



10 INDUSTRIAL AVENUE,
SUITE 3
MAHWAH, NJ 07430

PHONE: 201.684.0055
FAX: 201.684.0066

July 1, 2019

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

RE: Notice of Exempt Modification
818 Providence Pike, Killingly, CT
Latitude: 41.791417
Longitude: -72.822361
T-Mobile Site#: CT11156A/ L600

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 140-foot level of the existing 190-foot guyed-lattice tower at 818 Providence Pike, Killingly, CT. The 190-foot guyed-lattice tower and underlying property is owned by Quinebaug Valley Emergency Communications Inc. T-Mobile now intends to replace six (6) of its existing antennas with three (3) new 600/700 MHz antennas and three (3) new 1900 MHz antennas. The new antennas would be installed at the 140-foot level of the tower. Three V-frame sector mounts (Commscope P/N: SF-QV12-B) will also be installed

Planned Modifications:

Remove:

Coax:

- (6) 1-5/8" coax cables -inside of the existing tower
- (6) RRU's, RUS01 B12 from cabinet

Remove and Replace:

Antennas:

- (3) EMS RR90-17-02DP panel (REMOVE) - (3) RFS APXVAARR24 - 600 MHz / 700 MHz antenna (REPLACE)
- (3) Andrew LNX-6515DS panel antennas (REMOVE) - (3) RFS APX16DWV-16DWVS- 1900 MHz / 1900 MHz (REPLACE)

Install New:

RRUs:

- (3) Ericsson 4449 B71 B12 RRH's at antenna

Coax Cables:

- (1) 6x12 fiber cable - inside of the existing tower.

Mounts:

- (3) V-Frames Commscope p/n SF-QV12)

Existing to Remain:

Antennas:

(3) TMAs (RELOCATE)

Coax Cables:

(6) 1-5/8" coax cables

Ground:

Replace (1) DUS41 (1) BB6630 for LTE and add (1) BB6630 for future 5G N600

This facility was approved by the Killingly Planning and Zoning Commission, however, after corresponding with the Town Planner, the Planner has not been able to find records of the approval on file in her department. Subsequent exempt modifications have been approved by the Siting Council to this facility, with no record of conditions that would restrict exempt modifications. Therefore, this modification complies with the aforementioned approval.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies § 16- SOj-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-SOj-73, a copy of this letter is being sent to Jonathan Cesolini, Chairman, Councilor at Large for the Town of Killingly as well as Ann-Marie Aubrey, Director, Planning and Development for the Town of Killingly and Quinebaug Valley Emergency Communications Inc., tower and property owner

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

1. The proposed 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,

Elizabeth Jamieson

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

Cc:

Jonathan Cesolini, Chairman, Town of Killingly
Ann-Marie Aubrey, Director, Planning and Development, Town of Killingly
Quinebaug Valley Emergency Communications Inc, as tower and property owner.

Situs : 812 PROVIDENCE PIKE

Map ID: 001389

Class: Charitable Organizations under

Card: 1 of 1

Printed: December 5, 2018

CURRENT OWNER
QUINEBAUG VALLEY EMERGENCY COMMUNICATIONS INC
1249 HARTFORD PIKE
KILLINGLY CT 06239

GENERAL INFORMATION
Living Units
Neighborhood 112
Alternate Id 212-27
Vol / Pg 652/315
District 7
Zoning RURAL DEVELOPMENT
Class EXEMPT

Property Notes
COMMUNICATION TOWER 20X40 BLDG & 1 SHELTER FOR QVEC THE OTHER VERIZON - NOT EXEMPT 7200

Land Information				
Type	Size	Influence Factors	Influence %	Value
Primary	AC 1.0000	Traffic	-10	16,200
Total Acres: 1 Spot: Location:				

Assessment Information					
	Assessed	Appraised	Cost	Income	Market
Land	11,340	16,200	16,200	0	0
Building	129,430	184,900	184,900	0	0
Total	140,770	201,100	201,100	0	0
Manual Override Reason					
Value Flag COST APPROACH			Base Date of Value 10/01/2018		
TOWER ON SLAB 20000			Effective Date of Value 10/01/2018		

Entrance Information			
Date	ID	Entry Code	Source
06/19/12	DB	Complete	Other

Permit Information					
Date Issued	Number	Price	Purpose	% Complete	
01/24/18	25795	15,000	97 BPP	Repl 6 Antenna Panels W/New Mo	995
03/03/17	25119	500	BLDG	Nvc Set 1000g A/G Lp Tank & U/G	997
02/28/17	25111	21,000	81 CELE	Supply & Install 1 New Propane Ge	997
05/15/15	23589	3,000	BLDG	Nvc Install 1000 Gal A/G Lp Tank &	997
05/07/15	23567	15,000	72 CREN	Modification Of Existing Telecomm	997

Sales/Ownership History						
Transfer Date	Price	Type	Validity	Deed Reference	Deed Type	Grantee
04/01/96	15,000	Land Only				

Inspection Witnessed By _____

Situs : 812 PROVIDENCE PIKE

Parcel Id: 001389

Class: Charitable Organizations under

Card: 1 of 1

Printed: December 5, 2018

Building Information

Year Built/Eff Year /
Building #
Structure Type
Identical Units
Total Units
Grade
Covered Parking
Uncovered Parking
DBA

Building Other Features

Line	Type	+/-	Meas1	Meas2	# Stops	Ident	Units	Line	Type	+/-	Meas1	Meas2	# Stops	Ident	Units
------	------	-----	-------	-------	---------	-------	-------	------	------	-----	-------	-------	---------	-------	-------

Interior/Exterior Information

Line	Level From - To	Int Fin	Area	Perim	Use Type	Wall Height	Ext Walls	Construction	Partitions	Heating	Cooling	Plumbing	Physical	Functional
------	-----------------	---------	------	-------	----------	-------------	-----------	--------------	------------	---------	---------	----------	----------	------------

Interior/Exterior Valuation Detail

Line	Area	Use Type	% Good	% Complete	Use Value/RCNLD
------	------	----------	--------	------------	-----------------

Outbuilding Data

Line	Type	Yr Blt	Meas1	Meas2	Qty	Area	Grade	Phy	Fun	Value
1	Mas Garage	2000	20	40	1	800	D	A		14,280
2	Fence Chai	2000	1	4,000	1	4,000	C	3	3	5,280
3	Tow er Cell	2014	1	160	1	160	C	3	3	124,800
4	Gar-1s Stq	2015	12	25	1	300	C	3	3	9,870
5	Gar-1s Stq	2015	12	27	1	324	C	3	3	10,660

Situs : 812 PROVIDENCE PIKE

Parcel Id: 001389

Class: Charitable Organizations under

Card: 1 of 1

Printed: December 5, 2018

Additional Property Photos

Situs : 812 PROVIDENCE PIKE

Parcel Id: 001389

Class: Charitable Organizations under '

Card: 1 of 1

Printed: December 5, 2018

Income Detail (Includes all Buildings on Parcel)

Use Mod Grp	Inc Type	Model Description	Units	Net Area	Income Rate	Econ Adjust	Potential Gross Income	Vac Model	Vac Adj	Additional Income	Effective Gross Income	Expense Model %	Expense Adj %	Expense Adj	Other Expenses	Total Expenses	Net Operating Income
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Apartment Detail - Building 1 of 1

Line	Use Type	Per Bldg	Beds	Baths	Units	Rent	Income
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Building Cost Detail - Building 1 of 1

Total Gross Building Area	
Replace, Cost New Less Depr Percent Complete	100
Number of Identical Units	
Economic Condition Factor	
Final Building Value	
Value per SF	0.00

Notes - Building 1 of 1

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Income Summary (Includes all Building on Parcel)

Total Gross Rent Area
Total Gross Building Area



812 Providence Pike

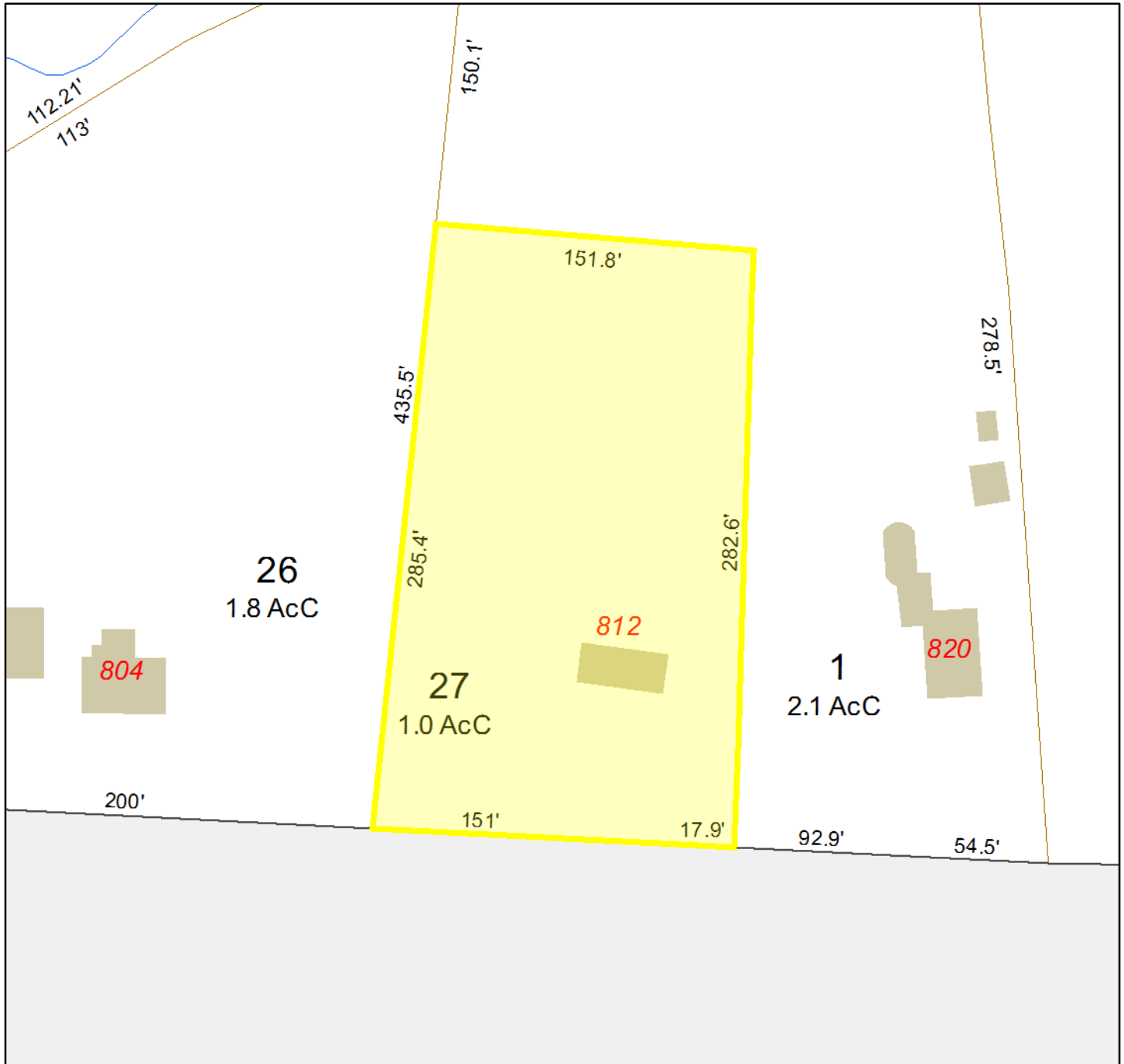
Killingly, CT



June 17, 2019

1 inch = 67 Feet

www.cai-tech.com



	PROPERTYLINE		Right of Ways
	ROAD		
	WATER		
	Buildings		

Data shown on this map is provided for planning and informational purposes only. The municipality and CAI Technologies are not responsible for any use for other purposes or misuse or misrepresentation of this map.

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

KILLINGLY/MARGARET HENR1

SITE ID: CT1156A

812 PROVIDENCE PIKE

DANIELSON, CT 06239

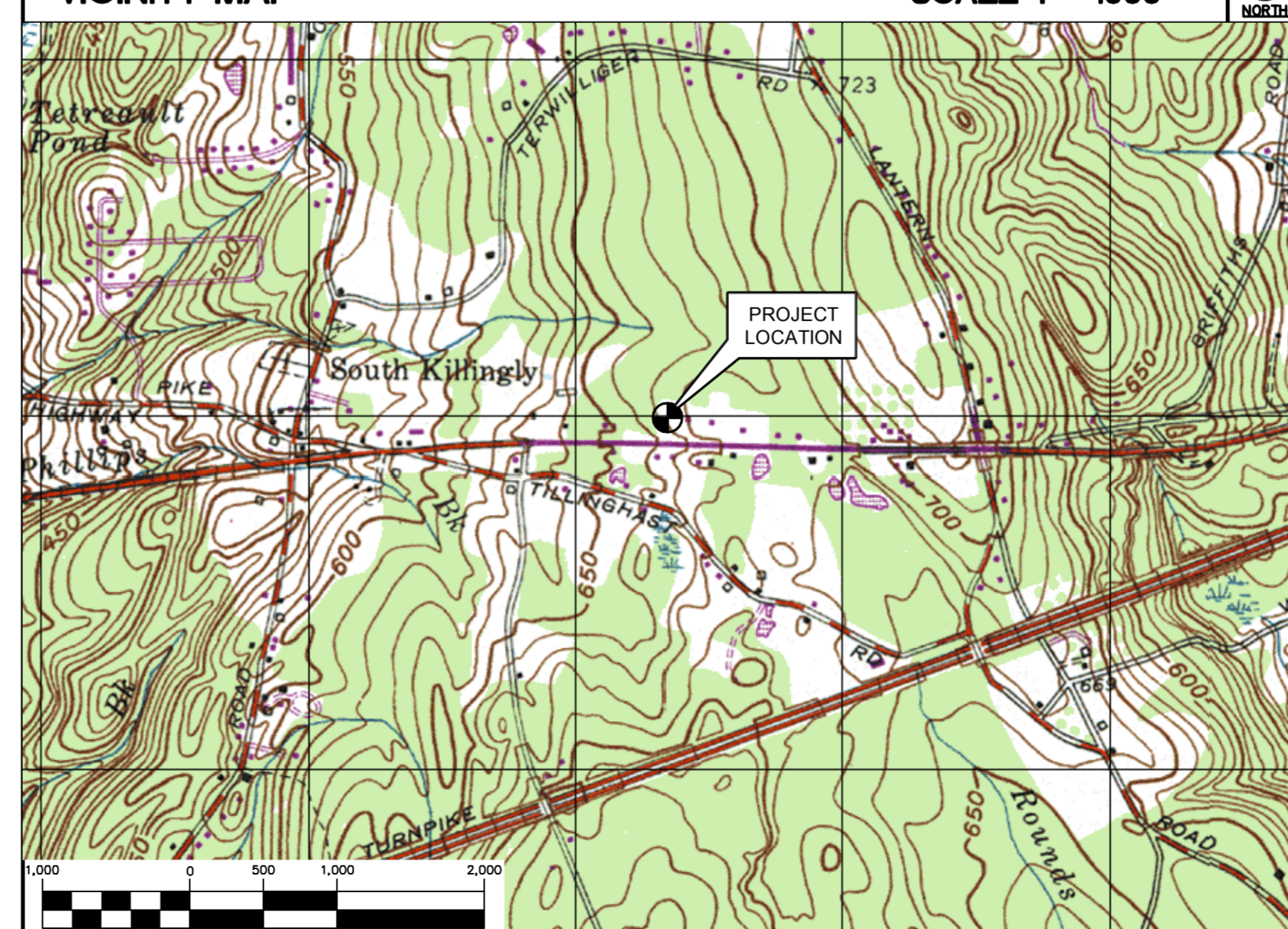
GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2017 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN "AS-BUILT" SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT, AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE, AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER MFR.'S RECOMMENDATIONS. CONTRACTOR TO SUPPLY THESE ITEMS AT NO COST TO OWNER OR CONSTRUCTION MANAGER.
12. ANY AND ALL ERRORS, DISCREPANCIES, AND "MISSED" ITEMS ARE TO BE BROUGHT TO THE ATTENTION OF THE T-MOBILE CONSTRUCTION MANAGER DURING THE BIDDING PROCESS BY THE CONTRACTOR. ALL THESE ITEMS ARE TO BE INCLUDED IN THE BID. NO "EXTRA" WILL BE ALLOWED FOR MISSED ITEMS.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNERS ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

FROM:	TO:
35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002	812 PROVIDENCE PIKE DANIELSON, CT 06239
<ol style="list-style-type: none"> 1. HEAD NORTH ON GRIFFIN ROAD S. TOWARD HARTMAN RD. 0.30 MI. 2. TAKE THE 2ND RIGHT ONTO DAY HILL RD. 0.14 MI. 3. TAKE THE 1ST RIGHT ONTO BLUE HILLS AVENUE EXT/CT-187. CONTINUE TO FOLLOW CT-187. 0.64 MI. 4. STAY STRAIGHT TO GO ONTO BLUE HILLS AVE/CT-187. 1.24 MI. 5. TURN LEFT ONTO OLD WINDSOR RD/CT-305. CONTINUE TO FOLLOW CT-305. 2.33 MI. 6. MERGE ONTO I-91 S TOWARD HARTFORD. 2.37 MI. 7. MERGE ONTO I-291 E VIA EXIT 35A TOWARD MANCHESTER. 6.18 MI. 8. MERGE ONTO I-84 E VIA THE EXIT ON THE LEFT TOWARD BOSTON. 15.35 MI. 9. TAKE THE CT-74 EXIT, EXIT 69, TOWARD WILLINGTON/US-44. 0.32 MI. 10. TURN RIGHT ONTO TOLLAND STAGE RD/CT-74. CONTINUE TO FOLLOW CT-74. 7.54 MI. 11. TURN LEFT ONTO POMPEY HOLLOW RD/US-44 E. CONTINUE TO FOLLOW US-44 E. 11.89 MI. 12. STAY STRAIGHT TO GO ONTO MASHAMOQUET RD/CT-101. CONTINUE TO FOLLOW CT-101. 4.83 MI. 13. MERGE ONTO I-395 S TOWARD NORWICH. 3.57 MI. 14. MERGE ONTO PROVIDENCE PIKE/US-6 E VIA EXIT 37A TOWARD PROVIDENCE. 3.22 MI. 15. 818 PROVIDENCE PIKE, DANIELSON, CT 06239-3901, 818 PROVIDENCE PIKE IS ON THE LEFT. 	

VICINITY MAP



T-MOBILE RF CONFIGURATION

67D04G_1DP+10P

PROJECT SUMMARY

1. THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:
 - A. REMOVE AND REPLACE (6) EXISTING ANTENNAS, (2) PER SECTOR
 - B. REMOVE EXISTING ANTENNA MOUNTING SYSTEM
 - C. INSTALL NEW ANTENNA MOUNTING SYSTEM
 - D. INSTALL (6) ANTENNAS, (2) PER SECTOR
 - E. INSTALL (3) RRU'S (RADIO REMOTE UNITS), (1) PER SECTOR
 - F. REMOVE (6) EXISTING COAX CABLES
 - G. INSTALL (1) 6x12 HYBRID CABLE
 - H. REPLACE (1) DUS41 WITH (1) BB 6630 FOR LTE
 - I. INSTALL (1) ADDITIONAL BB6630 FOR FUTURE 5G N600
 - J. REMOVE ALL (6) RUS01 B12 (FOR L700) FROM CABINET
 - K. RELOCATE (3) EXISTING TMA'S, (1) PER SECTOR

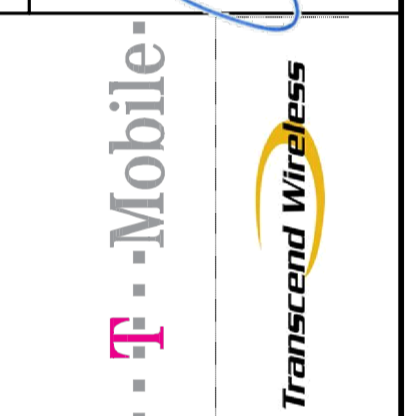
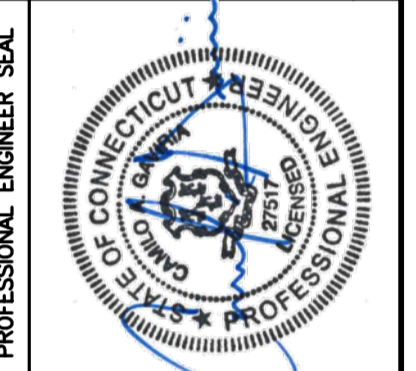
PROJECT INFORMATION

SITE NAME:	KILLINGLY/MARGARET HENR1
SITE ID:	CT11156A
SITE ADDRESS:	812 PROVIDENCE PIKE DANIELSON, CT 06239
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	DAN REID (PROJECT MANAGER) TRANSCEND WIRELESS, LLC (203) 592-8291
ENGINEER:	CEN TEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405
PROJECT COORDINATES:	LATITUDE: 41°-47'-29.14" N LONGITUDE: 71°-49'-20.48" W GROUND ELEVATION: 660'± AMSL
	SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	1
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C-2	SITE PLAN, EQUIPMENT PLAN, AND ELEVATION	1
C-3	ANTENNA PLANS	1
E-1	TYPICAL ELECTRICAL DETAILS	1
E-2	DETAILS	1

REV.	DATE	BY	CHK'D BY	DESCRIPTION
1	07/01/19	KAWIB	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
0	06/04/19	KAWIB	CAG	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION



CEN TEK engineering
 203-498-0390
 203-498-3897 Fax
 632 North Branford Road
 Branford, CT 06405
 www.CentekEng.com

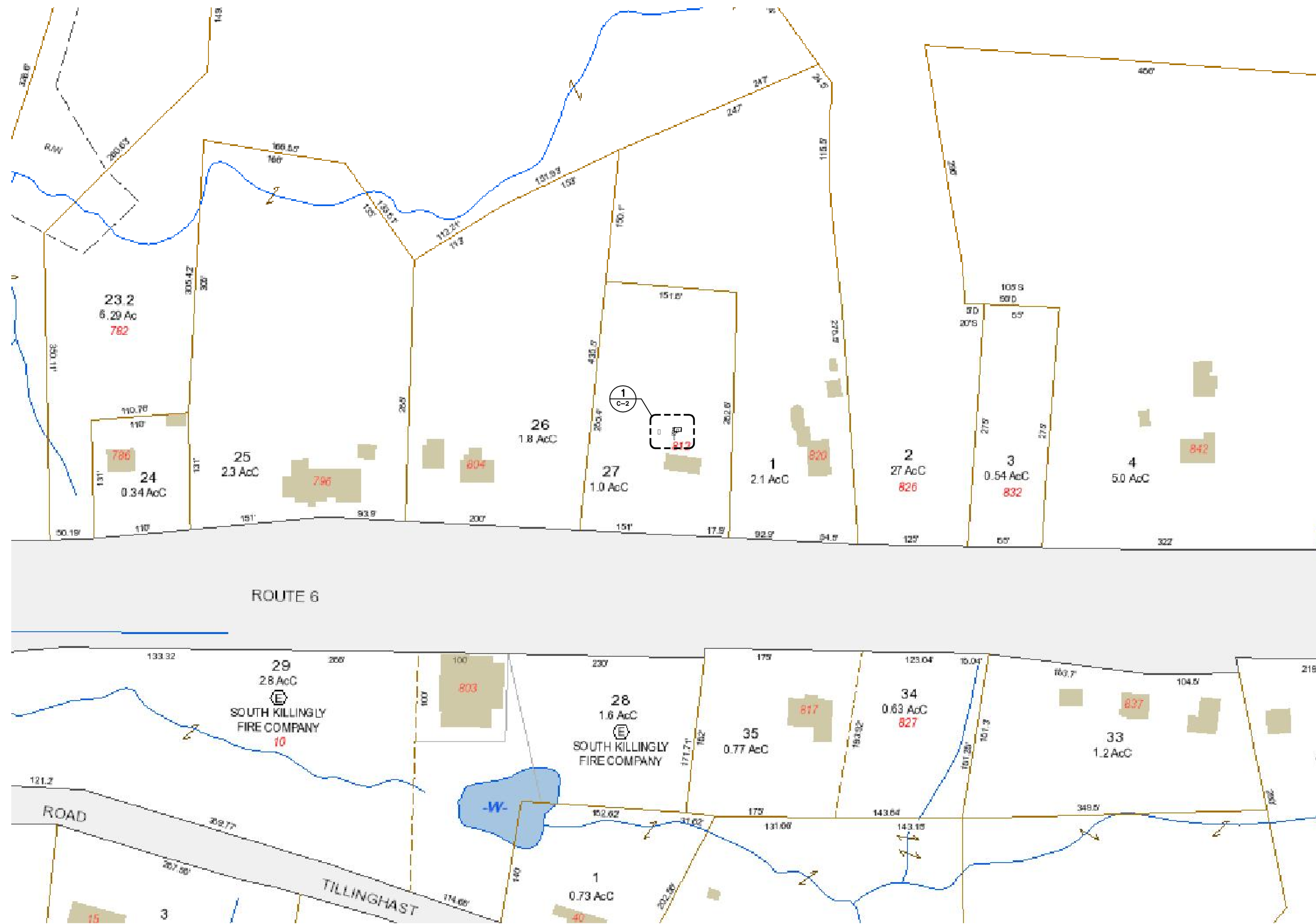
T-MOBILE NORTHEAST LLC
 WIRELESS COMMUNICATIONS FACILITY
KILLINGLY/MARGARET HENR1
SITE ID: CT1156A
 812 PROVIDENCE PIKE
 DANIELSON, CT 06239

DATE: 05/23/19
 SCALE: AS NOTED
 JOB NO. 19027.60

TITLE SHEET

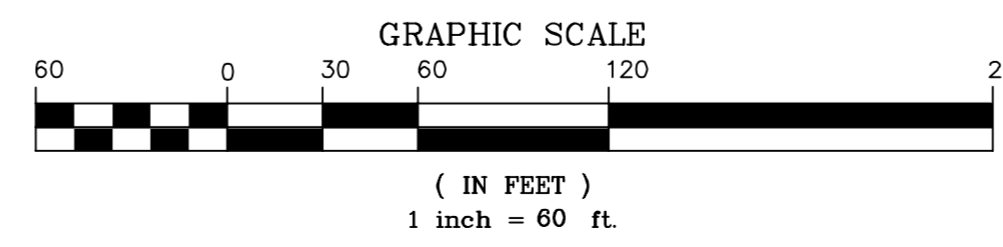
T-1

Sheet No. 1 of 7

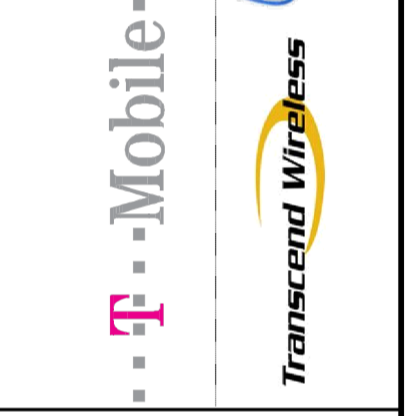
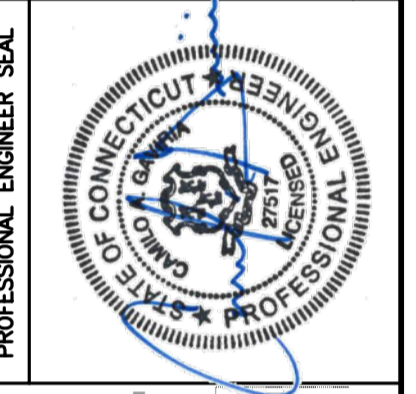


1 SITE LOCATION PLAN
 C-1 SCALE: 1" = 60'

APPROX. NORTH



REV.	DATE	BY	DESCRIPTION
1	07/01/19	KAW/R	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
0	06/04/19	KAW/R	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION



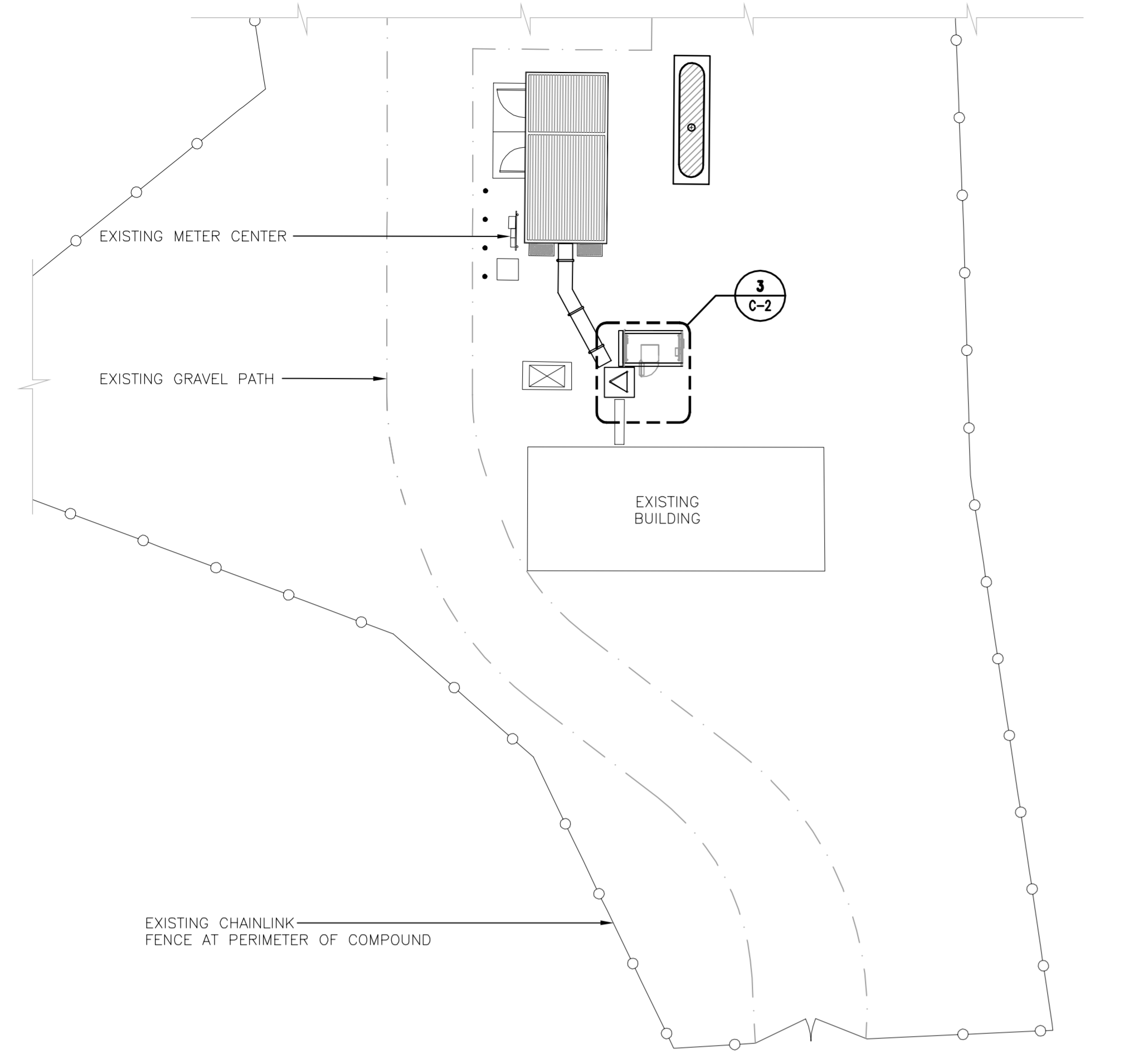
CEN TEK engineering
 Centered on Solutions
 (203) 488-0380
 (203) 488-3887 Fax
 622 North Branford Road
 Branford, CT 06405
 www.CentekEng.com

T-MOBILE NORTHEAST LLC
 WIRELESS COMMUNICATIONS FACILITY
KILLINGLY/MARGARET HENRI
SITE ID: CT1156A
 812 PROVIDENCE PIKE
 DANIELSON, CT 06239

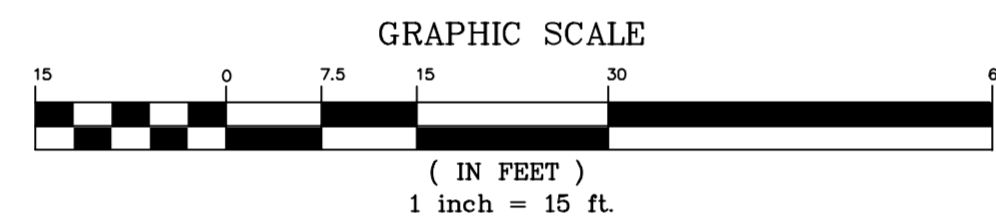
DATE: 05/23/19
 SCALE: AS NOTED
 JOB NO. 19027.60

SITE LOCATION PLAN

C-1
 Sheet No. 3 of 7



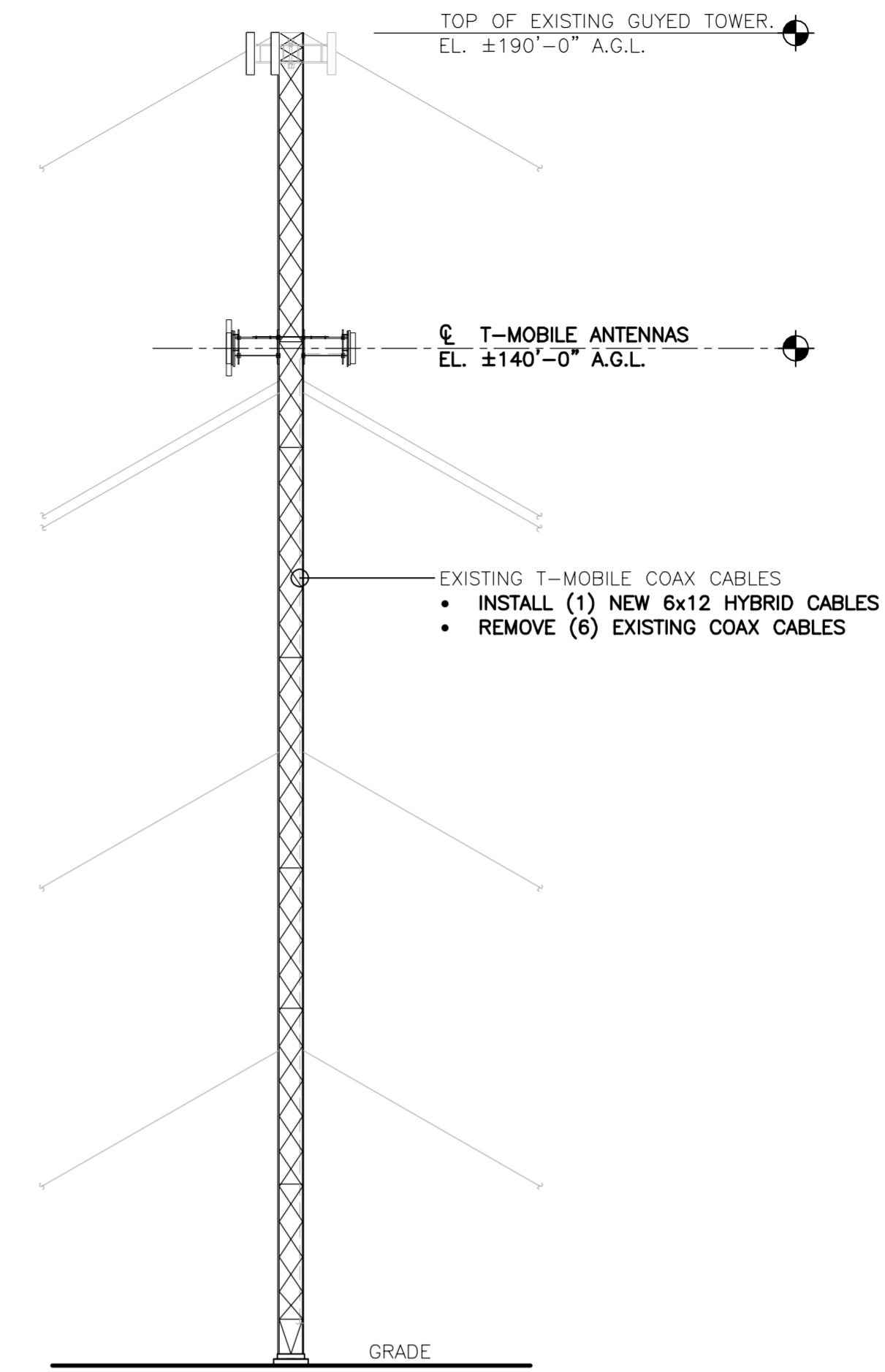
1 SITE PLAN
 C-2 SCALE: 1" = 15'



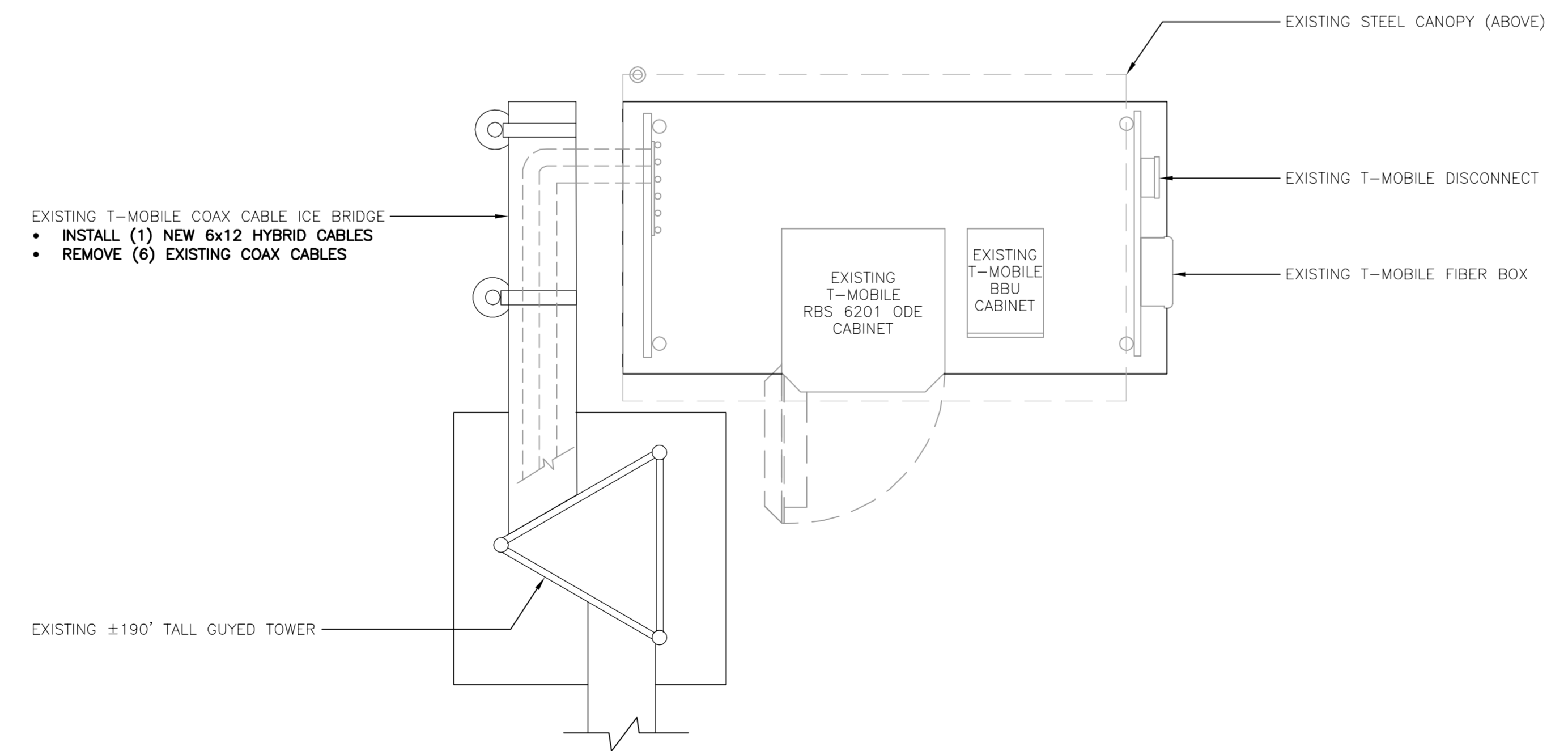
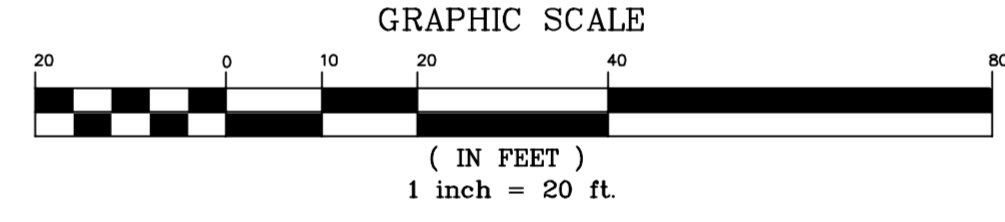
STRUCTURAL NOTE:
 REFER TO STRUCTURAL ANALYSIS REPORT OF TOWER AND FOUNDATION AS PREPARED BY CENTEK ENGINEERING INC., DATED: 05/21/19 PROJECT NUMBER: 19027.60

- NOTES:**
- OTHER CARRIER EQUIPMENT NOT SHOWN FOR CLARITY
 - A.G.L. = ABOVE GRADE LEVEL

NOTE:
 GROUND EQUIPMENT NOT SHOWN FOR CLARITY.



