10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

September 10, 2020

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

RE: Notice of Exempt Modification
158 Edison Road, Trumbull, CT
Latitude: 41.23444444
Longitude: -73.21888890
T-Mobile Site#: CTFF481B – Anchor

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 120-foot level of the existing 130-foot monopole tower at 158 Edison Road, Trumbull, CT. The tower is owned by Blue Sky Towers. The property is owned by the Town of Trumbull. T-Mobile now intends to replace six (6) existing antennas with six (6) new 1900/2100/2500 MHz antennas. The new antennas will be installed at the same 120-foot level of the tower.

Planned Modifications:
Tower:

Remove
N/A

Remove and Replace:
(3) AIR 21 for (3) AIR 6449 B41 2500 MHz Antennas
(3) AIR 21 for (3) AIR 32 1900/2100 MHz Antennas

Install New:
(3) Radio 4415 RRU
(3) Commscope SDX1926Q-43 Diplexers
(1) 1-5/8” Hybrid Fiber Cable

Existing to Remain:
(3) APXVAARR24_43-UNA20 600/700/1900/2100 MHz Antennas
(3) Radio 4449 RRU
(3) TMA
(6) 1-5/8” Coax
(2) 1-5/8” Hybrid Cable

Ground:
Install New: 6160 Cabinet and B160 Battery Cabinet

This facility was approved by the Connecticut Siting Council on April 26, 2012 in Docket No. 421. The proposed modification complies with the original 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.SA. § 16-SOj-73, a copy of this letter is being sent to First Selectman -Vicki Tesoro, Elected Official, and Rob Librandi, Land Use Planner for the Town of Trumbull, as well as the tower 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,

Kyle Richers
Transcend Wireless
Cell: 908-447-4716
Email: krichers@transcendwireless.com

Attachments
cc: Vicki Tesoro – First Selectman of the Town of Trumbull
Rob Librandi– Land Use Planner for the Town of Trumbull
Blue Sky Towers- Tower Owner

View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialogue 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 scheduled Pickup
   - Your driver will pickup your shipment(s) as usual.

   Customers without a scheduled Pickup
   - Schedule a Pickup on ups.com to have a UPS driver pickup all of your packages.
   - 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. To find the location nearest you, please visit the 'Locations' Quick link at ups.com.

UPS Access Point™
MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY NJ

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH NJ

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY NJ

FOLD HERE

NEIL GUERRIERO
3473040176
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 07430

1 LBS 1 OF 1

SHIP TO:
BLUE SKY TOWERS
57 EAST WASHINGTON STREET
CHAGRIN FALLS OH 44022

OH 440 9-70

UPS GROUND
TRACKING #: 1Z V25 742 42 9018 8308

BILLING: P/P
SIGNATURE REQUIRED

Reference #1: CTFF481B CSC TO

XOL 20.08.05 NV45 31.0A 07/2020*

View/Print Label

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

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   - 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. To find the location nearest you, please visit the 'Locations' Quick link at ups.com.

UPS Access Point™
MICHAELS STORE # 7773
75 INTERSTATE SHOP CTR
RAMSEY NJ

UPS Access Point™
THE UPS STORE
115 FRANKLIN TPKE
MAHWAH NJ

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY NJ

FOLD HERE

NEIL GUERRIERO
3473040176
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 07430

1 LBS 1 OF 1

SHIP TO:
VICKI TESORO
TOWN OF TRUMBULL
2ND FLOOR
5866 MAIN STREET
TRUMBULL CT 06611

CT 066 9-07

UPS GROUND
TRACKING #: 1Z V25 742 42 9051 4311

BILLING: P/P
SIGNATURE REQUIRED

Reference #1: CTFF481B CSC EO

XOL 20.08.05 NV45 31.0A 07/2020*

View/Print Label

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115 FRANKLIN TPKE
MAHWAH NJ

UPS Access Point™
THE UPS STORE
120 E MAIN ST
RAMSEY NJ

FOLD HERE

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1 LBS 1 OF 1

NEIL GUERRIERO
3473040176
TRANSCEND WIRELESS
10 INDUSTRIAL AVE
MAHWAH NJ 07430

SHIP TO:
ROB LIBRANDI
TOWN OF TRUMBULL
PLANNING AND ZONING
5866 MAIN STREET
TRUMBULL CT 06611

CT 066 9-07

UPS GROUND
TRACKING #: 1Z V25 742 42 9889 1211

BILLING: P/P
SIGNATURE REQUIRED

Reference #1: CTFF481B CSC ZO

XOL 20.08.05 NV45 31.0A 07/2020*

158 EDISON ROAD

Location	158 EDISON ROAD	**Mblu**	E/10 / 00304/ 000/
Acct#		**Owner**	TRUMBULL TOWN OF
Assessment	$3,490,410	**Appraisal**	$4,986,300
PID	12741	**Building Count**	1
Fire District	L		

Current Value

Appraisal	
Valuation Year	**Total**
2015	$4,986,300

Assessment	
Valuation Year	**Total**
2015	$3,490,410

Owner of Record

Owner TRUMBULL TOWN OF
Co-Owner
Address 5866 MAIN STREET
TRUMBULL, CT 06611

Sale Price $0
Book & Page 29/ 587
Sale Date 03/27/1929

Ownership History

Ownership History			
Owner	**Sale Price**	**Book & Page**	**Sale Date**
TRUMBULL TOWN OF	$0	29/ 587	03/27/1929

Building Information

Building 1 : Section 1

Year Built: 1981
Living Area: 28,105

Building Attributes	
Field	**Description**

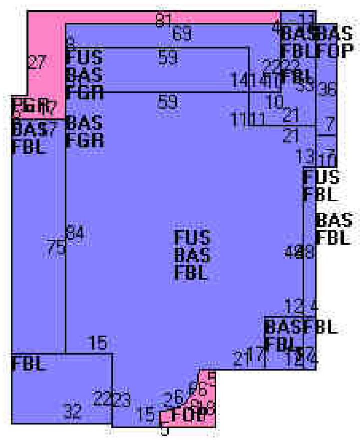
STYLE	Police Station
Stories:	2 Stories
Occupancy	1
Exterior Wall 1	Brick Masonry
Exterior Wall 2	
Roof Structure	Flat
Roof Cover	Tar & Gravel
Interior Wall 1	Drywall
Interior Wall 2	
Interior Floor 1	Carpet
Interior Floor 2	Vinyl
Heating Fuel	Gas
Heating Type	Hot Water
AC Type	Central
Bldg Use	Police Dept
1st Floor Use:	
Heat/AC	Heat/AC Split
Frame Type	Fireprf Steel
Baths/Plumbing	Average
Ceiling/Walls	Sus-Ceil & WL
Rooms/Prtns	Average
Wall Height	12
% Comn Wall	

Building Photo

E10-304 04/29/2015

(http://images.vgsi.com/photos2/TrumbullCTPhotos//\00\02\11/62.JPG)

Building Layout



(http://images.vgsi.com/photos2/TrumbullCTPhotos//Sketches/12741_1274

Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	10,547	10,547
FBL	Fin Bsmt Living Area	9,785	9,785
FUS	Finished Upper Story	7,773	7,773
FGR	Attached Garage	2,254	0
FOP	Open Porch	441	0
		30,800	28,105

Extra Features

Extra Features			Legend
Code	Description	Size	Bldg #
ELV	Elevator	1 Units	1

Land

Land Use

Use Code 929
Description Police Dept
Zone A
Neighborhood 110
Alt Land Appr No
Category

Land Line Valuation

Size (Acres) 2.3
Frontage
Depth

Outbuildings

Outbuildings					Legend
Code	**Description**	**Sub Code**	**Sub Description**	**Size**	**Bldg #**
PAV1	Paving Asph.			60000 S.F.	1
LT1	Light - 1			13 Units	1
LT2	Light - 2			1 Units	1
ANTS	Self Sup Tower			100 L.F.	1

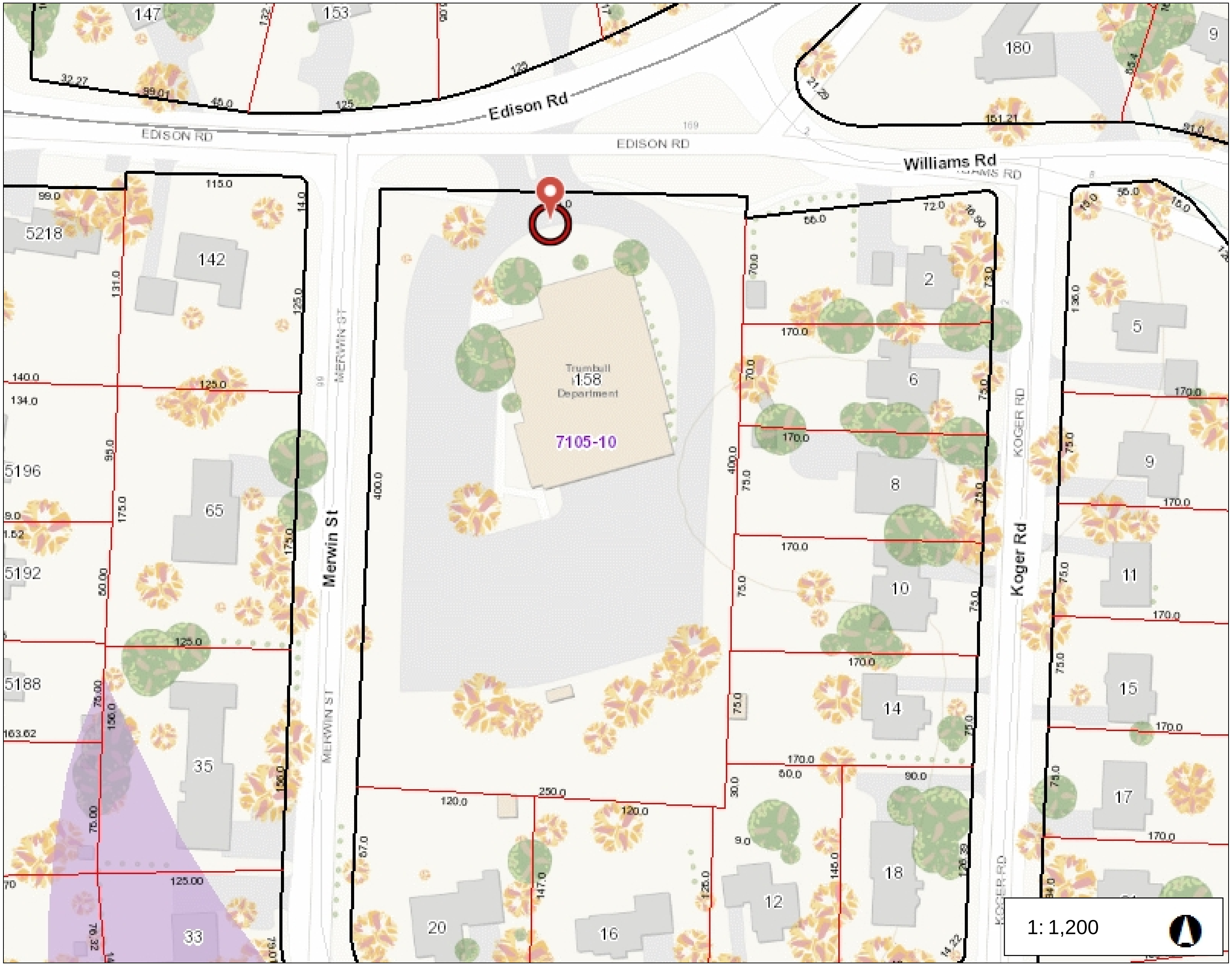
Valuation History

Appraisal	
Valuation Year	**Total**
2018	$4,986,300
2017	$4,986,300
2016	$4,986,300

Assessment	
Valuation Year	**Total**
2018	$3,490,410
2017	$3,490,410
2016	$3,490,410

Town of Trumbull

Map Title



1: 1,200

Legend

Streetname

Roadways

- Local
- Collector
- Minor Collector
- Minor Arterial
- Major Collector
- PA Other
- PA Other Expwy
- PA Interstate

Inland Wetland Soils

- Poorly Drained and Very Poorly Dra
- Alluvial and Floodplain Soils

Local Basin Boundary

- Major
- Regional
- Subregional
- Local

Local Basin Area

Citations

200.0 | 0 | 100.00 | 200.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Created by Greater Bridgeport Regional Council

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.
THIS MAP IS NOT TO BE USED FOR NAVIGATION

METROCOG
Connecticut Metropolitan Council of Governments

DOCKET NO. 421 – T-Mobile Northeast LLC application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance and operation of a telecommunications facility located at 158 Edison Road, Trumbull, Connecticut.	} } }	Connecticut Siting Council April 26, 2012

Decision and Order

Pursuant to the foregoing Findings of Fact and Opinion, the Connecticut Siting Council (Council) finds that the effects associated with the construction, maintenance, and operation of a telecommunications facility, including effects on the natural environment; ecological integrity and balance; public health and safety; scenic, historic, and recreational values; forests and parks; air and water purity; and fish and wildlife are not disproportionate, either alone or cumulatively with other effects, when compared to need, are not in conflict with the policies of the State concerning such effects, and are not sufficient reason to deny the application, and therefore directs that a Certificate of Environmental Compatibility and Public Need, as provided by General Statutes **§** 16-50k, be issued to T-Mobile Northeast LLC, hereinafter referred to as the Certificate Holder, for a telecommunications facility at 158 Edison Road in Trumbull, Connecticut.

Unless otherwise approved by the Council, the facility shall be constructed, operated, and maintained substantially as specified in the Council's record in this matter, and subject to the following conditions:

1. The tower shall be constructed as a monopole, sufficient to accommodate the antennas of T-Mobile and other entities, both public and private, but such tower shall not exceed a height of 130 feet above ground level.

2. The Certificate Holder shall install a tower foundation and tower that is capable of supporting an extension. Any extension of the tower must be approved by the Council.

3. Panel antennas shall be mounted cluster-mount configuration or as otherwise determined by the Council.

4. The Certificate Holder shall prepare a Development and Management (D&M) Plan for this site in compliance with Sections 16-50j-75 through 16-50j-77 of the Regulations of Connecticut State Agencies. The D&M Plan shall be served on the Town of Trumbull for comment, and all parties and intervenors as listed in the service list, and submitted to and approved by the Council prior to the commencement of facility construction and shall include:
    a) a final site plan(s) of site development to include specifications for the tower, tower foundation, antennas, equipment compound, radio equipment, access road, utility line, and landscaping; and
    b) construction plans for site clearing, grading, landscaping, water drainage, and erosion and sedimentation controls consistent with the <u>2002 Connecticut Guidelines for Soil Erosion and Sediment Control</u>, as amended.

5. Prior to the commencement of operation, the Certificate Holder shall provide the Council worst-case modeling of the electromagnetic radio frequency power density of all proposed entities' antennas at the closest point of uncontrolled access to the tower base, consistent with Federal Communications Commission, Office of Engineering and Technology, Bulletin No. 65, August 1997. The Certificate Holder shall ensure a recalculated report of the electromagnetic radio frequency power density be submitted to the Council if and when circumstances in operation cause a change in power density above the levels calculated and provided pursuant to this Decision and Order.

6. Upon the establishment of any new State or federal radio frequency standards applicable to frequencies of this facility, the facility granted herein shall be brought into compliance with such standards.

7. The Certificate Holder shall permit public or private entities to share space on the proposed tower for fair consideration, or shall provide any requesting entity with specific legal, technical, environmental, or economic reasons precluding such tower sharing.

8. Unless otherwise approved by the Council, if the facility authorized herein is not fully constructed with at least one fully operational wireless telecommunications carrier providing wireless service within eighteen months from the date of the mailing of the Council's Findings of Fact, Opinion, and Decision and Order (collectively called "Final Decision"), this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made. The time between the filing and resolution of any appeals of the Council's Final Decision shall not be counted in calculating this deadline. Authority to monitor and modify this schedule, as necessary, is delegated to the Executive Director. The Certificate Holder shall provide written notice to the Executive Director of any schedule changes as soon as is practicable.

9. Any request for extension of the time period referred to in Condition 8 shall be filed with the Council not later than 60 days prior to the expiration date of this Certificate and shall be served on all parties and intervenors, as listed in the service list, and the Town of Trumbull. Any proposed modifications to this Decision and Order shall likewise be so served.

10. If the facility ceases to provide wireless services for a period of one year, this Decision and Order shall be void, and the Certificate Holder shall dismantle the tower and remove all associated equipment or reapply for any continued or new use to the Council before any such use is made.

11. Any nonfunctioning antenna, and associated antenna mounting equipment, on this facility shall be removed within 60 days of the date the antenna ceased to function.

12. In accordance with Section 16-50j-77 of the Regulations of Connecticut State Agencies, the Certificate Holder shall provide the Council with written notice two weeks prior to the commencement of site construction activities. In addition, the Certificate Holder shall provide the Council with written notice of the completion of site construction, and the commencement of site operation.

13. The Certificate Holder shall remit timely payments associated with annual assessments and invoices submitted by the Council for expenses attributable to the facility under Conn. Gen. Stat. §16-50v.

14. This Certificate may be transferred in accordance with Conn. Gen. Stat. §16-50k(b), provided both the Certificate Holder/transferor and the transferee are current with payments to the Council for their respective annual assessments and invoices under Conn. Gen. Stat. §16-50v. In addition, both the Certificate Holder/transferor and the transferee shall provide the Council a written agreement as to the entity responsible for any quarterly assessment charges under Conn. Gen. Stat. §16-50v(b)(2) that may be associated with this facility.

15. The Certificate Holder shall maintain the facility and associated equipment, including but not limited to, the tower, tower foundation, antennas, equipment compound, radio equipment, access road, utility line and landscaping in a reasonable physical and operational condition that is consistent with this Decision and Order and a Development and Management Plan to be approved by the Council.

16. If the Certificate Holder is a wholly-owned subsidiary of a corporation or other entity and is sold/transferred to another corporation or other entity, the Council shall be notified of such sale and/or transfer and of any change in contact information for the individual or representative responsible for management and operations of the Certificate Holder within 30 days of the sale and/or transfer.

Pursuant to General Statutes **§** 16-50p, the Council hereby directs that a copy of the Findings of Fact, Opinion, and Decision and Order be served on each person listed below, and notice of issuance shall be published in the Connecticut Post.

By this Decision and Order, the Council disposes of the legal rights, duties, and privileges of each party named or admitted to the proceeding in accordance with Section 16-50j-17 of the Regulations of Connecticut State Agencies.

The parties and intervenors to this proceeding are:

Applicant	**Its Representative**
T-Mobile Northeast, LLC	Julie D. Kohler, Esq. Cohen and Wolf, P.C. 1115 Broad Street Bridgeport, CT 06604
Intervenor	**Its Representative**
Citizens Against Trumbull Tower	Keith R. Ainsworth, Esq Evans Feldman & Ainsworth, L.L.C. P.O. Box 1694 New Haven, CT 06507-1694

T-Mobile

WIRELESS COMMUNICATIONS FACILITY

POLICE STA EDISON RD
SITE ID: CTFF481B
158 EDISON RD
TRUMBULL, CT 06611

T-MOBILE RF CONFIGURATION

67D5997DB_2xAIR+1OP

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 CONSTRUCTON, 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 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 MANUFACTURER'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 CONDUITS 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 THE OWNER'S ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.

SITE DIRECTIONS

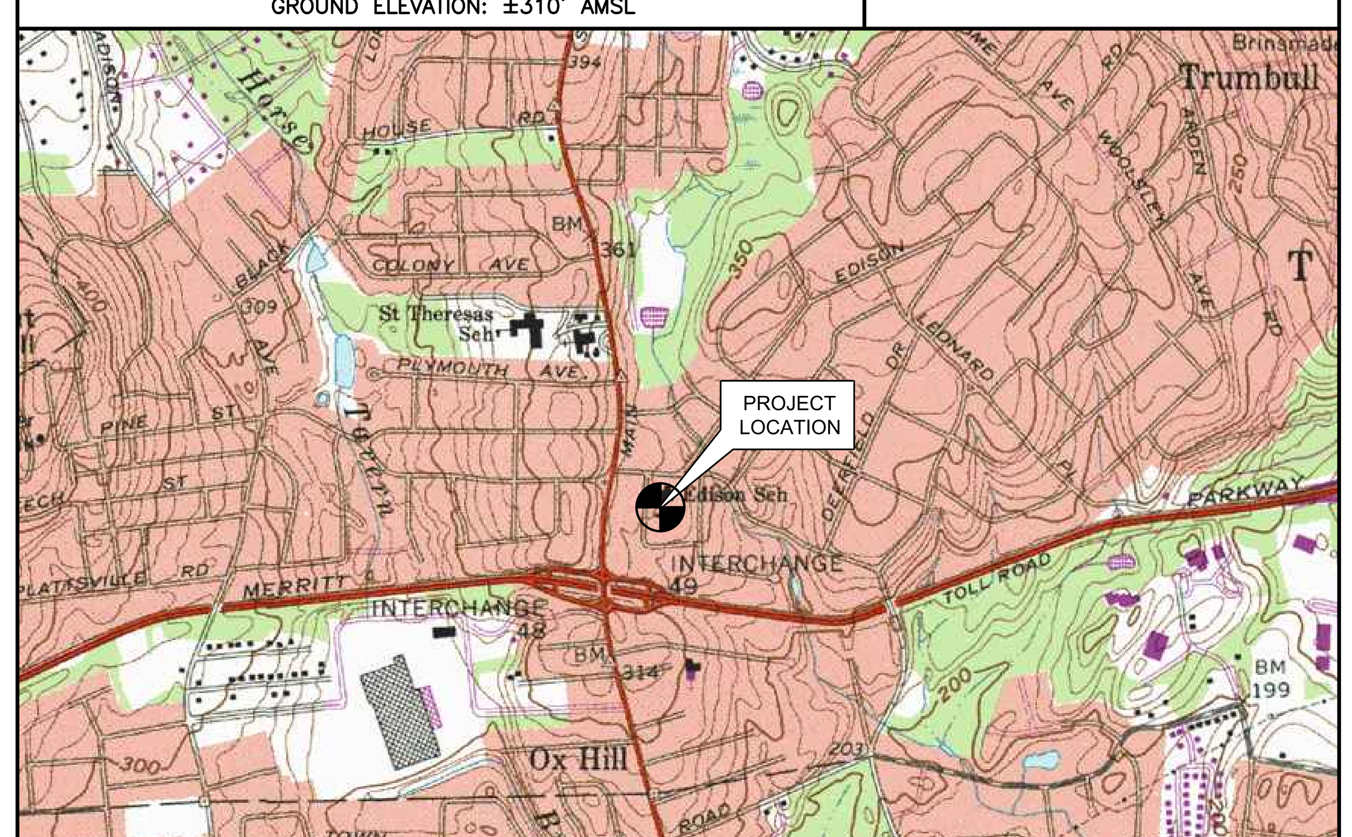
FROM: 35 GRIFFIN ROAD SOUTH, BLOOMFIELD, CT 06002

TO: 158 EDISON RD, TRUMBULL CT, 06611

1. HEAD NORTH ON GRIFFIN RD S	0.30 MI.
2. TURN RIGHT ONTO DAY HILL RD	3.60 MI.
3. USE THE RIGHT LANE TO MERGE ONTO I–91 S VIA THE RAMP TO HARTFORD	0.40 MI.
4. MERGE ONTO I–91 S	6.90 MI.
5. TAKE EXIT 32A–32B FOR I–84 W TOWARD WATERBURY	0.50 MI.
6. MERGE ONTO I–84	6.30 MI.
7. TAKE EXIT 39A FOR CT–9 S TOWARD NEWINGTON/NEW BRITAIN	0.80 MI.
8. CONTINUE ON CT–9 S	3.80 MI.
9. CONTINUE STRAIGHT TO STAY ON CT–9 S	4.10 MI.
10. TAKE EXIT 22 FOR CT–372 E/MILL ST	0.40 MI.
11. KEEP RIGHT AT THE FORK AND MERGE ONTO CT–15 S/US–5 S/BERLIN TURNPIKE	0.06 MI.
12. KEEP LEFT TO CONTINUE ON CT–15 S	35.9 MI.
13. TAKE EXIT 48 FOR CT–111/MAIN ST	0.10 MI.
14. USE THE RIGHT LANE TO TURN RIGHT ONTO CT–111 N/MAIN ST (SIGNS FOR TRUMBULL/LONGHILL)	0.20 MI.
15. TURN RIGHT ONTO EDISON RD	0.08 MI.
16. TURN RIGHT	0.01 MI.
17. TURN LEFT	0.04 MI.
18. DESTINATION WILL BE ON RIGHT	

SITE COORDINATES: LATITUDE: 41° 14' 03.67" N
LONGITUDE: 73° 13' 7.54" W
GROUND ELEVATION: ±310' AMSL

COORDINATES AND GROUND ELEVATION ARE REFERENCED FROM GOOGLE EARTH



VICINITY MAP

NORTH

PROJECT SUMMARY

THE PROPOSED SCOPE OF WORK CONSISTS OF A MODIFICATION TO THE EXISTING UNMANNED TELECOMMUNICATIONS FACILITY INCLUDING THE FOLLOWING:

1. INSTALL (1) ENCLOSURE 6160
2. ADD (1) iXRe ROUTER TO NEW ENCLOSURE 6160
3. ADD (1) BB6630 FOR L2500
4. ADD (1) BB6648 FOR N2500
5. INSTALL (1) BATTERY CABINET B160
6. INSTALL (1) 6X12 HCS
7. REMOVE (6) AIR21 ANTENNAS
8. INSTALL (3) AIR32 ANTENNAS
9. INSTALL (3) AIR6449 B41
10. INSTALL (3) RRU 4415 B25
11. INSTALL (3) DIPLEXERS
12. RELOCATE (3) TMA'S
13. REMOVE (1) 125A CIRCUIT BREAKER
14. INSTALL (2) 100A CIRCUIT BREAKERS

PROJECT INFORMATION

SITE NAME:	POLICE STA EDISON RD
SITE ID:	CTFF481B
SITE ADDRESS:	158 EDISON RD TRUMBULL, CT 06611
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 OF RECORD:	CENTEK ENGINEERING, INC. 63–2 NORTH BRANFORD RD. BRANFORD, CT 06405 CARLO F. CENTORE, PE (203) 488–0580 EXT. 122
PROJECT COORDINATES:	LATITUDE: 41° 14' 03.67" N LONGITUDE: 73° 13' 7.54" W GROUND ELEVATION: ±310' AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	08/31/20	BSP	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
POLICE STA EDISON RD
SITE ID: CTFF481B
158 EDISON RD
TRUMBULL, CT 06611

DATE: 07/23/20
SCALE: AS NOTED
JOB NO. 20074.61

TITLE SHEET

T–1

NOTES AND SPECIFICATIONS

DESIGN BASIS:

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

1. DESIGN CRITERIA:

- RISK CATEGORY II (BASED ON IBC TABLE 1604.5)
- NOMINAL DESIGN SPEED (OTHER STRUCTURE): 97 MPH (Vasd) (EXPOSURE C/ IMPORTANCE FACTOR 1.0 BASED ON ASCE 7–10).

SITE NOTES

1. THE CONTRACTOR SHALL CALL UTILITIES PRIOR TO THE START OF CONSTRUCTION.
2. ACTIVE EXISTING UTILITIES, WHERE ENCOUNTERED IN THE WORK, SHALL BE PROTECTED AT ALL TIMES. THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY, PRIOR TO PROCEEDING, SHOULD ANY UNCOVERED EXISTING UTILITY PRECLUDE COMPLETION OF THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. THE AREAS OF THE COMPOUND DISTURBED BY THE WORK SHALL BE RETURNED TO THEIR ORIGINAL CONDITION.
4. CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING SITE DURING CONSTRUCTION. EROSION CONTROL MEASURES, SHALL BE IN CONFORMANCE WITH THE LOCAL GUIDELINES FOR EROSION AND SEDIMENT CONTROL.
5. IF ANY FIELD CONDITIONS EXIST WHICH PRECLUDE COMPLIANCE WITH THE DRAWINGS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER AND SHALL PROCEED WITH AFFECTED WORK AFTER CONFLICT IS SATISFACTORILY RESOLVED.

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 IT'S 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 SITE OWNER'S 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 "DIG SAFE" (DIAL 811) AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
19. CONTRACTOR SHALL COMPLY WITH OWNER'S ENVIRONMENTAL ENGINEER ON ALL METHODS AND PROVISIONS FOR ALL EXCAVATION ACTIVITIES INCLUDING SOIL DISPOSAL. ALL BACKFILL MATERIALS TO BE PROVIDED BY THE CONTRACTOR.
20. THE COUNTY/CITY/TOWN WILL MAKE PERIODIC FIELD OBSERVATION AND INSPECTIONS TO MONITOR THE INSTALLATION, MATERIALS, WORKMANSHIP AND EQUIPMENT INCORPORATED INTO THE PROJECT TO ENSURE COMPLIANCE WITH THE DESIGN PLANS, SPECIFICATIONS, CONTRACT DOCUMENTS AND APPROVED SHOP DRAWINGS.
21. THE COUNTY/CITY/TOWN MUST BE NOTIFIED (2) WORKING DAYS PRIOR TO CONCEALMENT/BURIAL OF ANY SYSTEM OR MATERIAL THAT WILL PREVENT THE DIRECT INSPECTION OF MATERIALS, METHODS OR WORKMANSHIP. EXAMPLES OF THESE PROCESSES ARE BACKFILLING A GROUND RING OR TOWER FOUNDATION, POURING TOWER FOUNDATIONS, BURYING GROUND RODS, PLATES OR GRIDS, ETC. THE CONTRACTOR MAY PROCEED WITH THE SCHEDULED PROCESS (2) WORKING DAYS AFTER PROVIDING NOTICE UNLESS NOTIFIED OTHERWISE BY THE COUNTY/CITY/TOWN.

