



10 INDUSTRIAL AVENUE,
SUITE 3
MAHWAH, NJ 07430

PHONE: 201.684.0055
FAX: 201.684.0066

October 18, 2018

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

Notice of Exempt Modification
26 So. Orange Center Rd, Orange, CT
Latitude: 41.25553056
Longitude: -73.01088056

Dear Ms. Bachman,

T-Mobile currently maintains (9) existing antennas at the 150' level of the existing 180' Monopole at 26 So. Orange Center Road in Orange, Connecticut. The tower is owned by Crown Castle and the property is owned by the Town of Orange. T-Mobile now intends to replace (6) of its existing antennas with (6) new 1900/2100 MHz antennas, and swap (3) RRUs. These antennas and RRUs would be installed at the same 150' level of the tower, and one (1) 6x12 hybrid cable will be installed.

This facility was approved by Docket 0416 by the Siting Council November 3, 2011, with no record of conditions that would restrict exempt modifications. Therefore, this modification complies with the aforementioned approval.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies 16-50j-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. 16-50j-72(b)(2). In accordance with R.C.S.A. 16-50j-73, a copy of this letter is being sent to First Selectman Zeoli, as well as the tower and property owner.

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

1. The proposed modification will not result in an increase in the height of the existing structure
2. The proposed modifications will not require the extension of the site boundary.
3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.
4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

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

6. The existing structure and its foundation can support the proposed loading.

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

Sincerely,

Elizabeth Jamieson

Elizabeth Jamieson
Transcend Wireless
10 Industrial Ave., Suite 3
Mahwah, New Jersey 07430
860-605-7808
EJamieson@TranscendWireless.com

cc:

James Zeoli, Orange First Selectman and Property Owner
Paul Dinice, Zoning Administrator & Enforcement Officer
Crown Castle – Tower Owner

RED CEDAR RD

Location

RED CEDAR RD

Mblu

13/ 7/ 1A/ /

Acct#

34500

Owner

ORANGE TOWN OF

Assessment

\$2,174,000

Appraisal

\$3,105,800

PID

555

Building Count

1

Current Value

Appraisal			
Valuation Year	Improvements	Land	Total
2017	\$12,900	\$3,092,900	\$3,105,800
Assessment			
Valuation Year	Improvements	Land	Total
2017	\$9,000	\$2,165,000	\$2,174,000

Owner of Record

Owner

ORANGE TOWN OF

Co-Owner

TOWN DUMP AND OTHER TOWN OWNED LAND

Address

617 ORANGE CENTER RD
ORANGE, CT 06477

Sale Price

\$0

Certificate

Book & Page

232/ 655

Sale Date

02/11/1971

Instrument

00

Ownership History

Ownership History					
Owner	Sale Price	Certificate	Book & Page	Instrument	Sale Date
ORANGE TOWN OF	\$0		232/ 655	00	02/11/1971

Building Information

Building 1 : Section 1

Year Built:

Living Area:

0

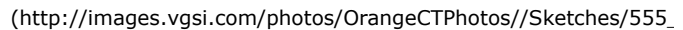
Replacement Cost

Less Depreciation:

\$0

Building Attributes	
Field	Description
Style	Outbuildings
Model	

Building Layout



Building Sub-Areas (sq ft)	Legend
No Data for Building Sub-Areas	

Extra Features		Legend
No Data for Extra Features		

Land Use

Land Line Valuation

Size (Acres)	40.61
Frontage	
Depth	
Assessed Value	\$2,165,000
Appraised Value	\$3,092,900

Category

Outbuildings

Outbuildings						Legend
Code	Description	Sub Code	Sub Description	Size	Value	Bldg #
FGR3	Garage w/Basement			510 UNITS	\$12,900	1

Valuation History

Appraisal			
Valuation Year	Improvements	Land	Total
2016	\$12,900	\$3,092,900	\$3,105,800
2015	\$12,900	\$3,092,900	\$3,105,800
2014	\$12,900	\$3,092,900	\$3,105,800

Assessment			
Valuation Year	Improvements	Land	Total
2016	\$9,000	\$2,165,000	\$2,174,000
2015	\$9,000	\$2,165,000	\$2,174,000
2014	\$9,000	\$2,165,000	\$2,174,000

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

T-Mobile Existing Facility

Site ID: CT11720A

CT720/Town of Orange_MP
26 So. Orange Center Road
Orange, CT 06477

October 9, 2018

EBI Project Number: 6218006562

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	6.42 %



October 9, 2018

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

Emissions Analysis for Site: **CT11720A – CT720/Town of Orange_MP**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **26 So. Orange Center Road, Orange, 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 97-01 and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The number of $\mu\text{W}/\text{cm}^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits, therefore it is necessary to report results and limits in terms of percent MPE rather than power density.

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

General population/uncontrolled exposure limits apply to situations in which the general population 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 population would always be considered under this category when exposure is not employment related, for example, in the case of a telecommunications tower that exposes persons in a nearby residential area.

Public exposure to radio frequencies is regulated and enforced in units of microwatts per square centimeter ($\mu\text{W}/\text{cm}^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately $400 \mu\text{W}/\text{cm}^2$ and $467 \mu\text{W}/\text{cm}^2$ respectively. The general population exposure limit for the 1900 MHz (PCS) and 2100 MHz (AWS) frequency bands is $1000 \mu\text{W}/\text{cm}^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.



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

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

- 1) 1 GSM channels (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 15 Watts per Channel.
- 2) 1 UMTS channel (PCS Band - 1900 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 3) 1 UMTS channel (AWS Band – 2100 MHz) was considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 4) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.
- 5) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 6) 2 LTE channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.



- 7) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 20 Watts per Channel.
- 8) 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.
- 9) For the following calculations the sample point was the top of a 6-foot person standing at the base of the tower. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas, was used in this direction. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 10) The antennas used in this modeling are the **Ericsson AIR32 B66A/B2A & Ericsson AIR21 B2A/B4P** for 1900 MHz (PCS) and 2100 MHz (AWS) channels and the **RFS APXVAARR24_43-U-NA20** for 600 MHz and 700 MHz channels. This is based on feedback from the carrier with regard to anticipated antenna selection. All Antenna gain values and associated transmit power levels are shown in the Site Inventory and Power Data table below. The maximum gain of the antenna per the antenna manufactures supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes minus 10 dB for directional panel antennas for broadcast and microwave backhaul, was used for all calculations. This value is a very conservative estimate as gain reductions for these particular antennas are typically much higher in this direction.
- 11) The antenna mounting height centerline of the proposed antennas (panel antennas) is **148 feet** above ground level (AGL).
- 12) 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.
- 13) All calculations were done with respect to uncontrolled / general population threshold limits.



T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR32 B66A/B2A	Make / Model:	Ericsson AIR32 B66A/B2A	Make / Model:	Ericsson AIR32 B66A/B2A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	148 feet	Height (AGL):	148 feet	Height (AGL):	148 feet
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	4,668.54	ERP (W):	4,668.54	ERP (W):	4,668.54
Antenna A1 MPE%	0.83	Antenna B1 MPE%	0.83	Antenna C1 MPE%	0.83
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P	Make / Model:	Ericsson AIR21 B2A/B4P
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	148 feet	Height (AGL):	148 feet	Height (AGL):	148 feet
Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)	Frequency Bands	1900 MHz (PCS) / 2100 MHz (AWS)
Channel Count	3	Channel Count	3	Channel Count	3
Total TX Power(W):	95	Total TX Power(W):	95	Total TX Power(W):	95
ERP (W):	3,695.93	ERP (W):	3,695.93	ERP (W):	3,695.93
Antenna A2 MPE%	0.66	Antenna B2 MPE%	0.66	Antenna C2 MPE%	0.66
Antenna #:	3	Antenna #:	3	Antenna #:	3
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd	Gain:	12.95 / 13.35 dBd
Height (AGL):	148 feet	Height (AGL):	148 feet	Height (AGL):	148 feet
Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz	Frequency Bands	600 MHz / 700 MHz
Channel Count	4	Channel Count	4	Channel Count	4
Total TX Power(W):	120	Total TX Power(W):	120	Total TX Power(W):	120
ERP (W):	2,443.03	ERP (W):	2,443.03	ERP (W):	2,443.03
Antenna A3 MPE%	1.03	Antenna B3 MPE%	1.03	Antenna C3 MPE%	1.03

Site Composite MPE%	
Carrier	MPE%
T-Mobile (Per Sector Max)	2.52 %
AT&T	1.47 %
Verizon Wireless	1.91 %
Clearwire	0.07 %
Sprint	0.45 %
Site Total MPE %:	6.42 %

T-Mobile Sector A Total:	2.52 %
T-Mobile Sector B Total:	2.52 %
T-Mobile Sector C Total:	2.52 %
Site Total:	6.42 %



T-Mobile Maximum MPE Power Values (Per Sector)

T-Mobile _Frequency Band / Technology (Per Sector)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density ($\mu\text{W}/\text{cm}^2$)	Frequency (MHz)	Allowable MPE ($\mu\text{W}/\text{cm}^2$)	Calculated % MPE
T-Mobile PCS - 1900 MHz LTE	2	1,556.18	148	5.55	PCS - 1900 MHz	1000.00	0.55%
T-Mobile AWS - 2100 MHz LTE	2	778.09	148	2.77	AWS - 2100 MHz	1000.00	0.28%
T-Mobile PCS - 1900 MHz GSM	1	583.57	148	1.04	PCS - 1900 MHz	1000.00	0.10%
T-Mobile PCS - 1900 MHz UMTS	1	1,556.18	148	2.77	PCS - 1900 MHz	1000.00	0.28%
T-Mobile AWS - 2100 MHz UMTS	1	1,556.18	148	2.77	AWS - 2100 MHz	1000.00	0.28%
T-Mobile 600 MHz LTE	2	788.97	148	2.81	600 MHz	400.00	0.70%
T-Mobile 700 MHz LTE	2	432.54	148	1.54	700 MHz	467.00	0.33%
						Total:	2.52%



Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	2.52 %
Sector B:	2.52 %
Sector C:	2.52 %
T-Mobile Maximum MPE % (Per Sector):	2.52 %
Site Total:	6.42 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **6.42%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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

Structural Analysis Report

180-ft Existing Rohn Monopole

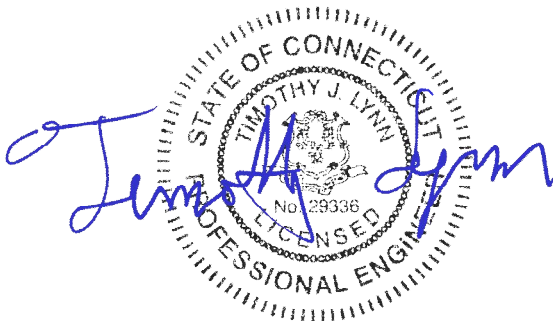
*Proposed T-Mobile
Antenna Upgrade*

Site Ref: CT11720A

*26 South Orange Center Road
Orange, CT*

CEN TEK Project No. 18058.87

Date: October 2, 2018



Prepared for:
T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

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Introduction

The purpose of this report is to summarize the results of the non-linear, P- Δ structural analysis of the antenna upgrade proposed by T-Mobile on the existing monopole (tower) located in Orange, CT.

The host tower is a 180-ft tall, five-section, eighteen sided, tapered monopole originally designed and manufactured by ROHN in August of 2001. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural report prepared by Crown Castle job no. 1519821 dated February 5, 2018. Antenna and appurtenance information were obtained from the aforementioned structural report and a RF data sheet.

The tower is made up of five (5) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 24.00-in at the top and 64.75-in at the base.

Antenna and Appurtenance Summary

The existing, proposed and future loads considered in this analysis consist of the following:

- **AT&T (EXISTING):**
Antennas: Three (3) Powerwave 7770 panel antennas, three (3) CCI OPA-65R-LCUU-H4 panel antenna, three (3) Andrew SBNHH-1D65A panel antennas, three (3) Kathrein 80010964 panel antennas, six (6) Powerwave LGP21401 TMAs, six (6) CCI TPX-070821 triplexers, three (3) Ericsson B14 4478 remote radio heads, six (6) Ericsson RRUS-11 remote radio units, nine (9) Ericsson RRUS-32 remote radio units and three (3) Raycap DC6-48-60-18-8F surge arrestors mounted on a low profile platform with a RAD center elevation of 177-ft above existing grade.
Coax Cables: Twelve (12) 1-5/8" $\varnothing$ coax cables, three (3) fiber cable and six (6) dc control cables running on the inside of the existing monopole.

- **SPRINT (EXISTING):**
Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas, three (3) RFS APXVTM14 panel antennas, three (3) ALU 1900 MHz RRHs, three (3) ALU 800 MHz RRHs, three (3) ALU TD-RRH-8x20-25 RRHs and three (3) Notch Filters mounted to a platform with handrails with a RAD center elevation of 131-ft above grade.
Coax Cables: Four (4) 1-5/8" Ø Hybriflex cables running on the inside of the existing tower.
- **VERIZON (EXISTING):**
Antennas: Three (3) Swedcom SLCP 2x6015 panel antenna, six (6) Antel BXA-171063-12BF panel antennas, three (3) Antel BXA-70063-4CF panel antenna, three (3) Alcatel-Lucent RRH2x40-AWS remote radio heads and one (1) RFS DB-T1-6Z-8AB-0Z main distribution box mounted on a low profile platform with a RAD center elevation of 115-ft above grade level.
Coax Cables: Twelve (12) 1-5/8" Ø coax cables and one (1) 1-5/8" Ø fiber cable running inside the monopole. Six (6) 1-5/8" Ø coax cables running on the exterior of the monopole.
- **T-MOBILE (EXISTING TO REMAIN):**
Antennas: Three (3) Ericsson AIR32 panel antennas, three (3) Ericsson AIR21 panel antennas and three (3) Ericsson KRY112 TMAs mounted on a low profile platform with a RAD center elevation of 148-ft above grade level
Coax Cables: Twelve (12) 1-5/8" Ø coax cables and one (1) 9x18 fiber line running inside the monopole.
- **T-MOBILE (EXISTING TO REMOVE):**
Antennas: Three (3) Andrew LNX-6515DS panel antennas and three (3) Ericsson RRUS-11 remote radio heads mounted on a low profile platform with a RAD center elevation of 148-ft above grade level.
- **T-MOBILE (PROPOSED):**
Misc. Equipment: Three (3) RFS APXVAARR24_43 panel antennas and three (3) Ericsson 4449 B71 B12 remote radio heads mounted on a low profile platform with a RAD center elevation of 148-ft above grade level. (Handrail kit to be installed on platform)
Coax Cables: One (1) 6x12 fiber lines running on the interior of the monopole.

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 or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables to be installed as indicated in this report.

Analysis

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

The existing tower was analyzed for the controlling basic wind speed (3-second gust) with no ice and the applicable wind and ice combination to determine stresses in members as per guidelines of TIA-222-G-2005 entitled “Structural Standard for Antenna Support Structures and Antennas”, the American Institute of Steel Construction (AISC) and the Manual of Steel Construction; Load and Resistance Factor Design (LRFD).

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC¹ and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

Tower loading was determined by the basic wind speed as applied to projected surface areas with modification factors per TIA-222-G-2005, gravity loads of the tower structure and its components, and the application of 0.75” radial ice on the tower structure and its components.

Basic Wind Speed:	New Haven; v = 95-115 mph	[Annex B of TIA-222-G-2005]
	Orange; v = 97 mph	[Appendix N of the 2016 CT Building Code]
Load Cases:	<u>Load Case 1</u> ; 97 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	[Appendix N of the 2016 CT Building Code]
	<u>Load Case 2</u> ; 50 mph wind speed w/ 0.75” radial ice plus gravity load – used in calculation of tower stresses.	[Annex B of TIA-222-G-2005]

¹ The 2012 International Building Code as amended by the 2016 Connecticut State Building Code (CSBC).

T o w e r C a p a c i t y

- Calculated stresses were found to be within allowable limits. This tower was found to be at **64.2%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L4)	40.75'-82.75'	64.2%	PASS

F o u n d a t i o n a n d A n c h o r s

The existing foundation consists of a 8-ft diameter x 2-ft long reinforced concrete pier on a 48.0-ft square x 6-ft thick reinforce concrete pad. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned Crown Castle structural report. The base of the tower is connected to the foundation by means of (20) 2.25"Ø, ASTM A615-75 anchor bolts embedded into the concrete foundation structure.

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

Location	Vector	Proposed Reactions
Base	Shear	42 kips
	Compression	64 kips
	Moment	4854 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 (FS)⁽¹⁾	Proposed Loading (FS)⁽¹⁾	Result
Reinforced Concrete Pad and Pier	OTM ⁽²⁾	1.0	10.75	PASS

Note 1: FS denotes Factor of Safety.

