COHEN and WOLF P.C.
ATTORNEYS AT LAW

JULIE D. KOHLER

PLEASE REPLY TO: Bridgeport
WRITER'S DIRECT DIAL: (203) 337-4157
E-Mail Address: jkohler@cohenandwolf.com

May 2, 2014

Attorney Melanie Bachman
Acting Executive Director
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: Notice of Exempt Modification
The Connecticut Light and Power Company/T-Mobile co-location
Site ID CT11111A
20 Barnabas Road, Newtown, Connecticut

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, the Connecticut Light and Power Company owns the existing lattice tower and related facility located at 20 Barnabas Road, Newtown, Connecticut (Latitude: 41.427778 Longitude: -73.343722). T-Mobile intends to replace three antennas and related equipment at this existing telecommunications facility in Newtown ("Newtown 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, copies of this letter are being sent to the First Selectman, Earnest Patricia Llodra, and the property owner, Barnabas Realty Group General Partnership.

The existing Newtown Facility consists of a 180 foot tall lattice tower, approved by the Council in Docket No. 144.[1] T-Mobile plans to replace three antennas and three TMAs (tower mounted amplifiers) with six antennas and three TMAs mounted on three proposed mounts at a centerline of 149 feet. (See the plans revised to March 24, 2014 attached hereto as Exhibit A). T-Mobile will also install a new equipment cabinet on the existing concrete pad, install fiber cable and coax cable, and reuse some coax cable. The existing Newtown Facility is structurally capable of supporting T-Mobile's proposed modifications, as indicated in the structural analysis dated March 3, 2014 and attached hereto as Exhibit B.[2]

[1] The Decision and Order in this docket (dated November 20, 1991) contains no relevant requirements or limitations on the configuration of the Newtown Facility.
[2] The structural analysis provides that the tower is adequate to support the proposed equipment with the reinforcements detailed in Section 4 in the report. Those reinforcements will be completed prior to the installation of the proposed modifications.

The planned modifications to the Newtown 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 replacement antennas will be installed at a centerline of 149 feet, merely replacing existing antennas located at the same 149 foot elevation. 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 of the site boundaries. T-Mobile's equipment will be located entirely within the existing compound and equipment pad as shown on Sheet A-1 of Exhibit A.

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

4 . The operation of the replacement antennas 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 April 30, 2014, T-Mobile's operations would add 0.510% 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 68.940% of the FCC Standard as calculated for a mixed frequency site as evidenced by the engineering exhibit attached hereto as Exhibit C.

CL&P has authorized the filing of this exempt modification as evidenced by the letter of authorization dated April 24, 2014 attached hereto as Exhibit D.

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

Sincerely,

Julie D. Kohler, Esq.

cc: Town of Newtown, First Selectman Patricia Llodra
Connecticut Light and Power Company
Barnabas Realty Group General Partnership
HPC Wireless Services, Halene Fujimoto

T-MOBILE USA, INC.
12920 SE 38TH STREET
BELLEVUE, WA 98006
(425) 378-4000

2772734
2/12/2014
2000011160

Invoice Number	Inv. Date	Description	Deductions	Voucher	Amount Paid
CT11111A-1	2/11/2014	Exempt Mod Filing Fees	0.00	1100282271	625.00

DO NOT ACCEPT THIS CHECK UNLESS THE FACE FADES FROM BLACK TO RED WITH LOGO IN BACKGROUND. THE BACK OF THIS DOCUMENT HAS HEAT-SENSITIVE INK THAT CHANGES FROM ORANGE TO YELLOW.

COPYBAN CAPTURE ANTI-FRAUD PROTECTION

T-MOBILE USA, INC.
12920 SE 38th Street
Bellevue, WA 98006
(425) 378-4000

The Bank of New York Mellon
Pittsburgh, PA
60-160/433

2772734
2/12/2014
VID 2000011160

PAY $625 00
SIX TWO FIVE CTS CTS

*$625.00

Six Hundred Twenty Five Dollars Only*******

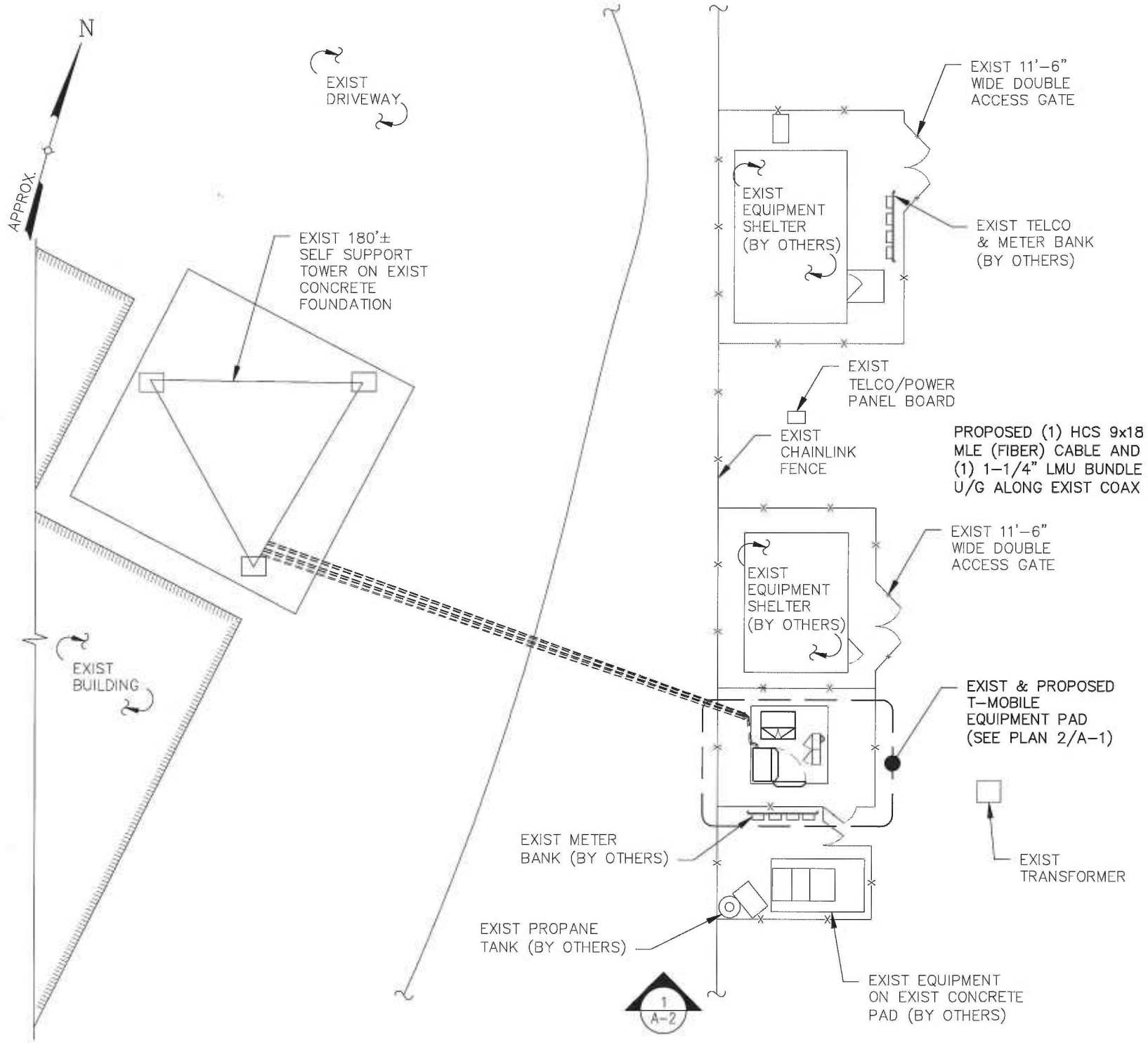
To The Order Of
CONNECTICUT SITING COUNCIL
10 FRANKLIN SQ
NEW BRITAIN, CT 06051

VOID AFTER 180 DAYS
THIS CHECK CLEARS THROUGH POSITIVE PAY

⑈000 2772734⑈ ⑆043301601⑆ 013⑈8430⑈

THE ORIGINAL DOCUMENT HAS A REFLECTIVE WATERMARK ON THE BACK. HOLD AT AN ANGLE TO VIEW, DO NOT CASH IF MISSING.

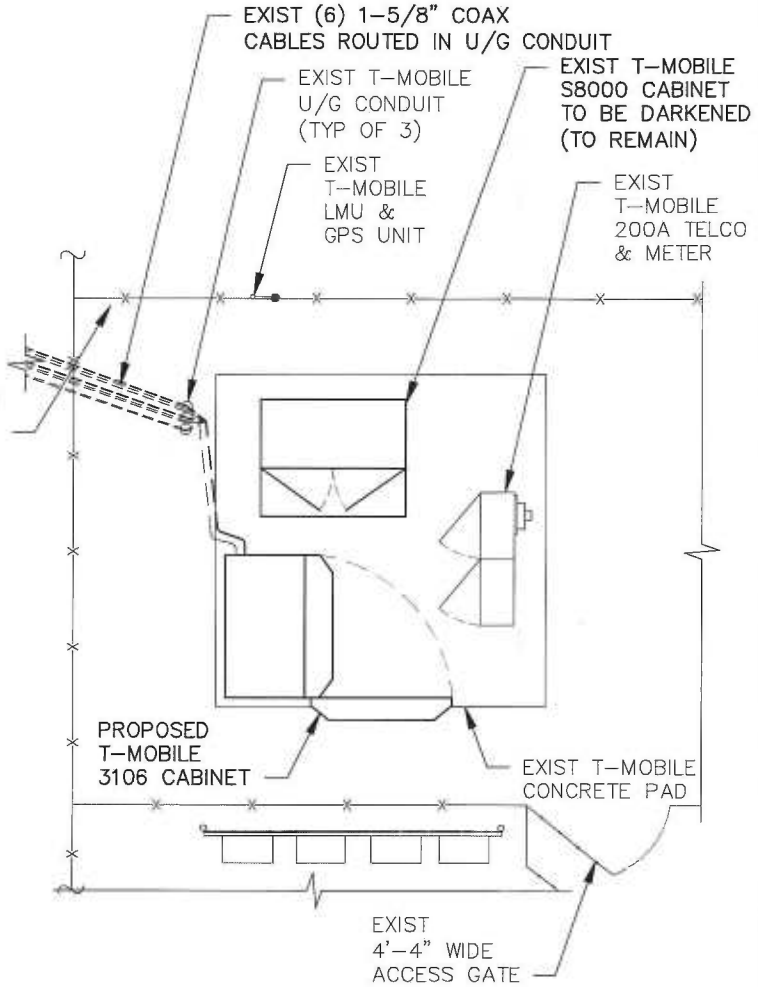
EXHIBIT A



1 A-1 SITE PLAN

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

HCS LENGTH			
FROM EQUIPMENT CABINET TO ANTENNA			
SECTOR	ALPHA	BETA	GAMMA
LENGTH	200'±	200'±	200'±
SIZE	1-5/8"		
HCS 9x18 MLE			



2 A-1 EQUIPMENT PLAN

SCALE: 3/16" = 1'-0"

NOTES:
1. CONTRACTOR SHALL FIELD VERIFY THE ADEQUACY TO ROUTE THE HCS 9x18 MLE (FIBER) CABLE ALONG THE EXTERIOR OF SELF SUPPORT TOWER PRIOR TO CONSTRUCTION.
2. CONTRACTOR TO MATCH ANTENNA AZIMUTHS AND DOWNTILTS TO EXISTING CONDITION AND NOTIFY RF ENGINEER OF ANY DISCREPANCY.
3. LOCK & TAG BREAKERS FOR ALL EQUIPMENT BEING TURNED OFF (WHEN APPLICABLE).
4. CONTRACTOR TO RE-VERIFY CABLE LENGTHS PRIOR TO CONSTRUCTION.
5. SEE RFDS FOR FINAL EQUIPMENT CONFIGURATION.

CONFIGURATION
2C
REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • SURVEYING
• ENGINEERING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile
NORTHEAST LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS

T-MOBILE _____
LANDLORD _____
RF _____
CONSTRUCTION _____

PROJECT NUMBER	DESIGNED BY
6644.CT11111A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/24/14	FOR COMMENT	MP

ISSUED BY _____ DATE _____

SITE INFORMATION

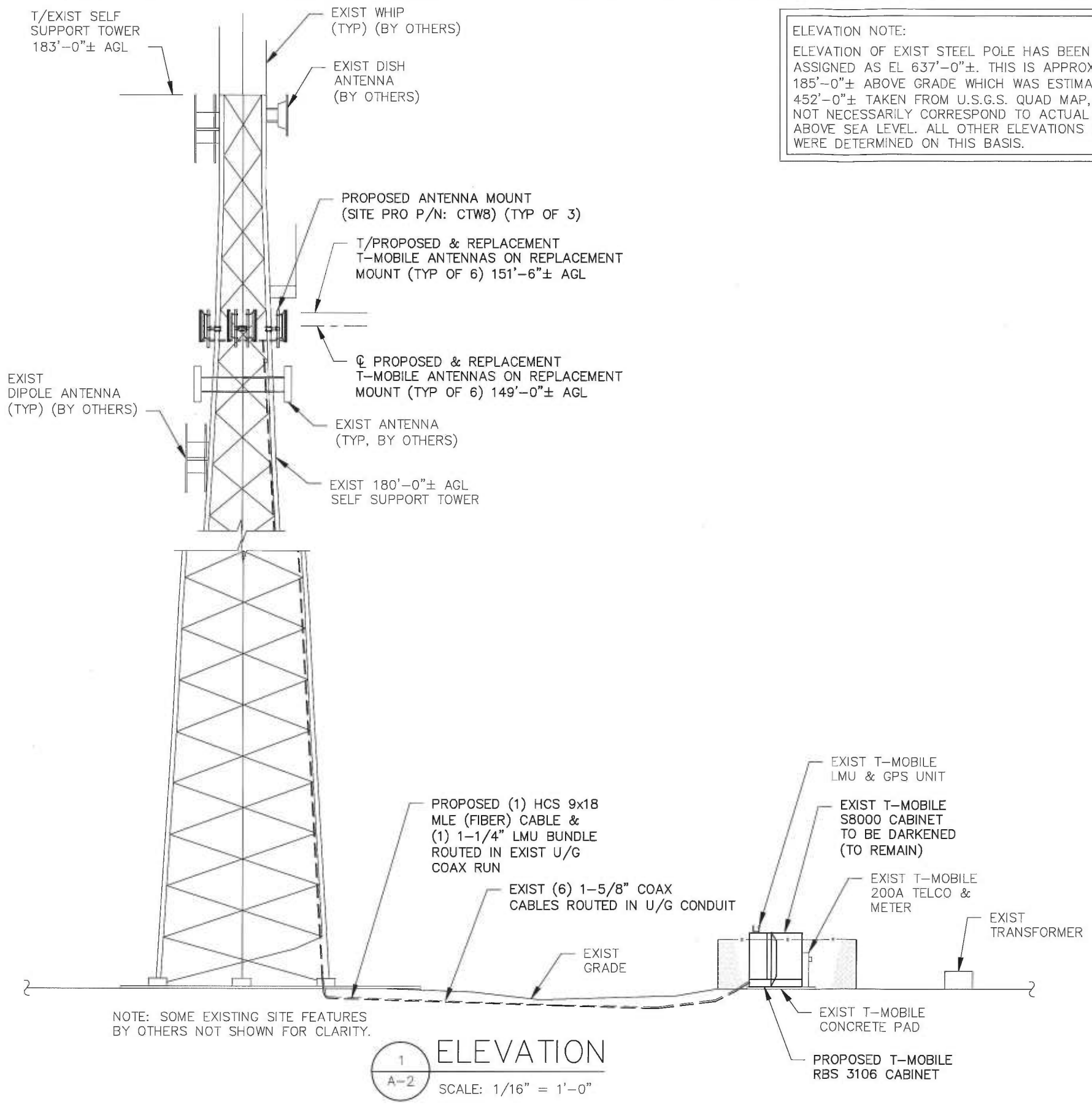
CT11111A
NEWTOWN/I-84 X9
NEWTON SERVICE CENTER
20 BARNABAS RD
NEWTON, CT 06470

SHEET TITLE

EQUIPMENT PLAN & SITE PLAN

SHEET NUMBER

A-1



1 / A-2 ELEVATION

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

ELEVATION NOTE:

ELEVATION OF EXIST STEEL POLE HAS BEEN ARBITRARILY ASSIGNED AS EL 637'-0"±. THIS IS APPROXIMATELY 185'-0"± ABOVE GRADE WHICH WAS ESTIMATED AS EL 452'-0"± TAKEN FROM U.S.G.S. QUAD MAP, AND DOES NOT NECESSARILY CORRESPOND TO ACTUAL ELEVATION ABOVE SEA LEVEL. ALL OTHER ELEVATIONS INDICATED WERE DETERMINED ON THIS BASIS.

NOTE:

REFER TO STRUCTURAL ANALYSIS BY CENTEK DATED 03/03/14 FOR PROPOSED TOWER REINFORCEMENT.

CONFIGURATION

2C

REFER TO LATEST T-MOBILE RF DATA SHEET FOR FINAL RF DESIGN & BOM.

0 1 2 3

ORIGINAL SIZE IN INCHES

TECTONIC
• PLANNING • ENGINEERING • SURVEYING • CONSTRUCTION MANAGEMENT
TECTONIC Engineering & Surveying Consultants P.C.
1279 Route 300
Newburgh, NY 12550
Phone: (845) 567-6656
Fax: (845) 567-8703

T-Mobile
NORTHEAST LLC.
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

APPROVALS

T-MOBILE _____
LANDLORD _____
RF _____
CONSTRUCTION _____

PROJECT NUMBER	DESIGNED BY
6644.CT11111A	JQ

REV	DATE	REVISION	DRAWN BY
0	03/24/14	FOR COMMENT	MP

ISSUED BY | DATE

SITE INFORMATION

CT11111A
NEWTOWN/I-84 X9
NEWTON SERVICE CENTER
20 BARNABAS RD
NEWTON, CT 06470

SHEET TITLE

ELEVATION

SHEET NUMBER

A-2

EXHIBIT B

CENTEK engineering

Centered on Solutions℠

Structural Analysis and Tower Reinforcement Report

180-ft Existing ROHN SSV Lattice Tower

Proposed T-Mobile
Antenna Upgrade

T-Mobile Site Ref: CT11111A

20 Barnabas Road
Newtown, CT 06470

CENTEK Project No. 14025.002

~~Date: February 4, 2014~~
Rev 1: March 3, 2014

Prepared for:
T-Mobile Towers
4 Sylvan Way
Parsippany, NJ 07054

63-2 North Branford Road, Branford, CT 06405 203.488.0580 Fax 203.488.8587 www.CentekEng.com

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 Northeast Utilities self supporting lattice tower located in Newtown, Connecticut.

The host tower is a 180-ft three legged, tapered steel lattice tower originally designed and manufactured by UNR-ROHN. The tower geometry and structure member sizes were obtained from a tower mapping report prepared by CSB Communications LLC, dated August 22, 2006 and a previous structural analysis and reinforcement design report prepared by Centek Engineering, Inc., for Verizon, project no. 13118 (Rev. 1), dated November 13, 2013.

Antenna and appurtenance inventory were obtained from a combination of the aforementioned Centek Engineering, Inc. structural analysis and reinforcement design report and a T-Mobile RF data sheet.

The existing tower consists of nine (9) tapered steel pipe leg sections conforming to ASTM A572-50. Diagonal lateral support bracing consists of single angle steel sections conforming to ASTM A36. All tower connections are bolted. The width of the tower face is 8.56-ft at the top and 24.86-ft at the base.

T-Mobile proposes the removal of three (3) panel antennas and three (3) TMA's and the installation of six (6) panel antennas and three (3) TMA's mounted on three proposed mounts. Refer to the Antenna and Appurtenance Summary below for a detailed description of the proposed antenna and appurtenance configuration.

Antenna and Appurtenance Summary

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

- NEU (Existing):
  Antenna: One (1) RFS PD220 Omni-directional whip antenna pipe mounted to the top of the existing tower with a RAD center elevation of ±191-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on the face of the existing tower as specified in Section 3 of this report.
- NEU (Existing):
  Antenna: One (1) 8-ft Omni-directional whip antenna mounted to the top of the existing tower with a RAD center elevation of ±189-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on the face of the existing tower as specified in Section 3 of this report.
- MUNICIPAL (EXISTING):
  Antenna: One (1) 10-ft 2 Bay dipole antenna mounted to the top of the existing tower with a RAD center elevation of ±188-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on the face of the existing tower as specified in Section 3 of this report.

- NEU (Existing):
  Antenna: One (1) 6-ft Microwave dish antenna mounted to the leg of the existing tower with a RAD center elevation of ±180-ft above grade level.
  Coax Cable: One (1) EW63 elliptical coax cable running on the face of the existing tower as specified in Section 3 of this report.
- NEU (Existing):
  Antenna: One (1) 12-ft 2 Bay Dipole antenna mounted to the leg of the existing tower with a RAD center elevation of ±176-ft above grade level.
  Coax Cable: One (1) 1/2" ∅ coax cable running on the face of the existing tower as specified in Section 3 of this report.
- NEU (Existing):
  Antenna: Two (2) Andrew DB586 Omni-directional whip antennas (one upright, one inverted) and one (1) TTA mounted to the leg of the existing tower on a 3-ft stand-off with a RAD center elevation of ±160-ft above grade level.
  Coax Cable: Two (2) 7/8" ∅ coax cables running on the face of the existing tower as specified in Section 3 of this report.
- MUNICIPAL (Existing):
  Antenna: One (1) 10-ft 2 Bay Dipole antenna mounted on one (1) 3-ft side arm with a RAD center elevation of ±144-ft above grade level.
  Coax Cable: One (1) 7/8" ∅ coax cable running on the face of the existing tower as specified in Section 3 of this report.
- AT&T (Existing):
  Antennas: Three (3) P65-16-XLH-RR panel antennas, three (3) Kathrein 800-10121 panel antennas and six (6) Powerwave LGP21401 TMA's mounted on three (3) SitePro1 10-ft Lightweight T-Arms with a RAD center elevation of 135-ft above grade level.
  Radios: Six (6) Ericsson Remote Radio Units, Part No. RRUS-11 mounted to three (3) faces of the existing tower at a RAD center elevation of 135-ft above grade level.
  Surge Arrestor: One (1) Raycap DC6-48-60-18-8F Surge Arrestor mounted to the leg of the existing tower with a RAD center elevation of 135-ft above grade level.
  Coax Cables: Nine (9) 1-5/8" ∅ coax cables and one (1) 5/8" ∅ fiber optic cable and two (2) #8 DC control cables running within one (1) 3" ∅ flex conduit running on the leg of the existing tower as specified in Section 3 of this report.
- VERIZON (Existing):
  Antennas: Six (6) Antel BXA-70063-6CF panel antennas, six (6) Antel BXA-171063-12CF panel antennas, three (3) Alcatel-Lucent RRH2x40-AWS Remote Radio Heads and three (3) Alcatel-Lucent RRH2x40-07-U Remote Radio Heads mounted to three (3) 12ft-6in. Heavy Duty V-Frames (Site PRO1 P/NVFA12 with a RAD center elevation of 126-ft above grade level.

- VERIZON (Existing):
  Misc Equipment: One (1) RFS DB-T1-6Z-8AB-0Z main distribution box flush mounted to the leg of the existing tower with a RAD center elevation of 126-ft above grade level.
  Coax Cables: Two (2) 1-5/8" ∅ Hybriflex fiber lines running on the East face of the existing tower adjacent to the existing municipal cables, as specified in Section 3 of this report.

- *SPRINT (Reserved – Interim configuration):*
  Antennas: *Four (4) Andrew/Decibel DB980F90E-M, two (2) Andrew/Decibel DB950G65E-M panel antennaS, two (2) RFS APXVSPP18-C-A20 panel antennas, one (1) Powerwave P40-16-XLPP-RR-A panel antenna, three (3) 1900MHz 4X45W RRH's and three (3) 800MHz 2X50W RRH's mounted on three (3) existing 10-ft boom gates with a RAD center elevation of ±91-ft above the tower base.*
  Coax Cables: Six (6) 1-5/8" ∅ coaxial cables and three (3) 1-1/4"∅ Hybriflex cables running on the leg of the existing tower as specified in Section 3 of this report.

- *SPRINT (Reserved – Final configuration):*
  Antennas: Two (2) RFS APXVSPP18-C-A20 panel antennas, one (1) Powerwave P40-16-XLPP-RR-A panel antenna, three (3) 1900MHz 4X45W RRH's and three (3) 800MHz 2X50W RRH's mounted on three (3) existing 10-ft boom gates with a RAD center elevation of ±91-ft above the tower base.
  Coax Cables: Three (3) 1-1/4"∅ Hybriflex cables running on the face of the existing tower as specified in Section 3 of this report.

  Note 1: All existing SPRINT equipment shall be removed upon the successful completion of the testing of the proposed equipment. The removal the existing SPRINT equipment shall be completed within a time frame acceptable to NEU.

- SPRINT (Existing):
  Antennas: One (1) GPS antenna mounted on one (1) 1-ft side arm with RAD center elevation of ±62-ft above grade level.
  Coax Cables: One (1) 1/2" ∅ coax cable running on the leg 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 of the existing tower as specified in Section 3 of this report.

- T-MOBILE (Existing to Remove):
  Antennas: Three (3) EMS RR-90-17-00DP panel antennas and three (3) TMA's mounted on three (3) 3-ft side arms with a RAD center elevation of ±149-ft above grade level.