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TRUMBULL, CT 06611

DATE: 07/23/20
SCALE: AS NOTED
JOB NO. 20074.61

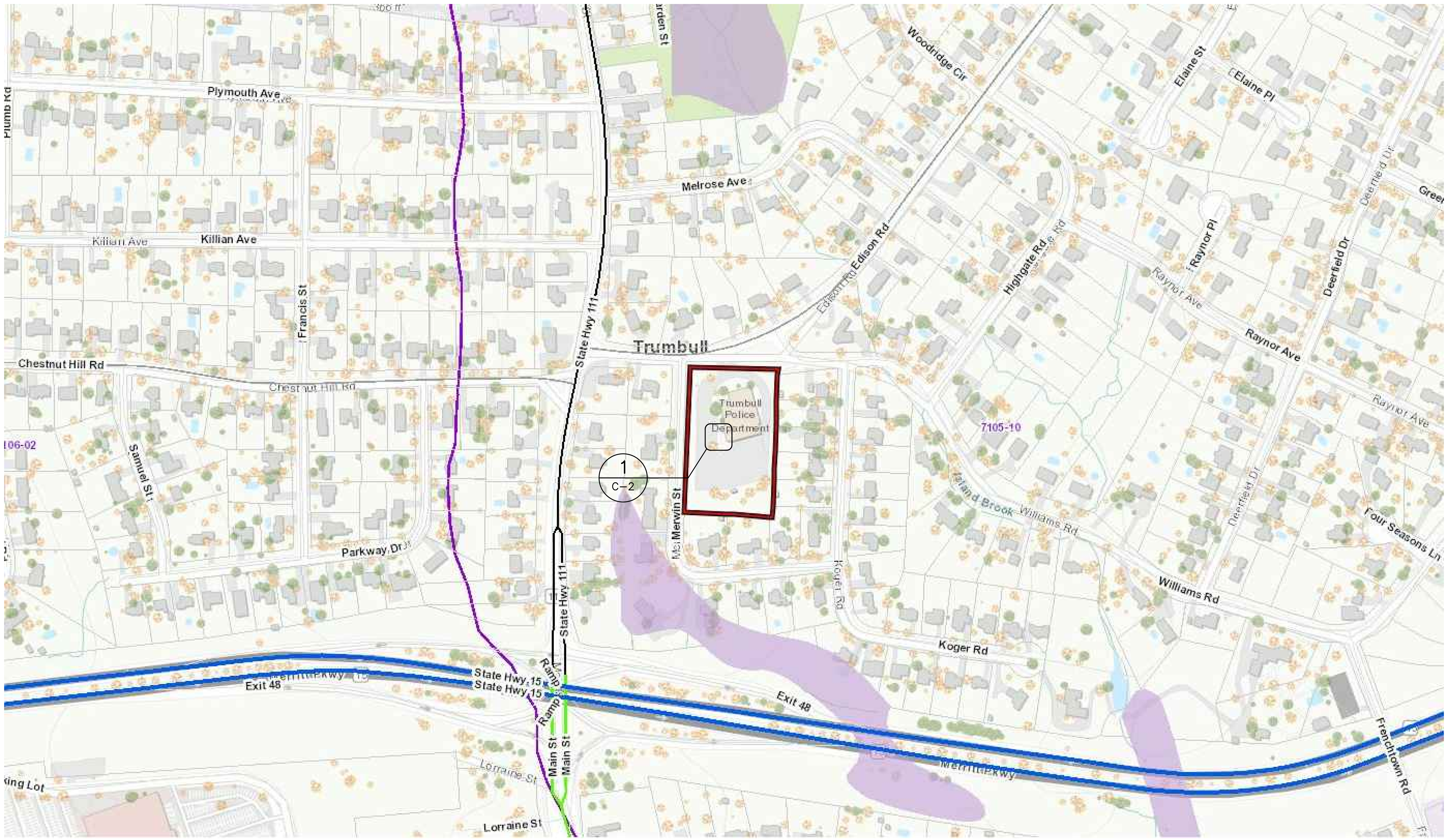
GENERAL NOTES AND SPECIFICATIONS

N-1

NOTE:
ALL COAX LENGTHS TO BE MEASURED AND VERIFIED IN FIELD BEFORE ORDERING

ANTENNA SCHEDULE

SECTOR	EXISTING/PROPOSED	ANTENNA	SIZE (INCHES) (L x W x D)	ANTENNA ℄ HEIGHT	AZIMUTH	(E/P) RRU (QTY)	(E/P) TMA AND DIPLEXER (QTY)	(QTY) PROPOSED COAX (LENGTH)
A1	PROPOSED	ERICSSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.9 x 8.7	120'	60°			(1) 6X12 HYBRID CABLE (±130FT)
A2	EXISTING	RFS – (APXVAARR24_43-U-N-NA20)	95.9 x 24.0 x 8.7	120'	60°	(E) RRU 4449 B71+B85 (1), (P) RRU 4415 B25 (1)	(E) GENERIC TWIN STYLE 1B (1), (P) COMMSCOPE SDX1926Q-43	
A3	PROPOSED	ERICSSON – (AIR6449 B41)	33.1 x 20.6 x 8.6	120'	60°			
B1	PROPOSED	ERICSSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.9 x 8.7	120'	150°			
B2	EXISTING	RFS – (APXVAARR24_43-U-N-NA20)	95.9 x 24.0 x 8.7	120'	150°	(E) RRU 4449 B71+B85 (1), (P) RRU 4415 B25 (1)	(E) GENERIC TWIN STYLE 1B (1), (P) COMMSCOPE SDX1926Q-43	
B3	PROPOSED	ERICSSON – (AIR6449 B41)	33.1 x 20.6 x 8.6	120'	150°			
C1	PROPOSED	ERICSSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.9 x 8.7	120'	340°			
C2	EXISTING	RFS – (APXVAARR24_43-U-N-NA20)	95.9 x 24.0 x 8.7	120'	340°	(E) RRU 4449 B71+B85 (1), (P) RRU 4415 B25 (1)	(E) GENERIC TWIN STYLE 1B (1), (P) COMMSCOPE SDX1926Q-43	
C3	PROPOSED	ERICSSON – (AIR6449 B41)	33.1 x 20.6 x 8.6	120'	340°			



1
C-1
SITE LOCATION PLAN
SCALE: NOT TO SCALE
TRUE NORTH

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SCALE: AS NOTED
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SITE LOCATION PLAN

C-1

Sheet No. 3 of 8

STRUCTURAL COMPLIANCE

ANTENNA MOUNTS

A STRUCTURAL ANALYSIS OF THE ANTENNA MOUNTS WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

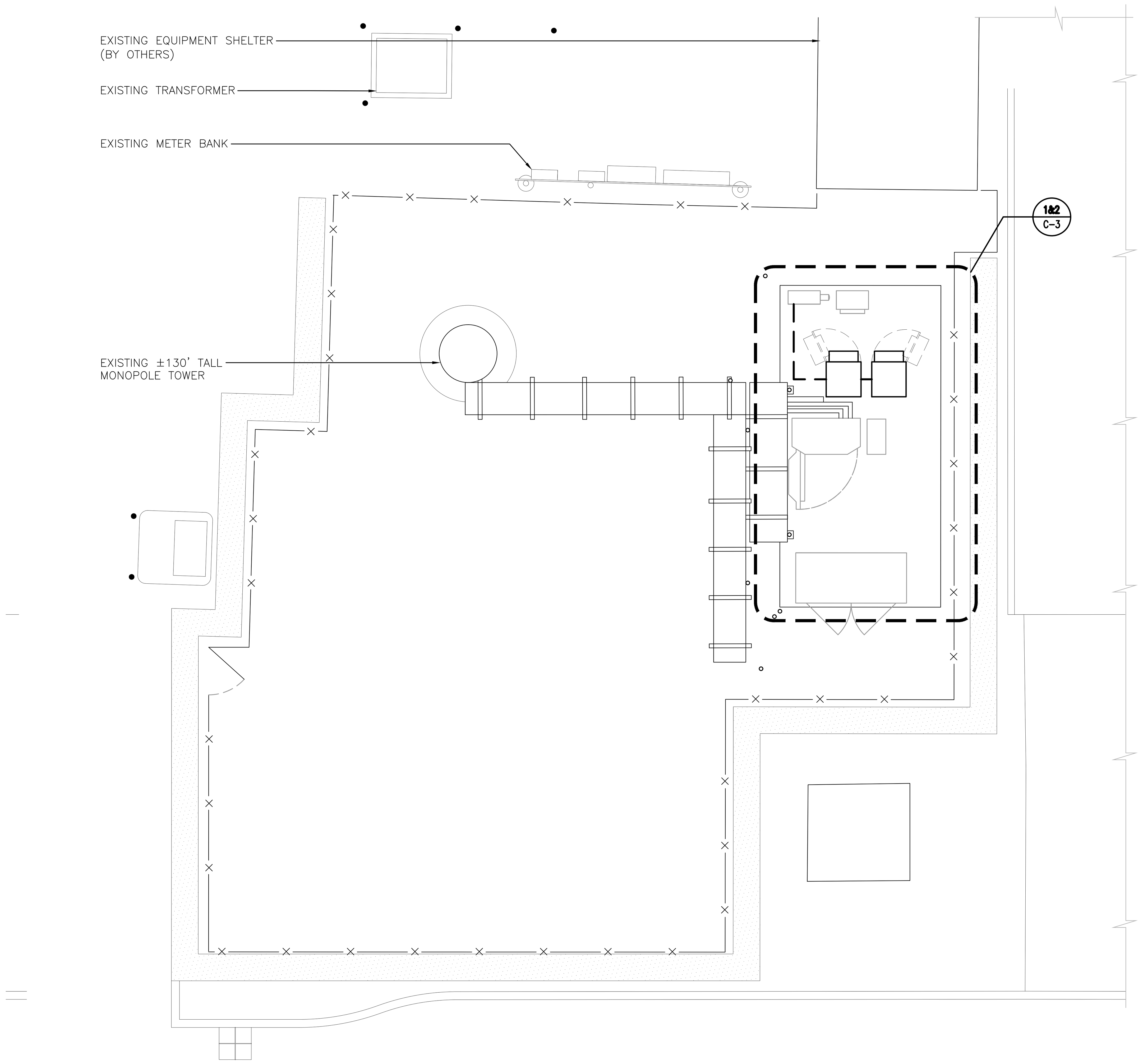
REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 20074.61) DATED 07/28/20 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

TOWER AND TOWER FOUNDATION

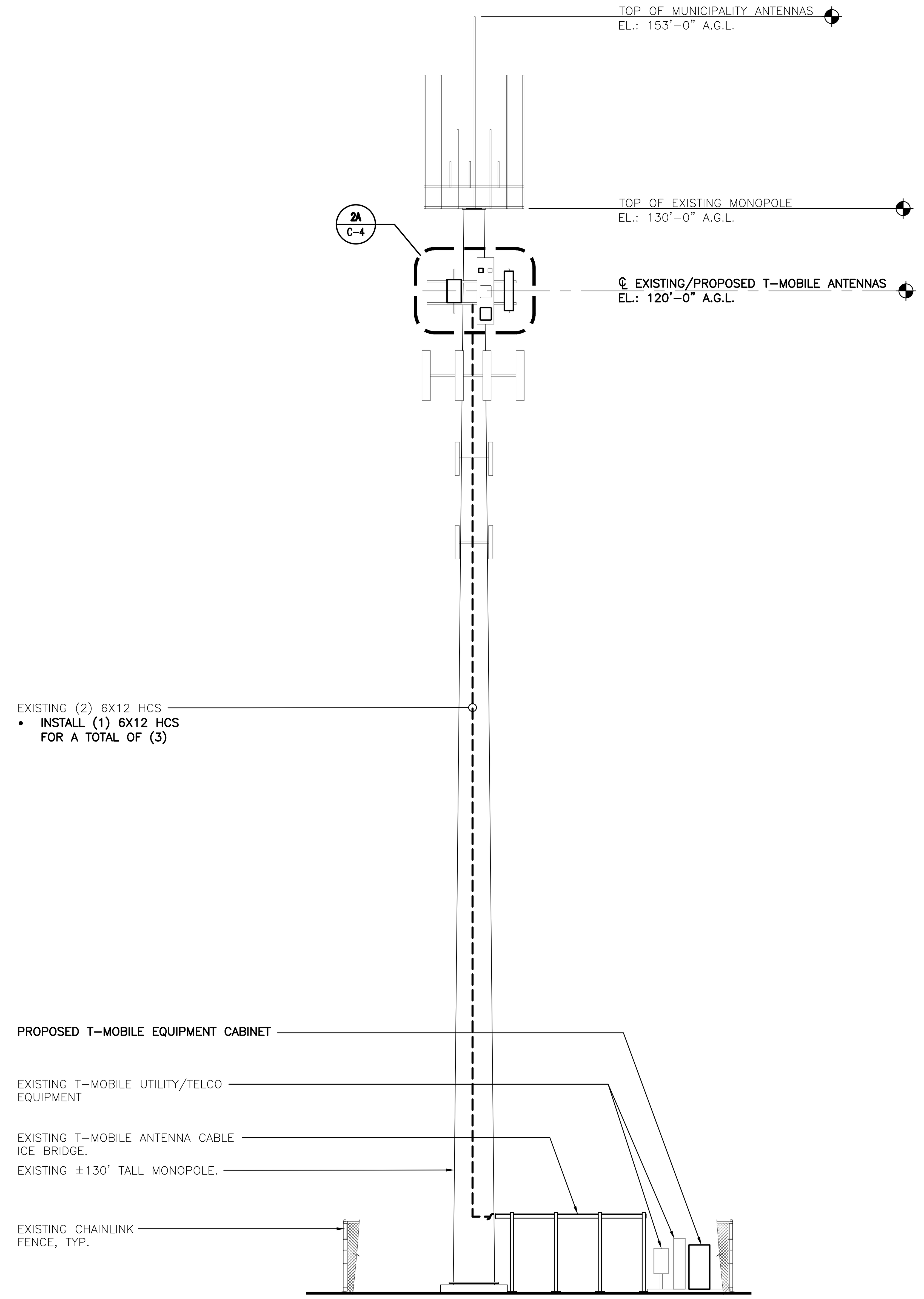
A STRUCTURAL ANALYSIS OF THE TOWER AND TOWER FOUNDATION WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 20074.61) DATED 07/28/20 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

NOTE: NO EQUIPMENT SHALL BE INSTALLED ON THE HOSTING STRUCTURE WITHOUT A PASSING STRUCTURAL ANALYSIS REPORT AND CONTRACTOR PRIOR CONFIRMATION THAT ANY AND ALL REQUISITE MODIFICATIONS HAVE BEEN COMPLETED.



1 C-2 **PROPOSED COMPOUND PLAN**
SCALE: 1" = 5'
APPROXIMATE NORTH



2 C-2 **PROPOSED TOWER ELEVATION**
SCALE: 1" = 10'

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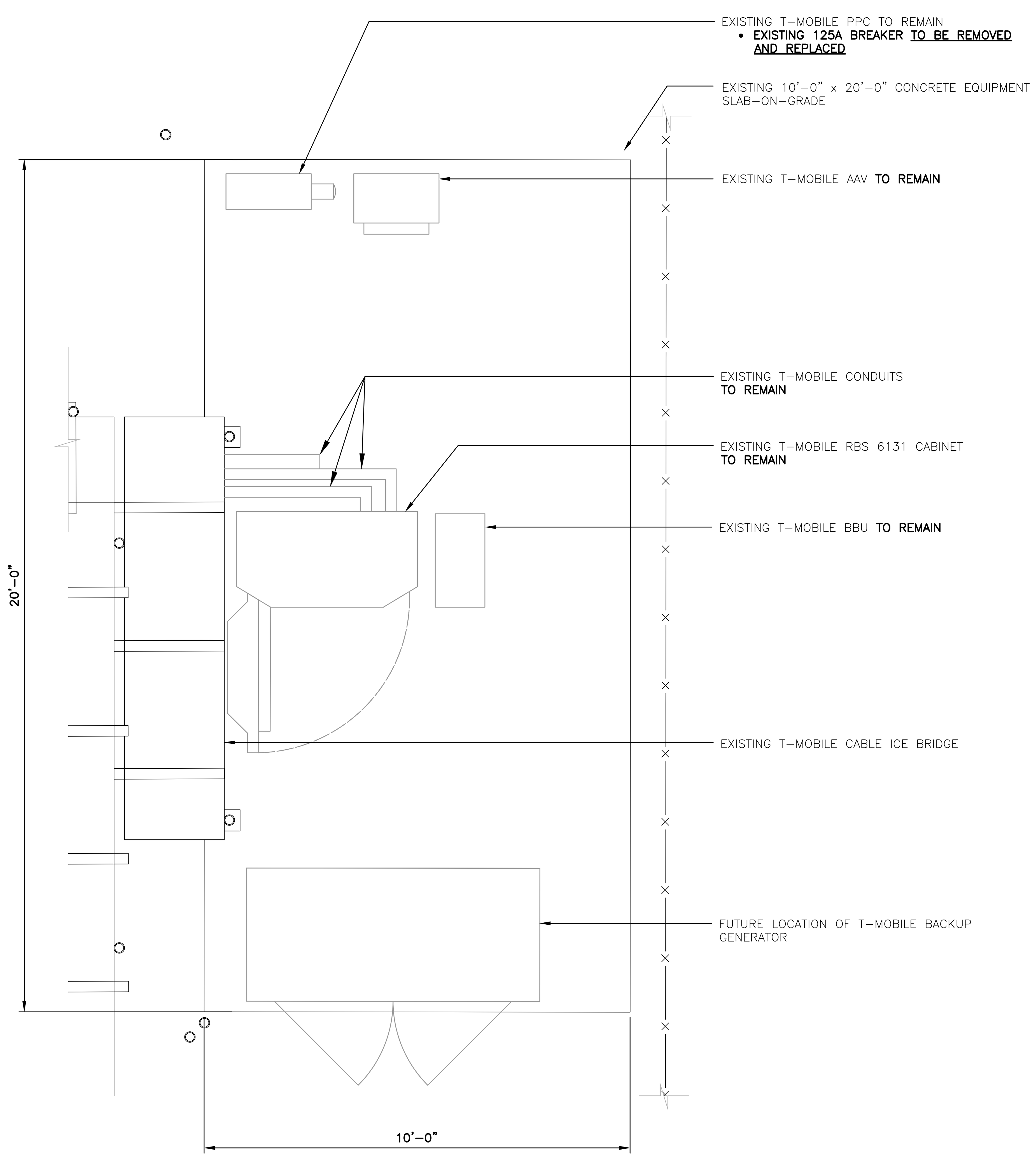
SCALE: AS NOTED
JOB NO. 20074.61

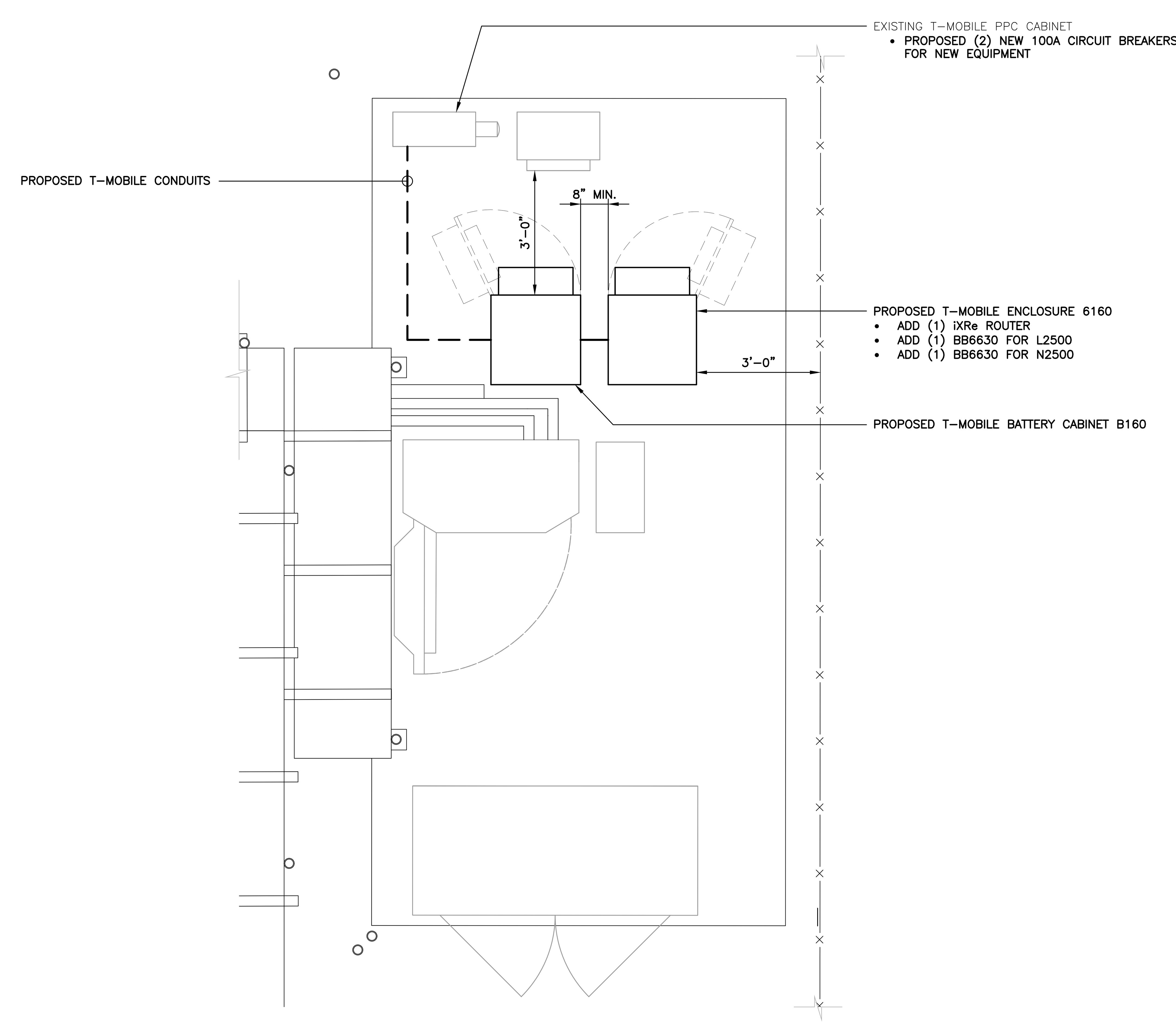
COMPOUND PLAN, EQUIPMENT PLAN, AND ELEVATION

C-2

Sheet No. 4 of 8



1 / C-3 **EXISTING EQUIPMENT PLAN**
SCALE: 1/2" = 1'



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

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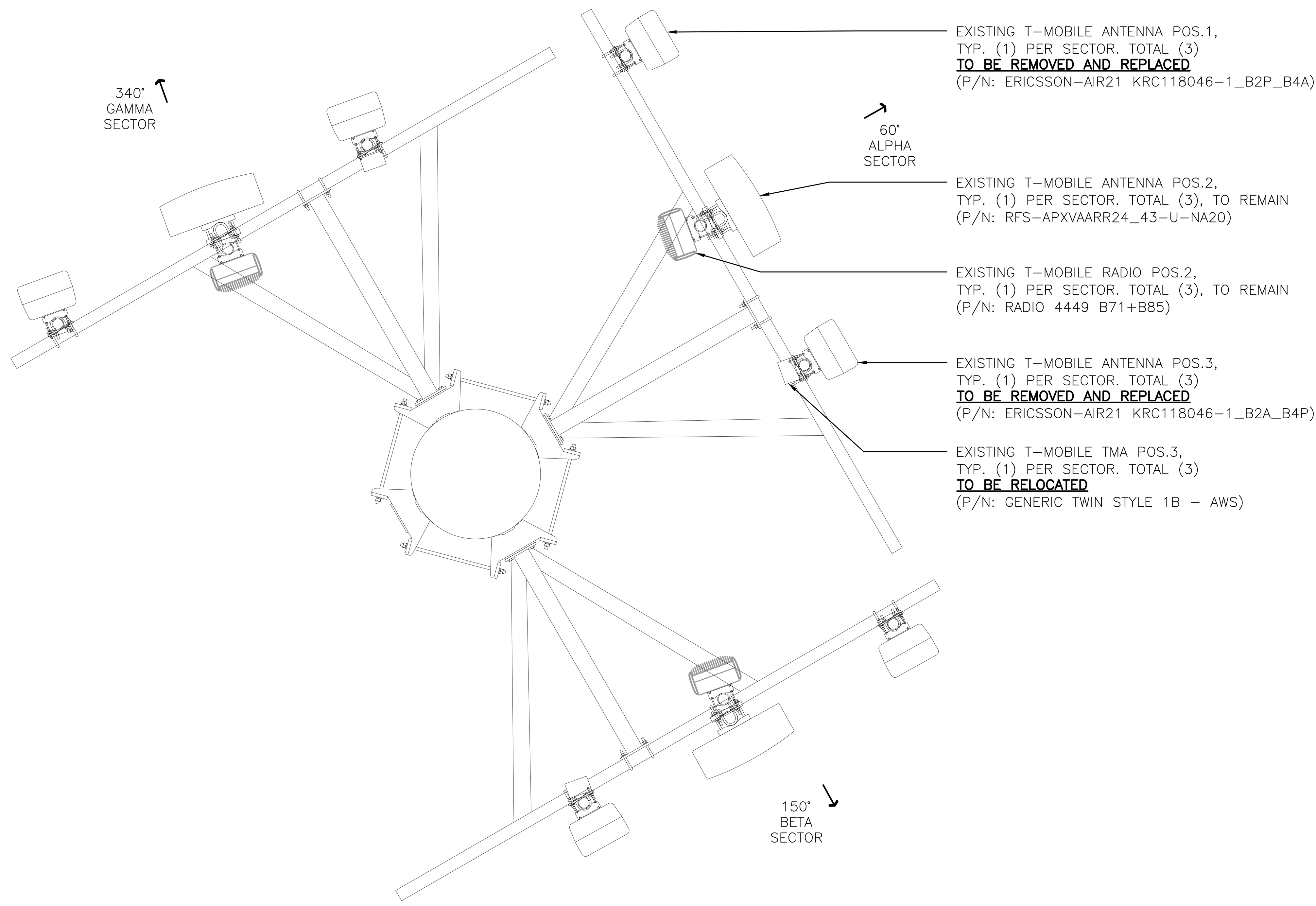
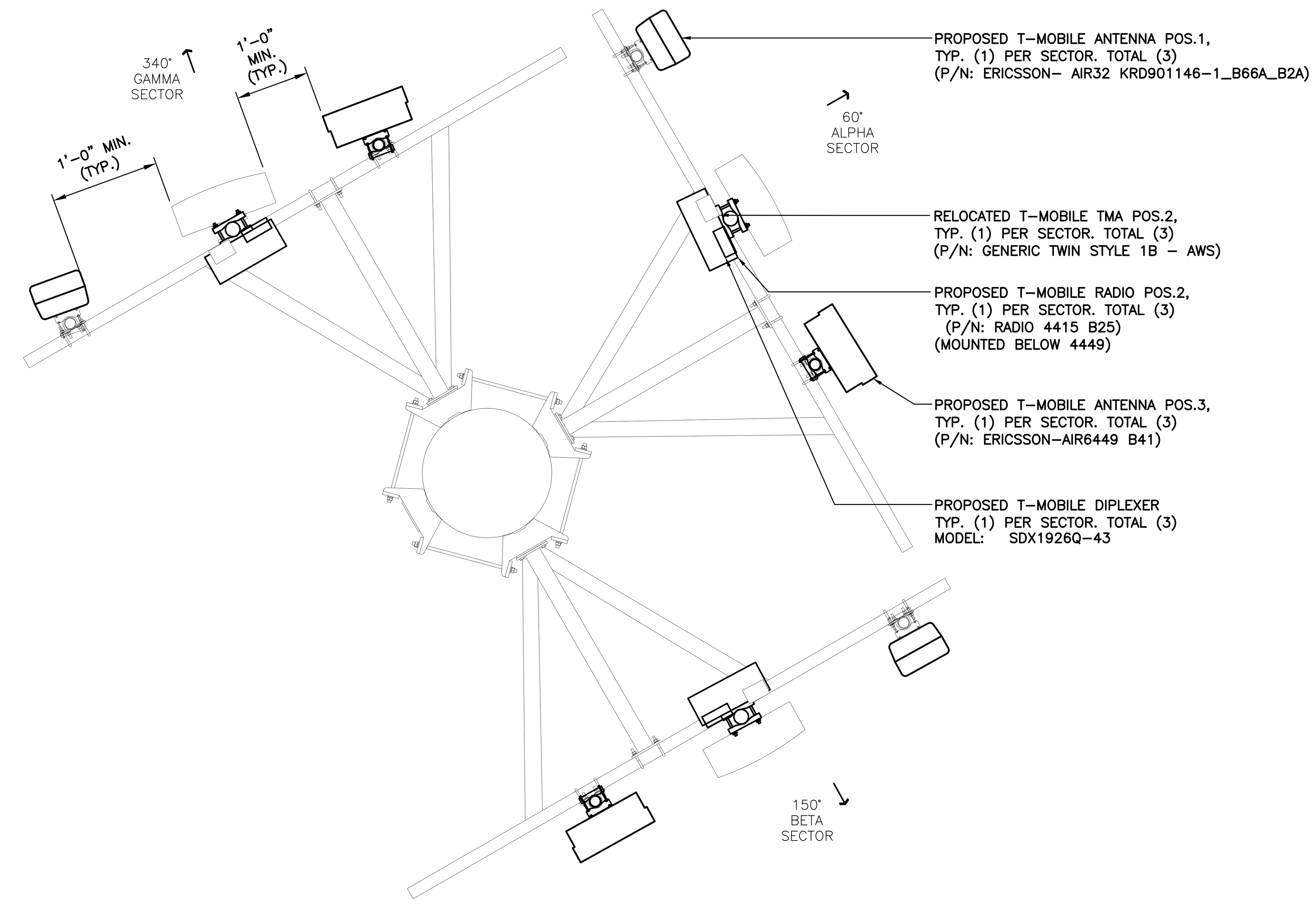
COMPOUND PLAN, EQUIPMENT PLAN, AND ELEVATION

C-3

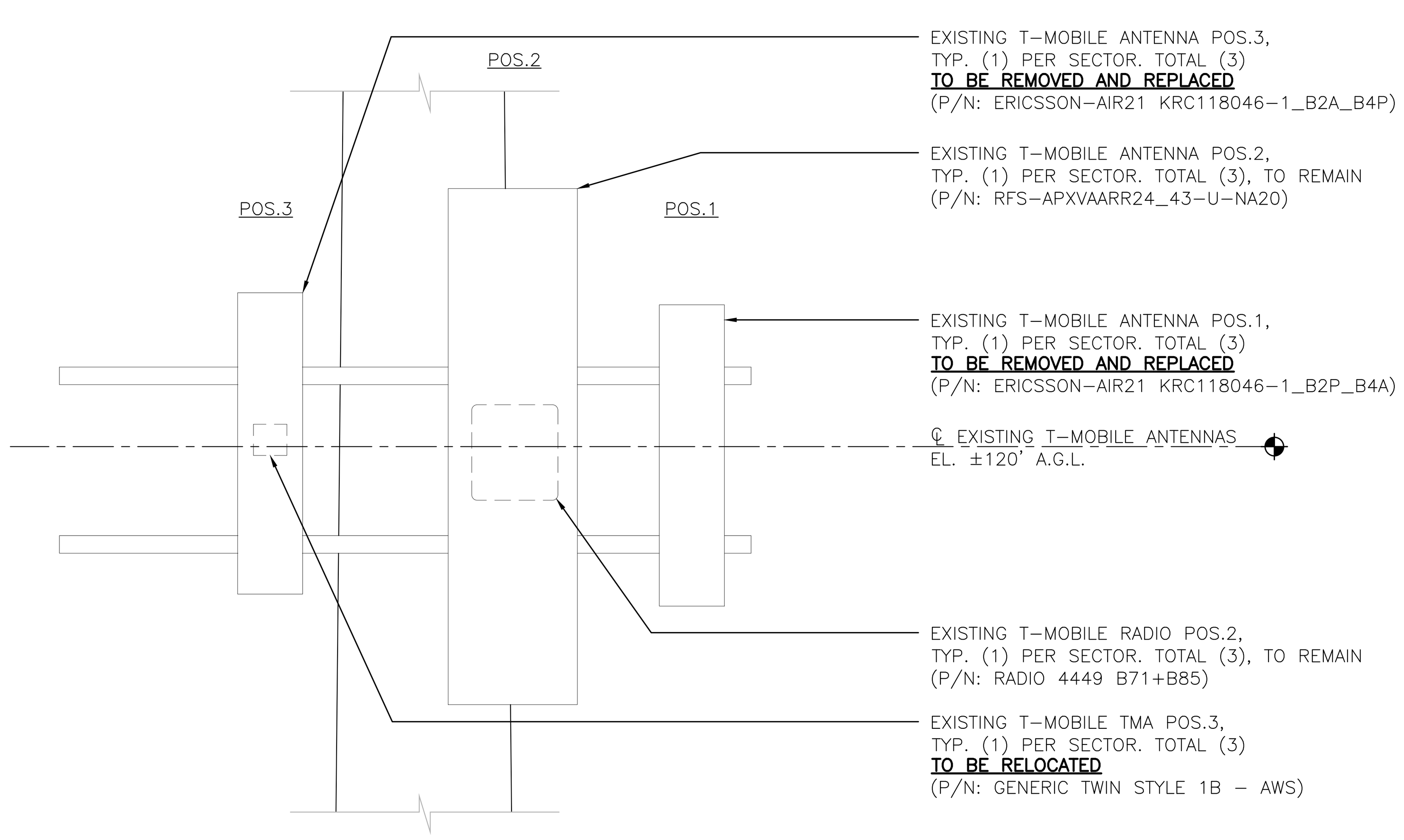
Sheet No. 5 of 8



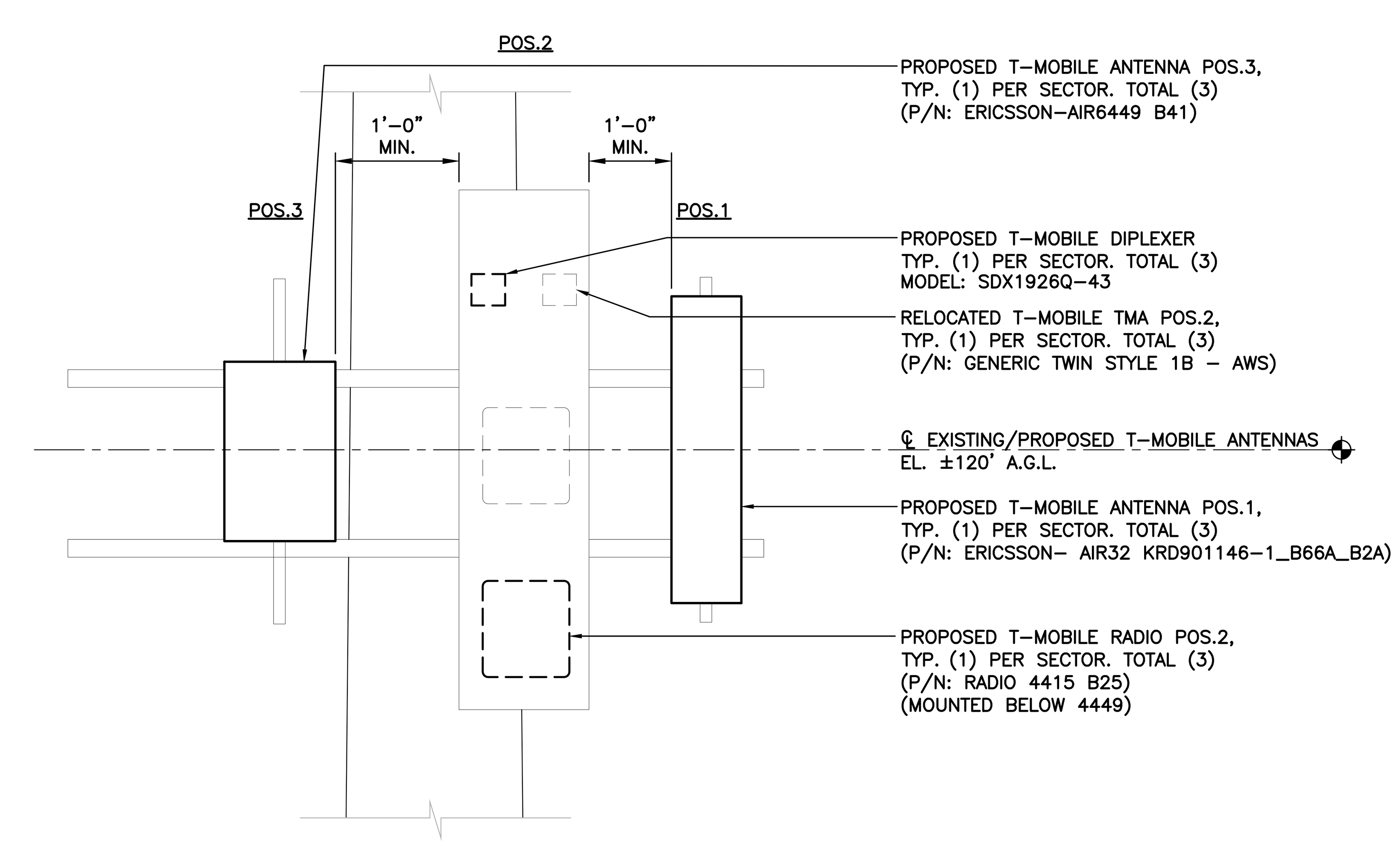
1 C-4 **EQUIPMENT AND ANTENNA PLAN - EXISTING**
SCALE: 1/2" = 1'