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Axial and Shear	51.8%	PASS
Base Plate	Bending	58.2%	PASS

Conclusion

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

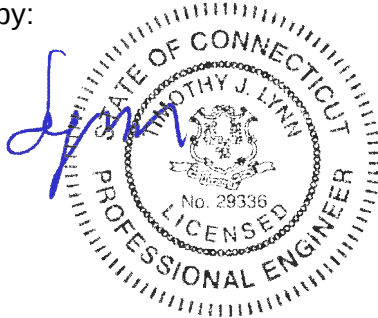
The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer



*Standard Conditions for Furnishing of
Professional Engineering Services on
Existing Structures*

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

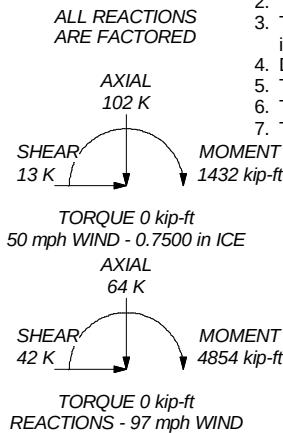
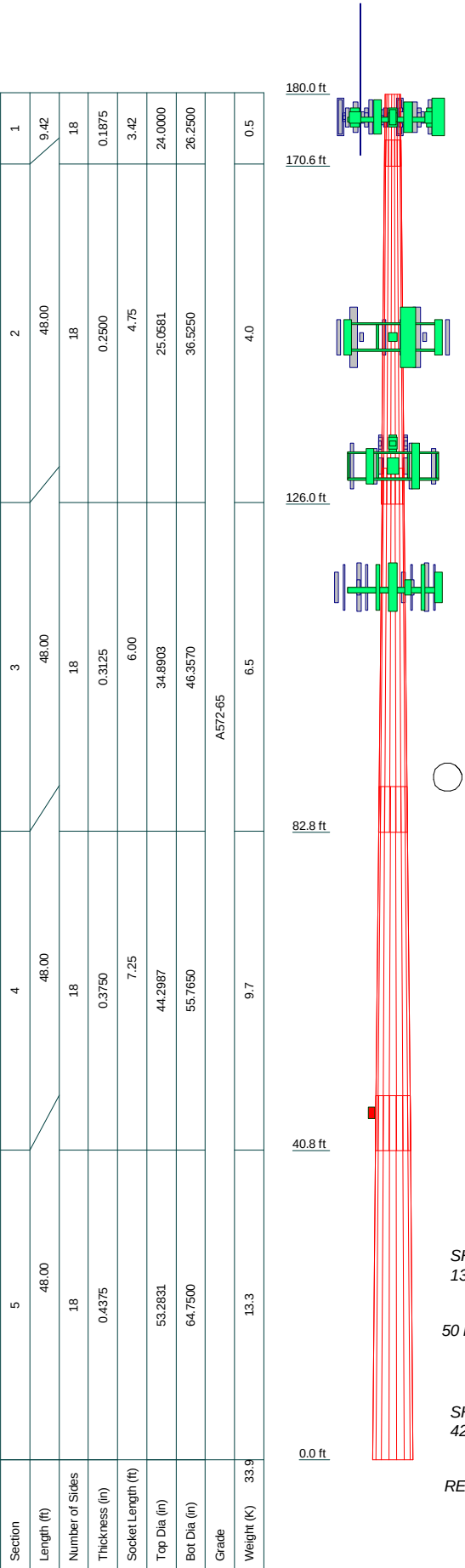
- Information supplied by the client regarding the structure itself, its foundations, the soil conditions, the antenna and feed line loading on the structure and its components, or other relevant information.
- Information from the field and/or drawings in the possession of Centek Engineering, Inc. or generated by field inspections or measurements of the structure.
- It is the responsibility of the client to ensure that the information 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 ERITower, automates much of the tower analysis and design required by the TIA/EIA 222 Standard.

tnxTower Features:

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



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
4-ft Lightning Rod (Town - Existing)	182	KRY 112 TMA (T-Mobile - Existing)	148
7770.00 (ATI)	177	Radio 4449 B71 B12 (T-Mobile - Proposed)	148
OPA-65R-LCUU-H4 (ATI)	177	Radio 4449 B71 B12 (T-Mobile - Proposed)	148
SBNHH-1D65A (ATI)	177	Radio 4449 B71 B12 (T-Mobile - Proposed)	148
80010964 (ATI)	177	Radio 4449 B71 B12 (T-Mobile - Proposed)	148
7770.00 (ATI)	177	13' Platform w/rails (T-Mobile - Existing)	148
OPA-65R-LCUU-H4 (ATI)	177	FD-RRH 4x45 1900 (Sprint)	134
SBNHH-1D65A (ATI)	177	FD-RRH 4x45 1900 (Sprint)	134
80010964 (ATI)	177	FD-RRH 4x45 1900 (Sprint)	134
7770.00 (ATI)	177	FD-RRH 2x50 800 (Sprint)	134
OPA-65R-LCUU-H4 (ATI)	177	FD-RRH 2x50 800 (Sprint)	134
SBNHH-1D65A (ATI)	177	FD-RRH 2x50 800 (Sprint)	134
80010964 (ATI)	177	FD-RRH 2x50 800 (Sprint)	134
(2) TPX-070821 (ATI)	177	Notch Filter (Sprint)	134
(2) TPX-070821 (ATI)	177	Notch Filter (Sprint)	134
(2) TPX-070821 (ATI)	177	Notch Filter (Sprint)	134
(2) LGP21401 TMA (ATI)	177	APXVSP18-C-A20 (Sprint)	131
(2) LGP21401 TMA (ATI)	177	APXVTM14 (Sprint)	131
(2) LGP21401 TMA (ATI)	177	APXVSP18-C-A20 (Sprint)	131
(3) RRUS-32 (ATI)	177	APXVTM14 (Sprint)	131
(3) RRUS-32 (ATI)	177	APXVSP18-C-A20 (Sprint)	131
(3) RRUS-32 (ATI)	177	APXVTM14 (Sprint)	131
B14 4478 (ATI)	177	APXVSP18-C-A20 (Sprint)	131
B14 4478 (ATI)	177	APXVTM14 (Sprint)	131
B14 4478 (ATI)	177	TD-RRH8x20-25 (Sprint)	131
(2) RRUS-11 (ATI)	177	TD-RRH8x20-25 (Sprint)	131
(2) RRUS-11 (ATI)	177	TD-RRH8x20-25 (Sprint)	131
(2) RRUS-11 (ATI)	177	13' Platform w/rails (Sprint)	131
(2) RRUS-11 (ATI)	177	BXA-70063/4CF (Verizon)	115
DC6-48-60-18-8F Surge Arrestor (ATI)	177	BXA-171063-12BF (Verizon)	115
DC6-48-60-18-8F Surge Arrestor (ATI)	177	SLCP 2x6015 (Verizon)	115
DC6-48-60-18-8F Surge Arrestor (ATI)	177	BXA-171063-12BF (Verizon)	115
EEI 14-ft Low Profile Platform (ATI)	177	BXA-70063/4CF (Verizon)	115
AIR21 B2A/B4P (T-Mobile - Existing)	148	BXA-171063-12BF (Verizon)	115
APXVAARR24-43 (T-Mobile - Proposed)	148	SLCP 2x6015 (Verizon)	115
AIR32 (T-Mobile - Existing)	148	BXA-171063-12BF (Verizon)	115
AIR21 B2A/B4P (T-Mobile - Existing)	148	BXA-70063/4CF (Verizon)	115
APXVAARR24-43 (T-Mobile - Proposed)	148	BXA-171063-12BF (Verizon)	115
AIR32 (T-Mobile - Existing)	148	SLCP 2x6015 (Verizon)	115
AIR21 B2A/B4P (T-Mobile - Existing)	148	BXA-171063-12BF (Verizon)	115
APXVAARR24-43 (T-Mobile - Proposed)	148	RRH2x40-AWS (Verizon)	115
AIR32 (T-Mobile - Existing)	148	RRH2x40-AWS (Verizon)	115
AIR21 B2A/B4P (T-Mobile - Existing)	148	RRH2x40-AWS (Verizon)	115
APXVAARR24-43 (T-Mobile - Proposed)	148	DB-T1-6Z-8AB-0Z (Verizon)	115
AIR32 (T-Mobile - Existing)	148	EEI 14-ft Low Profile Platform (Verizon)	115
KRY 112 TMA (T-Mobile - Existing)	148	GPS	45
KRY 112 TMA (T-Mobile - Existing)	148		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 64.2%

Centek Engineering Inc.

63-2 North Branford Rd.

Branford, CT 06405

Phone: (203) 488-0580

FAX: (203) 488-8587

Job: 18058.87 - CT11720A

Project: 180' Monopole - 26 South Orange Center Road, Orange, CT

Client: T-Mobile

Code: TIA-222-G

Path: J:\Jobs\18058.87\18058.87-CT11720A\05_Structure\Tower Analysis\Backup Documents\in\ER Files\180' Monopole - Orange, CT.dwg

Drawn by: T.JL

Date: 10/01/18

Dwg No. E-1

App'd:

Scale: NTS

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Tower Input Data

There is a pole section.

This tower is designed using the TIA-222-G standard.

The following design criteria apply:

Basic wind speed of 97 mph.

Structure Class II.

Exposure Category C.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

A wind speed of 50 mph is used in combination with ice.

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

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

Pressures are calculated at each section.

Stress ratio used in pole design is 1.

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

Options

Consider Moments - Legs	Distribute Leg Loads As Uniform	Use ASCE 10 X-Brace Ly Rules
Consider Moments - Horizontals	Assume Legs Pinned	Calculate Redundant Bracing Forces
Consider Moments - Diagonals	√ Assume Rigid Index Plate	Ignore Redundant Members in FEA
Use Moment Magnification	Use Clear Spans For Wind Area	SR Leg Bolts Resist Compression
√ Use Code Stress Ratios	Use Clear Spans For KL/r	All Leg Panels Have Same Allowable
√ Use Code Safety Factors - Guys	Retension Guys To Initial Tension	Offset Girt At Foundation
Escalate Ice	√ Bypass Mast Stability Checks	Consider Feed Line Torque
Always Use Max Kz	Use Azimuth Dish Coefficients	Include Angle Block Shear Check
Use Special Wind Profile	√ Project Wind Area of Appurt.	Use TIA-222-G Bracing Resist. Exemption
Include Bolts In Member Capacity	Autocalc Torque Arm Areas	Use TIA-222-G Tension Splice Exemption
Leg Bolts Are At Top Of Section	Add IBC .6D+W Combination	Poles
Secondary Horizontal Braces Leg	√ Sort Capacity Reports By Component	√ Include Shear-Torsion Interaction
Use Diamond Inner Bracing (4 Sided)	Triangulate Diamond Inner Bracing	Always Use Sub-Critical Flow
SR Members Have Cut Ends	Treat Feed Line Bundles As Cylinder	Use Top Mounted Sockets
SR Members Are Concentric		

Tapered Pole Section Geometry

Section	Elevation	Section Length	Splice Length	Number of Sides	Top Diameter	Bottom Diameter	Wall Thickness	Bend Radius	Pole Grade
	ft	ft	ft		in	in	in	in	
L1	180.00-170.58	9.42	3.42	18	24.0000	26.2500	0.1875	0.7500	A572-65 (65 ksi)
L2	170.58-126.00	48.00	4.75	18	25.0581	36.5250	0.2500	1.0000	A572-65 (65 ksi)
L3	126.00-82.75	48.00	6.00	18	34.8903	46.3570	0.3125	1.2500	A572-65

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	Client T-Mobile	Designed by TJL

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L4	82.75-40.75	48.00	7.25	18	44.2987	55.7650	0.3750	1.5000	(65 ksi) A572-65
L5	40.75-0.00	48.00		18	53.2831	64.7500	0.4375	1.7500	(65 ksi) A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	24.3702	14.1714	1015.2211	8.4534	12.1920	83.2694	2031.7780	7.0871	3.8940	20.768
L2	26.6549	15.5104	1331.0484	9.2522	13.3350	99.8162	2663.8483	7.7567	4.2900	22.88
	26.2743	19.6852	1530.6151	8.8069	12.7295	120.2413	3063.2442	9.8445	3.9702	15.881
	37.0885	28.7842	4785.2722	12.8776	18.5547	257.9008	9576.8409	14.3948	5.9884	23.954
L3	36.5807	34.2968	5180.6570	12.2751	17.7243	292.2920	10368.1308	17.1517	5.5907	17.89
	47.0721	45.6704	12232.8508	16.3458	23.5494	519.4559	24481.7979	22.8395	7.6088	24.348
L4	46.4374	52.2801	12742.9834	15.5929	22.5037	566.2613	25502.7344	26.1450	7.1366	19.031
	56.6253	65.9279	25554.6382	19.6635	28.3286	902.0785	51142.9018	32.9702	9.1546	24.412
L5	55.8638	73.3827	25891.0128	18.7602	27.0678	956.5239	51816.0937	36.6983	8.6078	19.675
	65.7489	89.3059	46666.8628	22.8309	32.8930	1418.7475	93395.1311	44.6615	10.6260	24.288

Tower Elevation	Gusset Area (per face)	Gusset Thickness	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
ft	ft ²	in							
L1				1	1	1			
180.00-170.58									
L2				1	1	1			
170.58-126.00									
L3				1	1	1			
126.00-82.75									
L4 82.75-40.75				1	1	1			
L5 40.75-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (Verizon)	C	Surface Ar (CaAa)	115.00 - 0.00	6	6	0.000 0.000	1.9800		1.04

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number	$C_A A_A$	Weight plf
1 5/8	C	No	Inside Pole	177.00 - 3.00	12	No Ice	0.00

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	Client T-Mobile	Designed by T.JL

Description	Face or Leg	Allow Shield	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
(AT&T)						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
RG6-Fiber (AT&T)	C	No	Inside Pole	177.00 - 3.00	3	No Ice	0.00	1.00
						1/2" Ice	0.00	1.00
						1" Ice	0.00	1.00
#8 AWG Copper Wire (AT&T)	C	No	Inside Pole	177.00 - 3.00	6	No Ice	0.00	0.05
						1/2" Ice	0.00	0.05
						1" Ice	0.00	0.05
1 5/8 (T-Mobile)	C	No	Inside Pole	102.00 - 3.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
HYBRIFLEX 1-5/8" (T-Mobile)	C	No	Inside Pole	102.00 - 3.00	1	No Ice	0.00	1.90
						1/2" Ice	0.00	1.90
						1" Ice	0.00	1.90
HYBRIFLEX 1-5/8" (T-Mobile - Proposed)	C	No	Inside Pole	102.00 - 3.00	1	No Ice	0.00	1.90
						1/2" Ice	0.00	1.90
						1" Ice	0.00	1.90
HYBRIFLEX 1-1/4" (Sprint)	C	No	Inside Pole	131.00 - 0.00	4	No Ice	0.00	1.30
						1/2" Ice	0.00	1.30
						1" Ice	0.00	1.30
1 5/8 (Verizon)	C	No	Inside Pole	115.00 - 0.00	12	No Ice	0.00	1.04
						1/2" Ice	0.00	1.04
						1" Ice	0.00	1.04
HYBRIFLEX 1-5/8" (Verizon)	C	No	Inside Pole	115.00 - 0.00	1	No Ice	0.00	1.90
						1/2" Ice	0.00	1.90
						1" Ice	0.00	1.90
1/2	C	No	Inside Pole	44.00 - 0.00	1	No Ice	0.00	0.25
						1/2" Ice	0.00	0.25
						1" Ice	0.00	0.25

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	180.00-170.58	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.10
L2	170.58-126.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.73
L3	126.00-82.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	38.313	0.000	1.89
L4	82.75-40.75	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	49.896	0.000	2.43
L5	40.75-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	48.411	0.000	2.27

Feed Line/Linear Appurtenances Section Areas - With Ice

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Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	180.00-170.58	A	1.773	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.10
L2	170.58-126.00	A	1.742	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.73
L3	126.00-82.75	A	1.682	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	61.936	0.000	2.63
L4	82.75-40.75	A	1.596	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	80.031	0.000	3.36
L5	40.75-0.00	A	1.431	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	76.775	0.000	3.12

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
L2	10	1 5/8	126.00 - 115.00	1.0000	1.0000
L3	10	1 5/8	82.75 - 115.00	1.0000	1.0000
L4	10	1 5/8	40.75 - 82.75	1.0000	1.0000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft	C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
4-ft Lightning Rod (Town - Existing)	A	From Face	4.00 0.00 0.00	0.0000	182.00	No Ice 1/2" Ice 1" Ice	0.40 0.81 1.06	0.01 0.01 0.02
7770.00 (AT&T)	A	From Face	3.50 -6.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	5.51 5.87 6.23	0.04 0.07 0.11
OPA-65R-LCUU-H4 (AT&T)	A	From Face	3.50 -2.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	5.94 6.28 6.62	0.06 0.10 0.14
SBNHH-1D65A (AT&T)	A	From Face	3.50 2.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	5.88 6.25 6.62	0.04 0.08 0.12
80010964 (AT&T)	A	From Face	3.50 -6.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	10.00 10.42 10.86	0.10 0.15 0.22

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Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
7770.00 (AT&T)	B	From Face	3.50 -6.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	5.51 5.87 6.23	2.93 3.27 3.63	0.04 0.07 0.11
OPA-65R-LCUU-H4 (AT&T)	B	From Face	3.50 -2.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	5.94 6.28 6.62	3.36 3.66 3.97	0.06 0.10 0.14
SBNHH-1D65A (AT&T)	B	From Face	3.50 2.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	5.88 6.25 6.62	3.86 4.22 4.57	0.04 0.08 0.12
80010964 (AT&T)	B	From Face	3.50 -6.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	10.00 10.42 10.86	4.10 4.48 4.87	0.10 0.15 0.22
7770.00 (AT&T)	C	From Face	3.50 -6.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	5.51 5.87 6.23	2.93 3.27 3.63	0.04 0.07 0.11
OPA-65R-LCUU-H4 (AT&T)	C	From Face	3.50 -2.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	5.94 6.28 6.62	3.36 3.66 3.97	0.06 0.10 0.14
SBNHH-1D65A (AT&T)	C	From Face	3.50 2.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	5.88 6.25 6.62	3.86 4.22 4.57	0.04 0.08 0.12
80010964 (AT&T)	C	From Face	3.50 -6.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	10.00 10.42 10.86	4.10 4.48 4.87	0.10 0.15 0.22
(2) TPX-070821 (AT&T)	A	From Face	3.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	0.47 0.56 0.66	0.10 0.15 0.20	0.01 0.01 0.02
(2) TPX-070821 (AT&T)	B	From Face	3.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	0.47 0.56 0.66	0.10 0.15 0.20	0.01 0.01 0.02
(2) TPX-070821 (AT&T)	C	From Face	3.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	0.47 0.56 0.66	0.10 0.15 0.20	0.01 0.01 0.02
(2) LGP21401 TMA (AT&T)	A	From Face	3.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	0.82 0.94 1.06	0.35 0.44 0.54	0.02 0.02 0.03
(2) LGP21401 TMA (AT&T)	B	From Face	3.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	0.82 0.94 1.06	0.35 0.44 0.54	0.02 0.02 0.03
(2) LGP21401 TMA (AT&T)	C	From Face	3.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	0.82 0.94 1.06	0.35 0.44 0.54	0.02 0.02 0.03
(3) RRUS-32 (AT&T)	A	From Face	3.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	3.31 3.56 3.81	2.42 2.64 2.86	0.08 0.10 0.14
(3) RRUS-32 (AT&T)	B	From Face	3.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	3.31 3.56 3.81	2.42 2.64 2.86	0.08 0.10 0.14
(3) RRUS-32 (AT&T)	C	From Face	3.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	3.31 3.56 3.81	2.42 2.64 2.86	0.08 0.10 0.14
B14 4478 (AT&T)	A	From Face	3.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	1.63 1.79 1.95	0.91 1.03 1.17	0.06 0.07 0.09
B14 4478 (AT&T)	B	From Face	3.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	1.63 1.79 1.95	0.91 1.03 1.17	0.06 0.07 0.09