- **T-MOBILE (Proposed):**
  Antennas: Six (6) Ericsson AIR 21 panel antennas and three (3) Ericsson KRY 112 144/1 TMA's mounted on three (3) proposed Site Pro Compact Tower Mounts p/n CWT8 with a RAD center elevation of ±149-ft above grade level.
  Coax Cables: One (1) 1-5/8" ∅ fiber cable and one (1) 1-1/4" ∅ LMU bundle running on a leg of the existing tower as specified in Section 3 of this report.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- **All coax cables routed as specified in Section 3 of this report.**
- **All calculations were performed using the interim configuration for Sprint's antenna loading.**
- **All reinforcements included within the structural reinforcement and modification design documents prepared by Centek Engineering, Inc., for Verizon Wireless; Centek Job No. 13118.000 dated November 13, 2013 must be completed prior to T-Mobile's antenna upgrade.**

Analysis

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

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

Tower Loading

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

Basic Wind Speed:	Fairfield; v = 85 mph (fastest mile)	*[Section 16 of TIA/EIA-222-F-96]*
	NU SUB-090; v = 85 mph (fastest mile)	*[Northeast Utilities Substation Standard 090]*
	Newtown; v = 95 mph (3 second gust) equivalent to v = 77.5 mph (fastest mile)	*[Appendix K of the 2005 CT Building Code Supplement]*
	NU–SUB-090 wind speed controls	
Load Cases:	Load Case 1; 85 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation. This load case typically controls the design.	*[Northeast Utilities Substation Standard 090]*
	Load Case 2; 85 mph wind speed w/ ½" radial ice plus gravity load – used in calculation of tower stresses. This load case typically controls the design of lattice towers.	*[Northeast Utilities Substation Standard 090]*
	Load Case 3; Seismic – not checked	*[Section 1614.5 of State Bldg. Code 2005] does not control in the design of this structure type*

Tower Capacity

Tower stresses were calculated utilizing the structural analysis software 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.

The tower deflection was evaluated with a wind velocity of 85 mph concurrent with 0.5" ice to determine twist (rotation) and sway (deflection) in accordance with NU SUB-90 requirements.

- Calculated stresses **with the proposed reinforcements outlined in section 4 of this report** were found to be within allowable limits. In Load Case 2, per tnxTower "Section Capacity Table", this tower was found to be at **85.9%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T10)	3'-0"-23'-0"	79.6%	**PASS**
Diagonal Bolts (T7)	103'-0-123'-0"	85.9%	**PASS**
Secondary Horizontal (T10)	3'-0"-23'-0"	84.4%	**PASS**

- The tower combined deflection is **0.5564 degrees**.

Deflection Criteria	Proposed (degrees)	Allowable (degrees)	Result
Sway (Tilt)	0.5556	0.5	**n/a**
Twist	0.0297	0.5	**n/a**
Combined	0.5564	0.5	**PASS** (2)

Note 2: *Under the proposed Load Case 2 above the tower marginally exceeds NU-SUB-90 limitation of 0.5 degrees. Tower deflection is subject to NEU approval.*

Foundation and Anchors

The existing foundation system consists of three (3) 2-ft 6in square reinforced concrete piers on three (3) 10-ft square x 2-ft deep reinforced concrete pads concentrically bearing on the existing sub grade, with subsequent mass concrete reinforcement located at grade. The existing foundation geometry was obtained from the aforementioned Centek structural report. The sub-grade conditions used in the analysis of the existing foundation were obtained from a geo-technical soil study prepared by Clarence Welti and Assoc., dated October 19, 2011. The tower legs are connected to the foundation with (6) 1.00"∅, ASTM A-449 (Fu = 120ksi) anchor bolts per leg.

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

Load Effect	Proposed Tower Reactions
Leg Shear	32 kips
Leg Compression	251 kips
Leg Tension	196 kips
Base Moment	54978 ft-kips
Base Shear	55 kips

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

Tower Section	Component	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	75.1%	**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)[4]	Proposed Loading (FS)[3]	Result
Reinforced Concrete Pad and Pier	Overturning	2.00	2.63	**PASS**

Note 3: FS denotes Factor of Safety

Conclusion

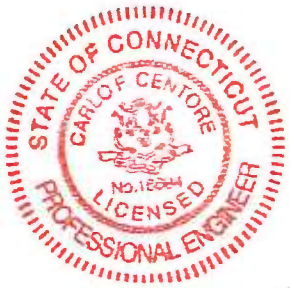
This analysis shows that the subject tower **with the proposed reinforcement detailed in section 4 of this report is adequate** to support the proposed modified antenna configuration.

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Carlo F. Centore, PE
Principal ~ Structural Engineer



Prepared by:

Timothy J. Lynn, 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:

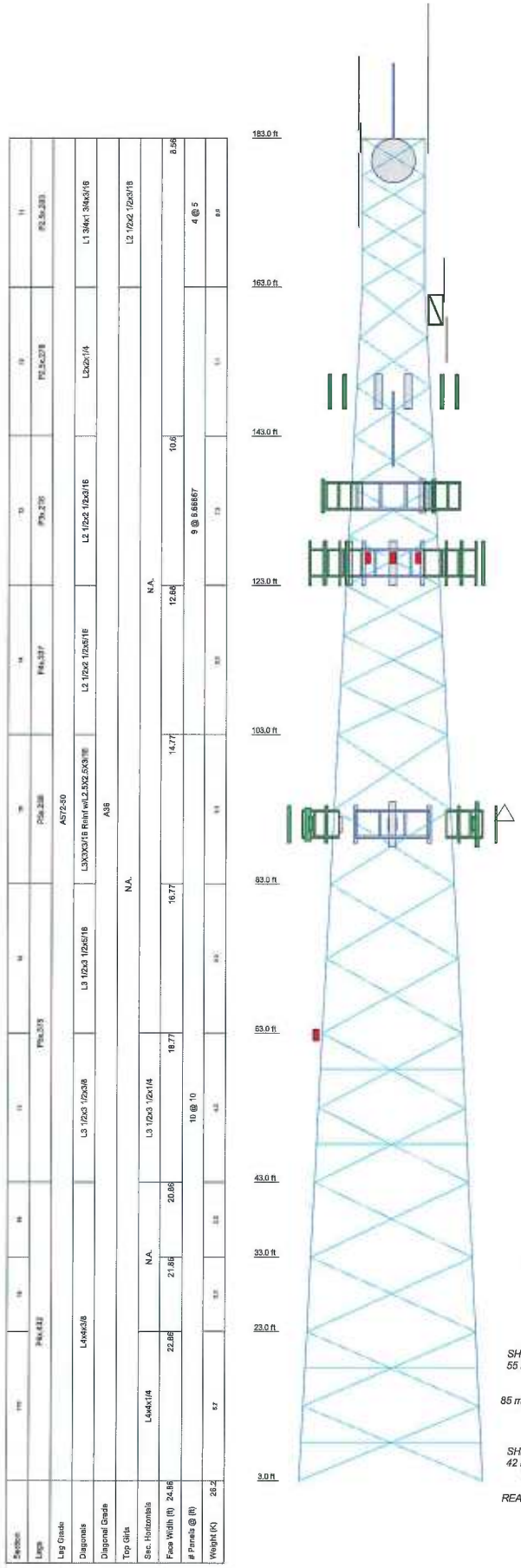
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information provided 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 RISA Tower, 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.



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
PD220 (NU)	191	DC6-48-60-18-8F Surge Arrestor (ATT)	135
2' Dia 8' Omni (NU)	189	10'6" Site Pro T-Arm (ATT)	135
10' 2-Bay Dipole (Municipal)	188	10'6" Site Pro T-Arm (ATT)	135
3'x2.5" Pipe Mount (NU)	183	BXA-70063/6CF (Verizon)	126
4'x4" Pipe Mount (NU)	183	BXA-70063/6CF (Verizon)	126
6'x4" Pipe Mount (NU Dish)	180	BXA-70063/6CF (Verizon)	126
6 FT DISH (NU)	180	BXA-70063/6CF (Verizon)	126
12' Dipole (NU)	176	BXA-70063/6CF (Verizon)	126
DB588-Y (NEU)	164	BXA-70063/6CF (Verizon)	126
3' Standoff (NEU)	160	BXA-171063-12CF (Verizon)	126
TMA (NEU)	160	BXA-171063-12CF (Verizon)	126
DB588-Y (NEU)	156	BXA-171063-12CF (Verizon)	126
AIR21 (T-Mobile - Proposed)	149	BXA-171063-12CF (Verizon)	126
AIR21 (T-Mobile - Proposed)	149	BXA-171063-12CF (Verizon)	126
AIR21 (T-Mobile - Proposed)	149	BXA-171063-12CF (Verizon)	126
AIR21 (T-Mobile - Proposed)	149	RRH2x40-07-U (Verizon)	126
AIR21 (T-Mobile - Proposed)	149	RRH2x40-07-U (Verizon)	126
AIR21 (T-Mobile - Proposed)	149	RRH2x40-07-U (Verizon)	126
KRY 112 TMA (T-Mobile - Proposed)	149	RRH2x40-AWS (Verizon)	126
KRY 112 TMA (T-Mobile - Proposed)	149	RRH2x40-AWS (Verizon)	126
KRY 112 TMA (T-Mobile - Proposed)	149	RRH2x40-AWS (Verizon)	126
Site Pro Compact Tower Mount CWTS (T-Mobile - Proposed)	149	DB-T1-6Z-8AB-0Z (Verizon)	126
		Site Pro Heavy Duty V-Frame (Verizon)	126
Site Pro Compact Tower Mount CWTS (T-Mobile - Proposed)	149	Site Pro Heavy Duty V-Frame (Verizon)	126
Site Pro Compact Tower Mount CWTS (T-Mobile - Proposed)	149	Site Pro Heavy Duty V-Frame (Verizon)	126
		FD-RRH 2x50 800 (Sprint)	91
10' 2-Bay Dipole (Municipal)	144	FD-RRH 2x50 800 (Sprint)	91
3' Standoff (Municipal)	139	FD-RRH 4x40 1900 (Sprint)	91
800 10121 (ATT)	135	FD-RRH 2x50 800 (Sprint)	91
10'6" Site Pro T-Arm (ATT)	135	(2) DB950G65E-M w/Mount Pipe (Sprint)	91
800 10121 (ATT)	135	(2) DB980F90E-M w/Mount Pipe (Sprint)	91
(2) LPG21401 TMA (ATT)	135	10' Frame (Sprint)	91
(2) LPG21401 TMA (ATT)	135	(2) DB980F90E-M w/Mount Pipe (Sprint)	91
800 10121 (ATT)	135	10' Frame (Sprint)	91
(2) LPG21401 TMA (ATT)	135	APXVSPP18-C-A20 w/ Mount (Sprint)	91
P65-16-XL w/ mount pipe (ATT)	135	APXVSPP18-C-A20 w/ Mount (Sprint)	91
P65-16-XL w/ mount pipe (ATT)	135	P40-16-XLPP-RR-A w/ Mount (Sprint)	91
P65-16-XL w/ mount pipe (ATT)	135	FD-RRH 4x40 1900 (Sprint)	91
(2) RRH (ATT)	135	FD-RRH 4x40 1900 (Sprint)	91
(2) RRH (ATT)	135	10' Frame (Sprint)	91
(2) RRH (ATT)	135	GPS (Sprint)	62
		1' Standoff (Sprint)	62

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for a 85 mph basic wind in accordance with the TIA/EIA-222-F Standard.
2. Tower is also designed for a 85 mph basic wind with 0.50 in ice.
3. Deflections are based upon a 85 mph wind.
4. Analysis per NU-SUB-090 Standard
5. TOWER RATING: 85.9%

MAX. CORNER REACTIONS AT BASE:
DOWN: 251 K
UPLIFT: -196 K
SHEAR: 32 K

AXIAL
60 K
SHEAR 55 K *MOMENT 4978 kip-ft*
TORQUE 3 kip-ft
85 mph WIND - 0.5000 in ICE

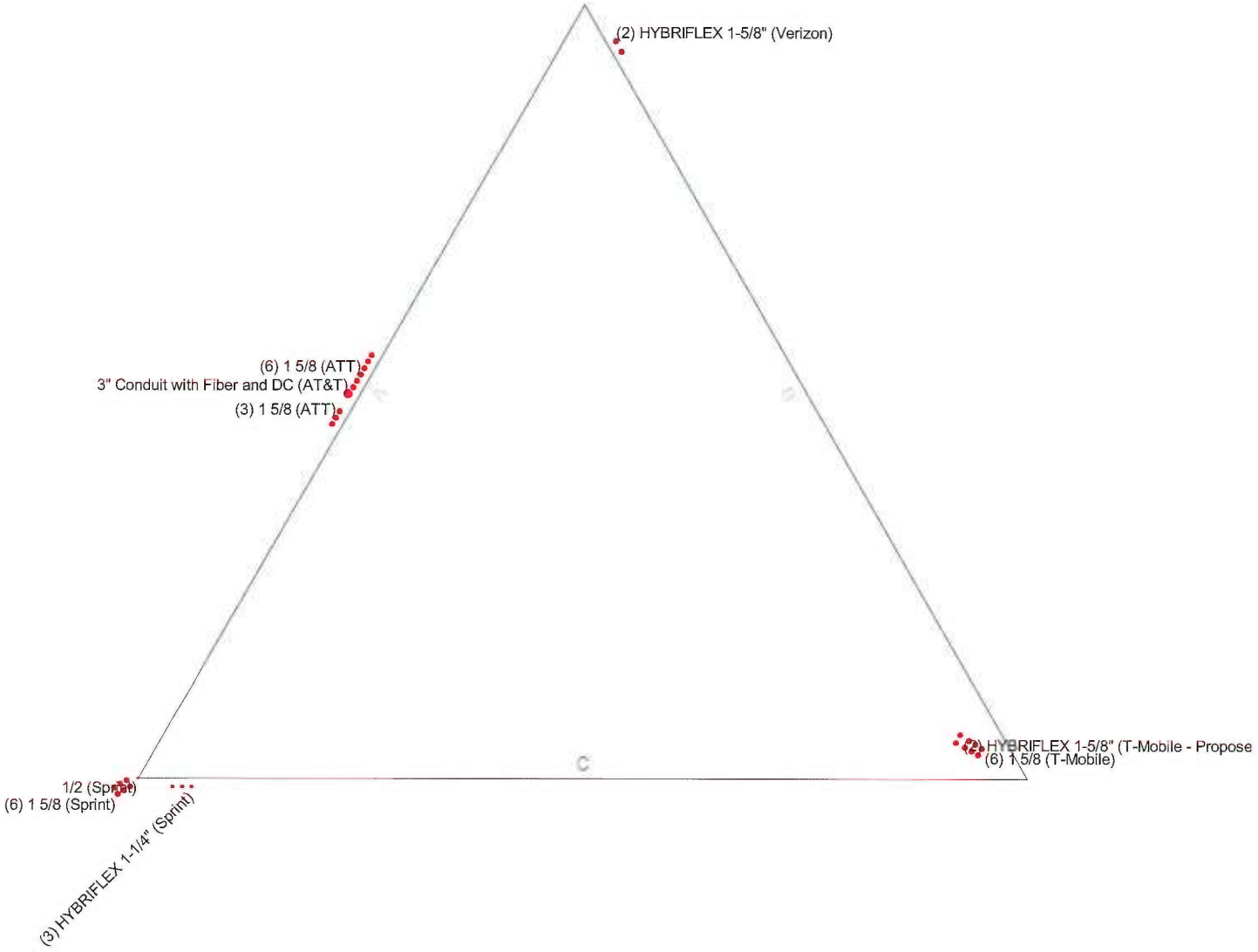
AXIAL
40 K
SHEAR 42 K *MOMENT 3845 kip-ft*
TORQUE 8 kip-ft
REACTIONS - 85 mph WIND

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

Job: *14025.002 - CT11111A*			
Project: *180-ft Lattice Tower - 20 Barnabas Rd, Newtown, CT*			
Client: T-Mobile	Drawn by: TJL	App'd:	
Code: TIA/EIA-222-F	Date: 03/03/14	Scale: NTS	
Path:		Dwg No. E-1	

Feedline Plan

Round Flat App In Face App Out Face



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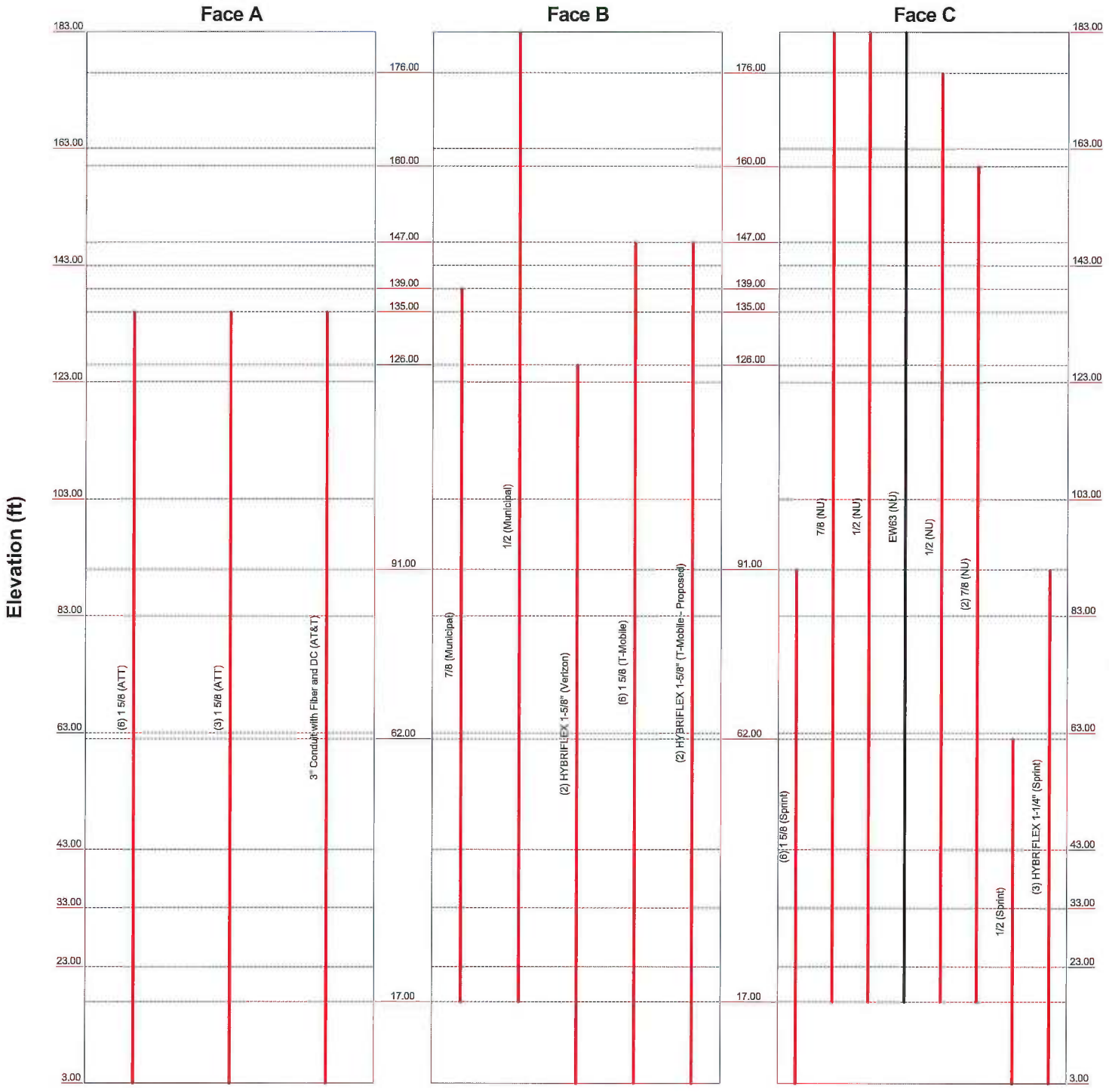
Code: TIA/EIA-222-F	Date: 03/03/14	Scale: NTS
Path: J:\Jobs\14025\002 W\002 - CT11111A\Backup Documentation\Calcs\Rev (1)\ER Files\Reinforced\180 RDHN.SSV Lattice Newton CT.eri		Dwg No. E-7

Feedline Distribution Chart
3' - 183'

Round | Flat | App In Face | App Out Face | Truss Leg



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Phone: (203) 488-0580
FAX: (203) 488-8587

Job: **14025.002 - CT11111A**		
Project: ***180-ft Lattice Tower - 20 Barnabas Rd, Newtown, CT***		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA/EIA-222-F	Date: 03/03/14	Scale: NTS
Path: J:\Jobs\14025\00.W\002 - CT11111A\Backup Documentation\Cad\Rev 0\ER Files\Reinforced\180 ROHN SSV Lattice Newton CT.eri		Dwg No. E-7

tnxTower	Job	Page
	14025.002 - CT11111A	1 of 35
Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	**Project** 180-ft Lattice Tower - 20 Barnabas Rd, Newtown, CT	**Date** 14:15:40 03/03/14
	Client T-Mobile	**Designed by** TJL

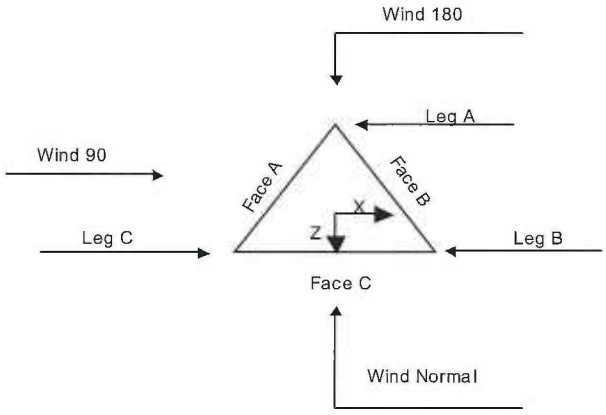
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 183.00 ft above the ground line.
The base of the tower is set at an elevation of 3.00 ft above the ground line.
The face width of the tower is 8.56 ft at the top and 24.86 ft at the base.
This tower is designed using the TIA/EIA-222-F standard.
The following design criteria apply:

Basic wind speed of 85 mph.
Nominal ice thickness of 0.5000 in.
Ice density of 56 pcf.
A wind speed of 85 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 85 mph.
Analysis per NU-SUB-090 Standard.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.333.
Local bending stresses due to climbing loads, feedline supports, and appurtenance mounts are not considered.

Options

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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	183.00-163.00			8.56	1	20.00
T2	163.00-143.00			8.56	1	20.00
T3	143.00-123.00			10.60	1	20.00
T4	123.00-103.00			12.68	1	20.00
T5	103.00-83.00			14.77	1	20.00
T6	83.00-63.00			16.77	1	20.00
T7	63.00-43.00			18.77	1	20.00
T8	43.00-33.00			20.86	1	10.00
T9	33.00-23.00			21.86	1	10.00
T10	23.00-3.00			22.86	1	20.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation	Diagonal Spacing	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset	Bottom Girt Offset
	ft	ft				in	in
T1	183.00-163.00	5.00	X Brace	No	No	0.0000	0.0000
T2	163.00-143.00	6.67	X Brace	No	No	0.0000	0.0000
T3	143.00-123.00	6.67	X Brace	No	No	0.0000	0.0000
T4	123.00-103.00	6.67	X Brace	No	No	0.0000	0.0000
T5	103.00-83.00	10.00	X Brace	No	No	0.0000	0.0000

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T6	83.00-63.00	10.00	X Brace	No	No	0.0000	0.0000
T7	63.00-43.00	10.00	X Brace	No	Yes	0.0000	0.0000
T8	43.00-33.00	10.00	X Brace	No	No	0.0000	0.0000
T9	33.00-23.00	10.00	X Brace	No	No	0.0000	0.0000
T10	23.00-3.00	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 183.00-163.00	Pipe	P2.5x.203	A572-50 (50 ksi)	Equal Angle	L1 3/4x1 3/4x3/16	A36 (36 ksi)
T2 163.00-143.00	Pipe	P2.5x.276	A572-50 (50 ksi)	Equal Angle	L2x2x1/4	A36 (36 ksi)
T3 143.00-123.00	Pipe	P3x.216	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 ksi)
T4 123.00-103.00	Pipe	P4x.337	A572-50 (50 ksi)	Equal Angle	L2 1/2x2 1/2x5/16	A36 (36 ksi)
T5 103.00-83.00	Pipe	P5x.258	A572-50 (50 ksi)	Arbitrary Shape	L3X3X3/16 Reinf w/L2.5X2.5X3/16	A36 (36 ksi)
T6 83.00-63.00	Pipe	P5x.375	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x5/16	A36 (36 ksi)
T7 63.00-43.00	Pipe	P5x.375	A572-50 (50 ksi)	Equal Angle	L3 1/2x3 1/2x3/8	A36 (36 ksi)
T8 43.00-33.00	Pipe	P6x.432	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)
T9 33.00-23.00	Pipe	P6x.432	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	A36 (36 ksi)
T10 23.00-3.00	Pipe	P6x.432	A572-50 (50 ksi)	Equal Angle	L4x4x3/8	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 183.00-163.00	Equal Angle	L2 1/2x2 1/2x3/16	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
T7 63.00-43.00	Equal Angle	L3 1/2x3 1/2x1/4	A36	Equal Angle		A36

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T10 23.00-3.00	Equal Angle	L4x4x1/4	(36 ksi) A36 (36 ksi)	Equal Angle		(36 ksi) 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 183.00-163.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T2 163.00-143.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T3 143.00-123.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T4 123.00-103.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T5 103.00-83.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T6 83.00-63.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T7 63.00-43.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T8 43.00-33.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T9 33.00-23.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000
T10 23.00-3.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] Legs	X Brace Diags X 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 183.00-163.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T2 163.00-143.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T3 143.00-123.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T4 123.00-103.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T5 103.00-83.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1
T6 83.00-63.00	Yes	Yes	1	1 1	1 1	1 1	1 1	1 1	1 1	1 1

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] 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
T7	Yes	Yes	1	1	1	1	1	1	1	1
63.00-43.00				1	1	1	1	1	1	1
T8	Yes	Yes	1	1	1	1	1	1	1	1
43.00-33.00				1	1	1	1	1	1	1
T9	Yes	Yes	1	1	1	1	1	1	1	1
33.00-23.00				1	1	1	1	1	1	1
T10	Yes	Yes	1	1	1	1	1	1	1	1
23.00-3.00				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Net Width Deduct in	Leg U	Diagonal Net Width Deduct in	Diagonal U	Top Girt Net Width Deduct in	Top Girt U	Bottom Girt Net Width Deduct in	Bottom Girt U	Mid Girt Net Width Deduct in	Mid Girt U	Long Horizontal Net Width Deduct in	Long Horizontal U	Short Horizontal Net Width Deduct in	Short Horizontal U
T1	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
183.00-163.00														
T2	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
163.00-143.00														
T3	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
143.00-123.00														
T4	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
123.00-103.00														
T5	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
103.00-83.00														
T6 83.00-63.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 63.00-43.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 43.00-33.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 33.00-23.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 23.00-3.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg Bolt Size in	Leg No.	Diagonal Bolt Size in	Diagonal No.	Top Girt Bolt Size in	Top Girt No.	Bottom Girt Bolt Size in	Bottom Girt No.	Mid Girt Bolt Size in	Mid Girt No.	Long Horizontal Bolt Size in	Long Horizontal No.	Short Horizontal Bolt Size in	Short Horizontal No.
T1	Flange	0.6250	4	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0
183.00-163.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2	Flange	0.7500	4	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
163.00-143.00		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3	Flange	0.8750	4	0.5000	1	0.6250	0	0.6250	0	0.6250	0	0.6250	0	0.6250	0
143.00-123.00		A325N		A325X		A325N		A325N		A325N		A325N		A325N	