2 C-4 **EQUIPMENT AND ANTENNA PLAN - PROPOSED**
SCALE: 1/2" = 1'



1A C-4 **ANTENNA ELEVATION - EXISTING**
SCALE: 1/2" = 1'



2A C-4 **ANTENNA ELEVATION - PROPOSED**
SCALE: 1/2" = 1'

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0	08/31/20	BSP	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

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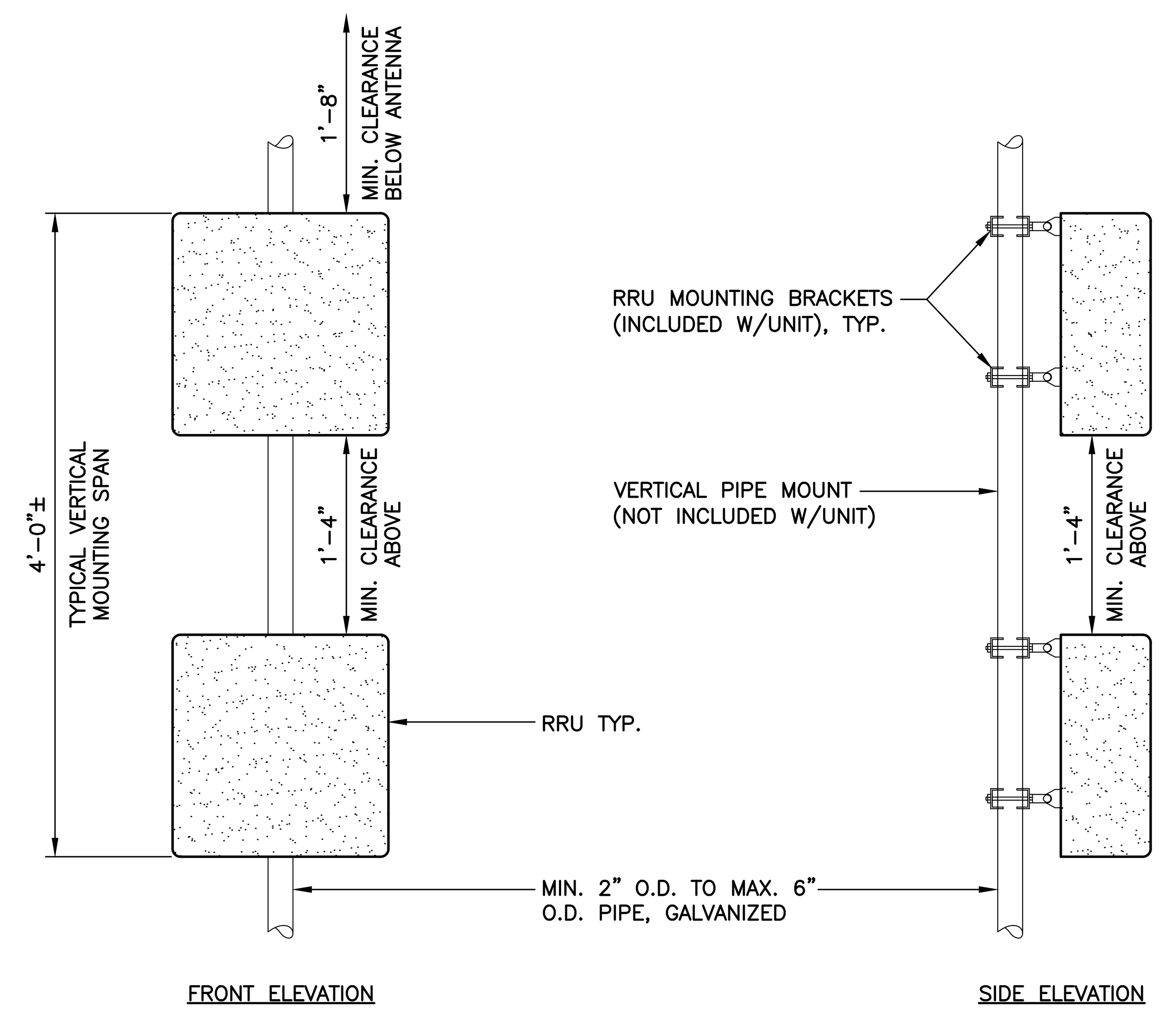
JOB NO. 20074.61

ANTENNA PLANS

C-4

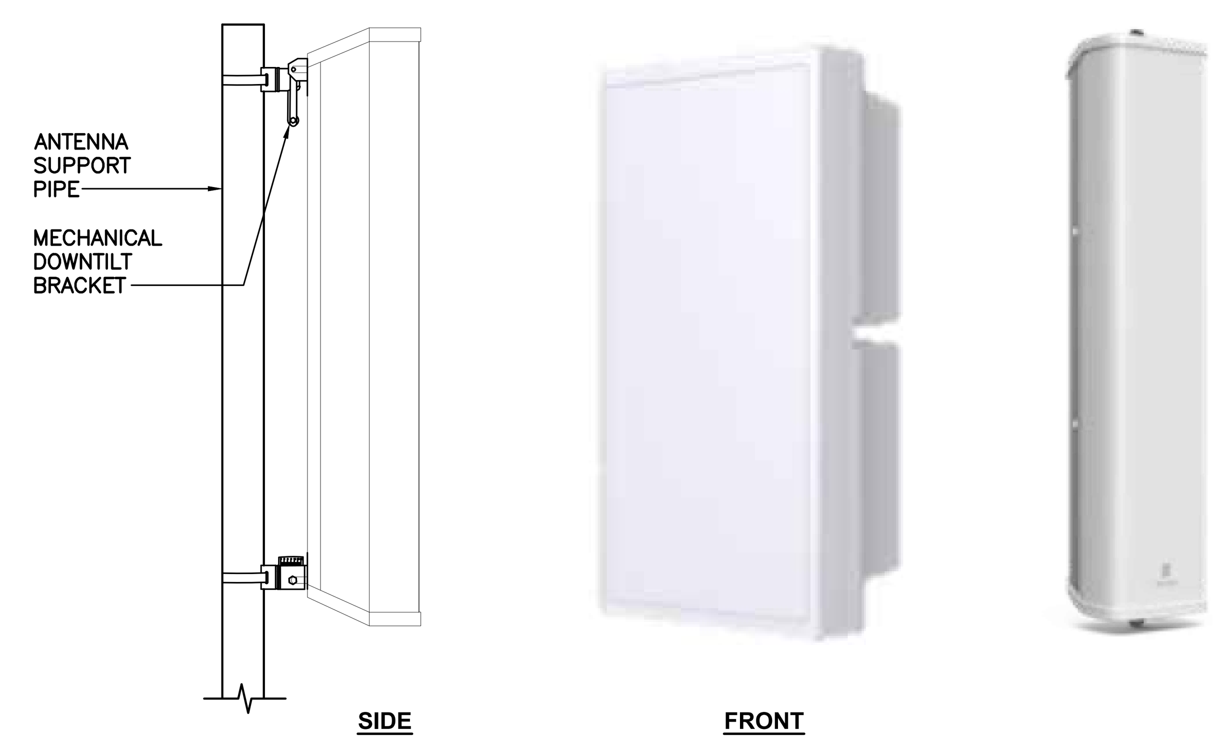
Sheet No. 6 of 8



NOTES:

1. 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.
2. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

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



ALPHA/BETA/GAMMA ANTENNA		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: AIR6449 B41	33.1"L x 20.6"W x 8.6"D	±104 LBS.
MAKE: ERICSSON MODEL: AIR32 KRD901146-1_B66A_B2A	56.6"L x 12.9"W x 8.7"D	±132 LBS.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

2 C-5 PROPOSED ANTENNA DETAIL
SCALE: NOT TO SCALE

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4415 B25	14.9"L x 13.2"W x 5.4"D	±46 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

3 C-5 PROPOSED RRU DETAIL
SCALE: NOT TO SCALE

EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: ENCLOSURE 6160	62.0"H x 26.0"W x 26.0"D	±1200 LBS

4 C-5 ENCLOSURE 6160 (OUTDOOR)
SCALE: NOT TO SCALE

EQUIPMENT CABINET		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: ERICSSON MODEL: BATTERY CABINET B160	62.0"H x 26.0"W x 26.0"D	±1883 LBS

5 C-5 BATTERY CABINET DETAIL
NOT TO SCALE

DIPLEXER		
EQUIPMENT	DIMENSIONS	WEIGHT
MAKE: COMMSCOPE MODEL: SDX1926Q-43(E14F05P86)	4.2"L x 7.0"W x 3.0"D	–

NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

6 C-5 PROPOSED DIPLEXER DETAIL
SCALE: NOT TO SCALE

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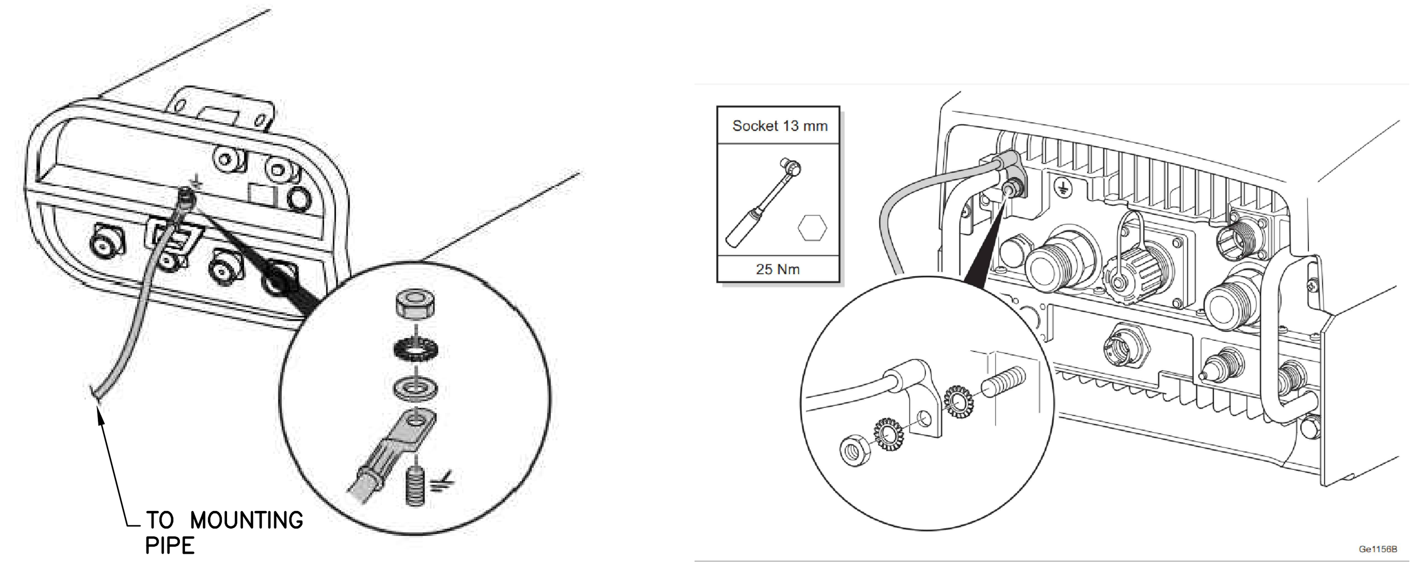
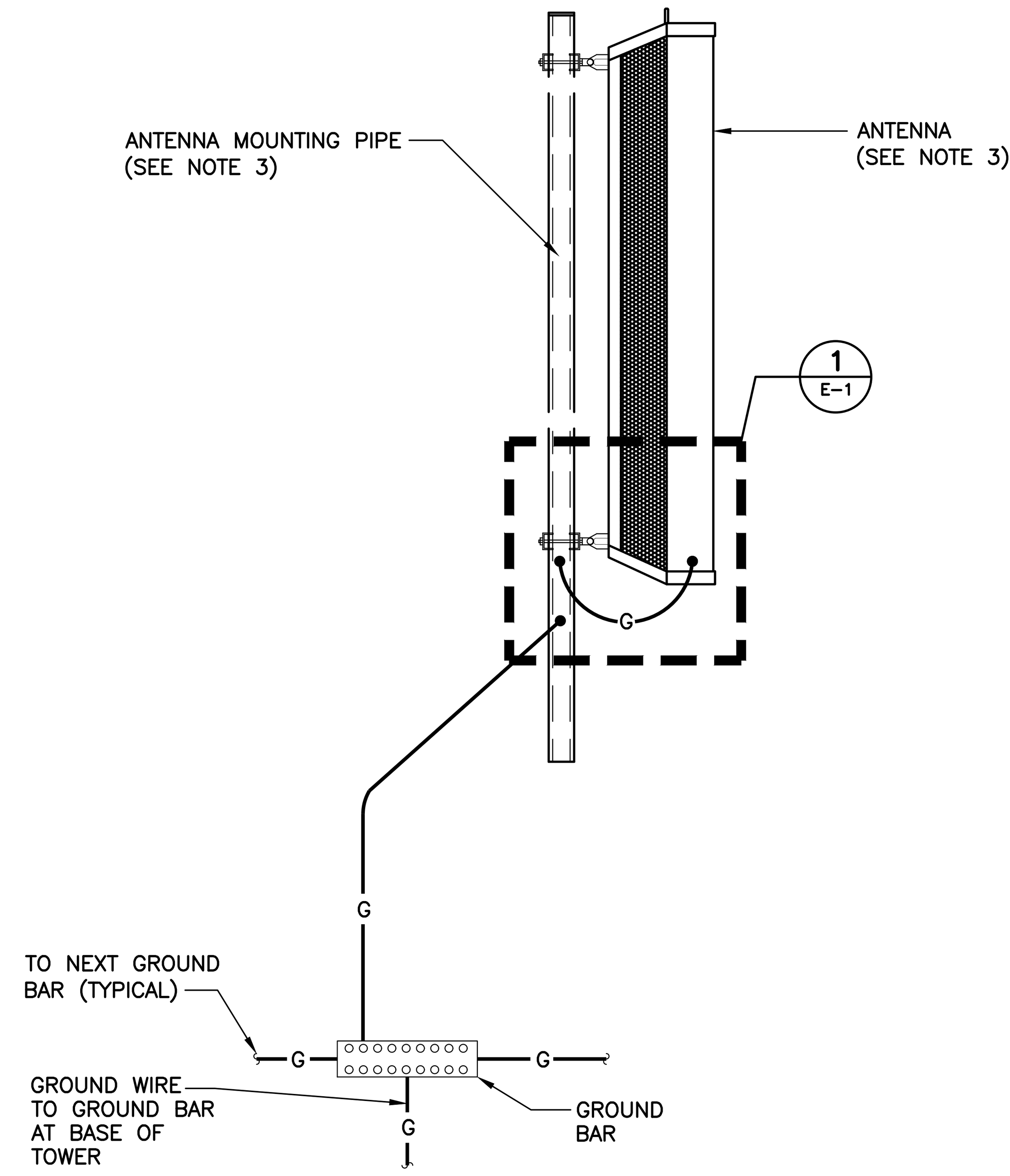
TYPICAL EQUIPMENT DETAILS

C-5

Sheet No. 7 of 8



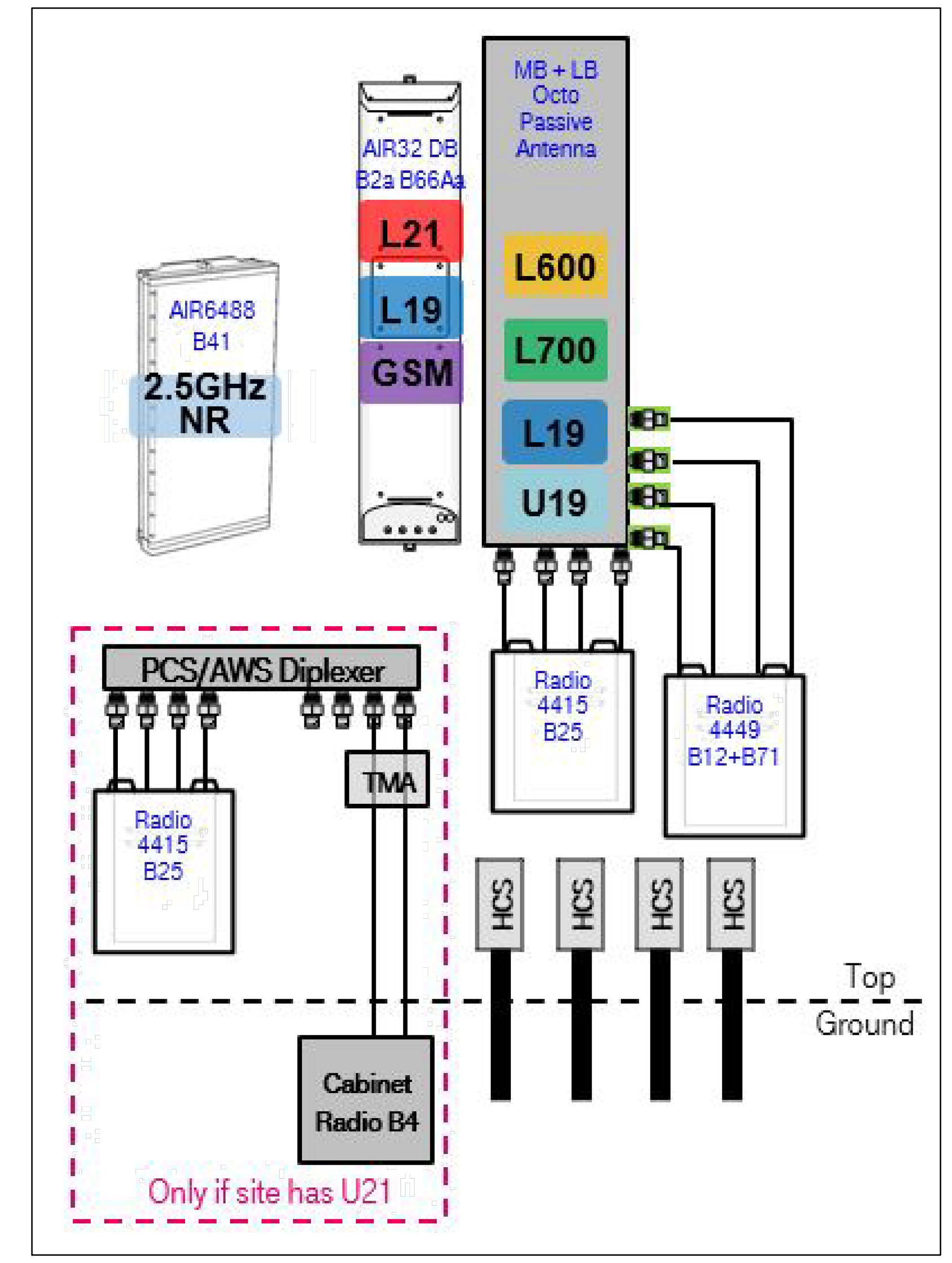
1 TYPICAL ANTENNA/RRU GROUNDING DETAILS
E-1
SCALE: NOT TO SCALE



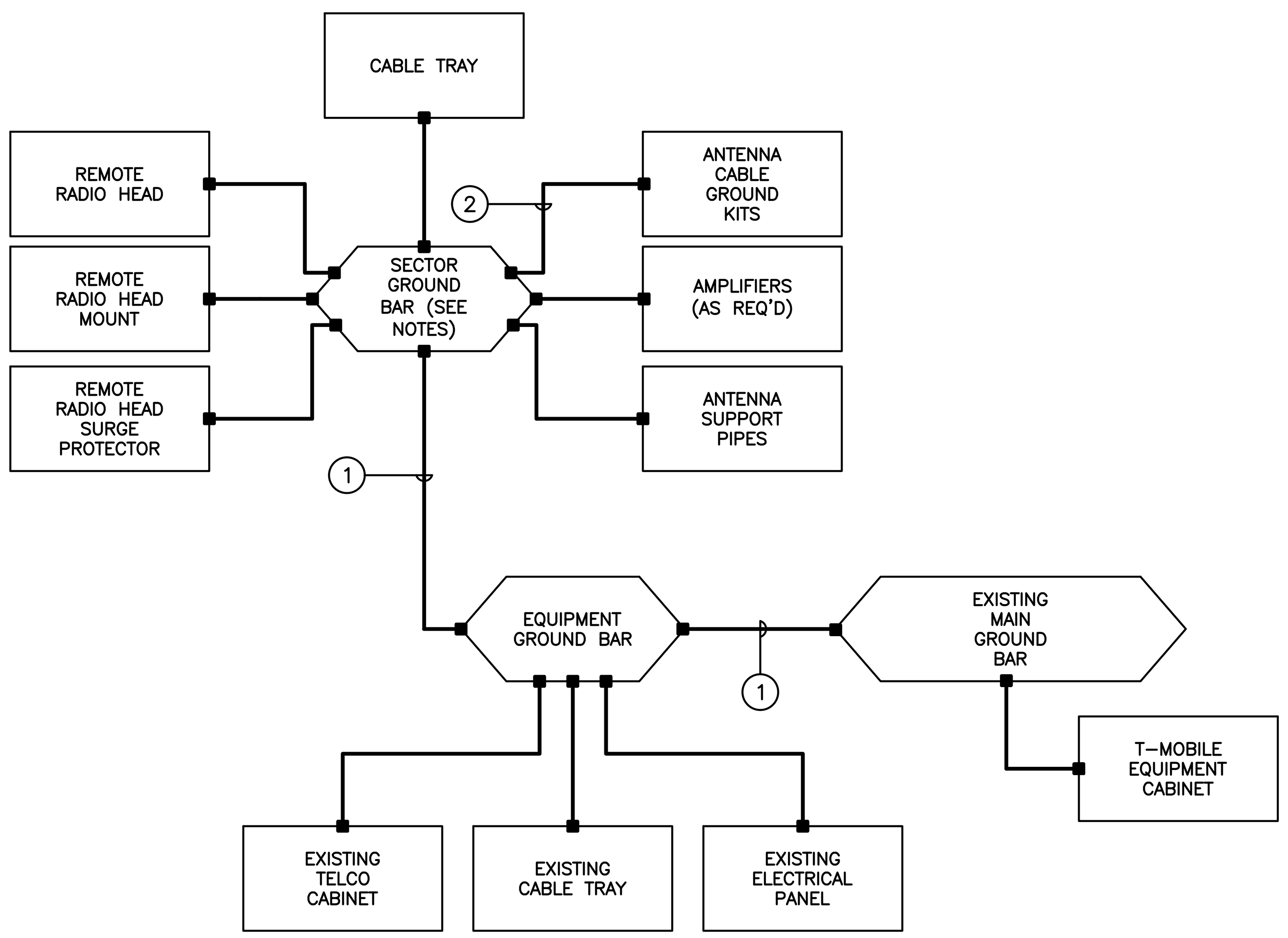
NOTES:

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

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



3 PROPOSED PLUMBING DIAGRAM
E-1
SCALE: NOT TO SCALE



GROUNDING SCHEMATIC NOTES

(1) #2 AWG

(2) #6 AWG

GENERAL NOTES:

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

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

RISER DIAGRAM NOTES

(1) EXISTING 200A, 120/240V, SINGLE PHASE PANEL TO REMAIN.

(2) EXISTING CONDUITS AND CONDUCTORS TO REMAIN.

(3) EXISTING EQUIPMENT CABINET TO REMAIN.

(4) EXISTING 125A/2P CIRCUIT BREAKER SERVING EXISTING EQUIPMENT CABINET TO BE REMOVED AND REPLACED WITH NEW 100A/2P CIRCUIT BREAKER. COORDINATE CABINET DOWNGRADE WITH CONSTRUCTION MANAGER.

(5) NEW 100A/2P CIRCUIT BREAKER TO SERVE NEW EQUIPMENT CABINET.

(6) (3) #1 AWG, (1) #8 AWG GROUND, 1-1/4" CONDUIT.

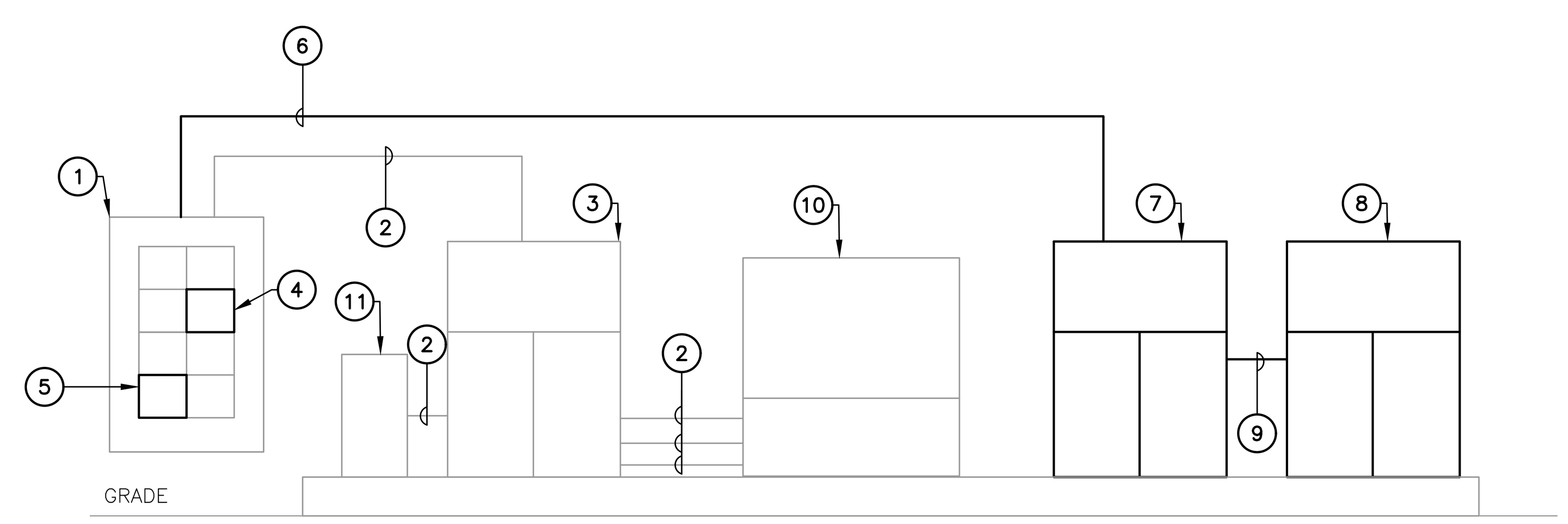
(7) NEW RADIO EQUIPMENT CABINET.

(8) NEW BATTERY CABINET.

(9) DC CONDUIT AND CONDUCTORS FOR BATTERY CABINET CONNECTION PER MANUFACTURERS SPECIFICATIONS.

(10) EXISTING 25KW DC GENERATOR TO REMAIN.

(11) EXISTING BBU CABINET TO REMAIN.



5 ELECTRICAL POWER RISER DIAGRAM
E-1
SCALE: NOT TO SCALE

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	08/31/20	BSP	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

T-Mobile
Transcend Wireless

CENTEK engineering
Centered on Solutions
(203) 488-0580
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63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE NORTHEAST LLC
WIRELESS COMMUNICATIONS FACILITY
POLICE STA EDISON RD
SITE ID: CTFF481B
158 EDISON RD
TRUMBULL, CT 06611

DATE: 07/23/20
SCALE: AS NOTED
JOB NO. 20074.61

TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 8 of 8

Structural Analysis Report

130-ft Existing Valmont Monopole

Proposed T-Mobile
Antenna Upgrade

Site Ref: CTFF481B

158 Edison Road
Trumbull, CT

CENTEK Project No. 20074.61

Date: July 28, 2020

Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

Introduction

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

The host tower is a 130-ft tall, three-section, eighteen sided, tapered monopole originally designed and manufactured by Valmont order no: 291087, dated June 29, 2016. The tower geometry, structure member sizes and foundation system information were obtained from the aforementioned tower design documents.

Antenna and appurtenance information were obtained from a previous structural analysis report prepared by Centek dated February 22, 2019 and a RF data sheet.

The tower consists of three (3) tapered vertical sections consisting of A572-65 pole sections. The vertical tower sections are slip joint connected. The diameter of the pole (flat-flat) is 28.95-in at the top and 59.50-in at the base.

Antenna and Appurtenance Summary

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

- TOWN (Reserved):
  Antennas: Eight (8) Omni-directional whip antennas, two (2) dipole antennas and one (1) 2-ft ∅ Microwave dish pipe to the top of the tower.
  Coax Cables: Eleven (11) 7/8" ∅ coax cables running on the inside of the monopole.
- VERIZON (Existing):
  Antennas: Nine (9) Andrew SBNHH-1D65B panel antennas, three (3) Nokia RRH2x60-700 remote radio heads, three (3) Nokia RRH2x60-PCS remote radio heads, three (3) Nokia RRH4x45-AWS remote radio heads and two (2) Raycap RC2DC3315-PF-48 distribution boxes mounted on three (3) 12-ft T-Arms with a RAD center elevation of 109-ft above grade.
  Coax Cables: Two (2) 1-5/8" ∅ fiber cables running on the inside of the monopole.
- T-MOBILE (Existing to Remain):
  Antennas: Three (3) RFS APXVAARR24_43 panel antennas, three (3) Ericsson 4449 B71 B12 remote radio units and three (3) TMAs mounted on three (3) 12-ft T-arms with a RAD center elevation of 120-ft above existing grade.
  Coax Cables: Six (6) 1-5/8" ∅ coax cables and two (2) 6x12 fiber cables running on the inside of the monopole.
- **T-MOBILE (Existing to Remove):**
  Antennas: Six (6) Ericsson AIR21 panel antennas mounted on three (3) 12-ft T-arms with a RAD center elevation of 120-ft above existing grade.
- **T-MOBILE (Proposed):**
  Antennas: Three (3) Ericsson AIR32 panel antennas, three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson 4415 remote radio units and three (3) Commscope SDX1926Q-43 diplexers mounted on three (3) 12-ft T-arms with a RAD center elevation of 120-ft above existing grade.
  Coax Cables: One (1) 6x12 fiber cable running on the inside of the monopole.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents or reinforcement drawings.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All existing coax cables to be installed as indicated in this report.