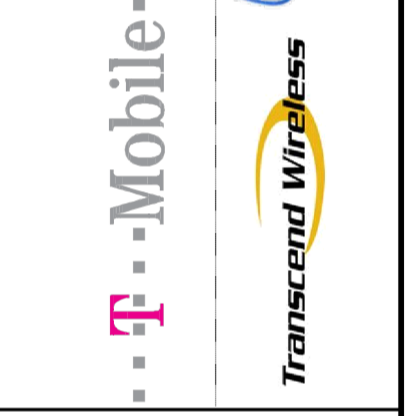
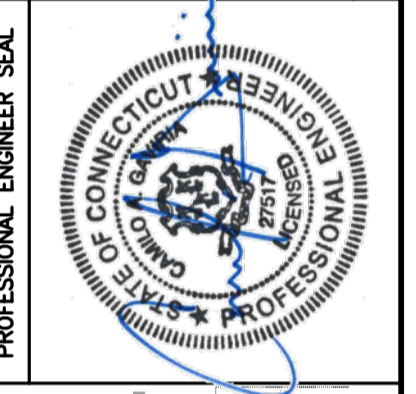
2 TOWER ELEVATION - PROPOSED
 C-2 SCALE: 1" = 20'



3 EQUIPMENT PLAN - PROPOSED
 C-2 SCALE: 3/8" = 1'



REV.	DATE	BY	CHK'D BY	DESCRIPTION
1	07/01/19	KAW/R	KAW/R	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
0	06/04/19	KAW/R	KAW/R	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

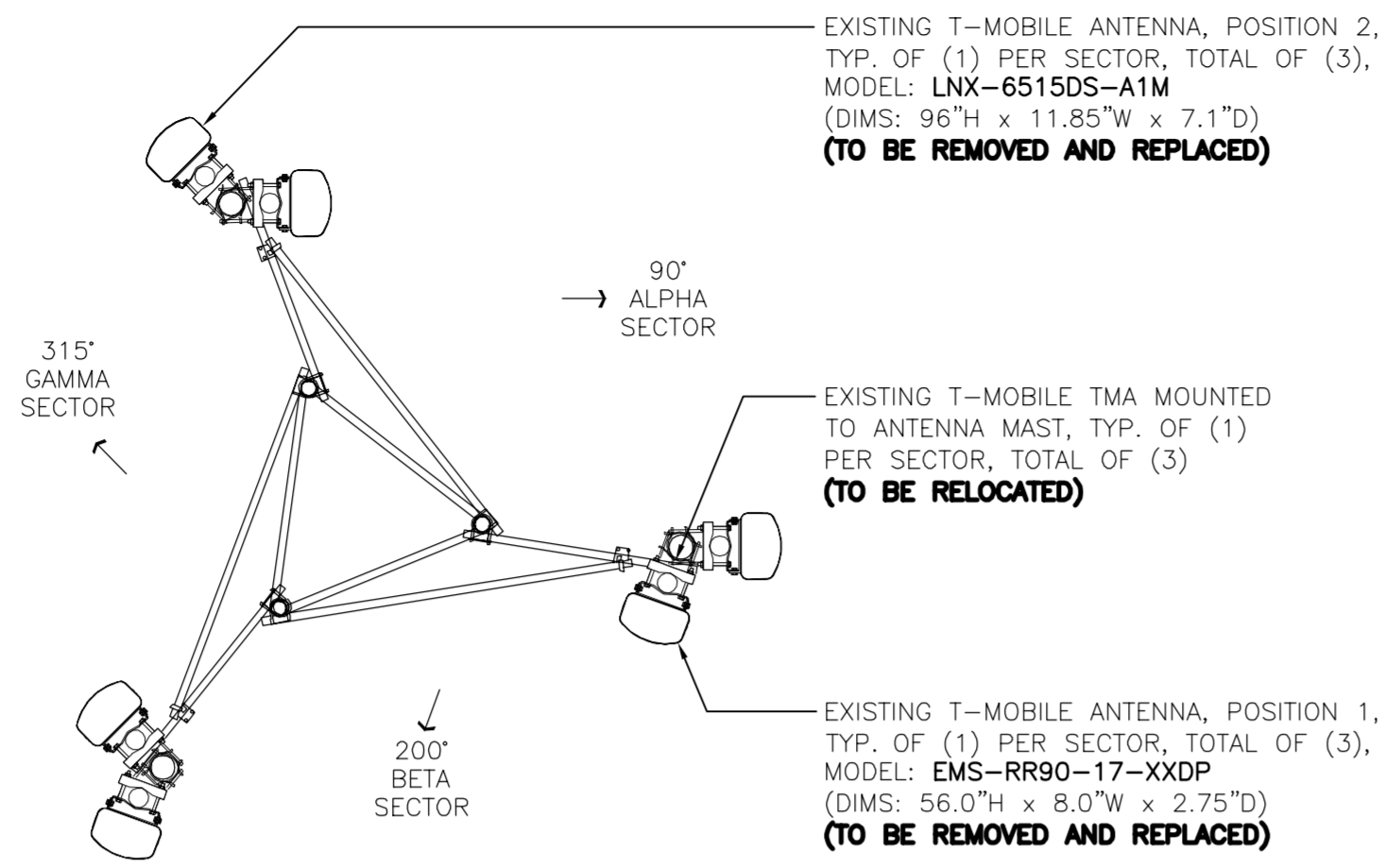


CEN TEK engineering
 Centered on Solutions™
 (203) 498-0390
 (203) 498-3897 Fax
 632 North Branford Road
 Branford, CT 06405
 www.CentekEng.com

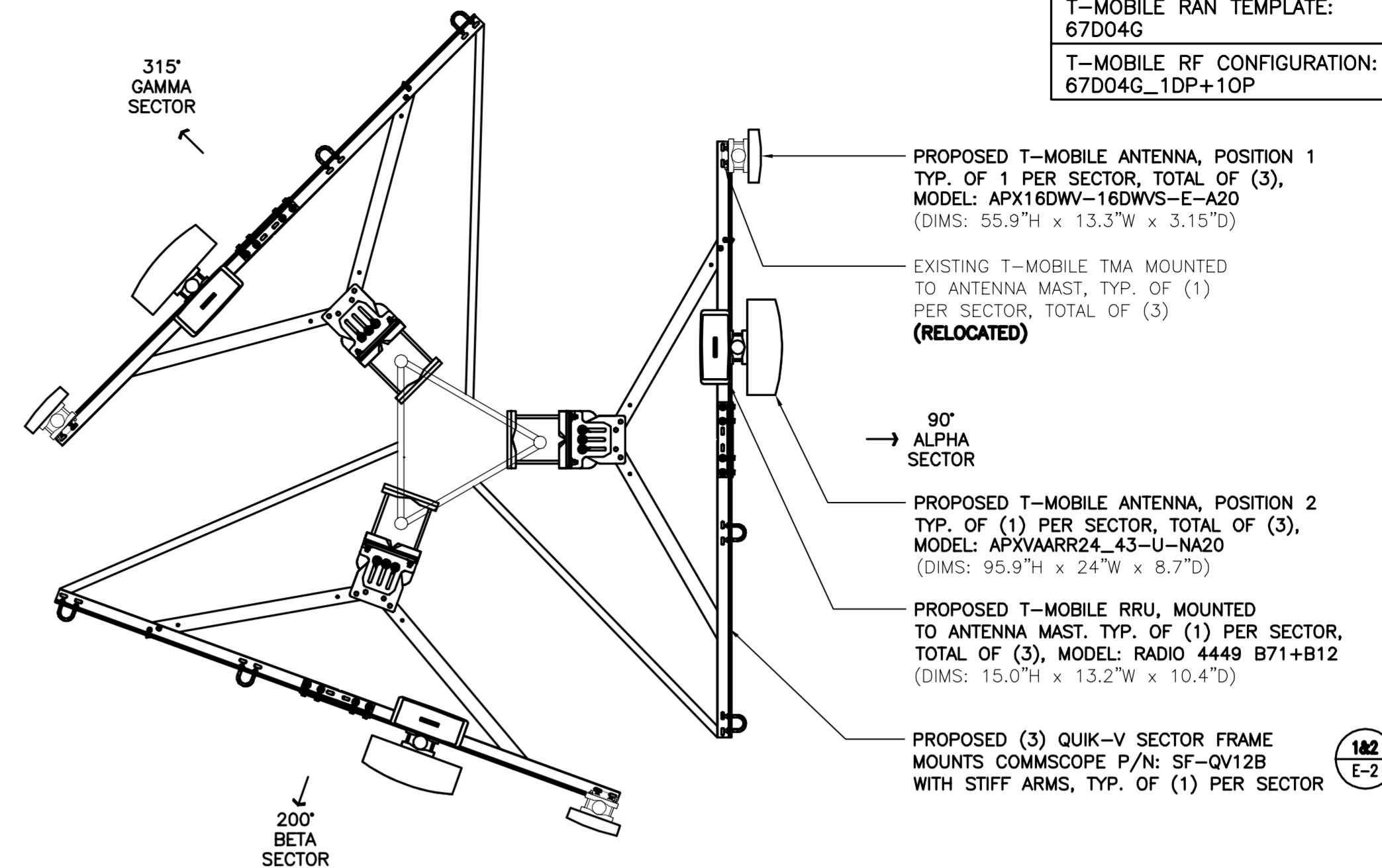
T-MOBILE NORTHEAST LLC
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KILLINGLY/MARGARET HENRI
SITE ID: CT1156A
 812 PROVIDENCE PIKE
 DANIELSON, CT 06239

DATE: 05/23/19
 SCALE: AS NOTED
 JOB NO. 19027.60

SITE PLAN,
 EQUIPMENT PLAN,
 AND ELEVATION

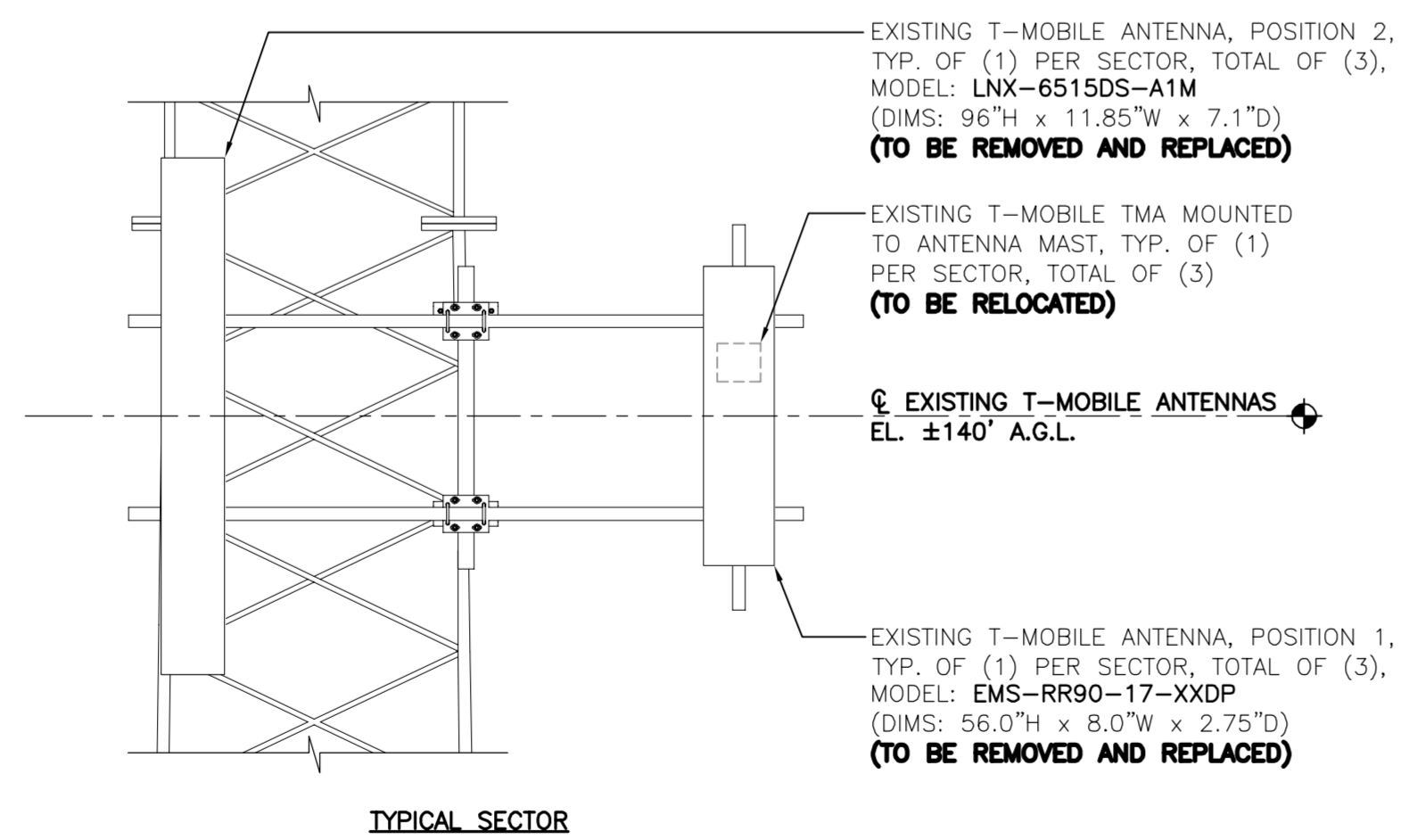


1 EXISTING ANTENNA MOUNTING CONFIGURATION TYP.
 SCALE: NONE
 145°-0' ELEVATION

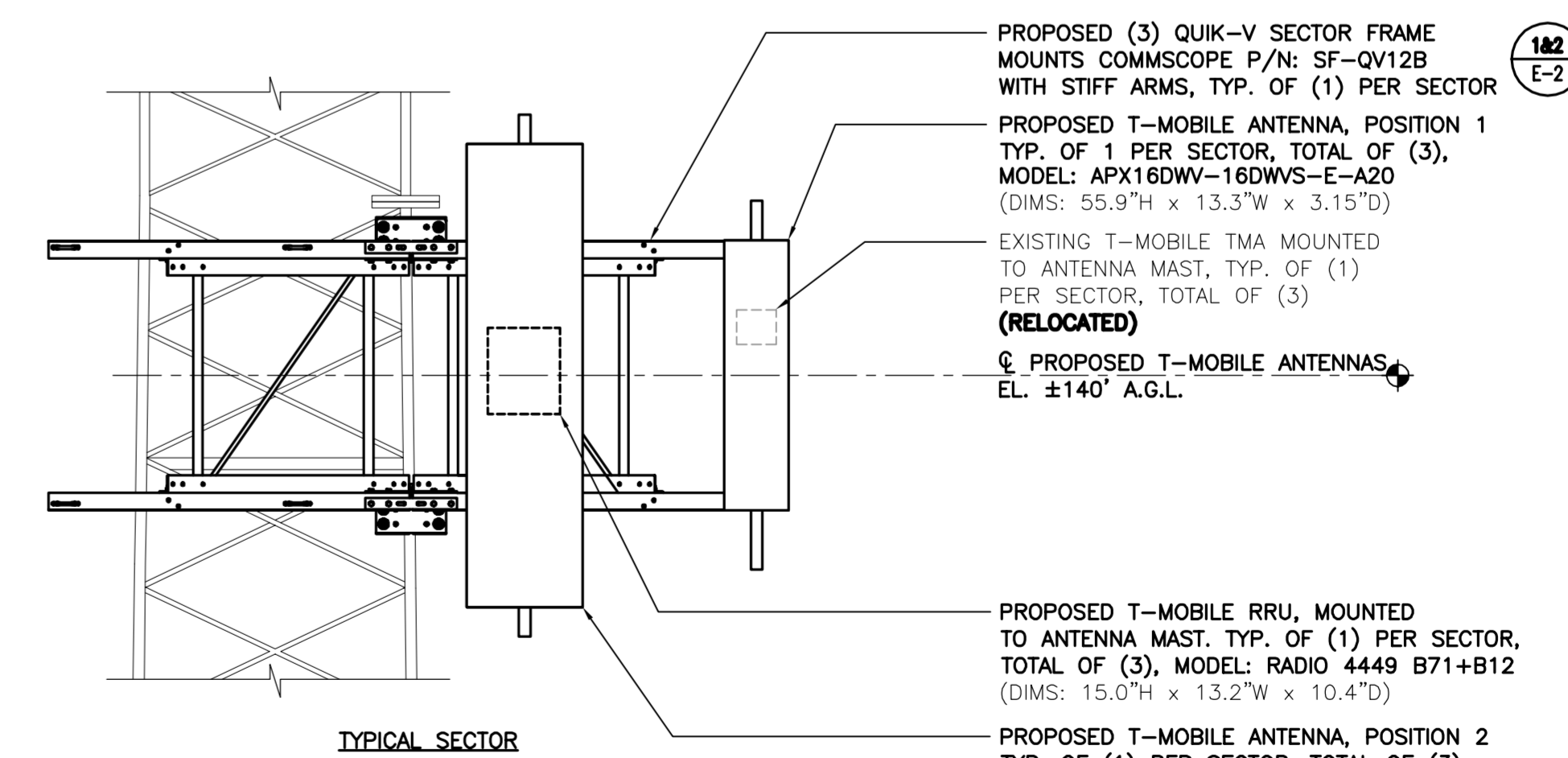


2 PROPOSED ANTENNA MOUNTING CONFIGURATION TYP.
 SCALE: NONE
 145°-0' ELEVATION

ADDITIONAL ANTENNA MAST NOTE:
 REPLACE EXISTING PIPE MAST WITH 2" STD (O.D. = 2.375") x 9'-0" LONG PIPE © RFS APXVAARR24_43-U-NA20



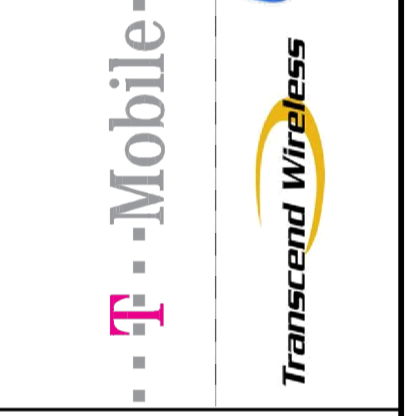
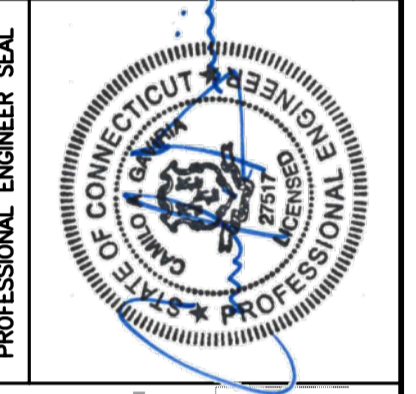
3 ANTENNA ELEVATION - EXISTING
 SCALE: NONE



4 ANTENNA ELEVATION - PROPOSED
 SCALE: NONE

T-MOBILE RAN TEMPLATE:
 67D04G
 T-MOBILE RF CONFIGURATION:
 67D04G_1DP+10P

REV.	DATE	BY	CHK'D BY	DESCRIPTION
1	07/01/19	KAW/R		CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION
0	06/04/19	KAW/R		CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

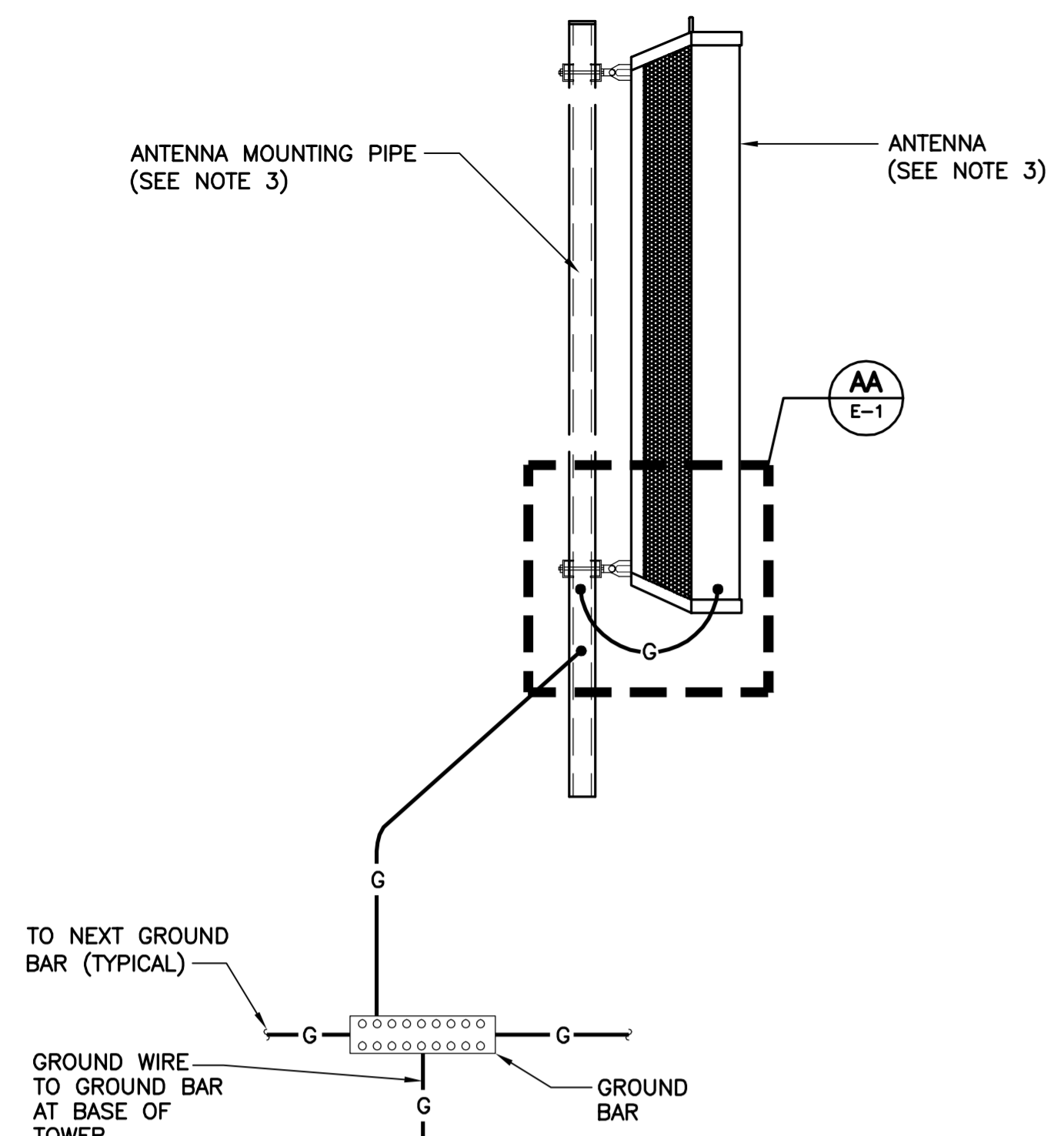


CENTEK engineering
 Centered on Solutions
 (203) 498-0390
 (203) 498-3897 Fax
 632 North Branford Road
 Branford, CT 06405
 www.CentekEng.com

T-MOBILE NORTHEAST LLC
 WIRELESS COMMUNICATIONS FACILITY
KILLINGLY/MARGARET HENRI
SITE ID: CT1156A
 812 PROVIDENCE PIKE
 DANIELSON, CT 06239

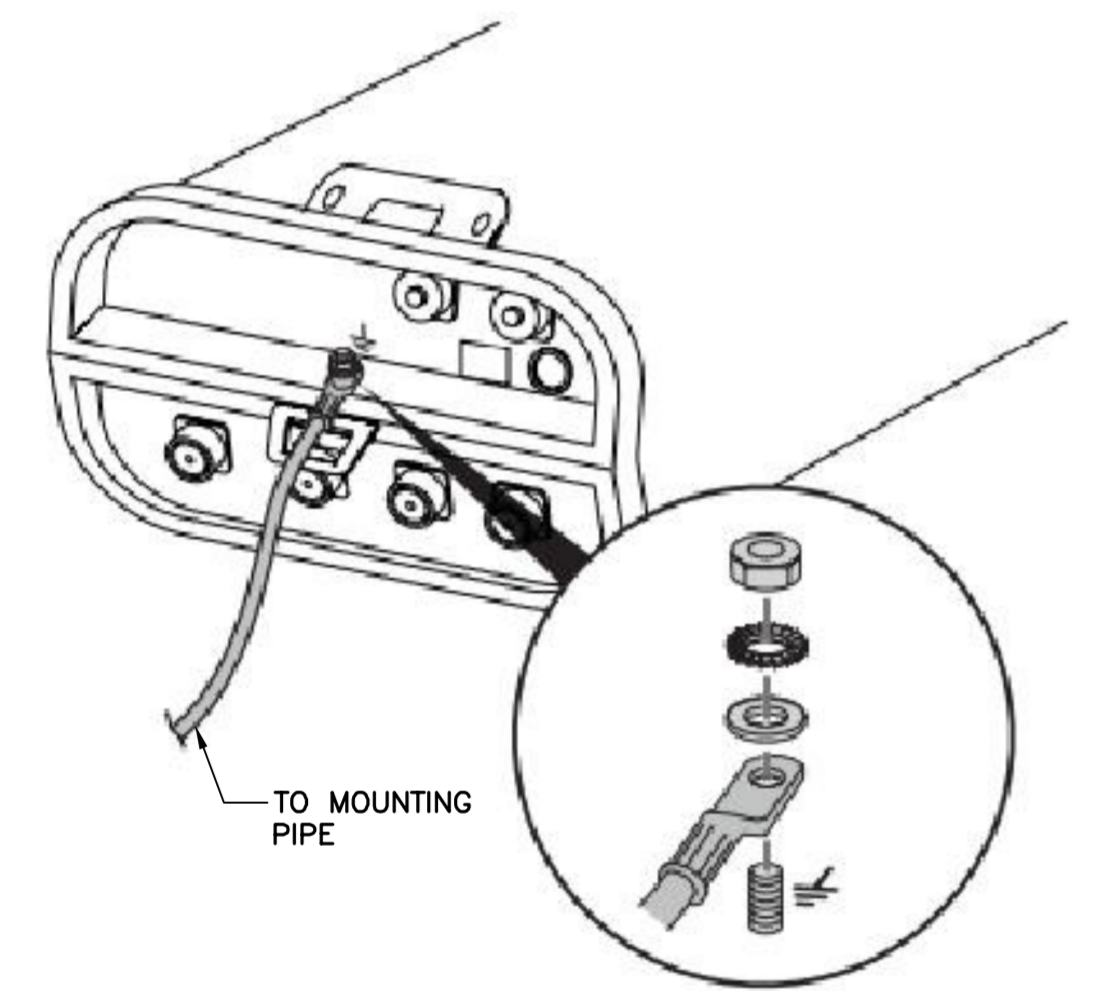
DATE: 05/23/19
 SCALE: AS NOTED
 JOB NO. 19027.60

ANTENNA PLANS

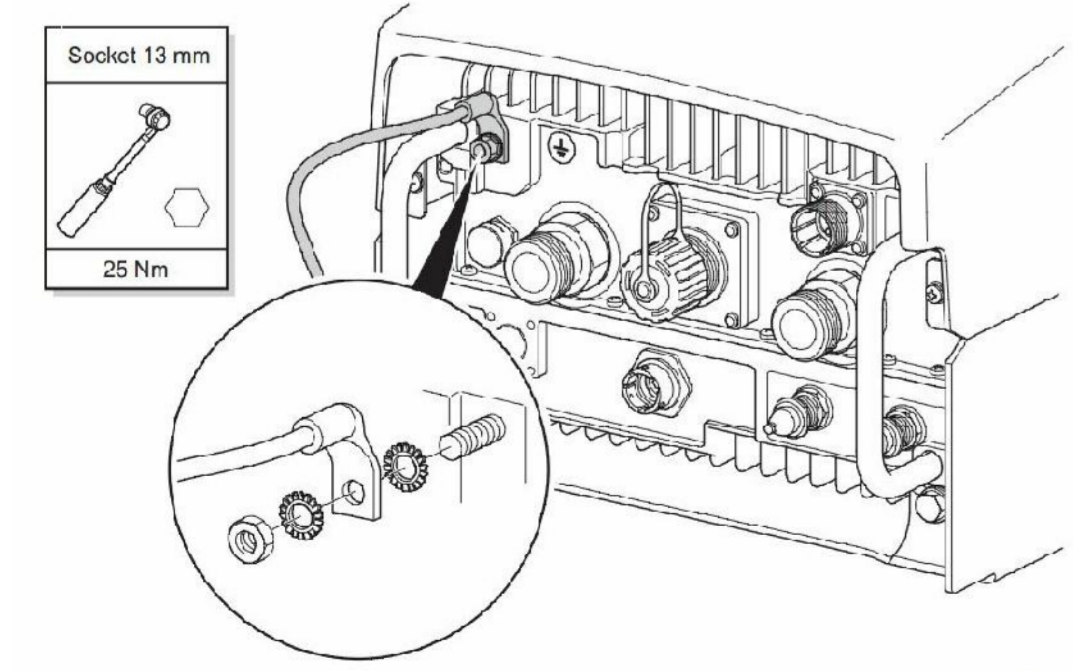


1 TYPICAL ANTENNA GROUNDING DETAIL
E-1 SCALE: NOT TO SCALE

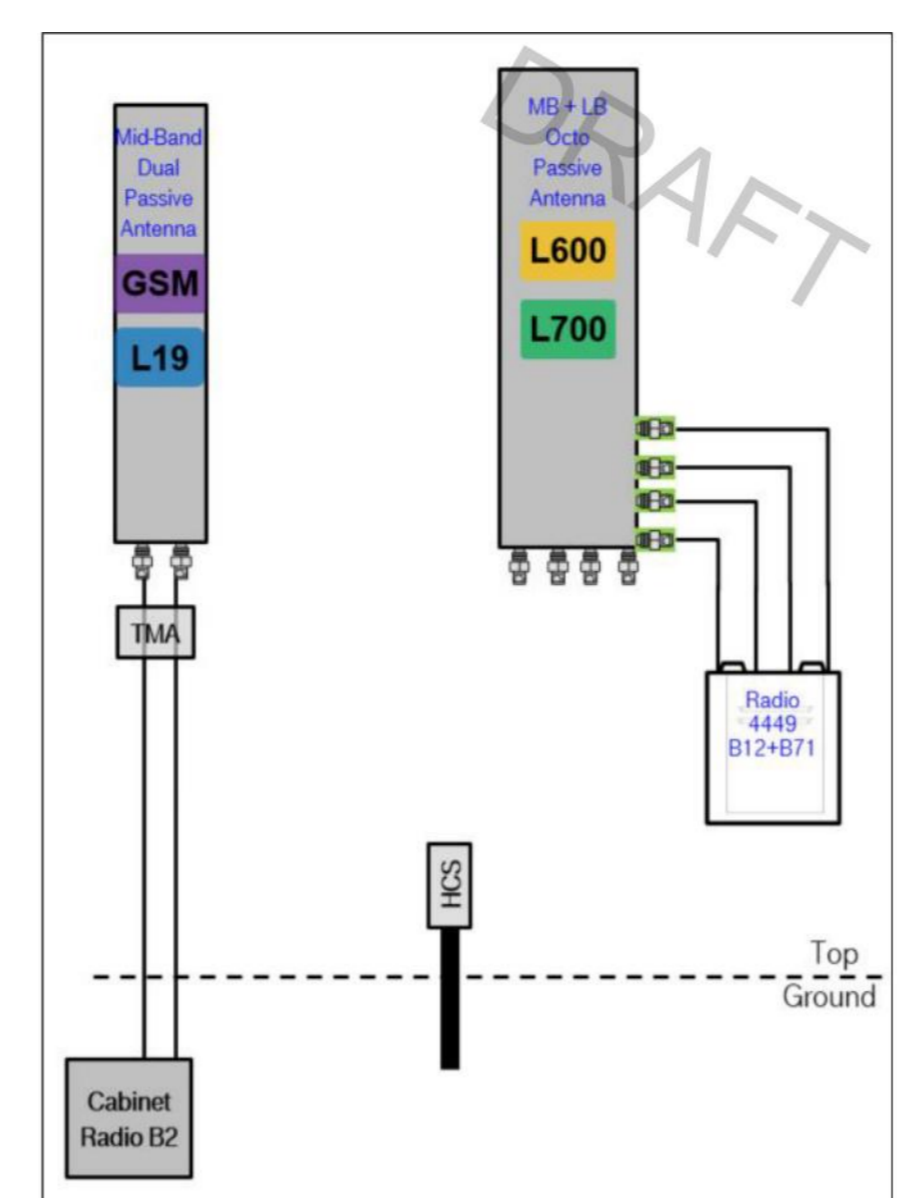
- NOTES:
- BOND COAXIAL CABLE GROUND KITS TO EACH OWNER'S GROUND BAR ALONG ENTIRE COAX RUN FROM ANTENNA TO SHELTER.
 - BOND ALL EQUIPMENT TO GROUND PER NEC AND MANUFACTURERS SPECIFICATIONS.
 - DETAIL IS TYPICAL FOR ALL ANTENNA SECTORS, INCLUDING GPS ANTENNA.



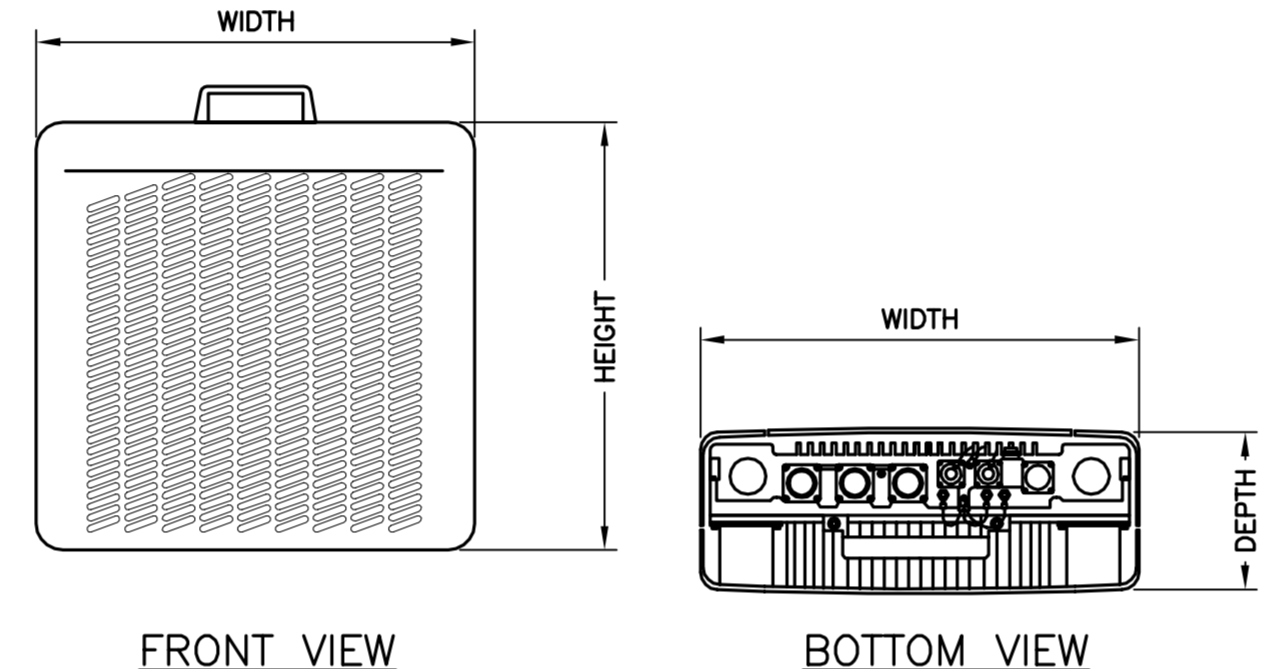
AA TYPICAL ANTENNA GROUNDING DETAIL
E-1 SCALE: NOT TO SCALE



2 TYPICAL RRU GROUNDING DETAIL
E-1 SCALE: NOT TO SCALE

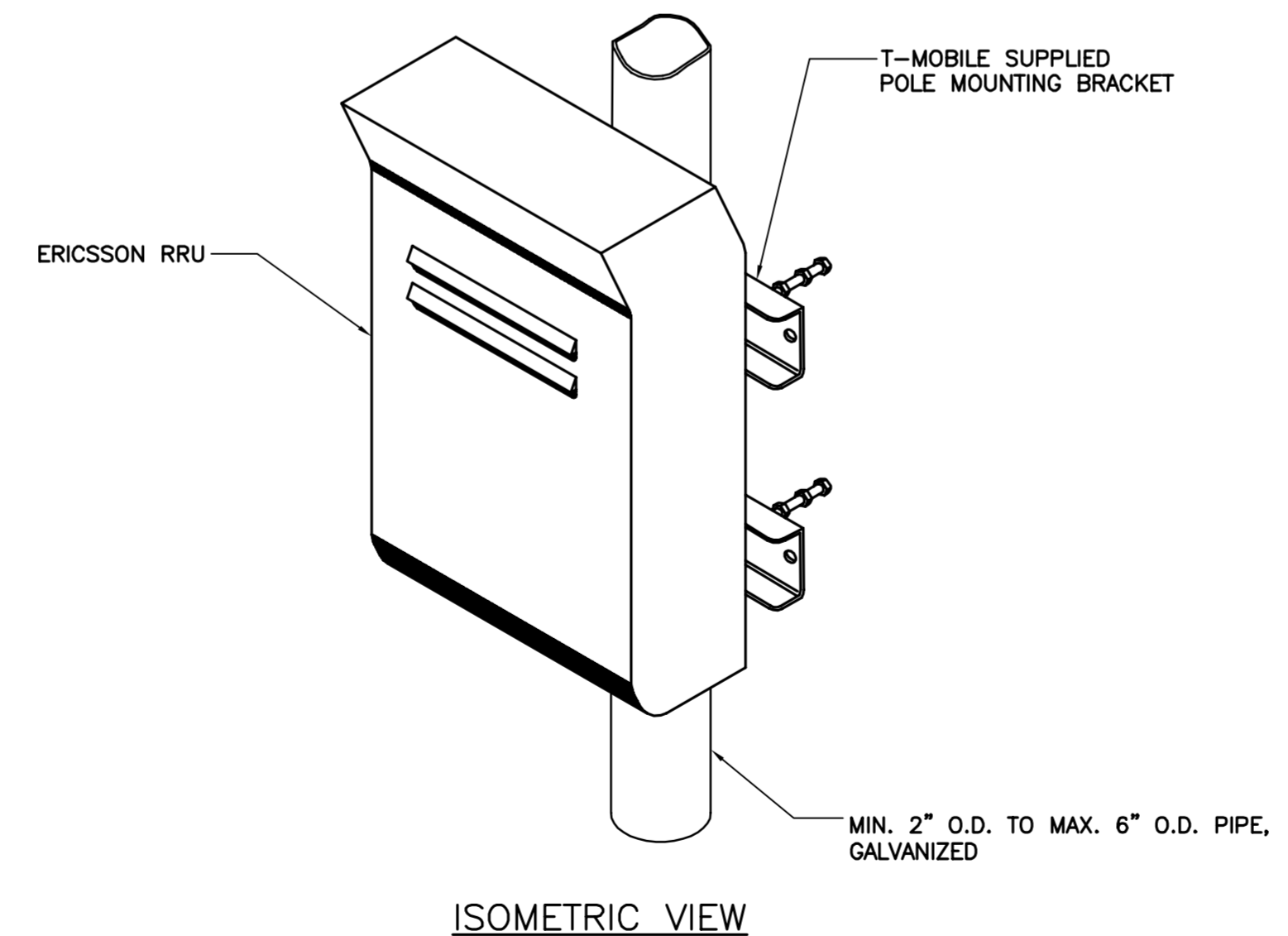


3 PROPOSED PLUMBING DIAGRAM
E-1 SCALE: NONE



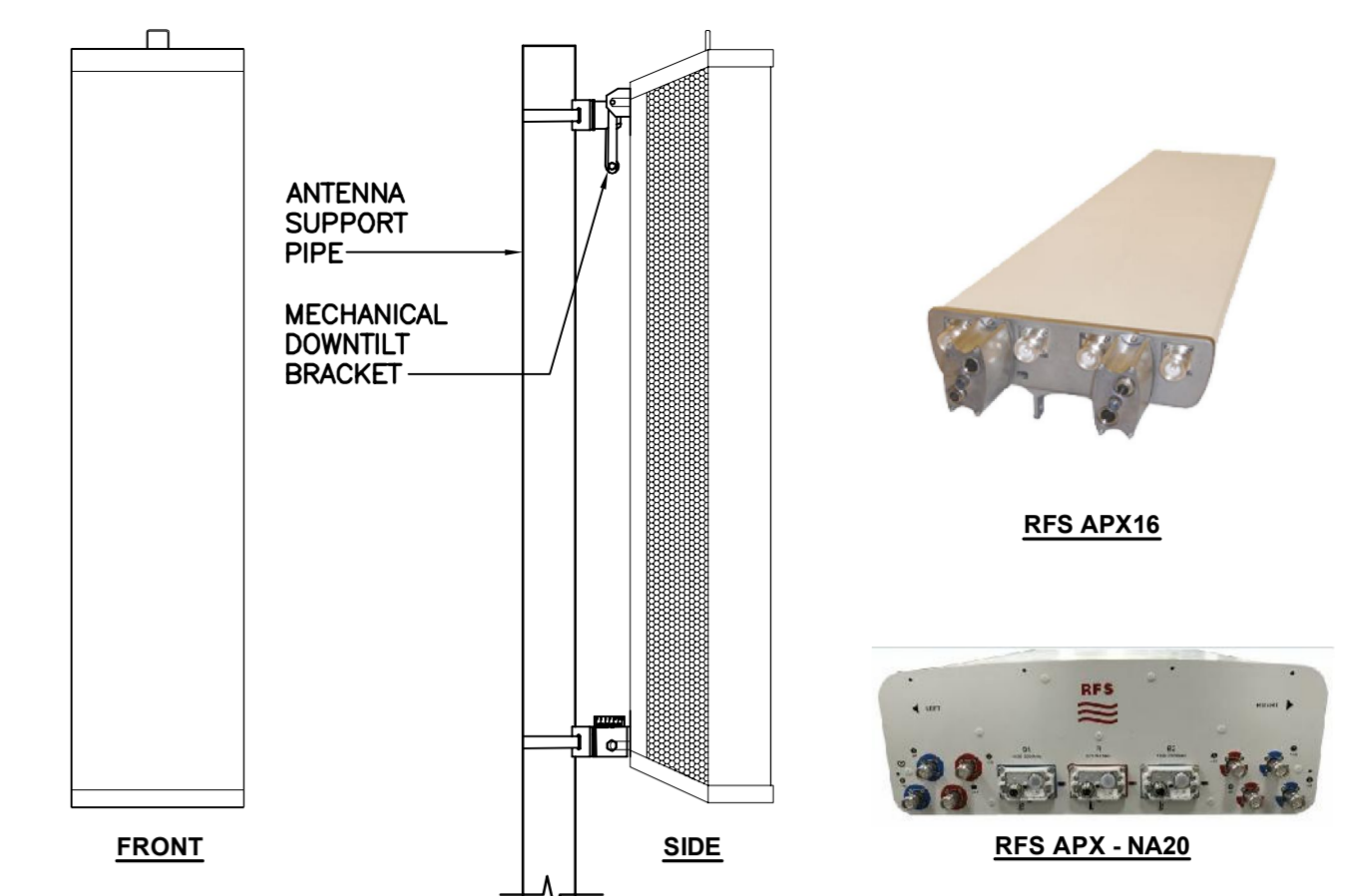
RRH (REMOTE RADIO HEAD)		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: RRU 4449 B71+B12	14.9"H x 13.2"W x 9.3"D	±74 LBS

4 REMOTE RADIO HEAD (RRH) DETAIL (TYP)
E-1 SCALE: NOT TO SCALE



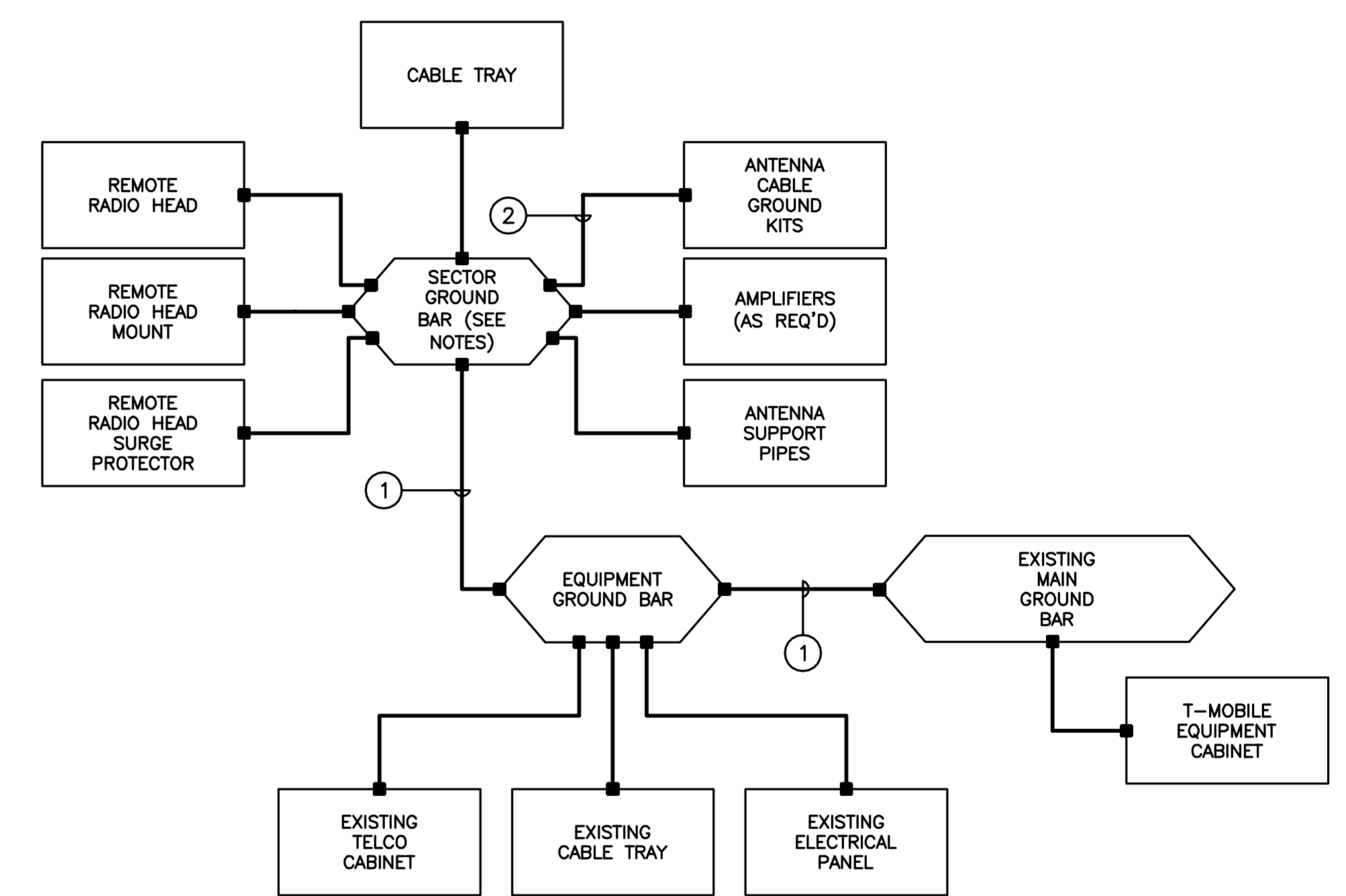
- NOTES:
- T-MOBILE SHALL SUPPLY RRU, AND RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL SUPPLY POLE/PIPE AND INSTALL ALL MOUNTING HARDWARE INCLUDING ERICSSON RRU POLE-MOUNTING BRACKET. CONTRACTOR SHALL INSTALLS RRU AND MAKES CABLE TERMINATIONS.
 - NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

5 TYPICAL RRUS MOUNTING DETAILS
E-1 SCALE: NOT TO SCALE



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: RFS MODEL: APX16DW-16DWS-E-A20	55.9"H x 13.3"W x 3.15"D	40.7 LBS
MAKE: RFS MODEL: APXVAARR24_43-U-NA20	95.9"H x 24"W x 8.7"D	153 LBS

6 PROPOSED ANTENNA DETAIL
E-1 SCALE: NOT TO SCALE



- GROUNDING SCHEMATIC NOTES**
- #2 AWG
 - #6 AWG
- GENERAL NOTES:
- ALL SURGE SUPPRESSION EQUIPMENT SHALL BE BONDED TO GROUND PER MANUFACTURER'S SPECIFICATIONS
 - UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, GROUND CONDUCTORS SHOWN SHALL BE #2 AWG (SOLID TINNED BCW - EXTERIOR; STRANDED GREEN INSULATED - INTERIOR).
 - ALL SECTOR GROUND BARS SHALL BE BONDED TOGETHER WITH #2 AWG SOLID TINNED BCW.
 - BOND ALL EQUIPMENT CABINETS AND BATTERY CABINETS TO GROUND PER MANUFACTURER'S SPECIFICATIONS.
 - COORDINATE ALL ROOF MOUNTED EQUIPMENT WITH OWNER.
 - ALL ROOF MOUNTED AMPLIFIERS AND ASSOCIATED EQUIPMENT SHALL BE BONDED TO THE SECTOR GROUND BAR PER MANUFACTURER'S SPECIFICATIONS.
 - ALL GROUNDING SHALL BE IN ACCORDANCE WITH NEC AND OWNER'S REQUIREMENTS.