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.
T4 123.00-103.00	Flange	1.0000 A325N	4	0.5000 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T5 103.00-83.00	Flange	1.0000 A325N	4	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T6 83.00-63.00	Flange	1.0000 A325N	4	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T7 63.00-43.00	Flange	1.0000 A325N	6	0.7500 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T8 43.00-33.00	Flange	0.0000 A325N	0	0.7500 A325X	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T9 33.00-23.00	Flange	1.0000 A325N	6	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0
T10 23.00-3.00	Flange	1.0000 A449	6	0.8750 A325N	1	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0	0.6250 A325N	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Sprint)	C	No	Ar (Leg)	91.00 - 3.00	0.0000	-0.02	6	3	0.5000	1.9800		1.04
1 5/8 (ATT)	A	Yes	Ar (CfAe)	135.00 - 3.00	2.0000	0.02	6	6	0.5000	1.9800		1.04
1 5/8 (ATT)	A	Yes	Ar (CfAe)	135.00 - 3.00	2.0000	-0.04	3	3	0.5000	1.9800		1.04
7/8 (Municipal)	B	Yes	Ar (CfAe)	139.00 - 17.00	2.0000	-0.47	1	1	1.1100	1.1100		0.54
1/2 (Municipal)	B	Yes	Ar (CfAe)	183.00 - 17.00	2.0000	-0.46	1	1	0.5800	0.5800		0.25
7/8 (NU)	C	Yes	Ar (CfAe)	183.00 - 17.00	2.0000	-0.45	1	1	1.1100	1.1100		0.54
1/2 (NU)	C	Yes	Ar (CfAe)	183.00 - 17.00	2.0000	-0.44	1	1	0.5800	0.5800		0.25
EW63 (NU)	C	Yes	Af (CfAe)	183.00 - 17.00	2.0000	-0.43	1	1	1.5742	1.5742	5.0668	0.51
1/2 (NU)	C	Yes	Ar (CfAe)	176.00 - 17.00	2.0000	-0.42	1	1	0.5800	0.5800		0.25
7/8 (NU)	C	Yes	Ar (CfAe)	160.00 - 17.00	2.0000	-0.4	2	2	1.1100	1.1100		0.54
1/2 (Sprint)	C	No	Ar (Leg)	62.00 - 3.00	0.0000	0	1	1	0.5800	0.5800		0.25
3" Conduit with Fiber and DC (AT&T)	A	Yes	Ar (CfAe)	135.00 - 3.00	2.0000	-0.01	1	1	0.0000	3.0000		1.16
HYBRIFLEX 1-1/4" (Sprint)	C	Yes	Ar (CfAe)	91.00 - 3.00	2.0000	0.45	3	3	1.5400	1.5400		1.30
HYBRIFLEX 1-5/8" (Verizon)	B	Yes	Ar (CfAe)	126.00 - 3.00	2.0000	-0.44	2	2	1.9800	1.9800		1.90
1 5/8 (T-Mobile)	B	No	Ar (Leg)	147.00 - 3.00	0.0000	0.07	6	3	0.5000	1.9800		1.04

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
HYBRIFLEX 1-5/8" (T-Mobile - Proposed)	B	No	Ar (Leg)	147.00 - 3.00	0.0000	0.09	2	1	1.0000	1.9800		1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	183.00-163.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.967	0.000	0.000	0.000	0.01
		C	3.445	2.624	0.000	0.000	0.03
T2	163.00-143.00	A	0.000	0.000	0.000	0.000	0.00
		B	3.607	0.000	0.000	0.000	0.05
		C	9.568	2.624	0.000	0.000	0.05
T3	143.00-123.00	A	20.820	0.000	0.000	0.000	0.13
		B	16.637	0.000	0.000	0.000	0.23
		C	20.683	2.624	0.000	0.000	0.05
T4	123.00-103.00	A	34.700	0.000	0.000	0.000	0.21
		B	22.617	0.000	0.000	0.000	0.29
		C	20.683	2.624	0.000	0.000	0.05
T5	103.00-83.00	A	38.660	0.000	0.000	0.000	0.21
		B	22.617	0.000	0.000	0.000	0.29
		C	27.723	2.624	0.000	0.000	0.13
T6	83.00-63.00	A	44.600	0.000	0.000	0.000	0.21
		B	22.617	0.000	0.000	0.000	0.29
		C	38.283	2.624	0.000	0.000	0.26
T7	63.00-43.00	A	45.518	0.000	0.000	0.000	0.21
		B	22.617	0.000	0.000	0.000	0.29
		C	39.202	2.624	0.000	0.000	0.26
T8	43.00-33.00	A	22.783	0.000	0.000	0.000	0.11
		B	11.308	0.000	0.000	0.000	0.15
		C	19.625	1.312	0.000	0.000	0.13
T9	33.00-23.00	A	22.783	0.000	0.000	0.000	0.11
		B	11.308	0.000	0.000	0.000	0.15
		C	19.625	1.312	0.000	0.000	0.13
T10	23.00-3.00	A	45.567	0.000	0.000	0.000	0.21
		B	20.645	0.000	0.000	0.000	0.28
		C	34.012	0.787	0.000	0.000	0.22

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	183.00-163.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		2.633	0.000	0.000	0.000	0.02
		C		7.862	3.735	0.000	0.000	0.10
T2	163.00-143.00	A	0.500	0.000	0.000	0.000	0.000	0.00
		B		4.620	1.653	0.000	0.000	0.11
		C		16.748	5.388	0.000	0.000	0.16
T3	143.00-123.00	A	0.500	9.960	17.360	0.000	0.000	0.33
		B		16.870	8.267	0.000	0.000	0.50

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
		C		25.750	12.001	0.000	0.000	0.17
T4	123.00-103.00	A	0.500	16.600	28.933	0.000	0.000	0.55
		B		26.017	8.267	0.000	0.000	0.63
		C		25.750	12.001	0.000	0.000	0.17
T5	103.00-83.00	A	0.500	18.587	32.240	0.000	0.000	0.55
		B		26.017	8.267	0.000	0.000	0.63
		C		32.817	15.308	0.000	0.000	0.35
T6	83.00-63.00	A	0.500	21.567	37.200	0.000	0.000	0.55
		B		26.017	8.267	0.000	0.000	0.63
		C		43.417	20.268	0.000	0.000	0.62
T7	63.00-43.00	A	0.500	24.068	37.200	0.000	0.000	0.55
		B		26.017	8.267	0.000	0.000	0.63
		C		45.918	20.268	0.000	0.000	0.64
T8	43.00-33.00	A	0.500	12.100	18.600	0.000	0.000	0.27
		B		13.008	4.133	0.000	0.000	0.31
		C		23.025	10.134	0.000	0.000	0.32
T9	33.00-23.00	A	0.500	12.100	18.600	0.000	0.000	0.27
		B		13.008	4.133	0.000	0.000	0.31
		C		23.025	10.134	0.000	0.000	0.32
T10	23.00-3.00	A	0.500	24.200	37.200	0.000	0.000	0.55
		B		21.712	8.267	0.000	0.000	0.59
		C		34.978	17.654	0.000	0.000	0.52

Feed Line Shielding

Section	Elevation ft	Face	A_R ft^2	A_R Ice ft^2	A_F ft^2	A_F Ice ft^2
T1	183.00-163.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.113	0.075	0.205
		C	0.000	0.520	0.473	0.948
T2	163.00-143.00	A	0.000	0.000	0.000	0.000
		B	0.000	0.080	0.059	0.161
		C	0.000	0.581	0.583	1.162
T3	143.00-123.00	A	0.000	0.788	1.501	1.969
		B	0.000	0.200	0.248	0.500
		C	0.000	0.580	0.729	1.449
T4	123.00-103.00	A	0.000	1.266	2.412	3.165
		B	0.000	0.447	0.655	1.118
		C	0.000	0.559	0.703	1.398
T5	103.00-83.00	A	0.000	0.000	2.270	3.577
		B	0.000	0.000	0.616	1.264
		C	0.000	0.000	0.862	1.979
T6	83.00-63.00	A	0.000	0.871	2.323	3.049
		B	0.000	0.308	0.630	1.077
		C	0.000	0.628	1.192	2.196
T7	63.00-43.00	A	0.000	1.230	3.280	4.304
		B	0.000	0.434	0.890	1.520
		C	0.000	0.886	1.683	3.101
T8	43.00-33.00	A	0.000	0.419	1.277	1.676
		B	0.000	0.148	0.347	0.592
		C	0.000	0.302	0.655	1.207
T9	33.00-23.00	A	0.000	0.416	1.267	1.663
		B	0.000	0.147	0.344	0.587
		C	0.000	0.299	0.650	1.198
T10	23.00-3.00	A	0.000	1.202	3.665	4.809

Section	Elevation	Face	A_R	A_R Ice	A_F	A_F Ice
	ft		ft^2	ft^2	ft^2	ft^2
		B	0.000	0.311	0.786	1.244
		C	0.000	0.495	1.134	1.979

Feed Line Center of Pressure

Section	Elevation	CP_X	CP_Z	CP_X Ice	CP_Z Ice
	ft	in	in	in	in
T1	183.00-163.00	3.4327	1.7386	4.1619	1.7337
T2	163.00-143.00	7.5088	4.4363	8.3617	4.5559
T3	143.00-123.00	4.3568	1.2827	5.7681	1.5174
T4	123.00-103.00	1.3543	-3.2328	3.7029	-2.7382
T5	103.00-83.00	-1.8376	-1.2580	1.0577	-1.2152
T6	83.00-63.00	-6.3413	1.5550	-2.8140	1.3077
T7	63.00-43.00	-6.1985	1.8366	-3.2858	1.8536
T8	43.00-33.00	-6.9880	1.9402	-3.8915	1.9706
T9	33.00-23.00	-7.2129	2.0049	-4.0206	2.0328
T10	23.00-3.00	-8.9453	1.1519	-7.2710	1.0169

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
2" Dia 8' Omni (NU)	C	From Leg	0.50 0.00 0.00	0.0000	189.00	No Ice 1/2" Ice	2.00 3.03	2.00 3.03	0.01 0.02
4'x4" Pipe Mount (NU)	C	From Leg	0.25 0.00 0.00	0.0000	183.00	No Ice 1/2" Ice	1.32 1.58	1.32 1.58	0.04 0.06
12' Dipole (NU)	C	From Leg	0.50 0.00 0.00	0.0000	176.00	No Ice 1/2" Ice	3.60 4.83	3.60 4.83	0.04 0.06
10' 2-Bay Dipole (Municipal)	A	From Leg	0.50 0.00 0.00	0.0000	188.00	No Ice 1/2" Ice	1.07 1.71	1.07 1.71	0.01 0.02
3'x2.5" Pipe Mount (NU)	A	From Leg	0.25 0.00 0.00	0.0000	183.00	No Ice 1/2" Ice	0.60 0.79	0.60 0.79	0.02 0.03
6'x4" Pipe Mount (NU Dish)	A	From Leg	0.25 0.00 0.00	0.0000	180.00	No Ice 1/2" Ice	2.09 2.46	2.09 2.46	0.05 0.07
PD220 (NU)	B	From Leg	0.50 0.00 0.00	0.0000	191.00	No Ice 1/2" Ice	3.56 7.13	3.56 7.13	0.02 0.05
3' Standoff (Municipal)	A	From Leg	1.50 0.00 0.00	0.0000	139.00	No Ice 1/2" Ice	2.20 3.30	2.20 3.30	0.06 0.07

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
10' 2-Bay Dipole	A	From Leg	3.00			0.0000	144.00	No Ice	1.07	1.07	0.01
(Municipal)			0.00					1/2" Ice	1.71	1.71	0.02
			0.00								
800 10121	A	From Leg	2.00			0.0000	135.00	No Ice	5.46	3.29	0.05
(ATT)			4.00					1/2" Ice	5.88	3.64	0.08
			0.00								
(2) LPG21401 TMA	A	From Leg	2.00			0.0000	135.00	No Ice	0.95	0.37	0.02
(ATT)			4.00					1/2" Ice	1.09	0.48	0.02
			0.00								
800 10121	B	From Leg	2.00			0.0000	135.00	No Ice	5.46	3.29	0.05
(ATT)			4.00					1/2" Ice	5.88	3.64	0.08
			0.00								
(2) LPG21401 TMA	B	From Leg	2.00			0.0000	135.00	No Ice	0.95	0.37	0.02
(ATT)			4.00					1/2" Ice	1.09	0.48	0.02
			0.00								
800 10121	C	From Leg	2.00			0.0000	135.00	No Ice	5.46	3.29	0.05
(ATT)			4.00					1/2" Ice	5.88	3.64	0.08
			0.00								
(2) LPG21401 TMA	C	From Leg	2.00			0.0000	135.00	No Ice	0.95	0.37	0.02
(ATT)			4.00					1/2" Ice	1.09	0.48	0.02
			0.00								
P65-16-XL w/ mount pipe	A	From Leg	2.00			0.0000	135.00	No Ice	8.40	5.54	0.07
(ATT)			-4.00					1/2" Ice	8.95	6.48	0.12
			0.00								
P65-16-XL w/ mount pipe	B	From Leg	2.00			0.0000	135.00	No Ice	8.40	5.54	0.07
(ATT)			-4.00					1/2" Ice	8.95	6.48	0.12
			0.00								
P65-16-XL w/ mount pipe	C	From Leg	2.00			0.0000	135.00	No Ice	8.40	5.54	0.07
(ATT)			-4.00					1/2" Ice	8.95	6.48	0.12
			0.00								
(2) RRH	A	From Leg	0.00			0.0000	135.00	No Ice	2.94	1.25	0.06
(ATT)			0.00					1/2" Ice	3.17	1.41	0.07
			0.00								
(2) RRH	B	From Leg	0.00			0.0000	135.00	No Ice	2.94	1.25	0.06
(ATT)			0.00					1/2" Ice	3.17	1.41	0.07
			0.00								
(2) RRH	C	From Leg	0.00			0.0000	135.00	No Ice	2.94	1.25	0.06
(ATT)			0.00					1/2" Ice	3.17	1.41	0.07
			0.00								
DC6-48-60-18-8F Surge	C	From Leg	0.00			0.0000	135.00	No Ice	2.23	2.23	0.02
Arrestor			0.00					1/2" Ice	2.45	2.45	0.04
(ATT)			0.00								
10'6" Site Pro T-Arm	A	From Leg	1.00			0.0000	135.00	No Ice	4.50	4.50	0.25
(ATT)			0.00					1/2" Ice	5.65	5.65	0.35
			0.00								
10'6" Site Pro T-Arm	B	From Leg	1.00			0.0000	135.00	No Ice	4.50	4.50	0.25
(ATT)			0.00					1/2" Ice	5.65	5.65	0.35
			0.00								
10'6" Site Pro T-Arm	C	From Leg	1.00			0.0000	135.00	No Ice	4.50	4.50	0.25
(ATT)			0.00					1/2" Ice	5.65	5.65	0.35
			0.00								
10' Frame	A	From Leg	2.00			0.0000	91.00	No Ice	17.20	12.50	1.00
(Sprint)			0.00					1/2" Ice	25.00	19.00	1.50
			0.00								
(2) DB980F90E-M w/Mount	A	From Leg	4.00			0.0000	91.00	No Ice	4.37	3.95	0.03
Pipe			0.00					1/2" Ice	4.96	5.04	0.07
(Sprint)			0.00								

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
10' Frame	B	From Leg	2.00	0.0000	91.00	No Ice	17.20	12.50	1.00
(Sprint)			0.00			1/2" Ice	25.00	19.00	1.50
			0.00						
(2) DB980F90E-M w/Mount Pipe	B	From Leg	4.00	0.0000	91.00	No Ice	4.37	3.95	0.03
			0.00			1/2" Ice	4.96	5.04	0.07
(Sprint)			0.00						
10' Frame	C	From Leg	2.00	0.0000	91.00	No Ice	17.20	12.50	1.00
(Sprint)			0.00			1/2" Ice	25.00	19.00	1.50
			0.00						
(2) DB950G65E-M w/Mount Pipe	C	From Leg	4.00	0.0000	91.00	No Ice	6.89	5.90	0.04
			0.00			1/2" Ice	7.56	7.01	0.10
(Sprint)			0.00						
GPS	C	From Leg	1.00	0.0000	62.00	No Ice	1.00	1.00	0.01
(Sprint)			0.00			1/2" Ice	1.50	1.50	0.01
			0.00						
1' Standoff	C	From Leg	0.50	0.0000	62.00	No Ice	0.25	0.25	0.01
(Sprint)			0.00			1/2" Ice	0.38	0.38	0.01
			0.00						
3' Standoff	B	From Leg	1.50	0.0000	160.00	No Ice	2.75	2.75	0.06
(NEU)			0.00			1/2" Ice	3.65	3.65	0.07
			0.00						
DB586-Y	B	From Leg	3.00	0.0000	164.00	No Ice	1.01	1.01	0.01
(NEU)			0.00			1/2" Ice	1.28	1.28	0.02
			0.00						
DB586-Y	B	From Leg	3.00	0.0000	156.00	No Ice	1.01	1.01	0.01
(NEU)			0.00			1/2" Ice	1.28	1.28	0.02
			0.00						
TMA	B	From Leg	0.00	0.0000	160.00	No Ice	0.78	0.29	0.02
(NEU)			0.00			1/2" Ice	0.90	0.38	0.02
			0.00						
APXVSPP18-C-A20 w/ Mount	A	From Leg	4.00	0.0000	91.00	No Ice	8.96	8.08	0.12
			0.00			1/2" Ice	9.66	9.14	0.20
(Sprint)			0.00						
APXVSPP18-C-A20 w/ Mount	B	From Leg	4.00	0.0000	91.00	No Ice	8.96	8.08	0.12
			0.00			1/2" Ice	9.66	9.14	0.20
(Sprint)			0.00						
P40-16-XLPP-RR-A w/ Mount	C	From Leg	4.00	0.0000	91.00	No Ice	11.73	6.32	0.11
			0.00			1/2" Ice	12.47	7.27	0.20
(Sprint)			0.00						
FD-RRH 4x40 1900	A	From Face	3.50	0.0000	91.00	No Ice	2.61	2.71	0.06
(Sprint)			0.00			1/2" Ice	2.84	2.95	0.08
			0.00						
FD-RRH 4x40 1900	B	From Leg	3.50	0.0000	91.00	No Ice	2.61	2.71	0.06
(Sprint)			0.00			1/2" Ice	2.84	2.95	0.08
			0.00						
FD-RRH 4x40 1900	C	From Leg	3.50	0.0000	91.00	No Ice	2.61	2.71	0.06
(Sprint)			0.00			1/2" Ice	2.84	2.95	0.08
			0.00						
FD-RRH 2x50 800	A	From Leg	3.50	0.0000	91.00	No Ice	2.40	2.25	0.06
(Sprint)			0.00			1/2" Ice	2.61	2.46	0.09
			0.00						
FD-RRH 2x50 800	B	From Leg	3.50	0.0000	91.00	No Ice	2.40	2.25	0.06
(Sprint)			0.00			1/2" Ice	2.61	2.46	0.09
			0.00						
FD-RRH 2x50 800	C	From Leg	3.50	0.0000	91.00	No Ice	2.40	2.25	0.06
(Sprint)			0.00			1/2" Ice	2.61	2.46	0.09
			0.00						

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
BXA-70063/6CF (Verizon)	A	From Leg	3.50 -6.00 0.00	0.0000	126.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-70063/6CF (Verizon)	B	From Leg	3.50 -6.00 0.00	0.0000	126.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-70063/6CF (Verizon)	C	From Leg	3.50 -6.00 0.00	0.0000	126.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-70063/6CF (Verizon)	A	From Leg	3.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-70063/6CF (Verizon)	B	From Leg	3.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-70063/6CF (Verizon)	C	From Leg	3.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	7.73 8.27	4.16 4.60	0.02 0.06
BXA-171063-12CF (Verizon)	A	From Leg	3.50 -4.00 0.00	0.0000	126.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-171063-12CF (Verizon)	B	From Leg	3.50 -4.00 0.00	0.0000	126.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-171063-12CF (Verizon)	C	From Leg	3.50 -4.00 0.00	0.0000	126.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-171063-12CF (Verizon)	A	From Leg	3.50 4.00 0.00	0.0000	126.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-171063-12CF (Verizon)	B	From Leg	3.50 4.00 0.00	0.0000	126.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
BXA-171063-12CF (Verizon)	C	From Leg	3.50 4.00 0.00	0.0000	126.00	No Ice 1/2" Ice	4.79 5.24	3.62 4.06	0.02 0.04
RRH2x40-07-U (Verizon)	A	From Face	0.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-07-U (Verizon)	B	From Face	0.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-07-U (Verizon)	C	From Face	0.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	2.25 2.45	1.23 1.39	0.05 0.07
RRH2x40-AWS (Verizon)	A	From Face	0.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
RRH2x40-AWS (Verizon)	B	From Face	0.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
RRH2x40-AWS (Verizon)	C	From Face	0.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	2.52 2.75	1.59 1.80	0.04 0.06
DB-T1-6Z-8AB-0Z (Verizon)	C	From Face	0.50 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	5.60 5.92	2.33 2.56	0.04 0.08

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
Site Pro Heavy Duty V-Frame (Verizon)	A	From Leg	1.75 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	15.00 20.60	15.00 20.60	0.50 0.65
Site Pro Heavy Duty V-Frame (Verizon)	B	From Leg	1.75 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	15.00 20.60	15.00 20.60	0.50 0.65
Site Pro Heavy Duty V-Frame (Verizon)	C	From Leg	1.75 0.00 0.00	0.0000	126.00	No Ice 1/2" Ice	15.00 20.60	15.00 20.60	0.50 0.65
AIR21 (T-Mobile - Proposed)	A	From Leg	3.00 -2.00 0.00	0.0000	149.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
AIR21 (T-Mobile - Proposed)	A	From Leg	3.00 2.00 0.00	0.0000	149.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
AIR21 (T-Mobile - Proposed)	B	From Leg	3.00 -2.00 0.00	0.0000	149.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
AIR21 (T-Mobile - Proposed)	B	From Leg	3.00 2.00 0.00	0.0000	149.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
AIR21 (T-Mobile - Proposed)	C	From Leg	3.00 -2.00 0.00	0.0000	149.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
AIR21 (T-Mobile - Proposed)	C	From Leg	3.00 2.00 0.00	0.0000	149.00	No Ice 1/2" Ice	6.53 6.98	4.36 4.77	0.08 0.12
KRY 112 TMA (T-Mobile - Proposed)	A	From Leg	3.00 -2.00 0.00	0.0000	149.00	No Ice 1/2" Ice	0.00 0.00	0.49 0.59	0.03 0.03
KRY 112 TMA (T-Mobile - Proposed)	B	From Leg	3.00 -2.00 0.00	0.0000	149.00	No Ice 1/2" Ice	0.00 0.00	0.49 0.59	0.03 0.03
KRY 112 TMA (T-Mobile - Proposed)	C	From Leg	3.00 -2.00 0.00	0.0000	149.00	No Ice 1/2" Ice	0.00 0.00	0.49 0.59	0.03 0.03
Site Pro Compact Tower Mount CWT8 (T-Mobile - Proposed)	A	From Leg	3.00 0.00 0.00	0.0000	149.00	No Ice 1/2" Ice	2.85 4.05	2.85 4.05	0.15 0.20
Site Pro Compact Tower Mount CWT8 (T-Mobile - Proposed)	B	From Leg	3.00 0.00 0.00	0.0000	149.00	No Ice 1/2" Ice	2.85 4.05	2.85 4.05	0.15 0.20
Site Pro Compact Tower Mount CWT8 (T-Mobile - Proposed)	C	From Leg	3.00 0.00 0.00	0.0000	149.00	No Ice 1/2" Ice	2.85 4.05	2.85 4.05	0.15 0.20

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft²	Weight K
6 FT DISH (NU)	A	Paraboloid w/Radome	From Leg	0.50 0.00 0.00	0.0000		180.00	6.00	No Ice 1/2" Ice	28.27 29.05	0.14 0.29

Tower Pressures - No Ice

$G_H = 1.121$

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	173.00	1.605	30	175.992	A	12.975	9.583	9.583	42.48	0.000	0.000
183.00-163.00					B	12.900	10.550		40.87	0.000	0.000
					C	15.126	13.028		34.04	0.000	0.000
T2	153.00	1.55	29	196.398	A	11.385	9.600	9.600	45.75	0.000	0.000
163.00-143.00					B	11.326	13.207		39.13	0.000	0.000
					C	13.426	19.168		29.45	0.000	0.000
T3	133.00	1.489	28	238.641	A	14.865	32.508	11.688	24.67	0.000	0.000
143.00-123.00					B	16.118	28.324		26.30	0.000	0.000
					C	18.260	32.371		23.08	0.000	0.000
T4	113.00	1.421	26	282.010	A	16.163	49.727	15.027	22.81	0.000	0.000
123.00-103.00					B	17.921	37.644		27.04	0.000	0.000
					C	20.497	35.711		26.74	0.000	0.000
T5	93.00	1.345	25	324.683	A	17.779	57.234	18.574	24.76	0.000	0.000
103.00-83.00					B	19.433	41.191		30.64	0.000	0.000
					C	21.810	46.298		27.27	0.000	0.000
T6 83.00-63.00	73.00	1.255	23	364.683	A	20.849	63.174	18.574	22.11	0.000	0.000
					B	22.542	41.191		29.14	0.000	0.000
					C	24.604	56.858		22.80	0.000	0.000
T7 63.00-43.00	53.00	1.145	21	405.584	A	33.293	64.095	18.577	19.08	0.000	0.000
					B	35.683	41.194		24.16	0.000	0.000
					C	37.513	57.779		19.49	0.000	0.000
T8 43.00-33.00	38.00	1.041	19	219.128	A	14.074	33.843	11.060	23.08	0.000	0.000
					B	15.004	22.368		29.59	0.000	0.000
					C	16.007	30.685		23.69	0.000	0.000
T9 33.00-23.00	28.00	1	18	229.128	A	14.660	33.843	11.060	22.80	0.000	0.000
					B	15.584	22.368		29.14	0.000	0.000
					C	16.589	30.685		23.40	0.000	0.000
T10 23.00-3.00	13.00	1	18	488.255	A	45.566	67.687	22.120	19.53	0.000	0.000
					B	48.445	42.765		24.25	0.000	0.000
					C	48.884	56.132		21.06	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.121$