Analysis

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

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

The controlling wind speed is determined by evaluating the local available wind speed data as provided in Appendix N of the CSBC[1] and the wind speed data available in the TIA-222-G-2005 Standard.

Tower Loading

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

Basic Wind Speed:	Fairfield; v = 90-110 mph (3-second gust)	*[Annex B of TIA-222-G-2005]*
	Trumbull; v = 97 mph (3 second gust)	*[Appendix N of the 2018 CT Building Code]*
Load Cases:	<u>Load Case 1</u>; 97 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2018 CT Building Code]*
	<u>Load Case 2</u>; 50 mph wind speed w/ 0.75" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

1 The 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 **48.3%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Pole Shaft (L3)	1.00'-39.03'	48.3%	**PASS**

Foundation and Anchors

The foundation consists of a 8.0-ft square x 4.5-ft long reinforced concrete pier on a 26.5-ft square x 3.0-ft thick reinforced concrete pad. The sub-grade conditions used in the analysis of the foundation were obtained from the aforementioned design documents. The base of the tower is connected to the foundation by means of (20) 2.25"∅, ASTM A615 Grade 75 anchor bolts embedded approximately 5-ft into the concrete foundation structure.

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

Location	Vector	Proposed Reactions
Base	Shear	34 kips
	Compression	43 kips
	Moment	3207 kip-ft

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 FS(1)	Proposed Loading (FS)(1)	Result
Reinforced Concrete Pad and Pier	OTM(2)	1.0	2.43	**PASS**

Note 1: FS denotes Factor of Safety.

Note 2: OTM denotes Overturning Moment

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Combined Compression and Shear	36.9%	**PASS**
Base Plate	Bending	46.9%	**PASS**

Conclusion

This analysis shows that the subject tower **is adequate** to support the proposed 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:

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

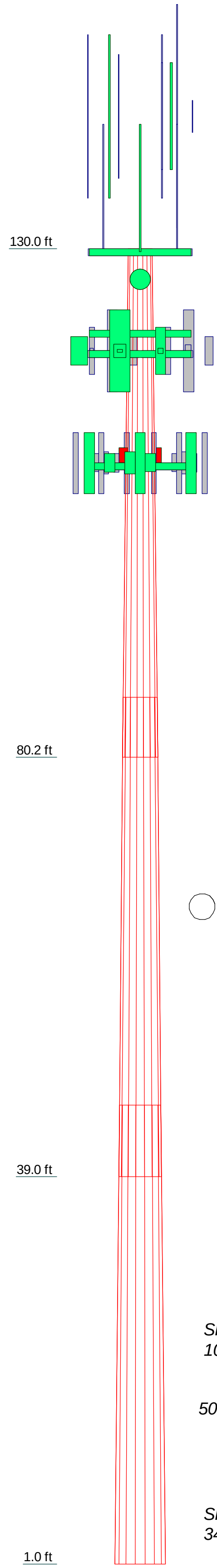
General Description of Structural Analysis Program

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

tnxTower Features:

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

Section	1	2	3	
Length (ft)	49.833	46.971	45.000	
Number of Sides	18	18	18	
Thickness (in)	0.313	0.375	0.438	
Socket Length (ft)	5.833	6.971		
Top Dia (in)	28.950	39.214	48.352	
Bot Dia (in)	41.283	50.825	59.500	
Grade	A572-65			
Weight (K)	5.9	8.5	11.4	25.7



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) DB809KE-XT	143	SDX1926Q-43 (T-Mobile - Proposed)	120
ANT790F2	143	SDX1926Q-43 (T-Mobile - Proposed)	120
(2) PD1142-2AN	143	SDX1926Q-43 (T-Mobile - Proposed)	120
PD1142-2AN	143	KRY 112-144-1 TMA (T-Mobile)	120
PD1142-2AN	143	KRY 112-144-1 TMA (T-Mobile)	120
872-70	143	KRY 112-144-1 TMA (T-Mobile)	120
DS1F06F36U-D	143	Valmont T-Arm (1) (T-Mobile)	120
872-70	143	Valmont T-Arm (1) (T-Mobile)	120
12-ft T-arm w/ Work Support Platform	130	Valmont T-Arm (1) (T-Mobile)	120
12-ft T-arm w/ Work Support Platform	130	Valmont T-Arm (1) (Verizon - Existing)	109
12-ft T-arm w/ Work Support Platform	130	Valmont T-Arm (1) (Verizon - Existing)	109
(4) 2" Std. x 12'-6" pipe	130	(3) SBNHH-1D65B (Verizon - Existing)	109
(4) 2" Std. x 12'-6" pipe	130	(3) SBNHH-1D65B (Verizon - Existing)	109
(4) 2" Std. x 12'-6" pipe	130	(3) SBNHH-1D65B (Verizon - Existing)	109
2-ft dish	127	RRH2x60-07-U (Verizon - Existing)	109
T-Arm Stablizer - VSK-M (T-Mobile)	122	RRH2x60-07-U (Verizon - Existing)	109
AIR6449 (T-Mobile - Proposed)	120	RRH2x60-07-U (Verizon - Existing)	109
AIR32 (T-Mobile - Proposed)	120	RRH4x45/2x90-AWS (Verizon - Existing)	109
APXVAARR24-43 (T-Mobile)	120		
AIR6449 (T-Mobile - Proposed)	120	RRH4x45/2x90-AWS (Verizon - Existing)	109
AIR32 (T-Mobile - Proposed)	120		
APXVAARR24-43 (T-Mobile)	120	RRH4x45/2x90-AWS (Verizon - Existing)	109
AIR6449 (T-Mobile - Proposed)	120	RRH2x60-PCS (Verizon - Existing)	109
AIR32 (T-Mobile - Proposed)	120	RRH2x60-PCS (Verizon - Existing)	109
APXVAARR24-43 (T-Mobile)	120	RRH2x60-PCS (Verizon - Existing)	109
Radio 4449 B71 B12 (T-Mobile)	120	RC2DC-3315-PF-48 (Verizon - Existing)	109
Radio 4449 B71 B12 (T-Mobile)	120		
Radio 4449 B71 B12 (T-Mobile)	120	RC2DC-3315-PF-48 (Verizon - Existing)	109
4415 B25 (T-Mobile - Proposed)	120		
4415 B25 (T-Mobile - Proposed)	120	Valmont T-Arm (1) (Verizon - Existing)	109
4415 B25 (T-Mobile - Proposed)	120		

MATERIAL STRENGTH

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

TOWER DESIGN NOTES

1. Tower designed for Exposure C to the TIA-222-G Standard.
2. Tower designed for a 97 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class III.
6. Topographic Category 1 with Crest Height of 0.000 ft
7. TOWER RATING: 48.3%

ALL REACTIONS ARE FACTORED

AXIAL 74 K
SHEAR 10 K
MOMENT 982 kip-ft
TORQUE 1 kip-ft
50 mph WIND - 0.750 in ICE

AXIAL 43 K
SHEAR 34 K
MOMENT 3207 kip-ft
TORQUE 2 kip-ft
REACTIONS - 97 mph WIND

Centek Engineering Inc. 63-2 North Branford Rd. Branford, CT 06405 Phone: (203) 488-0580 FAX: (203) 488-8587	Job: **20074.61 - CTFF481B**		
	Project: **130-ft Valmont Monopole - 158 Edison Road Trumbull, CT**		
	Client: T-Mobile	Drawn by: TJL	App'd:
	Code: TIA-222-G	Date: 07/27/20	Scale: NTS
	Path:		Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

- Basic wind speed of 97 mph.
- Structure Class III.
- Exposure Category C.
- Topographic Category 1.
- Crest Height 0.000 ft.
- Nominal ice thickness of 0.750 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs
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

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

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

Poles

√ Include Shear-Torsion Interaction
Always Use Sub-Critical Flow
Use Top Mounted Sockets
Pole Without Linear Attachments
Pole With Shroud Or No Appurtenances
Outside and Inside Corner Radii Are Known

Tapered Pole Section Geometry

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L1	130.000-80.167	49.833	5.833	18	28.950	41.283	0.313	1.250	A572-65 (65 ksi)

Section	*Elevation* *ft*	*Section Length* *ft*	*Splice Length* *ft*	*Number of Sides*	*Top Diameter* *in*	*Bottom Diameter* *in*	*Wall Thickness* *in*	*Bend Radius* *in*	*Pole Grade*
L2	80.167-39.029	46.971	6.971	18	39.214	50.825	0.375	1.500	A572-65 (65 ksi)
L3	39.029-1.000	45.000		18	48.352	59.500	0.438	1.750	A572-65 (65 ksi)

Tapered Pole Properties

Section	*Tip Dia.* *in*	*Area* *in²*	*I* *in⁴*	*r* *in*	*C* *in*	*I/C* *in³*	*J* *in⁴*	*It/Q* *in²*	*w* *in*	*w/t*
L1	29.348	28.405	2943.064	10.166	14.707	200.119	5890.000	14.205	4.545	14.545
	41.872	40.638	8618.034	14.545	20.972	410.935	17247.407	20.323	6.716	21.491
L2	41.226	46.229	8810.358	13.788	19.921	442.267	17632.308	23.119	6.242	16.645
	51.551	60.048	19308.972	17.910	25.819	747.856	38643.351	30.030	8.285	22.094
L3	50.784	66.535	19298.325	17.010	24.563	785.675	38622.043	33.274	7.740	17.691
	60.350	82.016	36145.806	20.967	30.226	1195.851	72339.173	41.016	9.702	22.176

Tower Elevation *ft*	*Gusset Area (per face)* *ft²*	*Gusset Thickness* *in*	*Gusset Grade*	*Adjust. Factor* A_f	*Adjust. Factor* A_r	*Weight Mult.*	*Double Angle Stitch Bolt Spacing Diagonals* *in*	*Double Angle Stitch Bolt Spacing Horizontals* *in*	*Double Angle Stitch Bolt Spacing Redundants* *in*
L1 130.000-80.167				1	1	1			
L2 80.167-39.029				1	1	1			
L3 39.029-1.000				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	*Face or Leg*	*Allow Shield*	*Exclude From Torque Calculation*	*Component Type*	*Placement* *ft*	*Total Number*		C_AA_A *ft²/ft*	*Weight* *klf*
7/8 (Town)	C	No	No	Inside Pole	130.000 - 1.000	11	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
1 5/8 (T-Mobile)	C	No	No	Inside Pole	120.000 - 1.000	6	No Ice	0.000	0.001
							1/2" Ice	0.000	0.001
							1" Ice	0.000	0.001
HYBRIFLEX 1-5/8" (T-Mobile)	C	No	No	Inside Pole	120.000 - 1.000	3	No Ice	0.000	0.002
							1/2" Ice	0.000	0.002
							1" Ice	0.000	0.002
HYBRIFLEX 1-5/8" (Verizon)	C	No	No	Inside Pole	109.000 - 1.000	2	No Ice	0.000	0.002
							1/2" Ice	0.000	0.002
							1" Ice	0.000	0.002

Feed Line/Linear Appurtenances Section Areas

Tower Section	*Tower Elevation ft*	*Face*	A_R ft^2	A_F ft^2	C_AA_A *In Face* ft^2	C_AA_A *Out Face* ft^2	*Weight K*
L1	130.000-80.167	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.881
L2	80.167-39.029	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.892
L3	39.029-1.000	A	0.000	0.000	0.000	0.000	0.000
		B	0.000	0.000	0.000	0.000	0.000
		C	0.000	0.000	0.000	0.000	0.824

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	*Tower Elevation ft*	*Face or Leg*	*Ice Thickness in*	A_R ft^2	A_F ft^2	C_AA_A *In Face* ft^2	C_AA_A *Out Face* ft^2	*Weight K*
L1	130.000-80.167	A	2.103	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.881
L2	80.167-39.029	A	1.988	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.892
L3	39.029-1.000	A	1.785	0.000	0.000	0.000	0.000	0.000
		B		0.000	0.000	0.000	0.000	0.000
		C		0.000	0.000	0.000	0.000	0.824

Feed Line Center of Pressure

Section	*Elevation ft*	CP_X *in*	CP_Z *in*	CP_X *Ice in*	CP_Z *Ice in*
L1	130.000-80.167	0.000	0.000	0.000	0.000
L2	80.167-39.029	0.000	0.000	0.000	0.000
L3	39.029-1.000	0.000	0.000	0.000	0.000

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

Shielding Factor Ka

Tower Section	*Feed Line Record No.*	*Description*	*Feed Line Segment Elev.*	K_a *No Ice*	K_a *Ice*

Discrete Tower Loads

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
(3) SBNHH-1D65B	A	From Face	3.000	0.000	109.000	No Ice	8.079	5.342	0.042
(Verizon - Existing)			0.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
(3) SBNHH-1D65B	B	From Face	3.000	0.000	109.000	No Ice	8.079	5.342	0.042
(Verizon - Existing)			0.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
(3) SBNHH-1D65B	C	From Face	3.000	0.000	109.000	No Ice	8.079	5.342	0.042
(Verizon - Existing)			0.000			1/2" Ice	8.535	5.795	0.092
			0.000			1" Ice	8.998	6.255	0.148
RRH2x60-07-U	A	From Face	3.000	0.000	109.000	No Ice	2.100	1.406	0.050
(Verizon - Existing)			-1.000			1/2" Ice	2.287	1.565	0.068
			0.000			1" Ice	2.481	1.737	0.089
RRH2x60-07-U	B	From Face	3.000	0.000	109.000	No Ice	2.100	1.406	0.050
(Verizon - Existing)			-1.000			1/2" Ice	2.287	1.565	0.068
			0.000			1" Ice	2.481	1.737	0.089
RRH2x60-07-U	C	From Face	3.000	0.000	109.000	No Ice	2.100	1.406	0.050
(Verizon - Existing)			-1.000			1/2" Ice	2.287	1.565	0.068
			0.000			1" Ice	2.481	1.737	0.089
RRH4x45/2x90-AWS	A	From Face	3.000	0.000	109.000	No Ice	2.580	1.688	0.075
(Verizon - Existing)			1.000			1/2" Ice	2.794	1.871	0.096
			0.000			1" Ice	3.015	2.060	0.120
RRH4x45/2x90-AWS	B	From Face	3.000	0.000	109.000	No Ice	2.580	1.688	0.075
(Verizon - Existing)			1.000			1/2" Ice	2.794	1.871	0.096
			0.000			1" Ice	3.015	2.060	0.120
RRH4x45/2x90-AWS	C	From Face	3.000	0.000	109.000	No Ice	2.580	1.688	0.075
(Verizon - Existing)			1.000			1/2" Ice	2.794	1.871	0.096
			0.000			1" Ice	3.015	2.060	0.120
RRH2x60-PCS	A	From Face	3.000	0.000	109.000	No Ice	2.150	1.346	0.055
(Verizon - Existing)			3.000			1/2" Ice	2.340	1.504	0.073
			0.000			1" Ice	2.537	1.669	0.093
RRH2x60-PCS	B	From Face	3.000	0.000	109.000	No Ice	2.150	1.346	0.055
(Verizon - Existing)			3.000			1/2" Ice	2.340	1.504	0.073
			0.000			1" Ice	2.537	1.669	0.093
RRH2x60-PCS	C	From Face	3.000	0.000	109.000	No Ice	2.150	1.346	0.055
(Verizon - Existing)			3.000			1/2" Ice	2.340	1.504	0.073
			0.000			1" Ice	2.537	1.669	0.093
RC2DC-3315-PF-48	A	From Face	0.500	0.000	109.000	No Ice	3.015	1.965	0.025
(Verizon - Existing)			0.000			1/2" Ice	3.234	2.153	0.051
			0.000			1" Ice	3.460	2.349	0.081
RC2DC-3315-PF-48	B	From Face	0.500	0.000	109.000	No Ice	3.015	1.965	0.025
(Verizon - Existing)			0.000			1/2" Ice	3.234	2.153	0.051
			0.000			1" Ice	3.460	2.349	0.081
Valmont T-Arm (1)	A	From Face	1.750	0.000	109.000	No Ice	10.540	10.540	0.336
(Verizon - Existing)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000			1" Ice	18.360	18.360	0.488
Valmont T-Arm (1)	B	From Face	1.750	0.000	109.000	No Ice	10.540	10.540	0.336
(Verizon - Existing)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000			1" Ice	18.360	18.360	0.488
Valmont T-Arm (1)	C	From Face	1.750	0.000	109.000	No Ice	10.540	10.540	0.336
(Verizon - Existing)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000			1" Ice	18.360	18.360	0.488
AIR6449	A	From Face	3.000	0.000	120.000	No Ice	5.655	2.416	0.103
(T-Mobile - Proposed)			6.000			1/2" Ice	5.956	2.641	0.141
			0.000			1" Ice	6.265	2.874	0.184

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* *ft ft ft*	*Azimuth Adjustment* *°*	*Placement* *ft*		*C_AA_A Front* *ft^2*	*C_AA_A Side* *ft^2*	*Weight* *K*
AIR32	A	From Face	3.000	0.000	120.000	No Ice	6.510	4.712	0.133
(T-Mobile - Proposed)			-2.000			1/2" Ice	6.887	5.068	0.179
			0.000			1" Ice	7.271	5.431	0.230
APXVAARR24-43	A	From Face	3.000	0.000	120.000	No Ice	20.243	8.889	0.153
(T-Mobile)			2.000			1/2" Ice	20.890	9.487	0.266
			0.000			1" Ice	21.544	10.092	0.387
AIR6449	B	From Face	3.000	0.000	120.000	No Ice	5.655	2.416	0.103
(T-Mobile - Proposed)			6.000			1/2" Ice	5.956	2.641	0.141
			0.000			1" Ice	6.265	2.874	0.184
AIR32	B	From Face	3.000	0.000	120.000	No Ice	6.510	4.712	0.133
(T-Mobile - Proposed)			-2.000			1/2" Ice	6.887	5.068	0.179
			0.000			1" Ice	7.271	5.431	0.230
APXVAARR24-43	B	From Face	3.000	0.000	120.000	No Ice	20.243	8.889	0.153
(T-Mobile)			2.000			1/2" Ice	20.890	9.487	0.266
			0.000			1" Ice	21.544	10.092	0.387
AIR6449	C	From Face	3.000	0.000	120.000	No Ice	5.655	2.416	0.103
(T-Mobile - Proposed)			6.000			1/2" Ice	5.956	2.641	0.141
			0.000			1" Ice	6.265	2.874	0.184
AIR32	C	From Face	3.000	0.000	120.000	No Ice	6.510	4.712	0.133
(T-Mobile - Proposed)			-2.000			1/2" Ice	6.887	5.068	0.179
			0.000			1" Ice	7.271	5.431	0.230
APXVAARR24-43	C	From Face	3.000	0.000	120.000	No Ice	20.243	8.889	0.153
(T-Mobile)			2.000			1/2" Ice	20.890	9.487	0.266
			0.000			1" Ice	21.544	10.092	0.387
Radio 4449 B71 B12	A	From Face	3.000	0.000	120.000	No Ice	1.639	1.291	0.074
(T-Mobile)			2.000			1/2" Ice	1.799	1.436	0.091
			0.000			1" Ice	1.966	1.587	0.111
Radio 4449 B71 B12	B	From Face	3.000	0.000	120.000	No Ice	1.639	1.291	0.074
(T-Mobile)			2.000			1/2" Ice	1.799	1.436	0.091
			0.000			1" Ice	1.966	1.587	0.111
Radio 4449 B71 B12	C	From Face	3.000	0.000	120.000	No Ice	1.639	1.291	0.074
(T-Mobile)			2.000			1/2" Ice	1.799	1.436	0.091
			0.000			1" Ice	1.966	1.587	0.111
4415 B25	A	From Face	3.000	0.000	120.000	No Ice	1.843	0.820	0.046
(T-Mobile - Proposed)			2.000			1/2" Ice	2.012	0.943	0.060
			0.000			1" Ice	2.190	1.075	0.077
4415 B25	B	From Face	3.000	0.000	120.000	No Ice	1.843	0.820	0.046
(T-Mobile - Proposed)			2.000			1/2" Ice	2.012	0.943	0.060
			0.000			1" Ice	2.190	1.075	0.077
4415 B25	C	From Face	3.000	0.000	120.000	No Ice	1.843	0.820	0.046
(T-Mobile - Proposed)			2.000			1/2" Ice	2.012	0.943	0.060
			0.000			1" Ice	2.190	1.075	0.077
SDX1926Q-43	A	From Face	3.000	0.000	120.000	No Ice	0.241	0.101	0.030
(T-Mobile - Proposed)			2.000			1/2" Ice	0.306	0.144	0.032
			0.000			1" Ice	0.379	0.195	0.036
SDX1926Q-43	B	From Face	3.000	0.000	120.000	No Ice	0.241	0.101	0.030
(T-Mobile - Proposed)			2.000			1/2" Ice	0.306	0.144	0.032
			0.000			1" Ice	0.379	0.195	0.036
SDX1926Q-43	C	From Face	3.000	0.000	120.000	No Ice	0.241	0.101	0.030
(T-Mobile - Proposed)			2.000			1/2" Ice	0.306	0.144	0.032
			0.000			1" Ice	0.379	0.195	0.036
KRY 112-144-1 TMA	A	From Face	3.000	0.000	120.000	No Ice	0.351	0.142	0.015
(T-Mobile)			-2.000			1/2" Ice	0.427	0.195	0.018
			0.000			1" Ice	0.510	0.256	0.022
KRY 112-144-1 TMA	B	From Face	3.000	0.000	120.000	No Ice	0.351	0.142	0.015
(T-Mobile)			-2.000			1/2" Ice	0.427	0.195	0.018
			0.000			1" Ice	0.510	0.256	0.022

Description	*Face or Leg*	*Offset Type*	*Offsets: Horz Lateral Vert* (*ft ft ft*)	*Azimuth Adjustment* (°)	*Placement* (*ft*)		*C_AA_A Front* (*ft²*)	*C_AA_A Side* (*ft²*)	*Weight* (*K*)
KRY 112-144-1 TMA	C	From Face	3.000	0.000	120.000	No Ice	0.351	0.142	0.015
(T-Mobile)			-2.000			1/2" Ice	0.427	0.195	0.018
			0.000			1" Ice	0.510	0.256	0.022
Valmont T-Arm (1)	A	From Face	1.750	0.000	120.000	No Ice	10.540	10.540	0.336
(T-Mobile)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000			1" Ice	18.360	18.360	0.488
Valmont T-Arm (1)	B	From Face	1.750	0.000	120.000	No Ice	10.540	10.540	0.336
(T-Mobile)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000			1" Ice	18.360	18.360	0.488
Valmont T-Arm (1)	C	From Face	1.750	0.000	120.000	No Ice	10.540	10.540	0.336
(T-Mobile)			0.000			1/2" Ice	14.450	14.450	0.412
			0.000			1" Ice	18.360	18.360	0.488
T-Arm Stablizer - VSK-M	C	From Face	1.750	0.000	122.000	No Ice	7.500	7.500	0.650
(T-Mobile)			0.000			1/2" Ice	10.000	10.000	1.000
			0.000			1" Ice	12.500	12.500	1.350
(2) DB809KE-XT	A	From Face	3.000	0.000	143.000	No Ice	3.050	3.050	0.030
			3.000			1/2" Ice	4.299	4.299	0.053
			0.000			1" Ice	5.565	5.565	0.083
ANT790F2	B	From Face	3.000	0.000	143.000	No Ice	0.691	0.691	0.008
			3.000			1/2" Ice	0.889	0.889	0.015
			0.000			1" Ice	1.097	1.097	0.024
(2) PD1142-2AN	A	From Face	3.000	0.000	143.000	No Ice	3.200	3.200	0.010
			-3.000			1/2" Ice	4.825	4.825	0.035
			0.000			1" Ice	6.467	6.467	0.069
PD1142-2AN	B	From Face	3.000	0.000	143.000	No Ice	3.200	3.200	0.010
			-3.000			1/2" Ice	4.825	4.825	0.035
			0.000			1" Ice	6.467	6.467	0.069
PD1142-2AN	C	From Face	3.000	0.000	143.000	No Ice	3.200	3.200	0.010
			3.000			1/2" Ice	4.825	4.825	0.035
			0.000			1" Ice	6.467	6.467	0.069
872-70	C	From Face	3.000	0.000	143.000	No Ice	3.150	3.150	0.024
			-3.000			1/2" Ice	4.233	4.233	0.047
			0.000			1" Ice	5.333	5.333	0.077
DS1F06F36U-D	B	From Face	3.000	0.000	143.000	No Ice	6.575	6.575	0.060
			0.000			1/2" Ice	8.800	8.800	0.107
			0.000			1" Ice	11.042	11.042	0.168
872-70	B	From Face	3.000	0.000	143.000	No Ice	3.150	3.150	0.024
			-3.000			1/2" Ice	4.233	4.233	0.047
			0.000			1" Ice	5.333	5.333	0.077
12-ft T-arm w/ Work Support	A	From Face	1.750	0.000	130.000	No Ice	14.200	14.200	0.486
Platform			0.000			1/2" Ice	19.700	19.700	0.575
			0.000			1" Ice	25.200	25.200	0.664
12-ft T-arm w/ Work Support	B	From Face	1.750	0.000	130.000	No Ice	14.200	14.200	0.486
Platform			0.000			1/2" Ice	19.700	19.700	0.575
			0.000			1" Ice	25.200	25.200	0.664
12-ft T-arm w/ Work Support	C	From Face	1.750	0.000	130.000	No Ice	14.200	14.200	0.486
Platform			0.000			1/2" Ice	19.700	19.700	0.575
			0.000			1" Ice	25.200	25.200	0.664
(4) 2" Std. x 12'-6" pipe	A	From Face	3.000	0.000	130.000	No Ice	2.969	2.969	0.040
			0.000			1/2" Ice	4.247	4.247	0.062
			6.000			1" Ice	5.542	5.542	0.093
(4) 2" Std. x 12'-6" pipe	B	From Face	3.000	0.000	130.000	No Ice	2.969	2.969	0.040
			0.000			1/2" Ice	4.247	4.247	0.062
			6.000			1" Ice	5.542	5.542	0.093
(4) 2" Std. x 12'-6" pipe	C	From Face	3.000	0.000	130.000	No Ice	2.969	2.969	0.040
			0.000			1/2" Ice	4.247	4.247	0.062
			6.000			1" Ice	5.542	5.542	0.093

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft		Aperture Area ft^2	Weight K
2-ft dish		Paraboloid w/o Radome	None		Worst		127.000	2.000	No Ice	3.140	0.050
									1/2" Ice	3.410	0.080
									1" Ice	3.680	0.100

Tower Pressures - No Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	103.933	1.276	0.034	147.880	A	0.000	147.880	147.880	100.00	0.000	0.000
130.000-80.16					B	0.000	147.880		100.00	0.000	0.000
7					C	0.000	147.880		100.00	0.000	0.000
L2	59.212	1.133	0.030	159.027	A	0.000	159.027	159.027	100.00	0.000	0.000
80.167-39.029					B	0.000	159.027		100.00	0.000	0.000
					C	0.000	159.027		100.00	0.000	0.000
L3	20.135	0.903	0.024	176.097	A	0.000	176.097	176.097	100.00	0.000	0.000
39.029-1.000					B	0.000	176.097		100.00	0.000	0.000
					C	0.000	176.097		100.00	0.000	0.000

Tower Pressure - With Ice

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z ksf	t_Z in	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1	103.933	1.276	0.008	2.103	165.345	A	0.000	165.345	165.345	100.00	0.000	0.000
130.000-80.167						B	0.000	165.345		100.00	0.000	0.000
						C	0.000	165.345		100.00	0.000	0.000
L2	59.212	1.133	0.007	1.988	173.446	A	0.000	173.446	173.446	100.00	0.000	0.000
80.167-39.029						B	0.000	173.446		100.00	0.000	0.000
						C	0.000	173.446		100.00	0.000	0.000
L3 39.029-1.000	20.135	0.903	0.006	1.785	188.696	A	0.000	188.696	188.696	100.00	0.000	0.000
						B	0.000	188.696		100.00	0.000	0.000
						C	0.000	188.696		100.00	0.000	0.000

Tower Pressure - Service

$G_H = 1.100$

Section Elevation ft	z ft	K_Z	q_z ksf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
L1 130.000-80.167	103.933	1.276	0.010	147.880	A	0.000	147.880	147.880	100.00	0.000	0.000
					B	0.000	147.880		100.00	0.000	0.000
					C	0.000	147.880		100.00	0.000	0.000
L2 80.167-39.029	59.212	1.133	0.009	159.027	A	0.000	159.027	159.027	100.00	0.000	0.000
					B	0.000	159.027		100.00	0.000	0.000
					C	0.000	159.027		100.00	0.000	0.000
L3 39.029-1.000	20.135	0.903	0.007	176.097	A	0.000	176.097	176.097	100.00	0.000	0.000
					B	0.000	176.097		100.00	0.000	0.000
					C	0.000	176.097		100.00	0.000	0.000

