10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

Transcend Wireless

December 10, 2021

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

RE: Notice of Exempt Modification
130 Vernon Road, Bolton, CT 06043
Latitude: 41.80264800
Longitude: -72.44121300
T-Mobile Site#: CT11580A - Sprint Consolidation Project

Dear Ms. Bachman:

T-Mobile currently maintains nine (9) antennas at the 130-foot level of the existing 153-foot Guyed Tower at 130 Vernon Road, Bolton, Connecticut. The 153-foot Guyed Tower and property is owned and operated by Mountaintop Enterprises Inc. T-Mobile and Sprint now intend to consolidate their space by removing all Sprint equipment (including antennas, cables, and ground equipment) and moving T-Mobile's antennas to the 148 foot level of the tower. T-mobile will have a total of nine (9) antennas at the 148 foot level. The new antennas support 5G services.

Planned Modifications:
Tower:
Remove
(6) Sprint Antennas
(12) Sprint RRHs
(1) Sprint Hybrid Cables

Install New:
(3) Commscope VV 65A R1 Antennas
(3) APXVAALL24 43-U-NA20 Antennas
(3) AIR6449 Antennas
(3) Ericsson Radio 4460 B25+B66
(3) Ericsson 4480 B71+B85
(3) 6/24 Hybrid Cables

Ground:
Install New:
(1) 6160 Cabinet and (1) B160 Battery Cabinet. Relocate existing generator to equipment platform.

To Be Removed:
All Sprint Ground Equipment

This facility was originally approved by the town of Bolton on September 4, 2001. A copy of this approval is attached. This approval did not come with conditions.

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 - Pamela Sawyer, Elected Official, and Michael D'Amato, Zoning Enforcement Officer, as well as the tower and property owner.

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

1. The proposed 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,

Eric Breun
Transcend Wireless
Cell: 201-658-7728
Email: ebreun@transcendwireless.com

Attachments
cc: Pamela Sawyer – as First Selectman of Bolton

Michael D'Amato - Zoning Enforcement Officer
Mountaintop Enterprises Inc. - Land Owner

ERIC BREUN
2016587728
10 INDUSTRIAL AVE
MAHWAH NJ 07430

1 LBS 1 OF 1

SHIP TO:
MICHAEL D'AMATO
222 BOLTON CENTER ROAD
BOLTON CT 06043

CT 061 9-01

UPS GROUND
TRACKING #: 1Z V25 742 03 9300 9622

BILLING: P/P

Reference #1: CT11580A

XOL 21.11.24 NV45 50.0A 12/2021*

ERIC BREUN
2016587728
10 INDUSTRIAL AVE
MAHWAH NJ 07430

1 LBS 1 OF 1

SHIP TO:
PAMELA SAWYER
222 BOLTON CENTER ROAD
BOLTON CT 06043

CT 061 9-01

UPS GROUND
TRACKING #: 1Z V25 742 03 9994 6822

BILLING: P/P

Reference #1: CT11580A

XOL 21.11.24 NV45 50.0A 12/2021*

Hello, your package has been delivered.

Delivery Date: Thursday, 12/09/2021

Delivery Time: 12:58 PM

Left At: OFFICE

Signed by: WATERS

TRANSCEND WIRELESS

Tracking Number:	1ZV257420393009622
Ship To:	MICHAEL D'AMATO 222 BOLTON CENTER ROAD BOLTON, CT 06043 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.0 LBS
Reference Number:	CT11580A

Hello, your package has been delivered.

Delivery Date: Thursday, 12/09/2021

Delivery Time: 12:58 PM

Left At: OFFICE

Signed by: WATERS

TRANSCEND WIRELESS

Tracking Number:	1ZV257420399946822
Ship To:	PAMELA SAWYER 222 BOLTON CENTER ROAD BOLTON, CT 06043 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.0 LBS
Reference Number:	CT11580A

Hello, your package has been delivered.

Delivery Date: Thursday, 12/09/2021

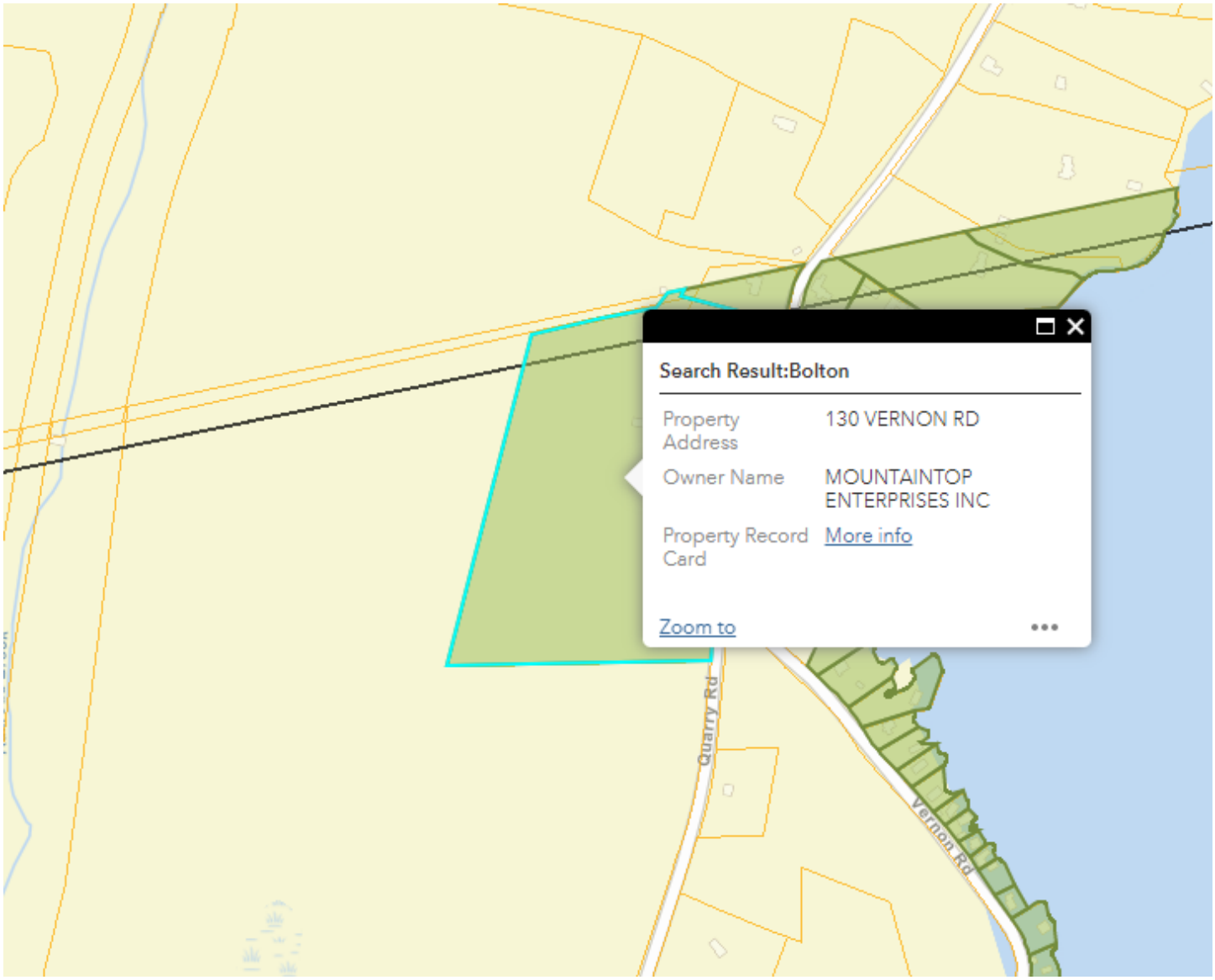
Delivery Time: 10:24 AM

Left At: OFFICE

Signed by: MARGARET

TRANSCEND WIRELESS

Tracking Number:	1ZV257420391863631
Ship To:	MOUNTAINTOP SERVICES INC 10 QUARRY ROAD SUITE C BOLTON, CT 06043 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.0 LBS
Reference Number:	CT11580A


Search Result:Bolton
Property Address
130 VERNON RD
Owner Name
MOUNTAINTOP ENTERPRISES INC
Property Record Card
More info
Zoom to
Quarry Rd
Vernon Rd

130 VERNON RD

Sales | Print | Map It

Location	130 VERNON RD	**Mblu**	02/ / 3/ /
Owner	MOUNTAINTOP ENTERPRISES INC	**Assessment**	$344,420
		Appraisal	$683,000
PID	1982	**Building Count**	1

Current Value

Appraisal	
Valuation Year	**Total**
2018	$683,000
Assessment	
Valuation Year	**Total**
2018	$344,420

Owner of Record

Owner	MOUNTAINTOP ENTERPRISES INC	**Sale Price**	$0
Co-Owner		**Certificate**	
Address	PO BOX 9219 BOLTON, CT 06043	**Book & Page**	166/656
		Sale Date	10/01/2014
		Instrument	24

Ownership History

Ownership History					
Owner	Sale Price	Certificate	Book & Page	Instrument	Sale Date
MOUNTAINTOP ENTERPRISES INC	$0		166/656	24	10/01/2014
MOUNTAINTOP ENTERPRISES INC	$0		0051/0920		01/30/1979

Building Information

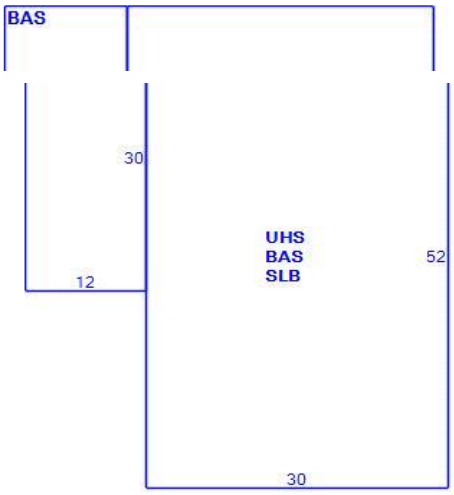
Building 1 : Section 1

Year Built: 1980
Living Area: 1,920
Building Percent Good: 76

Building Attributes	
Field	Description
STYLE	Equipment Garage
MODEL	Comm/Ind
Grade	D
Stories:	1.5
Occupancy	1.00
Exterior Wall 1	Board & Batten
Exterior Wall 2	
Roof Structure	Gable
Roof Cover	Metal
Interior Wall 1	Minimum
Interior Wall 2	
Interior Floor 1	Minimum
Interior Floor 2	
Heating Fuel	None
Heating Type	None
% Central Air	0
Frame Type	WOOD FRAME
Fin. Bsmt. Area	
Wall Height	8.00

Building Photo

Building Layout



Building Sub-Areas (sq ft)			Legend
Code	Description	Gross Area	Living Area
BAS	First Floor	1,920	1,920
SLB	Slab	1,560	0
UHS	Unfinished Half Story	1,560	0
		5,040	1,920

Land

Land Use

Zone R-3

Land Line Valuation

Size (Acres) 30.30
Depth
Assessed Value $297,220
Appraised Value $615,500

Outbuildings

Outbuildings					Legend
Code	Description	Sub Code	Sub Description	Size	Bldg #
SHD1	Shed	MS	Masonry	128.00 S.F.	1
SHD1	Shed	MS	Masonry	200.00 S.F.	1
BRN1	1 Story Barn	FR	Frame	4000.00 S.F.	1
CELL	Cell Tower			150.00 FEET	1
CELL	Cell Tower			200.00 FEET	1
SHD1	Shed	MS	Masonry	264.00 S.F.	1
SHD1	Shed	MS	Masonry	256.00 S.F.	1
SHD1	Shed	MS	Masonry	1144.00 S.F.	1

Valuation History

Appraisal	
Valuation Year	Total
2020	$683,000
2019	$683,000

Assessment	
Valuation Year	Total
2020	$344,420
2019	$344,420

TOWN OF BOLTON

222 Bolton Center Rd, Bolton, CT 06043

LAND USE DEPARTMENT PERMIT APPLICATION

15-21-9

PLEASE CONTACT THE LAND USE DEPARTMENT AT 649-8066 TO SCHEDULE INSPECTIONS OR FOR FINAL INSPECTION UPON COMPLETION TO ISSUE CERTIFICATE

1. PERMIT TYPE -- BUILDING ✓ ELECTRICAL_____ PLUMBING_____ HEATING_____
2. ADDRESS OF WORK 130 Vernon Road ZONE_____
3. PROPERTY OWNER Mountaintop Enterprises Inc.
   ADDRESS PO Box 9219, Bolton, CT 06043 TELEPHONE # 860 647 7772
4. APPLICANT Milton R. Hathaway
   ADDRESS PO Box 9219, Bolton, CT 06043 TELEPHONE # 860 647 7772

I hereby agree to conform to all the requirements of the Laws of the State of CT, the Ordinances of the Town of Bolton, all stipulations of this application, and to notify the Building Official of any alteration in the plans or specifications of the building for which this permit is asked. And agree that this building is to be located the proper distance from all street lines, side yard lines and required distances from all other zones and is located in a zone in which this building and its use is allowed. This permit expires one (1) year from date of approval.

Milton R Hathaway 8-31-01
APPLICANT DATE

Proof of Workers Compensation Coverage
I as owner or sole proprietor claim exemption and intend to not act as a general contractor or principal employer._____

Ronald Barbara 9/4/01
PERMIT APPROVED - DATE
BUILDING OFFICIAL

n/a
PLAN APPROVED - DATE
HEALTH DISTRICT/SANITARIAN

5. OTHER REQUIRED PERMIT APPLICATION(S) - TYPE Town of Bolton Zoning Permit
6. FLOODPLAIN: N ✓ Y DESCRIPTION
7. FEE SCHEDULE

ESTIMATED VALUE OF ALL WORK $ 90,000

Estimated Value	Fee
$ 1 - 1000	$20
each additional $1000 or fraction thereof	$12

(standard fees)

[redacted]

----- DRIVEWAY PERMIT FEE: $30
----- RETURNABLE DRIVEWAY PERMIT BOND: $1,000.00

SEP - 4 2001

TOTAL PERMIT FEE $ 1,088.00

150'

Sprint Now part of T-Mobile™

SPRINT ID: CT33XC550
SITE ID: CT11580A
130 VERNON RD
BOLTON, CT 06043

T-MOBILE A&L TEMPLATE (PROVIDED BY RFDS)
67E5998E_1xAIR+1OP+1QP

RAN TEMPLATE (PROVIDED BY RFDS)
67E5A998E 6160

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2017 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL CONSTRUCTION, PLUMBING, ELECTRICAL, AND HVAC. PERMITS SHALL BE PAID FOR BY THE RESPECTIVE SUBCONTRACTORS.
6. CONTRACTOR SHALL MAINTAIN A CURRENT SET OF DRAWINGS AND SPECIFICATIONS ON SITE AT ALL TIMES AND INSURE DISTRIBUTION OF NEW DRAWINGS TO SUBCONTRACTORS AND OTHER RELEVANT PARTIES AS SOON AS THEY ARE MADE AVAILABLE. ALL OLD DRAWINGS SHALL BE MARKED VOID AND REMOVED FROM THE CONTRACT AREA. THE CONTRACTOR SHALL FURNISH AN 'AS-BUILT' SET OF DRAWINGS TO OWNER UPON COMPLETION OF PROJECT.
7. LOCATION OF EQUIPMENT AND WORK SUPPLIED BY OTHERS THAT IS DIAGRAMMATICALLY INDICATED ON THE DRAWINGS, SHALL BE DETERMINED BY THE CONTRACTOR. THE CONTRACTOR SHALL DETERMINE LOCATIONS AND DIMENSIONS SUBJECT TO STRUCTURAL CONDITIONS AND WORK OF THE SUBCONTRACTORS.
8. THE CONTRACTOR IS SOLELY RESPONSIBLE TO DETERMINE CONSTRUCTION PROCEDURE AND SEQUENCE AND TO ENSURE THE SAFETY OF THE EXISTING STRUCTURES AND ITS COMPONENT PARTS DURING CONSTRUCTION. THIS INCLUDES THE ADDITION OF WHATEVER SHORING, BRACING, UNDERPINNING, ETC. THAT MAY BE NECESSARY.
9. DRAWINGS INDICATE THE MINIMUM STANDARDS, BUT IF ANY WORK SHOULD BE INDICATED TO BE SUBSTANDARD TO ANY ORDINANCES, LAWS, CODES, RULES, OR REGULATIONS BEARING ON THE WORK, THE CONTRACTOR SHALL INCLUDE IN HIS WORK AND SHALL EXECUTE THE WORK CORRECTLY IN ACCORDANCE WITH SUCH ORDINANCES, LAWS, CODES, RULES OR REGULATIONS WITH NO INCREASE IN COSTS.
10. ALL UTILITY WORK SHALL BE IN ACCORDANCE WITH LOCAL UTILITY COMPANY REQUIREMENTS AND SPECIFICATIONS.
11. ALL EQUIPMENT AND PRODUCTS PURCHASED ARE TO BE REVIEWED BY CONTRACTOR AND ALL APPLICABLE SUBCONTRACTORS FOR ANY CONDITION PER 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

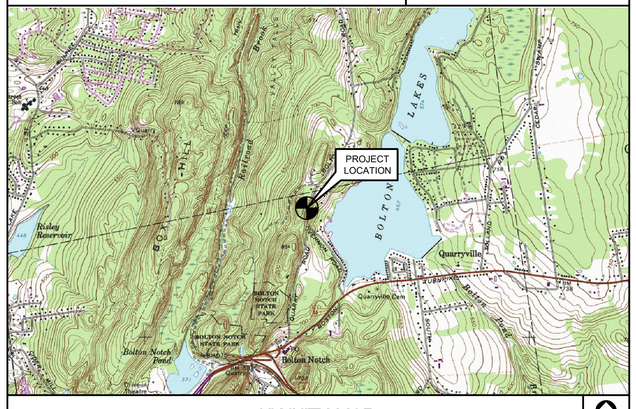
FROM: 35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

TO: 130 VERNON RD
BOLTON, CT 06043

1.	HEAD NORTHEAST TOWARD GRIFFIN RD S	0.01 MI.
2.	TURN LEFT ONTO GRIFFIN RD S	0.02 MI.
3.	TURN RIGHT ONTO DAY HILL RD	3.60 MI.
4.	USE THE RIGHT LANE TO MERGE ONTO I-91 S VIA THE RAMP TO HARTFORD	0.50 MI.
5.	MERGE ONTO I-91 S	3.50 MI.
6.	TAKE EXIT 35A FOR I-291 TOWARD MANCHESTER	0.60 MI.
7.	CONTINUE ONTO I-291 E	5.60 MI.
8.	USE THE LEFT LANE TO MERGE ONTO I-84 E TOWARD BOSTON	6.30 MI.
9.	TAKE EXIT 66 TOWARD BOLTON RD	0.40 MI.
10.	TURN LEFT ONTO CT-541	0.20 MI.
11.	TURN RIGHT AT THE 1ST CROSS STREET ONTO BOLTON RD	3.00 MI.
12.	DESTINATION IS ON THE RIGHT	

SITE COORDINATES: LATITUDE: 41°-48'-07.33" N
LONGITUDE: 72°-26'-28.22" W
GROUND ELEVATION: 810'± 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. RELOCATE EXISTING GENERATOR TO EQUIPMENT PLATFORM
2. REMOVE EXISTING SPRINT EQUIPMENT
3. INSTALL T-MOBILE POWER ENCLOSURE 6160
4. INSTALL T-MOBILE BATTERY CABINET B160
5. INSTALL (1) RADIO 4480 B71+B85 PER SECTOR. TOTAL (3)
6. INSTALL (1) RADIO 4460 B25+B66 PER SECTOR. TOTAL (3)
7. INSTALL (1) ERICSSON AIR6449 B41 ANTENNA PER SECTOR. TOTAL (3)
8. INSTALL (1) COMMSCOPE VV-65A-R1 ANTENNA PER SECTOR. TOTAL (3)
9. INSTALL (1) RFS APXVAALL24_43-U-NA20 ANTENNA PER SECTOR. TOTAL (3)
10. INSTALL 150A CIRCUIT BREAKER TO SERVE NEW EQUIPMENT

PROJECT INFORMATION

SPRINT ID:	CT33XC550
SITE ID:	CT11580A
SITE ADDRESS:	130 VERNON RD BOLTON, CT 06043
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	KYLE RICHERS TRANSCEND WIRELESS, LLC (908) 447-4716
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°-48'-07.33" N LONGITUDE: 72°-26'-28.22" W GROUND ELEVATION: 810'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/19/21	RTS	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT — CARLO F. CENTORE — No. 22538 — REGISTERED PROFESSIONAL ENGINEER

Sprint Now part of T-Mobile — Transcend Wireless

CENTEK engineering
Centered on Solutions℠
(203) 488-0580
(203) 488-8587 Fax
63-2 North Branford Road
Branford, CT 06405
www.CentekEng.com

T-MOBILE NORTHEAST LLC
SPRINT ID: CT33XC550
SITE ID: CT11580A
130 VERNON RDREET
BOLTON, CT 06043

DATE: 09/15/21
SCALE: AS NOTED
JOB NO. 21005.37

TITLE SHEET

T-1

Sheet No. 1 of 9

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: 97 MPH (Vasd)
  (EXPOSURE B/ 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

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13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ON-SITE SAFETY FROM THE TIME THE JOB IS AWARDED UNTIL ALL WORK IS COMPLETE AND ACCEPTED BY THE OWNER.
14. CONTRACTOR TO REVIEW ALL SHOP DRAWINGS AND SUBMIT COPY TO ENGINEER FOR APPROVAL. DRAWINGS MUST BEAR THE CHECKER'S INITIALS BEFORE SUBMITTING TO THE CONSTRUCTION MANAGER FOR REVIEW.
15. THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, ELEVATIONS, ANGLES, AND EXISTING CONDITIONS AT THE SITE, PRIOR TO FABRICATION AND/OR INSTALLATION OF ANY WORK IN THE CONTRACT AREA.
16. COORDINATION, LAYOUT, FURNISHING AND INSTALLATION OF CONDUIT AND ALL APPURTENANCES REQUIRED FOR PROPER INSTALLATION OF ELECTRICAL AND TELECOMMUNICATION SERVICE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
17. ALL DAMAGE CAUSED TO ANY EXISTING STRUCTURE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR WILL BE HELD LIABLE FOR ALL REPAIRS REQUIRED FOR EXISTING STRUCTURES IF DAMAGED DURING CONSTRUCTION ACTIVITIES.
18. THE CONTRACTOR SHALL CONTACT 'CALL BEFORE YOU DIG' AT LEAST 48 HOURS PRIOR TO ANY EXCAVATIONS AT 1-800-922-4455. ALL UTILITIES SHALL BE IDENTIFIED AND CLEARLY MARKED. CONTRACTOR SHALL MAINTAIN AND PROTECT MARKED UTILITIES THROUGHOUT PROJECT COMPLETION.
18. 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.
19. 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.
20. 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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SITE ID: CT11580A
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BOLTON, CT 06043

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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 (QTY)	(QTY) PROPOSED COAX (LENGTH)
A1	PROPOSED	RFS-APXVAALL24_43-U-NA20	95.9 x 24 x 8.5	148'	0°	(P) RADIO 4480 B71+B85 (1)		(1) 6/24 4AWG HYBRID CABLE (±220')
A2	PROPOSED	ERICSSON-AIR6449 B41	33.1 x 20.6 x 8.6	148'	0°			
A2	PROPOSED	COMMSCOPE VV-65A-R1	54.7 x 12.08 x 4.6	148'	0°	(P) RADIO 4460 B25+B66 (1)		
B1	PROPOSED	RFS-APXVAALL24_43-U-NA20	95.9 x 24 x 8.5	148'	100°	(P) RADIO 4480 B71+B85 (1)		(1) 6/24 4AWG HYBRID CABLE (±220')
B2	PROPOSED	ERICSSON-AIR6449 B41	33.1 x 20.6 x 8.6	148'	100°			
B3	PROPOSED	COMMSCOPE VV-65A-R1	54.7 x 12.08 x 4.6	148'	100°	(P) RADIO 4460 B25+B66 (1)		
C1	PROPOSED	RFS-APXVAALL24_43-U-NA20	95.9 x 24 x 8.5	148'	195°	(P) RADIO 4480 B71+B85 (1)		(1) 6/24 4AWG HYBRID CABLE (±220')
C2	PROPOSED	ERICSSON-AIR6449 B41	33.1 x 20.6 x 8.6	148'	195°			
C3	PROPOSED	COMMSCOPE VV-65A-R1	54.7 x 12.08 x 4.6	148'	195°	(P) RADIO 4460 B25+B66 (1)		

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

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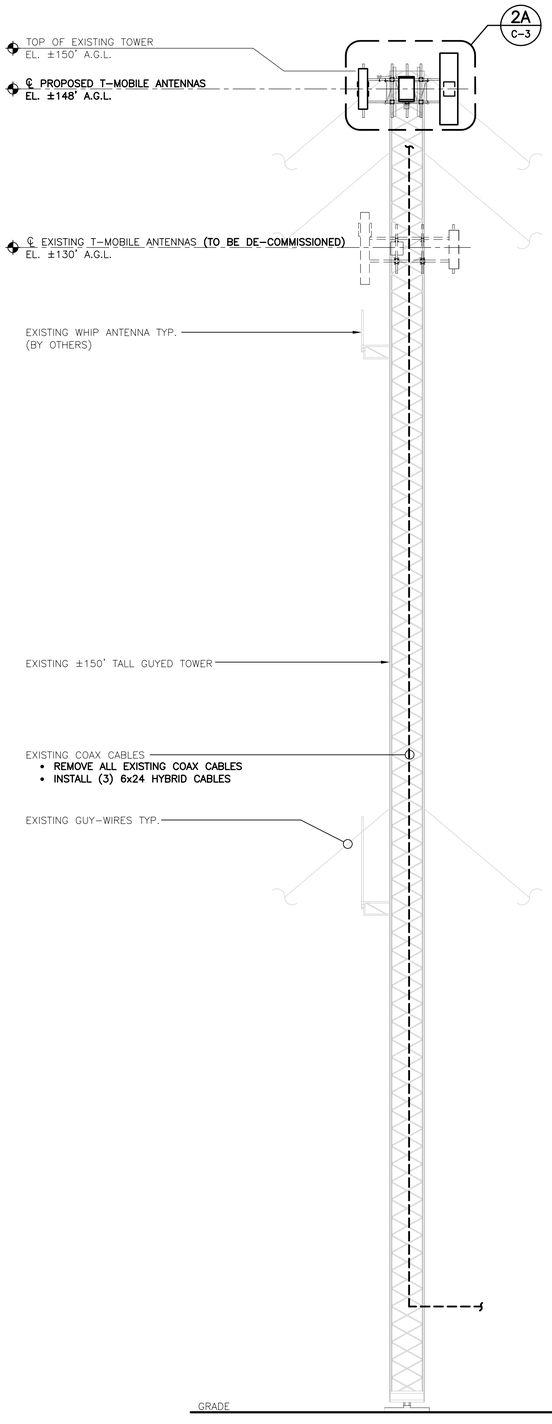
SITE LOCATION PLANS

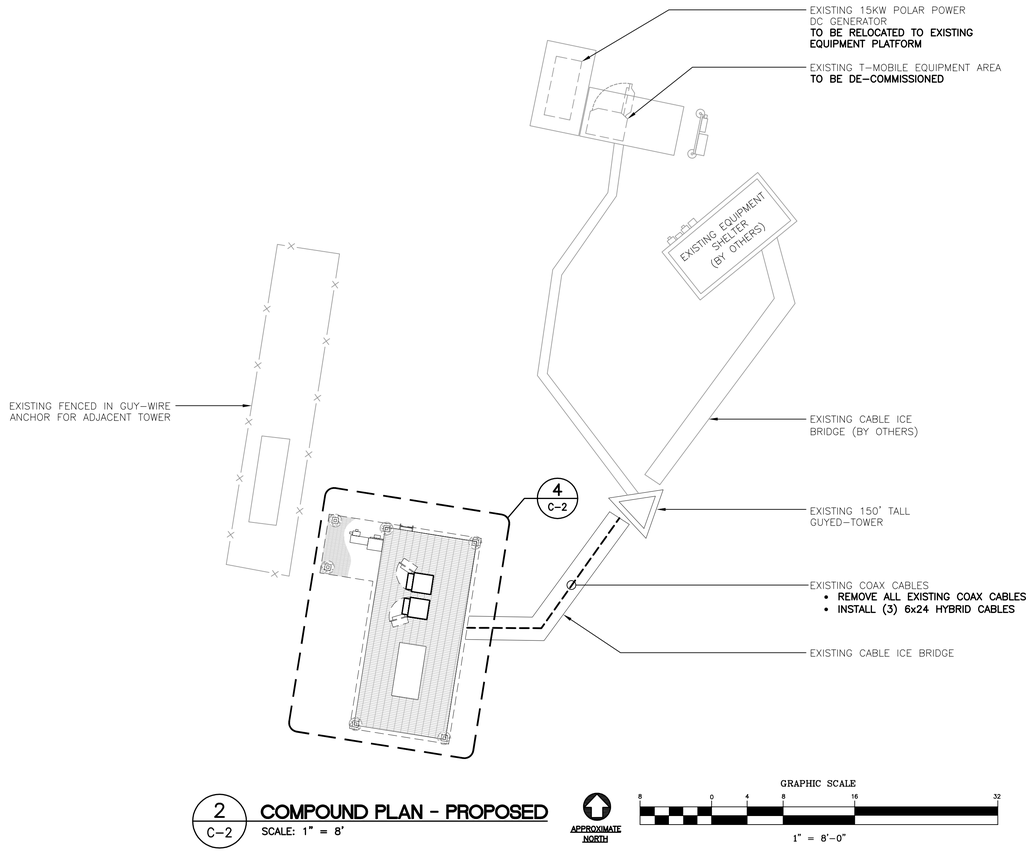
C-1

Sheet No. 3 of 9



1 C-2 **TOWER ELEVATION - PROPOSED**
SCALE: 1" = 8'

GRAPHIC SCALE
8 0 4 8 16 32
1" = 8'-0"



2 C-2 **COMPOUND PLAN - PROPOSED**
SCALE: 1" = 8'

APPROXIMATE NORTH

GRAPHIC SCALE
8 0 4 8 16 32
1" = 8'-0"

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.

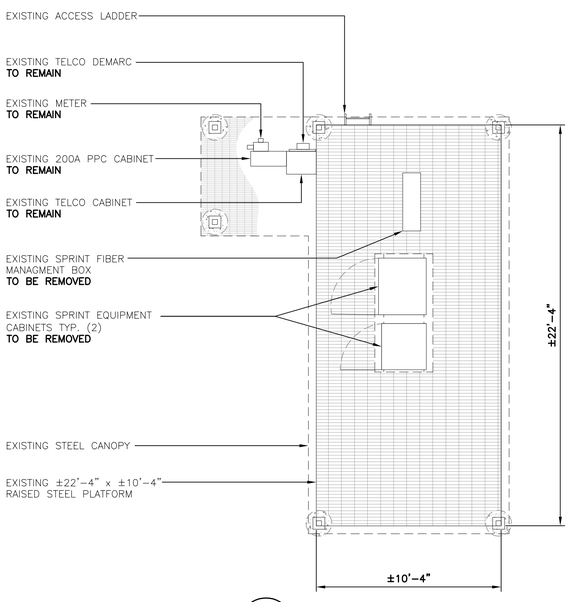
REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 21005.37) DATED 10/12/21 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

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.

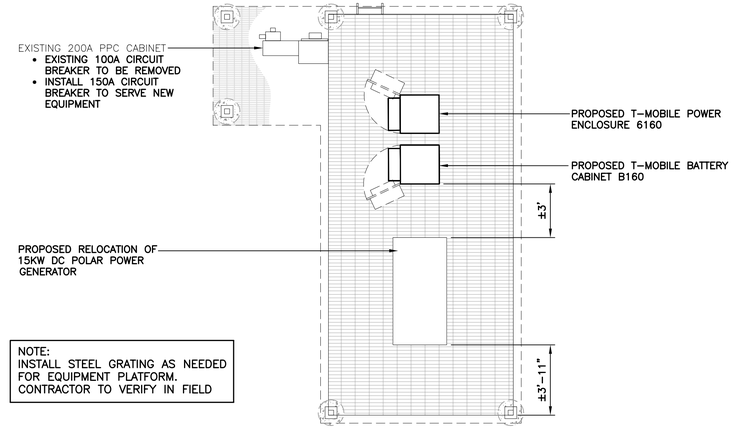
REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 21005.37) DATED 10/12/21 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

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.



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

APPROXIMATE NORTH



NOTE:
INSTALL STEEL GRATING AS NEEDED FOR EQUIPMENT PLATFORM. CONTRACTOR TO VERIFY IN FIELD

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

APPROXIMATE NORTH

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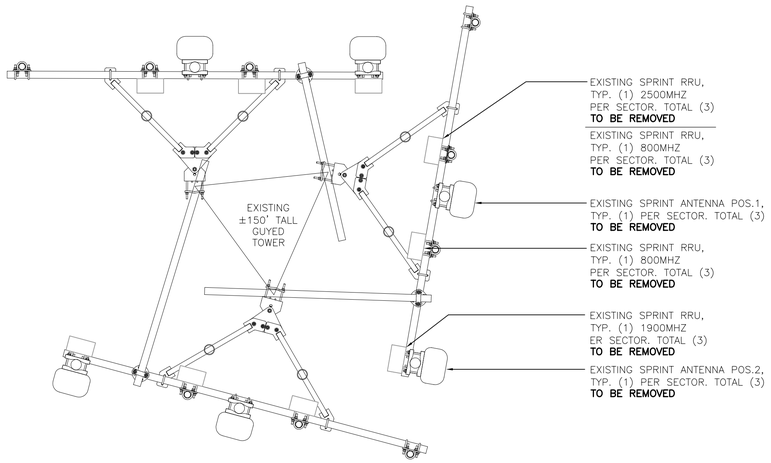
COMPOUND PLAN, TOWER ELEVATION, AND EQUIPMENT PLANS

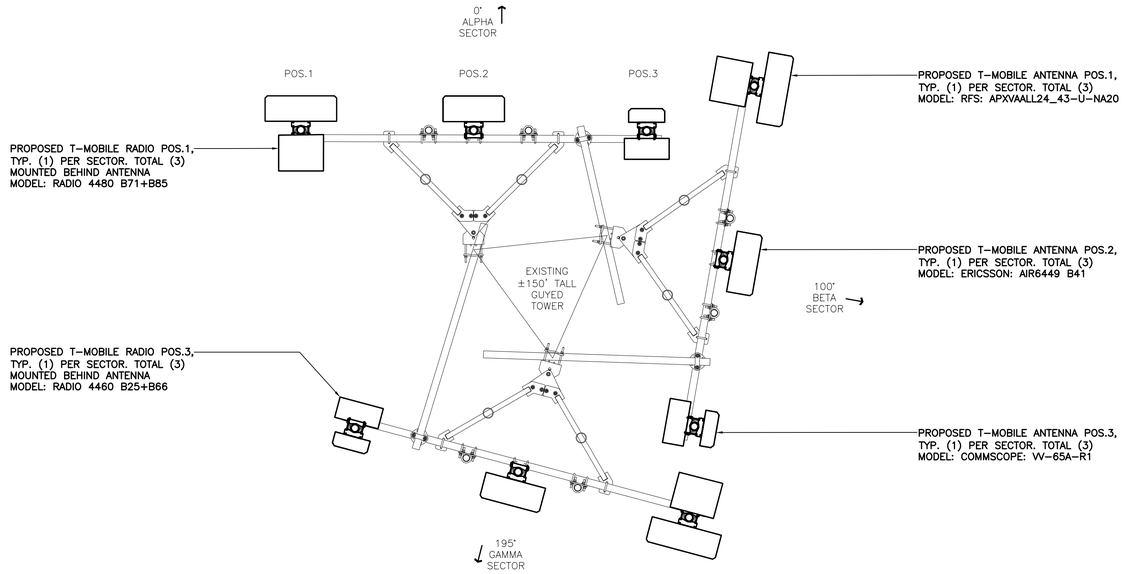
C-2

Sheet No. 4 of 9



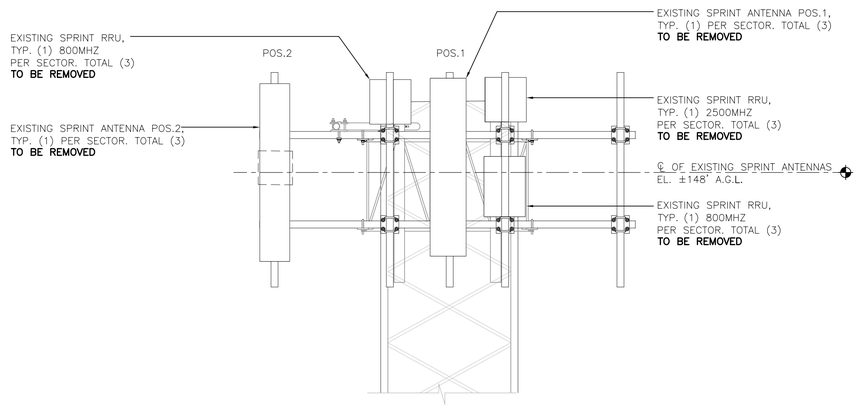
1 C-3 **ANTENNA PLAN - EXISTING**
SCALE: 1/2" = 1'

APPROXIMATE NORTH

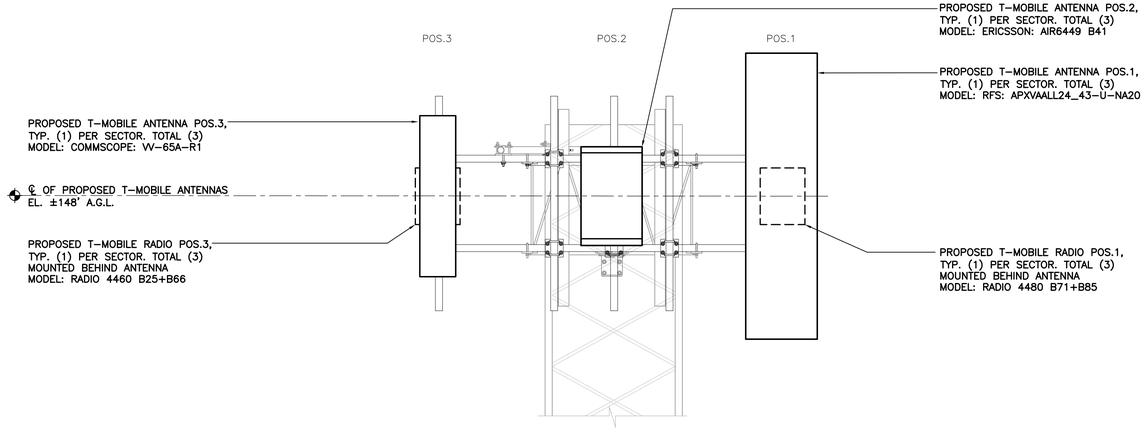


2 C-3 **ANTENNA PLAN - PROPOSED**
SCALE: 1/2" = 1'

APPROXIMATE NORTH



1A C-3 **ANTENNA ELEVATION - EXISTING**
SCALE: 1/2" = 1'



2A C-3 **ANTENNA ELEVATION - PROPOSED**
SCALE: 1/2" = 1'

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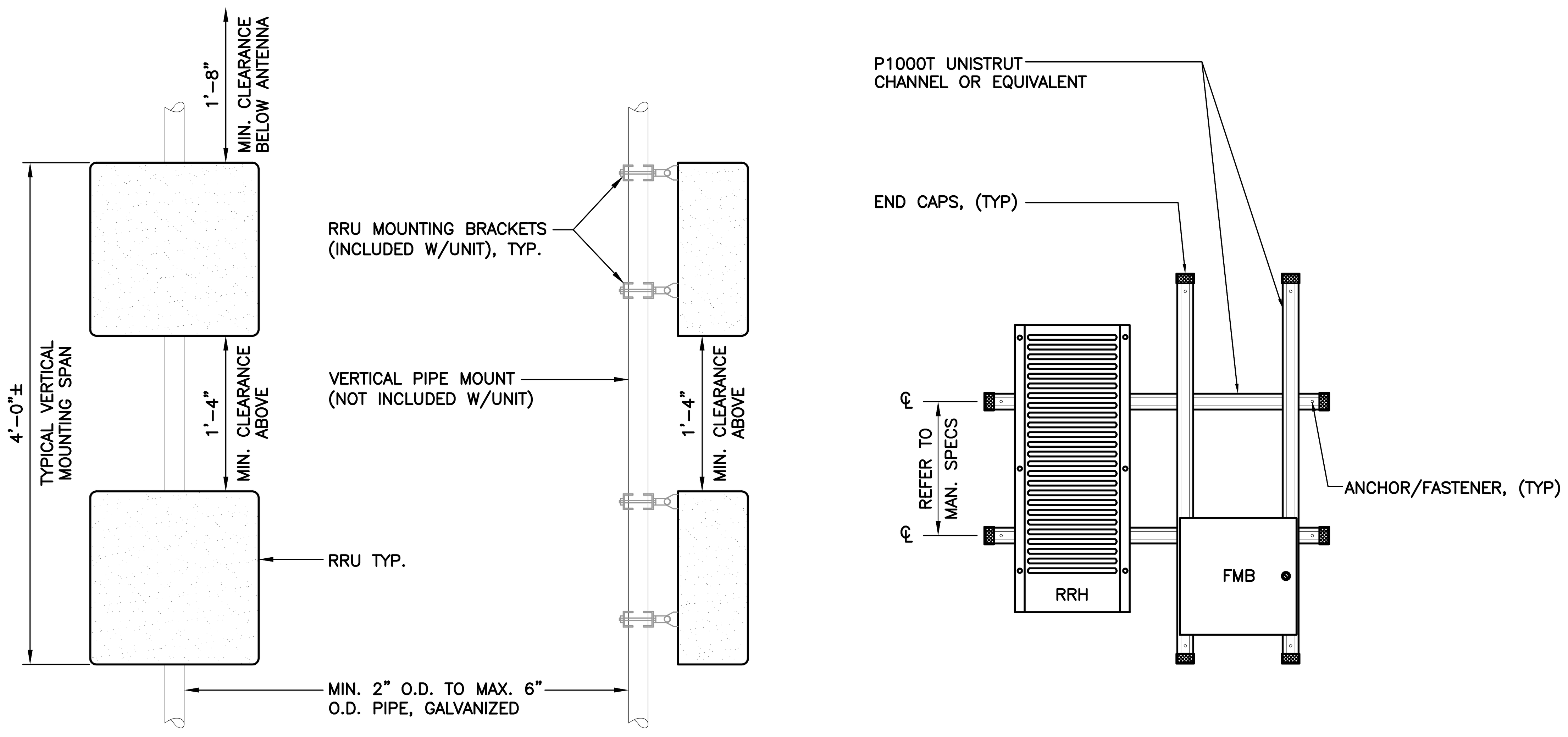
ANTENNA PLANS AND ELEVATIONS

C-3

Sheet No. 5 of 9



NOTES: (PIPE MOUNTING)

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

NOTES: (UNISTRUT MOUNTING)

1. INSTALL A MINIMUM OF (2) ANCHORS PER UNISTRUT (± 16"o/c MIN).
2. MOUNT RRU TO UNISTRUT WITH 3/8"ø UNISTRUT BOLTING HARDWARE AND SPRING NUTS. TYPICAL FOUR PER BRACKET.
3. NO PAINTING OF THE RRU OR SOLAR SHIELD IS ALLOWED.