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	Project 180' Monopole - 26 South Orange Center Road, Orange, CT Client T-Mobile	Date 16:38:46 10/01/18 Designed by TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
B14 4478 (AT&T)	C	From Face	3.00 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	1.63 1.79 1.95	0.91 1.03 1.17	0.06 0.07 0.09
(2) RRUS-11 (AT&T)	A	From Face	0.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	2.57 2.76 2.97	1.07 1.21 1.36	0.05 0.07 0.09
(2) RRUS-11 (AT&T)	B	From Face	0.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	2.57 2.76 2.97	1.07 1.21 1.36	0.05 0.07 0.09
(2) RRUS-11 (AT&T)	C	From Face	0.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	2.57 2.76 2.97	1.07 1.21 1.36	0.05 0.07 0.09
DC6-48-60-18-8F Surge Arrestor (AT&T)	A	From Face	0.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	1.91 2.10 2.29	1.91 2.10 2.29	0.02 0.04 0.06
DC6-48-60-18-8F Surge Arrestor (AT&T)	B	From Face	0.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	1.91 2.10 2.29	1.91 2.10 2.29	0.02 0.04 0.06
DC6-48-60-18-8F Surge Arrestor (AT&T)	C	From Face	0.50 0.00 0.00	0.0000	177.00	No Ice 1/2" Ice 1" Ice	1.91 2.10 2.29	1.91 2.10 2.29	0.02 0.04 0.06
EEI 14-ft Low Profile Platform (AT&T)	C	None		0.0000	177.00	No Ice 1/2" Ice 1" Ice	16.50 20.00 23.50	16.50 20.00 23.50	1.55 1.80 2.05
AIR21 B2A/B4P (T-Mobile - Existing)	A	From Face	3.50 -6.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	6.05 6.42 6.80	4.36 4.70 5.06	0.08 0.12 0.17
APXVAARR24-43 (T-Mobile - Proposed)	A	From Face	3.50 -2.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	20.24 20.89 21.54	8.89 9.49 10.09	0.16 0.27 0.39
AIR32 (T-Mobile - Existing)	A	From Face	3.50 6.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	6.51 6.89 7.27	4.71 5.07 5.43	0.13 0.18 0.23
AIR21 B2A/B4P (T-Mobile - Existing)	B	From Face	3.50 -6.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	6.05 6.42 6.80	4.36 4.70 5.06	0.08 0.12 0.17
APXVAARR24-43 (T-Mobile - Proposed)	B	From Face	3.50 -2.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	20.24 20.89 21.54	8.89 9.49 10.09	0.16 0.27 0.39
AIR32 (T-Mobile - Existing)	B	From Face	3.50 6.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	6.51 6.89 7.27	4.71 5.07 5.43	0.13 0.18 0.23
AIR21 B2A/B4P (T-Mobile - Existing)	C	From Face	3.50 -6.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	6.05 6.42 6.80	4.36 4.70 5.06	0.08 0.12 0.17
APXVAARR24-43 (T-Mobile - Proposed)	C	From Face	3.50 -2.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	20.24 20.89 21.54	8.89 9.49 10.09	0.16 0.27 0.39
AIR32 (T-Mobile - Existing)	C	From Face	3.50 6.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	6.51 6.89 7.27	4.71 5.07 5.43	0.13 0.18 0.23
KRY 112 TMA (T-Mobile - Existing)	A	From Face	3.50 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	0.78 0.90 1.03	0.49 0.59 0.70	0.03 0.03 0.04
KRY 112 TMA (T-Mobile - Existing)	B	From Face	3.50 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	0.78 0.90 1.03	0.49 0.59 0.70	0.03 0.03 0.04

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	Project 180' Monopole - 26 South Orange Center Road, Orange, CT	Date 16:38:46 10/01/18
	Client T-Mobile	Designed by TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K
KRY 112 TMA (T-Mobile - Existing)	C	From Face	3.50 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	0.78 0.90 1.03	0.49 0.59 0.70	0.03 0.03 0.04
Radio 4449 B71 B12 (T-Mobile - Proposed)	A	From Face	3.50 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.29 1.44 1.59	0.07 0.09 0.11
Radio 4449 B71 B12 (T-Mobile - Proposed)	B	From Face	3.50 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.29 1.44 1.59	0.07 0.09 0.11
Radio 4449 B71 B12 (T-Mobile - Proposed)	C	From Face	3.50 0.00 0.00	0.0000	148.00	No Ice 1/2" Ice 1" Ice	1.64 1.80 1.97	1.29 1.44 1.59	0.07 0.09 0.11
13' Platform w/rails (T-Mobile - Existing)	C	None		0.0000	148.00	No Ice 1/2" Ice 1" Ice	31.30 40.20 49.10	31.30 40.20 49.10	1.82 2.45 3.08
APXVSP18-C-A20 (Sprint)	A	From Face	3.00 -3.00 0.00	0.0000	131.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	5.28 5.74 6.20	0.06 0.11 0.16
APXVTM14 (Sprint)	A	From Face	3.00 3.00 0.00	0.0000	131.00	No Ice 1/2" Ice 1" Ice	6.34 6.72 7.10	3.61 3.97 4.33	0.06 0.10 0.14
APXVSP18-C-A20 (Sprint)	B	From Face	3.00 -3.00 0.00	0.0000	131.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	5.28 5.74 6.20	0.06 0.11 0.16
APXVTM14 (Sprint)	B	From Face	3.00 3.00 0.00	0.0000	131.00	No Ice 1/2" Ice 1" Ice	6.34 6.72 7.10	3.61 3.97 4.33	0.06 0.10 0.14
APXVSP18-C-A20 (Sprint)	C	From Face	3.00 -3.00 0.00	0.0000	131.00	No Ice 1/2" Ice 1" Ice	8.02 8.48 8.94	5.28 5.74 6.20	0.06 0.11 0.16
APXVTM14 (Sprint)	C	From Face	3.00 3.00 0.00	0.0000	131.00	No Ice 1/2" Ice 1" Ice	6.34 6.72 7.10	3.61 3.97 4.33	0.06 0.10 0.14
TD-RRH8x20-25 (Sprint)	A	From Face	0.50 0.00 0.00	0.0000	131.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25 (Sprint)	B	From Face	0.50 0.00 0.00	0.0000	131.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
TD-RRH8x20-25 (Sprint)	C	From Face	0.50 0.00 0.00	0.0000	131.00	No Ice 1/2" Ice 1" Ice	4.05 4.30 4.56	1.53 1.71 1.90	0.07 0.10 0.13
FD-RRH 4x45 1900 (Sprint)	A	From Face	0.50 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	2.32 2.52 2.74	2.38 2.59 2.80	0.06 0.08 0.11
FD-RRH 4x45 1900 (Sprint)	B	From Face	0.50 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	2.32 2.52 2.74	2.38 2.59 2.80	0.06 0.08 0.11
FD-RRH 4x45 1900 (Sprint)	C	From Face	0.50 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	2.32 2.52 2.74	2.38 2.59 2.80	0.06 0.08 0.11
FD-RRH 2x50 800 (Sprint)	A	From Face	0.50 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.93 2.11 2.29	0.06 0.09 0.11
FD-RRH 2x50 800 (Sprint)	B	From Face	0.50 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.93 2.11 2.29	0.06 0.09 0.11

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	Project 180' Monopole - 26 South Orange Center Road, Orange, CT	Date 16:38:46 10/01/18
	Client T-Mobile	Designed by TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
FD-RRH 2x50 800 (Sprint)	C	From Face	0.50 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	2.06 2.24 2.43	1.93 2.11 2.29	0.06 0.09 0.11
Notch Filter (Sprint)	A	From Face	0.50 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	0.74 0.85 0.97	0.32 0.40 0.48	0.01 0.02 0.02
Notch Filter (Sprint)	B	From Face	0.50 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	0.74 0.85 0.97	0.32 0.40 0.48	0.01 0.02 0.02
Notch Filter (Sprint)	C	From Face	0.50 0.00 0.00	0.0000	134.00	No Ice 1/2" Ice 1" Ice	0.74 0.85 0.97	0.32 0.40 0.48	0.01 0.02 0.02
13' Platform w/rails (Sprint)	C	None		0.0000	131.00	No Ice 1/2" Ice 1" Ice	31.30 40.20 49.10	31.30 40.20 49.10	1.82 2.45 3.08
BXA-70063/4CF (Verizon)	A	From Face	3.50 -6.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.71 5.03 5.35	2.44 2.74 3.05	0.01 0.04 0.07
BXA-171063-12BF (Verizon)	A	From Face	3.50 2.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.73 5.18 5.63	3.57 4.01 4.45	0.02 0.04 0.07
SLCP 2x6015 (Verizon)	A	From Face	3.50 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	9.98 10.48 10.98	8.23 8.71 9.20	0.03 0.10 0.18
BXA-171063-12BF (Verizon)	A	From Face	3.50 -4.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.73 5.18 5.63	3.57 4.01 4.45	0.02 0.04 0.07
BXA-70063/4CF (Verizon)	B	From Face	3.50 -6.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.71 5.03 5.35	2.44 2.74 3.05	0.01 0.04 0.07
BXA-171063-12BF (Verizon)	B	From Face	3.50 2.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.73 5.18 5.63	3.57 4.01 4.45	0.02 0.04 0.07
SLCP 2x6015 (Verizon)	B	From Face	3.50 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	9.98 10.48 10.98	8.23 8.71 9.20	0.03 0.10 0.18
BXA-171063-12BF (Verizon)	B	From Face	3.50 -4.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.73 5.18 5.63	3.57 4.01 4.45	0.02 0.04 0.07
BXA-70063/4CF (Verizon)	C	From Face	3.50 -6.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.71 5.03 5.35	2.44 2.74 3.05	0.01 0.04 0.07
BXA-171063-12BF (Verizon)	C	From Face	3.50 2.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.73 5.18 5.63	3.57 4.01 4.45	0.02 0.04 0.07
SLCP 2x6015 (Verizon)	C	From Face	3.50 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	9.98 10.48 10.98	8.23 8.71 9.20	0.03 0.10 0.18
BXA-171063-12BF (Verizon)	C	From Face	3.50 -4.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.73 5.18 5.63	3.57 4.01 4.45	0.02 0.04 0.07
RRH2x40-AWS (Verizon)	A	From Face	2.50 -2.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08
RRH2x40-AWS (Verizon)	B	From Face	2.50 -2.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08

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	Project	180' Monopole - 26 South Orange Center Road, Orange, CT	Date	16:38:46 10/01/18
	Client	T-Mobile	Designed by	TJL

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C _A A _A Front ft ²	C _A A _A Side ft ²	Weight K
RRH2x40-AWS (Verizon)	C	From Face	2.50 -2.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	2.16 2.36 2.57	1.42 1.59 1.77	0.04 0.06 0.08
DB-T1-6Z-8AB-0Z (Verizon)	A	From Face	0.50 0.00 0.00	0.0000	115.00	No Ice 1/2" Ice 1" Ice	4.80 5.07 5.35	2.00 2.19 2.39	0.04 0.08 0.12
EEI 14-ft Low Profile Platform (Verizon)	C	None		0.0000	115.00	No Ice 1/2" Ice 1" Ice	16.50 20.00 23.50	16.50 20.00 23.50	1.55 1.80 2.05
GPS	A	From Face	1.00 0.00 0.00	0.0000	45.00	No Ice 1/2" Ice 1" Ice	1.00 1.50 2.00	1.00 1.50 2.00	0.01 0.01 0.02

Tower Pressures - No Ice

$$G_H = 1.100$$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 180.00-170.58	175.22	1.424	33	20.027	A	0.000	20.027	20.027	100.00	0.000	0.000
					B	0.000	20.027		100.00	0.000	0.000
					C	0.000	20.027		100.00	0.000	0.000
L2 170.58-126.00	147.20	1.373	31	117.696	A	0.000	117.696	117.696	100.00	0.000	0.000
					B	0.000	117.696		100.00	0.000	0.000
					C	0.000	117.696		100.00	0.000	0.000
L3 126.00-82.75	103.71	1.275	29	150.749	A	0.000	150.749	150.749	100.00	0.000	0.000
					B	0.000	150.749		100.00	0.000	0.000
					C	0.000	150.749		100.00	38.313	0.000
L4 82.75-40.75	61.44	1.142	26	180.360	A	0.000	180.360	180.360	100.00	0.000	0.000
					B	0.000	180.360		100.00	0.000	0.000
					C	0.000	180.360		100.00	49.896	0.000
L5 40.75-0.00	20.57	0.907	21	206.488	A	0.000	206.488	206.488	100.00	0.000	0.000
					B	0.000	206.488		100.00	0.000	0.000
					C	0.000	206.488		100.00	48.411	0.000

Tower Pressure - With Ice

$$G_H = 1.100$$

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 180.00-170.58	175.22	1.424	9	1.7725	22.810	A	0.000	22.810	22.810	100.00	0.000	0.000
						B	0.000	22.810		100.00	0.000	0.000

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	Client	T-Mobile	Designed by	TJL

Section Elevation ft	z ft	K _Z	q _z psf	t _z in	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L2 170.58-126.00	147.20	1.373	8	1.7419	130.866	C	0.000	22.810		100.00	0.000	0.000
						A	0.000	130.866	130.866	100.00	0.000	0.000
						B	0.000	130.866		100.00	0.000	0.000
						C	0.000	130.866		100.00	0.000	0.000
L3 126.00-82.75	103.71	1.275	8	1.6820	163.306	A	0.000	163.306	163.306	100.00	0.000	0.000
						B	0.000	163.306		100.00	0.000	0.000
						C	0.000	163.306		100.00	61.936	0.000
L4 82.75-40.75	61.44	1.142	7	1.5962	192.134	A	0.000	192.134	192.134	100.00	0.000	0.000
						B	0.000	192.134		100.00	0.000	0.000
						C	0.000	192.134		100.00	80.031	0.000
L5 40.75-0.00	20.57	0.907	6	1.4308	217.329	A	0.000	217.329	217.329	100.00	0.000	0.000
						B	0.000	217.329		100.00	0.000	0.000
						C	0.000	217.329		100.00	76.775	0.000

Tower Pressure - Service

$$G_H = 1.100$$

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e	A _F ft ²	A _R ft ²	A _{leg} ft ²	Leg %	C _A A _A In Face ft ²	C _A A _A Out Face ft ²
L1 180.00-170.58	175.22	1.424	11	20.027	A	0.000	20.027	20.027	100.00	0.000	0.000
					B	0.000	20.027		100.00	0.000	0.000
					C	0.000	20.027		100.00	0.000	0.000
L2 170.58-126.00	147.20	1.373	11	117.696	A	0.000	117.696	117.696	100.00	0.000	0.000
					B	0.000	117.696		100.00	0.000	0.000
					C	0.000	117.696		100.00	0.000	0.000
L3 126.00-82.75	103.71	1.275	10	150.749	A	0.000	150.749	150.749	100.00	0.000	0.000
					B	0.000	150.749		100.00	0.000	0.000
					C	0.000	150.749		100.00	38.313	0.000
L4 82.75-40.75	61.44	1.142	9	180.360	A	0.000	180.360	180.360	100.00	0.000	0.000
					B	0.000	180.360		100.00	0.000	0.000
					C	0.000	180.360		100.00	49.896	0.000
L5 40.75-0.00	20.57	0.907	7	206.488	A	0.000	206.488	206.488	100.00	0.000	0.000
					B	0.000	206.488		100.00	0.000	0.000
					C	0.000	206.488		100.00	48.411	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 180.00-170.58	0.10	0.48	A	1	0.65	33	1	1	20.027	0.47	49.54	C
			B	1	0.65		1	1	20.027			
			C	1	0.65		1	1	20.027			
L2 170.58-126.00	0.73	3.96	A	1	0.65	31	1	1	117.696	2.64	59.26	C
			B	1	0.65		1	1	117.696			
			C	1	0.65		1	1	117.696			
L3 126.00-82.75	1.89	6.53	A	1	0.65	29	1	1	150.749	3.14	72.63	C
			B	1	0.65		1	1	150.749			

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	Client T-Mobile	Designed by TJJL

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
ft	K	K										
L4 82.75-40.75	2.43	9.65	C	1	0.65		1	1	150.749			
			A	1	0.65	26	1	1	180.360	3.36	79.95	C
			B	1	0.65		1	1	180.360			
			C	1	0.65		1	1	180.360			
L5 40.75-0.00	2.27	13.29	A	1	0.65	21	1	1	206.488	3.09	75.84	C
			B	1	0.65		1	1	206.488			
			C	1	0.65		1	1	206.488			
Sum Weight:	7.42	33.90						OTM	1066.31 kip-ft	12.70		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
ft	K	K										
L1 180.00-170.58	0.10	0.48	A	1	0.65	33	1	1	20.027	0.47	49.54	C
			B	1	0.65		1	1	20.027			
			C	1	0.65		1	1	20.027			
L2 170.58-126.00	0.73	3.96	A	1	0.65	31	1	1	117.696	2.64	59.26	C
			B	1	0.65		1	1	117.696			
			C	1	0.65		1	1	117.696			
L3 126.00-82.75	1.89	6.53	A	1	0.65	29	1	1	150.749	3.80	87.76	B
			B	1	0.785		1	1	150.749			
			C	1	0.65		1	1	150.749			
L4 82.75-40.75	2.43	9.65	A	1	0.65	26	1	1	180.360	4.21	100.20	B
			B	1	0.815		1	1	180.360			
			C	1	0.65		1	1	180.360			
L5 40.75-0.00	2.27	13.29	A	1	0.65	21	1	1	206.488	3.61	88.65	B
			B	1	0.76		1	1	206.488			
			C	1	0.65		1	1	206.488			
Sum Weight:	7.42	33.90						OTM	1197.16 kip-ft	14.73		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
ft	K	K										
L1 180.00-170.58	0.10	0.48	A	1	0.65	33	1	1	20.027	0.47	49.54	C
			B	1	0.65		1	1	20.027			
			C	1	0.65		1	1	20.027			
L2 170.58-126.00	0.73	3.96	A	1	0.65	31	1	1	117.696	2.64	59.26	C
			B	1	0.65		1	1	117.696			
			C	1	0.65		1	1	117.696			
L3 126.00-82.75	1.89	6.53	A	1	0.65	29	1	1	150.749	3.14	72.63	C
			B	1	0.65		1	1	150.749			
			C	1	0.65		1	1	150.749			

