

Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Wednesday, June 12, 2019 2:55 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CTHA539A CSC EO



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Shipment Details

From: TRANSCEND WIRELESS

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Ship To: Theodore Shafer
Town of Burlington
200 Spielman Highway
BURLINGTON, CT 060131735
US

UPS Service: UPS GROUND

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Kyle Richers

From: UPS Quantum View <pkginfo@ups.com>
Sent: Wednesday, June 12, 2019 2:57 PM
To: krichers@transcendwireless.com
Subject: UPS Ship Notification, Reference Number 1: CTHA539A CSC ZO



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Scheduled Delivery Date: Thursday, 06/13/2019

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Shipment Details

From: TRANSCEND WIRELESS

Tracking Number: [1ZV257424297297142](#)

Ship To: Gerald Burns
Town of Burlington
200 Spielman Highway
BURLINGTON, CT 060131735
US

UPS Service: UPS GROUND

Number of Packages: 1

Scheduled Delivery: 06/13/2019

Signature Required: A signature is required for package delivery

Weight: 1.0 LBS

Reference Number 1: CTHA539A CSC ZO



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10 INDUSTRIAL AVE,
SUITE 3
MAHWAH NJ 07430

PHONE: 201.684.0055
FAX: 201.684.0066

June 7, 2019

Members of the Siting Council
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Notice of Exempt Modification
719 George Washington Turnpike, Burlington, CT 06013
Latitude: 41.766400000
Longitude: -72.9617000000
T-Mobile Site#: CTHA539A – L600

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 179-foot level of the existing 180-foot monopole tower at 719 George Washington Turnpike, Burlington, CT. The 180-foot monopole tower and property are owned by the Town of Burlington. T-Mobile now intends to replace six (6) of its existing antennas with six (6) new 600/700/1900/2100 MHz antennas. The new antennas will be installed at the same 179-foot level of the tower.

Planned Modifications:

Tower:

Remove

N/A

Remove and Replace:

(3) LNX-6515DS (Remove) - APXVAARR24_43-U-NA20 Antenna (Replace) 600/700 MHz

(3) AIR 21 KRC118023 B2P B4A (Remove) – AIR 32 KRD901146-1 B66A_B2A Antenna (Replace) 1900/2100 Mhz

Install New:

(3) Radio 4449 B71+B12 RRUs

(3) 1-3/8" Hybrid Cables

(1) SitePro handrail

Existing to Remain:

(3) AIR 21 KRC118012 B2P B4A Antenna 1900 MHz

(6) 1-5/8" coax

(1) 1-3/8" Hybrid Cable

Ground:

Remove: Existing 6201 Cabinet

Install New: 6102 Cabinet

This facility was originally approved by the CSC for tower-sharing on January 22, 1997. This modification complies with this approval. Please see the enclosed.

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 -Theodore Shafer, Elected Official, and Gerald Burns, Zoning Enforcement Officer for the Town of Burlington.

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

1. The proposed modifications will not result in an increase in the height of the existing 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 modifications 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,

Kyle Richers

Transcend Wireless

Cell: 908-447-4716

Email: krichers@transcendwireless.com

Attachments

cc: Theodore Shafer – Town of Burlington First Selectman

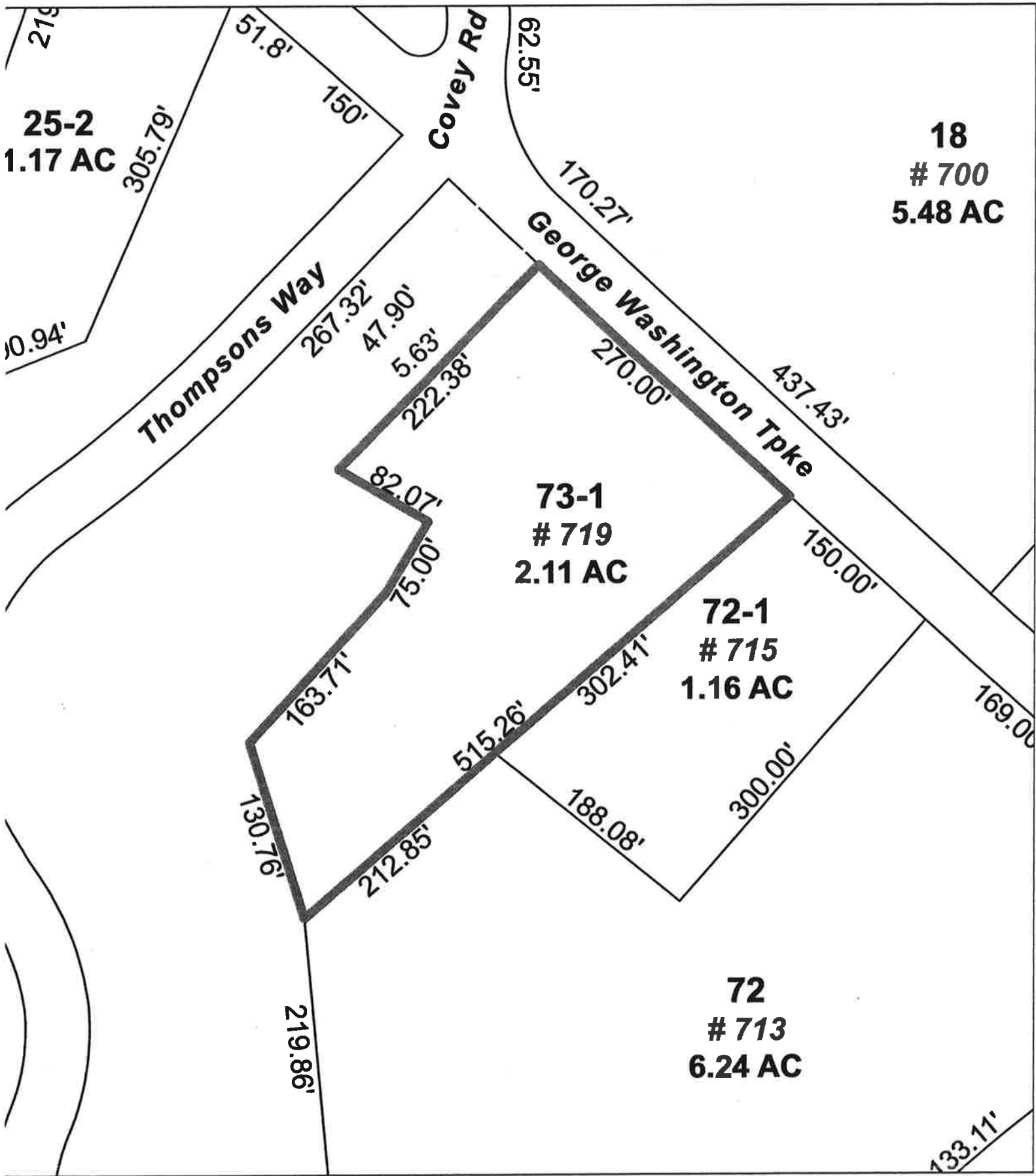
Gerald Burns– Town of Burlington Zoning Enforcement Officer



Town of Burlington, Connecticut. Assessment Parcel Map

Map-Block-Lot 4-08-73-1

Address: 719 GEO WASHINGTON TPKE



1 inch = 100 feet

N

Disclaimer: This map is for informational purposes only. All information is subject to verification by any user. The Town of Burlington and its mapping.



Town of Burlington, CT

Property Listing Report

Map Block Lot

4-08-73-1

Account

00037000

Valuation Summary (Assessed value = 70% of Appraised Value)

Item	Appraised	Assessed
Buildings	977900	684530
Extras	27100	18970
Improvements	1044600	731220
Outbuildings	39600	27720
Land	159200	111440
Total	1203800	842660

Sub Areas

Subarea Type	Gross Area (sq ft)	Living Area (sq ft)
Basement, Finished	3912	0
First Floor	9880	9880
Cathedral	5968	0
Porch, Enclosed	160	0
Total Area	19920	9880

Outbuilding and Extra Items

Type	Description
Fram Shedw/Ele	400.00 S.F.
Open Porch	1040.00 S.F.
Air Condition	8500.00 UNITS
Paving-Asphalt	10000.00 S.F.
Light w/Pole	5.00 UNITS

Sales History

Owner of Record	Book/ Page	Sale Date	Sale Price
BURLINGTON TOWN OF	00091/0528		0



STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

10 Franklin Square
New Britain, Connecticut 06051
Phone: (860) 827-2935
Fax: (860) 827-2950

FILE
COPY

January 23, 1997

David S. Malko, P.E. Manager
Engineering & Regulatory Services
Bell Atlantic NYNEX Mobile
20 Alexander Drive, P.O. Box 5029
Wallingford, CT 06492

Re: Bell Atlantic NYNEX Mobile request for an order of tower sharing at an existing telecommunications tower located at 716 George Washington Turnpike in the Town of Burlington, Connecticut.

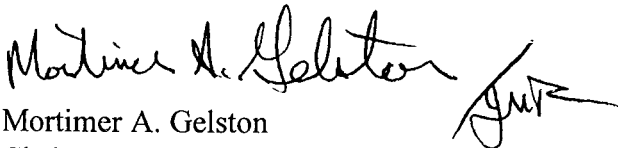
Dear Mr. Malko:

At a meeting held January 22, 1997, the Connecticut Siting Council (Council) ruled that the shared use of this existing tower site is technically, legally, environmentally, and economically feasible and meets public safety concerns, and therefore, in compliance with General Statutes § 16-50aa, the Council has ordered the shared use of this facility to avoid the unnecessary proliferation of tower structures.

This decision applies only to this request for tower sharing and is not applicable to any other request or construction.

The proposed shared use is to be implemented as specified in your letter dated December 19, 1996. Please notify the Council when all work is complete. A copy of the staff report on this request, dated January 22, 1997, is enclosed for your information.

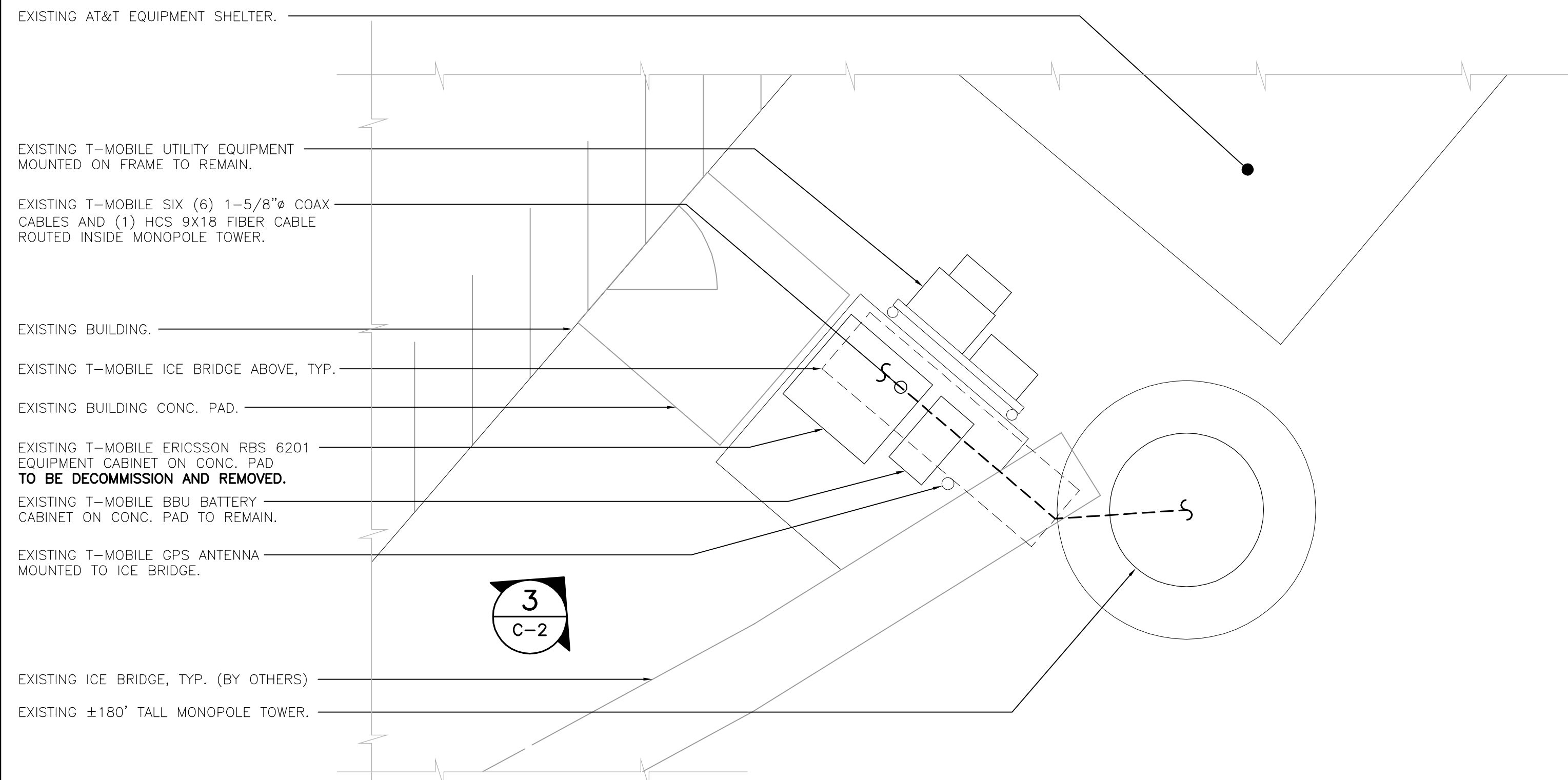
Very truly yours,


Mortimer A. Gelston
Chairman

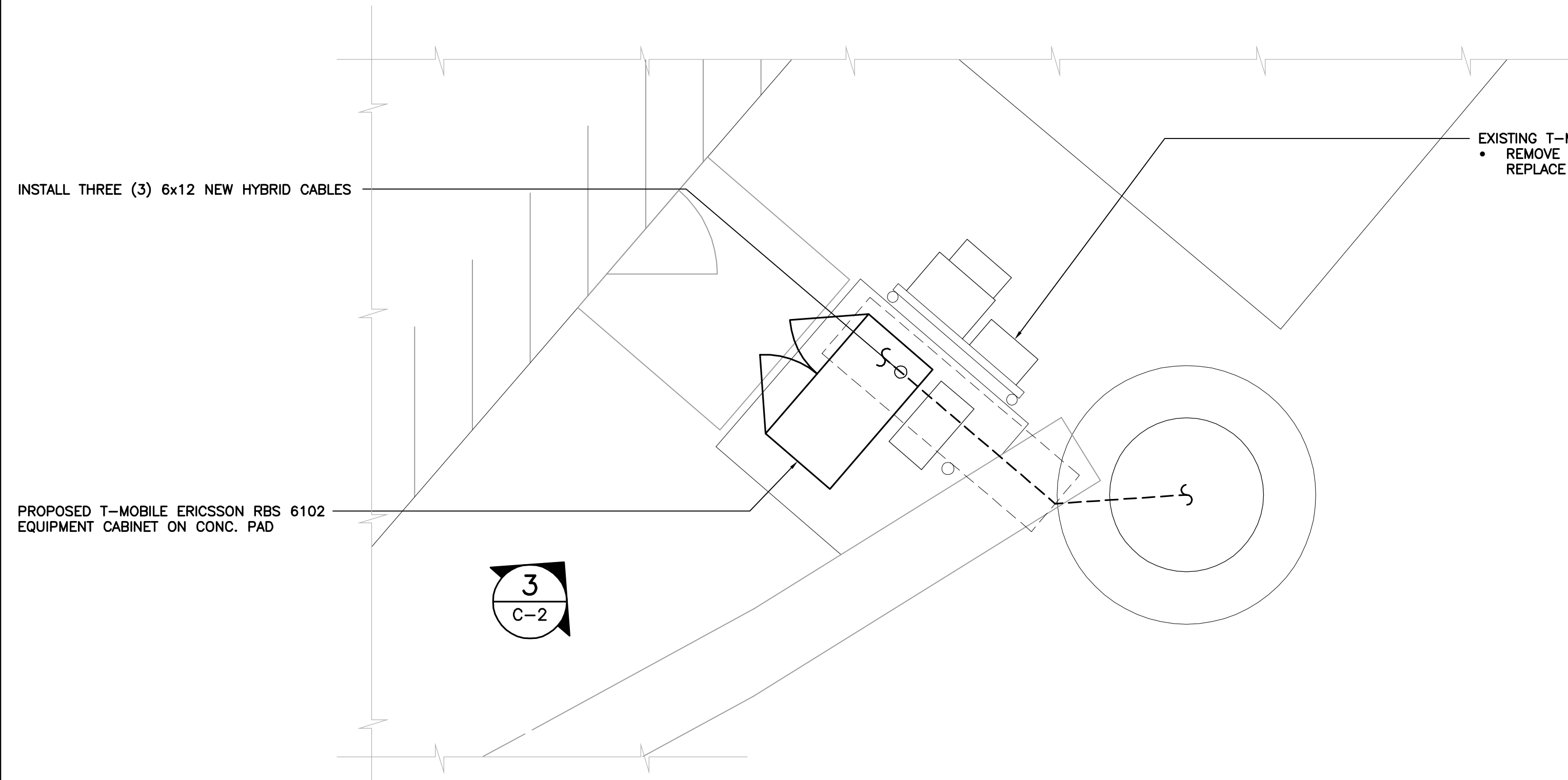
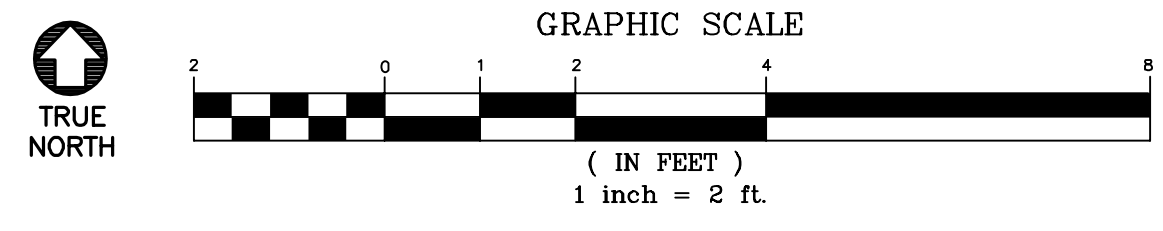
MAG:TEF:mmb
Enclosure

1. Staff Report dated January 22, 1997.

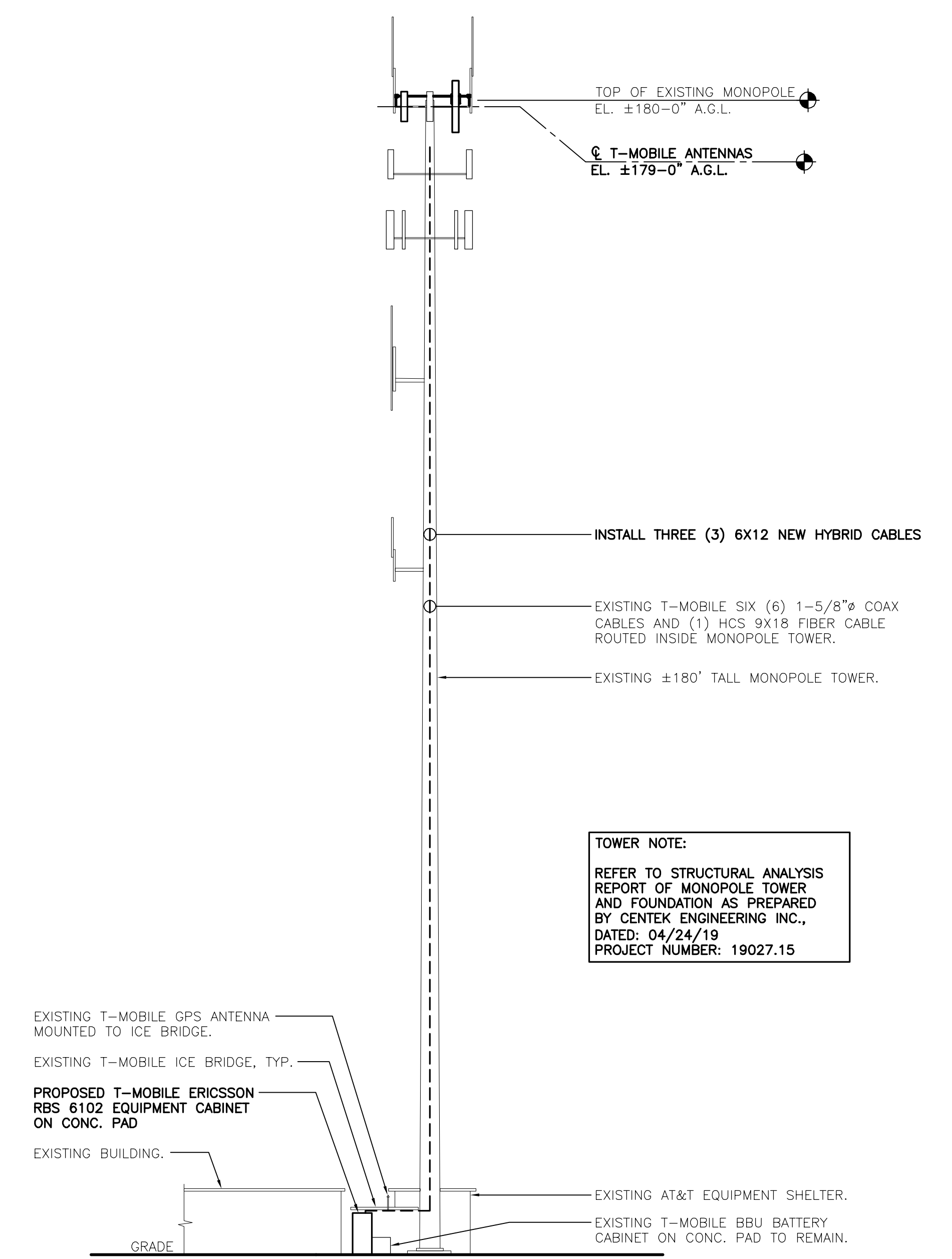
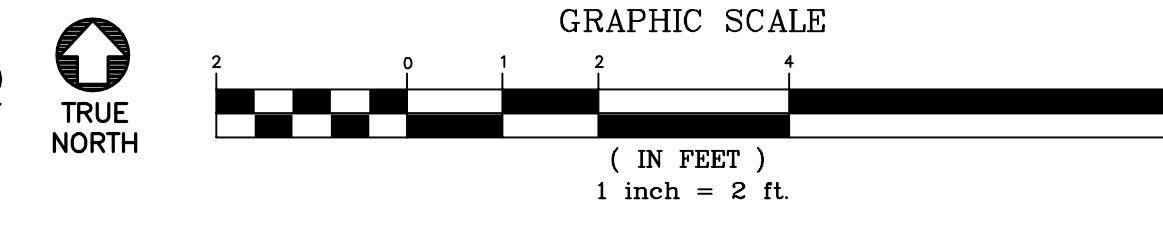
c: Theodore Schiedel, First Selectman, Burlington
Sandy Carter, Bell Atlantic NYNEX Mobile



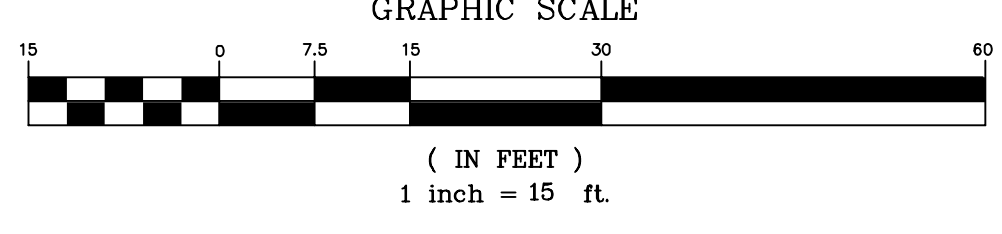
1 PARTIAL SITE PLAN - EXISTING
C-2 SCALE: 1/2" = 1'



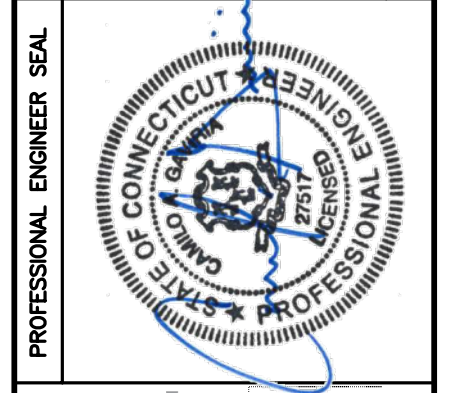
2 PARTIAL SITE PLAN - PROPOSED
C-2 SCALE: 1/2" = 1'



3 SOUTHWEST ELEVATION - PROPOSED
C-2 SCALE: 1" = 15'



REV.	DATE	BY	CHK'D BY	DESCRIPTION
1	05/09/19	KAWR		CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
0	05/13/19	KAWR		CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