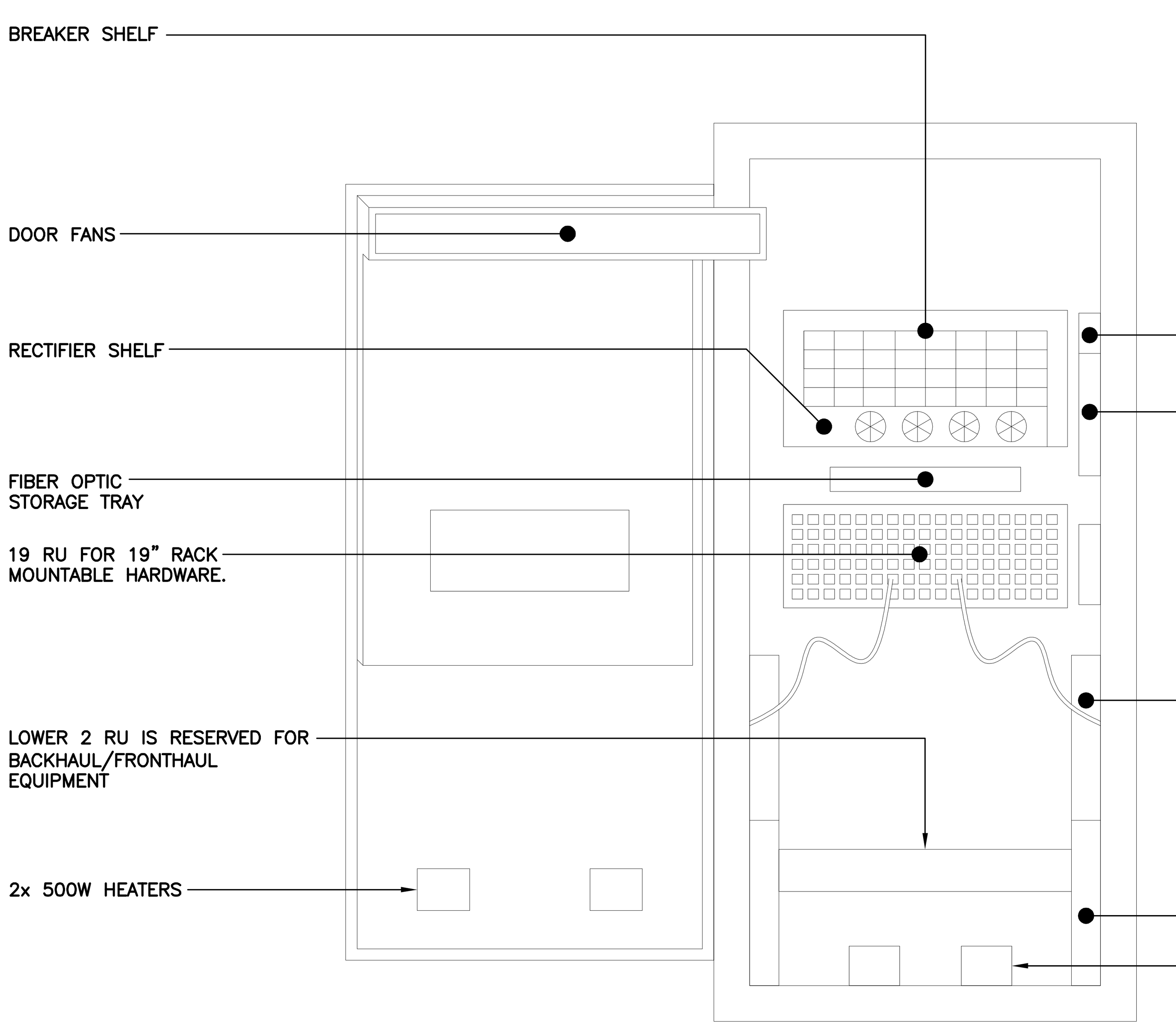
1 (C-4) TYPICAL RRU MOUNTING DETAILS
SCALE: NOT TO SCALE

RADIO 4460 B25+B66 RADIO 4480 B71+B85

RRU (REMOTE RADIO UNIT)			
EQUIPMENT	DIMENSIONS	WEIGHT	CLEARANCES
MAKE: ERICSSON MODEL: RADIO 4460 B25+B66	19.6"L x 15.7"W x 12.1"D	±109 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.
MAKE: ERICSSON MODEL: RADIO 4480 B71+B85	21.8"L x 15.7"W x 7.5"D	±84 LBS.	BEHIND ANT.: 8" MIN. BELOW ANT.: 20" MIN. BELOW RRU: 16" MIN.

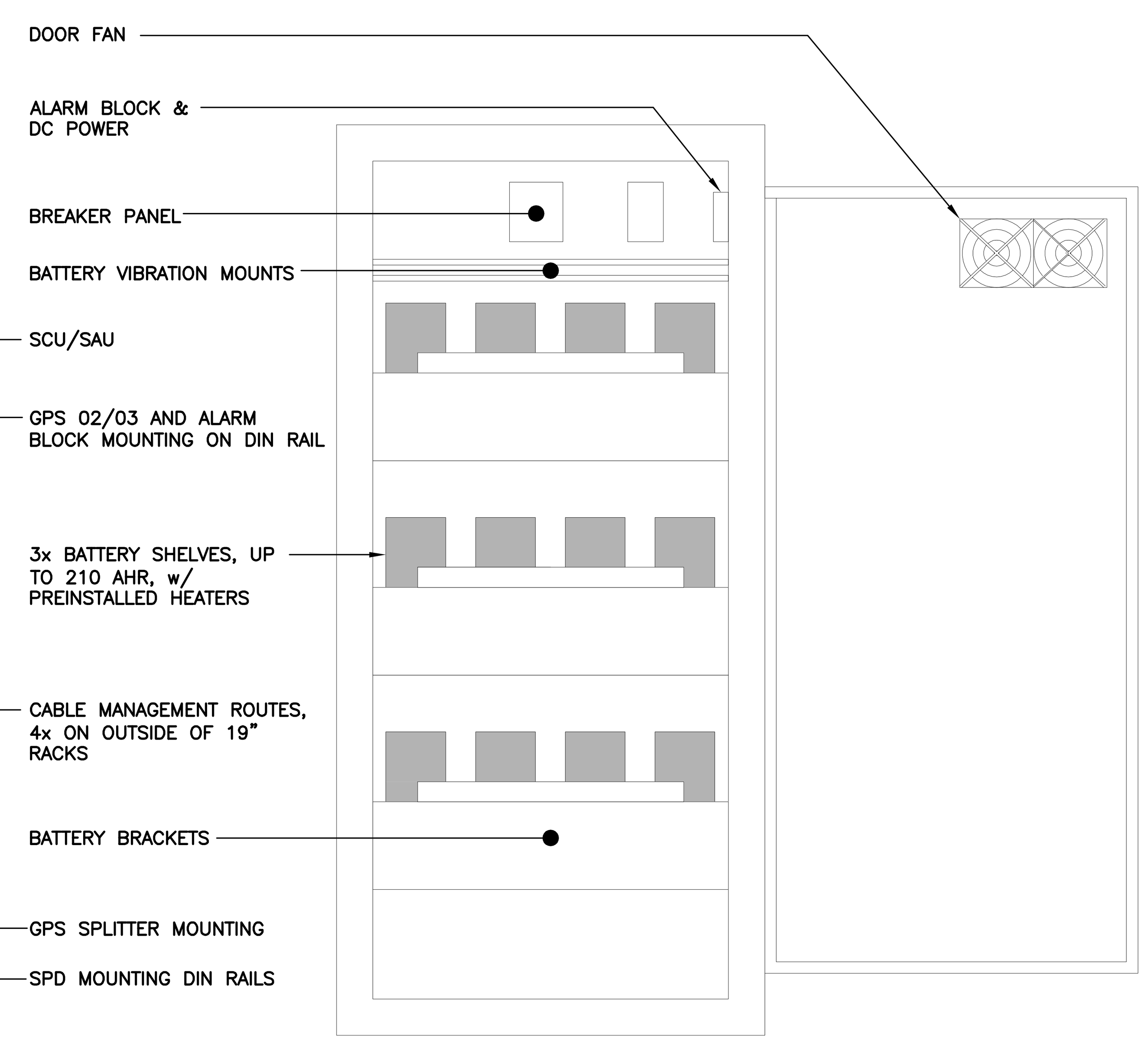
NOTES:
1. CONTRACTOR TO COORDINATE FINAL EQUIPMENT MODEL SELECTION WITH T-MOBILE CONSTRUCTION MANAGER PRIOR TO ORDERING.

2 (C-4) PROPOSED RRU DETAIL
SCALE: NOT TO SCALE



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

3 (C-4) ENCLOSURE 6160 CABINET DETAIL
SCALE: NOT TO SCALE



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

4 (C-4) BATTERY B160 CABINET DETAIL
SCALE: NOT TO SCALE

AIR6449 B41 APXVAALL24_43-U-NA20 VV-65A-R1

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: RFS MODEL: APXVAALL24_43-U-NA20	95.9"L x 24.0"W x 8.5"D	±150 LBS.
MAKE: COMMSCOPE MODEL: VV-65A-R1	54.7"L x 12.08"W x 4.6"D	±23 LBS.

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

5 (C-4) PROPOSED ANTENNA DETAIL
SCALE: NOT TO SCALE

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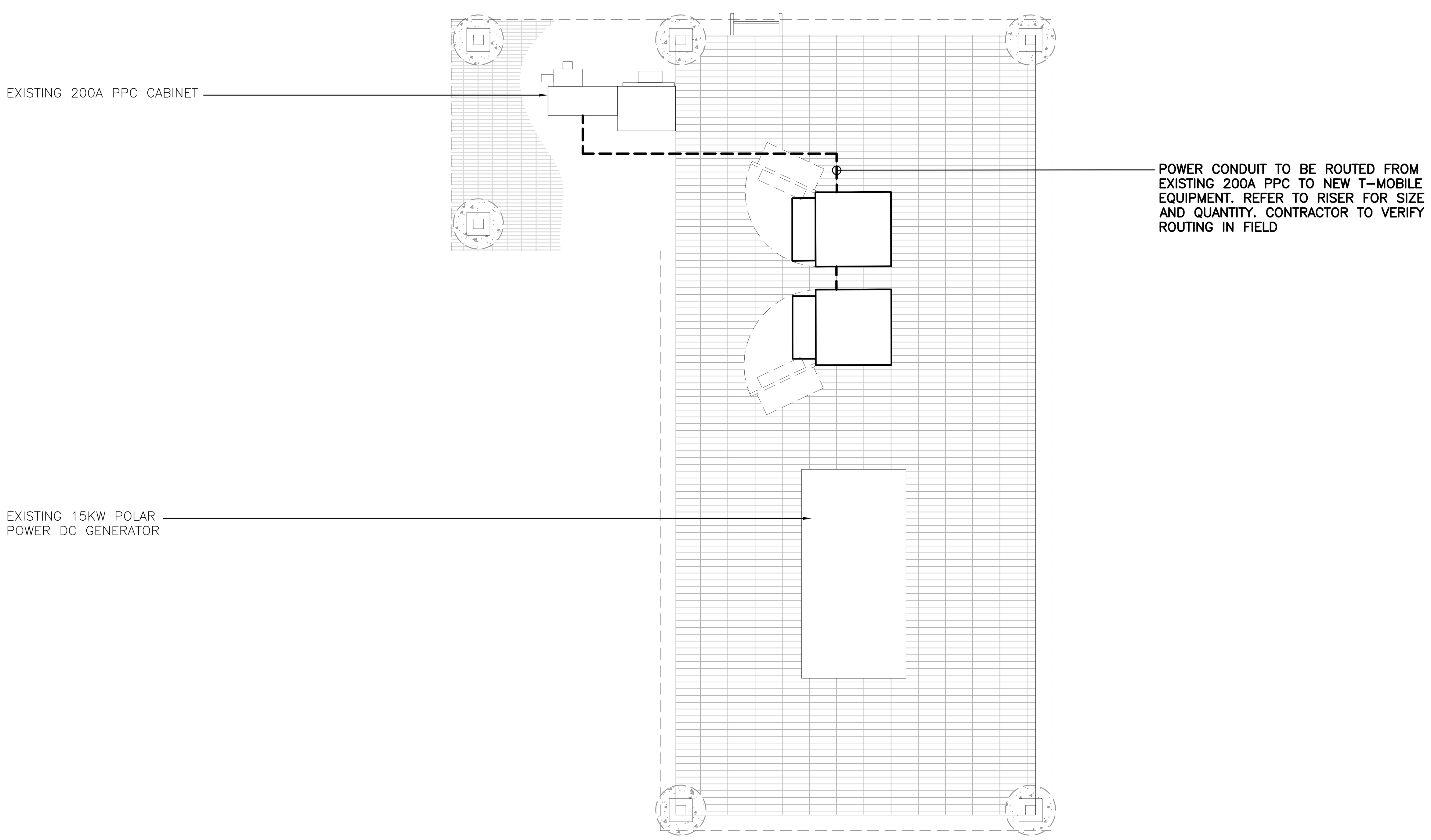
TYPICAL EQUIPMENT DETAILS

C-4

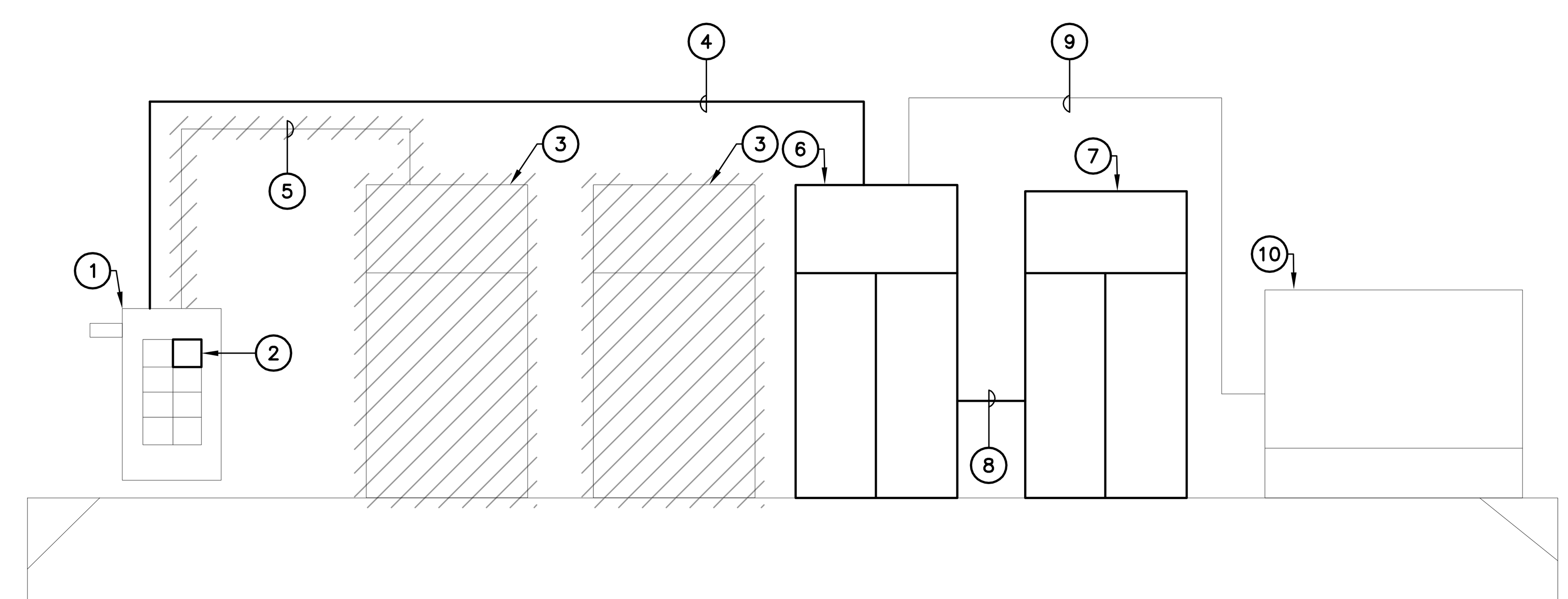
Sheet No. 6 of 9



1 / E-1 **ELECTRICAL CONDUIT ROUTING PLAN**
SCALE: 1/4" = 1'

RISER DIAGRAM NOTES

1. EXISTING 200A, PPC CABINET TO REMAIN.
2. EXISTING 100A CIRCUIT BREAKER TO BE REMOVED AND REPLACED WITH NEW 150A/2P CIRCUIT BREAKER TO SERVE NEW EQUIPMENT CABINET.
3. EXISTING CABINETS TO BE REMOVED.
4. (3) 1/0 AWG, (1) #6 AWG GROUND, 1-1/2" CONDUIT.
5. EXISTING CONDUITS AND CONDUCTORS TO BE REMOVED.
6. NEW T-MOBILE EQUIPMENT CABINET.
7. NEW T-MOBILE BATTERY CABINET.
8. DC CONDUIT AND CONDUCTORS FOR BATTERY CABINET CONNECTION PER MANUFACTURERS SPECIFICATIONS.
9. EXISTING DC CONDUITS AND CONDUCTORS TO BE RELOCATED. BOND GENERATOR TO THE EXISTING GROUNDING SYSTEM.
10. EXISTING 15KW POLAR POWER DC GENERATOR.



2 / E-1 **ELECTRICAL POWER RISER DIAGRAM**
SCALE: NOT TO SCALE

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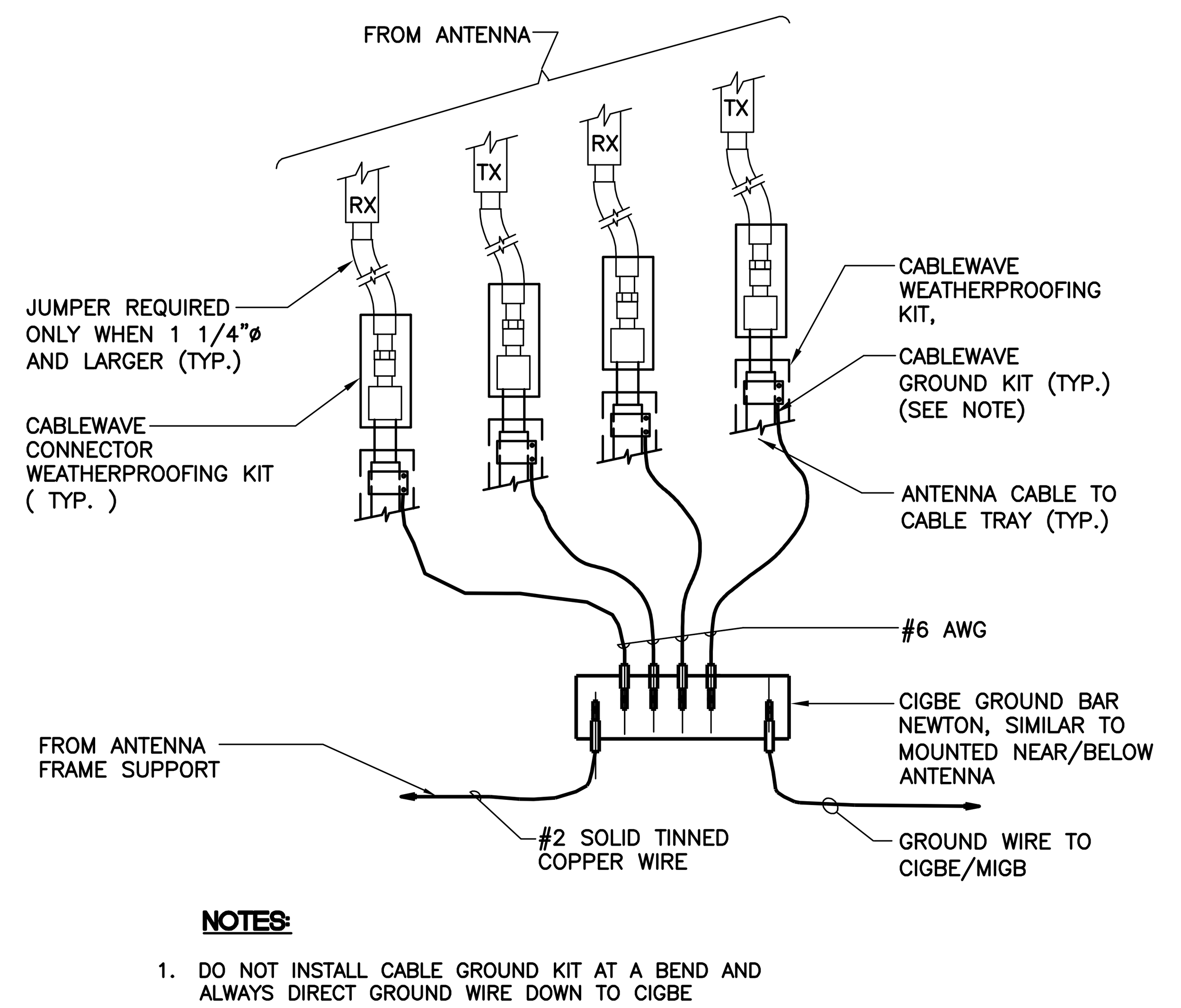
ELECTRICAL RISER DIAGRAM AND CONDUIT ROUTING

E-1

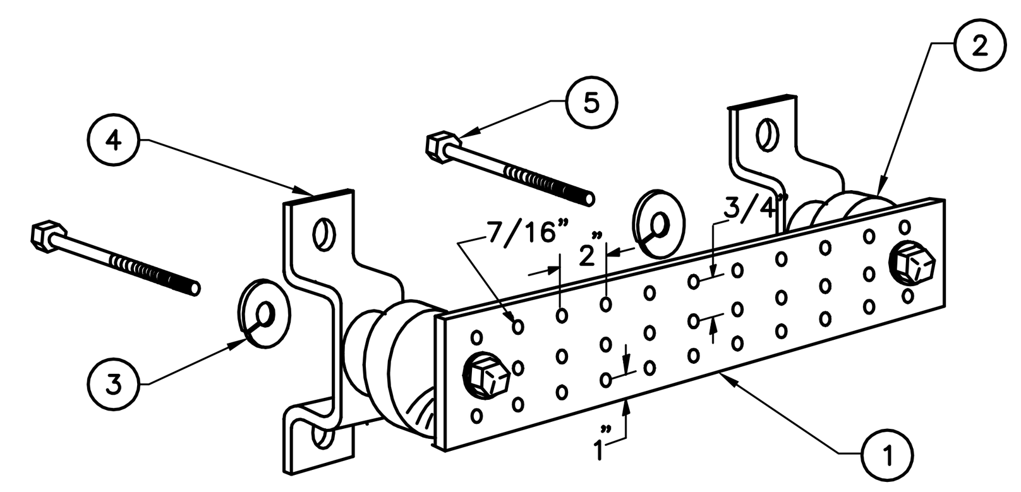
Sheet No. 7 of 9



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO CIGBE

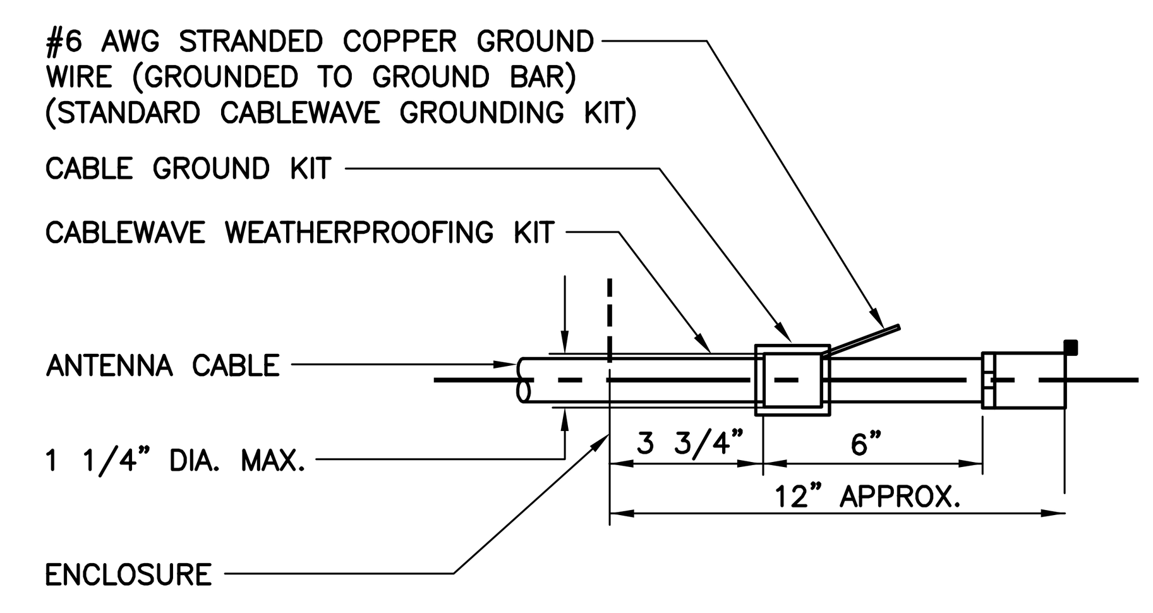
1 CONNECTION OF GROUND WIRES TO GROUND BAR
E-2 SCALE: NOT TO SCALE



NOTES

1. TINNED COPPER GROUND BAR, 1/4" x 4" x 20", NEWTON INSTRUMENT CO. HOLE CENTERS TO MATCH NEMA DOUBLE LUG CONFIGURATION.
2. INSULATORS, NEWTON INSTRUMENT CAT. NO. 3061-4.
3. 5/8" LOCK WASHERS, NEWTON INSTRUMENT CO. CAT. NO. 3015-8.
4. WALL MOUNTING BRACKET, NEWTON INSTRUMENT CO. CAT NO. A-6056.
5. 5/8-11 x 1" STAINLESS STEEL TRUSS SPANNER MACHINE SCREWS.

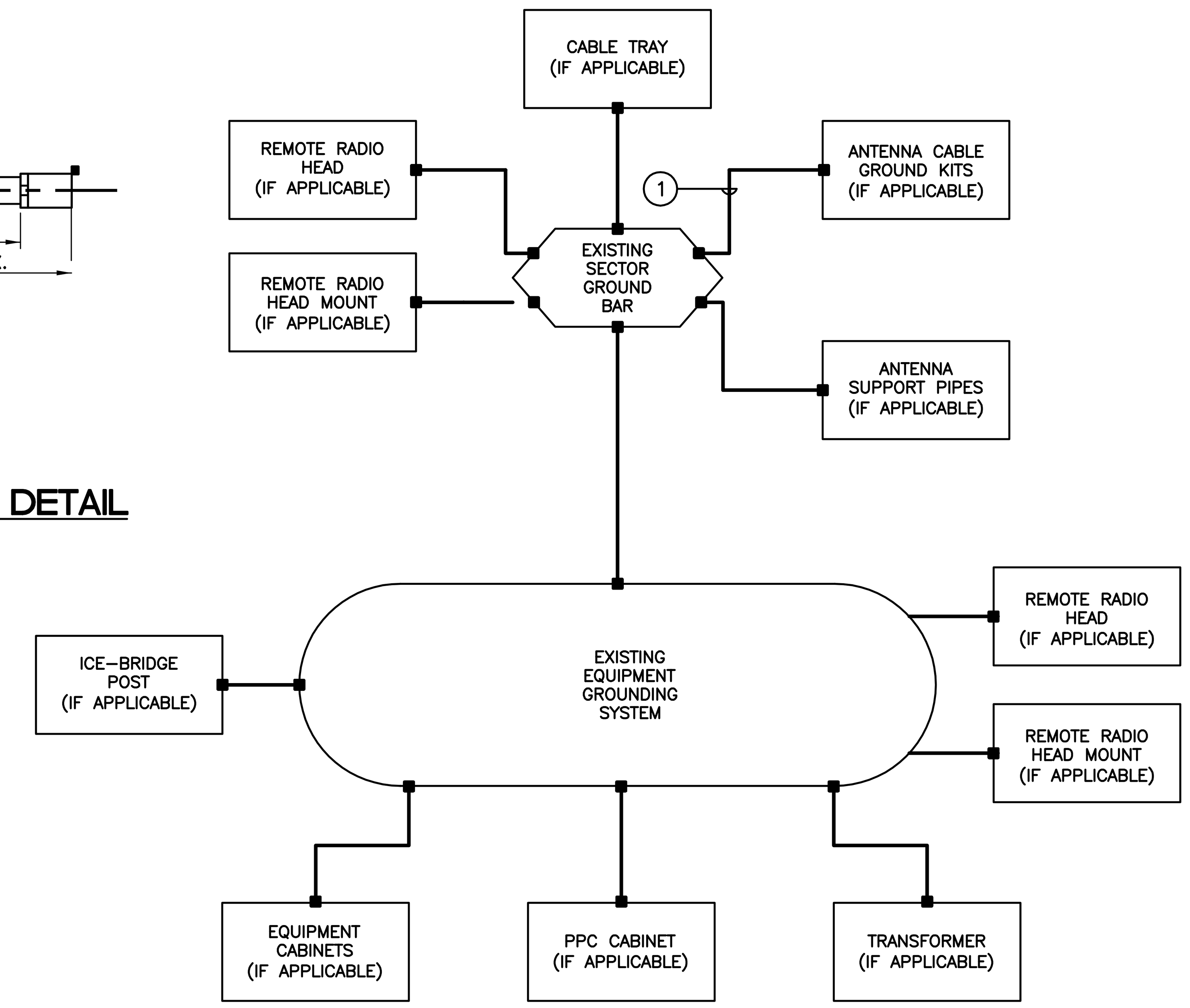
2 GROUND BAR DETAIL
E-2 SCALE: NOT TO SCALE



NOTES:

1. DO NOT INSTALL CABLE GROUND KIT AT A BEND AND ALWAYS DIRECT GROUND WIRE DOWN TO GROUND BAR.

3 ANTENNA CABLE GROUNDING DETAIL
E-2 SCALE: NOT TO SCALE



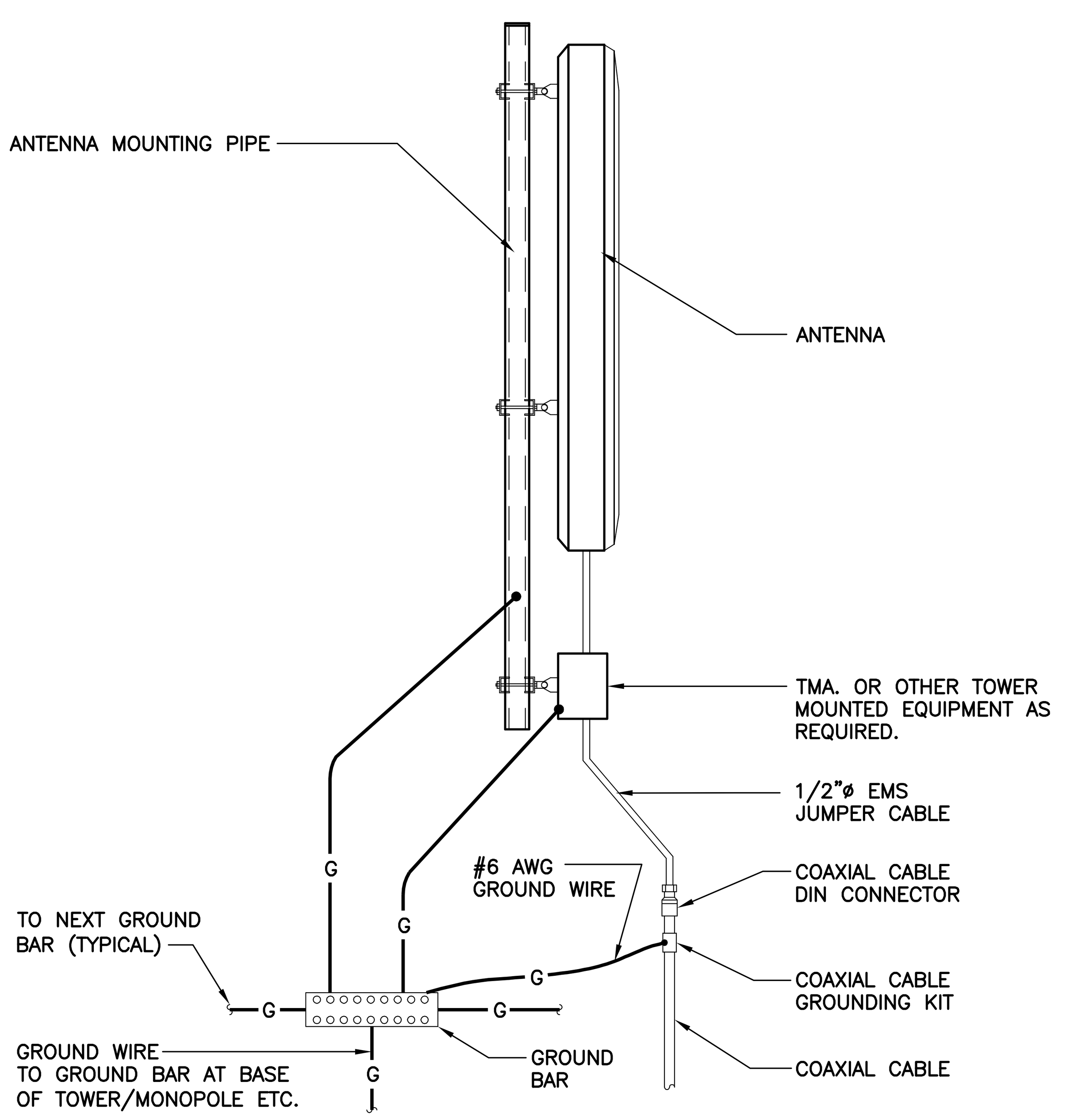
GROUNDING SCHEMATIC NOTES

1. #6 AWG

GENERAL NOTES:

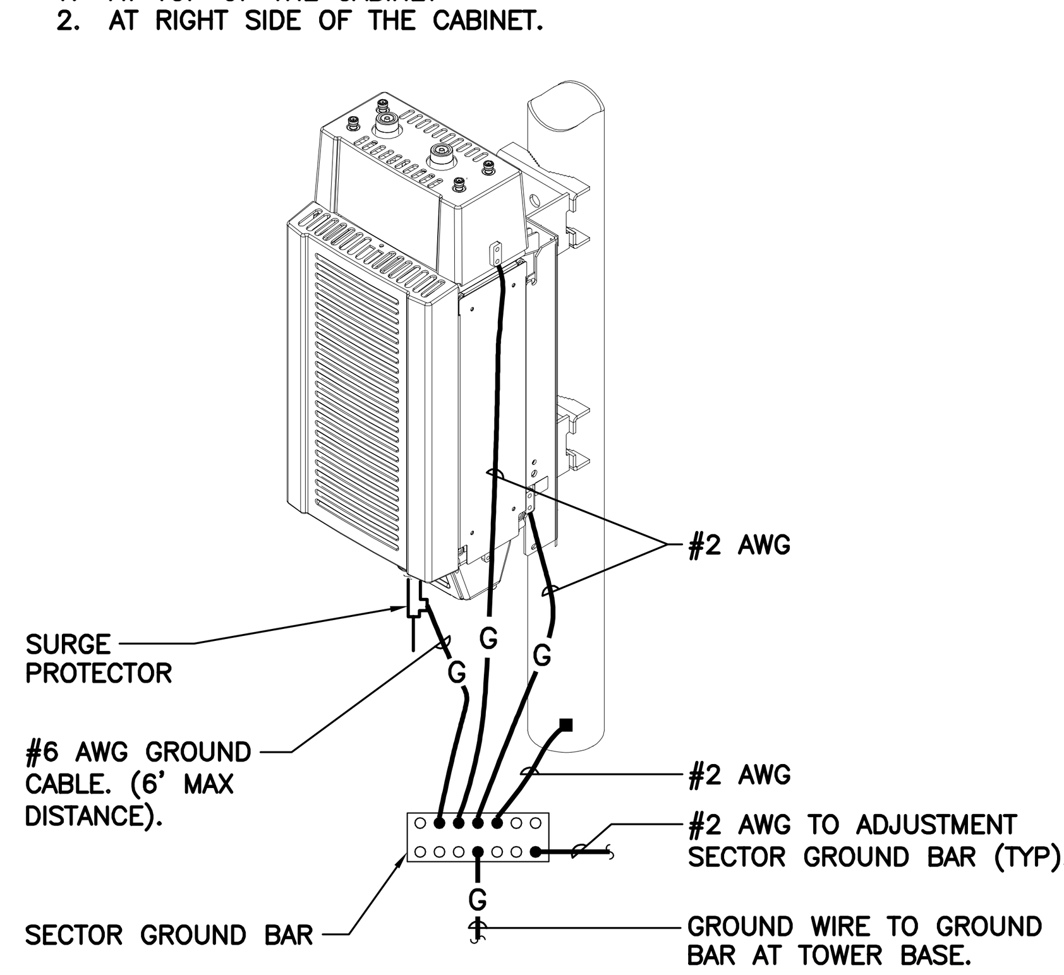
1. ALL SURGE SUPPRESSION EQUIPMENT SHALL BE BONDED TO GROUND PER MANUFACTURER'S SPECIFICATIONS
2. UNLESS OTHERWISE NOTED OR REQUIRED BY CODE, GROUND CONDUCTORS SHOWN SHALL BE #2 AWG (SOLID TINNED BCW – EXTERIOR; STRANDED GREEN INSULATED – INTERIOR).
3. BOND CABLE TRAY SECTIONS TOGETHER WITH #6 AWG STRANDED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

7 ELECTRICAL SCHEMATIC DIAGRAM
E-2 SCALE: NOT TO SCALE

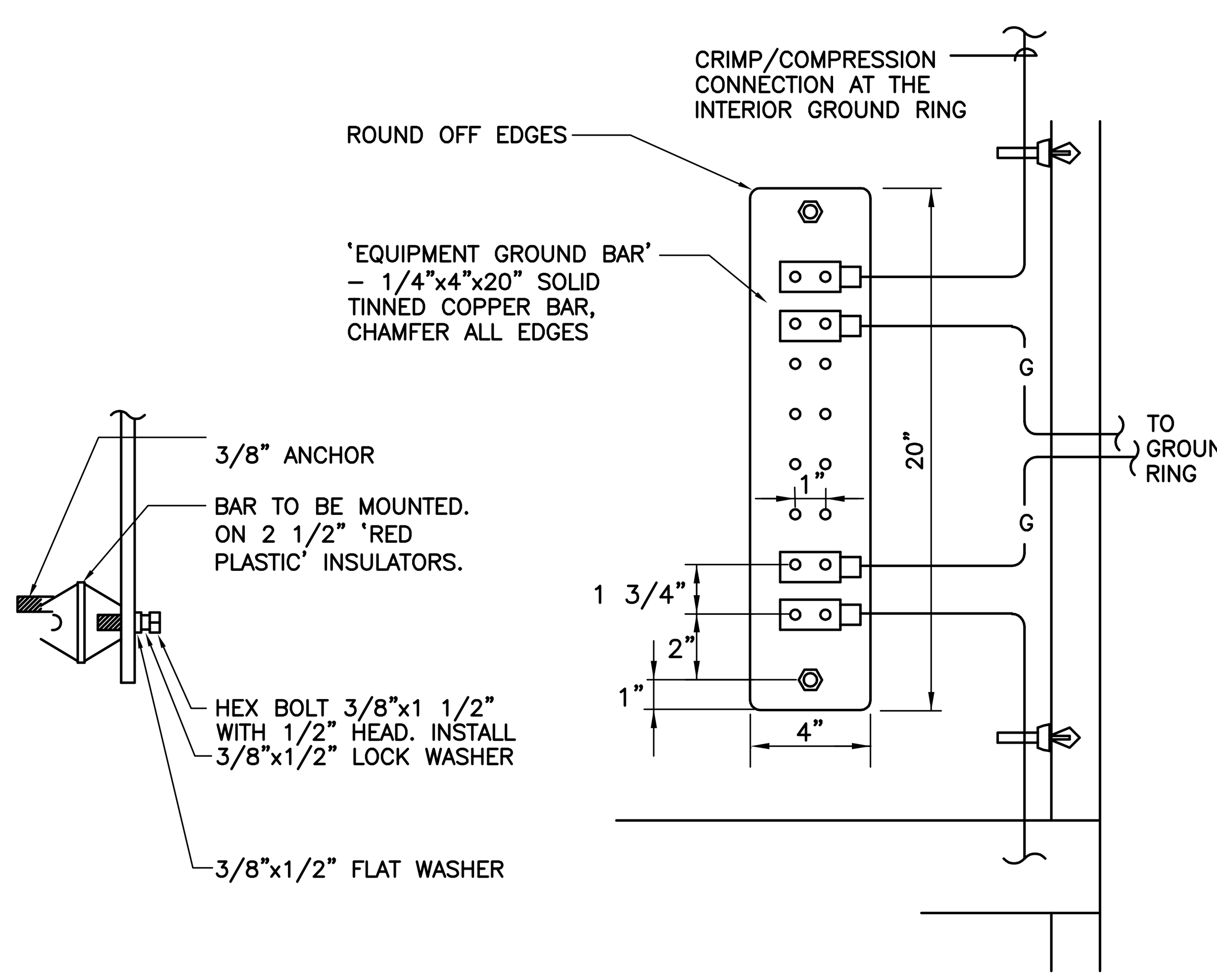


4 TYPICAL ANTENNA GROUNDING DETAIL
E-2 SCALE: NOT TO SCALE

EACH RRH CABINET SHALL BE GROUNDED IN THE FOLLOWING MANNER:
1. AT TOP OF THE CABINET
2. AT RIGHT SIDE OF THE CABINET.