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Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L4 82.75-40.75	2.43	9.65	A	1	0.65	26	1	1	180.360	3.36	79.95	C
L5 40.75-0.00	2.27	13.29	B	1	0.65	21	1	1	180.360	3.09	75.84	C
			C	1	0.65		1	1	180.360			
			A	1	0.65		1	1	206.488			
			B	1	0.65		1	1	206.488			
Sum Weight:	7.42	33.90	C	1	0.65		1	1	206.488	12.70		
								OTM	1066.31 kip-ft			

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 180.00-170.58	0.10	0.48	A	1	0.65	33	1	1	20.027	0.47	49.54	C
L2 170.58-126.00	0.73	3.96	B	1	0.65	31	1	1	20.027	2.64	59.26	C
			C	1	0.65		1	1	20.027			
			A	1	0.65		1	1	117.696			
			B	1	0.65		1	1	117.696			
L3 126.00-82.75	1.89	6.53	C	1	0.65	29	1	1	117.696	3.80	87.76	C
			A	1	0.65		1	1	150.749			
			B	1	0.65		1	1	150.749			
			C	1	0.785		1	1	150.749			
L4 82.75-40.75	2.43	9.65	A	1	0.65	26	1	1	180.360	4.21	100.20	C
			B	1	0.65		1	1	180.360			
			C	1	0.815		1	1	180.360			
			A	1	0.65		1	1	206.488			
L5 40.75-0.00	2.27	13.29	B	1	0.65	21	1	1	206.488	3.61	88.65	C
			C	1	0.65		1	1	206.488			
			A	1	0.76		1	1	206.488			
								OTM	1197.16 kip-ft			
Sum Weight:	7.42	33.90								14.73		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 180.00-170.58	0.10	1.03	A	1	1.2	9	1	1	22.810	0.26	27.68	C
L2 170.58-126.00	0.73	7.12	B	1	1.2	8	1	1	22.810	1.44	32.32	C
			C	1	1.2		1	1	22.810			
			A	1	1.2		1	1	130.866			
			B	1	1.2		1	1	130.866			
L3 126.00-82.75	2.63	10.38	C	1	1.2	8	1	1	130.866	1.67	38.59	C
			A	1	1.2		1	1	163.306			
			B	1	1.2		1	1	163.306			
			C	1	1.2		1	1	163.306			
L4	3.36	13.99	A	1	1.2	7	1	1	192.134	1.75	41.78	C

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Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
82.75-40.75			B	1	1.2		1	1	192.134			
			C	1	1.2		1	1	192.134			
L5 40.75-0.00	3.12	17.70	A	1	1.2	6	1	1	217.329	1.60	39.16	C
			B	1	1.2		1	1	217.329			
			C	1	1.2		1	1	217.329			
Sum Weight:	9.94	50.21						OTM	571.53 kip-ft	6.72		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1	0.10	1.03	A	1	1.2	9	1	1	22.810	0.26	27.68	C
180.00-170.58			B	1	1.2		1	1	22.810			
			C	1	1.2		1	1	22.810			
L2	0.73	7.12	A	1	1.2	8	1	1	130.866	1.44	32.32	C
170.58-126.00			B	1	1.2		1	1	130.866			
			C	1	1.2		1	1	130.866			
L3	2.63	10.38	A	1	1.2	8	1	1	163.306	2.28	52.78	B
126.00-82.75			B	1	1.2		1	1	163.306			
			C	1	1.2		1	1	163.306			
L4	3.36	13.99	A	1	1.2	7	1	1	192.134	2.46	58.50	B
82.75-40.75			B	1	1.2		1	1	192.134			
			C	1	1.2		1	1	192.134			
L5 40.75-0.00	3.12	17.70	A	1	1.2	6	1	1	217.329	2.13	52.28	B
			B	1	1.2		1	1	217.329			
			C	1	1.2		1	1	217.329			
Sum Weight:	9.94	50.21						OTM	689.30 kip-ft	8.57		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1	0.10	1.03	A	1	1.2	9	1	1	22.810	0.26	27.68	C
180.00-170.58			B	1	1.2		1	1	22.810			
			C	1	1.2		1	1	22.810			
L2	0.73	7.12	A	1	1.2	8	1	1	130.866	1.44	32.32	C
170.58-126.00			B	1	1.2		1	1	130.866			
			C	1	1.2		1	1	130.866			
L3	2.63	10.38	A	1	1.2	8	1	1	163.306	1.67	38.59	C
126.00-82.75			B	1	1.2		1	1	163.306			
			C	1	1.2		1	1	163.306			
L4	3.36	13.99	A	1	1.2	7	1	1	192.134	1.75	41.78	C
82.75-40.75			B	1	1.2		1	1	192.134			

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	Client	T-Mobile	Designed by	TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L5 40.75-0.00	3.12	17.70	C	1	1.2	6	1	1	192.134	1.60	39.16	C
			A	1	1.2		1	1	217.329			
			B	1	1.2		1	1	217.329			
			C	1	1.2		1	1	217.329			
Sum Weight:	9.94	50.21						OTM	571.53 kip-ft	6.72		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 180.00-170.58	0.10	1.03	A	1	1.2	9	1	1	22.810	0.26	27.68	C
			B	1	1.2		1	1	22.810			
			C	1	1.2		1	1	22.810			
L2 170.58-126.00	0.73	7.12	A	1	1.2	8	1	1	130.866	1.44	32.32	C
			B	1	1.2		1	1	130.866			
			C	1	1.2		1	1	130.866			
L3 126.00-82.75	2.63	10.38	A	1	1.2	8	1	1	163.306	2.28	52.78	C
			B	1	1.2		1	1	163.306			
			C	1	1.2		1	1	163.306			
L4 82.75-40.75	3.36	13.99	A	1	1.2	7	1	1	192.134	2.46	58.50	C
			B	1	1.2		1	1	192.134			
			C	1	1.2		1	1	192.134			
L5 40.75-0.00	3.12	17.70	A	1	1.2	6	1	1	217.329	2.13	52.28	C
			B	1	1.2		1	1	217.329			
			C	1	1.2		1	1	217.329			
Sum Weight:	9.94	50.21						OTM	689.30 kip-ft	8.57		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 180.00-170.58	0.10	0.48	A	1	0.65	11	1	1	20.027	0.16	16.96	C
			B	1	0.65		1	1	20.027			
			C	1	0.65		1	1	20.027			
L2 170.58-126.00	0.73	3.96	A	1	0.65	11	1	1	117.696	0.90	20.29	C
			B	1	0.65		1	1	117.696			
			C	1	0.65		1	1	117.696			
L3 126.00-82.75	1.89	6.53	A	1	0.65	10	1	1	150.749	1.08	24.86	C
			B	1	0.65		1	1	150.749			
			C	1	0.65		1	1	150.749			
L4 82.75-40.75	2.43	9.65	A	1	0.65	9	1	1	180.360	1.15	27.37	C
			B	1	0.65		1	1	180.360			
			C	1	0.65		1	1	180.360			

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L5 40.75-0.00	2.27	13.29	A	1	0.65	7	1	1	206.488	1.06	25.96	C
			B	1	0.65		1	1	206.488			
			C	1	0.65		1	1	206.488			
Sum Weight:	7.42	33.90						OTM	365.04 kip-ft	4.35		

Tower Forces - Service - Wind 45 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.10	0.48	A	1	0.65	11	1	1	20.027	0.16	16.96	C
180.00-170.58			B	1	0.65		1	1	20.027			
			C	1	0.65		1	1	20.027			
L2	0.73	3.96	A	1	0.65	11	1	1	117.696	0.90	20.29	C
170.58-126.00			B	1	0.65		1	1	117.696			
			C	1	0.65		1	1	117.696			
L3	1.89	6.53	A	1	0.65	10	1	1	150.749	1.30	30.04	B
126.00-82.75			B	1	0.785		1	1	150.749			
			C	1	0.65		1	1	150.749			
L4	2.43	9.65	A	1	0.65	9	1	1	180.360	1.44	34.30	B
82.75-40.75			B	1	0.815		1	1	180.360			
			C	1	0.65		1	1	180.360			
L5 40.75-0.00	2.27	13.29	A	1	0.65	7	1	1	206.488	1.24	30.35	B
			B	1	0.76		1	1	206.488			
			C	1	0.65		1	1	206.488			
Sum Weight:	7.42	33.90						OTM	409.83 kip-ft	5.04		

Tower Forces - Service - Wind 60 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1	0.10	0.48	A	1	0.65	11	1	1	20.027	0.16	16.96	C
180.00-170.58			B	1	0.65		1	1	20.027			
			C	1	0.65		1	1	20.027			
L2	0.73	3.96	A	1	0.65	11	1	1	117.696	0.90	20.29	C
170.58-126.00			B	1	0.65		1	1	117.696			
			C	1	0.65		1	1	117.696			
L3	1.89	6.53	A	1	0.65	10	1	1	150.749	1.08	24.86	C
126.00-82.75			B	1	0.65		1	1	150.749			
			C	1	0.65		1	1	150.749			
L4	2.43	9.65	A	1	0.65	9	1	1	180.360	1.15	27.37	C
82.75-40.75			B	1	0.65		1	1	180.360			
			C	1	0.65		1	1	180.360			
L5 40.75-0.00	2.27	13.29	A	1	0.65	7	1	1	206.488	1.06	25.96	C

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Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
Sum Weight:	7.42	33.90	B C	1 1	0.65 0.65		1 1	1 1 OTM	206.488 206.488 365.04 kip-ft	4.35		

Tower Forces - Service - Wind 90 To Face

Section Elevation	Add Weight	Self Weight	F a c e	e	C _F	q _z psf	D _F	D _R	A _E	F	w	Ctrl. Face
ft	K	K							ft ²	K	plf	
L1 180.00-170.58	0.10	0.48	A B C	1 1 1	0.65 0.65 0.65	11	1 1 1	1 1 1	20.027 20.027 20.027	0.16	16.96	C
L2 170.58-126.00	0.73	3.96	A B C	1 1 1	0.65 0.65 0.65	11	1 1 1	1 1 1	117.696 117.696 117.696	0.90	20.29	C
L3 126.00-82.75	1.89	6.53	A B C	1 1 1	0.65 0.65 0.785	10	1 1 1	1 1 1	150.749 150.749 150.749	1.30	30.04	C
L4 82.75-40.75	2.43	9.65	A B C	1 1 1	0.65 0.65 0.815	9	1 1 1	1 1 1	180.360 180.360 180.360	1.44	34.30	C
L5 40.75-0.00	2.27	13.29	A B C	1 1 1	0.65 0.65 0.76	7	1 1 1	1 1 1	206.488 206.488 206.488	1.24	30.35	C
Sum Weight:	7.42	33.90						OTM	409.83 kip-ft	5.04		

Force Totals

Load Case	Vertical Forces	Sum of Forces X	Sum of Forces Z	Sum of Overturning Moments, M _x	Sum of Overturning Moments, M _z	Sum of Torques
	K	K	K	kip-ft	kip-ft	kip-ft
Leg Weight	33.90					
Bracing Weight	0.00					
Total Member Self-Weight	33.90			-0.08	0.14	
Total Weight	53.01			-0.08	0.14	
Wind 0 deg - No Ice		-0.03	-24.39	-2791.05	3.80	-0.24
Wind 30 deg - No Ice		12.19	-21.11	-2415.30	-1394.28	-0.27
Wind 45 deg - No Ice		17.25	-17.23	-1971.01	-1973.77	-0.26
Wind 60 deg - No Ice		21.14	-12.17	-1392.40	-2418.73	-0.24
Wind 90 deg - No Ice		26.46	0.03	3.58	-2925.90	-0.14
Wind 120 deg - No Ice		21.17	12.22	1398.57	-2422.39	0.00
Wind 135 deg - No Ice		17.30	17.27	1976.02	-1978.94	0.07
Wind 150 deg - No Ice		12.24	21.14	2418.80	-1400.62	0.14
Wind 180 deg - No Ice		0.03	24.39	2790.88	-3.51	0.24
Wind 210 deg - No Ice		-12.19	21.11	2415.14	1394.57	0.27

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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 225 deg - No Ice		-17.25	17.23	1970.84	1974.06	0.26
Wind 240 deg - No Ice		-21.14	12.17	1392.23	2419.02	0.24
Wind 270 deg - No Ice		-26.46	-0.03	-3.74	2926.19	0.14
Wind 300 deg - No Ice		-21.17	-12.22	-1398.74	2422.68	0.00
Wind 315 deg - No Ice		-17.30	-17.27	-1976.18	1979.23	-0.07
Wind 330 deg - No Ice		-12.24	-21.14	-2418.96	1400.91	-0.14
Member Ice	16.31					
Total Weight Ice	89.27			-0.33	0.57	
Wind 0 deg - Ice		-0.01	-11.11	-1216.86	1.64	-0.15
Wind 30 deg - Ice		5.55	-9.62	-1053.35	-607.39	-0.17
Wind 45 deg - Ice		7.86	-7.85	-859.80	-859.76	-0.16
Wind 60 deg - Ice		9.63	-5.55	-607.67	-1053.51	-0.15
Wind 90 deg - Ice		12.97	0.01	0.73	-1334.96	-0.08
Wind 120 deg - Ice		9.64	5.56	608.86	-1054.57	0.00
Wind 135 deg - Ice		7.87	7.86	860.64	-861.27	0.04
Wind 150 deg - Ice		5.57	9.63	1053.75	-609.23	0.08
Wind 180 deg - Ice		0.01	11.11	1216.20	-0.49	0.15
Wind 210 deg - Ice		-5.55	9.62	1052.69	608.53	0.17
Wind 225 deg - Ice		-7.86	7.85	859.14	860.91	0.16
Wind 240 deg - Ice		-9.63	5.55	607.01	1054.65	0.15
Wind 270 deg - Ice		-12.97	-0.01	-1.39	1336.11	0.08
Wind 300 deg - Ice		-9.64	-5.56	-609.52	1055.72	0.00
Wind 315 deg - Ice		-7.87	-7.86	-861.30	862.41	-0.04
Wind 330 deg - Ice		-5.57	-9.63	-1054.41	610.37	-0.08
Total Weight	53.01			-0.08	0.14	
Wind 0 deg - Service		-0.01	-8.35	-955.54	1.40	-0.08
Wind 30 deg - Service		4.17	-7.23	-826.90	-477.22	-0.09
Wind 45 deg - Service		5.91	-5.90	-674.80	-675.60	-0.09
Wind 60 deg - Service		7.24	-4.17	-476.73	-827.93	-0.08
Wind 90 deg - Service		9.06	0.01	1.17	-1001.55	-0.05
Wind 120 deg - Service		7.25	4.18	478.73	-829.18	0.00
Wind 135 deg - Service		5.92	5.91	676.41	-677.37	0.02
Wind 150 deg - Service		4.19	7.24	827.99	-479.39	0.05
Wind 180 deg - Service		0.01	8.35	955.37	-1.11	0.08
Wind 210 deg - Service		-4.17	7.23	826.74	477.51	0.09
Wind 225 deg - Service		-5.91	5.90	674.64	675.89	0.09
Wind 240 deg - Service		-7.24	4.17	476.56	828.22	0.08
Wind 270 deg - Service		-9.06	-0.01	-1.34	1001.84	0.05
Wind 300 deg - Service		-7.25	-4.18	-478.89	829.47	0.00
Wind 315 deg - Service		-5.92	-5.91	-676.58	677.66	-0.02
Wind 330 deg - Service		-4.19	-7.24	-828.16	479.68	-0.05

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice

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Comb. No.	Description
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+ Wind 0 deg - Service
52	Dead+ Wind 30 deg - Service
53	Dead+ Wind 45 deg - Service
54	Dead+ Wind 60 deg - Service
55	Dead+ Wind 90 deg - Service
56	Dead+ Wind 120 deg - Service
57	Dead+ Wind 135 deg - Service
58	Dead+ Wind 150 deg - Service
59	Dead+ Wind 180 deg - Service
60	Dead+ Wind 210 deg - Service
61	Dead+ Wind 225 deg - Service
62	Dead+ Wind 240 deg - Service
63	Dead+ Wind 270 deg - Service
64	Dead+ Wind 300 deg - Service
65	Dead+ Wind 315 deg - Service
66	Dead+ Wind 330 deg - Service