7 TYPICAL GROUNDING SCHEMATIC DETAIL
E-1 SCALE: NOT TO SCALE

CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION	CAG	CHK'D BY	DESCRIPTION
CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION	CAG	DATE	REV.
1	07/01/19	KAWIB	0
0	06/04/19	KAWIB	0

PROFESSIONAL ENGINEER SEAL
STATE OF CONNECTICUT
ENGINEER
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632 North Branford Road
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www.CentekEng.com

T-Mobile
Transcend Wireless

T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
KILLINGLY/MARGARET HENRI
SITE ID: CT1156A
812 PROVIDENCE PIKE
DANIELSON, CT 06239

DATE: 05/23/19
SCALE: AS NOTED
JOB NO. 19027.60

TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 6 of 7

Structural Analysis Report

190-ft Existing ROHN Guyed Lattice Tower

*Proposed T-Mobile
Antenna Upgrade (L600)*

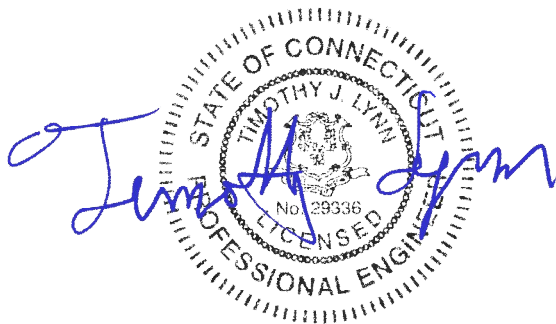
T-Mobile Site Ref: CT11156A

*812 Providence Pike
Danielson, CT*

Centek Project No. 19027.60

Date: May 21, 2019

Max Stress Ratio = 71.4%



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

Table of Contents

SECTION 1 - REPORT

- INTRODUCTION
- ANTENNA AND APPURTENANCE SUMMARY
- PRIMARY ASSUMPTIONS USED IN THE ANALYSIS
- ANALYSIS
- TOWER LOADING
- TOWER CAPACITY
- FOUNDATION AND ANCHORS
- CONCLUSION

SECTION 2 – CONDITIONS & SOFTWARE

- STANDARD ENGINEERING CONDITIONS
- GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

SECTION 3 – CALCULATIONS

- tnxTower INPUT/OUTPUT SUMMARY
- tnxTower DETAILED OUTPUT
- FOUNDATION ANALYSIS

SECTION 4 – REFERENCE MATERIAL

- RF DATA SHEET
- ANTENNA CUT SHEETS

Introduction

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

The host tower is a 190-ft tall, eleven-section, Rohn model 80 guyed lattice tower. The manufacturer's drawings and calculations were unavailable for use in this report. The tower geometry, structure member sizes and foundation system information were obtained from a previous structural analysis report prepared by Centek; job no; 09059 dated November 12, 2013.

Antenna and appurtenance information were obtained from a previous structural analysis report prepared by All-Points; job no; CT1416060 dated September 7, 2017 and an RF data sheet.

The tower consists of eleven (11) vertical sections constructed of steel pipe legs conforming to ASTM A572-50. Diagonal and horizontal lateral support bracing consists of steel pipe construction conforming to ASTM A53-B-42. The vertical tower sections are connected by bolted flange plates with the diagonal and horizontal bracing to pipe legs consisting of bolted connections. The width of the tower face is 3.42-ft throughout its length with the exception of a 5'-0" high tapered base section.

Antenna and Appurtenance Summary

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

- VERIZON (Existing):
Antennas: Three (3) Antel BXA-70063-6CF panel antennas, six (6) Commscope JAHH-65B-r3B panel antennas, three (3) Alcatel-Lucent RRH2x90-AWS remote radio heads, three (3) Alcatel-Lucent RRH2x60-07-U remote radio heads, three (3) Alcatel-Lucent RRH4x40-850 remote radio heads and two (2) main distribution boxes mounted on three (3) Valmont 13-ft lightweight T-Frames with a RAD center elevation of 187-ft above the existing tower base.
Cables: Two (2) 1-5/8" dia. Hybriflex Fiber feeder cables running on the exterior of the existing tower.
- T-MOBILE (Existing to Remain/Relocate):
Antennas: Three (3) TMAs mounted on three (3) side arms with a RAD center elevation of 140-ft above the existing tower base **relocated to three (3) proposed V-Frames (Commscope p/n SF-QV12).**
Coax Cables: Six (6) 1-5/8" \varnothing coax cables running on the exterior of the existing tower.
- T-MOBILE (Existing to Remove):
Antennas: Three (3) EMS RR90-17-02DP panel antennas and three (3) Andrew LNX-6515DS panel antennas mounted on three (3) side arms with a RAD center elevation of 140-ft above the existing tower base.
Coax Cables: Six (6) 1-5/8" \varnothing coax cables running on the inside of the existing tower.

- **T-MOBILE (Proposed):**
Antennas: Three (3) RFS APX16DWV-16DWVS panel antennas, three (3) RFS APXVAARR24_43 panel antennas and three (3) Ericsson 4449 B71 B12 remote radio heads mounted three (3) proposed V-Frames (Commscope p/n SF-QV12) with a RAD center elevation of 140-ft above the existing tower base.
Coax Cables: One (1) 6x12 fiber cable running on the inside of the existing tower.

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 existing coax cables to be installed as indicated in this report.

A n a l y s i s

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.

T o w e r L o a d i n g

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

Basic Wind Speed:	Danielson; v = 101 mph (3 second gust)	<i>[Appendix N of the 2018 CT Building Code]</i>
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Load Cases:	<u>Load Case 1</u> ; 101 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	<i>[Appendix N of the 2018 CT Building Code]</i>
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	<u>Load Case 2</u> ; 50 mph wind speed w/ 0.75” radial ice plus gravity load – used in calculation of tower stresses.	<i>[Annex B of TIA-222-G-2005]</i>
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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. This tower was found to be at **70.3%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T6)	80.01' - 100.01'	68.3%	PASS
Diagonal (T1)	175.35' - 190.6'	52.6%	PASS
Bottom Girt (T10)	4.58' - 20.01'	70.3%	PASS
Guy B @ 189.98' radius (T1)	175.35' - 190.6'	64.9%	PASS

Foundations and Anchorage

The existing tower base foundation consists of a 2.0-ft square x 3.75-ft long reinforced concrete pedestal with a 4.0-ft square x 1.75-ft thick reinforced concrete pad bearing directly on the existing sub grade. Additionally, guy wire loading is transferred to six (6) existing 7-ft x 4-ft x 2-ft reinforced concrete anchor support blocks. The foundation information was obtained from the original design documents prepared by ROHN dated September 27, 1979.

- The worst case tower base and guy anchor reactions developed from the governing Load Case were used in the verification of the anchorage foundations:

Tower Guy Reactions		
Vector	Inner	Outer
Horizontal (In Plane of GW)	7 kips	15 kips
Horizontal (Out of Plane of GW)	0 kips	0 kips
Vertical	6 kips	24 kips
Resultant Force at end of Guy Wire	9 kips	28 kips
Tower Base Reactions		
Vector	Proposed Reaction	
Horizontal Shear	1.0 kips	
Axial Compression	93.0 kips	

CEN TEK Engineering, Inc.
 Structural Analysis – 190-ft Guyed Lattice Tower
 T-Mobile Antenna Upgrade – CT11156A
 Danielson, CT
 May 21, 2019

Foundation	Design Limit	TIA-222-G Section 9.4 FS ⁽¹⁾	Proposed Loading (FS) ⁽¹⁾	Result
Reinf. Conc. Anchor Block (C) at 99-ft radius.	Uplift	1.0	2.06	PASS
	Sliding	1.0	1.50	PASS
		Ultimate Bearing	Proposed	
Base Foundation	Bearing	12.0 ksf	6.0 ksf	PASS

Note 1: FS denotes 'Factor of Safety'.

Conclusion

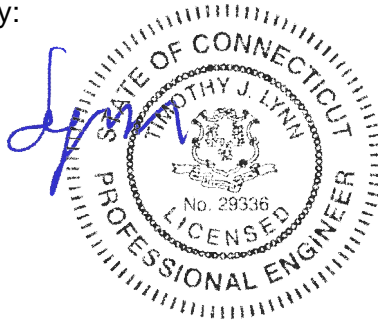
This analysis shows that the subject tower **is adequate** to support the proposed modified antenna configuration.

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.

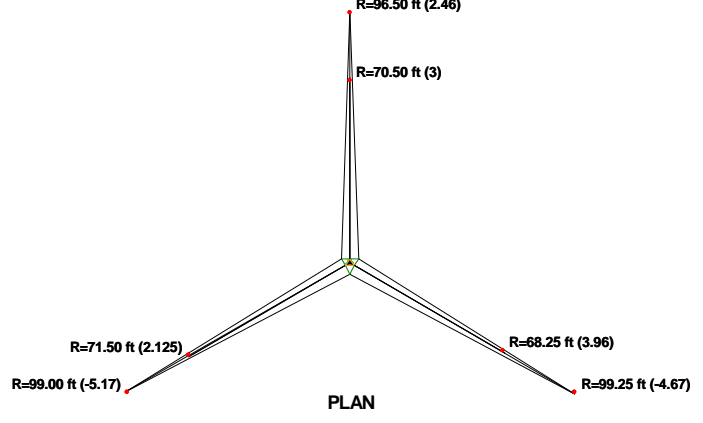
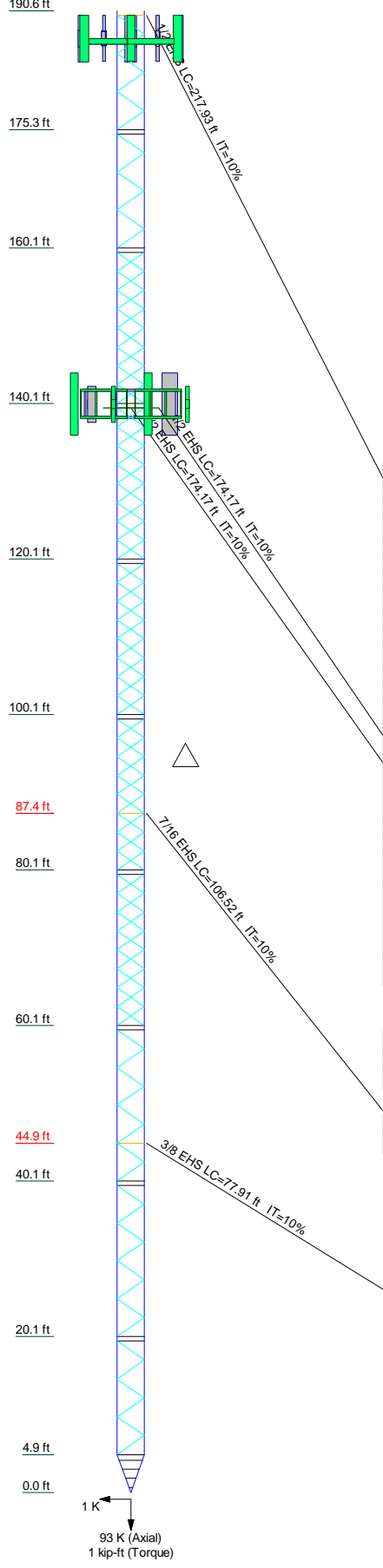
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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.

Section	T11	T10	T9	T8	T7	T6	T5	T4	T3	T2	T1
Legs	A		ROHN 2.5 STD		ROHN 2 EH			ROHN 2 STD		ROHN 2.5 X-STR	
Leg Grade	N.A.					A572-50					
Diagonals	N.A.					ROHN TS1.5x16 ga					
Diagonal Grade	N.A.					A53-B-42					
Top Girts	B					ROHN TS1.5x16 ga					N.A.
Mid Girts	B					N.A.					
Bottom Girts	B					ROHN TS1.5x16 ga					
Top Guy/Pull-Offs						C4x5.4					4 1/2x3/8
Face Width (ft)						N.A.					
# Panels @ (ft)	C	6 @ 2.43857				56 @ 2.42318				12 @ 2.43924	3.458
Weight (K)	5.1	0.3									



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
JAHH-65B-R3B (Verizon - Existing)	187	Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	187
BXA-70063/6CF (Verizon - Existing)	187	APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	140
JAHH-65B-R3B (Verizon - Existing)	187	APXVAARR24-43 (T-Mobile - Proposed)	140
JAHH-65B-R3B (Verizon - Existing)	187	APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	140
BXA-70063/6CF (Verizon - Existing)	187	APXVAARR24-43 (T-Mobile - Proposed)	140
JAHH-65B-R3B (Verizon - Existing)	187	APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	140
RRH2x60-07-U (Verizon - Existing)	187	APXVAARR24-43 (T-Mobile - Proposed)	140
RRH2x60-07-U (Verizon - Existing)	187	APX16DWV-16DWVS-E-A20 (T-Mobile - Proposed)	140
RRH2x60-07-U (Verizon - Existing)	187	APXVAARR24-43 (T-Mobile - Proposed)	140
RRH4x45/2x90-AWS (Verizon - Existing)	187	KRY112-71-2 (T-Mobile - Existing)	140
RRH4x45/2x90-AWS (Verizon - Existing)	187	KRY112-71-2 (T-Mobile - Existing)	140
RRH4x45/2x90-AWS (Verizon - Existing)	187	KRY112-71-2 (T-Mobile - Existing)	140
4x40 RRH 850 (Verizon - Existing)	187	Radio 4449 B71 B12 (T-Mobile - Proposed)	140
4x40 RRH 850 (Verizon - Existing)	187	Radio 4449 B71 B12 (T-Mobile - Proposed)	140
4x40 RRH 850 (Verizon - Existing)	187	Radio 4449 B71 B12 (T-Mobile - Proposed)	140
RC2DC-3315-PF-48 (Verizon - Existing)	187	12' V-Frame (T-Mobile - Proposed)	140
RC2DC-3315-PF-48 (Verizon - Existing)	187	12' V-Frame (T-Mobile - Proposed)	140
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	187	12' V-Frame (T-Mobile - Proposed)	140
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	187		

SYMBOL LIST

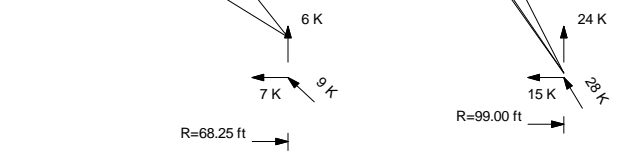
MARK	SIZE	MARK	SIZE
A	ROHN 2.5 X-STR	C	4 @ 1.17356
B	14x3/16		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 ksi	A53-B-42	42 ksi	63 ksi

TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-G Standard.
2. Tower designed for a 101 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 70.3%

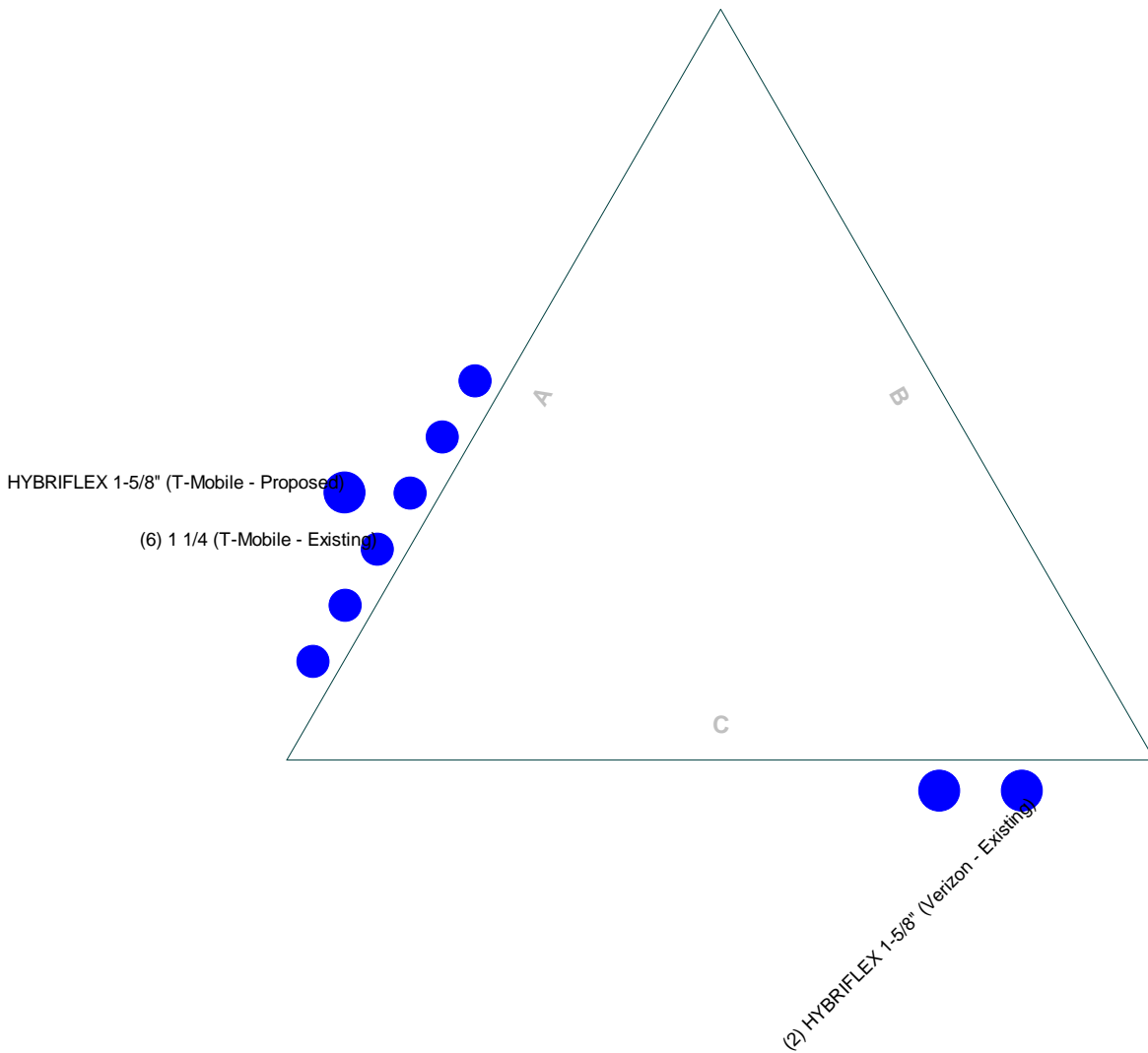


ALL REACTIONS ARE FACTORED

Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: 19027.60 - CT11156A		
	Project: 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT		
	Client: T-Mobile	Drawn by: TJL	App'd:
	Code: TIA-222-G	Date: 05/21/19	Scale: NTS
	Path:	Dwg No. E-1	

Feed Line Plan

— Round
 — Flat
 — App In Face
 — App Out Face

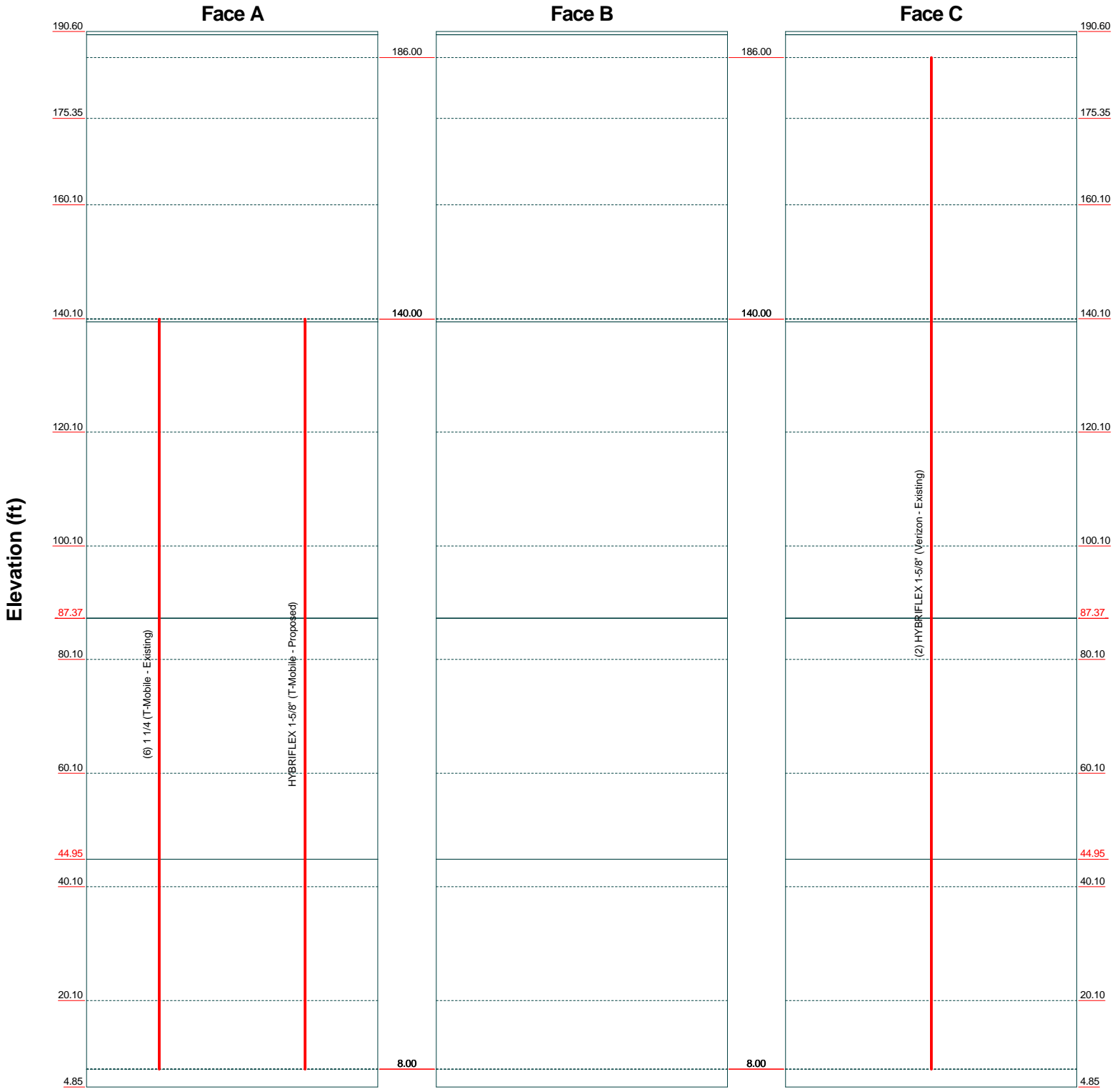


Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587			Job: 19027.60 - CT11156A Project: 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT		
Client: T-Mobile	Drawn by: TJL	App'd:			
Code: TIA-222-G	Date: 05/21/19	Scale: NTS			
Path:	Dwg No. E-7				

Feed Line Distribution Chart

4'10-3/16" - 190'7-3/16"

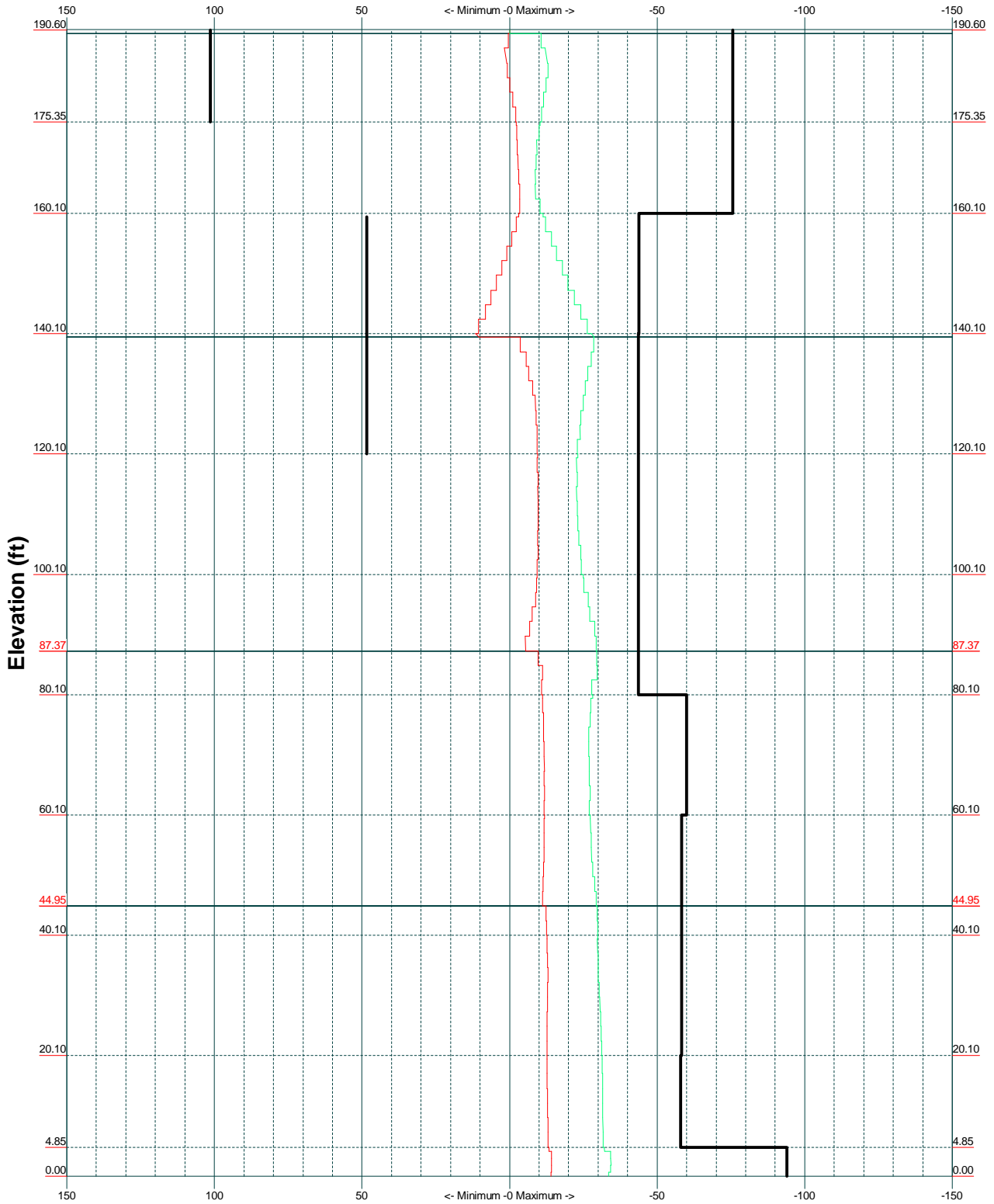
— Round
 — Flat
 — App In Face
 — App Out Face
 — Truss Leg



Centek Engineering Inc.		
63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587		
Job: 19027.60 - CT11156A		
Project: 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA-222-G	Date: 05/21/19	Scale: NTS
Path:		Dwg No. E-7

TIA-222-G - 101 mph/50 mph 0.7500 in Ice Exposure B

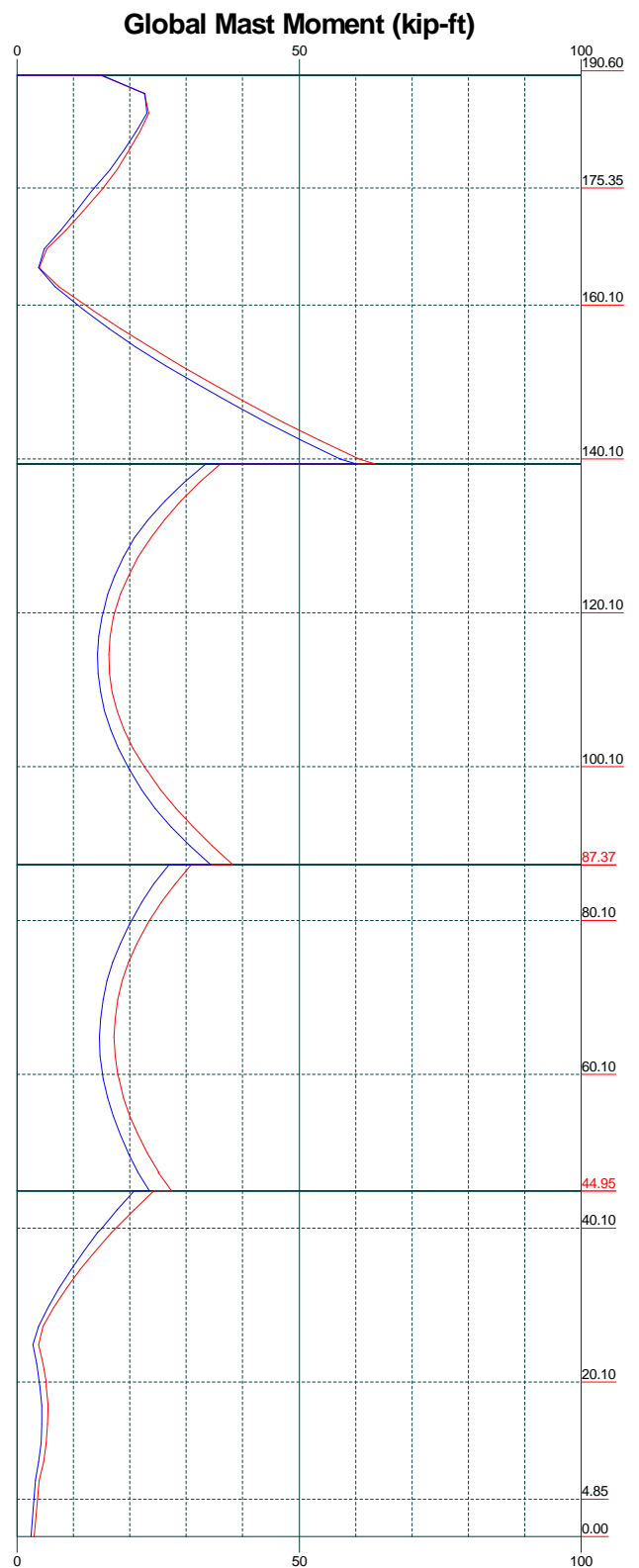
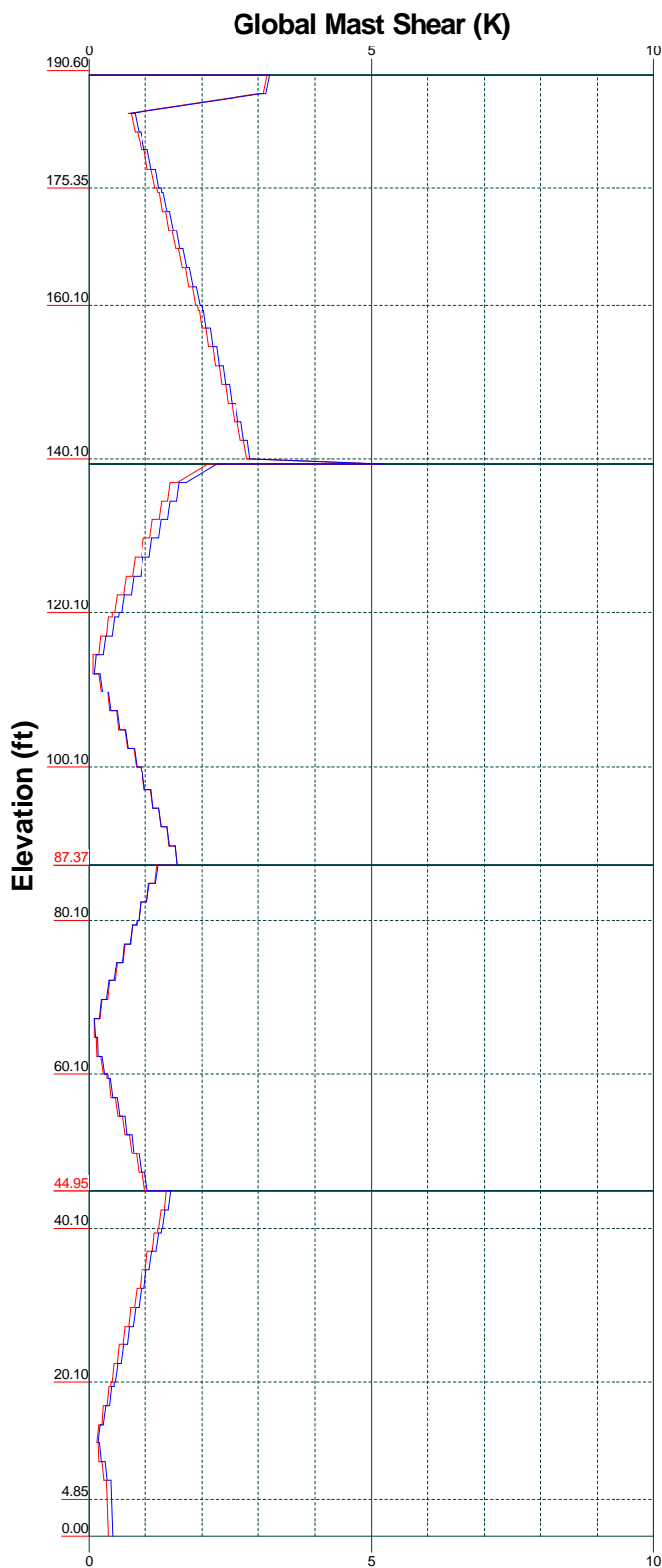
Leg Capacity ——— Leg Compression (K)



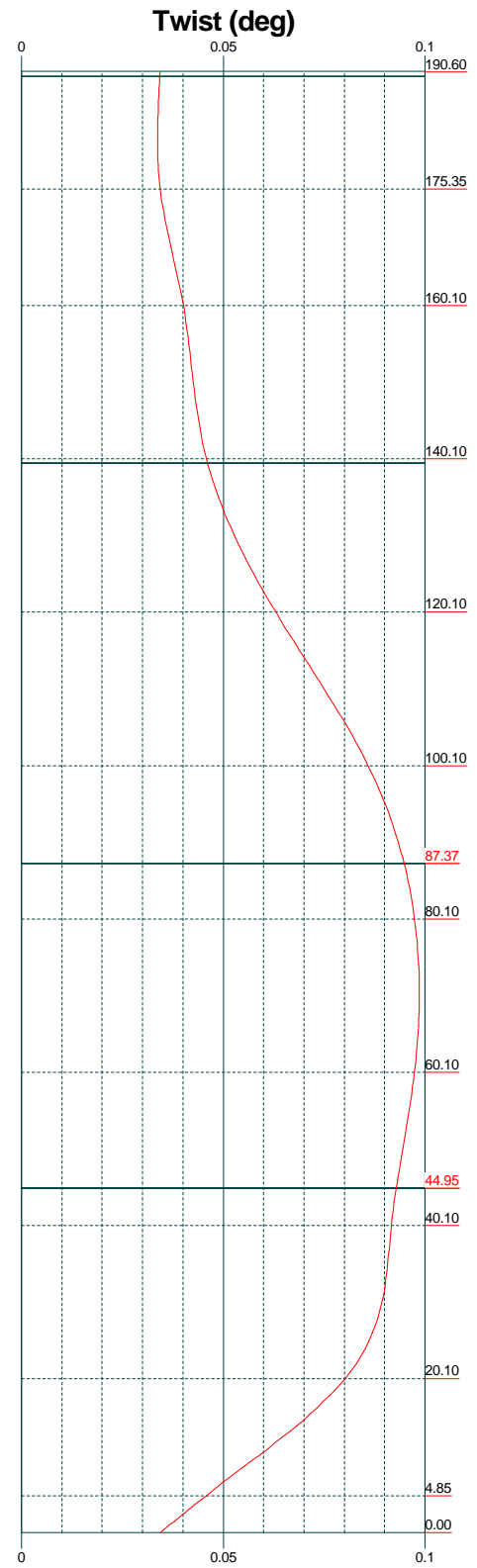
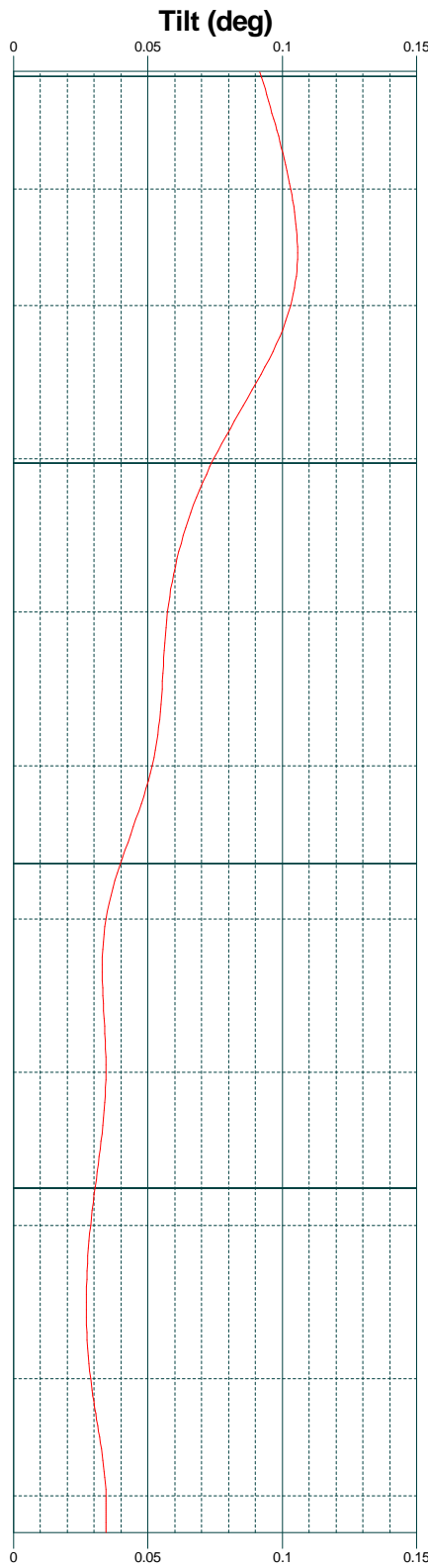
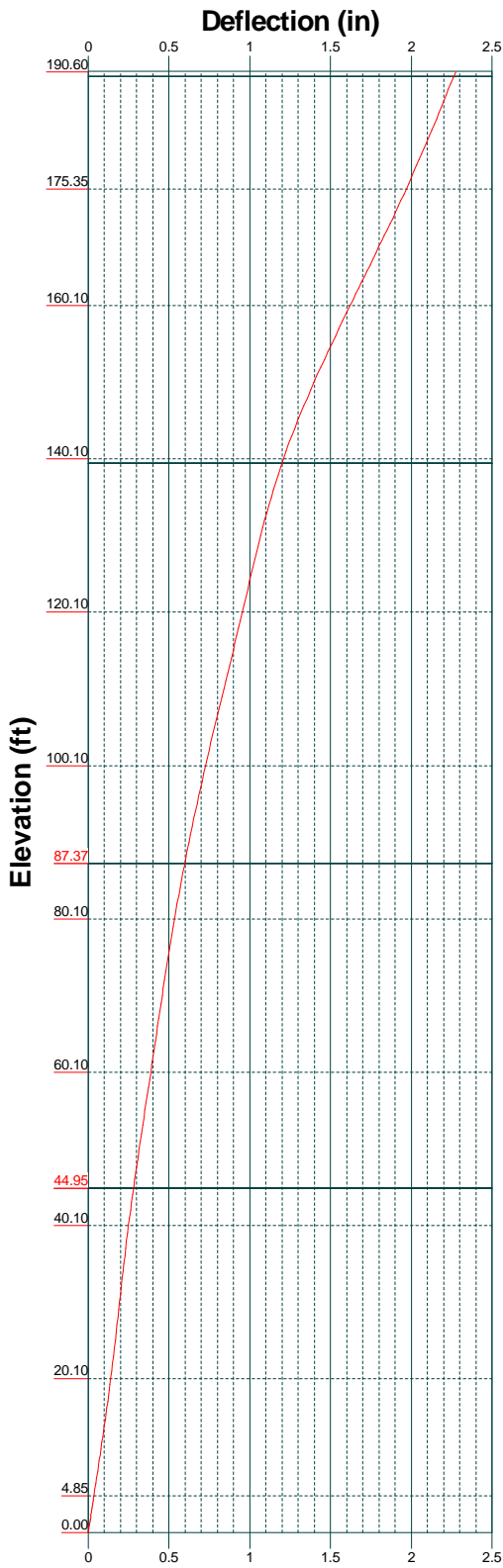
Centek Engineering Inc.		Job: 19027.60 - CT11156A	
63-2 North Branford Rd.		Project: 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	
Branford, CT 06405		Client: T-Mobile	Drawn by: T.JL
Phone: (203) 488-0580		Code: TIA-222-G	Date: 05/21/19
FAX: (203) 488-8587		Path:	Scale: NTS
			Dwg No. E-3

