10 Industrial Ave,
Suite 3
Mahwah NJ 07430

Phone: 201.684.0055
Fax: 201.684.0066

January 28, 2022

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

RE: Notice of Exempt Modification
303 Boxwood Lane, Danbury, CT 06811
Latitude: 41.39472156
Longitude: -73.48666590
T-Mobile Site#: CTFF703A – Anchor

Dear Ms. Bachman:

T-Mobile currently maintains six (6) antennas at the 83-foot level of the existing 100-foot lattice tower at 303 Boxwood Lane, Danbury, CT. The 100-foot lattice tower and property are owned by Western Connecticut State University (State of Connecticut). T-Mobile now intends to add three (3) new 2500 MHz antennas. The new antennas will be installed at the same 83-foot level of the tower. The Sprint equipment at this tower will be removed prior to the proposed T-Mobile modification. The new antennas will support 5G services.

Planned Modifications:
Tower:

Remove
(1) 1-5/8" Hybrid Cable
(6) 1-5/8" Coax Cables
(3) TMAs

Install New:
(3) AIR 6449 B41 2500 MHz Antennas
(3) 4460 RRUs
(3) 1-5/8" Hybrid Cables

Existing to Remain:
(3) APXVAARR18_43-U-NA20 600/700/1900/2100 MHz Antennas
(3) AIR 32 1900/2100 MHz Antennas
(3) Radio 4449 B71B85
(3) 1-5/8" Hybrid

Ground:
Install New: 6160 Cabinet and B160 Battery Cabinet

This facility was originally approved by the Siting Council on October 21, 1996 in Docket No. 176. The proposed modification complies with the original approval.

Please accept this letter as notification pursuant to Regulations of Connecticut State Agencies§ 16- SOj-73, for construction that constitutes an exempt modification pursuant to R.C.S.A. § 16-50j-72(b)(2). In accordance with R.C.SA. § 16-SOj-73, a copy of this letter is being sent to Mayor -Dean Esposito, Elected Official, and Sharon Calitro, Director of Planning and Zoning for the City of Danbury, as well as the owner.

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

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

2. The proposed modifications will not require the extension of the site boundary.

3. The proposed modifications will not increase noise levels at the facility by six decibels or more, or to levels that exceed state and local criteria.

4. The operation of the replacement antennas will not increase radio frequency emissions at the facility to a level at or above the Federal Communications Commission safety standard.

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

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

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

Sincerely,

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

Attachments
cc: Dean Esposito – Mayor of City of Danbury
Sharon Calitro - Director of Planning and Zoning for City of Danbury
Western Connecticut State University- Owner
State of Connecticut - Owner

Kyle Richers

From: UPS <pkginfo@ups.com>
Sent: Tuesday, February 1, 2022 11:57 AM
To: KRICHERS@TRANSCENDWIRELESS.COM
Subject: UPS Delivery Notification, Tracking Number 1ZV257424292424236

Hello, your package has been delivered.

Delivery Date: Tuesday, 02/01/2022
Delivery Time: 11:55 AM
Left At: DOCK
Signed by: ESTRADA

TRANSCEND WIRELESS

Tracking Number:	1ZV257424292424236
Ship To:	STATE OF CONNECTICUT 210 CAPITOL AVENUE SUITE 1 HARTFORD, CT 06106 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.0 LBS
Reference Number:	CTFF703A CSC STATE OF CT

Download the UPS mobile app

Kyle Richers

From: UPS <pkginfo@ups.com>
Sent: Tuesday, February 1, 2022 10:38 AM
To: KRICHERS@TRANSCENDWIRELESS.COM
Subject: UPS Delivery Notification, Tracking Number 1ZV257424292122240

Hello, your package has been delivered.

Delivery Date: Tuesday, 02/01/2022
Delivery Time: 10:36 AM
Left At: RECEIVER
Signed by: YODER

TRANSCEND WIRELESS

Tracking Number:	1ZV257424292122240
Ship To:	WESTERN CONNECTICUT STATE U 181 WHITE STREET DANBURY, CT 06810 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.0 LBS
Reference Number:	CTFF703A CSC WCSU

Download the UPS mobile app

Kyle Richers

From: UPS <pkginfo@ups.com>
Sent: Tuesday, February 1, 2022 10:06 AM
To: KRICHERS@TRANSCENDWIRELESS.COM
Subject: UPS Delivery Notification, Tracking Number 1ZV257424294240216

Hello, your package has been delivered.

Delivery Date: Tuesday, 02/01/2022
Delivery Time: 10:04 AM
Left At: INSIDE DELIV
Signed by: MCW

TRANSCEND WIRELESS

Tracking Number:	1ZV257424294240216
Ship To:	CITY OF DANBURY 155 DEER HILL AVENUE DANBURY, CT 06810 US
Number of Packages:	1
UPS Service:	UPS Ground
Package Weight:	1.0 LBS
Reference Number:	CTFF703A CSC EO

Download the UPS mobile app

Kyle Richers

From: UPS <pkginfo@ups.com>
Sent: Monday, January 31, 2022 11:23 PM
To: krichers@transcendwireless.com
Subject: UPS Schedule Delivery Update, Tracking Number 1ZV257424290330224

Your scheduled delivery date has changed.
Scheduled Delivery Date: Wednesday, 02/02/2022

Important Delivery Information

From:	TRANSCEND WIRELESS
Tracking Number:	1ZV257424290330224

Shipment Details

Ship To:	Sharon Calitro City of Danbury 155 Deer Hill Avenue 1st Floor DANBURY, CT 06810 US
Number of Packages:	1
Signature Required:	A signature is required for package delivery
Weight:	1.0 LBS
Reference Number 1:	CTFF703A CSC ZO

303 BOXWOOD LN

Location	303 BOXWOOD LN	**Mblu**	F14/ / 96/ /
Acct#		**Owner**	STATE OF CONNECTICUT
Assessment	$69,100	**Appraisal**	$98,700
PID	24557	**Building Count**	1

Current Value

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2020	$0	$98,700	$98,700
Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2020	$0	$69,100	$69,100

Owner of Record

Owner	STATE OF CONNECTICUT	**Sale Price**	$0
Co-Owner	WATER STORAGE&PUMPING STATION	**Book & Page**	0482/0104
Address	210 CAPITOL AVE STE 1 HARTFROD, CT 06106	**Sale Date**	01/02/1970

Ownership History

Ownership History			
Owner	**Sale Price**	**Book & Page**	**Sale Date**
STATE OF CONNECTICUT	$0	0482/0104	01/02/1970

Building Information

Building 1 : Section 1

Year Built:	
Living Area:	0
Replacement Cost:	$0
Building Percent Good:	
Replacement Cost Less Depreciation:	$0

Building Attributes

Field	Description
Style	Vacant Land
Model	
Grade:	
Stories:	
Occupancy	
Exterior Wall 1	
Exterior Wall 2	
Roof Structure:	
Roof Cover	
Interior Wall 1	
Interior Wall 2	
Interior Flr 1	
Interior Flr 2	
Heat Fuel	
Heat Type:	
AC Type:	
Total Bedrooms:	
Total Bthrms:	
Total Half Baths:	
Total Xtra Fixtrs:	
Total Rooms:	
Bath Style:	
Kitchen Style:	
Fireplaces	
Whirlpool	
Addn'l Kitchen	
Bsm Gar	
Fin Bsm Area	
Fin Bsm Qual	
Nhbd	
MH Park	

Building Photo

(http://images.vgsi.com/photos2/DanburyCTPhotos//default.jpg)

Building Layout

(http://images.vgsi.com/photos2/DanburyCTPhotos//Sketches/24557_2455

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

Extra Features

Extra Features	Legend
No Data for Extra Features	

Land

Land Use

Land Line Valuation

Use Code	946V	**Size (Acres)**	1.86
Description	Rec. Vacant	**Frontage**	0
Zone	RA40	**Depth**	0
Neighborhood		**Assessed Value**	$69,100
Alt Land Appr	No	**Appraised Value**	$98,700
Category			