5 RRH POLE MOUNT GROUNDING
E-2 SCALE: NOT TO SCALE



6 EQUIPMENT GROUND BAR DETAIL
E-2 SCALE: NOT TO SCALE

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DATE: 09/15/21
SCALE: AS NOTED
JOB NO. 21005.37

TYPICAL ELECTRICAL DETAILS

E-2

Sheet No. 8 of 9

ELECTRICAL SPECIFICATIONS

SECTION 16010

1.01. SCOPE OF WORK

A. WORK SHALL INCLUDE ALL LABOR, EQUIPMENT AND SERVICES REQUIRED TO COMPLETE (MAKE READY FOR OPERATION) ALL THE ELECTRICAL WORK INCLUDING, BUT NOT LIMITED TO, THE FOLLOWING:

1. INSTALL 200A/3P CIRCUIT BREAKER WITH ASSOCIATED SUBMETER FOR OWNER'S EQUIPMENT
2. FEEDERS AND BRANCH CIRCUIT WIRING TO PANELS, RECEPTACLES, EQUIPMENT, LIGHTING FIXTURES, ETC. AS INDICATED OR NOTED ON PLANS.
3. FIELD MEASURE EXISTING ELECTRICAL SERVICES TO CONFIRM AVAILABLE EXISTING POWER.

1.02. GENERAL REQUIREMENTS

A. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE MADE IN STRICT ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES AND REGULATIONS WHICH MAY APPLY AND NOTHING IN THE DRAWINGS OR SPECIFICATIONS SHALL BE INTERPRETED AS AN INFRINGEMENT OF SUCH CODES OR REGULATIONS.

B. THE ELECTRICAL CONTRACTOR IS TO BE RESPONSIBLE FOR THE COMPLETE INSTALLATION AND COORDINATION OF THE ENTIRE ELECTRICAL SERVICE. ALL ACTIVITIES TO BE COORDINATED THROUGH OWNERS REPRESENTATIVE, DESIGN ENGINEER AND OTHER AUTHORITIES HAVING JURISDICTION OF TRADES.

C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL PERMITS AND PAY ALL FEES THAT MAY BE REQUIRED FOR THE ELECTRICAL WORK AND FOR THE SCHEDULING OF ALL INSPECTIONS THAT MAY BE REQUIRED BY THE LOCAL AUTHORITY.

D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE BUILDING OWNER FOR NEW AND/OR DEMOLITION WORK INVOLVED.

E. NO MATERIAL OTHER THAN THAT CONTAINED IN THE "LATEST LIST OF ELECTRICAL FITTINGS" APPROVED BY THE UNDERWRITERS' LABORATORIES, SHALL BE USED IN ANY PART OF THE WORK. ALL MATERIAL FOR WHICH LABEL SERVICE HAS BEEN ESTABLISHED SHALL BEAR THE U.L. LABEL.

F. THE CONTRACTOR SHALL GUARANTEE ALL NEW WORK FOR A PERIOD OF ONE YEAR FROM THE ACCEPTANCE DATE BY THE OWNER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING WARRANTIES FROM ALL EQUIPMENT MANUFACTURERS FOR SUBMISSION TO THE OWNER.

G. DRAWINGS INDICATE GENERAL ARRANGEMENT OF WORK INCLUDED IN CONTRACT. CONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE MODIFICATIONS TO THE LAYOUT OF THE WORK TO PREVENT CONFLICT WITH WORK OF OTHER TRADES AND FOR THE PROPER INSTALLATION OF WORK. CHECK ALL DRAWINGS AND VISIT JOB SITE TO VERIFY SPACE AND TYPE OF EXISTING CONDITIONS IN WHICH WORK WILL BE DONE, PRIOR TO SUBMITTAL OF BID.

H. THE ELECTRICAL CONTRACTOR SHALL SUPPLY THREE (3) COMPLETE SETS OF APPROVED DRAWINGS, ENGINEERING DATA SHEETS, MAINTENANCE AND OPERATING INSTRUCTION MANUALS FOR ALL SYSTEMS AND THEIR RESPECTIVE EQUIPMENT. THESE MANUALS SHALL BE INSERTED IN VINYL COVERED 3–RING BINDERS AND TURNED OVER TO OWNER'S REPRESENTATIVE ONE (1) WEEK PRIOR TO FINAL PUNCH LIST.

I. ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMAN LIKE MANNER AND WILL BE SUBJECT TO THE APPROVAL OF THE OWNER'S REPRESENTATIVE.

J. ALL EQUIPMENT AND MATERIALS TO BE INSTALLED SHALL BE NEW, UNLESS OTHERWISE NOTED.

K. BEFORE FINAL PAYMENT, THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF PRINTS (AS–BUILTS), LEGIBLY MARKED IN RED PENCIL TO SHOW ALL CHANGES FROM THE ORIGINAL PLANS.

L. PROVIDE TEMPORARY POWER AND LIGHTING IN WORK AREAS AS REQUIRED.

M. SHOP DRAWINGS:

1. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF SHOP DRAWINGS ON ALL EQUIPMENT AND MATERIALS PROPOSED FOR USE ON THIS PROJECT, GIVING ALL DETAILS, WHICH INCLUDE DIMENSIONS, CAPACITIES, ETC.
2. CONTRACTOR SHALL SUBMIT SIX (6) COPIES OF ALL TEST REPORTS CALLED FOR IN THE SPECIFICATIONS AND DRAWINGS.

N. THE ENTIRE ELECTRICAL INSTALLATION SHALL BE IN ACCORDANCE WITH OWNER'S SPECIFICATIONS, AND REQUIREMENTS OF ALL LOCAL AUTHORITIES HAVING JURISDICTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH APPROPRIATE INDIVIDUALS TO OBTAIN ALL SUCH SPECIFICATIONS AND REQUIREMENTS. NOTHING CONTAINED IN, OR OMITTED FROM, THESE DOCUMENTS SHALL RELIEVE CONTRACTOR FROM THIS OBLIGATION.

SECTION 16111

1.01. CONDUITS

A. MINIMUM CONDUIT SIZE FOR BRANCH CIRCUITS, LOW VOLTAGE CONTROL AND ALARM CIRCUITS SHALL BE 3/4". CONDUITS SHALL BE PROPERLY FASTENED AS REQUIRED BY THE N.E.C.

B. THE INTERIOR OF RACEWAYS/ENCLOSURES INSTALLED UNDERGROUND SHALL BE CONSIDERED TO BE WET LOCATION, INSULATED CONDUCTORS SHALL BE LISTED FOR USE IN WET LOCATIONS. PROVIDE WEATHERPROOF CONSTRUCTION IN WET LOCATIONS.

C. CONDUIT INSTALLED UNDERGROUND SHALL BE INSTALLED TO MEET MINIMUM COVER REQUIREMENTS OF TABLE 300.5.

D. PROVIDE RIGID GALVANIZED STEEL CONDUIT (RMC) FOR THE FIRST 10 FOOT SECTION WHEN LEAVING A BUILDING OR SECTIONS PASSING THROUGH FLOOR SLABS

E. ONLY LISTED PVC CONDUIT AND FITTINGS ARE PERMITTED FOR THE INSTALLATION OF ELECTRICAL CONDUCTORS, SUITABLE FOR UNDERGROUND APPLICATIONS.

CONDUIT SCHEDULE SECTION 16111

CONDUIT TYPE	NEC REFERENCE	APPLICATION	MIN. BURIAL DEPTH (PER NEC TABLE 300.5) [2,3]
EMT	ARTICLE 358	INTERIOR CIRCUITING, EQUIPMENT ROOMS, SHELTERS	N/A
RMC, RIGID GALV. STEEL	ARTICLE 344, 300.5, 300.50	ALL INTERIOR/ EXTERIOR CIRCUITING, ALL UNDERGROUND INSTALLATIONS.	6 INCHES
PVC, SCHEDULE 40	ARTICLE 352, 300.5, 300.50	INTERIOR/ EXTERIOR CIRCUITING AND GROUNDING SYSTEMS, UNDERGROUND INSTALLATIONS, WHERE NOT SUBJECT TO PHYSICAL DAMAGE. [1]	18 INCHES
PVC, SCHEDULE 80	ARTICLE 352, 300.5, 300.50	INTERIOR/ EXTERIOR CIRCUITING AND GROUNDING SYSTEMS, UNDERGROUND INSTALLATIONS, WHERE SUBJECT TO PHYSICAL DAMAGE. [1]	18 INCHES
LIQUID TIGHT FLEX. METAL	ARTICLE 350	SHORT LENGTHS (MAX. 3FT.) WIRING TO VIBRATING EQUIPMENT IN WET LOCATIONS.	N/A
FLEX. METAL	ARTICLE 348	SHORT LENGTHS (MAX. 3FT.) WIRING TO VIBRATING EQUIPMENT IN WET LOCATIONS.	N/A

[1] PHYSICAL DAMAGE IS SUBJECT TO THE AUTHORITY HAVING JURISDICTION.

[2] UNDERGROUND CONDUIT INSTALLED UNDER ROADS, HIGHWAYS, DRIVEWAYS, PARKING LOTS SHALL HAVE MINIMUM DEPTH OF 24".

[3] WHERE SOLID ROCK PREVENTS COMPLIANCE WITH MINIMUM COVER DEPTHS, WIRING SHALL BE INSTALLED IN PERMITTED RACEWAY FOR DIRECT BURIAL. THE RACEWAY SHALL BE COVERED BY A MINIMUM OF 2" OF CONCRETE EXTENDING DOWN TO ROCK.

SECTION 16123

1.01. CONDUCTORS

A. ALL CONDUCTORS SHALL BE TYPE THWN (INT. APPLICATION) AND XHHW (EXT. APPLICATION), 75 DEGREE C, 600 VOLT INSULATION, SOFT ANNEALED STRANDED COPPER. #10 AWG AND SMALLER SHALL BE SPLICED USING ACCEPTABLE SOLDERLESS PRESSURE CONNECTORS. #8 AWG AND LARGER SHALL BE SPLICED USING COMPRESSION SPLIT–BOLT TYPE CONNECTORS. #12 AWG SHALL BE THE MINIMUM SIZE CONDUCTOR FOR LINE VOLTAGE BRANCH CIRCUITS. REFER TO PANEL SCHEDULE FOR BRANCH CIRCUIT CONDUCTOR SIZE(S). CONDUCTORS SHALL BE COLOR CODED FOR CONSISTENT PHASE IDENTIFICATION:

	120/208/240V	277/480V
LINE	COLOR	COLOR
A	BLACK	BROWN
B	RED	ORANGE
C	BLUE	YELLOW
N	CONTINUOUS WHITE	GREY
G	CONTINUOUS GREEN	GREEN WITH YELLOW STRIPE

B. MINIMUM BENDING RADIUS FOR CONDUCTORS SHALL BE 12 TIMES THE LARGEST DIAMETER OF BRANCH CIRCUIT CONDUCTOR.

SECTION 16130

1.01. BOXES

A. FURNISH AND INSTALL OUTLET BOXES FOR ALL DEVICES, SWITCHES, RECEPTACLES, ETC.. BOXES TO BE ZINC COATED STEEL.

B. FURNISH AND INSTALL PULL BOXES IN MAIN FEEDERS RUNS WHERE REQUIRED. PULL BOXES SHALL BE GALVANIZED STEEL WITH SCREW REMOVABLE COVERS, SIZE AND QUANTITY AS REQUIRED. PROVIDE WEATHERPROOF CONSTRUCTION IN WET LOCATIONS.

SECTION 16140

1.01. WIRING DEVICES

A. THE FOLLOWING LIST IS PROVIDED TO CONVEY THE QUALITY AND RATING OF WIRING DEVICES WHICH ARE TO BE INSTALLED. A COMPLETE LIST OF ALL DEVICES MUST BE SUBMITTED BEFORE INSTALLATION FOR APPROVAL.

1. 15 MINUTE TIMER SWITCH – INTERMATIC #FF15M (INTERIOR LIGHTS)
2. DUPLEX RECEPTACLE – P&S #2095 (GFCI) SPECIFICATION GRADE
3. SINGLE POLE SWITCH – P&S #CSB20AC2 (20A–120V HARD USE) SPECIFICATION GRADE
4. DUPLEX RECEPTACLE – P&S #5362 (20A–120V HARD USE) SPECIFICATION GRADE

B. PLATES – ALL PLATES USED SHALL BE CORROSION RESISTANT TYPE 304 STAINLESS STEEL. PLATES SHALL BE FROM SAME MANUFACTURER AS SWITCHES AND RECEPTACLES. PROVIDE WEATHERPROOF HOUSING FOR DEVICES LOCATED IN WET LOCATIONS.

C. OTHER MANUFACTURERS OF THE SWITCHES, RECEPTACLES AND PLATES MAY BE SUBMITTED FOR APPROVAL BY THE ENGINEER.

SECTION 16170

1.01. DISCONNECT SWITCHES

A. FUSIBLE AND NON–FUSIBLE, 600V, HEAVY DUTY DISCONNECT SWITCHES SHALL BE AS MANUFACTURED BY SQUARE "D". PROVIDE FUSES AS CALLED FOR ON THE CONTRACT DRAWINGS. AMPERE RATING SHALL BE CONSISTENT WITH LOAD BEING SERVED. DISCONNECT SWITCH COVER SHALL BE MECHANICALLY INTERLOCKED TO PREVENT COVER FROM OPENING WHEN THE SWITCH IS IN THE "ON" POSITION. EXTERIOR APPLICATIONS SHALL BE NEMA 3R CONSTRUCTION WITH PADLOCK FEATURE.

SECTION 16190

1.01. SEISMIC RESTRAINT

A. ALL DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH ZONE 2 SEISMIC REQUIREMENTS.

SECTION 16195

1.01. LABELING AND IDENTIFICATION NOMENCLATURE FOR ELECTRICAL EQUIPMENT

A. CONTRACTOR SHALL FURNISH AND INSTALL NON–METALLIC ENGRAVED BACK–LIT NAMEPLATES ON ALL PANELS AND MAJOR ITEMS OF ELECTRICAL EQUIPMENT.

B. LETTERS TO BE WHITE ON BLACK BACKGROUND WITH LETTERS 1–1/2 INCH HIGH WITH 1/4 INCH MARGIN.

C. IDENTIFICATION NOMENCLATURE SHALL BE IN ACCORDANCE WITH OWNER'S STANDARDS.

SECTION 16450

1.01. GROUNDING

A. ALL NON–CURRENT CARRYING PARTS OF THE ELECTRICAL AND TELEPHONE CONDUIT SYSTEMS SHALL BE MECHANICALLY AND ELECTRICALLY CONNECTED TO PROVIDE AN INDEPENDENT RETURN PATH TO THE EQUIPMENT GROUNDING SOURCES.

B. GROUNDING SYSTEM WILL BE IN ACCORDANCE WITH THE LATEST ACCEPTABLE EDITION OF THE NATIONAL ELECTRICAL CODE AND REQUIREMENTS PER LOCAL INSPECTOR HAVING JURISDICTION.

C. GROUNDING OF PANELBOARDS:

1. PANELBOARD SHALL BE GROUNDED BY TERMINATING THE PANELBOARD FEEDER'S EQUIPMENT GROUND CONDUCTOR TO THE EQUIPMENT GROUND BAR KIT(S) LUGGED TO THE CABINET. ENSURE THAT THE SURFACE BETWEEN THE KIT AND CABINET ARE BARE METAL TO BARE METAL. PRIME AND PAINT OVER TO PREVENT CORROSION.
2. CONDUIT(S) TERMINATING INTO THE PANELBOARD SHALL HAVE GROUNDING TYPE BUSHINGS. THE BUSHINGS SHALL BE BONDED TOGETHER WITH BARE #10 AWG COPPER CONDUCTOR WHICH IN TURN IS TERMINATED INTO THE PANELBOARD'S EQUIPMENT GROUND BAR KIT(S).

D. EQUIPMENT GROUNDING CONDUCTOR:

1. EACH EQUIPMENT GROUND CONDUCTOR SHALL BE SIZED IN ACCORDANCE WITH THE N.E.C. ARTICLE 250–122.
2. THE MINIMUM SIZE OF EQUIPMENT GROUND CONDUCTOR SHALL BE #12 AWG COPPER.
3. EACH FEEDER OR BRANCH CIRCUIT SHALL HAVE EQUIPMENT GROUND CONDUCTOR(S) INSTALLED IN THE SAME RACEWAY(S).

E. CELLULAR GROUNDING SYSTEM:

CONTRACTOR SHALL PROVIDE A CELLULAR GROUNDING SYSTEM WITH THE MAXIMUM AC RESISTANCE TO GROUND OF 10 OHM BETWEEN ANY POINT ON THE GROUNDING SYSTEM AS MEASURED BY 3–POINT GROUNDING TEST. (REFER TO SECTION 16960).

PROVIDE THE CELLULAR GROUNDING SYSTEM AS SPECIFIED ON DRAWINGS, INCLUDING, BUT NOT LIMITED TO:

1. GROUND BARS
2. EXTERIOR GROUNDING (WHERE REQUIRED DUE TO MEASURED AC RESISTANCE GREATER THAN SPECIFIED).
3. ANTENNA GROUND CONNECTIONS AND PLATES.

F. CONTRACTOR, AFTER COMPLETION OF THE COMPLETE GROUNDING SYSTEM BUT PRIOR TO CONCEALMENT/BURIAL OF SAME, SHALL NOTIFY OWNER'S PROJECT ENGINEER WHO WILL HAVE A DESIGN ENGINEER VISIT SITE AND MAKE A VISUAL INSPECTION OF THE GROUNDING GRID AND CONNECTIONS OF THE SYSTEM.

G. ALL EQUIPMENT SHALL BE BONDED TO GROUND AS REQUIRED BY N.E.C., MFG. SPECIFICATIONS, AND OWNER'S SPECIFICATIONS.

SECTION 16470

1.01. DISTRIBUTION EQUIPMENT

A. REFER TO CONTRACT DRAWINGS FOR DETAILS AND SCHEDULES.

SECTION 16477

1.01. FUSES

A. FUSES SHALL BE NONRENEWABLE TYPE AS MANUFACTURED BY "BUSSMAN" OR APPROVED EQUAL. FUSES RATED TO 1/10 AMPERE UP TO 600 AMPERES SHALL BE EQUIVALENT TO BUSSMAN TYPE LPN–RK (250V) UL CLASS RK1, LOW PEAK, DUAL ELEMENT, TIME–DELAY FUSES. FUSES SHALL HAVE SEPARATE SHORT CIRCUIT AND OVERLOAD ELEMENTS AND HAVE AN INTERRUPTING RATING OF 200 KAIC. UPON COMPLETION OF WORK, PROVIDE ONE SPARE SET OF FUSES FOR EACH TYPE INSTALLED.

SECTION 16960

1.01. TESTS BY INDEPENDENT ELECTRICAL TESTING FIRM

A. CONTRACTOR SHALL RETAIN THE SERVICES OF A LOCAL INDEPENDENT ELECTRICAL TESTING FIRM (WITH MINIMUM 5 YEARS COMMERCIAL EXPERIENCE IN THE ELECTRICAL TESTING INDUSTRY) AS SPECIFIED BY OWNER TO PERFORM:

TEST 1: THERMAL OVERLOAD AND MAGNETIC TRIP TEST, AND CABLE INSULATION TEST FOR ALL CIRCUIT BREAKERS RATED 100 AMPS OR GREATER.

TEST 2: RESISTANCE TO GROUND TEST ON THE CELLULAR GROUNDING SYSTEM.

THE TESTING FIRM SHALL INCLUDE THE FOLLOWING INFORMATION WITH THE REPORT:

1. TESTING PROCEDURE INCLUDING THE MAKE AND MODEL OF TEST EQUIPMENT.
2. CERTIFICATION OF TESTING EQUIPMENT CALIBRATION WITHIN SIX (6) MONTHS OF DATE OF TESTING. INCLUDE CERTIFICATION LAB ADDRESS AND TELEPHONE NUMBER.
3. GRAPHICAL DESCRIPTION OF TESTING METHOD ACTUALLY IMPLEMENTED.

B. THESE TESTS SHALL BE PERFORMED IN THE PRESENCE AND TO THE SATISFACTION OF OWNER'S CONSTRUCTION REPRESENTATIVE. TESTING DATA SHALL BE INITIALED AND DATED BY THE CONSTRUCTION REPRESENTATIVE AND INCLUDED WITH THE WRITTEN REPORT/ANALYSIS.

C. THE CONTRACTOR SHALL FORWARD SIX (6) COPIES OF THE INDEPENDENT ELECTRICAL TESTING FIRM'S REPORT/ANALYSIS TO ENGINEER A MINIMUM OF TEN (10) WORKING DAYS PRIOR TO THE JOB TURNOVER.

D. CONTRACTOR TO PROVIDE A MINIMUM OF ONE (1) WEEK NOTICE TO OWNER AND ENGINEER FOR ALL TESTS REQUIRING WITNESSING.

SECTION 16961

1.01. TESTS BY CONTRACTOR

A. ALL TESTS AS REQUIRED UPON COMPLETION OF WORK, SHALL BE MADE BY THIS CONTRACTOR. THESE SHALL BE CONTINUITY AND INSULATION TESTS; TEST TO DETERMINE THE QUALITY OF MATERIALS, ETC. AND SHALL BE MADE IN ACCORDANCE WITH N.E.C. RECOMMENDATIONS. ALL FEEDERS AND BRANCH CIRCUIT WIRING (EXCEPT CLASS 2 SIGNAL CIRCUITS) MUST BE TESTED FREE FROM SHORT CIRCUIT AND GROUND FAULT CONDITIONS AT 500V IN A REASONABLY DRY AMBIENT OF APPROXIMATELY 70 DEGREES F.

B. CONTRACTOR SHALL PERFORM LOAD PHASE BALANCING TESTS. CIRCUITS SHALL BE CONNECTED TO THE PANELBOARDS SO THAT THE NEW LOAD IS DISTRIBUTED AS EQUALLY AS POSSIBLE BETWEEN EACH LOAD AND NEUTRAL. 10% SHALL BE CONSIDERED AS A REASONABLE AND ACCEPTABLE ALLOWANCE. BRANCH CIRCUITS SHALL BE BALANCED ON THEIR OWN PANELBOARDS; FEEDER LOADS SHALL, IN TURN, BE BALANCED ON THE SERVICE EQUIPMENT. REASONABLE LOAD TEST SHALL BE ARRANGED TO VERIFY LOAD BALANCE IF REQUESTED BY THE ENGINEER.

C. ALL TESTS, UPON REQUEST, SHALL BE REPEATED IN THE PRESENCE OF OWNER'S REPRESENTATIVE. ALL TESTS SHALL BE DOCUMENTED AND TURNED OVER TO OWNER. OWNER SHALL HAVE THE AUTHORITY TO STOP ANY OF THE WORK NOT BEING PROPERLY INSTALLED. ALL SUCH DETECTED WORK SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL EXPENSE TO THE OWNER AND THE TESTS SHALL BE REPEATED.

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	10/19/21	RTS	TJR	CONSTRUCTION DRAWINGS – ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

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T-MOBILE NORTHEAST LLC

SPRINT ID: CT33XC550
SITE ID: CT11580A
130 VERNON RDREET
BOLTON, CT 06043

DATE:	09/15/21
SCALE:	AS NOTED
JOB NO.	21005.37

ELECTRICAL SPECIFICATIONS

E-3

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

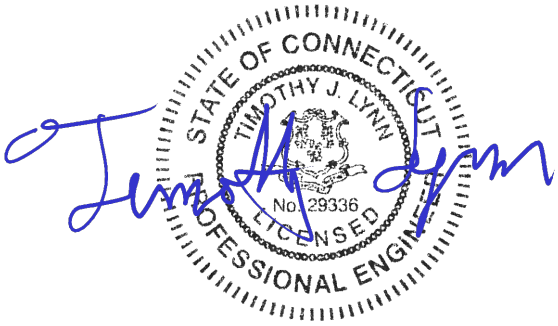
Site Ref: CT11580A

130 Vernon Road
Bolton, CT

Centek Project No. 21005.37

~~Date: September 7, 2021~~
Rev.1: October 12, 2021

Max Stress Ratio = 42.6%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

T a b l e o f C o n t e n t s

CENTEK engineering

Centered on Solutions℠

October 12, 2021

Mr. Kyle Richers
Transcend Wireless
10 Industrial Ave
Mahwah, NJ 07430

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CT11580A
130 Vernon Road
Bolton, CT 06043

Centek Project No. 21005.37

Dear Mr. Richers,

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) V-gate booms 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:**
  Gate Booms: Three (3) Commscope VV-65A-R1 panel antennas, three (3) RFS APXVAALL24_43-U-NA20 panel antennas, three (3) Ericsson AIR6449 B41 panel antennas, three (3) Ericsson 4460 B25+B66 remote radio units and three (3) Ericsson 4480 B71+B85 remote radio units mounted on three (3) gate booms with a RAD center elevation of 148-ft +/- AGL.

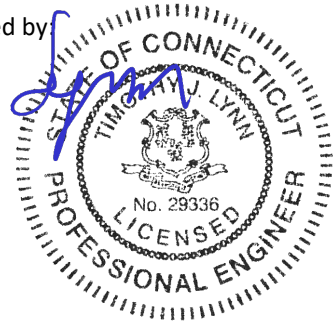
The antenna mount was analyzed per the requirements of the 2015 International Building Code as modified by the 2018 Connecticut State Building Code considering a nominal design wind speed of 97 mph for Bolton as required in Appendix N of the 2018 Connecticut State Building Code.

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 have sufficient capacity** to support the aforementioned antenna configuration. If there are any questions regarding this matter, please feel free to call.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer



Prepared by:

Fernando J. Palacios
Engineer

Section 2 - Calculations

Figure 1 Antenna Mount

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Subject: Loads on Equipment

Location: Bolton, CT

Rev. 1: 10/12/2021

Prepared by: F.J.P Checked by: T.J.L.
Job No. 21005.37

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

Wind Speeds

Basic Wind Speed	$V := 97$	mph	(User Input - 2018 CSBC Appendix N)
Basic Wind Speed with Ice	$V_i := 50$	mph	(User Input per Annex B of TIA-222-G)

Input

Structure Type =	$Structure\_Type := Lattice$		(User Input)
Structure Category =	$SC := II$		(User Input)
Exposure Category =	$Exp := C$		(User Input)
Structure Height =	$h := 150$	ft	(User Input)
Height to Center of Antennas =	$z := 148$	ft	(User Input)
Radial Ice Thickness =	$t_i := 1.00$	in	(User Input per Annex B of TIA-222-G)
Radial Ice Density =	$Id := 56.00$	pcf	(User Input)
Topographic Factor =	$K_{zt} := 1.35$		(User Input)
	$K_a := 1.0$		(User Input)
Gust Response Factor =	$G_H = 1.15$		(User Input)

Output

Wind Direction Probability Factor =

$$K_d := \begin{cases} 0.95 & \text{if } Structure\_Type = Pole \\ 0.85 & \text{if } Structure\_Type = Lattice \end{cases} = 0.85$$

(Per Table 2-2 of TIA-222-G)

(Per Table 2-3 of TIA-222-G)

Importance Factors =

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

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

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

$$K_{iz} := \left(\frac{z}{33}\right)^{0.1} = 1.162$$

Velocity Pressure Coefficient Antennas =

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 2.581$$

$$Kz := 2.01 \cdot \left(\left(\frac{z}{zg}\right)\right)^{\overline{\alpha}} = 1.375$$

Velocity Pressure w/o Ice Antennas = $qz := 0.00256 \cdot K_d \cdot Kz \cdot V^2 \cdot I_{Wind} = 28$ psf

Velocity Pressure with Ice Antennas = $qz_{ice} := 0.00256 \cdot K_d \cdot Kz \cdot V_i^2 \cdot I_{Wind} = 7$ psf

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Commscope - VV-65A-R1		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 54.7$	in	(User Input)
Antenna Width =	$W_{ant} := 12.1$	in	(User Input)
Antenna Thickness =	$T_{ant} := 4.6$	in	(User Input)
Antenna Weight =	$WT_{ant} := 24$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.5$		
Antenna Force Coefficient =	$Ca_{ant} = 1.29$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.6$	sf
Total Antenna Wind Force Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 192$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.7$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 73$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 7.2$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 80$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 4.1$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 45$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 24$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 3045$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 7044$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 228$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 228$	lbs

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Branford, CT 06405 F: (203) 488-8587

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFS APXVAALL24_43-U-NA20		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 95.9$	in	(User Input)
Antenna Width =	$W_{ant} := 24.0$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 149.$	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 Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 655$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 5.7$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 232$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 20.5$	sf
Total Antenna Wind Force w/ Ice Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 223$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 9.6$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 104$	lbs

Gravity Load (without ice)

Weight of All Antennas =	$WT_{ant} \cdot N_{ant} = 149$	lbs

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 2 \cdot 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 2 \cdot 10^4$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 671$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 671$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR6449 B41		
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 Front =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 183$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.9$	sf
Total Antenna Wind Force Side =	$F_{ant} := qz \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 74$	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 Front =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 70$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 3.6$	sf
Total Antenna Wind Force w/ Ice Side =	$Fi_{ant} := qz_{ice} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 37$	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 =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 7587$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 246$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 246$	lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model =	Ericsson 4480 B71+B85		
RRUS Shape =	Flat		(User Input)
RRUS Height =	$L_{RRUS} := 21.8$	in	(User Input)
RRUS Width =	$W_{RRUS} := 15.7$	in	(User Input)
RRUS Thickness =	$T_{RRUS} := 7.8$	in	(User Input)
RRUS Weight =	$WT_{RRUS} := 84$	lbs	(User Input)
Number of RRUS's =	$N_{RRUS} := 1$		
RRUS Aspect Ratio =	$Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.4$		
RRUS Force Coefficient =	$Ca_{RRUS} = 1.2$		

Wind Load (without ice)

Surface Area for One RRUS =	$SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 2.4$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 92$	lbs
Surface Area for One RRUS =	$SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.2$	sf
Total RRUS Wind Force =	$F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 46$	lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 3.9$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 40$	lbs
Surface Area for One RRUS w/ Ice =	$SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 2.4$	sf
Total RRUS Wind Force w/ Ice =	$Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 25$	lbs

Gravity Load (without ice)

Weight of All RRUSs =	$WT_{RRUS} \cdot N_{RRUS} = 84$	lbs

Gravity Loads (ice only)

Volume of Each RRUS =	$V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 2670$	cu in
Volume of Ice on Each RRUS =	$V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 4622$	cu in
Weight of Ice on Each RRUS =	$W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 150$	lbs
Weight of Ice on All RRUSs =	$W_{ICERRUS} \cdot N_{RRUS} = 150$	lbs

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Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model = Ericsson 4460 B25+B66

RRUS Shape = Flat (User Input)

RRUS Height = $L_{RRUS} := 19.6$ in (User Input)

RRUS Width = $W_{RRUS} := 15.7$ in (User Input)

RRUS Thickness = $T_{RRUS} := 12.1$ in (User Input)

RRUS Weight = $WT_{RRUS} := 109$ lbs (User Input)

Number of RRUS's = $N_{RRUS} := 1$

RRUS Aspect Ratio = $Ar_{RRUS} := \frac{L_{RRUS}}{W_{RRUS}} = 1.2$

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

Wind Load (without ice)

Surface Area for One RRUS = $SA_{RRUSF} := \frac{L_{RRUS} \cdot W_{RRUS}}{144} = 2.1$ sf

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 83$ lbs

Surface Area for One RRUS = $SA_{RRUSS} := \frac{L_{RRUS} \cdot T_{RRUS}}{144} = 1.6$ sf

Total RRUS Wind Force = $F_{RRUS} := qz \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 64$ lbs

Wind Load (with ice)

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSF} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz})}{144} = 3.6$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 37$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 3$ sf

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 31$ lbs

Gravity Load (without ice)

Weight of All RRUSs = $WT_{RRUS} \cdot N_{RRUS} = 109$ lbs

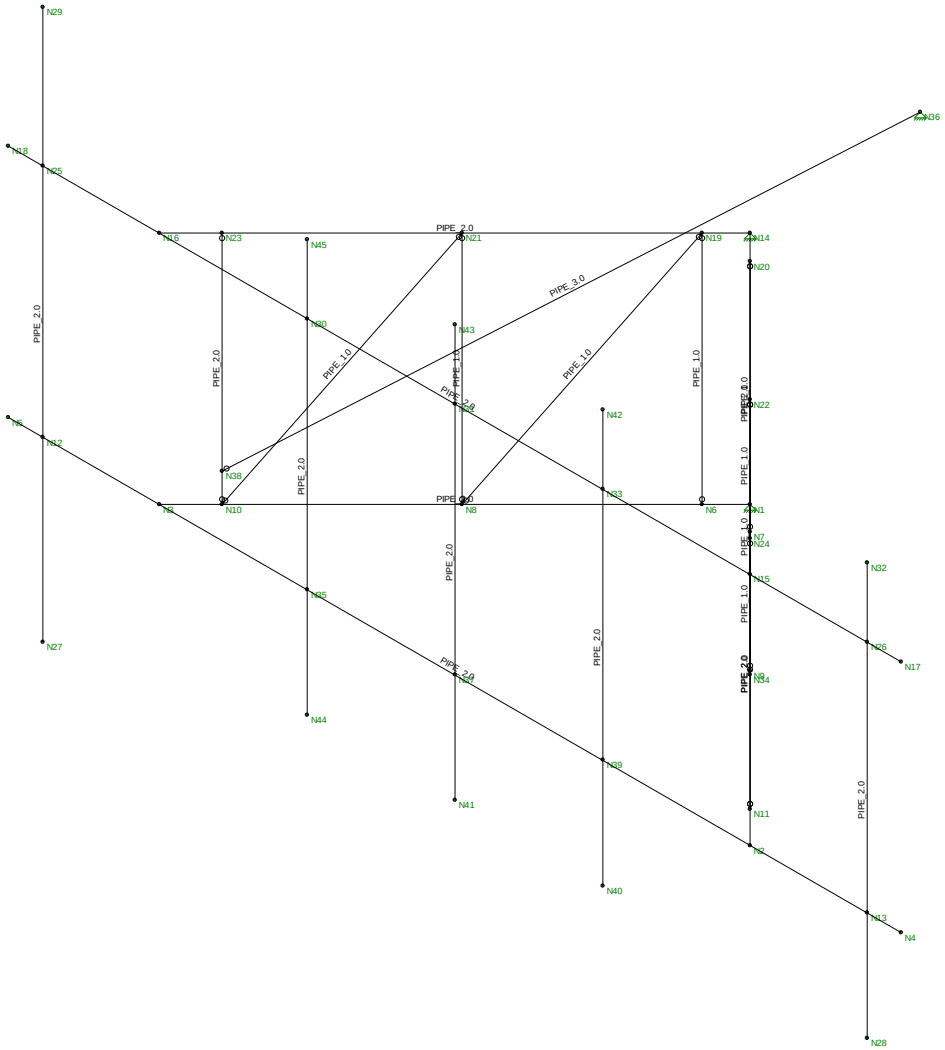
Gravity Loads (ice only)

Volume of Each RRUS = $V_{RRUS} := L_{RRUS} \cdot W_{RRUS} \cdot T_{RRUS} = 3723$ cu in

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz}) \cdot (W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 5194$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 168$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 168$ lbs



Envelope Only Solution

Centek		SK - 1
FJP	CT11580A - AMA	Sept 7, 2021 at 4:30 PM
21005.37	Member Framing	CT11580A_AMA.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 15th(360-16): 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

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	(E)Antenna Mast_Pipe 2.0 STD	PIPE_2.0	Beam	Pipe	A53 Grad...	Typical	1.02	.627	.627	1.25
2	(E) 2" Pipe	PIPE_2.0	Beam	Pipe	A53 Grad...	Typical	1.02	.627	.627	1.25
3	(E)1" Pipe	PIPE_1.0	Beam	Pipe	A53 Grad...	Typical	.469	.083	.083	.166
4	(E) Outrigger_Pipe 2.0 STD	PIPE_2.0	Beam	Pipe	A53 Grad...	Typical	1.02	.627	.627	1.25
5	(E) Stabilize_Pipe 3.0 STD	PIPE_3.0	Beam	Pipe	A53 Grad...	Typical	2.07	2.85	2.85	5.69
6	(P)Ant Mast_Pipe 2.0 STD	PIPE_2.0	Beam	Pipe	A53 Grad...	Typical	1.02	.627	.627	1.25