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg % %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	173.00	1.605	30	0.5000	177.658	A	12.975	20.034	12.917	39.13	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
183.00-163.00						B	12.770	22.555		36.57	0.000	0.000
						C	15.763	27.376		29.94	0.000	0.000
T2	153.00	1.55	29	0.5000	198.067	A	11.385	18.632	12.939	43.11	0.000	0.000
163.00-143.00						B	12.878	23.171		35.89	0.000	0.000
						C	15.611	34.799		25.67	0.000	0.000
T3	133.00	1.489	28	0.5000	240.310	A	31.756	30.745	15.027	24.04	0.000	0.000
143.00-123.00						B	24.132	38.243		24.09	0.000	0.000
						C	26.917	46.743		20.40	0.000	0.000
T4	113.00	1.421	26	0.5000	283.679	A	44.344	41.131	18.367	21.49	0.000	0.000
123.00-103.00						B	25.724	51.366		23.82	0.000	0.000
						C	29.179	50.988		22.91	0.000	0.000
T5 103.00-83.00	93.00	1.345	25	0.5000	326.352	A	52.746	40.500	21.913	23.50	0.000	0.000
						B	31.086	47.930		27.73	0.000	0.000
						C	37.413	54.730		23.78	0.000	0.000
T6 83.00-63.00	73.00	1.255	23	0.5000	366.352	A	57.324	49.229	21.913	20.57	0.000	0.000
						B	30.362	54.243		25.90	0.000	0.000
						C	41.244	71.323		19.47	0.000	0.000
T7 63.00-43.00	53.00	1.145	21	0.5000	407.253	A	69.469	55.205	21.916	17.58	0.000	0.000
						B	43.319	57.948		21.64	0.000	0.000
						C	53.740	77.398		16.71	0.000	0.000
T8 43.00-33.00	38.00	1.041	19	0.5000	219.962	A	32.275	28.248	12.729	21.03	0.000	0.000
						B	18.892	29.428		26.34	0.000	0.000
						C	24.277	39.290		20.03	0.000	0.000
T9 33.00-23.00	28.00	1	18	0.5000	229.962	A	32.865	28.396	12.729	20.78	0.000	0.000
						B	19.474	29.573		25.95	0.000	0.000
						C	24.864	39.437		19.80	0.000	0.000
T10 23.00-3.00	13.00	1	18	0.5000	489.924	A	81.622	60.764	25.459	17.88	0.000	0.000
						B	56.254	59.167		22.06	0.000	0.000
						C	64.906	72.250		18.56	0.000	0.000

Tower Pressure - Service

$G_H = 1.121$

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	173.00	1.605	30	175.992	A	12.975	9.583	9.583	42.48	0.000	0.000
183.00-163.00					B	12.900	10.550		40.87	0.000	0.000
					C	15.126	13.028		34.04	0.000	0.000
T2	153.00	1.55	29	196.398	A	11.385	9.600	9.600	45.75	0.000	0.000
163.00-143.00					B	11.326	13.207		39.13	0.000	0.000
					C	13.426	19.168		29.45	0.000	0.000
T3	133.00	1.489	28	238.641	A	14.865	32.508	11.688	24.67	0.000	0.000
143.00-123.00					B	16.118	28.324		26.30	0.000	0.000
					C	18.260	32.371		23.08	0.000	0.000
T4	113.00	1.421	26	282.010	A	16.163	49.727	15.027	22.81	0.000	0.000
123.00-103.00					B	17.921	37.644		27.04	0.000	0.000
					C	20.497	35.711		26.74	0.000	0.000
T5	93.00	1.345	25	324.683	A	17.779	57.234	18.574	24.76	0.000	0.000
103.00-83.00					B	19.433	41.191		30.64	0.000	0.000
					C	21.810	46.298		27.27	0.000	0.000
T6 83.00-63.00	73.00	1.255	23	364.683	A	20.849	63.174	18.574	22.11	0.000	0.000
					B	22.542	41.191		29.14	0.000	0.000

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
					C	24.604	56.858		22.80	0.000	0.000
T7 63.00-43.00	53.00	1.145	21	405.584	A	33.293	64.095	18.577	19.08	0.000	0.000
					B	35.683	41.194		24.16	0.000	0.000
					C	37.513	57.779		19.49	0.000	0.000
T8 43.00-33.00	38.00	1.041	19	219.128	A	14.074	33.843	11.060	23.08	0.000	0.000
					B	15.004	22.368		29.59	0.000	0.000
					C	16.007	30.685		23.69	0.000	0.000
T9 33.00-23.00	28.00	1	18	229.128	A	14.660	33.843	11.060	22.80	0.000	0.000
					B	15.584	22.368		29.14	0.000	0.000
					C	16.589	30.685		23.40	0.000	0.000
T10 23.00-3.00	13.00	1	18	488.255	A	45.566	67.687	22.120	19.53	0.000	0.000
					B	48.445	42.765		24.25	0.000	0.000
					C	48.884	56.132		21.06	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.03	0.93	A	0.128	2.853	0.578	1	1	18.518	2.07	103.42	C
183.00-163.00			B	0.133	2.834	0.579	1	1	19.009			
			C	0.16	2.735	0.583	1	1	22.722			
T2	0.09	1.13	A	0.107	2.937	0.576	1	1	16.913	2.15	107.35	C
163.00-143.00			B	0.125	2.866	0.578	1	1	18.959			
			C	0.166	2.714	0.584	1	1	24.621			
T3	0.40	1.20	A	0.199	2.601	0.59	1	1	34.047	2.96	147.78	C
143.00-123.00			B	0.186	2.643	0.588	1	1	32.763			
			C	0.212	2.556	0.593	1	1	37.455			
T4	0.56	2.27	A	0.234	2.487	0.598	1	1	45.892	3.36	168.20	A
123.00-103.00			B	0.197	2.606	0.59	1	1	40.123			
			C	0.199	2.598	0.59	1	1	41.575			
T5	0.64	3.33	A	0.231	2.496	0.597	1	1	51.961	3.61	180.73	A
103.00-83.00			B	0.187	2.641	0.588	1	1	43.644			
			C	0.21	2.564	0.592	1	1	49.239			
T6	0.76	2.99	A	0.23	2.498	0.597	1	1	58.569	3.83	191.57	C
83.00-63.00			B	0.175	2.682	0.586	1	1	46.662			
			C	0.223	2.52	0.595	1	1	58.459			
T7	0.76	4.18	A	0.24	2.467	0.599	1	1	71.712	4.25	212.43	C
63.00-43.00			B	0.19	2.631	0.588	1	1	59.918			
			C	0.235	2.483	0.598	1	1	72.074			
T8	0.38	2.24	A	0.219	2.535	0.594	1	1	34.190	1.88	188.49	C
43.00-33.00			B	0.171	2.697	0.585	1	1	28.086			
			C	0.213	2.553	0.593	1	1	34.208			
T9	0.38	2.29	A	0.212	2.557	0.593	1	1	34.725	1.85	185.49	C
33.00-23.00			B	0.166	2.715	0.584	1	1	28.647			
			C	0.206	2.575	0.592	1	1	34.746			
T10	0.72	5.69	A	0.232	2.493	0.597	1	1	86.005	4.44	222.23	A
23.00-3.00			B	0.187	2.641	0.588	1	1	73.582			
			C	0.215	2.546	0.594	1	1	82.204			
Sum Weight:	4.73	26.24						OTM	2390.68 kip-ft	30.41		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	plf	
T1	0.03	0.93	A	0.128	2.853	0.578	0.8	1	15.923	1.79	89.65	C
183.00-163.00			B	0.133	2.834	0.579	0.8	1	16.429			
			C	0.16	2.735	0.583	0.8	1	19.697			
T2	0.09	1.13	A	0.107	2.937	0.576	0.8	1	14.636	1.91	95.64	C
163.00-143.00			B	0.125	2.866	0.578	0.8	1	16.694			
			C	0.166	2.714	0.584	0.8	1	21.936			
T3	0.40	1.20	A	0.199	2.601	0.59	0.8	1	31.074	2.67	133.37	C
143.00-123.00			B	0.186	2.643	0.588	0.8	1	29.540			
			C	0.212	2.556	0.593	0.8	1	33.803			
T4	0.56	2.27	A	0.234	2.487	0.598	0.8	1	42.660	3.13	156.35	A
123.00-103.00			B	0.197	2.606	0.59	0.8	1	36.539			
			C	0.199	2.598	0.59	0.8	1	37.476			
T5	0.64	3.33	A	0.231	2.496	0.597	0.8	1	48.405	3.37	168.36	A
103.00-83.00			B	0.187	2.641	0.588	0.8	1	39.758			
			C	0.21	2.564	0.592	0.8	1	44.877			
T6	0.76	2.99	A	0.23	2.498	0.597	0.8	1	54.399	3.53	176.70	A
83.00-63.00			B	0.175	2.682	0.586	0.8	1	42.154			
			C	0.223	2.52	0.595	0.8	1	53.539			
T7	0.76	4.18	A	0.24	2.467	0.599	0.8	1	65.053	3.81	190.51	A
63.00-43.00			B	0.19	2.631	0.588	0.8	1	52.781			
			C	0.235	2.483	0.598	0.8	1	64.571			
T8	0.38	2.24	A	0.219	2.535	0.594	0.8	1	31.375	1.72	171.66	A
43.00-33.00			B	0.171	2.697	0.585	0.8	1	25.085			
			C	0.213	2.553	0.593	0.8	1	31.007			
T9	0.38	2.29	A	0.212	2.557	0.593	0.8	1	31.793	1.69	168.56	A
33.00-23.00			B	0.166	2.715	0.584	0.8	1	25.530			
			C	0.206	2.575	0.592	0.8	1	31.428			
T10	0.72	5.69	A	0.232	2.493	0.597	0.8	1	76.891	3.97	198.68	A
23.00-3.00			B	0.187	2.641	0.588	0.8	1	63.893			
			C	0.215	2.546	0.594	0.8	1	72.427			
Sum Weight:	4.73	26.24						OTM	2165.36 kip-ft	27.59		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	Face	e	C_F	R_R	D_F	D_R	A_E	F	w	Ctrl. Face
ft	K	K							ft^2	K	plf	
T1	0.03	0.93	A	0.128	2.853	0.578	0.85	1	16.572	1.86	93.09	C
183.00-163.00			B	0.133	2.834	0.579	0.85	1	17.074			
			C	0.16	2.735	0.583	0.85	1	20.453			
T2	0.09	1.13	A	0.107	2.937	0.576	0.85	1	15.205	1.97	98.57	C
163.00-143.00			B	0.125	2.866	0.578	0.85	1	17.260			
			C	0.166	2.714	0.584	0.85	1	22.607			
T3	0.40	1.20	A	0.199	2.601	0.59	0.85	1	31.818	2.74	136.97	C
143.00-123.00			B	0.186	2.643	0.588	0.85	1	30.346			
			C	0.212	2.556	0.593	0.85	1	34.716			
T4	0.56	2.27	A	0.234	2.487	0.598	0.85	1	43.468	3.19	159.32	A
123.00-103.00			B	0.197	2.606	0.59	0.85	1	37.435			
			C	0.199	2.598	0.59	0.85	1	38.501			
T5	0.64	3.33	A	0.231	2.496	0.597	0.85	1	49.294	3.43	171.45	A
103.00-83.00			B	0.187	2.641	0.588	0.85	1	40.729			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.21	2.564	0.592	0.85	1	45.967			
T6	0.76	2.99	A	0.23	2.498	0.597	0.85	1	55.441	3.60	180.08	A
83.00-63.00			B	0.175	2.682	0.586	0.85	1	43.281			
			C	0.223	2.52	0.595	0.85	1	54.769			
T7	0.76	4.18	A	0.24	2.467	0.599	0.85	1	66.718	3.92	195.85	C
63.00-43.00			B	0.19	2.631	0.588	0.85	1	54.566			
			C	0.235	2.483	0.598	0.85	1	66.447			
T8	0.38	2.24	A	0.219	2.535	0.594	0.85	1	32.079	1.76	175.51	A
43.00-33.00			B	0.171	2.697	0.585	0.85	1	25.835			
			C	0.213	2.553	0.593	0.85	1	31.807			
T9	0.38	2.29	A	0.212	2.557	0.593	0.85	1	32.526	1.72	172.45	A
33.00-23.00			B	0.166	2.715	0.584	0.85	1	26.309			
			C	0.206	2.575	0.592	0.85	1	32.257			
T10	0.72	5.69	A	0.232	2.493	0.597	0.85	1	79.170	4.09	204.57	A
23.00-3.00			B	0.187	2.641	0.588	0.85	1	66.315			
			C	0.215	2.546	0.594	0.85	1	74.871			
Sum Weight:	4.73	26.24						OTM	2220.87 kip-ft	28.28		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.12	1.53	A	0.186	2.644	0.588	1	1	24.747	2.63	131.74	C
183.00-163.00			B	0.199	2.6	0.59	1	1	26.081			
			C	0.243	2.459	0.6	1	1	32.190			
T2	0.26	1.66	A	0.152	2.766	0.582	1	1	22.223	2.85	142.53	C
163.00-143.00			B	0.182	2.657	0.587	1	1	26.477			
			C	0.255	2.424	0.603	1	1	36.596			
T3	1.00	1.91	A	0.26	2.408	0.604	1	1	50.342	3.93	196.29	C
143.00-123.00			B	0.26	2.409	0.604	1	1	47.244			
			C	0.307	2.279	0.618	1	1	55.801			
T4	1.34	3.09	A	0.301	2.293	0.616	1	1	69.692	4.71	235.42	A
123.00-103.00			B	0.272	2.374	0.608	1	1	56.937			
			C	0.283	2.343	0.611	1	1	60.319			
T5	1.52	4.33	A	0.286	2.335	0.612	1	1	77.517	5.04	252.23	A
103.00-83.00			B	0.242	2.461	0.6	1	1	59.839			
			C	0.282	2.344	0.611	1	1	70.834			
T6	1.80	3.97	A	0.291	2.321	0.613	1	1	87.508	5.28	264.10	A
83.00-63.00			B	0.231	2.496	0.597	1	1	62.756			
			C	0.307	2.277	0.618	1	1	85.332			
T7	1.81	5.60	A	0.306	2.28	0.618	1	1	103.574	5.60	280.25	A
63.00-43.00			B	0.249	2.442	0.602	1	1	78.177			
			C	0.322	2.239	0.623	1	1	101.950			
T8	0.91	2.86	A	0.275	2.364	0.609	1	1	49.467	2.52	252.43	A
43.00-33.00			B	0.22	2.532	0.595	1	1	36.390			
			C	0.289	2.326	0.613	1	1	48.346			
T9	0.91	2.93	A	0.266	2.389	0.606	1	1	50.078	2.48	248.05	A
33.00-23.00			B	0.213	2.552	0.593	1	1	37.016			
			C	0.28	2.352	0.61	1	1	48.915			
T10	1.66	7.53	A	0.291	2.321	0.613	1	1	118.875	5.72	286.03	A
23.00-3.00			B	0.236	2.481	0.598	1	1	91.654			
			C	0.28	2.351	0.61	1	1	108.977			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
Sum Weight:	11.32	35.41						OTM	3215.34 kip-ft	40.78		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	1.53	A	0.186	2.644	0.588	0.8	1	22.152	2.38	118.83	C
183.00-163.00			B	0.199	2.6	0.59	0.8	1	23.527			
			C	0.243	2.459	0.6	0.8	1	29.037			
T2	0.26	1.66	A	0.152	2.766	0.582	0.8	1	19.946	2.61	130.37	C
163.00-143.00			B	0.182	2.657	0.587	0.8	1	23.901			
			C	0.255	2.424	0.603	0.8	1	33.474			
T3	1.00	1.91	A	0.26	2.408	0.604	0.8	1	43.990	3.55	177.35	C
143.00-123.00			B	0.26	2.409	0.604	0.8	1	42.418			
			C	0.307	2.279	0.618	0.8	1	50.417			
T4	1.34	3.09	A	0.301	2.293	0.616	0.8	1	60.824	4.11	205.46	A
123.00-103.00			B	0.272	2.374	0.608	0.8	1	51.793			
			C	0.283	2.343	0.611	0.8	1	54.483			
T5	1.52	4.33	A	0.286	2.335	0.612	0.8	1	66.968	4.36	217.90	A
103.00-83.00			B	0.242	2.461	0.6	0.8	1	53.622			
			C	0.282	2.344	0.611	0.8	1	63.351			
T6	1.80	3.97	A	0.291	2.321	0.613	0.8	1	76.044	4.59	229.50	A
83.00-63.00			B	0.231	2.496	0.597	0.8	1	56.683			
			C	0.307	2.277	0.618	0.8	1	77.083			
T7	1.81	5.60	A	0.306	2.28	0.618	0.8	1	89.680	4.85	242.65	A
63.00-43.00			B	0.249	2.442	0.602	0.8	1	69.513			
			C	0.322	2.239	0.623	0.8	1	91.202			
T8	0.91	2.86	A	0.275	2.364	0.609	0.8	1	43.012	2.19	219.49	A
43.00-33.00			B	0.22	2.532	0.595	0.8	1	32.612			
			C	0.289	2.326	0.613	0.8	1	43.491			
T9	0.91	2.93	A	0.266	2.389	0.606	0.8	1	43.505	2.15	215.49	A
33.00-23.00			B	0.213	2.552	0.593	0.8	1	33.121			
			C	0.28	2.352	0.61	0.8	1	43.942			
T10	1.66	7.53	A	0.291	2.321	0.613	0.8	1	102.550	4.94	246.75	A
23.00-3.00			B	0.236	2.481	0.598	0.8	1	80.403			
			C	0.28	2.351	0.61	0.8	1	95.996			
Sum Weight:	11.32	35.41						OTM	2844.50 kip-ft	35.73		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.12	1.53	A	0.186	2.644	0.588	0.85	1	22.801	2.44	122.06	C
183.00-163.00			B	0.199	2.6	0.59	0.85	1	24.165			
			C	0.243	2.459	0.6	0.85	1	29.826			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T2	0.26	1.66	A	0.152	2.766	0.582	0.85	1	20.516	2.67	133.41	C
163.00-143.00			B	0.182	2.657	0.587	0.85	1	24.545			
			C	0.255	2.424	0.603	0.85	1	34.254			
T3	1.00	1.91	A	0.26	2.408	0.604	0.85	1	45.578	3.64	182.09	C
143.00-123.00			B	0.26	2.409	0.604	0.85	1	43.625			
			C	0.307	2.279	0.618	0.85	1	51.763			
T4	1.34	3.09	A	0.301	2.293	0.616	0.85	1	63.041	4.26	212.95	A
123.00-103.00			B	0.272	2.374	0.608	0.85	1	53.079			
			C	0.283	2.343	0.611	0.85	1	55.942			
T5	1.52	4.33	A	0.286	2.335	0.612	0.85	1	69.605	4.53	226.48	A
103.00-83.00			B	0.242	2.461	0.6	0.85	1	55.176			
			C	0.282	2.344	0.611	0.85	1	65.222			
T6	1.80	3.97	A	0.291	2.321	0.613	0.85	1	78.910	4.76	238.15	A
83.00-63.00			B	0.231	2.496	0.597	0.85	1	58.202			
			C	0.307	2.277	0.618	0.85	1	79.146			
T7	1.81	5.60	A	0.306	2.28	0.618	0.85	1	93.154	5.04	252.05	A
63.00-43.00			B	0.249	2.442	0.602	0.85	1	71.679			
			C	0.322	2.239	0.623	0.85	1	93.889			
T8	0.91	2.86	A	0.275	2.364	0.609	0.85	1	44.626	2.28	227.72	A
43.00-33.00			B	0.22	2.532	0.595	0.85	1	33.556			
			C	0.289	2.326	0.613	0.85	1	44.705			
T9	0.91	2.93	A	0.266	2.389	0.606	0.85	1	45.148	2.24	223.63	A
33.00-23.00			B	0.213	2.552	0.593	0.85	1	34.095			
			C	0.28	2.352	0.61	0.85	1	45.186			
T10	1.66	7.53	A	0.291	2.321	0.613	0.85	1	106.632	5.13	256.57	A
23.00-3.00			B	0.236	2.481	0.598	0.85	1	83.216			
			C	0.28	2.351	0.61	0.85	1	99.241			
Sum Weight:	11.32	35.41						OTM	2937.21 kip-ft	36.99		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.03	0.93	A	0.128	2.853	0.578	1	1	18.518	2.07	103.42	C
183.00-163.00			B	0.133	2.834	0.579	1	1	19.009			
			C	0.16	2.735	0.583	1	1	22.722			
T2	0.09	1.13	A	0.107	2.937	0.576	1	1	16.913	2.15	107.35	C
163.00-143.00			B	0.125	2.866	0.578	1	1	18.959			
			C	0.166	2.714	0.584	1	1	24.621			
T3	0.40	1.20	A	0.199	2.601	0.59	1	1	34.047	2.96	147.78	C
143.00-123.00			B	0.186	2.643	0.588	1	1	32.763			
			C	0.212	2.556	0.593	1	1	37.455			
T4	0.56	2.27	A	0.234	2.487	0.598	1	1	45.892	3.36	168.20	A
123.00-103.00			B	0.197	2.606	0.59	1	1	40.123			
			C	0.199	2.598	0.59	1	1	41.575			
T5	0.64	3.33	A	0.231	2.496	0.597	1	1	51.961	3.61	180.73	A
103.00-83.00			B	0.187	2.641	0.588	1	1	43.644			
			C	0.21	2.564	0.592	1	1	49.239			
T6	0.76	2.99	A	0.23	2.498	0.597	1	1	58.569	3.83	191.57	C
83.00-63.00			B	0.175	2.682	0.586	1	1	46.662			
			C	0.223	2.52	0.595	1	1	58.459			
T7	0.76	4.18	A	0.24	2.467	0.599	1	1	71.712	4.25	212.43	C
63.00-43.00			B	0.19	2.631	0.588	1	1	59.918			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
			C	0.235	2.483	0.598	1	1	72.074			
T8	0.38	2.24	A	0.219	2.535	0.594	1	1	34.190	1.88	188.49	C
43.00-33.00			B	0.171	2.697	0.585	1	1	28.086			
			C	0.213	2.553	0.593	1	1	34.208			
T9	0.38	2.29	A	0.212	2.557	0.593	1	1	34.725	1.85	185.49	C
33.00-23.00			B	0.166	2.715	0.584	1	1	28.647			
			C	0.206	2.575	0.592	1	1	34.746			
T10	0.72	5.69	A	0.232	2.493	0.597	1	1	86.005	4.44	222.23	A
23.00-3.00			B	0.187	2.641	0.588	1	1	73.582			
			C	0.215	2.546	0.594	1	1	82.204			
Sum Weight:	4.73	26.24						OTM	2390.68 kip-ft	30.41		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft²	F K	w plf	Ctrl. Face
T1	0.03	0.93	A	0.128	2.853	0.578	0.8	1	15.923	1.79	89.65	C
183.00-163.00			B	0.133	2.834	0.579	0.8	1	16.429			
			C	0.16	2.735	0.583	0.8	1	19.697			
T2	0.09	1.13	A	0.107	2.937	0.576	0.8	1	14.636	1.91	95.64	C
163.00-143.00			B	0.125	2.866	0.578	0.8	1	16.694			
			C	0.166	2.714	0.584	0.8	1	21.936			
T3	0.40	1.20	A	0.199	2.601	0.59	0.8	1	31.074	2.67	133.37	C
143.00-123.00			B	0.186	2.643	0.588	0.8	1	29.540			
			C	0.212	2.556	0.593	0.8	1	33.803			
T4	0.56	2.27	A	0.234	2.487	0.598	0.8	1	42.660	3.13	156.35	A
123.00-103.00			B	0.197	2.606	0.59	0.8	1	36.539			
			C	0.199	2.598	0.59	0.8	1	37.476			
T5	0.64	3.33	A	0.231	2.496	0.597	0.8	1	48.405	3.37	168.36	A
103.00-83.00			B	0.187	2.641	0.588	0.8	1	39.758			
			C	0.21	2.564	0.592	0.8	1	44.877			
T6	0.76	2.99	A	0.23	2.498	0.597	0.8	1	54.399	3.53	176.70	A
83.00-63.00			B	0.175	2.682	0.586	0.8	1	42.154			
			C	0.223	2.52	0.595	0.8	1	53.539			
T7	0.76	4.18	A	0.24	2.467	0.599	0.8	1	65.053	3.81	190.51	A
63.00-43.00			B	0.19	2.631	0.588	0.8	1	52.781			
			C	0.235	2.483	0.598	0.8	1	64.571			
T8	0.38	2.24	A	0.219	2.535	0.594	0.8	1	31.375	1.72	171.66	A
43.00-33.00			B	0.171	2.697	0.585	0.8	1	25.085			
			C	0.213	2.553	0.593	0.8	1	31.007			
T9	0.38	2.29	A	0.212	2.557	0.593	0.8	1	31.793	1.69	168.56	A
33.00-23.00			B	0.166	2.715	0.584	0.8	1	25.530			
			C	0.206	2.575	0.592	0.8	1	31.428			
T10	0.72	5.69	A	0.232	2.493	0.597	0.8	1	76.891	3.97	198.68	A
23.00-3.00			B	0.187	2.641	0.588	0.8	1	63.893			
			C	0.215	2.546	0.594	0.8	1	72.427			
Sum Weight:	4.73	26.24						OTM	2165.36 kip-ft	27.59		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	R_R	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.93	A	0.128	2.853	0.578	0.85	1	16.572	1.86	93.09	C
183.00-163.00			B	0.133	2.834	0.579	0.85	1	17.074			
			C	0.16	2.735	0.583	0.85	1	20.453			
T2	0.09	1.13	A	0.107	2.937	0.576	0.85	1	15.205	1.97	98.57	C
163.00-143.00			B	0.125	2.866	0.578	0.85	1	17.260			
			C	0.166	2.714	0.584	0.85	1	22.607			
T3	0.40	1.20	A	0.199	2.601	0.59	0.85	1	31.818	2.74	136.97	C
143.00-123.00			B	0.186	2.643	0.588	0.85	1	30.346			
			C	0.212	2.556	0.593	0.85	1	34.716			
T4	0.56	2.27	A	0.234	2.487	0.598	0.85	1	43.468	3.19	159.32	A
123.00-103.00			B	0.197	2.606	0.59	0.85	1	37.435			
			C	0.199	2.598	0.59	0.85	1	38.501			
T5	0.64	3.33	A	0.231	2.496	0.597	0.85	1	49.294	3.43	171.45	A
103.00-83.00			B	0.187	2.641	0.588	0.85	1	40.729			
			C	0.21	2.564	0.592	0.85	1	45.967			
T6	0.76	2.99	A	0.23	2.498	0.597	0.85	1	55.441	3.60	180.08	A
83.00-63.00			B	0.175	2.682	0.586	0.85	1	43.281			
			C	0.223	2.52	0.595	0.85	1	54.769			
T7	0.76	4.18	A	0.24	2.467	0.599	0.85	1	66.718	3.92	195.85	C
63.00-43.00			B	0.19	2.631	0.588	0.85	1	54.566			
			C	0.235	2.483	0.598	0.85	1	66.447			
T8	0.38	2.24	A	0.219	2.535	0.594	0.85	1	32.079	1.76	175.51	A
43.00-33.00			B	0.171	2.697	0.585	0.85	1	25.835			
			C	0.213	2.553	0.593	0.85	1	31.807			
T9	0.38	2.29	A	0.212	2.557	0.593	0.85	1	32.526	1.72	172.45	A
33.00-23.00			B	0.166	2.715	0.584	0.85	1	26.309			
			C	0.206	2.575	0.592	0.85	1	32.257			
T10	0.72	5.69	A	0.232	2.493	0.597	0.85	1	79.170	4.09	204.57	A
23.00-3.00			B	0.187	2.641	0.588	0.85	1	66.315			
			C	0.215	2.546	0.594	0.85	1	74.871			
Sum Weight:	4.73	26.24						OTM	2220.87 kip-ft	28.28		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	8.98					
Bracing Weight	17.26					
Total Member Self-Weight	26.24			4.15	2.24	
Total Weight	40.02			4.15	2.24	
Wind 0 deg - No Ice		0.06	-42.13	-3836.00	-2.79	-8.32
Wind 30 deg - No Ice		19.98	-34.60	-3163.63	-1822.91	-6.57
Wind 60 deg - No Ice		33.82	-19.54	-1777.03	-3084.70	-3.25
Wind 90 deg - No Ice		39.71	0.06	21.49	-3615.67	0.90
Wind 120 deg - No Ice		36.35	21.08	1932.04	-3300.46	5.11
Wind 150 deg - No Ice		20.00	34.76	3207.70	-1837.23	7.23
Wind 180 deg - No Ice		-0.06	39.47	3647.94	7.27	7.70
Wind 210 deg - No Ice		-20.11	34.83	3212.72	1850.41	6.36
Wind 240 deg - No Ice		-36.41	21.19	1940.75	3309.96	3.21
Wind 270 deg - No Ice		-39.71	0.19	31.55	3620.14	-0.90