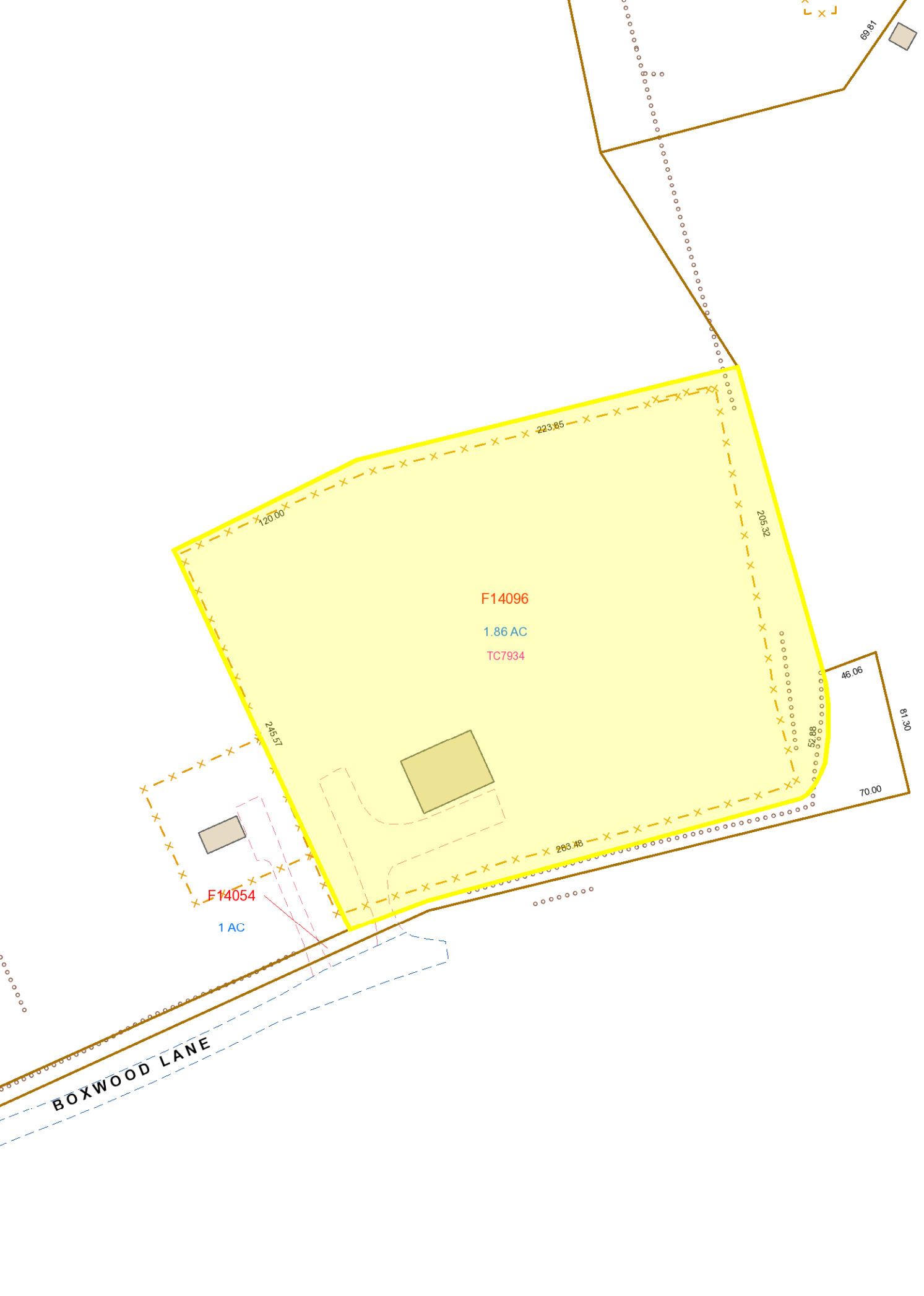
Outbuildings

Outbuildings	Legend
No Data for Outbuildings	

Valuation History

Appraisal			
Valuation Year	**Improvements**	**Land**	**Total**
2019	$0	$98,700	$98,700
2018	$0	$98,700	$98,700
2017	$0	$98,700	$98,700

Assessment			
Valuation Year	**Improvements**	**Land**	**Total**
2019	$0	$69,100	$69,100
2018	$0	$69,100	$69,100
2017	$0	$69,100	$69,100


69.81
223.85
120.00
205.32
F14096
1.86 AC
TC7934
46.06
81.30
52.88
70.00
263.48
245.57
F14054
1 AC
BOXWOOD LANE

NOTE:

EXISTING SPRINT ANTENNAS SHALL BE REMOVED PRIOR TO THE INSTALLATION OF ANY PROPOSED T-MOBILE ANTENNAS

T-Mobile

SITE NAME: CT703/WCSU ET
SITE ID: CTFF703A
303 BOXWOOD LANE
DANBURY, CT 06811

T-MOBILE RF CONFIGURATION

67D5997DB_2xAIR+1OP

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE AS MODIFIED BY THE 2018 CONNECTICUT SUPPLEMENT, INCLUDING THE TIA/EIA-222 REVISION "G" "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND SUPPORTING STRUCTURES." 2017 CONNECTICUT FIRE SAFETY CODE, NATIONAL ELECTRICAL CODE AND LOCAL CODES.
2. CONTRACTOR SHALL REVIEW ALL DRAWINGS AND SPECIFICATIONS IN THE CONTRACT DOCUMENT SET. CONTRACTOR SHALL COORDINATE ALL WORK SHOWN IN THE SET OF DRAWINGS. THE CONTRACTOR SHALL PROVIDE A COMPLETE SET OF DRAWINGS TO ALL SUBCONTRACTORS AND ALL RELATED PARTIES. THE SUBCONTRACTORS SHALL EXAMINE ALL THE DRAWINGS AND SPECIFICATIONS FOR THE INFORMATION THAT AFFECTS THEIR WORK.
3. CONTRACTOR SHALL PROVIDE A COMPLETE BUILD-OUT WITH ALL FINISHES, STRUCTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS AND PROVIDE ALL ITEMS AS SHOWN OR INDICATED ON THE DRAWINGS OR IN THE WRITTEN SPECIFICATIONS.
4. CONTRACTOR SHALL FURNISH ALL MATERIAL, LABOR AND EQUIPMENT TO COMPLETE THE WORK AND FURNISH A COMPLETED JOB ALL IN ACCORDANCE WITH LOCAL AND STATE GOVERNING AUTHORITIES AND OTHER AUTHORITIES HAVING LAWFUL JURISDICTION OVER THE WORK.
5. CONTRACTOR SHALL SECURE AND PAY FOR ALL PERMITS AND ALL INSPECTIONS REQUIRED AND SHALL ALSO PAY FEES REQUIRED FOR THE GENERAL 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 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

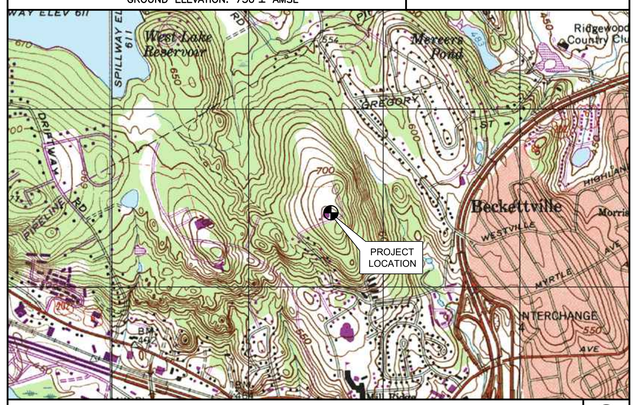
FROM: 35 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

TO: 303 BOXWOOD LANE
DANBURY, CT 06811

1.	HEAD NORTH ON GRIFFIN RD S	0.30 MI.
2.	TURN RIGHT ONTO DAY HILL RD	3.60 MI.
3.	USE THE RIGHT LANE TO MERGE ONTO I-91 S VIA THE RAMP TO HARTFORD	0.40 MI.
4.	MERGE ONTO I-91 S	6.90 MI.
5.	TAKE EXIT 32A-32B FOR I-84 TOWARD WATERBURY	0.50 MI.
6.	MERGE ONTO I-84	58.2 MI.
7.	TAKE EXIT 4 FOR US-6 W/US-202 W TOWARD LAKE AVE	0.30 MI.
8.	TURN RIGHT ONTO US-202 W.US-6 W/LAKE AVE EXT	404 FT.
9.	TURN RIGHT ONTO MILL RIDGE RD	0.40 MI.
10.	TURN RIGHT ONTO HIGH RIDGE RD	0.10 MI.
11.	TURN LEFT TO STAY ON HIGH RIDGE RD.	89 FT.
12.	TURN LEFT AT THE 1ST CROSS STREET ONTO SCUPPO RD	0.10 MI.
13.	TURN RIGHT ONTO BOXWOOD LN.	0.10 MI.

SITE COORDINATES: LATITUDE: 41° 23' 41.90" N
LONGITUDE: 73° 29' 12.27" W
GROUND ELEVATION: 730'± 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. REMOVE 3106 CABINET
2. INSTALL (1) ENCLOSURE 6160
3. INSTALL (1) BATTERY CABINET B160
4. INSTALL (1) iXRe ROUTER TO NEW ENCLOSURE 6160
5. INSTALL (1) BB6648 FOR L2500 AND N2500 TO NEW ENCLOSURE 6160
6. MOVE U2100 TO NEW TOWER MOUNTED RADIO 4460 B25+B66
7. REMOVE ALL COAXIAL LINES
8. REMOVE THE 9X18 HYBRID CABLES
9. INSTALL (3) 6X24 HYBRID CABLES
10. REMOVE (3) TMA'S
11. INSTALL (3) ERICSSON AIR6449 B41 ANTENNAS
12. INSTALL (3) RADIO 4460 B25+B66
13. EXISTING SPRINT ANTENNAS SHALL BE REMOVED PRIOR TO THE INSTALLATION OF ANY PROPOSED T-MOBILE ANTENNAS

PROJECT INFORMATION

SITE NAME:	CT703/WCSU ET
SITE ID:	CTFF703A
SITE ADDRESS:	303 BOXWOOD LANE DANBURY CT, 06811
APPLICANT:	T-MOBILE NORTHEAST, LLC 35 GRIFFIN ROAD SOUTH BLOOMFIELD, CT 06002
CONTACT PERSON:	DAN REID (PROJECT MANAGER) TRANSCEND WIRELESS, LLC (203) 592-8291
ENGINEER OF RECORD:	CENTEK ENGINEERING, INC. 63-2 NORTH BRANFORD RD. BRANFORD, CT 06405 CARLO F. CENTORE, PE (203) 488-0580 EXT. 122
PROJECT COORDINATES:	LATITUDE: 41° 23' 41.90" N LONGITUDE: 73° 29' 12.27" W GROUND ELEVATION: 730'± AMSL SITE COORDINATES AND GROUND ELEVATION REFERENCED FROM GOOGLE EARTH.