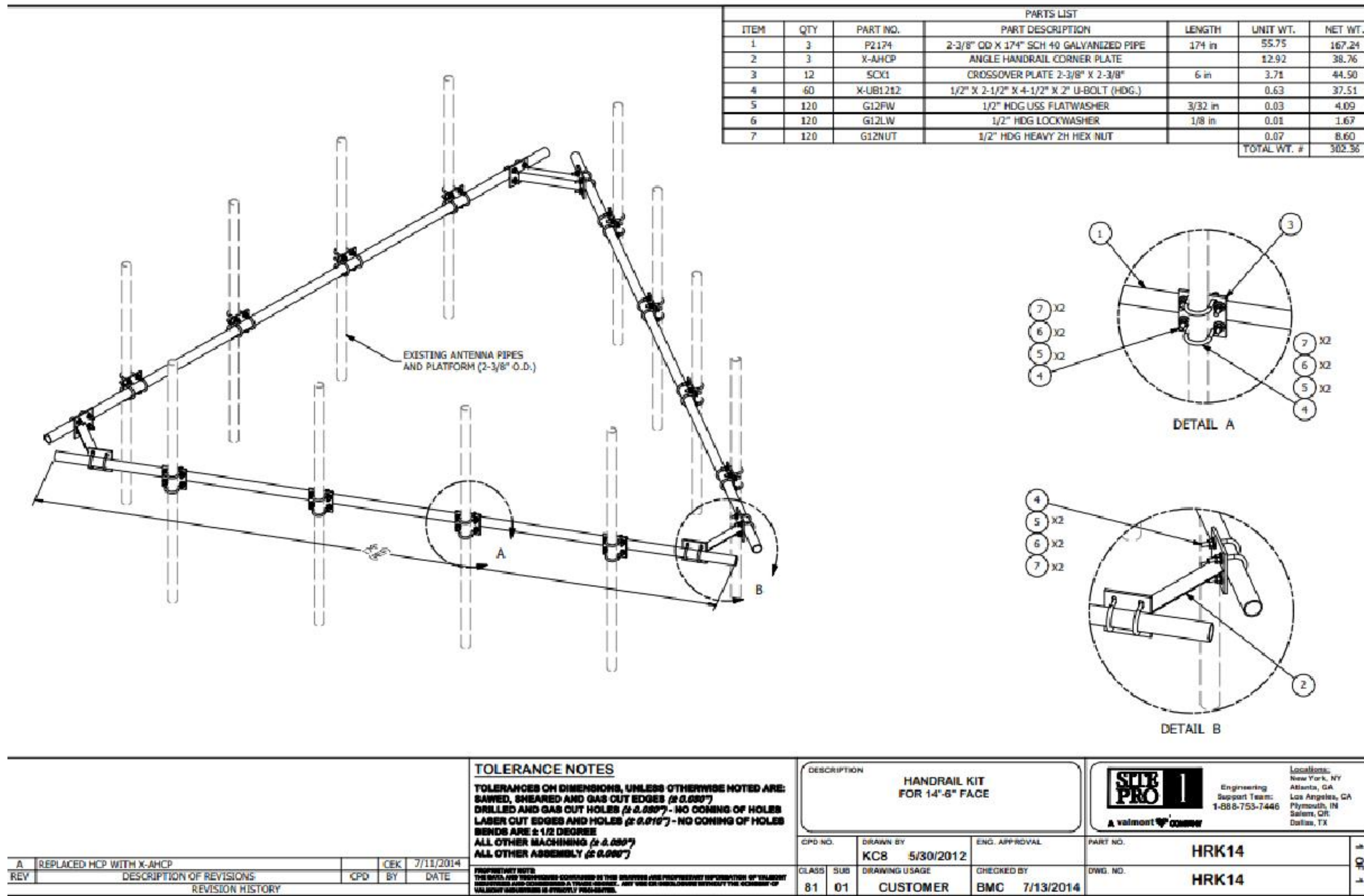


CEN TEK engineering
Centek on Solutions
(203) 488-0380
(203) 488-3387 Fax
622 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
BURLINGTON F.D. FLAGPOLE
SITE ID: CTHA539A
719 GEORGE WASHINGTON TPKE
BURLINGTON, CT 06013

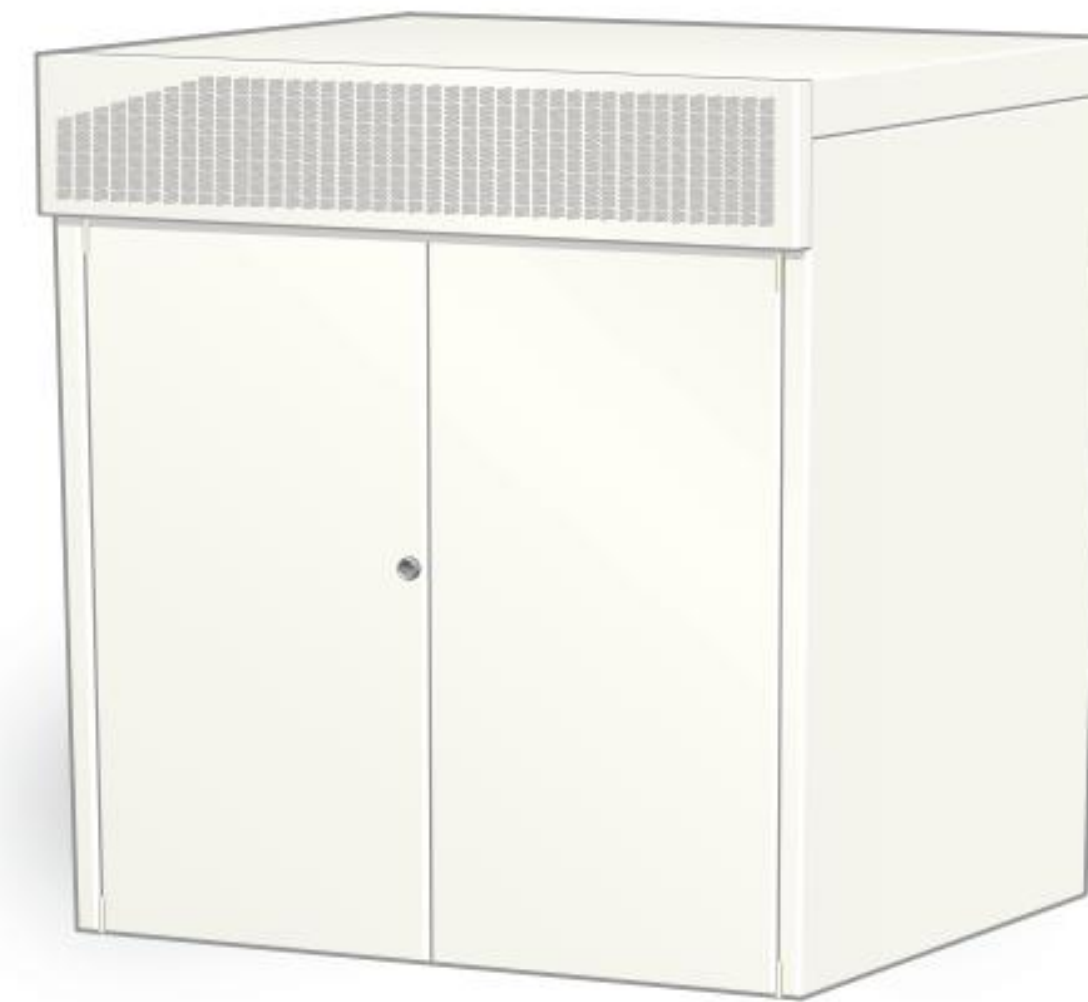
DATE: 05/01/19
SCALE: AS NOTED
JOB NO. 19027.15

PARTIAL SITE PLAN
&
TOWER ELEVATION



TOLERANCE NOTES TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE: SAWED, UNBEARED AND GAS CUT EDGES (± 0.007") DRILLED AND GAS CUT HOLES (± 0.007") - NO CONING OF HOLES LASER CUT EDGES AND HOLES (± 0.015") - NO CONING OF HOLES BENDS ARE ± 1/2 DEGREE ALL OTHER MACHINING (± 0.004") ALL OTHER ASSEMBLY (± 0.004")		DESCRIPTION HANDRAIL KIT FOR 14'-6" FACE	 Local Offices: New York, NY Atlanta, GA Los Angeles, CA Plymouth, IN Salem, OH Dallas, TX Engineering Support Team: 1-888-753-7446
A REPLACED MCP WITH X-AHCP REV. DESCRIPTION OF REVISIONS REVISION HISTORY	CEK 7/13/2014 CPD BT DATE	CPD NO. 81 SUB 01 CLASS CUSTOMER	DRAWN BY KCB 5/30/2012 ENG. APPROVAL CHECKED BY BMC 7/13/2014 PART NO. HRK14 DWG. NO. HRK14

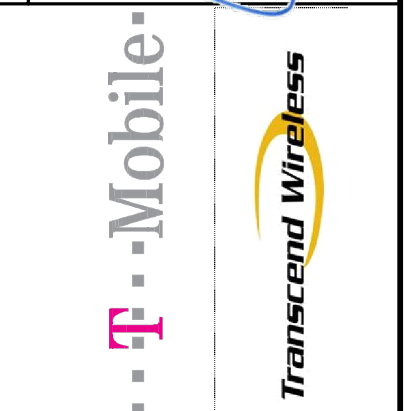
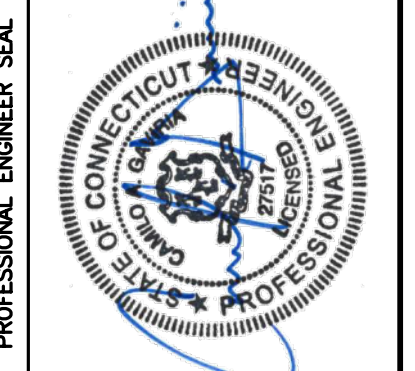
1 HANDRAIL DETAIL (SITE PRO P/N: HRK14)
 E-2 SCALE: NOT TO SCALE



EQUIPMENT CABINET	DIMENSIONS	WEIGHT
EQUIPMENT MAKE: ERICSSON MODEL: 6102 MU AC CABINET	57.09"H x 51.18"W x 27.56"D	727.53 LBS

2 ERICSSON RADIO CABINET DETAIL
 E-2 SCALE: NOT TO SCALE

REV.	DATE	BY	CHK'D BY	DESCRIPTION
1	05/09/19	KAWR		CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
0	05/13/19	KAWR		CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION



CEN TEK engineering
 Centered on Solutions
 (203) 488-0390
 (203) 488-3897 Fax
 622 North Branford Road
 Branford, CT 06405
 www.CenTekEng.com

T-MOBILE NORTHEAST LLC
 WIRELESS COMMUNICATIONS FACILITY
BURLINGTON F.D. FLAGPOLE
SITE ID: CTHA539A
 719 GEORGE WASHINGTON TPKE
 BURLINGTON, CT 06013

DATE: 05/01/19
 SCALE: AS NOTED
 JOB NO. 19027.15

DETAILS

E-2

Structural Analysis Report

180-ft Existing EEI Monopole

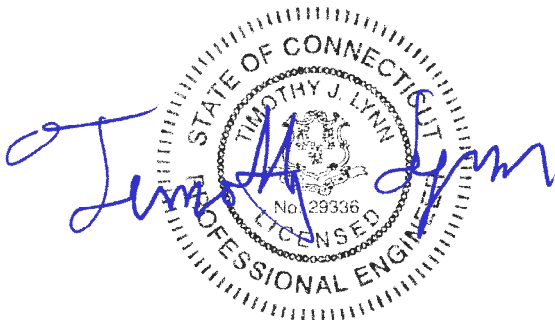
*Proposed T-Mobile
Antenna Upgrade*

T-Mobile Site Ref: CTHA539A

*719 George Washington Turnpike
Burlington, CT*

CEN TEK Project No. 19027.15

Date: April 24, 2019



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

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I n t r o d u c t i o n

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 Burlington, CT.

The host tower is a 180-ft tall, four-section, eighteen sided, tapered monopole, originally designed and manufactured by Engineered Endeavors Incorporated (EEI); project no. 13628 dated September 15, 2005. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural analysis report prepared by Centek job no; 17051.00, dated April 17, 2017. The tower was previously reinforced per the structural analysis and reinforcement design prepared by Atlantis Group dated October 8, 2014.

Antenna and appurtenance information were obtained from the previously issued structural reports, visual verification from grade conducted by Centek personnel on April 15, 2019 and a T-Mobile RF data sheet.

The tower is made up of four (4) tapered vertical sections consisting of A572-65 pole sections. The tower sections are slip joint connected. The diameter of the pole (flat-flat) is 19.50-in at the top and 56.25-in at the base.

A n t e n n a a n d A p p u r t e n a n c e S u m m a r y

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

- **TOWN (EXISTING):**
Antennas: Three (3) 20-ft Omni-directional whip antennas mounted to the T-Mobile low profile platform with an elevation of 191-ft above grade level.
Coax Cables: Three (3) 1-5/8" \varnothing coax cables running on the inside of the existing monopole.
- **AT&T (EXISTING):**
Antennas: Six (6) Ericsson RRUS-11 and one (1) Raycap DC6-48-60-18-8F surge arrester mounted to one (1) universal ring mount with a RAD center elevation of 170-ft above grade level.
Coax Cables: One (1) fiber cable and two (2) dc control cables running on the inside of the existing monopole.
- **AT&T (EXISTING):**
Antennas: Six (6) Powerwave 7770.00 panel antennas, three (3) Powerwave P65-17-XLH-RR panel antennas, six (6) LGP21401 TMA's and six (6) LGP13519 diplexers mounted on a low profile platform with a RAD center elevation of 170-ft above grade level.
Coax Cables: Twelve (12) 1-5/8" \varnothing coax cables running on the inside of the existing monopole

- **VERIZON (EXISTING):**
Antennas: Six (6) RFS APL866513 panel antennas, six (6) Commscope JAHH-65B-R3B panel antennas, three (3) Alcatel-Lucent RRH2x60-700 remote radio heads, three (3) Nokia B66A RRH4x45 remote radio heads, three (3) Nokia RRH 4T4R B5 remote radio heads and two (2) Raycap RC2DC-3315-PF-48 main distribution boxes mounted on a low profile platform with a RAD center elevation of 160-ft above grade level.
Coax Cables: Twelve (12) 1-5/8" Ø coax cables and two (2) 1-5/8" Ø fiber cables running inside the monopole.
- **TOWN (EXISTING):**
Antennas: One (1) 20-ft dipole antenna mounted on a 3-ft standoff with an elevation of 138.5-ft above grade level.
Coax Cables: One (1) 1-5/8" Ø coax cable running on the inside of the existing monopole.
- **TOWN (EXISTING):**
Antennas: One (1) 8-ft Omni-directional whip antenna and one (1) 3-ft yagi mounted on a 3-ft standoff with an elevation of 132.5-ft above grade level.
Coax Cables: One (1) 1-5/8" Ø and one (1) 1/2" Ø coax cables running on the inside of the existing monopole.
- **TOWN (EXISTING):**
Antennas: One (1) 10-ft dipole antenna mounted on a 3-ft standoff with an elevation of 112.5-ft above grade level.
Coax Cables: One (1) 1-5/8" Ø coax cable running on the inside of the existing monopole.
- **T-MOBILE (EXISTING TO REMAIN):**
Antennas: Three (3) Ericsson AIR21 panel antennas mounted on a low profile platform with a RAD center elevation of 179-ft above grade level.
Coax Cables: Six (6) 1-5/8" Ø coax cables and one (1) 9x18 Hybrid cable running inside the monopole.
- **T-MOBILE (EXISTING TO REMOVE):**
Antennas: Three (3) Ericsson AIR21 panel antennas and three (3) Andrew LNX-6515DS mounted on a low profile platform with a RAD center elevation of 179-ft above grade level.
- **T-MOBILE (PROPOSED):**
Antennas: **Three (3) Ericsson AIR32 panel antennas, 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 179-ft above grade level. (SitePro handrail kit (p/n HRK14) to be installed on platform)**
Coax Cables: **Three (3) 6x12 fiber lines running on the exterior 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 as a Class III Structure used primarily for essential facilities, gravity loads of the tower structure and its components, and the application of 1.00” radial ice on the tower structure and its components.

Basic Wind Speed:	Hartford; $v = 90-105$ mph	[Annex B of TIA-222-G-2005]
	Burlington; $v = 93$ mph	[Appendix N of the 2018 CT Building Code]
Load Cases:	<u>Load Case 1</u> ; 93 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	[Appendix N of the 2018 CT Building Code]
	<u>Load Case 2</u> ; 50 mph wind speed w/ 1.00” radial ice plus gravity load – used in calculation of tower stresses.	[Annex B of TIA-222-G-2005]

¹ The 2015 International Building Code as amended by the 2018 Connecticut State Building Code (CSBC).

Tower Capacity

- Calculated stresses were found to be within allowable limits. Per trnTower “Section Capacity Table”, this tower was found to be at **98.0%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L1)	139.50'-179.00'	98.0%	PASS

- (1) Wall thickness increased in tower section 2 to account for reinforcement design prepared by Atlantis Group for T-Mobile dated 10.8.14.

Foundation and Anchors

The existing foundation consists of a 7.5 Ø x 28.0-ft long reinforced concrete caisson. The sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned structural report. The base of the tower is connected to the foundation by means of (18) 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	34 kips
	Compression	53 kips
	Moment	4399 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	Proposed Loading	Result
Reinforced Concrete Caisson	Moment Capacity	66.7%	PASS
	Lateral Deflection	0.24 in. ⁽¹⁾	PASS

- (2) Lateral deflection limited to 0.75” under service load condition per section 9.5 of TIA-222-G.

- 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	57.1%	PASS
Base Plate	Bending	90.8%	PASS

Conclusion

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

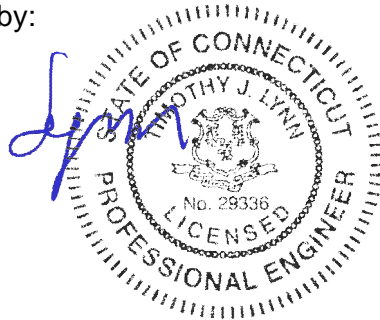
The analysis is based, in part, on the information provided to this office by T-Mobile. If the existing conditions are different than the information in this report, Centek Engineering, Inc. must be contacted for resolution of any potential issues.

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
20' x 2" Dia Omni (Town Existing)	191	(2) LPG13519 Diplexer (ATI Existing)	170
20' x 2" Dia Omni (Town Existing)	191	(2) LPG13519 Diplexer (ATI Existing)	170
20' x 2" Dia Omni (Town Existing)	191	EEL 14-ft Low Profile Platform (ATI Existing)	168
AIR21 B2A/B4P (T-Mobile Existing)	179	APL866513-42T0 (Verizon Existing)	160
AIR32 (T-Mobile Proposed)	179	JAHH-65B-R3B (Verizon Existing)	160
AIR21 B2A/B4P (T-Mobile Existing)	179	JAHH-65B-R3B (Verizon Existing)	160
AIR32 (T-Mobile Existing)	179	APL866513-42T0 (Verizon Existing)	160
AIR21 B2A/B4P (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
AIR32 (T-Mobile Proposed)	179	JAHH-65B-R3B (Verizon Existing)	160
APXVAARR24-43 (T-Mobile Proposed)	179	JAHH-65B-R3B (Verizon Existing)	160
APXVAARR24-43 (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
4449 B12,B71 (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
4449 B12,B71 (T-Mobile Proposed)	179	JAHH-65B-R3B (Verizon Existing)	160
4449 B12,B71 (T-Mobile Proposed)	179	JAHH-65B-R3B (Verizon Existing)	160
4449 B12,B71 (T-Mobile Proposed)	179	APL866513-42T0 (Verizon Existing)	160
EEL 14-ft Platform w/ Rails (T-Mobile Existing)	177	B66A RRH4x45 (Verizon Existing)	160
(2) RRUS-11 (ATI Existing)	170	B66A RRH4x45 (Verizon Existing)	160
(2) RRUS-11 (ATI Existing)	170	B66A RRH4x45 (Verizon Existing)	160
(2) RRUS-11 (ATI Existing)	170	RRH4x30-B13 (Verizon Existing)	160
DC6-48-60-18-8F Surge Arrestor (ATI Existing)	170	RRH4x30-B13 (Verizon Existing)	160
Valmont Uni-Tri Bracket (ATI Existing)	170	RRH4x30-B13 (Verizon Existing)	160
7770.00 (ATI Existing)	170	RRH 4T4R B5 160W (Verizon Existing)	160
7770.00 (ATI Existing)	170	RRH 4T4R B5 160W (Verizon Existing)	160
P65-17-XLH-RR (ATI Existing)	170	RRH 4T4R B5 160W (Verizon Existing)	160
7770.00 (ATI Existing)	170	RC2DC-3315-PF-48 (Verizon Existing)	160
7770.00 (ATI Existing)	170	RC2DC-3315-PF-48 (Verizon Existing)	160
P65-17-XLH-RR (ATI Existing)	170	EEL 14-ft Low Profile Platform (Verizon Existing)	158
7770.00 (ATI Existing)	170	20' 4-Bay Dipole (Town Existing)	138.5
P65-17-XLH-RR (ATI Existing)	170	3' Pipe Mount Side Arm (Town Existing)	138.5
7770.00 (ATI Existing)	170	3' Pipe Mount Side Arm (Town Existing)	132.5
(2) LGP21401 TMA (ATI Existing)	170	8' x 2" Omni (Town Existing)	132.5
(2) LGP21401 TMA (ATI Existing)	170	3' Yagi (Town Existing)	132.5
(2) LGP21401 TMA (ATI Existing)	170	10' Dipole (Town Existing)	112.5
(2) LPG13519 Diplexer (ATI Existing)	170	3' Pipe Mount Side Arm (Town Existing)	112.5

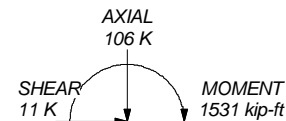
MATERIAL STRENGTH

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

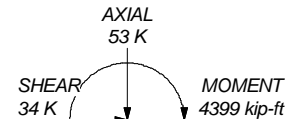
TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
8. Welds are fabricated with ER-70S-6 electrodes.
9. Wall thickness increased in tower section 2 to account for reinforcement design per Atlantis Group drawings dated 10.8.14
10. TOWER RATING: 98%

ALL REACTIONS ARE FACTORED

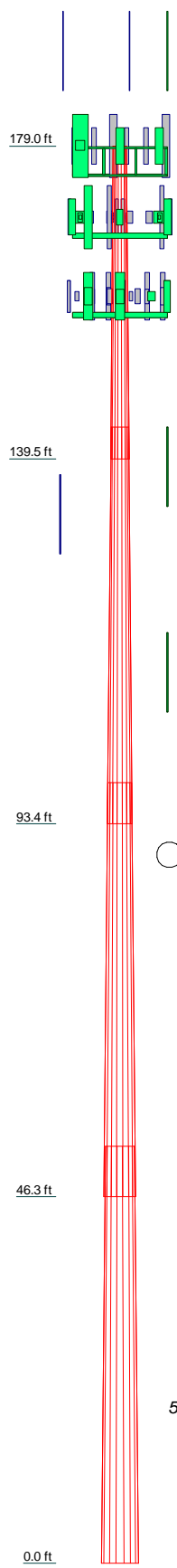


TORQUE 2 kip-ft
50 mph WIND - 1.0000 in ICE



TORQUE 3 kip-ft
REACTIONS - 93 mph WIND

Section	1	2	3	4	Grade	Weight (K)
Length (ft)	39.50	50.10	52.29	52.70	A572-65	27.7
Number of Sides	18	18	18	18		
Thickness (in)	0.1875	0.3750	0.3750	0.3750		
Socket Length (ft)	4.00	5.20	6.39	44.9739		
Top Dia (in)	19.5000	26.8051	35.6737	56.2500		
Bot Dia (in)	28.0455	37.5377	47.1230			
Grade	1.9	6.5	8.7	10.7		
Weight (K)						



Centek Engineering Inc.		Job: 19027.15 - CTHA539A	
63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587		Project: 180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	
Client: T-Mobile	Drawn by: TJL	App'd:	
Code: TIA-222-G	Date: 04/24/19	Scale: NTS	
Path:		Dwg No: E-1	

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 19027.15 - CTHA539A	Page 1 of 22
	Project 180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	Date 09:39:39 04/24/19
	Client T-Mobile	Designed by TJL

Tower Input Data

The tower is a monopole.