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	(E) Outrigg...	6.083			Lbyy						Lateral
2	M2	(E) Outrigg...	6.083			Lbyy						Lateral
3	M3	(E) Outrigg...	13	Segment	Segment	Lbyy						Lateral
4	M4	(E) Outrigg...	6.083			Lbyy						Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[...	Lcomp bot[...	L-torq...	Kyy	Kzz	Cb	Functi...
5	M5	(E) Outrigg...	6.083			Lbyy						Lateral
6	M6	(E) Outrigg...	13	Segment	Segment	Lbyy						Lateral
7	M7	(E)1" Pipe	3.417			Lbyy						Lateral
8	M8	(E)1" Pipe	3.417			Lbyy						Lateral
9	M9	(E) 2" Pipe	3.417			Lbyy						Lateral
10	M10	(E)1" Pipe	3.417			Lbyy						Lateral
11	M11	(E)1" Pipe	3.417			Lbyy						Lateral
12	M12	(E) 2" Pipe	3.417			Lbyy						Lateral
13	M13	(E)1" Pipe	4.217			Lbyy						Lateral
14	M14	(E)1" Pipe	4.217			Lbyy						Lateral
15	M15	(E)1" Pipe	4.217			Lbyy						Lateral
16	M16	(E)1" Pipe	4.217			Lbyy						Lateral
17	PS.2L	(E)Antenna...	6			Lbyy						Lateral
18	M18	(E) Stabiliz...	9.627			Lbyy						Lateral
19	PS.2R	(E)Antenna...	6			Lbyy						Lateral
20	PS.1	(E)Antenna...	8			Lbyy						Lateral
21	PS.2	(E)Antenna...	6			Lbyy						Lateral
22	PS.3	(E)Antenna...	6			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N1	N3			(E) Outrigger_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
2	M2	N1	N2			(E) Outrigger_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
3	M3	N5	N4			(E) Outrigger_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
4	M4	N14	N16			(E) Outrigger_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
5	M5	N14	N15			(E) Outrigger_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
6	M6	N18	N17			(E) Outrigger_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
7	M7	N20	N7			(E)1" Pipe	Beam	Pipe	A53 Gr...	Typical
8	M8	N22	N34			(E)1" Pipe	Beam	Pipe	A53 Gr...	Typical
9	M9	N24	N11			(E) 2" Pipe	Beam	Pipe	A53 Gr...	Typical
10	M10	N19	N6			(E)1" Pipe	Beam	Pipe	A53 Gr...	Typical
11	M11	N21	N8			(E)1" Pipe	Beam	Pipe	A53 Gr...	Typical
12	M12	N23	N10			(E) 2" Pipe	Beam	Pipe	A53 Gr...	Typical
13	M13	N20	N9			(E)1" Pipe	Beam	Pipe	A53 Gr...	Typical
14	M14	N22	N11			(E)1" Pipe	Beam	Pipe	A53 Gr...	Typical
15	M15	N19	N8			(E)1" Pipe	Beam	Pipe	A53 Gr...	Typical
16	M16	N21	N10			(E)1" Pipe	Beam	Pipe	A53 Gr...	Typical
17	PS.2L	N40	N42			(E)Antenna Mast_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
18	M18	N38	N36			(E) Stabilize_Pipe 3.0 STD	Beam	Pipe	A53 Gr...	Typical
19	PS.2R	N44	N45			(E)Antenna Mast_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
20	PS.1	N27	N29			(E)Antenna Mast_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
21	PS.2	N41	N43			(E)Antenna Mast_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical
22	PS.3	N28	N32			(E)Antenna Mast_Pipe 2.0 STD	Beam	Pipe	A53 Gr...	Typical

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			
2	N14	Reaction	Reaction	Reaction			
3	N36	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.075	1.083
2	PS.1	Y	-.075	5.917
3	PS.2	Y	-.052	1.667
4	PS.2	Y	-.052	4.417
5	PS.3	Y	-.012	.667
6	PS.3	Y	-.012	5.333
7	PS.2R	Y	-.084	3
8	PS.2L	Y	-.109	3

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Y	-.336	1.083
2	PS.1	Y	-.336	5.917
3	PS.2	Y	-.123	1.667
4	PS.2	Y	-.123	4.417
5	PS.3	Y	-.114	.667
6	PS.3	Y	-.114	5.333
7	PS.2R	Y	-.15	3
8	PS.2L	Y	-.168	3

Member Point Loads (BLC 4 : Wind with Ice X (7psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.052	1.083
2	PS.1	X	.052	5.917
3	PS.2	X	.018	1.667
4	PS.2	X	.018	4.417
5	PS.3	X	.023	.667
6	PS.3	X	.023	5.333
7	PS.2R	X	.025	3
8	PS.2L	X	.031	3

Member Point Loads (BLC 5 : Wind X(28 psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	X	.116	1.083
2	PS.1	X	.116	5.917
3	PS.2	X	.037	1.667
4	PS.2	X	.037	4.417
5	PS.3	X	.037	.667
6	PS.3	X	.037	5.333
7	PS.2R	X	.046	3
8	PS.2L	X	.064	3

Member Point Loads (BLC 6 : Wind with Ice Z(7psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.112	1.083
2	PS.1	Z	.112	5.917
3	PS.2	Z	.035	1.667
4	PS.2	Z	.035	4.417
5	PS.3	Z	.04	.667

Member Point Loads (BLC 6 : Wind with Ice Z(7psf)) (Continued)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
6	PS.3	Z	.04	5.333
7	PS.2R	Z	.04	3
8	PS.2L	Z	.037	3

Member Point Loads (BLC 7 : Wind Z(28psf))

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	PS.1	Z	.328	1.083
2	PS.1	Z	.328	5.917
3	PS.2	Z	.092	1.667
4	PS.2	Z	.092	4.417
5	PS.3	Z	.096	.667
6	PS.3	Z	.096	5.333
7	PS.2R	Z	.092	3
8	PS.2L	Z	.083	3

Member Distributed Loads (BLC 4 : Wind with Ice X (7psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[f...	End Location[ft...
1	M1	X	.001	.001	0	0
2	M2	X	.001	.001	0	0
3	M4	X	.001	.001	0	0
4	M5	X	.001	.001	0	0
5	M9	X	.001	.001	0	0
6	M12	X	.001	.001	0	0
7	PS.2L	X	.001	.001	0	0
8	PS.2R	X	.001	.001	0	0
9	PS.1	X	.001	.001	0	0
10	PS.2	X	.001	.001	0	0
11	PS.3	X	.001	.001	0	0
12	M7	X	.0008	.0008	0	0
13	M8	X	.0008	.0008	0	0
14	M9	X	.0008	.0008	0	0
15	M10	X	.0008	.0008	0	0
16	M11	X	.0008	.0008	0	0
17	M13	X	.0008	.0008	0	0
18	M14	X	.0008	.0008	0	0
19	M15	X	.0008	.0008	0	0
20	M16	X	.0008	.0008	0	0

Member Distributed Loads (BLC 5 : Wind X(28 psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[f...	End Location[ft...
1	M1	X	.005	.005	0	0
2	M2	X	.005	.005	0	0
3	M4	X	.005	.005	0	0
4	M5	X	.005	.005	0	0
5	M9	X	.005	.005	0	0
6	M12	X	.005	.005	0	0
7	PS.2L	X	.005	.005	0	0
8	PS.2R	X	.005	.005	0	0
9	PS.1	X	.005	.005	0	0

Member Distributed Loads (BLC 5 : Wind X(28 psf)) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[f...	End Location[ft...
10	PS.2	X	.005	.005	0	0
11	PS.3	X	.005	.005	0	0
12	M7	X	.003	.003	0	0
13	M8	X	.003	.003	0	0
14	M9	X	.003	.003	0	0
15	M10	X	.003	.003	0	0
16	M11	X	.003	.003	0	0
17	M13	X	.003	.003	0	0
18	M14	X	.003	.003	0	0
19	M15	X	.003	.003	0	0
20	M16	X	.003	.003	0	0

Member Distributed Loads (BLC 6 : Wind with Ice Z(7psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[f...	End Location[ft...
1	M1	Z	.001	.001	0	0
2	M2	Z	.001	.001	0	0
3	M4	Z	.001	.001	0	0
4	M5	Z	.001	.001	0	0
5	M9	Z	.001	.001	0	0
6	M12	Z	.001	.001	0	0
7	PS.2	Z	.001	.001	0	1.667
8	PS.3	Z	.001	.001	0	.667
9	PS.2	Z	.001	.001	4.417	0
10	PS.3	Z	.001	.001	5.333	0
11	M7	Z	.0008	.0008	0	0
12	M8	Z	.0008	.0008	0	0
13	M9	Z	.0008	.0008	0	0
14	M10	Z	.0008	.0008	0	0
15	M11	Z	.0008	.0008	0	0
16	M13	Z	.0008	.0008	0	0
17	M14	Z	.0008	.0008	0	0
18	M15	Z	.0008	.0008	0	0
19	M16	Z	.0008	.0008	0	0
20	M3	Z	.001	.001	1	12
21	M6	Z	.001	.001	1	12

Member Distributed Loads (BLC 7 : Wind Z(28psf))

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[f...	End Location[ft...
1	M1	Z	.005	.005	0	0
2	M2	Z	.005	.005	0	0
3	M4	Z	.005	.005	0	0
4	M5	Z	.005	.005	0	0
5	PS.2	Z	.005	.005	0	1.667
6	PS.3	Z	.005	.005	0	.667
7	PS.2	Z	.005	.005	4.417	0
8	PS.3	Z	.005	.005	5.333	0
9	M9	Z	.005	.005	0	0
10	M12	Z	.005	.005	0	0
11	M7	Z	.003	.003	0	0
12	M8	Z	.003	.003	0	0
13	M9	Z	.003	.003	0	0

Member Distributed Loads (BLC 7 : Wind Z(28psf)) (Continued)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/ft,F,ksf]	Start Location[f...	End Location[ft...
14	M10	Z	.003	.003	0	0
15	M11	Z	.003	.003	0	0
16	M13	Z	.003	.003	0	0
17	M14	Z	.003	.003	0	0
18	M15	Z	.003	.003	0	0
19	M16	Z	.003	.003	0	0
20	M3	Z	.005	.005	0	0
21	M6	Z	.005	.005	0	0
22	M3	Z	.005	.005	0	0
23	M6	Z	.005	.005	0	0

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	J...	Point	Distribu...	Area(M...	Surface...
1	Self Weight	None		-1						
2	Dead Load	None					8			
3	Ice Load	None					8			
4	Wind with Ice X (7psf)	None					8	20		
5	Wind X(28 psf)	None					8	20		
6	Wind with Ice Z(7psf)	None					8	21		
7	Wind Z(28psf)	None					8	23		

Load Combinations

	Description	Solve	PDelta	...	B...	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-directi...	Yes	Y		1	1.2	2	1.2	5	1.6																
2	0.9D + 1.6W (X-directi...	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-directi...	Yes	Y		1	1.2	2	1.2	7	1.6																
5	0.9D + 1.6W (Z-directi...	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	-.29	5	1.175	6	3.368	3	0	6	0	6	0	6
2		min	-1.312	3	.371	2	.188	5	0	1	0	1	0	1
3	N14	max	1.073	6	1.334	3	-.702	2	0	6	0	6	0	6
4		min	-.389	2	.362	5	-3.209	6	0	1	0	1	0	1
5	N36	max	.088	2	.041	1	-.234	6	0	6	0	6	0	6
6		min	.013	6	.031	5	-1.543	2	0	1	0	1	0	1
7	Totals:	max	0	6	2.54	6	0	3						
8		min	-1.503	1	.807	2	-2.866	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
1	N5	max	.071	4	-.026	5	.498	5	8.261e-4	1	1.799e-2	5	3.066e-3	3
2		min	.025	6	-.203	3	.034	3	-6.968e-3	5	5.915e-4	3	2.169e-4	5
3	N18	max	.103	2	-.024	5	.411	4	1.028e-3	1	1.414e-2	4	2.775e-3	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
4		min	0	6	-.2	3	.039	3	5.163e-4	6	1.149e-3	3	-4.414e-4	2
5	N12	max	.071	4	-.025	5	.39	5	8.261e-4	1	1.799e-2	5	3.065e-3	3
6		min	.025	6	-.184	3	.031	3	-6.968e-3	5	5.915e-4	3	2.162e-4	5
7	N25	max	.103	2	-.025	5	.326	5	1.028e-3	1	1.414e-2	4	2.774e-3	6
8		min	0	6	-.184	3	.032	3	5.163e-4	6	1.149e-3	3	-4.421e-4	2
9	N27	max	.157	1	-.025	5	.753	5	8.248e-4	1	1.799e-2	5	3.658e-3	3
10		min	.077	5	-.185	3	.013	3	-1.28e-2	5	5.915e-4	3	2.159e-4	5
11	N29	max	.116	2	-.025	5	.347	4	1.028e-3	1	1.414e-2	4	2.774e-3	6
12		min	-.068	6	-.184	3	.046	3	5.163e-4	6	1.149e-3	3	-5.583e-4	2
13	N16	max	.103	2	-.022	5	.103	2	2.327e-3	3	6.717e-3	5	2.826e-3	3
14		min	0	6	-.104	3	.004	6	8.335e-4	5	5.949e-4	3	9.794e-5	5
15	N3	max	.071	4	-.013	5	.07	4	2.305e-3	3	9.776e-3	4	2.877e-3	6
16		min	.025	6	-.102	3	.016	3	-1.94e-3	5	1.145e-3	3	2.819e-5	2
17	N10	max	.038	1	-.017	5	.028	1	2.274e-3	3	7.369e-3	4	2.629e-3	6
18		min	.015	6	-.073	3	.007	6	-1.186e-3	5	1.067e-3	3	-5.914e-5	2
19	N23	max	.087	2	-.017	5	.087	2	2.257e-3	3	5.265e-3	5	2.374e-3	3
20		min	-.006	6	-.074	3	-.002	6	8.056e-4	5	5.195e-4	3	-9.611e-6	5
21	N38	max	.046	1	-.017	5	.006	1	-9.205e-4	6	7.111e-3	4	4.805e-4	6
22		min	.013	6	-.073	3	.001	6	-3.41e-3	1	1.001e-3	3	-1.636e-3	2
23	N36	max	0	6	0	6	0	6	1.294e-3	3	4.023e-4	1	6.069e-4	6
24		min	0	1	0	1	0	1	7.088e-4	5	1.106e-4	6	-1.396e-3	2
25	N44	max	.055	5	-.029	5	-.019	5	1.19e-3	1	1.954e-3	1	-7.954e-4	2
26		min	.007	6	-.11	3	-.047	1	6.966e-4	5	-1.167e-3	5	-9.896e-4	3
27	N45	max	.112	1	-.029	5	.046	1	1.322e-3	1	2.495e-3	2	-4.821e-4	5
28		min	.01	6	-.11	3	.014	6	4.801e-4	5	-6.508e-4	6	-9.164e-4	3
29	N30	max	.103	2	-.029	5	.033	4	1.322e-3	1	2.495e-3	2	-4.821e-4	5
30		min	0	6	-.11	3	.006	6	4.801e-4	5	-6.508e-4	6	-9.141e-4	3
31	N35	max	.071	4	-.029	5	-.006	5	1.19e-3	1	1.954e-3	1	-8.011e-4	5
32		min	.025	6	-.11	3	-.025	1	6.966e-4	5	-1.167e-3	5	-1.001e-3	1
33	N8	max	.007	3	-.011	5	0	3	7.591e-4	1	1.562e-4	3	4.401e-4	5
34		min	-.036	5	-.046	3	-.037	5	-2.751e-4	5	-4.417e-4	5	-9.072e-4	3
35	N21	max	.046	2	-.012	5	.046	2	7.473e-4	1	1.574e-3	2	-6.452e-4	5
36		min	-.011	6	-.053	3	-.007	6	1.886e-4	6	-2.059e-4	6	-1.115e-3	3
37	N6	max	.002	1	-.006	2	.001	1	3.693e-3	3	2.713e-4	1	1.368e-3	6
38		min	-.005	5	-.025	6	-.005	5	8.753e-4	5	-1.485e-3	5	-1.327e-4	2
39	N19	max	.009	2	-.007	2	.009	2	4.241e-3	3	2.086e-3	2	1.499e-3	6
40		min	-.002	6	-.028	6	0	6	1.261e-3	5	-3.772e-4	6	-1.385e-4	2
41	N41	max	.067	4	-.042	5	.025	5	9.317e-4	3	7.086e-4	1	1.346e-4	6
42		min	.027	6	-.136	3	-.071	1	5.531e-4	5	-5.817e-4	5	-2.329e-4	2
43	N43	max	.107	2	-.042	5	.048	4	9.305e-4	3	1.741e-3	2	1.241e-4	6
44		min	-.002	6	-.136	3	-.017	2	-1.542e-4	5	-2.557e-4	6	-3.084e-4	2
45	N1	max	0	6	0	6	0	6	4.386e-3	3	6.868e-4	1	1.79e-3	6
46		min	0	1	0	1	0	1	1.157e-3	5	-1.024e-3	5	-1.952e-5	2
47	N14	max	0	6	0	6	0	6	5.003e-3	3	2.301e-3	2	1.971e-3	6
48		min	0	1	0	1	0	1	1.426e-3	5	-3.257e-4	6	-3.232e-5	2
49	N31	max	.103	2	-.042	5	.049	4	9.305e-4	3	1.741e-3	2	1.241e-4	6
50		min	0	6	-.136	3	-.026	2	-1.687e-4	5	-2.557e-4	6	-2.939e-4	2
51	N37	max	.071	4	-.042	5	.035	5	9.318e-4	3	7.086e-4	1	1.346e-4	6
52		min	.025	6	-.136	3	-.056	1	6.108e-4	5	-5.817e-4	5	-2.906e-4	2
53	N7	max	.004	1	-.004	5	.003	5	4.061e-3	3	1.097e-3	1	1.907e-3	6
54		min	-.003	5	-.011	3	-.004	1	1.077e-3	5	-4.627e-4	5	1.129e-4	2
55	N20	max	.01	2	-.005	5	.002	6	4.627e-3	3	2.448e-3	2	2.06e-3	6

Envelope Joint Displacements (Continued)

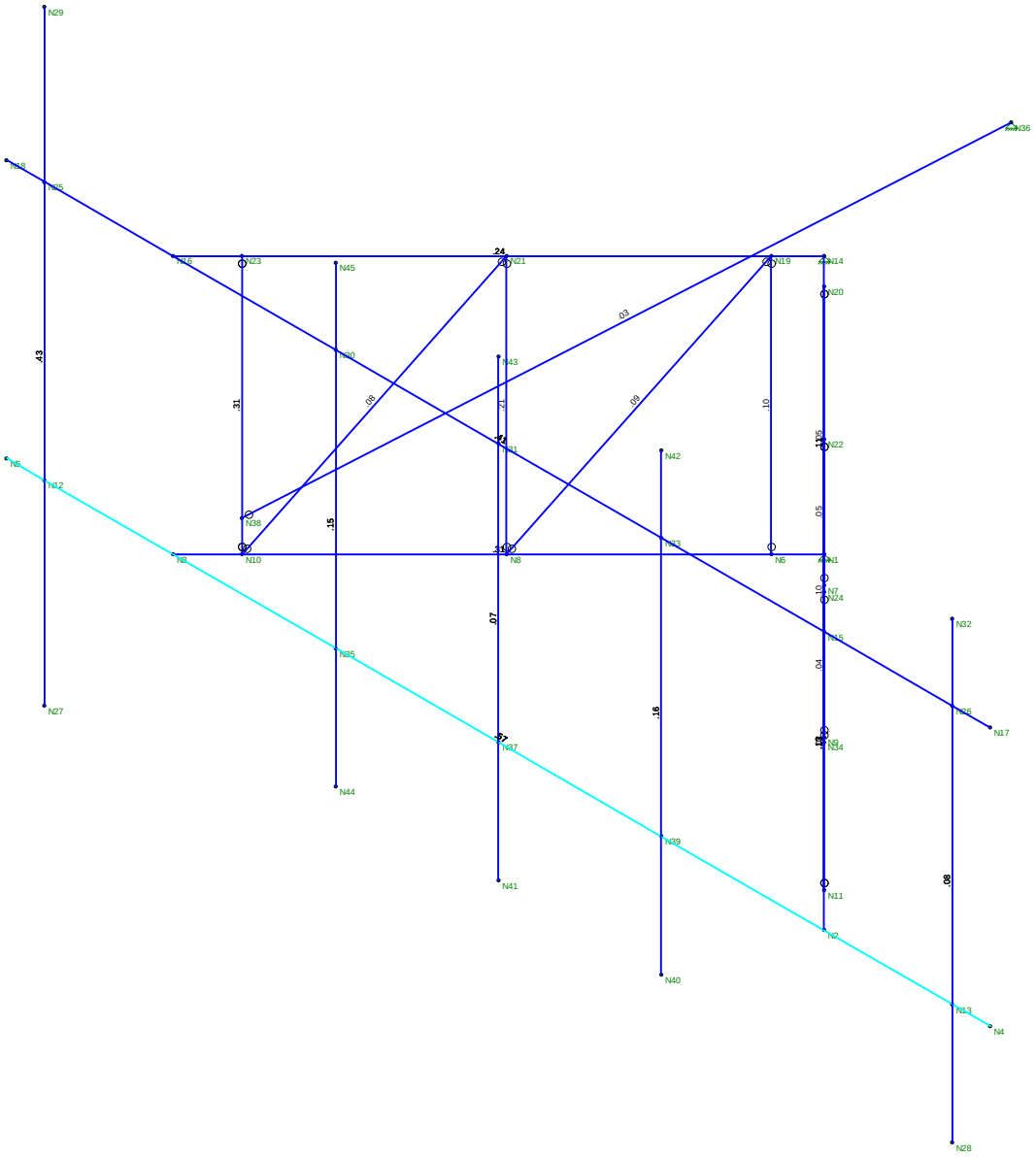
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [...	LC	Y Rotation [...	LC	Z Rotation [...	LC
56		min	0	6	-.013	3	-.01	2	1.282e-3	5	-2.589e-4	6	1.037e-4	2
57	N9	max	.035	1	-.008	5	-.012	6	2.603e-3	3	1.779e-3	4	2.403e-3	3
58		min	.01	6	-.022	3	-.037	1	6.053e-4	5	6.519e-4	6	4.546e-4	5
59	N22	max	.062	2	-.009	5	.005	6	2.567e-3	6	2.161e-3	2	2.796e-3	6
60		min	-.003	6	-.026	3	-.061	2	6.354e-4	2	6.11e-6	6	6.73e-4	2
61	N34	max	.036	1	-.008	5	-.013	6	2.601e-3	3	1.828e-3	4	2.375e-3	3
62		min	.01	6	-.022	3	-.038	1	6.088e-4	5	6.575e-4	6	4.394e-4	5
63	N33	max	.103	2	-.035	5	.016	6	1.137e-3	3	3.263e-3	4	1.724e-3	3
64		min	-.001	6	-.106	3	-.067	2	-3.742e-4	5	2.83e-4	3	3.527e-4	5
65	N39	max	.07	4	-.035	5	.003	5	1.241e-3	6	2.742e-3	5	1.754e-3	6
66		min	.025	6	-.106	3	-.064	1	1.468e-4	2	-6.245e-5	3	1.738e-4	2
67	N40	max	.082	4	-.035	5	-.005	5	1.241e-3	6	2.742e-3	5	1.754e-3	6
68		min	.058	6	-.106	3	-.069	1	1.468e-4	2	-6.245e-5	3	2.314e-4	2
69	N42	max	.099	2	-.035	5	.028	6	1.137e-3	3	3.263e-3	4	1.722e-3	6
70		min	-.022	6	-.106	3	-.065	2	-3.742e-4	5	2.83e-4	3	3.527e-4	5
71	N11	max	.062	1	-.012	5	-.026	6	2.848e-3	3	2.105e-3	4	1.188e-3	6
72		min	.022	6	-.035	3	-.064	1	4.404e-4	5	3.846e-4	3	2.263e-4	2
73	N24	max	.097	2	-.012	5	.004	6	2.88e-3	6	2.134e-3	5	1.264e-3	6
74		min	-.002	6	-.036	3	-.096	2	6.722e-4	2	7.339e-5	3	3.155e-4	2
75	N2	max	.07	4	-.012	5	-.028	6	2.58e-3	3	1.643e-3	4	1.185e-3	6
76		min	.025	6	-.045	3	-.069	4	1.643e-4	5	3.194e-4	3	4.019e-4	2
77	N15	max	.103	2	-.014	5	.004	6	2.608e-3	6	1.794e-3	5	1.219e-3	6
78		min	-.001	6	-.045	3	-.102	2	4.354e-4	2	-1.748e-5	6	4.687e-4	2
79	N13	max	.07	4	-.013	5	-.031	6	1.386e-3	3	1.032e-3	1	2.257e-4	6
80		min	.025	6	-.039	3	-.088	1	-1.44e-3	5	-9.071e-4	5	-4.175e-4	2
81	N26	max	.103	2	-.013	5	.015	6	1.671e-3	6	7.491e-4	2	2.726e-4	6
82		min	-.001	6	-.039	3	-.12	2	-5.376e-4	2	-8.778e-4	4	-7.58e-4	2
83	N28	max	.064	4	-.013	5	-.027	5	1.385e-3	3	1.032e-3	1	3.243e-4	3
84		min	.029	6	-.039	3	-.082	1	-2.125e-3	5	-9.071e-4	5	-3.525e-4	5
85	N32	max	.113	2	-.013	5	.035	6	1.695e-3	6	7.491e-4	2	2.727e-4	6
86		min	-.005	6	-.039	3	-.126	2	-5.376e-4	2	-8.778e-4	4	-8.051e-4	2
87	N4	max	.07	4	-.015	5	-.03	6	1.386e-3	3	1.032e-3	1	2.249e-4	6
88		min	.025	6	-.038	3	-.094	1	-1.44e-3	5	-9.108e-4	5	-4.181e-4	2
89	N17	max	.103	2	-.015	5	.02	6	1.671e-3	6	7.491e-4	2	2.717e-4	6
90		min	-.001	6	-.038	3	-.124	2	-5.376e-4	2	-8.815e-4	4	-7.587e-4	2

Envelope AISC 15th(360-16): LRFD Steel Code Checks

	Me...	Sha...	Code C...	Lo...	LC	Shea...	Loc...	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y...	phi*Mn...	Cb	Eqn
1	M1	PIP...	.308	5.45	5	.106	5.45		6	20.616	32.13	1.872	1.872	2.96	H1-1b
2	M2	PIP...	.126	.507	3	.111	2.9...		3	20.616	32.13	1.872	1.872	2.438	H1-1b
3	M3	PIP...	.574	2.1...	5	.254	2.1...		4	31.038	32.13	1.872	1.872	2.409	H1-1b
4	M4	PIP...	.235	.507	6	.115	0		6	20.616	32.13	1.872	1.872	2.09	H1-1b
5	M5	PIP...	.107	.507	3	.069	0		3	20.616	32.13	1.872	1.872	2.194	H1-1b
6	M6	PIP...	.414	2.1...	4	.108	2.1...		3	31.038	32.13	1.872	1.872	2.029	H1-1b
7	M7	PIP...	.055	3.4...	3	.015	3.4...		2	9.085	14.774	.465	.465	1.136	H1-1b*
8	M8	PIP...	.105	3.4...	3	.007	3.4...		2	9.083	14.774	.465	.465	1.136	H1-1b*
9	M9	PIP...	.015	3.4...	6	.008	3.4...		2	27.933	32.13	1.872	1.872	1	H1-1b*
10	M10	PIP...	.101	3.4...	6	.019	3.4...		2	9.085	14.774	.465	.465	1	H1-1b*
11	M11	PIP...	.208	1.8...	6	.016	0		2	9.085	14.774	.465	.465	1	H1-1a
12	M12	PIP...	.308	2.99	1	.163	3.4...		1	27.933	32.13	1.872	1.872	1.22	H1-1b

Envelope AISC 15th(360-16): LRFD Steel Code Checks (Continued)

	Me...	Sha...	Code C...	Lo...	LC	Shea...	Loc...	Dir	LC	phi*Pnc [k]	phi*Pnt [k]	phi*Mn y...	phi*Mn...	Cb	Eqn
13	M13	PIP...	.047	2.0...	3	.012	4.2...		4	7.044	14.774	.465	.465	1.136	H1-1b
14	M14	PIP...	.041	2.0...	3	.009	0		2	7.044	14.774	.465	.465	1.136	H1-1b
15	M15	PIP...	.089	2.1...	3	.016	0		1	7.044	14.774	.465	.465	1.136	H1-1b
16	M16	PIP...	.083	2.1...	3	.032	4.2...		5	7.044	14.774	.465	.465	1.136	H1-1b
17	PS...	PIP...	.156	1.6...	1	.045	1.6...		1	20.867	32.13	1.872	1.872	2.83	H1-1b
18	M18	PIP...	.029	4.8...	1	.002	0		6	39.704	65.205	5.749	5.749	1.136	H1-1b
19	PS...	PIP...	.149	5	6	.032	3.0...		6	20.867	32.13	1.872	1.872	2.34	H1-1b
20	PS.1	PIP...	.426	2.5...	4	.121	2.5...		5	14.916	32.13	1.872	1.872	2.109	H1-1b
21	PS.2	PIP...	.070	1.6...	2	.033	1.6...		2	20.867	32.13	1.872	1.872	2.437	H1-1b
22	PS.3	PIP...	.078	1.5...	4	.018	5		3	20.867	32.13	1.872	1.872	2.499	H1-1b



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		SK - 1
FJP	CT11580A - AMA	Oct 12, 2021 at 11:19 AM
21005.37	Member Unity Check	CT11580A_AMA.r3d

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

150' Existing Guyed Lattice Tower

Proposed T-Mobile
Antenna Upgrade

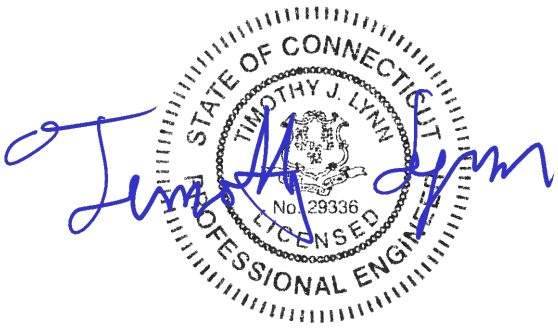
T-Mobile Site Ref: CT11580A

130 Vernon Road
Bolton, CT 06043

Centek Project No. 21005.37

~~Date: September 9, 2021~~
Rev.1: October 12, 2021

Max Stress Ratio = 55.9%



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 existing guyed lattice tower located in Bolton, CT.

The host tower is a 150-ft, three legged, guyed lattice tower. The original tower design documents were unavailable for use in this report. The tower geometry, structure member sizes and foundation information were obtained from a previous structural report prepared by Centek job no. 20074.29 dated June 10, 2020.

Antenna and appurtenance information were obtained from the aforementioned structural report and a T-Mobile RF data sheet.

The tower consists of eight (8) straight and one (1) tapered base vertical sections consisting of solid round legs steel grade of ASTM A572-50. Diagonal and horizontal lateral support bracing consists of solid round steel grade of ASTM A572-50. The vertical tower sections are connected by bolted sleeves with the diagonal and horizontal bracing to legs consisting of welded connections. The width of the tower face is 3.75-ft throughout its length.

Antenna and Appurtenance Summary

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

- **SPRINT (EXISTING TO REMOVE):**
  Antennas: Three (3) RFS APXVSPP18 panel antennas, three (3) Commscope DT465B-2XR panel antennas, six (6) 800MHz RRHs, three (3) 1900MHz RRHs and three (3) TD-RRH8x20-25 remote radio heads mounted on three (3) 12-ft T-frames with a RAD center elevation of 148-ft above grade.
  Cables: Four (4) 1-1/4" ∅ fiber cables running on a leg/face of the existing tower as specified in Section 3 of this report.
- **T-MOBILE (EXISTING TO RELOCATE):**
  Antennas: Three (3) RFS APXVAARR24_43 panel antennas and three (3) AIR6449 panel antennas relocated to three (3) V-Frames with a RAD center elevation of 148-ft above the existing tower base,
- **T-MOBILE (EXISTING TO REMOVE):**
  Antennas: Three (3) Ericsson AIR32 panel antennas, three (3) Ericsson 4449 B71 B12 remote radio units and six (6) Ericsson 4415 remote radio units mounted three (3) V-Frames with a RAD center elevation of 130-ft above the existing tower base. Remove antenna mounts.
  Cables: Three (3) 6x12 fiber cables running on the exterior of the existing tower.

- **T-MOBILE (PROPOSED):**
  Antennas: Three (3) Commscope VV-65A-R1 panel antenna, three (3) Ericsson 4480 B71+B85 remote radio units and three (3) Ericsson 4460 B25+B66 remote radio units mounted three (3) V-Frames with a RAD center elevation of 148-ft above the existing tower base.
  Cables: Three (3) 6x12 fiber cables running on the exterior of the existing tower.

Primary Assumptions Used in the Analysis

- The tower structure's theoretical capacity not including any assessment of the condition of the tower.
- The tower carries the horizontal and vertical loads due to the weight of antennas, ice load and wind.
- Tower is properly installed and maintained.
- Tower is in plumb condition.
- Tower loading for antennas and mounts as listed in this report.
- All bolts are appropriately tightened providing the necessary connection continuity.
- All welds are fabricated with ER-70S-6 electrodes.
- All members are assumed to be as specified in the original tower design documents.
- All members are "hot dipped" galvanized in accordance with ASTM A123 and ASTM A153 Standards.
- All member protective coatings are in good condition.
- All tower members were properly designed, detailed, fabricated, installed and have been properly maintained since erection.
- Any deviation from the analyzed antenna loading will require a new analysis for verification of structural adequacy.
- All coax cables routed as specified in Section 3 of this report.

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 1.00" radial ice on the tower structure and its components.

Basic Wind Speed:	Tolland County; v = 95-105 mph (3-second gust)	*[Annex B of TIA-222-G-2005]*
	Bolton; v = 97 mph (3 second gust)	*[Appendix N of the 2018 CT Building Code]*
Load Cases:	Load Case 1; 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]*
	Load Case 2; 50 mph wind speed w/ 1.00" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

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

Tower Capacity

- Calculated stresses were found to be within allowable limits. This tower was found to be at **55.9%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T7)	20'-0" - 40'-0"	24.6%	**PASS**
Diagonal (T9)	0'-0" - 5'-0"	35.0%	**PASS**
Bottom Girt (T8)	5'-0" - 20'-0"	36.8%	**PASS**
Guy C @ 210-ft radius (T2)	138-ft	55.9%	**PASS**

Foundations and Anchorage

The existing tower base foundation consists of a 2.5-ft diameter x 2.25-ft long reinforced concrete pier on a 7-ft square x 1.25-ft thick reinforced concrete pad bearing directly on the existing sub grade. Additionally, guy wire loading is transferred to three (3) concrete support blocks anchored to rock with (2) 1-3/8" diameter rock anchors per block. The sub-grade conditions used as the basis for the foundation analysis were derived from the aforementioned structural report.

- The worst case tower base and guy anchor reactions developed from the governing Load Case 1 were used in the verification of the anchorage foundations:

Tower Guy Reactions	
Vector	**Inner**
Horizontal (In Plane of GW)	28 kips
Horizontal (Out of Plane of GW)	1 kips
Vertical	17 kips
Resultant Force at end of Guy Wire	33 kips
Tower Base Reactions	
Vector	**Proposed Reaction**
Horizontal Shear	1.0 kips
Axial Compression	105.0 kips

Foundation	Design Limit	FS[(1)]	Proposed Loading (FS)[(1)]	Result
Reinf. Conc. Anchor Block w/ Rock Anchors	Steel Strength	1.0	4.1	**PASS**
	Bond Strength	1.0	11.6	**PASS**
		Ultimate Bearing	**Proposed**	
Base Foundation	Bearing	8.0 ksf	2.36 ksf	**PASS**

Note 1: FS denotes 'Factor of Safety'.