SHEET INDEX

SHT. NO.	DESCRIPTION	REV.
T-1	TITLE SHEET	0
N-1	GENERAL NOTES AND SPECIFICATIONS	0
C-1	SITE LOCATION PLAN	0
C-2	COMPOUND PLAN, EQUIPMENT PLAN, AND ELEVATION	0
C-3	ANTENNA PLANS	0
C-4	TYPICAL EQUIPMENT DETAILS	0
E-1	TYPICAL ELECTRICAL DETAILS	0
E-2	ELECTRICAL SPECIFICATIONS	0

REV.	DATE	DRAWN BY	CHK'D BY	DESCRIPTION
0	01/26/22	ASC	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

STATE OF CONNECTICUT — CARLO F. CENTORE — LICENSED PROFESSIONAL ENGINEER

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
WIRELESS COMMUNICATIONS FACILITY
CT703/WCSU ET
SITE ID: CTFF703A
303 BOXWOOD LANE
DANBURY, CT

DATE:	07/21/20
SCALE:	AS NOTED
JOB NO.	20074.58

TITLE SHEET

T-1

Sheet No. 1 of 8

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 III (BASED ON IBC TABLE 1604.5)
- ULTIMATE DESIGN SPEED (OTHER STRUCTURE): 124 MPH (Vasd) (EXPOSURE C/ IMPORTANCE FACTOR 1.0 BASED ON ASCE 7-10).

SITE NOTES

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

GENERAL NOTES

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

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GENERAL NOTES AND SPECIFICATIONS

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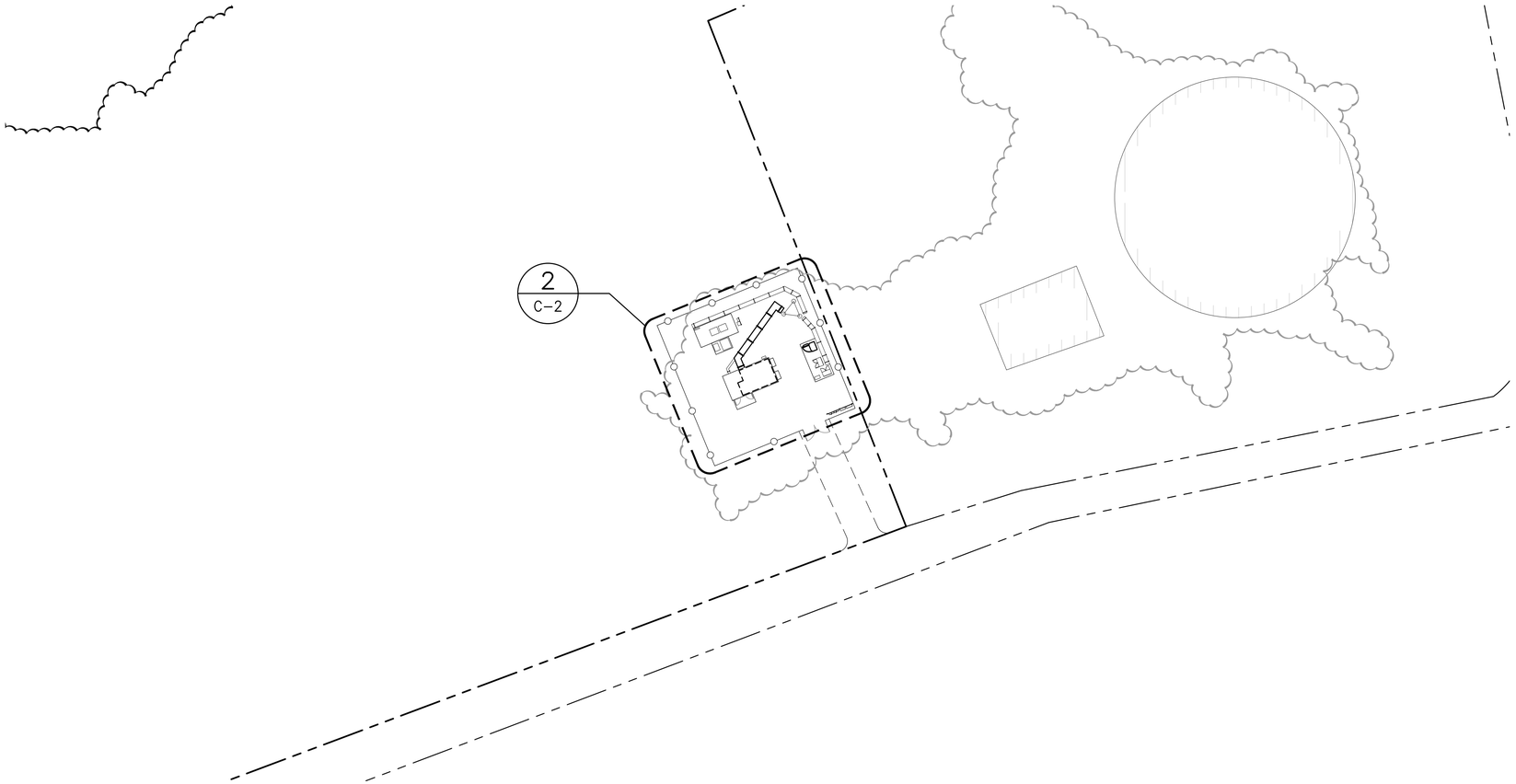
Sheet No. 2 of 8

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/DIPLEXER (QTY)	(QTY) PROPOSED COAX (LENGTH)
A1	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	83'	30°			(1) 6x24 HYBRID CABLE (±100')
A2	EXISTING	RFS (APXVAARR18_43-UNA20)	72.0 x 24.0 x 8.5	83'	30°	(E) RRU 4449 B71+B85 (1), (P) RRU 4460 B25+B66A (1)		
A3	EXISTING	ERICSSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.0 x 8.7	83'	30°			
B1	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	83'	150°			(1) 6x24 HYBRID CABLE (±100')
B2	EXISTING	RFS (APXVAARR18_43-UNA20)	72.0 x 24.0 x 8.5	83'	150°	(E) RRU 4449 B71+B85 (1), (P) RRU 4460 B25+B66A (1)		
B3	EXISTING	ERICSSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.0 x 8.7	83'	150°			
C1	PROPOSED	ERICSSON (AIR6449 B41)	33.1 x 20.6 x 8.6	83'	270°			(1) 6x24 HYBRID CABLE (±100')
C2	EXISTING	RFS (APXVAARR18_43-UNA20)	72.0 x 24.0 x 8.5	83'	270°	(E) RRU 4449 B71+B85 (1), (P) RRU 4460 B25+B66A (1)		
C3	EXISTING	ERICSSON (AIR32 KRD901146-1_B66A_B2A)	56.6 x 12.0 x 8.7	83'	270°			



1 C-1 **SITE LOCATION PLAN**
SCALE: NOT TO SCALE

TRUE NORTH

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SITE LOCATION PLAN

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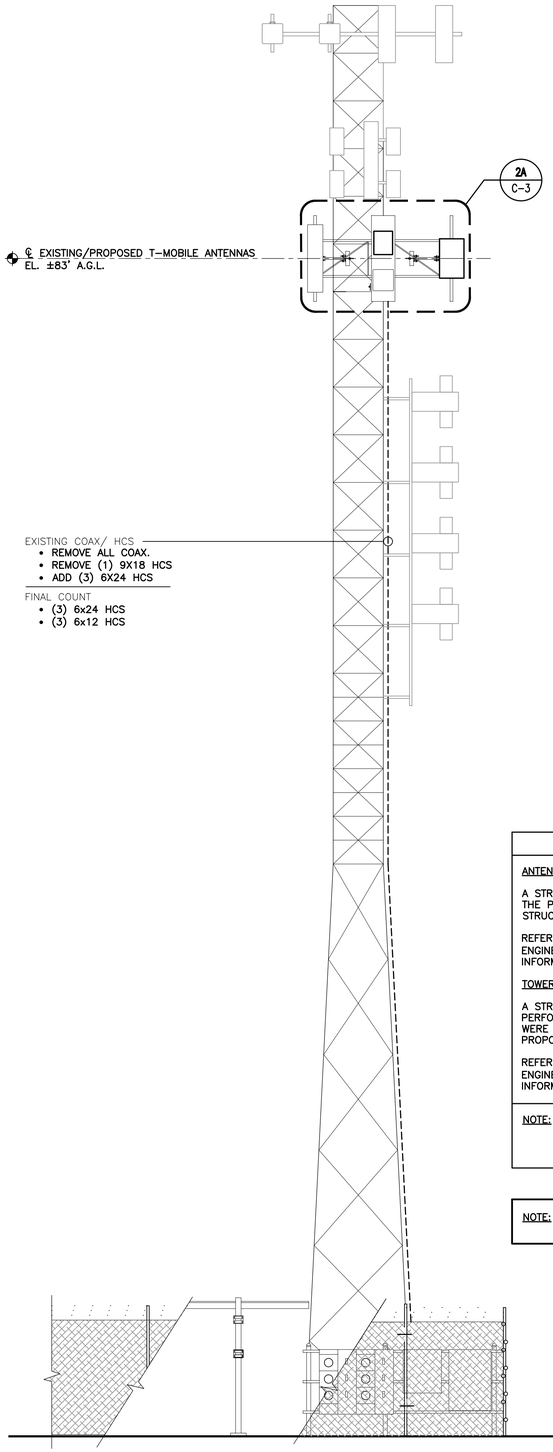