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

The following design criteria apply:

- Basic wind speed of 93 mph.
- Structure Class III.
- Exposure Category C.
- Topographic Category 1.
- Crest Height 0.00 ft.
- Nominal ice thickness of 1.0000 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.
- Tower members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards..
- Welds are fabricated with ER-70S-6 electrodes..
- Wall thickness increased in tower section 2 to account for reinforcement design per Atlantis Group drawings dated 10.8.14.
- 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

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric | <ul style="list-style-type: none"> Distribute Leg Loads As Uniform Assume Legs Pinned √ Assume Rigid Index Plate Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension Bypass Mast Stability Checks Use Azimuth Dish Coefficients √ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination √ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs | <ul style="list-style-type: none"> Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation √ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-G Bracing Resist. Exemption Use TIA-222-G Tension Splice Exemption <li style="text-align: center;">Poles Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known |
|--|---|---|

Tapered Pole Section Geometry

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 19027.15 - CTHA539A	Page 2 of 22
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	Client T-Mobile	Designed by TJJ

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
L1	179.00-139.50	39.50	4.00	18	19.5000	28.0455	0.1875	0.7500	A572-65 (65 ksi)
L2	139.50-93.40	50.10	5.20	18	26.8051	37.5377	0.3750	1.5000	A572-65 (65 ksi)
L3	93.40-46.31	52.29	6.39	18	35.6737	47.1230	0.3750	1.5000	A572-65 (65 ksi)
L4	46.31-0.00	52.70		18	44.9739	56.2500	0.3750	1.5000	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	19.7719	11.4934	541.5782	6.8559	9.9060	54.6717	1083.8689	5.7478	3.1020	16.544
	28.4492	16.5790	1625.5317	9.8896	14.2471	114.0955	3253.2023	8.2911	4.6060	24.565
L2	28.0309	31.4585	2776.3466	9.3827	13.6170	203.8882	5556.3464	15.7322	4.0577	10.821
	38.0589	44.2329	7717.8693	13.1928	19.0692	404.7306	15445.8939	22.1207	5.9466	15.858
L3	37.3224	42.0143	6613.8340	12.5311	18.1223	364.9563	13236.3706	21.0112	5.6186	14.983
	47.7921	55.6418	15362.6008	16.5955	23.9385	641.7533	30745.4162	27.8262	7.6336	20.356
L4	46.9982	53.0838	13339.7306	15.8326	22.8467	583.8794	26697.0140	26.5469	7.2554	19.348
	57.0599	66.5052	26231.8094	19.8356	28.5750	917.9986	52498.1354	33.2589	9.2400	24.64

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 179.00-139.50				1	1	1			
L2 139.50-93.40				1	1	1			
L3 93.40-46.31				1	1	1			
L4 46.31-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Sector	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	Number Per Row	Start/End Position	Width or Diameter in	Perimeter in	Weight plf
HYBRIFLEX 1-1/4" (T-Mobile Proposed)	B	No	Surface Ar (CaAa)	179.00 - 3.00	3	3	0.000 0.000	1.5400		1.30

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf
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tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 19027.15 - CTHA539A	Page 3 of 22
	Project 180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	Date 09:39:39 04/24/19
	Client T-Mobile	Designed by TJL

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _{AA} ft ² /ft	Weight plf
1 5/8 (Town Existing)	A	No	No	Inside Pole	179.00 - 3.00	3	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1 5/8 (Town Existing)	A	No	No	Inside Pole	138.50 - 3.00	1	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1 5/8 (Town Existing)	A	No	No	Inside Pole	132.50 - 3.00	1	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1/2 (Town Existing)	A	No	No	Inside Pole	128.50 - 3.00	1	No Ice	0.00	0.25
							1/2" Ice	0.00	0.25
							1" Ice	0.00	0.25
1 5/8 (Town Existing)	A	No	No	Inside Pole	113.00 - 3.00	1	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1 5/8 (T-Mobile Existing)	B	No	No	Inside Pole	179.00 - 3.00	6	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
HYBRIFLEX 1-1/4" (T-Mobile Existing)	B	No	No	Inside Pole	179.00 - 3.00	1	No Ice	0.00	1.30
							1/2" Ice	0.00	1.30
							1" Ice	0.00	1.30
1 5/8 (AT&T Existing)	A	No	No	Inside Pole	170.00 - 3.00	12	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
RG6-Fiber (AT&T Existing)	A	No	No	Inside Pole	170.00 - 3.00	1	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
#8 AWG Copper Wire (AT&T Existing)	A	No	No	Inside Pole	170.00 - 3.00	2	No Ice	0.00	0.00
							1/2" Ice	0.00	0.00
							1" Ice	0.00	0.00
1 5/8 (Verizon Existing)	C	No	No	Inside Pole	160.00 - 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" (Verizon Existing)	C	No	No	Inside Pole	160.00 - 3.00	2	No Ice	0.00	1.90
							1/2" Ice	0.00	1.90
							1" Ice	0.00	1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	Weight K
L1	179.00-139.50	A	0.000	0.000	0.000	0.000	0.50
		B	0.000	0.000	18.249	0.000	0.45
		C	0.000	0.000	0.000	0.000	0.33
L2	139.50-93.40	A	0.000	0.000	0.000	0.000	0.84
		B	0.000	0.000	21.298	0.000	0.53
		C	0.000	0.000	0.000	0.000	0.75
L3	93.40-46.31	A	0.000	0.000	0.000	0.000	0.89
		B	0.000	0.000	21.756	0.000	0.54
		C	0.000	0.000	0.000	0.000	0.77
L4	46.31-0.00	A	0.000	0.000	0.000	0.000	0.82
		B	0.000	0.000	20.009	0.000	0.50
		C	0.000	0.000	0.000	0.000	0.71

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	Client T-Mobile	Designed by TJL

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft ²	A_F ft ²	C_{AA} In Face ft ²	C_{AA} Out Face ft ²	Weight K
L1	179.00-139.50	A	2.924	0.000	0.000	0.000	0.000	0.50
		B		0.000	0.000	51.688	0.000	1.37
		C		0.000	0.000	0.000	0.000	0.33
L2	139.50-93.40	A	2.834	0.000	0.000	0.000	0.000	0.84
		B		0.000	0.000	60.324	0.000	1.60
		C		0.000	0.000	0.000	0.000	0.75
L3	93.40-46.31	A	2.693	0.000	0.000	0.000	0.000	0.89
		B		0.000	0.000	60.554	0.000	1.59
		C		0.000	0.000	0.000	0.000	0.77
L4	46.31-0.00	A	2.416	0.000	0.000	0.000	0.000	0.82
		B		0.000	0.000	54.165	0.000	1.39
		C		0.000	0.000	0.000	0.000	0.71

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	179.00-139.50	2.8642	-1.6536	2.7434	-1.5839
L2	139.50-93.40	3.0328	-1.7510	3.1601	-1.8245
L3	93.40-46.31	3.1454	-1.8160	3.4563	-1.9955
L4	46.31-0.00	3.0228	-1.7452	3.4449	-1.9889

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor K_a

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
L1	13	HYBRIFLEX 1-1/4"	139.50 - 179.00	1.0000	1.0000
L2	13	HYBRIFLEX 1-1/4"	93.40 - 139.50	1.0000	1.0000
L3	13	HYBRIFLEX 1-1/4"	46.31 - 93.40	1.0000	1.0000

Discrete Tower Loads

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">Centek Engineering Inc. 63-2 North Branford Rd.</p> <p style="text-align: center;">Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587</p>	Job		19027.15 - CTHA539A		Page		5 of 22	
	Project		180' EEI Monopole - 719 George Washington Tpk., Burlington, CT		Date		09:39:39 04/24/19	
	Client		T-Mobile		Designed by		TJL	

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight
			Horz	Vert			Front	Side	
			ft	ft	°	ft	ft ²	ft ²	K
20' x 2" Dia Omni (Town Existing)	A	From Face	4.00	0.0000	191.00	No Ice	4.00	4.00	0.02
			-6.00			1/2" Ice	6.03	6.03	0.05
			0.00			1" Ice	8.07	8.07	0.09
20' x 2" Dia Omni (Town Existing)	B	From Face	4.00	0.0000	191.00	No Ice	4.00	4.00	0.02
			-6.00			1/2" Ice	6.03	6.03	0.05
			0.00			1" Ice	8.07	8.07	0.09
20' x 2" Dia Omni (Town Existing)	C	From Face	4.00	0.0000	191.00	No Ice	4.00	4.00	0.02
			-6.00			1/2" Ice	6.03	6.03	0.05
			0.00			1" Ice	8.07	8.07	0.09
20' 4-Bay Dipole (Town Existing)	C	From Face	4.00	0.0000	138.50	No Ice	4.00	4.00	0.06
			-6.00			1/2" Ice	6.00	6.00	0.10
			0.00			1" Ice	8.00	8.00	0.14
3' Pipe Mount Side Arm (Town Existing)	C	From Face	4.00	0.0000	138.50	No Ice	0.30	0.30	0.01
			-6.00			1/2" Ice	0.61	0.61	0.05
			0.00			1" Ice	0.81	0.81	0.09
8' x 2" Omni (Town Existing)	A	From Face	4.00	0.0000	132.50	No Ice	1.60	1.60	0.02
			-6.00			1/2" Ice	2.42	2.42	0.03
			0.00			1" Ice	3.24	3.24	0.05
3' Yagi (Town Existing)	A	From Face	4.00	0.0000	132.50	No Ice	2.08	2.08	0.03
			-6.00			1/2" Ice	3.79	3.79	0.05
			0.00			1" Ice	5.52	5.52	0.09
3' Pipe Mount Side Arm (Town Existing)	A	From Face	4.00	0.0000	132.50	No Ice	0.30	0.30	0.01
			-6.00			1/2" Ice	0.61	0.61	0.05
			0.00			1" Ice	0.81	0.81	0.09
10' Dipole (Town Existing)	C	From Face	4.00	0.0000	112.50	No Ice	4.00	4.00	0.05
			-6.00			1/2" Ice	6.00	6.00	0.07
			0.00			1" Ice	8.00	8.00	0.10
3' Pipe Mount Side Arm (Town Existing)	C	From Face	4.00	0.0000	112.50	No Ice	0.30	0.30	0.01
			-6.00			1/2" Ice	0.61	0.61	0.05
			0.00			1" Ice	0.81	0.81	0.09
AIR21 B2A/B4P (T-Mobile Existing)	A	From Face	3.00	0.0000	179.00	No Ice	6.05	4.36	0.08
			-5.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
AIR32 (T-Mobile Proposed)	A	From Face	3.00	0.0000	179.00	No Ice	6.51	4.71	0.13
			0.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P (T-Mobile Existing)	B	From Face	3.00	0.0000	179.00	No Ice	6.05	4.36	0.08
			-5.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
AIR32 (T-Mobile Existing)	B	From Face	3.00	0.0000	179.00	No Ice	6.51	4.71	0.13
			0.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR21 B2A/B4P (T-Mobile Proposed)	C	From Face	3.00	0.0000	179.00	No Ice	6.05	4.36	0.08
			-5.00			1/2" Ice	6.42	4.70	0.12
			0.00			1" Ice	6.80	5.06	0.17
AIR32 (T-Mobile Proposed)	C	From Face	3.00	0.0000	179.00	No Ice	6.51	4.71	0.13
			0.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
APXVAARR24-43 (T-Mobile Proposed)	A	From Face	3.00	0.0000	179.00	No Ice	20.24	8.89	0.16
			5.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
APXVAARR24-43 (T-Mobile Proposed)	B	From Face	3.00	0.0000	179.00	No Ice	20.24	8.89	0.16
			5.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39
APXVAARR24-43 (T-Mobile Proposed)	C	From Face	3.00	0.0000	179.00	No Ice	20.24	8.89	0.16
			5.00			1/2" Ice	20.89	9.49	0.27
			0.00			1" Ice	21.54	10.09	0.39

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	Project 180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	Date 09:39:39 04/24/19
	Client T-Mobile	Designed by TJL

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Lateral					
4449 B12,B71 (T-Mobile Proposed)	A	From Face	3.00	0.0000	179.00	No Ice	1.65	1.16	0.08
			5.00			1/2" Ice	1.81	1.29	0.10
			0.00			1" Ice	1.98	1.44	0.11
4449 B12,B71 (T-Mobile Proposed)	B	From Face	3.00	0.0000	179.00	No Ice	1.65	1.16	0.08
			5.00			1/2" Ice	1.81	1.29	0.10
			0.00			1" Ice	1.98	1.44	0.11
4449 B12,B71 (T-Mobile Proposed)	C	From Face	3.00	0.0000	179.00	No Ice	1.65	1.16	0.08
			5.00			1/2" Ice	1.81	1.29	0.10
			0.00			1" Ice	1.98	1.44	0.11
EEI 14-ft Platform w/ Rails (T-Mobile Existing)	C	None		0.0000	177.00	No Ice	19.00	19.00	1.75
						1/2" Ice	24.00	24.00	2.00
						1" Ice	29.00	29.00	2.25
(2) RRUS-11 (AT&T Existing)	A	From Face	0.50	0.0000	170.00	No Ice	2.57	1.07	0.05
			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
(2) RRUS-11 (AT&T Existing)	B	From Face	0.50	0.0000	170.00	No Ice	2.57	1.07	0.05
			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
(2) RRUS-11 (AT&T Existing)	C	From Face	0.50	0.0000	170.00	No Ice	2.57	1.07	0.05
			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
DC6-48-60-18-8F Surge Arrestor (AT&T Existing)	C	From Face	0.50	0.0000	170.00	No Ice	1.91	1.91	0.02
			0.00			1/2" Ice	2.10	2.10	0.04
			0.00			1" Ice	2.29	2.29	0.06
Valmont Uni-Tri Bracket (AT&T Existing)	C	None		0.0000	170.00	No Ice	1.75	1.75	0.29
						1/2" Ice	1.94	1.94	0.31
						1" Ice	2.13	2.13	0.32
7770.00 (AT&T Existing)	A	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.04
			6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
P65-17-XLH-RR (AT&T Existing)	A	From Face	3.00	0.0000	170.00	No Ice	11.47	6.80	0.06
			4.00			1/2" Ice	12.08	7.38	0.12
			0.00			1" Ice	12.71	7.98	0.19
7770.00 (AT&T Existing)	A	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.04
			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
7770.00 (AT&T Existing)	B	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.04
			6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
P65-17-XLH-RR (AT&T Existing)	B	From Face	3.00	0.0000	170.00	No Ice	11.47	6.80	0.06
			4.00			1/2" Ice	12.08	7.38	0.12
			0.00			1" Ice	12.71	7.98	0.19
7770.00 (AT&T Existing)	B	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.04
			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
7770.00 (AT&T Existing)	C	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.04
			6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
P65-17-XLH-RR (AT&T Existing)	C	From Face	3.00	0.0000	170.00	No Ice	11.47	6.80	0.06
			4.00			1/2" Ice	12.08	7.38	0.12
			0.00			1" Ice	12.71	7.98	0.19
7770.00 (AT&T Existing)	C	From Face	3.00	0.0000	170.00	No Ice	5.51	2.93	0.04
			-6.00			1/2" Ice	5.87	3.27	0.07
			0.00			1" Ice	6.23	3.63	0.11
(2) LGP21401 TMA (AT&T Existing)	A	From Face	3.00	0.0000	170.00	No Ice	0.82	0.35	0.02
			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03

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	Project	180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	Date	09:39:39 04/24/19
	Client	T-Mobile	Designed by	TJL

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA} Front	C _{AA} Side	Weight
			Horz	Vert					
			ft	ft	°	ft	ft ²	ft ²	K
(2) LGP21401 TMA (AT&T Existing)	B	From Face	3.00	0.0000	170.00	No Ice	0.82	0.35	0.02
			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LGP21401 TMA (AT&T Existing)	C	From Face	3.00	0.0000	170.00	No Ice	0.82	0.35	0.02
			0.00			1/2" Ice	0.94	0.44	0.02
			0.00			1" Ice	1.06	0.54	0.03
(2) LPG13519 Diplexer (AT&T Existing)	A	From Face	3.00	0.0000	170.00	No Ice	0.23	0.16	0.01
			0.00			1/2" Ice	0.29	0.21	0.01
			0.00			1" Ice	0.36	0.28	0.01
(2) LPG13519 Diplexer (AT&T Existing)	B	From Face	3.00	0.0000	170.00	No Ice	0.23	0.16	0.01
			0.00			1/2" Ice	0.29	0.21	0.01
			0.00			1" Ice	0.36	0.28	0.01
(2) LPG13519 Diplexer (AT&T Existing)	C	From Face	3.00	0.0000	170.00	No Ice	0.23	0.16	0.01
			0.00			1/2" Ice	0.29	0.21	0.01
			0.00			1" Ice	0.36	0.28	0.01
EEI 14-ft Low Profile Platform (AT&T Existing)	C	None		0.0000	168.00	No Ice	16.50	16.50	1.55
						1/2" Ice	20.00	20.00	1.80
						1" Ice	23.50	23.50	2.05
APL866513-42T0 (Verizon Existing)	A	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
			-6.00			1/2" Ice	4.36	3.92	0.05
			0.00			1" Ice	4.68	4.23	0.08
JAHH-65B-R3B (Verizon Existing)	A	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
			0.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
JAHH-65B-R3B (Verizon Existing)	A	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
			4.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
APL866513-42T0 (Verizon Existing)	A	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
			-6.00			1/2" Ice	4.36	3.92	0.05
			0.00			1" Ice	4.68	4.23	0.08
APL866513-42T0 (Verizon Existing)	B	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
			-6.00			1/2" Ice	4.36	3.92	0.05
			0.00			1" Ice	4.68	4.23	0.08
JAHH-65B-R3B (Verizon Existing)	B	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
			0.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
JAHH-65B-R3B (Verizon Existing)	B	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
			4.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
APL866513-42T0 (Verizon Existing)	B	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
			-6.00			1/2" Ice	4.36	3.92	0.05
			0.00			1" Ice	4.68	4.23	0.08
APL866513-42T0 (Verizon Existing)	C	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
			-6.00			1/2" Ice	4.36	3.92	0.05
			0.00			1" Ice	4.68	4.23	0.08
JAHH-65B-R3B (Verizon Existing)	C	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
			0.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
JAHH-65B-R3B (Verizon Existing)	C	From Face	3.00	0.0000	160.00	No Ice	9.11	5.98	0.06
			4.00			1/2" Ice	9.58	6.44	0.12
			0.00			1" Ice	10.05	6.91	0.19
APL866513-42T0 (Verizon Existing)	C	From Face	3.00	0.0000	160.00	No Ice	4.05	3.61	0.02
			-6.00			1/2" Ice	4.36	3.92	0.05
			0.00			1" Ice	4.68	4.23	0.08
B66A RRH4x45 (Verizon Existing)	A	From Face	3.00	0.0000	160.00	No Ice	2.53	1.60	0.07
			4.00			1/2" Ice	2.74	1.78	0.09
			0.00			1" Ice	2.96	1.97	0.11

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	Project 180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	Date 09:39:39 04/24/19
	Client T-Mobile	Designed by TJL

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement	C _{AA}		Weight
			Horz	Vert			Front	Side	
			ft	ft	°	ft	ft ²	ft ²	K
B66A RRH4x45 (Verizon Existing)	B	From Face	3.00	0.0000	160.00	No Ice	2.53	1.60	0.07
			4.00	0.0000		1/2" Ice	2.74	1.78	0.09
			0.00	0.0000		1" Ice	2.96	1.97	0.11
B66A RRH4x45 (Verizon Existing)	C	From Face	3.00	0.0000	160.00	No Ice	2.53	1.60	0.07
			4.00	0.0000		1/2" Ice	2.74	1.78	0.09
			0.00	0.0000		1" Ice	2.96	1.97	0.11
RRH4x30-B13 (Verizon Existing)	A	From Face	3.00	0.0000	160.00	No Ice	2.16	1.62	0.06
			0.00	0.0000		1/2" Ice	2.35	1.79	0.08
			0.00	0.0000		1" Ice	2.55	1.97	0.10
RRH4x30-B13 (Verizon Existing)	B	From Face	3.00	0.0000	160.00	No Ice	2.16	1.62	0.06
			0.00	0.0000		1/2" Ice	2.35	1.79	0.08
			0.00	0.0000		1" Ice	2.55	1.97	0.10
RRH4x30-B13 (Verizon Existing)	C	From Face	3.00	0.0000	160.00	No Ice	2.16	1.62	0.06
			0.00	0.0000		1/2" Ice	2.35	1.79	0.08
			0.00	0.0000		1" Ice	2.55	1.97	0.10
RRH 4T4R B5 160W (Verizon Existing)	A	From Face	3.00	0.0000	160.00	No Ice	1.28	0.72	0.04
			-4.00	0.0000		1/2" Ice	1.43	0.83	0.05
			0.00	0.0000		1" Ice	1.58	0.95	0.06
RRH 4T4R B5 160W (Verizon Existing)	B	From Face	3.00	0.0000	160.00	No Ice	1.28	0.72	0.04
			-4.00	0.0000		1/2" Ice	1.43	0.83	0.05
			0.00	0.0000		1" Ice	1.58	0.95	0.06
RRH 4T4R B5 160W (Verizon Existing)	C	From Face	3.00	0.0000	160.00	No Ice	1.28	0.72	0.04
			-4.00	0.0000		1/2" Ice	1.43	0.83	0.05
			0.00	0.0000		1" Ice	1.58	0.95	0.06
RC2DC-3315-PF-48 (Verizon Existing)	A	From Face	1.00	0.0000	160.00	No Ice	3.01	1.96	0.03
			1.00	0.0000		1/2" Ice	3.23	2.15	0.05
			0.00	0.0000		1" Ice	3.46	2.35	0.08
RC2DC-3315-PF-48 (Verizon Existing)	B	From Face	1.00	0.0000	160.00	No Ice	3.01	1.96	0.03
			1.00	0.0000		1/2" Ice	3.23	2.15	0.05
			0.00	0.0000		1" Ice	3.46	2.35	0.08
EEI 14-ft Low Profile Platform (Verizon Existing)	C	None		0.0000	158.00	No Ice	16.50	16.50	1.55
				0.0000		1/2" Ice	20.00	20.00	1.80
				0.0000		1" Ice	23.50	23.50	2.05

Tower Pressures - No Ice

$$G_H = 1.100$$

Section Elevation	z	K _Z	q _z	A _G	F _a	A _F	A _R	A _{leg}	Leg %	C _{AA} In Face	C _{AA} Out Face
ft	ft		psf	ft ²	e	ft ²	ft ²	ft ²		ft ²	ft ²
L1 179.00-139.50	158.19	1.394	34	79.364	A	0.000	79.364	79.364	100.00	0.000	0.000
					B	0.000	79.364		100.00	18.249	0.000
					C	0.000	79.364		100.00	0.000	0.000
L2 139.50-93.40	115.52	1.305	32	126.948	A	0.000	126.948	126.948	100.00	0.000	0.000
					B	0.000	126.948		100.00	21.298	0.000
					C	0.000	126.948		100.00	0.000	0.000
L3 93.40-46.31	69.31	1.172	28	167.002	A	0.000	167.002	167.002	100.00	0.000	0.000
					B	0.000	167.002		100.00	21.756	0.000

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	Project 180' EEI Monopole - 719 George Washington Tpk., Burlington, CT	Date 09:39:39 04/24/19
	Client T-Mobile	Designed by TJL

Section Elevation ft	z ft	K _Z	q _z psf	A _G ft ²	F a c e ft ²	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
L4 46.31-0.00	23.42	0.932	22	200.789	C	0.000	167.002	200.789	100.00	0.000	0.000
					A	0.000	200.789	200.789	100.00	0.000	0.000
					B	0.000	200.789	200.789	100.00	20.009	0.000
					C	0.000	200.789	200.789	100.00	0.000	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 ft ²	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 179.00-139.50	158.19	1.394	8	2.9242	98.615	A	0.000	98.615	98.615	100.00	0.000	0.000
						B	0.000	98.615	98.615	100.00	51.688	0.000
						C	0.000	98.615	98.615	100.00	0.000	0.000
L2 139.50-93.40	115.52	1.305	8	2.8337	149.415	A	0.000	149.415	149.415	100.00	0.000	0.000
						B	0.000	149.415	149.415	100.00	60.324	0.000
						C	0.000	149.415	149.415	100.00	0.000	0.000
L3 93.40-46.31	69.31	1.172	7	2.6926	189.242	A	0.000	189.242	189.242	100.00	0.000	0.000
						B	0.000	189.242	189.242	100.00	60.554	0.000
						C	0.000	189.242	189.242	100.00	0.000	0.000
L4 46.31-0.00	23.42	0.932	6	2.4157	221.571	A	0.000	221.571	221.571	100.00	0.000	0.000
						B	0.000	221.571	221.571	100.00	54.165	0.000
						C	0.000	221.571	221.571	100.00	0.000	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 ft ²	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 179.00-139.50	158.19	1.394	11	79.364	A	0.000	79.364	79.364	100.00	0.000	0.000
					B	0.000	79.364	79.364	100.00	18.249	0.000
					C	0.000	79.364	79.364	100.00	0.000	0.000
L2 139.50-93.40	115.52	1.305	10	126.948	A	0.000	126.948	126.948	100.00	0.000	0.000
					B	0.000	126.948	126.948	100.00	21.298	0.000
					C	0.000	126.948	126.948	100.00	0.000	0.000
L3 93.40-46.31	69.31	1.172	9	167.002	A	0.000	167.002	167.002	100.00	0.000	0.000
					B	0.000	167.002	167.002	100.00	21.756	0.000
					C	0.000	167.002	167.002	100.00	0.000	0.000
L4 46.31-0.00	23.42	0.932	7	200.789	A	0.000	200.789	200.789	100.00	0.000	0.000
					B	0.000	200.789	200.789	100.00	20.009	0.000
					C	0.000	200.789	200.789	100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

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	Client T-Mobile	Designed by T.J.L.