Maximum Member Forces

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Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	180 - 170.58	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-10.49	0.17	0.10
			Max. Mx	26	-4.28	21.26	0.03
			Max. My	2	-4.29	0.05	21.22
			Max. Vy	26	-7.03	21.26	0.03
			Max. Vx	2	-7.03	0.05	21.22
			Max. Torque	20			-0.12
L2	170.58 - 126	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-35.31	0.17	0.10
			Max. Mx	26	-15.85	509.25	0.06
			Max. My	2	-15.89	0.08	508.64
			Max. Vy	26	-20.73	509.25	0.06
			Max. Vx	2	-20.70	0.08	508.64
			Max. Torque	20			-0.12
L3	126 - 82.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-54.76	0.52	0.30
			Max. Mx	26	-27.56	1597.18	1.51
			Max. My	2	-27.65	1.57	1577.49
			Max. Vy	26	-30.25	1597.18	1.51
			Max. Vx	2	-29.26	1.57	1577.49
			Max. Torque	20			-0.30
L4	82.75 - 40.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-73.86	0.52	0.30
			Max. Mx	26	-41.61	2954.90	3.65
			Max. My	2	-41.70	3.71	2869.77
			Max. Vy	26	-36.35	2954.90	3.65
			Max. Vx	2	-34.08	3.71	2869.77
			Max. Torque	20			-0.29
L5	40.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-101.94	0.60	0.35
			Max. Mx	26	-63.59	4854.30	6.15
			Max. My	2	-63.59	6.23	4633.24
			Max. Vy	26	-42.37	4854.30	6.15
			Max. Vx	2	-39.06	6.23	4633.24
			Max. Torque	20			-0.43

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	47	101.94	12.97	0.01
	Max. H _x	26	63.61	42.33	0.05
	Max. H _z	2	63.61	0.05	39.03
	Max. M _x	2	4633.24	0.05	39.03
	Max. M _z	10	4853.93	-42.33	-0.05
	Max. Torsion	4	0.43	-19.50	33.78
	Min. Vert	7	47.71	-27.60	27.56
	Min. H _x	10	63.61	-42.33	-0.05
	Min. H _z	18	63.61	-0.05	-39.03
	Min. M _x	18	-4633.02	-0.05	-39.03
	Min. M _z	26	-4854.30	42.33	0.05
	Min. Torsion	20	-0.43	19.50	-33.78

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Tower Mast Reaction Summary

Load Combination	Vertical	Shear _x	Shear _z	Overturing Moment, M _x	Overturing Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
Dead Only	53.01	0.00	0.00	-0.08	0.14	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	63.61	-0.05	-39.03	-4633.24	6.23	-0.38
0.9 Dead+1.6 Wind 0 deg - No Ice	47.71	-0.05	-39.03	-4588.73	6.13	-0.38
1.2 Dead+1.6 Wind 30 deg - No Ice	63.61	19.50	-33.78	-4009.51	-2314.65	-0.43
0.9 Dead+1.6 Wind 30 deg - No Ice	47.71	19.50	-33.78	-3970.97	-2292.46	-0.43
1.2 Dead+1.6 Wind 45 deg - No Ice	63.61	27.60	-27.56	-3271.96	-3276.61	-0.42
0.9 Dead+1.6 Wind 45 deg - No Ice	47.71	27.60	-27.56	-3240.51	-3245.19	-0.42
1.2 Dead+1.6 Wind 60 deg - No Ice	63.61	33.83	-19.47	-2311.44	-4015.26	-0.38
0.9 Dead+1.6 Wind 60 deg - No Ice	47.71	33.83	-19.47	-2289.21	-3976.75	-0.38
1.2 Dead+1.6 Wind 90 deg - No Ice	63.61	42.33	0.05	5.94	-4853.93	-0.22
0.9 Dead+1.6 Wind 90 deg - No Ice	47.71	42.33	0.05	5.92	-4808.17	-0.22
1.2 Dead+1.6 Wind 120 deg - No Ice	63.61	33.88	19.56	2321.69	-4021.29	0.00
0.9 Dead+1.6 Wind 120 deg - No Ice	47.71	33.88	19.56	2299.43	-3982.73	0.00
1.2 Dead+1.6 Wind 135 deg - No Ice	63.61	27.68	27.63	3280.29	-3285.14	0.11
0.9 Dead+1.6 Wind 135 deg - No Ice	47.71	27.68	27.63	3248.82	-3253.66	0.11
1.2 Dead+1.6 Wind 150 deg - No Ice	63.61	19.59	33.83	4015.33	-2325.11	0.22
0.9 Dead+1.6 Wind 150 deg - No Ice	47.71	19.59	33.83	3976.80	-2302.84	0.22
1.2 Dead+1.6 Wind 180 deg - No Ice	63.61	0.05	39.03	4633.02	-5.86	0.38
0.9 Dead+1.6 Wind 180 deg - No Ice	47.71	0.05	39.03	4588.57	-5.86	0.38
1.2 Dead+1.6 Wind 210 deg - No Ice	63.61	-19.50	33.78	4009.30	2315.01	0.43
0.9 Dead+1.6 Wind 210 deg - No Ice	47.71	-19.50	33.78	3970.82	2292.73	0.43
1.2 Dead+1.6 Wind 225 deg - No Ice	63.61	-27.60	27.56	3271.75	3276.98	0.42
0.9 Dead+1.6 Wind 225 deg - No Ice	47.71	-27.60	27.56	3240.35	3245.46	0.42
1.2 Dead+1.6 Wind 240 deg - No Ice	63.61	-33.83	19.47	2311.23	4015.63	0.38
0.9 Dead+1.6 Wind 240 deg - No Ice	47.71	-33.83	19.47	2289.06	3977.02	0.38
1.2 Dead+1.6 Wind 270 deg - No Ice	63.61	-42.33	-0.05	-6.15	4854.30	0.22
0.9 Dead+1.6 Wind 270 deg - No Ice	47.71	-42.33	-0.05	-6.07	4808.44	0.22
1.2 Dead+1.6 Wind 300 deg - No Ice	63.61	-33.88	-19.56	-2321.91	4021.66	0.00
0.9 Dead+1.6 Wind 300 deg - No Ice	47.71	-33.88	-19.56	-2299.59	3983.00	0.00
1.2 Dead+1.6 Wind 315 deg -	63.61	-27.68	-27.63	-3280.50	3285.51	-0.11

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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
No Ice						
0.9 Dead+1.6 Wind 315 deg - No Ice	47.71	-27.68	-27.63	-3248.97	3253.93	-0.11
1.2 Dead+1.6 Wind 330 deg - No Ice	63.61	-19.59	-33.83	-4015.54	2325.47	-0.22
0.9 Dead+1.6 Wind 330 deg - No Ice	47.71	-19.59	-33.83	-3976.96	2303.11	-0.22
1.2 Dead+1.0 Ice+1.0 Temp	101.94	0.00	0.00	-0.35	0.60	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	101.94	-0.01	-11.11	-1307.40	1.81	-0.15
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	101.94	5.55	-9.62	-1131.73	-652.50	-0.17
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	101.94	7.86	-7.85	-923.78	-923.64	-0.17
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	101.94	9.63	-5.55	-652.91	-1131.79	-0.15
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	101.94	12.97	0.01	0.74	-1430.80	-0.09
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	101.94	9.64	5.56	654.09	-1132.92	0.00
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	101.94	7.87	7.86	924.60	-925.24	0.04
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	101.94	5.57	9.63	1132.07	-654.46	0.09
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	101.94	0.01	11.11	1306.61	-0.45	0.15
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	101.94	-5.55	9.62	1130.94	653.86	0.17
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	101.94	-7.86	7.85	923.00	925.00	0.17
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	101.94	-9.63	5.55	652.13	1133.15	0.15
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	101.94	-12.97	-0.01	-1.53	1432.16	0.09
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	101.94	-9.64	-5.56	-654.88	1134.28	0.00
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	101.94	-7.87	-7.86	-925.39	926.60	-0.04
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	101.94	-5.57	-9.63	-1132.86	655.82	-0.09
Dead+ Wind 0 deg - Service	53.01	-0.01	-8.35	-985.96	1.44	-0.08
Dead+ Wind 30 deg - Service	53.01	4.17	-7.23	-853.23	-492.41	-0.09
Dead+ Wind 45 deg - Service	53.01	5.91	-5.90	-696.29	-697.10	-0.09
Dead+ Wind 60 deg - Service	53.01	7.24	-4.17	-491.91	-854.28	-0.08
Dead+ Wind 90 deg - Service	53.01	9.06	0.01	1.20	-1032.87	-0.05
Dead+ Wind 120 deg - Service	53.01	7.25	4.18	493.96	-855.56	0.00
Dead+ Wind 135 deg - Service	53.01	5.92	5.91	697.94	-698.92	0.02
Dead+ Wind 150 deg - Service	53.01	4.19	7.24	854.34	-494.64	0.05
Dead+ Wind 180 deg - Service	53.01	0.01	8.35	985.78	-1.13	0.08
Dead+ Wind 210 deg - Service	53.01	-4.17	7.23	853.05	492.71	0.09
Dead+ Wind 225 deg - Service	53.01	-5.91	5.90	696.12	697.41	0.09
Dead+ Wind 240 deg - Service	53.01	-7.24	4.17	491.73	854.58	0.08
Dead+ Wind 270 deg - Service	53.01	-9.06	-0.01	-1.37	1033.18	0.05
Dead+ Wind 300 deg - Service	53.01	-7.25	-4.18	-494.14	855.87	0.00
Dead+ Wind 315 deg - Service	53.01	-5.92	-5.91	-698.11	699.23	-0.02
Dead+ Wind 330 deg - Service	53.01	-4.19	-7.24	-854.52	494.94	-0.05

Solution Summary

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-53.01	0.00	0.00	53.01	0.00	0.000%
2	-0.05	-63.61	-39.03	0.05	63.61	39.03	0.000%
3	-0.05	-47.71	-39.03	0.05	47.71	39.03	0.000%
4	19.50	-63.61	-33.78	-19.50	63.61	33.78	0.000%
5	19.50	-47.71	-33.78	-19.50	47.71	33.78	0.000%
6	27.60	-63.61	-27.56	-27.60	63.61	27.56	0.000%
7	27.60	-47.71	-27.56	-27.60	47.71	27.56	0.000%
8	33.83	-63.61	-19.47	-33.83	63.61	19.47	0.000%
9	33.83	-47.71	-19.47	-33.83	47.71	19.47	0.000%
10	42.33	-63.61	0.05	-42.33	63.61	-0.05	0.000%
11	42.33	-47.71	0.05	-42.33	47.71	-0.05	0.000%
12	33.88	-63.61	19.56	-33.88	63.61	-19.56	0.000%
13	33.88	-47.71	19.56	-33.88	47.71	-19.56	0.000%
14	27.68	-63.61	27.63	-27.68	63.61	-27.63	0.000%
15	27.68	-47.71	27.63	-27.68	47.71	-27.63	0.000%
16	19.59	-63.61	33.83	-19.59	63.61	-33.83	0.000%
17	19.59	-47.71	33.83	-19.59	47.71	-33.83	0.000%
18	0.05	-63.61	39.03	-0.05	63.61	-39.03	0.000%
19	0.05	-47.71	39.03	-0.05	47.71	-39.03	0.000%
20	-19.50	-63.61	33.78	19.50	63.61	-33.78	0.000%
21	-19.50	-47.71	33.78	19.50	47.71	-33.78	0.000%
22	-27.60	-63.61	27.56	27.60	63.61	-27.56	0.000%
23	-27.60	-47.71	27.56	27.60	47.71	-27.56	0.000%
24	-33.83	-63.61	19.47	33.83	63.61	-19.47	0.000%
25	-33.83	-47.71	19.47	33.83	47.71	-19.47	0.000%
26	-42.33	-63.61	-0.05	42.33	63.61	0.05	0.000%
27	-42.33	-47.71	-0.05	42.33	47.71	0.05	0.000%
28	-33.88	-63.61	-19.56	33.88	63.61	19.56	0.000%
29	-33.88	-47.71	-19.56	33.88	47.71	19.56	0.000%
30	-27.68	-63.61	-27.63	27.68	63.61	27.63	0.000%
31	-27.68	-47.71	-27.63	27.68	47.71	27.63	0.000%
32	-19.59	-63.61	-33.83	19.59	63.61	33.83	0.000%
33	-19.59	-47.71	-33.83	19.59	47.71	33.83	0.000%
34	0.00	-101.94	0.00	0.00	101.94	0.00	0.000%
35	-0.01	-101.94	-11.11	0.01	101.94	11.11	0.000%
36	5.55	-101.94	-9.62	-5.55	101.94	9.62	0.000%
37	7.86	-101.94	-7.85	-7.86	101.94	7.85	0.000%
38	9.63	-101.94	-5.55	-9.63	101.94	5.55	0.000%
39	12.97	-101.94	0.01	-12.97	101.94	-0.01	0.000%
40	9.64	-101.94	5.56	-9.64	101.94	-5.56	0.000%
41	7.87	-101.94	7.86	-7.87	101.94	-7.86	0.000%
42	5.57	-101.94	9.63	-5.57	101.94	-9.63	0.000%
43	0.01	-101.94	11.11	-0.01	101.94	-11.11	0.000%
44	-5.55	-101.94	9.62	5.55	101.94	-9.62	0.000%
45	-7.86	-101.94	7.85	7.86	101.94	-7.85	0.000%
46	-9.63	-101.94	5.55	9.63	101.94	-5.55	0.000%
47	-12.97	-101.94	-0.01	12.97	101.94	0.01	0.000%
48	-9.64	-101.94	-5.56	9.64	101.94	5.56	0.000%
49	-7.87	-101.94	-7.86	7.87	101.94	7.86	0.000%
50	-5.57	-101.94	-9.63	5.57	101.94	9.63	0.000%
51	-0.01	-53.01	-8.35	0.01	53.01	8.35	0.000%
52	4.17	-53.01	-7.23	-4.17	53.01	7.23	0.000%
53	5.91	-53.01	-5.90	-5.91	53.01	5.90	0.000%
54	7.24	-53.01	-4.17	-7.24	53.01	4.17	0.000%
55	9.06	-53.01	0.01	-9.06	53.01	-0.01	0.000%
56	7.25	-53.01	4.18	-7.25	53.01	-4.18	0.000%
57	5.92	-53.01	5.91	-5.92	53.01	-5.91	0.000%
58	4.19	-53.01	7.24	-4.19	53.01	-7.24	0.000%
59	0.01	-53.01	8.35	-0.01	53.01	-8.35	0.000%
60	-4.17	-53.01	7.23	4.17	53.01	-7.23	0.000%

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Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
61	-5.91	-53.01	5.90	5.91	53.01	-5.90	0.000%
62	-7.24	-53.01	4.17	7.24	53.01	-4.17	0.000%
63	-9.06	-53.01	-0.01	9.06	53.01	0.01	0.000%
64	-7.25	-53.01	-4.18	7.25	53.01	4.18	0.000%
65	-5.92	-53.01	-5.91	5.92	53.01	5.91	0.000%
66	-4.19	-53.01	-7.24	4.19	53.01	7.24	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	0.00030742
3	Yes	4	0.00000001	0.00015181
4	Yes	5	0.00000001	0.00076744
5	Yes	5	0.00000001	0.00034610
6	Yes	5	0.00000001	0.00086434
7	Yes	5	0.00000001	0.00038525
8	Yes	5	0.00000001	0.00077418
9	Yes	5	0.00000001	0.00034937
10	Yes	4	0.00000001	0.00026018
11	Yes	4	0.00000001	0.00010616
12	Yes	5	0.00000001	0.00077437
13	Yes	5	0.00000001	0.00034913
14	Yes	5	0.00000001	0.00086743
15	Yes	5	0.00000001	0.00038638
16	Yes	5	0.00000001	0.00077260
17	Yes	5	0.00000001	0.00034830
18	Yes	4	0.00000001	0.00026805
19	Yes	4	0.00000001	0.00011734
20	Yes	5	0.00000001	0.00077479
21	Yes	5	0.00000001	0.00034970
22	Yes	5	0.00000001	0.00086443
23	Yes	5	0.00000001	0.00038528
24	Yes	5	0.00000001	0.00076799
25	Yes	5	0.00000001	0.00034631
26	Yes	4	0.00000001	0.00028468
27	Yes	4	0.00000001	0.00012899
28	Yes	5	0.00000001	0.00077477
29	Yes	5	0.00000001	0.00034926
30	Yes	5	0.00000001	0.00086784
31	Yes	5	0.00000001	0.00038650
32	Yes	5	0.00000001	0.00077660
33	Yes	5	0.00000001	0.00035020
34	Yes	4	0.00000001	0.00000001
35	Yes	5	0.00000001	0.00030498
36	Yes	5	0.00000001	0.00037788
37	Yes	5	0.00000001	0.00040020
38	Yes	5	0.00000001	0.00037920
39	Yes	5	0.00000001	0.00031991
40	Yes	5	0.00000001	0.00037888
41	Yes	5	0.00000001	0.00040048
42	Yes	5	0.00000001	0.00037846
43	Yes	5	0.00000001	0.00030463
44	Yes	5	0.00000001	0.00037953
45	Yes	5	0.00000001	0.00040057

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46	Yes	5	0.00000001	0.00037841
47	Yes	5	0.00000001	0.00032052
48	Yes	5	0.00000001	0.00038017
49	Yes	5	0.00000001	0.00040187
50	Yes	5	0.00000001	0.00038040
51	Yes	4	0.00000001	0.00004012
52	Yes	4	0.00000001	0.00020752
53	Yes	4	0.00000001	0.00024225
54	Yes	4	0.00000001	0.00021366
55	Yes	4	0.00000001	0.00004060
56	Yes	4	0.00000001	0.00021180
57	Yes	4	0.00000001	0.00024325
58	Yes	4	0.00000001	0.00021014
59	Yes	4	0.00000001	0.00003995
60	Yes	4	0.00000001	0.00021417
61	Yes	4	0.00000001	0.00024238
62	Yes	4	0.00000001	0.00020810
63	Yes	4	0.00000001	0.00004072
64	Yes	4	0.00000001	0.00021225
65	Yes	4	0.00000001	0.00024374
66	Yes	4	0.00000001	0.00021385

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 170.58	22.530	63	1.0792	0.0004
L2	174 - 126	21.174	63	1.0774	0.0003
L3	130.75 - 82.75	12.051	63	0.8928	0.0002
L4	88.75 - 40.75	5.402	63	0.5878	0.0001
L5	48 - 0	1.557	63	0.2945	0.0000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.00	4-ft Lightning Rod	63	22.530	1.0792	0.0004	50079
177.00	7770.00	63	21.851	1.0788	0.0004	50079
148.00	AIR21 B2A/B4P	63	15.491	0.9955	0.0002	12504
134.00	FD-RRH 4x45 1900	63	12.671	0.9139	0.0002	9132
131.00	APXVSPP18-C-A20	63	12.098	0.8945	0.0002	8726
115.00	BXA-70063/4CF	63	9.256	0.7835	0.0001	8283
45.00	GPS	63	1.383	0.2745	0.0000	7361