1 C-2 **TOWER ELEVATION - PROPOSED**
SCALE: 1" = 5'

STRUCTURAL COMPLIANCE

ANTENNA MOUNTS

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

REFER TO THE ANTENNA MOUNT ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 20074.58) DATED 12/09/21 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

TOWER AND TOWER FOUNDATION

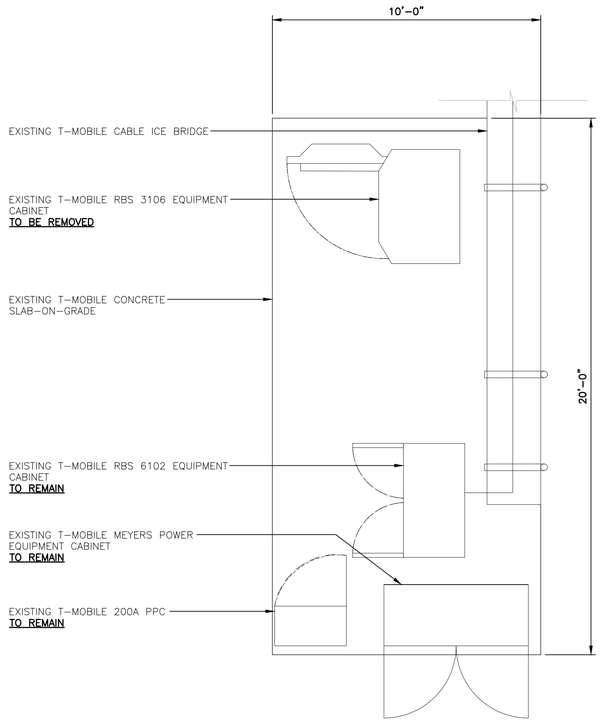
A STRUCTURAL ANALYSIS OF THE TOWER AND TOWER FOUNDATION WAS PERFORMED FOR THE PROPOSED EQUIPMENT INSTALLATION AND THEY WERE FOUND TO BE STRUCTURALLY SUFFICIENT TO ACCOMMODATE THE PROPOSED LOADING.

REFER TO THE STRUCTURAL ANALYSIS REPORT PREPARED BY CENTEK ENGINEERING (PROJECT # 20074.58) DATED 12/09/21 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.

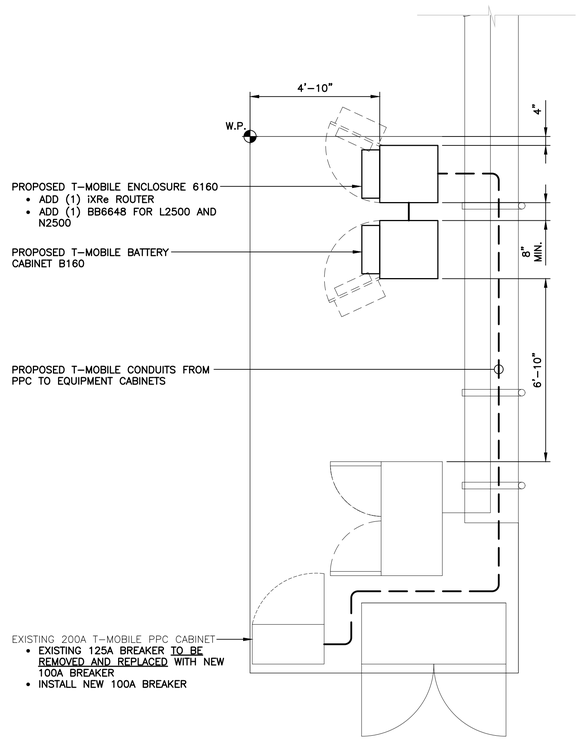
NOTE: EXISTING SPRINT ANTENNAS SHALL BE REMOVED PRIOR TO THE INSTALLATION OF ANY PROPOSED T-MOBILE EQUIPMENT

GRAPHIC SCALE
5 0 2.5 5 10 20
1" = 5'-0"



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

APPROXIMATE NORTH

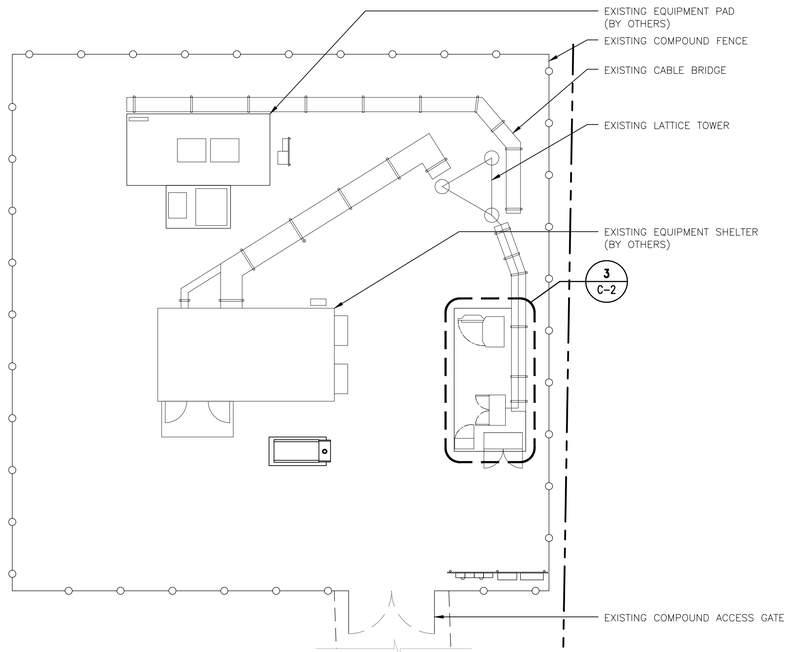


4 C-2 **PROPOSED EQUIPMENT PLAN**
SCALE: 3/8" = 1'

APPROXIMATE NORTH

LEGEND

W.P. DENOTES WORKING POINT.



2 C-2 **PARTIAL COMPOUND PLAN - EXISTING**
SCALE: 1" = 5'

APPROXIMATE NORTH

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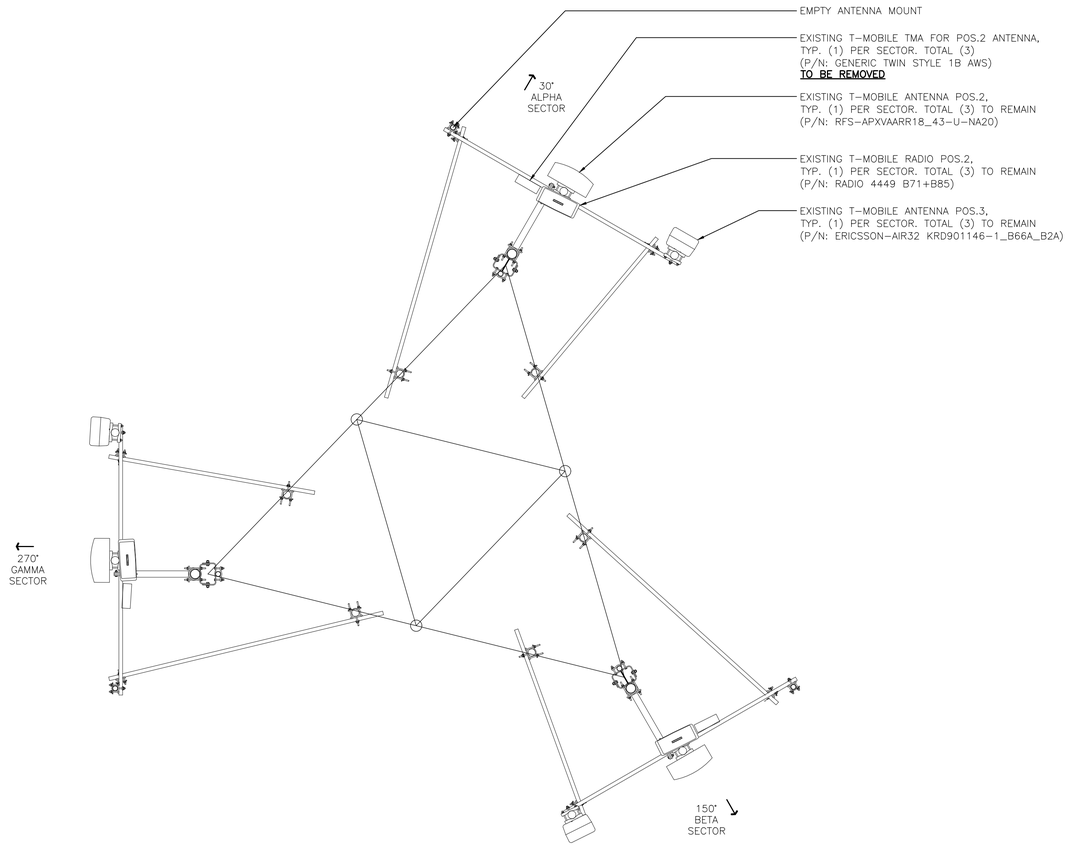
COMPOUND PLAN, EQUIPMENT PLAN, AND ELEVATION