Tower Forces - No Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	5.854	A	1	0.65	0.034	1	1	147.880	3.544	0.071	C
			B	1	0.65		1	1	147.880			
			C	1	0.65		1	1	147.880			
L2 80.167-39.029	0.892	8.493	A	1	0.65	0.030	1	1	159.027	3.378	0.082	C
			B	1	0.65		1	1	159.027			
			C	1	0.65		1	1	159.027			
L3 39.029-1.000	0.824	11.373	A	1	0.65	0.024	1	1	176.097	3.019	0.079	C
			B	1	0.65		1	1	176.097			
			C	1	0.65		1	1	176.097			
Sum Weight:	2.598	25.721						OTM	619.194 kip-ft	9.941		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	5.854	A	1	0.65	0.034	1	1	147.880	3.544	0.071	C
			B	1	0.65		1	1	147.880			
			C	1	0.65		1	1	147.880			
L2 80.167-39.029	0.892	8.493	A	1	0.65	0.030	1	1	159.027	3.378	0.082	C
			B	1	0.65		1	1	159.027			
			C	1	0.65		1	1	159.027			
L3 39.029-1.000	0.824	11.373	A	1	0.65	0.024	1	1	176.097	3.019	0.079	C
			B	1	0.65		1	1	176.097			
			C	1	0.65		1	1	176.097			
Sum Weight:	2.598	25.721						OTM	619.194 kip-ft	9.941		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	5.854	A	1	0.65	0.034	1	1	147.880	3.544	0.071	C
			B	1	0.65		1	1	147.880			
			C	1	0.65		1	1	147.880			
L2 80.167-39.029	0.892	8.493	A	1	0.65	0.030	1	1	159.027	3.378	0.082	C
			B	1	0.65		1	1	159.027			
			C	1	0.65		1	1	159.027			
L3 39.029-1.000	0.824	11.373	A	1	0.65	0.024	1	1	176.097	3.019	0.079	C
			B	1	0.65		1	1	176.097			
			C	1	0.65		1	1	176.097			
Sum Weight:	2.598	25.721						OTM	619.194 kip-ft	9.941		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	5.854	A	1	0.65	0.034	1	1	147.880	3.544	0.071	C
			B	1	0.65		1	1	147.880			
			C	1	0.65		1	1	147.880			
L2 80.167-39.029	0.892	8.493	A	1	0.65	0.030	1	1	159.027	3.378	0.082	C
			B	1	0.65		1	1	159.027			
			C	1	0.65		1	1	159.027			
L3 39.029-1.000	0.824	11.373	A	1	0.65	0.024	1	1	176.097	3.019	0.079	C
			B	1	0.65		1	1	176.097			
			C	1	0.65		1	1	176.097			
Sum Weight:	2.598	25.721						OTM	619.194 kip-ft	9.941		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	10.668	A	1	1.2	0.008	1	1	165.345	1.690	0.034	C
			B	1	1.2		1	1	165.345			
			C	1	1.2		1	1	165.345			
L2 80.167-39.029	0.892	13.311	A	1	1.2	0.007	1	1	173.446	1.572	0.038	C
			B	1	1.2		1	1	173.446			
			C	1	1.2		1	1	173.446			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L3 39.029-1.000	0.824	16.113	A	1	1.2	0.006	1	1	188.696	1.380	0.036	C
			B	1	1.2		1	1	188.696			
			C	1	1.2		1	1	188.696			
Sum Weight:	2.598	40.092						OTM	291.860 kip-ft	4.642		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	10.668	A	1	1.2	0.008	1	1	165.345	1.690	0.034	C
			B	1	1.2		1	1	165.345			
			C	1	1.2		1	1	165.345			
L2 80.167-39.029	0.892	13.311	A	1	1.2	0.007	1	1	173.446	1.572	0.038	C
			B	1	1.2		1	1	173.446			
			C	1	1.2		1	1	173.446			
L3 39.029-1.000	0.824	16.113	A	1	1.2	0.006	1	1	188.696	1.380	0.036	C
			B	1	1.2		1	1	188.696			
			C	1	1.2		1	1	188.696			
Sum Weight:	2.598	40.092						OTM	291.860 kip-ft	4.642		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	10.668	A	1	1.2	0.008	1	1	165.345	1.690	0.034	C
			B	1	1.2		1	1	165.345			
			C	1	1.2		1	1	165.345			
L2 80.167-39.029	0.892	13.311	A	1	1.2	0.007	1	1	173.446	1.572	0.038	C
			B	1	1.2		1	1	173.446			
			C	1	1.2		1	1	173.446			
L3 39.029-1.000	0.824	16.113	A	1	1.2	0.006	1	1	188.696	1.380	0.036	C
			B	1	1.2		1	1	188.696			
			C	1	1.2		1	1	188.696			
Sum Weight:	2.598	40.092						OTM	291.860 kip-ft	4.642		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	10.668	A	1	1.2	0.008	1	1	165.345	1.690	0.034	C
			B	1	1.2		1	1	165.345			
			C	1	1.2		1	1	165.345			
L2 80.167-39.029	0.892	13.311	A	1	1.2	0.007	1	1	173.446	1.572	0.038	C
			B	1	1.2		1	1	173.446			
			C	1	1.2		1	1	173.446			
L3 39.029-1.000	0.824	16.113	A	1	1.2	0.006	1	1	188.696	1.380	0.036	C
			B	1	1.2		1	1	188.696			
			C	1	1.2		1	1	188.696			
Sum Weight:	2.598	40.092						OTM	291.860 kip-ft	4.642		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	5.854	A	1	0.65	0.010	1	1	147.880	1.055	0.021	C
			B	1	0.65		1	1	147.880			
			C	1	0.65		1	1	147.880			
L2 80.167-39.029	0.892	8.493	A	1	0.65	0.009	1	1	159.027	1.006	0.024	C
			B	1	0.65		1	1	159.027			
			C	1	0.65		1	1	159.027			
L3 39.029-1.000	0.824	11.373	A	1	0.65	0.007	1	1	176.097	0.899	0.024	C
			B	1	0.65		1	1	176.097			
			C	1	0.65		1	1	176.097			
Sum Weight:	2.598	25.721						OTM	184.325 kip-ft	2.959		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	5.854	A	1	0.65	0.010	1	1	147.880	1.055	0.021	C
			B	1	0.65		1	1	147.880			
			C	1	0.65		1	1	147.880			
L2 80.167-39.029	0.892	8.493	A	1	0.65	0.009	1	1	159.027	1.006	0.024	C
			B	1	0.65		1	1	159.027			
			C	1	0.65		1	1	159.027			
L3 39.029-1.000	0.824	11.373	A	1	0.65	0.007	1	1	176.097	0.899	0.024	C
			B	1	0.65		1	1	176.097			
			C	1	0.65		1	1	176.097			
Sum Weight:	2.598	25.721						OTM	184.325 kip-ft	2.959		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	5.854	A	1	0.65	0.010	1	1	147.880	1.055	0.021	C
			B	1	0.65		1	1	147.880			
			C	1	0.65		1	1	147.880			
L2 80.167-39.029	0.892	8.493	A	1	0.65	0.009	1	1	159.027	1.006	0.024	C
			B	1	0.65		1	1	159.027			
			C	1	0.65		1	1	159.027			
L3 39.029-1.000	0.824	11.373	A	1	0.65	0.007	1	1	176.097	0.899	0.024	C
			B	1	0.65		1	1	176.097			
			C	1	0.65		1	1	176.097			
Sum Weight:	2.598	25.721						OTM	184.325 kip-ft	2.959		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z ksf	D_F	D_R	A_E ft^2	F K	w klf	Ctrl. Face
L1 130.000-80.167	0.881	5.854	A	1	0.65	0.010	1	1	147.880	1.055	0.021	C
			B	1	0.65		1	1	147.880			
			C	1	0.65		1	1	147.880			
L2 80.167-39.029	0.892	8.493	A	1	0.65	0.009	1	1	159.027	1.006	0.024	C
			B	1	0.65		1	1	159.027			
			C	1	0.65		1	1	159.027			
L3 39.029-1.000	0.824	11.373	A	1	0.65	0.007	1	1	176.097	0.899	0.024	C
			B	1	0.65		1	1	176.097			
			C	1	0.65		1	1	176.097			
Sum Weight:	2.598	25.721						OTM	184.325 kip-ft	2.959		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	25.721					
Bracing Weight	0.000					
Total Member Self-Weight	25.721			1.516	-0.143	
Total Weight	35.818			1.516	-0.143	
Wind 0 deg - No Ice		0.000	-21.002	-1963.367	-0.143	-0.199
Wind 30 deg - No Ice		10.517	-18.188	-1700.122	-984.277	-0.734

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 45 deg - No Ice		14.873	-14.851	-1387.866	-1391.919	-0.935
Wind 60 deg - No Ice		18.216	-10.501	-980.925	-1704.713	-1.073
Wind 90 deg - No Ice		21.034	0.000	1.516	-1968.411	-1.124
Wind 120 deg - No Ice		18.216	10.501	983.957	-1704.713	-0.874
Wind 135 deg - No Ice		14.873	14.851	1390.898	-1391.919	-0.655
Wind 150 deg - No Ice		10.517	18.188	1703.154	-984.277	-0.390
Wind 180 deg - No Ice		0.000	21.002	1966.398	-0.143	0.199
Wind 210 deg - No Ice		-10.517	18.188	1703.154	983.991	0.734
Wind 225 deg - No Ice		-14.873	14.851	1390.898	1391.632	0.935
Wind 240 deg - No Ice		-18.216	10.501	983.957	1704.427	1.073
Wind 270 deg - No Ice		-21.034	0.000	1.516	1968.125	1.124
Wind 300 deg - No Ice		-18.216	-10.501	-980.925	1704.427	0.874
Wind 315 deg - No Ice		-14.873	-14.851	-1387.866	1391.632	0.655
Wind 330 deg - No Ice		-10.517	-18.188	-1700.122	983.991	0.390
Member Ice	14.371					
Total Weight Ice	65.624			3.656	0.451	
Wind 0 deg - Ice		0.000	-9.848	-935.078	0.451	-0.416
Wind 30 deg - Ice		4.928	-8.528	-809.311	-469.355	-0.691
Wind 45 deg - Ice		6.969	-6.963	-660.129	-663.955	-0.762
Wind 60 deg - Ice		8.535	-4.924	-465.711	-813.277	-0.780
Wind 90 deg - Ice		9.856	0.000	3.656	-939.161	-0.660
Wind 120 deg - Ice		8.535	4.924	473.022	-813.277	-0.364
Wind 135 deg - Ice		6.969	6.963	667.440	-663.955	-0.173
Wind 150 deg - Ice		4.928	8.528	816.622	-469.355	0.030
Wind 180 deg - Ice		0.000	9.848	942.389	0.451	0.416
Wind 210 deg - Ice		-4.928	8.528	816.622	470.256	0.691
Wind 225 deg - Ice		-6.969	6.963	667.440	664.856	0.762
Wind 240 deg - Ice		-8.535	4.924	473.022	814.178	0.780
Wind 270 deg - Ice		-9.856	0.000	3.656	940.062	0.660
Wind 300 deg - Ice		-8.535	-4.924	-465.711	814.178	0.364
Wind 315 deg - Ice		-6.969	-6.963	-660.129	664.856	0.173
Wind 330 deg - Ice		-4.928	-8.528	-809.311	470.256	-0.030
Total Weight	35.818			1.516	-0.143	
Wind 0 deg - Service		0.000	-6.252	-583.400	-0.143	-0.059
Wind 30 deg - Service		3.131	-5.414	-505.036	-293.105	-0.219
Wind 45 deg - Service		4.427	-4.421	-412.082	-414.453	-0.278
Wind 60 deg - Service		5.423	-3.126	-290.942	-507.568	-0.319
Wind 90 deg - Service		6.261	0.000	1.516	-586.066	-0.335
Wind 120 deg - Service		5.423	3.126	293.974	-507.568	-0.260
Wind 135 deg - Service		4.427	4.421	415.114	-414.453	-0.195
Wind 150 deg - Service		3.131	5.414	508.068	-293.105	-0.116
Wind 180 deg - Service		0.000	6.252	586.431	-0.143	0.059
Wind 210 deg - Service		-3.131	5.414	508.068	292.818	0.219
Wind 225 deg - Service		-4.427	4.421	415.114	414.167	0.278
Wind 240 deg - Service		-5.423	3.126	293.974	507.281	0.319
Wind 270 deg - Service		-6.261	0.000	1.516	585.780	0.335
Wind 300 deg - Service		-5.423	-3.126	-290.942	507.281	0.260
Wind 315 deg - Service		-4.427	-4.421	-412.082	414.167	0.195
Wind 330 deg - Service		-3.131	-5.414	-505.036	292.818	0.116

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice

Comb. No.	*Description*
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 45 deg - No Ice
7	0.9 Dead+1.6 Wind 45 deg - No Ice
8	1.2 Dead+1.6 Wind 60 deg - No Ice
9	0.9 Dead+1.6 Wind 60 deg - No Ice
10	1.2 Dead+1.6 Wind 90 deg - No Ice
11	0.9 Dead+1.6 Wind 90 deg - No Ice
12	1.2 Dead+1.6 Wind 120 deg - No Ice
13	0.9 Dead+1.6 Wind 120 deg - No Ice
14	1.2 Dead+1.6 Wind 135 deg - No Ice
15	0.9 Dead+1.6 Wind 135 deg - No Ice
16	1.2 Dead+1.6 Wind 150 deg - No Ice
17	0.9 Dead+1.6 Wind 150 deg - No Ice
18	1.2 Dead+1.6 Wind 180 deg - No Ice
19	0.9 Dead+1.6 Wind 180 deg - No Ice
20	1.2 Dead+1.6 Wind 210 deg - No Ice
21	0.9 Dead+1.6 Wind 210 deg - No Ice
22	1.2 Dead+1.6 Wind 225 deg - No Ice
23	0.9 Dead+1.6 Wind 225 deg - No Ice
24	1.2 Dead+1.6 Wind 240 deg - No Ice
25	0.9 Dead+1.6 Wind 240 deg - No Ice
26	1.2 Dead+1.6 Wind 270 deg - No Ice
27	0.9 Dead+1.6 Wind 270 deg - No Ice
28	1.2 Dead+1.6 Wind 300 deg - No Ice
29	0.9 Dead+1.6 Wind 300 deg - No Ice
30	1.2 Dead+1.6 Wind 315 deg - No Ice
31	0.9 Dead+1.6 Wind 315 deg - No Ice
32	1.2 Dead+1.6 Wind 330 deg - No Ice
33	0.9 Dead+1.6 Wind 330 deg - No Ice
34	1.2 Dead+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
39	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
40	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
41	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp
42	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
43	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
44	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
45	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp
46	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
47	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
48	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
49	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp
50	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
51	Dead+Wind 0 deg - Service
52	Dead+Wind 30 deg - Service
53	Dead+Wind 45 deg - Service
54	Dead+Wind 60 deg - Service
55	Dead+Wind 90 deg - Service
56	Dead+Wind 120 deg - Service
57	Dead+Wind 135 deg - Service
58	Dead+Wind 150 deg - Service
59	Dead+Wind 180 deg - Service
60	Dead+Wind 210 deg - Service
61	Dead+Wind 225 deg - Service
62	Dead+Wind 240 deg - Service
63	Dead+Wind 270 deg - Service
64	Dead+Wind 300 deg - Service

Comb. No.	Description
65	Dead+Wind 315 deg - Service
66	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	130 - 80.167	Pole	Max Tension	34	0.000	-0.000	0.000
			Max. Compression	34	-35.692	0.439	-4.111
			Max. Mx	10	-15.135	-773.289	-1.876
			Max. My	18	-15.138	-0.180	-773.774
			Max. Vy	10	23.264	-773.289	-1.876
			Max. Vx	18	23.214	-0.180	-773.774
			Max. Torque	10			2.689
L2	80.167 - 39.029	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-51.416	0.439	-4.111
			Max. Mx	10	-25.935	-1806.419	-1.873
			Max. My	18	-25.936	-0.178	-1804.878
			Max. Vy	10	28.375	-1806.419	-1.873
			Max. Vx	18	28.325	-0.178	-1804.878
			Max. Torque	10			1.883
L3	39.029 - 1	Pole	Max Tension	1	0.000	0.000	0.000
			Max. Compression	34	-74.339	0.439	-4.111
			Max. Mx	10	-42.967	-3207.235	-1.882
			Max. My	18	-42.967	-0.178	-3203.420
			Max. Vy	10	33.673	-3207.235	-1.882
			Max. Vx	18	33.623	-0.178	-3203.420
			Max. Torque	10			1.881

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	43	74.339	0.000	-9.848
	Max. H_x	26	42.982	33.654	0.000
	Max. H_z	2	42.982	0.000	33.604
	Max. M_x	2	3199.670	0.000	33.604
	Max. M_z	10	3207.235	-33.654	0.000
	Max. Torsion	10	1.880	-33.654	0.000
	Min. Vert	31	32.236	23.797	23.761
	Min. H_x	10	42.982	-33.654	0.000
	Min. H_z	18	42.982	0.000	-33.604
	Min. M_x	18	-3203.420	0.000	-33.604
	Min. M_z	26	-3206.880	33.654	0.000
	Min. Torsion	26	-1.880	33.654	0.000

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	35.818	0.000	0.000	1.516	-0.143	0.000
1.2 Dead+1.6 Wind 0 deg - No Ice	42.982	0.000	-33.604	-3199.670	-0.178	-0.309
0.9 Dead+1.6 Wind 0 deg - No Ice	32.236	0.000	-33.604	-3185.173	-0.133	-0.311
1.2 Dead+1.6 Wind 30 deg - No Ice	42.982	16.827	-29.102	-2770.741	-1603.712	-1.209
0.9 Dead+1.6 Wind 30 deg - No Ice	32.236	16.827	-29.102	-2758.251	-1596.163	-1.199
1.2 Dead+1.6 Wind 45 deg - No Ice	42.982	23.797	-23.761	-2261.954	-2267.916	-1.549
0.9 Dead+1.6 Wind 45 deg - No Ice	32.236	23.797	-23.761	-2251.844	-2257.259	-1.535
1.2 Dead+1.6 Wind 60 deg - No Ice	42.982	29.145	-16.802	-1598.890	-2777.576	-1.784
0.9 Dead+1.6 Wind 60 deg - No Ice	32.236	29.145	-16.802	-1591.883	-2764.534	-1.766
1.2 Dead+1.6 Wind 90 deg - No Ice	42.982	33.654	-0.000	1.882	-3207.235	-1.880
0.9 Dead+1.6 Wind 90 deg - No Ice	32.236	33.654	0.000	1.400	-3192.185	-1.858
1.2 Dead+1.6 Wind 120 deg - No Ice	42.982	29.145	16.802	1602.651	-2777.569	-1.473
0.9 Dead+1.6 Wind 120 deg - No Ice	32.236	29.145	16.802	1594.680	-2764.530	-1.453
1.2 Dead+1.6 Wind 135 deg - No Ice	42.982	23.797	23.761	2265.711	-2267.908	-1.110
0.9 Dead+1.6 Wind 135 deg - No Ice	32.236	23.797	23.761	2254.638	-2257.254	-1.093
1.2 Dead+1.6 Wind 150 deg - No Ice	42.982	16.827	29.102	2774.495	-1603.705	-0.672
0.9 Dead+1.6 Wind 150 deg - No Ice	32.236	16.827	29.102	2761.042	-1596.158	-0.659
1.2 Dead+1.6 Wind 180 deg - No Ice	42.982	0.000	33.604	3203.420	-0.178	0.308
0.9 Dead+1.6 Wind 180 deg - No Ice	32.236	0.000	33.604	3187.961	-0.133	0.311
1.2 Dead+1.6 Wind 210 deg - No Ice	42.982	-16.827	29.102	2774.496	1603.349	1.206
0.9 Dead+1.6 Wind 210 deg - No Ice	32.236	-16.827	29.102	2761.043	1595.893	1.197
1.2 Dead+1.6 Wind 225 deg - No Ice	42.982	-23.797	23.761	2265.712	2267.552	1.546
0.9 Dead+1.6 Wind 225 deg - No Ice	32.236	-23.797	23.761	2254.639	2256.989	1.532
1.2 Dead+1.6 Wind 240 deg - No Ice	42.982	-29.145	16.802	1602.652	2777.213	1.781
0.9 Dead+1.6 Wind 240 deg - No Ice	32.236	-29.145	16.802	1594.680	2764.266	1.763
1.2 Dead+1.6 Wind 270 deg - No Ice	42.982	-33.654	-0.000	1.882	3206.880	1.880
0.9 Dead+1.6 Wind 270 deg - No Ice	32.236	-33.654	0.000	1.400	3191.921	1.858
1.2 Dead+1.6 Wind 300 deg - No Ice	42.982	-29.145	-16.802	-1598.891	2777.220	1.475
0.9 Dead+1.6 Wind 300 deg - No Ice	32.236	-29.145	-16.802	-1591.884	2764.270	1.455
1.2 Dead+1.6 Wind 315 deg - No Ice	42.982	-23.797	-23.761	-2261.955	2267.560	1.113
0.9 Dead+1.6 Wind 315 deg - No Ice	32.236	-23.797	-23.761	-2251.845	2256.994	1.096

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*
1.2 Dead+1.6 Wind 330 deg - No Ice	42.982	-16.827	-29.102	-2770.742	1603.355	0.674
0.9 Dead+1.6 Wind 330 deg - No Ice	32.236	-16.827	-29.102	-2758.252	1595.898	0.661
1.2 Dead+1.0 Ice+1.0 Temp	74.339	-0.000	0.000	4.111	0.439	0.000
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	74.339	-0.000	-9.848	-973.277	0.455	-0.422
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	74.339	4.928	-8.528	-842.310	-488.775	-0.747
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp	74.339	6.969	-6.963	-686.959	-691.421	-0.837
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	74.339	8.535	-4.924	-484.502	-846.916	-0.871
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	74.339	9.856	0.000	4.271	-978.004	-0.762
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	74.339	8.535	4.924	493.043	-846.914	-0.448
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp	74.339	6.969	6.963	695.499	-691.419	-0.239
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	74.339	4.928	8.528	850.849	-488.774	-0.015
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	74.339	-0.000	9.848	981.815	0.455	0.423
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	74.339	-4.928	8.528	850.849	489.684	0.747
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp	74.339	-6.969	6.963	695.499	692.329	0.838
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	74.339	-8.535	4.924	493.044	847.825	0.871
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	74.339	-9.856	0.000	4.271	978.915	0.762
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	74.339	-8.535	-4.924	-484.502	847.827	0.449
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp	74.339	-6.969	-6.963	-686.959	692.331	0.240
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	74.339	-4.928	-8.528	-842.310	489.686	0.015
Dead+Wind 0 deg - Service	35.818	0.000	-6.252	-592.454	-0.147	-0.058
Dead+Wind 30 deg - Service	35.818	3.131	-5.414	-512.871	-297.666	-0.224
Dead+Wind 45 deg - Service	35.818	4.427	-4.421	-418.471	-420.902	-0.287
Dead+Wind 60 deg - Service	35.818	5.423	-3.126	-295.447	-515.465	-0.330
Dead+Wind 90 deg - Service	35.818	6.261	0.000	1.560	-595.184	-0.348
Dead+Wind 120 deg - Service	35.818	5.423	3.126	298.566	-515.464	-0.273
Dead+Wind 135 deg - Service	35.818	4.427	4.421	421.591	-420.902	-0.205
Dead+Wind 150 deg - Service	35.818	3.131	5.414	515.990	-297.666	-0.124
Dead+Wind 180 deg - Service	35.818	0.000	6.252	595.573	-0.147	0.058
Dead+Wind 210 deg - Service	35.818	-3.131	5.414	515.990	297.371	0.224
Dead+Wind 225 deg - Service	35.818	-4.427	4.421	421.591	420.607	0.287
Dead+Wind 240 deg - Service	35.818	-5.423	3.126	298.566	515.170	0.330
Dead+Wind 270 deg - Service	35.818	-6.261	0.000	1.560	594.890	0.348
Dead+Wind 300 deg - Service	35.818	-5.423	-3.126	-295.447	515.170	0.273
Dead+Wind 315 deg - Service	35.818	-4.427	-4.421	-418.471	420.607	0.205
Dead+Wind 330 deg - Service	35.818	-3.131	-5.414	-512.871	297.371	0.124

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	*PX K*	*PY K*	*PZ K*	*PX K*	*PY K*	*PZ K*	*% Error*
1	0.000	-35.818	0.000	0.000	35.818	0.000	0.000%
2	0.000	-42.982	-33.604	0.000	42.982	33.604	0.000%
3	0.000	-32.236	-33.604	0.000	32.236	33.604	0.000%
4	16.827	-42.982	-29.102	-16.827	42.982	29.102	0.000%
5	16.827	-32.236	-29.102	-16.827	32.236	29.102	0.000%
6	23.797	-42.982	-23.761	-23.797	42.982	23.761	0.000%
7	23.797	-32.236	-23.761	-23.797	32.236	23.761	0.000%
8	29.145	-42.982	-16.802	-29.145	42.982	16.802	0.000%
9	29.145	-32.236	-16.802	-29.145	32.236	16.802	0.000%
10	33.654	-42.982	0.000	-33.654	42.982	0.000	0.000%
11	33.654	-32.236	0.000	-33.654	32.236	0.000	0.000%
12	29.145	-42.982	16.802	-29.145	42.982	-16.802	0.000%
13	29.145	-32.236	16.802	-29.145	32.236	-16.802	0.000%
14	23.797	-42.982	23.761	-23.797	42.982	-23.761	0.000%
15	23.797	-32.236	23.761	-23.797	32.236	-23.761	0.000%
16	16.827	-42.982	29.102	-16.827	42.982	-29.102	0.000%
17	16.827	-32.236	29.102	-16.827	32.236	-29.102	0.000%
18	0.000	-42.982	33.604	0.000	42.982	-33.604	0.000%
19	0.000	-32.236	33.604	0.000	32.236	-33.604	0.000%
20	-16.827	-42.982	29.102	16.827	42.982	-29.102	0.000%
21	-16.827	-32.236	29.102	16.827	32.236	-29.102	0.000%
22	-23.797	-42.982	23.761	23.797	42.982	-23.761	0.000%
23	-23.797	-32.236	23.761	23.797	32.236	-23.761	0.000%
24	-29.145	-42.982	16.802	29.145	42.982	-16.802	0.000%
25	-29.145	-32.236	16.802	29.145	32.236	-16.802	0.000%
26	-33.654	-42.982	0.000	33.654	42.982	0.000	0.000%
27	-33.654	-32.236	0.000	33.654	32.236	0.000	0.000%
28	-29.145	-42.982	-16.802	29.145	42.982	16.802	0.000%
29	-29.145	-32.236	-16.802	29.145	32.236	16.802	0.000%
30	-23.797	-42.982	-23.761	23.797	42.982	23.761	0.000%
31	-23.797	-32.236	-23.761	23.797	32.236	23.761	0.000%
32	-16.827	-42.982	-29.102	16.827	42.982	29.102	0.000%
33	-16.827	-32.236	-29.102	16.827	32.236	29.102	0.000%
34	0.000	-74.339	0.000	0.000	74.339	-0.000	0.000%
35	0.000	-74.339	-9.848	0.000	74.339	9.848	0.000%
36	4.928	-74.339	-8.528	-4.928	74.339	8.528	0.000%
37	6.969	-74.339	-6.963	-6.969	74.339	6.963	0.000%
38	8.535	-74.339	-4.924	-8.535	74.339	4.924	0.000%
39	9.856	-74.339	0.000	-9.856	74.339	-0.000	0.000%
40	8.535	-74.339	4.924	-8.535	74.339	-4.924	0.000%
41	6.969	-74.339	6.963	-6.969	74.339	-6.963	0.000%
42	4.928	-74.339	8.528	-4.928	74.339	-8.528	0.000%
43	0.000	-74.339	9.848	0.000	74.339	-9.848	0.000%
44	-4.928	-74.339	8.528	4.928	74.339	-8.528	0.000%
45	-6.969	-74.339	6.963	6.969	74.339	-6.963	0.000%
46	-8.535	-74.339	4.924	8.535	74.339	-4.924	0.000%
47	-9.856	-74.339	0.000	9.856	74.339	-0.000	0.000%
48	-8.535	-74.339	-4.924	8.535	74.339	4.924	0.000%
49	-6.969	-74.339	-6.963	6.969	74.339	6.963	0.000%
50	-4.928	-74.339	-8.528	4.928	74.339	8.528	0.000%
51	0.000	-35.818	-6.252	0.000	35.818	6.252	0.000%
52	3.131	-35.818	-5.414	-3.131	35.818	5.414	0.000%
53	4.427	-35.818	-4.421	-4.427	35.818	4.421	0.000%
54	5.423	-35.818	-3.126	-5.423	35.818	3.126	0.000%
55	6.261	-35.818	0.000	-6.261	35.818	0.000	0.000%
56	5.423	-35.818	3.126	-5.423	35.818	-3.126	0.000%
57	4.427	-35.818	4.421	-4.427	35.818	-4.421	0.000%
58	3.131	-35.818	5.414	-3.131	35.818	-5.414	0.000%
59	0.000	-35.818	6.252	0.000	35.818	-6.252	0.000%
60	-3.131	-35.818	5.414	3.131	35.818	-5.414	0.000%
61	-4.427	-35.818	4.421	4.427	35.818	-4.421	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	*PX K*	*PY K*	*PZ K*	*PX K*	*PY K*	*PZ K*	*% Error*
62	-5.423	-35.818	3.126	5.423	35.818	-3.126	0.000%
63	-6.261	-35.818	0.000	6.261	35.818	0.000	0.000%
64	-5.423	-35.818	-3.126	5.423	35.818	3.126	0.000%
65	-4.427	-35.818	-4.421	4.427	35.818	4.421	0.000%
66	-3.131	-35.818	-5.414	3.131	35.818	5.414	0.000%

Non-Linear Convergence Results

Load Combination	*Converged?*	*Number of Cycles*	*Displacement Tolerance*	*Force Tolerance*
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00003050
3	Yes	4	0.00000001	0.00001625
4	Yes	4	0.00000001	0.00092817
5	Yes	4	0.00000001	0.00056714
6	Yes	5	0.00000001	0.00002348
7	Yes	4	0.00000001	0.00066989
8	Yes	5	0.00000001	0.00002184
9	Yes	4	0.00000001	0.00061981
10	Yes	4	0.00000001	0.00010264
11	Yes	4	0.00000001	0.00006321
12	Yes	4	0.00000001	0.00092668
13	Yes	4	0.00000001	0.00056534
14	Yes	5	0.00000001	0.00002353
15	Yes	4	0.00000001	0.00067062
16	Yes	4	0.00000001	0.00098202
17	Yes	4	0.00000001	0.00060017
18	Yes	4	0.00000001	0.00003054
19	Yes	4	0.00000001	0.00001626
20	Yes	4	0.00000001	0.00099732
21	Yes	4	0.00000001	0.00061011
22	Yes	5	0.00000001	0.00002356
23	Yes	4	0.00000001	0.00067158
24	Yes	4	0.00000001	0.00091927
25	Yes	4	0.00000001	0.00056068
26	Yes	4	0.00000001	0.00010261
27	Yes	4	0.00000001	0.00006320
28	Yes	5	0.00000001	0.00002161
29	Yes	4	0.00000001	0.00061336
30	Yes	5	0.00000001	0.00002343
31	Yes	4	0.00000001	0.00066840
32	Yes	4	0.00000001	0.00094071
33	Yes	4	0.00000001	0.00057528
34	Yes	4	0.00000001	0.00000723
35	Yes	4	0.00000001	0.00083590
36	Yes	4	0.00000001	0.00091182
37	Yes	4	0.00000001	0.00093965
38	Yes	4	0.00000001	0.00091943
39	Yes	4	0.00000001	0.00084421
40	Yes	4	0.00000001	0.00092591
41	Yes	4	0.00000001	0.00095278
42	Yes	4	0.00000001	0.00092836
43	Yes	4	0.00000001	0.00085095
44	Yes	4	0.00000001	0.00093343
45	Yes	4	0.00000001	0.00095570
46	Yes	4	0.00000001	0.00092725

47	Yes	4	0.00000001	0.00084585
48	Yes	4	0.00000001	0.00091850
49	Yes	4	0.00000001	0.00093990
50	Yes	4	0.00000001	0.00091444
51	Yes	4	0.00000001	0.00000492
52	Yes	4	0.00000001	0.00001058
53	Yes	4	0.00000001	0.00001307
54	Yes	4	0.00000001	0.00001308
55	Yes	4	0.00000001	0.00000645
56	Yes	4	0.00000001	0.00001074
57	Yes	4	0.00000001	0.00001305
58	Yes	4	0.00000001	0.00001195
59	Yes	4	0.00000001	0.00000497
60	Yes	4	0.00000001	0.00001253
61	Yes	4	0.00000001	0.00001327
62	Yes	4	0.00000001	0.00001072
63	Yes	4	0.00000001	0.00000644
64	Yes	4	0.00000001	0.00001265
65	Yes	4	0.00000001	0.00001280
66	Yes	4	0.00000001	0.00001073

Maximum Tower Deflections - Service Wind

Section No.	*Elevation ft*	*Horz. Deflection in*	*Gov. Load Comb.*	*Tilt °*	*Twist °*
L1	130 - 80.167	8.072	59	0.537	0.002
L2	86 - 39.029	3.594	58	0.398	0.001
L3	46 - 1	1.009	57	0.202	0.000

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	*Appurtenance*	*Gov. Load Comb.*	*Deflection in*	*Tilt °*	*Twist °*	*Radius of Curvature ft*
143.000	(2) DB809KE-XT	59	8.072	0.537	0.002	102543
130.000	12-ft T-arm w/ Work Support Platform	59	8.072	0.537	0.002	102543
127.000	2-ft dish	59	7.744	0.529	0.002	102543
122.000	T-Arm Stablizer - VSK-M	59	7.200	0.516	0.002	64089
120.000	AIR6449	59	6.983	0.510	0.002	51271
109.000	(3) SBNHH-1D65B	59	5.812	0.479	0.001	24415

Maximum Tower Deflections - Design Wind

Section No.	*Elevation ft*	*Horz. Deflection in*	*Gov. Load Comb.*	*Tilt °*	*Twist °*
L1	130 - 80.167	43.347	12	2.876	0.010
L2	86 - 39.029	19.337	10	2.143	0.003
L3	46 - 1	5.432	10	1.089	0.001

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
143.000	(2) DB809KE-XT	12	43.347	2.876	0.010	19331
130.000	12-ft T-arm w/ Work Support Platform	12	43.347	2.876	0.010	19331
127.000	2-ft dish	12	41.589	2.835	0.010	19331
122.000	T-Arm Stablizer - VSK-M	12	38.670	2.765	0.009	12081
120.000	AIR6449	12	37.509	2.736	0.008	9665
109.000	(3) SBNHH-1D65B	10	31.236	2.572	0.006	4601