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 300 deg - No Ice		-33.76	-19.43	-1768.32	3084.15	-4.45
Wind 330 deg - No Ice		-19.87	-34.53	-3158.60	1818.68	-7.02
Member Ice	9.17					
Total Weight Ice	60.41			10.94	6.04	
Wind 0 deg - Ice		0.07	-54.93	-4948.94	0.78	-2.36
Wind 30 deg - Ice		25.55	-44.25	-4032.49	-2324.71	-1.10
Wind 60 deg - Ice		42.98	-24.82	-2256.69	-3923.60	0.41
Wind 90 deg - Ice		50.85	0.06	28.67	-4622.02	1.86
Wind 120 deg - Ice		47.43	27.48	2498.84	-4265.86	3.00
Wind 150 deg - Ice		25.57	44.42	4091.04	-2339.27	2.71
Wind 180 deg - Ice		-0.07	50.05	4629.74	11.30	1.98
Wind 210 deg - Ice		-25.69	44.49	4096.29	2360.46	0.89
Wind 240 deg - Ice		-47.50	27.59	2507.94	4283.20	-0.64
Wind 270 deg - Ice		-50.85	0.20	39.19	4634.10	-1.86
Wind 300 deg - Ice		-42.91	-24.71	-2247.59	3930.43	-2.40
Wind 330 deg - Ice		-25.44	-44.18	-4027.23	2327.69	-2.50
Total Weight	40.02			4.15	2.24	
Wind 0 deg - Service		0.06	-42.13	-3840.41	-4.44	-8.32
Wind 30 deg - Service		19.98	-34.60	-3168.04	-1824.56	-6.57
Wind 60 deg - Service		33.82	-19.54	-1781.43	-3086.35	-3.25
Wind 90 deg - Service		39.71	0.06	17.09	-3617.31	0.90
Wind 120 deg - Service		36.35	21.08	1927.64	-3302.10	5.11
Wind 150 deg - Service		20.00	34.76	3203.29	-1838.88	7.23
Wind 180 deg - Service		-0.06	39.47	3643.53	5.62	7.70
Wind 210 deg - Service		-20.11	34.83	3208.32	1848.77	6.36
Wind 240 deg - Service		-36.41	21.19	1936.35	3308.32	3.21
Wind 270 deg - Service		-39.71	0.19	27.14	3618.49	-0.90
Wind 300 deg - Service		-33.76	-19.43	-1772.73	3082.50	-4.45
Wind 330 deg - Service		-19.87	-34.53	-3163.01	1817.03	-7.02

Load Combinations

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

Comb. No.	Description
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 K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	183 - 163	Leg	Max Tension	21	5.11	-0.00	-0.02
			Max. Compression	15	-6.74	0.05	0.13
			Max. Mx	19	-0.24	0.37	-0.11
			Max. My	20	-0.78	-0.07	0.36
			Max. Vy	18	0.32	-0.24	-0.03
			Max. Vx	21	-0.31	0.00	0.00
		Diagonal	Max Tension	20	1.54	0.00	0.00
			Max. Compression	19	-1.62	0.00	0.00
			Max. Mx	26	0.28	0.01	-0.00
			Max. My	19	-1.21	0.01	0.00
			Max. Vy	26	-0.01	0.01	-0.00
			Max. Vx	19	0.00	0.00	0.00
		Top Girt	Max Tension	19	0.06	0.00	0.00
			Max. Compression	17	-0.17	0.00	0.00
			Max. Mx	14	-0.04	-0.05	0.00
			Max. My	26	-0.04	0.00	-0.00
			Max. Vy	14	0.02	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
T2	163 - 143	Leg	Max Tension	21	14.97	-0.22	0.01
			Max. Compression	15	-18.58	0.04	-0.02
			Max. Mx	15	-13.52	0.24	-0.02
			Max. My	18	-1.40	-0.03	0.25
			Max. Vy	25	-0.55	-0.22	0.00
			Max. Vx	22	0.51	0.01	0.11
		Diagonal	Max Tension	20	2.81	0.00	0.00
			Max. Compression	20	-2.82	0.00	0.00
			Max. Mx	20	1.25	0.03	0.00
			Max. My	20	-2.80	0.01	0.01
			Max. Vy	20	0.02	0.03	0.00
			Max. Vx	20	-0.00	0.00	0.00
T3	143 - 123	Leg	Max Tension	21	30.33	-0.88	0.01
			Max. Compression	19	-39.53	1.38	0.02
			Max. Mx	21	29.42	1.48	0.02
			Max. My	16	-4.63	0.01	1.49
			Max. Vy	21	0.97	-1.36	0.02
			Max. Vx	16	0.88	0.01	-1.09
		Diagonal	Max Tension	20	5.08	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	20	-5.22	0.00	0.00
			Max. Mx	20	1.67	0.05	0.00
			Max. My	20	-3.89	0.01	0.01
			Max. Vy	20	-0.02	0.05	0.00
			Max. Vx	20	-0.00	0.00	0.00
T4	123 - 103	Leg	Max Tension	21	55.33	-0.22	0.01
			Max. Compression	15	-69.73	-0.09	-0.03
			Max. Mx	15	-49.06	1.41	-0.02
			Max. My	22	-5.27	0.03	1.09
			Max. Vy	15	0.32	1.41	-0.02
			Max. Vx	16	-0.19	0.01	-1.09
		Diagonal	Max Tension	20	6.71	0.00	0.00
			Max. Compression	20	-6.53	0.00	0.00
			Max. Mx	20	2.70	0.07	0.01
			Max. My	20	-6.48	0.04	0.02
			Max. Vy	22	0.04	0.07	-0.01
			Max. Vx	26	0.00	0.00	0.00
T5	103 - 83	Leg	Max Tension	21	78.73	-1.18	-0.03
			Max. Compression	15	-100.30	0.48	0.03
			Max. Mx	23	-80.97	1.42	-0.00
			Max. My	26	-7.07	0.09	-1.23
			Max. Vy	17	-1.31	-1.21	-0.01
			Max. Vx	20	-1.22	0.09	-1.20
		Diagonal	Max Tension	20	9.34	0.00	0.00
			Max. Compression	20	-9.07	0.00	0.00
			Max. Mx	21	5.57	-0.19	-0.02
			Max. My	21	-7.21	-0.10	-0.03
			Max. Vy	21	-0.08	-0.19	0.02
			Max. Vx	21	0.00	0.00	0.00
T6	83 - 63	Leg	Max Tension	21	106.79	0.03	-0.01
			Max. Compression	15	-136.39	-0.31	0.03
			Max. Mx	17	89.53	-1.07	-0.00
			Max. My	20	-10.30	-0.31	-0.89
			Max. Vy	17	-0.20	-1.07	-0.00
			Max. Vx	26	0.17	-0.31	0.89
		Diagonal	Max Tension	20	10.03	0.00	0.00
			Max. Compression	20	-9.95	0.00	0.00
			Max. Mx	15	8.70	0.18	0.01
			Max. My	21	-7.80	0.08	0.02
			Max. Vy	21	0.06	0.18	0.02
			Max. Vx	15	-0.00	0.00	0.00
T7	63 - 43	Leg	Max Tension	21	134.72	0.82	-0.02
			Max. Compression	23	-171.74	-1.30	-0.01
			Max. Mx	23	-171.57	1.48	0.00
			Max. My	20	-14.48	0.40	-1.28
			Max. Vy	15	0.58	1.47	-0.01
			Max. Vx	20	-0.41	0.40	-1.28
		Diagonal	Max Tension	20	10.62	0.00	0.00
			Max. Compression	20	-10.47	0.00	0.00
			Max. Mx	21	7.69	0.24	0.02
			Max. My	21	-8.72	0.15	0.03
			Max. Vy	21	0.08	0.24	0.02
			Max. Vx	21	-0.00	0.00	0.00
		Secondary Horizontal	Max Tension	23	2.98	0.00	0.00
			Max. Compression	23	-2.98	0.00	0.00
			Max. Mx	14	0.25	-0.46	0.00
			Max. My	14	0.25	0.00	0.01
			Max. Vy	14	0.09	0.00	0.00
			Max. Vx	14	-0.00	0.00	0.00
T8	43 - 33	Leg	Max Tension	21	150.03	-1.45	-0.01

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Force K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Compression	23	-188.82	2.63	-0.00
			Max. Mx	15	-188.59	2.64	0.02
			Max. My	20	-14.78	-1.33	-0.83
			Max. Vy	15	-0.47	2.64	0.02
			Max. Vx	20	-0.11	-1.33	-0.83
		Diagonal	Max Tension	20	9.83	0.00	0.00
			Max. Compression	20	-11.74	0.00	0.00
			Max. Mx	21	7.57	0.35	0.03
			Max. My	21	-10.17	0.24	0.03
			Max. Vy	21	0.10	0.35	0.03
			Max. Vx	21	-0.01	0.00	0.00
T9	33 - 23	Leg	Max Tension	21	161.64	1.08	-0.01
			Max. Compression	23	-207.99	-2.08	-0.01
			Max. Mx	15	-207.34	2.64	0.02
			Max. My	20	-18.30	-2.17	-0.72
			Max. Vy	15	0.55	2.64	0.02
			Max. Vx	20	0.10	-2.17	-0.72
		Diagonal	Max Tension	20	12.19	0.00	0.00
			Max. Compression	20	-9.76	0.00	0.00
			Max. Mx	2	7.31	0.23	0.02
			Max. My	24	6.90	0.20	0.03
			Max. Vy	21	0.09	0.21	0.03
			Max. Vx	24	0.00	0.00	0.00
T10	23 - 3	Leg	Max Tension	21	187.15	3.76	-0.04
			Max. Compression	23	-244.28	-0.00	-0.00
			Max. Mx	21	187.15	3.76	-0.04
			Max. My	20	-21.75	3.10	-2.52
			Max. Vy	21	-1.16	-1.95	0.02
			Max. Vx	20	0.69	3.10	-2.52
		Diagonal	Max Tension	16	14.15	0.00	0.00
			Max. Compression	18	-13.16	0.00	0.00
			Max. Mx	21	7.40	0.43	-0.03
			Max. My	24	-13.08	0.29	0.05
			Max. Vy	21	0.11	0.43	-0.03
			Max. Vx	24	-0.01	0.00	0.00
		Secondary Horizontal	Max Tension	23	4.24	0.00	0.00
			Max. Compression	23	-4.24	0.00	0.00
			Max. Mx	14	0.37	-0.75	0.00
			Max. My	20	3.55	0.00	0.02
			Max. Vy	14	-0.12	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	23	251.36	25.67	-14.80
	Max. H_x	23	251.36	25.67	-14.80
	Max. H_z	16	-167.59	-23.30	15.96
	Min. Vert	17	-190.74	-27.11	15.65
	Min. H_x	17	-190.74	-27.11	15.65
	Min. H_z	23	251.36	25.67	-14.80
Leg B	Max. Vert	19	250.46	-25.64	-14.71
	Max. H_x	25	-190.80	27.08	15.58
	Max. H_z	26	-167.59	23.28	15.85

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg A	Min. Vert	25	-190.80	27.08	15.58
	Min. H_x	19	250.46	-25.64	-14.71
	Min. H_z	19	250.46	-25.64	-14.71
	Max. Vert	15	250.70	-0.06	29.62
	Max. H_x	24	18.31	4.20	-2.46
	Max. H_z	15	250.70	-0.06	29.62
	Min. Vert	21	-195.56	0.05	-31.61
	Min. H_x	18	18.80	-4.21	-2.38
	Min. H_z	21	-195.56	0.05	-31.61

Tower Mast Reaction Summary

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead Only	40.02	0.00	0.00	4.15	2.24	-0.00
Dead+Wind 0 deg - No Ice	40.02	0.06	-42.13	-3844.27	-2.80	-8.31
Dead+Wind 30 deg - No Ice	40.02	19.98	-34.60	-3170.44	-1826.83	-6.56
Dead+Wind 60 deg - No Ice	40.02	33.82	-19.54	-1780.84	-3091.32	-3.25
Dead+Wind 90 deg - No Ice	40.02	39.71	0.06	21.55	-3623.43	0.91
Dead+Wind 120 deg - No Ice	40.02	36.35	21.08	1936.21	-3307.56	5.12
Dead+Wind 150 deg - No Ice	40.02	20.00	34.76	3214.63	-1841.21	7.23
Dead+Wind 180 deg - No Ice	40.02	-0.06	39.47	3655.82	7.27	7.70
Dead+Wind 210 deg - No Ice	40.02	-20.11	34.83	3219.66	1854.40	6.35
Dead+Wind 240 deg - No Ice	40.02	-36.41	21.19	1944.93	3317.07	3.20
Dead+Wind 270 deg - No Ice	40.02	-39.71	0.19	31.62	3627.90	-0.91
Dead+Wind 300 deg - No Ice	40.02	-33.76	-19.43	-1772.12	3090.75	-4.45
Dead+Wind 330 deg - No Ice	40.02	-19.87	-34.53	-3165.40	1822.59	-7.02
Dead+Ice+Temp	60.41	0.00	-0.00	10.97	6.03	-0.00
Dead+Wind 0 deg+Ice+Temp	60.41	0.07	-54.93	-4963.83	0.75	-2.34
Dead+Wind 30 deg+Ice+Temp	60.41	25.55	-44.25	-4044.68	-2331.77	-1.07
Dead+Wind 60 deg+Ice+Temp	60.41	42.98	-24.82	-2263.51	-3935.48	0.44
Dead+Wind 90 deg+Ice+Temp	60.41	50.85	0.06	28.78	-4635.98	1.88
Dead+Wind 120 deg+Ice+Temp	60.41	47.43	27.48	2506.35	-4278.70	3.01
Dead+Wind 150 deg+Ice+Temp	60.41	25.57	44.42	4103.44	-2346.41	2.70
Dead+Wind 180 deg+Ice+Temp	60.41	-0.07	50.05	4643.81	11.28	1.97
Dead+Wind 210 deg+Ice+Temp	60.41	-25.69	44.49	4108.72	2367.57	0.86
Dead+Wind 240 deg+Ice+Temp	60.41	-47.50	27.59	2515.49	4296.02	-0.67
Dead+Wind 270 deg+Ice+Temp	60.41	-50.85	0.20	39.31	4648.04	-1.88
Dead+Wind 300 deg+Ice+Temp	60.41	-42.91	-24.71	-2254.40	3942.26	-2.41
Dead+Wind 330 deg+Ice+Temp	60.41	-25.44	-44.18	-4039.43	2334.68	-2.49
Dead+Wind 0 deg - Service	40.02	0.06	-42.13	-3844.27	-2.80	-8.31
Dead+Wind 30 deg - Service	40.02	19.98	-34.60	-3170.44	-1826.83	-6.56
Dead+Wind 60 deg - Service	40.02	33.82	-19.54	-1780.84	-3091.32	-3.25
Dead+Wind 90 deg - Service	40.02	39.71	0.06	21.55	-3623.43	0.91
Dead+Wind 120 deg - Service	40.02	36.35	21.08	1936.21	-3307.56	5.12
Dead+Wind 150 deg - Service	40.02	20.00	34.76	3214.63	-1841.21	7.23
Dead+Wind 180 deg - Service	40.02	-0.06	39.47	3655.82	7.27	7.70
Dead+Wind 210 deg - Service	40.02	-20.11	34.83	3219.66	1854.40	6.35
Dead+Wind 240 deg - Service	40.02	-36.41	21.19	1944.93	3317.07	3.20
Dead+Wind 270 deg - Service	40.02	-39.71	0.19	31.62	3627.90	-0.91
Dead+Wind 300 deg - Service	40.02	-33.76	-19.43	-1772.12	3090.75	-4.45
Dead+Wind 330 deg - Service	40.02	-19.87	-34.53	-3165.40	1822.59	-7.02

Solution Summary

Load Comb.	Sum of Applied Forces PX K	PY K	PZ K	Sum of Reactions PX K	PY K	PZ K	% Error
1	0.00	-40.02	0.00	0.00	40.02	0.00	0.000%
2	0.06	-40.02	-42.13	-0.06	40.02	42.13	0.000%
3	19.98	-40.02	-34.60	-19.98	40.02	34.60	0.000%
4	33.82	-40.02	-19.54	-33.82	40.02	19.54	0.000%
5	39.71	-40.02	0.06	-39.71	40.02	-0.06	0.000%
6	36.35	-40.02	21.08	-36.35	40.02	-21.08	0.000%
7	20.00	-40.02	34.76	-20.00	40.02	-34.76	0.000%
8	-0.06	-40.02	39.47	0.06	40.02	-39.47	0.000%
9	-20.11	-40.02	34.83	20.11	40.02	-34.83	0.000%
10	-36.41	-40.02	21.19	36.41	40.02	-21.19	0.000%
11	-39.71	-40.02	0.19	39.71	40.02	-0.19	0.000%
12	-33.76	-40.02	-19.43	33.76	40.02	19.43	0.000%
13	-19.87	-40.02	-34.53	19.87	40.02	34.53	0.000%
14	0.00	-60.41	0.00	-0.00	60.41	0.00	0.000%
15	0.07	-60.41	-54.93	-0.07	60.41	54.93	0.000%
16	25.55	-60.41	-44.25	-25.55	60.41	44.25	0.000%
17	42.98	-60.41	-24.82	-42.98	60.41	24.82	0.000%
18	50.85	-60.41	0.06	-50.85	60.41	-0.06	0.000%
19	47.43	-60.41	27.48	-47.43	60.41	-27.48	0.000%
20	25.57	-60.41	44.42	-25.57	60.41	-44.42	0.000%
21	-0.07	-60.41	50.05	0.07	60.41	-50.05	0.000%
22	-25.69	-60.41	44.49	25.69	60.41	-44.49	0.000%
23	-47.50	-60.41	27.59	47.50	60.41	-27.59	0.000%
24	-50.85	-60.41	0.20	50.85	60.41	-0.20	0.000%
25	-42.91	-60.41	-24.71	42.91	60.41	24.71	0.000%
26	-25.44	-60.41	-44.18	25.44	60.41	44.18	0.000%
27	0.06	-40.02	-42.13	-0.06	40.02	42.13	0.000%
28	19.98	-40.02	-34.60	-19.98	40.02	34.60	0.000%
29	33.82	-40.02	-19.54	-33.82	40.02	19.54	0.000%
30	39.71	-40.02	0.06	-39.71	40.02	-0.06	0.000%
31	36.35	-40.02	21.08	-36.35	40.02	-21.08	0.000%
32	20.00	-40.02	34.76	-20.00	40.02	-34.76	0.000%
33	-0.06	-40.02	39.47	0.06	40.02	-39.47	0.000%
34	-20.11	-40.02	34.83	20.11	40.02	-34.83	0.000%
35	-36.41	-40.02	21.19	36.41	40.02	-21.19	0.000%
36	-39.71	-40.02	0.19	39.71	40.02	-0.19	0.000%
37	-33.76	-40.02	-19.43	33.76	40.02	19.43	0.000%
38	-19.87	-40.02	-34.53	19.87	40.02	34.53	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00000001
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00000001
5	Yes	4	0.00000001	0.00000001
6	Yes	4	0.00000001	0.00000001
7	Yes	4	0.00000001	0.00000001
8	Yes	4	0.00000001	0.00000001
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00000001

11	Yes	4	0.00000001	0.00000001
12	Yes	4	0.00000001	0.00000001
13	Yes	4	0.00000001	0.00000001
14	Yes	4	0.00000001	0.00000001
15	Yes	4	0.00000001	0.00000153
16	Yes	4	0.00000001	0.00000348
17	Yes	4	0.00000001	0.00000196
18	Yes	4	0.00000001	0.00000341
19	Yes	4	0.00000001	0.00000152
20	Yes	4	0.00000001	0.00000359
21	Yes	4	0.00000001	0.00000203
22	Yes	4	0.00000001	0.00000360
23	Yes	4	0.00000001	0.00000152
24	Yes	4	0.00000001	0.00000344
25	Yes	4	0.00000001	0.00000193
26	Yes	4	0.00000001	0.00000350
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	183 - 163	9.859	27	0.4348	0.0218
T2	163 - 143	8.030	27	0.4235	0.0136
T3	143 - 123	6.277	27	0.3934	0.0082
T4	123 - 103	4.677	27	0.3380	0.0027
T5	103 - 83	3.272	27	0.2920	0.0016
T6	83 - 63	2.145	27	0.2268	0.0019
T7	63 - 43	1.241	27	0.1711	0.0020
T8	43 - 33	0.593	27	0.1067	0.0016
T9	33 - 23	0.362	27	0.0815	0.0013
T10	23 - 3	0.188	27	0.0553	0.0010

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
191.00	PD220	27	9.859	0.4348	0.0218	271373
189.00	2" Dia 8' Omni	27	9.859	0.4348	0.0218	271373
188.00	10' 2-Bay Dipole	27	9.859	0.4348	0.0218	271373
183.00	4'x4" Pipe Mount	27	9.859	0.4348	0.0218	271373
180.00	6 FT DISH	27	9.583	0.4335	0.0203	271373
176.00	12' Dipole	27	9.215	0.4318	0.0184	193838

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
164.00	DB586-Y	27	8.121	0.4244	0.0139	70778
160.00	3' Standoff	27	7.760	0.4207	0.0128	56021
156.00	DB586-Y	27	7.403	0.4163	0.0118	45534
149.00	AIR21	27	6.790	0.4058	0.0099	34266
144.00	10' 2-Bay Dipole	27	6.361	0.3957	0.0085	29503
139.00	3' Standoff	27	5.943	0.3832	0.0070	28321
135.00	800 10121	27	5.616	0.3719	0.0058	28361
126.00	BXA-70063/6CF	27	4.906	0.3460	0.0034	28390
91.00	10' Frame	27	2.566	0.2533	0.0019	19973
62.00	GPS	27	1.202	0.1680	0.0020	17546

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	183 - 163	12.608	15	0.5556	0.0297
T2	163 - 143	10.274	15	0.5404	0.0236
T3	143 - 123	8.038	15	0.5017	0.0174
T4	123 - 103	5.999	15	0.4314	0.0095
T5	103 - 83	4.208	23	0.3733	0.0045
T6	83 - 63	2.768	23	0.2908	0.0028
T7	63 - 43	1.604	23	0.2201	0.0020
T8	43 - 33	0.768	23	0.1377	0.0016
T9	33 - 23	0.471	23	0.1053	0.0013
T10	23 - 3	0.244	23	0.0715	0.0010

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
191.00	PD220	15	12.608	0.5556	0.0297	203317
189.00	2" Dia 8' Omni	15	12.608	0.5556	0.0297	203317
188.00	10' 2-Bay Dipole	15	12.608	0.5556	0.0297	203317
183.00	4'x4" Pipe Mount	15	12.608	0.5556	0.0297	203317
180.00	6 FT DISH	15	12.255	0.5538	0.0287	203317
176.00	12' Dipole	15	11.786	0.5514	0.0274	145226
164.00	DB586-Y	15	10.389	0.5415	0.0238	53160
160.00	3' Standoff	15	9.929	0.5368	0.0230	42570
156.00	DB586-Y	15	9.474	0.5310	0.0219	35032
149.00	AIR21	15	8.692	0.5175	0.0197	26726
144.00	10' 2-Bay Dipole	15	8.146	0.5047	0.0178	23017
139.00	3' Standoff	15	7.613	0.4888	0.0158	22189
135.00	800 10121	15	7.197	0.4744	0.0141	22269
126.00	BXA-70063/6CF	15	6.291	0.4414	0.0106	22260
91.00	10' Frame	23	3.306	0.3244	0.0034	15896
62.00	GPS	23	1.554	0.2162	0.0020	13771