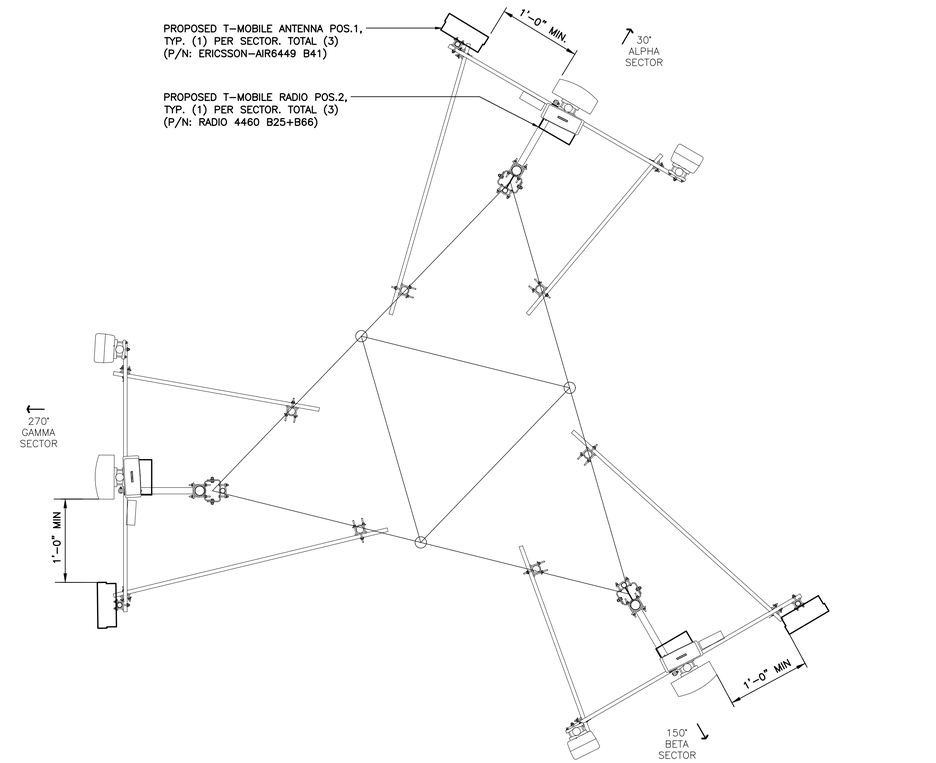
C-2

Sheet No. 4 of 8



1 C–3 EQUIPMENT AND ANTENNA PLAN – EXISTING

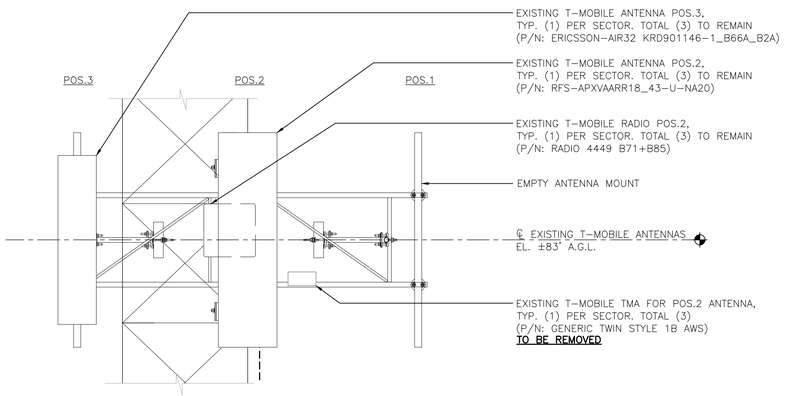
SCALE: 3/8" = 1'



2 C–3 EQUIPMENT AND ANTENNA PLAN – PROPOSED

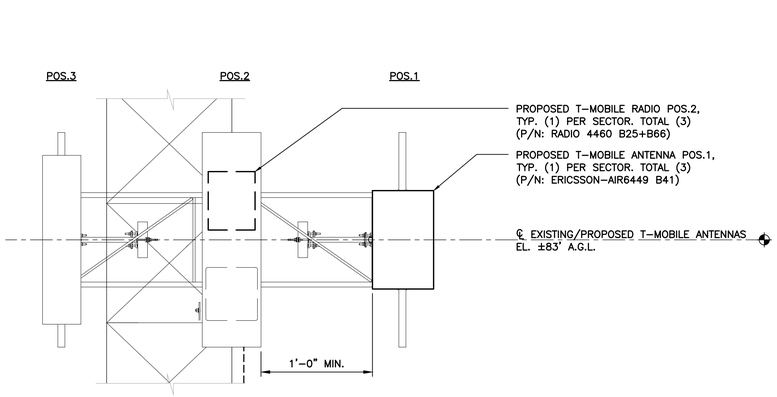
SCALE: 3/8" = 1'

NOTE: EXISTING SPRINT ANTENNAS SHALL BE REMOVED PRIOR TO THE INSTALLATION OF ANY PROPOSED T–MOBILE EQUIPMENT



1A C–3 ANTENNA ELEVATION – EXISTING

SCALE: 1/2" = 1'



2A C–3 ANTENNA ELEVATION – PROPOSED

SCALE: 1/2" = 1'

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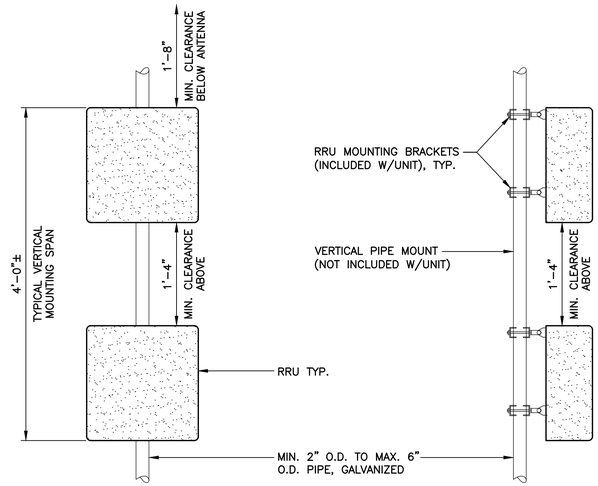
ANTENNA PLANS

C–3

Sheet No. 5 of 8



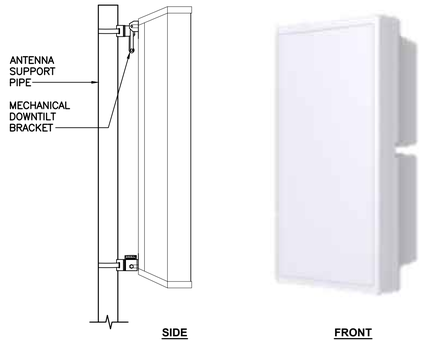
FRONT ELEVATION SIDE ELEVATION

NOTES:

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

1 C-4 TYPICAL RRUS MOUNTING DETAILS

SCALE: NOT TO SCALE



SIDE

FRONT

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

2 C-4 PROPOSED ANTENNA DETAIL

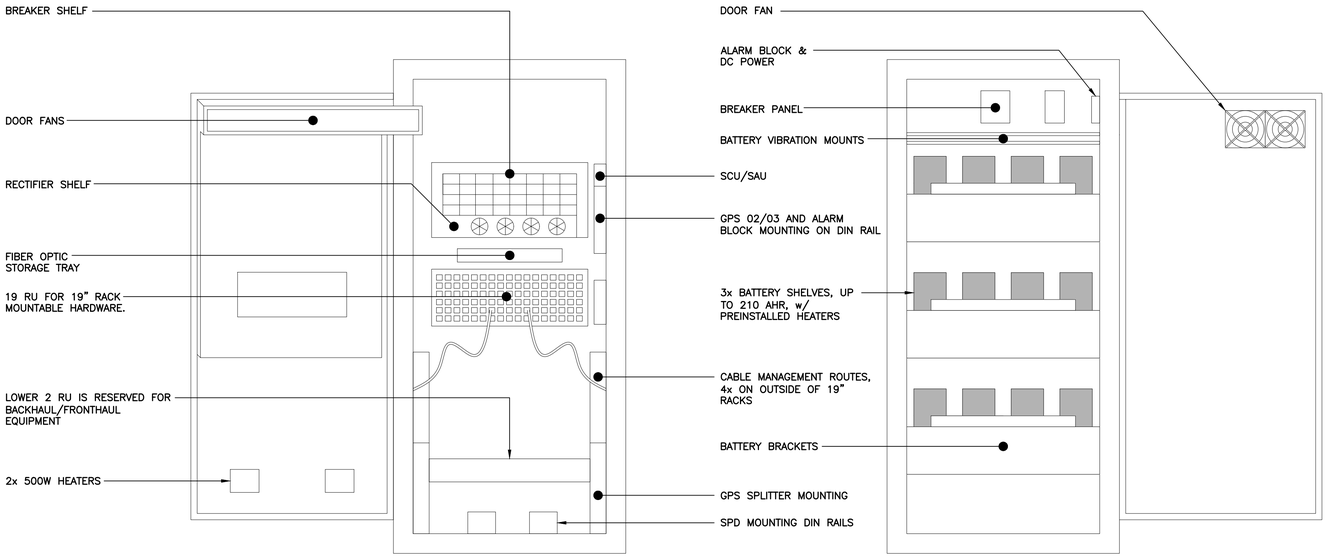
SCALE: NOT TO SCALE

RADIO 4460 B25+B66

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

3 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

4 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

5 C-4 BATTERY B160 CABINET DETAIL

SCALE: NOT TO SCALE

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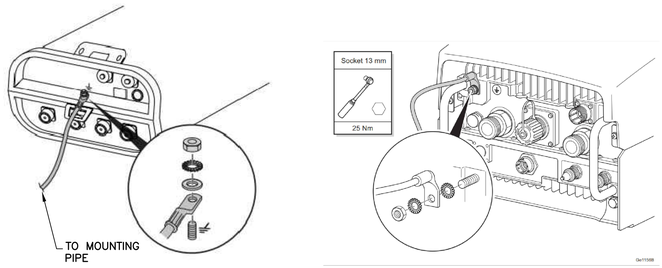
TYPICAL EQUIPMENT DETAILS

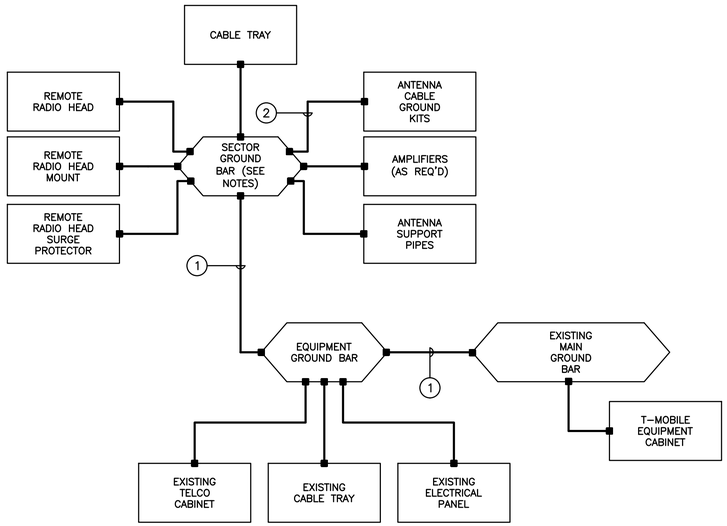
C-4

Sheet No. 6 of 8



1 E-1 TYPICAL ANTENNA/RRU GROUNDING DETAILS

SCALE: NOT TO SCALE



GROUNDING SCHEMATIC NOTES

(1) #2 AWG

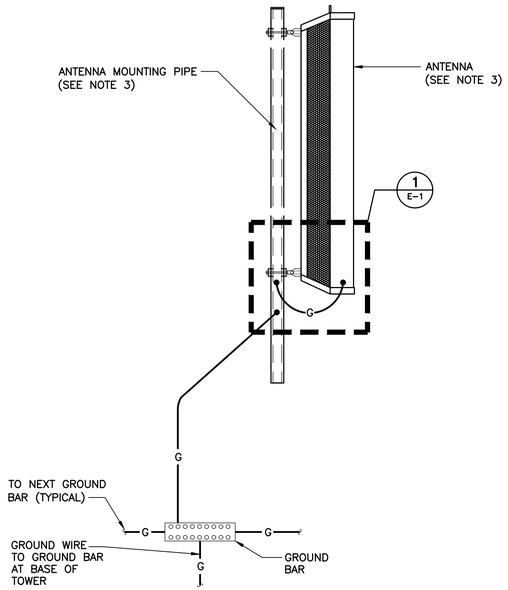
(2) #6 AWG

GENERAL NOTES:

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

3 E-1 TYPICAL GROUNDING SCHEMATIC DETAIL

SCALE: NOT TO SCALE



NOTES:

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

2 E-1 TYPICAL ANTENNA GROUNDING DETAIL

SCALE: NOT TO SCALE

RISER DIAGRAM NOTES

(1) EXISTING 200A, PPC CABINET TO REMAIN.

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

(3) EXISTING CABINETS AND ASSOCIATED CONDUITS AND CONDUCTORS TO BE REMOVED.

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

(5) EXISTING CONDUITS AND CONDUCTORS TO REMAIN.

(6) NEW T–MOBILE EQUIPMENT CABINET

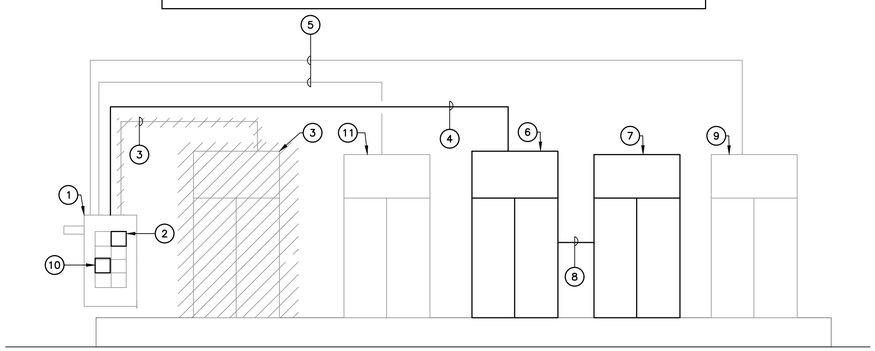
(7) NEW T–MOBILE BATTERY CABINET

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

(9) EXISTING CABINET TO REMAIN.

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

(11) EXISTING CABINET TO REMAIN AND BE DOWNGRADED. COORDINATE WITH CONSTRUCTION MANAGER



4 E-1 ELECTRICAL POWER RISER DIAGRAM

SCALE: NOT TO SCALE

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TYPICAL ELECTRICAL DETAILS

E-1

Sheet No. 7 of 8

ELECTRICAL SPECIFICATIONS

SECTION 16010

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	01/26/22	ASC	TJR	CONSTRUCTION DRAWINGS - ISSUED FOR CONSTRUCTION

PROFESSIONAL ENGINEER SEAL

T-Mobile

Transcend Wireless

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

T-MOBILE NORTHEAST LLC

WIRELESS COMMUNICATIONS FACILITY

CT703/WCSU ET

SITE ID: CTFF703A

303 BOXWOOD LANE
DANBURY, CT

DATE:	07/21/20
SCALE:	AS NOTED
JOB NO.	20074.58

ELECTRICAL SPECIFICATIONS

E-2

Sheet No. 8 of 8

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

100' Existing NUDD Lattice Tower

Proposed T-Mobile
Antenna Upgrade

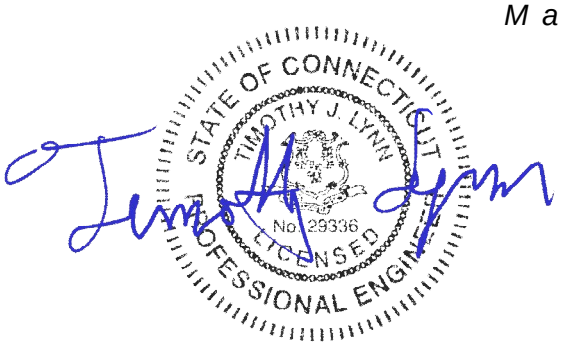
T-Mobile Site Ref: CTFF703A

303 Boxwood Lane
Danbury, CT

Centek Project No. 20074.58

~~Date: July 29, 2020~~
Rev 2: December 9, 2021

Max Stress Ratio = 88.9%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

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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 self supporting lattice tower located in Danbury, Connecticut.

The host tower is a 100-ft, three-legged self-support lattice tower originally designed and manufactured by Fred A. Nudd Corporation; file no: 96-4992 dated January 21, 1997. Subsequent reinforcements were made to the tower per Centek job no. 361A dated November 28, 2001 and Centek job no. 10106 dated August 16, 2010. The tower geometry, structure member sizes and the foundation system information were taken from the aforementioned design documents.