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 179.00-139.50	1.29	1.89	A	1	0.65	34	1	1	79.364	1.91	48.42	C
			B	1	0.65							
			C	1	0.65							
L2 139.50-93.40	2.11	6.45	A	1	0.65	32	1	1	126.948	2.86	62.06	C
			B	1	0.65							
			C	1	0.65							
L3 93.40-46.31	2.20	8.69	A	1	0.65	28	1	1	167.002	3.37	71.60	C
			B	1	0.65							
			C	1	0.65							
L4 46.31-0.00	2.02	10.72	A	1	0.65	22	1	1	200.789	3.22	69.51	C
			B	1	0.65							
			C	1	0.65							
Sum Weight:	7.62	27.75						OTM	942.11 kip-ft	11.36		

Tower Forces - No 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 179.00-139.50	1.29	1.89	A	1	0.65	34	1	1	79.364	1.91	48.42	C
			B	1	0.65							
			C	1	0.65							
L2 139.50-93.40	2.11	6.45	A	1	0.65	32	1	1	126.948	2.86	62.06	C
			B	1	0.65							
			C	1	0.65							
L3 93.40-46.31	2.20	8.69	A	1	0.65	28	1	1	167.002	3.37	71.60	C
			B	1	0.65							
			C	1	0.65							
L4 46.31-0.00	2.02	10.72	A	1	0.65	22	1	1	200.789	3.22	69.51	C
			B	1	0.65							
			C	1	0.65							
Sum Weight:	7.62	27.75						OTM	942.11 kip-ft	11.36		

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 179.00-139.50	1.29	1.89	A	1	0.65	34	1	1	79.364	1.91	48.42	C
			B	1	0.65							
			C	1	0.65							
L2 139.50-93.40	2.11	6.45	A	1	0.65	32	1	1	126.948	2.86	62.06	C
			B	1	0.65							
			C	1	0.65							
L3	2.20	8.69	A	1	0.65	28	1	1	167.002	3.37	71.60	C

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Section Elevation ft	Add Weight K	Self Weight K	Face	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
93.40-46.31			B	1	0.65		1	1	167.002			
L4 46.31-0.00	2.02	10.72	C	1	0.65	22	1	1	167.002	3.22	69.51	C
			A	1	0.65		1	1	200.789			
			B	1	0.65		1	1	200.789			
			C	1	0.65		1	1	200.789			
Sum Weight:	7.62	27.75					OTM	942.11 kip-ft	11.36			

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 179.00-139.50	2.21	5.69	A	1	1.2	8	1	1	98.615	1.10	27.92	C
			B	1	1.2		1	1	98.615			
			C	1	1.2		1	1	98.615			
L2 139.50-93.40	3.19	12.17	A	1	1.2	8	1	1	149.415	1.56	33.89	C
			B	1	1.2		1	1	149.415			
			C	1	1.2		1	1	149.415			
L3 93.40-46.31	3.25	15.68	A	1	1.2	7	1	1	189.242	1.77	37.65	C
			B	1	1.2		1	1	189.242			
			C	1	1.2		1	1	189.242			
L4 46.31-0.00	2.92	18.14	A	1	1.2	6	1	1	221.571	1.65	35.60	C
			B	1	1.2		1	1	221.571			
			C	1	1.2		1	1	221.571			
									221.571			
Sum Weight:	11.57	51.68					OTM	516.42 kip-ft	6.09			

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
L1 179.00-139.50	2.21	5.69	A	1	1.2	8	1	1	98.615	1.10	27.92	C
			B	1	1.2		1	1	98.615			
			C	1	1.2		1	1	98.615			
L2 139.50-93.40	3.19	12.17	A	1	1.2	8	1	1	149.415	1.56	33.89	C
			B	1	1.2		1	1	149.415			
			C	1	1.2		1	1	149.415			
L3 93.40-46.31	3.25	15.68	A	1	1.2	7	1	1	189.242	1.77	37.65	C
			B	1	1.2		1	1	189.242			
			C	1	1.2		1	1	189.242			
L4 46.31-0.00	2.92	18.14	A	1	1.2	6	1	1	221.571	1.65	35.60	C
			B	1	1.2		1	1	221.571			
			C	1	1.2		1	1	221.571			
									221.571			
Sum Weight:	11.57	51.68					OTM	516.42 kip-ft	6.09			

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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 179.00-139.50	2.21	5.69	A	1	1.2	8	1	1	98.615	1.10	27.92	C
			B	1	1.2		1	98.615				
			C	1	1.2		1	98.615				
L2 139.50-93.40	3.19	12.17	A	1	1.2	8	1	1	149.415	1.56	33.89	C
			B	1	1.2		1	149.415				
			C	1	1.2		1	149.415				
L3 93.40-46.31	3.25	15.68	A	1	1.2	7	1	1	189.242	1.77	37.65	C
			B	1	1.2		1	189.242				
			C	1	1.2		1	189.242				
L4 46.31-0.00	2.92	18.14	A	1	1.2	6	1	1	221.571	1.65	35.60	C
			B	1	1.2		1	221.571				
			C	1	1.2		1	221.571				
Sum Weight:	11.57	51.68						OTM	516.42 kip-ft	6.09		

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 179.00-139.50	1.29	1.89	A	1	0.65	11	1	1	79.364	0.62	15.68	C
			B	1	0.65		1	79.364				
			C	1	0.65		1	79.364				
L2 139.50-93.40	2.11	6.45	A	1	0.65	10	1	1	126.948	0.93	20.10	C
			B	1	0.65		1	126.948				
			C	1	0.65		1	126.948				
L3 93.40-46.31	2.20	8.69	A	1	0.65	9	1	1	167.002	1.09	23.19	C
			B	1	0.65		1	167.002				
			C	1	0.65		1	167.002				
L4 46.31-0.00	2.02	10.72	A	1	0.65	7	1	1	200.789	1.04	22.51	C
			B	1	0.65		1	200.789				
			C	1	0.65		1	200.789				
Sum Weight:	7.62	27.75						OTM	305.09 kip-ft	3.68		

Tower Forces - Service - Wind 60 To Face

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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
L1 179.00-139.50	1.29	1.89	A	1	0.65	11	1	1	79.364	0.62	15.68	C
			B	1	0.65		1	1	79.364			
			C	1	0.65		1	1	79.364			
L2 139.50-93.40	2.11	6.45	A	1	0.65	10	1	1	126.948	0.93	20.10	C
			B	1	0.65		1	1	126.948			
			C	1	0.65		1	1	126.948			
L3 93.40-46.31	2.20	8.69	A	1	0.65	9	1	1	167.002	1.09	23.19	C
			B	1	0.65		1	1	167.002			
			C	1	0.65		1	1	167.002			
L4 46.31-0.00	2.02	10.72	A	1	0.65	7	1	1	200.789	1.04	22.51	C
			B	1	0.65		1	1	200.789			
			C	1	0.65		1	1	200.789			
Sum Weight:	7.62	27.75						OTM	305.09 kip-ft	3.68		

Tower Forces - Service - 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 179.00-139.50	1.29	1.89	A	1	0.65	11	1	1	79.364	0.62	15.68	C
			B	1	0.65		1	1	79.364			
			C	1	0.65		1	1	79.364			
L2 139.50-93.40	2.11	6.45	A	1	0.65	10	1	1	126.948	0.93	20.10	C
			B	1	0.65		1	1	126.948			
			C	1	0.65		1	1	126.948			
L3 93.40-46.31	2.20	8.69	A	1	0.65	9	1	1	167.002	1.09	23.19	C
			B	1	0.65		1	1	167.002			
			C	1	0.65		1	1	167.002			
L4 46.31-0.00	2.02	10.72	A	1	0.65	7	1	1	200.789	1.04	22.51	C
			B	1	0.65		1	1	200.789			
			C	1	0.65		1	1	200.789			
Sum Weight:	7.62	27.75						OTM	305.09 kip-ft	3.68		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M _x kip-ft	Sum of Overturning Moments, M _z kip-ft	Sum of Torques kip-ft
Leg Weight	27.75					
Bracing Weight	0.00					
Total Member Self-Weight	27.75					
Total Weight	44.05			0.22	-1.30	
Wind 0 deg - No Ice		0.00	-21.07	-2575.67	-1.30	0.84
Wind 30 deg - No Ice		10.55	-18.24	-2230.56	-1291.74	1.70
Wind 60 deg - No Ice		18.27	-10.53	-1287.72	-2236.41	2.11

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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 90 deg - No Ice		21.10	0.00	0.22	-2582.19	1.95
Wind 120 deg - No Ice		18.27	10.53	1288.17	-2236.41	1.27
Wind 150 deg - No Ice		10.55	18.24	2231.01	-1291.74	0.25
Wind 180 deg - No Ice		0.00	21.07	2576.11	-1.30	-0.84
Wind 210 deg - No Ice		-10.55	18.24	2231.01	1289.14	-1.70
Wind 240 deg - No Ice		-18.27	10.53	1288.17	2233.82	-2.11
Wind 270 deg - No Ice		-21.10	0.00	0.22	2579.59	-1.95
Wind 300 deg - No Ice		-18.27	-10.53	-1287.72	2233.82	-1.27
Wind 330 deg - No Ice		-10.55	-18.24	-2230.56	1289.14	-0.25
Member Ice	23.93					
Total Weight Ice	95.38			4.44	-7.75	
Wind 0 deg - Ice		0.00	-10.55	-1259.51	-7.75	0.36
Wind 30 deg - Ice		5.28	-9.13	-1090.17	-640.46	1.22
Wind 60 deg - Ice		9.14	-5.27	-627.53	-1103.64	1.75
Wind 90 deg - Ice		10.56	0.00	4.44	-1273.17	1.82
Wind 120 deg - Ice		9.14	5.27	636.42	-1103.64	1.39
Wind 150 deg - Ice		5.28	9.13	1099.06	-640.46	0.59
Wind 180 deg - Ice		0.00	10.55	1268.40	-7.75	-0.36
Wind 210 deg - Ice		-5.28	9.13	1099.06	624.96	-1.22
Wind 240 deg - Ice		-9.14	5.27	636.42	1088.14	-1.75
Wind 270 deg - Ice		-10.56	0.00	4.44	1257.67	-1.82
Wind 300 deg - Ice		-9.14	-5.27	-627.53	1088.14	-1.39
Wind 330 deg - Ice		-5.28	-9.13	-1090.17	624.96	-0.59
Total Weight	44.05			0.22	-1.30	
Wind 0 deg - Service		0.00	-6.82	-833.40	-0.33	0.27
Wind 30 deg - Service		3.42	-5.91	-721.64	-418.23	0.55
Wind 60 deg - Service		5.92	-3.41	-416.31	-724.15	0.68
Wind 90 deg - Service		6.83	0.00	0.78	-836.13	0.63
Wind 120 deg - Service		5.92	3.41	417.87	-724.15	0.41
Wind 150 deg - Service		3.42	5.91	723.21	-418.23	0.08
Wind 180 deg - Service		0.00	6.82	834.97	-0.33	-0.27
Wind 210 deg - Service		-3.42	5.91	723.21	417.57	-0.55
Wind 240 deg - Service		-5.92	3.41	417.87	723.50	-0.68
Wind 270 deg - Service		-6.83	0.00	0.78	835.47	-0.63
Wind 300 deg - Service		-5.92	-3.41	-416.31	723.50	-0.41
Wind 330 deg - Service		-3.42	-5.91	-721.64	417.57	-0.08

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 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice

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Comb. No.	Description
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	179 - 139.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-39.45	-1.54	0.28
			Max. Mx	8	-11.08	-487.18	0.01
			Max. My	2	-11.09	-0.23	486.20
			Max. Vy	8	19.24	-487.18	0.01
			Max. Vx	14	19.19	-0.23	-485.97
			Max. Torque	21			0.16
L2	139.5 - 93.4	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-57.99	-4.77	-8.29
			Max. Mx	8	-21.13	-1477.52	-0.62
			Max. My	14	-21.14	-0.81	-1474.12
			Max. Vy	8	24.67	-1477.52	-0.62
			Max. Vx	14	24.62	-0.81	-1474.12
			Max. Torque	19			3.33
L3	93.4 - 46.31	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-78.97	-7.21	-7.72
			Max. Mx	8	-34.45	-2722.41	-0.51
			Max. My	14	-34.46	-1.20	-2716.00

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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
L4	46.31 - 0	Pole	Max. Vy	8	29.46	-2722.41	-0.51
			Max. Vx	14	29.41	-1.20	-2716.00
			Max. Torque	19			3.32
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-106.48	-9.69	-6.46
			Max. Mx	8	-52.83	-4399.49	-0.26
			Max. My	14	-52.83	-1.65	-4389.65
			Max. Vy	8	33.81	-4399.49	-0.26
			Max. Vx	14	33.76	-1.65	-4389.65
			Max. Torque	19			3.30

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	30	106.48	-10.56	-0.00
	Max. H _x	20	52.86	33.76	-0.00
	Max. H _z	2	52.86	-0.00	33.71
	Max. M _x	2	4389.02	-0.00	33.71
	Max. M _z	8	4399.49	-33.76	-0.00
	Max. Torsion	19	3.29	29.23	-16.85
	Min. Vert	13	39.65	-16.88	-29.19
	Min. H _x	8	52.86	-33.76	-0.00
	Min. H _z	14	52.86	-0.00	-33.71
	Min. M _x	14	-4389.65	-0.00	-33.71
	Min. M _z	20	-4396.17	33.76	-0.00
	Min. Torsion	7	-3.29	-29.23	16.85

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	44.05	0.00	0.00	0.22	-1.30	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	52.86	0.00	-33.71	-4389.02	-1.65	1.27
0.9 Dead+1.6 Wind 0 deg - No Ice	39.65	0.00	-33.71	-4314.72	-1.21	1.28
1.2 Dead+1.6 Wind 30 deg - No Ice	52.86	16.88	-29.19	-3800.97	-2200.57	2.63
0.9 Dead+1.6 Wind 30 deg - No Ice	39.65	16.88	-29.19	-3736.63	-2162.87	2.64
1.2 Dead+1.6 Wind 60 deg - No Ice	52.86	29.23	-16.85	-2194.38	-3810.29	3.28
0.9 Dead+1.6 Wind 60 deg - No Ice	39.65	29.23	-16.85	-2157.26	-3745.29	3.29
1.2 Dead+1.6 Wind 90 deg - No Ice	52.86	33.76	0.00	0.26	-4399.49	3.06
0.9 Dead+1.6 Wind 90 deg - No Ice	39.65	33.76	0.00	0.19	-4324.51	3.06
1.2 Dead+1.6 Wind 120 deg - No Ice	52.86	29.23	16.85	2194.92	-3810.33	2.01

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">Centek Engineering Inc. 63-2 North Branford Rd.</p> <p style="text-align: center;">Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587</p>	<p style="text-align: center;">Job</p> <p style="text-align: center;">19027.15 - CTHA539A</p>	<p style="text-align: center;">Page</p> <p style="text-align: center;">17 of 22</p>
	<p style="text-align: center;">Project</p> <p style="text-align: center;">180' EEI Monopole - 719 George Washington Tpk., Burlington, CT</p>	<p style="text-align: center;">Date</p> <p style="text-align: center;">09:39:39 04/24/19</p>
	<p style="text-align: center;">Client</p> <p style="text-align: center;">T-Mobile</p>	<p style="text-align: center;">Designed by</p> <p style="text-align: center;">TJL</p>

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
0.9 Dead+1.6 Wind 120 deg - No Ice	39.65	29.23	16.85	2157.65	-3745.33	2.01
1.2 Dead+1.6 Wind 150 deg - No Ice	52.86	16.88	29.19	3801.57	-2200.62	0.43
0.9 Dead+1.6 Wind 150 deg - No Ice	39.65	16.88	29.19	3737.06	-2162.90	0.42
1.2 Dead+1.6 Wind 180 deg - No Ice	52.86	0.00	33.71	4389.65	-1.65	-1.27
0.9 Dead+1.6 Wind 180 deg - No Ice	39.65	0.00	33.71	4315.17	-1.21	-1.28
1.2 Dead+1.6 Wind 210 deg - No Ice	52.86	-16.88	29.19	3801.56	2197.31	-2.63
0.9 Dead+1.6 Wind 210 deg - No Ice	39.65	-16.88	29.19	3737.05	2160.47	-2.64
1.2 Dead+1.6 Wind 240 deg - No Ice	52.86	-29.23	16.85	2194.92	3807.02	-3.28
0.9 Dead+1.6 Wind 240 deg - No Ice	39.65	-29.23	16.85	2157.64	3742.89	-3.29
1.2 Dead+1.6 Wind 270 deg - No Ice	52.86	-33.76	0.00	0.26	4396.17	-3.06
0.9 Dead+1.6 Wind 270 deg - No Ice	39.65	-33.76	0.00	0.19	4322.07	-3.06
1.2 Dead+1.6 Wind 300 deg - No Ice	52.86	-29.23	-16.85	-2194.37	3806.97	-2.01
0.9 Dead+1.6 Wind 300 deg - No Ice	39.65	-29.23	-16.85	-2157.25	3742.85	-2.01
1.2 Dead+1.6 Wind 330 deg - No Ice	52.86	-16.88	-29.19	-3800.96	2197.27	-0.43
0.9 Dead+1.6 Wind 330 deg - No Ice	39.65	-16.88	-29.19	-3736.62	2160.43	-0.42
1.2 Dead+1.0 Ice+1.0 Temp	106.48	0.00	0.00	6.46	-9.69	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	106.48	0.00	-10.55	-1511.42	-9.84	0.17
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	106.48	5.28	-9.13	-1308.15	-769.77	1.06
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	106.48	9.14	-5.27	-752.50	-1326.08	1.67
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	106.48	10.56	0.00	6.53	-1529.60	1.83
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	106.48	9.14	5.27	765.58	-1326.10	1.50
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	106.48	5.28	9.13	1321.26	-769.79	0.77
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	106.48	0.00	10.55	1524.54	-9.84	-0.17
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	106.48	-5.28	9.13	1321.27	750.12	-1.06
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	106.48	-9.14	5.27	765.59	1306.45	-1.67
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	106.48	-10.56	0.00	6.53	1509.95	-1.83
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	106.48	-9.14	-5.27	-752.51	1306.42	-1.50
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	106.48	-5.28	-9.13	-1308.16	750.10	-0.77
Dead+Wind 0 deg - Service	44.05	0.00	-6.82	-880.98	-1.39	0.26
Dead+Wind 30 deg - Service	44.05	3.42	-5.91	-762.93	-442.87	0.54
Dead+Wind 60 deg - Service	44.05	5.92	-3.41	-440.37	-766.06	0.68
Dead+Wind 90 deg - Service	44.05	6.83	0.00	0.26	-884.34	0.63
Dead+Wind 120 deg - Service	44.05	5.92	3.41	440.89	-766.06	0.42
Dead+Wind 150 deg - Service	44.05	3.42	5.91	763.45	-442.87	0.09

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	Client T-Mobile	Designed by TJL

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead+Wind 180 deg - Service	44.05	0.00	6.82	881.50	-1.39	-0.26
Dead+Wind 210 deg - Service	44.05	-3.42	5.91	763.45	440.10	-0.54
Dead+Wind 240 deg - Service	44.05	-5.92	3.41	440.89	763.29	-0.68
Dead+Wind 270 deg - Service	44.05	-6.83	0.00	0.26	881.57	-0.63
Dead+Wind 300 deg - Service	44.05	-5.92	-3.41	-440.37	763.29	-0.42
Dead+Wind 330 deg - Service	44.05	-3.42	-5.91	-762.93	440.10	-0.09

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-44.05	0.00	0.00	44.05	0.00	0.000%
2	0.00	-52.86	-33.71	-0.00	52.86	33.71	0.000%
3	0.00	-39.65	-33.71	-0.00	39.65	33.71	0.000%
4	16.88	-52.86	-29.19	-16.88	52.86	29.19	0.000%
5	16.88	-39.65	-29.19	-16.88	39.65	29.19	0.000%
6	29.23	-52.86	-16.85	-29.23	52.86	16.85	0.000%
7	29.23	-39.65	-16.85	-29.23	39.65	16.85	0.000%
8	33.76	-52.86	0.00	-33.76	52.86	-0.00	0.000%
9	33.76	-39.65	0.00	-33.76	39.65	-0.00	0.000%
10	29.23	-52.86	16.85	-29.23	52.86	-16.85	0.000%
11	29.23	-39.65	16.85	-29.23	39.65	-16.85	0.000%
12	16.88	-52.86	29.19	-16.88	52.86	-29.19	0.000%
13	16.88	-39.65	29.19	-16.88	39.65	-29.19	0.000%
14	0.00	-52.86	33.71	-0.00	52.86	-33.71	0.000%
15	0.00	-39.65	33.71	-0.00	39.65	-33.71	0.000%
16	-16.88	-52.86	29.19	16.88	52.86	-29.19	0.000%
17	-16.88	-39.65	29.19	16.88	39.65	-29.19	0.000%
18	-29.23	-52.86	16.85	29.23	52.86	-16.85	0.000%
19	-29.23	-39.65	16.85	29.23	39.65	-16.85	0.000%
20	-33.76	-52.86	0.00	33.76	52.86	-0.00	0.000%
21	-33.76	-39.65	0.00	33.76	39.65	-0.00	0.000%
22	-29.23	-52.86	-16.85	29.23	52.86	16.85	0.000%
23	-29.23	-39.65	-16.85	29.23	39.65	16.85	0.000%
24	-16.88	-52.86	-29.19	16.88	52.86	29.19	0.000%
25	-16.88	-39.65	-29.19	16.88	39.65	29.19	0.000%
26	0.00	-106.48	0.00	-0.00	106.48	-0.00	0.000%
27	0.00	-106.48	-10.55	-0.00	106.48	10.55	0.000%
28	5.28	-106.48	-9.13	-5.28	106.48	9.13	0.000%
29	9.14	-106.48	-5.27	-9.14	106.48	5.27	0.000%
30	10.56	-106.48	0.00	-10.56	106.48	-0.00	0.000%
31	9.14	-106.48	5.27	-9.14	106.48	-5.27	0.000%
32	5.28	-106.48	9.13	-5.28	106.48	-9.13	0.000%
33	0.00	-106.48	10.55	-0.00	106.48	-10.55	0.000%
34	-5.28	-106.48	9.13	5.28	106.48	-9.13	0.000%
35	-9.14	-106.48	5.27	9.14	106.48	-5.27	0.000%
36	-10.56	-106.48	0.00	10.56	106.48	-0.00	0.000%
37	-9.14	-106.48	-5.27	9.14	106.48	5.27	0.000%
38	-5.28	-106.48	-9.13	5.28	106.48	9.13	0.000%
39	0.00	-44.05	-6.82	-0.00	44.05	6.82	0.000%
40	3.42	-44.05	-5.91	-3.42	44.05	5.91	0.000%
41	5.92	-44.05	-3.41	-5.92	44.05	3.41	0.000%
42	6.83	-44.05	0.00	-6.83	44.05	-0.00	0.000%
43	5.92	-44.05	3.41	-5.92	44.05	-3.41	0.000%
44	3.42	-44.05	5.91	-3.42	44.05	-5.91	0.000%
45	0.00	-44.05	6.82	-0.00	44.05	-6.82	0.000%
46	-3.42	-44.05	5.91	3.42	44.05	-5.91	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	
47	-5.92	-44.05	3.41	5.92	44.05	-3.41	0.000%
48	-6.83	-44.05	0.00	6.83	44.05	-0.00	0.000%
49	-5.92	-44.05	-3.41	5.92	44.05	3.41	0.000%
50	-3.42	-44.05	-5.91	3.42	44.05	5.91	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	5	0.00000001	0.00012724
3	Yes	5	0.00000001	0.00005724
4	Yes	6	0.00000001	0.00054578
5	Yes	6	0.00000001	0.00016018
6	Yes	6	0.00000001	0.00052024
7	Yes	6	0.00000001	0.00015099
8	Yes	5	0.00000001	0.00030513
9	Yes	5	0.00000001	0.00013841
10	Yes	6	0.00000001	0.00054397
11	Yes	6	0.00000001	0.00015941
12	Yes	6	0.00000001	0.00053214
13	Yes	6	0.00000001	0.00015523
14	Yes	5	0.00000001	0.00012725
15	Yes	5	0.00000001	0.00005724
16	Yes	6	0.00000001	0.00052287
17	Yes	6	0.00000001	0.00015200
18	Yes	6	0.00000001	0.00054911
19	Yes	6	0.00000001	0.00016137
20	Yes	5	0.00000001	0.00030512
21	Yes	5	0.00000001	0.00013844
22	Yes	6	0.00000001	0.00052482
23	Yes	6	0.00000001	0.00015274
24	Yes	6	0.00000001	0.00053594
25	Yes	6	0.00000001	0.00015674
26	Yes	4	0.00000001	0.00013583
27	Yes	6	0.00010394	0.00060215
28	Yes	7	0.00000001	0.00034648
29	Yes	7	0.00000001	0.00032798
30	Yes	6	0.00010386	0.00063709
31	Yes	7	0.00000001	0.00036057
32	Yes	7	0.00000001	0.00034399
33	Yes	6	0.00010393	0.00061263
34	Yes	7	0.00000001	0.00033339
35	Yes	7	0.00000001	0.00035350
36	Yes	6	0.00010400	0.00062817
37	Yes	7	0.00000001	0.00032186
38	Yes	7	0.00000001	0.00033619
39	Yes	4	0.00000001	0.00018766
40	Yes	5	0.00000001	0.00009567
41	Yes	5	0.00000001	0.00008276
42	Yes	4	0.00000001	0.00027295
43	Yes	5	0.00000001	0.00009480
44	Yes	5	0.00000001	0.00008839
45	Yes	4	0.00000001	0.00018823
46	Yes	5	0.00000001	0.00008351
47	Yes	5	0.00000001	0.00009741