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
L1	130 - 127.684	TP41.283x28.95x0.313	49.833	0.000	0.0	28.973	-2.578	2152.570	0.001
	127.684 - 125.368					29.542	-2.937	2194.810	0.001
	125.368 - 123.053					30.110	-3.258	2237.040	0.001
	123.053 - 120.737					30.679	-4.345	2279.270	0.002
	120.737 - 118.421					31.247	-7.610	2317.150	0.003
	118.421 - 116.105					31.816	-7.951	2348.440	0.003
	116.105 - 113.789					32.384	-8.298	2379.330	0.003
	113.789 - 111.474					32.953	-8.651	2409.840	0.004
	111.474 - 109.158					33.521	-9.011	2439.960	0.004
	109.158 - 106.842					34.090	-11.499	2469.690	0.005
	106.842 - 104.526					34.658	-11.876	2499.030	0.005
	104.526 - 102.211					35.227	-12.259	2527.990	0.005
	102.211 - 99.8947					35.795	-12.650	2556.550	0.005
	99.8947 - 97.5789					36.363	-13.047	2584.730	0.005
	97.5789 - 95.2632					36.932	-13.451	2612.520	0.005

Section No.	*Elevation* *ft*	*Size*	*L* *ft*	L_u *ft*	*Kl/r*	*A* in^2	P_u *K*	ϕP_n *K*	*Ratio* $\frac{P_u}{\phi P_n}$
	95.2632 - 92.9474					37.500	-13.863	2639.920	0.005
	92.9474 - 90.6316					38.069	-14.281	2666.930	0.005
	90.6316 - 88.3158					38.637	-14.705	2693.550	0.005
	88.3158 - 86					39.206	-15.136	2719.790	0.006
	86 - 80.167					40.638	-7.978	2784.140	0.003
L2	86 - 80.167	TP50.825x39.214x0.375	46.971	0.000	0.0	47.945	-9.354	3496.360	0.003
	80.167 - 78.2688					48.503	-17.774	3525.780	0.005
	78.2688 - 76.3707					49.062	-18.215	3554.940	0.005
	76.3707 - 74.4725					49.620	-18.660	3583.840	0.005
	74.4725 - 72.5743					50.179	-19.111	3612.480	0.005
	72.5743 - 70.6762					50.737	-19.566	3640.860	0.005
	70.6762 - 68.778					51.296	-20.027	3668.980	0.005
	68.778 - 66.8798					51.854	-20.492	3696.830	0.006
	66.8798 - 64.9817					52.412	-20.962	3724.430	0.006
	64.9817 - 63.0835					52.971	-21.438	3751.770	0.006
	63.0835 - 61.1853					53.529	-21.918	3778.840	0.006
	61.1853 - 59.2872					54.088	-22.403	3805.660	0.006
	59.2872 - 57.389					54.646	-22.893	3832.220	0.006
	57.389 - 55.4908					55.205	-23.388	3858.510	0.006
	55.4908 - 53.5927					55.763	-23.887	3884.550	0.006
	53.5927 - 51.6945					56.322	-24.392	3910.320	0.006
	51.6945 - 49.7963					56.880	-24.901	3935.840	0.006
	49.7963 - 47.8982					57.439	-25.416	3961.090	0.006
	47.8982 - 46					57.997	-25.935	3986.090	0.007
	46 - 39.029					60.048	-13.894	4075.640	0.003
L3	46 - 39.029	TP59.5x48.352x0.438	45.000	0.000	0.0	68.933	-15.850	4949.250	0.003
	39.029 - 37.0275					69.622	-30.397	4983.990	0.006
	37.0275 - 35.0259					70.310	-31.044	5018.430	0.006
	35.0259 - 33.0244					70.999	-31.697	5052.590	0.006
	33.0244 - 31.0229					71.687	-32.356	5086.450	0.006
	31.0229 - 29.0214					72.376	-33.022	5120.030	0.006
	29.0214 - 27.0198					73.064	-33.693	5153.310	0.007
	27.0198 - 25.0183					73.753	-34.371	5186.300	0.007

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
	25.0183 - 23.0168					74.442	-35.054	5219.000	0.007
	23.0168 - 21.0153					75.130	-35.743	5251.410	0.007
	21.0153 - 19.0137					75.819	-36.439	5283.530	0.007
	19.0137 - 17.0122					76.507	-37.140	5315.360	0.007
	17.0122 - 15.0107					77.196	-37.848	5346.890	0.007
	15.0107 - 13.0092					77.884	-38.561	5378.140	0.007
	13.0092 - 11.0076					78.573	-39.281	5409.100	0.007
	11.0076 - 9.00611					79.261	-40.006	5439.760	0.007
	9.00611 - 7.00458					79.950	-40.737	5470.130	0.007
	7.00458 - 5.00305					80.639	-41.474	5500.220	0.008
	5.00305 - 3.00153					81.327	-42.218	5530.010	0.008
	3.00153 - 1					82.016	-42.967	5559.510	0.008

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	130 - 127.684	TP41.283x28.95x0.313	55.612	1289.342	0.043	0.000	1289.342	0.000
	127.684 - 125.368		71.768	1340.708	0.054	0.000	1340.708	0.000
	125.368 - 123.053		88.722	1393.075	0.064	0.000	1393.075	0.000
	123.053 - 120.737		108.108	1446.450	0.075	0.000	1446.450	0.000
	120.737 - 118.421		135.972	1498.008	0.091	0.000	1498.008	0.000
	118.421 - 116.105		168.563	1546.125	0.109	0.000	1546.125	0.000
	116.105 - 113.789		201.756	1594.725	0.127	0.000	1594.725	0.000
	113.789 - 111.474		235.559	1643.792	0.143	0.000	1643.792	0.000
	111.474 - 109.158		269.978	1693.317	0.159	0.000	1693.317	0.000
	109.158 - 106.842		316.663	1743.283	0.182	0.000	1743.283	0.000
	106.842 - 104.526		364.887	1793.675	0.203	0.000	1793.675	0.000
	104.526 - 102.211		413.741	1844.483	0.224	0.000	1844.483	0.000
	102.211 - 99.8947		463.229	1895.692	0.244	0.000	1895.692	0.000
	99.8947 - 97.5789		513.357	1947.283	0.264	0.000	1947.283	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio M_{ux} / ϕM_{nx}	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio M_{uy} / ϕM_{ny}
	97.5789 - 95.2632		564.149	1999.250	0.282	0.000	1999.250	0.000
	95.2632 - 92.9474		615.602	2051.567	0.300	0.000	2051.567	0.000
	92.9474 - 90.6316		667.710	2104.233	0.317	0.000	2104.233	0.000
	90.6316 - 88.3158		720.487	2157.233	0.334	0.000	2157.233	0.000
	88.3158 - 86		773.950	2210.550	0.350	0.000	2210.550	0.000
	86 - 80.167		426.368	2346.150	0.182	0.000	2346.150	0.000
L2	86 - 80.167	TP50.825x39.214x0.375	485.438	2891.925	0.168	0.000	2891.925	0.000
	80.167 - 78.2688		957.675	2950.542	0.325	0.000	2950.542	0.000
	78.2688 - 76.3707		1003.983	3009.508	0.334	0.000	3009.508	0.000
	76.3707 - 74.4725		1050.742	3068.825	0.342	0.000	3068.825	0.000
	74.4725 - 72.5743		1097.958	3128.475	0.351	0.000	3128.475	0.000
	72.5743 - 70.6762		1145.617	3188.450	0.359	0.000	3188.450	0.000
	70.6762 - 68.778		1193.725	3248.750	0.367	0.000	3248.750	0.000
	68.778 - 66.8798		1242.292	3309.367	0.375	0.000	3309.367	0.000
	66.8798 - 64.9817		1291.308	3370.283	0.383	0.000	3370.283	0.000
	64.9817 - 63.0835		1340.775	3431.500	0.391	0.000	3431.500	0.000
	63.0835 - 61.1853		1390.700	3493.008	0.398	0.000	3493.008	0.000
	61.1853 - 59.2872		1441.075	3554.800	0.405	0.000	3554.800	0.000
	59.2872 - 57.389		1491.908	3616.867	0.412	0.000	3616.867	0.000
	57.389 - 55.4908		1543.200	3679.208	0.419	0.000	3679.208	0.000
	55.4908 - 53.5927		1594.950	3741.800	0.426	0.000	3741.800	0.000
	53.5927 - 51.6945		1647.150	3804.650	0.433	0.000	3804.650	0.000
	51.6945 - 49.7963		1699.817	3867.750	0.439	0.000	3867.750	0.000
	49.7963 - 47.8982		1752.942	3931.083	0.446	0.000	3931.083	0.000
	47.8982 - 46		1806.525	3994.642	0.452	0.000	3994.642	0.000
	46 - 39.029		951.558	4229.933	0.225	0.000	4229.933	0.000
L3	46 - 39.029	TP59.5x48.352x0.438	1056.008	5047.367	0.209	0.000	5047.367	0.000
	39.029 - 37.0275		2066.525	5134.008	0.403	0.000	5134.008	0.000
	37.0275 - 35.0259		2125.975	5221.058	0.407	0.000	5221.058	0.000
	35.0259 - 33.0244		2185.908	5308.508	0.412	0.000	5308.508	0.000
	33.0244 - 31.0229		2246.317	5396.350	0.416	0.000	5396.350	0.000
	31.0229 - 29.0214		2307.192	5484.583	0.421	0.000	5484.583	0.000
	29.0214 - 27.0198		2368.542	5573.192	0.425	0.000	5573.192	0.000

Section No.	Elevation ft	Size	M_{ux} kip-ft	ϕM_{nx} kip-ft	Ratio M_{ux} / ϕM_{nx}	M_{uy} kip-ft	ϕM_{ny} kip-ft	Ratio M_{uy} / ϕM_{ny}
	27.0198 - 25.0183		2430.350	5662.158	0.429	0.000	5662.158	0.000
	25.0183 - 23.0168		2492.625	5751.491	0.433	0.000	5751.491	0.000
	23.0168 - 21.0153		2555.358	5841.167	0.437	0.000	5841.167	0.000
	21.0153 - 19.0137		2618.550	5931.191	0.441	0.000	5931.191	0.000
	19.0137 - 17.0122		2682.192	6021.541	0.445	0.000	6021.541	0.000
	17.0122 - 15.0107		2746.283	6112.208	0.449	0.000	6112.208	0.000
	15.0107 - 13.0092		2810.817	6203.191	0.453	0.000	6203.191	0.000
	13.0092 - 11.0076		2875.800	6294.483	0.457	0.000	6294.483	0.000
	11.0076 - 9.00611		2941.217	6386.067	0.461	0.000	6386.067	0.000
	9.00611 - 7.00458		3007.075	6477.933	0.464	0.000	6477.933	0.000
	7.00458 - 5.00305		3073.367	6570.075	0.468	0.000	6570.075	0.000
	5.00305 - 3.00153		3140.092	6662.491	0.471	0.000	6662.491	0.000
	3.00153 - 1		3207.233	6755.167	0.475	0.000	6755.167	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio V_u / ϕV_n	Actual T_u kip-ft	ϕT_n kip-ft	Ratio T_u / ϕT_n
L1	130 - 127.684	TP41.283x28.95x0.313	6.625	1076.290	0.006	1.614	2586.000	0.001
	127.684 - 125.368		7.197	1097.400	0.007	1.614	2688.942	0.001
	125.368 - 123.053		7.448	1118.520	0.007	1.614	2793.892	0.001
	123.053 - 120.737		8.084	1139.640	0.007	0.309	2900.842	0.000
	120.737 - 118.421		13.946	1158.580	0.012	0.309	3004.167	0.000
	118.421 - 116.105		14.205	1174.220	0.012	0.309	3100.575	0.000
	116.105 - 113.789		14.467	1189.670	0.012	0.309	3197.958	0.000
	113.789 - 111.474		14.732	1204.920	0.012	0.309	3296.275	0.000
	111.474 - 109.158		14.999	1219.980	0.012	0.309	3395.508	0.000
	109.158 - 106.842		20.693	1234.850	0.017	0.309	3495.617	0.000
	106.842 - 104.526		20.964	1249.520	0.017	0.309	3596.583	0.000
	104.526 - 102.211		21.238	1263.990	0.017	0.309	3698.383	0.000
	102.211 - 99.8947		21.513	1278.280	0.017	0.309	3800.975	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
	99.8947 - 97.5789		21.791	1292.360	0.017	0.309	3904.342	0.000
	97.5789 - 95.2632		22.085	1306.260	0.017	0.673	4008.450	0.000
	95.2632 - 92.9474		22.367	1319.960	0.017	0.673	4113.283	0.000
	92.9474 - 90.6316		22.652	1333.460	0.017	0.673	4218.800	0.000
	90.6316 - 88.3158		22.950	1346.780	0.017	1.111	4324.975	0.000
	88.3158 - 86		23.239	1359.890	0.017	1.111	4431.783	0.000
	86 - 80.167		11.445	1392.070	0.008	0.689	4703.442	0.000
L2	86 - 80.167	TP50.825x39.214x0.375	12.613	1748.180	0.007	0.785	5799.058	0.000
	80.167 - 78.2688		24.290	1762.890	0.014	1.475	5916.500	0.000
	78.2688 - 76.3707		24.526	1777.470	0.014	1.475	6034.650	0.000
	76.3707 - 74.4725		24.763	1791.920	0.014	1.474	6153.491	0.000
	74.4725 - 72.5743		25.000	1806.240	0.014	1.474	6273.000	0.000
	72.5743 - 70.6762		25.238	1820.430	0.014	1.474	6393.167	0.000
	70.6762 - 68.778		25.475	1834.490	0.014	1.474	6513.983	0.000
	68.778 - 66.8798		25.714	1848.420	0.014	1.474	6635.425	0.000
	66.8798 - 64.9817		25.953	1862.220	0.014	1.474	6757.475	0.000
	64.9817 - 63.0835		26.192	1875.880	0.014	1.474	6880.125	0.000
	63.0835 - 61.1853		26.432	1889.420	0.014	1.474	7003.358	0.000
	61.1853 - 59.2872		26.672	1902.830	0.014	1.474	7127.158	0.000
	59.2872 - 57.389		26.912	1916.110	0.014	1.474	7251.508	0.000
	57.389 - 55.4908		27.153	1929.260	0.014	1.474	7376.400	0.000
	55.4908 - 53.5927		27.394	1942.270	0.014	1.474	7501.808	0.000
	53.5927 - 51.6945		27.636	1955.160	0.014	1.474	7627.717	0.000
	51.6945 - 49.7963		27.878	1967.920	0.014	1.473	7754.125	0.000
	49.7963 - 47.8982		28.120	1980.550	0.014	1.473	7881.008	0.000
	47.8982 - 46		28.363	1993.040	0.014	1.473	8008.350	0.000
	46 - 39.029		14.164	2037.820	0.007	0.698	8479.750	0.000
L3	46 - 39.029	TP59.5x48.352x0.438	15.192	2474.630	0.006	0.775	10120.500	0.000
	39.029 - 37.0275		29.598	2491.990	0.012	1.881	10294.083	0.000
	37.0275 - 35.0259		29.838	2509.220	0.012	1.881	10468.500	0.000
	35.0259 - 33.0244		30.076	2526.290	0.012	1.881	10643.750	0.000
	33.0244 - 31.0229		30.313	2543.230	0.012	1.881	10819.750	0.000
	31.0229 - 29.0214		30.548	2560.010	0.012	1.881	10996.500	0.000

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
	29.0214 - 27.0198		30.782	2576.650	0.012	1.881	11174.000	0.000
	27.0198 - 25.0183		31.014	2593.150	0.012	1.881	11352.249	0.000
	25.0183 - 23.0168		31.244	2609.500	0.012	1.881	11531.249	0.000
	23.0168 - 21.0153		31.473	2625.700	0.012	1.881	11710.916	0.000
	21.0153 - 19.0137		31.701	2641.760	0.012	1.880	11891.249	0.000
	19.0137 - 17.0122		31.926	2657.680	0.012	1.880	12072.249	0.000
	17.0122 - 15.0107		32.150	2673.450	0.012	1.880	12253.916	0.000
	15.0107 - 13.0092		32.373	2689.070	0.012	1.880	12436.167	0.000
	13.0092 - 11.0076		32.593	2704.550	0.012	1.880	12619.083	0.000
	11.0076 - 9.00611		32.813	2719.880	0.012	1.880	12802.500	0.000
	9.00611 - 7.00458		33.030	2735.070	0.012	1.880	12986.583	0.000
	7.00458 - 5.00305		33.246	2750.110	0.012	1.880	13171.167	0.000
	5.00305 - 3.00153		33.460	2765.010	0.012	1.880	13356.333	0.000
	3.00153 - 1		33.673	2779.760	0.012	1.880	13542.000	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	130 - 127.684	0.001	0.043	0.000	0.006	0.001	0.044 ✔	1.000	4.8.2 ✔
	127.684 - 125.368	0.001	0.054	0.000	0.007	0.001	0.055 ✔	1.000	4.8.2 ✔
	125.368 - 123.053	0.001	0.064	0.000	0.007	0.001	0.065 ✔	1.000	4.8.2 ✔
	123.053 - 120.737	0.002	0.075	0.000	0.007	0.000	0.077 ✔	1.000	4.8.2 ✔
	120.737 - 118.421	0.003	0.091	0.000	0.012	0.000	0.094 ✔	1.000	4.8.2 ✔
	118.421 - 116.105	0.003	0.109	0.000	0.012	0.000	0.113 ✔	1.000	4.8.2 ✔
	116.105 - 113.789	0.003	0.127	0.000	0.012	0.000	0.130 ✔	1.000	4.8.2 ✔
	113.789 - 111.474	0.004	0.143	0.000	0.012	0.000	0.147 ✔	1.000	4.8.2 ✔
	111.474 - 109.158	0.004	0.159	0.000	0.012	0.000	0.163 ✔	1.000	4.8.2 ✔
	109.158 -	0.005	0.182	0.000	0.017	0.000	0.187	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	106.842						✔		
	106.842 - 104.526	0.005	0.203	0.000	0.017	0.000	0.208 ✔	1.000	4.8.2 ✔
	104.526 - 102.211	0.005	0.224	0.000	0.017	0.000	0.229 ✔	1.000	4.8.2 ✔
	102.211 - 99.8947	0.005	0.244	0.000	0.017	0.000	0.250 ✔	1.000	4.8.2 ✔
	99.8947 - 97.5789	0.005	0.264	0.000	0.017	0.000	0.269 ✔	1.000	4.8.2 ✔
	97.5789 - 95.2632	0.005	0.282	0.000	0.017	0.000	0.288 ✔	1.000	4.8.2 ✔
	95.2632 - 92.9474	0.005	0.300	0.000	0.017	0.000	0.306 ✔	1.000	4.8.2 ✔
	92.9474 - 90.6316	0.005	0.317	0.000	0.017	0.000	0.323 ✔	1.000	4.8.2 ✔
	90.6316 - 88.3158	0.005	0.334	0.000	0.017	0.000	0.340 ✔	1.000	4.8.2 ✔
	88.3158 - 86	0.006	0.350	0.000	0.017	0.000	0.356 ✔	1.000	4.8.2 ✔
	86 - 80.167	0.003	0.182	0.000	0.008	0.000	0.185 ✔	1.000	4.8.2 ✔
L2	86 - 80.167	0.003	0.168	0.000	0.007	0.000	0.171 ✔	1.000	4.8.2 ✔
	80.167 - 78.2688	0.005	0.325	0.000	0.014	0.000	0.330 ✔	1.000	4.8.2 ✔
	78.2688 - 76.3707	0.005	0.334	0.000	0.014	0.000	0.339 ✔	1.000	4.8.2 ✔
	76.3707 - 74.4725	0.005	0.342	0.000	0.014	0.000	0.348 ✔	1.000	4.8.2 ✔
	74.4725 - 72.5743	0.005	0.351	0.000	0.014	0.000	0.356 ✔	1.000	4.8.2 ✔
	72.5743 - 70.6762	0.005	0.359	0.000	0.014	0.000	0.365 ✔	1.000	4.8.2 ✔
	70.6762 - 68.778	0.005	0.367	0.000	0.014	0.000	0.373 ✔	1.000	4.8.2 ✔
	68.778 - 66.8798	0.006	0.375	0.000	0.014	0.000	0.381 ✔	1.000	4.8.2 ✔
	66.8798 - 64.9817	0.006	0.383	0.000	0.014	0.000	0.389 ✔	1.000	4.8.2 ✔
	64.9817 - 63.0835	0.006	0.391	0.000	0.014	0.000	0.397 ✔	1.000	4.8.2 ✔
	63.0835 - 61.1853	0.006	0.398	0.000	0.014	0.000	0.404 ✔	1.000	4.8.2 ✔
	61.1853 - 59.2872	0.006	0.405	0.000	0.014	0.000	0.411 ✔	1.000	4.8.2 ✔
	59.2872 - 57.389	0.006	0.412	0.000	0.014	0.000	0.419 ✔	1.000	4.8.2 ✔
	57.389 - 55.4908	0.006	0.419	0.000	0.014	0.000	0.426 ✔	1.000	4.8.2 ✔
	55.4908 - 53.5927	0.006	0.426	0.000	0.014	0.000	0.433 ✔	1.000	4.8.2 ✔
	53.5927 -	0.006	0.433	0.000	0.014	0.000	0.439	1.000	4.8.2 ✔

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
	51.6945						✔		
	51.6945 - 49.7963	0.006	0.439	0.000	0.014	0.000	0.446 ✔	1.000	4.8.2 ✔
	49.7963 - 47.8982	0.006	0.446	0.000	0.014	0.000	0.453 ✔	1.000	4.8.2 ✔
	47.8982 - 46	0.007	0.452	0.000	0.014	0.000	0.459 ✔	1.000	4.8.2 ✔
	46 - 39.029	0.003	0.225	0.000	0.007	0.000	0.228 ✔	1.000	4.8.2 ✔
L3	46 - 39.029	0.003	0.209	0.000	0.006	0.000	0.212 ✔	1.000	4.8.2 ✔
	39.029 - 37.0275	0.006	0.403	0.000	0.012	0.000	0.409 ✔	1.000	4.8.2 ✔
	37.0275 - 35.0259	0.006	0.407	0.000	0.012	0.000	0.414 ✔	1.000	4.8.2 ✔
	35.0259 - 33.0244	0.006	0.412	0.000	0.012	0.000	0.418 ✔	1.000	4.8.2 ✔
	33.0244 - 31.0229	0.006	0.416	0.000	0.012	0.000	0.423 ✔	1.000	4.8.2 ✔
	31.0229 - 29.0214	0.006	0.421	0.000	0.012	0.000	0.427 ✔	1.000	4.8.2 ✔
	29.0214 - 27.0198	0.007	0.425	0.000	0.012	0.000	0.432 ✔	1.000	4.8.2 ✔
	27.0198 - 25.0183	0.007	0.429	0.000	0.012	0.000	0.436 ✔	1.000	4.8.2 ✔
	25.0183 - 23.0168	0.007	0.433	0.000	0.012	0.000	0.440 ✔	1.000	4.8.2 ✔
	23.0168 - 21.0153	0.007	0.437	0.000	0.012	0.000	0.444 ✔	1.000	4.8.2 ✔
	21.0153 - 19.0137	0.007	0.441	0.000	0.012	0.000	0.449 ✔	1.000	4.8.2 ✔
	19.0137 - 17.0122	0.007	0.445	0.000	0.012	0.000	0.453 ✔	1.000	4.8.2 ✔
	17.0122 - 15.0107	0.007	0.449	0.000	0.012	0.000	0.457 ✔	1.000	4.8.2 ✔
	15.0107 - 13.0092	0.007	0.453	0.000	0.012	0.000	0.460 ✔	1.000	4.8.2 ✔
	13.0092 - 11.0076	0.007	0.457	0.000	0.012	0.000	0.464 ✔	1.000	4.8.2 ✔
	11.0076 - 9.00611	0.007	0.461	0.000	0.012	0.000	0.468 ✔	1.000	4.8.2 ✔
	9.00611 - 7.00458	0.007	0.464	0.000	0.012	0.000	0.472 ✔	1.000	4.8.2 ✔
	7.00458 - 5.00305	0.008	0.468	0.000	0.012	0.000	0.475 ✔	1.000	4.8.2 ✔
	5.00305 - 3.00153	0.008	0.471	0.000	0.012	0.000	0.479 ✔	1.000	4.8.2 ✔
	3.00153 - 1	0.008	0.475	0.000	0.012	0.000	0.483 ✔	1.000	4.8.2 ✔

Section Capacity Table

Section No.	*Elevation ft*	*Component Type*	*Size*	*Critical Element*	*P K*	*øP_{allow} K*	*% Capacity*	*Pass Fail*
L1	130 - 80.167	Pole	TP41.283x28.95x0.313	1	-15.136	2719.790	35.6	Pass
L2	80.167 - 39.029	Pole	TP50.825x39.214x0.375	2	-25.935	3986.090	45.9	Pass
L3	39.029 - 1	Pole	TP59.5x48.352x0.438	3	-42.967	5559.510	48.3	Pass
							Summary	
						Pole (L3)	48.3	Pass
						RATING =	**48.3**	**Pass**

Program Version 8.0.5.0 - 11/28/2018 File:J:/Jobs/2007400.WI/61_CTFF481B/05_Structural/Tower Analysis/Backup Documentation/Calcs/ERI Files/130' Valmont Monopole_ Trumbull CT.eri

Anchor Bolt and Base Plate Analysis:

Input Data:

Tower Reactions:

Overturning Moment =	$M_u := 3207 \cdot ft \cdot kips$	(Input From RisaTower)
Shear Force =	$Shear := 34 \cdot kips$	(Input From RisaTower)
Axial Force =	$R_u := 43 \cdot kips$	(Input From RisaTower)

Anchor Bolt Data:

ASTMA615 Grade 75

Number of Anchor Bolts =	$N := 20$	(User Input)
Diameter of Bolt Circle =	$D_{BC} := 66.92 \cdot in$	(User Input)
Bolt "Column" Distance =	$l := 3.0 \cdot in$	(User Input)
Bolt Ultimate Strength =	$F_u := 100 \cdot ksi$	(User Input)
Bolt Yield Strength =	$F_y := 75 \cdot ksi$	(User Input)
Bolt Modulus =	$E := 29000 \cdot ksi$	(User Input)
Diameter of Anchor Bolts =	$D := 2.25 \cdot in$	(User Input)
Threads per Inch =	$n := 4.5$	(User Input)
Top of Concrete to Bot Leveling Nut =	$l_{ar} := 2 \cdot in$	(User Input)
Anchor Rod Force Correction Factor =	$n_c = 1$	Table 2-1 Addendum 3

Base Plate Data:

Use ASTM A572 Grade 50

Plate Yield Strength =	$F_{yf} := 50 \cdot ksi$	(User Input)
Base Plate Thickness =	$t_{TP} := 3.25 \cdot in$	(User Input)
Base Plate Diameter =	$D_{OD} := 74.0 \cdot in$	(User Input)
Outer Pole Diameter =	$D_T := 59.5 \cdot in$	(User Input)
Pole Wall Thickness =	$t_T := 0.4375 \cdot in$	(User Input)
Pole Design Yield Strength =	$F_{yp} := 65 \cdot ksi$	(User Input)
	$\eta := 0.5$	For Ungrouted Base Plate per TIA-222-G Section 4.9.9

Anchor Bolt Analysis:

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

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

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

Plastic Section Modulus = $Z := \frac{d_{rt}^{\,3}}{6} = 1.401 \cdot in^3$

Maximum Anchor Rod Force = $P_u := \frac{n_c \cdot \pi \cdot M_u}{N \cdot D_{BC}} + \frac{R_u}{N} = 92.5 \cdot kips$

Maximum Shear Force = $V_u := \frac{Shear}{N} = 1.7 \cdot kips$

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

Bolt % of Capacity = $\frac{\left(P_u + \frac{V_u}{\eta}\right)}{\Phi R_{nt}} \cdot 100 = 36.9$

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

$Condition1 = \text{"OK"}$

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

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

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

Bolt % of Capacity = $\left[\left(\frac{V_u}{\Phi R_{nv}}\right)^2 + \left(\frac{P_u}{\Phi R_{nt}} + \frac{M_u}{\Phi R_{nm}}\right)^2\right] \cdot 100 = 12.7$

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

$Condition2 = \text{"OK"}$

Base Plate Analysis:

Strength Resistance Factor for Yielding due to Bending = $\phi_b := 0.9$

Strength Resistance Factor for Yielding due to Shear = $\phi_v := 1.0$

Outside Fillet Horizontal Leg Dimension = $w_1 := 0.25 \cdot in$

Effective Pole Outside Diameter = $D_e := D_T + w_1 = 59.75 \cdot in$

Effective Base Plate Outside Diameter = $D_{oe} := \begin{cases} D_{OD} & \text{if } D_{OD} \le (D_{BC} + 6 \cdot t_{TP}) \\ (D_{BC} + 6 \cdot t_{TP}) & \text{otherwise} \end{cases} = 74 \cdot in$

Half-Angle Between Radial Lines Extending from Pole Centerline Through Midpoints Between Adjacent Anchor Rods = $\theta_1 := \frac{\pi}{N} = 0.157$

Angle Defining Limiting Effective Base Plate Width Based on Plate Thickness = $\theta_2 := asin\left(\frac{12 \cdot t_{TP}}{D_{BC}}\right) = 0.622$

Angle Defining Limiting Effective Base Plate Width Based on Distance Between Anchor Rod Bolt Circle and Effective Pole Outside Diameter = $\theta_3 := acos\left(\frac{D_{BC} + D_e}{2 \cdot D_{BC}}\right) = 0.329$

Governing Angle Defining Effective Base Plate Width Resisting Bending = $\theta := min(\theta_1, \theta_2, \theta_3) = 0.157$

Effective Moment Arm of Anchor Rod Force = $x := 0.5 \cdot (D_{BC} - D_e) = 3.585 \cdot in$

Effective Base Plate Width Resisting Bending from Transverse Bend Line = $B_{et} := D_{BC} \cdot sin(\theta) = 10.469 \cdot in$

Effective Base Plate Width Resisting Bending from Radial Bend Lines = $B_{er} := (D_{oe} - D_e) \cdot sin(\theta) = 2.229 \cdot in$

Total Effective Base Plate Width Resisting Bending = $B_{eff} := B_{et} + B_{er} = 12.698 \cdot in$

Required Base Plate Thickness = $t_{TP.Req} := \sqrt{\frac{4 \cdot P_u \cdot x}{\phi_b \cdot F_{yf} \cdot B_{eff}}} = 1.523 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 46.9 \cdot \%$

Condition2 = $Condition3 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition3 = "Ok"

Required Base Plate Thickness = $t_{TP.Req} := \frac{\phi_b \cdot t_T \cdot F_{yp}}{\phi_v \cdot 0.6 \cdot F_{yf}} = 0.853 \cdot in$

Plate Bending Stress % of Capacity = $\frac{t_{TP.Req}}{t_{TP}} = 26.3 \cdot \%$

Condition2 = $Condition4 := if\left(\frac{t_{TP.Req}}{t_{TP}} < 1.00, \text{"Ok"}, \text{"Overstressed"}\right)$

Condition4 = "Ok"

Standard Monopole Foundation:

Input Data:

Tower Data

Overturning Moment =	$OM := 3207 \cdot ft \cdot kips$	(User Input)	
Shear Force =	$Shear := 34 \cdot kip$	(User Input)	
Axial Force =	$Axial := 43 \cdot kip$	(User Input)	
Tower Height =	$H_t := 130 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 7 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.5 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 8.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 3.0 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 26.5 \cdot ft$	(User Input)	

Anchor Bolt Data:

Length of Anchor Bolts=	$L_{st} := 72 \cdot in$	(User Input)	
Projection of Anchor Bolts Above Pier =	$A_{BP} := 12.0 \cdot in$	(User Input)	
Anchor Bolt Diameter =	$d_{anchor} := 2.25 \cdot in$	(User Input)	
Base Plate Bolt Circle =	$MP := 66.92 \cdot in$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 3000 \cdot psi$	(User Input)	
Steel Reinforcment Yield Strength =	$f_y := 60000 \cdot psi$	(User Input)	
Anchor Bolt Yield Strength =	$f_{ya} := 75000 \cdot psi$	(User Input)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_u := 12000 \cdot psf$	(User Input)	
Allowable Soil Bearing Capacity =	$q_a := \frac{q_u}{2} = 6000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 100 \cdot pcf$	(User Input)	
Unit Weight of Concrete =	$\gamma_{conc} := 150 \cdot pcf$	(User Input)	
Foundation Bouyancy =	$Bouyancy := 0$	(User Input)	(Yes=1 / No=0)
Depth to Neglect =	$n := 0 \cdot ft$	(User Input)	
Cohesion of Clay Type Soil =	$c := 0 \cdot ksf$	(User Input)	(Use 0 for Sandy Soil)
Seismic Zone Factor =	$Z := 2$	(User Input)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 11$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.41 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 48$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 3 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 6$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.75 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 32$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 9$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.128 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 34$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $$A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 1.561 \cdot in^2$$