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	183	Leg	A325N	0.6250	4	1.28	13.50	0.095 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	1.62	4.12	0.393 ✔	1.333	Bolt Shear
		Top Girt	A325N	0.5000	1	0.17	4.12	0.041 ✔	1.333	Bolt Shear
T2	163	Leg	A325N	0.7500	4	3.74	19.44	0.193 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.5000	1	2.82	4.12	0.683 ✔	1.333	Bolt Shear
T3	143	Leg	A325N	0.8750	4	7.58	26.45	0.287 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.5000	1	5.08	4.76	1.068 ✔	1.333	Member Bearing
T4	123	Leg	A325N	1.0000	4	13.83	34.56	0.400 ✔	1.333	Bolt Tension
		Diagonal	A325X	0.5000	1	6.71	5.89	1.140 ✔	1.333	Bolt Shear
T5	103	Leg	A325N	1.0000	4	19.68	34.55	0.570 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	9.34	9.28	1.007 ✔	1.333	Bolt Shear
T6	83	Leg	A325N	1.0000	4	26.70	34.56	0.773 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	10.03	9.28	1.082 ✔	1.333	Bolt Shear
T7	63	Leg	A325N	1.0000	6	22.41	34.56	0.648 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.7500	1	10.62	9.28	1.144 ✔	1.333	Bolt Shear
T8	43	Diagonal	A325X	0.7500	1	11.74	13.25	0.886 ✔	1.333	Bolt Shear
T9	33	Leg	A325N	1.0000	6	26.94	34.56	0.780 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.8750	1	12.19	12.63	0.966 ✔	1.333	Bolt Shear
T10	23	Leg	A449	1.0000	6	31.12	31.10	1.000 ✔	1.333	Bolt Tension
		Diagonal	A325N	0.8750	1	14.15	12.63	1.120 ✔	1.333	Bolt Shear

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	183 - 163	P2.5x.203	20.00	5.00	63.3 K=1.00	22.141	1.7040	-6.74	37.73	0.179 ✔
T2	163 - 143	P2.5x.276	20.03	6.68	86.7 K=1.00	17.634	2.2535	-18.58	39.74	0.468 ✔
T3	143 - 123	P3x.216	20.04	6.68	68.9 K=1.00	21.145	2.2285	-39.53	47.12	0.839 ✔
T4	123 - 103	P4x.337	20.04	6.68	54.3 K=1.00	23.671	4.4074	-69.73	104.33	0.668 ✔
T5	103 - 83	P5x.258	20.03	10.02	64.0 K=1.00	22.021	4.2999	-100.30	94.69	1.059 ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T6	83 - 63	P5x.375	20.03	10.02	65.4 K=1.00	21.782	6.1120	-136.39	133.13	1.025 ✔
T7	63 - 43	P5x.375	20.04	5.14	33.6 K=1.00	26.700	6.1120	-171.74	163.19	1.052 ✔
T8	43 - 33	P6x.432	10.02	10.02	54.8 K=1.00	23.591	8.4049	-188.82	198.28	0.952 ✔
T9	33 - 23	P6x.432	10.02	10.02	54.8 K=1.00	23.591	8.4049	-207.99	198.28	1.049 ✔
T10	23 - 3	P6x.432	20.03	5.12	28.0 K=1.00	27.400	8.4049	-244.28	230.30	1.061 ✔

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	183 - 163	L1 3/4x1 3/4x3/16	9.91	4.70	164.3 K=1.00	5.530	0.6211	-1.62	3.43	0.471 ✔
T2	163 - 143	L2x2x1/4	12.24	6.06	186.1 K=1.00	4.312	0.9380	-2.82	4.04	0.697 ✔
T3	143 - 123	L2 1/2x2 1/2x3/16	14.02	6.93	167.9 K=1.00	5.295	0.9020	-5.22	4.78	1.093 ✔
T4	123 - 103	L2 1/2x2 1/2x5/16	15.89	7.82	191.8 K=1.00	4.060	1.4600	-6.50	5.93	1.097 ✔
T5	103 - 83	L3X3X3/16 Reinf w/L2.5X2.5X3/16	19.10	9.57	143.2 K=1.00	7.281	3.2137	-9.07	23.40	0.388 ✔
T6	83 - 63	L3 1/2x3 1/2x5/16	20.83	10.29	179.0 K=1.00	4.663	2.0900	-9.57	9.75	0.982 ✔
T7	63 - 43	L3 1/2x3 1/2x3/8	22.67	11.22	196.0 K=1.00	3.888	2.4800	-9.78	9.64	1.014 ✔
T8	43 - 33	L4x4x3/8	23.59	11.62	176.9 K=1.00	4.770	2.8600	-11.74	13.64	0.860 ✔
T9	33 - 23	L4x4x3/8	24.50	12.05	183.5 K=1.00	4.433	2.8600	-9.76	12.68	0.770 ✔
T10	23 - 3	L4x4x3/8	25.41	12.51	190.6 K=1.00	4.113	2.8600	-13.16	11.76	1.119 ✔

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T7	63 - 43	L3 1/2x3 1/2x1/4	20.32	19.86	267.1 K=0.78	2.093	1.6900	-2.98	3.54	0.842 ✔
T10	23 - 3	KL/R > 250 (C) - 133 L4x4x1/4	24.35	23.80	277.4 K=0.77	1.940	1.9400	-4.24	3.76	1.126 ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
		KL/R > 250 (C) - 172								

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	183 - 163	L2 1/2x2 1/2x3/16	8.56	8.09	196.2 K=1.00	3.881	0.9020	-0.17	3.50	0.048 ✔

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	183 - 163	P2.5x.203	20.00	5.00	63.3	30.000	1.7040	5.11	51.12	0.100 ✔
T2	163 - 143	P2.5x.276	20.03	6.68	86.7	30.000	2.2535	14.97	67.61	0.221 ✔
T3	143 - 123	P3x.216	20.04	6.68	68.9	30.000	2.2285	30.33	66.85	0.454 ✔
T4	123 - 103	P4x.337	20.04	6.68	54.3	30.000	4.4074	55.33	132.22	0.418 ✔
T5	103 - 83	P5x.258	20.03	10.02	64.0	30.000	4.2999	78.73	129.00	0.610 ✔
T6	83 - 63	P5x.375	20.03	10.02	65.4	30.000	6.1120	106.79	183.36	0.582 ✔
T7	63 - 43	P5x.375	20.04	5.14	33.6	30.000	6.1120	134.72	183.36	0.735 ✔
T8	43 - 33	P6x.432	10.02	10.02	54.8	30.000	8.4049	150.03	252.15	0.595 ✔
T9	33 - 23	P6x.432	10.02	10.02	54.8	30.000	8.4049	161.64	252.15	0.641 ✔
T10	23 - 3	P6x.432	20.03	5.12	28.0	30.000	8.4049	187.15	252.15	0.742 ✔

Diagonal Design Data (Tension)

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

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	183 - 163	L1 3/4x1 3/4x3/16	9.91	4.70	107.7	29.000	0.3779	1.54	10.96	0.141 ✓
T2	163 - 143	L2x2x1/4	12.24	6.06	121.7	29.000	0.5863	2.81	17.00	0.165 ✓
T3	143 - 123	L2 1/2x2 1/2x3/16	14.02	6.93	108.6	29.000	0.5886	5.08	17.07	0.298 ✓
T4	123 - 103	L2 1/2x2 1/2x5/16	15.89	7.82	125.0	29.000	0.9485	6.71	27.51	0.244 ✓
T5	103 - 83	L3X3X3/16 Reinf w/L2.5X2.5X3/16	19.10	9.57	143.2	21.600	3.2137	9.34	69.42	0.135 ✓
T6	83 - 63	L3 1/2x3 1/2x5/16	20.83	10.29	116.0	29.000	1.3624	10.03	39.51	0.254 ✓
T7	63 - 43	L3 1/2x3 1/2x3/8	22.67	11.22	127.5	29.000	1.6139	10.62	46.80	0.227 ✓
T8	43 - 33	L4x4x3/8	23.59	11.62	114.8	29.000	1.8989	9.83	55.07	0.179 ✓
T9	33 - 23	L4x4x3/8	24.50	12.05	119.2	29.000	1.8637	12.19	54.05	0.226 ✓
T10	23 - 3	L4x4x3/8	26.33	12.97	128.2	29.000	1.8637	14.15	54.05	0.262 ✓

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 K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T7	63 - 43	L3 1/2x3 1/2x1/4	20.32	19.86	218.6	21.600	1.6900	2.98	36.50	0.082 ✓
T10	23 - 3	L4x4x1/4	24.35	23.80	228.5	21.600	1.9400	4.24	41.90	0.101 ✓

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	F_a ksi	A in^2	Actual P K	Allow. P_a K	Ratio $\frac{P}{P_a}$
T1	183 - 163	L2 1/2x2 1/2x3/16	8.56	8.09	128.3	29.000	0.5886	0.06	17.07	0.004 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T1	183 - 163	Leg	P2.5x.203	3	-6.74	50.29	13.4	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	$SF*P_{allow}$ K	% Capacity	Pass Fail
T2	163 - 143	Leg	P2.5x.276	33	-18.58	52.97	35.1	Pass
T3	143 - 123	Leg	P3x.216	53	-39.53	62.81	62.9	Pass
T4	123 - 103	Leg	P4x.337	75	-69.73	139.07	50.1	Pass
T5	103 - 83	Leg	P5x.258	96	-100.30	126.22	79.5	Pass
T6	83 - 63	Leg	P5x.375	111	-136.39	177.46	76.9	Pass
T7	63 - 43	Leg	P5x.375	124	-171.74	217.53	78.9	Pass
T8	43 - 33	Leg	P6x.432	145	-188.82	264.31	71.4	Pass
T9	33 - 23	Leg	P6x.432	154	-207.99	264.31	78.7	Pass
T10	23 - 3	Leg	P6x.432	163	-244.28	306.99	79.6	Pass
T1	183 - 163	Diagonal	L1 3/4x1 3/4x3/16	9	-1.62	4.58	35.4	Pass
T2	163 - 143	Diagonal	L2x2x1/4	36	-2.82	5.39	52.3	Pass
T3	143 - 123	Diagonal	L2 1/2x2 1/2x3/16	57	-5.22	6.37	82.0	Pass
T4	123 - 103	Diagonal	L2 1/2x2 1/2x5/16	78	-6.50	7.90	82.3 85.5 (b)	Pass
T5	103 - 83	Diagonal	L3X3X3/16 Reinf w/L2.5X2.5X3/16	99	-9.07	31.19	29.1 75.5 (b)	Pass
T6	83 - 63	Diagonal	L3 1/2x3 1/2x5/16	114	-9.57	12.99	73.6 81.1 (b)	Pass
T7	63 - 43	Diagonal	L3 1/2x3 1/2x3/8	129	-9.78	12.85	76.1 85.9 (b)	Pass
T8	43 - 33	Diagonal	L4x4x3/8	150	-11.74	18.19	64.5 66.4 (b)	Pass
T9	33 - 23	Diagonal	L4x4x3/8	159	-9.76	16.90	57.8 72.4 (b)	Pass
T10	23 - 3	Diagonal	L4x4x3/8	176	-13.16	15.68	83.9 84.1 (b)	Pass
T7	63 - 43	Secondary Horizontal	L3 1/2x3 1/2x1/4	135	-2.98	4.72	63.2	Pass
T10	23 - 3	Secondary Horizontal	L4x4x1/4	172	-4.24	5.02	84.4	Pass
T1	183 - 163	Top Girt	L2 1/2x2 1/2x3/16	5	-0.17	4.67	3.6	Pass
							Summary	
						Leg (T10)	79.6	Pass
						Diagonal (T7)	85.9	Pass
						Secondary Horizontal (T10)	84.4	Pass
						Top Girt (T1)	3.6	Pass
						Bolt Checks	85.9	Pass
						RATING =	**85.9**	**Pass**

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Subject:	Lattice Tower Foundation Anaylsis
Location:	Newtown, CT
Rev. 1: 3/03/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.002

Pad and Pier Foundation:

Input Data:

(With AT&T Foundation Reinforcements)

Tower Data

Max Uplift Force =	$Uplift := 196 \cdot kips$	(User Input from RISATower)	(Leg)
Max Shear Force =	$Shear := 32 \cdot kips$	(User Input from RISATower)	(Leg)
Max Compressive Force =	$Compression := 251 \cdot kips$	(User Input from RISATower)	(Leg)
Base Shear =	$Shear_{tot} := 55 \cdot kips$	(User Input from RISATower)	(Tower)
Base Compression =	$Comp_{tot} := 60 \cdot kips$	(User Input from RISATower)	(Tower)
Base Moment =	$Moment := 4978 \cdot ft \cdot kips$	(User Input from RISATower)	(Tower)
Tower Height =	$H_t := 180 \cdot ft$	(User Input)	

Original Foundation Data (Foundation #1): (North East Leg):

Overall Depth of Footing =	$D_{f1} := 7.1 \cdot ft$	(User Input)	Foundation #1. Refer to Sketch SKRAD101498 Sheet 1 of 3 prepared for Connecticut Light and Power Company, dated 10/14/98
Length of Pier =	$L_{p1} := 10.0 \cdot ft$	(User Input)	
Pier Projection Above Grade =	$P_{P1} := 4.9 \cdot ft$	(User Input)	
Width of Pier =	$d_{p1} := 2.5 \cdot ft$	(User Input)	
Pad Width =	$PD_{w1} := 10.0 \cdot ft$	(User Input)	
Pad Thickness =	$PD_{t1} := 2.0 \cdot ft$	(User Input)	

Original Foundation Data (Foundation #2): (South West Leg):

Overall Depth of Footing =	$D_{f2} := 8.5 \cdot ft$	(User Input)	Foundation #2. Refer to Sketch SKRAD101498 Sheet 1 of 3 prepared for Connecticut Light and Power Company, dated 10/14/98
Length of Pier =	$L_{p2} := 10.0 \cdot ft$	(User Input)	
Pier Projection Above Grade =	$P_{P2} := 3.5 \cdot ft$	(User Input)	
Width of Pier =	$d_{p2} := 2.5 \cdot ft$	(User Input)	
Pad Width =	$PD_{w2} := 10.0 \cdot ft$	(User Input)	
Pad Thickness =	$PD_{t2} := 2.0 \cdot ft$	(User Input)	

Original Foundation Data (Foundation #3): (South East Leg):

Overall Depth of Footing =	$D_{f3} := 10.75 \cdot ft$	(User Input)	Foundation #3. Refer to Sketch SKRAD101498 Sheet 1 of 3 prepared for Connecticut Light and Power Company, dated 10/14/98
Length of Pier =	$L_{p3} := 10.0 \cdot ft$	(User Input)	
Pier Projection Above Grade =	$P_{P3} := 1.25 \cdot ft$	(User Input)	
Width of Pier =	$d_{p3} := 2.5 \cdot ft$	(User Input)	
Pad Width =	$PD_{w3} := 10.0 \cdot ft$	(User Input)	
Pad Thickness =	$PD_{t3} := 2.0 \cdot ft$	(User Input)	

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Subject:	Lattice Tower Foundation Anaylsis
Location:	Newtown, CT
Rev. 1: 3/03/14	Prepared by: T.J.L. Checked by: C.F.C. Job No. 14025.002

Material Properties:

Internal Friction Angle of Soil =	$\Phi_s := 34 \cdot deg$	(User Input)	Based on Geotech Report prepared by Clarence Welti & Assoc., INC., dated October 19, 2011
Allowable Soil Bearing Capacity =	$q_s := 6000 \cdot psf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_{suse} := 3000 \cdot psf$	(User Input)	Note: 3000psf used for evaluation of existing concrete at grade and proposed concrete infill for soil bearing condition.
Unit Weight of Soil =	$\gamma_s := 125 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_c := 150 \cdot pcf$	(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 =	$\mu := 0.45$	(User Input)	

Calculated Factors:

Load Factor =

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

Calculated Data:

Active Pressure =

$$K_a := \frac{\left(1 - \sin\left(\Phi_s\right)\right)}{\left(1 + \sin\left(\Phi_s\right)\right)} = 0.283$$

$$P_a := \frac{1}{2} \cdot \left(PD_{t1}\right)^2 \cdot PD_{w1} \cdot \gamma_s \cdot K_a = 0.71 \cdot kips$$

Coefficient of Lateral Soil Pressure =

$$K_p := \frac{1 + \sin\left(\Phi_s\right)}{1 - \sin\left(\Phi_s\right)} = 3.537$$

$$P_p := \frac{1}{2} \cdot \left(PD_{t1}\right)^2 \cdot PD_{w1} \cdot \gamma_s \cdot K_p = 8.84 \cdot kips$$

Stability of Footing:

Adjusted Concrete Unit Weight =

$$\gamma_c := if\left(Bouyancy = 1, \gamma_c - 62.4pcf, \gamma_c\right) = 150 \cdot pcf$$

Adjusted Soil Unit Weight =

$$\gamma_s := if\left(Bouyancy = 1, \gamma_s - 62.4pcf, \gamma_s\right) = 125 \cdot pcf$$

Cross Sectional Area 1 of Resisting Pyramid =

$$B_1 := PD_{w1}^2 = 100ft^2$$

Cross Sectional Area 2 of Resisting Pyramid =

$$B_2 := \left[2\left(L_{p1} - P_{P1} - n\right) \cdot \tan\left(\Phi_s\right) + PD_{w1}\right]^2 = 284.9ft^2$$

Volume and Weight of Original Tower Foundation

Foundation #1:

Volume of Concrete = $V_{origconc1} := \left[\left(PD_{w1}^{2} \cdot PD_{t1}\right) + d_{p1}^{2} L_{p1}\right] = 262.5 \cdot ft^{3}$

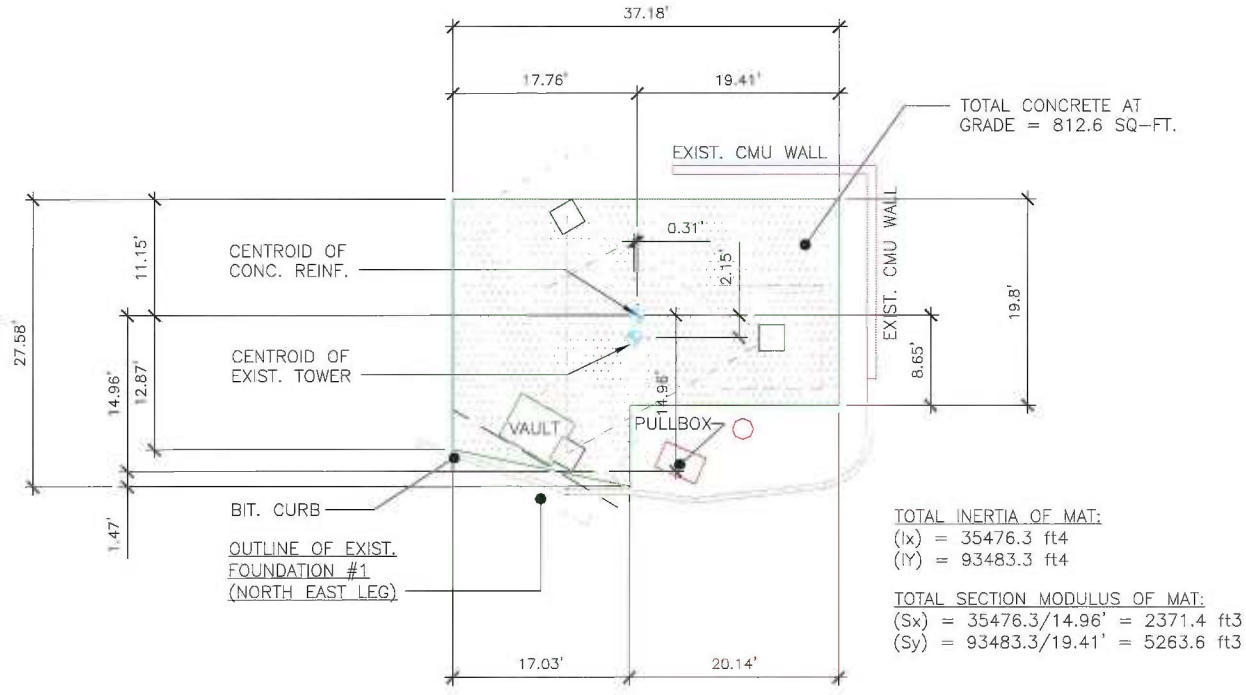
Foundation #2:

Volume of Concrete = $V_{origconc2} := \left[\left(PD_{w2}^{2} \cdot PD_{t2}\right) + d_{p2}^{2} L_{p2}\right] = 262.5 \cdot ft^{3}$

Foundation #3:

Volume of Concrete = $V_{origconc3} := \left[\left(PD_{w3}^{2} \cdot PD_{t3}\right) + d_{p3}^{2} L_{p3}\right] = 262.5 \cdot ft^{3}$

Total Weight of Original Concrete = $WT_{origconc} := \left(V_{origconc1} + V_{origconc2} + V_{origconc3}\right) \cdot \gamma_c = 118.1 \cdot kip$



TOTAL INERTIA OF MAT:
(Ix) = 35476.3 ft4
(IY) = 93483.3 ft4

TOTAL SECTION MODULUS OF MAT:
(Sx) = 35476.3/14.96' = 2371.4 ft3
(Sy) = 93483.3/19.41' = 5263.6 ft3

Volume and Weight of Soil Above Original Footing to Underside of Previous Reinforcement

Foundation #1:

Volume of Soil Above Footing = $V_{soilfnd1} := \left(PD_{w1}^2 - d_{p1}^2\right)\left(L_{p1} - P_{P1}\right) = 478.12 \cdot ft^3$

Foundation #2:

Volume of Soil Above Footing = $V_{soilfnd2} := \left(PD_{w2}^2 - d_{p2}^2\right)\left(L_{p2} - P_{P2}\right) = 609.38 \cdot ft^3$

Foundation #3:

Volume of Soil Above Footing = $V_{soilfnd3} := \left(PD_{w3}^2 - d_{p3}^2\right)\left(L_{p3} - P_{P3}\right) = 820.31 \cdot ft^3$

Total Weight of Soil = $WT_s := \left(V_{soilfnd1} + V_{soilfnd2} + V_{soilfnd3}\right) \cdot \gamma_s = 238.5 \cdot kip$

Volume and Weight of Previous Concrete Reinforcement and Proposed Infill

Foundation #1:

Contact Area of Concrete At Grade = $A_{concfnd1} := \left(102.87ft^2 - 6.25ft^2\right) = 96.62ft^2$

Volume of Concrete At Grade = $V_{concfnd1} := \left(A_{concfnd1} \cdot 6.0ft\right) = 579.72 \cdot ft^3$

Foundation #2:

Contact Area of Concrete At Grade = $A_{concfnd2} := \left(260ft^2 - 6.25ft^2\right) = 253.75ft^2$

Volume of Concrete At Grade = $V_{concfnd2} := \left[\left(A_{concfnd2}\right)4.0ft\right] = 1015 \cdot ft^3$ (Minus pier area)

Foundation #3:

Contact Area of Concrete At Grade = $A_{concfnd3} := \left(169ft^2 - 6.25ft^2\right) = 162.75ft^2$

Volume of Concrete At Grade = $V_{concfnd3} := \left[\left(A_{concfnd3}\right)4.5ft\right] = 732.38 \cdot ft^3$

Area of Existing Reinforced Concrete At Grade = $A_{origreinf} := \left(A_{concfnd1} + A_{concfnd2} + A_{concfnd3}\right) = 513.1 \cdot ft^2$

Area of Proposed Reinforced Concrete Infill = $A_{reinfprop} := 255ft^2$

Average Depth of Mat (Existing and Proposed Infill) = $Mat_t := 4.0ft$

Area of Proposed Reinforced Concrete Infill = $A_{mattot} := A_{origreinf} + A_{reinfprop} = 768.1ft^2$

Weight of Concrete At Grade (Proposed Infill) = $WT_{concgrade} := \left(V_{concfnd1} + V_{concfnd2} + V_{concfnd3}\right) \cdot \gamma_c = 349.1 \cdot kip$

Weight of Concrete At Grade (Proposed Infill) = $WT_{concgradeinfill} := \left[\left(A_{reinfprop}\right)Mat_t\right] \cdot \gamma_c = 153 \cdot kip$

Total Weight of Concrete At Grade = $WT_{concgradetot} := \left(WT_{concgrade} + WT_{concgradeinfill}\right) = 502.1 \cdot kip$

Total Weight of Original Concrete Foundation System (x3), Soil, Previous Concrete Reinforcement and Proposed R.C. Infill

Total Weight = $WT_{tot} := WT_{origconc} + WT_s + WT_{concgradetot} = 858.7 \cdot kip$

Soil Bearing Pressure:

Section Modulus of Mat = $S := 2274.5ft^3$ (Calculated external of program)

Minimum Distance From Tower Centroid to Edge of Mat at Foundation #1 (North East leg) = $y1 := 14.62ft$ (Calculated external of program)

Minimum Distance From Reinforced Mat Centroid to Edge of Mat at Foundation #1 (North East leg) = $y2 := 16.83ft$ (Shortest Lever Arm Calculated external of program)

Maximum Pressure Under Mat =

$$P_{max} := \frac{WT_{tot} - WT_{origconc} - WT_s + Comp_{tot}}{A_{mattot}} + \frac{Shear_{tot} \cdot (Mat_t)}{S} = 0.83 \cdot ksf$$

$Max\_Pressure\_Check := if(P_{max} < q_{suse}, "Okay", "No Good")$

Max_Pressure_Check = "Okay"

Minimum Pressure Under Mat =

$$P_{min} := \frac{WT_{tot} - WT_{origconc} - WT_s + Comp_{tot}}{A_{mattot}} - \frac{Shear_{tot} \cdot (Mat_t)}{S} = 0.64 \cdot ksf$$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < q_{suse}), "Okay", "No Good"]$

Min_Pressure_Check = "Okay"

Overturning Moment Check:

Overturning Moment = $M_{ot} := Moment + Shear_{tot} \cdot (Mat_t) = 5198 \cdot kip \cdot ft$

Resisting Moment = $M_r := (WT_{origconc} + WT_s) \cdot y1 + (WT_{concgradetot} \cdot y2) = 13663.3 ft \cdot kips$

Factor of Safety = $\frac{M_r}{M_{ot}} = 2.63$

$$Overturning\_Moment := if\left(\frac{M_r}{M_{ot}} > 2, "OK", "NG"\right)$$

Overturning_Moment = "OK"

Concrete Infill Reinforcement:

Note:
Reinforcement calculation for concrete infill based on temperature and shrinkage steel requirements only. Moment strength okay by inspection due to thickness of slab.
Top and bottom reinforcement combined to account for required amount

Concrete Cover = $c := 3in$

Assumed Min Rebar Diameter = $d_{bar} := 0.5in$

Concrete Infill Thickness = $h := Mat_t$

Effective Depth = $d := h - c - \left(.5 \cdot d_{bar}\right) = 44.75 \cdot in$

Reinforcement = $Reinf_{reqd} := (.0018 \cdot d \cdot 1 \cdot ft) \cdot \frac{1}{2} = 0.48 \cdot in^2$

(Temperature and Shrinkage Reinforcement Distributed Between Top and Bottom of Concrete Slab)

Use #6 bars @ 10" o.c. or #7 bars @ 12" o.c.