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48	Yes	4	0.00000001	0.00027165
49	Yes	5	0.00000001	0.00008418
50	Yes	5	0.00000001	0.00008956

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	179 - 139.5	36.024	42	1.9083	0.0033
L2	143.5 - 93.4	22.776	42	1.5431	0.0031
L3	98.6 - 46.31	10.526	42	1.0366	0.0017
L4	52.7 - 0	2.958	42	0.5207	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
191.00	20' x 2" Dia Omni	42	36.024	1.9083	0.0033	26953
179.00	AIR21 B2A/B4P	42	36.024	1.9083	0.0033	26953
177.00	EEI 14-ft Platform w/ Rails	42	35.241	1.8882	0.0033	26953
170.00	(2) RRUS-11	42	32.508	1.8176	0.0033	14974
168.00	EEI 14-ft Low Profile Platform	42	31.733	1.7973	0.0033	12251
160.00	APL866513-42T0	42	28.680	1.7158	0.0032	7092
158.00	EEI 14-ft Low Profile Platform	42	27.932	1.6953	0.0032	6416
138.50	20' 4-Bay Dipole	42	21.137	1.4890	0.0030	3946
132.50	8' x 2" Omni	42	19.270	1.4230	0.0028	4145
112.50	10' Dipole	42	13.769	1.1969	0.0022	4984

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	179 - 139.5	178.943	8	9.4949	0.0158
L2	143.5 - 93.4	113.265	8	7.6827	0.0149
L3	98.6 - 46.31	52.387	8	5.1632	0.0085
L4	52.7 - 0	14.724	8	2.5933	0.0031

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
191.00	20' x 2" Dia Omni	8	178.943	9.4949	0.0158	5686
179.00	AIR21 B2A/B4P	8	178.943	9.4949	0.0158	5686

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Elevation	Appurtenance	Gov. Load Comb.	Deflection	Tilt	Twist	Radius of Curvature
ft			in	°	°	ft
177.00	EEI 14-ft Platform w/ Rails	8	175.059	9.3950	0.0158	5686
170.00	(2) RRUS-11	8	161.516	9.0449	0.0158	3158
168.00	EEI 14-ft Low Profile Platform	8	157.676	8.9445	0.0158	2583
160.00	APL866513-42T0	8	142.542	8.5401	0.0157	1492
158.00	EEI 14-ft Low Profile Platform	8	138.833	8.4381	0.0156	1349
138.50	20' 4-Bay Dipole	8	105.128	7.4140	0.0145	822
132.50	8' x 2" Omni	8	95.857	7.0861	0.0138	861
112.50	10' Dipole	8	68.521	5.9611	0.0107	1023

Compression Checks

Pole Design Data

Section No.	Elevation	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio
	ft		ft	ft		in ²	K	K	$\frac{P_u}{\phi P_n}$
L1	179 - 139.5 (1)	TP28.0455x19.5x0.1875	39.50	179.00	224.2	16.0640	-11.08	72.22	0.153
L2	139.5 - 93.4 (2)	TP37.5377x26.8051x0.375	50.10	179.00	167.8	42.9070	-21.13	344.06	0.061
L3	93.4 - 46.31 (3)	TP47.123x35.6737x0.375	52.29	179.00	133.4	53.9765	-34.45	684.96	0.050
L4	46.31 - 0 (4)	TP56.25x44.9739x0.375	52.70	179.00	108.3	66.5052	-52.83	1281.21	0.041

Pole Bending Design Data

Section No.	Elevation	Size	M _{ux}	φM _{ux}	Ratio	M _{uy}	φM _{uy}	Ratio
	ft		kip-ft	kip-ft	$\frac{M_{ux}}{\phi M_{ux}}$	kip-ft	kip-ft	$\frac{M_{uy}}{\phi M_{uy}}$
L1	179 - 139.5 (1)	TP28.0455x19.5x0.1875	487.18	590.06	0.826	0.00	590.06	0.000
L2	139.5 - 93.4 (2)	TP37.5377x26.8051x0.375	1477.53	2357.09	0.627	0.00	2357.09	0.000
L3	93.4 - 46.31 (3)	TP47.123x35.6737x0.375	2722.41	3542.45	0.769	0.00	3542.45	0.000
L4	46.31 - 0 (4)	TP56.25x44.9739x0.375	4399.48	4986.09	0.882	0.00	4986.09	0.000

Pole Shear Design Data

Section No.	Elevation	Size	Actual V _u	φV _n	Ratio	Actual T _u	φT _n	Ratio
	ft		K	K	$\frac{V_u}{\phi V_n}$	kip-ft	kip-ft	$\frac{T_u}{\phi T_n}$
L1	179 - 139.5 (1)	TP28.0455x19.5x0.1875	19.24	531.05	0.036	0.03	1182.80	0.000
L2	139.5 - 93.4 (2)	TP37.5377x26.8051x0.375	24.67	1593.89	0.015	3.08	4727.34	0.001
L3	93.4 - 46.31 (3)	TP47.123x35.6737x0.375	29.46	1900.17	0.016	3.06	7102.42	0.000
L4	46.31 - 0 (4)	TP56.25x44.9739x0.375	33.81	2167.33	0.016	3.06	9994.50	0.000

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Pole Interaction Design Data

Section No.	Elevation ft	Ratio	Ratio	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
		P_u	M_{ux}	M_{uy}	V_u	T_u			
L1	179 - 139.5 (1)	0.153	0.826	0.000	0.036	0.000	0.980	1.000	4.8.2 ✓
L2	139.5 - 93.4 (2)	0.061	0.627	0.000	0.015	0.001	0.689	1.000	4.8.2 ✓
L3	93.4 - 46.31 (3)	0.050	0.769	0.000	0.016	0.000	0.819	1.000	4.8.2 ✓
L4	46.31 - 0 (4)	0.041	0.882	0.000	0.016	0.000	0.924	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	179 - 139.5	Pole	TP28.0455x19.5x0.1875	1	-11.08	72.22	98.0	Pass
L2	139.5 - 93.4	Pole	TP37.5377x26.8051x0.375	2	-21.13	344.06	68.9	Pass
L3	93.4 - 46.31	Pole	TP47.123x35.6737x0.375	3	-34.45	684.96	81.9	Pass
L4	46.31 - 0	Pole	TP56.25x44.9739x0.375	4	-52.83	1281.21	92.4	Pass
Summary								
Pole (L1)							98.0	Pass
RATING =							98.0	Pass

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturing Moment =	$M_U := 4399\text{-ft-kips}$	(Input From trnTower)
Shear Force =	Shear := 34-kips	(Input From trnTower)
Axial Force =	$R_U := 53\text{-kips}$	(Input From trnTower)

Anchor Bolt Data:

ASTMA615 Grade 75		
Number of Anchor Bolts =	$N := 18$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 65\text{-in}$	(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 =	$t_{TP} := 2\text{-in}$	(User Input)
Base Plate Diameter =	$D_{OD} := 71\text{-in}$	(User Input)
Outer Pole Diameter =	$D_T := 56.25\text{-in}$	(User Input)
Pole Wall Thickness =	$t_T := 0.375\text{-in}$	(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:

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

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

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 = $P_u := \frac{n_c \cdot \pi \cdot M_u}{N \cdot D_{BC}} + \frac{R_u}{N} = 144.7 \cdot \text{kips}$

Maximum Shear Force = $V_u := \frac{\text{Shear}}{N} = 1.9 \cdot \text{kips}$

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

Bolt % of Capacity = $\frac{\left(P_u + \frac{V_u}{\eta} \right)}{\Phi R_{nt}} \cdot 100 = 57.1$

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 = $\left[\left(\frac{V_u}{\Phi R_{nv}} \right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}} \right)^2 \right] \cdot 100 = 31$

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 =

$$D_e := D_T + w_1 = 56.5 \text{ in}$$

Effective Base Plate Outside Diameter =

$$D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \leq (D_{BC} + 6 \cdot t_{TP}) \\ (D_{BC} + 6 \cdot t_{TP}) & \text{otherwise} \end{cases} = 71 \text{ in}$$

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

$$\theta_1 := \frac{\pi}{N} = 0.175$$

Rods =

Angle Defining Limiting Effective Base Plate Width

$$\theta_2 := \text{asin}\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.378$$

Based on Plate Thickness =

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

$$\theta_3 := \text{acos}\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.364$$

Effective Pole Outside Diameter =

Governing Angle Defining Effective Base Plate Width

$$\theta := \min(\theta_1, \theta_2, \theta_3) = 0.175$$

Resisting Bending =

Effective Moment Arm of Anchor Rod Force =

$$x := 0.5 \cdot (D_{BC} - D_e) = 4.25 \text{ in}$$

Effective Base Plate Width Resisting Bending from

$$B_{et} := D_{BC} \cdot \sin(\theta) = 11.287 \text{ in}$$

Transverse Bend Line =

Effective Base Plate Width Resisting Bending from

$$B_{er} := (D_{oe} - D_e) \cdot \sin(\theta) = 2.518 \text{ in}$$

Radial Bend Lines =

Total Effective Base Plate Width Resisting Bending =

$$B_{eff} := B_{et} + B_{er} = 13.805 \text{ in}$$

Required Base Plate Thickness =

$$t_{TP,Req} := \sqrt{\frac{4 \cdot P_u \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.816 \text{ in}$$

Plate Bending Stress % of Capacity =

$$\frac{t_{TP,Req}}{t_{TP}} = 90.8\%$$

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 =

$$t_{TP,Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.609 \text{ in}$$

Plate Bending Stress % of Capacity =

$$\frac{t_{TP,Req}}{t_{TP}} = 30.5\%$$

Condition2 =

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

Condition4 = "Ok"

Caisson Foundation:

Input Data:

Shear Force =	S := 34k	<i>USER INPUT-FROM trnTower</i>
Overturing Moment =	M := 4399ft-k	<i>USER INPUT-FROM trnTower</i>
Applied Axial Load =	A1 := 53k	<i>USER INPUT-FROM trnTower</i>
Bending Moment =	Mu := 4510ft-k	<i>USER INPUT-FROM LPILE</i>
Moment Capacity =	Mn := 7497ft-k	<i>USER INPUT-FROM LPILE</i>
Foundation Diameter =	d := 7.5ft	<i>USER INPUT</i>
Overall Length of Caisson =	Lc := 28.0ft	<i>USER INPUT</i>
Depth From Top of Caisson to Grade =	Lpag := 1.0ft	<i>USER INPUT</i>
Number of Rebar =	n := 24	<i>USER INPUT</i>
Area of Rebar =	Ar := 1.560in ²	<i>USER INPUT</i>
Rebar Yield Strength =	fy := 60ksi	<i>USER INPUT</i>
Concrete Comp Strength =	fc := 4ksi	<i>USER INPUT</i>

Check Moment Capacity:

Factor of Safety =	$FS := \frac{0.9 \cdot Mn}{Mu} = 1.5$
Factor of Safety Required =	FS _{reqd} := 1.0
	FOSCheck := if(FS ≥ FS _{reqd} , "OK", "NO GOOD")
	FOSCheck = "OK"

=====

LPILE Plus for Windows, Version 5.0 (5.0.47)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

TJL
Centek Engineering

Files Used for Analysis

Path to file locations: J:\Jobs\1902700.WI\15_CTHA539A\05_Structural\Tower
Analysis\Backup Documentation\Cals\Foundation\
Name of input data file: Caisson Analysis.lpd
Name of output file: Caisson Analysis.lpo
Name of plot output file: Caisson Analysis.lpp
Name of runtime file: Caisson Analysis.lpr

Time and Date of Analysis

Date: April 24, 2019 Time: 9:53:02

Problem Title

19027.15 - Burlington

Program Options

Units Used in Computations - US Customary Units: Inches, Pounds

Basic Program Options:

Analysis Type 3:

- Computation of Nonlinear Bending Stiffness and Ultimate Bending Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:

- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- Analysis includes computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No additional p-y curves to be computed at user-specified depths

Solution Control Parameters:

- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-04 in
- Maximum allowable deflection = 1.0000E+02 in

Printing Options:

- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (spacing of output points) = 8

 Pile Structural Properties and Geometry

- Pile Length = 336.00 in
- Depth of ground surface below top of pile = 12.00 in
- Slope angle of ground surface = 0.00 deg.

Structural properties of pile defined using 2 points

Point No.	Point Depth in	Pile Diameter in	Moment of Inertia in**4	Pile Area Sq.in	Modulus of Elasticity lbs/Sq.in
1	0.0000	90.00000000	3220623.	6361.7000	3600000.
2	336.0000	90.00000000	3220623.	6361.7000	3600000.

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of moment of inertia and modulus of are not used for any computations other than total stress due to combined axial loading and bending.

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 12.000 in
 Distance from top of pile to bottom of layer = 336.000 in
 p-y subgrade modulus k for top of soil layer = 90.000 lbs/in**3
 p-y subgrade modulus k for bottom of layer = 90.000 lbs/in**3

(Depth of lowest layer extends 0.00 in below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 2 points

Point No.	Depth X in	Eff. Unit Weight lbs/in**3
1	12.00	0.07500
2	336.00	0.07500

Shear Strength of Soils

Shear strength parameters with depth defined using 2 points

Point No.	Depth X in	Cohesion c lbs/in**2	Angle of Friction Deg.	E50 or k_rm	RQD %
1	12.000	0.00000	34.00	-----	-----
2	336.000	0.00000	34.00	-----	-----

Notes:

- (1) Cohesion = uniaxial compressive strength for rock materials.
- (2) Values of E50 are reported for clay strata.
- (3) Default values will be generated for E50 when input values are 0.
- (4) RQD and k_rm are reported only for weak rock strata.

Loading Type

Static loading criteria was used for computation of p-y curves.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 2

Load Case Number 1

Pile-head boundary conditions are Shear and Moment (BC Type 1)

Shear force at pile head = 34000.000 lbs

Bending moment at pile head = 52788000.000 in-lbs

Axial load at pile head = 53000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Load Case Number 2

Pile-head boundary conditions are Shear and Moment (BC Type 1)

Shear force at pile head = 14000.000 lbs

Bending moment at pile head = 22056000.000 in-lbs

Axial load at pile head = 53000.000 lbs

Non-zero moment at pile head for this load case indicates the pile-head may rotate under the applied pile-head loading, but is not a free-head (zero moment) condition.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Number of sections = 1

Pile Section No. 1

The sectional shape is a circular drilled shaft (bored pile).

Outside Diameter = 90.0000 in

Material Properties:

Compressive Strength of Concrete = 4.000 kip/in**2
 Yield Stress of Reinforcement = 60. kip/in**2
 Modulus of Elasticity of Reinforcement = 29000. kip/in**2
 Number of Reinforcing Bars = 24
 Area of Single Bar = 1.56000 in**2
 Number of Rows of Reinforcing Bars = 13
 Area of Steel = 37.440 in**2
 Area of Shaft = 6361.725 in**2
 Percentage of Steel Reinforcement = 0.589 percent
 Cover Thickness (edge to bar center) = 4.000 in

Unfactored Axial Squash Load Capacity = 23748.97 kip

Distribution and Area of Steel Reinforcement

Row Number	Area of Reinforcement in**2	Distance to Centroidal Axis in
1	1.560	41.000
2	3.120	39.603
3	3.120	35.507
4	3.120	28.991
5	3.120	20.500
6	3.120	10.612
7	3.120	0.000
8	3.120	-10.612
9	3.120	-20.500
10	3.120	-28.991
11	3.120	-35.507
12	3.120	-39.603
13	1.560	-41.000

Axial Thrust Force = 53000.00 lbs

Bending Max. Steel Moment Stress in-lbs psi	Bending Stiffness lb-in ²	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi
7871395.810.10726	1.259423E+13	6.250000E-07	0.00003043	48.69557306	108.10167

32070. 42604						
35857469.	2. 048998E+12	0. 00001750	0. 00035796	20. 45476064	1138. 39624	
33264. 20897						
37071781.	2. 045340E+12	0. 00001813	0. 00037056	20. 44466481	1174. 23769	
34457. 52306						
38284905.	2. 041862E+12	0. 00001875	0. 00038318	20. 43611124	1209. 84043	
35650. 36451						
39496826.	2. 038546E+12	0. 00001938	0. 00039581	20. 42895243	1245. 20340	
36842. 73236						
40707551.	2. 035378E+12	0. 00002000	0. 00040846	20. 42307034	1280. 32618	
38034. 61920						
41917058.	2. 032342E+12	0. 00002063	0. 00042113	20. 41834697	1315. 20748	
39226. 02622						
43125352.	2. 029428E+12	0. 00002125	0. 00043381	20. 41469112	1349. 84677	
40416. 94660						
44332421.	2. 026625E+12	0. 00002188	0. 00044651	20. 41201428	1384. 24305	
41607. 37844						
45538260.	2. 023923E+12	0. 00002250	0. 00045923	20. 41024134	1418. 39552	
42797. 31753						
46742858.	2. 021313E+12	0. 00002313	0. 00047197	20. 40930256	1452. 30319	
43986. 76147						
47946213.	2. 018788E+12	0. 00002375	0. 00048472	20. 40913895	1485. 96527	
45175. 70555						
49148319.	2. 016341E+12	0. 00002438	0. 00049749	20. 40969685	1519. 38094	
46364. 14554						
51548742.	2. 011658E+12	0. 00002563	0. 00052308	20. 41278139	1585. 46908	
48739. 50183						
53944067.	2. 007221E+12	0. 00002688	0. 00054874	20. 41821823	1650. 56016	
51112. 80117						
56334231.	2. 002995E+12	0. 00002813	0. 00057447	20. 42573109	1714. 64664	
53484. 01308						
58719189.	1. 998951E+12	0. 00002938	0. 00060028	20. 43509737	1777. 72124	
55853. 10143						
61098850.	1. 995064E+12	0. 00003063	0. 00062616	20. 44611856	1839. 77548	
58220. 04095						
63412459.	1. 989410E+12	0. 00003188	0. 00065190	20. 45169219	1900. 26682	
60000. 00000						
65196189.	1. 968187E+12	0. 00003313	0. 00067575	20. 40014818	1955. 11326	
60000. 00000						
66830852.	1. 944170E+12	0. 00003438	0. 00069912	20. 33813819	2007. 80121	
60000. 00000						
68019891.	1. 909330E+12	0. 00003563	0. 00072076	20. 23198977	2055. 56315	
60000. 00000						
69202490.	1. 876678E+12	0. 00003688	0. 00074243	20. 13377801	2102. 55276	
60000. 00000						
70382441.	1. 846097E+12	0. 00003813	0. 00076414	20. 04313543	2148. 80150	
60000. 00000						
71249530.	1. 809512E+12	0. 00003938	0. 00078449	19. 92355987	2191. 25112	
60000. 00000						
72050029.	1. 773539E+12	0. 00004063	0. 00080458	19. 80498210	2232. 41755	
60000. 00000						

72848542. 60000.00000	1.739667E+12	0.00004188	0.00082470	19.69430342	2272.94266
73645063. 60000.00000	1.707712E+12	0.00004313	0.00084486	19.59084526	2312.82334
74123403. 60000.00000	1.670387E+12	0.00004438	0.00086531	19.49999884	2352.59332
75130149. 60000.00000	1.646688E+12	0.00004563	0.00088797	19.46239963	2395.97913
75626406. 60000.00000	1.613363E+12	0.00004688	0.00090612	19.33052883	2429.69959
76121310. 60000.00000	1.581742E+12	0.00004813	0.00092429	19.20609042	2462.89755
76614838. 60000.00000	1.551693E+12	0.00004938	0.00094250	19.08852115	2495.57031
77106998. 60000.00000	1.523101E+12	0.00005063	0.00096073	18.97731945	2527.71572
77597782. 60000.00000	1.495861E+12	0.00005188	0.00097899	18.87202933	2559.33131
78087181. 60000.00000	1.469876E+12	0.00005313	0.00099728	18.77223775	2590.41458
78575171. 60000.00000	1.445061E+12	0.00005438	0.00101559	18.67756650	2620.96272
79061745. 60000.00000	1.421335E+12	0.00005563	0.00103394	18.58767495	2650.97321
79386055. 60000.00000	1.395799E+12	0.00005688	0.00105108	18.48060116	2678.38190
79672577. 60000.00000	1.370711E+12	0.00005813	0.00106797	18.37371513	2704.85757
79958046. 60000.00000	1.346662E+12	0.00005938	0.00108488	18.27172950	2730.87675
80242459. 60000.00000	1.323587E+12	0.00006063	0.00110182	18.17434385	2756.43747
80525845. 60000.00000	1.301428E+12	0.00006188	0.00111878	18.08128729	2781.53827
80855231. 60000.00000	1.280875E+12	0.00006313	0.00113625	18.00000027	2806.91513
81665540. 60000.00000	1.268591E+12	0.00006438	0.00115875	18.00000027	2839.21336
81665540. 60000.00000	1.244427E+12	0.00006563	0.00117529	17.90912971	2862.01540
81708503. 60000.00000	1.221809E+12	0.00006688	0.00119171	17.81993821	2884.18148
81978191. 60000.00000	1.203350E+12	0.00006813	0.00120815	17.73437306	2905.91461
82246907. 60000.00000	1.185541E+12	0.00006938	0.00122462	17.65223578	2927.21240
82514660. 60000.00000	1.168349E+12	0.00007063	0.00124112	17.57334933	2948.07315
82781434. 60000.00000	1.151742E+12	0.00007188	0.00125764	17.49754474	2968.49470
83047224. 60000.00000	1.135689E+12	0.00007313	0.00127418	17.42466643	2988.47509

60000.00000						
83312044.	1.	120162E+12	0.00007438	0.00129075	17.35457227	3008.01259
60000.00000						
83638070.	1.	087975E+12	0.00007688	0.00132154	17.19077781	3042.90921
60000.00000						
83922393.	1.	057290E+12	0.00007938	0.00135195	17.03246579	3075.74836
60000.00000						
84203799.	1.	028443E+12	0.00008188	0.00138244	16.88481823	3107.09092
60000.00000						
84482249.	1.	001271E+12	0.00008438	0.00141302	16.74689636	3136.92404
60000.00000						
84757700.	9.	756282E+11	0.00008688	0.00144368	16.61786869	3165.23461
60000.00000						
84757700.	9.	483379E+11	0.00008938	0.00147469	16.49999902	3192.25060
60000.00000						
85394048.	9.	294590E+11	0.00009188	0.00151556	16.49588183	3225.82732
60000.00000						
85645661.	9.	075037E+11	0.00009438	0.00154503	16.37122348	3247.80396
60000.00000						
85894570.	8.	866536E+11	0.00009688	0.00157459	16.25384733	3268.35790
60000.00000						
86140761.	8.	668253E+11	0.00009938	0.00160423	16.14321694	3287.47671
60000.00000						
86384207.	8.	479431E+11	0.00010188	0.00163396	16.03884682	3305.14757
60000.00000						
86624831.	8.	299385E+11	0.00010438	0.00166377	15.94029173	3321.35700
60000.00000						
86862662.	8.	127501E+11	0.00010688	0.00169367	15.84716275	3336.09213
60000.00000						
87097620.	7.	963211E+11	0.00010938	0.00172365	15.75909242	3349.33896
60000.00000						
87277284.	7.	801321E+11	0.00011188	0.00175256	15.66534653	3360.62932
60000.00000						
87387579.	7.	640444E+11	0.00011438	0.00178006	15.56335822	3370.01814
60000.00000						
87495723.	7.	486265E+11	0.00011688	0.00180763	15.46636418	3378.15155
60000.00000						
87601687.	7.	338361E+11	0.00011938	0.00183528	15.37405595	3385.01865
60000.00000						
87705451.	7.	196345E+11	0.00012188	0.00186300	15.28615192	3390.60841
60000.00000						
87806984.	7.	059858E+11	0.00012438	0.00189080	15.20239189	3394.90958
60000.00000						
87906284.	6.	928574E+11	0.00012688	0.00191867	15.12253985	3397.91078
60000.00000						
88003305.	6.	802188E+11	0.00012938	0.00194662	15.04637316	3399.60034
60000.00000						
88312438.	6.	696678E+11	0.00013188	0.00197813	15.00000045	3397.52958
60000.00000						
88976509.	6.	621508E+11	0.00013438	0.00201563	15.00000045	3388.11636
60000.00000						