Pad Top Reinforcement Bar Area = $$A_{btop} := \frac{\pi \cdot d_{btop}^2}{4} = 0.442 \cdot in^2$$

Pad Bottom Reinforcement Bar Area = $$A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.999 \cdot in^2$$

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

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := \text{if}(\text{Bouyancy} = 1, \gamma_{soil} - 62.4\text{pcf}, \gamma_{soil}) = 100 \cdot \text{pcf}$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.2 \cdot \text{ksf}$

$P_{top} := \text{if}[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.2 \cdot \text{ksf}$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.1 \cdot \text{ksf}$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.65 \cdot \text{ksf}$$

$T_p := \text{if}[n < (D_f - T_f), T_f, (D_f - n)] = 3$

$A_p := W_f \cdot T_p = 79.5$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 131.175 \cdot \text{kip}$

Weight of Concrete Pad = $WT_c := \left[\left(W_f^{\,2} \cdot T_f\right) + d_p^{\,2} L_p\right] \cdot \gamma_c = 359.213 \cdot \text{kip}$

Weight of Soil Above Footing = $WT_{s1} := \left[\left(W_f^{\,2} - d_p^{\,2}\right) \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 255.3 \cdot \text{kip}$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left(\frac{D_f^{\,2} \cdot \tan(\Phi_s)}{2} \cdot W_f\right) \cdot \gamma_s = 37.484 \cdot \text{kip}$

Weight of Soil Wedge at back face Corners = $WT_{s3} := 2 \cdot \left[(D_f)^3 \cdot \frac{\tan(\Phi_s)}{3}\right] \cdot \gamma_s = 13.202 \cdot \text{kips}$

Total Weight = $WT_{tot} := WT_c + WT_{s1} + \text{Axial} = 657.513 \cdot \text{kip}$

Resisting Weight = $WT_R := 0.9 \cdot WT_c + 0.75 \cdot WT_{s1} + 0.75 \cdot \text{Axial} = 547.016 \cdot \text{kip}$

Resisting Moment = $$M_r := (WT_R) \cdot \frac{W_f}{2} + 0.75 \cdot S_u \cdot \frac{T_f}{3} + 0.75 \cdot \left[(WT_{s2} + WT_{s3}) \cdot \left(W_f + \frac{D_f \cdot \tan(\Phi_s)}{3}\right)\right] = 8405 \cdot \text{kip} \cdot \text{ft}$$

Overturning Moment = $M_{ot} := OM + \text{Shear} \cdot (L_p + T_f) = 3462 \cdot \text{kip} \cdot \text{ft}$

Factor of Safety Actual = $$FS := \frac{M_r}{M_{ot}} = 2.43$$

Factor of Safety Required = $FS_{req} := 1$

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

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 427.056 \cdot kips$

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

Shear_Check = "Okay"

Bearing Pressure Caused by Footing:

Area of the Mat = $A_{mat} := W_f^{\,2} = 702.25$

Section Modulus of Mat = $S := \frac{W_f^{\,3}}{6} = 3101.6 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.052 \cdot ksf$

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

Max_Pressure_Check = "Okay"

Minimum Pressure in Mat = $P_{min} := \frac{WT_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.18 \cdot ksf$

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

Min_Pressure_Check = "No Good"

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 8.121$

Distance to Kern = $X_k := \frac{W_f}{6} = 4.417$

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

Eccentricity = $e := \frac{M_{ot}}{WT_{tot}} = 5.265$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot WT_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 2.072 \cdot ksf$

$q_{adj} := \text{if}(P_{min} < 0, P_a, P_{max}) = 2.072 \cdot ksf$

Pressure_Check := if($q_{adj} < .75 \cdot q_u$, "Okay", "No Good")

Pressure_Check = "Okay"

Concrete Bearing Capacity:

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

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 1.2 \times 10^4 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if(P_b > Axial, "Okay", "No Good")$

$Bearing\_Check = "Okay"$

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 2.656$

$d_1 := \frac{W_f}{2} - \frac{d_p}{2}$

$d_2 := d_1 - d$

$L := \left(\frac{W_f}{2} - e\right) \cdot 3$

$Slope := if\left(L > W_f, \frac{P_{max} - P_{min}}{W_f}, \frac{q_{adj}}{L}\right)$

$V_{req} := \left[\left(q_{adj} - Slope \cdot d_1\right) + \left(\frac{Slope \cdot d_1}{2}\right)\right] \cdot W_f \cdot d_1$

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

$Beam\_Shear\_Check := if(V_{req} < V_{Avail}, "Okay", "No Good")$

$Beam\_Shear\_Check = "Okay"$

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

Critical Perimeter of Punching Shear = $b_o := (d_p + d) \cdot \pi = 33.5$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot (d_p + d)^2}{4} = 89.2$

Area Outside of Perimeter = $A_{out} := A_{mat} - A_{bo} = 613.1$

Guess Value = $v_u := 1\text{ksf}$ (From "Foundation Analysis and design", By Joseph Bowles, Eq. 8-9)

Given $d^2 + d_p \cdot d = \frac{WT_{tot}}{\pi \cdot v_u}$

$v_u := \text{Find}(v_u) = 7.4 \cdot \text{ksf}$

$V_u := v_u \cdot d \cdot W_f = 520.5 \cdot \text{kips}$

Required Shear Strength = $V_{req} := V_u = 520.5 \cdot \text{kips}$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot \text{psi}} \cdot b_o \cdot d = 2384.4 \cdot \text{kip}$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

$q_b := q_{adj} - d_1 \cdot \text{Slope} = 1.272 \cdot \text{ksf}$

Maximum Bending at Face of Pier = $M_n := \frac{1}{\phi_m} \cdot \left[(q_{adj} - q_b) \cdot \frac{d_1^{\,2}}{3} + q_b \cdot \frac{d_1^{\,2}}{2} \right] \cdot W_f = 2273.7 \cdot \text{kip} \cdot \text{ft}$

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

(ACI-2008 10.2.7.3)

$R_n := \frac{M_n}{W_f \cdot d^2} = 84.5 \cdot \text{psi}$

$\rho := \frac{0.85 \cdot f_c}{f_y} \left(1 - \sqrt{1 - \frac{2 \cdot R_n}{0.85 \cdot f_c}} \right) = 0.0014$

$\rho_{min} := \rho = 0.00143$

Required Reinforcement for Temperature and Shrinkage:

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

Check Bottom Bars:

$$As := \begin{cases} \rho_{min} \cdot W_f \cdot d & \text{if } \rho_{min} > \frac{\rho_{sh}}{2} \\ \rho_{sh} \cdot W_f \cdot \frac{d}{2} & \text{otherwise} \end{cases} = 14.512 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 34 \cdot in^2$$

Pad_Reinforcement_Bot := if($As_{prov} > As$, "Okay" , "No Good")

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := \rho_{sh} \cdot \left(W_f \cdot \frac{d}{2} \right) = 9.1 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 14.1 \cdot in^2$$

Pad_Reinforcement_Top := if($As_{prov} > As$, "Okay" , "No Good")

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 8.29 \cdot in$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

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

$$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 34.8 \cdot in$$

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{d_p}{2} - Cvr_{pad} = 108 \cdot in$$

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

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := d_p^2 = 9216 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 46.08 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 74.95 \cdot in^2$

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

Steel_Area_Check = "Okay"

NOTE: Anchor Bolts are not accounted for in reinforcement calculation and will provide additional reinforcement to satisfy minimum requirement of steel.

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 4.873 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 90 \cdot in$

Maximum Moment in Pier = $M_p := \left[OM + Shear \cdot \left(L_p + \frac{A_{BP}}{2}\right)\right] = 40524 \cdot in \cdot kips$

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

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) := \left(d_p \cdot 12 \;\; NB_{pier} \;\; BS_{pier} \;\; \frac{Axial \cdot 1.333}{kips} \;\; \frac{M_p}{in \cdot kips}\right)$$

$$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) = (96 \;\; 48 \;\; 11 \;\; 57.3 \;\; 40524)$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := (0 \;\; 0 \;\; 0 \;\; 0)$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) := \phi P'_n\left(D, N, n, P_u, M_{xu}\right)^T$$

$$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = \left(223.9 \;\; 1.6 \times 10^5 \;\; -60 \;\; 0\right)$$

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

Axial_Load_Check = "Okay"

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

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$$L_{pier} := L_p - Cvr_{pier} = 51 \cdot in$$

$$L_{pad} := T_f - Cvr_{pad} = 33 \cdot in$$

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

$$c := if\left(Cvr_{pier} < \frac{B_{sPier}}{2}, Cvr_{pier}, \frac{B_{sPier}}{2}\right) = 2.437 \cdot in$$

Transverse Reinforcement =

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

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 67.04 \cdot in$$

Minimum Development Length =

$$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 21.624 \cdot in$$ (ACI 12.2.1)

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

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

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

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

Compression: (ACI-2008 12.3.2)

$$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 30.892 \cdot in$$

$$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 25.38 \cdot in$$

$$L_{dbc} := if\left(L_{dbc1} \ge L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 30.892 \cdot in$$

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

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

Tie Size and Spacing in Column:

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

Used #3 Ties

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

$s_{lim1} := 16 \cdot d_{bpier} \cdot z = 22.56 \cdot in$

$s_{lim2} := \frac{48 \cdot d_{Tie}}{8} \cdot z = 18 \cdot in$

$s_{lim3} := D_f \cdot z = 84 \cdot in$

$s_{lim4} := 18in$

Maximum Spacing = $s_{tie} := min\left(\begin{pmatrix} s_{lim1} \\ s_{lim2} \\ s_{lim3} \\ s_{lim4} \end{pmatrix}\right) = 18 \cdot in$

Number of Ties Required = $n_{tie} := \frac{L_{pier} - 3 \cdot in}{s_{tie}} + 1 = 3.667$

Check Anchor Steel Embedment:

Depth Available = $D_{ab} := L_{st} - A_{BP} = 5 \cdot ft$

Length of Anchor Bolt = $L_{anchor} := \frac{(0.11 \cdot f_{ya}) \cdot in}{\sqrt{f_c \cdot psi}} = 12.552 \cdot ft$

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

$Depth\_Check = \text{"No Good"}$

Note: Anchor plate is provided

RAN Template: 67D5A997DB Outdoor	**A&L Template:** 67D5997DB_2xAIR+1OP (U21 Market)

CTFF481B_Anchor_6_draft

Print Name: Preliminary (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Section 1 - Site Information

Site ID: CTFF481B
Status: Draft
Version: 6
Project Type: Anchor
Approved: Not Approved
Approved By: Not Approved
Last Modified: 7/15/2020 9:28:37 PM
Last Modified By: Dominic.Kallas2@T-Mobile.com

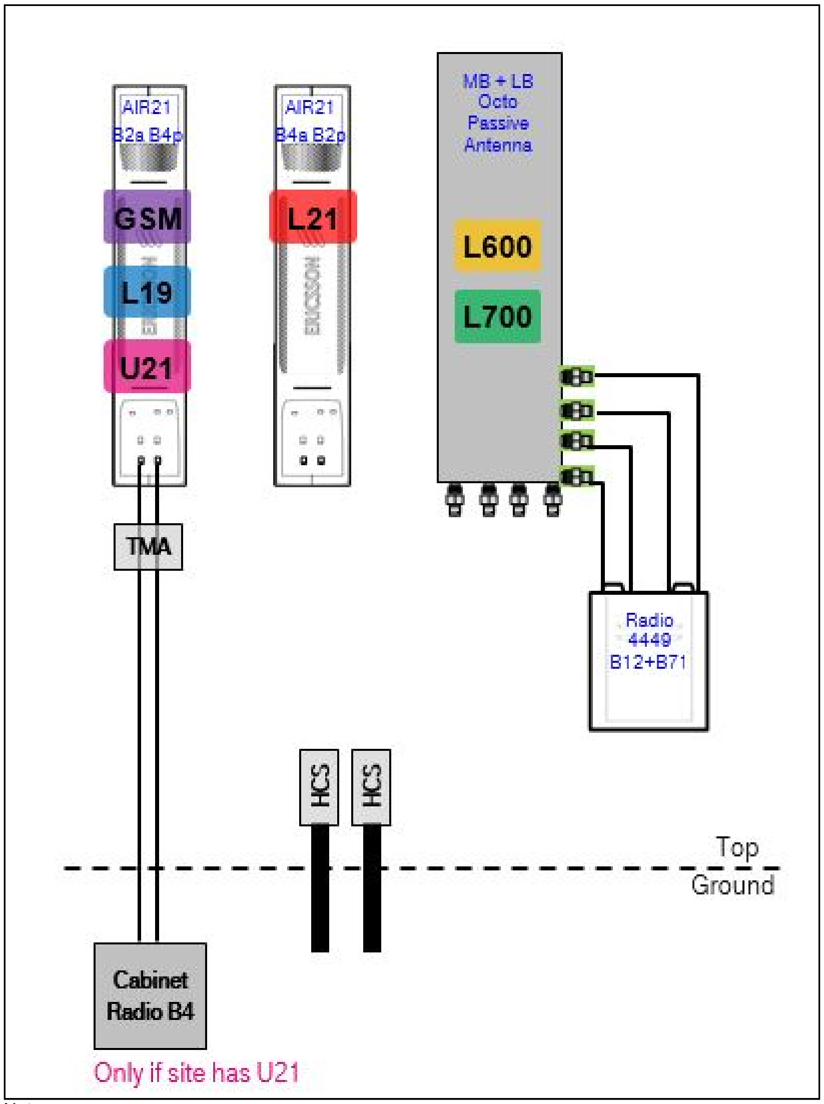
Site Name: POLICE STA EDISON RD
Site Class: Monopole
Site Type: Structure Non Building
Plan Year: 2020
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: T-Mobile USA Inc

Latitude: 41.23444444
Longitude: -73.21888890
Address: 158 Edison Rd
City, State: Trumbull, CT
Region: NORTHEAST

RAN Template: 67D5A997DB Outdoor		**AL Template:** 67D5997DB_2xAIR+1OP (U21 Market)		
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 6	**TMA Count:** 3	**RRU Count:** 6

Section 2 - Existing Template Images

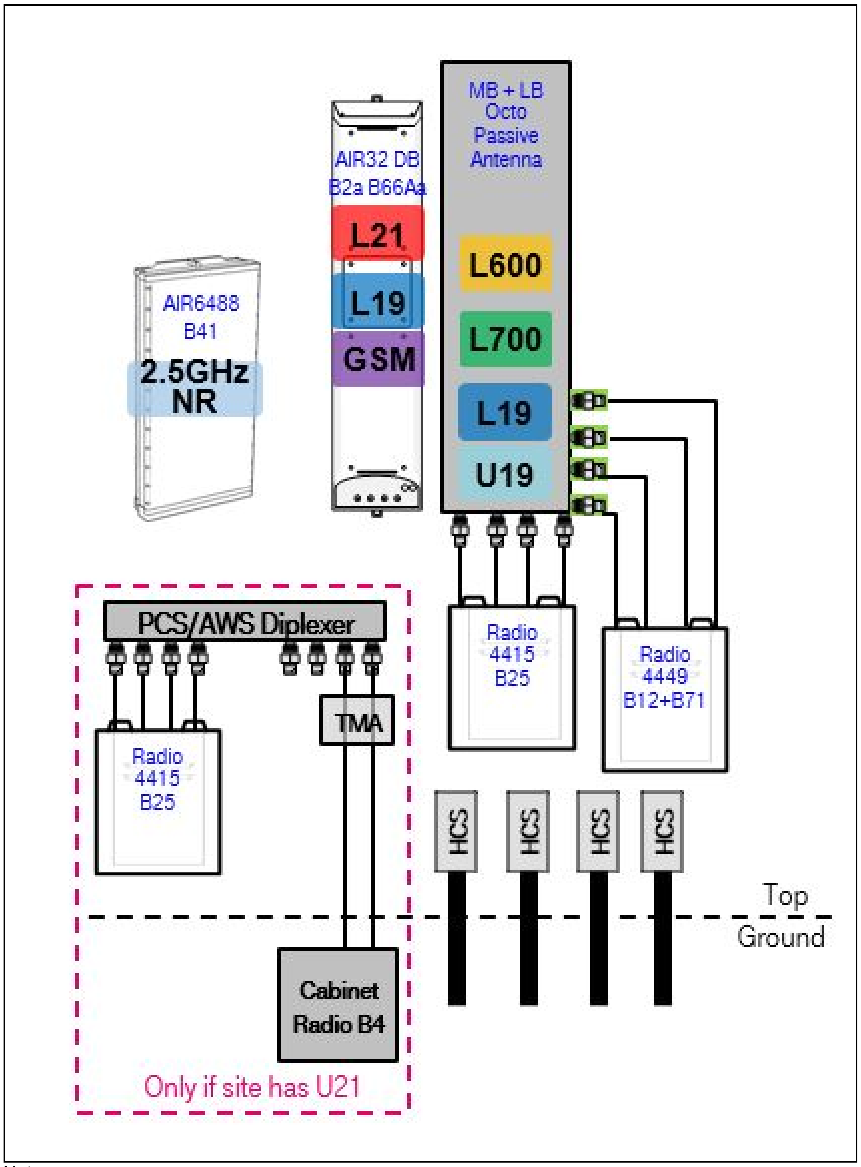
67D92C.JPG



Notes:

Section 3 - Proposed Template Images

67D5997DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

----- This section is intentionally blank. -----

RAN Template: 67D5A997DB Outdoor	A&L Template: 67D5997DB_2xAIR+1OP (U21 Market)

CTFF481B_Anchor_6_draft

Print Name: Preliminary (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 67D92C Outdoor

Enclosure	1	2
Enclosure Type	RBS 6131	Ancillary Equipment (Ericsson)
Baseband	DUW30 (U2100); DUG20 (G1900); BB 6630 (L2100, L700, L600, L1900); BB 6630 (N600)	
Hybrid Cable System		Ericsson 6x12 HCS 6AWG 40m; Ericsson 9x18 HCS 30m; Ericsson 6x12 HCS *Select AWG & Length*
Radio	RU22 **(x 6)** (U2100)	

Proposed RAN Equipment

Template: 67D5A997DB Outdoor

Enclosure	1	2	3
Enclosure Type	RBS 6131	Ancillary Equipment (Ericsson)	Enclosure 6160
Baseband	DUW30 (U2100); DUG20 (G1900); BB 6630 (L2100, L1900); BB 6630 (L700, L600, N600)		BB 6630 (L2500); BB 6648 (N2500)
Hybrid Cable System		Ericsson 6x12 HCS 6AWG 40m; Ericsson 6x12 HCS *Select AWG & Length*	Ericsson 6x12 HCS *Select AWG & Length*
Radio	RU22 **(x 6)** (U2100)		

RAN Scope of Work:

Location of new cabinets to be determined.

Add (1) Enclosure 6160.

Add (1) Battery Cabinet B160.

Add (1) iXRe Router to new Enclosure 6160.

Add (1) BB6630 for L2500 to new Enclosure 6160.

Add (1) BB6648 for N2500 to new Enclosure 6160.

Existing: (6) Coaxial Lines; (2) 6X12 HCS

Add (1) 6X12 HCS for new Anchor A&L Equipment. Length of new HCS will match that of existing HCS.

RAN Template: 67D5A997DB Outdoor	A&L Template: 67D5997DB_2xAIR+1OP (U21 Market)

CTFF481B_Anchor_6_draft

Print Name: Preliminary (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Section 6 - A&L Equipment

Existing Template: 67D92C_2xAIR+1OP
Proposed Template: 67D5997DB_2xAIR+1OP (U21 Market)

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1		2				3	
Antenna Model	Ericsson - AIR21 KRC118046-1_B2P_B4A (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)	
Azimuth	60		60				60	
M. Tilt								
Height	120		120				120	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.		L2100	L700 L600 N600	L700 L600 N600			L1900 G1900	U2100
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt								
Cables		Fiber Jumper **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**			Fiber Jumper	1-5/8" Coax - 130 ft. **(x2)**
TMAs								Generic Twin Style 1B - AWS (AtAntenna)
Diplexers / Combiners								
Radio			Radio 4449 B71+B85 (At Antenna)					
Sector Equipment								

Unconnected Equipment:

Scope of Work:

RAN Template: 67D5A997DB Outdoor	**A&L Template:** 67D5997DB_2xAIR+1OP (U21 Market)

CTFF481B_Anchor_6_draft

Print Name: Preliminary (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1				2				3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)	
Azimuth	60				60				60	
M. Tilt	0				0				0	
Height	120				120				120	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**
Active Tech.	L2100	L2100	L1900 G1900	L1900	L700 L600 N600	L700 L600 N600	L1900	L1900 U2100	L2500 N2500	L2500 N2500
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables	Fiber Jumper		Fiber Jumper		JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** Fiber Jumper	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** Fiber Jumper	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** 1-5/8" Coax - 130 ft. **(x2)**	Fiber Jumper	Fiber Jumper
TMAs								Generic Twin Style 1B - AWS (AtAntenna)		
Diplexers / Combiners							Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)		
Radio					Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4415 B25 (At Antenna)	SHARED Radio 4415 B25 (At Antenna)		
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Replace AIR21 B2P/B4A in Position 1 with (1) AIR32 Dual Band for L2100, L1900 1st Carrier, and GSM.

Add (1) PCS/AWS 8:4 diplexer to Position 2 at antenna, and connect its four output ports to the Mid-Band ports of the Octo antenna.

Add (1) Radio 4415 B25 for L1900 2nd Carrier to Position 2 near antenna, and connect its ports to the four PCS input ports of the diplexer.

Move coaxial lines and AWS TMA for U2100 to Position 2, and connect its ports to two AWS input ports of the diplexer.

Make sure to install metal caps on all empty ports of PCS/AWS diplexer for load balancing.

Remove AIR21 B2A/B4P from Position 3.

Install AIR6449 B41 for L2500 and N2500 in Position 3.

Ensure RET control is enabled for all technology layers according to the Design Documents.

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

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

CTFF481B_Anchor_6_draft

Print Name: Preliminary (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Sector 2 (Existing) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1		2				3	
Antenna Model	Ericsson - AIR21 KRC118046-1_B2P_B4A (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)	
Azimuth	150		150				150	
M. Tilt								
Height	120		120				120	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.		L2100	L700 L600 N600	L700 L600 N600			L1900 G1900	U2100
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt								
Cables		Fiber Jumper **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**			Fiber Jumper	1-5/8" Coax - 130 ft. **(x2)**
TMAs								Generic Twin Style 1B - AWS (AtAntenna)
Diplexers / Combiners								
Radio			Radio 4449 B71+B85 (At Antenna)					
Sector Equipment								

Unconnected Equipment:

Scope of Work:

RAN Template: 67D5A997DB Outdoor	**A&L Template:** 67D5997DB_2xAIR+1OP (U21 Market)

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1				2				3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)	
Azimuth	150				150				150	
M. Tilt	0				0				0	
Height	120				120				120	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**
Active Tech.	L2100	L2100	L1900 G1900	L1900	L700 L600 N600	L700 L600 N600	L1900	L1900 U2100	L2500 N2500	L2500 N2500
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables	Fiber Jumper		Fiber Jumper		JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** Fiber Jumper	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** Fiber Jumper	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** 1-5/8" Coax - 130 ft. **(x2)**	Fiber Jumper	Fiber Jumper
TMAs								Generic Twin Style 1B - AWS (AtAntenna)		
Diplexers / Combiners							Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)		
Radio					Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4415 B25 (At Antenna)	SHARED Radio 4415 B25 (At Antenna)		
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Replace AIR21 B2P/B4A in Position 1 with (1) AIR32 Dual Band for L2100, L1900 1st Carrier, and GSM.

Add (1) PCS/AWS 8:4 diplexer to Position 2 at antenna, and connect its four output ports to the Mid-Band ports of the Octo antenna.

Add (1) Radio 4415 B25 for L1900 2nd Carrier to Position 2 near antenna, and connect its ports to the four PCS input ports of the diplexer.

Move coaxial lines and AWS TMA for U2100 to Position 2, and connect its ports to two AWS input ports of the diplexer.

Make sure to install metal caps on all empty ports of PCS/AWS diplexer for load balancing.

Remove AIR21 B2A/B4P from Position 3.

Install AIR6449 B41 for L2500 and N2500 in Position 3.

Ensure RET control is enabled for all technology layers according to the Design Documents.

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

RAN Template: 67D5A997DB Outdoor	**A&L Template:** 67D5997DB_2xAIR+1OP (U21 Market)

CTFF481B_Anchor_6_draft

Print Name: Preliminary (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Sector 3 (Existing) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1		2				3	
Antenna Model	Ericsson - AIR21 KRC118046-1_B2P_B4A (Quad)		RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR21 KRC118023-1_B2A_B4P (Quad)	
Azimuth	340		340				340	
M. Tilt								
Height	120		120				120	
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.		L2100	L700 L600 N600	L700 L600 N600			L1900 G1900	U2100
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt								
Cables		Fiber Jumper **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**			Fiber Jumper	1-5/8" Coax - 130 ft. **(x2)**
TMAs								Generic Twin Style 1B - AWS (AtAntenna)
Diplexers / Combiners								
Radio			Radio 4449 B71+B85 (At Antenna)					
Sector Equipment								

Unconnected Equipment:

Scope of Work:

RAN Template:	A&L Template:
67D5A997DB Outdoor	67D5997DB_2xAIR+1OP (U21 Market)

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1				2				3	
Antenna Model	Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)				RFS - APXVAARR24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)	
Azimuth	340				340				340	
M. Tilt	0				0				0	
Height	120				120				120	
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2100	L2100	L1900 G1900	L1900	L700 L600 N600	L700 L600 N600	L1900	L1900 U2100	L2500 N2500	L2500 N2500
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables	Fiber Jumper		Fiber Jumper		JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** Fiber Jumper	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)**	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** Fiber Jumper	JUMPER 6' SUREFLEX DIN MALE-DIN MALE **(x2)** 1-5/8" Coax - 130 ft. **(x2)**	Fiber Jumper	Fiber Jumper
TMAs								Generic Twin Style 1B - AWS (AtAntenna)		
Diplexers / Combiners							Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)	SHARED Commscope - SDX1926Q-43 (E14F05P86) (AtAntenna)		
Radio					Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4415 B25 (At Antenna)	SHARED Radio 4415 B25 (At Antenna)		
Sector Equipment										

Unconnected Equipment:

Scope of Work:

Replace AIR21 B2P/B4A in Position 1 with (1) AIR32 Dual Band for L2100, L1900 1st Carrier, and GSM.

Add (1) PCS/AWS 8:4 diplexer to Position 2 at antenna, and connect its four output ports to the Mid-Band ports of the Octo antenna.

Add (1) Radio 4415 B25 for L1900 2nd Carrier to Position 2 near antenna, and connect its ports to the four PCS input ports of the diplexer.

Move coaxial lines and AWS TMA for U2100 to Position 2, and connect its ports to two AWS input ports of the diplexer.

Make sure to install metal caps on all empty ports of PCS/AWS diplexer for load balancing.

Remove AIR21 B2A/B4P from Position 3.

Install AIR6449 B41 for L2500 and N2500 in Position 3.

Ensure RET control is enabled for all technology layers according to the Design Documents.