C o n c l u s i o n

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

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

Prepared by:

Fernando J. Palacios
Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

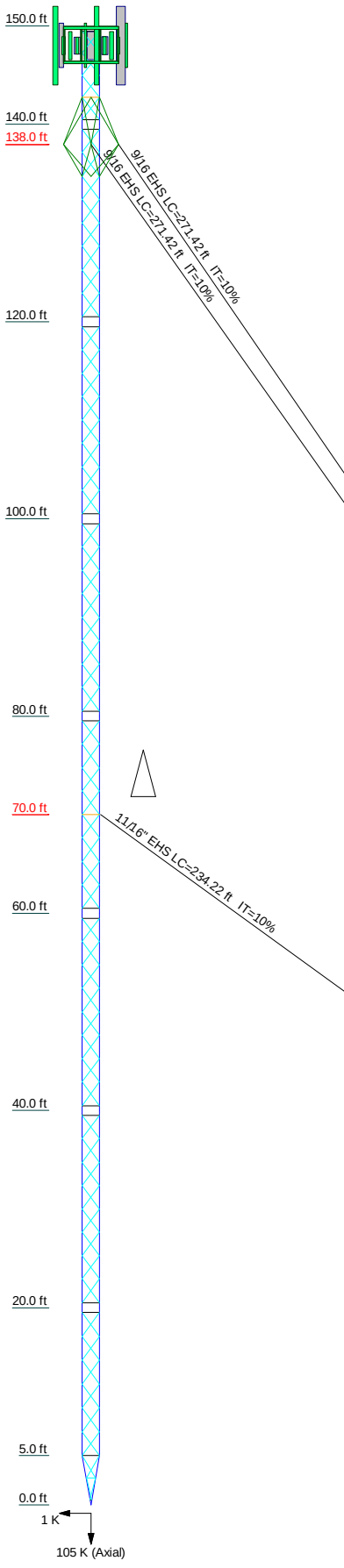
GENERAL DESCRIPTION OF STRUCTURAL ANALYSIS PROGRAM

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

tnxTower Features:

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

Section	T1	T2	T3	T4	T5	T6	T7	T8	T9	
Legs		SR 2			SR 2 1/4			SR 2 1/2		
Leg Grade					A572-50					
Diagonals					SR 3/4					
Diagonal Grade					A572-50					
Top Girts					SR 3/4				N.A.	
Bottom Girts					SR 3/4					
Horizontals					N.A.				4x1/2	
Top Guy Pull-Offs			N.A.		SR 1 1/4		N.A.			
Face Width (ft)					3.75					
# Panels @ (ft)	4 @ 2.25			48 @ 2.375				6 @ 2.41667	A	
Weight (K)	0.6	2.1	1.0	1.2	1.2	1.2	1.2	1.0	0.4	9.7



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
APXVAARR24_43-U-NA20 (T-Mobile)	148	4480 b71+b85 (T-Mobile)	148
APXVAARR24_43-U-NA20 (T-Mobile)	148	4460 B25+B60 (T-Mobile)	148
APXVAARR24_43-U-NA20 (T-Mobile)	148	4460 B25+B60 (T-Mobile)	148
AIR6449 (T-Mobile)	148	4460 B25+B60 (T-Mobile)	148
AIR6449 (T-Mobile)	148	PiROD 13' Lightweight T-Frame (T-Mobile)	148
AIR6449 (T-Mobile)	148	PiROD 13' Lightweight T-Frame (T-Mobile)	148
VV-65A-R1 (T-Mobile)	148	PiROD 13' Lightweight T-Frame (T-Mobile)	148
VV-65A-R1 (T-Mobile)	148		
VV-65A-R1 (T-Mobile)	148		
4480 b71+b85 (T-Mobile)	148		
4480 b71+b85 (T-Mobile)	148		

SYMBOL LIST

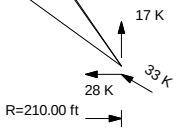
MARK	SIZE	MARK	SIZE
A	2 @ 2.25		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-50	50 ksi	65 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 1.00 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 55.9%



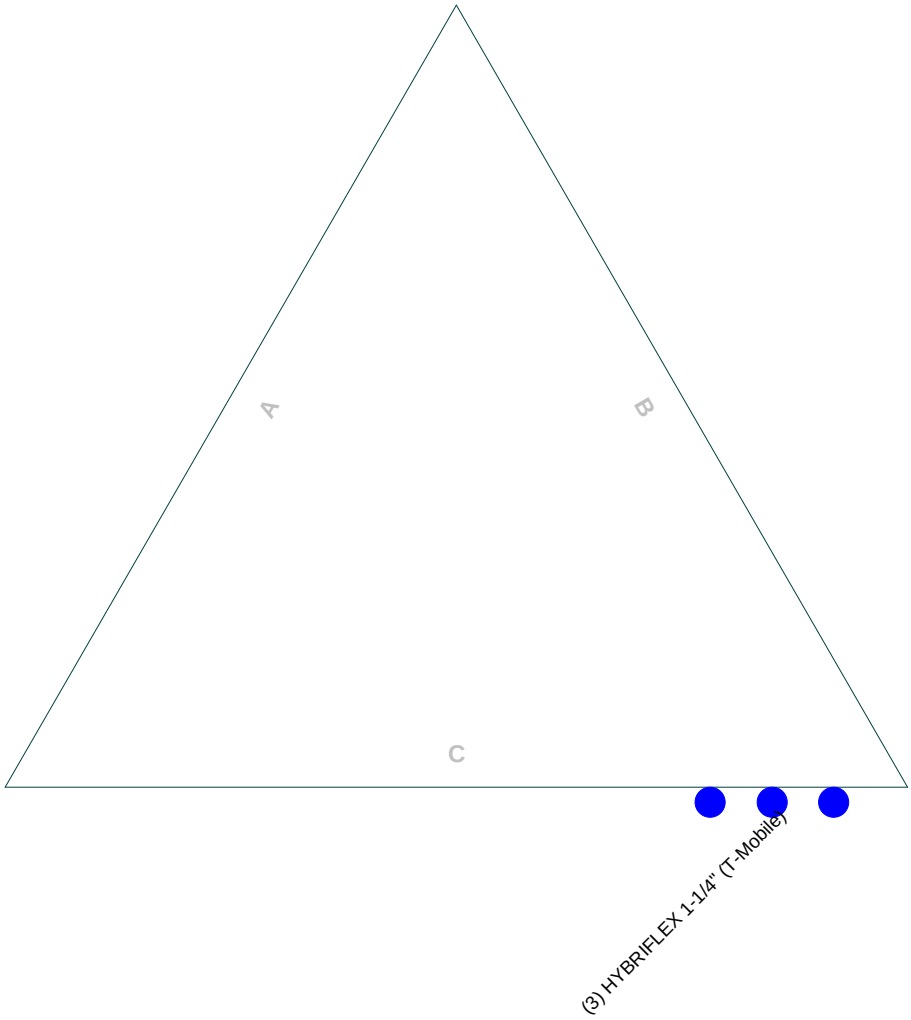
ALL REACTIONS ARE FACTORED

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

Job:	***21005.37 - CT11580A***		
Project:	***150' Guyed Tower - 130 Vernon Road Bolton, CT***		
Client: T-Mobile	Drawn by: FJP	App'd:	
Code: TIA-222-G	Date: 10/12/21	Scale: NTS	
Path:		Dwg No. E-1	

Feed Line Plan

Round Flat App In Face App Out Face



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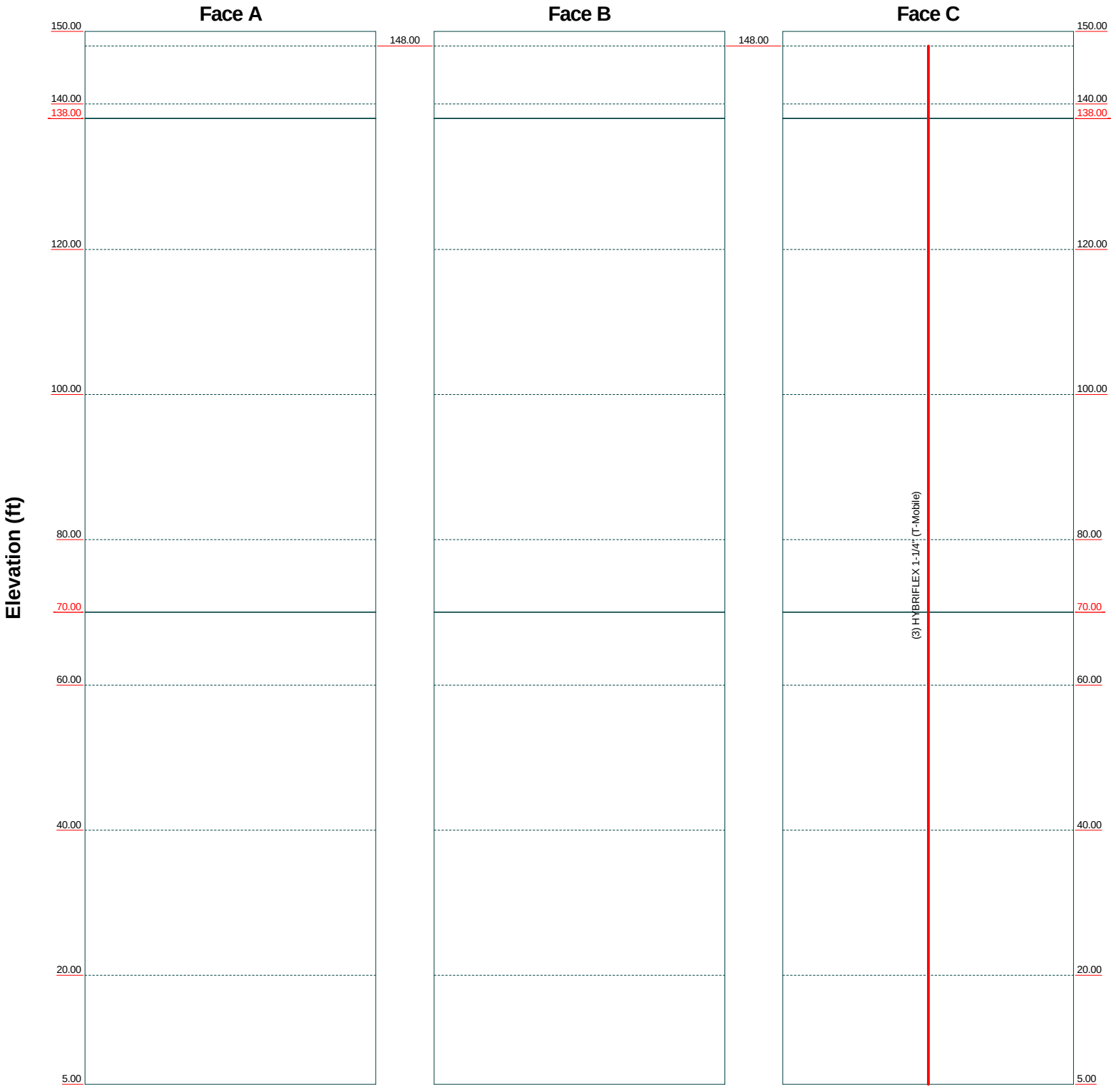
Project:	***150' Guyed Tower - 130 Vernon Road Bolton, CT***		
Client: T-Mobile	Drawn by: FJP	App'd:	
Code: TIA-222-G	Date: 10/12/21	Scale: NTS	
Path:		Dwg No. E-7	

Feed Line Distribution Chart
5' - 150'

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



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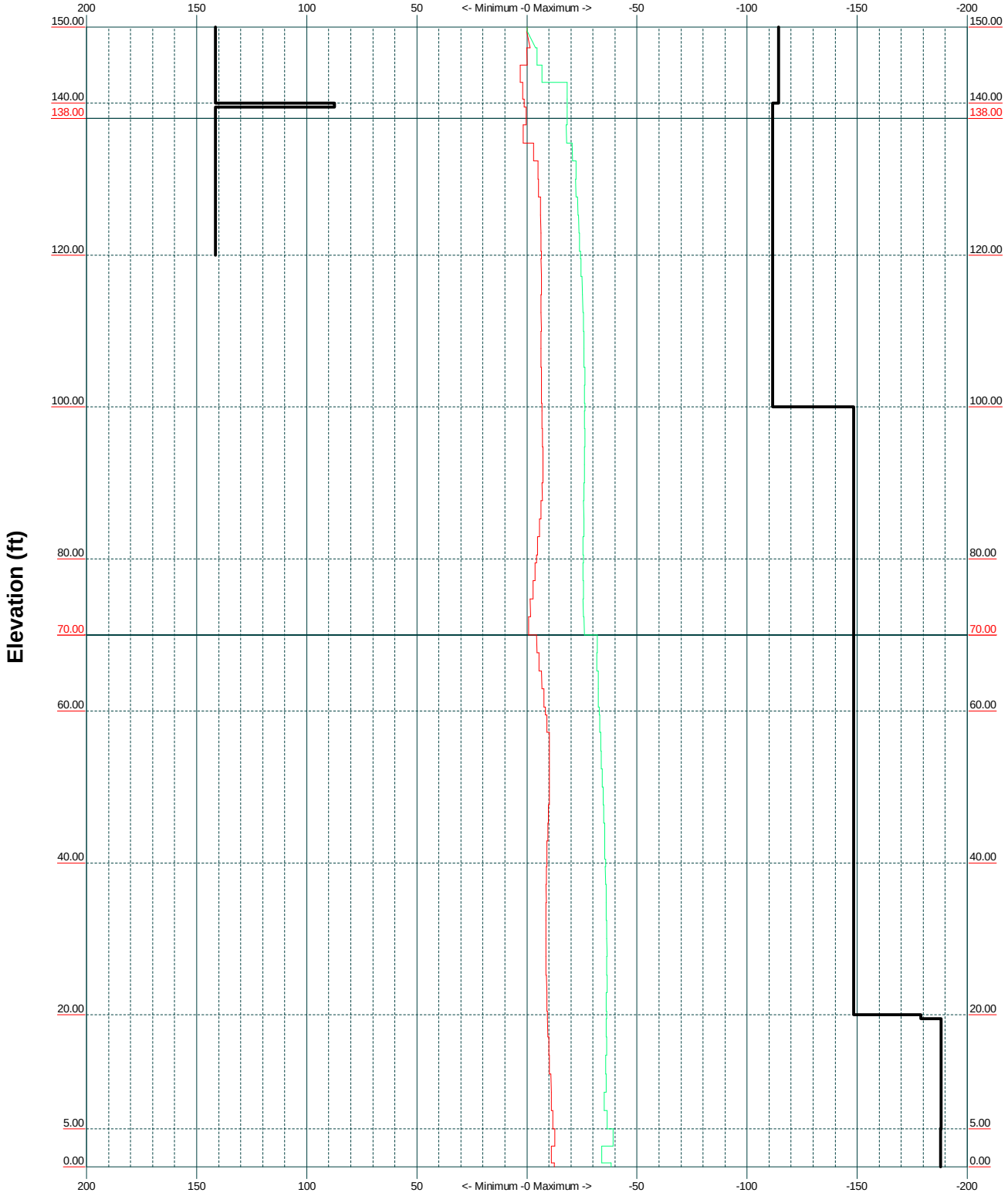
Client: T-Mobile	Drawn by: FJP	App'd:	
Code: TIA-222-G	Date: 10/12/21	Scale: NTS	
Path:		Dwg No. E-7	

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure C

Leg Capacity ——— **Leg Compression (K)**



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Job:	***21005.37 - CT11580A***		
Project:	***150' Guyed Tower - 130 Vernon Road Bolton, CT***		
Client: T-Mobile	Drawn by: FJP	App'd:	
Code: TIA-222-G	Date: 10/12/21	Scale: NTS	
Path:		Dwg No. E-3	

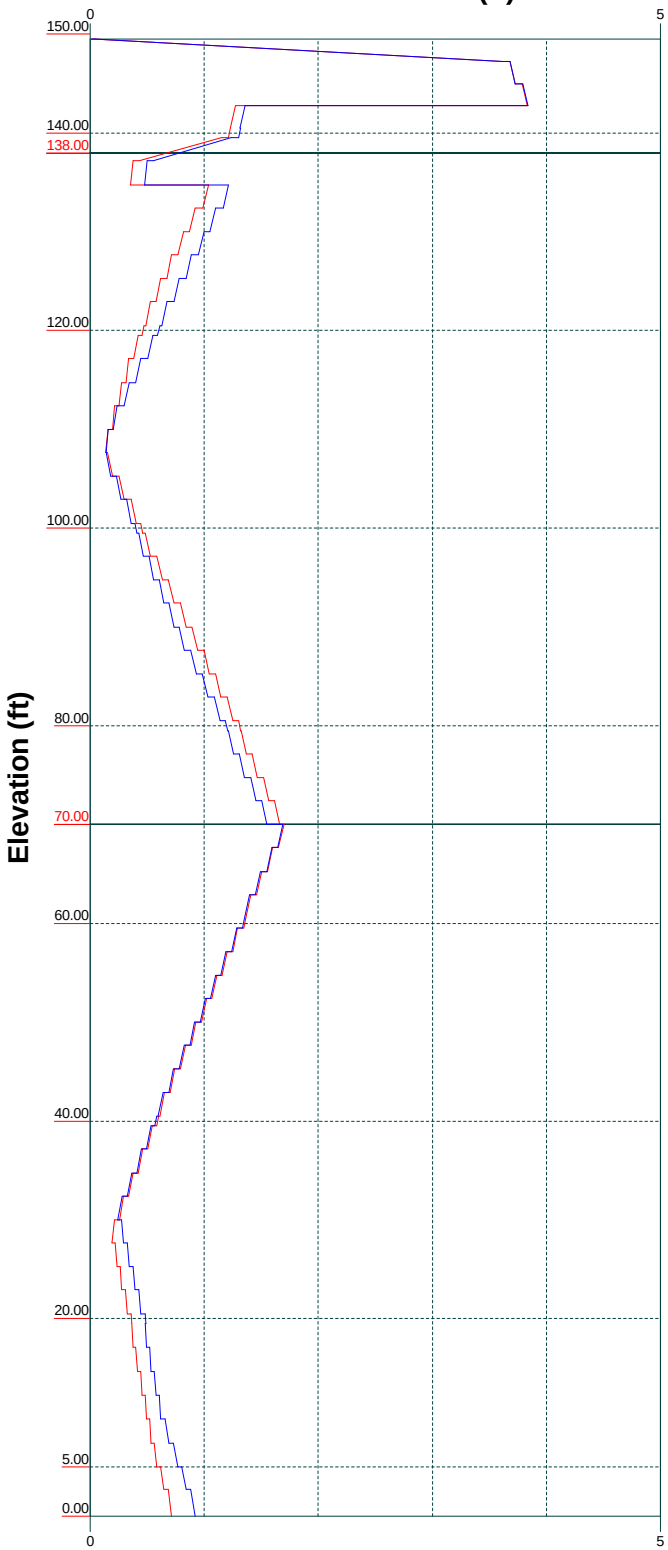
TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure C

Vx Vz

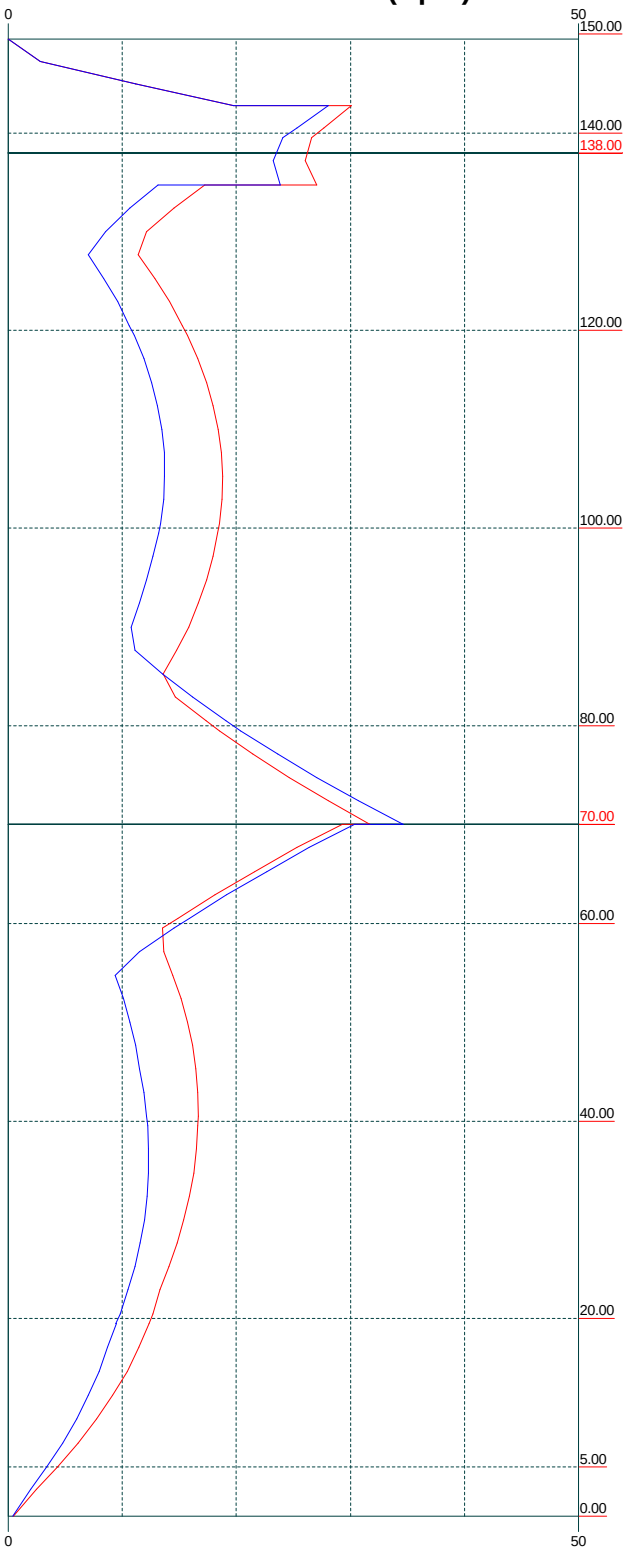
Maximum Values

Mx Mz

Global Mast Shear (K)



Global Mast Moment (kip-ft)



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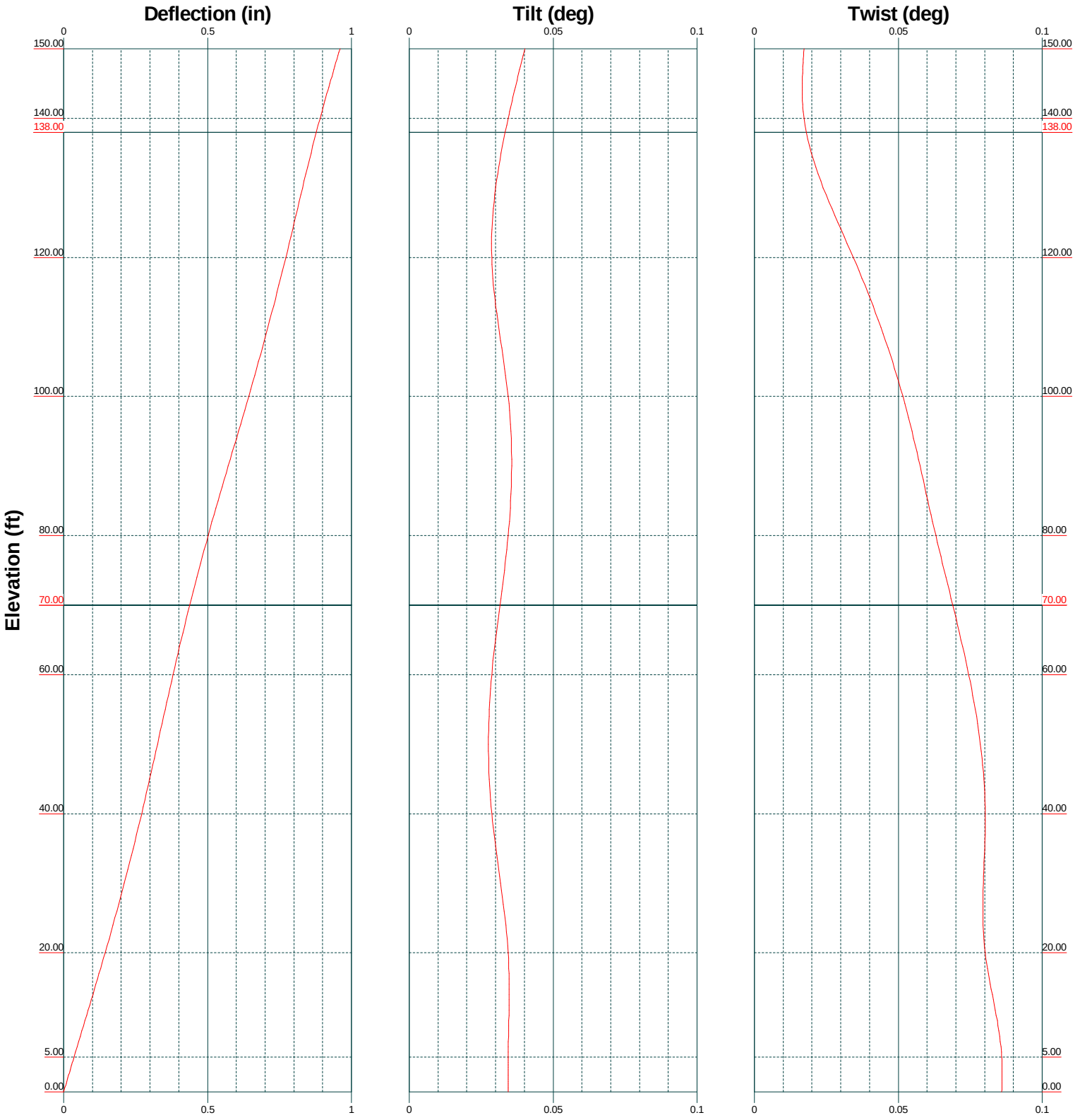
Job: ***21005.37 - CT11580A***			
Project: ***150' Guyed Tower - 130 Vernon Road Bolton, CT***			
Client: T-Mobile	Drawn by: FJP	App'd:	
Code: TIA-222-G	Date: 10/12/21	Scale: NTS	
Path:		Dwg No. E-4	

TIA-222-G - Service - 60 mph

Maximum Values



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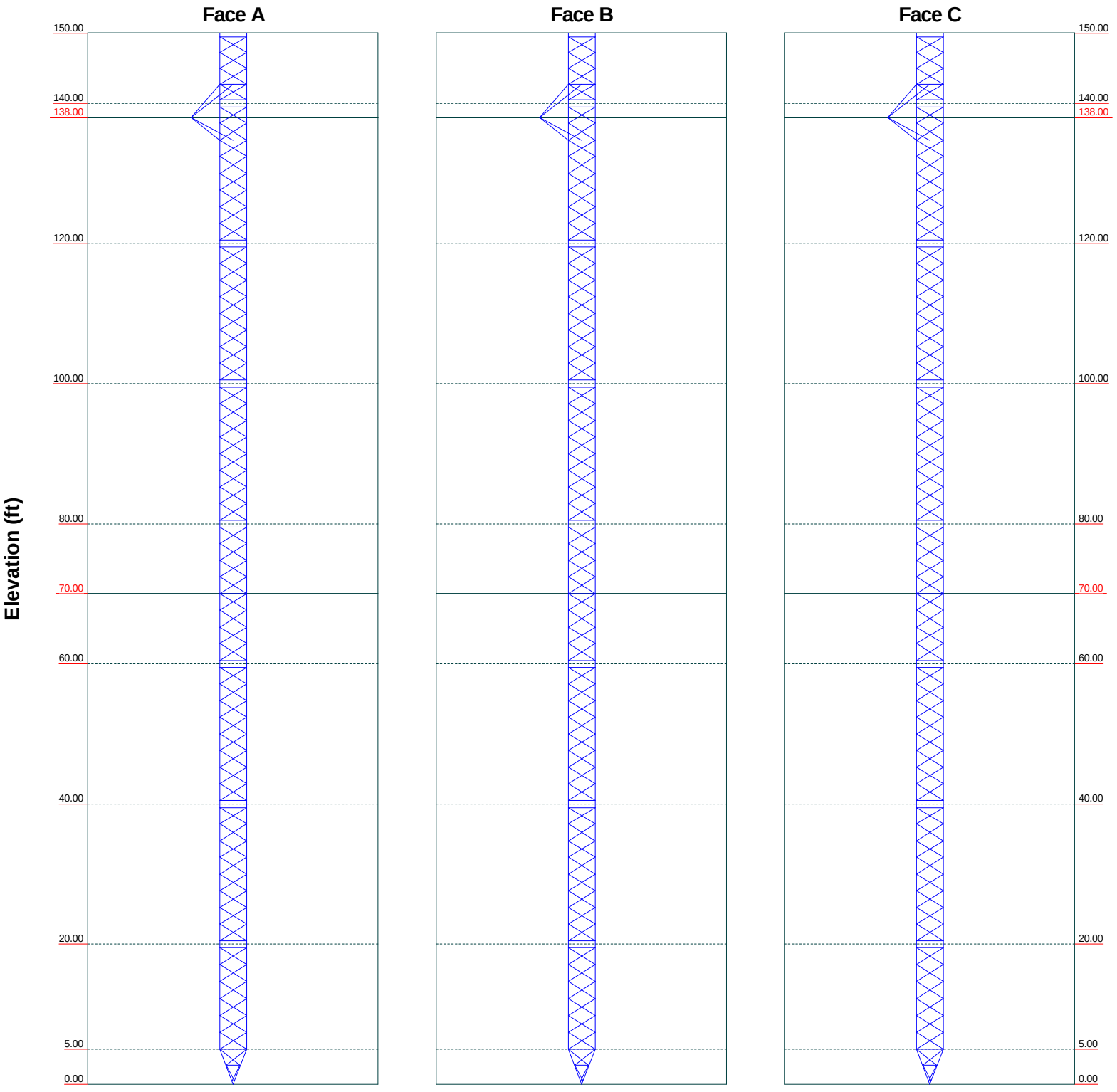
Job: ***21005.37 - CT11580A***			
Project: ***150' Guyed Tower - 130 Vernon Road Bolton, CT***			
Client: T-Mobile	Drawn by: FJP	App'd:	
Code: TIA-222-G	Date: 10/12/21	Scale: NTS	
Path:		Dwg No. E-5	

Stress Distribution Chart
0' - 150'

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



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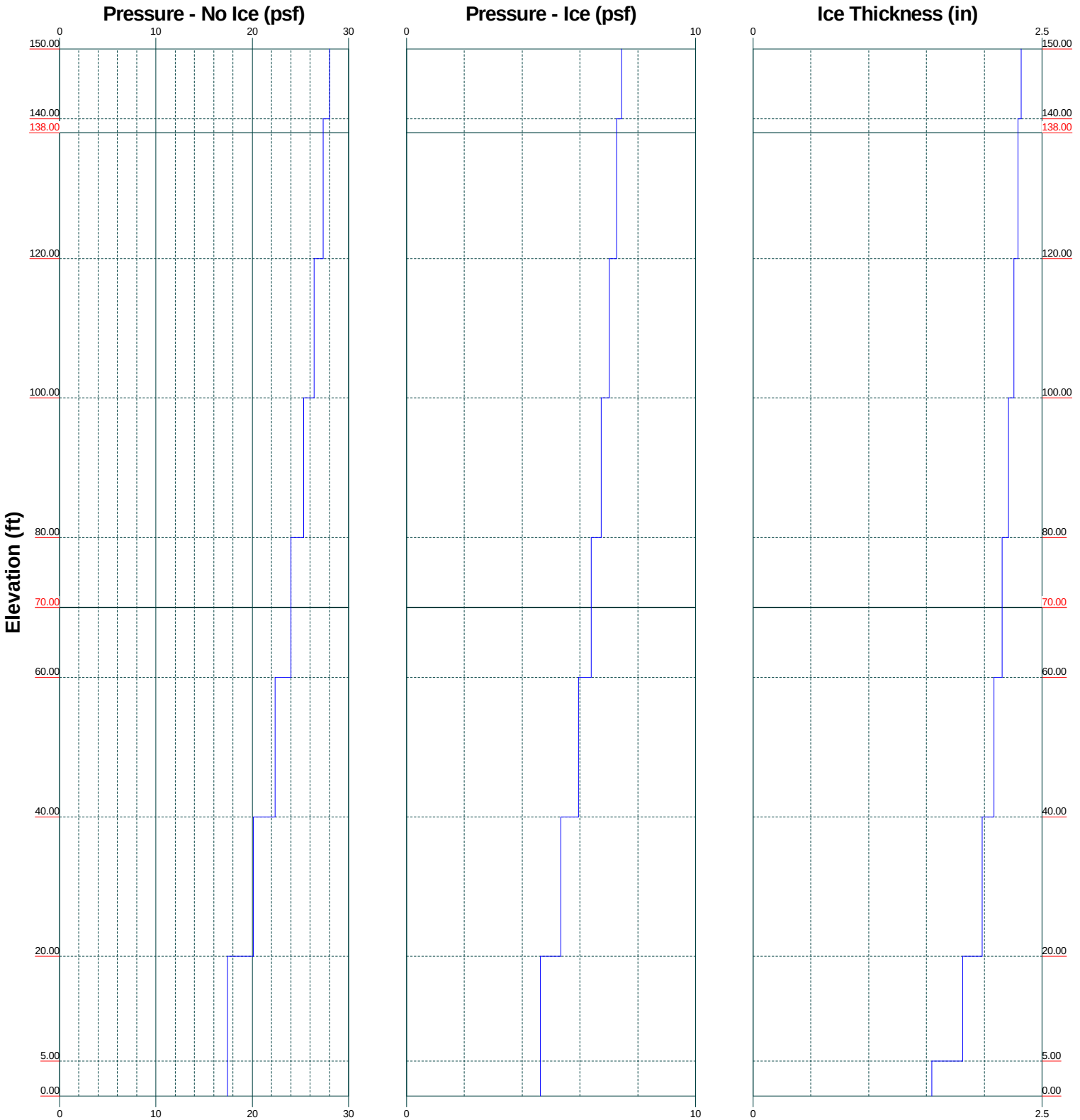
Client: T-Mobile	Drawn by: FJP	App'd:
Code: TIA-222-G	Date: 10/12/21	Scale: NTS
Path:		Dwg No. E-8

Wind Pressures and Ice Thickness

TIA-222-G - 97 mph/50 mph 1.0000 in Ice Exposure C



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Job: ***21005.37 - CT11580A***		
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Client: T-Mobile	Drawn by: FJP	App'd:
Code: TIA-222-G	Date: 10/12/21	Scale: NTS
Path:		Dwg No. E-9

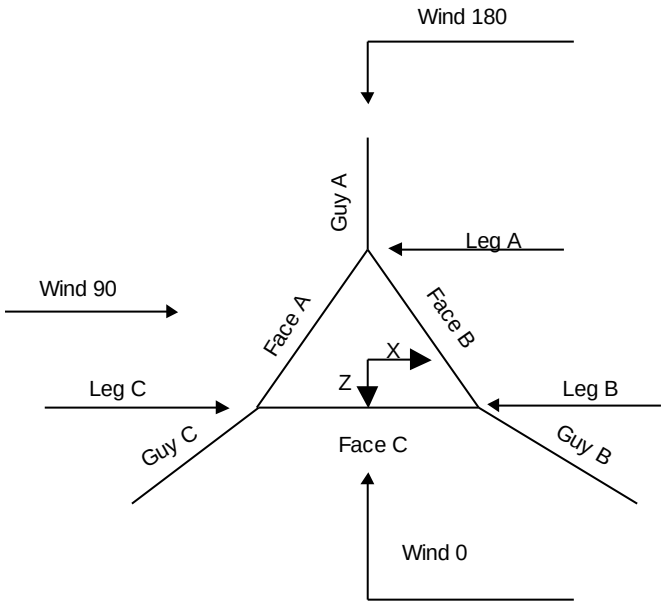
Tower Input Data

The main tower is a 3x guyed tower with an overall height of 150.00 ft above the ground line.
The base of the tower is set at an elevation of 0.00 ft above the ground line.
The face width of the tower is 3.75 ft at the top and tapered at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

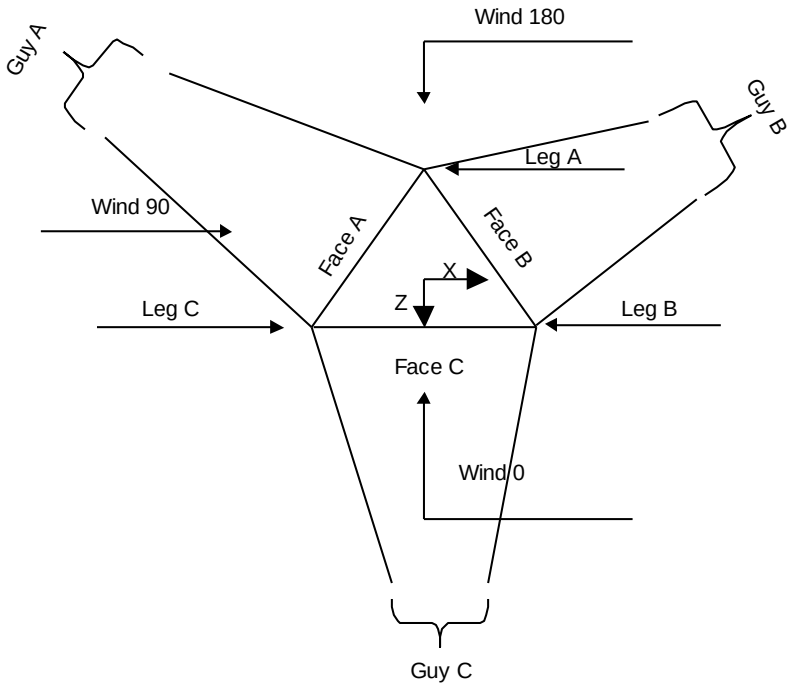
Basic wind speed of 97 mph.
Structure Class II.
Exposure Category C.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 1.0000 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Safety factor used in guy design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	Consider Moments - Legs		Distribute Leg Loads As Uniform		Use ASCE 10 X-Brace Ly Rules
	Consider Moments - Horizontals		Assume Legs Pinned		Calculate Redundant Bracing Forces
	Consider Moments - Diagonals	√	Assume Rigid Index Plate		Ignore Redundant Members in FEA
	Use Moment Magnification	√	Use Clear Spans For Wind Area	√	SR Leg Bolts Resist Compression
√	Use Code Stress Ratios	√	Use Clear Spans For KL/r	√	All Leg Panels Have Same Allowable
√	Use Code Safety Factors - Guys	√	Retension Guys To Initial Tension		Offset Girt At Foundation
	Escalate Ice		Bypass Mast Stability Checks	√	Consider Feed Line Torque
	Always Use Max Kz	√	Use Azimuth Dish Coefficients		Include Angle Block Shear Check
	Use Special Wind Profile	√	Project Wind Area of Appurt.		Use TIA-222-G Bracing Resist. Exemption
√	Include Bolts In Member Capacity	√	Autocalc Torque Arm Areas		Use TIA-222-G Tension Splice Exemption
√	Leg Bolts Are At Top Of Section		Add IBC .6D+W Combination		Poles
	Secondary Horizontal Braces Leg	√	Sort Capacity Reports By Component		Include Shear-Torsion Interaction
	Use Diamond Inner Bracing (4 Sided)		Triangulate Diamond Inner Bracing		Always Use Sub-Critical Flow
√	SR Members Have Cut Ends		Treat Feed Line Bundles As Cylinder		Use Top Mounted Sockets
	SR Members Are Concentric		Ignore KL/ry For 60 Deg. Angle Legs		Pole Without Linear Attachments
					Pole With Shroud Or No Appurtenances
					Outside and Inside Corner Radii Are Known



Corner & Starmount Guyed Tower



Face Guyed

Tower Section Geometry

Tower Section	Tower Elevation	Assembly Database	Description	Section Width	Number of Sections	Section Length
	ft			ft		ft
T1	150.00-140.00			3.75	1	10.00
T2	140.00-120.00			3.75	1	20.00
T3	120.00-100.00			3.75	1	20.00
T4	100.00-80.00			3.75	1	20.00
T5	80.00-60.00			3.75	1	20.00
T6	60.00-40.00			3.75	1	20.00
T7	40.00-20.00			3.75	1	20.00
T8	20.00-5.00			3.75	1	15.00
T9	5.00-0.00			3.75	1	5.00

Tower Section Geometry *(cont'd)*

Tower Section	Tower Elevation ft	Diagonal Spacing ft	Bracing Type	Has K Brace End Panels	Has Horizontals	Top Girt Offset in	Bottom Girt Offset in
T1	150.00-140.00	2.25	X Brace	No	Steps	6.0000	6.0000
T2	140.00-120.00	2.38	X Brace	No	Steps	6.0000	6.0000
T3	120.00-100.00	2.38	X Brace	No	Steps	6.0000	6.0000
T4	100.00-80.00	2.38	X Brace	No	Steps	6.0000	6.0000
T5	80.00-60.00	2.38	X Brace	No	Steps	6.0000	6.0000
T6	60.00-40.00	2.38	X Brace	No	Steps	6.0000	6.0000
T7	40.00-20.00	2.38	X Brace	No	Steps	6.0000	6.0000
T8	20.00-5.00	2.42	X Brace	No	Steps	6.0000	0.0000
T9	5.00-0.00	2.25	X Brace	No	Yes	0.0000	6.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 150.00-140.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 140.00-120.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T3 120.00-100.00	Solid Round	2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T4 100.00-80.00	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T5 80.00-60.00	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T6 60.00-40.00	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T7 40.00-20.00	Solid Round	2 1/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T8 20.00-5.00	Solid Round	2 1/2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T9 5.00-0.00	Solid Round	2 1/2	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T1 150.00-140.00	Solid Round	3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T2 140.00-120.00	Solid Round	3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T3 120.00-100.00	Solid Round	3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T4 100.00-80.00	Solid Round	3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T5 80.00-60.00	Solid Round	3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T6 60.00-40.00	Solid Round	3/4	A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)
T7 40.00-20.00	Solid Round	3/4	A572-50	Solid Round	3/4	A572-50

Tower Elevation ft	Top Girt Type	Top Girt Size	Top Girt Grade	Bottom Girt Type	Bottom Girt Size	Bottom Girt Grade
T8 20.00-5.00	Solid Round	3/4	(50 ksi) A572-50 (50 ksi)	Solid Round	3/4	(50 ksi) A572-50 (50 ksi)
T9 5.00-0.00	Solid Round		A572-50 (50 ksi)	Solid Round	3/4	A572-50 (50 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T9 5.00-0.00	None	Solid Round		A572-50 (50 ksi)	Flat Bar	4x1/2	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Gusset Area (per face) ft^2	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
T1 150.00-140.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 140.00-120.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 120.00-100.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 60.00-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T7 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T8 20.00-5.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T9 5.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

K Factors[1]

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	Legs	X Brace Diags X Y	K Brace Diags X Y	Single Diags X Y	Girts X Y	Horiz. X Y	Sec. Horiz. X Y	Inner Brace X Y
T1	Yes	Yes	1	1	1	1	1	1	1	1
150.00-140.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
140.00-120.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
120.00-100.00				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
100.00-80.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T6	Yes	Yes	1	1	1	1	1	1	1	1
60.00-40.00				1	1	1	1	1	1	1
T7	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T8 20.00-5.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1
T9 5.00-0.00	Yes	Yes	1	1	1	1	1	1	1	1
				1	1	1	1	1	1	1

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

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
150.00-140.00														
T2	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
140.00-120.00														
T3	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
120.00-100.00														
T4	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
100.00-80.00														
T5 80.00-60.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 60.00-40.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 40.00-20.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 20.00-5.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 5.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T1	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
150.00-140.00														

Tower Elevation ft	Redundant Horizontal		Redundant Diagonal		Redundant Sub-Diagonal		Redundant Sub-Horizontal		Redundant Vertical		Redundant Hip		Redundant Hip Diagonal	
	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U	Net Width Deduct in	U
T2 140.00-120.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T3 120.00-100.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T4 100.00-80.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T5 80.00-60.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T6 60.00-40.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T7 40.00-20.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T8 20.00-5.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75
T9 5.00-0.00	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75	0.0000	0.75

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Connection Type	Leg		Diagonal		Top Girt		Bottom Girt		Mid Girt		Long Horizontal		Short Horizontal	
		Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.	Bolt Size in	No.
T1 150.00-140.00	Sleeve SS	0.0000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T2 140.00-120.00	Sleeve SS	0.6250 A325N	5	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T3 120.00-100.00	Sleeve SS	0.6250 A325N	5	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T4 100.00-80.00	Sleeve SS	0.7500 A325N	5	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T5 80.00-60.00	Sleeve SS	0.7500 A325N	5	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T6 60.00-40.00	Sleeve SS	0.7500 A325N	5	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T7 40.00-20.00	Sleeve SS	0.7500 A325N	5	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T8 20.00-5.00	Sleeve SS	0.7500 A325N	5	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0
T9 5.00-0.00	Sleeve SS	0.0000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325X	0	0.5000 A325N	0	0.6250 A325X	0