88976509. 60000.00000	6. 500567E+11	0. 00013688	0. 00204993	14. 97668937	3384. 09200
88976509. 60000.00000	6. 383965E+11	0. 00013938	0. 00207659	14. 89932910	3388. 89417
88976509. 60000.00000	6. 271472E+11	0. 00014188	0. 00210333	14. 82524917	3392. 84893
88976509. 60000.00000	6. 162875E+11	0. 00014438	0. 00213015	14. 75428864	3395. 94679
88976509. 60000.00000	6. 057975E+11	0. 00014688	0. 00215705	14. 68629465	3398. 17793
88976509. 60000.00000	5. 956586E+11	0. 00014938	0. 00218403	14. 62112501	3399. 53236
88976509. 60000.00000	5. 858536E+11	0. 00015188	0. 00221110	14. 55865100	3399. 99986
88976509. 60000.00000	5. 763661E+11	0. 00015438	0. 00223840	14. 49973360	3394. 40272
88976509. 60000.00000	5. 671809E+11	0. 00015688	0. 00226576	14. 44310412	3388. 65819
89002853. 60000.00000	5. 584493E+11	0. 00015938	0. 00229319	14. 38863382	3382. 89755
89069458. 60000.00000	5. 502360E+11	0. 00016188	0. 00232068	14. 33623418	3377. 12031
89135528. 60000.00000	5. 422694E+11	0. 00016438	0. 00234823	14. 28580597	3381. 46900
89201124. 60000.00000	5. 345386E+11	0. 00016688	0. 00237585	14. 23727408	3386. 04269
89266187. 60000.00000	5. 270328E+11	0. 00016938	0. 00240352	14. 19055268	3389. 98192
89330745. 60000.00000	5. 197425E+11	0. 00017188	0. 00243127	14. 14557204	3393. 28011
89394769. 60000.00000	5. 126582E+11	0. 00017438	0. 00245908	14. 10225973	3395. 93027
89521201. 60000.00000	4. 990729E+11	0. 00017938	0. 00251491	14. 02038261	3399. 25834
89644397. 60000.00000	4. 862069E+11	0. 00018438	0. 00257111	13. 94498572	3397. 40230
89763040. 60000.00000	4. 739963E+11	0. 00018938	0. 00262781	13. 87622997	3387. 37361
89869805. 60000.00000	4. 623527E+11	0. 00019438	0. 00268407	13. 80872145	3377. 46253
89904318. 60000.00000	4. 509307E+11	0. 00019938	0. 00273628	13. 72428820	3368. 62144
89938175. 60000.00000	4. 400645E+11	0. 00020438	0. 00278864	13. 64469901	3376. 87750
89971381. 60000.00000	4. 297141E+11	0. 00020938	0. 00284114	13. 56961861	3384. 08069
89971381. 60000.00000	4. 196916E+11	0. 00021438	0. 00289406	13. 49999920	3390. 02628
89971381. 60000.00000	4. 101260E+11	0. 00021938	0. 00296156	13. 49999920	3396. 49644
89971381. 60000.00000	4. 009867E+11	0. 00022438	0. 00302906	13. 49999920	3399. 65731

60000.00000						
89971381.	3.922458E+11	0.00022938	0.00309656	13.49999920	3394.06162	
60000.00000						
90175643.	3.847494E+11	0.00023438	0.00316188	13.49069729	3383.73816	
60000.00000						
90184676.	3.767506E+11	0.00023938	0.00321381	13.42583612	3376.95341	
60000.00000						
90193483.	3.690782E+11	0.00024438	0.00326583	13.36399779	3370.14487	
60000.00000						
90202055.	3.617125E+11	0.00024938	0.00331794	13.30500528	3363.31219	
60000.00000						
90210395.	3.546355E+11	0.00025438	0.00337014	13.24869767	3356.45494	
60000.00000						
90218492.	3.478303E+11	0.00025938	0.00342243	13.19492474	3361.79378	
60000.00000						
90226332.	3.412816E+11	0.00026438	0.00347483	13.14354703	3368.64223	
60000.00000						
90231359.	3.349656E+11	0.00026938	0.00352795	13.09680149	3375.04404	
60000.00000						
90231359.	3.288614E+11	0.00027438	0.00358418	13.06306466	3381.55589	
60000.00000						
90231359.	3.229758E+11	0.00027938	0.00364059	13.03117856	3387.12537	
60000.00000						
90231359.	3.172971E+11	0.00028438	0.00369718	13.00106540	3391.72973	
60000.00000						
90231359.	3.118146E+11	0.00028938	0.00375396	12.97265545	3395.34516	
60000.00000						
90231359.	3.065184E+11	0.00029438	0.00381094	12.94588163	3397.94638	
60000.00000						

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 89971.38135
in-kip

Axial Thrust Force = 53000.00 lbs

Bending Max. Steel Moment Stress in-lbs psi	Bending Stiffness lb-in ²	Bending Curvature rad/in	Maximum Strain in/in	Neutral Axis Position inches	Max. Concrete Stress psi
7871395. 810.10726	1.259423E+13	6.250000E-07	0.00003043	48.69557306	108.10167
15667996. 1556.36275	1.253440E+13	0.00000125	0.00005867	46.93414494	206.70181
23390755.	1.247507E+13	0.00000188	0.00008694	46.36802718	303.93957

2303. 76148						
31037487.	1.	241499E+13	0. 00000250	0. 00011517	46. 06913790	399. 53867
3050. 01250						
31037487.	9.	931996E+12	0. 00000313	0. 00007136	22. 83490196	246. 35066
5724. 33701						
31037487.	8.	276663E+12	0. 00000375	0. 00008393	22. 38083616	288. 58837
6918. 58407						
31037487.	7.	094283E+12	0. 00000438	0. 00009623	21. 99486896	329. 60951
8120. 65100						
31037487.	6.	207497E+12	0. 00000500	0. 00010854	21. 70800403	370. 40325
9322. 33942						
31037487.	5.	517775E+12	0. 00000563	0. 00012087	21. 48722336	410. 96899
10523. 64669						
31037487.	4.	965998E+12	0. 00000625	0. 00013320	21. 31271347	451. 30607
11724. 57068						
31037487.	4.	514544E+12	0. 00000688	0. 00014556	21. 17186531	491. 41382
12925. 10935						
31037487.	4.	138332E+12	0. 00000750	0. 00015792	21. 05627283	531. 29154
14125. 26066						
31037487.	3.	819998E+12	0. 00000813	0. 00017063	21. 00000009	572. 01342
15315. 62498						
31037487.	3.	547141E+12	0. 00000875	0. 00018319	20. 93596771	611. 98899
16509. 99819						
31037487.	3.	310665E+12	0. 00000938	0. 00019557	20. 86125210	651. 09081
17709. 59709						
31037487.	3.	103749E+12	0. 00001000	0. 00020797	20. 79736188	689. 96473
18908. 76505						
31037487.	2.	921175E+12	0. 00001063	0. 00022039	20. 74239001	728. 60984
20107. 50108						
31037487.	2.	758888E+12	0. 00001125	0. 00023282	20. 69486126	767. 02549
21305. 80151						
31037487.	2.	613683E+12	0. 00001188	0. 00024526	20. 65360889	805. 21096
22503. 66344						
31037487.	2.	482999E+12	0. 00001250	0. 00025772	20. 61769679	843. 16540
23701. 08491						
31037487.	2.	364761E+12	0. 00001313	0. 00027020	20. 58637396	880. 88825
24898. 06141						
31037487.	2.	257272E+12	0. 00001375	0. 00028269	20. 55902079	918. 37868
26094. 59046						
31037487.	2.	159130E+12	0. 00001438	0. 00029519	20. 53512499	955. 63586
27290. 66977						
31037487.	2.	069166E+12	0. 00001500	0. 00030771	20. 51426008	992. 65897
28486. 29686						
32207454.	2.	061277E+12	0. 00001563	0. 00032025	20. 49607471	1029. 44748
29681. 46615						
33425299.	2.	056941E+12	0. 00001625	0. 00033280	20. 48026040	1066. 00033
30876. 17729						
34641972.	2.	052858E+12	0. 00001688	0. 00034537	20. 46656236	1102. 31684
32070. 42604						
35857469.	2.	048998E+12	0. 00001750	0. 00035796	20. 45476064	1138. 39624
33264. 20897						

37071781.	2. 045340E+12	0. 00001813	0. 00037056	20. 44466481	1174. 23769
34457. 52306					
38284905.	2. 041862E+12	0. 00001875	0. 00038318	20. 43611124	1209. 84043
35650. 36451					
39496826.	2. 038546E+12	0. 00001938	0. 00039581	20. 42895243	1245. 20340
36842. 73236					
40707551.	2. 035378E+12	0. 00002000	0. 00040846	20. 42307034	1280. 32618
38034. 61920					
41917058.	2. 032342E+12	0. 00002063	0. 00042113	20. 41834697	1315. 20748
39226. 02622					
43125352.	2. 029428E+12	0. 00002125	0. 00043381	20. 41469112	1349. 84677
40416. 94660					
44332421.	2. 026625E+12	0. 00002188	0. 00044651	20. 41201428	1384. 24305
41607. 37844					
45538260.	2. 023923E+12	0. 00002250	0. 00045923	20. 41024134	1418. 39552
42797. 31753					
46742858.	2. 021313E+12	0. 00002313	0. 00047197	20. 40930256	1452. 30319
43986. 76147					
47946213.	2. 018788E+12	0. 00002375	0. 00048472	20. 40913895	1485. 96527
45175. 70555					
49148319.	2. 016341E+12	0. 00002438	0. 00049749	20. 40969685	1519. 38094
46364. 14554					
51548742.	2. 011658E+12	0. 00002563	0. 00052308	20. 41278139	1585. 46908
48739. 50183					
53944067.	2. 007221E+12	0. 00002688	0. 00054874	20. 41821823	1650. 56016
51112. 80117					
56334231.	2. 002995E+12	0. 00002813	0. 00057447	20. 42573109	1714. 64664
53484. 01308					
58719189.	1. 998951E+12	0. 00002938	0. 00060028	20. 43509737	1777. 72124
55853. 10143					
61098850.	1. 995064E+12	0. 00003063	0. 00062616	20. 44611856	1839. 77548
58220. 04095					
63412459.	1. 989410E+12	0. 00003188	0. 00065190	20. 45169219	1900. 26682
60000. 00000					
65196189.	1. 968187E+12	0. 00003313	0. 00067575	20. 40014818	1955. 11326
60000. 00000					
66830852.	1. 944170E+12	0. 00003438	0. 00069912	20. 33813819	2007. 80121
60000. 00000					
68019891.	1. 909330E+12	0. 00003563	0. 00072076	20. 23198977	2055. 56315
60000. 00000					
69202490.	1. 876678E+12	0. 00003688	0. 00074243	20. 13377801	2102. 55276
60000. 00000					
70382441.	1. 846097E+12	0. 00003813	0. 00076414	20. 04313543	2148. 80150
60000. 00000					
71249530.	1. 809512E+12	0. 00003938	0. 00078449	19. 92355987	2191. 25112
60000. 00000					
72050029.	1. 773539E+12	0. 00004063	0. 00080458	19. 80498210	2232. 41755
60000. 00000					
72848542.	1. 739667E+12	0. 00004188	0. 00082470	19. 69430342	2272. 94266
60000. 00000					
73645063.	1. 707712E+12	0. 00004313	0. 00084486	19. 59084526	2312. 82334

60000.00000						
74123403.	1.670387E+12	0.00004438	0.00086531	19.49999884	2352.59332	
60000.00000						
75130149.	1.646688E+12	0.00004563	0.00088797	19.46239963	2395.97913	
60000.00000						
75626406.	1.613363E+12	0.00004688	0.00090612	19.33052883	2429.69959	
60000.00000						
76121310.	1.581742E+12	0.00004813	0.00092429	19.20609042	2462.89755	
60000.00000						
76614838.	1.551693E+12	0.00004938	0.00094250	19.08852115	2495.57031	
60000.00000						
77106998.	1.523101E+12	0.00005063	0.00096073	18.97731945	2527.71572	
60000.00000						
77597782.	1.495861E+12	0.00005188	0.00097899	18.87202933	2559.33131	
60000.00000						
78087181.	1.469876E+12	0.00005313	0.00099728	18.77223775	2590.41458	
60000.00000						
78575171.	1.445061E+12	0.00005438	0.00101559	18.67756650	2620.96272	
60000.00000						
79061745.	1.421335E+12	0.00005563	0.00103394	18.58767495	2650.97321	
60000.00000						
79386055.	1.395799E+12	0.00005688	0.00105108	18.48060116	2678.38190	
60000.00000						
79672577.	1.370711E+12	0.00005813	0.00106797	18.37371513	2704.85757	
60000.00000						
79958046.	1.346662E+12	0.00005938	0.00108488	18.27172950	2730.87675	
60000.00000						
80242459.	1.323587E+12	0.00006063	0.00110182	18.17434385	2756.43747	
60000.00000						
80525845.	1.301428E+12	0.00006188	0.00111878	18.08128729	2781.53827	
60000.00000						
80855231.	1.280875E+12	0.00006313	0.00113625	18.00000027	2806.91513	
60000.00000						
81665540.	1.268591E+12	0.00006438	0.00115875	18.00000027	2839.21336	
60000.00000						
81665540.	1.244427E+12	0.00006563	0.00117529	17.90912971	2862.01540	
60000.00000						
81708503.	1.221809E+12	0.00006688	0.00119171	17.81993821	2884.18148	
60000.00000						
81978191.	1.203350E+12	0.00006813	0.00120815	17.73437306	2905.91461	
60000.00000						
82246907.	1.185541E+12	0.00006938	0.00122462	17.65223578	2927.21240	
60000.00000						
82514660.	1.168349E+12	0.00007063	0.00124112	17.57334933	2948.07315	
60000.00000						
82781434.	1.151742E+12	0.00007188	0.00125764	17.49754474	2968.49470	
60000.00000						
83047224.	1.135689E+12	0.00007313	0.00127418	17.42466643	2988.47509	
60000.00000						
83312044.	1.120162E+12	0.00007438	0.00129075	17.35457227	3008.01259	
60000.00000						

83638070. 60000.00000	1.087975E+12	0.00007688	0.00132154	17.19077781	3042.90921
83922393. 60000.00000	1.057290E+12	0.00007938	0.00135195	17.03246579	3075.74836
84203799. 60000.00000	1.028443E+12	0.00008188	0.00138244	16.88481823	3107.09092
84482249. 60000.00000	1.001271E+12	0.00008438	0.00141302	16.74689636	3136.92404
84757700. 60000.00000	9.756282E+11	0.00008688	0.00144368	16.61786869	3165.23461
84757700. 60000.00000	9.483379E+11	0.00008938	0.00147469	16.49999902	3192.25060
85394048. 60000.00000	9.294590E+11	0.00009188	0.00151556	16.49588183	3225.82732
85645661. 60000.00000	9.075037E+11	0.00009438	0.00154503	16.37122348	3247.80396
85894570. 60000.00000	8.866536E+11	0.00009688	0.00157459	16.25384733	3268.35790
86140761. 60000.00000	8.668253E+11	0.00009938	0.00160423	16.14321694	3287.47671
86384207. 60000.00000	8.479431E+11	0.00010188	0.00163396	16.03884682	3305.14757
86624831. 60000.00000	8.299385E+11	0.00010438	0.00166377	15.94029173	3321.35700
86862662. 60000.00000	8.127501E+11	0.00010688	0.00169367	15.84716275	3336.09213
87097620. 60000.00000	7.963211E+11	0.00010938	0.00172365	15.75909242	3349.33896
87277284. 60000.00000	7.801321E+11	0.00011188	0.00175256	15.66534653	3360.62932
87387579. 60000.00000	7.640444E+11	0.00011438	0.00178006	15.56335822	3370.01814
87495723. 60000.00000	7.486265E+11	0.00011688	0.00180763	15.46636418	3378.15155
87601687. 60000.00000	7.338361E+11	0.00011938	0.00183528	15.37405595	3385.01865
87705451. 60000.00000	7.196345E+11	0.00012188	0.00186300	15.28615192	3390.60841
87806984. 60000.00000	7.059858E+11	0.00012438	0.00189080	15.20239189	3394.90958
87906284. 60000.00000	6.928574E+11	0.00012688	0.00191867	15.12253985	3397.91078
88003305. 60000.00000	6.802188E+11	0.00012938	0.00194662	15.04637316	3399.60034
88312438. 60000.00000	6.696678E+11	0.00013188	0.00197813	15.00000045	3397.52958
88976509. 60000.00000	6.621508E+11	0.00013438	0.00201563	15.00000045	3388.11636
88976509. 60000.00000	6.500567E+11	0.00013688	0.00204993	14.97668937	3384.09200
88976509. 60000.00000	6.383965E+11	0.00013938	0.00207659	14.89932910	3388.89417

60000.00000						
88976509.	6.271472E+11	0.00014188	0.00210333	14.82524917	3392.84893	
60000.00000						
88976509.	6.162875E+11	0.00014438	0.00213015	14.75428864	3395.94679	
60000.00000						
88976509.	6.057975E+11	0.00014688	0.00215705	14.68629465	3398.17793	
60000.00000						
88976509.	5.956586E+11	0.00014938	0.00218403	14.62112501	3399.53236	
60000.00000						
88976509.	5.858536E+11	0.00015188	0.00221110	14.55865100	3399.99986	
60000.00000						
88976509.	5.763661E+11	0.00015438	0.00223840	14.49973360	3394.40272	
60000.00000						
88976509.	5.671809E+11	0.00015688	0.00226576	14.44310412	3388.65819	
60000.00000						
89002853.	5.584493E+11	0.00015938	0.00229319	14.38863382	3382.89755	
60000.00000						
89069458.	5.502360E+11	0.00016188	0.00232068	14.33623418	3377.12031	
60000.00000						
89135528.	5.422694E+11	0.00016438	0.00234823	14.28580597	3381.46900	
60000.00000						
89201124.	5.345386E+11	0.00016688	0.00237585	14.23727408	3386.04269	
60000.00000						
89266187.	5.270328E+11	0.00016938	0.00240352	14.19055268	3389.98192	
60000.00000						
89330745.	5.197425E+11	0.00017188	0.00243127	14.14557204	3393.28011	
60000.00000						
89394769.	5.126582E+11	0.00017438	0.00245908	14.10225973	3395.93027	
60000.00000						
89521201.	4.990729E+11	0.00017938	0.00251491	14.02038261	3399.25834	
60000.00000						
89644397.	4.862069E+11	0.00018438	0.00257111	13.94498572	3397.40230	
60000.00000						
89763040.	4.739963E+11	0.00018938	0.00262781	13.87622997	3387.37361	
60000.00000						
89869805.	4.623527E+11	0.00019438	0.00268407	13.80872145	3377.46253	
60000.00000						
89904318.	4.509307E+11	0.00019938	0.00273628	13.72428820	3368.62144	
60000.00000						
89938175.	4.400645E+11	0.00020438	0.00278864	13.64469901	3376.87750	
60000.00000						
89971381.	4.297141E+11	0.00020938	0.00284114	13.56961861	3384.08069	
60000.00000						
89971381.	4.196916E+11	0.00021438	0.00289406	13.49999920	3390.02628	
60000.00000						
89971381.	4.101260E+11	0.00021938	0.00296156	13.49999920	3396.49644	
60000.00000						
89971381.	4.009867E+11	0.00022438	0.00302906	13.49999920	3399.65731	
60000.00000						
89971381.	3.922458E+11	0.00022938	0.00309656	13.49999920	3394.06162	
60000.00000						

90175643.	3. 847494E+11	0. 00023438	0. 00316188	13. 49069729	3383. 73816
60000. 00000					
90184676.	3. 767506E+11	0. 00023938	0. 00321381	13. 42583612	3376. 95341
60000. 00000					
90193483.	3. 690782E+11	0. 00024438	0. 00326583	13. 36399779	3370. 14487
60000. 00000					
90202055.	3. 617125E+11	0. 00024938	0. 00331794	13. 30500528	3363. 31219
60000. 00000					
90210395.	3. 546355E+11	0. 00025438	0. 00337014	13. 24869767	3356. 45494
60000. 00000					
90218492.	3. 478303E+11	0. 00025938	0. 00342243	13. 19492474	3361. 79378
60000. 00000					
90226332.	3. 412816E+11	0. 00026438	0. 00347483	13. 14354703	3368. 64223
60000. 00000					
90231359.	3. 349656E+11	0. 00026938	0. 00352795	13. 09680149	3375. 04404
60000. 00000					
90231359.	3. 288614E+11	0. 00027438	0. 00358418	13. 06306466	3381. 55589
60000. 00000					
90231359.	3. 229758E+11	0. 00027938	0. 00364059	13. 03117856	3387. 12537
60000. 00000					
90231359.	3. 172971E+11	0. 00028438	0. 00369718	13. 00106540	3391. 72973
60000. 00000					
90231359.	3. 118146E+11	0. 00028938	0. 00375396	12. 97265545	3395. 34516
60000. 00000					
90231359.	3. 065184E+11	0. 00029438	0. 00381094	12. 94588163	3397. 94638
60000. 00000					

Unfactored (Nominal) Moment Capacity at Concrete Strain of 0.003 = 89971.38135
in-kip

 Computed Values of Load Distribution and Deflection
 for Lateral Loading for Load Case Number 1

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
 Specified shear force at pile head = 34000.000 lbs
 Specified moment at pile head = 52788000.000 in-lbs
 Specified axial load at pile head = 53000.000 lbs

Depth Es*h X F/L in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res. p lbs/in
0.000	0.841405	5.28E+07	34000.	-0.006566	745.909	2.01E+12	0.000

0.000								
26.880	0.674447	5.37E+07	29436.	-0.005854	758.496	2.01E+12	-613.016	
3053.957								
53.760	0.526798	5.41E+07	-2474.259	-0.005131	764.663	2.01E+12	-1755.814	
11199.								
80.640	0.398598	5.33E+07	-61796.	-0.004410	753.305	2.01E+12	-2462.378	
20757.								
107.520	0.289525	5.08E+07	-1.29E+05	-0.003712	717.540	2.01E+12	-2488.988	
28885.								
134.400	0.198614	4.64E+07	-1.93E+05	-0.003063	656.904	2.02E+12	-2187.934	
37014.								
161.280	0.124242	4.05E+07	-2.45E+05	-0.002485	574.347	2.04E+12	-1669.222	
45142.								
188.160	0.064212	3.34E+07	-2.81E+05	-0.001998	475.036	2.06E+12	-1018.039	
53271.								
215.040	0.013242	2.56E+07	-2.99E+05	-0.001858	365.526	1.25E+13	-241.985	
61399.								
241.920	-0.036030	1.76E+07	-2.92E+05	-0.001811	253.750	1.25E+13	745.557	
69528.								
268.800	-0.084285	1.01E+07	-2.57E+05	-0.001782	149.678	1.26E+13	1947.993	
77656.								
295.680	-0.131952	4.09E+06	-1.86E+05	-0.001767	65.452	1.26E+13	3368.882	
85785.								
322.560	-0.179372	5.08E+05	-73421.	-0.001763	15.422	1.26E+13	5013.524	
93913.								

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.84140455 in
Computed slope at pile head	=	-0.00656642
Maximum bending moment	=	54130224. lbs-in
Maximum shear force	=	-299443.50162 lbs
Depth of maximum bending moment	=	53.76000000 in
Depth of maximum shear force	=	221.76000 in
Number of iterations	=	38
Number of zero deflection points	=	1

 Computed Values of Load Distribution and Deflection
 for Lateral Loading for Load Case Number 2

Pile-head boundary conditions are Shear and Moment (Pile-head Condition Type 1)
 Specified shear force at pile head = 14000.000 lbs
 Specified moment at pile head = 22056000.000 in-lbs
 Specified axial load at pile head = 53000.000 lbs

Depth Es*h X F/L in	Deflect. y in	Moment M lbs-in	Shear V lbs	Slope S Rad.	Total Stress lbs/in**2	Flx. Rig. EI lbs-in**2	Soil Res. p lbs/in
0.000	0.236301	2.21E+07	14000.	-0.001228	316.507	1.25E+13	0.000
0.000							
26.880	0.203923	2.24E+07	11885.	-0.001181	321.644	1.25E+13	-273.093
4499.712							
53.760	0.172841	2.26E+07	-840.432	-0.001132	324.068	1.25E+13	-649.606
12628.							
80.640	0.143066	2.23E+07	-21753.	-0.001084	320.050	1.25E+13	-883.803
20757.							
107.520	0.114579	2.14E+07	-47153.	-0.001036	307.219	1.25E+13	-985.012
28885.							
134.400	0.087327	1.98E+07	-73586.	-0.000992	284.546	1.25E+13	-961.989
37014.							
161.280	0.061214	1.75E+07	-97818.	-0.000952	252.256	1.25E+13	-822.419
45142.							
188.160	0.036106	1.46E+07	-1.17E+05	-0.000917	211.755	1.25E+13	-572.438
53271.							
215.040	0.011835	1.13E+07	-1.28E+05	-0.000890	165.561	1.26E+13	-216.272
61399.							
241.920	-0.011789	7.80E+06	-1.27E+05	-0.000869	117.270	1.26E+13	243.944
69528.							
268.800	-0.034964	4.52E+06	-1.14E+05	-0.000856	71.527	1.26E+13	808.099
77656.							
295.680	-0.057878	1.84E+06	-83095.	-0.000850	34.029	1.26E+13	1477.691
85785.							
322.560	-0.080681	2.30E+05	-33167.	-0.000848	11.539	1.26E+13	2255.057
93913.							