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
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Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	180 - 170.58	105.950	26	5.0799	0.0018
L2	174 - 126	99.576	26	5.0718	0.0016
L3	130.75 - 82.75	56.678	26	4.2027	0.0009
L4	88.75 - 40.75	25.404	26	2.7659	0.0004
L5	48 - 0	7.318	26	1.3847	0.0002

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
182.00	4-ft Lightning Rod	26	105.950	5.0799	0.0018	10850
177.00	7770.00	26	102.760	5.0782	0.0017	10850
148.00	AIR21 B2A/B4P	26	72.855	4.6866	0.0010	2689
134.00	FD-RRH 4x45 1900	26	59.595	4.3022	0.0009	1960
131.00	APXVSPP18-C-A20	26	56.900	4.2105	0.0009	1872
115.00	BXA-70063/4CF	26	43.531	3.6879	0.0007	1773
45.00	GPS	26	6.504	1.2910	0.0002	1566

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	180 - 170.58 (1)	TP26.25x24x0.1875	9.42	0.00	0.0	15.0243	-4.28	1019.44	0.004
L2	170.58 - 126 (2)	TP36.525x25.0581x0.25	48.00	0.00	0.0	27.8838	-15.85	1861.24	0.009
L3	126 - 82.75 (3)	TP46.357x34.8903x0.3125	48.00	0.00	0.0	44.2487	-27.56	2935.51	0.009
L4	82.75 - 40.75 (4)	TP55.765x44.2987x0.375	48.00	0.00	0.0	63.8666	-41.61	4233.02	0.010
L5	40.75 - 0 (5)	TP64.75x53.2831x0.4375	48.00	0.00	0.0	89.3059	-63.59	5854.04	0.011

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M _{uy} kip-ft	φM _{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	180 - 170.58 (1)	TP26.25x24x0.1875	21.26	529.45	0.040	0.00	529.45	0.000
L2	170.58 - 126 (2)	TP36.525x25.0581x0.25	509.25	1345.93	0.378	0.00	1345.93	0.000
L3	126 - 82.75 (3)	TP46.357x34.8903x0.3125	1597.18	2695.18	0.593	0.00	2695.18	0.000
L4	82.75 - 40.75	TP55.765x44.2987x0.375	2954.90	4674.70	0.632	0.00	4674.70	0.000

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Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L5	(4) 40.75 - 0 (5)	TP64.75x53.2831x0.4375	4854.30	7749.95	0.626	0.00	7749.95	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	180 - 170.58 (1)	TP26.25x24x0.1875	7.03	509.72	0.014	0.06	1060.19	0.000
L2	170.58 - 126 (2)	TP36.525x25.0581x0.25	20.73	930.62	0.022	0.06	2695.15	0.000
L3	126 - 82.75 (3)	TP46.357x34.8903x0.3125	30.25	1467.75	0.021	0.15	5396.95	0.000
L4	82.75 - 40.75 (4)	TP55.765x44.2987x0.375	36.35	2116.51	0.017	0.15	9360.83	0.000
L5	40.75 - 0 (5)	TP64.75x53.2831x0.4375	42.37	2927.02	0.014	0.22	15518.83	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	180 - 170.58 (1)	0.004	0.040	0.000	0.014	0.000	0.045	1.000	4.8.2 ✓
L2	170.58 - 126 (2)	0.009	0.378	0.000	0.022	0.000	0.387	1.000	4.8.2 ✓
L3	126 - 82.75 (3)	0.009	0.593	0.000	0.021	0.000	0.602	1.000	4.8.2 ✓
L4	82.75 - 40.75 (4)	0.010	0.632	0.000	0.017	0.000	0.642	1.000	4.8.2 ✓
L5	40.75 - 0 (5)	0.011	0.626	0.000	0.014	0.000	0.637	1.000	4.8.2 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	180 - 170.58	Pole	TP26.25x24x0.1875	1	-4.28	1019.44	4.5	Pass
L2	170.58 - 126	Pole	TP36.525x25.0581x0.25	2	-15.85	1861.24	38.7	Pass
L3	126 - 82.75	Pole	TP46.357x34.8903x0.3125	3	-27.56	2935.51	60.2	Pass
L4	82.75 - 40.75	Pole	TP55.765x44.2987x0.375	4	-41.61	4233.02	64.2	Pass
L5	40.75 - 0	Pole	TP64.75x53.2831x0.4375	5	-63.59	5854.04	63.7	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						Pole (L4)	64.2	Pass
						RATING =	64.2	Pass

Program Version 7.0.5.1 - 2/1/2016 File:J:/Jobs/1805800.WI/87_CT11720A/05_Structural/Tower Analysis/Backup Documentation/ERI Files/180'
Monopole_Orange_CT.eri

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturing Moment =	$M_U := 4854\text{-ft-kips}$	(Input From trnTower)
Shear Force =	Shear := 42-kips	(Input From trnTower)
Axial Force =	$R_U := 64\text{-kips}$	(Input From trnTower)

Anchor Bolt Data:

ASTMA615 Grade 75

Number of Anchor Bolts =	$N := 20$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 72\text{-in}$	(User Input)
Bolt Ultimate Strength =	$F_U := 100\text{-ksi}$	(User Input)
Bolt Yield Strength =	$F_y := 75\text{-ksi}$	(User Input)
Bolt Modulus =	$E := 29000\text{-ksi}$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25\text{-in}$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)
Top of Concrete to Bot Leveling Nut =	$l_{ar} := 2\text{-in}$	(User Input)
Anchor Rod Force Correction Factor =	$n_c := 1$	Table 2-1 Addendum 3

Base Plate Data:

ASTMA572 Grade 60

Plate Yield Strength =	$F_{yf} := 60\text{-ksi}$	(User Input)
Base Plate Thickness =	$t_{TP} := 2.75\text{-in}$	(User Input)
Base Plate Diameter =	$D_{OD} := 77.25\text{-in}$	(User Input)
Outer Pole Diameter =	$D_T := 64.75\text{-in}$	(User Input)
Pole Wall Thickness =	$t_T := 0.4375\text{-in}$	(User Input)
Pole Design Yield Strength =	$F_{yp} := 65\text{-ksi}$	(User Input)
	$\eta := 0.5$	For Ungrouted Base Plate per TIA-222-G Section 4.9.9

Anchor Bolt Analysis:

GrossArea of Bolt =

$$A_g := \frac{\pi}{4} \cdot D^2 = 3.976 \cdot \text{in}^2$$

NetArea of Bolt =

$$A_n := \frac{\pi}{4} \cdot \left(D - \frac{0.9743 \cdot \text{in}}{n} \right)^2 = 3.248 \cdot \text{in}^2$$

Tensile Root Diameter =

$$d_{rt} := D - \frac{0.9743 \cdot \text{in}}{n} = 2.033 \cdot \text{in}$$

Plastic Section Modulus =

$$Z := \frac{d_{rt}^3}{6} = 1.401 \cdot \text{in}^3$$

Maximum Anchor Rod Force =

$$P_u := \frac{n_c \cdot \pi \cdot M_u}{N \cdot D_{BC}} + \frac{R_u}{N} = 130.3 \cdot \text{kips}$$

Maximum Shear Force =

$$V_u := \frac{\text{Shear}}{N} = 2.1 \cdot \text{kips}$$

Design Tensile Strength =

$$\Phi R_{nt} := 0.8 \cdot F_u \cdot A_n = 259.815 \cdot \text{k}$$

Bolt % of Capacity =

$$\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \cdot 100 = 51.8$$

Condition1 =

$$\text{Condition1} := \text{if} \left[\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right]$$

Condition1 = "OK"

Design Shear Strength =

$$\Phi R_{nv} := 0.75 \cdot 0.45 \cdot F_u \cdot A_g = 134.193 \cdot \text{k}$$

Design Flexural Strength =

$$\Phi R_{nm} := 0.9 \cdot F_y \cdot Z = 94.597 \cdot \text{in} \cdot \text{k}$$

$$M_u := \begin{cases} 0 & \text{if } l_{ar} < D \\ 0.65 \cdot l_{ar} \cdot V_u & \text{otherwise} \end{cases} = 0 \cdot \text{in} \cdot \text{k}$$

Bolt % of Capacity =

$$\left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \right] \cdot 100 = 25.2$$

Condition2 =

$$\text{Condition2} := \text{if} \left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \leq 1.00, \text{"OK"}, \text{"Overstressed"} \right]$$

Condition2 = "OK"

Base Plate Analysis:

Strength Resistance Factor for Yielding due to Bending =

$$\phi_b := 0.9$$

Strength Resistance Factor for Yielding due to Shear =

$$\phi_v := 1.0$$

Outside Fillet Horizontal Leg Dimension =

$$w_1 := 0.25 \text{ in}$$

Effective Pole Outside Diameter =

$$D_e := D_T + w_1 = 65 \text{ in}$$

Effective Base Plate Outside Diameter =

$$D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \leq (D_{BC} + 6 \cdot t_{TP}) \\ (D_{BC} + 6 \cdot t_{TP}) & \text{otherwise} \end{cases} = 77.25 \text{ in}$$

Half-Angle Between Radial Lines Extending from Pole
 Centerline Through Midpoints Between Adjacent Anchor

$$\theta_1 := \frac{\pi}{N} = 0.157$$

Rods =

Angle Defining Limiting Effective Base Plate Width
 Based on Plate Thickness =

$$\theta_2 := \arcsin\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.476$$

Angle Defining Limiting Effective Base Plate Width
 Based on Distance Between Anchor Rod Bolt Circle and
 Effective Pole Outside Diameter =

$$\theta_3 := \arccos\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.313$$

Governing Angle Defining Effective Base Plate Width
 Resisting Bending =

$$\theta := \min(\theta_1, \theta_2, \theta_3) = 0.157$$

Effective Moment Arm of Anchor Rod Force =

$$x := 0.5 \cdot (D_{BC} - D_e) = 3.5 \text{ in}$$

Effective Base Plate Width Resisting Bending from
 Transverse Bend Line =

$$B_{et} := D_{BC} \cdot \sin(\theta) = 11.263 \text{ in}$$

Effective Base Plate Width Resisting Bending from
 Radial Bend Lines =

$$B_{er} := (D_{oe} - D_e) \cdot \sin(\theta) = 1.916 \text{ in}$$

Total Effective Base Plate Width Resisting Bending =

$$B_{eff} := B_{et} + B_{er} = 13.18 \text{ in}$$

Required Base Plate Thickness =

$$t_{TP,Req} := \sqrt{\frac{4 \cdot P_u \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.601 \text{ in}$$

Plate Bending Stress % of Capacity =

$$\frac{t_{TP,Req}}{t_{TP}} = 58.2\%$$

Condition2 =

$$\text{Condition3} := \text{if} \left(\frac{t_{TP,Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"} \right)$$

Condition3 = "Ok"

Required Base Plate Thickness =

$$t_{TP,Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.711 \text{ in}$$

Plate Bending Stress % of Capacity =

$$\frac{t_{TP,Req}}{t_{TP}} = 25.9\%$$

Condition2 =

$$\text{Condition4} := \text{if} \left(\frac{t_{TP,Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"} \right)$$

Condition4 = "Ok"

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	OM := 4854-ft-kips	(User Input)
Shear Force =	Shear := 42-kip	(User Input)
Axial Force =	Axial := 64-kip	(User Input)
Tower Height =	H _t := 180-ft	(User Input)

Footing Data:

Overall Depth of Footing =	D _f := 7.0-ft	(User Input)
Length of Pier =	L _p := 2.0-ft	(User Input)
Extension of Pier Above Grade =	L _{pag} := 1-ft	(User Input)
Diameter of Pier =	d _p := 8.0-ft	(User Input)
Thickness of Footing =	T _f := 6.0-ft	(User Input)
Width of Footing =	W _f := 48.0-ft	(User Input)

Material Properties:

Concrete Compressive Strength =	f _c := 3000-psi	(User Input)
Steel Reinforcement Yield Strength =	f _y := 60000-psi	(User Input)
Anchor Bolt Yield Strength =	f _{ya} := 75000-psi	(User Input)
Internal Friction Angle of Soil =	Φ _s := 32-deg	(User Input)
Ultimate Soil Bearing Capacity =	q _u := 12000-psf	(User Input)
Allowable Soil Bearing Capacity =	q _a := $\frac{q_u}{2}$ = 6000-psf	(User Input)
Unit Weight of Soil =	γ _{soil} := 120-pcf	(User Input)
Unit Weight of Concrete =	γ _{conc} := 150-pcf	(User Input)
Foundation Bouyancy =	Bouyancy := 0	(User Input) (Yes=1 / No=0)
Depth to Neglect =	n := 0-ft	(User Input)
Cohesion of Clay Type Soil =	c := 0-ksf	(User Input) (Use 0 for Sandy Soil)
Seismic Zone Factor =	Z := 2	(User Input) (UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	μ := 0.45	(User Input)
Coefficient of Lateral Soil Pressure =	K _p := $\frac{1 + \sin(\Phi_s)}{1 - \sin(\Phi_s)}$ = 3.255	

Stability of Footing:

Adjusted Concrete Unit Weight =

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

Adjusted Soil Unit Weight =

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

Passive Pressure =

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

$$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 0.391 \text{ksf}$$

$$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 0.391 \text{ksf}$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.734 \text{ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.562 \text{ksf}$$

$$T_p := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] = 6$$

$$A_p := W_f \cdot T_p = 288$$

Ultimate Shear =

$$S_u := P_{ave} \cdot A_p = 449.914 \text{kip}$$

Weight of Concrete Pad =

$$WT_c := \left[(W_f^2 \cdot T_f) + d_p^2 \cdot L_p \right] \cdot \gamma_c = 2093 \text{kip}$$

Weight of Soil Above Footing =

$$WT_{s1} := \left[(W_f^2 - d_p^2) \cdot (L_p - L_{pag} - n) \right] \cdot \gamma_s = 268.8 \text{kip}$$

Weight of Soil Wedge at Back Face =

$$WT_{s2} := \left(\frac{D_f^2 \cdot \tan(\phi_s)}{2} \cdot W_f \right) \cdot \gamma_s = 88.182 \text{kip}$$

Weight of Soil Wedge at back face Corners =

$$WT_{s3} := 2 \cdot \left[(D_f)^3 \cdot \frac{\tan(\phi_s)}{3} \right] \cdot \gamma_s = 17.146 \text{kips}$$

Total Weight =

$$WT_{tot} := WT_c + WT_{s1} + \text{Axial} = 2.426 \times 10^3 \text{kip}$$

Resisting Weight =

$$WT_R := 0.9 \cdot WT_c + 0.75 \cdot WT_{s1} + 0.75 \cdot \text{Axial} = 2.133 \times 10^3 \text{kip}$$

Resisting Moment =

$$M_r := (WT_R) \cdot \frac{W_f}{2} + 0.75 \cdot S_u \cdot \frac{T_f}{3} + 0.75 \cdot \left[(WT_{s2} + WT_{s3}) \cdot \left(W_f + \frac{D_f \cdot \tan(\phi_s)}{3} \right) \right] = 55777 \text{kip-ft}$$

Overtuning Moment =

$$M_{ot} := OM + \text{Shear} \cdot (L_p + T_f) = 5190 \text{kip-ft}$$

Factor of Safety Actual =

$$FS := \frac{M_r}{M_{ot}} = 10.75$$

Factor of Safety Required =

$$FS_{req} := 1$$

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

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

Shear Capacity in Pier:

Shear Resistance of Pier =

$$S_p := \frac{P_{ave} \cdot A_p + \mu \cdot W_{T_{tot}}}{FS_{req}} = 1.541 \times 10^3 \text{ kips}$$

$$\text{Shear_Check} := \text{if}(S_p > \text{Shear}, \text{"Okay"}, \text{"No Good"})$$

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat =

$$A_{mat} := W_f^2 = 2.304 \times 10^3$$

Section Modulus of Mat =

$$S := \frac{W_f^3}{6} = 1.84 \times 10^4 \text{ ft}^3$$

Maximum Pressure in Mat =

$$P_{max} := \frac{W_{T_{tot}}}{A_{mat}} + \frac{M_{ot}}{S} = 1.334 \text{ ksf}$$

$$\text{Max_Pressure_Check} := \text{if}(P_{max} < .75 \cdot q_u, \text{"Okay"}, \text{"No Good"})$$

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat =

$$P_{min} := \frac{W_{T_{tot}}}{A_{mat}} - \frac{M_{ot}}{S} = 0.771 \text{ ksf}$$

$$\text{Min_Pressure_Check} := \text{if}[(P_{min} \geq 0) \cdot (P_{min} < .75 \cdot q_u), \text{"Okay"}, \text{"No Good"}]$$

Min_Pressure_Check = "Okay"

RAN Template: 67D92DB Outdoor	A&L Template: 67D92DB_2xAIR+1OP	Power System Template: Custom
---	---	---

CT11720A_L600_2.1_draft

Section 1 - Site Information

Site ID: CT11720A
Status: Draft
Version: 2.1
Project Type: L600
Approved: Not Approved
Approved By: Not Approved
Last Modified: 5/11/2018 2:3:29 PM
Last Modified By: GSM1900\MSEDDIK

Site Name: CT720/Town of Orange_MP
Site Class: Monopole
Site Type: Structure Non Building
Solution Type:
Plan Year:
Market: CONNECTICUT
Vendor: Ericsson
Landlord: Town of Orange

Latitude: 41.2557210000
Longitude: -73.0108180000
Address: 26 So. Orange Center Rd
City, State: Orange, CT
Region: NORTHEAST