Vx Vz

Mx Mz

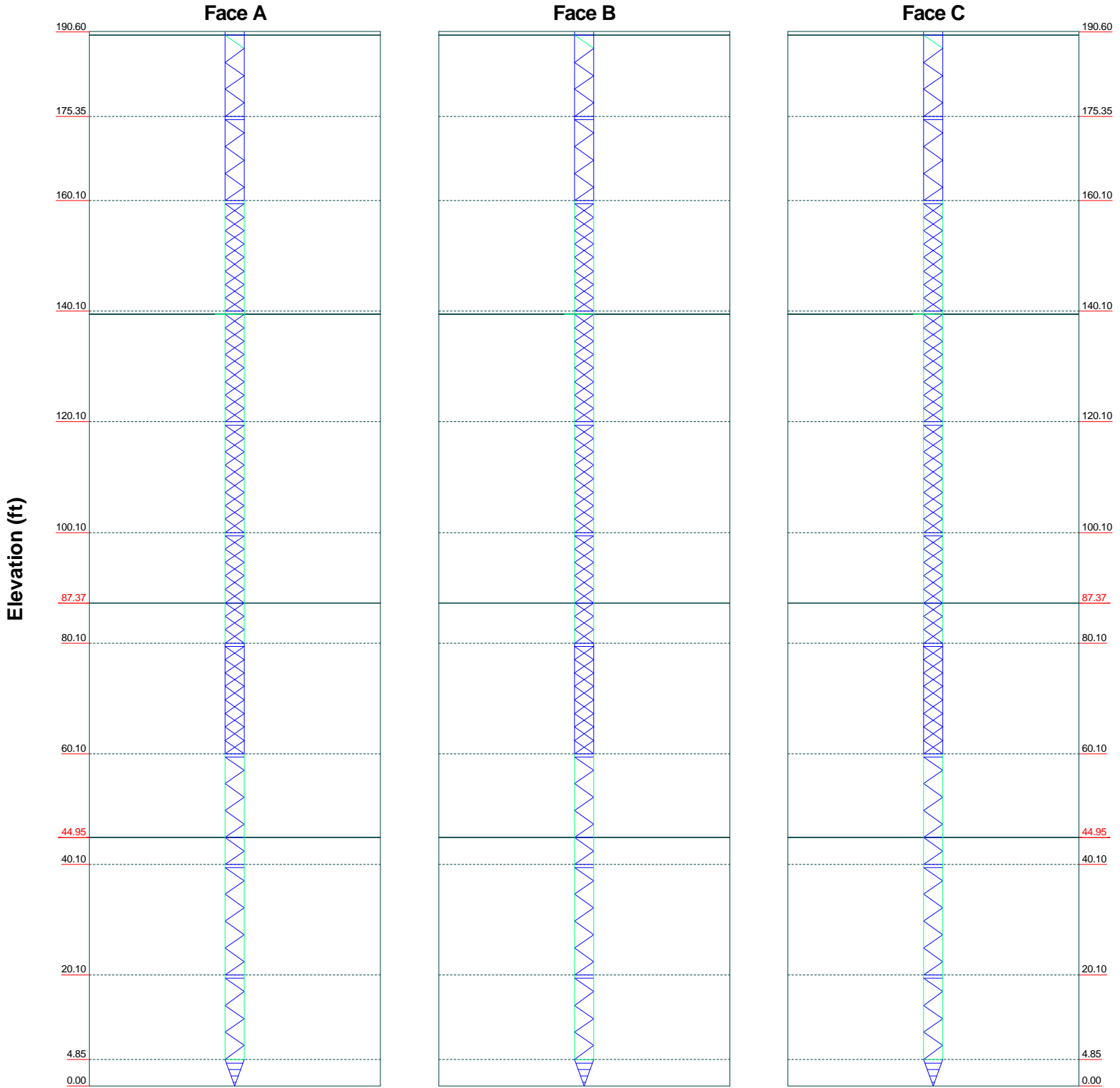


Centek Engineering Inc.		
63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587		
Job: 19027.60 - CT11156A		
Project: 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA-222-G	Date: 05/21/19	Scale: NTS
Path:		Dwg No. E-4



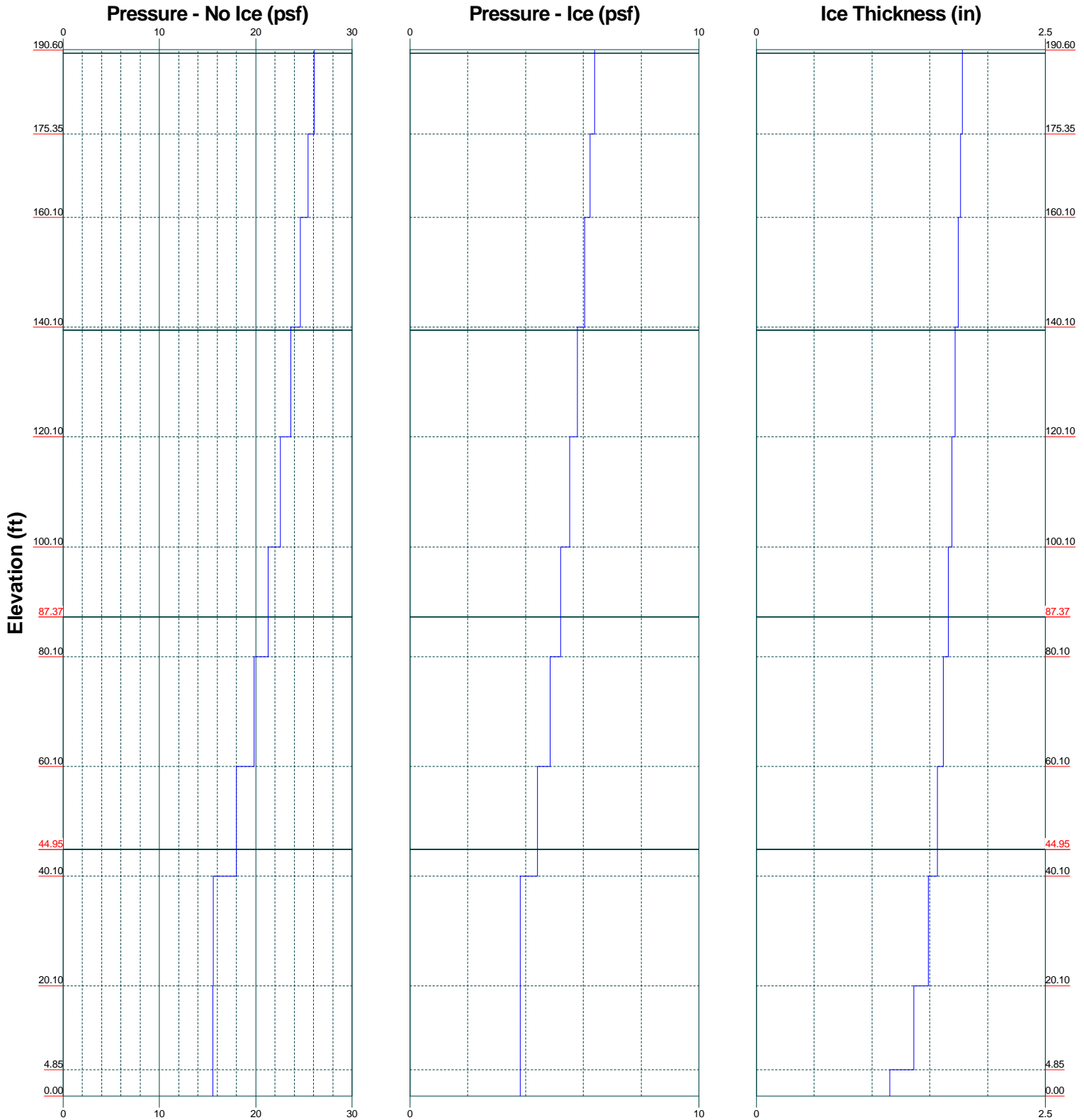
Stress Distribution Chart 0' - 190'7-3/16"

■ > 100%
 ■ 90%-100%
 ■ 75%-90%
 ■ 50%-75%
 ■ < 50% Overstress



Centek Engineering Inc.		Job: 19027.60 - CT11156A	
63-2 North Branford Rd.		Project: 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	
Branford, CT 06405		Client: T-Mobile	Drawn by: T.JL
Phone: (203) 488-0580		Code: TIA-222-G	Date: 05/21/19
FAX: (203) 488-8587		Path:	Scale: NTS
			Dwg No. E-8

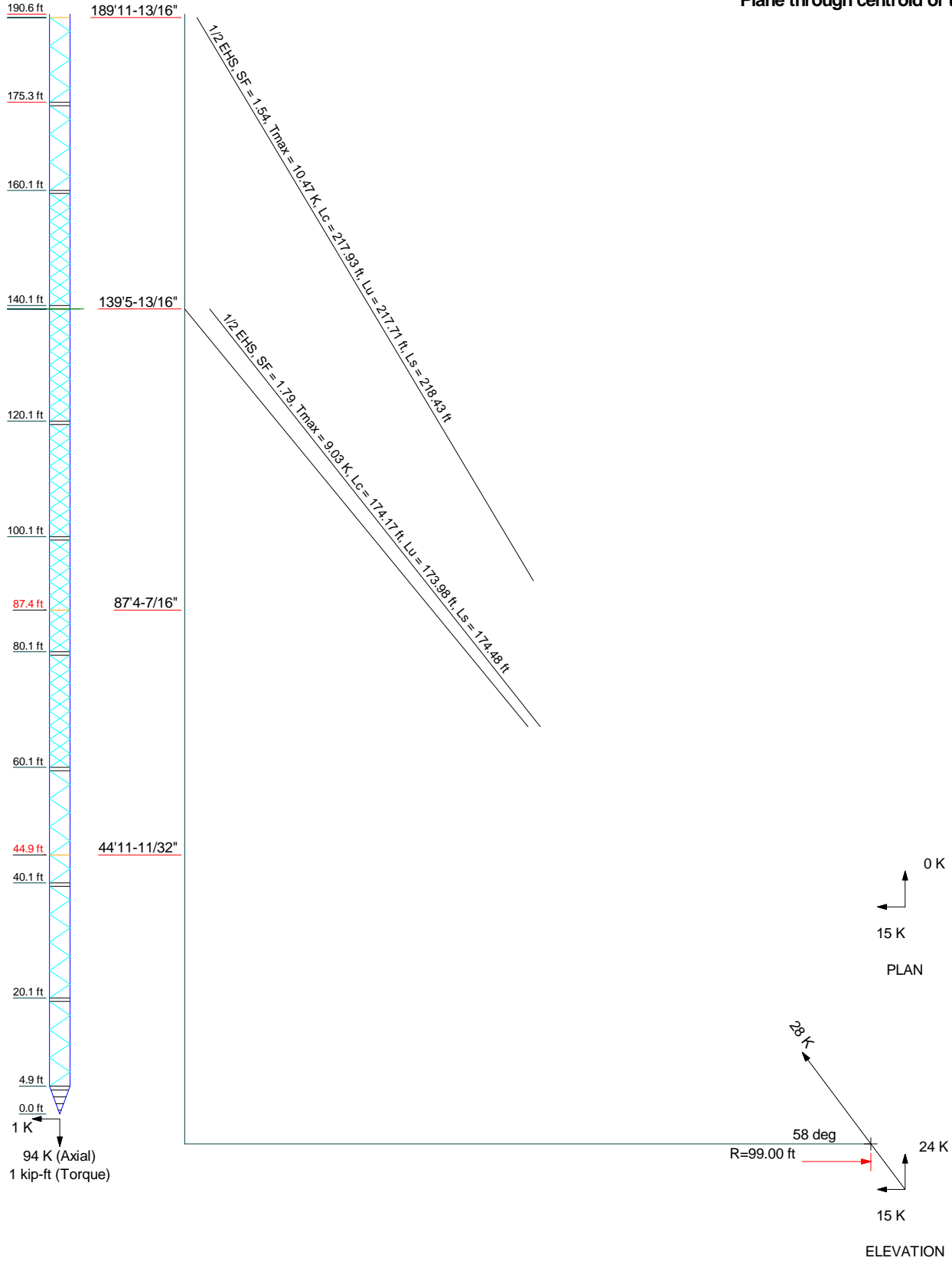
Wind Pressures and Ice Thickness
TIA-222-G - 101 mph/50 mph 0.7500 in Ice Exposure B



Centek Engineering Inc.		
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Job: 19027.60 - CT11156A	Project: 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA-222-G	Date: 05/21/19	Scale: NTS
Path:	Dwg No. E-9	

Guy Tensions and Tower Reactions
TIA-222-G - 101 mph/50 mph 0.7500 in Ice Exposure B

Maximum Values
Anchor 'C' @99 ft Azimuth 240 deg Elev -5.17 ft
Plane through centroid of tower



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	Project: 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT		
	Client: T-Mobile	Drawn by: T.JL	App'd:
	Code: TIA-222-G	Date: 05/21/19	Scale: NTS
	Path:	Dwg No. E-6	

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	Client T-Mobile	Designed by TJL

Tower Input Data

The main tower is a 3x guyed tower with an overall height of 190.60 ft above the ground line.

The base of the tower is set at an elevation of 0.00 ft above the ground line.

The face width of the tower is 3.46 ft at the top and tapered at the base.

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

The following design criteria apply:

Basic wind speed of 101 mph.

Structure Class II.

Exposure Category B.

Topographic Category 1.

Crest Height 0.00 ft.

Nominal ice thickness of 0.7500 in.

Ice thickness is considered to increase with height.

Ice density of 56 pcf.

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

Temperature drop of 50 °F.

Deflections calculated using a wind speed of 60 mph.

Pressures are calculated at each section.

Safety factor used in guy design is 1.

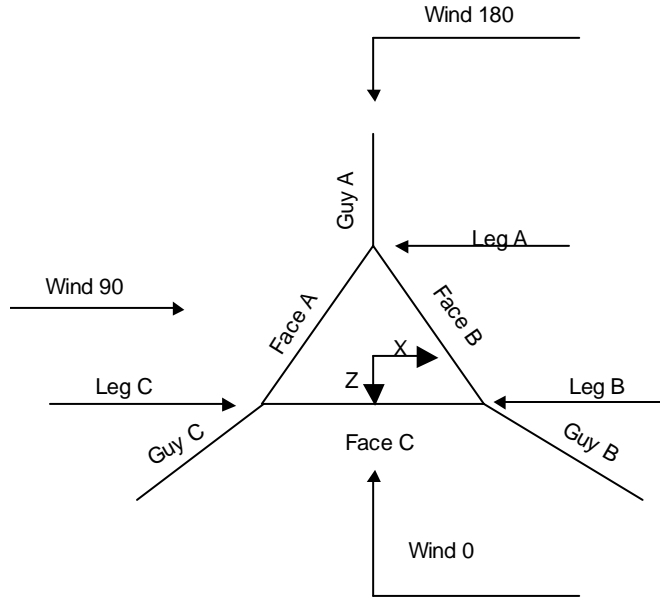
Stress ratio used in tower member design is 1.

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

Options

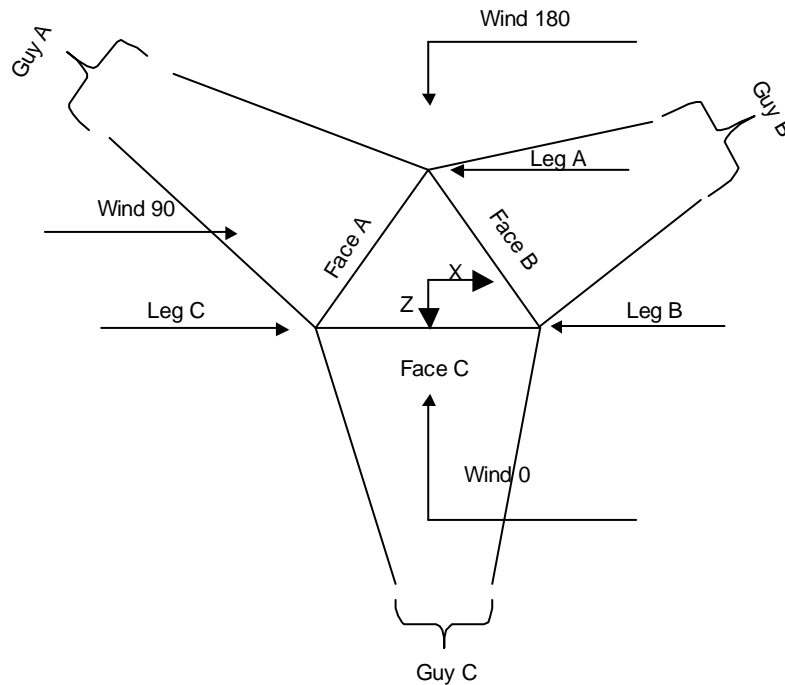
<ul style="list-style-type: none"> Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification √ Use Code Stress Ratios √ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile √ Include Bolts In Member Capacity Leg Bolts 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="background-color: #e0e0e0;">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
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Corner & Starmount Guyed Tower

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Face Guyed

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	190.60-175.35			3.46	1	15.25
T2	175.35-160.10			3.46	1	15.25
T3	160.10-140.10			3.46	1	20.00
T4	140.10-120.10			3.46	1	20.00
T5	120.10-100.10			3.46	1	20.00
T6	100.10-80.10			3.46	1	20.00
T7	80.10-60.10			3.46	1	20.00
T8	60.10-40.10			3.46	1	20.00
T9	40.10-20.10			3.46	1	20.00
T10	20.10-4.85			3.46	1	15.25
T11	4.85-0.00			3.46	1	4.85

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Tower Section Geometry (cont'd)

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	190.60-175.35	2.44	K Brace Left	No	Yes	7.3750	0.0000
T2	175.35-160.10	2.44	K Brace Left	No	Yes	7.3750	0.0000
T3	160.10-140.10	2.42	CX Brace	No	Yes	7.3750	0.0000
T4	140.10-120.10	2.42	CX Brace	No	Yes	7.3750	0.0000
T5	120.10-100.10	2.42	CX Brace	No	Yes	7.3750	0.0000
T6	100.10-80.10	2.42	CX Brace	No	Yes	7.3750	0.0000
T7	80.10-60.10	2.42	CX Brace	No	Yes	7.3750	0.0000
T8	60.10-40.10	2.42	K Brace Left	No	Yes	7.3750	0.0000
T9	40.10-20.10	2.42	K Brace Left	No	Yes	7.3750	0.0000
T10	20.10-4.85	2.44	K Brace Left	No	Yes	7.3750	0.0000
T11	4.85-0.00	1.17	X Brace	No	Yes	8.0000	8.0000

Tower Section Geometry (cont'd)

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 190.60-175.35	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T2 175.35-160.10	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T3 160.10-140.10	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T4 140.10-120.10	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T5 120.10-100.10	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T6 100.10-80.10	Pipe	ROHN 2 STD	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T7 80.10-60.10	Pipe	ROHN 2 EH	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T8 60.10-40.10	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T9 40.10-20.10	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T10 20.10-4.85	Pipe	ROHN 2.5 STD	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T11 4.85-0.00	Pipe	ROHN 2.5 X-STR	A572-50 (50 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 190.60-175.35	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T2 175.35-160.10	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)

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Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T3 160.10-140.10	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T4 140.10-120.10	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T5 120.10-100.10	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T6 100.10-80.10	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T7 80.10-60.10	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T8 60.10-40.10	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T9 40.10-20.10	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T10 20.10-4.85	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)	Pipe	ROHN TS1.5x16 ga	A53-B-42 (42 ksi)
T11 4.85-0.00	Flat Bar	14x3/16	A36 (36 ksi)	Flat Bar	14x3/16	A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T11 4.85-0.00	2	Flat Bar	14x3/16	A36 (36 ksi)	Flat Bar		A36 (36 ksi)

Tower Section Geometry (cont'd)

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _f	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 190.60-175.35	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 175.35-160.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 160.10-140.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 140.10-120.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 120.10-100.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 100.10-80.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 80.10-60.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 60.10-40.10	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

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Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T2 175.35-160.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 160.10-140.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 140.10-120.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 120.10-100.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 100.10-80.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 80.10-60.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 60.10-40.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 40.10-20.10	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T10 20.10-4.85	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T11 4.85-0.00	0.0000	1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry (cont'd)

Tower Elevation ft	Connection Offsets							
	Diagonal				K-Bracing			
	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.	Vert. Top	Horiz. Top	Vert. Bot.	Horiz. Bot.
in	in	in	in	in	in	in	in	
T1 190.60-175.35	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T2 175.35-160.10	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T3 160.10-140.10	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T4 140.10-120.10	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T5 120.10-100.10	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T6 100.10-80.10	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T7 80.10-60.10	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T8 60.10-40.10	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T9 40.10-20.10	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T10 20.10-4.85	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000
T11 4.85-0.00	0.0000	0.0000	0.0000	0.0000	3.2500	0.0000	3.2500	0.0000

Tower Section Geometry (cont'd)

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Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 190.60-175.35	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T2 175.35-160.10	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T3 160.10-140.10	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T4 140.10-120.10	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T5 120.10-100.10	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T6 100.10-80.10	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T7 80.10-60.10	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T8 60.10-40.10	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T9 40.10-20.10	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T10 20.10-4.85	Flange	0.7500	4	0.5000	1	0.5000	1	0.5000	1	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	
T11 4.85-0.00	Flange	0.7500	0	0.0000	0	0.0000	0	0.0000	0	0.6250	0	0.6250	0	0.6250	0
		A325N		A325N		A325N		A325N		A325N		A325N		A325N	

Guy Data

Guy Elevation ft	Guy Grade	Guy Size	Initial Tension K	%	Guy Modulus ksi	Guy Weight plf	L _u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
189.985	EHS	A 1/2	2.69	10%	21000	0.517	209.81	96.50	0.0000	2.46	100%
		B 1/2	2.69	10%	21000	0.517	217.41	99.25	0.0000	-4.67	100%
		C 1/2	2.69	10%	21000	0.517	217.75	99.00	0.0000	-5.17	100%
139.485	EHS	A 1/2	2.69	10%	21000	0.517	166.31	96.50	0.0000	2.46	100%
		B 1/2	2.69	10%	21000	0.517	173.74	99.25	0.0000	-4.67	100%
		C 1/2	2.69	10%	21000	0.517	174.02	99.00	0.0000	-5.17	100%
87.3695	EHS	A 7/16	2.08	10%	21000	0.399	108.59	70.50	0.0000	3.00	100%
		B 7/16	2.08	10%	21000	0.399	106.43	68.25	0.0000	3.96	100%
		C 7/16	2.08	10%	21000	0.399	109.89	71.50	0.0000	2.13	100%
44.9464	EHS	A 3/8	1.54	10%	21000	0.273	80.25	70.50	0.0000	3.00	100%
		B 3/8	1.54	10%	21000	0.273	77.83	68.25	0.0000	3.96	100%
		C 3/8	1.54	10%	21000	0.273	81.56	71.50	0.0000	2.13	100%

Guy Data(cont'd)

Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade	Torque-Arm Type	Torque-Arm Size
189.985	Corner						
139.485	Torque Arm	7.17	0.0000	Channel	A36	Channel	C10x15.3

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Guy Elevation ft	Mount Type	Torque-Arm Spread ft	Torque-Arm Leg Angle °	Torque-Arm Style	Torque-Arm Grade (36 ksi)	Torque-Arm Type	Torque-Arm Size
87.3695	Corner						
44.9464	Corner						

Guy Data (cont'd)

Guy Elevation ft	Diagonal Grade	Diagonal Type	Upper Diagonal Size	Lower Diagonal Size	Is Strap.	Pull-Off Grade	Pull-Off Type	Pull-Off Size
189.99	A53-B-42 (42 ksi)	Pipe			No	A36 (36 ksi)	Flat Bar	4 1/2x3/8
139.49	A53-B-42 (42 ksi)	Pipe				A36 (36 ksi)	Flat Bar	
87.37	A53-B-42 (42 ksi)	Pipe			No	A36 (36 ksi)	Channel	C4x5.4
44.95	A53-B-42 (42 ksi)	Pipe			Yes	A36 (36 ksi)	Channel	C4x5.4

Guy Data (cont'd)

Guy Elevation ft	Cable Weight A K	Cable Weight B K	Cable Weight C K	Cable Weight D K	Tower Intercept A ft	Tower Intercept B ft	Tower Intercept C ft	Tower Intercept D ft
189.985	0.11	0.11	0.11		4.16	4.46	4.48	
139.485	0.09	0.09	0.09		3.5 sec/pulse 2.63	3.6 sec/pulse 2.86	3.7 sec/pulse 2.87	
87.3695	0.04	0.04	0.04		2.8 sec/pulse 1.12	2.9 sec/pulse 1.08	2.9 sec/pulse 1.15	
44.9464	0.02	0.02	0.02		1.8 sec/pulse 0.57	1.8 sec/pulse 0.54	1.9 sec/pulse 0.59	
					1.3 sec/pulse	1.3 sec/pulse	1.3 sec/pulse	

Guy Data (cont'd)

Guy Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Torque Arm		Pull Off		Diagonal	
			K _x	K _y	K _x	K _y	K _x	K _y
189.985	Yes	No			1	1	1	1
139.485	Yes	No	1	1	1	1	1	1
87.3695	Yes	No			1	1	1	1
44.9464	No	No			1	1	1	1

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Guy Data (cont'd)

Guy Elevation ft	Torque-Arm				Pull Off				Diagonal			
	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U	Bolt Size in	Number	Net Width Deduct in	U
189.985	0.6250 A325N	2	0.0000	1	0.0000 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
139.485	0.6250 A325N	0	0.0000	1	0.0000 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
87.3695	0.6250 A325N	2	0.0000	1	0.0000 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
44.9464	0.0000 A325N	0	0.0000	1	0.0000 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q _z psf	q _z Ice psf	Ice Thickness in
189.985	A	96.22	22	5	1.6694
	B	92.66	21	5	1.6631
	C	92.41	21	5	1.6627
139.485	A	70.97	20	5	1.6194
	B	67.41	20	5	1.6111
	C	67.16	20	5	1.6105
87.3695	A	45.18	17	4	1.5479
	B	45.66	18	4	1.5495
	C	44.75	17	4	1.5464
44.9464	A	23.97	16	4	1.4528
	B	24.45	16	4	1.4557
	C	23.54	16	4	1.4501

Guy-Mast Forces (Excluding Wind) - No Ice

Guy Elevation ft	Guy Location	Chord Angle °	Guy Tension Top Bottom K	F _x K	F _y K	F _z K	M _x kip-ft	M _y kip-ft	M _z kip-ft
189.985	A	63.2542	2.79 2.69	0.00	2.50	-1.23	-4.99	0.00	0.00
	B	63.4524	2.79 2.69	1.06	2.51	0.61	2.50	0.00	-4.34
	C	63.5700	2.79 2.69	-1.06	2.51	0.61	2.51	0.00	4.34
139.485			Sum:	0.00	7.52	-0.01	0.02	0.00	0.00
	A	55.4083	2.76 2.69	-0.06	2.29	-1.55	-4.73	5.66	-8.20
	A	55.4083	2.76 2.69	0.06	2.29	-1.55	-4.73	-5.66	8.20
	B	55.9967	2.76 2.69	1.35	2.31	0.71	9.54	5.58	0.00
	B	55.9967	2.76 2.69	1.29	2.31	0.81	-4.77	-5.58	-8.27

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
87.3695	C	56.1568	2.76 2.69	-1.29	2.31	0.81	-4.78	5.56	8.28
	C	56.1568	2.76 2.69	-1.34	2.31	0.71	9.56	-5.56	0.00
	Sum:			0.01	13.80	-0.05	0.09	0.00	0.02
87.3695	A	50.9253	2.11 2.08	0.00	1.65	-1.32	-3.29	0.00	0.00
	B	51.5393	2.11 2.08	1.13	1.66	0.65	1.66	0.00	-2.88
	C	50.8082	2.11 2.08	-1.15	1.65	0.66	1.64	0.00	2.85
44.9464	Sum:			-0.02	4.96	-0.01	0.01	0.00	-0.03
	A	31.4801	1.55 1.54	0.00	0.82	-1.32	-1.63	0.00	0.00
	B	31.7421	1.55 1.54	1.14	0.82	0.66	0.82	0.00	-1.42
	C	31.6374	1.55 1.54	-1.14	0.82	0.66	0.82	0.00	1.42
	Sum:			-0.00	2.46	-0.00	0.01	0.00	-0.00

Guy-Mast Forces (Excluding Wind) - Ice

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
189.985	A	63.2542	5.38 4.45	0.00	4.90	-2.20	-9.79	0.00	0.00
	B	63.4524	5.43 4.47	1.91	4.96	1.10	4.95	0.00	-8.58
	C	63.5700	5.42 4.47	-1.90	4.96	1.10	4.95	0.00	8.58
139.485	Sum:			0.01	14.83	-0.00	0.11	0.00	0.00
	A	55.4083	5.15 4.51	-0.10	4.36	-2.73	-9.03	10.01	-15.65
	A	55.4083	5.15 4.51	0.10	4.36	-2.73	-9.03	-10.01	15.65
	B	55.9967	5.20 4.52	2.40	4.43	1.27	18.35	9.92	0.00
	B	55.9967	5.20 4.52	2.30	4.43	1.44	-9.18	-9.92	-15.89
	C	56.1568	5.19 4.52	-2.28	4.44	1.43	-9.18	9.87	15.91
87.3695	C	56.1568	5.19 4.52	-2.38	4.44	1.26	18.37	-9.87	0.00
	Sum:			0.02	26.47	-0.06	0.29	0.00	0.01
	A	50.9253	3.70 3.35	0.00	2.96	-2.22	-5.92	0.00	0.00
	B	51.5393	3.67 3.33	1.88	2.96	1.09	2.96	0.00	-5.12
	C	50.8082	3.72 3.36	-1.93	2.97	1.12	2.97	0.00	5.14
	Sum:			-0.05	8.90	-0.02	0.00	0.00	0.02

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Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
44.9464	A	31.4801	2.73 2.58	0.00	1.53	-2.26	-3.05	0.00	0.00
	B	31.7421	2.70 2.56	1.93	1.52	1.12	1.52	0.00	-2.63
	C	31.6374	2.74 2.59	-1.96	1.54	1.13	1.54	0.00	2.66
			Sum:	-0.03	4.58	-0.01	0.01	0.00	0.03

Guy-Mast Forces (Excluding Wind) - Service

Guy Elevation	Guy Location	Chord Angle	Guy Tension Top Bottom K	F _x	F _y	F _z	M _x	M _y	M _z
ft		°		K	K	K	kip-ft	kip-ft	kip-ft
189.985	A	63.2542	2.79 2.69	0.00	2.50	-1.23	-4.99	0.00	0.00
	B	63.4524	2.79 2.69	1.06	2.51	0.61	2.50	0.00	-4.34
	C	63.5700	2.79 2.69	-1.06	2.51	0.61	2.51	0.00	4.34
			Sum:	0.00	7.52	-0.01	0.02	0.00	0.00
139.485	A	55.4083	2.76 2.69	-0.06	2.29	-1.55	-4.73	5.66	-8.20
	A	55.4083	2.76 2.69	0.06	2.29	-1.55	-4.73	-5.66	8.20
	B	55.9967	2.76 2.69	1.35	2.31	0.71	9.54	5.58	0.00
	B	55.9967	2.76 2.69	1.29	2.31	0.81	-4.77	-5.58	-8.27
	C	56.1568	2.76 2.69	-1.29	2.31	0.81	-4.78	5.56	8.28
	C	56.1568	2.76 2.69	-1.34	2.31	0.71	9.56	-5.56	0.00
				Sum:	0.01	13.80	-0.05	0.09	0.00
87.3695	A	50.9253	2.11 2.08	0.00	1.65	-1.32	-3.29	0.00	0.00
	B	51.5393	2.11 2.08	1.13	1.66	0.65	1.66	0.00	-2.88
	C	50.8082	2.11 2.08	-1.15	1.65	0.66	1.64	0.00	2.85
			Sum:	-0.02	4.96	-0.01	0.01	0.00	-0.03
44.9464	A	31.4801	1.55 1.54	0.00	0.82	-1.32	-1.63	0.00	0.00
	B	31.7421	1.55 1.54	1.14	0.82	0.66	0.82	0.00	-1.42
	C	31.6374	1.55 1.54	-1.14	0.82	0.66	0.82	0.00	1.42
			Sum:	-0.00	2.46	-0.00	0.01	0.00	-0.00

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Guy-Tensioning Information

Temperature At Time Of Tensioning																	
Guy Elevation ft	H ft	V ft	0 F		20 F		40 F		60 F		80 F		100 F		120 F		
			Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	Initial Tension K	Intercept ft	
			189.985	A	94.50	187.53	2.932	3.82	2.851	3.93	2.771	4.04	2.690	4.16	2.610	4.29	2.530
	B	97.25	194.66	2.929	4.10	2.849	4.22	2.769	4.34	2.690	4.46	2.611	4.60	2.532	4.74	2.454	4.89
	C	97.00	195.16	2.927	4.12	2.848	4.23	2.769	4.35	2.690	4.48	2.612	4.61	2.533	4.75	2.456	4.90
139.485	A	94.50	137.03	3.076	2.30	2.947	2.40	2.818	2.51	2.690	2.63	2.562	2.76	2.435	2.90	2.310	3.05
	B	97.25	144.16	3.064	2.52	2.939	2.62	2.814	2.74	2.690	2.86	2.566	3.00	2.443	3.15	2.321	3.31
	C	97.00	144.66	3.061	2.53	2.937	2.63	2.813	2.75	2.690	2.87	2.567	3.01	2.445	3.16	2.324	3.32
87.3695	A	68.50	84.37	2.452	0.95	2.328	1.00	2.204	1.06	2.080	1.12	1.957	1.19	1.834	1.27	1.712	1.36
	B	66.25	83.41	2.442	0.92	2.321	0.97	2.201	1.02	2.080	1.08	1.960	1.14	1.840	1.22	1.721	1.30
	C	69.50	85.24	2.454	0.98	2.329	1.03	2.204	1.09	2.080	1.15	1.956	1.22	1.833	1.30	1.710	1.40
44.9464	A	68.50	41.95	2.008	0.44	1.852	0.47	1.696	0.52	1.540	0.57	1.385	0.63	1.231	0.71	1.078	0.81
	B	66.25	40.99	2.006	0.41	1.850	0.45	1.695	0.49	1.540	0.54	1.386	0.60	1.232	0.67	1.080	0.76
	C	69.50	42.82	2.007	0.45	1.851	0.49	1.695	0.53	1.540	0.59	1.386	0.65	1.232	0.73	1.080	0.84

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 1/4 (T-Mobile - Existing)	A	No	No	Ar (CaAa)	140.00 - 8.00	0.5000	-0.2	6	6	1.5500	1.5500		0.66
HYBRIFLEX 1-5/8" (Verizon - Existing)	C	No	No	Ar (CaAa)	186.00 - 8.00	0.5000	-0.3	2	2	1.9800	1.9800		1.90
HYBRIFLEX 1-5/8" (T-Mobile - Proposed)	A	No	No	Ar (CaAa)	140.00 - 8.00	3.0000	-0.2	1	1	1.9800	1.9800		1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
T1	190.60-175.35	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	4.217	0.000	0.04
T2	175.35-160.10	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	6.039	0.000	0.06
T3	160.10-140.10	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.920	0.000	0.08
T4	140.10-120.10	A	0.000	0.000	22.447	0.000	0.12
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.920	0.000	0.08
T5	120.10-100.10	A	0.000	0.000	22.560	0.000	0.12
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.920	0.000	0.08

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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
T6	100.10-80.10	A	0.000	0.000	22.560	0.000	0.12
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.920	0.000	0.08
T7	80.10-60.10	A	0.000	0.000	22.560	0.000	0.12
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.920	0.000	0.08
T8	60.10-40.10	A	0.000	0.000	22.560	0.000	0.12
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.920	0.000	0.08
T9	40.10-20.10	A	0.000	0.000	22.560	0.000	0.12
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.920	0.000	0.08
T10	20.10-4.85	A	0.000	0.000	13.649	0.000	0.07
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	4.792	0.000	0.05
T11	4.85-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

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
T1	190.60-175.35	A	1.780	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	14.641	0.000	0.21
T2	175.35-160.10	A	1.765	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	20.885	0.000	0.29
T3	160.10-140.10	A	1.745	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	27.256	0.000	0.38
T4	140.10-120.10	A	1.721	0.000	0.000	63.250	0.000	0.93
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	27.087	0.000	0.37
T5	120.10-100.10	A	1.692	0.000	0.000	63.282	0.000	0.92
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	26.893	0.000	0.37
T6	100.10-80.10	A	1.658	0.000	0.000	62.945	0.000	0.91
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	26.663	0.000	0.36
T7	80.10-60.10	A	1.617	0.000	0.000	62.533	0.000	0.89
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	26.383	0.000	0.35
T8	60.10-40.10	A	1.564	0.000	0.000	61.998	0.000	0.86
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	26.019	0.000	0.34
T9	40.10-20.10	A	1.486	0.000	0.000	61.222	0.000	0.83
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	25.490	0.000	0.33
T10	20.10-4.85	A	1.361	0.000	0.000	36.285	0.000	0.46
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	14.907	0.000	0.19
T11	4.85-0.00	A	1.155	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

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Feed Line Center of Pressure

Section	Elevation	CP _x	CP _z	CP _x Ice	CP _z Ice
	ft	in	in	in	in
T1	190.60-175.35	1.4745	1.6307	1.9776	2.1555
T2	175.35-160.10	2.2344	2.4175	2.8165	3.0473
T3	160.10-140.10	2.0400	2.2072	1.6967	1.8358
T4	140.10-120.10	-3.6943	1.6093	-2.6156	1.4907
T5	120.10-100.10	-3.7139	1.6073	-2.6782	1.5102
T6	100.10-80.10	-3.5184	1.5364	-2.5145	1.4162
T7	80.10-60.10	-3.7123	1.6066	-2.7988	1.5638
T8	60.10-40.10	-3.7406	1.6349	-3.7691	2.0989
T9	40.10-20.10	-3.9713	1.7187	-4.0625	2.2324
T10	20.10-4.85	-3.4595	1.4972	-3.7036	2.0016
T11	4.85-0.00	0.0000	0.0000	0.0000	0.0000

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T1	2	HYBRIFLEX 1-5/8"	175.35 - 186.00	0.6000	0.5101
T2	2	HYBRIFLEX 1-5/8"	160.10 - 175.35	0.6000	0.5256
T3	2	HYBRIFLEX 1-5/8"	140.10 - 160.10	0.6000	0.3824
T4	1	1 1/4	120.10 - 140.00	0.6000	0.3875
T4	2	HYBRIFLEX 1-5/8"	120.10 - 140.10	0.6000	0.3875
T4	3	HYBRIFLEX 1-5/8"	120.10 - 140.00	0.6000	0.3875
T5	1	1 1/4	100.10 - 120.10	0.6000	0.3934
T5	2	HYBRIFLEX 1-5/8"	100.10 - 120.10	0.6000	0.3934
T5	3	HYBRIFLEX 1-5/8"	100.10 - 120.10	0.6000	0.3934
T6	1	1 1/4	80.10 - 100.10	0.6000	0.3751
T6	2	HYBRIFLEX 1-5/8"	80.10 - 100.10	0.6000	0.3751
T6	3	HYBRIFLEX 1-5/8"	80.10 - 100.10	0.6000	0.3751
T7	1	1 1/4	60.10 - 80.10	0.6000	0.4088
T7	2	HYBRIFLEX 1-5/8"	60.10 - 80.10	0.6000	0.4088
T7	3	HYBRIFLEX 1-5/8"	60.10 - 80.10	0.6000	0.4088
T8	1	1 1/4	40.10 - 60.10	0.6000	0.5386
T8	2	HYBRIFLEX 1-5/8"	40.10 - 60.10	0.6000	0.5386
T8	3	HYBRIFLEX 1-5/8"	40.10 - 60.10	0.6000	0.5386
T9	1	1 1/4	20.10 - 40.10	0.6000	0.5741
T9	2	HYBRIFLEX 1-5/8"	20.10 - 40.10	0.6000	0.5741
T9	3	HYBRIFLEX 1-5/8"	20.10 - 40.10	0.6000	0.5741
T10	1	1 1/4	8.00 - 20.10	0.6000	0.5855
T10	2	HYBRIFLEX 1-5/8"	8.00 - 20.10	0.6000	0.5855

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Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K _a No Ice	K _a Ice
T10	3	HYBRIFLEX 1-5/8"	8.00 - 20.10	0.6000	0.5855

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:			Azimuth Adjustment	Placement	C _A A _A Front	C _A A _A Side	Weight
			Horz	Lateral	Vert					
JAHH-65B-R3B (Verizon - Existing)	A	From Face	3.00	0.0000	187.00	No Ice	9.11	5.98	0.06	
			-6.00			1/2" Ice	9.58	6.44	0.12	
			0.00			1" Ice	10.05	6.91	0.19	
BXA-70063/6CF (Verizon - Existing)	A	From Face	3.00	0.0000	187.00	No Ice	7.57	4.16	0.01	
			0.00			1/2" Ice	8.02	4.60	0.05	
			0.00			1" Ice	8.47	5.04	0.10	
JAHH-65B-R3B (Verizon - Existing)	A	From Face	3.00	0.0000	187.00	No Ice	9.11	5.98	0.06	
			6.00			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	187.00	No Ice	9.11	5.98	0.06	
			-6.00			1/2" Ice	9.58	6.44	0.12	
			0.00			1" Ice	10.05	6.91	0.19	
BXA-70063/6CF (Verizon - Existing)	B	From Face	3.00	0.0000	187.00	No Ice	7.57	4.16	0.01	
			0.00			1/2" Ice	8.02	4.60	0.05	
			0.00			1" Ice	8.47	5.04	0.10	
JAHH-65B-R3B (Verizon - Existing)	B	From Face	3.00	0.0000	187.00	No Ice	9.11	5.98	0.06	
			6.00			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	187.00	No Ice	9.11	5.98	0.06	
			-6.00			1/2" Ice	9.58	6.44	0.12	
			0.00			1" Ice	10.05	6.91	0.19	
BXA-70063/6CF (Verizon - Existing)	C	From Face	3.00	0.0000	187.00	No Ice	7.57	4.16	0.01	
			0.00			1/2" Ice	8.02	4.60	0.05	
			0.00			1" Ice	8.47	5.04	0.10	
JAHH-65B-R3B (Verizon - Existing)	C	From Face	3.00	0.0000	187.00	No Ice	9.11	5.98	0.06	
			6.00			1/2" Ice	9.58	6.44	0.12	
			0.00			1" Ice	10.05	6.91	0.19	
RRH2x60-07-U (Verizon - Existing)	A	From Face	3.00	0.0000	187.00	No Ice	2.10	1.41	0.05	
			0.00			1/2" Ice	2.29	1.56	0.07	
			0.00			1" Ice	2.48	1.74	0.09	
RRH2x60-07-U (Verizon - Existing)	B	From Face	3.00	0.0000	187.00	No Ice	2.10	1.41	0.05	
			0.00			1/2" Ice	2.29	1.56	0.07	
			0.00			1" Ice	2.48	1.74	0.09	
RRH2x60-07-U (Verizon - Existing)	C	From Face	3.00	0.0000	187.00	No Ice	2.10	1.41	0.05	
			0.00			1/2" Ice	2.29	1.56	0.07	
			0.00			1" Ice	2.48	1.74	0.09	
RRH4x45/2x90-AWS (Verizon - Existing)	A	From Face	3.00	0.0000	187.00	No Ice	2.58	1.69	0.08	
			-6.00			1/2" Ice	2.79	1.87	0.10	
			0.00			1" Ice	3.01	2.06	0.12	
RRH4x45/2x90-AWS (Verizon - Existing)	B	From Face	3.00	0.0000	187.00	No Ice	2.58	1.69	0.08	
			-6.00			1/2" Ice	2.79	1.87	0.10	
			0.00			1" Ice	3.01	2.06	0.12	
RRH4x45/2x90-AWS (Verizon - Existing)	C	From Face	3.00	0.0000	187.00	No Ice	2.58	1.69	0.08	
			-6.00			1/2" Ice	2.79	1.87	0.10	