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

RAN Template: 67D5A997DB Outdoor	**A&L Template:** 67D5997DB_2xAIR+1OP (U21 Market)

CTFF481B_Anchor_6_draft

Print Name: Preliminary (RFDS_for_Scoping)
PORs: Anchor_Phase 3

Section 7 - Power Systems Equipment

Existing Power Systems Equipment

----- This section is intentionally blank. -----

Proposed Power Systems Equipment

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

T-Mobile Site #: CTFF481B

158 Edison Road
Trumbull, CT

Centek Project No. 20074.61

Date: July 28, 2020

Max Stress Ratio = 89.1%

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

July 28, 2020

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

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CTFF481B
158 Edison Road
Trumbull, CT 06611

Centek Project No. 20074.61

Dear Mr. Reid,

Centek Engineering, Inc. has reviewed the T-Mobile antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the existing mount, consisting of three (3) 12-ft T-Arms w/ stabilizers to support the equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

- T-Mobile:
  T-Arms: Three (3) Ericsson AIR32 panel antennas, three (3) Ericsson AIR6449 panel antennas, three (3) RFS APXVAARR24-43-NA20 panel antennas, three (3) KRY112 TMAs, three (3) Ericsson 4449 remote radio units, three (3) Ericsson 4415 remote radio units and three (3) Commscope SDX1926Q-43 diplexers mounted on three (3) T-Arms with a RAD center elevation of 120-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 97 mph for Trumbull 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 antenna mount has 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

STATE OF CONNECTICUT
TIMOTHY J. LYNN
No. 29336
LICENSED
PROFESSIONAL ENGINEER

Section 2 - Calculations

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

Wind Speeds

Basic Wind Speed $V := 97$ 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 := Pole (User Input)

Structure Category = $SC := II$ (User Input)

Exposure Category = $Exp := C$ (User Input)

Structure Height = $h := 130$ ft (User Input)

Height to Center of Antennas = $z_{Ant} := 120$ ft (User Input)

Radial Ice Thickness = $t_i := 0.75$ in (User Input per Annex B of TIA-222-G)

Radial Ice Density = $Id := 56.00$ pcf (User Input)

Topograpic Factor = $K_{zt} := 1.0$ (User Input)

$K_a := 1.0$ (User Input)

Gust Response Factor = $G_H = 1.1$ (User Input)

Output

Wind Direction Probability Factor = $K_d := \begin{cases} 0.95 & \text{if Structure\_Type = Pole} \\ 0.85 & \text{if Structure\_Type = Lattice} \end{cases} = 0.95$ (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)

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

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

$K_{iz} := \left(\frac{z_{Ant}}{33}\right)^{0.1} = 1.138$ $t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.707$

Velocity Pressure Coefficient Antennas = $Kz_{Ant} := 2.01\left(\left(\frac{z_{Ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.315$

Velocity Pressure w/o Ice Antennas = $qz_{Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V^2 \cdot I_{Wind} = 30.094$

Velocity Pressure with Ice Antennas = $qz_{ice.Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V_i^2 \cdot I_{Wind} = 7.996$

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model = Ericsson AIR32

Antenna Shape = Flat (User Input)

Antenna Height = $L_{ant} := 56.6$ in (User Input)

Antenna Width = $W_{ant} := 12.9$ in (User Input)

Antenna Thickness = $T_{ant} := 8.7$ in (User Input)

Antenna Weight = $WT_{ant} := 133$ lbs (User Input)

Number of Antennas = $N_{ant} := 1$ (User Input)

Antenna Aspect Ratio = $Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.4$

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

Wind Load (without ice)

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

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

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

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

Wind Load (with ice)

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

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 77$ lbs

Surface Area for One Antenna w/ Ice = $SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5$ sf

Total Antenna Wind Force w/ Ice = $Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 57$ lbs

Gravity Load (without ice)

Weight of All Antennas = $WT_{ant} \cdot N_{ant} = 133$ lbs

Gravity Loads (ice only)

Volume of Each Antenna = $V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6352$ cu in

Volume of Ice on Each Antenna = $V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5507$ cu in

Weight of Ice on Each Antenna = $W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 178$ lbs

Weight of Ice on All Antennas = $W_{ICEant} \cdot N_{ant} = 178$ lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR6449		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 33.1$	in	(User Input)
Antenna Width =	$W_{ant} := 20.5$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.3$	in	(User Input)
Antenna Weight =	$WT_{ant} := 103$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 1.6$		
Antenna Force Coefficient =	$Ca_{ant} = 1.2$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 187$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.9$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 76$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.1$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 64$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 3$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 31$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 103$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5632$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4596$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 149$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 149$	lbs

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 =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 670$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.8$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 243$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 18.9$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 211$	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 =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 93$	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 =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 1 \times 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 420$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 420$	lbs

Development of Wind & Ice Load on TMA's

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 = $WT_{TMA} := 11$ 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 = $F_{TMA} := qz_{Ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAF} = 16$ lbs

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

Total TMA Wind Force = $F_{TMA} := qz_{Ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{TMAS} = 7$ lbs

Wind Load (with ice)

Surface Area for One TMA w/ Ice = $SA_{ICETMAF} := \frac{(L_{TMA} + 2 \cdot t_{iz}) \cdot (W_{TMA} + 2 \cdot t_{iz})}{144} = 0.8$ sf

Total TMA Wind Force w/ Ice = $Fi_{TMA} := qz_{ice.Ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAF} = 9$ 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 = $Fi_{TMA} := qz_{ice.Ant} \cdot G_H \cdot Ca_{TMA} \cdot K_a \cdot SA_{ICETMAS} = 6$ lbs

Gravity Load (without ice)

Weight of All TMAs = $WT_{TMA} \cdot N_{TMA} = 11$ 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 = $V_{ice} := (L_{TMA} + 2 \cdot t_{iz})(W_{TMA} + 2 \cdot t_{iz}) \cdot (T_{TMA} + 2 \cdot t_{iz}) - V_{TMA} = 630$ cu in

Weight of Ice on Each TMA = $W_{ICETMA} := \frac{V_{ice}}{1728} \cdot Id = 20$ lbs

Weight of Ice on All TMAs = $W_{ICETMA} \cdot N_{TMA} = 20$ lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model = Ericsson 4449

RRUS Shape = Flat (User Input)

RRUS Height = $L_{RRUS} := 14.9$ in (User Input)

RRUS Width = $W_{RRUS} := 13.2$ in (User Input)

RRUS Thickness = $T_{RRUS} := 10.4$ in (User Input)

RRUS Weight = $WT_{RRUS} := 74$ lbs (User Input)

Number of RRUS's = $N_{RRUS} := 1$ (User Input)

RRUS Aspect Ratio = $Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.1$

RRUS Force Coefficient = $Ca_{RRUS} = 1.2$

Wind Load (without ice)

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

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

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

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

Wind Load (with ice)

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

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 22$ 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 = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 19$ lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

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

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2157$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 70$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 70$ lbs

Development of Wind & Ice Load on RRUS

RRUS Data:

RRUS Model = Ericsson 4415

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 = $T_{RRUS} := 5.4$ in (User Input)

RRUS Weight = $WT_{RRUS} := 47$ lbs (User Input)

Number of RRUS's = $N_{RRUS} := 1$ (User Input)

RRUS Aspect Ratio = $Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.1$

RRUS Force Coefficient = $Ca_{RRUS} = 1.2$

Wind Load (without ice)

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

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

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 0.6$ sf

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 22$ 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 = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 22$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.1$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 12$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 47$ lbs

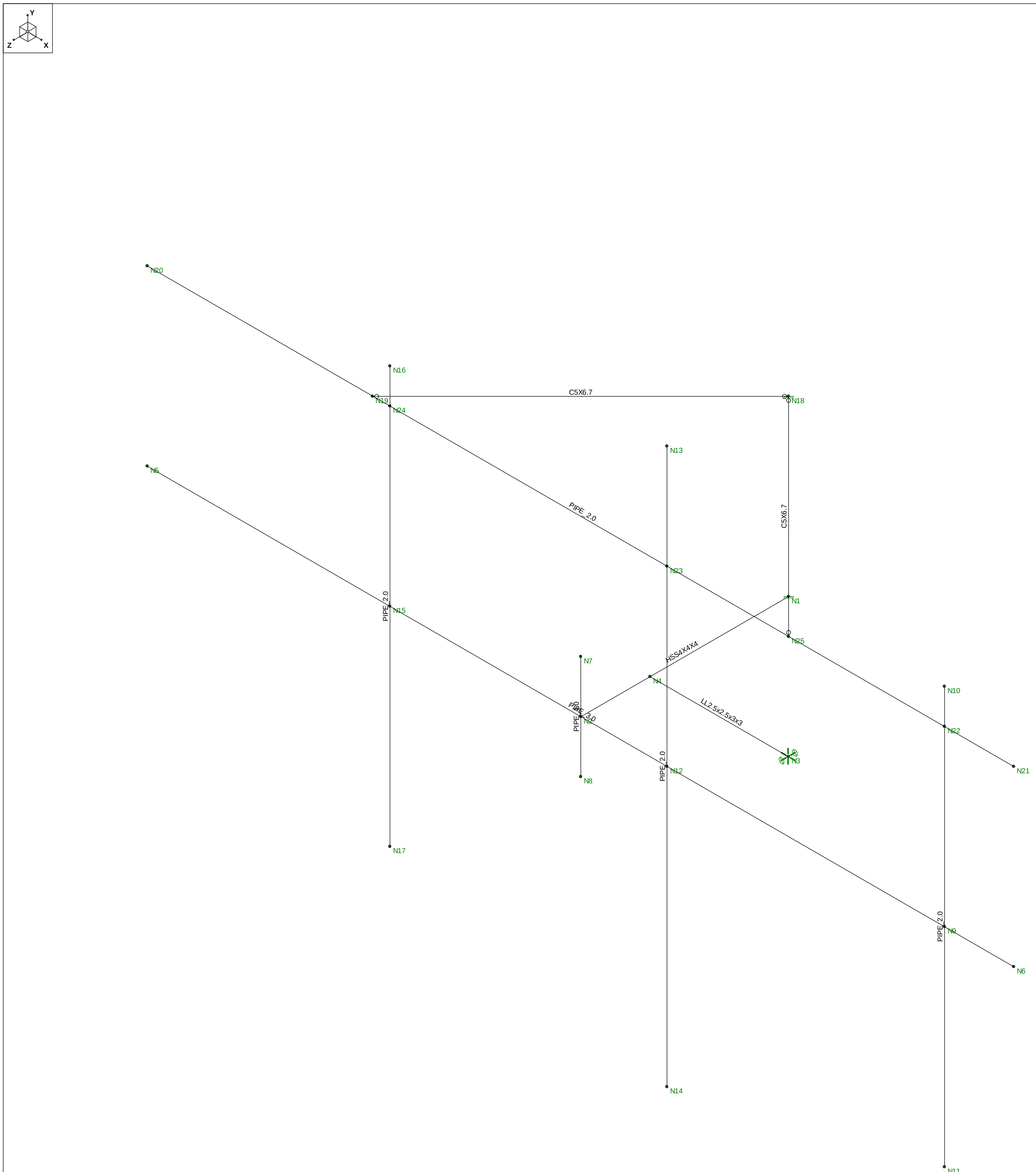
Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 1062$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 1619$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 52$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 52$ lbs



Envelope Only Solution

Centek	CTFF481B - Mount Member Framing	
TJL		July 28, 2020 at 7:55 AM
20074.61		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 (\...	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 Rul...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Outrigger	HSS4X4X4	Beam	Tube	A500 Gr.46	Typical	3.37	7.8	7.8	12.8
2	Horz	PIPE_3.0	Beam	Pipe	A53 Grade B	Typical	2.07	2.85	2.85	5.69
3	Antenna Mast	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	Support	LL2.5x2.5x3x3	Beam	Tube	A36 Gr.36	Typical	1.8	2.46	1.07	.023
5	Vert	PIPE_4.0	Column	Pipe	A53 Grade B	Typical	2.96	6.82	6.82	13.6
6	Stablizer Horz.	PIPE_2.0	Beam	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
7	Stablizer	C5X6.7	Beam	Pipe	A36 Gr.36	Typical	1.97	.47	7.48	.055

Hot Rolled Steel Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
1	M1	Outrigger	3			Lbyy						Lateral
2	M2	Horz	12.5			Lbyy						Lateral
3	M3	Vert	1.5			Lbyy						Lateral
4	M4	Support	2.828			Lbyy						Lateral
5	M5	Antenna Mast	6			Lbyy						Lateral
6	M6	Antenna Mast	8			Lbyy						Lateral
7	M7	Antenna Mast	6			Lbyy						Lateral
8	M8	Stablizer Horz.	12.5			Lbyy						Lateral
9	M9	Stablizer	4.243			Lbyy						Lateral
10	M10	Stablizer	4.243			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(d...	Section/Shape	Type	Design List	Material	Design Rul...
1	M1	N1	N2			Outrigger	Beam	Tube	A500 Gr....	Typical
2	M2	N5	N6			Horz	Beam	Pipe	A53 Gra...	Typical
3	M3	N7	N8			Vert	Column	Pipe	A53 Gra...	Typical
4	M4	N4	N3			Support	Beam	Tube	A36 Gr.36	Typical
5	M5	N11	N10			Antenna Mast	Column	Pipe	A53 Gra...	Typical
6	M6	N14	N13			Antenna Mast	Column	Pipe	A53 Gra...	Typical
7	M7	N17	N16			Antenna Mast	Column	Pipe	A53 Gra...	Typical
8	M8	N20	N21			Stablizer Horz.	Beam	Pipe	A53 Gra...	Typical
9	M9	N19	N18			Stablizer	Beam	Pipe	A36 Gr.36	Typical
10	M10	N18	N25			Stablizer	Beam	Pipe	A36 Gr.36	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	0	0	3	0	
3	N3	0	-2	0	0	
4	N4	0	0	2	0	
5	N5	-6.25	0	3	0	
6	N6	6.25	0	3	0	
7	N7	0	.75	3	0	
8	N8	0	-.75	3	0	
9	N9	5.25	0	3	0	
10	N10	5.25	3	3	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Dia...
11	N11	5.25	-3	3	0	
12	N12	1.25	0	3	0	
13	N13	1.25	4	3	0	
14	N14	1.25	-4	3	0	
15	N15	-2.75	0	3	0	
16	N16	-2.75	3	3	0	
17	N17	-2.75	-3	3	0	
18	N18	0	2.5	0	0	
19	N19	-3	2.5	3	0	
20	N20	-6.25	2.5	3	0	
21	N21	6.25	2.5	3	0	
22	N22	5.25	2.5	3	0	
23	N23	1.25	2.5	3	0	
24	N24	-2.75	2.5	3	0	
25	N25	3	2.5	3	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	N3	Reaction	Reaction	Reaction			Reaction
3	N18	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Point Loads (BLC 2 : Equipment Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.067	1
2	M7	Y	-.052	2
3	M5	Y	-.067	5
4	M7	Y	-.052	5
5	M6	Y	-.077	1
6	M6	Y	-.077	7
7	M6	Y	-.074	5
8	M2	Y	-.011	10
9	M6	Y	-.047	2
10	M8	Y	-.011	10

Member Point Loads (BLC 3 : Ice Weight)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Y	-.089	1
2	M7	Y	-.075	2
3	M5	Y	-.089	5
4	M7	Y	-.075	5
5	M6	Y	-.21	1
6	M6	Y	-.21	7
7	M6	Y	-.07	5
8	M2	Y	-.02	10
9	M6	Y	-.052	2
10	M8	Y	-.02	10

Member Point Loads (BLC 4 : Wind w/ Ice X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.029	1
2	M7	X	.016	2
3	M5	X	.029	5
4	M7	X	.016	5
5	M6	X	.047	1
6	M6	X	.047	7
7	M6	X	.019	5
8	M2	X	.006	10
9	M6	X	.012	2
10	M8	X	.006	10

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	X	.073	1
2	M7	X	.038	2
3	M5	X	.073	5
4	M7	X	.038	5
5	M6	X	.122	1
6	M6	X	.122	7
7	M6	X	.043	5
8	M2	X	.007	10
9	M6	X	.022	2
10	M8	X	.007	10

Member Point Loads (BLC 6 : Wind w/ Ice Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	.039	1
2	M7	Z	.032	2
3	M5	Z	.039	5
4	M7	Z	.032	5
5	M6	Z	.106	1
6	M6	Z	.106	7
7	M2	Z	.09	10
8	M8	Z	.09	10

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M5	Z	.108	1
2	M7	Z	.094	2
3	M5	Z	.108	5
4	M7	Z	.094	5
5	M6	Z	.335	1
6	M6	Z	.335	7
7	M2	Z	.016	10
8	M8	Z	.016	10

Member Distributed Loads (BLC 4 : Wind w/ Ice X)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.002	.002	0	0
2	M3	X	.002	.002	0	0
3	M4	X	.002	.002	0	0
4	M7	X	.002	.002	0	0
5	M6	X	.002	.002	0	0
6	M5	X	.002	.002	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.008	.008	0	0
2	M3	X	.008	.008	0	0
3	M4	X	.008	.008	0	0
4	M7	X	.008	.008	0	0
5	M6	X	.008	.008	0	0
6	M5	X	.008	.008	0	0

Member Distributed Loads (BLC 6 : Wind w/ Ice Z)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M2	Z	.002	.002	0	0
2	M3	Z	.002	.002	0	0
3	M4	Z	.002	.002	0	0
4	M8	Z	.002	.002	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M2	Z	.008	.008	0	0
2	M3	Z	.008	.008	0	0
3	M4	Z	.008	.008	0	0
4	M8	Z	.008	.008	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	DL		-1						
2	Equipment Weight	None					10			
3	Ice Weight	None					10			
4	Wind w/ Ice X	None					10	6		
5	Wind X	None					10	6		
6	Wind w/ Ice Z	None					8	4		
7	Wind Z	None					8	4		

Load Combinations

	Description	Solve	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
1	1.2D + 1.6W (X-direc...	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W (X-direc...	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														

Load Combinations (Continued)

	Description	Solve	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
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	.567	4	.568	5	-1.032	2	.208	3	2.506	4	1.1	3
2		min	-1.295	2	-.807	3	-2.779	6	-.372	5	-3.525	2	.047	5
3	N3	max	.271	3	2.712	3	2.781	3	0	6	0	6	.001	4
4		min	-.133	5	.18	5	.131	5	0	1	0	1	-.001	2
5	N18	max	-.11	2	.037	6	-.039	2	.003	6	0	6	.01	3
6		min	-.495	6	.026	5	-.861	4	0	2	0	1	0	5
7	Totals:	max	0	6	1.941	6	0	3						
8		min	-1.222	1	.774	2	-2.145	4						

Envelope Joint Displacements

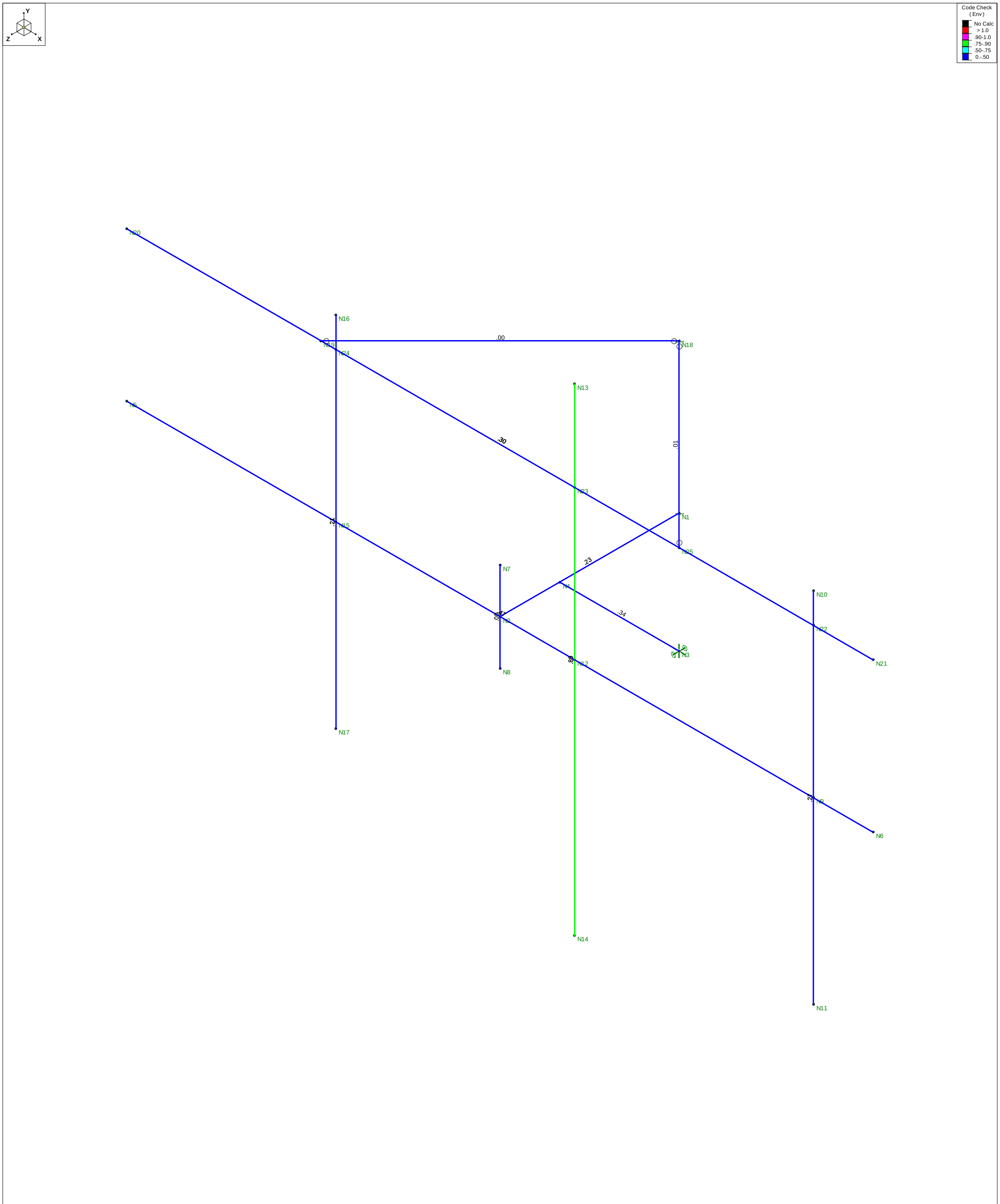
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotatio...	LC
1	N1	max	0	6	0	6	0	6	0	6	0	6	0	6
2		min	0	1	0	1	0	1	0	1	0	1	0	1
3	N2	max	.102	1	.007	5	0	6	1.497e-03	3	4.329e-03	1	1.256e-04	5
4		min	-.086	5	-.023	3	0	2	-1.21e-03	5	-4.264e-03	5	-3.878e-03	3
5	N3	max	0	6	0	6	0	6	2.169e-04	5	1.33e-03	2	0	6
6		min	0	1	0	1	0	1	-2.645e-04	3	-1.415e-03	6	0	1
7	N4	max	.053	1	0	5	0	6	9.679e-04	3	3.584e-03	1	-9.407e-05	5
8		min	-.042	5	-.005	3	0	2	-3.004e-04	5	-3.106e-03	5	-2.219e-03	3
9	N5	max	.102	1	.218	3	.359	1	2.399e-03	3	4.869e-03	1	2.08e-03	5
10		min	-.086	5	-.123	5	-.174	5	-1.711e-03	5	-1.896e-03	5	-3.193e-03	3
11	N6	max	.102	1	.008	5	.742	5	-3.44e-04	2	5.448e-03	1	5.094e-04	5
12		min	-.087	5	-.601	3	-.39	1	-7.762e-03	4	-1.168e-02	5	-7.718e-03	3
13	N7	max	.116	1	.007	5	.014	3	1.497e-03	3	4.329e-03	1	1.256e-04	5
14		min	-.087	5	-.023	3	-.01	5	-1.209e-03	5	-4.264e-03	5	-3.878e-03	3
15	N8	max	.091	2	.007	5	.012	5	1.497e-03	3	4.329e-03	1	1.256e-04	5
16		min	-.088	4	-.023	3	-.013	3	-1.211e-03	5	-4.264e-03	5	-3.878e-03	3
17	N9	max	.102	1	.002	5	.602	5	-3.44e-04	2	5.448e-03	1	5.117e-04	5
18		min	-.087	5	-.509	3	-.324	1	-7.762e-03	4	-1.167e-02	5	-7.715e-03	3
19	N10	max	.235	1	.002	5	.369	5	-9.228e-04	2	5.113e-03	1	1.279e-03	5
20		min	-.148	5	-.509	3	-.363	1	-5.858e-03	4	-1.138e-02	5	-6.222e-03	3
21	N11	max	.075	2	.002	5	.973	5	-3.434e-04	2	5.448e-03	1	5.109e-04	5
22		min	-.246	6	-.509	3	-.307	1	-1.116e-02	4	-1.167e-02	5	-7.022e-03	3
23	N12	max	.102	1	.005	5	.098	5	3.514e-04	3	4.946e-03	1	-8.336e-05	5
24		min	-.086	5	-.113	3	-.07	1	-5.225e-03	5	-7.955e-03	5	-7.068e-03	3
25	N13	max	.299	3	.005	5	.092	5	1.761e-03	5	6.003e-03	1	1.136e-03	5
26		min	-.161	5	-.114	3	-.104	3	-1.597e-03	3	-3.704e-03	5	-5.861e-03	3
27	N14	max	.395	2	.005	5	1.208	5	3.456e-04	3	4.946e-03	1	8.703e-03	2
28		min	-.313	6	-.114	3	-.081	1	-2.899e-02	5	-7.955e-03	5	-5.754e-03	6
29	N15	max	.102	1	.083	3	.154	1	2.399e-03	3	4.869e-03	1	1.981e-03	5
30		min	-.086	5	-.037	5	-.092	5	-1.711e-03	5	-2.095e-03	5	-3.325e-03	3
31	N16	max	.231	1	.083	3	.203	1	2.824e-03	3	5.64e-03	1	1.38e-03	5
32		min	-.148	5	-.037	5	-.135	5	-9.59e-04	5	-3.457e-03	5	-5.108e-03	3
33	N17	max	.072	2	.083	3	.118	2	2.391e-03	3	4.869e-03	1	1.978e-03	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
34		min	-.093	6	-.037	5	-.063	6	-2.452e-03	5	-2.095e-03	5	-3.146e-03	3
35	N18	max	0	6	0	6	0	6	0	6	0	6	0	6
36		min	0	1	0	1	0	1	0	1	0	1	0	1
37	N19	max	.213	1	.098	3	.213	1	2.814e-03	3	5.655e-03	1	1.425e-03	5
38		min	-.14	5	-.041	5	-.139	5	-9.559e-04	5	-3.342e-03	5	-5.034e-03	3
39	N20	max	.213	1	.287	3	.433	1	2.814e-03	3	5.655e-03	1	1.602e-03	5
40		min	-.14	5	-.102	5	-.248	5	-9.559e-04	5	-2.617e-03	5	-4.798e-03	3
41	N21	max	.214	1	.018	5	.539	5	-9.228e-04	2	5.113e-03	1	1.273e-03	5
42		min	-.14	5	-.584	3	-.417	1	-5.858e-03	4	-1.14e-02	5	-6.228e-03	3
43	N22	max	.214	1	.002	5	.402	5	-9.228e-04	2	5.113e-03	1	1.279e-03	5
44		min	-.14	5	-.509	3	-.356	1	-5.858e-03	4	-1.138e-02	5	-6.221e-03	3
45	N23	max	.213	1	.005	5	.061	5	1.097e-03	5	6.003e-03	1	1.135e-03	5
46		min	-.14	5	-.114	3	-.086	1	-1.718e-03	6	-3.704e-03	5	-5.782e-03	3
47	N24	max	.213	1	.083	3	.196	1	2.824e-03	3	5.64e-03	1	1.38e-03	5
48		min	-.14	5	-.037	5	-.129	5	-9.59e-04	5	-3.457e-03	5	-5.107e-03	3
49	N25	max	.214	1	.004	5	.142	5	-6.823e-04	2	5.752e-03	1	-6.634e-04	5
50		min	-.14	5	-.283	3	-.213	1	-2.684e-03	6	-6.102e-03	5	-9.261e-03	3

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

	Member	Shape	Code Check	Lo...	LC	She...	Lo...	...	...	phi*P...	phi*P...	phi*...	phi*...	Cb	Eqn
1	M6	PIPE_2.0	.891	4	4	.161	6.5		4	14.916	32.13	1.872	1.872	1.6...	H1-...
2	M2	PIPE_3.0	.474	6.25	4	.345	6.25		4	28.251	65.205	5.749	5.749	1.8...	H3-6
3	M4	LL2.5x2.5x3x3	.337	0	3	.016	0	z	1	44.646	58.32	3.954	1.593	1.6...	H1-...
4	M8	PIPE_2.0	.301	9....	4	.143	9....		4	6.295	32.13	1.872	1.872	4.41	H1-...
5	M5	PIPE_2.0	.273	3	6	.054	5....		6	20.867	32.13	1.872	1.872	1.8...	H1-...
6	M1	HSS4X4X4	.229	0	1	.169	2	y	3	134....	139....	16.181	16.181	1.5...	H1-...
7	M7	PIPE_2.0	.212	3	3	.068	3		3	20.867	32.13	1.872	1.872	1.8...	H1-...
8	M10	C5X6.7	.009	2....	4	.030	0	y	3	36.026	63.828	1.604	9.585	1.1...	H1-...
9	M9	C5X6.7	.004	0	3	.021	0	y	3	36.026	63.828	1.604	9.585	1.1...	H1-...
10	M3	PIPE_4.0	.000	.75	1	.000	.75		1	92.571	93.24	10.631	10.631	1.5...	H1-...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek	CTFF481B - Mount	
TJL	Unity Check	July 28, 2020 at 7:55 AM
20074.61		Mount.r3d

EBI Consulting

environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTFF481B

Police Sta Edison Rd
158 Edison Road
Trumbull, Connecticut 06611

August 7, 2020

EBI Project Number: 6220003720

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**18.04%**

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

EBI Consulting

environmental | engineering | due diligence

August 7, 2020

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

Emissions Analysis for Site: CTFF481B - Police Sta Edison Rd

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **158 Edison Road** in **Trumbull, 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 97-01and ANSI/IEEE Std C95.1. The FCC regulates Maximum Permissible Exposure in units of microwatts per square centimeter ($\mu W/cm^2$). The number of $\mu W/cm^2$ calculated at each sample point is called the power density. The exposure limit for power density varies depending upon the frequencies being utilized. Wireless Carriers and Paging Services use different frequency bands each with different exposure limits; therefore, it is necessary to report results and limits in terms of percent MPE rather than power density.

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

General population/uncontrolled exposure limits apply to situations in which the general 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 ($\mu W/cm^2$). The general population exposure limits for the 600 MHz and 700 MHz frequency bands are approximately 400 $\mu W/cm^2$ and 467 $\mu W/cm^2$, respectively. The general population exposure limit for the 1900 MHz (PCS), 2100 MHz (AWS) and 11 GHz frequency bands is 1000 $\mu W/cm^2$. Because each carrier will be using different frequency bands, and each frequency band has different exposure limits, it is necessary to report percent of MPE rather than power density.

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 158 Edison Road in Trumbull, 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 channels (600 MHz Band) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.
2) 1 NR channel (600 MHz Band) was considered for each sector of the proposed installation. This Channel has a transmit power of 80 Watts.
3) 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.
4) 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.
5) 4 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.

6) 2 UMTS channels (AWS Band - 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 30 Watts per Channel.

7) 2 LTE channels (AWS Band – 2100 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

8) 2 LTE channels (BRS Band - 2500 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

9) 2 NR channels (BRS Band - 2500 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 40 Watts per Channel.

10) 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.

11) 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.

12) The antennas used in this modeling are the Ericsson AIR 32 for the 2100 MHz / 1900 MHz / 1900 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR6449 B41 for the 2500 MHz / 2500 MHz channel(s) in Sector A, the Ericsson AIR 32 for the 2100 MHz / 1900 MHz / 1900 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR6449 B41 for the 2500 MHz / 2500 MHz channel(s) in Sector B, the Ericsson AIR 32 for the 2100 MHz / 1900 MHz / 1900 MHz channel(s), the RFS APXVAARR24_43-U-NA20 for the 700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR6449 B41 for the 2500 MHz / 2500 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.

13) The antenna mounting height centerline of the proposed antennas is 120 feet above ground level (AGL).

14) 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.

15) All calculations were done with respect to uncontrolled / general population threshold limits.

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	**1**	Antenna #:	**1**	Antenna #:	**1**
Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32
Frequency Bands:	2100 MHz / 1900 MHz / 1900 MHz	Frequency Bands:	2100 MHz / 1900 MHz / 1900 MHz	Frequency Bands:	2100 MHz / 1900 MHz / 1900 MHz
Gain:	15.85 dBd / 15.35 dBd / 15.35 dBd	Gain:	15.85 dBd / 15.35 dBd / 15.35 dBd	Gain:	15.85 dBd / 15.35 dBd / 15.35 dBd
Height (AGL):	120 feet	Height (AGL):	120 feet	Height (AGL):	120 feet
Channel Count:	8	Channel Count:	8	Channel Count:	8
Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts
ERP (W):	12,841.53	ERP (W):	12,841.53	ERP (W):	12,841.53
Antenna A1 MPE %:	**3.21%**	Antenna B1 MPE %:	**3.21%**	Antenna C1 MPE %:	**3.21%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20	Make / Model:	RFS APXVAARR24_43-U-NA20
Frequency Bands:	700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	700 MHz / 600 MHz / 600 MHz / 1900 MHz / 2100 MHz
Gain:	13.35 dBd / 12.95 dBd / 12.95 dBd / 15.65 dBd / 16.35 dBd	Gain:	13.35 dBd / 12.95 dBd / 12.95 dBd / 15.65 dBd / 16.35 dBd	Gain:	13.35 dBd / 12.95 dBd / 12.95 dBd / 15.65 dBd / 16.35 dBd
Height (AGL):	120 feet	Height (AGL):	120 feet	Height (AGL):	120 feet
Channel Count:	9	Channel Count:	9	Channel Count:	9
Total TX Power (W):	380 Watts	Total TX Power (W):	380 Watts	Total TX Power (W):	380 Watts
ERP (W):	11,055.53	ERP (W):	11,055.53	ERP (W):	11,055.53
Antenna A2 MPE %:	**4.16%**	Antenna B2 MPE %:	**4.16%**	Antenna C2 MPE %:	**4.16%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Ericsson AIR6449 B41	Make / Model:	Ericsson AIR6449 B41	Make / Model:	Ericsson AIR6449 B41
Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz
Gain:	22.05 dBd / 22.05 dBd	Gain:	22.05 dBd / 22.05 dBd	Gain:	22.05 dBd / 22.05 dBd
Height (AGL):	120 feet	Height (AGL):	120 feet	Height (AGL):	120 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	160 Watts	Total TX Power (W):	160 Watts	Total TX Power (W):	160 Watts
ERP (W):	25,651.93	ERP (W):	25,651.93	ERP (W):	25,651.93
Antenna A3 MPE %:	**6.40%**	Antenna B3 MPE %:	**6.40%**	Antenna C3 MPE %:	**6.40%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	13.77%
Verizon	3.53%
Trumbull PD	0.74%
Site Total MPE % :	18.04%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	13.77%
T-Mobile Sector B Total:	13.77%
T-Mobile Sector C Total:	13.77%
Site Total MPE % :	18.04%

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 (µW/cm²)	Frequency (MHz)	Allowable MPE (µW/cm²)	Calculated % MPE
T-Mobile 2100 MHz LTE	2	2307.55	120.0	11.52	2100 MHz LTE	1000	1.15%
T-Mobile 1900 MHz LTE	2	2056.61	120.0	10.27	1900 MHz LTE	1000	1.03%
T-Mobile 1900 MHz GSM	4	1028.30	120.0	10.27	1900 MHz GSM	1000	1.03%
T-Mobile 700 MHz LTE	2	648.82	120.0	3.24	700 MHz LTE	467	0.69%
T-Mobile 600 MHz LTE	2	591.73	120.0	2.95	600 MHz LTE	400	0.74%
T-Mobile 600 MHz NR	1	1577.94	120.0	3.94	600 MHz NR	400	0.98%
T-Mobile 1900 MHz LTE	2	2203.69	120.0	11.00	1900 MHz LTE	1000	1.10%
T-Mobile 2100 MHz UMTS	2	1294.56	120.0	6.46	2100 MHz UMTS	1000	0.65%
T-Mobile 2500 MHz LTE	2	6412.98	120.0	32.02	2500 MHz LTE	1000	3.20%
T-Mobile 2500 MHz NR	2	6412.98	120.0	32.02	2500 MHz NR	1000	3.20%
						Total:	**13.77%**

• NOTE: Totals may vary by approximately 0.01% due to summation of remainders in calculations.

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:	13.77%
Sector B:	13.77%
Sector C:	13.77%
T-Mobile Maximum MPE % (Sector A):	13.77%
Site Total:	18.04%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **18.04%** 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.