Please note that because this analysis makes computations of ultimate moment capacity and pile response using nonlinear bending stiffness that the above values of total stress due to combined axial stress and bending may not be representative of actual conditions.

Output Verification:

Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 2:

Pile-head deflection = 0.23630119 in
 Computed slope at pile head = -0.00122845
 Maximum bending moment = 22597097. lbs-in
 Maximum shear force = -129108.20257 lbs
 Depth of maximum bending moment = 53.76000000 in
 Depth of maximum shear force = 228.48000 in
 Number of iterations = 5
 Number of zero deflection points = 1

 Summary of Pile Response(s)

Definition of Symbols for Pile-Head Loading Conditions:

Type 1 = Shear and Moment, y = pile-head displacement in
 Type 2 = Shear and Slope, M = Pile-head Moment lbs-in
 Type 3 = Shear and Rot. Stiffness, V = Pile-head Shear Force lbs
 Type 4 = Deflection and Moment, S = Pile-head Slope, radians
 Type 5 = Deflection and Slope, R = Rot. Stiffness of Pile-head in-lbs/rad

Load Type	Pile-Head Condition 1	Pile-Head Condition 2	Axial Load lbs	Pile-Head Deflection in	Maximum Moment in-lbs	Maximum Shear lbs
1	V= 34000.	M= 5.28E+07	53000.0000	0.8414046	5.4130E+07	-299444.
1	V= 14000.	M= 2.21E+07	53000.0000	0.2363012	2.2597E+07	-129108.

 Computed Pile-head Stiffness Matrix Members
 K22, K23, K32, K33 for Superstructure

Top y in	Shear React. lbs	Mom. React. in-lbs	K22 lbs/in	K32 in-lbs/in
0.00155937	3400.00005	637038.93934	2180373.	4.085243E+08
0.00469416	10235.01985	1917678.	2180373.	4.085243E+08
0.00744007	16222.12266	3039448.	2180373.	4.085243E+08
0.00938832	20470.03970	3835357.	2180373.	4.085243E+08

0.01089950	23764.98015	4452711.	2180373.	4.085243E+08
0.01213423	26457.14251	4957126.	2180373.	4.085243E+08
0.01317817	28733.33336	5383604.	2180373.	4.085243E+08
0.01408248	30705.05956	5753035.	2180373.	4.085243E+08
0.01488014	32444.24532	6078896.	2180373.	4.085243E+08
0.01559366	34000.00000	6370389.	2180373.	4.085243E+08

Top Rota. rad	Shear React. lbs	Mom. React. in-lbs	K23 lbs/rad	K33 in-lbs/rad
0.00005461	22307.48338	5278800.	4.085243E+08	9.667240E+10
0.00016468	67158.47564	15890771.	4.078046E+08	9.649309E+10
0.00026167	106461.92159	25186277.	4.068557E+08	9.625208E+10
0.00033139	134358.84033	31781543.	4.054370E+08	9.590299E+10
0.00076390	158589.06185	36897229.	2.076038E+08	4.830096E+10
0.00108501	181333.35338	41077048.	1.671258E+08	3.785864E+10
0.00131812	201260.75844	44611035.	1.526879E+08	3.384448E+10
0.00150412	218772.53750	47672314.	1.454493E+08	3.169458E+10
0.00166867	234759.72748	50372554.	1.406864E+08	3.018717E+10
0.00178835	247988.77006	52788000.	1.386687E+08	2.951765E+10

K22 = abs(Shear Reaction/Top y)

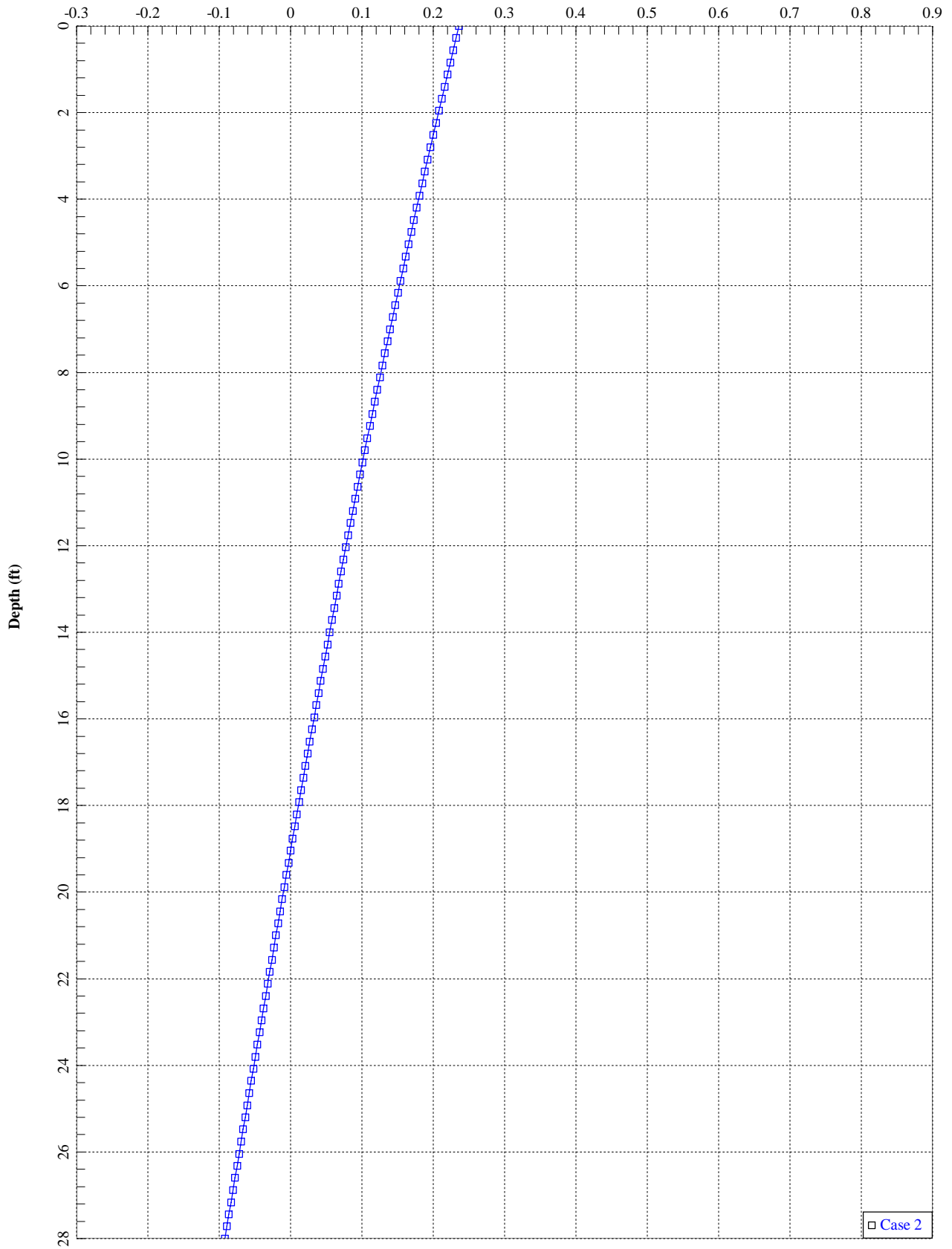
K23 = abs(Shear Reaction/Top Rotation)

K32 = abs(Moment Reaction/Top y)

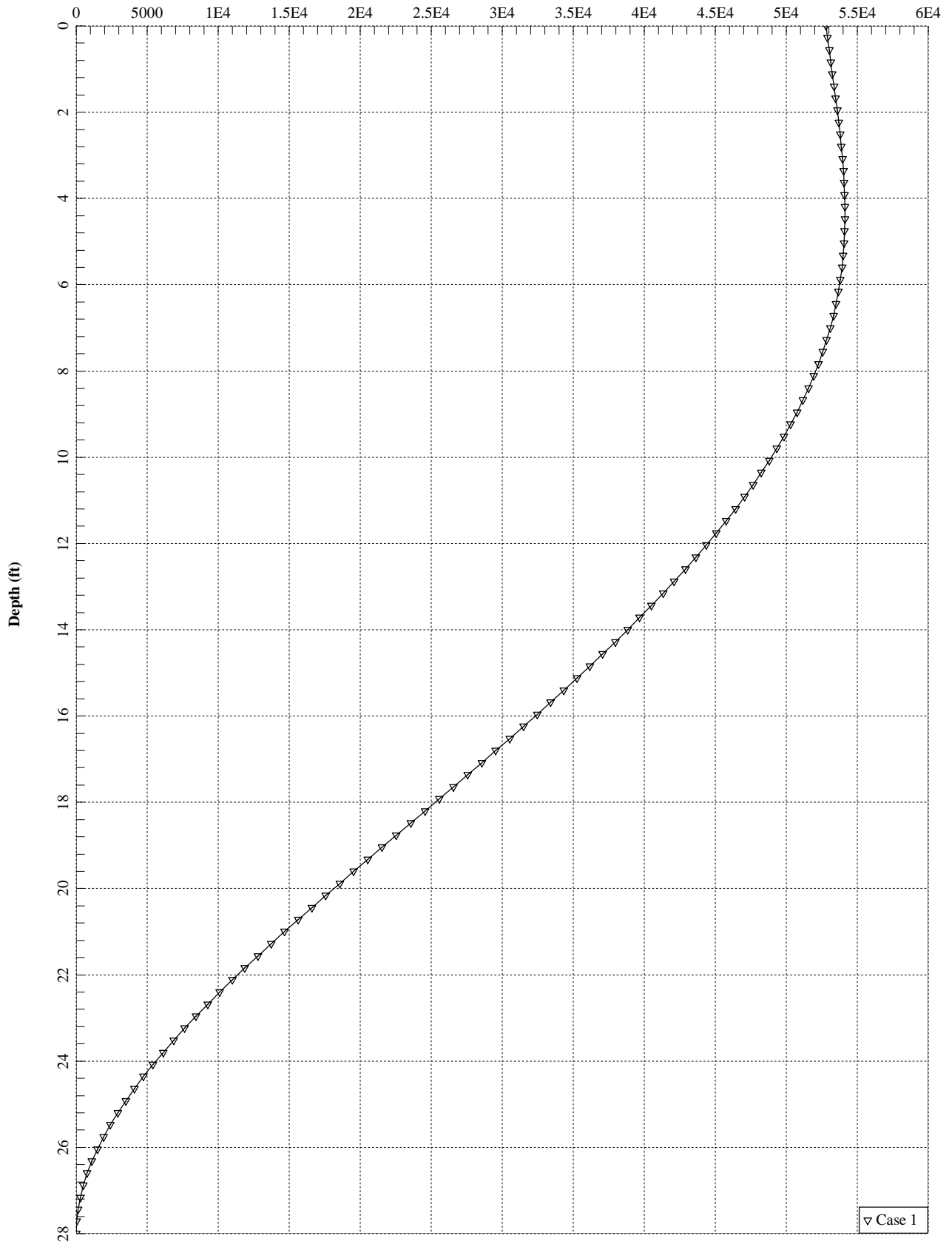
K33 = abs(Moment Reaction/Top Rotation)

The analysis ended normally.

Lateral Deflection (in)

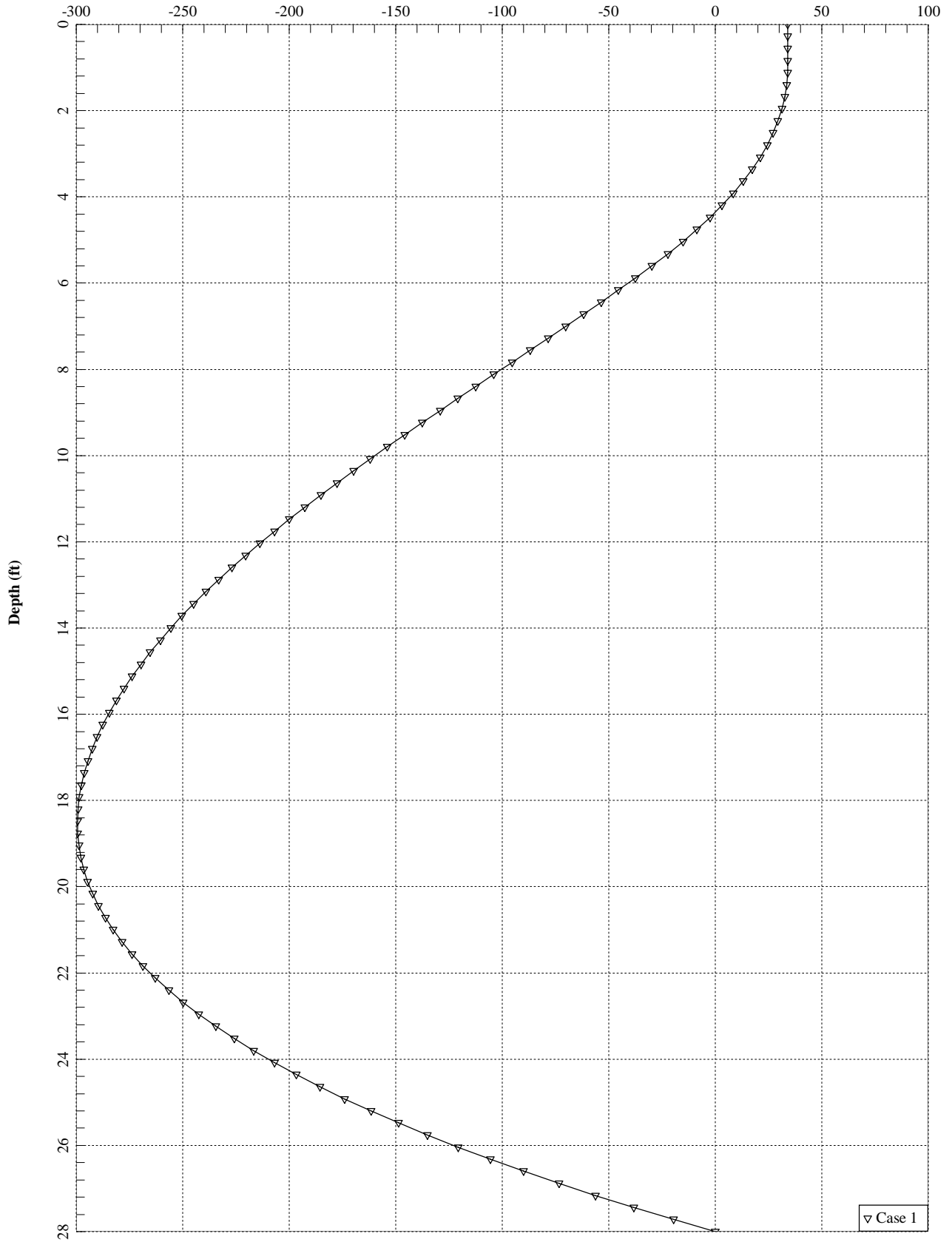


Bending Moment (in-kips)



▽ Case 1

Shear Force (kips)



RAN Template: 67D95ADB	A&L Template: 67D95ADB_2xAIR+1OP	Power System Template: Custom
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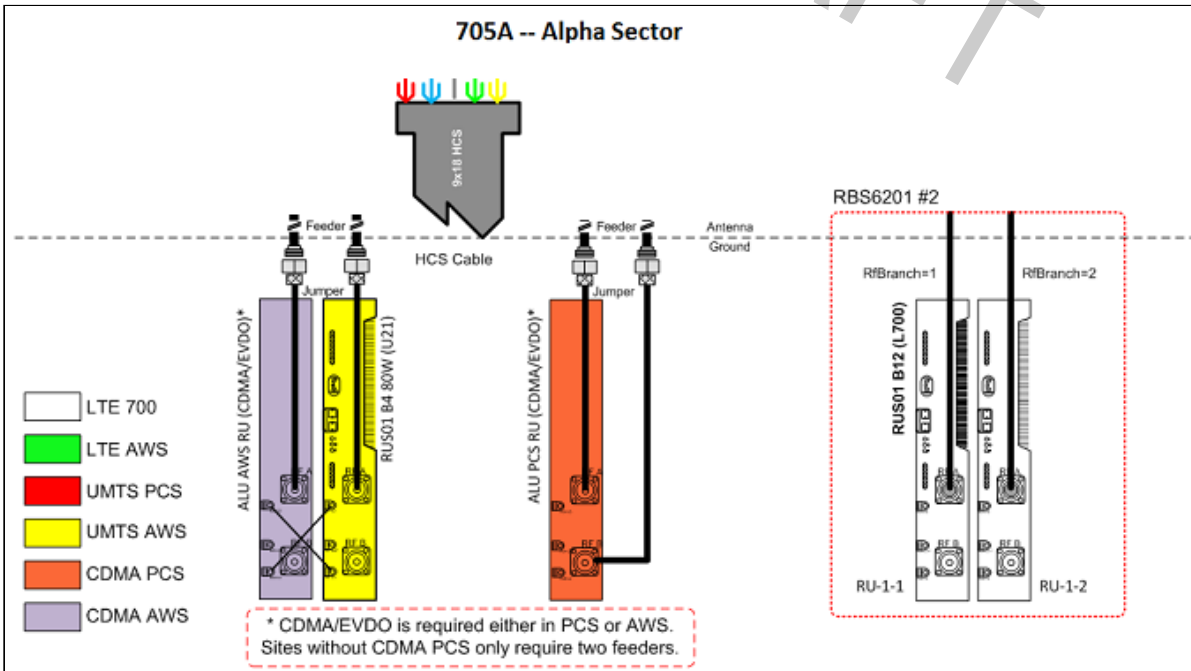
Section 1 - Site Information

Site ID: CTHA539A	Site Name: Burlington Fire Department Flagpole	Latitude: 41.766400000
Status: Draft	Site Class: Monopole	Longitude: -72.961700000
Version: 3.1	Site Type: Structure Non Building	Address: 719 George Washington Tpke
Project Type: L600	Plan Year: 2019	City, State: Burlington, CT
Approved: Not Approved	Market: CONNECTICUT	Region: NORTHEAST
Approved By: Not Approved	Vendor: Ericsson	
Last Modified: 4/17/2019 11:7:50 AM	Landlord: <undefined>	
Last Modified By: GSM1900\AMurill9		

RAN Template: 67D95ADB	AL Template: 67D95ADB_2xAIR+1OP
Sector Count: 3	Antenna Count: 9
Coax Line Count: 6	TMA Count: 0
RRU Count: 3	

Section 2 - Existing Template Images

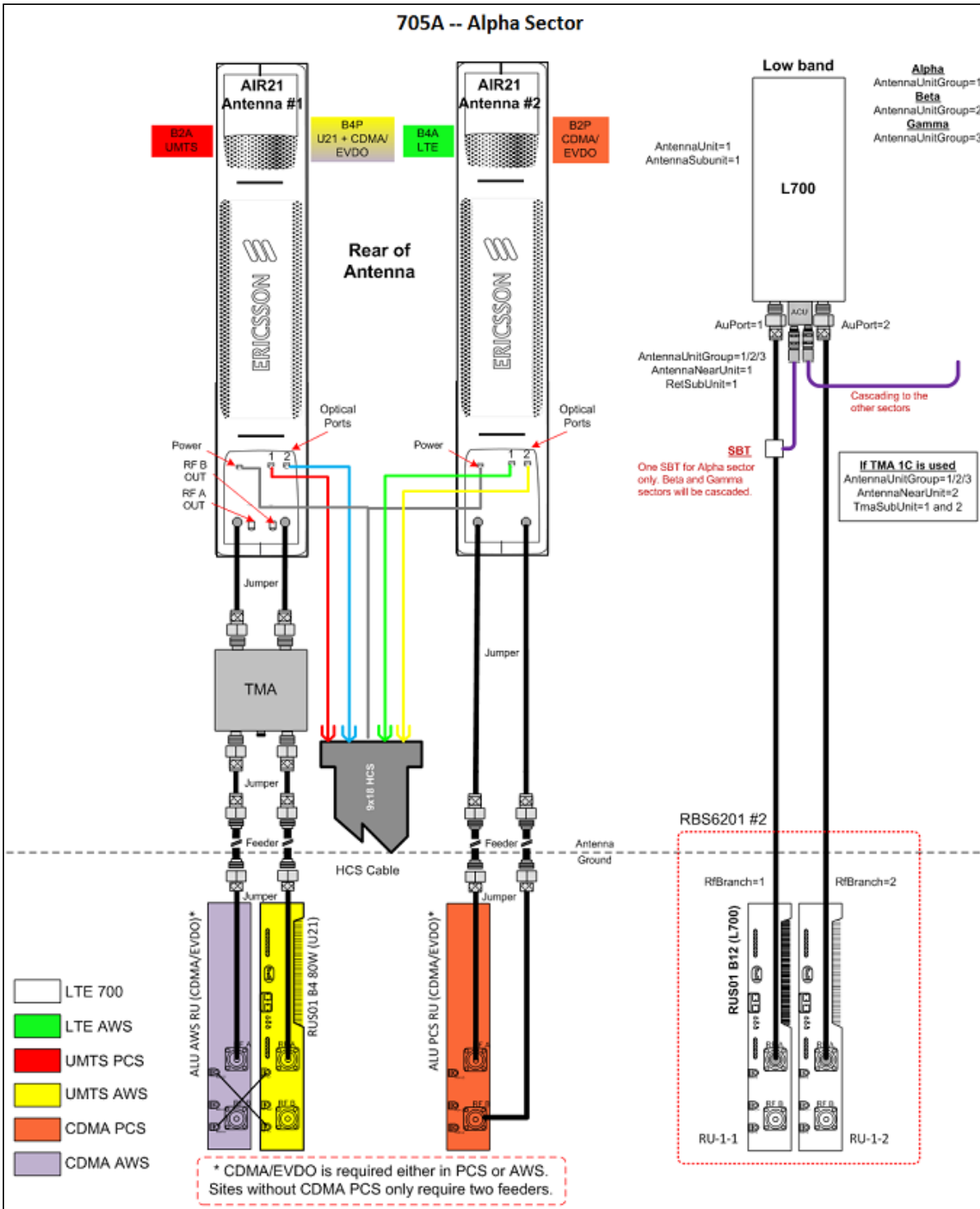
RAN_705A.png



Notes:

AL_705A.png

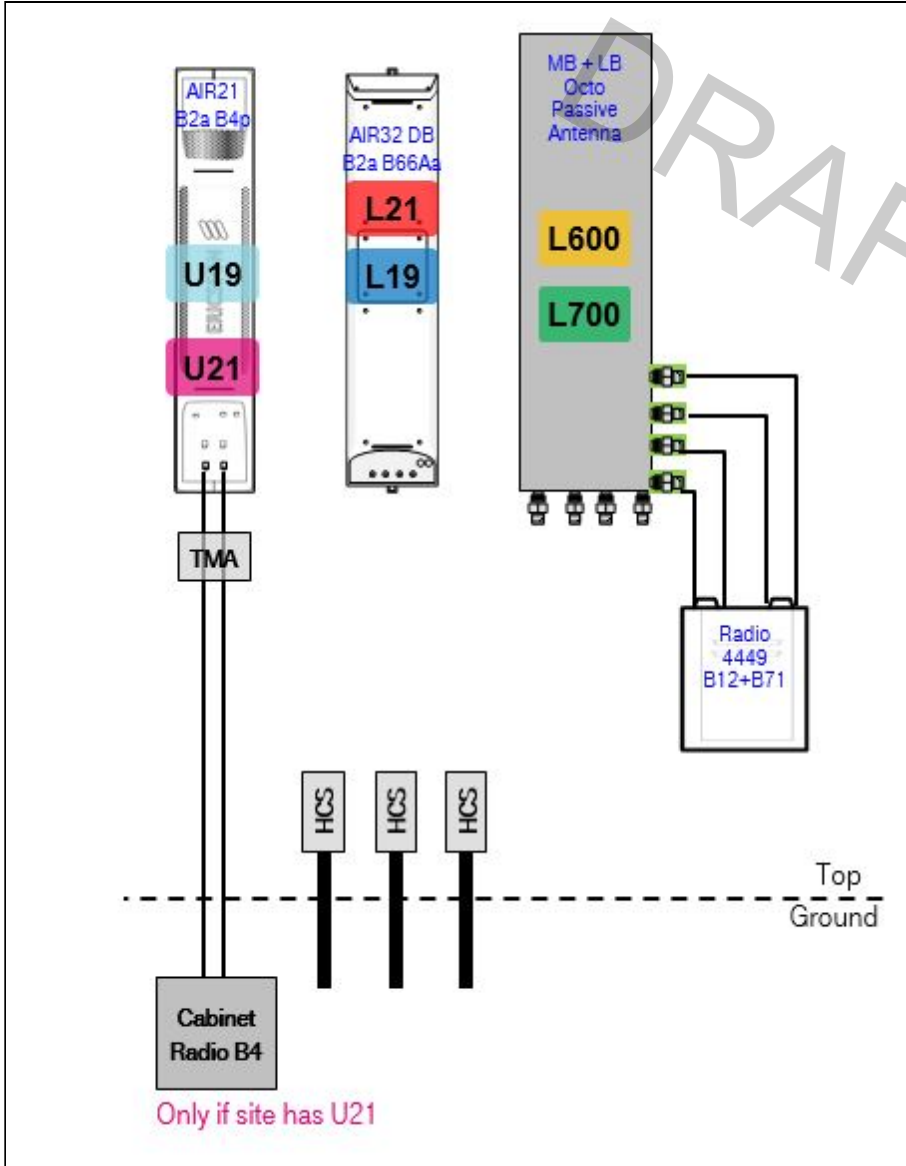
705A -- Alpha Sector



Notes:

Section 3 - Proposed Template Images

67D95ADB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

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DRAFT

RAN Template: 67D95ADB	A&L Template: 67D95ADB_2xAIR+1OP	Power System Template: Custom
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Section 5 - RAN Equipment

Existing RAN Equipment

Template: 705A-V2

Enclosure	1	2
Enclosure Type	RBS 6201 ODE	Battery Cabinet
Baseband	DUW30 U2100	DUS41 L2100 L700
Hybrid Cable System	Ericsson 9x18 HCS *Select Length*	
Multiplexer	XMU	
Radio	RUS01 B12 (x6) L700	

Proposed RAN Equipment

Template: 67D95ADB

Enclosure	1		
Enclosure Type	RBS 6102 MU AC		
Baseband	DUW30 U2100	BB 6630 N600 (DARK)	BB 6630 L2100 L1900 L700 L600
Hybrid Cable System	Ericsson 9x18 HCS *Select Length*	Ericsson 6x12 HCS *Select Length & AWG* (x2)	Ericsson 6x12 HCS *Select AWG & Length*

RAN Scope of Work:

Swap RBS 6201 ODE with (1) RBS 6102 MU AC.
 Carry over the DUW30 to the new cabinet.
 Remove (6) RUS01 B12 radios.
 Replace (1) DUS41 with (1) BB6630 for LTE,
 Add (1) BB6630 for future 5G (N600).
 Remove (1) XMU.
 Add (3) 6x12 HCS. Total will be (4) HCS.