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Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft	C _{AA} Front ft ²	C _{AA} Side ft ²	Weight K	
			Horz Lateral ft	Vert ft						
4x40 RRH 850 (Verizon - Existing)	A	From Face	0.00	3.00	0.0000	187.00	1" Ice	3.01	2.06	0.12
			3.00	0.00			No Ice	2.00	2.00	0.06
			0.00	0.00			1/2" Ice	2.19	2.19	0.08
			0.00	0.00			1" Ice	2.39	2.39	0.10
4x40 RRH 850 (Verizon - Existing)	B	From Face	3.00	0.00	0.0000	187.00	No Ice	2.00	2.00	0.06
			0.00	0.00			1/2" Ice	2.19	2.19	0.08
			0.00	0.00			1" Ice	2.39	2.39	0.10
			3.00	0.00			No Ice	2.00	2.00	0.06
4x40 RRH 850 (Verizon - Existing)	C	From Face	3.00	0.00	0.0000	187.00	No Ice	2.00	2.00	0.06
			0.00	0.00			1/2" Ice	2.19	2.19	0.08
			0.00	0.00			1" Ice	2.39	2.39	0.10
			0.00	0.00			No Ice	2.00	2.00	0.06
RC2DC-3315-PF-48 (Verizon - Existing)	A	From Face	3.00	0.00	0.0000	187.00	No Ice	3.01	1.96	0.03
			0.00	0.00			1/2" Ice	3.23	2.15	0.05
			0.00	0.00			1" Ice	3.46	2.35	0.08
			0.00	0.00			No Ice	3.01	1.96	0.03
RC2DC-3315-PF-48 (Verizon - Existing)	B	From Face	3.00	0.00	0.0000	187.00	No Ice	3.01	1.96	0.03
			0.00	0.00			1/2" Ice	3.23	2.15	0.05
			0.00	0.00			1" Ice	3.46	2.35	0.08
			0.00	0.00			No Ice	3.01	1.96	0.03
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	A	From Leg	1.00	0.00	0.0000	187.00	No Ice	13.60	13.60	0.47
			0.00	0.00			1/2" Ice	18.40	18.40	0.60
			0.00	0.00			1" Ice	23.20	23.20	0.73
			0.00	0.00			No Ice	13.60	13.60	0.47
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	B	From Leg	1.00	0.00	0.0000	187.00	No Ice	13.60	13.60	0.47
			0.00	0.00			1/2" Ice	18.40	18.40	0.60
			0.00	0.00			1" Ice	23.20	23.20	0.73
			0.00	0.00			No Ice	13.60	13.60	0.47
Pirod 12' T-Frame Sector Mount (1) (Verizon - Existing)	C	From Leg	1.00	0.00	0.0000	187.00	No Ice	13.60	13.60	0.47
			0.00	0.00			1/2" Ice	18.40	18.40	0.60
			0.00	0.00			1" Ice	23.20	23.20	0.73
			0.00	0.00			No Ice	13.60	13.60	0.47
APX16DWV-16DWVS-E-A 20 (T-Mobile - Proposed)	A	From Leg	3.50	0.00	0.0000	140.00	No Ice	6.46	2.15	0.04
			-5.00	0.00			1/2" Ice	6.83	2.49	0.07
			0.00	0.00			1" Ice	7.21	2.84	0.11
			0.00	0.00			No Ice	20.24	8.89	0.16
APXVAARR24-43 (T-Mobile - Proposed)	A	From Leg	3.50	0.00	0.0000	140.00	No Ice	20.24	8.89	0.16
			5.00	0.00			1/2" Ice	20.89	9.49	0.27
			0.00	0.00			1" Ice	21.54	10.09	0.39
			0.00	0.00			No Ice	6.46	2.15	0.04
APX16DWV-16DWVS-E-A 20 (T-Mobile - Proposed)	B	From Leg	3.50	0.00	0.0000	140.00	No Ice	6.46	2.15	0.04
			-5.00	0.00			1/2" Ice	6.83	2.49	0.07
			0.00	0.00			1" Ice	7.21	2.84	0.11
			0.00	0.00			No Ice	20.24	8.89	0.16
APXVAARR24-43 (T-Mobile - Proposed)	B	From Leg	3.50	0.00	0.0000	140.00	No Ice	20.24	8.89	0.16
			5.00	0.00			1/2" Ice	20.89	9.49	0.27
			0.00	0.00			1" Ice	21.54	10.09	0.39
			0.00	0.00			No Ice	6.46	2.15	0.04
APX16DWV-16DWVS-E-A 20 (T-Mobile - Proposed)	C	From Leg	3.50	0.00	0.0000	140.00	No Ice	6.46	2.15	0.04
			-5.00	0.00			1/2" Ice	6.83	2.49	0.07
			0.00	0.00			1" Ice	7.21	2.84	0.11
			0.00	0.00			No Ice	20.24	8.89	0.16
APXVAARR24-43 (T-Mobile - Proposed)	C	From Leg	3.50	0.00	0.0000	140.00	No Ice	20.24	8.89	0.16
			5.00	0.00			1/2" Ice	20.89	9.49	0.27
			0.00	0.00			1" Ice	21.54	10.09	0.39
			0.00	0.00			No Ice	6.46	2.15	0.04
KRY112-71-2 (T-Mobile - Existing)	A	From Leg	3.50	0.00	0.0000	140.00	No Ice	0.58	0.40	0.02
			-5.00	0.00			1/2" Ice	0.69	0.49	0.02
			0.00	0.00			1" Ice	0.80	0.59	0.03
			0.00	0.00			No Ice	0.58	0.40	0.02
KRY112-71-2 (T-Mobile - Existing)	B	From Leg	3.50	0.00	0.0000	140.00	No Ice	0.58	0.40	0.02
			-5.00	0.00			1/2" Ice	0.69	0.49	0.02
			0.00	0.00			1" Ice	0.80	0.59	0.03
			0.00	0.00			No Ice	0.58	0.40	0.02
KRY112-71-2 (T-Mobile - Existing)	C	From Leg	3.50	0.00	0.0000	140.00	No Ice	0.58	0.40	0.02
			-5.00	0.00			1/2" Ice	0.69	0.49	0.02
			0.00	0.00			1" Ice	0.80	0.59	0.03
			0.00	0.00			No Ice	0.58	0.40	0.02
Radio 4449 B71 B12 (T-Mobile - Proposed)	A	From Leg	3.50	0.00	0.0000	140.00	No Ice	1.64	1.29	0.07
			-5.00	0.00			1/2" Ice	1.80	1.44	0.09
			0.00	0.00			1" Ice	1.97	1.59	0.11
			0.00	0.00			No Ice	1.64	1.29	0.07
Radio 4449 B71 B12 (T-Mobile - Proposed)	B	From Leg	3.50	0.00	0.0000	140.00	No Ice	1.64	1.29	0.07
			-5.00	0.00			1/2" Ice	1.80	1.44	0.09

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	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					
			ft	ft	°	ft	ft ²	ft ²	K
Radio 4449 B71 B12 (T-Mobile - Proposed)	C	From Leg	0.00			1" Ice	1.97	1.59	0.11
			3.50		0.0000	No Ice	1.64	1.29	0.07
			-5.00			1/2" Ice	1.80	1.44	0.09
12' V-Frame (T-Mobile - Proposed)	A	From Leg	0.00			1" Ice	1.97	1.59	0.11
			2.00		0.0000	No Ice	9.22	12.97	0.30
			0.00			1/2" Ice	9.22	12.97	0.40
12' V-Frame (T-Mobile - Proposed)	B	From Leg	0.00			1" Ice	9.22	12.97	0.50
			2.00		0.0000	No Ice	9.22	12.97	0.30
			0.00			1/2" Ice	9.22	12.97	0.40
12' V-Frame (T-Mobile - Proposed)	C	From Leg	0.00			1" Ice	9.22	12.97	0.50
			2.00		0.0000	No Ice	9.22	12.97	0.30
			0.00			1/2" Ice	9.22	12.97	0.40
			0.00			1" Ice	9.22	12.97	0.50

Tower Pressures - No Ice

$G_H = 0.850$

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	c	ft ²	ft ²	ft ²		ft ²	ft ²	
T1 190.60-175.35	182.98	1.174	26	56.388	A	1.207	10.664	7.307	61.56	0.000	0.000	
					B	1.207	10.664			0.000	0.000	
					C	1.207	10.664			61.56	4.217	0.000
T2 175.35-160.10	167.73	1.146	25	56.388	A	0.000	11.066	7.307	66.03	0.000	0.000	
					B	0.000	11.066			66.03	0.000	0.000
					C	0.000	11.066			66.03	6.039	0.000
T3 160.10-140.10	150.10	1.11	25	73.118	A	0.000	16.693	7.917	47.42	0.000	0.000	
					B	0.000	16.693			47.42	0.000	0.000
					C	0.000	16.693			47.42	7.920	0.000
T4 140.10-120.10	130.10	1.065	24	73.118	A	0.000	16.693	7.917	47.42	22.447	0.000	
					B	0.000	16.693			47.42	0.000	0.000
					C	0.000	16.693			47.42	7.920	0.000
T5 120.10-100.10	110.10	1.016	23	73.118	A	0.000	16.693	7.917	47.42	22.560	0.000	
					B	0.000	16.693			47.42	0.000	0.000
					C	0.000	16.693			47.42	7.920	0.000
T6 100.10-80.10	90.10	0.959	21	73.118	A	1.087	16.693	7.917	44.53	22.560	0.000	
					B	1.087	16.693			44.53	0.000	0.000
					C	1.087	16.693			44.53	7.920	0.000
T7 80.10-60.10	70.10	0.893	20	73.127	A	0.000	16.709	7.933	47.48	22.560	0.000	
					B	0.000	16.709			47.48	0.000	0.000
					C	0.000	16.709			47.48	7.920	0.000
T8 60.10-40.10	50.10	0.811	18	73.952	A	1.073	14.318	9.583	62.27	22.560	0.000	
					B	1.073	14.318			62.27	0.000	0.000
					C	1.073	14.318			62.27	7.920	0.000
T9 40.10-20.10	30.10	0.701	16	73.952	A	0.000	14.318	9.583	66.93	22.560	0.000	
					B	0.000	14.318			66.93	0.000	0.000
					C	0.000	14.318			66.93	7.920	0.000
T10 20.10-4.85	12.48	0.7	16	56.373	A	0.000	11.064	7.305	66.03	13.649	0.000	

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job	19027.60 - CT11156A	Page	19 of 52	
	Project	190-ft Guyed Tower - 812 Providence Pike, Danielson, CT		Date	16:38:39 05/21/19
	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 % ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	
T11 4.85-0.00	2.43	0.7	16	9.627	B	0.000	11.064	2.515	2.515	66.03	0.000	0.000
					C	0.000	11.064			66.03	4.792	0.000
					A	6.951	2.515			26.57	0.000	0.000
					B	6.951	2.515			26.57	0.000	0.000
					C	6.951	2.515			26.57	0.000	0.000

Tower Pressure - With Ice

$G_H = 0.850$

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 % ft ²	C _{AA} In Face ft ²	C _{AA} Out Face ft ²	
T1 190.60-175.35	182.98	1.174	6	1.7802	60.913	A	1.207	28.634	16.357	54.81	0.000	0.000	
						B	1.207	28.634			54.81	0.000	0.000
						C	1.207	28.634			54.81	14.641	0.000
T2 175.35-160.10	167.73	1.146	6	1.7648	60.874	A	0.000	28.881	16.278	56.36	0.000	0.000	
						B	0.000	28.881			56.36	0.000	0.000
						C	0.000	28.881			56.36	20.885	0.000
T3 160.10-140.10	150.10	1.11	6	1.7453	78.936	A	0.000	48.753	19.552	40.10	0.000	0.000	
						B	0.000	48.753			40.10	0.000	0.000
						C	0.000	48.753			40.10	27.256	0.000
T4 140.10-120.10	130.10	1.065	6	1.7206	78.854	A	0.000	48.298	19.387	40.14	63.250	0.000	
						B	0.000	48.298			40.14	0.000	0.000
						C	0.000	48.298			40.14	27.087	0.000
T5 120.10-100.10	110.10	1.016	6	1.6921	78.759	A	0.000	47.775	19.197	40.18	63.282	0.000	
						B	0.000	47.775			40.18	0.000	0.000
						C	0.000	47.775			40.18	26.893	0.000
T6 100.10-80.10	90.10	0.959	5	1.6585	78.647	A	1.087	48.059	18.973	38.61	62.945	0.000	
						B	1.087	48.059			38.61	0.000	0.000
						C	1.087	48.059			38.61	26.663	0.000
T7 80.10-60.10	70.10	0.893	5	1.6174	78.518	A	0.000	46.416	18.716	40.32	62.533	0.000	
						B	0.000	46.416			40.32	0.000	0.000
						C	0.000	46.416			40.32	26.383	0.000
T8 60.10-40.10	50.10	0.811	4	1.5640	79.165	A	1.073	35.456	20.010	54.78	61.998	0.000	
						B	1.073	35.456			54.78	0.000	0.000
						C	1.073	35.456			54.78	26.019	0.000
T9 40.10-20.10	30.10	0.701	4	1.4863	78.906	A	0.000	33.609	19.492	58.00	61.222	0.000	
						B	0.000	33.609			58.00	0.000	0.000
						C	0.000	33.609			58.00	25.490	0.000
T10 20.10-4.85	12.48	0.7	4	1.3610	59.832	A	0.000	24.800	14.222	57.35	36.285	0.000	
						B	0.000	24.800			57.35	0.000	0.000
						C	0.000	24.800			57.35	14.907	0.000
T11 4.85-0.00	2.43	0.7	4	1.1554	10.619	A	6.951	5.684	4.536	35.91	0.000	0.000	
						B	6.951	5.684			35.91	0.000	0.000
						C	6.951	5.684			35.91	0.000	0.000

Tower Pressure - Service

$G_H = 0.850$

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 19027.60 - CT11156A	Page 20 of 52
	Project 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	Date 16:38:39 05/21/19
	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 _{AA} In Face ft ²	C _{AA} Out Face ft ²
T1 190.60-175.35	182.98	1.174	9	56.388	A 1.207 B 1.207 C 1.207	1.207 10.664 10.664 10.664	10.664	7.307	61.56	0.000	0.000
T2 175.35-160.10	167.73	1.146	9	56.388	A 0.000 B 0.000 C 0.000	0.000 11.066 11.066 11.066	11.066	7.307	66.03	0.000	0.000
T3 160.10-140.10	150.10	1.11	9	73.118	A 0.000 B 0.000 C 0.000	0.000 16.693 16.693 16.693	16.693	7.917	47.42	0.000	0.000
T4 140.10-120.10	130.10	1.065	8	73.118	A 0.000 B 0.000 C 0.000	0.000 16.693 16.693 16.693	16.693	7.917	47.42	22.447	0.000
T5 120.10-100.10	110.10	1.016	8	73.118	A 0.000 B 0.000 C 0.000	0.000 16.693 16.693 16.693	16.693	7.917	47.42	22.560	0.000
T6 100.10-80.10	90.10	0.959	8	73.118	A 1.087 B 1.087 C 1.087	1.087 16.693 16.693 16.693	16.693	7.917	44.53	22.560	0.000
T7 80.10-60.10	70.10	0.893	7	73.127	A 0.000 B 0.000 C 0.000	0.000 16.709 16.709 16.709	16.709	7.933	47.48	22.560	0.000
T8 60.10-40.10	50.10	0.811	6	73.952	A 1.073 B 1.073 C 1.073	1.073 14.318 14.318 14.318	14.318	9.583	62.27	22.560	0.000
T9 40.10-20.10	30.10	0.701	5	73.952	A 0.000 B 0.000 C 0.000	0.000 14.318 14.318 14.318	14.318	9.583	66.93	22.560	0.000
T10 20.10-4.85	12.48	0.7	5	56.373	A 0.000 B 0.000 C 0.000	0.000 11.064 11.064 11.064	11.064	7.305	66.03	13.649	0.000
T11 4.85-0.00	2.43	0.7	5	9.627	A 6.951 B 6.951 C 6.951	6.951 2.515 2.515 2.515	2.515	2.515	26.57	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	F _{a c e}	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T1 190.60-175.35	0.04	0.49	A 0.211 B 0.211 C 0.211	0.211	2.561	26	1	1	7.353	0.47	31.04	C
T2 175.35-160.10	0.06	0.44	A 0.196 B 0.196 C 0.196	0.196	2.609	25	1	1	6.350	0.44	28.61	C
T3 160.10-140.10	0.08	0.42	A 0.228 B 0.228 C 0.228	0.228	2.504	25	1	1	9.682	0.61	30.36	C
T4 140.10-120.10	0.19	0.42 TA 0.33	A 0.228 B 0.228 C 0.228	0.228	2.504	24	1	1	9.682	0.85	42.68	C
T5 120.10-100.10	0.19	0.42	A 0.228 B 0.228 C 0.228	0.228	2.504	23	1	1	9.682	0.82	40.76	C
T6 100.10-80.10	0.19	0.48	A 0.243 B 0.243 C 0.243	0.243	2.458	21	1	1	10.825	0.81	40.63	C

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	Project 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	Date 16:38:39 05/21/19
	Client T-Mobile	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T7 80.10-60.10	0.19	0.50	C	0.243	2.458	20	1	1	10.825	0.72	35.84	C
			A	0.228	2.504				9.692			
			B	0.228	2.504				9.692			
T8 60.10-40.10	0.19	0.51	C	0.228	2.504	18	1	1	9.692	0.65	32.32	C
			A	0.208	2.569				9.319			
			B	0.208	2.569				9.319			
T9 40.10-20.10	0.19	0.46	C	0.208	2.569	16	1	1	9.319	0.53	26.31	C
			A	0.194	2.617				8.210			
			B	0.194	2.617				8.210			
T10 20.10-4.85	0.12	0.35	C	0.194	2.617	16	1	1	8.210	0.36	23.93	C
			A	0.196	2.609				6.349			
			B	0.196	2.609				6.349			
T11 4.85-0.00	0.00	0.31	C	0.196	2.609	16	1	1	6.349	0.26	53.20	C
			A	0.983	2.066				9.466			
			B	0.983	2.066				9.466			
Sum Weight:	1.45	5.12	C	0.983	2.066				9.466	6.51		

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
T1 190.60-175.35	0.04	0.49	A	0.211	2.561	26	0.8	1	7.112	0.46	30.14	C
			B	0.211	2.561				7.112			
			C	0.211	2.561				7.112			
T2 175.35-160.10	0.06	0.44	A	0.196	2.609	25	0.8	1	6.350	0.44	28.61	C
			B	0.196	2.609				6.350			
			C	0.196	2.609				6.350			
T3 160.10-140.10	0.08	0.42	A	0.228	2.504	25	0.8	1	9.682	0.61	30.36	C
			B	0.228	2.504				9.682			
			C	0.228	2.504				9.682			
T4 140.10-120.10	0.19	0.42	A	0.228	2.504	24	0.8	1	9.682	0.85	42.68	C
		TA	B	0.228	2.504				9.682			
		C	0.228	2.504	9.682							
T5 120.10-100.10	0.19	0.42	A	0.228	2.504	23	0.8	1	9.682	0.82	40.76	C
			B	0.228	2.504				9.682			
			C	0.228	2.504				9.682			
T6 100.10-80.10	0.19	0.48	A	0.243	2.458	21	0.8	1	10.608	0.80	40.15	C
			B	0.243	2.458				10.608			
			C	0.243	2.458				10.608			
T7 80.10-60.10	0.19	0.50	A	0.228	2.504	20	0.8	1	9.692	0.72	35.84	C
			B	0.228	2.504				9.692			
			C	0.228	2.504				9.692			
T8 60.10-40.10	0.19	0.51	A	0.208	2.569	18	0.8	1	9.105	0.64	31.89	C
			B	0.208	2.569				9.105			
			C	0.208	2.569				9.105			
T9 40.10-20.10	0.19	0.46	A	0.194	2.617	16	0.8	1	8.210	0.53	26.31	C
			B	0.194	2.617				8.210			
			C	0.194	2.617				8.210			
T10 20.10-4.85	0.12	0.35	A	0.196	2.609	16	0.8	1	6.349	0.36	23.93	C
			B	0.196	2.609				6.349			
			C	0.196	2.609				6.349			

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	Project 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	Date 16:38:39 05/21/19
	Client T-Mobile	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T11 4.85-0.00	0.00	0.31	A	0.983	2.066	16	0.8	1	8.075	0.22	45.39	C
			B	0.983	2.066		0.8	1	8.075			
			C	0.983	2.066		0.8	1	8.075			
Sum Weight:	1.45	5.12								6.44		

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
T1 190.60-175.35	0.04	0.49	A	0.211	2.561	26	0.85	1	7.172	0.46	30.37	C
			B	0.211	2.561		0.85	1	7.172			
			C	0.211	2.561		0.85	1	7.172			
T2 175.35-160.10	0.06	0.44	A	0.196	2.609	25	0.85	1	6.350	0.44	28.61	C
			B	0.196	2.609		0.85	1	6.350			
			C	0.196	2.609		0.85	1	6.350			
T3 160.10-140.10	0.08	0.42	A	0.228	2.504	25	0.85	1	9.682	0.61	30.36	C
			B	0.228	2.504		0.85	1	9.682			
			C	0.228	2.504		0.85	1	9.682			
T4 140.10-120.10	0.19	0.42	A	0.228	2.504	24	0.85	1	9.682	0.85	42.68	C
		TA 0.33	B	0.228	2.504		0.85	1	9.682			
			C	0.228	2.504		0.85	1	9.682			
T5 120.10-100.10	0.19	0.42	A	0.228	2.504	23	0.85	1	9.682	0.82	40.76	C
			B	0.228	2.504		0.85	1	9.682			
			C	0.228	2.504		0.85	1	9.682			
T6 100.10-80.10	0.19	0.48	A	0.243	2.458	21	0.85	1	10.662	0.81	40.27	C
			B	0.243	2.458		0.85	1	10.662			
			C	0.243	2.458		0.85	1	10.662			
T7 80.10-60.10	0.19	0.50	A	0.228	2.504	20	0.85	1	9.692	0.72	35.84	C
			B	0.228	2.504		0.85	1	9.692			
			C	0.228	2.504		0.85	1	9.692			
T8 60.10-40.10	0.19	0.51	A	0.208	2.569	18	0.85	1	9.158	0.64	32.00	C
			B	0.208	2.569		0.85	1	9.158			
			C	0.208	2.569		0.85	1	9.158			
T9 40.10-20.10	0.19	0.46	A	0.194	2.617	16	0.85	1	8.210	0.53	26.31	C
			B	0.194	2.617		0.85	1	8.210			
			C	0.194	2.617		0.85	1	8.210			
T10 20.10-4.85	0.12	0.35	A	0.196	2.609	16	0.85	1	6.349	0.36	23.93	C
			B	0.196	2.609		0.85	1	6.349			
			C	0.196	2.609		0.85	1	6.349			
T11 4.85-0.00	0.00	0.31	A	0.983	2.066	16	0.85	1	8.423	0.23	47.34	C
			B	0.983	2.066		0.85	1	8.423			
			C	0.983	2.066		0.85	1	8.423			
Sum Weight:	1.45	5.12								6.46		

Tower Forces - With Ice - Wind Normal To Face

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	Project 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	Date 16:38:39 05/21/19
	Client T-Mobile	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T1 190.60-175.35	0.21	1.71	A	0.49	1.913	6	1	1	20.667	0.26	16.74	C
			B	0.49	1.913				20.667			
			C	0.49	1.913				20.667			
T2 175.35-160.10	0.29	1.58	A	0.474	1.935	6	1	1	19.395	0.26	16.85	C
			B	0.474	1.935				19.395			
			C	0.474	1.935				19.395			
T3 160.10-140.10	0.38	2.49	A	0.618	1.794	6	1	1	36.811	0.39	19.62	C
			B	0.618	1.794				36.811			
			C	0.618	1.794				36.811			
T4 140.10-120.10	1.31	2.45 TA 0.87	A	0.613	1.797	6	1	1	36.307	0.49	24.69	C
			B	0.613	1.797				36.307			
			C	0.613	1.797				36.307			
T5 120.10-100.10	1.29	2.40	A	0.607	1.8	6	1	1	35.733	0.47	23.44	C
			B	0.607	1.8				35.733			
			C	0.607	1.8				35.733			
T6 100.10-80.10	1.27	2.52	A	0.625	1.791	5	1	1	37.601	0.45	22.39	C
			B	0.625	1.791				37.601			
			C	0.625	1.791				37.601			
T7 80.10-60.10	1.24	2.35	A	0.591	1.81	5	1	1	34.264	0.41	20.30	C
			B	0.591	1.81				34.264			
			C	0.591	1.81				34.264			
T8 60.10-40.10	1.21	1.85	A	0.461	1.955	4	1	1	24.648	0.36	17.93	C
			B	0.461	1.955				24.648			
			C	0.461	1.955				24.648			
T9 40.10-20.10	1.16	1.59	A	0.426	2.015	4	1	1	21.773	0.30	15.18	C
			B	0.426	2.015				21.773			
			C	0.426	2.015				21.773			
T10 20.10-4.85	0.65	1.14	A	0.414	2.036	4	1	1	15.937	0.20	13.25	C
			B	0.414	2.036				15.937			
			C	0.414	2.036				15.937			
T11 4.85-0.00	0.00	0.84	A	1	2.1	4	1	1	12.634	0.07*	14.87	C
			B	1	2.1				12.634			
			C	1	2.1				12.634			
Sum Weight:	9.01	21.80			*2.1A _g limit					3.66		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T1 190.60-175.35	0.21	1.71	A	0.49	1.913	6	0.8	1	20.425	0.25	16.58	C
			B	0.49	1.913				20.425			
			C	0.49	1.913				20.425			
T2 175.35-160.10	0.29	1.58	A	0.474	1.935	6	0.8	1	19.395	0.26	16.85	C
			B	0.474	1.935				19.395			
			C	0.474	1.935				19.395			
T3 160.10-140.10	0.38	2.49	A	0.618	1.794	6	0.8	1	36.811	0.39	19.62	C
			B	0.618	1.794				36.811			
			C	0.618	1.794				36.811			
T4 140.10-120.10	1.31	2.45 TA 0.87	A	0.613	1.797	6	0.8	1	36.307	0.49	24.69	C
			B	0.613	1.797				36.307			
			C	0.613	1.797				36.307			

tnxTower Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job 19027.60 - CT11156A	Page 24 of 52
	Project 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	Date 16:38:39 05/21/19
	Client T-Mobile	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T5 120.10-100.10	1.29	2.40	A	0.607	1.8	6	0.8	1	35.733	0.47	23.44	C
			B	0.607	1.8		0.8	1	35.733			
			C	0.607	1.8		0.8	1	35.733			
T6 100.10-80.10	1.27	2.52	A	0.625	1.791	5	0.8	1	37.383	0.45	22.30	C
			B	0.625	1.791		0.8	1	37.383			
			C	0.625	1.791		0.8	1	37.383			
T7 80.10-60.10	1.24	2.35	A	0.591	1.81	5	0.8	1	34.264	0.41	20.30	C
			B	0.591	1.81		0.8	1	34.264			
			C	0.591	1.81		0.8	1	34.264			
T8 60.10-40.10	1.21	1.85	A	0.461	1.955	4	0.8	1	24.434	0.36	17.85	C
			B	0.461	1.955		0.8	1	24.434			
			C	0.461	1.955		0.8	1	24.434			
T9 40.10-20.10	1.16	1.59	A	0.426	2.015	4	0.8	1	21.773	0.30	15.18	C
			B	0.426	2.015		0.8	1	21.773			
			C	0.426	2.015		0.8	1	21.773			
T10 20.10-4.85	0.65	1.14	A	0.414	2.036	4	0.8	1	15.937	0.20	13.25	C
			B	0.414	2.036		0.8	1	15.937			
			C	0.414	2.036		0.8	1	15.937			
T11 4.85-0.00	0.00	0.84	A	1	2.1	4	0.8	1	11.244	0.07*	14.87	C
			B	1	2.1		0.8	1	11.244			
			C	1	2.1		0.8	1	11.244			
Sum Weight:	9.01	21.80			*2.1A _g limit					3.65		

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
T1 190.60-175.35	0.21	1.71	A	0.49	1.913	6	0.85	1	20.486	0.25	16.62	C
			B	0.49	1.913		0.85	1	20.486			
			C	0.49	1.913		0.85	1	20.486			
T2 175.35-160.10	0.29	1.58	A	0.474	1.935	6	0.85	1	19.395	0.26	16.85	C
			B	0.474	1.935		0.85	1	19.395			
			C	0.474	1.935		0.85	1	19.395			
T3 160.10-140.10	0.38	2.49	A	0.618	1.794	6	0.85	1	36.811	0.39	19.62	C
			B	0.618	1.794		0.85	1	36.811			
			C	0.618	1.794		0.85	1	36.811			
T4 140.10-120.10	1.31	2.45 TA 0.87	A	0.613	1.797	6	0.85	1	36.307	0.49	24.69	C
			B	0.613	1.797		0.85	1	36.307			
			C	0.613	1.797		0.85	1	36.307			
T5 120.10-100.10	1.29	2.40	A	0.607	1.8	6	0.85	1	35.733	0.47	23.44	C
			B	0.607	1.8		0.85	1	35.733			
			C	0.607	1.8		0.85	1	35.733			
T6 100.10-80.10	1.27	2.52	A	0.625	1.791	5	0.85	1	37.438	0.45	22.32	C
			B	0.625	1.791		0.85	1	37.438			
			C	0.625	1.791		0.85	1	37.438			
T7 80.10-60.10	1.24	2.35	A	0.591	1.81	5	0.85	1	34.264	0.41	20.30	C
			B	0.591	1.81		0.85	1	34.264			
			C	0.591	1.81		0.85	1	34.264			
T8 60.10-40.10	1.21	1.85	A	0.461	1.955	4	0.85	1	24.488	0.36	17.87	C
			B	0.461	1.955		0.85	1	24.488			
			C	0.461	1.955		0.85	1	24.488			

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	Client	T-Mobile		Designed by	TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T9 40.10-20.10	1.16	1.59	A	0.426	2.015	4	0.85	1	21.773	0.30	15.18	C
			B	0.426	2.015		0.85	1	21.773			
			C	0.426	2.015		0.85	1	21.773			
T10 20.10-4.85	0.65	1.14	A	0.414	2.036	4	0.85	1	15.937	0.20	13.25	C
			B	0.414	2.036		0.85	1	15.937			
			C	0.414	2.036		0.85	1	15.937			
T11 4.85-0.00	0.00	0.84	A	1	2.1	4	0.85	1	11.592	0.07*	14.87	C
			B	1	2.1		0.85	1	11.592			
			C	1	2.1		0.85	1	11.592			
Sum Weight:	9.01	21.80			*2.1A _g limit					3.65		

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
T1 190.60-175.35	0.04	0.49	A	0.211	2.561	9	1	1	7.353	0.17	10.96	C
			B	0.211	2.561		1	1	7.353			
			C	0.211	2.561		1	1	7.353			
T2 175.35-160.10	0.06	0.44	A	0.196	2.609	9	1	1	6.350	0.15	10.10	C
			B	0.196	2.609		1	1	6.350			
			C	0.196	2.609		1	1	6.350			
T3 160.10-140.10	0.08	0.42	A	0.228	2.504	9	1	1	9.682	0.21	10.71	C
			B	0.228	2.504		1	1	9.682			
			C	0.228	2.504		1	1	9.682			
T4 140.10-120.10	0.19	0.42	A	0.228	2.504	8	1	1	9.682	0.30	15.06	C
		TA 0.33	B	0.228	2.504		1	1	9.682			
			C	0.228	2.504		1	1	9.682			
T5 120.10-100.10	0.19	0.42	A	0.228	2.504	8	1	1	9.682	0.29	14.38	C
			B	0.228	2.504		1	1	9.682			
			C	0.228	2.504		1	1	9.682			
T6 100.10-80.10	0.19	0.48	A	0.243	2.458	8	1	1	10.825	0.29	14.34	C
			B	0.243	2.458		1	1	10.825			
			C	0.243	2.458		1	1	10.825			
T7 80.10-60.10	0.19	0.50	A	0.228	2.504	7	1	1	9.692	0.25	12.65	C
			B	0.228	2.504		1	1	9.692			
			C	0.228	2.504		1	1	9.692			
T8 60.10-40.10	0.19	0.51	A	0.208	2.569	6	1	1	9.319	0.23	11.40	C
			B	0.208	2.569		1	1	9.319			
			C	0.208	2.569		1	1	9.319			
T9 40.10-20.10	0.19	0.46	A	0.194	2.617	5	1	1	8.210	0.19	9.29	C
			B	0.194	2.617		1	1	8.210			
			C	0.194	2.617		1	1	8.210			
T10 20.10-4.85	0.12	0.35	A	0.196	2.609	5	1	1	6.349	0.13	8.45	C
			B	0.196	2.609		1	1	6.349			
			C	0.196	2.609		1	1	6.349			
T11 4.85-0.00	0.00	0.31	A	0.983	2.066	5	1	1	9.466	0.09	18.78	C
			B	0.983	2.066		1	1	9.466			
			C	0.983	2.066		1	1	9.466			
Sum Weight:	1.45	5.12								2.30		

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	Project 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	Date 16:38:39 05/21/19
	Client T-Mobile	Designed by TJL

Tower Forces - Service - 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
T1 190.60-175.35	0.04	0.49	A	0.211	2.561	9	0.8	1	7.112	0.16	10.64	C
			B	0.211	2.561							
			C	0.211	2.561							
T2 175.35-160.10	0.06	0.44	A	0.196	2.609	9	0.8	1	6.350	0.15	10.10	C
			B	0.196	2.609							
			C	0.196	2.609							
T3 160.10-140.10	0.08	0.42	A	0.228	2.504	9	0.8	1	9.682	0.21	10.71	C
			B	0.228	2.504							
			C	0.228	2.504							
T4 140.10-120.10	0.19	0.42 TA 0.33	A	0.228	2.504	8	0.8	1	9.682	0.30	15.06	C
			B	0.228	2.504							
			C	0.228	2.504							
T5 120.10-100.10	0.19	0.42	A	0.228	2.504	8	0.8	1	9.682	0.29	14.38	C
			B	0.228	2.504							
			C	0.228	2.504							
T6 100.10-80.10	0.19	0.48	A	0.243	2.458	8	0.8	1	10.608	0.28	14.17	C
			B	0.243	2.458							
			C	0.243	2.458							
T7 80.10-60.10	0.19	0.50	A	0.228	2.504	7	0.8	1	9.692	0.25	12.65	C
			B	0.228	2.504							
			C	0.228	2.504							
T8 60.10-40.10	0.19	0.51	A	0.208	2.569	6	0.8	1	9.105	0.23	11.26	C
			B	0.208	2.569							
			C	0.208	2.569							
T9 40.10-20.10	0.19	0.46	A	0.194	2.617	5	0.8	1	8.210	0.19	9.29	C
			B	0.194	2.617							
			C	0.194	2.617							
T10 20.10-4.85	0.12	0.35	A	0.196	2.609	5	0.8	1	6.349	0.13	8.45	C
			B	0.196	2.609							
			C	0.196	2.609							
T11 4.85-0.00	0.00	0.31	A	0.983	2.066	5	0.8	1	8.075	0.08	16.02	C
			B	0.983	2.066							
			C	0.983	2.066							
Sum Weight:	1.45	5.12								2.27		

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
T1 190.60-175.35	0.04	0.49	A	0.211	2.561	9	0.85	1	7.172	0.16	10.72	C
			B	0.211	2.561							
			C	0.211	2.561							
T2 175.35-160.10	0.06	0.44	A	0.196	2.609	9	0.85	1	6.350	0.15	10.10	C
			B	0.196	2.609							
			C	0.196	2.609							
T3 160.10-140.10	0.08	0.42	A	0.228	2.504	9	0.85	1	9.682	0.21	10.71	C
			B	0.228	2.504							
			C	0.228	2.504							

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	Project 190-ft Guyed Tower - 812 Providence Pike, Danielson, CT	Date 16:38:39 05/21/19
	Client T-Mobile	Designed by TJL

Section Elevation ft	Add Weight K	Self Weight K	F a c e	e	C _F	q _z psf	D _F	D _R	A _E ft ²	F K	w plf	Ctrl. Face
T4 140.10-120.10	0.19	0.42	C	0.228	2.504	8	0.85	1	9.682	0.30	15.06	C
			A	0.228	2.504		0.85	1	9.682			
			B	0.228	2.504		0.85	1	9.682			
			C	0.228	2.504		0.85	1	9.682			
T5 120.10-100.10	0.19	0.42	A	0.228	2.504	8	0.85	1	9.682	0.29	14.38	C
			B	0.228	2.504		0.85	1	9.682			
			C	0.228	2.504		0.85	1	9.682			
T6 100.10-80.10	0.19	0.48	A	0.243	2.458	8	0.85	1	10.662	0.28	14.21	C
			B	0.243	2.458		0.85	1	10.662			
			C	0.243	2.458		0.85	1	10.662			
T7 80.10-60.10	0.19	0.50	A	0.228	2.504	7	0.85	1	9.692	0.25	12.65	C
			B	0.228	2.504		0.85	1	9.692			
			C	0.228	2.504		0.85	1	9.692			
T8 60.10-40.10	0.19	0.51	A	0.208	2.569	6	0.85	1	9.158	0.23	11.29	C
			B	0.208	2.569		0.85	1	9.158			
			C	0.208	2.569		0.85	1	9.158			
T9 40.10-20.10	0.19	0.46	A	0.194	2.617	5	0.85	1	8.210	0.19	9.29	C
			B	0.194	2.617		0.85	1	8.210			
			C	0.194	2.617		0.85	1	8.210			
T10 20.10-4.85	0.12	0.35	A	0.196	2.609	5	0.85	1	6.349	0.13	8.45	C
			B	0.196	2.609		0.85	1	6.349			
			C	0.196	2.609		0.85	1	6.349			
T11 4.85-0.00	0.00	0.31	A	0.983	2.066	5	0.85	1	8.423	0.08	16.71	C
			B	0.983	2.066		0.85	1	8.423			
			C	0.983	2.066		0.85	1	8.423			
Sum Weight:	1.45	5.12								2.28		

Force Totals (Does not include forces on guys)

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Torques kip-ft
Leg Weight	2.96			
Bracing Weight	2.15			
Total Member Self-Weight	5.12			
Guy Weight	1.06			
Total Weight	11.81			
Wind 0 deg - No Ice		0.00	-10.56	-1.21
Wind 30 deg - No Ice		5.26	-9.10	-0.67
Wind 60 deg - No Ice		9.10	-5.24	0.05
Wind 90 deg - No Ice		10.52	0.00	0.75
Wind 120 deg - No Ice		9.16	5.28	1.26
Wind 150 deg - No Ice		5.26	9.10	1.43
Wind 180 deg - No Ice		0.00	10.49	1.21
Wind 210 deg - No Ice		-5.26	9.10	0.67
Wind 240 deg - No Ice		-9.16	5.28	-0.05
Wind 270 deg - No Ice		-10.52	0.00	-0.75
Wind 300 deg - No Ice		-9.10	-5.24	-1.26
Wind 330 deg - No Ice		-5.26	-9.10	-1.43
Member Ice	16.68			
Guy Ice	9.12			
Total Weight Ice	52.61			
Wind 0 deg - Ice		0.00	-5.03	-0.52

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587</p>	<p>Job</p> <p style="text-align: center;">19027.60 - CT11156A</p>	<p>Page</p> <p style="text-align: center;">28 of 52</p>
	<p>Project</p> <p style="text-align: center;">190-ft Guyed Tower - 812 Providence Pike, Danielson, CT</p>	<p>Date</p> <p style="text-align: center;">16:38:39 05/21/19</p>
	<p>Client</p> <p style="text-align: center;">T-Mobile</p>	<p>Designed by</p> <p style="text-align: center;">TJL</p>

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Torques kip-ft
Wind 30 deg - Ice		2.51	-4.35	-0.20
Wind 60 deg - Ice		4.35	-2.51	0.18
Wind 90 deg - Ice		5.03	0.00	0.50
Wind 120 deg - Ice		4.36	2.51	0.70
Wind 150 deg - Ice		2.51	4.35	0.70
Wind 180 deg - Ice		0.00	5.02	0.52
Wind 210 deg - Ice		-2.51	4.35	0.20
Wind 240 deg - Ice		-4.36	2.51	-0.18
Wind 270 deg - Ice		-5.03	0.00	-0.50
Wind 300 deg - Ice		-4.35	-2.51	-0.70
Wind 330 deg - Ice		-2.51	-4.35	-0.70
Total Weight	11.81			
Wind 0 deg - Service		0.00	-3.73	-0.43
Wind 30 deg - Service		1.86	-3.21	-0.24
Wind 60 deg - Service		3.21	-1.85	0.02
Wind 90 deg - Service		3.71	0.00	0.27
Wind 120 deg - Service		3.23	1.86	0.44
Wind 150 deg - Service		1.86	3.21	0.50
Wind 180 deg - Service		0.00	3.70	0.43
Wind 210 deg - Service		-1.86	3.21	0.24
Wind 240 deg - Service		-3.23	1.86	-0.02
Wind 270 deg - Service		-3.71	0.00	-0.27
Wind 300 deg - Service		-3.21	-1.85	-0.44
Wind 330 deg - Service		-1.86	-3.21	-0.50

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
5	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
11	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
14	1.2 Dead+1.0 Ice+1.0 Temp+Guy
15	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
16	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
17	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
18	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
19	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
20	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy

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	Client T-Mobile	Designed by TJJ

Comb. No.	Description
26	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	Dead+Wind 0 deg - Service+Guy
28	Dead+Wind 30 deg - Service+Guy
29	Dead+Wind 60 deg - Service+Guy
30	Dead+Wind 90 deg - Service+Guy
31	Dead+Wind 120 deg - Service+Guy
32	Dead+Wind 150 deg - Service+Guy
33	Dead+Wind 180 deg - Service+Guy
34	Dead+Wind 210 deg - Service+Guy
35	Dead+Wind 240 deg - Service+Guy
36	Dead+Wind 270 deg - Service+Guy
37	Dead+Wind 300 deg - Service+Guy
38	Dead+Wind 330 deg - Service+Guy

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
T1	190.6 - 175.35	Leg	Max Tension	6	1.88	-0.05	0.48
			Max. Compression	4	-13.14	-0.06	-0.08
			Max. Mx	6	-9.29	1.07	0.26
			Max. My	2	-9.25	-0.28	-1.19
			Max. Vy	10	1.12	0.34	0.50
			Max. Vx	2	1.06	-0.62	0.04
		Diagonal	Max Tension	5	2.19	0.00	0.00
			Max. Compression	11	-2.20	0.00	0.00
			Max. Mx	17	0.19	0.02	0.00
			Max. My	25	0.01	0.00	0.00
			Max. Vy	17	-0.01	0.00	0.00
			Max. Vx	25	-0.00	0.00	0.00
		Bottom Girt	Max Tension	7	0.29	0.00	0.00
			Max. Compression	13	-0.24	0.00	0.00
			Max. Mx	19	0.03	0.01	0.00
			Max. My	13	-0.24	0.00	-0.00
			Max. Vy	19	-0.01	0.00	0.00
			Max. Vx	13	0.00	0.00	0.00
		Guy A	Bottom Tension	7	10.26		
			Top Tension	7	10.36		
			Top Cable Vert	7	9.29		
			Top Cable Norm	7	4.59		
			Top Cable Tan	7	0.02		
			Bot Cable Vert	7	-9.08		
			Bot Cable Norm	7	4.78		
			Bot Cable Tan	7	0.13		
			Bottom Tension	11	10.38		
			Top Tension	11	10.48		
			Top Cable Vert	11	9.41		
			Top Cable Norm	11	4.61		
		Guy B	Top Cable Tan	11	0.02		
			Bot Cable Vert	11	-9.20		
			Bot Cable Norm	11	4.81		
			Bot Cable Tan	11	0.13		
			Bottom Tension	5	10.42		
			Top Tension	5	10.52		
Top Cable Vert	5		9.46				
Top Cable Norm	5		4.61				
Top Cable Tan	5		0.02				
Bot Cable Vert	5		-9.25				

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	Client T-Mobile	Designed by TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft		
T2	175.35 - 160.1	Top Guy Pull-Off	Bot Cable Norm	5	4.81				
			Bot Cable Tan	5	0.13				
			Max Tension	13	2.86	0.00	0.00		
		Leg	Max. Compression	1	0.00	0.00	0.00	0.00	
			Max. Mx	19	1.49	0.03	0.00	0.00	
			Max. My	13	0.29	0.00	0.00	-0.00	
			Max. Vy	19	0.04	0.00	0.00	0.00	
			Max. Vx	13	-0.00	0.00	0.00	0.00	
			Max Tension	1	0.00	0.00	0.00	0.00	
			Max. Compression	5	-10.52	-0.17	-0.05	-0.05	
			Max. Mx	5	-5.14	0.26	-0.05	-0.05	
			Max. My	8	-4.06	0.00	0.26	0.26	
			Max. Vy	11	-0.56	0.18	-0.02	-0.02	
			Max. Vx	2	-0.54	-0.05	0.17	0.17	
			Diagonal	Max Tension	13	1.73	0.00	0.00	0.00
				Max. Compression	7	-1.77	0.00	0.00	0.00
				Max. Mx	17	0.47	0.01	0.00	0.00
				Max. My	25	-0.01	0.00	0.00	0.00
		Max. Vy		17	-0.01	0.00	0.00	0.00	
		Max. Vx		25	0.00	0.00	0.00	0.00	
		Top Girt	Max Tension	12	0.31	0.00	0.00	0.00	
			Max. Compression	6	-0.31	0.00	0.00	0.00	
			Max. Mx	19	0.05	0.01	0.00	0.00	
			Max. My	13	0.31	0.00	-0.00	-0.00	
			Max. Vy	19	-0.01	0.00	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	0.00	
		Bottom Girt	Max Tension	7	0.67	0.00	0.00	0.00	
			Max. Compression	13	-0.62	0.00	0.00	0.00	
			Max. Mx	19	-0.02	0.01	0.00	0.00	
			Max. My	13	-0.62	0.00	-0.00	-0.00	
			Max. Vy	19	-0.01	0.00	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	0.00	
		T3	160.1 - 140.1	Leg	Max Tension	8	10.16	-0.00	-0.06
Max. Compression	6				-25.97	-0.10	-0.05		
Max. Mx	5				-4.20	0.26	-0.05		
Diagonal	Max. My			2	-10.86	-0.01	0.26	0.26	
	Max. Vy			11	-0.80	0.25	-0.05	-0.05	
	Max. Vx			2	-0.84	-0.01	0.26	0.26	
	Max Tension			7	1.16	0.00	0.00	0.00	
	Max. Compression			7	-1.25	0.00	0.00	0.00	
	Max. Mx			17	0.18	0.01	0.00	0.00	
	Max. My			25	0.08	0.00	0.00	0.00	
	Max. Vy			17	-0.01	0.00	0.00	0.00	
	Max. Vx			25	-0.00	0.00	0.00	0.00	
	Top Girt			Max Tension	9	0.27	0.00	0.00	0.00
				Max. Compression	3	-0.12	0.00	0.00	0.00
				Max. Mx	19	0.15	0.01	0.00	0.00
				Max. My	13	-0.03	0.00	-0.00	-0.00
				Max. Vy	19	-0.01	0.00	0.00	0.00
				Max. Vx	13	0.00	0.00	0.00	0.00
Bottom Girt	Max Tension			8	2.02	0.00	0.00	0.00	
	Max. Compression			6	-1.29	0.00	0.00	0.00	
	Max. Mx			19	-0.03	0.01	0.00	0.00	
	Max. My			13	0.45	0.00	-0.00	-0.00	
	Max. Vy			19	-0.01	0.00	0.00	0.00	
	Max. Vx			13	0.00	0.00	0.00	0.00	
T4	140.1 - 120.1			Leg	Max Tension	8	11.15	0.00	-0.04
					Max. Compression	6	-27.87	-0.05	-0.03
					Max. Mx	5	-5.40	-1.56	-0.37
					Max. My	3	-5.59	-0.48	1.59
					Max. Vy	11	-2.74	1.56	-0.37

