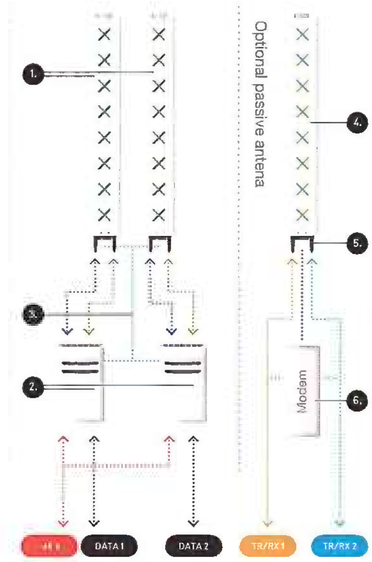
Figure 2 →
Three-sector tower site with three AIR units.e

The Antenna-Integrated Radio (AIR) is a single tower-mounted unit that can replace the antenna/s and radio for one sector. Additional electronics such as ASC? and a RET Actuator and control are also included. A passive antenna function for an extra band is optional. (The option has to be specified when ordering, retrofit is not possible).
The height and width are the same as for a passive antenna with similar characteristics. The depth is increased to house the radios' electronics. Digital Units (DUs) from Ericsson's RBS 6000 family provide the baseband function and support GSM, WCDMA and LTE.

Digital Units (DUs) from Ericsson's RBS 6000 family provide the baseband function and support GSM, WCDMA and LTE.

One or two DUs, depending on capacity and the standards to be supported, are needed for a three-sector site with AIR units.

The AIR is especially suited for state of the art mobile broadband basestations utilizing advanced MIMO techniques. Less tower-mounted equipment is required and the unit's attractive appearance enables it to blend in well with other existing equipment. The same applies to sites with multiple access technologies on different frequency bands. With Air, it is only necessary to swap antennas in order to add new 3G/4G technology on-site or at a new site. The AIR also saves power compared to traditional macro RBSs that use long feeders for antenna connections.



← Figure 2
Example of hardware that a single AIR unit can replace

Functionality for the AIR unit
Figure 2 shows an example of the hardware that a single AIR unit can replace. The function of the AIR unit is the same, but the implementation is different.
The AIR unit's active band has two radios (2) connected to a pair of cross-polarized antenna arrays (1). Remote electrical tilt (3) is included. Air supports 2 TX for the down-link and 4 RX for the up-link.
The passive antenna function on the frequency band not used by the AIR unit's active part is optional. The passive function includes an antenna array (4) and a RET motor (5) with a modem to control it (6).
The tilts for the active part and the passive part are controlled independently, but each band has the same tilt for both arrays and for both polarizations.

Configuration Example
Figure 3 shows a typical configuration with WCDMA with 2 x 2 MIMO for Band 1.
One AIR unit is deployed in each sector.
A common base band unit with a DUW inside provides base band processing and back-haul.
The AIR units can be specified with passive antennas for Band 4.

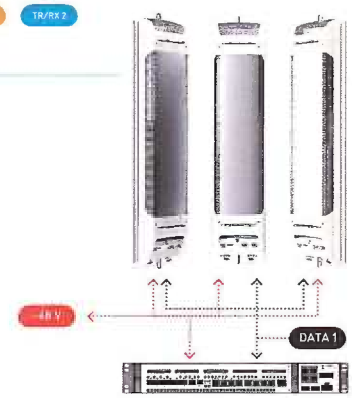
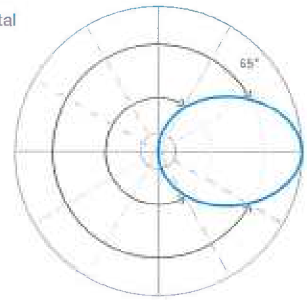


Figure 3 →
Three sector configuration example: RBS 6601 with three AIR units.

Figure 4
Antenna
Characteristics

Horizontal
pattern



Vertical pattern
2° to 10°
electrical
down-tilt

Technical Specification

RADIO	
Active frequency band	Band 2 (1850-1910 / 1930-1990 MHz)
Passive frequency band (optional)	Band 4 (1710-1755 / 2110-2155 MHz)
Downlink EIRP in bore-sight direction for the active band	2 x 63 dBm
Uplink sensitivity	TBD*
Remote electrical tilt	-2° to -12°, independently controlled per frequency band
MIMO	2 x 2 for DL 4 RX branches to be used for diversity/beam-steering
Instantaneous bandwidth	20 MHz
Capacity (single standard per sector)	Up to 8 carriers GSM Up to 4 carriers WCDMA with 2 x 2 DL MIMO Up to 20 MHz LTE with 2 x 2 DL MIMO
Multi-RAT capability	Single standard or two simultaneous standards (Capacity above is reduced for multi-RAT)
Bore-sight antenna gain for passive antenna option	17.5 dBi
Nominal beam-width, azimuth	65°
Nominal beam-width, elevation	7°
Additional antenna parameters	See Figure 3
MECHANICAL	
Weight	32 kg (70 lb) for active only 38 kg (83 lb) for active and passive
Size (H x W x D)	56" x 12" x 8" (1422 mm x 300 mm x 200 mm)
Wind load (frontal/lateral/rear-side) @ 150 km/h wind speed	580 N / 300 N / 720 N
INTERFACES	
AIR – DU	DATA 1, Data 2: CPRI links (SFP modules with LC socket + flanges that match protective cover TYCO C20611458)
Power	- 48 V DC (TYCO/Ericsson RPT 447 04)
Passive antenna (option)	TX/RX 1, TX/RX 2: RF connectors (7/16 female)
SUPPORTING BASE-BAND	
RBS 6601	One or two units depending on configuration.