NORTHEAST UTILITIES SYSTEM

TOWER REINFORCEMENT DESIGN

T-MOBILE - CT11111A
20 BARNABAS ROAD
NEWTOWN, CT 06470

VICINITY MAP

PROJECT SUMMARY

SITE ADDRESS:	20 BARNABAS ROAD NEWTOWN, CT 06470
PROJECT COORDINATES:	LAT: 41°–25'–39.50"N LON: 73°–20'–37.42"W ELEV: ±452' AMSL
NU CONTACT:	STEVE FLORIO 860.665.5611
T–MOBILE SITE REF.:	CT11111A
T–MOBILE CONTACT:	MARK RICHARD 860.692.7143
ANTENNA CL HEIGHT:	149'–0"
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63–2 NORTH BRANFORD ROAD BRANFORD, CT 06405
CENTEK CONTACT:	CARLO F. CENTORE, PE 203.488.0580 ext. 122

SHEET INDEX

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DESIGNED BY: TJL
DRAWN BY: TJL
CHK'D BY: GPC

ISSUED FOR NU POWER
1 2/04/14 TJL GPC

PROFESSIONAL ENGINEER SEAL

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T-MOBILE
CT11111A
20 BARNABAS ROAD
NEWTOWN, CT 06470

DATE: 2/04/14
SCALE: AS SHOWN
JOB NO.: 14023.002

TITLE SHEET

SHEET NO.
T-1
Sheet No. 1 of 8

DESIGN BASIS

GOVERNING CODE: 2003 INTERNATIONAL BUILDING CODE (IBC) AS MODIFIED BY THE 2009 CONNECTICUT SUPPLEMENT.

1. DESIGN CRITERIA:

   WIND SPEED OF 85 MPH (FASTEST MILE) AND 85 MPH (FASTEST MILE) CONCURRENT WITH 0.5" OF RADIAL ICE PER ASCE 7-05 SUB-090.

   - SEISMIC LOAD: PER ASCE 7-95 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES (DOES NOT GOVERN).

PROJECT SCOPE

1. REMOVAL OF THREE EMS RR-90-17-00DP PANEL ANTENNAS, THREE (3) TMA's AND THREE (3) SIDEARMS WITH A RAD CENTER ELEVATION OF 149'-0" AGL.
2. INSTALLATION OF SIX (6) ERICSSON AIR21 PANEL ANTENNAS AND THREE (3) ERICSSON KRY 112 TMA's MOUNTED ON THREE (3) SITE PRO COMPACT TOWER MOUNTS (P/N CWT8) WITH A RAD CENTER ELEVATION OF 149'-0" AGL.
3. INSTALLATION OF SIX (6) 1-5/8" ø COAX CABLES AND ONE (1) 1-5/8" ø FIBER CABLE MOUNTED TO A LEG OF THE EXISTING TOWER.

GENERAL NOTES

1. REFER TO STRUCTURAL ANALYSIS AND REINFORCEMENT DESIGN PREPARED BY CENTEK ENGINEERING, INC., FOR T-MOBILE, REV 1 DATED 3/03/14.
2. TOWER GEOMETRY AND STRUCTURE MEMBER SIZES WERE OBTAINED FROM A PREVIOUS STRUCTURAL REPORT PREPARED BY CENTEK ENGINEERING PROJECT #13118.000, DATED NOVEMBER 13, 2013.
3. THE TEMPORARY DETACHMENT AND/OR REPLACEMENT OF TOWER MEMBERS SHALL BE DONE ONE AT A TIME AND SHALL BE CONDUCTED ON DAYS WITH LESS THAN 15 MPH WIND PRESENT. NO MEMBER SHALL BE LEFT DISCONNECTED FOR THE NEXT WORKING DAY.
4. ALL REINFORCEMENT SHOWN HEREIN APPLIES TO ALL SIDES OF THE TOWER.
5. PROVIDE TEMPORARY ANCHORS, GUYING AND/OR BRACING AS REQUIRED TO SAFELY CONDUCT THE WORK.
6. ALL WORK SHALL BE IN ACCORDANCE WITH TIA/EIA-222 REVISION "F" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES".
7. THE TOWER STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER REINFORCEMENTS ARE COMPLETE. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO DETERMINE ERECTION PROCEDURE AND SEQUENCE AND TO INSURE THE SAFETY OF THE TOWER STRUCTURE AND ITS COMPONENT PARTS DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, TEMPORARY BRACING, GUYS OR TIE-DOWNS, WHICH MIGHT BE NECESSARY.
8. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS SCOPE OF WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
9. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
10. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
12. CONTRACTOR SHALL TAKE FIELD MEASUREMENTS NECESSARY TO ASSURE PROPER FIT OF ALL FINISHED WORK.
13. TOWER REINFORCING SHALL BE CONDUCTED BY FIELD CREWS EXPERIENCED IN THE ASSEMBLY AND ERECTION OF RADIO ANTENNAS AND SUPPORT STRUCTURES. ALL SAFETY PROCEDURES, RIGGING AND ERECTION METHODS SHALL BE STANDARD TO THE INDUSTRY AND IN COMPLIANCE WITH OSHA.
14. EXISTING COAXIAL CABLES AND ALL ACCESSORIES SHALL BE TEMPORARILY RELOCATED AS NECESSARY AND REINSTALLED BY THE CONTRACTOR WITHOUT INTERRUPTION IN SERVICE WHERE THEY ARE IN CONFLICT WITH TOWER REINFORCEMENT.
15. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

DESIGNED BY:	T.A.
DRAWN BY:	
CHK'D BY:	CPC

ISSUED FOR RF REVIEW
ISSUED FOR RF REVIEW

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T-MOBILE

CT11111A

35 WINDHAM ROAD
WINDHAM, CT 06280

DATE: 2/04/14
SCALE: AS SHOWN
JOB NO. 14025.002

DESIGN BASIS AND GENERAL NOTES

SHEET NO.
N-1
Sheet No. 2 of 5

STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL IS DESIGNED BY ALLOWABLE STRESS DESIGN (ASD).

2. MATERIAL SPECIFICATIONS

   A. STRUCTURAL STEEL (W SHAPES)---ASTM A992 (FY = 50 KSI)
   B. STRUCTURAL STEEL (OTHER SHAPES)---ASTM A36 (FY = 36 KSI).
   C. STRUCTURAL STEEL (TOWER REINF. SOLID ROUND BAR)--- ASTM A572_GR50 (50 KSI)
   D. STRUCTURAL HSS (RECTANGULAR SHAPES)---ASTM A500 GRADE B, (FY = 46 KSI)
   E. STRUCTURAL HSS (ROUND SHAPES)---ASTM A500 GRADE B, (FY = 42 KSI)
   F. PIPE---ASTM A53 GRADE B (FY = 35 KSI)

3. FASTENER SPECIFICATIONS

   A. CONNECTION BOLTS---ASTM A325-N, UNLESS OTHERWISE SCHEDULED.
   B U-BOLTS---ASTM A307
   C. ANCHOR RODS---ASTM F1554
   D. WELDING ELECTRODES---ASTM E70XX FOR A36 & A572_GR50 STEELS, ASTM E80XX FOR A572_GR65 STEEL.
   E. BLIND BOLTS---AS1252 PROPERTY CLASS 8.8 (FU=120 KSI).

4. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE ENGINEER FOR REVIEW. SHOP DRAWINGS SHALL INCLUDE THE FOLLOWING: SECTION PROFILES, SIZES, CONNECTION ATTACHMENTS, REINFORCING, ANCHORAGE, SIZE AND TYPE OF FASTENERS AND ACCESSORIES. INCLUDE ERECTION DRAWINGS, ELEVATIONS AND DETAILS.

5. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST PROVISIONS OF AISC MANUAL OF STEEL CONSTRUCTION.

6. PROVIDE ALL PLATES, CLIP ANGLES, CLOSURE PIECES, STRAP ANCHORS, MISCELLANEOUS PIECES AND HOLES REQUIRED TO COMPLETE THE STRUCTURE.

7. FIT AND SHOP ASSEMBLE FABRICATIONS IN THE LARGEST PRACTICAL SECTIONS FOR DELIVERY TO SITE.

8. INSTALL FABRICATIONS PLUMB AND LEVEL, ACCURATELY FITTED, AND FREE FROM DISTORTIONS OR DEFECTS.

9. AFTER ERECTION OF STRUCTURES, TOUCHUP ALL WELDS, ABRASIONS AND NON-GALVANIZED SURFACES WITH A 95% ORGANIC ZINC RICH PAINT IN ACCORDANCE WITH ASTM 780.

10. ALL STEEL MATERIAL (EXPOSED TO WEATHER) SHALL BE GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 "ZINC (HOT DIPPED GALVANIZED) COATINGS" ON IRONS AND STEEL PRODUCTS.

11. ALL BOLTS, ANCHORS AND MISCELLANEOUS HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153 "ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE".

12. CONTRACTOR SHALL COMPLY WITH AWS CODE FOR PROCEDURES APPEARANCE AND QUALITY OF WELDS, AND WELDING PROCESSES SHALL BE QUALIFIED IN ACCORDANCE WITH AWS "STANDARD QUALIFICATION PROCEDURES". ALL WELDING SHALL BE DONE USING THE SCHEDULED ELECTRODES AND WELDING SHALL CONFORM TO AISC AND D1.1 WHERE FILLET WELD SIZES ARE NOT SHOWN, PROVIDE THE MINIMUM SIZE PER TABLET J2.4 IN THE AISC "MANUAL OF STEEL CONSTRUCTION" 9TH EDITION. AT THE COMPLETION OF WELDING, ALL DAMAGE TO GALVANIZED COATING SHALL BE REPAIRED.

13. THE ENGINEER SHALL BE NOTIFIED OF ANY INCORRECTLY FABRICATED, DAMAGED OR OTHERWISE MISFITTING OR NON CONFORMING MATERIALS OR CONDITIONS TO REMEDIAL OR CORRECTIVE ACTION. ANY SUCH ACTION SHALL REQUIRE ENGINEER REVIEW.

14. CONNECTION ANGLES SHALL HAVE A MINIMUM THICKNESS OF 1/4 INCHES.

15. STRUCTURAL CONNECTION BOLTS SHALL CONFORM TO ASTM A325. ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM AND SHALL HAVE A MINIMUM OF TWO BOLTS, UNLESS OTHERWISE ON THE DRAWINGS.

16. ALL BOLTS SHALL BE INSTALLED PER THE REQUIREMENTS OF AISC 14TH EDITION & RCSC "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS".

17. ALL BOLTS SHALL BE INSTALLED AS SNUG-TIGHT CONNECTIONS UNLESS OTHERWISE INDICATED. CONNECTIONS SPECIFIED AS PRETENSIONED OR SLIP-CRITICAL SHALL BE TIGHTENED TO A BOLT TENSION NOT LESS THAN THAT GIVEN IN TABLE J3.1 OF AISC 14TH EDITION.

18. LOCK WASHER ARE NOT PERMITTED FOR A325 BOLTED STEEL ASSEMBLIES.

19. LOAD INDICATOR WASHERS SHALL BE UTILIZED ON ALL PRETENSIONED OR SLIP-CRITICAL CONNECTIONS.

20. SHOP CONNECTIONS SHALL BE WELDED OR HIGH STRENGTH BOLTED.

21. MILL BEARING ENDS OF COLUMNS, STIFFENERS, AND OTHER BEARING SURFACES TO TRANSFER LOAD OVER ENTIRE CROSS SECTION.

22. FABRICATE BEAMS WITH MILL CAMBER UP.

23. LEVEL AND PLUMB INDIVIDUAL MEMBERS OF THE STRUCTURE TO AN ACCURACY OF 1:500, BUT NOT TO EXCEED 1/4" IN THE FULL HEIGHT OF THE COLUMN.

24. COMMENCEMENT OF STRUCTURAL STEEL WORK WITHOUT NOTIFYING THE ENGINEER OF ANY DISCREPANCIES WILL BE CONSIDERED ACCEPTANCE OF PRECEDING WORK.

DESIGNED BY:	TJL
DRAWN BY:	TJL
CHK'D BY:	GRC

REV	DESCRIPTION	DATE
1	ISSUED FOR NO REVIEW	2/04/14

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HEBRON, CT 06248

DATE:	2/04/14
SCALE:	AS SHOWN
JOB NO.	14025.002

STRUCTURAL STEEL NOTES

SHEET NO.
N-2
Sheet No. 3 of 5

MODIFICATION INSPECTION REPORT REQUIREMENTS

PRE-CONSTRUCTION		DURING CONSTRUCTION		POST-CONSTRUCTION	
SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM	SCHEDULED ITEM	REPORT ITEM
X	EOR MODIFICATION INSPECTION DRAWING	–	FOUNDATIONS	X	MODIFICATION INSPECTOR RECORD REDLINE DRAWING
X	EOR APPROVED SHOP DRAWINGS	–	EARTHWORK: BACKFILL MATERIAL & COMPACTION	–	POST-INSTALLED ANCHOR ROD PULL-OUT TEST
–	EOR APPROVED POST-INSTALLED ANCHOR MPII	–	REBAR & FORMWORK GEOMETRY VERIFICATION	X	PHOTOGRAPHS
–	FABRICATION INSPECTION	–	CONCRETE TESTING		
–	FABRICATOR CERTIFIED WELDER INSPECTION	X	STEEL INSPECTION		
X	MATERIAL CERTIFICATIONS	–	POST INSTALLED ANCHOR ROD VERIFICATION		
		–	BASE PLATE GROUT VERIFICATION		
		–	CONTRACTOR'S CERTIFIED WELD INSPECTION		
		X	ON-SITE COLD GALVANIZING VERIFICATION		
		X	CONTRACTOR AS-BUILT REDLINE DRAWINGS		

NOTES:
1. REFER TO MODIFICATION INSPECTION NOTES FOR ADDITIONAL REQUIREMENTS
2. "X" DENOTES DOCUMENT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
3. "–" DENOTES DOCUMENT NOT REQUIRED FOR INCLUSION IN MODIFICATION INSPECTION FINAL REPORT.
4. EOR – ENGINEER OF RECORD
4. MPII – "MANUFACTURER'S PRINTED INSTALLATION GUIDELINES"

GENERAL

1. THE MODIFICATION INSPECTION IS A VISUAL INSPECTION OF STRUCTURAL MODIFICATIONS, TO INCLUDE A REVIEW AND COMPILATION OF SPECIFIED SUBMITTALS AND CONSTRUCTION INSPECTIONS, AS AN ASSURANCE OF COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS PREPARED UNDER THE DIRECTION OF THE ENGINEER OF RECORD (EOR).
2. THE MODIFICATION INSPECTION IS TO CONFIRM INSTALLATION CONFIGURATION AND GENERAL WORKMANSHIP AND IS NOT A REVIEW OF THE MODIFICATION DESIGN. OWNERSHIP OF THE MODIFICATION DESIGN EFFECTIVENESS AND INTENT RESIDES WITH THE ENGINEER OF RECORD.
3. TO ENSURE COMPLIANCE WITH THE MODIFICATION INSPECTION REQUIREMENTS THE GENERAL CONTRACTOR (GC) AND THE MODIFICATION INSPECTOR (MI) COMMENCE COMMUNICATION UPON AUTHORIZATION TO PROCEED BY THE CLIENT. EACH PARTY SHALL BE PROACTIVE IN CONTACTING THE OTHER. THE EOR SHALL BE CONTACTED IF SPECIFIC GC/MI CONTACT INFORMATION IS NOT MADE AVAILABLE.
4. THE GC SHALL PROVIDE THE MI WITH A MINIMUM OF 5 BUSINESS DAYS NOTICE OF IMPENDING INSPECTIONS.
5. WHEN POSSIBLE, THE GC AND MI SHALL BE ON SITE DURING THE MODIFICATION INSPECTION TO HAVE ANY NOTED DEFICIENCIES ADDRESSED DURING THE INITIAL MODIFICATION INSPECTION.

MODIFICATION INSPECTOR (MI)

1. THE MI SHALL CONTACT THE GC UPON AUTHORIZATION BY THE CLIENT TO:
   - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   - WORK WITH THE GC IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
   - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE MI IS RESPONSIBLE FOR COLLECTION OF ALL INSPECTION AND TEST REPORTS, REVIEWING REPORTS FOR ADHERENCE TO THE CONTRACT DOCUMENTS, CONDUCTING ON-SITE INSPECTIONS AND COMPILATION & SUBMISSION OF THE MODIFICATION INSPECTION REPORT TO THE CLIENT AND THE EOR.

GENERAL CONTRACTOR (GC)

1. THE GC IS REQUIRED TO CONTACT THE GC UPON AUTHORIZATION TO PROCEED WITH CONSTRUCTION BY THE CLIENT TO:
   - REVIEW THE MODIFICATION INSPECTION REPORT REQUIREMENTS.
   - WORK WITH THE MI IN DEVELOPMENT OF A SCHEDULE FOR ON-SITE INSPECTIONS.
   - DISCUSS CRITICAL INSPECTIONS AND PROJECT CONCERNS.
2. THE GC IS RESPONSIBLE FOR COORDINATING AND SCHEDULING IN ADVANCE ALL REQUIRED INSPECTIONS AND TESTS WITH THE MI.

CORRECTION OF FAILING MODIFICATION INSPECTION

1. SHOULD THE STRUCTURAL MODIFICATION NOT COMPLY WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS, THE GC SHALL WORK WITH THE MODIFICATION INSPECTOR IN A VIABLE REMEDIATION PLAN AS FOLLOWS:
   - CORRECT ALL DEFICIENCIES TO COMPLY WITH THE CONTRACT DOCUMENTS AND COORDINATE WITH THE MI FOR A FOLLOW UP INSPECTION.
   - WITH CLIENT AUTHORIZATION, THE GC MAY WORK WITH THE EOR TO REANALYZE THE MODIFICATION USING THE AS-BUILT CONDITION.

REQUIRED PHOTOGRAPHS

1. THE GC AND MI SHALL AT MINIMUM PHOTO DOCUMENT THE FOLLOWING FOR INCLUSION IN THE MODIFICATION INSPECTION REPORT:
   - PRE-CONSTRUCTION: GENERAL CONDITION OF THE SITE.
   - DURING CONSTRUCTION: RAW MATERIALS, CRITICAL DETAILS, WELD PREPARATION, BOLT INSTALLATION & TORQUE, FINAL INSTALLED CONDITION & SURFACE COATING REPAIRS.
   - POST-CONSTRUCTION: FINAL CONDITION OF THE SITE

DESIGNED BY: TJL
DRAWN BY: TJL
CHK'D BY: JW

NO.	DESCRIPTION	DATE
1	ISSUED FOR MI REVIEW	3/24/14

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DATE: 3/24/14
SCALE: AS SHOWN
JOB NO.: 14025.002

MODIFICATION INSPECTION REQUIREMENTS

SHEET NO.
MI-1
Sheet No. 4 of 5

I. REINFORCEMENT SCHEDULE KEY:
(MEMBERS INDICATED WITHIN SCHEDULE ARE EXISTING UNLESS NOTED OTHERWISE)

A. REPLACE EXIST. L3.5X3.5X1/4 DIAGONAL MEMBERS WITH L3.5X3.5X5/16 MEMBERS. REPLACE EXIST. 1/2" ø A325–N BOLTS W/ NEW 1/2" ø A325–N BOLTS.

B. REPLACE EXIST. L2X2X1/8 DIAGONAL MEMBERS WITH L2X2X1/4 MEMBERS. REPLACE EXIST. 1/2" ø A325–N BOLTS W/ NEW 1/2" ø A325–N BOLTS.

REPLACE EXIST. 3/4" ø A325–N DIAGONAL BOLTS WITH W/ NEW 3/4" ø A325–X BOLTS (SECTION T7 40'–0"–60'–0" ATB)

MAX. TOWER STEEL USAGE w/ ABOVE REINFORCEMENTS = 85.9% (DIAGONAL BOLTS SECTION T7 43'–0"–63'–0" ATB) UNDER LOAD CASE #2

LEGEND:

1. A.T.B. DENOTES ABOVE TOWER BASE.
2. A.G.L. DENOTES ABOVE GRADE LEVEL.
3. TXX DENOTES TNXTOWER OUTPUT SECTION NUMBER.

SECTION	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
LEGS	P6X0.432			P5X0.375		P5X0.258	P4X0.337	P3X0.216	P2.5X0.276	P2.5X0.203
LEG GRADE	A572–50									
DIAGONALS	L4X4X3/8			L3.5X3.5X3/8	A	L3X3X3/16 REIN.	L2.5X2.5X3/16	L2.5X2.5X1/4 B	B	L1.75X1.75X3/16
DIAG.GRADE	A36									
TOP GIRTS	N.A.									L2.5X2.5X3/16
SEC. HORZ.	L4X4X1/4		N.A.	L3.5X3.5X1/4			N.A.			

180.0'
160.0'
140.0'
120.0'
100.0'
80.0'
60.0'
40.0'
20.0'
0.0'

NOTE: ALL NON T–MOBILE APPURTENANCES NOT SHOWN FOR CLARITY

PROPOSED SIX (6) ERICSSON AIR21 PANEL ANTENNAS AND THREE (3) ERICSSON KRY 112 TMA's MOUNTED ON THREE (3) SITE PRO COMPACT TOWER MOUNTS (P/N CWT8).

℄ T–MOBILE ANTENNAS EL. ±149'–0" A.G.L.

EXISTING MUNICIPAL ONE (1) 7/8" ø AND ONE (1) 1/2" ø CABLES

EXISTING VERIZON TWO (2) 1–5/8" ø HYBRIFLEX FIBER LINES.

APPROX TRUE NORTH

EXISTING AT&T NINE (9) 1–5/8" ø COAX CABLES AND ONE (1) 3" CONDIUT

PROPOSED T–MOBLIE SIX (6) 1–5/8" ø COAX CABLES AND ONE (1) 1–5/8" ø FIBER CABLE

EXISTING/RESERVED SPRINT SIX (6) 1–5/8" ø COAX CABLES, THREE (3) 1–1/4" ø HYBRIFLEX FIBER LINES AND ONE (1) 1/2" ø CABLE

EXISTING T–MOBLIE SIX (6) 1–5/8" ø COAX CABLES

EXISTING NEU THREE (3) 7/8" ø, TWO (2) 1/2" ø AND ONE (1) EW63 CABLES

REPLACE EXISTING 3/4"ø A325 DIAGONAL BOLTS w/ 3/4"ø A325–X BOLTS OF SAME LENGTH, TYP. OF 24.

2 / S–1 FEEDLINE PLAN
SCALE: 1/4" = 1'–0"

1 / S–1 TOWER ELEVATION – PROPOSED
SCALE: 1" = 20'–0"

DESIGNED BY: TJL
DRAWN BY: TJL
CHK'D BY: DFC

ISSUED FOR 90 REVIEW
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BRANFORD, CT 06405

DATE: 2/24/14
SCALE: AS SHOWN
JOB NO. 14023.002

TOWER REINFORCEMENT DETAILS

SHEET NO.
S-1
Sheet No. 1 of 2

Network Modernization RFDS v3.0

Site ID	**CT11111A**	**Latitude**	41.42763
		Longitude	-73.34360
Site Name	Newtown/ I-84 X9	**Site Type**	Structure (Non-Building)
Address	Newtown Service Center. 20 Barnabus Rd., Newtown, CONNECTICUT,	**Site Class**	Utility Lattice Tower
Market	CONNECTICUT	**Landlord**	Northeast Utilities/ CL&P

Configuration
2C

Approvals	
Market RF	
Market Development	

RFDS Revision		**Date**	01/21/2014
RFDS Final			
Work Order #		**NOC#**	(888) 218-6664

Site Information

Existing Configuration					Proposed Configuration			
1	2	3	4	Cabinet #	1	2	3	4
GSM				Technology	GSM/UMTS/LTE	GSM		
S8000				Cabinet type	6102	S8000		
				CBU				
				DUW30	2			
				DUL20	1			
				DUG20	1			
				DUS41				
				RBS6601				
6				dTRU/TRX				
				RU22 B4				
				RUS01 B2				
				RUS01 B4	6			

	Relocate cabinet
X	Add cabinet
	Swap cabinet
	Remove cabinet
X	Make cabinet dark

Scope of Work

Keep and turn off existing S8000 GSM cabinet. Install 6102 cabinet equipped with DUW30 and 6 RUS01 B4 radios. Add another DUW30, DUL20 and DUG20. Install 3 E/// TMAs, remove existing TMAs. Install 6 coax lines. .

ALPHA - Scope of Work

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
X	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
	Add TMA	X	Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Add AWS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Add 2 coax lines, connect 2 lines at position 1/left for LMU and position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 2. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA remove existing TMAs. Install 2 coax lines.

BETA - Scope of Work

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
X	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
	Add TMA	X	Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Add AWS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Add 2 coax lines, connect 2 lines at position 1/left for LMU and position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 2. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA remove existing TMAs. Install 2 coax lines.

GAMMA - Scope of Work

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
X	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
	Add TMA	X	Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Add AWS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Add 2 coax lines, connect 2 lines at position 1/left for LMU and position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 2. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA remove existing TMAs. Install 2 coax lines.