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	Client T-Mobile	Designed by TJL

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vx	3	-2.78	-0.48	1.59
		Diagonal	Max Tension	8	1.02	0.00	0.00
			Max. Compression	8	-1.25	0.00	0.00
			Max. Mx	17	-0.54	0.01	0.00
			Max. My	26	-0.11	0.00	0.00
			Max. Vy	17	0.01	0.00	0.00
			Max. Vx	26	-0.00	0.00	0.00
		Top Girt	Max Tension	8	2.16	0.00	0.00
			Max. Compression	10	-2.22	0.00	0.00
			Max. Mx	15	0.31	0.01	0.00
			Max. My	13	-0.09	0.00	-0.00
			Max. Vy	15	-0.01	0.00	0.00
			Max. Vx	13	0.00	0.00	0.00
		Bottom Girt	Max Tension	23	0.28	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	19	0.26	0.01	0.00
			Max. My	13	0.21	0.00	-0.00
			Max. Vy	19	-0.01	0.00	0.00
			Max. Vx	13	0.00	0.00	0.00
		Guy A	Bottom Tension	7	9.18		
			Top Tension	7	9.25		
			Top Cable Vert	7	7.65		
			Top Cable Norm	7	5.19		
			Top Cable Tan	7	0.02		
			Bot Cable Vert	7	-7.48		
			Bot Cable Norm	7	5.31		
			Bot Cable Tan	7	0.09		
		Guy B	Bottom Tension	13	9.21		
			Top Tension	13	9.29		
			Top Cable Vert	13	7.74		
			Top Cable Norm	13	5.14		
			Top Cable Tan	13	0.02		
			Bot Cable Vert	13	-7.57		
			Bot Cable Norm	13	5.25		
			Bot Cable Tan	13	0.09		
		Guy C	Bottom Tension	5	9.07		
			Top Tension	5	9.15		
			Top Cable Vert	5	7.63		
			Top Cable Norm	5	5.04		
			Top Cable Tan	5	0.02		
			Bot Cable Vert	5	-7.46		
			Bot Cable Norm	5	5.15		
			Bot Cable Tan	5	0.09		
		Torque Arm Top	Max Tension	9	5.54	0.00	0.00
			Max. Compression	9	-2.67	0.00	0.00
			Max. Mx	5	0.07	-27.11	-0.00
			Max. My	13	-1.16	-14.70	-0.00
			Max. Vy	5	7.59	-27.11	-0.00
			Max. Vx	13	-0.00	-14.70	-0.00
T5	120.1 - 100.1	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	2	-24.17	-0.03	-0.03
			Max. Mx	5	-11.59	0.15	-0.05
			Max. My	8	-10.29	0.03	0.15
			Max. Vy	12	0.22	0.03	-0.03
			Max. Vx	8	-0.29	0.03	-0.12
		Diagonal	Max Tension	13	0.54	0.00	0.00
			Max. Compression	13	-0.78	0.00	0.00
			Max. Mx	17	0.19	0.01	0.00
			Max. My	26	-0.28	0.00	0.00
			Max. Vy	17	0.01	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00

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	Client T-Mobile	Designed by TJJ

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft	
T6	100.1 - 80.1	Top Girt	Max Tension	21	0.26	0.00	0.00	
			Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	19	0.23	0.01	0.00	
			Max. My	13	0.19	0.00	-0.00	
			Max. Vy	19	-0.01	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	
		Bottom Girt	Max Tension	5	0.33	0.00	0.00	
			Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	19	0.23	0.01	0.00	
			Max. My	13	0.22	0.00	-0.00	
			Max. Vy	19	-0.01	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	
		Leg	Max Tension	1	0.00	0.00	0.00	
			Max. Compression	2	-29.80	0.00	-0.03	
			Max. Mx	10	-24.64	0.17	-0.09	
			Max. My	2	-24.88	0.03	0.20	
			Max. Vy	5	0.36	-0.07	0.01	
			Max. Vx	2	-0.40	-0.04	0.10	
			Diagonal	Max Tension	2	0.90	0.00	0.00
				Max. Compression	2	-1.02	0.00	0.00
				Max. Mx	25	0.35	0.01	0.00
				Max. My	26	-0.44	0.00	0.00
				Max. Vy	25	0.01	0.00	0.00
				Max. Vx	26	-0.00	0.00	0.00
			Top Girt	Max Tension	15	0.33	0.00	0.00
				Max. Compression	1	0.00	0.00	0.00
		Max. Mx		23	0.32	0.01	0.00	
		Max. My		13	0.22	0.00	-0.00	
		Max. Vy		23	-0.01	0.00	0.00	
		Max. Vx		13	0.00	0.00	0.00	
		Bottom Girt	Max Tension	23	0.44	0.00	0.00	
			Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	17	0.39	0.01	0.00	
			Max. My	13	0.32	0.00	-0.00	
			Max. Vy	17	-0.01	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	
		Guy A	Bottom Tension	9	5.72			
			Top Tension	9	5.76			
			Top Cable Vert	9	4.49			
			Top Cable Norm	9	3.60			
			Top Cable Tan	9	0.01			
			Bot Cable Vert	9	-4.41			
Bot Cable Norm	9		3.65					
Guy B	Bot Cable Tan	9	0.04					
	Bottom Tension	11	5.89					
	Top Tension	11	5.93					
	Top Cable Vert	11	4.66					
	Top Cable Norm	11	3.66					
	Top Cable Tan	11	0.01					
	Bot Cable Vert	11	-4.58					
Guy C	Bot Cable Norm	11	3.71					
	Bot Cable Tan	11	0.04					
	Bottom Tension	3	5.84					
	Top Tension	3	5.88					
	Top Cable Vert	3	4.58					
	Top Cable Norm	3	3.69					
	Top Cable Tan	3	0.01					
Top Guy Pull-Off	Bot Cable Vert	3	-4.49					
	Bot Cable Norm	3	3.74					
	Bot Cable Tan	3	0.04					
	Max Tension	2	2.21	0.00	0.00			

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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	
T7	80.1 - 60.1	Leg	Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	17	1.65	0.03	0.00	
			Max. My	13	1.72	0.00	-0.00	
			Max. Vy	17	-0.03	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	
			Max Tension	1	0.00	0.00	0.00	
			Max. Compression	2	-28.14	0.02	-0.01	
			Max. Mx	11	-14.11	-0.16	-0.04	
			Max. My	8	-12.71	-0.01	0.17	
			Max. Vy	11	0.36	0.07	-0.01	
			Max. Vx	8	-0.39	0.01	-0.07	
			Max Tension	3	0.39	0.00	0.00	
		Diagonal	Max. Compression	3	-0.62	0.00	0.00	
			Max. Mx	24	0.19	0.01	0.00	
			Max. My	26	-0.33	0.00	0.00	
			Max. Vy	24	0.01	0.00	0.00	
			Max. Vx	26	-0.00	0.00	0.00	
			Max Tension	5	0.33	0.00	0.00	
		Top Girt	Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	17	0.32	0.01	0.00	
			Max. My	13	0.23	0.00	-0.00	
			Max. Vy	17	-0.01	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	
			Max Tension	16	0.28	0.00	0.00	
		Bottom Girt	Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	19	0.23	0.01	0.00	
Max. My	13		0.23	0.00	-0.00			
Max. Vy	19		-0.01	0.00	0.00			
Max. Vx	13		0.00	0.00	0.00			
Max Tension	1		0.00	0.00	0.00			
T8	60.1 - 40.1	Leg	Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	2	-29.48	0.13	0.26	
			Max. My	6	-28.86	-0.29	0.01	
			Max. Vy	2	-28.16	0.04	0.31	
			Max. Vx	6	-0.21	-0.29	0.01	
			Max Tension	2	-0.20	0.04	0.31	
			Diagonal	Max Tension	7	1.19	0.00	0.00
				Max. Compression	13	-1.43	0.00	0.00
				Max. Mx	24	0.24	0.01	0.00
				Max. My	26	-0.35	0.00	0.00
				Max. Vy	24	0.01	0.00	0.00
				Max. Vx	26	-0.00	0.00	0.00
		Top Girt	Max Tension	8	0.17	0.00	0.00	
			Max. Compression	11	-0.03	0.00	0.00	
			Max. Mx	19	0.10	0.01	0.00	
			Max. My	13	0.13	0.00	-0.00	
			Max. Vy	19	-0.01	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	
		Bottom Girt	Max Tension	13	0.51	0.00	0.00	
			Max. Compression	7	-0.28	0.00	0.00	
			Max. Mx	19	0.17	0.01	0.00	
			Max. My	13	0.51	0.00	-0.00	
			Max. Vy	19	-0.01	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	
		Guy A	Bottom Tension	8	3.54			
			Top Tension	8	3.55			
Top Cable Vert	8		1.87					
Top Cable Norm	8		3.02					
Top Cable Tan	8		0.00					
Bot Cable Vert	8		-1.83					
Bot Cable Norm	8		3.03					
Bot Cable Tan	8		0.00					

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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	
T9	40.1 - 20.1	Guy B	Bottom Tension	12	3.59			
			Top Tension	12	3.60			
			Top Cable Vert	12	1.91			
			Top Cable Norm	12	3.06			
			Top Cable Tan	12	0.00			
			Bot Cable Vert	12	-1.87			
			Bot Cable Norm	12	3.06			
			Bot Cable Tan	12	0.00			
			Guy C	Bottom Tension	4	3.51		
				Top Tension	4	3.53		
				Top Cable Vert	4	1.86		
				Top Cable Norm	4	2.99		
				Top Cable Tan	4	0.00		
				Bot Cable Vert	4	-1.83		
		Bot Cable Norm		4	3.00			
		Top Guy Pull-Off	Bot Cable Tan	4	0.00			
			Max Tension	13	1.84	0.00	0.00	
			Max. Compression	1	0.00	0.00	0.00	
			Max. Mx	19	1.70	0.03	0.00	
			Max. My	13	0.43	0.00	-0.00	
			Max. Vy	19	-0.03	0.00	0.00	
			Max. Vx	13	0.00	0.00	0.00	
			Leg	Max Tension	1	0.00	0.00	0.00
				Max. Compression	17	-30.74	0.05	-0.13
				Max. Mx	6	-27.38	-0.28	-0.15
		Max. My		2	-27.73	0.04	0.31	
		Max. Vy		10	0.61	0.26	-0.17	
		Max. Vx		2	0.59	0.04	0.31	
		Diagonal		Max Tension	13	1.12	0.00	0.00
				Max. Compression	7	-1.30	0.00	0.00
				Max. Mx	24	-0.08	0.01	0.00
				Max. My	26	-0.24	0.00	0.00
				Max. Vy	24	-0.01	0.00	0.00
				Max. Vx	26	-0.00	0.00	0.00
		Top Girt		Max Tension	6	0.41	0.00	0.00
				Max. Compression	13	-0.30	0.00	0.00
			Max. Mx	19	0.06	0.01	0.00	
			Max. My	13	-0.30	0.00	-0.00	
			Max. Vy	19	0.01	0.00	0.00	
		Bottom Girt	Max. Vx	13	0.00	0.00	0.00	
Max Tension	13		0.25	0.00	0.00			
Max. Compression	6		-0.15	0.00	0.00			
Max. Mx	19		0.05	0.01	0.00			
Max. My	26		0.12	0.00	-0.00			
T10	20.1 - 4.854	Leg	Max. Vy	19	0.01	0.00	0.00	
			Max. Vx	26	-0.00	0.00	0.00	
			Max Tension	1	0.00	0.00	0.00	
			Max. Compression	17	-31.22	-0.59	0.50	
			Max. Mx	21	-30.49	0.72	0.22	
			Max. My	21	-31.21	-0.17	-0.76	
		Diagonal	Max. Vy	20	-0.35	-0.12	0.14	
			Max. Vx	21	0.33	-0.17	-0.76	
			Max Tension	7	0.86	0.00	0.00	
			Max. Compression	7	-0.67	0.00	0.00	
			Max. Mx	26	0.28	0.01	0.00	
			Max. My	26	0.31	0.00	0.00	
			Max. Vy	26	-0.01	0.00	0.00	
			Max. Vx	26	-0.00	0.00	0.00	
			Top Girt	Max Tension	7	0.24	0.00	0.00
				Max. Compression	13	-0.12	0.00	0.00
		Max. Mx	19	0.11	0.01	0.00		

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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
T11	4.854 - 0	Bottom Girt	Max. My	26	0.03	0.00	-0.00
			Max. Vy	19	-0.01	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
			Max Tension	25	4.16	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	25	4.10	0.01	0.00
		Leg	Max. Vy	25	-0.01	0.00	0.00
			Max. Vx	26	0.00	0.00	0.00
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	17	-33.78	0.05	-0.01
			Max. Mx	26	-31.18	-2.66	-0.14
			Max. My	13	-21.78	-0.41	-0.63
		Top Girt	Max. Vy	25	4.71	-2.65	-0.11
			Max. Vx	13	1.32	-0.41	-0.63
			Max Tension	26	2.96	-1.31	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	26	2.96	-1.81	-0.01
			Max. My	13	1.94	-1.39	-0.01
		Bottom Girt	Max. Vy	13	0.28	-1.49	-0.01
			Max. Vx	26	0.01	-1.79	-0.01
			Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-0.95	-0.83	-0.01
			Max. Mx	13	-0.64	-1.14	-0.01
			Max. My	13	-0.64	-1.14	-0.01
		Mid Girt	Max. Vy	13	3.37	-1.14	-0.01
			Max. Vx	13	0.05	-1.14	-0.01
			Max Tension	19	0.08	0.00	0.00
			Max. Compression	21	-0.17	0.00	0.00
			Max. Mx	19	0.07	0.02	0.00
			Max. My	25	0.07	0.00	0.00
			Max. Vy	19	0.03	0.00	0.00
			Max. Vx	25	0.01	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K	
Mast	Max. Vert	21	92.68	-0.04	-0.14	
	Max. H _x	12	53.71	0.52	0.31	
	Max. H _z	4	53.57	-0.53	0.32	
	Max. M _x	1	0.00	-0.00	0.00	
	Max. M _z	1	0.00	-0.00	0.00	
	Max. Torsion	13	0.84	0.33	0.28	
	Min. Vert	1	39.49	-0.00	0.00	
	Min. H _x	4	53.57	-0.53	0.32	
	Min. H _z	8	53.78	-0.00	-0.63	
	Min. M _x	1	0.00	-0.00	0.00	
	Min. M _z	1	0.00	-0.00	0.00	
	Min. Torsion	7	-0.94	-0.09	-0.46	
	Guy C @ 99 ft Elev -5.17 ft Azimuth 240 deg	Max. Vert	10	-1.34	-0.47	0.27
		Max. H _x	10	-1.34	-0.47	0.27
Max. H _z		3	-23.82	-12.75	7.69	
Min. Vert		5	-23.97	-13.12	7.24	
Min. H _x		5	-23.97	-13.12	7.24	

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Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Guy B @ 99.25 ft Elev -4.67 ft Azimuth 120 deg	Min. H _z	10	-1.34	-0.47	0.27
	Max. Vert	6	-1.32	0.46	0.27
	Max. H _x	11	-23.86	13.13	7.25
	Max. H _z	13	-23.71	12.77	7.69
	Min. Vert	11	-23.86	13.13	7.25
Guy A @ 96.5 ft Elev 2.46 ft Azimuth 0 deg	Min. H _x	6	-1.32	0.46	0.27
	Min. H _z	6	-1.32	0.46	0.27
	Max. Vert	2	-1.22	-0.00	-0.49
	Max. H _x	11	-12.64	0.46	-7.93
	Max. H _z	2	-1.22	-0.00	-0.49
Guy C @ 71.5 ft Elev 2.125 ft Azimuth 240 deg	Min. Vert	9	-23.52	0.28	-15.03
	Min. H _x	5	-12.62	-0.46	-7.92
	Min. H _z	9	-23.52	0.28	-15.03
	Max. Vert	10	-0.15	-0.09	0.05
	Max. H _x	10	-0.15	-0.09	0.05
Guy B @ 68.25 ft Elev 3.96 ft Azimuth 120 deg	Max. H _z	3	-6.31	-5.80	3.41
	Min. Vert	3	-6.31	-5.80	3.41
	Min. H _x	5	-6.30	-5.84	3.31
	Min. H _z	10	-0.15	-0.09	0.05
	Max. Vert	6	-0.15	0.08	0.05
Guy A @ 70.5 ft Elev 3 ft Azimuth 0 deg	Max. H _x	11	-6.42	5.86	3.32
	Max. H _z	13	-6.41	5.80	3.41
	Min. Vert	11	-6.42	5.86	3.32
	Min. H _x	6	-0.15	0.08	0.05
	Min. H _z	6	-0.15	0.08	0.05
Guy A @ 70.5 ft Elev 3 ft Azimuth 0 deg	Max. Vert	2	-0.15	-0.00	-0.10
	Max. H _x	24	-3.22	0.12	-3.97
	Max. H _z	2	-0.15	-0.00	-0.10
	Min. Vert	9	-6.22	0.05	-6.65
	Min. H _x	18	-3.20	-0.11	-3.95
Min. H _z	9	-6.22	0.05	-6.65	

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	39.49	0.00	-0.00	0.00	0.00	0.03
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	67.03	0.01	-0.32	0.00	0.00	-0.72
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	62.12	0.35	-0.29	0.00	0.00	-0.42
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	53.57	0.53	-0.32	0.00	0.00	0.01
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	62.23	0.42	-0.15	0.00	0.00	0.44
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	66.93	0.29	0.18	0.00	0.00	0.78

<p style="text-align: center;">tnxTower</p> <p style="text-align: center;">Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587</p>	<p style="text-align: center;">Job</p> <p style="text-align: center;">19027.60 - CT11156A</p>	<p style="text-align: center;">Page</p> <p style="text-align: center;">37 of 52</p>
	<p style="text-align: center;">Project</p> <p style="text-align: center;">190-ft Guyed Tower - 812 Providence Pike, Danielson, CT</p>	<p style="text-align: center;">Date</p> <p style="text-align: center;">16:38:39 05/21/19</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
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 150 deg -	62.02	0.09	0.46	0.00	0.00	0.94
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 180 deg -	53.78	0.00	0.63	0.00	0.00	0.86
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 210 deg -	62.09	-0.08	0.46	0.00	0.00	0.52
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 240 deg -	66.96	-0.27	0.18	0.00	0.00	0.11
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 270 deg -	62.31	-0.40	-0.14	0.00	0.00	-0.33
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 300 deg -	53.71	-0.52	-0.31	0.00	0.00	-0.75
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 330 deg -	62.13	-0.33	-0.28	0.00	0.00	-0.84
No Ice+1.0 Guy						
1.2 Dead+1.0 Ice+1.0	90.83	0.04	-0.01	0.00	0.00	0.08
Temp+Guy						
1.2 Dead+1.0 Wind 0 deg+1.0	92.12	0.04	-0.19	0.00	0.00	-0.17
Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 30 deg+1.0	92.35	0.11	-0.17	0.00	0.00	-0.00
Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 60 deg+1.0	92.55	0.17	-0.09	0.00	0.00	0.11
Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 90 deg+1.0	92.28	0.20	0.00	0.00	0.00	0.21
Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 120	92.02	0.19	0.08	0.00	0.00	0.35
deg+1.0 Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 150	92.38	0.14	0.12	0.00	0.00	0.42
deg+1.0 Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 180	92.68	0.04	0.14	0.00	0.00	0.32
deg+1.0 Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 210	92.43	-0.05	0.12	0.00	0.00	0.16
deg+1.0 Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 240	92.12	-0.11	0.08	0.00	0.00	0.05
deg+1.0 Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 270	92.39	-0.12	0.00	0.00	0.00	-0.05
deg+1.0 Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 300	92.65	-0.08	-0.09	0.00	0.00	-0.19
deg+1.0 Ice+1.0 Temp+1.0 Guy						
1.2 Dead+1.0 Wind 330	92.41	-0.02	-0.17	0.00	0.00	-0.26
deg+1.0 Ice+1.0 Temp+1.0 Guy						
Dead+Wind 0 deg -	39.55	0.01	-0.18	0.00	0.00	-0.13
Service+Guy						
Dead+Wind 30 deg -	39.59	0.09	-0.15	0.00	0.00	-0.06
Service+Guy						
Dead+Wind 60 deg -	39.66	0.14	-0.08	0.00	0.00	0.02
Service+Guy						
Dead+Wind 90 deg -	39.66	0.17	-0.00	0.00	0.00	0.11
Service+Guy						
Dead+Wind 120 deg -	39.66	0.16	0.09	0.00	0.00	0.19
Service+Guy						
Dead+Wind 150 deg -	39.76	0.09	0.14	0.00	0.00	0.22
Service+Guy						
Dead+Wind 180 deg -	39.84	0.00	0.16	0.00	0.00	0.20
Service+Guy						
Dead+Wind 210 deg -	39.79	-0.08	0.14	0.00	0.00	0.13
Service+Guy						
Dead+Wind 240 deg -	39.71	-0.15	0.09	0.00	0.00	0.05
Service+Guy						
Dead+Wind 270 deg -	39.71	-0.16	0.00	0.00	0.00	-0.04
Service+Guy						

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Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead+Wind 300 deg - Service+Guy	39.71	-0.13	-0.08	0.00	0.00	-0.12
Dead+Wind 330 deg - Service+Guy	39.62	-0.08	-0.15	0.00	0.00	-0.15

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	-11.81	0.00	0.00	11.81	-0.00	0.017%
2	-0.00	-14.03	-19.12	0.00	14.03	19.12	0.005%
3	9.53	-13.97	-16.48	-9.53	13.97	16.48	0.006%
4	16.49	-13.91	-9.50	-16.49	13.91	9.50	0.004%
5	19.06	-13.96	0.00	-19.06	13.96	-0.00	0.005%
6	16.58	-14.02	9.56	-16.58	14.02	-9.56	0.004%
7	9.53	-13.96	16.48	-9.53	13.96	-16.48	0.005%
8	0.00	-13.90	19.01	-0.00	13.90	-19.01	0.006%
9	-9.53	-13.96	16.48	9.53	13.96	-16.48	0.005%
10	-16.58	-14.02	9.56	16.58	14.02	-9.56	0.007%
11	-19.06	-13.96	-0.00	19.06	13.96	0.00	0.005%
12	-16.49	-13.91	-9.50	16.49	13.91	9.50	0.004%
13	-9.53	-13.97	-16.48	9.53	13.97	16.48	0.006%
14	0.00	-54.76	0.00	-0.00	54.76	-0.00	0.001%
15	-0.00	-54.83	-7.64	0.00	54.83	7.64	0.002%
16	3.82	-54.76	-6.61	-3.82	54.76	6.61	0.002%
17	6.62	-54.69	-3.82	-6.62	54.69	3.82	0.002%
18	7.64	-54.76	0.00	-7.64	54.76	-0.00	0.002%
19	6.62	-54.82	3.82	-6.62	54.82	-3.82	0.002%
20	3.82	-54.75	6.61	-3.82	54.75	-6.61	0.002%
21	0.00	-54.68	7.63	-0.00	54.68	-7.63	0.001%
22	-3.82	-54.75	6.61	3.82	54.75	-6.61	0.002%
23	-6.62	-54.82	3.82	6.62	54.82	-3.82	0.002%
24	-7.64	-54.75	-0.00	7.64	54.75	0.00	0.002%
25	-6.62	-54.69	-3.82	6.62	54.69	3.82	0.002%
26	-3.82	-54.76	-6.61	3.82	54.76	6.61	0.002%
27	-0.00	-11.83	-4.22	0.00	11.83	4.22	0.010%
28	2.10	-11.81	-3.64	-2.10	11.81	3.63	0.006%
29	3.64	-11.80	-2.10	-3.64	11.80	2.10	0.007%
30	4.20	-11.81	0.00	-4.20	11.81	-0.00	0.006%
31	3.66	-11.82	2.11	-3.66	11.82	-2.11	0.010%
32	2.10	-11.81	3.64	-2.10	11.81	-3.64	0.005%
33	0.00	-11.80	4.19	-0.00	11.80	-4.19	0.006%
34	-2.10	-11.81	3.64	2.10	11.81	-3.63	0.005%
35	-3.66	-11.82	2.11	3.66	11.82	-2.11	0.010%
36	-4.20	-11.81	-0.00	4.20	11.81	0.00	0.006%
37	-3.64	-11.80	-2.10	3.64	11.80	2.10	0.007%
38	-2.10	-11.81	-3.64	2.10	11.81	3.64	0.005%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
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1	Yes	9	0.0000001	0.00008787
2	Yes	22	0.00006425	0.00007165
3	Yes	21	0.00009589	0.00009554
4	Yes	15	0.0000001	0.00005112
5	Yes	21	0.00007429	0.00007630
6	Yes	22	0.0000001	0.00005644
7	Yes	21	0.00007410	0.00007309
8	Yes	13	0.0000001	0.00008976
9	Yes	21	0.00007106	0.00007031
10	Yes	21	0.00008864	0.00009884
11	Yes	21	0.00007121	0.00007297
12	Yes	15	0.0000001	0.00005180
13	Yes	21	0.00009589	0.00009504
14	Yes	10	0.0000001	0.00005363
15	Yes	15	0.0000001	0.00002646
16	Yes	15	0.0000001	0.00003670
17	Yes	15	0.0000001	0.00003975
18	Yes	15	0.0000001	0.00004602
19	Yes	15	0.0000001	0.00003205
20	Yes	15	0.0000001	0.00003820
21	Yes	15	0.0000001	0.00003018
22	Yes	15	0.0000001	0.00003482
23	Yes	15	0.0000001	0.00002907
24	Yes	15	0.0000001	0.00004225
25	Yes	15	0.0000001	0.00003764
26	Yes	15	0.0000001	0.00003615
27	Yes	9	0.0000001	0.00008869
28	Yes	10	0.0000001	0.00005859
29	Yes	10	0.0000001	0.00007525
30	Yes	10	0.0000001	0.00006334
31	Yes	9	0.0000001	0.00009737
32	Yes	10	0.0000001	0.00005673
33	Yes	10	0.0000001	0.00006425
34	Yes	10	0.0000001	0.00005531
35	Yes	9	0.0000001	0.00009336
36	Yes	10	0.0000001	0.00006038
37	Yes	10	0.0000001	0.00007166
38	Yes	10	0.0000001	0.00005680

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	190.6 - 175.35	2.287	29	0.0909	0.0321
T2	175.35 - 160.1	1.986	29	0.1009	0.0361
T3	160.1 - 140.1	1.641	29	0.1049	0.0404
T4	140.1 - 120.1	1.230	29	0.0746	0.0442
T5	120.1 - 100.1	0.972	37	0.0589	0.0657
T6	100.1 - 80.1	0.738	37	0.0556	0.0834
T7	80.1 - 60.1	0.540	37	0.0382	0.0944
T8	60.1 - 40.1	0.389	37	0.0354	0.0990
T9	40.1 - 20.1	0.249	27	0.0288	0.0939
T10	20.1 - 4.854	0.139	27	0.0301	0.0816
T11	4.854 - 0	0.035	27	0.0337	0.0465

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	Client	T-Mobile	Designed by	TJL

Critical Deflections and Radius of Curvature - Service Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
189.99	Guy	29	2.276	0.0912	0.0323	120484
187.00	JAHH-65B-R3B	29	2.219	0.0932	0.0330	120484
140.00	APX16DWV-16DWVS-E-A20	29	1.228	0.0745	0.0442	22011
139.49	Guy	29	1.220	0.0737	0.0446	22192
87.37	Guy	37	0.605	0.0438	0.0910	72875
44.95	Guy	37	0.280	0.0303	0.0952	113105

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	190.6 - 175.35	23.375	2	1.0106	0.2225
T2	175.35 - 160.1	20.090	2	1.0513	0.2418
T3	160.1 - 140.1	16.636	2	1.0553	0.2614
T4	140.1 - 120.1	12.470	2	0.8488	0.2696
T5	120.1 - 100.1	9.310	2	0.6986	0.3343
T6	100.1 - 80.1	6.589	2	0.5915	0.4005
T7	80.1 - 60.1	4.465	2	0.4132	0.4371
T8	60.1 - 40.1	2.937	2	0.3260	0.4467
T9	40.1 - 20.1	1.740	2	0.2401	0.4084
T10	20.1 - 4.854	0.879	2	0.2088	0.3298
T11	4.854 - 0	0.218	2	0.2126	0.2066

Critical Deflections and Radius of Curvature - Design Wind

Elevation	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
189.99	Guy	2	23.245	1.0122	0.2233	27358
187.00	JAHH-65B-R3B	2	22.611	1.0200	0.2267	27358
140.00	APX16DWV-16DWVS-E-A20	2	12.452	0.8477	0.2697	3634
139.49	Guy	2	12.359	0.8421	0.2706	3652
87.37	Guy	2	5.158	0.4746	0.4263	7077
44.95	Guy	2	1.996	0.2587	0.4205	11416

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria	
T1	190.6	Leg	A325N	0.7500	4	0.92	29.82	0.031	✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	2.19	4.17	0.526	✓	1	Member Bearing

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Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load Allowable	Allowable Ratio	Criteria	
T2	175.35	Bottom Girt	A325N	0.5000	1	0.29	5.92	0.049	✓	1	Member Bearing
		Leg	A325N	0.7500	4	0.84	29.82	0.028	✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1.73	4.17	0.416	✓	1	Member Bearing
T3	160.1	Top Girt	A325N	0.5000	1	0.31	4.17	0.075	✓	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	0.67	5.92	0.113	✓	1	Member Bearing
		Leg	A325N	0.7500	4	2.54	29.82	0.085	✓	1	Bolt Tension
T4	140.1	Diagonal	A325N	0.5000	1	1.16	4.17	0.277	✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.27	4.17	0.065	✓	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	2.02	5.92	0.342	✓	1	Member Bearing
T5	120.1	Leg	A325N	0.7500	4	1.88	29.82	0.063	✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1.02	4.17	0.245	✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	2.16	4.17	0.518	✓	1	Member Bearing
T6	100.1	Bottom Girt	A325N	0.5000	1	0.28	5.92	0.047	✓	1	Member Bearing
		Leg	A325N	0.7500	4	2.01	29.82	0.068	✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	0.54	4.17	0.130	✓	1	Member Bearing
T7	80.1	Top Girt	A325N	0.5000	1	0.26	4.17	0.064	✓	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	0.33	5.92	0.056	✓	1	Member Bearing
		Leg	A325N	0.7500	4	2.33	29.82	0.078	✓	1	Bolt Tension
T8	60.1	Diagonal	A325N	0.5000	1	0.90	4.17	0.215	✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.33	4.17	0.079	✓	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	0.44	5.92	0.075	✓	1	Member Bearing
T9	40.1	Leg	A325N	0.7500	4	2.21	29.82	0.074	✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	0.39	4.17	0.095	✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.33	4.17	0.079	✓	1	Member Bearing
T10	20.1	Bottom Girt	A325N	0.5000	1	0.28	5.92	0.047	✓	1	Member Bearing
		Leg	A325N	0.7500	4	2.44	29.82	0.082	✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1.19	4.17	0.286	✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.17	4.17	0.040	✓	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	0.51	5.92	0.085	✓	1	Member Bearing
		Leg	A325N	0.7500	4	2.56	29.82	0.086	✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	1.12	4.17	0.268	✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.41	4.17	0.099	✓	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	0.25	5.92	0.041	✓	1	Member Bearing
		Leg	A325N	0.7500	4	2.60	29.82	0.087	✓	1	Bolt Tension
		Diagonal	A325N	0.5000	1	0.86	4.17	0.206	✓	1	Member Bearing
		Top Girt	A325N	0.5000	1	0.24	4.17	0.058	✓	1	Member Bearing
		Bottom Girt	A325N	0.5000	1	4.16	5.92	0.703	✓	1	Member Bearing

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Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
T1	189.99 (A) (450)	1/2 EHS	2.69	26.90	10.36	16.14	1.000	1.558 ✓
	189.99 (B) (449)	1/2 EHS	2.69	26.90	10.48	16.14	1.000	1.540 ✓
	189.99 (C) (448)	1/2 EHS	2.69	26.90	10.52	16.14	1.000	1.534 ✓
T4	139.49 (A) (459)	1/2 EHS	2.69	26.90	9.06	16.14	1.000	1.781 ✓
	139.49 (A) (460)	1/2 EHS	2.69	26.90	9.25	16.14	1.000	1.746 ✓
	139.49 (B) (455)	1/2 EHS	2.69	26.90	9.29	16.14	1.000	1.738 ✓
	139.49 (B) (456)	1/2 EHS	2.69	26.90	9.11	16.14	1.000	1.771 ✓
	139.49 (C) (451)	1/2 EHS	2.69	26.90	9.15	16.14	1.000	1.765 ✓
	139.49 (C) (452)	1/2 EHS	2.69	26.90	9.11	16.14	1.000	1.772 ✓
	139.49 (C) (452)	1/2 EHS	2.69	26.90	9.11	16.14	1.000	1.772 ✓
T6	87.37 (A) (468)	7/16 EHS	2.08	20.80	5.76	12.48	1.000	2.167 ✓
	87.37 (B) (467)	7/16 EHS	2.08	20.80	5.93	12.48	1.000	2.106 ✓
	87.37 (C) (463)	7/16 EHS	2.08	20.80	5.88	12.48	1.000	2.123 ✓
T8	44.95 (A) (474)	3/8 EHS	1.54	15.40	3.55	9.24	1.000	2.604 ✓
	44.95 (B) (473)	3/8 EHS	1.54	15.40	3.60	9.24	1.000	2.565 ✓
	44.95 (C) (469)	3/8 EHS	1.54	15.40	3.53	9.24	1.000	2.621 ✓

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in ²	Mast Stability Index	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	190.6 - 175.35	ROHN 2.5 X-STR	15.25	2.44	63.4 K=2.00	2.2535	1.00	-13.14	75.62	0.174 ¹ ✓
T2	175.35 - 160.1	ROHN 2.5 X-STR	15.25	2.44	63.4 K=2.00	2.2535	1.00	-10.52	75.62	0.139 ¹ ✓
T3	160.1 - 140.1	ROHN 2 STD	20.00	2.42	36.9 K=1.00	1.0745	1.00	-25.97	43.76	0.593 ¹ ✓
T4	140.1 - 120.1	ROHN 2 STD	20.00	2.42	36.9 K=1.00	1.0745	1.00	-27.87	43.72	0.638 ¹ ✓
T5	120.1 - 100.1	ROHN 2 STD	20.00	2.42	36.9 K=1.00	1.0745	1.00	-24.16	43.66	0.553 ¹ ✓
T6	100.1 - 80.1	ROHN 2 STD	20.00	2.42	36.9	1.0745	1.00	-29.80	43.66	0.683 ¹ ✓

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	Mast Stability Index	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T7	80.1 - 60.1	ROHN 2 EH	20.00	2.42	K=1.00 37.8	1.4807	1.00	-28.14	60.00	0.469 ¹ ✓
T8	60.1 - 40.1	ROHN 2.5 STD	20.00	2.42	K=1.00 61.4	1.7040	1.00	-29.48	58.22	0.506 ¹ ✓
T9	40.1 - 20.1	ROHN 2.5 STD	20.00	2.42	K=2.00 61.4	1.7040	1.00	-30.74	58.22	0.528 ¹ ✓
T10	20.1 - 4.854	ROHN 2.5 STD	15.25	2.44	K=2.00 61.8	1.7040	1.00	-31.22	58.01	0.538 ¹ ✓
T11	4.854 - 0	ROHN 2.5 X-STR	5.25	1.27	K=2.00 16.5 K=1.00	2.2535	0.95	-33.78	93.98	0.359 ¹ ✓

¹ P_u / φP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	190.6 - 175.35	ROHN TS1.5x16 ga	4.23	3.94	92.6 K=1.00	0.2627	-2.20	5.86	0.374 ¹ ✓
T2	175.35 - 160.1	ROHN TS1.5x16 ga	4.23	3.94	92.6 K=1.00	0.2627	-1.77	5.86	0.301 ¹ ✓
T3	160.1 - 140.1	ROHN TS1.5x16 ga	4.22	3.98	93.6 K=1.00	0.2627	-1.25	5.80	0.216 ¹ ✓
T4	140.1 - 120.1	ROHN TS1.5x16 ga	4.22	3.98	93.6 K=1.00	0.2627	-1.25	5.80	0.215 ¹ ✓
T5	120.1 - 100.1	ROHN TS1.5x16 ga	4.22	3.98	93.6 K=1.00	0.2627	-0.78	5.80	0.135 ¹ ✓
T6	100.1 - 80.1	ROHN TS1.5x16 ga	4.22	3.98	93.6 K=1.00	0.2627	-1.02	5.80	0.176 ¹ ✓
T7	80.1 - 60.1	ROHN TS1.5x16 ga	4.22	3.98	93.6 K=1.00	0.2627	-0.62	5.80	0.107 ¹ ✓
T8	60.1 - 40.1	ROHN TS1.5x16 ga	4.22	3.93	92.4 K=1.00	0.2627	-1.43	5.88	0.243 ¹ ✓
T9	40.1 - 20.1	ROHN TS1.5x16 ga	4.22	3.93	92.4 K=1.00	0.2627	-1.30	5.88	0.221 ¹ ✓
T10	20.1 - 4.854	ROHN TS1.5x16 ga	4.23	3.94	92.6 K=1.00	0.2627	-0.67	5.86	0.114 ¹ ✓

¹ P_u / φP_n controls

Top Girt Design Data (Compression)

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Section No.	Elevation ft	Size	L ft	L _u ft	KL/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T2	175.35 - 160.1	ROHN TS1.5x16 ga	3.46	3.22	75.7 K=1.00	0.2627	-0.31	6.99	0.045 ¹ ✓
T3	160.1 - 140.1	ROHN TS1.5x16 ga	3.46	3.26	76.7 K=1.00	0.2627	-0.12	6.92	0.018 ¹ ✓
T4	140.1 - 120.1	ROHN TS1.5x16 ga	3.46	3.26	76.7 K=1.00	0.2627	-2.22	6.92	0.321 ¹ ✓
T8	60.1 - 40.1	ROHN TS1.5x16 ga	3.46	3.22	75.7 K=1.00	0.2627	-0.03	6.99	0.004 ¹ ✓
T9	40.1 - 20.1	ROHN TS1.5x16 ga	3.46	3.22	75.7 K=1.00	0.2627	-0.30	6.99	0.043 ¹ ✓
T10	20.1 - 4.854	ROHN TS1.5x16 ga	3.46	3.22	75.7 K=1.00	0.2627	-0.12	6.99	0.018 ¹ ✓

¹ P_u / φP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	KL/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	190.6 - 175.35	ROHN TS1.5x16 ga	3.46	3.22	75.7 K=1.00	0.2627	-0.24	6.99	0.035 ¹ ✓
T2	175.35 - 160.1	ROHN TS1.5x16 ga	3.46	3.22	75.7 K=1.00	0.2627	-0.62	6.99	0.089 ¹ ✓
T3	160.1 - 140.1	ROHN TS1.5x16 ga	3.46	3.26	76.7 K=1.00	0.2627	-1.29	6.92	0.186 ¹ ✓
T8	60.1 - 40.1	ROHN TS1.5x16 ga	3.46	3.22	75.7 K=1.00	0.2627	-0.28	6.99	0.040 ¹ ✓
T9	40.1 - 20.1	ROHN TS1.5x16 ga	3.46	3.22	75.7 K=1.00	0.2627	-0.15	6.99	0.021 ¹ ✓
T11	4.854 - 0	14x3/16	0.47	0.24	52.2 K=1.00	2.6250	-0.95	73.69	0.013 ¹ ✓

¹ P_u / φP_n controls

Mid Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L _u ft	KL/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T11	4.854 - 0	14x3/16	1.31	1.07	237.5 K=1.00	2.6250	-0.17	10.51	0.016 ¹ ✓

KL/R > 200 (C) - 444

¹ P_u / φP_n controls

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Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T4	140.1 - 120.1 (453)	C10x15.3	3.59	3.49	58.7 K=1.00	4.4900	-2.65	121.35	0.022
T4	140.1 - 120.1 (454)	C10x15.3	3.59	3.49	58.7 K=1.00	4.4900	-0.20	121.35	0.002
T4	140.1 - 120.1 (457)	C10x15.3	3.59	3.49	58.7 K=1.00	4.4900	-2.65	121.35	0.022
T4	140.1 - 120.1 (458)	C10x15.3	3.59	3.49	58.7 K=1.00	4.4900	-2.66	121.35	0.022
T4	140.1 - 120.1 (461)	C10x15.3	3.59	3.49	58.7 K=1.00	4.4900	-2.55	121.35	0.021
T4	140.1 - 120.1 (462)	C10x15.3	3.59	3.49	58.7 K=1.00	4.4900	-2.57	121.35	0.021

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{ux} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M _{uy} kip-ft	φM _{uy} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T4	140.1 - 120.1 (453)	C10x15.3	-25.99	41.58	0.625	-0.00	4.70	0.000
T4	140.1 - 120.1 (454)	C10x15.3	-26.05	41.58	0.627	-0.00	4.70	0.000
T4	140.1 - 120.1 (457)	C10x15.3	-26.15	41.58	0.629	0.00	4.70	0.000
T4	140.1 - 120.1 (458)	C10x15.3	-26.07	41.58	0.627	-0.00	4.70	0.000
T4	140.1 - 120.1 (461)	C10x15.3	-25.30	41.58	0.608	-0.00	4.70	0.000
T4	140.1 - 120.1 (462)	C10x15.3	-25.05	41.58	0.602	0.00	4.70	0.000

Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	Ratio $\frac{M_{uy}}{\phi M_{uy}}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
T4	140.1 - 120.1 (453)	C10x15.3	0.022	0.625	0.000	0.636	1.000	4.8.1 ✓
T4	140.1 - 120.1 (454)	C10x15.3	0.002	0.627	0.000	0.627	1.000	4.8.1 ✓
T4	140.1 - 120.1 (457)	C10x15.3	0.022	0.629	0.000	0.640	1.000	4.8.1 ✓
T4	140.1 - 120.1 (458)	C10x15.3	0.022	0.627	0.000	0.638	1.000	4.8.1 ✓
T4	140.1 - 120.1	C10x15.3	0.021	0.608	0.000	0.619	1.000	4.8.1 ✓

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Section No.	Elevation ft	Size	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
			$\frac{P_u}{\phi P_n}$	$\frac{M_{ux}}{\phi M_{nx}}$	$\frac{M_{uy}}{\phi M_{ny}}$			
T4	140.1 - 120.1 (461) (462)	C10x15.3	0.021	0.602	0.000	0.613	1.000	4.8.1 ✓

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio
									$\frac{P_u}{\phi P_n}$
T1	190.6 - 175.35	ROHN 2.5 X-STR	15.25	2.44	31.7	2.2535	1.88	101.41	0.019 ¹ ✓
T3	160.1 - 140.1	ROHN 2 STD	20.00	2.42	36.9	1.0745	10.16	48.35	0.210 ¹ ✓
T4	140.1 - 120.1	ROHN 2 STD	20.00	2.42	36.9	1.0745	11.15	48.35	0.231 ¹ ✓