* Target: 1 dB better than best-in-class RRU connected to same size best-in-class antenna
** Other base-band configurations are available

DOUBLE TMA 17/21, PREMIUM

3GPP/AISG compatible with RET interface

Improving a radio uplink by using tower mounted amplifiers is perceived as a key method of optimizing radio networks. By ensuring maximum coverage including in-door penetration, a TMA supports the design of cost-efficient networks and extended talk-time handsets, low dropped call rates and high traffic billing.

TMA design
This Double Premium TMA for 17/2100 MHz has 12dB gain and is 3GPP/AISG 2.0 compatible, with a RET interface. It has superior RF performance, small size and low weight. There is a corresponding TMA version called ASC that has a higher gain and a VSWR measuring coupler.

System integration
The Double TMA 17/2100 is a part of Ericsson's TMA family. Power, control and supervision are provided by the RBS 3000. If sold to other RBS brand installations, it can be controlled and supervised from the "Antenna System & TMA Control Module", AST-CM, via the RF feeder.

3GPP/AISG
TMA communication is based on the 3GPP/AISG protocol standard and has a RET port for controlling antenna RET units. The communication port allows multiple RETs or Antenna Line Devices to be supervised and controlled via the TMA.

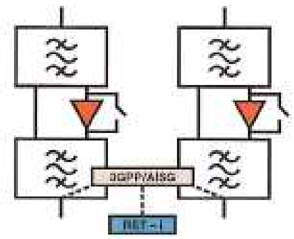
Future-proof
The Double TMA 17/21 Premium is designed for co-existence with future complementary, mast-mounted devices.

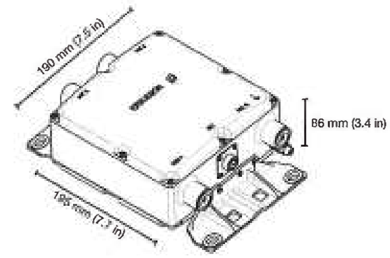
Excellent reliability
As the world's largest supplier of TMAs, Ericsson has a well-proven track record of reliable TMA designs. Reliability enhancing features include dual LNAs, weatherproof design, integrated alarm and lightning protection.

ERICSSON

Features

- Specified and verified as an integrated system solution for Ericsson RBSs
- Possible to power both TMAs from one feeder, or from both feeders
- High power capacity
- Automatic LNA by-pass function
- Built in lightning protection
- Excellent RF performance
- Connectors "in line"
- Distance between connectors simplifies sealing work
- A range of accessories for flexible site configurations





Technical Specifications for Double TMA 1700/2100, MHz Premium

Product name	**Product number**
Double TMA 17/21, Premium 3GPP/ASIG compatible with RET interface	KRY 112 144/1
Radio performance	
Bandwidth:	45 MHz
Receiving pass band:	1710 - 1755 MHz
Transmitting pass band:	2110 - 2155 MHz
RX Gain:	12± 1 dB
Input IP3:	16 dBm*
IM3 at antenna port (2x43dBM):	-128 dBm
Noise figure midband:	1.0 dB*
TX max input power (Max Peak):	57 dBm
TX insertion loss:	0.25 dB*
RX return loss:	22 dB*
TX return loss:	22 dB*
Electrical specifications	
Input power:	+12 - 32 VDC
Power consumption:	< 4.5 W
Mechanical specifications	
Dimensions (W x H x D):	155 x 176 x 71 mm
Weight:	5 kg
RF connectors:	7-16 DIN female
Ground connectors:	M8
DC/Alarm:	Superimposed on the RF signal
Mounting:	Pole or wall mounting
RET connectors:	Din con. IEC 60130-9 - Ed. 3.0 female
Environmental specifications	
Temperature range, full performance:	-40°C - +55°C
MTBF:	80 years
Sealing:	IP67
Lightning protection:	IEC 62305-1, IEC 61000-6
Safety approval:	International: CB certified, IEC 60 529 Europe: EN 60 529 North America: NRTL, NEMA 3R
Safety standard:	UL 60950-1, IEC 60950-1

* Typical values

Ericsson AB
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36/287 01 - FGC 101 764, rev A

EXHIBIT C

EBI Consulting

environmental | engineering | due diligence

RADIO FREQUENCY EMISSIONS ANALYSIS REPORT
EVALUATION OF HUMAN EXPOSURE POTENTIAL
TO NON-IONIZING EMISSIONS

T-Mobile Existing Facility

Site ID: CT11346C

Optasite Wilton
160 Deer Run Road
Wilton, CT 06897

November 13, 2014

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general public allowable limit:	**53.28 %**

21 B Street · Burlington, MA 01803 · Tel: (781) 273.2500 · Fax: (781) 273.3311

EBI Consulting
environmental | engineering | due diligence

November 13, 2014

T-Mobile USA
Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, CT 06002

Emissions Analysis for Site: **CT11346C – Optasite Wilton**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **160 Deer Run Road, Wilton, CT**, for the purpose of determining whether the emissions from the Proposed T-Mobile Antenna Installation located on this property are within specified federal limits.