RAN Template: 67D92DB Outdoor

AL Template: 67D92DB_2xAIR+1OP

Sector Count: 3

Antenna Count: 9

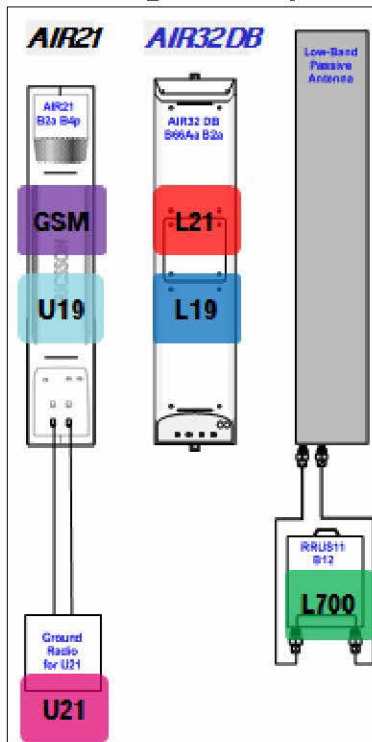
Coax Line Count: 6

TMA Count: 3

RRU Count: 3

Section 2 - Existing Template Images

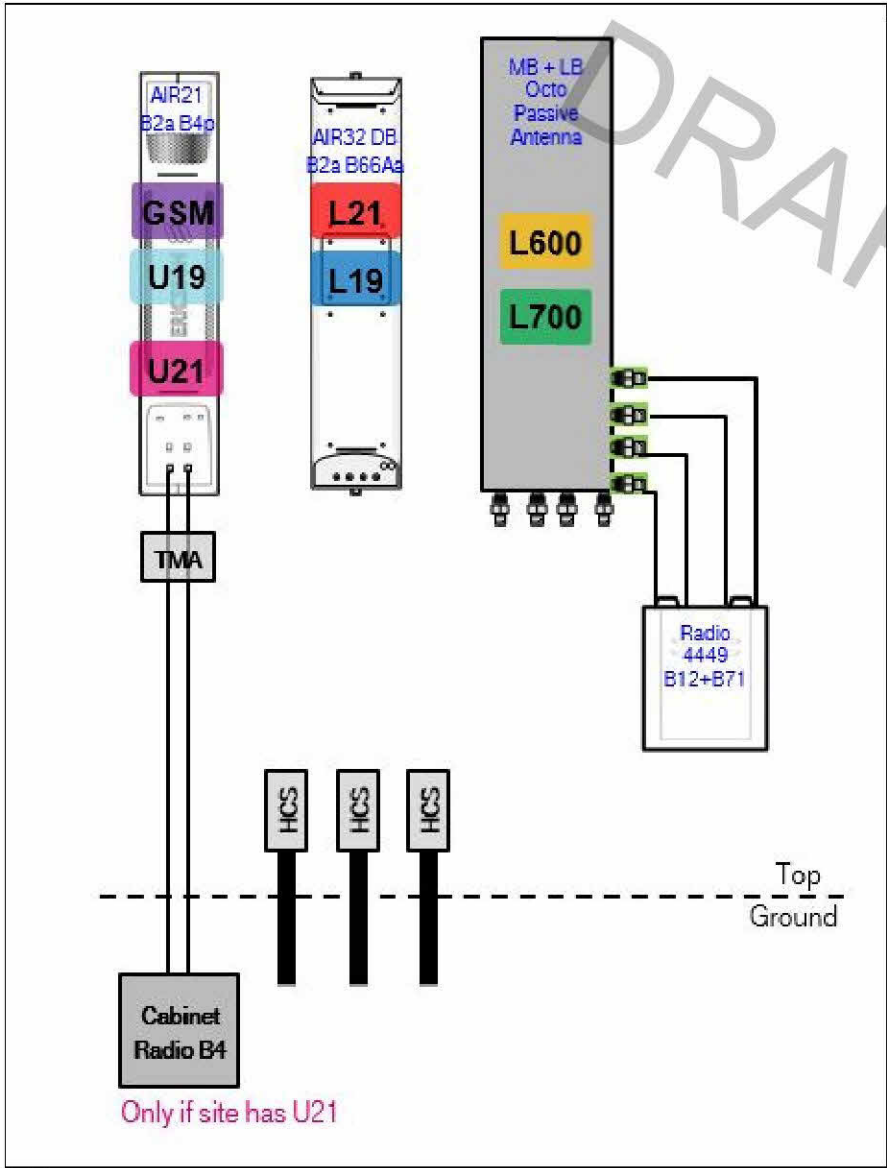
792DB_2xAIR+1DP.png



Notes:

Section 3 - Proposed Template Images

67D92DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

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DRAFT

RAN Template: 67D92DB Outdoor	A&L Template: 67D92DB_2xAIR+1OP	Power System Template: Custom
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CT11720A_L600_2.1_draft

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 792DB Outdoor

Enclosure	1	2
Enclosure Type	RBS 6131	Ancillary Equipment
Baseband	DUS41 (x2) DUW30 (x2) DUG20	
Hybrid Cable System		Ericsson 9x18 HCS *Select Length* Ericsson 6x12 HCS *Select Length & AWG*
Multiplexer	XMU	
Radio	RU22 (x6)	

Proposed RAN Equipment

Template: 67D92DB Outdoor

Enclosure	1	2
Enclosure Type	RBS 6131	Ancillary Equipment
Baseband	DUW30 U1900 DUW30 U2100 DUG20 G1900 BB 5216 L2100 L1900 L700 L600	
Hybrid Cable System		Ericsson 6x12 HCS 4AWG 60m
Multiplexer	XMU	
Radio	RU22 (x6) U2100	

RAN Scope of Work:

RAN Template: 67D92DB Outdoor	A&L Template: 67D92DB_2xAIR+1OP	Power System Template: Custom
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CT11720A_L600_2.1_draft

Section 6 - A&L Equipment

Existing Template: 792DB_2xAIR+1DP
Proposed Template: 67D92DB_2xAIR+1OP

Sector 1 (Existing) view from behind

Address	Address:		Latitude: 41.2557210000					
	City, State:		Longitude: -73.0108180000					
Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				Andrew - LNX-6515DS-A1M (Dual)		Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)	
Azimuth	0				0		0	
M. Tilt	0				0		0	
Height	150				150		150	
Ports	P1	P2	P3	P4	P5		P6	P7
Active Tech.	L2100	L2100	L1900	L1900	L700		U1900 G1900	U2100
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2	2	2	2	2		2	2
Cables								1-5/8" Coax - 198 ft. (x2)
TMA's								Generic Twin Style 1B - AWS (At Antenna)
Diplexers / Combiners								
Radio					RRUS11 B12 (At Antenna)			
Sector Equipment								

Unconnected Equipment:

Scope of Work:

RAN Template: 67D92DB Outdoor	A&L Template: 67D92DB_2xAIR+1OP	Power System Template: Custom
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CT11720A_L600_2.1_draft

Sector 1 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1			2			3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)			RFS - APXVAARR24_43-U-NA20 (Octo)			Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	0			0			0			
M. Tilt										
Height	150			150			150			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U1900 G1900	U2100			L700 L600	L700 L600	L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables		1-5/8" Coax - 198 ft. (x2) Coax Jumper (x2)			JUMPE R 6' DIN MALE- DIN MALE (x2)	JUMPE R 6' DIN MALE- DIN MALE (x2)				
TMA's		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio					Radio 4449 B71+B1 2 (At Antenna)					
Sector Equipment										
Unconnected Equipment:										
Scope of Work:										

RAN Template: 67D92DB Outdoor	A&L Template: 67D92DB_2xAIR+1OP	Power System Template: Custom
---	---	---

CT11720A_L600_2.1_draft

Sector 2 (Existing) view from behind								
Address	Address:		Latitude: 41.2555470000					
	City, State:		Longitude: -73.0108780000					
Coverage Type	A - Outdoor Macro							
Antenna	1			2			3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			Andrew - LNX-6515DS-A1M (Dual)			Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)	
Azimuth	120			120			120	
M. Tilt	0			0			0	
Height	150			150			150	
Ports	P1	P2	P3	P4	P5		P6	P7
Active Tech.	L2100	L2100	L1900	L1900	L700		U1900 G1900	U2100
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2	2	2	2	2		2	2
Cables								1-5/8" Coax - 198 ft. (x2)
TMA's								Generic Twin Style 1B - AWS (At Antenna)
Diplexers / Combiners								
Radio					RRUS11 B12 (At Antenna)			
Sector Equipment								
Unconnected Equipment:								
Scope of Work:								

RAN Template: 67D92DB Outdoor	A&L Template: 67D92DB_2xAIR+1OP	Power System Template: Custom
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CT11720A_L600_2.1_draft

Sector 2 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1			2			3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)			RFS - APXVAARR24_43-U-NA20 (Octo)			Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	120			120			120			
M. Tilt										
Height	150			150			150			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U1900 G1900	U2100			L700 L600	L700 L600	L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables		1-5/8" Coax - 198 ft. (x2) Coax Jumper (x2)			JUMPE R 6' DIN MALE- DIN MALE (x2)	JUMPE R 6' DIN MALE- DIN MALE (x2)				
TMA's		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio					Radio 4449 B71+B1 2 (At Antenna)					
Sector Equipment										
Unconnected Equipment:										
Scope of Work:										

RAN Template: 67D92DB Outdoor	A&L Template: 67D92DB_2xAIR+1OP	Power System Template: Custom
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CT11720A_L600_2.1_draft

Sector 3 (Existing) view from behind								
Address	Address:				Latitude: 41.2555510000			
	City, State:				Longitude: -73.0109080000			
Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				Andrew - LNX-6515DS-A1M (Dual)		Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)	
Azimuth	250				250		250	
M. Tilt	0				0		0	
Height	150				150		150	
Ports	P1	P2	P3	P4	P5		P6	P7
Active Tech.	L2100	L2100	L1900	L1900	L700		U1900 G1900	U2100
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt	2	2	2	2	2		2	2
Cables								1-5/8" Coax - 198 ft. (x2)
TMA's								Generic Twin Style 1B - AWS (At Antenna)
Diplexers / Combiners								
Radio					RRUS11 B12 (At Antenna)			
Sector Equipment								
Unconnected Equipment:								
Scope of Work:								

RAN Template: 67D92DB Outdoor	A&L Template: 67D92DB_2xAIR+1OP	Power System Template: Custom
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CT11720A_L600_2.1_draft

Sector 3 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1			2			3			
Antenna Model	Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)			RFS - APXVAARR24_43-U-NA20 (Octo)			Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	250			250			250			
M. Tilt										
Height	150			150			150			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	U1900 G1900	U2100			L700 L600	L700 L600	L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables		1-5/8" Coax - 198 ft. (x2) Coax Jumper (x2)			JUMPE R 6' DIN MALE- DIN MALE (x2)	JUMPE R 6' DIN MALE- DIN MALE (x2)				
TMA's		Generic Twin Style 1B - AWS (AtAntenna)								
Diplexers / Combiners										
Radio					Radio 4449 B71+B1 2 (At Antenna)					
Sector Equipment										
Unconnected Equipment:										
Scope of Work:										

Section 7 - Power Systems Equipment	
Existing Power Systems Equipment	
----- This section is intentionally blank. -----	
Proposed Power Systems Equipment	



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

FEATURES / BENEFITS

This antenna provides a 8 Port multi-band flexible platform for advanced use for flexible use in deployment scenarios for encompassing 600MHz, 700MHz, AWS & PCS applications.



- ➔ 24 Inch Width For Easier Zoning
- ➔ Field Replaceable (Integrated) AISG RET platform for reduced environmental exposure and long lasting quality
- ➔ Superior elevation pattern performance across the entire electrical down tilt range
- ➔ Includes three AISG RET motors - Includes 0.5m AISG jumper for optional diasy chain of two high band RET motors for one single AISG point of high band tilt control.
- ➔ Low band arrays driven by a single RET motor

Technical Features

LOW BAND LEFT ARRAY (617-746 MHZ) [R1]

Frequency Band	MHz	617-698	698-746
Gain	dBi	15.1	15.5
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.4
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	24
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250

LOW BAND RIGHT ARRAY (617-746 MHZ) [R2]

Frequency Band	MHz	617-698	698-746
Gain	dBi	14.8	15.1
Horizontal Beamwidth @3dB	Deg	65	62
Vertical Beamwidth @3dB	Deg	11.4	10.3
Electrical Downtilt Range	Deg	0-12	0-12
Upper Side Lobe Suppression 0 to +20	dB	19	20
Front-to-Back, at +/-30°, Copolar	dB	25	23
Cross Polar Discrimination (XPD) @ Boresight	dB	19	19
Cross Polar Discrimination (XPD) @ +/-60	dB	5	3
3rd Order PIM 2 x 43dBm	dBc		-153
VSWR	-	1.5:1	1.5:1
Cross Polar Isolation	dB	25	25
Maximum Effective Power per Port	Watt	250	250



Dual Slant Polarized Quad Band (8 Port) Antenna, 617-746/617-746/1695-2200/1695-2200MHz, 65deg, 15/15/18/18dBi, 2.4m (8ft), VET, RET, 0-12°/0-12°/2-12°/2-12°

ELECTRICAL SPECIFICATIONS

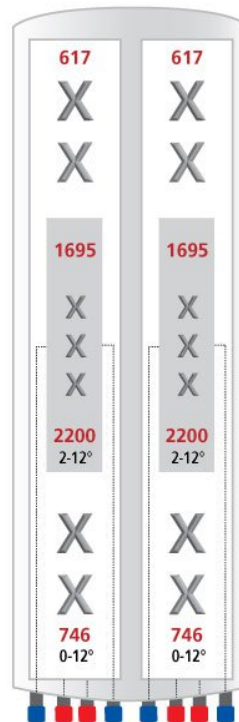
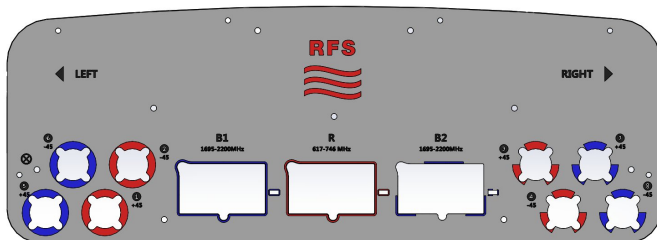
Impedance	Ohm	50.0
Polarization	Deg	±45°

MECHANICAL SPECIFICATIONS

Dimensions - H x W x D	mm (in)	2436 x 609 x 222 (95.9 x 24 x 8.7)
Weight (Antenna Only)	kg (lb)	58 (128)
Weight (Mounting Hardware only)	kg (lb)	11.5 (25.3)
Shipping Weight	kg (lb)	80 (176)
Connector type		8 x 4.3-10 female at bottom + 6 AISG connectors (3 male, 3 female)
Adjustment mechanism		Integrated RET solution AISG compliant (Field Replaceable) + Manual Override + External Tilt Indicator
Mounting Hardware Material		Galvanized steel
Radome Material / Color		Fiber Glass / Light Grey RAL7035

TESTING AND ENVIRONMENTAL

Temperature Range	°C (°F)	-40 to 60 (-40 to 140)
Lightning protection		IEC 61000-4-5
Survival/Rated Wind Velocity	km/h	241 (150)
Environmental		ETSI 300-019-2-4 Class 4.1E



ORDERING INFORMATION

Order No.	Configuration	Mounting Hardware	Mounting pipe Diameter	Shipping Weight
APXVAARR24_43-U-NA20	Field Replace RET included (3)	APM40-5E Beam tilt kit (included)	60-120mm	80 Kg

..T..Mobile-
WIRELESS COMMUNICATIONS FACILITY
CT720/TOWN OF ORANGE_MP
SITE ID: CT11720A
26 S ORANGE CENTER RD
ORANGE, CT 06477

GENERAL NOTES

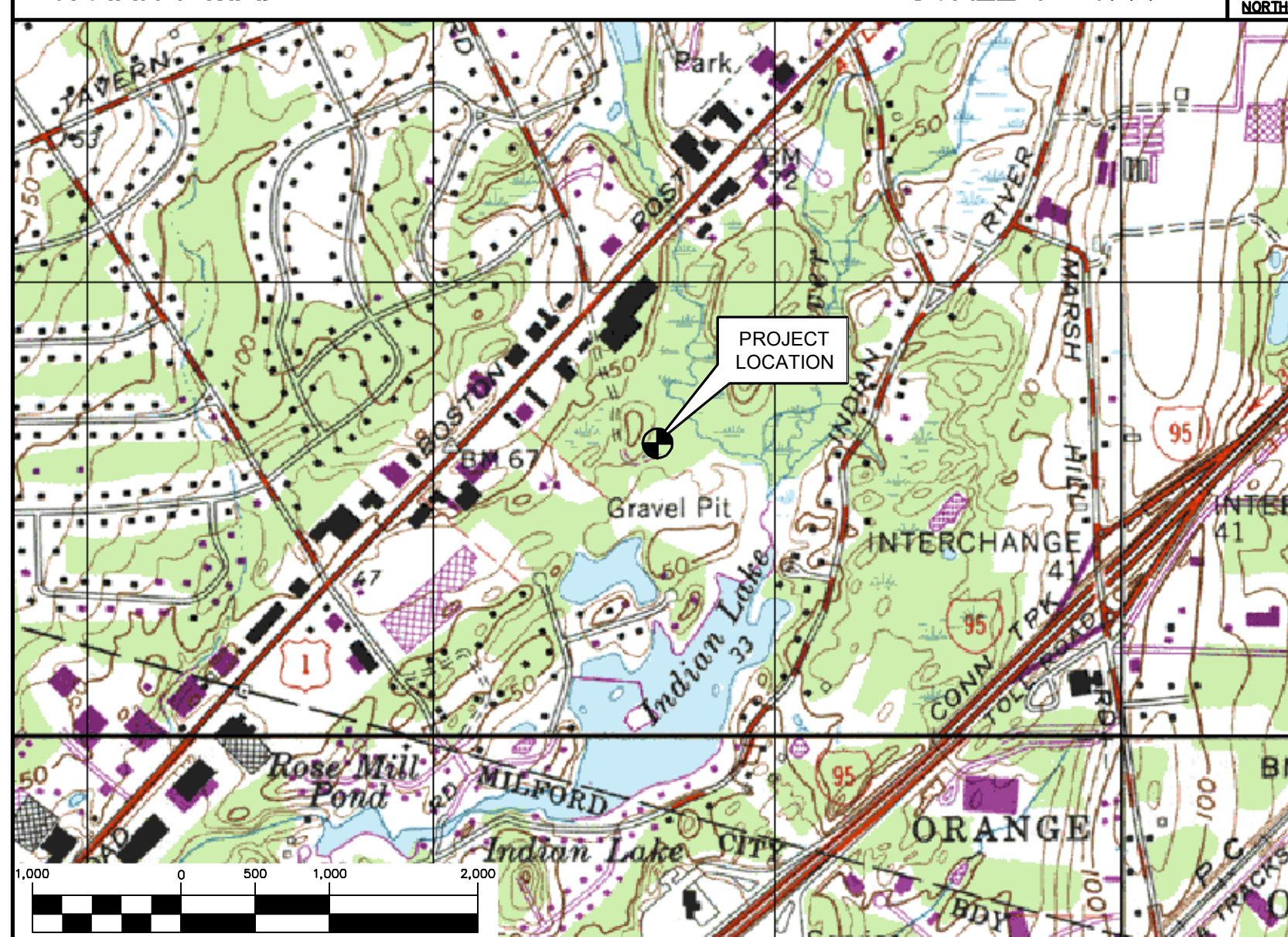
- ALL WORK SHALL BE IN ACCORDANCE WITH THE 2012 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2016 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2016 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
- CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
- CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
- CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
- CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
- CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
- LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
- THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
- 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 WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
- ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
- ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
- ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE T-MOBILE CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO "EXTRA" WILL BE ALLOWED FOR MISSED ITEMS.
- 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.
- CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
- 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.
- COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- 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.
- THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
- CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