¹ P_u / φP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio
									$\frac{P_u}{\phi P_n}$
T1	190.6 - 175.35	ROHN TS1.5x16 ga	4.23	3.94	92.6	0.2627	2.19	9.93	0.221 ¹ ✓
T2	175.35 - 160.1	ROHN TS1.5x16 ga	4.23	3.94	92.6	0.2627	1.73	9.93	0.175 ¹ ✓
T3	160.1 - 140.1	ROHN TS1.5x16 ga	4.22	3.98	93.6	0.2627	1.16	9.93	0.116 ¹ ✓
T4	140.1 - 120.1	ROHN TS1.5x16 ga	4.22	3.98	93.6	0.2627	1.02	9.93	0.103 ¹ ✓
T5	120.1 - 100.1	ROHN TS1.5x16 ga	4.22	3.98	93.6	0.2627	0.54	9.93	0.055 ¹ ✓
T6	100.1 - 80.1	ROHN TS1.5x16 ga	4.22	3.98	93.6	0.2627	0.90	9.93	0.090 ¹ ✓
T7	80.1 - 60.1	ROHN TS1.5x16 ga	4.22	3.98	93.6	0.2627	0.39	9.93	0.040 ¹ ✓
T8	60.1 - 40.1	ROHN TS1.5x16 ga	4.22	3.93	92.4	0.2627	1.19	9.93	0.120 ¹ ✓
T9	40.1 - 20.1	ROHN TS1.5x16 ga	4.22	3.93	92.4	0.2627	1.12	9.93	0.113 ¹ ✓
T10	20.1 - 4.854	ROHN TS1.5x16 ga	4.23	3.94	92.6	0.2627	0.86	9.93	0.086 ¹ ✓

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
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¹ P_u / φP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T2	175.35 - 160.1	ROHN TS1.5x16 ga	3.46	3.22	75.7	0.2627	0.31	9.93	0.031 ¹ ✓
T3	160.1 - 140.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	0.27	9.93	0.027 ¹ ✓
T4	140.1 - 120.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	2.16	9.93	0.217 ¹ ✓
T5	120.1 - 100.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	0.26	9.93	0.027 ¹ ✓
T6	100.1 - 80.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	0.33	9.93	0.033 ¹ ✓
T7	80.1 - 60.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	0.33	9.93	0.033 ¹ ✓
T8	60.1 - 40.1	ROHN TS1.5x16 ga	3.46	3.22	75.7	0.2627	0.17	9.93	0.017 ¹ ✓
T9	40.1 - 20.1	ROHN TS1.5x16 ga	3.46	3.22	75.7	0.2627	0.41	9.93	0.042 ¹ ✓
T10	20.1 - 4.854	ROHN TS1.5x16 ga	3.46	3.22	75.7	0.2627	0.24	9.93	0.024 ¹ ✓
T11	4.854 - 0	14x3/16	2.98	2.74	608.2	2.6250	2.96	85.05	0.035 ¹ ✓
		L/R > 500 (T) - 436							

¹ P_u / φP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	190.6 - 175.35	ROHN TS1.5x16 ga	3.46	3.22	75.7	0.2627	0.29	9.93	0.029 ¹ ✓
T2	175.35 - 160.1	ROHN TS1.5x16 ga	3.46	3.22	75.7	0.2627	0.67	9.93	0.068 ¹ ✓
T3	160.1 - 140.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	2.02	9.93	0.204 ¹ ✓
T4	140.1 - 120.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	0.28	9.93	0.028 ¹ ✓
T5	120.1 - 100.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	0.33	9.93	0.033 ¹ ✓

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Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T6	100.1 - 80.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	0.44	9.93	0.045 ¹
T7	80.1 - 60.1	ROHN TS1.5x16 ga	3.46	3.26	76.7	0.2627	0.28	9.93	0.028 ¹ ✓
T8	60.1 - 40.1	ROHN TS1.5x16 ga	3.46	3.22	75.7	0.2627	0.51	9.93	0.051 ¹ ✓
T9	40.1 - 20.1	ROHN TS1.5x16 ga	3.46	3.22	75.7	0.2627	0.25	9.93	0.025 ¹ ✓
T10	20.1 - 4.854	ROHN TS1.5x16 ga	3.46	3.22	75.7	0.2627	4.16	9.93	0.419 ¹ ✓

¹ P_u / φP_n controls

Mid Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T11	4.854 - 0	14x3/16	2.15	1.91	422.9	2.6250	0.08	85.05	0.001 ¹ ✓

¹ P_u / φP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L _u ft	Kl/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
T1	190.6 - 175.35	4 1/2x3/8	3.46	3.22	356.8	1.6875	2.86	54.67	0.052 ¹
T6	100.1 - 80.1	C4x5.4	3.46	3.26	87.1	1.5900	2.21	51.52	0.043 ¹
T8	60.1 - 40.1	C4x5.4	3.46	3.22	86.0	1.5900	1.84	51.52	0.036 ¹

¹ P_u / φP_n controls

Top Guy Pull-Off Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{ux} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{ux}}$	M _{uy} kip-ft	φM _{uy} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{uy}}$
T1	190.6 - 175.35	4 1/2x3/8	0.00	5.13	0.000	0.00	0.43	0.000
T6	100.1 - 80.1	C4x5.4	0.00	5.74	0.000	0.00	1.15	0.000
T8	60.1 - 40.1	C4x5.4	0.00	5.75	0.000	0.00	1.15	0.000

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Top Guy Pull-Off Interaction Design Data

Section No.	Elevation ft	Size	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
			$\frac{P_u}{\phi P_n}$	$\frac{M_{ux}}{\phi M_{nx}}$	$\frac{M_{uy}}{\phi M_{ny}}$			
T1	190.6 - 175.35	4 1/2x3/8	0.052	0.000	0.000	0.052 ¹	1.000	4.8.1 ✓
T6	100.1 - 80.1	C4x5.4	0.043	0.000	0.000	0.043 ¹	1.000	4.8.1 ✓
T8	60.1 - 40.1	C4x5.4	0.036	0.000	0.000	0.036 ¹	1.000	4.8.1 ✓

¹ $P_u / \phi P_n$ controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L	L _u	Kl/r	A	P _u	φP _n	Ratio
			ft	ft		in ²	K	K	$\frac{P_u}{\phi P_n}$
T4	140.1 - 120.1 (453)	C10x15.3	3.59	3.49	58.7	4.4900	0.07	145.48	0.001
T4	140.1 - 120.1 (454)	C10x15.3	3.59	3.49	58.7	4.4900	2.09	145.48	0.014
T4	140.1 - 120.1 (457)	C10x15.3	3.59	3.49	58.7	4.4900	0.03	145.48	0.000
T4	140.1 - 120.1 (458)	C10x15.3	3.59	3.49	58.7	4.4900	2.10	145.48	0.014
T4	140.1 - 120.1 (461)	C10x15.3	3.59	3.49	58.7	4.4900	0.09	145.48	0.001
T4	140.1 - 120.1 (462)	C10x15.3	3.59	3.49	58.7	4.4900	0.01	145.48	0.000

Torque-Arm Top Bending Design Data

Section No.	Elevation ft	Size	M _{ux}	φM _{ux}	Ratio	M _{uy}	φM _{uy}	Ratio
			kip-ft	kip-ft	$\frac{M_{ux}}{\phi M_{ux}}$	kip-ft	kip-ft	$\frac{M_{uy}}{\phi M_{uy}}$
T4	140.1 - 120.1 (453)	C10x15.3	-27.11	41.58	0.652	-0.00	4.70	0.000
T4	140.1 - 120.1 (454)	C10x15.3	-23.38	41.58	0.562	-0.00	4.70	0.000
T4	140.1 - 120.1 (457)	C10x15.3	-26.88	41.58	0.647	0.00	4.70	0.000
T4	140.1 - 120.1 (458)	C10x15.3	-23.66	41.58	0.569	0.00	4.70	0.000
T4	140.1 - 120.1 (461)	C10x15.3	-27.02	41.58	0.650	0.00	4.70	0.000
T4	140.1 - 120.1 (462)	C10x15.3	-26.46	41.58	0.636	-0.00	4.70	0.000

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Torque-Arm Top Interaction Design Data

Section No.	Elevation ft	Size	Ratio	Ratio	Ratio	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
			$\frac{P_u}{\phi P_n}$	$\frac{M_{ux}}{\phi M_{nx}}$	$\frac{M_{uy}}{\phi M_{ny}}$			
T4	140.1 - 120.1 (453)	C10x15.3	0.001	0.652	0.000	0.652	1.000	4.8.1 ✓
T4	140.1 - 120.1 (454)	C10x15.3	0.014	0.562	0.000	0.570	1.000	4.8.1 ✓
T4	140.1 - 120.1 (457)	C10x15.3	0.000	0.647	0.000	0.647	1.000	4.8.1 ✓
T4	140.1 - 120.1 (458)	C10x15.3	0.014	0.569	0.000	0.576	1.000	4.8.1 ✓
T4	140.1 - 120.1 (461)	C10x15.3	0.001	0.650	0.000	0.650	1.000	4.8.1 ✓
T4	140.1 - 120.1 (462)	C10x15.3	0.000	0.636	0.000	0.636	1.000	4.8.1 ✓

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	190.6 - 175.35	Leg	ROHN 2.5 X-STR	1	-13.14	75.62	17.4	Pass
T2	175.35 - 160.1	Leg	ROHN 2.5 X-STR	28	-10.52	75.62	13.9	Pass
T3	160.1 - 140.1	Leg	ROHN 2 STD	56	-25.97	43.76	59.3	Pass
T4	140.1 - 120.1	Leg	ROHN 2 STD	113	-27.87	43.72	63.8	Pass
T5	120.1 - 100.1	Leg	ROHN 2 STD	171	-24.16	43.66	55.3	Pass
T6	100.1 - 80.1	Leg	ROHN 2 STD	228	-29.80	43.66	68.3	Pass
T7	80.1 - 60.1	Leg	ROHN 2 EH	285	-28.14	60.00	46.9	Pass
T8	60.1 - 40.1	Leg	ROHN 2.5 STD	342	-29.48	58.22	50.6	Pass
T9	40.1 - 20.1	Leg	ROHN 2.5 STD	373	-30.74	58.22	52.8	Pass
T10	20.1 - 4.854	Leg	ROHN 2.5 STD	406	-31.22	58.01	53.8	Pass
T11	4.854 - 0	Leg	ROHN 2.5 X-STR	433	-33.78	93.98	35.9	Pass
T1	190.6 - 175.35	Diagonal	ROHN TS1.5x16 ga	25	-2.20	5.86	37.4	Pass
T2	175.35 - 160.1	Diagonal	ROHN TS1.5x16 ga	38	-1.77	5.86	52.6 (b) 30.1	Pass
T3	160.1 - 140.1	Diagonal	ROHN TS1.5x16 ga	66	-1.25	5.80	41.6 (b) 21.6	Pass
T4	140.1 - 120.1	Diagonal	ROHN TS1.5x16 ga	167	-1.25	5.80	27.7 (b) 21.5	Pass
T5	120.1 - 100.1	Diagonal	ROHN TS1.5x16 ga	181	-0.78	5.80	24.5 (b) 13.5	Pass
T6	100.1 - 80.1	Diagonal	ROHN TS1.5x16 ga	252	-1.02	5.80	17.6 21.5 (b)	Pass
T7	80.1 - 60.1	Diagonal	ROHN TS1.5x16 ga	339	-0.62	5.80	10.7	Pass
T8	60.1 - 40.1	Diagonal	ROHN TS1.5x16 ga	350	-1.43	5.88	24.3 28.6 (b)	Pass
T9	40.1 - 20.1	Diagonal	ROHN TS1.5x16 ga	404	-1.30	5.88	22.1 26.8 (b)	Pass
T10	20.1 - 4.854	Diagonal	ROHN TS1.5x16 ga	431	-0.67	5.86	11.4 20.6 (b)	Pass
T2	175.35 - 160.1	Top Girt	ROHN TS1.5x16 ga	32	-0.31	6.99	4.5 7.5 (b)	Pass
T3	160.1 - 140.1	Top Girt	ROHN TS1.5x16 ga	59	0.27	9.93	2.7 6.5 (b)	Pass

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	Client	T-Mobile		Designed by	TJL

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail	
T4	140.1 - 120.1	Top Girt	ROHN TS1.5x16 ga	116	-2.22	6.92	32.1	Pass	
T5	120.1 - 100.1	Top Girt	ROHN TS1.5x16 ga	172	0.26	9.93	51.8 (b) 2.7	Pass	
T6	100.1 - 80.1	Top Girt	ROHN TS1.5x16 ga	229	0.33	9.93	6.4 (b) 3.3	Pass	
T7	80.1 - 60.1	Top Girt	ROHN TS1.5x16 ga	287	0.33	9.93	7.9 (b) 3.3	Pass	
T8	60.1 - 40.1	Top Girt	ROHN TS1.5x16 ga	345	0.17	9.93	7.9 (b) 1.7	Pass	
T9	40.1 - 20.1	Top Girt	ROHN TS1.5x16 ga	377	-0.30	6.99	4.0 (b) 4.3	Pass	
T10	20.1 - 4.854	Top Girt	ROHN TS1.5x16 ga	410	0.24	9.93	9.9 (b) 2.4	Pass	
T11	4.854 - 0	Top Girt	14x3/16	436	2.96	85.05	5.8 (b) 3.5	Pass	
T1	190.6 - 175.35	Bottom Girt	ROHN TS1.5x16 ga	8	-0.24	6.99	3.5 4.9 (b)	Pass	
T2	175.35 - 160.1	Bottom Girt	ROHN TS1.5x16 ga	35	-0.62	6.99	8.9 11.3 (b)	Pass	
T3	160.1 - 140.1	Bottom Girt	ROHN TS1.5x16 ga	61	2.02	9.93	20.4 34.2 (b)	Pass	
T4	140.1 - 120.1	Bottom Girt	ROHN TS1.5x16 ga	119	0.28	9.93	2.8 4.7 (b)	Pass	
T5	120.1 - 100.1	Bottom Girt	ROHN TS1.5x16 ga	176	0.33	9.93	3.3 5.6 (b)	Pass	
T6	100.1 - 80.1	Bottom Girt	ROHN TS1.5x16 ga	233	0.44	9.93	4.5 7.5 (b)	Pass	
T7	80.1 - 60.1	Bottom Girt	ROHN TS1.5x16 ga	290	0.28	9.93	2.8 4.7 (b)	Pass	
T8	60.1 - 40.1	Bottom Girt	ROHN TS1.5x16 ga	347	0.51	9.93	5.1 8.5 (b)	Pass	
T9	40.1 - 20.1	Bottom Girt	ROHN TS1.5x16 ga	380	0.25	9.93	2.5 4.1 (b)	Pass	
T10	20.1 - 4.854	Bottom Girt	ROHN TS1.5x16 ga	412	4.16	9.93	41.9 70.3 (b)	Pass	
T11	4.854 - 0	Bottom Girt	14x3/16	439	-0.95	73.69	6.6	Pass	
T11	4.854 - 0	Mid Girt	14x3/16	444	-0.17	10.51	1.6	Pass	
T1	190.6 - 175.35	Guy A@189.985	1/2	450	10.36	16.14	64.2	Pass	
T4	140.1 - 120.1	Guy A@139.485	1/2	460	9.25	16.14	57.3	Pass	
T6	100.1 - 80.1	Guy A@87.3695	7/16	468	5.76	12.48	46.1	Pass	
T8	60.1 - 40.1	Guy A@44.9464	3/8	474	3.55	9.24	38.4	Pass	
T1	190.6 - 175.35	Guy B@189.985	1/2	449	10.48	16.14	64.9	Pass	
T4	140.1 - 120.1	Guy B@139.485	1/2	455	9.29	16.14	57.5	Pass	
T6	100.1 - 80.1	Guy B@87.3695	7/16	467	5.93	12.48	47.5	Pass	
T8	60.1 - 40.1	Guy B@44.9464	3/8	473	3.60	9.24	39.0	Pass	
T1	190.6 - 175.35	Guy C@189.985	1/2	448	10.52	16.14	65.2	Pass	
T4	140.1 - 120.1	Guy C@139.485	1/2	451	9.15	16.14	56.7	Pass	
T6	100.1 - 80.1	Guy C@87.3695	7/16	463	5.88	12.48	47.1	Pass	
T8	60.1 - 40.1	Guy C@44.9464	3/8	469	3.53	9.24	38.2	Pass	
T1	190.6 - 175.35	Top Guy	4 1/2x3/8	4	2.86	54.67	5.2	Pass	
T6	100.1 - 80.1	Pull-Off@189.985 Top Guy	C4x5.4	464	2.21	51.52	4.3	Pass	
T8	60.1 - 40.1	Pull-Off@87.3695 Top Guy	C4x5.4	470	1.84	51.52	3.6	Pass	
T4	140.1 - 120.1	Pull-Off@44.9464 Torque Arm Top@139.485	C10x15.3	453	-2.65	121.35	65.2	Pass	
							Summary		
							Leg (T6)	68.3	Pass
							Diagonal (T1)	52.6	Pass

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Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
						Top Girt (T4)	51.8	Pass
						Bottom Girt (T10)	70.3	Pass
						Mid Girt (T11)	1.6	Pass
						Guy A (T1)	64.2	Pass
						Guy B (T1)	64.9	Pass
						Guy C (T1)	65.2	Pass
						Top Guy Pull-Off (T1)	5.2	Pass
						Torque Arm Top (T4)	65.2	Pass
						Bolt Checks	70.3	Pass
						RATING =	70.3	Pass

Job : T-Mobile - CT11156A: 190-ft Guyed Lattice Tower
 Address: 812 Providence Pike, Danileson, CT
 Description: Guy Anchor Evaluation

Project No. 19027.60 Sheet 1 of 2
 Computed by TJL Date 5/21/19
 Checked by CAG Date

CHECK UPLIFT RESISTANCE

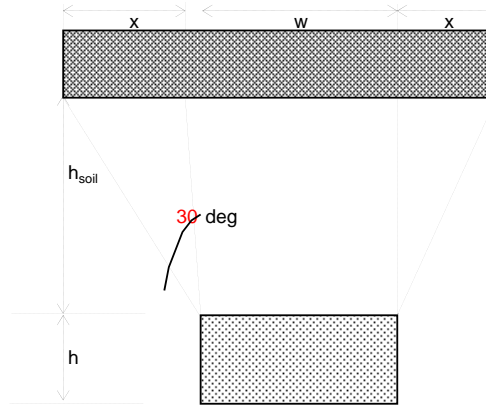
ANCHOR (C) AT 99ft RADIUS

RESULTS FROM COMPUTER ANALYSIS:

Uplift = 24 kips
 Sliding = 15 kips
 Wdepth = 1 ft

CONCRETE PARAMETERS:

$\gamma_{conc} = 150$ pcf
 $\gamma_{conc.sub} = 87.6$ pcf
 $w = 4$ ft
 $h = 2$ ft
 $d = 7$ ft
 Vol. = 0.00 ft³
 Vol.sub = 56.00 ft³
 $Wc = 4.91$ kips
 $\emptyset = 0.90$
 4.42



Foundation Section

SOIL PARAMETERS:

$\gamma_{soil} = 100$ pcf
 $\gamma_{soil.sub} = 37.6$ pcf
 $h_{soil} = 8$ ft
 $x = 4.62$ ft

Soil Weight (Wr):

B1 = 28.00
 B2 = 182.25
 B3 = 214.95

W.soil = 19.84 kips
 W.soil.sub = 24.71 kips
 Total = 44.55 kips
 $\emptyset = 0.75$
 33.41

SF AGAINST SLIDING

2.06 > 1 OK

GUY ANCHORS AGAINST UPLIFT ARE ADEQUATE

Job : T-Mobile - CT11156A: 190-ft Guyed Lattice Tower
 Address: 812 Providence Pike, Danileson, CT
 Description: Guy Anchor Evaluation

Project No. 19027.60 Sheet 2 of 2
 Computed by TJL Date 5/21/19
 Checked by CFC Date

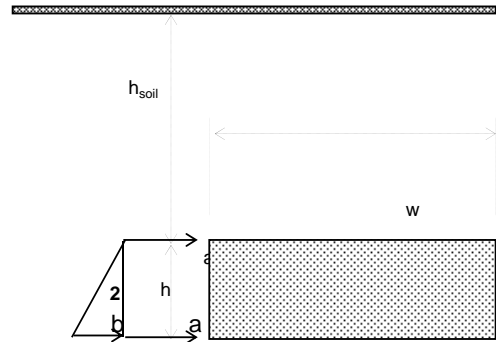
CHECK SLIDING RESISTANCE

SOIL PARAMETERS

$\gamma_{soil} = 100$ pcf
 $\gamma_{soil} = 37.6$ pcf
 $h_{soil} = 8$ ft
 $h = 2$ ft
 $\phi = 30$ degrees

ANCHOR PARAMETERS

$w = 4.0$ ft
 $h = 2.0$ ft
 $d = 7.0$ ft



Foundation Elevation View

$K_p = 3.00$

HORIZONTAL FORCES

RESIST TO SLIDING =

1.09 ksf
 1.32 ksf
 16.83 k

SOIL & CONCRETE WEIGHT =
UPLIFT REACTIONS =
SUM =

$W_r + W_c = 37.83$ k
 -24 k
 13.83 k

COEF. OF FRICTION, (0.45) =
RESIST TO SLIDING =
SUM =

6.22 k
 16.83 k
 23.06 k

SF AGAINST SLIDING

$SF = 1.5 > 1$ **OK**

GUY ANCHORS AGAINST SLIDING NEED REINFORCEMENT

Guyed Tower Base Foundation:

Input Data:

Tower Data

Shear Force = Shear := 1-kip (User Input from tnxTower)
 Axial Force = Axial := 93-kip (User Input from tnxTower)
 Tower Height = $H_t := 190\text{-ft}$ (User Input)

Footing Data:

Overall Depth of Footing = $D_f := 4.0\text{-ft}$ (User Input)
 Length of Pier = $L_p := 3.75\text{-ft}$ (User Input)
 Extension of Pier Above Grade = $L_{pag} := 1.0\text{-ft}$ (User Input)
 Width of Pier = $W_p := 2.0\text{-ft}$ (User Input)
 Thickness of Footing = $T_f := 1.25\text{-ft}$ (User Input)
 Width of Footing = $W_{f1} := 4\text{-ft}$ (User Input)
 Length of Footing = $W_{f2} := 4\text{-ft}$ (User Input)

Material Properties:

Concrete Compressive Strength = $f_c := 3000\text{-psi}$ (User Input)
 Steel Reinforcement Yield Strength = $f_y := 60000\text{-psi}$ (User Input)
 Internal Friction Angle of Soil = $\Phi_s := 30\text{-deg}$ (User Input)
 Ultimate Soil Bearing Capacity = $q_s := 12000\text{-psf}$ (User Input)
 Unit Weight of Soil = $\gamma_{soil} := 120\text{-pcf}$ (User Input)
 Unit Weight of Concrete = $\gamma_{conc} := 150\text{-pcf}$ (User Input)
 Foundation Bouyancy = Bouyancy := 1 (User Input) (Yes=1 / No=0)
 Depth to Neglect = $n := 0\text{-ft}$ (User Input)
 Cohesion of Clay Type Soil = $c := 0\text{-ksf}$ (User Input) (Use 0 for Sandy Soil)
 Seismic Zone Factor = $Z := 2$ (User Input)
 Coefficient of Friction Between Concrete = $\mu := 0.45$ (User Input)

Calculated Factors:

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

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

Stability of Footing:

Adjusted Concrete Unit Weight = $\gamma_c := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{conc}} - 62.4\text{pcf}, \gamma_{\text{conc}}) = 87.6\text{pcf}$

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{\text{soil}} - 62.4\text{pcf}, \gamma_{\text{soil}}) = 57.6\text{pcf}$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 0.475\text{ksf}$

$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 0.475\text{ksf}$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 0.691\text{ksf}$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.583\text{ksf}$

$T_p := \text{if}[n < (D_f - T_f), T_f \cdot (D_f - n)] = 1.25$

$A_p := W_{f1} \cdot T_p = 5$

Soil Shear Resistance = $Sl_1 := P_{ave} \cdot A_p = 2.92\text{kip}$

Weight of Concrete = $WT_c := [(W_{f1} \cdot W_{f2} \cdot T_f) + W_p^2 \cdot L_p] \cdot \gamma_c = 3.07\text{kip}$

Total Weight = $WT_{tot} := WT_c + \text{Axial} = 96.07\text{kip}$

Soil/Concrete Friction Resistance = $Sl_2 := \mu \cdot WT_{tot} = 43.23\text{kips}$

Total Sliding Resistance = $Sl_{tot} := Sl_1 + Sl_2 = 46.15\text{kips}$

Sliding Resistance Ratio = $\text{Sliding_Resistance_ratio} := \frac{0.75Sl_{tot}}{\text{Shear}} = 34.61$

$\text{Sliding_Resistance_Check} := \text{if}\left[\left(\frac{\text{Shear}}{0.75Sl_{tot}} < 1.0\right), \text{"Okay"}, \text{"No Good"}\right]$

Sliding_Resistance_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_{f1} \cdot W_{f2} = 16$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} = 6\text{ksf}$

$\text{Max_Pressure_Check} := \text{if}(P_{max} < 0.6q_s, \text{"Okay"}, \text{"No Good"})$

Max_Pressure_Check = "Okay"

RAN Template: 67D04G	A&L Template: 67D04G_1DP+1OP	Power System Template: Custom
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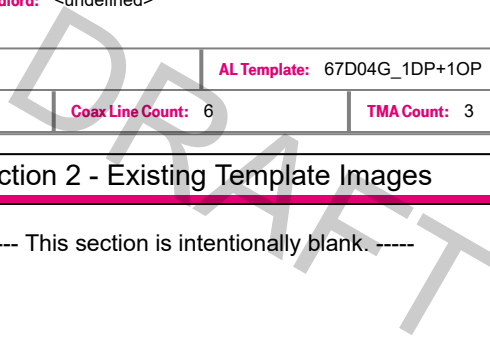
Section 1 - Site Information

Site ID: CT11156A	Site Name: Killingly/ Margaret Henr1	Latitude: 41.7914170000
Status: Draft	Site Class: Self Support Tower	Longitude: -71.8223610000
Version: 2.1	Site Type: Structure Non Building	Address: 818 Providence Pike
Project Type: L600	Plan Year:	City, State: Killingly, CT
Approved: Not Approved	Market: CONNECTICUT	Region: NORTHEAST
Approved By: Not Approved	Vendor: Ericsson	
Last Modified: 4/30/2019 6:48:42 PM	Landlord: <undefined>	
Last Modified By: GSM1900\AMurill9		

RAN Template: 67D04G		AL Template: 67D04G_1DP+1OP		
Sector Count: 3	Antenna Count: 6	Coax Line Count: 6	TMA Count: 3	RRU Count: 3

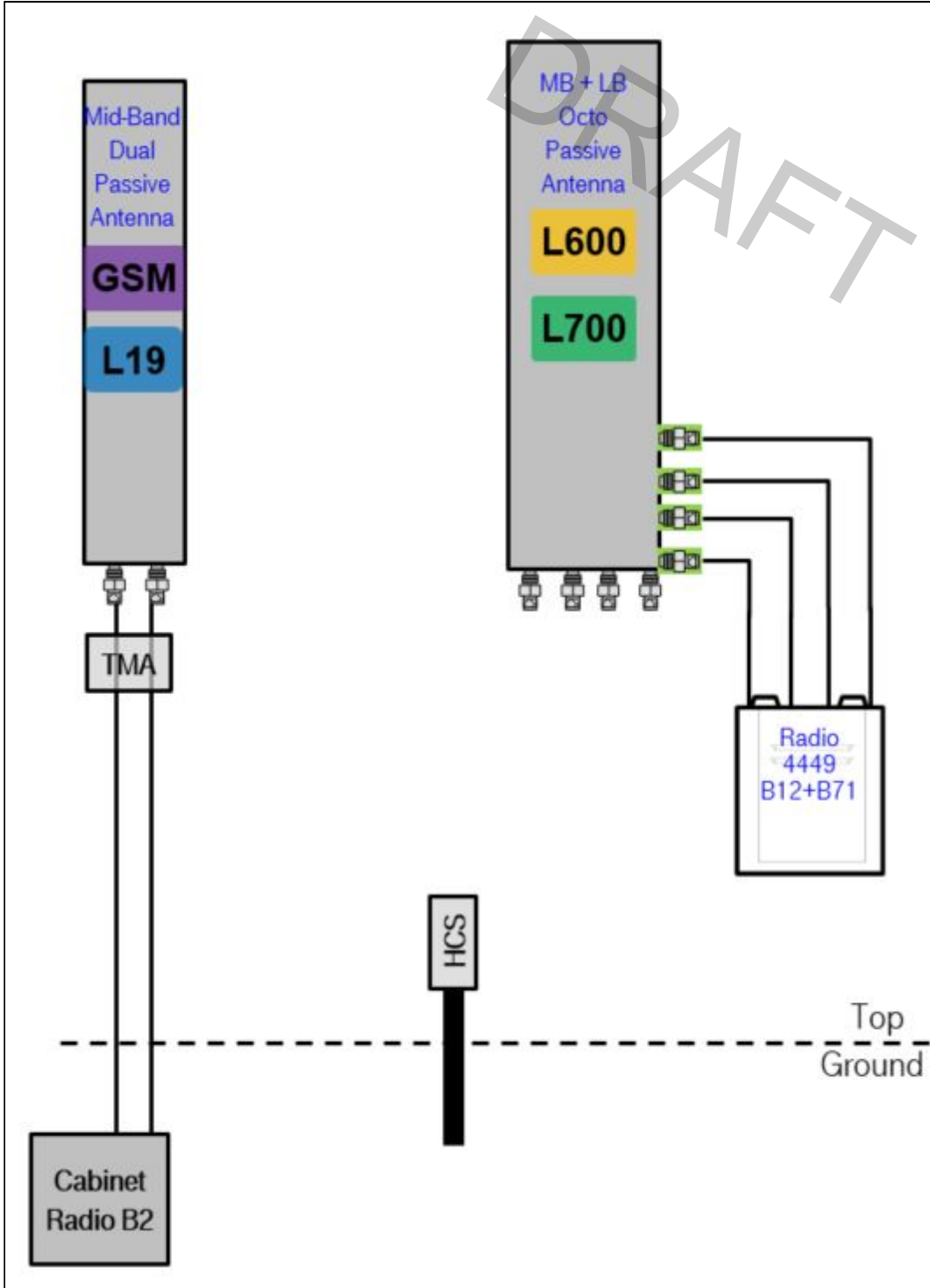
Section 2 - Existing Template Images

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Section 3 - Proposed Template Images

Capture.JPG



Notes:

Section 4 - Siteplan Images

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DRAFT

RAN Template: 67D04G	A&L Template: 67D04G_1DP+1OP	Power System Template: Custom
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Section 5 - RAN Equipment

Existing RAN Equipment

Template: 704G

Enclosure	1	
Enclosure Type	RBS 6201 ODE	
Baseband	DUG20	DUS41
Radio	RUS01 B2 (x6)	RUS01 B12 (x6)

Proposed RAN Equipment

Template: 67D04G

Enclosure	1	
Enclosure Type	RBS 6201 ODE	
Baseband	DUG20 G1900	BB 6630 L1900 L700 L600
Hybrid Cable System	Ericsson 6x12 HCS *Select Length & AWG*	
Radio	RUS01 B2 (x3) G1900	RUS01 B2 (x3) L1900

RAN Scope of Work:

*** Existing RBS6201 ODE on site ***

Remove all (6) RUS01 B12 for L700 from cabinet.

Replace (1) DUS41 with (1) BB6630 for LTE.
Add (1) BB6630 for future 5G N600.

Add (1) 6X12 HCS
Existing: (12) Coaxial Lines.
Remove (6) Coaxial Lines

RAN Template: 67D04G	A&L Template: 67D04G_1DP+1OP	Power System Template: Custom
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Section 6 - A&L Equipment

Existing Template: 704G
Proposed Template: 67D04G_1DP+1OP

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	EMS - RR90-17-XXDP (Dual)	Andrew - LNX-6515DS-A1M (Dual)
Azimuth	90	90
M. Tilt	0	0
Height	145	145
Ports	P1	P2
Active Tech.	L1900 G1900	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables	1-1/4" Coax - 165 ft. (x2)	1-5/8" Coax - 165 ft. (x2)
TMA's	Generic Twin Style 1A - PCS (AtAntenna)	
Diplexers / Combiners		
Radio		
Sector Equipment		

Unconnected Equipment:

Scope of Work:

*** Existing Two Mounts per Sector ***

RAN Template: 67D04G	A&L Template: 67D04G_1DP+1OP	Power System Template: Custom
--------------------------------	--	---

Sector 1 (Proposed) view from behind						
Coverage Type	A - Outdoor Macro					
Antenna	1			2		
Antenna Model	RFS - APX16DWV-16DWV-S-E-A20 (Quad)			RFS - APXVAARR24_43-U-NA20 (Octo)		
Azimuth	90			90		
M. Tilt	0			0		
Height	145			145		
Ports	P1	P2	P3	P4	P5	P6
Active Tech.	L1900 G1900		L700 L600	L700 L600		
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt	2		2	2		
Cables	1-5/8" Coax - 165 ft. (x2)					
TMA's	Generic Twin Style 1A - PCS (AtAntenna)					
Diplexers / Combiners						
Radio			Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)		
Sector Equipment						

Unconnected Equipment:

Scope of Work:

*** Existing Two Mounts per Sector ***
 Replace EMS antenna in Position 1 with RFS APX16 Quad.
 Connect (2) 1-5/8" Coaxial Lines to PCS TMA in Position 1.
 Replace LB Dual in Position 2 with (1) LB/MB Octo.
 Add (1) Radio 4449 B71+B12 for L600 and L700 to Postion 2 at antenna.

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

RAN Template: 67D04G	A&L Template: 67D04G_1DP+1OP	Power System Template: Custom
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Sector 2 (Existing) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	EMS - RR90-17-XXDP (Dual)	Andrew - LNX-6515DS-A1M (Dual)
Azimuth	200	200
M. Tilt	0	0
Height	145	145
Ports	P1	P2
Active Tech.	L1900 G1900	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables	1-1/4" Coax - 165 ft. (x2)	1-5/8" Coax - 165 ft. (x2)
TMA's	Generic Twin Style 1A - PCS (AtAntenna)	
Diplexers / Combiners		
Radio		
Sector Equipment		
Unconnected Equipment:		
Scope of Work:		
*** Existing Two Mounts per Sector ***		

RAN Template: 67D04G	A&L Template: 67D04G_1DP+1OP	Power System Template: Custom
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Sector 2 (Proposed) view from behind						
Coverage Type	A - Outdoor Macro					
Antenna	1			2		
Antenna Model	RFS - APX16DWV-16DWV-S-E-A20 (Quad)			RFS - APXVAARR24_43-U-NA20 (Octo)		
Azimuth	200			200		
M. Tilt	0			0		
Height	145			145		
Ports	P1	P2	P3	P4	P5	P6
Active Tech.	L1900 G1900		L700 L600	L700 L600		
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt	2		2	2		
Cables	1-5/8" Coax - 165 ft. (x2)					
TMA's	Generic Twin Style 1A - PCS (AtAntenna)					
Diplexers / Combiners						
Radio			Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)		
Sector Equipment						

Unconnected Equipment:

Scope of Work:

*** Existing Two Mounts per Sector ***
 Replace EMS antenna in Position 1 with RFS APX16 Quad.
 Connect (2) 1-5/8" Coaxial Lines to PCS TMA in Position 1.
 Replace LB Dual in Position 2 with (1) LB/MB Octo.
 Add (1) Radio 4449 B71+B12 for L600 and L700 to Postion 2 at antenna.

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

RAN Template: 67D04G	A&L Template: 67D04G_1DP+1OP	Power System Template: Custom
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Sector 3 (Existing) view from behind		
Coverage Type	A - Outdoor Macro	
Antenna	1	2
Antenna Model	EMS - RR90-17-XXDP (Dual)	Andrew - LNX-6515DS-A1M (Dual)
Azimuth	315	315
M. Tilt	0	0
Height	145	145
Ports	P1	P2
Active Tech.	L1900 G1900	L700
Dark Tech.		
Restricted Tech.		
Decomm. Tech.		
E. Tilt	2	2
Cables	1-1/4" Coax - 165 ft. (x2)	1-5/8" Coax - 165 ft. (x2)
TMA's	Generic Twin Style 1A - PCS (AtAntenna)	
Diplexers / Combiners		
Radio		
Sector Equipment		
Unconnected Equipment:		
Scope of Work:		
*** Existing Two Mounts per Sector ***		

RAN Template: 67D04G	A&L Template: 67D04G_1DP+1OP	Power System Template: Custom
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Sector 3 (Proposed) view from behind						
Coverage Type	A - Outdoor Macro					
Antenna	1			2		
Antenna Model	RFS - APX16DWV-16DWV-S-E-A20 (Quad)			RFS - APXVAARR24_43-U-NA20 (Octo)		
Azimuth	315			315		
M. Tilt	0			0		
Height	145			145		
Ports	P1	P2	P3	P4	P5	P6
Active Tech.	L1900 G1900		L700 L600	L700 L600		
Dark Tech.						
Restricted Tech.						
Decomm. Tech.						
E. Tilt	2		2	2		
Cables	1-5/8" Coax - 165 ft. (x2)					
TMA's	Generic Twin Style 1A - PCS (AtAntenna)					
Diplexers / Combiners						
Radio			Radio 4449 B71+B12 (At Antenna)	SHARED Radio 4449 B71+B12 (At Antenna)		
Sector Equipment						

Unconnected Equipment:

Scope of Work:

*** Existing Two Mounts per Sector ***
 Replace EMS antenna in Position 1 with RFS APX16 Quad.
 Connect (2) 1-5/8" Coaxial Lines to PCS TMA in Position 1.
 Replace LB Dual in Position 2 with (1) LB/MB Octo.
 Add (1) Radio 4449 B71+B12 for L600 and L700 to Postion 2 at antenna.

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

RAN Template: 67D04G	A&L Template: 67D04G_1DP+1OP	Power System Template: Custom
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Section 7 - Power Systems Equipment

Existing Power Systems Equipment

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Proposed Power Systems Equipment



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

Product Description

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

Features/Benefits

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



Technical Specifications

Electrical Specifications

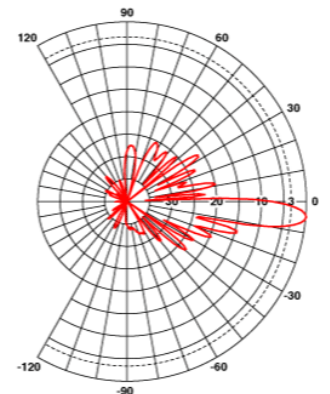
Frequency Range, MHz	1710-2200
Horizontal Beamwidth, deg	65
Vertical Beamwidth, deg	5.9 to 7.7
Electrical Downtilt, deg	0-10
Gain, dBi (dBd)	18.4 (16.3)
1st Upper Sidelobe Suppression, dB	> 18 (typically > 20)
Upper Sidelobe Suppression, dB	> 18 all (typically > 20)
Front-To-Back Ratio, dB	>26 (typically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

Mechanical Specifications

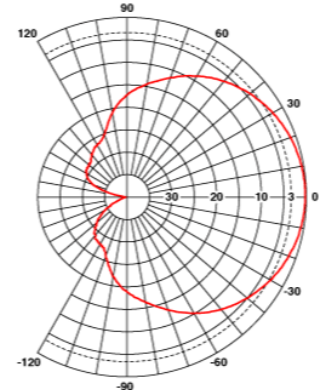
Dimensions - HxWxD, mm (in)	1420 x 331 x 80 (55.9 x 13 x 3.15)
Weight w/o Mtg Hardware, kg (lb)	18.5 (40.7)
Survival Wind Speed, km/h (mph)	200 (125)
Rated Wind Speed, km/h (mph)	160 (100)
Max Wind Loading Area, m ² (ft ²)	0.47 (5.03)
Front Thrust @ Rated Wind, N (lbf)	756 (170)
Maximum Thrust @ Rated Wind, N (lbf)	756 (170)
Wind Load - Side @ Rated Wind, N (lbf)	231 (52)
Wind Load - Rear @ Rated Wind, N (lbf)	408 (92)
Radome Material	Fiberglass
Radome Color	Light Grey RAL7035
Mounting Hardware Material	Diecasted Aluminum
Shipping Weight, kg (lb)	24.5 (53.9)
Packing Dimensions, HxWxD, mm (in)	1520 x 408 x 198 (59.8 x 16 x 7.8)

Ordering Information

Mounting Hardware APM40-2 + APM40-E2



Vertical Pattern



Horizontal Pattern

All information contained in the present datasheet is subject to confirmation at time of ordering



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

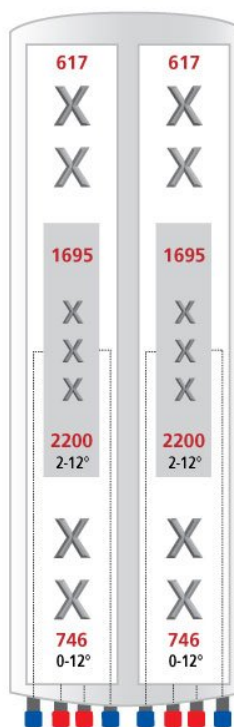
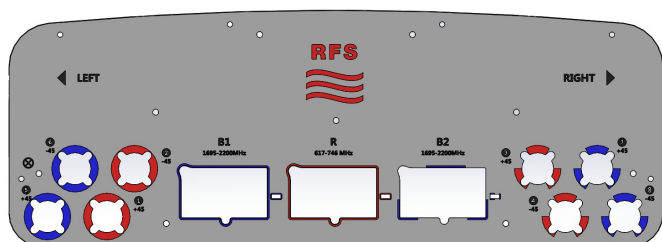
Impedance	Ohm	50.0
Polarization	Deg	±45°

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

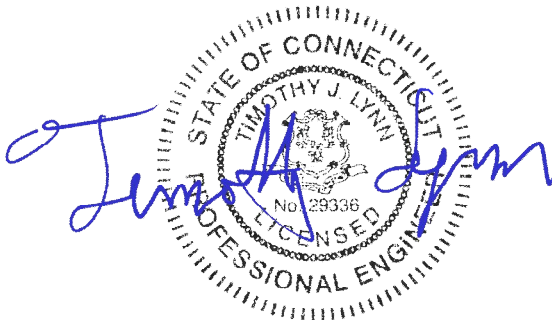
T-Mobile Site #: CT11156A

*812 Providence Pike
Danielson, CT*

Centek Project No. 19027.60

Date: May 22, 2019

Max Stress Ratio = 73.4%



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 04/30/19

May 22, 2019

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

Re: *Structural Letter ~ Antenna Mount*
T-Mobile – Site Ref: CT11156A
812 Providence Pike
Danielson, CT 06239

Centek Project No. 19027.60

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 proposed mount, consisting three (3) V - frame sector mounts (Commscope P/N: SF-QV12-B) with stiff arms to support the proposed/existing 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:

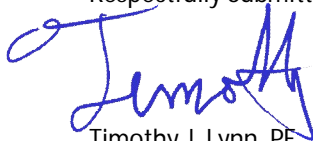
- T-Mobile:
V-Frames: Three (3) RFS APXVAARR24-43-NA20 panel antennas, three (3) RFS APX16DWW-16DWVS panel antennas, three (3) TMAs and three (3) Ericsson 4449 B71_B12 remote radio mounted on three (3) V-Frames with a RAD center elevation of 140-ft +/- AGL.

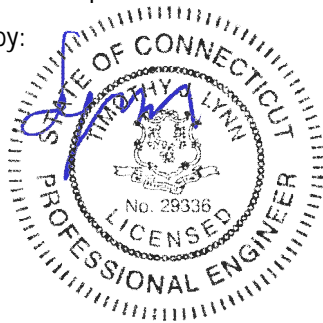
The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 101 mph for Danielson as required in Appendix N of the 2018 Connecticut State Building Code.