Guy Data

Guy Elevation ft	Guy Grade		Guy Size	Initial Tension K	%	Guy Modulus ksi	Guy Weight plf	L_u ft	Anchor Radius ft	Anchor Azimuth Adj. °	Anchor Elevation ft	End Fitting Efficiency %
138	EHS	A	9/16	3.50	10%	21000	0.671	256.30	210.00	0.0000	-14.00	100%
		B	9/16	3.50	10%	21000	0.671	268.63	210.00	0.0000	-34.00	100%
		C	9/16	3.50	10%	21000	0.671	271.20	210.00	0.0000	-38.00	100%

70	EHS	A	11/16"	5.00	10%	19000	1.000	223.97	210.00	0.0000	-14.00	100%
		B	11/16"	5.00	10%	19000	1.000	232.20	210.00	0.0000	-34.00	100%
		C	11/16"	5.00	10%	19000	1.000	234.02	210.00	0.0000	-38.00	100%

Guy Data*(cont'd)*

Guy Elevation *ft*	*Mount Type*	*Torque-Arm Spread* *ft*	*Torque-Arm Leg Angle* °	*Torque-Arm Style*	*Torque-Arm Grade*	*Torque-Arm Type*	*Torque-Arm Size*
138	Torque Arm	12.00	30.0000	Wing	A36 (36 ksi)	Double Angle	2L3x3x5/16
70	Corner						

Guy Data *(cont'd)*

Guy Elevation *ft*	*Diagonal Grade*	*Diagonal Type*	*Upper Diagonal Size*	*Lower Diagonal Size*	*Is Strap.*	*Pull-Off Grade*	*Pull-Off Type*	*Pull-Off Size*
138.00	A572-50 (50 ksi)	Solid Round			No	A572-50 (50 ksi)	Solid Round	1 1/4
70.00	A572-50 (50 ksi)	Solid Round			Yes	A572-50 (50 ksi)	Solid Round	1 1/4

Guy Data *(cont'd)*

Guy Elevation *ft*	*Cable Weight A* *K*	*Cable Weight B* *K*	*Cable Weight C* *K*	*Cable Weight D* *K*	*Tower Intercept A* *ft*	*Tower Intercept B* *ft*	*Tower Intercept C* *ft*	*Tower Intercept D* *ft*
138	0.17	0.18	0.18		6.21 4.3 sec/pulse	6.81 4.5 sec/pulse	6.94 4.5 sec/pulse	
70	0.22	0.23	0.23		4.98 3.9 sec/pulse	5.34 4.0 sec/pulse	5.42 4.0 sec/pulse	

Guy Data *(cont'd)*

			Torque Arm		*Pull Off*		*Diagonal*	
Guy Elevation *ft*	*Calc K Single Angles*	*Calc K Solid Rounds*	K_x	K_y	K_x	K_y	K_x	K_y
138	No	No	1	1	1	1	1	1
70	No	No			1	1	1	1

Guy Data *(cont'd)*

Guy Elevation ft	Torque-Arm Bolt Size in	Torque-Arm Number	Torque-Arm Net Width Deduct in	Torque-Arm U	Pull Off Bolt Size in	Pull Off Number	Pull Off Net Width Deduct in	Pull Off U	Diagonal Bolt Size in	Diagonal Number	Diagonal Net Width Deduct in	Diagonal U
138	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75
70	0.0000 A325N	0	0.0000	1	0.6250 A325N	0	0.0000	0.75	0.6250 A325N	0	0.0000	0.75

Guy Pressures

Guy Elevation ft	Guy Location	z ft	q_z psf	q_z Ice psf	Ice Thickness in
138	A	62.00	23	6	2.1302
	B	52.00	23	6	2.0930
	C	50.00	22	6	2.0849
70	A	28.00	20	5	1.9674
	B	18.00	18	5	1.8824
	C	16.00	18	5	1.8603

Guy-Tensioning Information

Guy Elevation ft		H ft	V ft	Temperature At Time Of Tensioning 0 F Initial Tension K	0 F Intercept ft	20 F Initial Tension K	20 F Intercept ft	40 F Initial Tension K	40 F Intercept ft	60 F Initial Tension K	60 F Intercept ft	80 F Initial Tension K	80 F Intercept ft	100 F Initial Tension K	100 F Intercept ft	120 F Initial Tension K	120 F Intercept ft
138	A	206.62	152.00	4.437	4.91	4.118	5.29	3.805	5.72	3.500	6.21	3.205	6.78	2.922	7.42	2.654	8.16
	B	206.62	172.00	4.351	5.49	4.062	5.88	3.778	6.32	3.500	6.81	3.231	7.37	2.971	8.00	2.724	8.72
	C	206.62	176.00	4.335	5.62	4.051	6.01	3.772	6.45	3.500	6.94	3.235	7.50	2.981	8.13	2.737	8.84
70	A	207.83	84.00	6.644	3.75	6.083	4.10	5.533	4.50	5.000	4.98	4.488	5.54	4.005	6.21	3.559	6.98
	B	207.83	104.00	6.527	4.10	6.006	4.45	5.496	4.86	5.000	5.34	4.523	5.90	4.070	6.55	3.647	7.30
	C	207.83	108.00	6.503	4.18	5.990	4.53	5.488	4.95	5.000	5.42	4.530	5.98	4.083	6.63	3.666	7.37

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
HYBRIFLEX 1-1/4" (T-Mobile)	C	No	No	Ar (CaAa)	148.00 - 0.00	0.0000	-0.35	3	3	1.5400	1.5400		1.30

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	150.00-140.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	3.696	0.000	0.03
T2	140.00-120.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	9.240	0.000	0.08
T3	120.00-100.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	9.240	0.000	0.08
T4	100.00-80.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	9.240	0.000	0.08
T5	80.00-60.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	9.240	0.000	0.08
T6	60.00-40.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	9.240	0.000	0.08
T7	40.00-20.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	9.240	0.000	0.08
T8	20.00-5.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	6.930	0.000	0.06
T9	5.00-0.00	A	0.000	0.000	0.000	0.000	0.00
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	2.310	0.000	0.02

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	150.00-140.00	A	2.319	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	13.799	0.000	0.23
T2	140.00-120.00	A	2.294	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	34.327	0.000	0.56
T3	120.00-100.00	A	2.256	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	34.073	0.000	0.55
T4	100.00-80.00	A	2.211	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	33.773	0.000	0.54
T5	80.00-60.00	A	2.156	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	33.405	0.000	0.52
T6	60.00-40.00	A	2.085	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	32.929	0.000	0.51
T7	40.00-20.00	A	1.981	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	32.237	0.000	0.48
T8	20.00-5.00	A	1.815	0.000	0.000	0.000	0.000	0.00
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	23.351	0.000	0.33
T9	5.00-0.00	A	1.545	0.000	0.000	0.000	0.000	0.00

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
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	7.339	0.000	0.10

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	150.00-140.00	2.9265	2.5568	1.2224	1.0680
T2	140.00-120.00	3.7140	3.2448	2.1791	1.9038
T3	120.00-100.00	3.7140	3.2448	2.2394	1.9565
T4	100.00-80.00	3.5527	3.1039	2.2590	1.9736
T5	80.00-60.00	3.4851	3.0448	2.1632	1.8899
T6	60.00-40.00	3.5527	3.1039	2.4603	2.1495
T7	40.00-20.00	3.5527	3.1039	2.6295	2.2973
T8	20.00-5.00	3.3790	2.9521	2.7242	2.3801
T9	5.00-0.00	1.6186	2.9160	0.5556	0.9802

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	HYBRIFLEX 1-1/4"	140.00 - 148.00	0.6000	0.2784
T2	2	HYBRIFLEX 1-1/4"	120.00 - 140.00	0.6000	0.3564
T3	2	HYBRIFLEX 1-1/4"	100.00 - 120.00	0.6000	0.3640
T4	2	HYBRIFLEX 1-1/4"	80.00 - 100.00	0.6000	0.3684
T5	2	HYBRIFLEX 1-1/4"	60.00 - 80.00	0.6000	0.3601
T6	2	HYBRIFLEX 1-1/4"	40.00 - 60.00	0.6000	0.3934
T7	2	HYBRIFLEX 1-1/4"	20.00 - 40.00	0.6000	0.4142
T8	2	HYBRIFLEX 1-1/4"	5.00 - 20.00	0.6000	0.4310
T9	2	HYBRIFLEX 1-1/4"	0.00 - 5.00	0.6000	0.1711

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft Vert ft	Azimuth Adjustment °	Placement ft	C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K

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
APXVAARR24_43-U-NA20	A	From Leg	3.00	0.0000	148.00	No Ice	20.24	10.79	0.16
(T-Mobile)			6.50			1/2" Ice	20.89	12.21	0.29
			0.00			1" Ice	21.55	13.49	0.44
APXVAARR24_43-U-NA20	B	From Leg	3.00	0.0000	148.00	No Ice	20.24	10.79	0.16
(T-Mobile)			6.50			1/2" Ice	20.89	12.21	0.29
			0.00			1" Ice	21.55	13.49	0.44
APXVAARR24_43-U-NA20	C	From Leg	3.00	0.0000	148.00	No Ice	20.24	10.79	0.16
(T-Mobile)			6.50			1/2" Ice	20.89	12.21	0.29
			0.00			1" Ice	21.55	13.49	0.44
AIR6449	A	From Leg	3.00	0.0000	148.00	No Ice	5.65	2.42	0.10
(T-Mobile)			0.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
AIR6449	B	From Leg	3.00	0.0000	148.00	No Ice	5.65	2.42	0.10
(T-Mobile)			0.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
AIR6449	C	From Leg	3.00	0.0000	148.00	No Ice	5.65	2.42	0.10
(T-Mobile)			0.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
VV-65A-R1	A	From Leg	3.00	0.0000	148.00	No Ice	5.93	2.73	0.02
(T-Mobile)			-6.50			1/2" Ice	6.29	3.07	0.06
			0.00			1" Ice	6.66	3.42	0.10
VV-65A-R1	B	From Leg	3.00	0.0000	148.00	No Ice	5.93	2.73	0.02
(T-Mobile)			-6.50			1/2" Ice	6.29	3.07	0.06
			0.00			1" Ice	6.66	3.42	0.10
VV-65A-R1	C	From Leg	3.00	0.0000	148.00	No Ice	5.93	2.73	0.02
(T-Mobile)			-6.50			1/2" Ice	6.29	3.07	0.06
			0.00			1" Ice	6.66	3.42	0.10
4480 b71+b85	A	From Leg	3.00	0.0000	148.00	No Ice	2.85	1.38	0.84
(T-Mobile)			3.00			1/2" Ice	3.06	1.54	0.86
			0.00			1" Ice	3.28	1.71	0.89
4480 b71+b85	B	From Leg	3.00	0.0000	148.00	No Ice	2.85	1.38	0.84
(T-Mobile)			3.00			1/2" Ice	3.06	1.54	0.86
			0.00			1" Ice	3.28	1.71	0.89
4480 b71+b85	C	From Leg	3.00	0.0000	148.00	No Ice	2.85	1.38	0.84
(T-Mobile)			3.00			1/2" Ice	3.06	1.54	0.86
			0.00			1" Ice	3.28	1.71	0.89
4460 B25+B60	A	From Leg	3.00	0.0000	148.00	No Ice	2.56	1.98	0.11
(T-Mobile)			-3.00			1/2" Ice	2.76	2.16	0.13
			0.00			1" Ice	2.97	2.34	0.16
4460 B25+B60	B	From Leg	3.00	0.0000	148.00	No Ice	2.56	1.98	0.11
(T-Mobile)			-3.00			1/2" Ice	2.76	2.16	0.13
			0.00			1" Ice	2.97	2.34	0.16
4460 B25+B60	C	From Leg	3.00	0.0000	148.00	No Ice	2.56	1.98	0.11
(T-Mobile)			-3.00			1/2" Ice	2.76	2.16	0.13
			0.00			1" Ice	2.97	2.34	0.16
PiROD 13' Lightweight	A	None		0.0000	148.00	No Ice	10.60	10.60	0.26
T-Frame						1/2" Ice	16.80	16.80	0.36
(T-Mobile)						1" Ice	23.00	23.00	0.46
PiROD 13' Lightweight	B	None		0.0000	148.00	No Ice	10.60	10.60	0.26
T-Frame						1/2" Ice	16.80	16.80	0.36
(T-Mobile)						1" Ice	23.00	23.00	0.46
PiROD 13' Lightweight	C	None		0.0000	148.00	No Ice	10.60	10.60	0.26
T-Frame						1/2" Ice	16.80	16.80	0.36
(T-Mobile)						1" Ice	23.00	23.00	0.46

Tower Pressures - No Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	145.00	1.369	28	39.167	A	0.000	6.244	3.333	53.39	0.000	0.000
150.00-140.00					B	0.000	6.244		53.39	0.000	0.000
					C	0.000	6.244		53.39	3.696	0.000
T2	130.00	1.337	27	78.333	A	0.000	11.356	6.667	58.71	0.000	0.000
140.00-120.00					B	0.000	11.356		58.71	0.000	0.000
					C	0.000	11.356		58.71	9.240	0.000
T3	110.00	1.291	26	78.333	A	0.000	11.356	6.667	58.71	0.000	0.000
120.00-100.00					B	0.000	11.356		58.71	0.000	0.000
					C	0.000	11.356		58.71	9.240	0.000
T4	90.00	1.238	25	78.750	A	0.000	12.162	7.500	61.67	0.000	0.000
100.00-80.00					B	0.000	12.162		61.67	0.000	0.000
					C	0.000	12.162		61.67	9.240	0.000
T5 80.00-60.00	70.00	1.174	24	78.750	A	0.000	12.533	7.500	59.84	0.000	0.000
					B	0.000	12.533		59.84	0.000	0.000
					C	0.000	12.533		59.84	9.240	0.000
T6 60.00-40.00	50.00	1.094	22	78.750	A	0.000	12.162	7.500	61.67	0.000	0.000
					B	0.000	12.162		61.67	0.000	0.000
					C	0.000	12.162		61.67	9.240	0.000
T7 40.00-20.00	30.00	0.982	20	78.750	A	0.000	12.162	7.500	61.67	0.000	0.000
					B	0.000	12.162		61.67	0.000	0.000
					C	0.000	12.162		61.67	9.240	0.000
T8 20.00-5.00	12.50	0.85	17	59.375	A	0.000	9.853	6.250	63.43	0.000	0.000
					B	0.000	9.853		63.43	0.000	0.000
					C	0.000	9.853		63.43	6.930	0.000
T9 5.00-0.00	2.50	0.85	17	10.488	A	0.618	2.985	2.270	63.00	0.000	0.000
					B	0.618	2.985		63.00	0.000	0.000
					C	0.618	2.985		63.00	2.310	0.000

Tower Pressure - With Ice

G_H = 0.850

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	145.00	1.369	7	2.3191	43.032	A	0.000	31.051	11.064	35.63	0.000	0.000
150.00-140.00						B	0.000	31.051		35.63	0.000	0.000
						C	0.000	31.051		35.63	13.799	0.000
T2	130.00	1.337	7	2.2939	85.980	A	0.000	55.334	21.959	39.68	0.000	0.000
140.00-120.00						B	0.000	55.334		39.68	0.000	0.000
						C	0.000	55.334		39.68	34.327	0.000
T3	110.00	1.291	7	2.2559	85.853	A	0.000	54.606	21.706	39.75	0.000	0.000
120.00-100.00						B	0.000	54.606		39.75	0.000	0.000
						C	0.000	54.606		39.75	34.073	0.000
T4 100.00-80.00	90.00	1.238	7	2.2111	86.120	A	0.000	54.392	22.240	40.89	0.000	0.000
						B	0.000	54.392		40.89	0.000	0.000
						C	0.000	54.392		40.89	33.773	0.000

Section Elevation ft	z ft	K_Z	q_z psf	t_Z in	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T5 80.00-60.00	70.00	1.174	6	2.1562	85.937	A	0.000	54.995	21.875	39.78	0.000	0.000
						B	0.000	54.995		39.78	0.000	0.000
						C	0.000	54.995		39.78	33.405	0.000
T6 60.00-40.00	50.00	1.094	6	2.0849	85.700	A	0.000	51.981	21.399	41.17	0.000	0.000
						B	0.000	51.981		41.17	0.000	0.000
						C	0.000	51.981		41.17	32.929	0.000
T7 40.00-20.00	30.00	0.982	5	1.9810	85.353	A	0.000	49.998	20.707	41.42	0.000	0.000
						B	0.000	49.998		41.42	0.000	0.000
						C	0.000	49.998		41.42	32.237	0.000
T8 20.00-5.00	12.50	0.85	5	1.8150	63.912	A	0.000	36.365	15.325	42.14	0.000	0.000
						B	0.000	36.365		42.14	0.000	0.000
						C	0.000	36.365		42.14	23.351	0.000
T9 5.00-0.00	2.50	0.85	5	1.5452	11.863	A	0.618	9.215	5.077	51.63	0.000	0.000
						B	0.618	9.215		51.63	0.000	0.000
						C	0.618	9.215		51.63	7.339	0.000

Tower Pressure - Service

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft²	Face	A_F ft²	A_R ft²	A_{leg} ft²	Leg %	C_AA_A In Face ft²	C_AA_A Out Face ft²
T1	145.00	1.369	11	39.167	A	0.000	6.244	3.333	53.39	0.000	0.000
150.00-140.00					B	0.000	6.244		53.39	0.000	0.000
					C	0.000	6.244		53.39	3.696	0.000
T2	130.00	1.337	10	78.333	A	0.000	11.356	6.667	58.71	0.000	0.000
140.00-120.00					B	0.000	11.356		58.71	0.000	0.000
					C	0.000	11.356		58.71	9.240	0.000
T3	110.00	1.291	10	78.333	A	0.000	11.356	6.667	58.71	0.000	0.000
120.00-100.00					B	0.000	11.356		58.71	0.000	0.000
					C	0.000	11.356		58.71	9.240	0.000
T4	90.00	1.238	10	78.750	A	0.000	12.162	7.500	61.67	0.000	0.000
100.00-80.00					B	0.000	12.162		61.67	0.000	0.000
					C	0.000	12.162		61.67	9.240	0.000
T5 80.00-60.00	70.00	1.174	9	78.750	A	0.000	12.533	7.500	59.84	0.000	0.000
					B	0.000	12.533		59.84	0.000	0.000
					C	0.000	12.533		59.84	9.240	0.000
T6 60.00-40.00	50.00	1.094	9	78.750	A	0.000	12.162	7.500	61.67	0.000	0.000
					B	0.000	12.162		61.67	0.000	0.000
					C	0.000	12.162		61.67	9.240	0.000
T7 40.00-20.00	30.00	0.982	8	78.750	A	0.000	12.162	7.500	61.67	0.000	0.000
					B	0.000	12.162		61.67	0.000	0.000
					C	0.000	12.162		61.67	9.240	0.000
T8 20.00-5.00	12.50	0.85	7	59.375	A	0.000	9.853	6.250	63.43	0.000	0.000
					B	0.000	9.853		63.43	0.000	0.000
					C	0.000	9.853		63.43	6.930	0.000
T9 5.00-0.00	2.50	0.85	7	10.488	A	0.618	2.985	2.270	63.00	0.000	0.000
					B	0.618	2.985		63.00	0.000	0.000
					C	0.618	2.985		63.00	2.310	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 psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.56	A	0.159	2.737	28	1	1	3.550	0.28	28.43	C
150.00-140.00			B	0.159	2.737		1	1	3.550			
			C	0.159	2.737		1	1	3.550			
T2	0.08	1.00	A	0.145	2.79	27	1	1	6.439	0.55	27.36	C
140.00-120.00		TA 1.07	B	0.145	2.79		1	1	6.439			
			C	0.145	2.79		1	1	6.439			
T3	0.08	1.00	A	0.145	2.79	26	1	1	6.439	0.53	26.42	C
120.00-100.00			B	0.145	2.79		1	1	6.439			
			C	0.145	2.79		1	1	6.439			
T4	0.08	1.17	A	0.154	2.755	25	1	1	6.908	0.53	26.47	C
100.00-80.00			B	0.154	2.755		1	1	6.908			
			C	0.154	2.755		1	1	6.908			
T5	0.08	1.21	A	0.159	2.738	24	1	1	7.126	0.51	25.60	C
80.00-60.00			B	0.159	2.738		1	1	7.126			
			C	0.159	2.738		1	1	7.126			
T6	0.08	1.17	A	0.154	2.755	22	1	1	6.908	0.47	23.39	C
60.00-40.00			B	0.154	2.755		1	1	6.908			
			C	0.154	2.755		1	1	6.908			
T7	0.08	1.17	A	0.154	2.755	20	1	1	6.908	0.42	21.01	C
40.00-20.00			B	0.154	2.755		1	1	6.908			
			C	0.154	2.755		1	1	6.908			
T8 20.00-5.00	0.06	1.03	A	0.166	2.714	17	1	1	5.610	0.29	19.11	C
			B	0.166	2.714		1	1	5.610			
			C	0.166	2.714		1	1	5.610			
T9 5.00-0.00	0.02	0.37	A	0.344	2.187	17	1	1	2.450	0.10	19.95	C
			B	0.344	2.187		1	1	2.450			
			C	0.344	2.187		1	1	2.450			
Sum Weight:	0.58	9.73								3.68		

Tower Forces - No Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.56	A	0.159	2.737	28	0.825	1	3.550	0.28	28.43	C
150.00-140.00			B	0.159	2.737		0.825	1	3.550			
			C	0.159	2.737		0.825	1	3.550			
T2	0.08	1.00	A	0.145	2.79	27	0.825	1	6.439	0.55	27.36	C
140.00-120.00		TA 1.07	B	0.145	2.79		0.825	1	6.439			
			C	0.145	2.79		0.825	1	6.439			
T3	0.08	1.00	A	0.145	2.79	26	0.825	1	6.439	0.53	26.42	C
120.00-100.00			B	0.145	2.79		0.825	1	6.439			
			C	0.145	2.79		0.825	1	6.439			
T4	0.08	1.17	A	0.154	2.755	25	0.825	1	6.908	0.53	26.47	C
100.00-80.00			B	0.154	2.755		0.825	1	6.908			
			C	0.154	2.755		0.825	1	6.908			
T5	0.08	1.21	A	0.159	2.738	24	0.825	1	7.126	0.51	25.60	C
80.00-60.00			B	0.159	2.738		0.825	1	7.126			
			C	0.159	2.738		0.825	1	7.126			
T6	0.08	1.17	A	0.154	2.755	22	0.825	1	6.908	0.47	23.39	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
60.00-40.00			B	0.154	2.755		0.825	1	6.908			
			C	0.154	2.755		0.825	1	6.908			
T7	0.08	1.17	A	0.154	2.755	20	0.825	1	6.908	0.42	21.01	C
40.00-20.00			B	0.154	2.755		0.825	1	6.908			
			C	0.154	2.755		0.825	1	6.908			
T8 20.00-5.00	0.06	1.03	A	0.166	2.714	17	0.825	1	5.610	0.29	19.11	C
			B	0.166	2.714		0.825	1	5.610			
			C	0.166	2.714		0.825	1	5.610			
T9 5.00-0.00	0.02	0.37	A	0.344	2.187	17	0.825	1	2.342	0.10	19.25	C
			B	0.344	2.187		0.825	1	2.342			
			C	0.344	2.187		0.825	1	2.342			
Sum Weight:	0.58	9.73								3.67		

Tower Forces - No Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.56	A	0.159	2.737	28	0.8	1	3.550	0.28	28.43	C
150.00-140.00			B	0.159	2.737		0.8	1	3.550			
			C	0.159	2.737		0.8	1	3.550			
T2	0.08	1.00	A	0.145	2.79	27	0.8	1	6.439	0.55	27.36	C
140.00-120.00		TA 1.07	B	0.145	2.79		0.8	1	6.439			
			C	0.145	2.79		0.8	1	6.439			
T3	0.08	1.00	A	0.145	2.79	26	0.8	1	6.439	0.53	26.42	C
120.00-100.00			B	0.145	2.79		0.8	1	6.439			
			C	0.145	2.79		0.8	1	6.439			
T4	0.08	1.17	A	0.154	2.755	25	0.8	1	6.908	0.53	26.47	C
100.00-80.00			B	0.154	2.755		0.8	1	6.908			
			C	0.154	2.755		0.8	1	6.908			
T5	0.08	1.21	A	0.159	2.738	24	0.8	1	7.126	0.51	25.60	C
80.00-60.00			B	0.159	2.738		0.8	1	7.126			
			C	0.159	2.738		0.8	1	7.126			
T6	0.08	1.17	A	0.154	2.755	22	0.8	1	6.908	0.47	23.39	C
60.00-40.00			B	0.154	2.755		0.8	1	6.908			
			C	0.154	2.755		0.8	1	6.908			
T7	0.08	1.17	A	0.154	2.755	20	0.8	1	6.908	0.42	21.01	C
40.00-20.00			B	0.154	2.755		0.8	1	6.908			
			C	0.154	2.755		0.8	1	6.908			
T8 20.00-5.00	0.06	1.03	A	0.166	2.714	17	0.8	1	5.610	0.29	19.11	C
			B	0.166	2.714		0.8	1	5.610			
			C	0.166	2.714		0.8	1	5.610			
T9 5.00-0.00	0.02	0.37	A	0.344	2.187	17	0.8	1	2.326	0.10	19.15	C
			B	0.344	2.187		0.8	1	2.326			
			C	0.344	2.187		0.8	1	2.326			
Sum Weight:	0.58	9.73								3.67		

Tower Forces - No Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.56	A	0.159	2.737	28	0.85	1	3.550	0.28	28.43	C
150.00-140.00			B	0.159	2.737		0.85	1	3.550			
			C	0.159	2.737		0.85	1	3.550			
T2	0.08	1.00	A	0.145	2.79	27	0.85	1	6.439	0.55	27.36	C
140.00-120.00		TA 1.07	B	0.145	2.79		0.85	1	6.439			
			C	0.145	2.79		0.85	1	6.439			
T3	0.08	1.00	A	0.145	2.79	26	0.85	1	6.439	0.53	26.42	C
120.00-100.00			B	0.145	2.79		0.85	1	6.439			
			C	0.145	2.79		0.85	1	6.439			
T4	0.08	1.17	A	0.154	2.755	25	0.85	1	6.908	0.53	26.47	C
100.00-80.00			B	0.154	2.755		0.85	1	6.908			
			C	0.154	2.755		0.85	1	6.908			
T5	0.08	1.21	A	0.159	2.738	24	0.85	1	7.126	0.51	25.60	C
80.00-60.00			B	0.159	2.738		0.85	1	7.126			
			C	0.159	2.738		0.85	1	7.126			
T6	0.08	1.17	A	0.154	2.755	22	0.85	1	6.908	0.47	23.39	C
60.00-40.00			B	0.154	2.755		0.85	1	6.908			
			C	0.154	2.755		0.85	1	6.908			
T7	0.08	1.17	A	0.154	2.755	20	0.85	1	6.908	0.42	21.01	C
40.00-20.00			B	0.154	2.755		0.85	1	6.908			
			C	0.154	2.755		0.85	1	6.908			
T8 20.00-5.00	0.06	1.03	A	0.166	2.714	17	0.85	1	5.610	0.29	19.11	C
			B	0.166	2.714		0.85	1	5.610			
			C	0.166	2.714		0.85	1	5.610			
T9 5.00-0.00	0.02	0.37	A	0.344	2.187	17	0.85	1	2.357	0.10	19.35	C
			B	0.344	2.187		0.85	1	2.357			
			C	0.344	2.187		0.85	1	2.357			
Sum Weight:	0.58	9.73								3.67		

Tower Forces - With Ice - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.23	2.15	A	0.722	1.779	7	1	1	25.666	0.31	31.32	C
150.00-140.00			B	0.722	1.779		1	1	25.666			
			C	0.722	1.779		1	1	25.666			
T2	0.56	3.73	A	0.644	1.783	7	1	1	42.725	0.55	27.35	C
140.00-120.00		TA 3.12	B	0.644	1.783		1	1	42.725			
			C	0.644	1.783		1	1	42.725			
T3	0.55	3.65	A	0.636	1.786	7	1	1	41.889	0.52	26.04	C
120.00-100.00			B	0.636	1.786		1	1	41.889			
			C	0.636	1.786		1	1	41.889			
T4	0.54	3.77	A	0.632	1.788	7	1	1	41.564	0.50	24.83	C
100.00-80.00			B	0.632	1.788		1	1	41.564			
			C	0.632	1.788		1	1	41.564			
T5	0.52	3.81	A	0.64	1.785	6	1	1	42.330	0.48	23.77	C
80.00-60.00			B	0.64	1.785		1	1	42.330			
			C	0.64	1.785		1	1	42.330			
T6	0.51	3.53	A	0.607	1.8	6	1	1	38.878	0.42	20.97	C
60.00-40.00			B	0.607	1.8		1	1	38.878			
			C	0.607	1.8		1	1	38.878			

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T7	0.48	3.34	A	0.586	1.814	5	1	1	36.741	0.36	18.16	C
40.00-20.00			B	0.586	1.814		1	1	36.741			
			C	0.586	1.814		1	1	36.741			
T8 20.00-5.00	0.33	2.50	A	0.569	1.827	5	1	1	26.348	0.23	15.25	C
			B	0.569	1.827		1	1	26.348			
			C	0.569	1.827		1	1	26.348			
T9 5.00-0.00	0.10	0.73	A	0.829	1.84	5	1	1	8.987	0.07	13.99	C
			B	0.829	1.84		1	1	8.987			
			C	0.829	1.84		1	1	8.987			
Sum Weight:	3.81	30.33								3.43		

Tower Forces - With Ice - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.23	2.15	A	0.722	1.779	7	0.825	1	25.666	0.31	31.32	C
150.00-140.00			B	0.722	1.779		0.825	1	25.666			
			C	0.722	1.779		0.825	1	25.666			
T2	0.56	3.73	A	0.644	1.783	7	0.825	1	42.725	0.55	27.35	C
140.00-120.00		TA 3.12	B	0.644	1.783		0.825	1	42.725			
			C	0.644	1.783		0.825	1	42.725			
T3	0.55	3.65	A	0.636	1.786	7	0.825	1	41.889	0.52	26.04	C
120.00-100.00			B	0.636	1.786		0.825	1	41.889			
			C	0.636	1.786		0.825	1	41.889			
T4	0.54	3.77	A	0.632	1.788	7	0.825	1	41.564	0.50	24.83	C
100.00-80.00			B	0.632	1.788		0.825	1	41.564			
			C	0.632	1.788		0.825	1	41.564			
T5	0.52	3.81	A	0.64	1.785	6	0.825	1	42.330	0.48	23.77	C
80.00-60.00			B	0.64	1.785		0.825	1	42.330			
			C	0.64	1.785		0.825	1	42.330			
T6	0.51	3.53	A	0.607	1.8	6	0.825	1	38.878	0.42	20.97	C
60.00-40.00			B	0.607	1.8		0.825	1	38.878			
			C	0.607	1.8		0.825	1	38.878			
T7	0.48	3.34	A	0.586	1.814	5	0.825	1	36.741	0.36	18.16	C
40.00-20.00			B	0.586	1.814		0.825	1	36.741			
			C	0.586	1.814		0.825	1	36.741			
T8 20.00-5.00	0.33	2.50	A	0.569	1.827	5	0.825	1	26.348	0.23	15.25	C
			B	0.569	1.827		0.825	1	26.348			
			C	0.569	1.827		0.825	1	26.348			
T9 5.00-0.00	0.10	0.73	A	0.829	1.84	5	0.825	1	8.879	0.07	13.83	C
			B	0.829	1.84		0.825	1	8.879			
			C	0.829	1.84		0.825	1	8.879			
Sum Weight:	3.81	30.33								3.43		

Tower Forces - With Ice - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.23	2.15	A	0.722	1.779	7	0.8	1	25.666	0.31	31.32	C
150.00-140.00			B	0.722	1.779		0.8	1	25.666			
			C	0.722	1.779		0.8	1	25.666			
T2	0.56	3.73	A	0.644	1.783	7	0.8	1	42.725	0.55	27.35	C
140.00-120.00		TA 3.12	B	0.644	1.783		0.8	1	42.725			
			C	0.644	1.783		0.8	1	42.725			
T3	0.55	3.65	A	0.636	1.786	7	0.8	1	41.889	0.52	26.04	C
120.00-100.00			B	0.636	1.786		0.8	1	41.889			
			C	0.636	1.786		0.8	1	41.889			
T4	0.54	3.77	A	0.632	1.788	7	0.8	1	41.564	0.50	24.83	C
100.00-80.00			B	0.632	1.788		0.8	1	41.564			
			C	0.632	1.788		0.8	1	41.564			
T5	0.52	3.81	A	0.64	1.785	6	0.8	1	42.330	0.48	23.77	C
80.00-60.00			B	0.64	1.785		0.8	1	42.330			
			C	0.64	1.785		0.8	1	42.330			
T6	0.51	3.53	A	0.607	1.8	6	0.8	1	38.878	0.42	20.97	C
60.00-40.00			B	0.607	1.8		0.8	1	38.878			
			C	0.607	1.8		0.8	1	38.878			
T7	0.48	3.34	A	0.586	1.814	5	0.8	1	36.741	0.36	18.16	C
40.00-20.00			B	0.586	1.814		0.8	1	36.741			
			C	0.586	1.814		0.8	1	36.741			
T8 20.00-5.00	0.33	2.50	A	0.569	1.827	5	0.8	1	26.348	0.23	15.25	C
			B	0.569	1.827		0.8	1	26.348			
			C	0.569	1.827		0.8	1	26.348			
T9 5.00-0.00	0.10	0.73	A	0.829	1.84	5	0.8	1	8.864	0.07	13.81	C
			B	0.829	1.84		0.8	1	8.864			
			C	0.829	1.84		0.8	1	8.864			
Sum Weight:	3.81	30.33								3.43		

Tower Forces - With Ice - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.23	2.15	A	0.722	1.779	7	0.85	1	25.666	0.31	31.32	C
150.00-140.00			B	0.722	1.779		0.85	1	25.666			
			C	0.722	1.779		0.85	1	25.666			
T2	0.56	3.73	A	0.644	1.783	7	0.85	1	42.725	0.55	27.35	C
140.00-120.00		TA 3.12	B	0.644	1.783		0.85	1	42.725			
			C	0.644	1.783		0.85	1	42.725			
T3	0.55	3.65	A	0.636	1.786	7	0.85	1	41.889	0.52	26.04	C
120.00-100.00			B	0.636	1.786		0.85	1	41.889			
			C	0.636	1.786		0.85	1	41.889			
T4	0.54	3.77	A	0.632	1.788	7	0.85	1	41.564	0.50	24.83	C
100.00-80.00			B	0.632	1.788		0.85	1	41.564			
			C	0.632	1.788		0.85	1	41.564			
T5	0.52	3.81	A	0.64	1.785	6	0.85	1	42.330	0.48	23.77	C
80.00-60.00			B	0.64	1.785		0.85	1	42.330			
			C	0.64	1.785		0.85	1	42.330			
T6	0.51	3.53	A	0.607	1.8	6	0.85	1	38.878	0.42	20.97	C
60.00-40.00			B	0.607	1.8		0.85	1	38.878			
			C	0.607	1.8		0.85	1	38.878			
T7	0.48	3.34	A	0.586	1.814	5	0.85	1	36.741	0.36	18.16	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
40.00-20.00			B	0.586	1.814		0.85	1	36.741			
			C	0.586	1.814		0.85	1	36.741			
T8 20.00-5.00	0.33	2.50	A	0.569	1.827	5	0.85	1	26.348	0.23	15.25	C
			B	0.569	1.827		0.85	1	26.348			
			C	0.569	1.827		0.85	1	26.348			
T9 5.00-0.00	0.10	0.73	A	0.829	1.84	5	0.85	1	8.894	0.07	13.85	C
			B	0.829	1.84		0.85	1	8.894			
			C	0.829	1.84		0.85	1	8.894			
Sum Weight:	3.81	30.33								3.43		

Tower Forces - Service - Wind Normal To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.56	A	0.159	2.737	11	1	1	3.550	0.11	10.88	C
150.00-140.00			B	0.159	2.737		1	1	3.550			
			C	0.159	2.737		1	1	3.550			
T2	0.08	1.00	A	0.145	2.79	10	1	1	6.439	0.21	10.47	C
140.00-120.00		TA 1.07	B	0.145	2.79		1	1	6.439			
			C	0.145	2.79		1	1	6.439			
T3	0.08	1.00	A	0.145	2.79	10	1	1	6.439	0.20	10.11	C
120.00-100.00			B	0.145	2.79		1	1	6.439			
			C	0.145	2.79		1	1	6.439			
T4	0.08	1.17	A	0.154	2.755	10	1	1	6.908	0.20	10.13	C
100.00-80.00			B	0.154	2.755		1	1	6.908			
			C	0.154	2.755		1	1	6.908			
T5	0.08	1.21	A	0.159	2.738	9	1	1	7.126	0.20	9.79	C
80.00-60.00			B	0.159	2.738		1	1	7.126			
			C	0.159	2.738		1	1	7.126			
T6	0.08	1.17	A	0.154	2.755	9	1	1	6.908	0.18	8.95	C
60.00-40.00			B	0.154	2.755		1	1	6.908			
			C	0.154	2.755		1	1	6.908			
T7	0.08	1.17	A	0.154	2.755	8	1	1	6.908	0.16	8.04	C
40.00-20.00			B	0.154	2.755		1	1	6.908			
			C	0.154	2.755		1	1	6.908			
T8 20.00-5.00	0.06	1.03	A	0.166	2.714	7	1	1	5.610	0.11	7.31	C
			B	0.166	2.714		1	1	5.610			
			C	0.166	2.714		1	1	5.610			
T9 5.00-0.00	0.02	0.37	A	0.344	2.187	7	1	1	2.450	0.04	7.63	C
			B	0.344	2.187		1	1	2.450			
			C	0.344	2.187		1	1	2.450			
Sum Weight:	0.58	9.73								1.41		

Tower Forces - Service - Wind 45 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.56	A	0.159	2.737	11	0.825	1	3.550	0.11	10.88	C
150.00-140.00			B	0.159	2.737		0.825	1	3.550			
			C	0.159	2.737		0.825	1	3.550			
T2	0.08	1.00	A	0.145	2.79	10	0.825	1	6.439	0.21	10.47	C
140.00-120.00		TA 1.07	B	0.145	2.79		0.825	1	6.439			
			C	0.145	2.79		0.825	1	6.439			
T3	0.08	1.00	A	0.145	2.79	10	0.825	1	6.439	0.20	10.11	C
120.00-100.00			B	0.145	2.79		0.825	1	6.439			
			C	0.145	2.79		0.825	1	6.439			
T4	0.08	1.17	A	0.154	2.755	10	0.825	1	6.908	0.20	10.13	C
100.00-80.00			B	0.154	2.755		0.825	1	6.908			
			C	0.154	2.755		0.825	1	6.908			
T5	0.08	1.21	A	0.159	2.738	9	0.825	1	7.126	0.20	9.79	C
80.00-60.00			B	0.159	2.738		0.825	1	7.126			
			C	0.159	2.738		0.825	1	7.126			
T6	0.08	1.17	A	0.154	2.755	9	0.825	1	6.908	0.18	8.95	C
60.00-40.00			B	0.154	2.755		0.825	1	6.908			
			C	0.154	2.755		0.825	1	6.908			
T7	0.08	1.17	A	0.154	2.755	8	0.825	1	6.908	0.16	8.04	C
40.00-20.00			B	0.154	2.755		0.825	1	6.908			
			C	0.154	2.755		0.825	1	6.908			
T8 20.00-5.00	0.06	1.03	A	0.166	2.714	7	0.825	1	5.610	0.11	7.31	C
			B	0.166	2.714		0.825	1	5.610			
			C	0.166	2.714		0.825	1	5.610			
T9 5.00-0.00	0.02	0.37	A	0.344	2.187	7	0.825	1	2.342	0.04	7.37	C
			B	0.344	2.187		0.825	1	2.342			
			C	0.344	2.187		0.825	1	2.342			
Sum Weight:	0.58	9.73								1.40		