DELTA - Scope of Work

	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
	Add antenna		Remove RRU
	Swap antenna		Consolidate coax cables
	Remove antenna		Add coax cables
	Add TMA		Add fiber cables
	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Network Modernization RFDS v3.0

Site ID	**CT11111A**	**Latitude**	41.42763
		Longitude	-73.34360
Site Name	Newtown/ I-84 X9	**Site Type**	Structure (Non-Building)
Address	Newtown Service Center. 20 Barnabus Rd., Newtown, CONNECTICUT,	**Site Class**	Utility Lattice Tower
Market	CONNECTICUT	**Landlord**	Northeast Utilities/ CL&P

Configuration

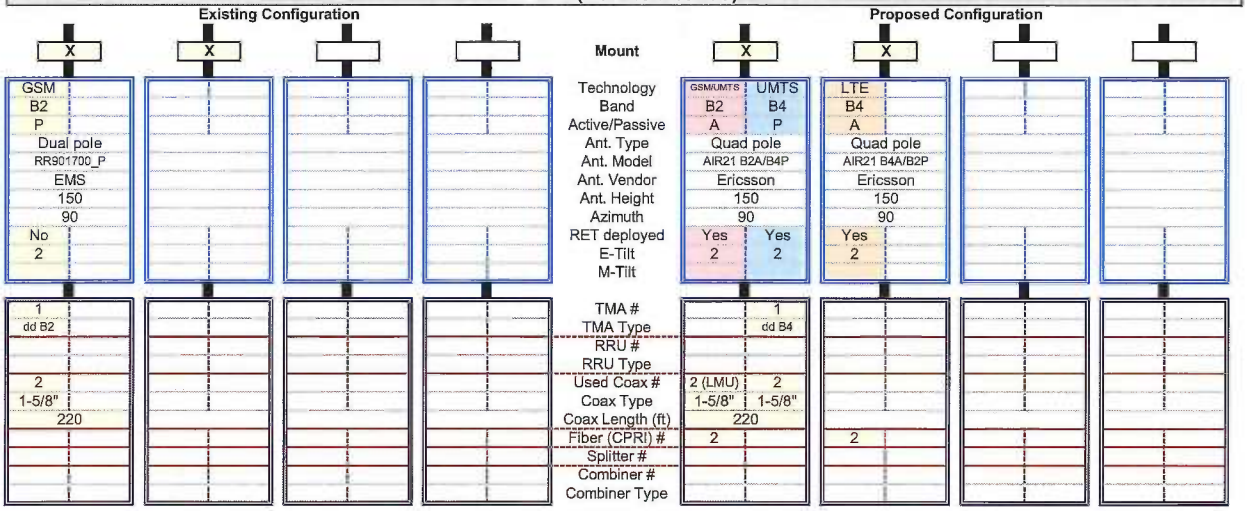
2C

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	

Date 01/21/2014

ALPHA (view from behind)

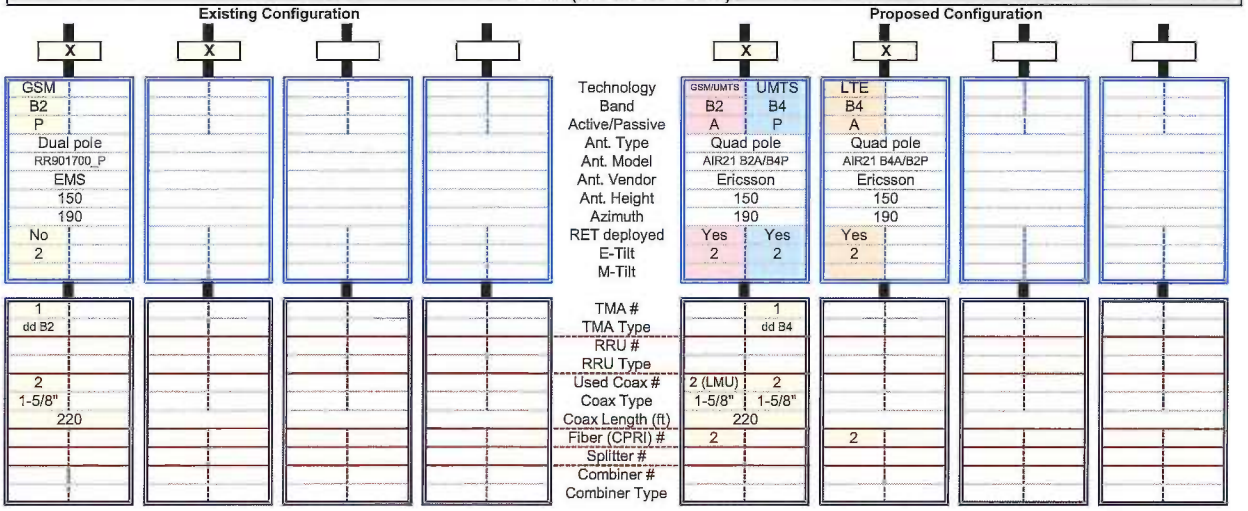


	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
X	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
	Add TMA	X	Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Add AWS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Add 2 coax lines, connect 2 lines at position 1/left for LMU and position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 2. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA remove existing TMAs. Install 2 coax lines.

BETA (view from behind)



	Add new mount		Add RRU
	Relocate antenna		Swap existing RRU
X	Add antenna		Remove RRU
X	Swap antenna		Consolidate coax cables
	Remove antenna	X	Add coax cables
	Add TMA	X	Add fiber cables
X	Swap TMA		Add hybrid combiner
	Remove TMA		Add filter combiner

Scope of work

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Add AWS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Add 2 coax lines, connect 2 lines at position 1/left for LMU and position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 2. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA remove existing TMAs. Install 2 coax lines.

Network Modernization RFDS v3.0

T - Mobile

Site ID	CT11111A	Latitude	41.42763
		Longitude	-73.34360
Site Name	Newtown/ I-84 X9	Site Type	Structure (Non-Building)
Address	Newtown Service Center. 20 Barnabus Rd., Newtown, CONNECTICUT,	Site Class	Utility Lattice Tower
Market	CONNECTICUT	Landlord	Northeast Utilities/ CL&P

Configuration

2C

Approvals	
Market RF	
Market Development	

RFDS Revision	
RFDS Final	

Date 01/21/2014

GAMMA (view from behind)

	Existing Configuration				Proposed Configuration				
Mount	X	X			X		X		
Technology	GSM				GSM/UMTS	UMTS	LTE		
Band	B2				B2	B4	B4		
Active/Passive	P				A	P	A		
Ant. Type	Dual pole				Quad pole		Quad pole		
Ant. Model	RR901700_P				AIR21 B2A/B4P		AIR21 B4A/B2P		
Ant. Vendor	EMS				Ericsson		Ericsson		
Ant. Height	150				150		150		
Azimuth	290				290		290		
RET deployed	No				Yes	Yes	Yes		
E-Tilt	2				2	2	2		
M-Tilt									
TMA #	1					1			
TMA Type	dd B2					dd B4			
RRU #									
RRU Type									
Used Coax #	2				2 (LMU)	2			
Coax Type	1-5/8"				1-5/8"	1-5/8"			
Coax Length (ft)	220				220				
Fiber (CPRI) #					2		2		
Splitter #									
Combiner #									
Combiner Type									

- [ ] Add new mount
- [ ] Relocate antenna
- [X] Add antenna
- [X] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [X] Swap TMA
- [ ] Remove TMA
- [ ] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [X] Add coax cables
- [X] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Scope of work

Swap existing passive antenna at position 1 with AIR21 B2A|B4P. Add AWS dd B4 TMA at position 1/right and remove/disconnect obsolete GSM TMAs. Add 2 coax lines, connect 2 lines at position 1/left for LMU and position 1/right for AWS UMTS. Connect DATA (CPRI) active ports of AIR21 B2A/B4P antenna to DUG20 and PCS UMTS DUW30 via fiber lines. Connect RF passive port of AIR21 B2A/B4P antenna to in cabinet radio/filter units via coax lines. Add AIR21 B4A|B2P antenna at position 2. Connect DATA 1 (CPRI) active port of AIR21 B4A/B2P antenna to DUL20 via fiber line. Connect spare (yellow) fiber jumper to DATA 2 (CPRI) active port of AIR B4A/B2P antenna to allow future implementation of AWS UMTS over fiber. Install 1 E/// TMA remove existing TMAs. Install 2 coax lines.

DELTA (view from behind)

	Existing Configuration				Proposed Configuration			
Technology								
Band								
Active/Passive								
Ant. Type								
Ant. Model								
Ant. Vendor								
Ant. Height								
Azimuth								
RET deployed								
E-Tilt								
M-Tilt								
TMA #								
TMA Type								
RRU #								
RRU Type								
Used Coax #								
Coax Type								
Coax Length (ft)								
Fiber (CPRI) #								
Splitter #								
Combiner #								
Combiner Type								

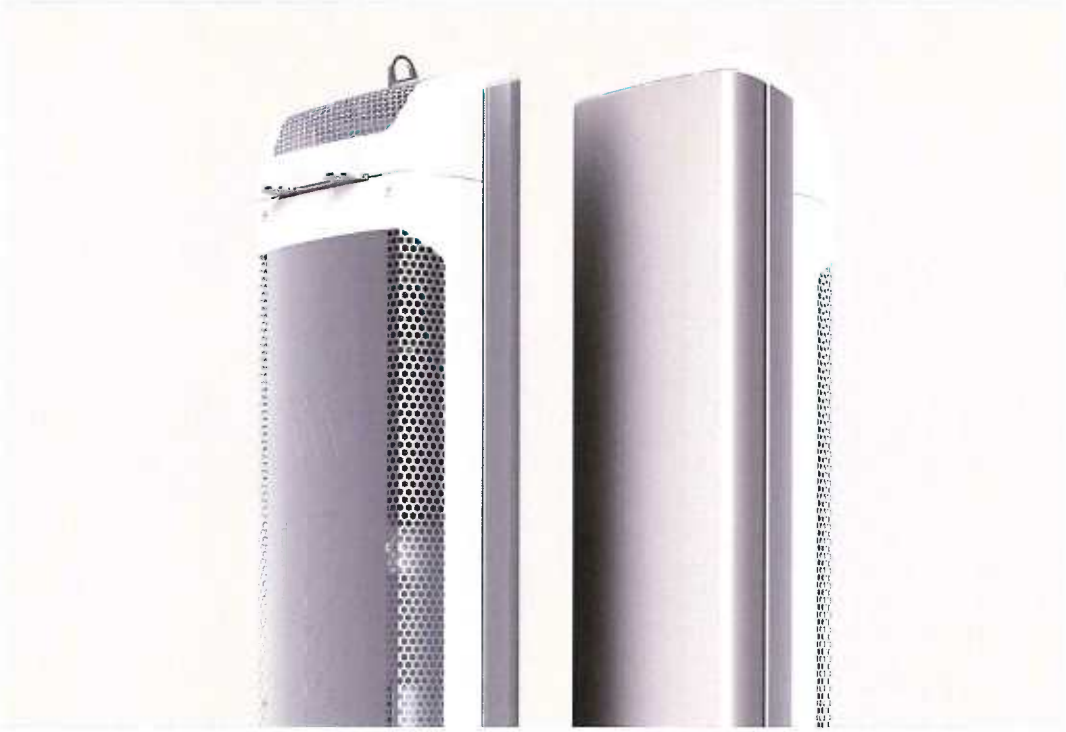
- [ ] Add new mount
- [ ] Relocate antenna
- [ ] Add antenna
- [ ] Swap antenna
- [ ] Remove antenna
- [ ] Add TMA
- [ ] Swap TMA
- [ ] Remove TMA
- [ ] Add RRU
- [ ] Swap existing RRU
- [ ] Remove RRU
- [ ] Consolidate coax cables
- [ ] Add coax cables
- [ ] Add fiber cables
- [ ] Add hybrid combiner
- [ ] Add filter combiner

Scope of work

ERICSSON

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.

ericsson.com

ANTENNA-INTEGRATED RADIO

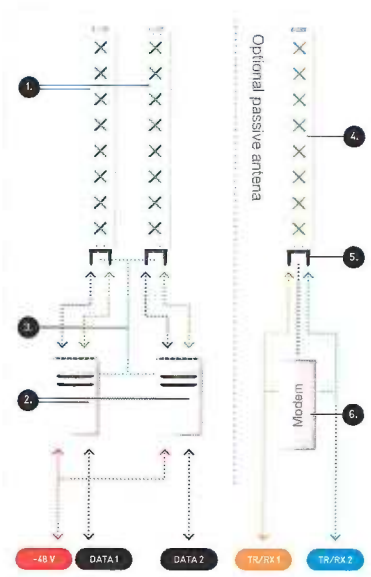
Figure 2 →
Three-sector tower site with three AIR units.e

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.

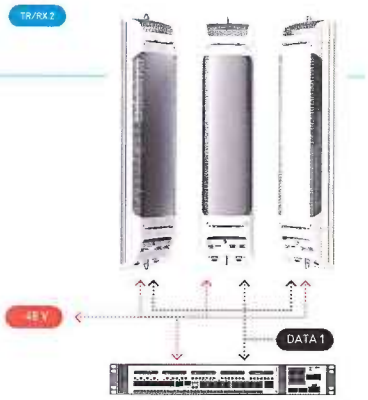
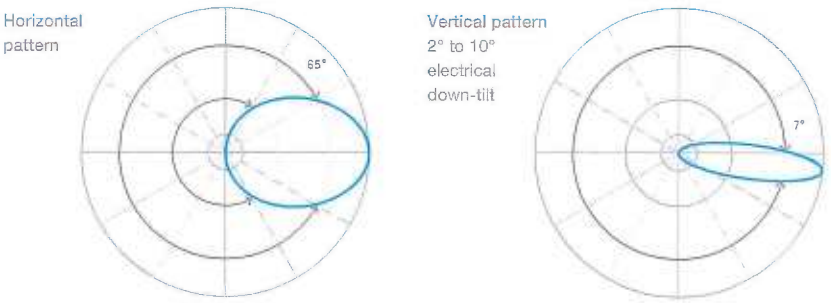


Figure 3 →
Three sector configuration example: RBS 6501 with three AIR units.

Figure 4
Antenna
Characteristics



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.

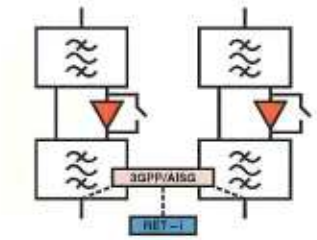
Future-proof
The Double TMA 17/21 Premium is designed for co-existence with future complementary, mast-mounted devices.

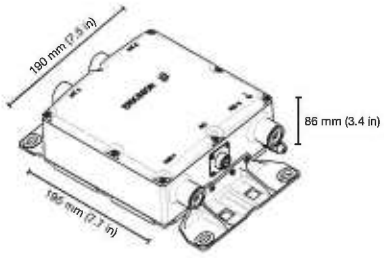
Excellent reliability
As the world's largest supplier of TMAs, Ericsson has a well-proven track record of reliable TMA designs. Reliability enhancing features include dual LNAs, weatherproof design, integrated alarm and lightning protection.

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

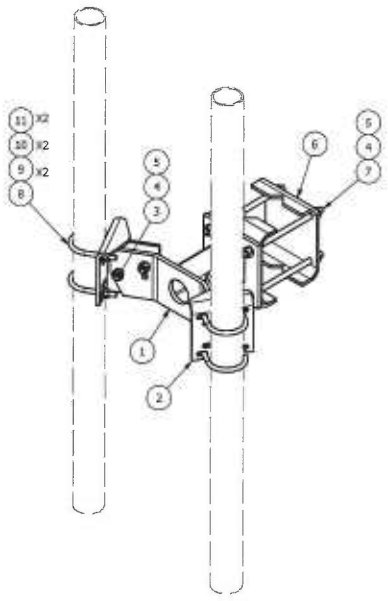


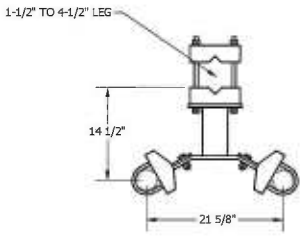


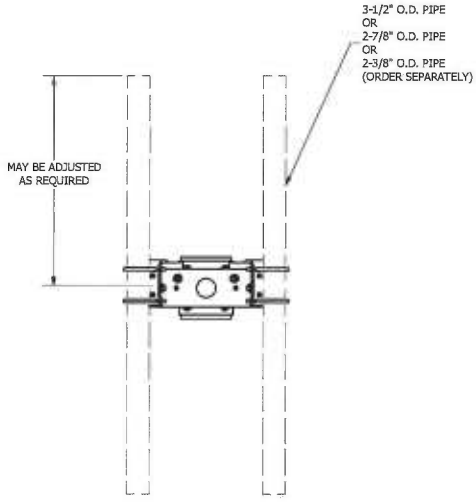
Technical Specifications for Double TMA 1700/2100, MHz Premium

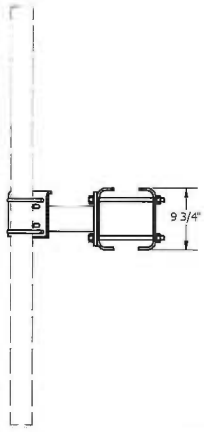
Product name Double TMA 17/21, Premium 3GPP/ASIG compatible with RET interface	**Product number** KRY 112 144/1
Radio performance	
Bandwidth:	45 MHz
Receiving pass band:	1710 - 1755 MHz
Transmitting pass band:	2110 - 2155 MHz
RX Gain:	12± 1 dB
Input IP3:	16 dBm*
IM3 at antenna port (2x43dBM):	-128 dBm
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









PARTS LIST

ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	X-210717	STANDOFF BRACKET WELDMENT		28.58	28.58
2	2	X-ATB	PIPE ATTACHMENT BRACKET		10.68	21.37
3	4	A5802	5/8" x 2" HDG A325 HEX BOLT		0.27	1.09
4	12	G58LW	5/8" HDG LOCKWASHER		0.03	0.31
5	12	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	1.56
6	2	X-214130	BENT PLATE V-CLAMP	12 5/8 in	11.43	22.86
7	4	G58R-12	5/8" x 12" THREADED ROD (HDG.)		1.05	4.18
8	4	X-UB135B	1/2" X 3-5/8" X 5-1/2" X 3" U-BOLT (HDG.)		0.77	3.09
8	4	X-UB1300	1/2" X 3" X 5" X 2" U-BOLT (HDG.)		0.70	2.80
8	4	X-UB1212	1/2" X 2-1/2" X 4-1/2" X 2" U-BOLT (HDG.)		0.63	2.52
9	8	G12FW	1/2" HDG USS FLATWASHER		0.03	0.27
10	8	G12LW	1/2" HDG LOCKWASHER		0.01	0.11
11	8	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	0.57
					TOTAL WT. #	88.42

NOTE:
REFERENCE VMI P/N 217928

REV	DESCRIPTION OF REVISIONS	CPD	BY	DATE
A	REPLACED X-210746 WITH X-ATB	4779	CEK	1/5/2012

REVISION HISTORY

TOLERANCE NOTE

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES (± 0.030")
DRILLED AND GAS CUT HOLES (± 0.030") - NO CONING OF HOLES
LASER CUT EDGES AND HOLES (± 0.010") - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE - ALL OTHER MACHINING (± 0.030")
ALL OTHER ASSEMBLY (± 0.060")

DESCRIPTION
DUAL ANTENNA MOUNT ASSEMBLY
(14" STAND-OFF)
1-1/2" TO 4-1/2" LEG

DRAWN BY	CPD NO.	DRAWING USAGE
CEK 1/5/2012	4779	CUSTOMER

ENG. APPROVAL

CHECKED BY
BMC 1/6/2012

SITE PRO 1
A valmont COMPANY
Engineering Support Team: 1-888-753-7446
Locations: New York, NY; Atlanta, GA; Los Angeles, CA; Plymouth, IN; Salem, OR; Dallas, TX

PART NO. CWT8

DWG. NO. CWT8

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: CT11111A
Newtown I84 X9

20 Barnabas Road
Newtown, CT 06470

April 30, 2014

EBI Project Number: 62142696

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

EBI Consulting
environmental | engineering | due diligence

April 30, 2014

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

Re: Emissions Values for Site: **CT11111A - Newtown I84 X9**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at 20 Barnabas Road, Newtown, 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 μW/cm2 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 (μW/cm2). The general population exposure limit for the cellular band is 567 μW/cm2, and the general population exposure limit for the PCS and AWS bands is 1000 μW/cm2. 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.

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 20 Barnabas Road, Newtown, 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, the actual antenna pattern gain value in the direction of the sample area was used. For this report the sample point is 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 (1940.000 MHz—to 1950.000 MHz) were considered for each sector of the proposed installation.
2) 2 UMTS channels (2110.000 MHz to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation.
3) 2 LTE channels (2110.000 MHz to 2120.000 MHz / 2140.000 MHz to 2145.000 MHz) were considered for each sector of the proposed installation.
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 actual gain in this direction was used per the manufactures supplied specifications.
6) The antenna used in this modeling is the Ericsson AIR21 for LTE, UMTS and GSM. This is based on feedback from the carrier with regards to anticipated antenna selection. This antenna has a 15.6 dBd gain value at its main lobe. Actual antenna gain values were used for all calculations as per the manufacturers specifications.

7) The antenna mounting height centerline of the proposed antennas is **149 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.

Site ID	CT11111A - Newtown I84 X9
Site Addresss	20 Barnabas Road, Newtown, CT 06470
Site Type	Lattice Tower

Sector 1

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	3	120	-3.95	149	143	None	0	0	48.326044	0.849601	0.08496%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	149	143	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	149	143	1-5/8"	0	0	24.163022	0.424801	0.04248%
2B	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	149	143	1-5/8"	0	0	24.163022	0.424801	0.04248%
															Sector total Power Density Value:		0.170%

Sector 2

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	3	120	-3.95	149	143	None	0	0	48.326044	0.849601	0.08496%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	149	143	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	149	143	1-5/8"	0	0	24.163022	0.424801	0.04248%
2b	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	149	143	1-5/8"	0	0	24.163022	0.424801	0.04248%
															Sector total Power Density Value:		0.170%

Sector 3

Antenna Number	Antenna Make	Antenna Model	Status	Frequency Band	Technology	Power Out Per Channel (Watts)	Number of Channels	Composite Power	Antenna Gain in direction of sample point (dBd)	Antenna Height (ft)	analysis height	Cable Size	Cable Loss (dB)	Additional Loss	ERP	Power Density Value	Power Density Percentage
1a	Ericsson	AIR21 B4A/B2P	Active	AWS - 2100 MHz	LTE	60	3	120	-3.95	149	143	None	0	0	48.326044	0.849601	0.08496%
1b	Ericsson	AIR21 B4A/B2P	Not Used	-	-			0	-3.95	149	143	None	0	0	0	0	0.00000%
2a	Ericsson	AIR21 B2A / B4P	Active	PCS - 1950 MHz	GSM / UMTS	30	2	60	-3.95	149	143	1-5/8"	0	0	24.163022	0.424801	0.04248%
2b	Ericsson	AIR21 B2A / B4P	Passive	AWS - 2100 MHz	UMTS	30	2	60	-3.95	149	143	1-5/8"	0	0	24.163022	0.424801	0.04248%
															Sector total Power Density Value:		0.170%

Site Composite MPE %	
Carrier	MPE %
T-Mobile	0.510%
AT&T	13.170%
37.48, 37.74, 48.34, 154.46375 MHz systems	4.800%
Nextel	4.71%
Sprint	9.010%
Verizon	36.740%
Total Site MPE %	**68.940%**

EBI Consulting
environmental | engineering | due diligence

Summary

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

The anticipated Maximum Composite contributions from the T-Mobile facility are **0.510% (0.170% from each sector)** of the allowable FCC established general public limit considering all three sectors simultaneously.

The anticipated composite MPE value for this site assuming all carriers present is **68.940%** of the allowable FCC established general public limit. 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 within the allowable 100% threshold standard per the federal government.

Scott Heffernan
RF Engineering Director

EBI Consulting
21 B Street
Burlington, MA 01803

EXHIBIT D

Northeast Utilities System

107 Selden Street, Berlin, CT 06037

Northeast Utilities Service Company
P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000

April 24, 2014

T-Mobile
4 Sylvan Way
Parsippany, NJ 07054

Re: Site Permitting Authorization
Barnabas Road, Newtown, CT

Dear T-Mobile,

Authorization is hereby given to T-Mobile employees and its duly authorized agents and independent contractors (hereinafter collectively referred to as " T-Mobile"), to apply for any and all local municipal, state and federal licenses, permits and approvals, including but not limited to Connecticut Siting Council, building permits, zoning variances, zoning special exceptions, site plan and subdivision approvals, driveway, wetlands and terrain alteration permits, which are or may be necessary or required for T-Mobile to construct, operate and maintain a wireless communications system (PCS System), and/or antenna site on the following property over which The Connecticut Light & Power Company (CL&P) has property rights:

CT 11111A (site location)
Newtown, Connecticut

The foregoing authorization is given subject to the following conditions:

1. This authorization shall be nonexclusive. Nothing herein shall prevent or restrict CL&P from authorizing any other person or entity to apply for any similar licenses, permits or approvals to construct, operate and maintain any other communication system or facility of any type on the property at any time.

2. This authorization shall not obligate CL&P to pay for or reimburse any costs or expenses or to provide any assistance of any kind in connection with any applications, or bind or obligate CL&P to agree or be responsible for any on-site or off-site improvements, development restrictions, impact fees or assessments, capital improvement charges, bonds or other security, or any other fee, assessment, charge or expense imposed or required as a condition of any license, permit or approval. T-Mobile shall be solely and fully responsible for all fees, charges costs and expenses of any kind in connection with any applications. CL&P agrees to reasonably cooperate with T-Mobile in signing such applications or other similar documents as may be required in order for T-Mobile to apply for any license, permit or approval.

3. This authorization shall not be deemed or construed to grant or transfer to T-Mobile any interest in the property, whatsoever, and shall not in any respect obligate or require CL&P to sell, lease or license the Property to T-Mobile or otherwise allow T-Mobile to use or occupy the property for any purpose, regardless of whether any licenses, permits and approvals applied for by T-Mobile for the property are granted. T-Mobile understands and acknowledges T-Mobile's sole risk and without any enforceable expectation that the property will be made available for T-Mobile's use.

4. T-Mobile shall be required to supply to CL&P, free of charge and contemporaneous with T-Mobile 's filing of same, a complete copy of any and all applications, plans, reports and other public filings made by T-Mobile with any local, municipal, state or federal governmental or regulatory officer, agency board, bureau, commission or other person or body for any licenses, permits or approvals for the property, and to keep CL&P fully informed on a regular basis of the status of T-Mobile 's applications.

5. This authorization shall automatically expire six (6) months after the date of this letter, unless extended in writing by mutual agreement of CL&P and T-Mobile.

Very truly yours,

Salvatore Giuliano, Manager
R E & Property Management

AGREED TO on behalf of
T-Mobile

By: _____
Duly Authorized

Date: 4.24.2014

Site Location: Barnabas Road, Newtown, CT