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

Based on our review of the installation, it is our opinion that the subject proposed replacement antenna frames have sufficient capacity to support the aforementioned antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:


Timothy J. Lynn, PE
Structural Engineer



CEN TEK Engineering, Inc.
Structural Analysis – Mount Analysis
T-Mobile Site Ref. ~ CT11156A
Danielson, CT
May 22, 2019

Section 2 - Calculations

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

Wind Speeds

Basic Wind Speed $V := 101$ mph (User Input - 2016 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 := Lattice (User Input)
 Structure Category = SC := II (User Input)
 Exposure Category = Exp := B (User Input)
 Structure Height = h := 190 ft (User Input)
 Height to Center of Antennas = $z_{Ant} := 140$ ft (User Input)
 Radial Ice Thickness = $t_i := 0.75$ in (User Input per Annex B of TIA-222-G)
 Radial Ice Density = $\rho_d := 56.00$ pcf (User Input)
 Topographic Factor = $K_{zt} := 1.0$ (User Input)
 $K_a := 1.0$ (User Input)
 Gust Response Factor = $G_H = 0.85$ (User Input)

Output

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

Importance Factors = $I_{Wind} := \begin{cases} 0.87 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.15 & \text{if SC = 3} \end{cases} = 1$ (Per Table 2-3 of TIA-222-G)

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

$I_{ice} := \begin{cases} 0 & \text{if SC = 1} \\ 1.00 & \text{if SC = 2} \\ 1.25 & \text{if SC = 3} \end{cases} = 1$

$$K_{iz} := \left(\frac{z_{Ant}}{33} \right)^{0.1} = 1.155$$

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.733$$

Velocity Pressure Coefficient Antennas =

$$K_{z_{Ant}} := 2.01 \left(\frac{z_{Ant}}{z_g} \right)^{\frac{2}{\alpha}} = 1.088$$

Velocity Pressure w/o Ice Antennas =

$$q_{z_{Ant}} := 0.00256 \cdot K_d \cdot K_{z_{Ant}} \cdot V^2 \cdot I_{Wind} = 24.15$$

Velocity Pressure with Ice Antennas =

$$q_{z_{ice.Ant}} := 0.00256 \cdot K_d \cdot K_{z_{Ant}} \cdot V_i^2 \cdot I_{Wind} = 5.918$$

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPXVAARR24-43	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 95.9$	in (User Input)
Antenna Width =	$W_{ant} := 24$	in (User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in (User Input)
Antenna Weight =	$WT_{ant} := 153$	lbs (User Input)
Number of Antennas =	$N_{ant} := 1$	(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.0$	
Antenna Force Coefficient =	$Ca_{ant} = 1.27$	

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 16$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 416$ lbs

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

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 151$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 19$ sf

Total Antenna Wind Force w/ Ice = $F_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 121$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 8.4$ sf

Total Antenna Wind Force w/ Ice = $F_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 53$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 153$ lbs

Gravity Loads (ice only)

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

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz})(T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \times 10^4$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot \rho_d = 427$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 427$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPX16DWV-16DWVS	
Antenna Shape =	Flat	(User Input)
Antenna Height =	$L_{ant} := 55.9$	in (User Input)
Antenna Width =	$W_{ant} := 13$	in (User Input)
Antenna Thickness =	$T_{ant} := 3.15$	in (User Input)
Antenna Weight =	$WT_{ant} := 41$	lbs (User Input)
Number of Antennas =	$N_{ant} := 1$	(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.3$	
Antenna Force Coefficient =	$Ca_{ant} = 1.28$	

Wind Load (without ice)

Surface Area for One Antenna = $SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 133$ lbs

Surface Area for One Antenna = $SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.2$ sf

Total Antenna Wind Force = $F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 32$ lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice = $SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.8$ sf

Total Antenna Wind Force w/ Ice = $F_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 44$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 2.7$ sf

Total Antenna Wind Force w/ Ice = $F_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 18$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 41$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2289$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4179$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot \rho_d = 135$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 135$ lbs

Development of Wind & Ice Load on RRUS

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 =	$W_{T_{RRUS}} := 74$ lbs (User Input)
Number of RRUSs =	$N_{RRUS} := 1$ (User Input)
RRUS Aspect Ratio =	$A_{r_{RRUS}} := \frac{L_{RRUS}}{W_{RRUS}} = 1.1$
RRUS Force Coefficient =	$C_{a_{RRUS}} = 1.2$

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 = $F_{RRUS} := qZ_{Ant} \cdot G_H \cdot C_{a_{RRUS}} \cdot K_a \cdot SA_{RRUSF} = 34$ lbs

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

Total RRUS Wind Force = $F_{RRUS} := qZ_{Ant} \cdot G_H \cdot C_{a_{RRUS}} \cdot K_a \cdot SA_{RRUSS} = 27$ lbs

Wind Load (with ice)

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

Total RRUS Wind Force w/ Ice = $F_{i_{RRUS}} := qZ_{ice} \cdot Ant \cdot G_H \cdot C_{a_{RRUS}} \cdot K_a \cdot SA_{ICERRUSF} = 13$ lbs

Surface Area for One RRUS w/Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.8$ sf

Total RRUS Wind Force w/ Ice = $F_{i_{RRUS}} := qZ_{ice} \cdot Ant \cdot G_H \cdot C_{a_{RRUS}} \cdot K_a \cdot SA_{ICERRUSS} = 11$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $W_{T_{RRUS}} \cdot N_{RRUS} = 74$ 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 = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz})(T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2190$

Weight of Ice on Each RRUS = $W_{i_{RRUS}} := \frac{V_{ice}}{1728} \cdot Id = 71$ lbs

Weight of Ice on All RRUSs = $W_{i_{RRUS}} \cdot N_{RRUS} = 71$ lbs

Development of Wind & Ice Load on TMA

TMA Data:

TMA Model =	Ericsson KRY112 TMA
TMA Shape =	Flat (User Input)
TMA Height =	$L_{TMA} := 7.7$ in (User Input)
TMA Width =	$W_{TMA} := 7.5$ in (User Input)
TMA Thickness =	$T_{TMA} := 3.4$ in (User Input)
TMA Weight =	$W_{TMA} := 11$ lbs (User Input)
Number of TMA's =	$N_{TMA} := 1$ (User Input)
TMA Aspect Ratio =	$Ar_{TMA} := \frac{L_{TMA}}{W_{TMA}} = 1$
TMA Force Coefficient =	$Ca_{TMA} = 1.2$

Wind Load (without ice)

Surface Area for One TMA = $SA_{TMAF} := \frac{L_{TMA} \cdot W_{TMA}}{144} = 0.4$ sf

Total TMA Wind Force = $F_{TMA} := qz_{Ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAF} = 10$ lbs

Surface Area for One TMA = $SA_{TMAS} := \frac{L_{TMA} \cdot T_{TMA}}{144} = 0.2$ sf

Total TMA Wind Force = $F_{TMA} := qz_{Ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAS} = 4$ lbs

Wind Load (with ice)

Surface Area for One TMA w/ Ice = $SA_{ICETMAF} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz})}{144} = 0.9$ sf

Total TMA Wind Force w/ Ice = $F_{i_{TMA}} := qz_{ice} \cdot Ant \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAF} = 5$ lbs

Surface Area for One TMA w/ Ice = $SA_{ICETMAS} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz})}{144} = 0.5$ sf

Total TMA Wind Force w/ Ice = $F_{i_{TMA}} := qz_{ice} \cdot Ant \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAS} = 3$ lbs

Gravity Load (without ice)

Weight of All TMAs = $W_{TMA} \cdot N_{TMA} = 11$ lbs

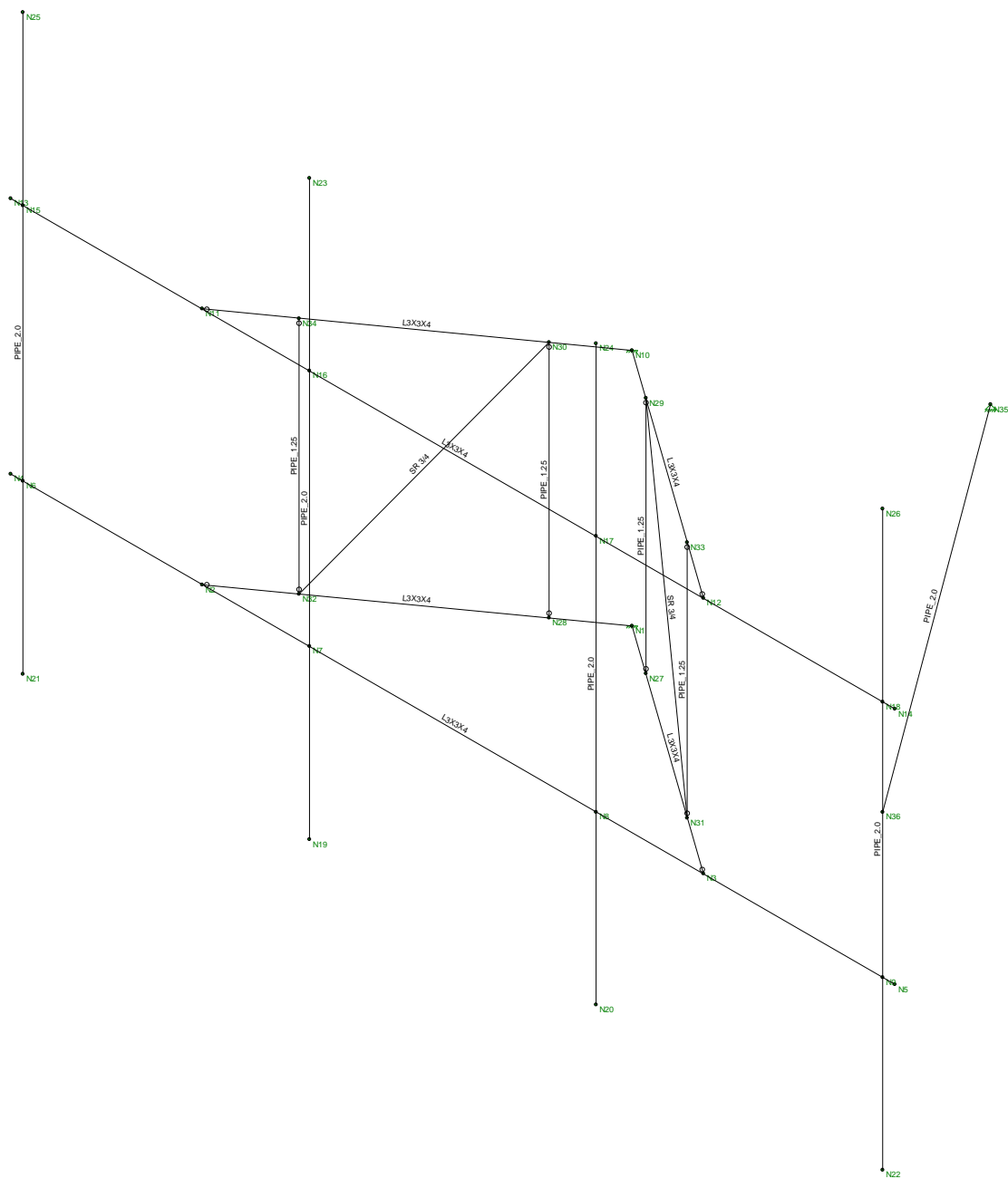
Gravity Loads (ice only)

Volume of Each TMA = $V_{TMA} := L_{TMA} \cdot W_{TMA} \cdot T_{TMA} = 196$ cu in

Volume of Ice on Each TMA = $V_{ice} := (L_{TMA} + 2 \cdot t_{iz})(W_{TMA} + 2 \cdot t_{iz})(T_{TMA} + 2 \cdot t_{iz}) - V_{TMA} = 644$ cu in

Weight of Ice on Each TMA = $W_{ICETMA} := \frac{V_{ice}}{1728} \cdot \rho_d = 21$ lbs

Weight of Ice on All TMAs = $W_{ICETMA} \cdot N_{TMA} = 21$ lbs



Envelope Only Solution

Centek
TJL
19027.60

CT11156A
Member Framing

May 22, 2019 at 9:13 AM
Antenna Mount.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (ft/sec^2)	32.2
Wall Mesh Size (in)	12
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 14th(360-10): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	AISC 14th(360-10): ASD
Cold Formed Steel Code	AISI S100-10: ASD
Wood Code	AWC NDS-12: ASD
Wood Temperature	< 100F
Concrete Code	ACI 318-11
Masonry Code	ACI 530-11: ASD
Aluminum Code	AA ADM1-10: ASD - Building
Stainless Steel Code	AISC 14th(360-10): ASD
Adjust Stiffness?	Yes(Iterative)

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	ASCE 7-10
Seismic Base Elevation (ft)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3
Ct Exp. X	.75
Ct Exp. Z	.75
SD1	1
SDS	1
S1	1
TL (sec)	5
Risk Cat	I or II
Drift Cat	Other
Om Z	1
Om X	1
Cd Z	4
Cd X	4
Rho Z	1
Rho X	1
Footing Overturning Safety Factor	1
Optimize for OTM/Sliding	No
Check Concrete Bearing	No
Footing Concrete Weight (k/ft^3)	150.001
Footing Concrete f'c (ksi)	4
Footing Concrete Ec (ksi)	3644
Lambda	1
Footing Steel fy (ksi)	60
Minimum Steel	0.0018
Maximum Steel	0.0075
Footing Top Bar	#3
Footing Top Bar Cover (in)	2
Footing Bottom Bar	#3
Footing Bottom Bar Cover (in)	3.5
Pedestal Bar	#3
Pedestal Bar Cover (in)	1.5
Pedestal Ties	#3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	58	1.2
3	A992	29000	11154	.3	.65	.49	50	1.1	58	1.2
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.3	58	1.1
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.2	58	1.1
6	A53 Grade B	29000	11154	.3	.65	.49	35	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	L3x3x1/4	L3X3X4	Beam	Pipe	A36 Gr.36	Typical	1.44	1.23	1.23	.031
2	Pipe 1.25	PIPE 1.25	Column	Pipe	A53 Grade B	Typical	.625	.184	.184	.368
3	Pipe 2.0	PIPE 2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Antenna Mast Pipe 2.0	PIPE 2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
5	SR3/4	SR 3/4	Beam	Pipe	A36 Gr.36	Typical	.442	.016	.016	.031

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	L3x3x1/4	4.301			Lbyy						Lateral
2	M2	L3x3x1/4	4.301			Lbyy						Lateral
3	M3	L3x3x1/4	12.34			Lbyy						Lateral
4	M4	L3x3x1/4	4.301			Lbyy						Lateral
5	M5	L3x3x1/4	4.301			Lbyy						Lateral
6	M6	L3x3x1/4	12.34			Lbyy						Lateral
7	M7	Antenna Ma...	8			Lbyy						Lateral
8	M8	Antenna Ma...	8			Lbyy						Lateral
9	M9	Antenna Ma...	8			Lbyy						Lateral
10	M10	Antenna Ma...	8			Lbyy						Lateral
11	M11	Pipe 1.25	3.333			Lbyy						Lateral
12	M12	Pipe 1.25	3.333			Lbyy						Lateral
13	M13	Pipe 1.25	3.333			Lbyy						Lateral
14	M14	Pipe 1.25	3.333			Lbyy						Lateral
15	M15	SR3/4	4.166			Lbyy						Lateral
16	M16	SR3/4	4.166			Lbyy						Lateral
17	M17	Pipe 2.0	7.049			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Ru...
1	M1	N1	N3		270	L3x3x1/4	Beam	Pipe	A36 Gr.36	Typical
2	M2	N1	N2			L3x3x1/4	Beam	Pipe	A36 Gr.36	Typical
3	M3	N4	N5		180	L3x3x1/4	Beam	Pipe	A36 Gr.36	Typical
4	M4	N10	N12		180	L3x3x1/4	Beam	Pipe	A36 Gr.36	Typical
5	M5	N10	N11		90	L3x3x1/4	Beam	Pipe	A36 Gr.36	Typical
6	M6	N13	N14		270	L3x3x1/4	Beam	Pipe	A36 Gr.36	Typical
7	M7	N25	N21			Antenna Mast Pipe 2.0	Column	Pipe	A53 Gra...	Typical
8	M8	N19	N23			Antenna Mast Pipe 2.0	Column	Pipe	A53 Gra...	Typical
9	M9	N20	N24			Antenna Mast Pipe 2.0	Column	Pipe	A53 Gra...	Typical
10	M10	N26	N22			Antenna Mast Pipe 2.0	Column	Pipe	A53 Gra...	Typical
11	M11	N29	N27			Pipe 1.25	Column	Pipe	A53 Gra...	Typical
12	M12	N33	N31			Pipe 1.25	Column	Pipe	A53 Gra...	Typical
13	M13	N30	N28			Pipe 1.25	Column	Pipe	A53 Gra...	Typical
14	M14	N34	N32			Pipe 1.25	Column	Pipe	A53 Gra...	Typical
15	M15	N30	N32			SR3/4	Beam	Pipe	A36 Gr.36	Typical
16	M16	N29	N31			SR3/4	Beam	Pipe	A36 Gr.36	Typical
17	M17	N36	N35			Pipe 2.0	Beam	Pipe	A53 Gra...	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
1	N1	0	0	0	0	
2	N2	-3.5	0	2.5	0	
3	N3	3.5	0	2.5	0	
4	N4	-6.17	0	2.5	0	
5	N5	6.17	0	2.5	0	
6	N6	-6	0	2.5	0	
7	N7	-2	0	2.5	0	
8	N8	2	0	2.5	0	
9	N9	6	0	2.5	0	
10	N10	0	3.333	0	0	
11	N11	-3.5	3.333	2.5	0	
12	N12	3.5	3.333	2.5	0	
13	N13	-6.17	3.333	2.5	0	
14	N14	6.17	3.333	2.5	0	
15	N15	-6	3.333	2.5	0	
16	N16	-2	3.333	2.5	0	
17	N17	2	3.333	2.5	0	
18	N18	6	3.333	2.5	0	
19	N19	-2	-2.333	2.5	0	
20	N20	2	-2.333	2.5	0	
21	N21	-6	-2.333	2.5	0	
22	N22	6	-2.333	2.5	0	
23	N23	-2	5.667	2.5	0	
24	N24	2	5.667	2.5	0	
25	N25	-6	5.667	2.5	0	
26	N26	6	5.667	2.5	0	
27	N27	0.675399	0	0.482428	0	
28	N28	-0.675399	0	0.482428	0	
29	N29	0.675399	3.333	0.482428	0	
30	N30	-0.675399	3.333	0.482428	0	
31	N31	2.709732	0	1.935523	0	
32	N32	-2.709732	0	1.935523	0	
33	N33	2.709732	3.333	1.935523	0	
34	N34	-2.709732	3.333	1.935523	0	
35	N35	1.825	2	-3.18	0	
36	N36	6	2	2.5	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N10	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N35	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	Y	-.077	.5
2	M7	Y	-.077	7.5
3	M10	Y	-.021	2

Member Point Loads (BLC 2 : Dead Load) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
4	M10	Y	-.021	6
5	M7	Y	-.074	%50
6	M10	Y	-.011	%50

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	Y	-.214	.5
2	M7	Y	-.214	7.5
3	M10	Y	-.068	2
4	M10	Y	-.068	6
5	M7	Y	-.071	%50
6	M10	Y	-.021	%50

Member Point Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	X	.027	.5
2	M7	X	.027	7.5
3	M10	X	.009	2
4	M10	X	.009	6
5	M7	X	.011	%50
6	M10	X	.003	%50

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	X	.076	.5
2	M7	X	.076	7.5
3	M10	X	.016	2
4	M10	X	.016	6
5	M7	X	.027	%50
6	M10	X	.004	%50

Member Point Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	Z	.061	.5
2	M7	Z	.061	7.5
3	M10	Z	.022	2
4	M10	Z	.022	6

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M7	Z	.208	.5
2	M7	Z	.208	7.5
3	M10	Z	.067	2
4	M10	Z	.067	6

Member Distributed Loads (BLC 4 : Wind with Ice X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.002	.002	0	0
2	M2	X	.002	.002	0	0
3	M4	X	.002	.002	0	0
4	M5	X	.002	.002	0	0
5	M8	X	.002	.002	0	0
6	M9	X	.002	.002	0	0
7	M17	X	.002	.002	0	0
8	M10	X	.002	.002	0	0
9	M7	X	.002	.002	0	0
10	M8	X	.002	.002	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.009	.009	0	0
2	M2	X	.009	.009	0	0
3	M4	X	.009	.009	0	0
4	M5	X	.009	.009	0	0
5	M8	X	.009	.009	0	0
6	M9	X	.009	.009	0	0
7	M17	X	.009	.009	0	0
8	M10	X	.009	.009	0	0
9	M7	X	.009	.009	0	0
10	M8	X	.009	.009	0	0

Member Distributed Loads (BLC 6 : Wind with Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M6	Z	.002	.002	0	0
2	M3	Z	.002	.002	0	0
3	M2	Z	.002	.002	0	0
4	M5	Z	.002	.002	0	0
5	M4	Z	.002	.002	0	0
6	M1	Z	.002	.002	0	0
7	M8	Z	.002	.002	0	0
8	M9	Z	.002	.002	0	0
9	M7	Z	.002	.002	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/...	Start Location[ft,%]	End Location[ft,%]
1	M6	Z	.009	.009	0	0
2	M3	Z	.009	.009	0	0
3	M2	Z	.009	.009	0	0
4	M5	Z	.009	.009	0	0
5	M4	Z	.009	.009	0	0
6	M1	Z	.009	.009	0	0
7	M8	Z	.009	.009	0	0
8	M9	Z	.009	.009	0	0
9	M7	Z	.009	.009	0	0

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribu...	Area(M...	Surface...
1	Self Weight	DL		-1						
2	Dead Load	None					6			
3	Ice Load	None					6			
4	Wind with Ice X	None					6	10		
5	Wind X	None					6	10		
6	Wind with Ice Z	None					4	9		
7	Wind Z	None					4	9		

Load Combinations

	Description	Solve	PDel...	S...B...Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC
1	1.2D + 1.6W (X-dire...	Yes	Y	1 1.2	2	1.2	5	1.6											
2	0.9D + 1.6W (X-dire...	Yes	Y	1 .9	2	.9	5	1.6											
3	1.2D + 1.0Di + 1.0Wi...	Yes	Y	1 1.2	2	1.2	3	1	4	1									
4	1.2D + 1.6W (Z-direc...	Yes	Y	1 1.2	2	1.2	7	1.6											
5	0.9D + 1.6W (Z-direc...	Yes	Y	1 .9	2	.9	7	1.6											
6	1.2D + 1.0Di + 1.0Wi...	Yes	Y	1 1.2	2	1.2	3	1	6	1									

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	-261	5	.631	6	.853	3	-0.76	5	-.321	3	.715	5
2		min	-1.02	3	.242	2	-.618	5	-.21	3	-1.595	4	.025	3
3	N10	max	.909	6	.825	3	-.467	2	-.119	2	-.029	3	-.207	3
4		min	-.463	2	.295	5	-1.418	4	-.282	3	-1.495	5	-.773	4
5	N35	max	.108	2	.01	4	.225	2	0	6	0	6	0	6
6		min	-.004	6	.006	3	.002	6	0	1	0	1	0	1
7	Totals:	max	0	6	1.451	6	0	3						
8		min	-1.269	1	.596	2	-1.829	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
1	N1	max	0	6	0	6	0	6	0	6	0	6	0	6
2		min	0	1	0	1	0	1	0	1	0	1	0	1
3	N2	max	.18	4	-.022	2	.253	4	5.261e-04	3	1.713e-02	5	6.029e-03	6
4		min	.044	3	-.075	6	.058	3	-3.051e-03	5	-8.57e-04	3	1.351e-03	2
5	N3	max	.178	4	-.007	5	-.06	3	1.813e-03	3	1.573e-03	3	-3.06e-04	5
6		min	.043	3	-.016	3	-.248	4	3.962e-04	5	-1.833e-03	5	-1.553e-03	3
7	N4	max	.18	4	-.083	5	.957	5	1.44e-03	3	2.453e-02	5	4.713e-03	3
8		min	.044	3	-.292	3	.019	3	-1.e-02	5	1.892e-04	3	4.962e-04	5
9	N5	max	.178	4	-.023	5	-.095	3	3.679e-03	3	1.848e-04	3	-2.011e-04	3
10		min	.043	3	-.06	3	-.154	4	1.075e-03	5	-3.426e-03	5	-4.742e-04	4
11	N6	max	.18	4	-.082	5	.907	5	1.44e-03	3	2.453e-02	5	4.713e-03	3
12		min	.044	3	-.282	3	.019	3	-1.e-02	5	1.892e-04	3	4.962e-04	5
13	N7	max	.18	4	-.006	5	.065	1	-6.555e-04	2	1.092e-02	4	1.859e-03	6
14		min	.043	3	-.01	1	.005	5	-2.089e-03	6	1.327e-03	3	5.077e-04	2
15	N8	max	.179	4	0	3	-.035	3	7.006e-04	3	2.121e-03	1	1.423e-04	1
16		min	.043	3	-.007	1	-.258	4	-1.925e-04	5	6.885e-04	5	-4.085e-05	5

Envelope Joint Displacements (Continued)

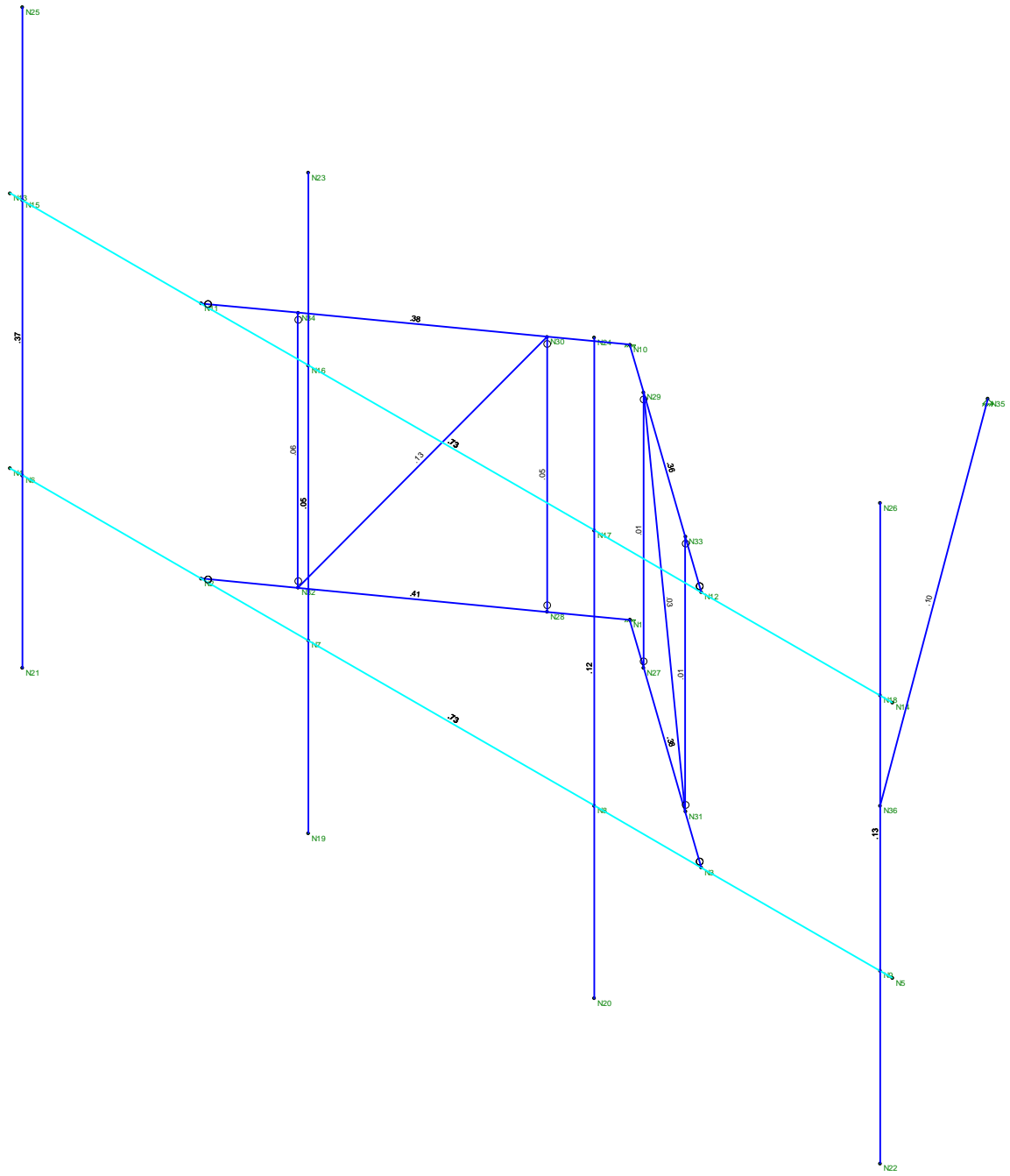
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
17	N9	max	.178	4	-.022	5	-.094	3	3.679e-03	3	1.847e-04	3	-2.01e-04	3
18		min	.043	3	-.06	3	-.161	4	1.075e-03	5	-3.426e-03	5	-4.743e-04	4
19	N10	max	0	6	0	6	0	6	0	6	0	6	0	6
20		min	0	1	0	1	0	1	0	1	0	1	0	1
21	N11	max	.163	5	-.007	5	.231	5	3.625e-03	4	1.813e-02	4	6.052e-03	3
22		min	-.006	3	-.074	3	-.008	3	-3.881e-05	2	2.531e-03	3	1.22e-03	5
23	N12	max	.162	5	-.009	2	.008	3	1.701e-03	6	-6.954e-04	2	-5.438e-04	2
24		min	-.006	3	-.017	6	-.225	5	1.507e-04	2	-2.767e-03	4	-1.592e-03	6
25	N13	max	.163	5	-.085	2	.975	4	1.09e-02	4	2.48e-02	4	4.582e-03	6
26		min	-.007	3	-.291	3	.079	3	4.127e-04	2	1.081e-03	3	1.904e-04	2
27	N14	max	.162	5	-.022	5	.041	3	3.325e-03	6	-2.374e-04	3	3.321e-04	5
28		min	-.006	3	-.06	3	-.106	5	4.66e-05	2	-3.429e-03	5	-9.305e-05	6
29	N15	max	.163	5	-.082	5	.925	4	1.09e-02	4	2.479e-02	4	4.582e-03	6
30		min	-.007	3	-.282	3	.077	3	4.127e-04	2	1.081e-03	3	1.904e-04	2
31	N16	max	.163	5	-.006	5	.035	2	-3.784e-05	5	1.05e-02	5	1.774e-03	3
32		min	-.006	3	-.01	1	-.041	6	-2.064e-03	3	2.486e-04	3	-2.926e-04	5
33	N17	max	.162	5	0	3	-.007	3	7.792e-04	6	1.507e-03	2	1.416e-04	4
34		min	-.006	3	-.007	4	-.247	5	1.042e-04	2	-5.472e-04	6	-1.863e-05	3
35	N18	max	.162	5	-.022	5	.041	3	3.325e-03	6	-2.373e-04	3	3.322e-04	5
36		min	-.006	3	-.06	3	-.113	5	4.66e-05	2	-3.429e-03	5	-9.3e-05	6
37	N19	max	.217	4	-.006	5	.109	3	-6.554e-04	2	1.092e-02	4	1.859e-03	6
38		min	.094	3	-.01	1	.04	5	-2.131e-03	6	1.327e-03	3	1.111e-03	2
39	N20	max	.178	4	0	3	-.054	3	7.005e-04	3	2.121e-03	1	4.44e-04	1
40		min	.044	3	-.007	1	-.248	4	-4.941e-04	5	6.885e-04	5	-4.084e-05	5
41	N21	max	.234	1	-.082	5	1.309	5	1.434e-03	3	2.453e-02	5	5.183e-03	3
42		min	.178	6	-.283	3	-.021	3	-1.582e-02	5	1.892e-04	3	4.957e-04	5
43	N22	max	.165	4	-.022	5	-.183	5	3.674e-03	3	1.847e-04	3	3.26e-05	2
44		min	.038	3	-.06	3	-.235	1	1.016e-03	5	-3.426e-03	5	-4.74e-04	4
45	N23	max	.171	5	-.006	5	.016	2	2.643e-04	5	1.05e-02	5	1.691e-03	3
46		min	-.054	3	-.01	1	-.095	6	-2.064e-03	3	2.486e-04	3	-2.926e-04	5
47	N24	max	.159	5	0	3	.013	3	1.033e-03	4	1.507e-03	2	1.416e-04	4
48		min	-.004	3	-.007	4	-.222	5	1.042e-04	2	-5.472e-04	6	-2.851e-04	2
49	N25	max	.131	2	-.082	5	1.353	4	1.676e-02	4	2.479e-02	4	4.602e-03	6
50		min	-.122	6	-.283	3	.118	3	4.132e-04	2	1.081e-03	3	-2.138e-03	2
51	N26	max	.153	5	-.022	5	.129	3	3.342e-03	6	-2.373e-04	3	3.323e-04	5
52		min	-.002	3	-.06	3	-.086	5	4.661e-05	2	-3.429e-03	5	-1.387e-04	3
53	N27	max	.009	4	0	2	-.003	3	1.564e-04	3	3.041e-03	4	4.436e-05	2
54		min	.002	3	-.001	6	-.013	4	8.736e-05	5	8.013e-04	3	-5.682e-06	4
55	N28	max	.009	4	-.001	5	.013	4	-2.235e-05	2	2.925e-03	4	3.406e-04	6
56		min	.002	3	-.004	3	.003	3	-4.286e-04	4	4.302e-04	3	1.588e-04	2
57	N29	max	.009	5	0	5	0	3	3.253e-04	6	2.735e-03	5	8.301e-05	5
58		min	0	3	-.002	3	-.012	5	1.5e-04	2	-1.131e-04	3	-1.523e-05	1
59	N30	max	.008	5	-.002	2	.012	5	4.976e-04	4	2.82e-03	5	4.272e-04	3
60		min	0	3	-.006	6	0	3	-9.078e-05	2	1.035e-04	3	-4.529e-05	5
61	N31	max	.12	4	-.002	5	-.043	3	8.515e-04	3	8.365e-03	4	4.703e-05	2
62		min	.031	3	-.005	3	-.167	4	3.793e-04	5	1.835e-03	3	-2.35e-04	6
63	N32	max	.114	4	-.006	5	.16	4	6.955e-04	3	8.999e-03	4	3.67e-03	6
64		min	.02	3	-.019	3	.026	3	-4.684e-04	5	2.62e-03	3	1.007e-03	2
65	N33	max	.107	5	-.003	5	.008	3	7.423e-04	6	7.768e-03	5	-1.945e-04	5
66		min	-.006	3	-.005	3	-.148	5	1.222e-04	2	-1.099e-04	3	-4.286e-04	1
67	N34	max	.109	5	-.006	5	.155	5	1.454e-03	4	7.792e-03	5	4.057e-03	3
68		min	.005	3	-.022	3	.007	3	-3.157e-04	3	-8.907e-04	3	-9.48e-04	5

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
69	N35	max	0	6	0	6	0	6	2.522e-03	3	4.71e-03	5	2.364e-03	3
70		min	0	1	0	1	0	1	9.895e-04	5	4.295e-04	3	5.91e-04	5
71	N36	max	.172	5	-.022	5	-.01	3	3.183e-03	3	-6.234e-05	3	1.878e-03	3
72		min	.013	3	-.06	3	-.127	5	9.135e-04	5	-1.87e-03	5	6.468e-04	5

Envelope AISC 14th(360-10): LRFD Steel Code Checks

Member	Shape	Code Check	Lo...	LC	She...	Lo...	phi*P..	phi*P..	phi*...	phi*...	Eqn			
1	M1	L3X3X4	.381	0	4	.016	4.3...	y	4	30.969	46.656	1.688	3.706	... H2-1
2	M2	L3X3X4	.407	0	4	.056	3.36	y	6	30.969	46.656	1.688	3.756	... H2-1
3	M3	L3X3X4	.730	2.6...	5	.057	2.5...	z	5	5.077	46.656	1.688	2.823	... H2-1
4	M4	L3X3X4	.362	0	5	.015	0	y	6	30.969	46.656	1.688	3.693	... H2-1
5	M5	L3X3X4	.379	0	5	.048	0	z	3	30.969	46.656	1.688	3.756	... H2-1
6	M6	L3X3X4	.734	2.6...	4	.058	2.5...	y	4	5.077	46.656	1.688	2.775	... H2-1
7	M7	PIPE 2.0	.372	2.4...	4	.052	5.6...		3	14.916	32.13	1.872	1.872	... H1-...
8	M8	PIPE 2.0	.053	2.3...	6	.025	2.3...		3	14.916	32.13	1.872	1.872	... H1-...
9	M9	PIPE 2.0	.116	2.3...	6	.039	5.5...		3	14.916	32.13	1.872	1.872	... H1-...
10	M10	PIPE 2.0	.128	5.6...	6	.077	2.4...		4	14.916	32.13	1.872	1.872	... H1-...
11	M11	PIPE 1.25	.012	3.3...	3	.011	0		3	14.908	19.688	.801	.801	1 H1-...
12	M12	PIPE 1.25	.013	3.3...	6	.024	0		3	14.908	19.688	.801	.801	1 H1-...
13	M13	PIPE 1.25	.051	3.3...	6	.004	0		3	14.908	19.688	.801	.801	1 H1-...
14	M14	PIPE 1.25	.056	3.3...	3	.043	0		3	14.908	19.688	.801	.801	1 H1-...
15	M15	SR 3/4	.130	4.1...	6	.016	4.1...		4	1.404	14.314	.179	.179	... H1-...
16	M16	SR 3/4	.034	4.1...	3	.020	4.1...		4	1.404	14.314	.179	.179	... H1-...
17	M17	PIPE 2.0	.104	0	4	.005	7.0...		1	17.707	32.13	1.872	1.872	... H1-...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek
TJL
19027.60

CT11156A
Unity Check

May 22, 2019 at 9:13 AM
Antenna Mount.r3d



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

T-Mobile Existing Facility

Site ID: CT11156A

Killingly/Margaret Henri
818 Providence Pike
Killingly, Connecticut 06239

May 18, 2019

EBI Project Number: 6219001672

Site Compliance Summary	
Compliance Status:	COMPLIANT
Site total MPE% of FCC general population allowable limit:	4.65%

May 18, 2019

T-Mobile

Attn: Jason Overbey, RF Manager
35 Griffin Road South
Bloomfield, Connecticut 06002

Emissions Analysis for Site: CT11156A - Killingly/Margaret Henri

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **818 Providence Pike in Killingly, Connecticut** 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) and 11 GHz 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 818 Providence Pike in Killingly, Connecticut 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 manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, was focused at the base of the tower. For this report, the sample point is the top of a 6-foot person standing at the base of the tower.

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

- 1) 2 LTE channel (600 MHz Band) was considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 2) 2 LTE channels (700 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 3) 4 GSM channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
- 4) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.
- 5) 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.
- 6) 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 manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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.
 - 7) The antennas used in this modeling are the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz channel(s), the RFS APX16DWV-16DWVS-E-A20 for the 1900 MHz / 1900 MHz channel(s) in Sector A, the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz channel(s), the RFS APX16DWV-16DWVS-E-A20 for the 1900 MHz / 1900 MHz channel(s) in Sector B, the RFS APXVAARR24_43-U-NA20 for the 600 MHz / 700 MHz channel(s), the RFS APX16DWV-16DWVS-E-A20 for the 1900 MHz / 1900 MHz channel(s) in Sector C. 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 manufacturer's supplied specifications, minus 10 dB for directional panel antennas and 20 dB for highly focused parabolic microwave dishes, 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.
 - 8) The antenna mounting height centerline of the proposed antennas is 145 feet above ground level (AGL).
 - 9) 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.
 - 10) 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:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Frequency Bands:	600 MHz / 700 MHz	Frequency Bands:	600 MHz / 700 MHz	Frequency Bands:	600 MHz / 700 MHz
Gain:	12.95 dBd / 13.35 dBd	Gain:	12.95 dBd / 13.35 dBd	Gain:	12.95 dBd / 13.35 dBd
Height (AGL):	145 feet	Height (AGL):	145 feet	Height (AGL):	145 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts	Total TX Power (W):	120 Watts
ERP (W):	2,481.08	ERP (W):	2,481.08	ERP (W):	2,481.08
Antenna A1 MPE %:	0.98%	Antenna B1 MPE %:	0.98%	Antenna C1 MPE %:	0.98%
Antenna #:	2	Antenna #:	2	Antenna #:	2
Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20	Make / Model:	RFS APX16DWV-16DWVS-E-A20
Frequency Bands:	1900 MHz / 1900 MHz	Frequency Bands:	1900 MHz / 1900 MHz	Frequency Bands:	1900 MHz / 1900 MHz
Gain:	15.9 dBd / 15.9 dBd	Gain:	15.9 dBd / 15.9 dBd	Gain:	15.9 dBd / 15.9 dBd
Height (AGL):	145 feet	Height (AGL):	145 feet	Height (AGL):	145 feet
Channel Count:	6	Channel Count:	6	Channel Count:	6
Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts
ERP (W):	9,337.08	ERP (W):	9,337.08	ERP (W):	9,337.08
Antenna A2 MPE %:	1.60%	Antenna B2 MPE %:	1.60%	Antenna C2 MPE %:	1.60%

Site Composite MPE %	
Carrier	MPE %
T-Mobile (Max at Sector A):	2.58%
Verizon	2.07%
Site Total MPE % :	4.65%

T-Mobile Sector A Total:	2.58%
T-Mobile Sector B Total:	2.58%
T-Mobile Sector C Total:	2.58%
Site Total:	4.65%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# 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 600 MHz LTE	2	591.73	145.0	2.02	600 MHz LTE	400	0.51%
T-Mobile 700 MHz LTE	2	648.82	145.0	2.22	700 MHz LTE	467	0.48%
T-Mobile 1900 MHz LTE	2	2334.27	145.0	7.98	1900 MHz LTE	1000	0.80%
T-Mobile 1900 MHz GSM	4	1167.14	145.0	7.98	1900 MHz GSM	1000	0.80%
						Total:	2.58%

Summary

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

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

T-Mobile Sector	Power Density Value (%)
Sector A:	2.58%
Sector B:	2.58%
Sector C:	2.58%
T-Mobile Maximum MPE % (Sector A):	2.58%
Site Total:	4.65%
Site Compliance Status:	COMPLIANT

The anticipated composite MPE value for this site assuming all carriers present is **4.65%** 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.

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1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**

Customers with a Daily Pickup

Your driver will pickup your shipment(s) as usual.

Customers without a Daily Pickup

Schedule a same day or future day Pickup to have a UPS driver pickup all of your Internet Shipping packages.

Hand the package to any UPS driver in your area.

Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.

FOLD HERE

NEIL GUERRIERO 3473040176 TRANSCEND WIRELESS 10 INDUSTRIAL AVE MAHWAH NJ 07430	1.0 LBS LTR 1 OF 1	SHIP TO: JONATHAN CESOLINI, CHAIRMAN, TOWN O (860) 779-5300 TOWN OF KILLINGLY 172 MAIN STREET, KILLINGLY CT 06239-2822	 CT 063 0-01 	UPS NEXT DAY AIR TRACKING #: 1Z V25 742 01 9394 8111 1		BILLING: P/P Reference#1: CT11156A Reference#2: 1st Sel UPS 21.2.09. WINTNV50 12.0A.04.2019 
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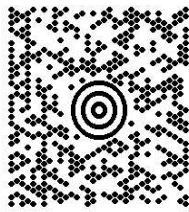
Customers without a Daily Pickup

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Hand the package to any UPS driver in your area.

Take your package to any location of The UPS Store®, UPS Access Point(TM) location, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the 'Find Locations' Quick link at ups.com.

FOLD HERE

<p>NEIL GUERRIERO 3473040176 TRANSCEND WIRELESS 10 INDUSTRIAL AVE MAHWAH NJ 07430</p> <p>SHIP TO: CHARLES KELLEHER QUINEBAUG VALLEY EMERGENCY COMMUNIC 1249 HARTFORD PIKE EAST KILLINGLY CT 06243-1810</p>	<p>1.0 LBS LTR 1 OF 1</p> <p>CT 063 0-04</p>  	<p>UPS NEXT DAY AIR</p> <p>TRACKING #: 1Z V25 742 01 9245 2130</p> <p>1</p>		<p>BILLING: P/P</p> <p>Reference#1: CT11156A Reference#2: UPS-LL</p> <p>UPS 21.2.09. WINTNVS0 12.04.04/2019</p> 
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FOLD HERE

NEIL GUERRIERO 3473040176 TRANSCEND WIRELESS 10 INDUSTRIAL AVE MAHWAH NJ 07430	1.0 LBS LTR	1 OF 1
SHIP TO: ANN-MARIE AUBREY, DIRECTOR, PLANNIN (860) 779-5300 TOWN OF KILLINGLY 172 MAIN STREET KILLINGLY CT 06239-2822		CT 063 0-01 
UPS NEXT DAY AIR TRACKING #: 1Z V25 742 01 9319 8128	1	
BILLING: P/P		
Reference#1: CT11156A Reference#2: Planner		UPS 21.2.09. WINTNVS0 12.04.04/2019