Tower Forces - Service - Wind 60 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.56	A	0.159	2.737	11	0.8	1	3.550	0.11	10.88	C
150.00-140.00			B	0.159	2.737		0.8	1	3.550			
			C	0.159	2.737		0.8	1	3.550			
T2	0.08	1.00	A	0.145	2.79	10	0.8	1	6.439	0.21	10.47	C
140.00-120.00		TA 1.07	B	0.145	2.79		0.8	1	6.439			
			C	0.145	2.79		0.8	1	6.439			
T3	0.08	1.00	A	0.145	2.79	10	0.8	1	6.439	0.20	10.11	C
120.00-100.00			B	0.145	2.79		0.8	1	6.439			
			C	0.145	2.79		0.8	1	6.439			
T4	0.08	1.17	A	0.154	2.755	10	0.8	1	6.908	0.20	10.13	C
100.00-80.00			B	0.154	2.755		0.8	1	6.908			
			C	0.154	2.755		0.8	1	6.908			
T5	0.08	1.21	A	0.159	2.738	9	0.8	1	7.126	0.20	9.79	C
80.00-60.00			B	0.159	2.738		0.8	1	7.126			
			C	0.159	2.738		0.8	1	7.126			
T6	0.08	1.17	A	0.154	2.755	9	0.8	1	6.908	0.18	8.95	C
60.00-40.00			B	0.154	2.755		0.8	1	6.908			
			C	0.154	2.755		0.8	1	6.908			
T7	0.08	1.17	A	0.154	2.755	8	0.8	1	6.908	0.16	8.04	C

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
40.00-20.00			B	0.154	2.755		0.8	1	6.908			
			C	0.154	2.755		0.8	1	6.908			
T8 20.00-5.00	0.06	1.03	A	0.166	2.714	7	0.8	1	5.610	0.11	7.31	C
			B	0.166	2.714		0.8	1	5.610			
			C	0.166	2.714		0.8	1	5.610			
T9 5.00-0.00	0.02	0.37	A	0.344	2.187	7	0.8	1	2.326	0.04	7.33	C
			B	0.344	2.187		0.8	1	2.326			
			C	0.344	2.187		0.8	1	2.326			
Sum Weight:	0.58	9.73								1.40		

Tower Forces - Service - Wind 90 To Face

Section Elevation ft	Add Weight K	Self Weight K	Face	e	C_F	q_z psf	D_F	D_R	A_E ft^2	F K	w plf	Ctrl. Face
T1	0.03	0.56	A	0.159	2.737	11	0.85	1	3.550	0.11	10.88	C
150.00-140.00			B	0.159	2.737		0.85	1	3.550			
			C	0.159	2.737		0.85	1	3.550			
T2	0.08	1.00	A	0.145	2.79	10	0.85	1	6.439	0.21	10.47	C
140.00-120.00		TA 1.07	B	0.145	2.79		0.85	1	6.439			
			C	0.145	2.79		0.85	1	6.439			
T3	0.08	1.00	A	0.145	2.79	10	0.85	1	6.439	0.20	10.11	C
120.00-100.00			B	0.145	2.79		0.85	1	6.439			
			C	0.145	2.79		0.85	1	6.439			
T4	0.08	1.17	A	0.154	2.755	10	0.85	1	6.908	0.20	10.13	C
100.00-80.00			B	0.154	2.755		0.85	1	6.908			
			C	0.154	2.755		0.85	1	6.908			
T5	0.08	1.21	A	0.159	2.738	9	0.85	1	7.126	0.20	9.79	C
80.00-60.00			B	0.159	2.738		0.85	1	7.126			
			C	0.159	2.738		0.85	1	7.126			
T6	0.08	1.17	A	0.154	2.755	9	0.85	1	6.908	0.18	8.95	C
60.00-40.00			B	0.154	2.755		0.85	1	6.908			
			C	0.154	2.755		0.85	1	6.908			
T7	0.08	1.17	A	0.154	2.755	8	0.85	1	6.908	0.16	8.04	C
40.00-20.00			B	0.154	2.755		0.85	1	6.908			
			C	0.154	2.755		0.85	1	6.908			
T8 20.00-5.00	0.06	1.03	A	0.166	2.714	7	0.85	1	5.610	0.11	7.31	C
			B	0.166	2.714		0.85	1	5.610			
			C	0.166	2.714		0.85	1	5.610			
T9 5.00-0.00	0.02	0.37	A	0.344	2.187	7	0.85	1	2.357	0.04	7.40	C
			B	0.344	2.187		0.85	1	2.357			
			C	0.344	2.187		0.85	1	2.357			
Sum Weight:	0.58	9.73								1.41		

Force Totals (Does not include forces on guys)

Load Case	*Vertical Forces* K	*Sum of Forces X* K	*Sum of Forces Z* K	*Sum of Torques* kip-ft
Leg Weight	5.88			
Bracing Weight	3.85			
Total Member Self-Weight	9.73			
Guy Weight	1.76			
Total Weight	16.52			
Wind 0 deg - No Ice		0.00	-6.65	1.06
Wind 30 deg - No Ice		3.32	-5.76	1.39
Wind 45 deg - No Ice		4.70	-4.70	1.42
Wind 60 deg - No Ice		5.76	-3.32	1.35
Wind 90 deg - No Ice		6.65	0.00	0.94
Wind 120 deg - No Ice		5.76	3.32	0.28
Wind 135 deg - No Ice		4.70	4.70	-0.09
Wind 150 deg - No Ice		3.32	5.76	-0.45
Wind 180 deg - No Ice		0.00	6.65	-1.06
Wind 210 deg - No Ice		-3.32	5.76	-1.39
Wind 225 deg - No Ice		-4.70	4.70	-1.42
Wind 240 deg - No Ice		-5.76	3.32	-1.35
Wind 270 deg - No Ice		-6.65	0.00	-0.94
Wind 300 deg - No Ice		-5.76	-3.32	-0.28
Wind 315 deg - No Ice		-4.70	-4.70	0.09
Wind 330 deg - No Ice		-3.32	-5.76	0.45
Member Ice	20.60			
Guy Ice	15.05			
Total Weight Ice	61.22			
Wind 0 deg - Ice		0.00	-4.92	0.63
Wind 30 deg - Ice		2.46	-4.26	0.82
Wind 45 deg - Ice		3.48	-3.48	0.83
Wind 60 deg - Ice		4.26	-2.46	0.79
Wind 90 deg - Ice		4.92	0.00	0.55
Wind 120 deg - Ice		4.26	2.46	0.16
Wind 135 deg - Ice		3.48	3.48	-0.05
Wind 150 deg - Ice		2.46	4.26	-0.27
Wind 180 deg - Ice		0.00	4.92	-0.63
Wind 210 deg - Ice		-2.46	4.26	-0.82
Wind 225 deg - Ice		-3.48	3.48	-0.83
Wind 240 deg - Ice		-4.26	2.46	-0.79
Wind 270 deg - Ice		-4.92	0.00	-0.55
Wind 300 deg - Ice		-4.26	-2.46	-0.16
Wind 315 deg - Ice		-3.48	-3.48	0.05
Wind 330 deg - Ice		-2.46	-4.26	0.27
Total Weight	16.52			
Wind 0 deg - Service		0.00	-2.54	0.41
Wind 30 deg - Service		1.27	-2.20	0.53
Wind 45 deg - Service		1.80	-1.80	0.54
Wind 60 deg - Service		2.20	-1.27	0.52
Wind 90 deg - Service		2.54	0.00	0.36
Wind 120 deg - Service		2.20	1.27	0.11
Wind 135 deg - Service		1.80	1.80	-0.03
Wind 150 deg - Service		1.27	2.20	-0.17
Wind 180 deg - Service		0.00	2.54	-0.41
Wind 210 deg - Service		-1.27	2.20	-0.53
Wind 225 deg - Service		-1.80	1.80	-0.54
Wind 240 deg - Service		-2.20	1.27	-0.52
Wind 270 deg - Service		-2.54	0.00	-0.36
Wind 300 deg - Service		-2.20	-1.27	-0.11
Wind 315 deg - Service		-1.80	-1.80	0.03
Wind 330 deg - Service		-1.27	-2.20	0.17

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy
3	1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy
4	1.2 Dead+1.6 Wind 45 deg - No Ice+1.0 Guy
5	1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy
6	1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy
7	1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy
8	1.2 Dead+1.6 Wind 135 deg - No Ice+1.0 Guy
9	1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy
10	1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy
11	1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy
12	1.2 Dead+1.6 Wind 225 deg - No Ice+1.0 Guy
13	1.2 Dead+1.6 Wind 240 deg - No Ice+1.0 Guy
14	1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy
15	1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy
16	1.2 Dead+1.6 Wind 315 deg - No Ice+1.0 Guy
17	1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy
18	1.2 Dead+1.0 Ice+1.0 Temp+Guy
19	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy
20	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy
21	1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp+1.0 Guy
22	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy
23	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy
24	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy
25	1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp+1.0 Guy
26	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy
27	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy
28	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy
29	1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp+1.0 Guy
30	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy
31	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy
32	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy
33	1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp+1.0 Guy
34	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy
35	Dead+Wind 0 deg - Service+Guy
36	Dead+Wind 30 deg - Service+Guy
37	Dead+Wind 45 deg - Service+Guy
38	Dead+Wind 60 deg - Service+Guy
39	Dead+Wind 90 deg - Service+Guy
40	Dead+Wind 120 deg - Service+Guy
41	Dead+Wind 135 deg - Service+Guy
42	Dead+Wind 150 deg - Service+Guy
43	Dead+Wind 180 deg - Service+Guy
44	Dead+Wind 210 deg - Service+Guy
45	Dead+Wind 225 deg - Service+Guy
46	Dead+Wind 240 deg - Service+Guy
47	Dead+Wind 270 deg - Service+Guy
48	Dead+Wind 300 deg - Service+Guy
49	Dead+Wind 315 deg - Service+Guy
50	Dead+Wind 330 deg - Service+Guy

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	150 - 140	Leg	Max Tension	10	3.06	-0.00	0.05
			Max. Compression	30	-18.28	0.04	-0.02
			Max. Mx	6	-1.85	0.45	-0.00
			Max. My	10	-1.93	-0.01	0.45
			Max. Vy	14	-0.90	0.24	0.02
			Max. Vx	10	0.90	-0.00	-0.25
		Diagonal	Max Tension	16	1.60	0.00	0.00
			Max. Compression	8	-1.64	0.00	0.00
			Max. Mx	23	-0.30	-0.01	0.00
			Max. My	17	-1.60	-0.00	0.00
			Max. Vy	23	0.01	-0.01	0.00
			Max. Vx	17	0.00	0.00	0.00
		Top Girt	Max Tension	5	0.09	0.00	0.00
			Max. Compression	13	-0.12	0.00	0.00
			Max. Mx	18	-0.06	0.02	0.00
			Max. My	3	-0.02	0.00	-0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	3	0.00	0.00	0.00
		Bottom Girt	Max Tension	19	0.34	0.00	0.00
			Max. Compression	5	-0.13	0.00	0.00
			Max. Mx	18	0.16	0.02	0.00
			Max. My	3	0.07	0.00	-0.00
			Max. Vy	18	0.02	0.00	0.00
			Max. Vx	3	0.00	0.00	0.00
		Top Guy Pull-Off	Max Tension	10	4.16	0.00	0.00
			Max. Compression	2	-2.50	0.00	0.00
			Max. Mx	18	1.77	0.03	0.00
			Max. My	3	0.75	0.00	-0.00
			Max. Vy	18	-0.03	0.00	0.00
			Max. Vx	3	0.00	0.00	0.00
T2	140 - 120	Leg	Max Tension	10	1.71	0.00	-0.27
			Max. Compression	22	-24.39	0.03	-0.02
			Max. Mx	6	-6.36	-0.31	0.05
			Max. My	12	-7.72	0.08	-0.32
			Max. Vy	5	-0.55	-0.02	0.01
			Max. Vx	2	0.60	-0.00	0.05
		Diagonal	Max Tension	4	1.32	0.00	0.00
			Max. Compression	12	-1.66	0.00	0.00
			Max. Mx	19	-1.02	-0.01	-0.00
			Max. My	5	-1.31	0.00	-0.00
			Max. Vy	19	0.01	-0.01	-0.00
			Max. Vx	5	-0.00	0.00	0.00
		Top Girt	Max Tension	5	0.50	0.00	0.00
			Max. Compression	2	-0.65	0.00	0.00
			Max. Mx	18	-0.15	0.02	0.00
			Max. My	3	-0.06	0.00	-0.00
			Max. Vy	18	-0.02	0.00	0.00
			Max. Vx	3	0.00	0.00	0.00
		Bottom Girt	Max Tension	24	0.20	0.00	0.00
			Max. Compression	10	-0.05	0.00	0.00
			Max. Mx	21	0.01	0.02	0.00
			Max. My	3	0.04	0.00	-0.00
			Max. Vy	21	-0.02	0.00	0.00
			Max. Vx	3	0.00	0.00	0.00
		Guy A	Bottom Tension	27	9.92		
			Top Tension	27	11.08		
			Top Cable Vert	27	7.29		
			Top Cable Norm	27	8.35		
			Top Cable Tan	27	0.01		
			Bot Cable Vert	27	-5.13		
			Bot Cable Norm	27	8.49		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Bot Cable Tan	27	0.01		
		Guy B	Bottom Tension	32	10.30		
			Top Tension	32	11.58		
			Top Cable Vert	32	8.09		
			Top Cable Norm	32	8.29		
			Top Cable Tan	32	0.01		
			Bot Cable Vert	32	-5.88		
			Bot Cable Norm	32	8.46		
			Bot Cable Tan	32	0.00		
		Guy C	Bottom Tension	22	10.43		
			Top Tension	22	11.74		
			Top Cable Vert	22	8.28		
			Top Cable Norm	22	8.32		
			Top Cable Tan	22	0.00		
			Bot Cable Vert	22	-6.06		
			Bot Cable Norm	22	8.49		
			Bot Cable Tan	22	0.01		
		Torque Arm Top	Max Tension	27	10.40	0.00	0.00
			Max. Compression	7	-0.15	0.00	0.00
			Max. Mx	21	9.43	0.22	0.00
			Max. My	4	1.40	0.00	0.00
			Max. Vy	21	-0.12	0.00	0.00
			Max. Vx	4	-0.00	0.00	0.00
		Torque Arm Bottom	Max Tension	2	2.50	0.00	0.00
			Max. Compression	23	-6.31	0.00	0.00
			Max. Mx	22	-3.35	0.20	0.00
			Max. My	20	-3.09	0.00	-0.00
			Max. Vy	22	0.12	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
T3	120 - 100	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-26.32	0.03	-0.01
			Max. Mx	13	-8.76	-0.14	0.14
			Max. My	11	-9.22	-0.10	0.18
			Max. Vy	4	0.30	-0.03	0.03
			Max. Vx	11	-0.38	-0.01	-0.01
		Diagonal	Max Tension	11	0.51	0.00	0.00
			Max. Compression	13	-0.61	0.00	0.00
			Max. Mx	20	-0.02	-0.01	-0.00
			Max. My	12	-0.59	-0.00	0.00
			Max. Vy	20	0.01	-0.01	-0.00
			Max. Vx	12	0.00	0.00	0.00
		Top Girt	Max Tension	27	0.17	0.00	0.00
			Max. Compression	2	-0.07	0.00	0.00
			Max. Mx	20	0.13	0.02	0.00
			Max. My	3	0.03	0.00	-0.00
			Max. Vy	20	-0.02	0.00	0.00
			Max. Vx	3	0.00	0.00	0.00
		Bottom Girt	Max Tension	32	0.15	0.00	0.00
			Max. Compression	14	-0.01	0.00	0.00
			Max. Mx	25	0.14	0.02	0.00
			Max. My	4	0.04	0.00	-0.00
			Max. Vy	25	-0.02	0.00	0.00
			Max. Vx	4	0.00	0.00	0.00
T4	100 - 80	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-26.42	0.03	-0.02
			Max. Mx	5	-12.49	0.22	-0.11
			Max. My	3	-4.88	0.11	-0.26
			Max. Vy	5	0.45	-0.00	0.02
			Max. Vx	3	-0.52	0.00	-0.00
		Diagonal	Max Tension	3	0.82	0.00	0.00
			Max. Compression	3	-0.92	0.00	0.00

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Mx	19	-0.04	-0.01	-0.00
			Max. My	3	-0.62	-0.00	-0.00
			Max. Vy	19	0.01	-0.01	-0.00
			Max. Vx	3	-0.00	0.00	0.00
		Top Girt	Max Tension	19	0.15	0.00	0.00
			Max. Compression	5	-0.04	0.00	0.00
			Max. Mx	25	0.12	0.02	0.00
			Max. My	4	0.06	0.00	-0.00
			Max. Vy	25	-0.02	0.00	0.00
			Max. Vx	4	0.00	0.00	0.00
		Bottom Girt	Max Tension	5	0.28	0.00	0.00
			Max. Compression	12	-0.14	0.00	0.00
			Max. Mx	25	0.07	0.02	0.00
			Max. My	20	0.14	0.00	-0.00
			Max. Vy	25	-0.02	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
T5	80 - 60	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	19	-32.93	0.04	-0.02
			Max. Mx	6	-17.21	-0.29	-0.02
			Max. My	3	-4.89	-0.10	0.26
			Max. Vy	6	-0.54	-0.26	-0.02
			Max. Vx	10	-0.53	-0.05	-0.26
		Diagonal	Max Tension	4	0.89	0.00	0.00
			Max. Compression	3	-0.97	0.00	0.00
			Max. Mx	25	0.02	-0.01	-0.00
			Max. My	3	-0.97	-0.00	-0.00
			Max. Vy	28	0.01	-0.01	0.00
			Max. Vx	3	-0.00	0.00	0.00
		Top Girt	Max Tension	19	0.26	0.00	0.00
			Max. Compression	5	-0.13	0.00	0.00
			Max. Mx	25	0.22	0.02	0.00
			Max. My	20	0.12	0.00	-0.00
			Max. Vy	25	-0.02	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Bottom Girt	Max Tension	24	0.29	0.00	0.00
			Max. Compression	10	-0.12	0.00	0.00
			Max. Mx	29	0.28	0.02	0.00
			Max. My	20	0.20	0.00	-0.00
			Max. Vy	29	-0.02	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Guy A	Bottom Tension	27	11.36		
			Top Tension	27	11.98		
			Top Cable Vert	27	5.22		
			Top Cable Norm	27	10.78		
			Top Cable Tan	27	0.00		
			Bot Cable Vert	27	-3.51		
			Bot Cable Norm	27	10.81		
			Bot Cable Tan	27	0.00		
		Guy B	Bottom Tension	32	11.80		
			Top Tension	32	12.51		
			Top Cable Vert	32	6.27		
			Top Cable Norm	32	10.83		
			Top Cable Tan	32	0.00		
			Bot Cable Vert	32	-4.59		
			Bot Cable Norm	32	10.87		
			Bot Cable Tan	32	0.00		
		Guy C	Bottom Tension	22	11.89		
			Top Tension	22	12.62		
			Top Cable Vert	22	6.48		
			Top Cable Norm	22	10.83		
			Top Cable Tan	22	0.00		

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Bot Cable Vert	22	-4.81		
			Bot Cable Norm	22	10.87		
			Bot Cable Tan	22	0.00		
		Top Guy Pull-Off	Max Tension	19	5.76	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	29	5.71	0.02	0.00
			Max. My	4	2.89	0.00	-0.00
			Max. Vy	29	0.03	0.00	0.00
			Max. Vx	4	0.00	0.00	0.00
T6	60 - 40	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-35.67	0.05	-0.03
			Max. Mx	6	-9.24	0.28	0.00
			Max. My	10	-8.55	0.05	0.27
			Max. Vy	6	-0.53	0.01	-0.01
			Max. Vx	10	-0.53	-0.00	0.01
		Diagonal	Max Tension	6	0.69	0.00	0.00
			Max. Compression	6	-0.83	0.00	0.00
			Max. Mx	20	-0.06	-0.01	0.00
			Max. My	5	-0.78	-0.00	-0.00
			Max. Vy	20	0.01	-0.01	0.00
			Max. Vx	5	-0.00	0.00	0.00
		Top Girt	Max Tension	10	0.29	0.00	0.00
			Max. Compression	12	-0.14	0.00	0.00
			Max. Mx	29	0.07	0.02	0.00
			Max. My	20	0.13	0.00	-0.00
			Max. Vy	29	0.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Bottom Girt	Max Tension	24	0.21	0.00	0.00
			Max. Compression	10	-0.03	0.00	0.00
			Max. Mx	23	0.15	0.02	0.00
			Max. My	20	0.19	0.00	-0.00
			Max. Vy	23	0.02	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
T7	40 - 20	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	22	-36.49	-0.07	0.04
			Max. Mx	6	-14.62	0.14	0.01
			Max. My	10	-14.80	0.03	0.13
			Max. Vy	6	-0.24	-0.02	-0.01
			Max. Vx	10	-0.22	-0.02	-0.01
		Diagonal	Max Tension	5	0.28	0.00	0.00
			Max. Compression	6	-0.42	0.00	0.00
			Max. Mx	20	-0.18	-0.01	0.00
			Max. My	5	-0.41	-0.00	-0.00
			Max. Vy	19	0.01	-0.01	-0.00
			Max. Vx	5	-0.00	0.00	0.00
		Top Girt	Max Tension	19	0.18	0.00	0.00
			Max. Compression	6	-0.01	0.00	0.00
			Max. Mx	23	0.15	0.01	0.00
			Max. My	20	0.13	0.00	-0.00
			Max. Vy	23	-0.02	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Bottom Girt	Max Tension	32	0.23	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	31	0.23	0.01	0.00
			Max. My	20	0.21	0.00	-0.00
			Max. Vy	31	-0.02	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
T8	20 - 5	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-36.52	0.42	0.24
			Max. Mx	20	-36.50	-0.42	0.24
			Max. My	29	-35.97	-0.00	-0.48

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
			Max. Vy	20	0.32	-0.42	0.24
			Max. Vx	25	0.37	0.00	-0.48
		Diagonal	Max Tension	34	1.25	0.00	0.00
			Max. Compression	34	-0.83	0.00	0.00
			Max. Mx	20	-0.63	-0.01	0.00
			Max. My	21	-0.45	-0.01	0.00
			Max. Vy	19	0.01	-0.01	-0.00
			Max. Vx	21	0.00	0.00	0.00
		Top Girt	Max Tension	19	0.25	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	31	0.10	0.01	0.00
			Max. My	20	0.15	0.00	-0.00
			Max. Vy	31	-0.01	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
		Bottom Girt	Max Tension	19	7.32	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	31	7.03	0.01	0.00
			Max. My	20	7.14	0.00	-0.00
			Max. Vy	31	-0.01	0.00	0.00
			Max. Vx	20	0.00	0.00	0.00
T9	5 - 0	Leg	Max Tension	1	0.00	0.00	0.00
			Max. Compression	34	-39.20	-0.31	0.00
			Max. Mx	20	-39.11	0.49	0.00
			Max. My	2	-15.49	0.06	-0.02
			Max. Vy	19	1.13	-0.42	-0.00
			Max. Vx	2	-0.05	-0.17	0.01
		Diagonal	Max Tension	20	0.55	0.00	0.00
			Max. Compression	19	-2.64	-0.00	0.00
			Max. Mx	19	0.54	-0.01	-0.00
			Max. My	20	0.52	-0.01	0.00
			Max. Vy	20	0.01	0.00	0.00
			Max. Vx	20	-0.00	0.00	0.00
		Horizontal	Max Tension	19	0.22	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	29	0.21	0.01	0.00
			Max. My	21	0.22	0.00	0.00
			Max. Vy	29	-0.02	0.00	0.00
			Max. Vx	21	-0.00	0.00	0.00
		Bottom Girt	Max Tension	19	1.25	0.00	0.00
			Max. Compression	1	0.00	0.00	0.00
			Max. Mx	31	1.22	0.00	0.00
			Max. Vy	31	0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Mast	Max. Vert	19	105.06	0.04	0.53
	Max. H_x	13	41.14	0.67	-0.37
	Max. H_z	2	41.26	0.00	0.87
	Max. M_x	1	0.00	0.00	0.02
	Max. M_z	1	0.00	0.00	0.02
	Max. Torsion	1	0.00	0.00	0.02
	Min. Vert	1	35.49	0.00	0.02
	Min. H_x	7	41.15	-0.67	-0.37
	Min. H_z	10	43.49	0.00	-0.65

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Min. M_x	1	0.00	0.00	0.02
	Min. M_z	1	0.00	0.00	0.02
	Min. Torsion	1	0.00	0.00	0.02
Guy C @ 210 ft Elev -38 ft Azimuth 240 deg	Max. Vert	13	-2.59	-3.49	2.02
	Max. H_x	13	-2.59	-3.49	2.02
	Max. H_z	20	-16.64	-23.63	14.00
	Min. Vert	22	-16.91	-24.10	13.92
	Min. H_x	22	-16.91	-24.10	13.92
	Min. H_z	13	-2.59	-3.49	2.02
Guy B @ 210 ft Elev -34 ft Azimuth 120 deg	Max. Vert	7	-2.43	3.42	1.97
	Max. H_x	32	-16.34	24.05	13.89
	Max. H_z	34	-16.07	23.57	13.98
	Min. Vert	32	-16.34	24.05	13.89
	Min. H_x	7	-2.43	3.42	1.97
	Min. H_z	7	-2.43	3.42	1.97
Guy A @ 210 ft Elev -14 ft Azimuth 0 deg	Max. Vert	2	-1.77	0.00	-3.64
	Max. H_x	31	-11.62	0.88	-23.80
	Max. H_z	2	-1.77	0.00	-3.64
	Min. Vert	27	-13.75	-0.00	-27.75
	Min. H_x	23	-11.62	-0.89	-23.79
	Min. H_z	27	-13.75	-0.00	-27.75

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	35.49	-0.00	-0.02	0.00	0.00	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice+1.0 Guy	41.26	-0.00	-0.87	0.00	0.00	0.00
1.2 Dead+1.6 Wind 30 deg - No Ice+1.0 Guy	43.15	0.32	-0.60	0.00	0.00	0.00
1.2 Dead+1.6 Wind 45 deg - No Ice+1.0 Guy	43.91	0.44	-0.47	0.00	0.00	0.00
1.2 Dead+1.6 Wind 60 deg - No Ice+1.0 Guy	44.18	0.53	-0.35	0.00	0.00	0.00
1.2 Dead+1.6 Wind 90 deg - No Ice+1.0 Guy	42.99	0.63	-0.03	0.00	0.00	0.00
1.2 Dead+1.6 Wind 120 deg - No Ice+1.0 Guy	41.15	0.67	0.37	0.00	0.00	0.00
1.2 Dead+1.6 Wind 135 deg - No Ice+1.0 Guy	41.68	0.51	0.49	0.00	0.00	0.00
1.2 Dead+1.6 Wind 150 deg - No Ice+1.0 Guy	42.55	0.32	0.57	0.00	0.00	0.00
1.2 Dead+1.6 Wind 180 deg - No Ice+1.0 Guy	43.49	-0.00	0.65	0.00	0.00	0.00
1.2 Dead+1.6 Wind 210 deg - No Ice+1.0 Guy	42.54	-0.32	0.57	0.00	0.00	0.00
1.2 Dead+1.6 Wind 225 deg - No Ice+1.0 Guy	41.66	-0.51	0.48	0.00	0.00	0.00
1.2 Dead+1.6 Wind 240 deg -	41.14	-0.67	0.37	0.00	0.00	0.00

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
No Ice+1.0 Guy						
1.2 Dead+1.6 Wind 270 deg - No Ice+1.0 Guy	42.90	-0.65	-0.04	0.00	0.00	0.00
1.2 Dead+1.6 Wind 300 deg - No Ice+1.0 Guy	44.06	-0.55	-0.35	0.00	0.00	0.00
1.2 Dead+1.6 Wind 315 deg - No Ice+1.0 Guy	43.81	-0.45	-0.48	0.00	0.00	0.00
1.2 Dead+1.6 Wind 330 deg - No Ice+1.0 Guy	43.07	-0.32	-0.60	0.00	0.00	0.00
1.2 Dead+1.0 Ice+1.0 Temp+Guy	103.22	-0.04	-0.04	0.00	0.00	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp+1.0 Guy	105.06	-0.04	-0.53	0.00	0.00	0.00
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp+1.0 Guy	104.43	0.14	-0.46	0.00	0.00	0.00
1.2 Dead+1.0 Wind 45 deg+1.0 Ice+1.0 Temp+1.0 Guy	103.99	0.23	-0.37	0.00	0.00	0.00
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp+1.0 Guy	103.76	0.31	-0.24	0.00	0.00	0.00
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp+1.0 Guy	104.07	0.42	0.02	0.00	0.00	0.00
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp+1.0 Guy	104.38	0.40	0.21	0.00	0.00	0.00
1.2 Dead+1.0 Wind 135 deg+1.0 Ice+1.0 Temp+1.0 Guy	104.10	0.34	0.28	0.00	0.00	0.00
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp+1.0 Guy	103.62	0.24	0.33	0.00	0.00	0.00
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp+1.0 Guy	103.00	-0.04	0.37	0.00	0.00	0.00
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp+1.0 Guy	103.56	-0.32	0.33	0.00	0.00	0.00
1.2 Dead+1.0 Wind 225 deg+1.0 Ice+1.0 Temp+1.0 Guy	104.00	-0.41	0.28	0.00	0.00	0.00
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp+1.0 Guy	104.26	-0.47	0.21	0.00	0.00	0.00
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp+1.0 Guy	103.93	-0.49	0.02	0.00	0.00	0.00
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp+1.0 Guy	103.63	-0.39	-0.24	0.00	0.00	0.00
1.2 Dead+1.0 Wind 315 deg+1.0 Ice+1.0 Temp+1.0 Guy	103.88	-0.30	-0.37	0.00	0.00	0.00
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp+1.0 Guy	104.36	-0.21	-0.46	0.00	0.00	0.00
Dead+Wind 0 deg - Service+Guy	35.89	-0.00	-0.22	0.00	0.00	0.00
Dead+Wind 30 deg - Service+Guy	35.80	0.09	-0.19	0.00	0.00	0.00
Dead+Wind 45 deg - Service+Guy	35.74	0.13	-0.16	0.00	0.00	0.00
Dead+Wind 60 deg - Service+Guy	35.71	0.16	-0.11	0.00	0.00	0.00
Dead+Wind 90 deg - Service+Guy	35.74	0.19	-0.01	0.00	0.00	0.00
Dead+Wind 120 deg - Service+Guy	35.78	0.17	0.08	0.00	0.00	0.00
Dead+Wind 135 deg - Service+Guy	35.74	0.14	0.12	0.00	0.00	0.00
Dead+Wind 150 deg - Service+Guy	35.67	0.10	0.15	0.00	0.00	0.00
Dead+Wind 180 deg - Service+Guy	35.59	-0.00	0.17	0.00	0.00	0.00

Load Combination	Vertical K	$Shear_x$ K	$Shear_z$ K	Overturning Moment, M_x kip-ft	Overturning Moment, M_z kip-ft	Torque kip-ft
Dead+Wind 210 deg - Service+Guy	35.67	-0.11	0.15	0.00	0.00	0.00
Dead+Wind 225 deg - Service+Guy	35.73	-0.15	0.12	0.00	0.00	0.00
Dead+Wind 240 deg - Service+Guy	35.76	-0.18	0.08	0.00	0.00	0.00
Dead+Wind 270 deg - Service+Guy	35.73	-0.20	-0.01	0.00	0.00	0.00
Dead+Wind 300 deg - Service+Guy	35.69	-0.16	-0.11	0.00	0.00	0.00
Dead+Wind 315 deg - Service+Guy	35.73	-0.13	-0.16	0.00	0.00	0.00
Dead+Wind 330 deg - Service+Guy	35.79	-0.09	-0.19	0.00	0.00	0.00

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	0.00	-16.52	0.00	0.00	16.52	-0.00	0.002%
2	0.01	-19.72	-12.88	-0.01	19.72	12.86	0.062%
3	6.45	-19.51	-11.14	-6.46	19.51	11.13	0.071%
4	9.15	-19.36	-9.09	-9.16	19.36	9.09	0.056%
5	11.21	-19.30	-6.44	-11.23	19.30	6.44	0.094%
6	12.95	-19.48	-0.00	-12.94	19.48	0.01	0.052%
7	11.21	-19.66	6.43	-11.20	19.66	-6.42	0.045%
8	9.14	-19.59	9.08	-9.13	19.59	-9.08	0.042%
9	6.44	-19.44	11.13	-6.43	19.44	-11.13	0.055%
10	-0.01	-19.22	12.87	0.01	19.22	-12.89	0.081%
11	-6.45	-19.43	11.14	6.44	19.43	-11.15	0.051%
12	-9.15	-19.58	9.09	9.14	19.58	-9.09	0.040%
13	-11.22	-19.65	6.44	11.21	19.65	-6.43	0.047%
14	-12.95	-19.47	0.00	12.94	19.47	0.01	0.048%
15	-11.21	-19.29	-6.42	11.23	19.29	6.42	0.101%
16	-9.14	-19.35	-9.08	9.15	19.35	9.07	0.057%
17	-6.44	-19.50	-11.13	6.45	19.50	11.12	0.071%
18	0.00	-64.17	0.00	0.00	64.17	-0.01	0.011%
19	0.01	-64.48	-7.86	-0.01	64.48	7.85	0.013%
20	3.97	-64.21	-6.81	-3.97	64.21	6.79	0.020%
21	5.64	-64.02	-5.56	-5.64	64.02	5.55	0.016%
22	6.92	-63.93	-3.94	-6.92	63.93	3.92	0.024%
23	8.00	-64.17	-0.01	-7.99	64.17	0.00	0.014%
24	6.91	-64.41	3.92	-6.90	64.41	-3.92	0.011%
25	5.63	-64.32	5.53	-5.62	64.32	-5.53	0.010%
26	3.95	-64.13	6.79	-3.94	64.13	-6.79	0.008%
27	-0.01	-63.86	7.86	0.01	63.86	-7.86	0.009%
28	-3.97	-64.13	6.81	3.96	64.13	-6.80	0.011%
29	-5.64	-64.32	5.56	5.64	64.32	-5.55	0.007%
30	-6.92	-64.40	3.94	6.92	64.40	-3.94	0.008%
31	-8.00	-64.16	0.01	7.99	64.16	-0.01	0.014%
32	-6.91	-63.92	-3.92	6.91	63.92	3.91	0.013%
33	-5.63	-64.01	-5.53	5.63	64.01	5.52	0.017%
34	-3.95	-64.20	-6.79	3.95	64.20	6.77	0.021%
35	0.00	-16.58	-3.08	-0.00	16.58	3.07	0.024%
36	1.54	-16.53	-2.66	-1.55	16.53	2.66	0.038%
37	2.19	-16.49	-2.17	-2.19	16.49	2.17	0.027%
38	2.68	-16.48	-1.54	-2.69	16.48	1.53	0.046%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
39	3.10	-16.52	-0.00	-3.09	16.52	0.01	0.037%
40	2.68	-16.56	1.54	-2.68	16.56	-1.53	0.029%
41	2.19	-16.55	2.17	-2.18	16.55	-2.17	0.028%
42	1.54	-16.51	2.66	-1.54	16.51	-2.66	0.022%
43	-0.00	-16.46	3.08	0.00	16.46	-3.08	0.011%
44	-1.54	-16.51	2.66	1.54	16.51	-2.66	0.018%
45	-2.19	-16.54	2.17	2.18	16.54	-2.17	0.024%
46	-2.68	-16.56	1.54	2.68	16.56	-1.54	0.025%
47	-3.10	-16.52	0.00	3.09	16.52	0.00	0.028%
48	-2.68	-16.47	-1.54	2.68	16.47	1.53	0.053%
49	-2.19	-16.49	-2.17	2.19	16.49	2.17	0.029%
50	-1.54	-16.53	-2.66	1.54	16.53	2.66	0.039%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	6	0.00000001	0.00007341
2	Yes	10	0.00120894	0.00114689
3	Yes	12	0.00121938	0.00091727
4	Yes	12	0.00086886	0.00072678
5	Yes	10	0.00112461	0.00126258
6	Yes	12	0.00083868	0.00069303
7	Yes	11	0.00092871	0.00070196
8	Yes	12	0.00087780	0.00062085
9	Yes	12	0.00104930	0.00075252
10	Yes	10	0.00097672	0.00137145
11	Yes	12	0.00097215	0.00072315
12	Yes	12	0.00083093	0.00060746
13	Yes	11	0.00095802	0.00070422
14	Yes	12	0.00079033	0.00065943
15	Yes	10	0.00125611	0.00134565
16	Yes	12	0.00090275	0.00073493
17	Yes	12	0.00125042	0.00090759
18	Yes	11	0.00144697	0.00021234
19	Yes	13	0.00090484	0.00030534
20	Yes	12	0.00126449	0.00042350
21	Yes	12	0.00094617	0.00033126
22	Yes	11	0.00137459	0.00044124
23	Yes	11	0.00090937	0.00026889
24	Yes	12	0.00102757	0.00022540
25	Yes	12	0.00117721	0.00022032
26	Yes	12	0.00098035	0.00017589
27	Yes	11	0.00090362	0.00016758
28	Yes	11	0.00134616	0.00021810
29	Yes	12	0.00100223	0.00016321
30	Yes	12	0.00091808	0.00017323
31	Yes	11	0.00100473	0.00026134
32	Yes	12	0.00086658	0.00027914
33	Yes	12	0.00109680	0.00035382
34	Yes	12	0.00140090	0.00043970
35	Yes	9	0.00000001	0.00034301
36	Yes	8	0.00133795	0.00038769
37	Yes	8	0.00090365	0.00027338
38	Yes	6	0.00118203	0.00021723
39	Yes	6	0.00110888	0.00019942

40	Yes	8	0.00134673	0.00028063
41	Yes	8	0.00142360	0.00026846
42	Yes	8	0.00000001	0.00020712
43	Yes	6	0.00000001	0.00011491
44	Yes	8	0.00000001	0.00017167
45	Yes	8	0.00000001	0.00023135
46	Yes	8	0.00000001	0.00024246
47	Yes	6	0.00000001	0.00017411
48	Yes	6	0.00141655	0.00019727
49	Yes	8	0.00102268	0.00028526
50	Yes	8	0.00144590	0.00039377

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	150 - 140	0.960	38	0.0373	0.0196
T2	140 - 120	0.891	38	0.0344	0.0196
T3	120 - 100	0.772	38	0.0298	0.0334
T4	100 - 80	0.643	38	0.0324	0.0506
T5	80 - 60	0.502	38	0.0318	0.0635
T6	60 - 40	0.380	38	0.0269	0.0728
T7	40 - 20	0.271	38	0.0284	0.0791
T8	20 - 5	0.144	37	0.0326	0.0825
T9	5 - 0	0.036	37	0.0343	0.0834

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
148.00	APXVAARR24_43-U-NA20	38	0.946	0.0368	0.0194	141293
138.00	Guy	38	0.878	0.0336	0.0201	80563
70.00	Guy	38	0.438	0.0292	0.0685	164757

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	150 - 140	5.220	5	0.2155	0.1444
T2	140 - 120	4.781	5	0.2045	0.1441
T3	120 - 100	4.004	5	0.1860	0.2007
T4	100 - 80	3.225	5	0.1864	0.2708
T5	80 - 60	2.440	5	0.1742	0.3230
T6	60 - 40	1.783	5	0.1413	0.3611
T7	40 - 20	1.233	5	0.1368	0.3873
T8	20 - 5	0.644	5	0.1482	0.4015
T9	5 - 0	0.163	5	0.1540	0.4054

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
148.00	APXVAARR24_43-U-NA20	5	5.130	0.2133	0.1434	38048
138.00	Guy	5	4.698	0.2023	0.1465	21940
70.00	Guy	5	2.092	0.1571	0.3436	31438

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T2	140	Leg	A325N	0.6250	5	3.66	24.85	0.147 ✔	1	Bolt DS
T3	120	Leg	A325N	0.6250	5	4.88	24.85	0.196 ✔	1	Bolt DS
T4	100	Leg	A325N	0.7500	5	5.27	35.78	0.147 ✔	1	Bolt DS
T5	80	Leg	A325N	0.7500	5	5.12	35.78	0.143 ✔	1	Bolt DS
T6	60	Leg	A325N	0.7500	5	6.59	35.78	0.184 ✔	1	Bolt DS
T7	40	Leg	A325N	0.7500	5	7.14	35.78	0.199 ✔	1	Bolt DS
T8	20	Leg	A325N	0.7500	5	7.25	35.78	0.203 ✔	1	Bolt DS