All information used in this report was analyzed as a percentage of current Maximum Permissible Exposure (% MPE) as listed in the FCC OET Bulletin 65 Edition 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter (μW/cm2). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

All results were compared to the FCC (Federal Communications Commission) radio frequency exposure rules, 47 CFR 1.1307(b)(1) – (b)(3), to determine compliance with the Maximum Permissible Exposure (MPE) limits for General Population/Uncontrolled environments as defined below.

General population/uncontrolled exposure limits apply to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Therefore, members of the general public would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu W/cm^2$). The general population exposure limit for both the PCS and AWS bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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Occupational/controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment and in which those persons who are exposed have been made fully aware of the potential for exposure and can exercise control over their exposure. Occupational/controlled exposure limits also apply where exposure is of a transient nature as a result of incidental passage through a location where exposure levels may be above general population/uncontrolled limits (see below), as long as the exposed person has been made fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Additional details can be found in FCC OET 65.

CALCULATIONS

Calculations were done for the proposed T-Mobile Wireless antenna facility located at **160 Deer Run Road, Wilton, CT**, using the equipment information listed below. All calculations were performed per the specifications under FCC OET 65. Since T-Mobile is proposing highly focused directional panel antennas, which project most of the emitted energy out toward the horizon, all calculations were performed assuming a lobe representing the maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was focused at the base of the tower. For this report the sample point is the top of a 6 foot person standing at the base of the tower.

For all calculations, all equipment was calculated using the following assumptions:

1) 2 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel

2) 2 UMTS channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

4) All radios at the proposed installation were considered to be running at full power and were uncombined in their RF transmissions paths per carrier prescribed configuration. Per FCC OET Bulletin No. 65 - Edition 97-01 recommendations to achieve the maximum anticipated value at each sample point, all power levels emitting from the proposed antenna installation 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.

5) For the following calculations the sample point was the top of a six foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications minus 10 dB was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

6) The antennas used in this modeling are the **Ericsson AIR21 B4A/B2P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels. This is based on feedback from the carrier with regards to anticipated antenna selection. The **Ericsson AIR21 B4A/B2P** has a maximum gain of **15.9 dBd** at its main lobe. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.

7) The antenna mounting height centerline of the proposed antennas is **118 feet** above ground level (AGL).

8) Emissions values for additional carriers were taken from the Connecticut Siting Council active database. Values in this database are provided by the individual carriers themselves.

All calculations were done with respect to uncontrolled / general public threshold limits.

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	118	Height (AGL):	118	Height (AGL):	118
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	2	Channel Count	2	# PCS Channels:	2
Total TX Power:	120	Total TX Power:	120	# AWS Channels:	120
ERP (W):	1,906.06	ERP (W):	1,906.06	ERP (W):	1,906.06
Antenna A1 MPE%	1.34	Antenna B1 MPE%	1.34	Antenna C1 MPE%	1.34
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P	Make / Model:	Ericsson AIR21 B4A/B2P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	118	Height (AGL):	118	Height (AGL):	118
Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz(PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power:	120	Total TX Power:	120	Total TX Power:	120
ERP (W):	1,906.06	ERP (W):	1,906.06	ERP (W):	1,906.06
Antenna A2 MPE%	1.34	Antenna B2 MPE%	1.34	Antenna C2 MPE%	1.34

Site Composite MPE%	
Carrier	**MPE%**
T-Mobile	**8.03**
AT&T	19.83 %
Verizon Wireless	25.42 %
Site Total MPE %:	**53.28 %**

T-Mobile Sector 1 Total:	2.68 %
T-Mobile Sector 2 Total:	2.68 %
T-Mobile Sector 3 Total:	2.68 %
Site Total:	53.28 %

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Summary

All calculations performed for this analysis yielded results that were **within** the allowable limits for general public exposure to RF Emissions.

The anticipated maximum composite contributions from the T-Mobile facility as well as the site composite emissions value with regards to compliance with FCC's allowable limits for general public exposure to RF Emissions are shown here:

T-Mobile Sector	Power Density Value (%)
Sector 1:	2.68 %
Sector 2:	2.68 %
Sector 3 :	2.68 %
T-Mobile Total:	8.03 %
Site Total:	53.28 %
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **53.28%** of the allowable FCC established general public limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

FCC guidelines state that if a site is found to be out of compliance (over allowable thresholds), that carriers over a 5% contribution to the composite value will require measures to bring the site into compliance. For this facility, the composite values calculated were well within the allowable 100% threshold standard per the federal government.

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