RAN Template: 67D95ADB	A&L Template: 67D95ADB_2xAIR+1OP	Power System Template: Custom
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Section 6 - A&L Equipment

Existing Template: 1DP_2xAIR_705A
Proposed Template: 67D95ADB_2xAIR+1OP

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro				
Antenna	1		2		3
Antenna Model	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)		Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)		Andrew - LNX-6515DS-A1M (Dual)
Azimuth	60		60		60
M. Tilt					
Height	179		179		179
Ports	P1	P2	P3	P4	P5
Active Tech.	U2100		L2100		L700
Dark Tech.					
Restricted Tech.					
Decomm. Tech.					
E. Tilt	2		2		2
Cables	1-5/8" Coax (x2)				
TMA's					
Diplexers / Combiners					
Radio					
Sector Equipment					

Unconnected Equipment:

Scope of Work:

Add L7 antenna on new mount. Re-use existing coax if swept clean and not aluminum otherwise replace 2 per sector.

RAN Template: 67D95ADB	A&L Template: 67D95ADB_2xAIR+1OP	Power System Template: Custom
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Sector 1 (Proposed) view from behind										
Coverage Type	A - Outdoor Macro									
Antenna	1			2			3			
Antenna Model	RFS - APXVAARR24_43-U-NA20 (Octo)			Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)			Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	60			60			60			
M. Tilt										
Height	179			179			179			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L700 L600	L700 L600				U2100	L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2				2	2	2	2	2
Cables										
TMA's										
Diplexers / Combiners										
Radio	Radio 4449 B71+B1 2 (At Antenna)	SHARED Radio 4449 B71+B1 2 (At Antenna)								
Sector Equipment										

Unconnected Equipment:

Cable: 1-5/8" Coax

Cable: 1-5/8" Coax

Scope of Work:

Swap (1) AIR21 B4A with (1) AIR32 DB antenna, connect L2100 and L1900.
Swap LB Dual antenna with (1) LB/MB Octa 8' antenna, add (1) Radio 4449.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template: 67D95ADB	A&L Template: 67D95ADB_2xAIR+1OP	Power System Template: Custom
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Sector 2 (Existing) view from behind					
Coverage Type	A - Outdoor Macro				
Antenna	1		2		3
Antenna Model	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)		Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)		Andrew - LNX-6515DS-A1M (Dual)
Azimuth	180		180		180
M. Tilt					
Height	179		179		179
Ports	P1	P2	P3	P4	P5
Active Tech.	U2100		L2100		L700
Dark Tech.					
Restricted Tech.					
Decomm. Tech.					
E. Tilt	2		2		2
Cables	1-5/8" Coax (x2)				
TMA's					
Diplexers / Combiners					
Radio					
Sector Equipment					
Unconnected Equipment:					
Scope of Work:					
Add L7 antenna on new mount. Re-use existing coax if swept clean and not aluminum otherwise replace 2 per sector.					

RAN Template: 67D95ADB	A&L Template: 67D95ADB_2xAIR+1OP	Power System Template: Custom
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Sector 2 (Proposed) view from behind											
Coverage Type	A - Outdoor Macro										
Antenna	1			2			3				
Antenna Model	RFS - APXVAARR24_43-U-NA20 (Octo)			Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)			Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				
Azimuth	180			180			180				
M. Tilt											
Height	179			179			179				
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	
Active Tech.	L700 L600	L700 L600				U2100	L2100	L2100	L1900	L1900	
Dark Tech.											
Restricted Tech.											
Decomm. Tech.											
E. Tilt	2	2			0	2	2	2	2	2	
Cables											
TMA's											
Diplexers / Combiners											
Radio	Radio 4449 B71+B1 2 (At Antenna)	SHARED Radio 4449 B71+B1 2 (At Antenna)									
Sector Equipment											

Unconnected Equipment:

- Cable: 1-5/8" Coax
- Cable: 1-5/8" Coax

Scope of Work:

Swap (1) AIR21 B4A with (1) AIR32 DB antenna, connect L2100 and L1900.
 Swap LB Dual antenna with (1) LB/MB Octa 8' antenna, add (1) Radio 4449.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template: 67D95ADB	A&L Template: 67D95ADB_2xAIR+1OP	Power System Template: Custom
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Sector 3 (Existing) view from behind					
Coverage Type	A - Outdoor Macro				
Antenna	1		2		3
Antenna Model	Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)		Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)		Andrew - LNX-6515DS-A1M (Dual)
Azimuth	300		300		300
M. Tilt					
Height	179		179		179
Ports	P1	P2	P3	P4	P5
Active Tech.	U2100		L2100		L700
Dark Tech.					
Restricted Tech.					
Decomm. Tech.					
E. Tilt	2		2		2
Cables	1-5/8" Coax (x2)				
TMA's					
Diplexers / Combiners					
Radio					
Sector Equipment					
Unconnected Equipment:					
Scope of Work:					
Add L7 antenna on new mount. Re-use existing coax if swept clean and not aluminum otherwise replace 2 per sector.					

RAN Template: 67D95ADB	A&L Template: 67D95ADB_2xAIR+1OP	Power System Template: Custom
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Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1			2			3			
Antenna Model	RFS - APXVAARR24_43-U-NA20 (Octo)			Ericsson - AIR21 KRC118023-1_B2P_B4A (Quad)			Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	300			300			300			
M. Tilt										
Height	179			179			179			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L700 L600	L700 L600				U2100	L2100	L2100	L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt	2	2			0	2	2	2	2	2
Cables										
TMA's										
Diplexers / Combiners										
Radio	Radio 4449 B71+B1 2 (At Antenna)	SHARED Radio 4449 B71+B1 2 (At Antenna)								
Sector Equipment										

Unconnected Equipment:

Cable: 1-5/8" Coax Cable: 1-5/8" Coax

Scope of Work:

Swap (1) AIR21 B4A with (1) AIR32 DB antenna, connect L2100 and L1900.
Swap LB Dual antenna with (1) LB/MB Octa 8' antenna, add (1) Radio 4449.

*A dashed border indicates shared equipment. Any connected equipment is denoted with the SHARED keyword.

RAN Template: 67D95ADB	A&L Template: 67D95ADB_2xAIR+1OP	Power System Template: Custom
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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 daisy 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

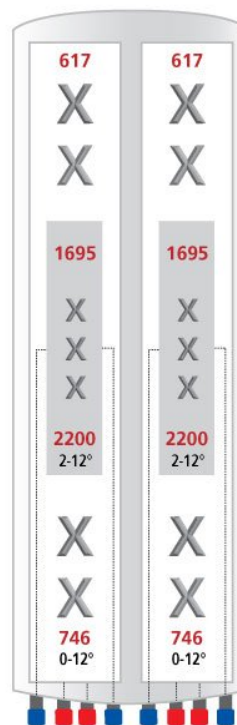
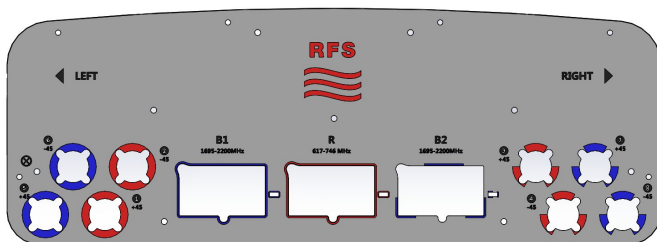
Impedance	Ohm	50.0
Polarization	Deg	±45°

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

Structural Analysis Report

Antenna Mount Analysis

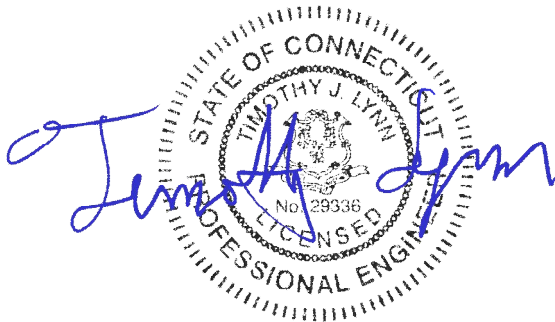
T-Mobile Site #: CTHA539A

*719 George Washington Tpke
Burlington, CT 06013*

Centek Project No. 19027.15

Date: April 22, 2019

Max Stress Ratio = 78.2%



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

Table of Contents

SECTION 1 – REPORT

- ANTENNA AND APPURTENANCE SUMMARY
- STRUCTURE LOADING
- CONCLUSION

SECTION 2 – CALCULATIONS

- WIND LOAD ON APPURTENANCES
- RISA3D OUTPUT REPORT

SECTION 3 – REFERENCE MATERIALS (NOT INCLUDED WITHIN REPORT)

- RF DATA SHEET, DATED 04/23/2019

April 24, 2019

Mr. Dan Reid
Transcend Wireless
10 Industrial Ave
Mahwah, NJ 07430

Re: *Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CTHA539A
719 George Washington Tpke
Burlington, CT 06013*

Centek Project No. 19027.15

Dear Mr. Reid,

Centek Engineering, Inc. has reviewed the T-Mobile antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the existing mount, consisting of one (1) low profile platform to support the equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

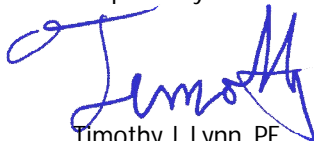
- T-Mobile:
Low Profile Platform: Three (3) Ericsson AIR32 panel antennas, three (3) RFS APXVAARR24-43-NA20 panel antennas, three (3) Ericsson AIR21 panel antennas, three (3) Ericsson 4449 B71_B12 remote radio units mounted on a platform with a RAD center elevation of 179-ft +/- AGL.

The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 93 mph for Burlington as required in Appendix N of the 2018 Connecticut State Building Code.

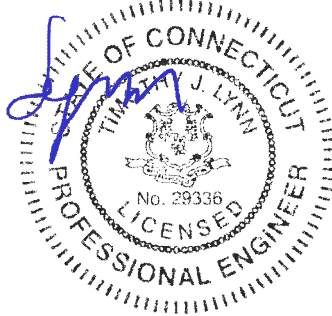
A structural analysis of tower and foundation needs to be completed prior to any work.

Based on our review of the equipment upgrade, it is our opinion that the existing antenna platform with the installation of one (1) SitePro handrail (p/n HRK14) is structurally adequate to support the proposed antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer



Prepared by:

Thanin Chanmalai
Engineer

CEN TEK Engineering, Inc.
Structural Analysis – Mount Analysis
T-Mobile Site Ref. ~ CTHA539A
Burlington, CT
April 24, 2019

Section 2 - Calculations

**Development of Design Heights, Exposure Coefficients,
 and Velocity Pressures Per TIA-222-G**

Wind Speeds

Basic Wind Speed	V := 93	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	V _i := 50	mph	(User Input per Annex B of TIA-222-G)

Input

Structure Type =	Structure_Type := Pole		(User Input)
Structure Category =	SC := 11		(User Input)
Exposure Category =	Exp := C		(User Input)
Structure Height =	h := 180	ft	(User Input)
Height to Center of Antennas =	z := 179	ft	(User Input)
Radial Ice Thickness =	t _i := 1.00	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	l _d := 56.00	pcf	(User Input)
Topographic Factor =	K _{zt} := 1.0		(User Input)
	K _a := 1.0		(User Input)
Gust Response Factor =	G _H = 1.1		(User Input)

Output

Wind Direction Probability Factor =	$K_d := \begin{cases} \text{if Structure_Type = Pole} \\ 0.95 \\ \text{if Structure_Type = Lattice} \\ 0.85 \end{cases} = 0.95$	(Per Table 2-2 of TIA-222-G)
		(Per Table 2-3 of TIA-222-G)

Importance Factors =	$I_{Wind} := \begin{cases} \text{if SC = 1} \\ 0.87 \\ \text{if SC = 2} \\ 1.00 \\ \text{if SC = 3} \\ 1.15 \end{cases} = 1$
----------------------	--

	$I_{Wind_w_Ice} := \begin{cases} \text{if SC = 1} \\ 0 \\ \text{if SC = 2} \\ 1.00 \\ \text{if SC = 3} \\ 1.00 \end{cases} = 1$
--	---

$K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.184$	$I_{ice} := \begin{cases} \text{if SC = 1} \\ 0 \\ \text{if SC = 2} \\ 1.00 \\ \text{if SC = 3} \\ 1.25 \end{cases} = 1$
---	--

Velocity Pressure Coefficient Antennas =	$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.368$ $K_z := 2.01 \cdot \left(\frac{z}{zg}\right)^{\alpha} = 1.431$
--	---

Velocity Pressure w/o Ice Antennas = $q_z := 0.00256 \cdot K_d \cdot K_z \cdot V^2 \cdot I_{Wind} = 30.09 \text{ psf}$

Velocity Pressure with Ice Antennas = $q_{z_{ice}} := 0.00256 \cdot K_d \cdot K_z \cdot V_i^2 \cdot I_{Wind} = 8.7 \text{ psf}$

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXVAARR24_43-U-NA20
Antenna Shape =	Flat (User Input)
Antenna Height =	$L_{ant} := 95.9$ in (User Input)
Antenna Width =	$W_{ant} := 19.7$ in (User Input)
Antenna Thickness =	$T_{ant} := 8.7$ in (User Input)
Antenna Weight =	$WT_{ant} := 114.7$ lbs (User Input)
Number of Antennas =	$N_{ant} := 1$ (User Input)
Antenna Aspect Ratio =	$AR_{ant} := \frac{L_{ant}}{W_{ant}} = 4.9$

Antenna Force Coefficient = $Ca_{ant} = 1.31$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 13.1$ sf

Total Antenna Wind Force Front = $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 567$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$ sf

Total Antenna Wind Force Side = $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 250$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 17.1$ sf

Total Antenna Wind Force w/ Ice Front = $F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 213$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 9.4$ sf

Total Antenna Wind Force w/ Ice Side = $F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 117$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 115$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \cdot 10^4$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 2 \cdot 10^4$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot I_d = 538$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 538$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson KRC118023-1_B2A_B4P	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 56.26$	in (User Input)
Antenna Width =	$W_{ant} := 12.08$	in (User Input)
Antenna Thickness =	$T_{ant} := 7.87$	in (User Input)
Antenna Weight =	$WT_{ant} := 150$	lbs (User Input)
Number of Antennas =	$N_{ant} := 1$	(User Input)
Antenna Aspect Ratio =	$AR_{ant} := \frac{L_{ant}}{W_{ant}} = 4.7$	
Antenna Force Coefficient =	$Ca_{ant} = 1.3$	

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 202$	lbs
Surface Area for One Antenna =	$SA_{ants} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.1$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ants} = 132$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 7.1$	sf
Total Antenna Wind Force w/ Ice Front =	$F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 88$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEants} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5.3$	sf
Total Antenna Wind Force w/ Ice Side =	$F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEants} = 66$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 150$	lbs
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Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5349$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 7583$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot I d = 246$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 246$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson KRD901146-1_B66A_B2A	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 56.65$	in (User Input)
Antenna Width =	$W_{ant} := 12.87$	in (User Input)
Antenna Thickness =	$T_{ant} := 8.66$	in (User Input)
Antenna Weight =	$WT_{ant} := 132.2$	lbs (User Input)
Number of Antennas =	$N_{ant} := 1$	(User Input)
Antenna Aspect Ratio =	$AR_{ant} := \frac{L_{ant}}{W_{ant}} = 4.4$	

Antenna Force Coefficient = $Ca_{ant} = 1.28$

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.1$ sf

Total Antenna Wind Force Front = $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 215$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.4$ sf

Total Antenna Wind Force Side = $F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 145$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 7.5$ sf

Total Antenna Wind Force w/ Ice Front = $F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 92$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5.7$ sf

Total Antenna Wind Force w/ Ice Side = $F_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 70$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 132$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6314$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 8166$

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot I_d = 265$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 265$ lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model =	Ericsson 4449 B71B12	
RRUS Shape =	Flat	(User Input)
RRUS Height =	$L_{RRUS} := 14.9$	in (User Input)
RRUS Width =	$W_{RRUS} := 13.2$	in (User Input)
RRUS Thickness =	$T_{RRUS} := 10.4$	in (User Input)
RRUS Weight =	$WT_{RRUS} := 74$	lbs (User Input)
Number of RRUS's =	$N_{RRUS} := 1$	
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.1$	
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$	

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 1.4$ sf

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 54$ lbs

Surface Area for One RRUS = $SA_{RRUS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUS} = 43$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 2.4$ sf

Total RRUS Wind Force w/ Ice = $F_{IRRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 28$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 2.1$ sf

Total RRUS Wind Force w/ Ice = $F_{IRRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUS} = 24$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 74$ lbs

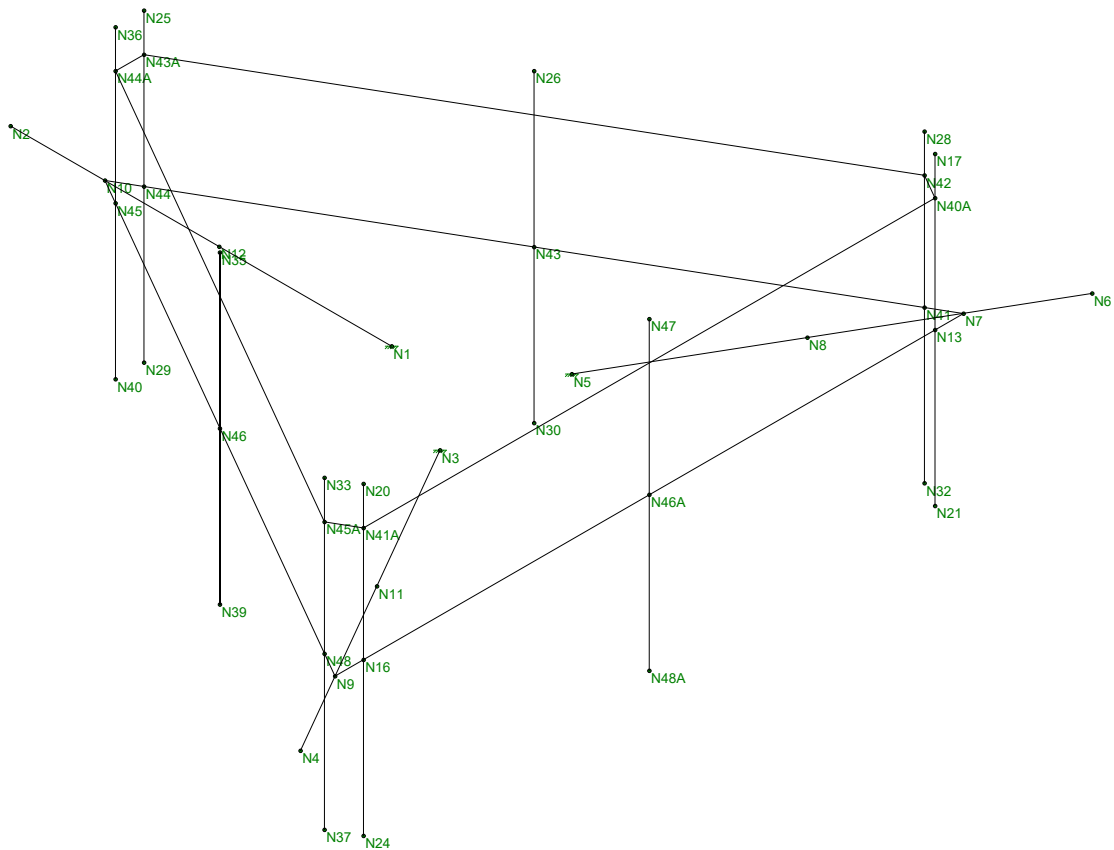
Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2045$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 3286$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot \rho = 106$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 106$ lbs



Envelope Only Solution

Centek	CTHA539A - Mount	SK - 1
THC		Apr 22, 2019 at 3:52 PM
19027.15		CTHA539A_AMA.R3D



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

T-Mobile Existing Facility

Site ID: CTHA539A

Burlington Fire Department Flagpole
719 George Washington Turnpike
Burlington, CT 06013

May 2, 2019

EBI Project Number: 6219001441

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	7.58 %



May 2, 2019

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

Emissions Analysis for Site: **CTHA539A – Burlington Fire Department Fla**

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **719 George Washington Turnpike, Burlington, 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), 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 **719 George Washington Turnpike, Burlington, 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 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.
- 2) 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.
- 3) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 4) 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.
- 5) 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.



- 6) 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.
- 7) 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.
- 8) The antennas used in this modeling are the **Ericsson AIR32 B66A/B2A & Ericsson AIR21 B2P/B4A** 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, 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.
- 9) The antenna mounting height centerline of the proposed antennas is **179 feet** above ground level (AGL).
- 10) 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.
- 11) 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):	179 feet	Height (AGL):	179 feet	Height (AGL):	179 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):	200	Total TX Power(W):	200	Total TX Power(W):	200
ERP (W):	7,780.90	ERP (W):	7,780.90	ERP (W):	7,780.90
Antenna A1 MPE%	0.93	Antenna B1 MPE%	0.93	Antenna C1 MPE%	0.93
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	Ericsson AIR21 B2P/B4A	Make / Model:	Ericsson AIR21 B2P/B4A	Make / Model:	Ericsson AIR21 B2P/B4A
Gain:	15.9 dBd	Gain:	15.9 dBd	Gain:	15.9 dBd
Height (AGL):	179 feet	Height (AGL):	179 feet	Height (AGL):	179 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	1	Channel Count	1	Channel Count	1
Total TX Power(W):	40	Total TX Power(W):	40	Total TX Power(W):	40
ERP (W):	1,556.18	ERP (W):	1,556.18	ERP (W):	1,556.18
Antenna A2 MPE%	0.19	Antenna B2 MPE%	0.19	Antenna C2 MPE%	0.19
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):	179 feet	Height (AGL):	179 feet	Height (AGL):	179 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%	0.70	Antenna B3 MPE%	0.70	Antenna C3 MPE%	0.70

Site Composite MPE%	
Carrier	MPE%
T-Mobile (Per Sector Max)	1.82 %
Public Safety	0.85 %
AT&T	1.28 %
Verizon Wireless	3.63 %
Site Total MPE %:	7.58 %

T-Mobile Sector A Total:	1.82 %
T-Mobile Sector B Total:	1.82 %
T-Mobile Sector C Total:	1.82 %
Site Total:	7.58 %



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	179	3.74	PCS - 1900 MHz	1000.00	0.37%
T-Mobile AWS - 2100 MHz LTE	2	2,334.27	179	5.61	AWS - 2100 MHz	1000.00	0.56%
T-Mobile AWS - 2100 MHz UMTS	1	1,556.18	179	1.87	AWS - 2100 MHz	1000.00	0.19%
T-Mobile 600 MHz LTE	2	788.97	179	1.90	600 MHz	400.00	0.48%
T-Mobile 700 MHz LTE	2	432.54	179	1.04	700 MHz	467.00	0.22%
						Total:	1.82%

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:	1.82 %
Sector B:	1.82 %
Sector C:	1.82 %
T-Mobile Maximum MPE % (Per Sector):	1.82 %
Site Total:	7.58 %
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **7.58%** 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.