- FROM:** 35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
- TO:** 26 S ORANGE CENTER RD
ORANGE, CT 06477
- HEAD NORTH ON GRIFFIN ROAD S. TOWARD HARTMAN RD. 0.30 MI.
 - TAKE THE 2ND RIGHT ONTO DAY HILL RD. 3.64 MI.
 - MERGE ONTO I-91 S TOWARD HARTFORD. 45.80 MI.
 - KEEP RIGHT TOWARD NY CITY. 0.08 MI.
 - MERGE ONTO I-95 S/GOVERNOR JOHN DAVIS LODGE TPKE S TOWARD NY CITY/N Y CITY. 5.69 MI.
 - TAKE THE MARSH HILL RD EXIT, EXIT 41. 0.29 MI.
 - TURN RIGHT ONTO MARSH HILL RD. 0.33 MI.
 - MARSH HILL RD BECOMES S LAMBERT RD. 0.32 MI.
 - TURN LEFT ONTO BOSTON POST RD/US-1 S. 0.47 MI.
 - TURN LEFT ONTO S ORANGE CENTER RD. 0.18 MI.
 - [201 - 233] S ORANGE CENTER RD, 232 5D.

VICINITY MAP

SCALE: 1" = 1000'



T-MOBILE RF CONFIGURATION

67D92DB_2xAIR+1OP

PROJECT SUMMARY

- THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
 - REMOVE (3) EXISTING ANTENNAS, (1) PER SECTOR
 - INSTALL (3) NEW RFS ANTENNAS, (1) PER SECTOR
 - REMOVE (3) EXISTING RRUS11 B12, (1) PER SECTOR
 - INSTALL (3) NEW RADIO 4449 B71+B12'S, (1) PER SECTOR
 - INSTALL (1) NEW HYBRID CABLE.
 - INSTALL HANDRAIL KIT TO EXISTING PLATFORM.
 - UPGRADE EXISTING BREAKER TO 150A.

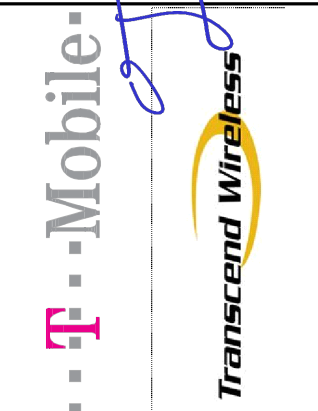
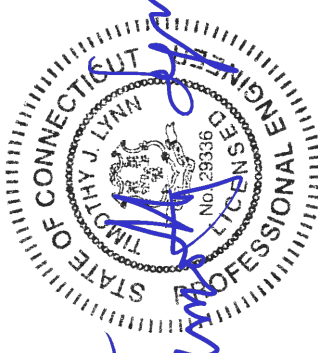
PROJECT INFORMATION

SITE NAME: CT720/TOWN OF ORANGE_MP
SITE ID: CT11720A
SITE ADDRESS: 26 S ORANGE CENTER RD
ORANGE, CT 06477
APPLICANT: T-MOBILE NORTHEAST, LLC
35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
CONTACT PERSON: DAN REID (PROJECT MANAGER)
TRANSCEND WIRELESS, LLC
(203) 592-8291
ENGINEER: CENTEK ENGINEERING, INC.
63-2 NORTH BRANFORD RD.
BRANFORD, CT 06405
PROJECT COORDINATES: LATITUDE: 41°-15'-20.07" N
LONGITUDE: 73°-00'-39.34" W
GROUND ELEVATION: 47± AMSL
SITE COORDINATES AND GROUND ELEVATION
REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	DESIGN BASIS AND SITE NOTES	0
C-1	SITE LOCATION PLAN	0
C-2	COMPOUND PLAN, ELEVATION AND ANTENNA MOUNTING CONFIG.	0
E-1	TYPICAL ELECTRICAL DETAILS	0

PROFESSIONAL ENGINEER SEAL



CENTEK engineering
Centered on Solutions
(203) 488-0360
(203) 488-8897 Fax
632 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
CT720/TOWN OF ORANGE_MP
SITE ID: CT11720A
26 S ORANGE CENTER RD
ORANGE, CT 06477

DATE: 10/2/18
SCALE: AS NOTED
JOB NO. 18058.87

TITLE SHEET

T-1

GOVERNING CODE: 2015 INTERNATIONAL BUILDING (IBC) AS MODIFIED BY
THE 2018 CT STATE BUILDING CODE AND AMENDMENTS.

- GENERAL NOTES:**

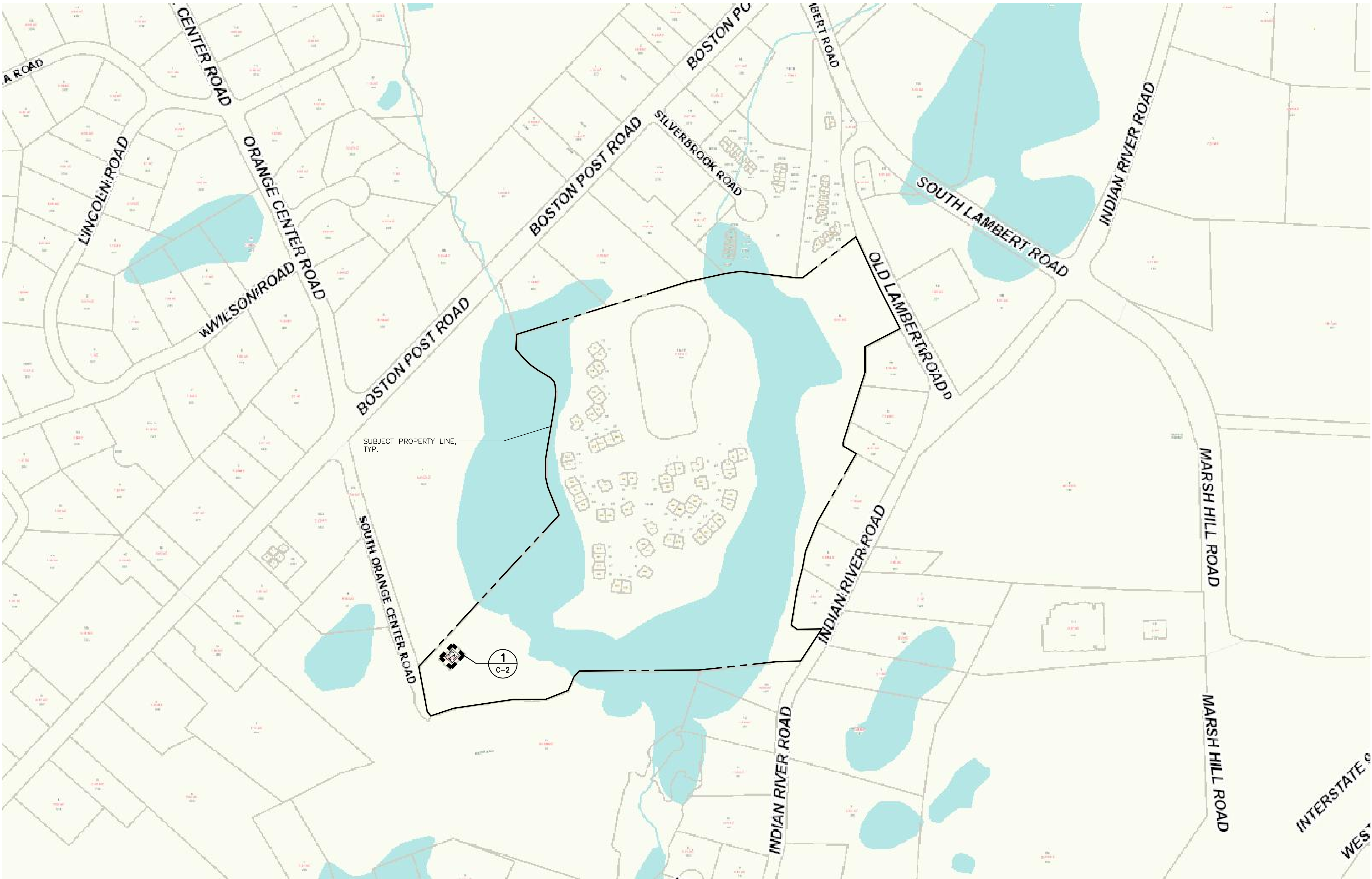
- ## STRUCTURAL STEEL

- | | | | | | | | | |
|---|---|----------|--|--|---|--|----------------------------|--|
| <div style="text-align: center;"> T-MOBILE NORTHEAST LLC
 <small>WIRELESS COMMUNICATIONS FACILITY</small>

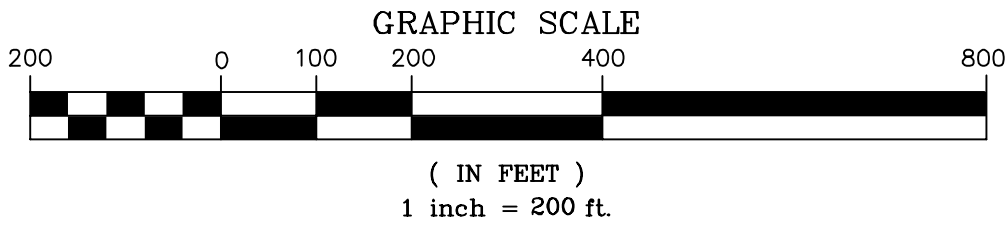
 CT720/TOWN OF ORANGE_MP

 SITE ID: CT1720A
 26 S ORANGE CENTER RD
 ORANGE, CT 06477 </div> |  <p>(203) 488-0380
(203) 488-8897 Fax
65/2 North Branford Road
Branford, CT 06405
www.CentekEng.com</p> | | 

 | |  | | PROFESSIONAL ENGINEER SEAL | |
| | DATE: | 10/2/18 | | | | | | |
| | SCALE: | AS NOTED | | | | | | |
| | JOB NO. | 18058.87 | | | | | | |
| | DESIGN BASIS AND SITE NOTES | | | | | | | |
| | N-1 | | | | | | | |
| Sheet No. <u>2</u> of <u>5</u> | | | | | | | | |



1 SITE LOCATION PLAN
C-1 SCALE: 1" = 200'



T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
CT720/TOWN OF ORANGE_MP
SITE ID: CT11720A
26 S ORANGE CENTER RD
ORANGE, CT 06477

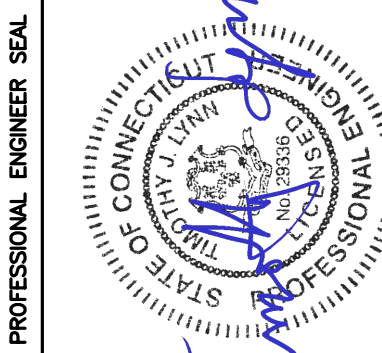
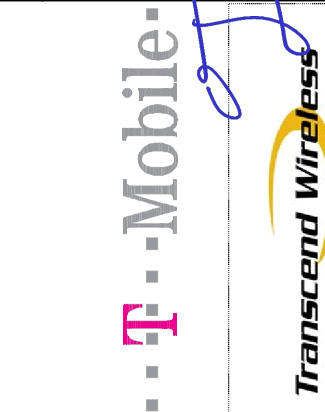
DATE: 10/2/18
SCALE: AS NOTED
JOB NO. 18058.87

SITE LOCATION
PLAN

C-1

Sheet No. 3 of 5

CENTEK engineering
Centered on Solutions
(203) 488-0380
(203) 488-3387 Fax
632 North Star Road
Branford, CT 06405
www.CentekEng.com



REV.	DATE	TITLE	CAG	ISSUED FOR CONSTRUCTION
0	10/15/18	DRAWN BY CHK'D BY		



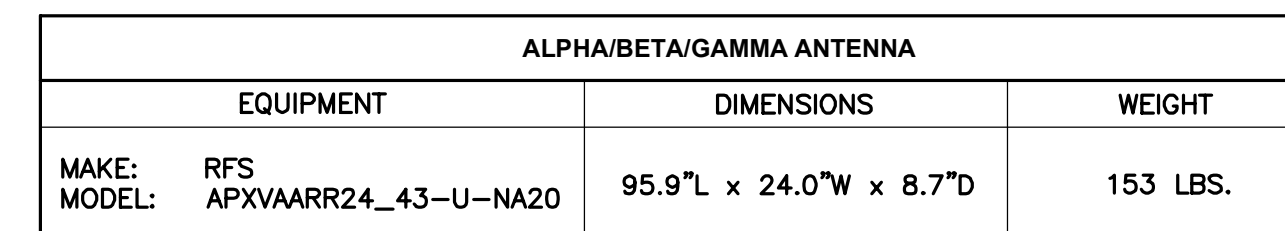
- # 1 TYPICAL ANTENNA GROUNDING DETAIL



2 TYPICAL RRU GROUNDING DETAIL
E-1 NOT TO SCALE



3 **PROPOSED PLUMBING DIAGRAM**
E-1 SCALE: NONE



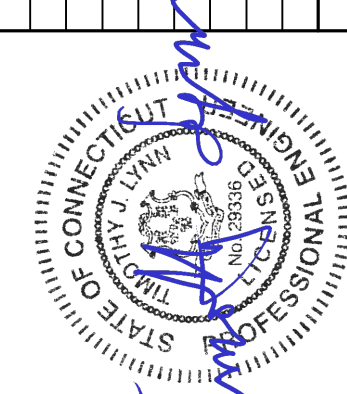
5 PROPOSED ANTENNA DETAIL
E-1 SCALE: NONE



4
E-1

[illegible]

PROFESSIONAL ENGINEER SEAL



UNIVERSITY OF CALIFORNIA, BERKELEY

CELTEK engineering
Centered on SolutionsSM

0590-4880(2003)498:0590

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(203) 488-8587 Fax
63-2 North Branford Road

Branford, CT 06405

www.CentekEng.com

T-MOBILE NORTHEAST LLC

WIRELESS COMMUNICATIONS FACILITY

CT720/TOWN OF ORANGE_MP

SITE ID: CT11720A

26 S ORANGE CENTER RD
ORANGE, CT 06477

DATE:	10/2/18
SCALE:	AS NOTED
JOB NO.	18058.87

TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 5 of 5

This notice serves as proof of delivery for the shipment listed below.

Tracking Number

1ZV257420192906542

Weight

1.00 LBS

Service

UPS Next Day Air®

Shipped / Billed On

10/18/2018

Delivered On

10/19/2018 10:21 A.M.

Delivered To

2000 CORPORATE DR
CANONSBURG, PA, 15317, US

Received By

TODD

[Handwritten signature]

Left At

Front Desk

Reference Number(s)

CROWN, CT11720A, CT11720A, CROWN

Thank you for giving us this opportunity to serve you. Details are only available for shipments delivered within the last 120 days. Please print for your records if you require this information after 120 days.

Sincerely,

UPS

Tracking results provided by UPS: 10/22/2018 12:03 P.M. EST

Proof of Delivery

Dear Customer,

This notice serves as proof of delivery for the shipment listed below.

Tracking Number

1ZV257420192674525

Weight

1.00 LBS

Service

UPS Next Day Air®

Shipped / Billed On

10/18/2018

Delivered On

10/19/2018 9:35 A.M.

Delivered To

617 ORANGE CENTER RD
ORANGE, CT, 06477, US

Received By

SHAW

Left At

Front Desk

Reference Number(s)

CT11720A, CT11720A

Thank you for giving us this opportunity to serve you. Details are only available for shipments delivered within the last 120 days. Please print for your records if you require this information after 120 days.

Sincerely,

UPS

Tracking results provided by UPS: 10/22/2018 12:02 P.M. EST

Proof of Delivery

Dear Customer,

This notice serves as proof of delivery for the shipment listed below.

Tracking Number

1ZV257420192488530

Weight

1.00 LBS

Service

UPS Next Day Air®

Shipped / Billed On

10/18/2018

Delivered On

10/19/2018 9:36 A.M.

Delivered To

617 ORANGE CENTER RD
ORANGE, CT, 06477, US

Received By

DINICE

Left At

Front Desk

Reference Number(s)

CT11720A, CT11720A

Thank you for giving us this opportunity to serve you. Details are only available for shipments delivered within the last 120 days. Please print for your records if you require this information after 120 days.

Sincerely,

UPS

Tracking results provided by UPS: 10/22/2018 12:02 P.M. EST