Guy Design Data

Section No.	Elevation ft	Size	Initial Tension K	Breaking Load K	Actual T_u K	Allowable ϕT_n K	Required S.F.	Actual S.F.
T2	138.00 (A) (457)	9/16 EHS	3.50	35.00	11.08	21.00	1.000	1.895 ✔
	138.00 (A) (458)	9/16 EHS	3.50	35.00	11.05	21.00	1.000	1.901 ✔
	138.00 (B) (451)	9/16 EHS	3.50	35.00	11.57	21.00	1.000	1.814 ✔
	138.00 (B) (452)	9/16 EHS	3.50	35.00	11.58	21.00	1.000	1.813 ✔
	138.00 (C) (442)	9/16 EHS	3.50	35.00	11.70	21.00	1.000	1.795 ✔
	138.00 (C) (443)	9/16 EHS	3.50	35.00	11.73	21.00	1.000	1.790 ✔
T5	70.00 (A) (468)	11/16" EHS	5.00	50.00	11.98	30.00	1.000	2.504 ✔
	70.00 (B) (467)	11/16" EHS	5.00	50.00	12.51	30.00	1.000	2.398 ✔
	70.00 (C) (463)	11/16" EHS	5.00	50.00	12.62	30.00	1.000	2.377 ✔

Compression Checks

Leg Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	Mast Stability Index	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	2	10.00	2.25	54.0 K=1.00	3.1416	1.00	-18.28	114.23	0.160 [1] ✔
T2	140 - 120	2	20.00	2.38	57.0 K=1.00	3.1416	1.00	-24.39	111.48	0.219 [1] ✔
T3	120 - 100	2	20.00	2.38	57.0 K=1.00	3.1416	1.00	-26.32	111.48	0.236 [1] ✔
T4	100 - 80	2 1/4	20.00	2.38	50.7 K=1.00	3.9761	1.00	-26.42	148.30	0.178 [1] ✔
T5	80 - 60	2 1/4	20.00	2.38	50.7 K=1.00	3.9761	1.00	-32.93	148.30	0.222 [1] ✔
T6	60 - 40	2 1/4	20.00	2.38	50.7 K=1.00	3.9761	1.00	-35.67	148.30	0.241 [1] ✔
T7	40 - 20	2 1/4	20.00	2.38	50.7 K=1.00	3.9761	1.00	-36.49	148.30	0.246 [1] ✔
T8	20 - 5	2 1/2	15.00	2.42	46.4 K=1.00	4.9087	1.00	-36.52	188.12	0.194 [1] ✔
T9	5 - 0	2 1/2	5.45	2.45	47.1 K=1.00	4.9087	1.00	-39.20	187.85	0.209 [1] ✔

[1] $P_u / \phi P_n$ controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	3/4	4.37	2.09	120.4 K=0.90	0.4418	-1.64	6.89	0.238 [1] ✔
T2	140 - 120	3/4	4.44	2.12	122.2 K=0.90	0.4418	-1.66	6.69	0.248 [1] ✔
T3	120 - 100	3/4	4.44	2.12	122.2 K=0.90	0.4418	-0.61	6.69	0.091 [1] ✔
T4	100 - 80	3/4	4.44	2.11	121.4 K=0.90	0.4418	-0.92	6.77	0.135 [1] ✔
T5	80 - 60	3/4	4.44	2.11	121.4 K=0.90	0.4418	-0.97	6.77	0.144 [1] ✔
T6	60 - 40	3/4	4.44	2.11	121.4 K=0.90	0.4418	-0.83	6.77	0.123 [1] ✔
T7	40 - 20	3/4	4.44	2.11	121.4 K=0.90	0.4418	-0.42	6.77	0.062 [1] ✔
T8	20 - 5	3/4	4.46	2.11	121.3	0.4418	-0.83	6.78	0.122 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	5 - 0	3/4	2.60	2.00	115.0 K=0.90	0.4418	-2.64	7.54	0.350 [1]

[1] P_u / ϕP_n controls

Top Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	3/4	3.75	3.58	160.5 K=0.70	0.4418	-0.12	3.87	0.032 [1]
T2	140 - 120	3/4	3.75	3.58	160.5 K=0.70	0.4418	-0.65	3.87	0.167 [1]
T3	120 - 100	3/4	3.75	3.58	160.5 K=0.70	0.4418	-0.07	3.87	0.019 [1]
T4	100 - 80	3/4	3.75	3.56	159.6 K=0.70	0.4418	-0.04	3.92	0.009 [1]
T5	80 - 60	3/4	3.75	3.56	159.6 K=0.70	0.4418	-0.13	3.92	0.033 [1]
T6	60 - 40	3/4	3.75	3.56	159.6 K=0.70	0.4418	-0.14	3.92	0.036 [1]
T7	40 - 20	3/4	3.75	3.56	159.6 K=0.70	0.4418	-0.01	3.92	0.003 [1]

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	3/4	3.75	3.58	160.5 K=0.70	0.4418	-0.13	3.87	0.034 [1]
T2	140 - 120	3/4	3.75	3.58	160.5 K=0.70	0.4418	-0.05	3.87	0.014 [1]
T3	120 - 100	3/4	3.75	3.58	160.5 K=0.70	0.4418	-0.01	3.87	0.004 [1]
T4	100 - 80	3/4	3.75	3.56	159.6 K=0.70	0.4418	-0.14	3.92	0.037 [1]
T5	80 - 60	3/4	3.75	3.56	159.6 K=0.70	0.4418	-0.12	3.92	0.031 [1]
T6	60 - 40	3/4	3.75	3.56	159.6 K=0.70	0.4418	-0.03	3.92	0.007 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	1 1/4	3.75	3.58	137.6 K=1.00	1.2272	-2.50	14.64	0.170 [1] ✔

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	140 - 120 (445)	2L3x3x5/16	7.76	7.76	101.0 K=1.00	3.5500	-0.11	67.21	0.002 [1] ✔
T2	140 - 120 (460)	2L3x3x5/16	7.76	7.76	101.0 K=1.00	3.5500	-0.15	67.21	0.002 [1] ✔

[1] P_u / ϕP_n controls

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	140 - 120 (449)	2L3x3x5/16	6.95	6.85	89.2 K=1.00	3.5500	-6.20	75.67	0.082 [1] ✔
T2	140 - 120 (450)	2L3x3x5/16	6.95	6.85	89.2 K=1.00	3.5500	-5.32	75.67	0.070 [1] ✔
T2	140 - 120 (455)	2L3x3x5/16	6.95	6.85	89.2 K=1.00	3.5500	-6.10	75.67	0.081 [1] ✔
T2	140 - 120 (456)	2L3x3x5/16	6.95	6.85	89.2 K=1.00	3.5500	-6.31	75.67	0.083 [1] ✔
T2	140 - 120 (461)	2L3x3x5/16	6.95	6.85	89.2 K=1.00	3.5500	-6.09	75.67	0.080 [1] ✔
T2	140 - 120 (462)	2L3x3x5/16	6.95	6.85	89.2 K=1.00	3.5500	-5.43	75.67	0.072 [1] ✔

[1] P_u / ϕP_n controls

Tension Checks

Leg Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	2	10.00	2.25	54.0	3.1416	3.06	141.37	0.022 [1] ✔
T2	140 - 120	2	20.00	2.38	57.0	1.7942	1.19	87.47	0.014 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	3/4	4.37	2.09	133.7	0.4418	1.60	19.88	0.080 [1] ✔
T2	140 - 120	3/4	4.44	2.12	135.7	0.4418	1.32	19.88	0.066 [1] ✔
T3	120 - 100	3/4	4.44	2.12	135.7	0.4418	0.51	19.88	0.026 [1] ✔
T4	100 - 80	3/4	4.44	2.11	134.9	0.4418	0.82	19.88	0.041 [1] ✔
T5	80 - 60	3/4	4.44	2.11	134.9	0.4418	0.89	19.88	0.045 [1] ✔
T6	60 - 40	3/4	4.44	2.11	134.9	0.4418	0.69	19.88	0.035 [1] ✔
T7	40 - 20	3/4	4.44	2.11	134.9	0.4418	0.28	19.88	0.014 [1] ✔
T8	20 - 5	3/4	4.46	2.11	134.8	0.4418	1.25	19.88	0.063 [1] ✔
T9	5 - 0	3/4	3.71	2.19	139.9	0.4418	0.55	19.88	0.028 [1] ✔

[1] P_u / ϕP_n controls

Horizontal Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	5 - 0	4x1/2	2.06	1.85	154.2	2.0000	0.22	64.80	0.003 [1] ✔

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	3/4	3.75	3.58	229.3	0.4418	0.09	19.88	0.004 [1] ✔
T2	140 - 120	3/4	3.75	3.58	229.3	0.4418	0.50	19.88	0.025 [1] ✔
T3	120 - 100	3/4	3.75	3.58	229.3	0.4418	0.17	19.88	0.008 [1] ✔
T4	100 - 80	3/4	3.75	3.56	228.0	0.4418	0.15	19.88	0.008 [1] ✔
T5	80 - 60	3/4	3.75	3.56	228.0	0.4418	0.26	19.88	0.013 [1] ✔
T6	60 - 40	3/4	3.75	3.56	228.0	0.4418	0.29	19.88	0.015 [1] ✔
T7	40 - 20	3/4	3.75	3.56	228.0	0.4418	0.18	19.88	0.009 [1] ✔
T8	20 - 5	3/4	3.75	3.54	226.7	0.4418	0.25	19.88	0.013 [1] ✔

[1] P_u / ϕP_n controls

Bottom Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	3/4	3.75	3.58	229.3	0.4418	0.34	19.88	0.017 [1] ✔
T2	140 - 120	3/4	3.75	3.58	229.3	0.4418	0.20	19.88	0.010 [1] ✔
T3	120 - 100	3/4	3.75	3.58	229.3	0.4418	0.15	19.88	0.008 [1] ✔
T4	100 - 80	3/4	3.75	3.56	228.0	0.4418	0.28	19.88	0.014 [1] ✔
T5	80 - 60	3/4	3.75	3.56	228.0	0.4418	0.29	19.88	0.015 [1] ✔
T6	60 - 40	3/4	3.75	3.56	228.0	0.4418	0.21	19.88	0.011 [1] ✔
T7	40 - 20	3/4	3.75	3.56	228.0	0.4418	0.23	19.88	0.012 [1] ✔
T8	20 - 5	3/4	3.75	3.54	226.7	0.4418	7.32	19.88	0.368 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T9	5 - 0	3/4	0.38	0.17	10.7	0.4418	1.25	19.88	0.063 [1]

[1] P_u / ϕP_n controls

Top Guy Pull-Off Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T1	150 - 140	1 1/4	3.75	3.58	137.6	1.2272	4.16	55.22	0.075 [1]
T5	80 - 60	1 1/4	3.75	3.56	136.8	1.2272	5.76	55.22	0.104 [1]

[1] P_u / ϕP_n controls

Torque-Arm Top Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	140 - 120 (444)	2L3x3x5/16	7.76	7.76	101.0	3.5500	10.40	115.02	0.090 [1]
T2	140 - 120 (445)	2L3x3x5/16	7.76	7.76	101.0	3.5500	9.61	115.02	0.084 [1]
T2	140 - 120 (453)	2L3x3x5/16	7.76	7.76	101.0	3.5500	10.21	115.02	0.089 [1]
T2	140 - 120 (454)	2L3x3x5/16	7.76	7.76	101.0	3.5500	10.33	115.02	0.090 [1]
T2	140 - 120 (459)	2L3x3x5/16	7.76	7.76	101.0	3.5500	10.28	115.02	0.089 [1]
T2	140 - 120 (460)	2L3x3x5/16	7.76	7.76	101.0	3.5500	9.61	115.02	0.084 [1]

[1] P_u / ϕP_n controls

Torque-Arm Bottom Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	140 - 120 (449)	2L3x3x5/16	6.95	6.85	89.2	3.5500	2.16	115.02	0.019 [1] ✔
T2	140 - 120 (450)	2L3x3x5/16	6.95	6.85	89.2	3.5500	2.24	115.02	0.019 [1] ✔
T2	140 - 120 (455)	2L3x3x5/16	6.95	6.85	89.2	3.5500	2.31	115.02	0.020 [1] ✔
T2	140 - 120 (456)	2L3x3x5/16	6.95	6.85	89.2	3.5500	2.34	115.02	0.020 [1] ✔
T2	140 - 120 (461)	2L3x3x5/16	6.95	6.85	89.2	3.5500	2.37	115.02	0.021 [1] ✔
T2	140 - 120 (462)	2L3x3x5/16	6.95	6.85	89.2	3.5500	2.50	115.02	0.022 [1] ✔

[1] P_u / ϕP_n controls

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	150 - 140	Leg	2	1	-18.28	114.23	16.0	Pass
T2	140 - 120	Leg	2	34	-24.39	111.48	21.9	Pass
T3	120 - 100	Leg	2	91	-26.32	111.48	23.6	Pass
T4	100 - 80	Leg	2 1/4	148	-26.42	148.30	17.8	Pass
T5	80 - 60	Leg	2 1/4	205	-32.93	148.30	22.2	Pass
T6	60 - 40	Leg	2 1/4	262	-35.67	148.30	24.1	Pass
T7	40 - 20	Leg	2 1/4	319	-36.49	148.30	24.6	Pass
T8	20 - 5	Leg	2 1/2	377	-36.52	188.12	19.4 20.3 (b)	Pass
T9	5 - 0	Leg	2 1/2	422	-39.20	187.85	20.9	Pass
T1	150 - 140	Diagonal	3/4	24	-1.64	6.89	23.8	Pass
T2	140 - 120	Diagonal	3/4	76	-1.66	6.69	24.8	Pass
T3	120 - 100	Diagonal	3/4	143	-0.61	6.69	9.1	Pass
T4	100 - 80	Diagonal	3/4	161	-0.92	6.77	13.5	Pass
T5	80 - 60	Diagonal	3/4	260	-0.97	6.77	14.4	Pass
T6	60 - 40	Diagonal	3/4	313	-0.83	6.77	12.3	Pass
T7	40 - 20	Diagonal	3/4	370	-0.42	6.77	6.2	Pass
T8	20 - 5	Diagonal	3/4	394	-0.83	6.78	12.2	Pass
T9	5 - 0	Diagonal	3/4	427	-2.64	7.54	35.0	Pass
T9	5 - 0	Horizontal	4x1/2	433	0.22	64.80	0.3	Pass
T1	150 - 140	Top Girt	3/4	5	-0.12	3.87	3.2	Pass
T2	140 - 120	Top Girt	3/4	37	-0.65	3.87	16.7	Pass
T3	120 - 100	Top Girt	3/4	94	-0.07	3.87	1.9	Pass
T4	100 - 80	Top Girt	3/4	152	-0.04	3.92	0.9	Pass
T5	80 - 60	Top Girt	3/4	209	-0.13	3.92	3.3	Pass
T6	60 - 40	Top Girt	3/4	266	-0.14	3.92	3.6	Pass
T7	40 - 20	Top Girt	3/4	322	0.18	19.88	0.9	Pass
T8	20 - 5	Top Girt	3/4	379	0.25	19.88	1.3	Pass
T1	150 - 140	Bottom Girt	3/4	8	-0.13	3.87	3.4	Pass
T2	140 - 120	Bottom Girt	3/4	40	-0.05	3.87	1.4	Pass
T3	120 - 100	Bottom Girt	3/4	99	0.15	19.88	0.8	Pass
T4	100 - 80	Bottom Girt	3/4	155	-0.14	3.92	3.7	Pass
T5	80 - 60	Bottom Girt	3/4	211	-0.12	3.92	3.1	Pass
T6	60 - 40	Bottom Girt	3/4	270	0.21	19.88	1.1	Pass
T7	40 - 20	Bottom Girt	3/4	327	0.23	19.88	1.2	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T8	20 - 5	Bottom Girt	3/4	382	7.32	19.88	36.8	Pass
T9	5 - 0	Bottom Girt	3/4	424	1.25	19.88	6.3	Pass
T2	140 - 120	Guy A@138	9/16	457	11.08	21.00	52.8	Pass
T5	80 - 60	Guy A@70	11/16"	468	11.98	30.00	39.9	Pass
T2	140 - 120	Guy B@138	9/16	452	11.58	21.00	55.1	Pass
T5	80 - 60	Guy B@70	11/16"	467	12.51	30.00	41.7	Pass
T2	140 - 120	Guy C@138	9/16	443	11.73	21.00	55.9	Pass
T5	80 - 60	Guy C@70	11/16"	463	12.62	30.00	42.1	Pass
T1	150 - 140	Top Guy Pull-Off@138	1 1/4	446	-2.50	14.64	17.0	Pass
T5	80 - 60	Top Guy Pull-Off@70	1 1/4	464	5.76	55.22	10.4	Pass
T2	140 - 120	Torque Arm Top@138	2L3x3x5/16	444	10.40	115.02	9.0	Pass
T2	140 - 120	Torque Arm Bottom@138	2L3x3x5/16	456	-6.31	75.67	8.3	Pass
							Summary	
						Leg (T7)	24.6	Pass
						Diagonal (T9)	35.0	Pass
						Horizontal (T9)	0.3	Pass
						Top Girt (T2)	16.7	Pass
						Bottom Girt (T8)	36.8	Pass
						Guy A (T2)	52.8	Pass
						Guy B (T2)	55.1	Pass
						Guy C (T2)	55.9	Pass
						Top Guy Pull-Off (T1)	17.0	Pass
						Torque Arm Top (T2)	9.0	Pass
						Torque Arm Bottom (T2)	8.3	Pass
						Bolt Checks	20.3	Pass
						RATING =	**55.9**	**Pass**

CENTEK engineering
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63-2 North Branford Road P: (203) 488-0580
Branford, CT 06405 F: (203) 488-8587

Subject: Base Foundation Analysis

Location: Bolton, CT

Rev. 1: 10/12/2021

Prepared by: F.J.P Checked by: T.J.L.
Job No. 21005.37

Guyed Tower Base Foundation:

Input Data:

Tower Data

Shear Force =	$Shear := 1 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$Axial := 105 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 150 \cdot ft$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 3.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 2.25 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.5 \cdot ft$	(User Input)	
Diameter of Pier =	$D_p := 2.5 \cdot ft$	(User Input)	
Width of Pad =	$W_{pad} := 7 \cdot ft$	(User Input)	
Thickness of Pad =	$t_{pad} := 1.25 \cdot ft$	(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)	
Internal Friction Angle of Soil =	$\Phi_s := 30 \cdot deg$	(User Input)	
Ultimate Soil Bearing Capacity =	$q_s := 8000 \cdot psf$	(User Input)	
Unit Weight of Soil =	$\gamma_{soil} := 120 \cdot pcf$	(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)	
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Calculated Factors:

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

Load Factor =

$$LF := \left\| \begin{array}{l} \text{if } H_t \le 700 \cdot ft \\ \quad \| \; 1.333 \\ \text{also if } H_t \ge 1200 \cdot ft \\ \quad \| \; 1.7 \\ \text{else} \\ \quad \| \; 1.333 + \left(\frac{H_t - 700 \cdot ft}{1200 \cdot ft - 700 \cdot ft} \right) \cdot 0.4 \end{array} \right\| = 1.333$$

Stability of Footing:

Adjusted Concrete Unit Weight =

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

Adjusted Soil Unit Weight =

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

Passive Pressure =

$$P_{top} := 0$$

$$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 1.08 \text{ ksf}$$

$$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 0.54 \text{ ksf}$$

$$A_p := D_p \cdot L_p = 5.625$$

Soil Shear Resistance =

$$Sl_1 := P_{ave} \cdot A_p = 3.04 \text{ kip}$$

Weight of Concrete =

$$WT_c := \left(\frac{1}{4} \cdot \pi \cdot {D_p}^2 \cdot L_p + {W_{pad}}^2 \cdot t_{pad} \right) \cdot \gamma_c = 10.84 \text{ kip}$$

Total Weight =

$$WT_{tot} := WT_c + Axial = 115.84 \text{ kip}$$

Soil/Concrete Friction Resistance =

$$Sl_2 := \mu \cdot WT_{tot} = 52.13 \text{ kips}$$

Total Sliding Resistance =

$$Sl_{tot} := Sl_1 + Sl_2 = 55.17 \text{ kips}$$

Sliding Resistance Ratio =

$$Sliding\_Resistance_{ratio} := \frac{0.75 \cdot Sl_{tot}}{Shear} = 41.38$$

$$Sliding\_Resistance\_Check := \text{if}\left(\left(\frac{Shear}{0.75 \cdot Sl_{tot}} < 1.0 \right) , \text{“Okay”} , \text{“No O} \right.$$

Sliding_Resistance_Check = “Okay”

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Subject: Base Foundation Analysis

Location: Bolton, CT

Rev. 1: 10/12/2021

Prepared by: F.J.P Checked by: T.J.L.
Job No. 21005.37

Bearing Pressure Caused by Footing:

Maximum Pressure in Mat = $P_{max} := \frac{WT_{tot}}{W_{pad}^{2}} = 2.36 \text{ ksf}$

$Max\_Pressure\_Check := \text{if}\left(P_{max} < 0.6 \cdot q_s, \text{“Okay”}, \text{“No Good”}\right)$

$Max\_Pressure\_Check = \text{“Okay”}$

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Branford, CT 06405 F: (203) 488-8587

Subject: Loads on Equipment

Location: Manchester, CT

Rev. 1: 10/12/2021 Prepared by: F.J.P Checked by: T.J.L.
Job No. 21005.31

Rock Anchor Foundation Analysis:

Input Data:

Max Pier Reactions:

Uplift =	$Uplift := 17 \cdot kips$	*user input*
Shear =	$Shear := 28 \cdot kips$	*user input*

Rock Anchor Properties:

Number of Anchors =	$N_{anchor} := 2$	*user input*
Hole Diameter =	$hole_d := 3.00 \cdot in$	*user input*
Ultimate Bond Stress Between Rock and Grout =	$\sigma_{bond} := 60 \cdot psi$	*user input*
Rock Anchor Ultimate Strength =	$F_u := 150.0 \cdot ksi$	*user input*
Rock Anchor Yield Strength =	$F_y := 127.7 \cdot ksi$	*user input*
Rock Anchor Diameter =	$d_{ra} := 1.375 \cdot in$	*user input*
Threads per Inch =	$n := 6$	*user input*
	$\eta := 0.55$	*user input*

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Rock Anchor Tension/Shear Check:

Net Area of Bolt = $A_n := \frac{\pi}{4} \cdot \left(d_{ra} - \frac{0.9743 \cdot in}{n}\right)^2 = 1.155\ in^2$

Maximum Tensile Force = $T_{Max} := \frac{Uplift}{N_{anchor}} = 8.5\ kips$

Maximum Shear Force = $V_{Max} := \frac{Shear}{N_{anchor}} = 14\ kips$

Design Tensile Strength = $\Phi R_{nt} := 0.8 \cdot F_u \cdot A_n = 138.586\ k$

Bolt Steel FS = $\frac{1}{\frac{T_{Max} + \frac{V_{Max}}{\eta}}{\Phi R_{nt}}} = 4.1$

Condition1 = $Condition1 := \text{if}\left(\frac{\left(T_{Max} + \frac{V_{Max}}{\eta}\right)}{\Phi R_{nt}} \le 1.00, \text{“OK”}, \text{“Overstressed”}\right)$

Condition1 = “OK”

Rock Anchor Req'd Development Length in Rock:

Rock/Grout Bond Length Provided = $L_{bprov} := 29 \cdot ft$

Required Rock/Grout Bond Length = $L_{breq} := \frac{T_{Max}}{0.5 \cdot \pi \cdot hole_d \cdot \sigma_{bond}} = 2.51\ ft$

Anchor Bond FS = $\frac{L_{bprov}}{L_{breq}} = 11.6$

$Bond\_Length\_Check := \text{if}\left(\frac{L_{breq}}{L_{bprov}} \le 1.00, \text{“OK”}, \text{“Increase Length”}\right)$

Bond_Length_Check = “OK”

Units:

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 1 - Site Information

Site ID: CT11580A
Status: Draft
Version: 1
Project Type: Sprint Retain
Approved: Not Approved
Approved By: Not Approved
Last Modified: 10/6/2021 10:39:40 AM
Last Modified By: Scott.Clemons@T-Mobile.com

Site Name: CT11580A
Site Class: Tower Other
Site Type: Structure Non Building
Plan Year: 2022
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: Not Specified

Latitude: 41.80203890
Longitude: -72.44108060
Address: 130 Vernon Rd
City, State: Bolton, CT
Region: NORTHEAST

RAN Template: 67E5A998E 6160			AL Template: 67E5998E_1xAIR+1OP+1QP	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 0	**TMA Count:** 0	**RRU Count:** 6

Section 2 - Existing Template Images

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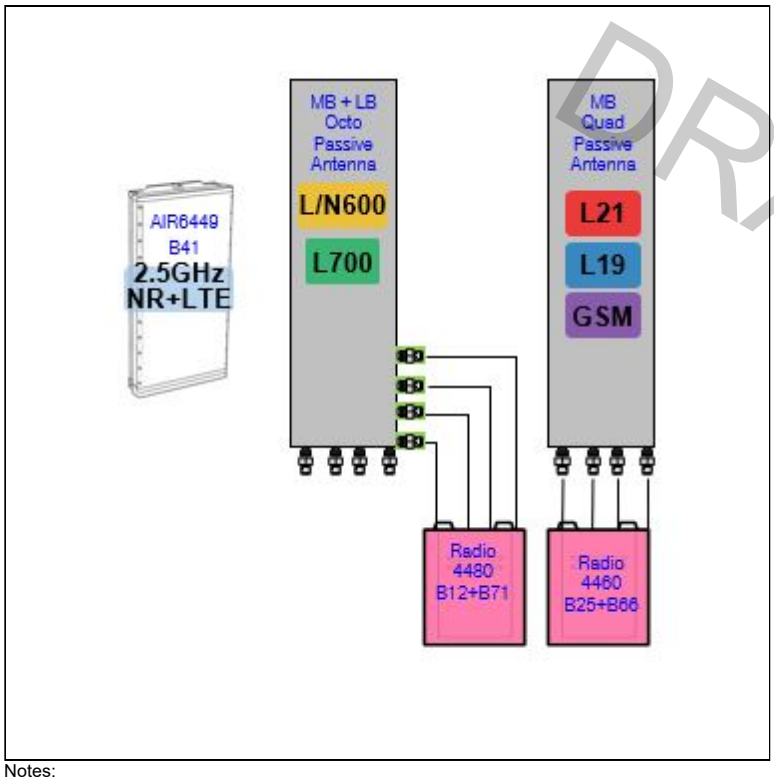
Section 3 - Proposed Template Images

67E5A998E.JPG



Notes:

Section 4 - Siteplan Images

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RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 5 - RAN Equipment

Existing RAN Equipment

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

Proposed RAN Equipment

Template: 67E5A998E 6160

Enclosure	1	2	3
Enclosure Type	Enclosure 6160	RBS 6601	B160
Baseband	BB 6648 (L2500, N2500); BB 6648 (L700, L600, N600); BB 6648 (L2100, L1900)	DUG20 (G1900)	
Hybrid Cable System	Ericsson Hybrid Trunk 6/24 4AWG 80m **(x 3)**		
Transport System	CSR IXRe V2 (Gen2)		

RAN Scope of Work:

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 6 - A&L Equipment

Existing Template: Custom
Proposed Template: 67E5998E_1xAIR+1OP+1QP

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		Commscope_VV-65A-R1 (Quad)	
Azimuth	0				0		0	
M. Tilt								
Height	148				148		148	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L700 L600 N600	L700 L600 N600			L2500 N2500	L2500 N2500	G1900 L2100 L1900	G1900 L2100 L1900
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt								
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**					Coax Jumper **(x2)**	Coax Jumper **(x2)**
TMAs								
Diplexers / Combiners								
Radio	Radio 4480 B71+B85 (At Antenna)	SHARED Radio 4480 B71+B85 (At Antenna)					Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		Commscope_VV-65A-R1 (Quad)	
Azimuth	100				100		100	
M. Tilt								
Height	148				148		148	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L700 L600 N600	L700 L600 N600			L2500 N2500	L2500 N2500	G1900 L2100 L1900	G1900 L2100 L1900
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt								
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**					Coax Jumper **(x2)**	Coax Jumper **(x2)**
TMAs								
Diplexers / Combiners								
Radio	Radio 4480 B71+B85 (At Antenna)	SHARED Radio 4480 B71+B85 (At Antenna)					Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		Commscope_VV-65A-R1 (Quad)	
Azimuth	195				195		195	
M. Tilt								
Height	148				148		148	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L700 L600 N600	L700 L600 N600			L2500 N2500	L2500 N2500	G1900 L2100 L1900	G1900 L2100 L1900
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt								
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**					Coax Jumper **(x2)**	Coax Jumper **(x2)**
TMAs								
Diplexers / Combiners								
Radio	Radio 4480 B71+B85 (At Antenna)	SHARED Radio 4480 B71+B85 (At Antenna)					Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 7 - Power Systems Equipment

Existing Power Systems Equipment
----- This section is intentionally blank. -----

	Proposed Power Systems Equipment
Enclosure	1
Enclosure Type	Enclosure 6160

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 1 - Site Information

Site ID: CT11580A
Status: Draft
Version: 1
Project Type: Sprint Retain
Approved: Not Approved
Approved By: Not Approved
Last Modified: 10/6/2021 10:39:40 AM
Last Modified By: Scott.Clemons@T-Mobile.com

Site Name: CT11580A
Site Class: Tower Other
Site Type: Structure Non Building
Plan Year: 2022
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: Not Specified

Latitude: 41.80203890
Longitude: -72.44108060
Address: 130 Vernon Rd
City, State: Bolton, CT
Region: NORTHEAST

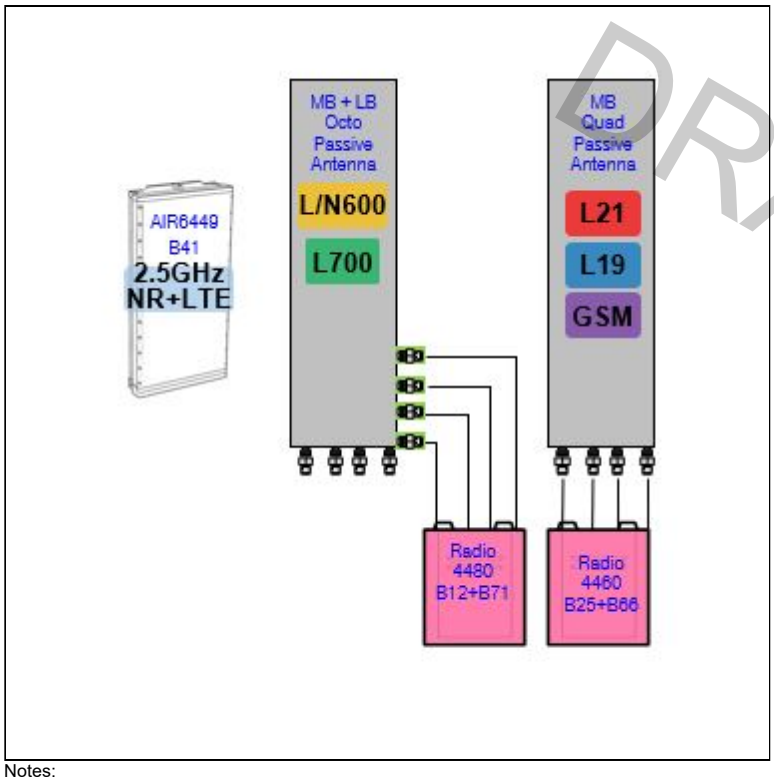
RAN Template: 67E5A998E 6160			AL Template: 67E5998E_1xAIR+1OP+1QP	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 0	**TMA Count:** 0	**RRU Count:** 6

Section 2 - Existing Template Images

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

Section 3 - Proposed Template Images

67E5A998E.JPG



Notes:

Section 4 - Siteplan Images

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

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 5 - RAN Equipment

Existing RAN Equipment

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

Proposed RAN Equipment

Template: 67E5A998E 6160

Enclosure	1	2	3
Enclosure Type	Enclosure 6160	RBS 6601	B160
Baseband	BB 6648 (L2500, N2500); BB 6648 (L700, L600, N600); BB 6648 (L2100, L1900)	DUG20 (G1900)	
Hybrid Cable System	Ericsson Hybrid Trunk 6/24 4AWG 80m **(x 3)**		
Transport System	CSR IXRe V2 (Gen2)		

RAN Scope of Work:

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 6 - A&L Equipment

Existing Template: Custom
Proposed Template: 67E5998E_1xAIR+1OP+1QP

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		Commscope_VV-65A-R1 (Quad)	
Azimuth	0				0		0	
M. Tilt								
Height	148				148		148	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L700 L600 N600	L700 L600 N600			L2500 N2500	L2500 N2500	G1900 L2100 L1900	G1900 L2100 L1900
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt								
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**					Coax Jumper **(x2)**	Coax Jumper **(x2)**
TMAs								
Diplexers / Combiners								
Radio	Radio 4480 B71+B85 (At Antenna)	SHARED Radio 4480 B71+B85 (At Antenna)					Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		Commscope_VV-65A-R1 (Quad)	
Azimuth	100				100		100	
M. Tilt								
Height	148				148		148	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L700 L600 N600	L700 L600 N600			L2500 N2500	L2500 N2500	G1900 L2100 L1900	G1900 L2100 L1900
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt								
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**					Coax Jumper **(x2)**	Coax Jumper **(x2)**
TMAs								
Diplexers / Combiners								
Radio	Radio 4480 B71+B85 (At Antenna)	SHARED Radio 4480 B71+B85 (At Antenna)					Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro							
Antenna	1				2		3	
Antenna Model	RFS - APXVAALL24_43-U-NA20 (Octo)				Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		Commscope_VV-65A-R1 (Quad)	
Azimuth	195				195		195	
M. Tilt								
Height	148				148		148	
Ports	P1	P2	P3	P4	P5	P6	P7	P8
Active Tech.	L700 L600 N600	L700 L600 N600			L2500 N2500	L2500 N2500	G1900 L2100 L1900	G1900 L2100 L1900
Dark Tech.								
Restricted Tech.								
Decomm. Tech.								
E. Tilt								
Cables	Coax Jumper **(x2)**	Coax Jumper **(x2)**					Coax Jumper **(x2)**	Coax Jumper **(x2)**
TMAs								
Diplexers / Combiners								
Radio	Radio 4480 B71+B85 (At Antenna)	SHARED Radio 4480 B71+B85 (At Antenna)					Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)
Sector Equipment								

Unconnected Equipment:

Scope of Work:

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

RAN Template:	A&L Template:
67E5A998E 6160	67E5998E_1xAIR+1OP+1QP

CT11580A_Sprint Retain_1_draft

Print Name: Standard
PORs: Replacement_Consolidation

Section 7 - Power Systems Equipment

Existing Power Systems Equipment
----- This section is intentionally blank. -----

	Proposed Power Systems Equipment
Enclosure	1
Enclosure Type	Enclosure 6160

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

T-Mobile Existing Facility

Site ID: CT11580A

130 Vernone Road
Bolton, Connecticut 06043

November 29, 2021

EBI Project Number: 6221007051

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**34.86%**

November 29, 2021

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

Emissions Analysis for Site: CT11580A -

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **130 Vernone Road** in **Bolton, 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 130 Vernone Road in Bolton, 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 power density calculations, the broadcast footprint of the AIR6449 antenna has been considered. Due to the beamforming nature of this antenna, the actual beam locations vary depending on demand and are narrow in nature. Using the broadcast footprint accounts for the potential location of beams at any given time.

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) 2 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

6) 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.

7) 1 LTE Traffic channel (LTE 1C and 2C BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 60 Watts.

8) 1 LTE Broadcast channel (LTE 1C and 2C BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 20 Watts.

9) 1 NR Traffic channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 120 Watts.

10) 1 NR Broadcast channel (BRS Band - 2500 MHz) was considered for each sector of the proposed installation. This Channel has a transmit power of 40 Watts.

11) 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.

12) 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.

13) The antennas used in this modeling are the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s), the Commscope VV-65A-R1 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector A, the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s), the Commscope VV-65A-R1 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector B, the RFS APXVAALL24_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz channel(s), the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s), the Commscope VV-65A-R1 for the 1900 MHz / 1900 MHz / 2100 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.

14) The antenna mounting height centerline of the proposed antennas is 148 feet above ground level (AGL).

15) 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.

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

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T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20	Make / Model:	RFS APXVAALL24_43-U-NA20
Frequency Bands:	600 MHz / 600 MHz / 700 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz
Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd	Gain:	12.95 dBd / 12.95 dBd / 13.65 dBd
Height (AGL):	148 feet	Height (AGL):	148 feet	Height (AGL):	148 feet
Channel Count:	5	Channel Count:	5	Channel Count:	5
Total TX Power (W):	200 Watts	Total TX Power (W):	200 Watts	Total TX Power (W):	200 Watts
ERP (W):	4,151.83	ERP (W):	4,151.83	ERP (W):	4,151.83
Antenna A1 MPE %:	**1.76%**	Antenna B1 MPE %:	**1.76%**	Antenna C1 MPE %:	**1.76%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449
Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz
Gain:	22.65 dBd / 17.3 dBd / 22.65 dBd / 17.3 dBd	Gain:	22.65 dBd / 17.3 dBd / 22.65 dBd / 17.3 dBd	Gain:	22.65 dBd / 17.3 dBd / 22.65 dBd / 17.3 dBd
Height (AGL):	148 feet	Height (AGL):	148 feet	Height (AGL):	148 feet
Channel Count:	4	Channel Count:	4	Channel Count:	4
Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts	Total TX Power (W):	240 Watts
ERP (W):	36,356.09	ERP (W):	36,356.09	ERP (W):	36,356.09
Antenna A2 MPE %:	**6.48%**	Antenna B2 MPE %:	**6.48%**	Antenna C2 MPE %:	**6.48%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Commscope VV-65A-R1	Make / Model:	Commscope VV-65A-R1	Make / Model:	Commscope VV-65A-R1
Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	1900 MHz / 1900 MHz / 2100 MHz
Gain:	15.15 dBd / 15.15 dBd / 15.8 dBd	Gain:	15.15 dBd / 15.15 dBd / 15.8 dBd	Gain:	15.15 dBd / 15.15 dBd / 15.8 dBd
Height (AGL):	148 feet	Height (AGL):	148 feet	Height (AGL):	148 feet
Channel Count:	6	Channel Count:	6	Channel Count:	6
Total TX Power (W):	300 Watts	Total TX Power (W):	300 Watts	Total TX Power (W):	300 Watts
ERP (W):	10,454.41	ERP (W):	10,454.41	ERP (W):	10,454.41
Antenna A3 MPE %:	**1.86%**	Antenna B3 MPE %:	**1.86%**	Antenna C3 MPE %:	**1.86%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	10.11%
AT&T	3.31%
T-Mobile (Existing)	11.94%
Verizon	2.71%
Nextel	0.32%
Various Others	3.33%
Eversource	3.14%
Site Total MPE % :	34.86%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	10.11%
T-Mobile Sector B Total:	10.11%
T-Mobile Sector C Total:	10.11%
Site Total MPE % :	34.86%

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 600 MHz LTE	2	591.73	148.0	2.11	600 MHz LTE	400	0.53%
T-Mobile 600 MHz NR	1	1577.94	148.0	2.81	600 MHz NR	400	0.70%
T-Mobile 700 MHz LTE	2	695.22	148.0	2.48	700 MHz LTE	467	0.53%
T-Mobile 2500 MHz LTE 1C & 2C Traffic	1	11044.63	148.0	19.69	2500 MHz LTE 1C & 2C Traffic	1000	1.97%
T-Mobile 2500 MHz LTE 1C & 2C Broadcast	1	1074.06	148.0	1.92	2500 MHz LTE 1C & 2C Broadcast	1000	0.19%
T-Mobile 2500 MHz NR Traffic	1	22089.26	148.0	39.38	2500 MHz NR Traffic	1000	3.94%
T-Mobile 2500 MHz NR Broadcast	1	2148.13	148.0	3.83	2500 MHz NR Broadcast	1000	0.38%
T-Mobile 1900 MHz GSM	2	982.02	148.0	3.50	1900 MHz GSM	1000	0.35%
T-Mobile 1900 MHz LTE	2	1964.04	148.0	7.00	1900 MHz LTE	1000	0.70%
T-Mobile 2100 MHz LTE	2	2281.14	148.0	8.13	2100 MHz LTE	1000	0.81%
						Total:	**10.11%**

• 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:	10.11%
Sector B:	10.11%
Sector C:	10.11%
T-Mobile Maximum MPE % (Sector A):	10.11%
Site Total:	34.86%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **34.86%** 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.