Antenna and appurtenance information were obtained from a previous structural report prepared by Centek job no. 19027.54 dated July 19, 2019 and a RF data sheet.

The tower is made up of five (5) steel sections consisting of A500-42, A500-50, and A500-61ksi pipe legs. Diagonal lateral support bracing consists of A36 single angle and steel rod construction. The vertical tower sections are connected by bolted flange plates while the pipe legs and bracing are connected by welded connections (40'-100'), bolted and welded gusset connections (0'-40'). The tower face width is 7.5-ft at the bottom tapering to 3.5-ft at the top.

Antenna and Appurtenance Summary

- AT&T Mobility (Existing):
  Antennas: Six (6) CCI OPA-65R-LUCC-H4 panel antennas, three (3) Commscope SBNHH-1D65A panel antennas, six (6) Ericsson RRUS-11 remote radio heads, three (3) Ericsson RRUS-12 remote radio heads, three (3) Ericsson RRUS-32 remote radio heads, three (3) Ericsson RRUS-32 B2 remote radio heads, three (3) Ericsson RRUS-32 B66 remote radio heads, three (3) Ericsson RRUS-E2 remote radio heads and three (3) Raycap DC6-48-60-18-8F surge arrestors mounted on (3) sector mounts with a RAD center elevation of 98-ft above the existing tower base.
  Coax Cables: Three (3) fiber cable, six (6) dc control cables and six (6) RET cables running on a face of the existing tower.
- Unknown (Existing):
  Antennas: One (1) 3' parabolic grid antenna with a RAD center elevation of 96-ft above the existing tower base.
  Coax Cables: One (1) 1/2" ∅ coax cable.
- **Sprint (Existing to Remove):**
  Antennas: Three (3) RFS APXVSPP18-C-A20 panel antennas and three (3) RFS APXVTM14 panel antennas, six (6) Alcatel-Lucent 1900 MHz RRHs, three (3) Alcatel-Lucent 800 MHz RRHs and three (3) Alcatel-Lucent TD-RRH8x20 remote radio heads mounted on three (3) sector frames with a RAD center elevation of 89-ft above the existing tower base.
  Coax Cables: Four (4) 1-1/4" ∅ fiber cables and one (1) RET cable.
- WCSU FM (Existing):
  Antennas: One (1) 4-Bay Shively Labs 6810 FM Antenna w/ Radomes with a RAD center elevation of 65-ft above the existing tower base.
  Coax Cables: One (1) 1 5/8" ∅ coax cable.

- **Sprint (Existing to Remove):**
  Antennas: (1) GPS antenna mounted to a 2' standoff mount with a RAD center elevation of 30-ft above the existing tower base.
  Coax Cables: One (1) 1/2" ∅ coax cable.
- T-Mobile: (Existing to Remain):
  Antennas: Three (3) AIR32 panel antennas, three (3) RFS APXVAARR18_43 panel antennas and three (3) Ericsson 4449 remote radio units mounted on three (3) 10-ft T-Frames with RAD center elevations of 83-ft above the existing tower base.
  Cables: Three (3) 6x12 fiber cables running on a leg/face of the tower.
- **T-Mobile: (Existing to Remove):**
  Antennas: Three (3) TMAs mounted on three (3) 10-ft T-Frames with RAD center elevations of 83-ft above the existing tower base.
  Coax Cables: Six (6) 1 5/8" ∅ coax cables and one (1) 9x18 fiber cable running on a leg/face of the tower.
- **T-Mobile: (Proposed):**
  Antennas: Three (3) Ericsson AIR6449 panel antennas and three (3) Ericsson 4460 remote radio units mounted on three (3) 10-ft T-Frames with RAD center elevations of 83-ft above the existing tower base.
  Coax Cables: Three (3) 6x24 fiber cables running on a leg/face of the 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 shall be routed as specified on 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 0.75" radial ice on the tower structure and its components.

Basic Wind Speed:	Danbury; v = 93 mph (3 second gust)	*[Appendix N of the 2018 CT Building Code]*
Load Cases:	Load Case 1; 93 mph wind speed w/ no ice plus gravity load – used in calculation of tower stresses and rotation.	*[Appendix N of the 2018 CT Building Code]*
	Load Case 2; 50 mph wind speed w/ 0.75" radial ice plus gravity load – used in calculation of tower stresses.	*[Annex B of TIA-222-G-2005]*

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

Tower Capacity

- Calculated stresses **were found** to be within allowable limits. This tower was found to be at **88.9%** of its total capacity.

Tower Section	Elevation	Stress Ratio (percentage of capacity)	Result
Leg (T4)	40'-0"-53'-4"	87.7%	**PASS**
Diagonal (T2)	60'-0"-80'-0"	88.9%	**PASS**

Foundation and Anchors

The existing foundation consists of three (3) 2.0-ft ∅ x 4.25-ft long reinforced concrete piers on a 14.5-ft square x 3-ft thick reinforced concrete pad bearing directly on existing sub grade. The existing foundation dimensions and sub-grade conditions used in the analysis of the existing foundation were obtained from the aforementioned manufacturers original design documents; Fred A. Nudd Corporation; file no: 96-4992. Tower legs are connected to the foundation by means of (4) 1.5" ∅, ASTM A36 anchor bolts per leg, embedded into the concrete foundation structure.

- The tower reactions developed from the governing Load Case were used in the verification of the foundation:

Reactions	Vector	Proposed Base Reactions
Base	Shear	**12 kips**
	Compression	**22 kips**
	Moment	**843 kip-ft**
Leg	Shear	**9 kips**
	Compression	**137 kips**
	Uplift	**122 kips**

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

Tower Component	Design Limit	Stress Ratio (percentage of capacity)	Result
Anchor Bolts	Tension	52.5%	**PASS**

- The foundation was found to be within allowable limits.

Foundation	Design Limit	TIA-222-G Section 9.4 FS[(1)]	Proposed Loading (FS)[(1)]	Result
Reinforced Concrete Mat	OTM[(2)]	1.0	1.81	**PASS**

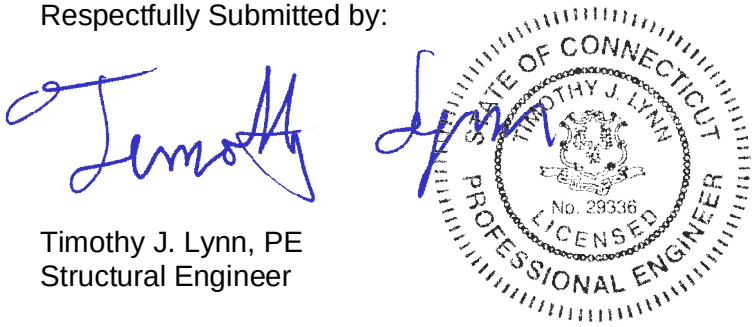
Conclusion

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

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

Please feel free to call with any questions or comments.

Respectfully Submitted by:



Timothy J. Lynn, PE
Structural Engineer

Standard Conditions for Furnishing of Professional Engineering Services on Existing Structures

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

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

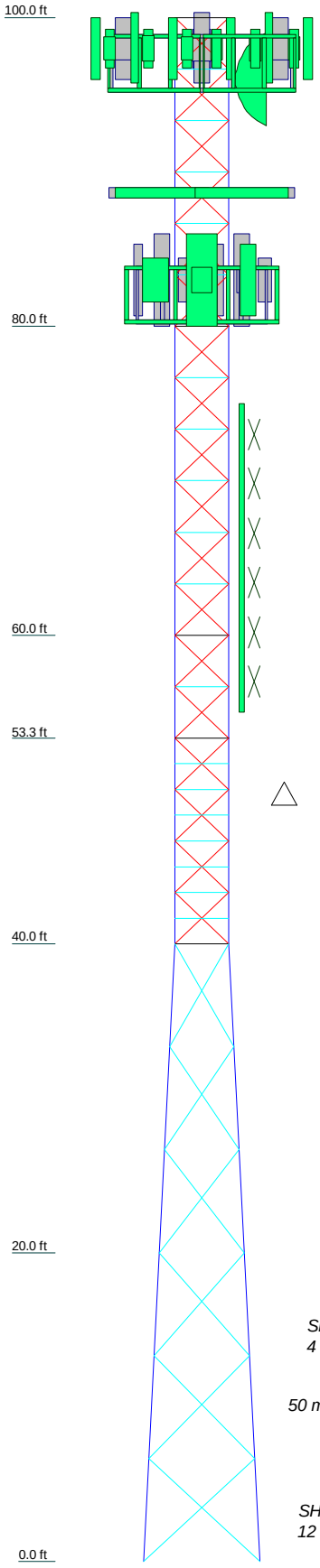
General Description of Structural Analysis Program

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

tnxTower Features:

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

Section	T1	T2	T3	T4	T5	T6		
Legs	P2.5x.276	P2.5x.276 (GR)		P3x.3 (GR)	P5x.258 (GR)			3.5
Leg Grade	A500-50			A500M-61	A500-42			
Diagonals	SR 5/8			SR 3/4	L2x2x3/16	L2 1/2x2 1/2x3/16		
Diagonal Grade	A36							
Top Girts	L1 1/2x1 1/2x3/16	2L1 1/2x1 1/2x3/16		2L1 1/2x1 1/2x3/16	N.A.			
Bottom Girts	N.A.			2L1 1/2x1 1/2x3/16	N.A.			
Horizontals	L1 1/2x1 1/2x3/16	2L1 1/2x1 1/2x3/16		L2 1/2x2 1/2x5/16	N.A.			
Sec. Horizontals	N.A.				N.A.			5.5
Face Width (ft)	7.5							
# Panels @ (ft)	0.8	1.1	0.5	1.3	2.5	2.6		6 @ 6.66667
Weight (K)	8.8							



DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
(2) OPA-65R-LCUU-H4 (ATI - Existing)	98	12' Boom Starmount (ATI - Existing)	97
(2) OPA-65R-LCUU-H4 (ATI - Existing)	98	Mount Mods (ATI - Existing)	97
(2) OPA-65R-LCUU-H4 (ATI - Existing)	98	PR-900	96
SBNHH-1D65A (ATI - Existing)	98	Pirod 12' T-Frame Sector Mount (1) (Empty)	89
SBNHH-1D65A (ATI - Existing)	98	Pirod 12' T-Frame Sector Mount (1) (Empty)	89
SBNHH-1D65A (ATI - Existing)	98	Pirod 12' T-Frame Sector Mount (1) (Empty)	89
(2) RRUS-11 (ATI - Existing)	98	AIR32 (T-Mobile - Existing)	83
RRUS-12 (ATI - Existing)	98	AIR32 (T-Mobile - Existing)	83
RRUS-32 (ATI - Existing)	98	AIR32 (T-Mobile - Existing)	83
(2) RRUS-32 (ATI - Existing)	98	APXVAARR18-43 (T-Mobile - Existing)	83
RRUS-E2 (ATI - Existing)	98	APXVAARR18-43 (T-Mobile - Existing)	83
(2) RRUS-11 (ATI - Existing)	98	APXVAARR18-43 (T-Mobile - Existing)	83
RRUS-12 (ATI - Existing)	98	AIR6449 (T-Mobile - Proposed)	83
RRUS-32 (ATI - Existing)	98	AIR6449 (T-Mobile - Proposed)	83
(2) RRUS-32 (ATI - Existing)	98	AIR6449 (T-Mobile - Proposed)	83
RRUS-E2 (ATI - Existing)	98	Radio 4449 B71 B12 (T-Mobile - Existing)	83
(2) RRUS-11 (ATI - Existing)	98	Radio 4449 B71 B12 (T-Mobile - Existing)	83
RRUS-12 (ATI - Existing)	98	Radio 4449 B71 B12 (T-Mobile - Existing)	83
RRUS-32 (ATI - Existing)	98	4460 B25+B66 (T-Mobile - Proposed)	83
(2) RRUS-32 (ATI - Existing)	98	4460 B25+B66 (T-Mobile - Proposed)	83
RRUS-E2 (ATI - Existing)	98	4460 B25+B66 (T-Mobile - Proposed)	83
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	98	10-ft T-Frame (T-Mobile - Existing)	82
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	98	10-ft T-Frame (T-Mobile - Existing)	82
DC6-48-60-18-8F Surge Arrestor (ATI - Existing)	98	10-ft T-Frame (T-Mobile - Existing)	82
12' Boom Starmount (ATI - Existing)	97	6810 4 Bay	65
Mount Mods (ATI - Existing)	97		
12' Boom Starmount (ATI - Existing)	97		
Mount Mods (ATI - Existing)	97		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A500-50	50 ksi	62 ksi	A500M-61	61 ksi	75 ksi
A36	36 ksi	58 ksi	A500-42	42 ksi	58 ksi

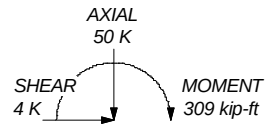
TOWER DESIGN NOTES

1. Tower designed for Exposure B to the TIA-222-G Standard.
2. Tower designed for a 93 mph basic wind in accordance with the TIA-222-G Standard.
3. Tower is also designed for a 50 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Structure Class II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. Grouted pipe f'c is 5 ksi
8. 3/4" dia SR used for sections T3 _T4 to account for 5/8" SR with 1/4" bar
9. TOWER RATING: 88.9%

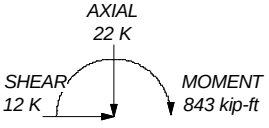
ALL REA
ARE FAC

MAX. CORNER REACTIONS AT BASE:
DOWN: 137 K
SHEAR: 9 K

UPLIFT: -122 K
SHEAR: 8 K



TORQUE 1 kip-ft
50 mph WIND - 0.7500 in ICE



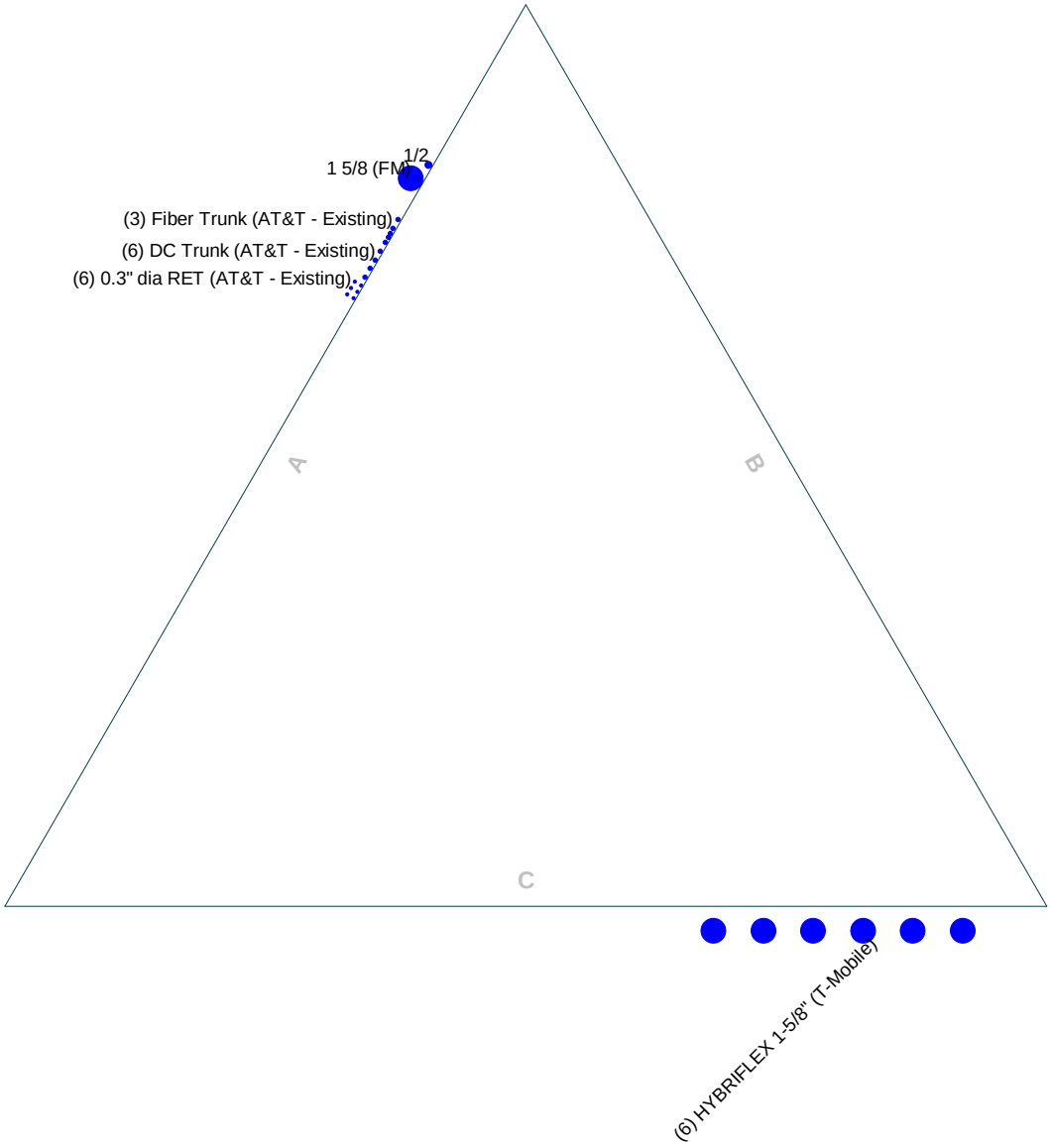
TORQUE 3 kip-ft
REACTIONS - 93 mph WIND

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

Job: **20074.58 - CTFF703A**			
Project: **100' Nudd Lattice - 303 Boxwood Lane, Danbury, CT**			
Client: T-Mobile	Drawn by: TJL	App'd:	
Code: TIA-222-G	Date: 12/09/21	Scale: NTS	
Path:		Dwg No. E-1	

Feed Line Plan

Round Flat App In Face App Out Face



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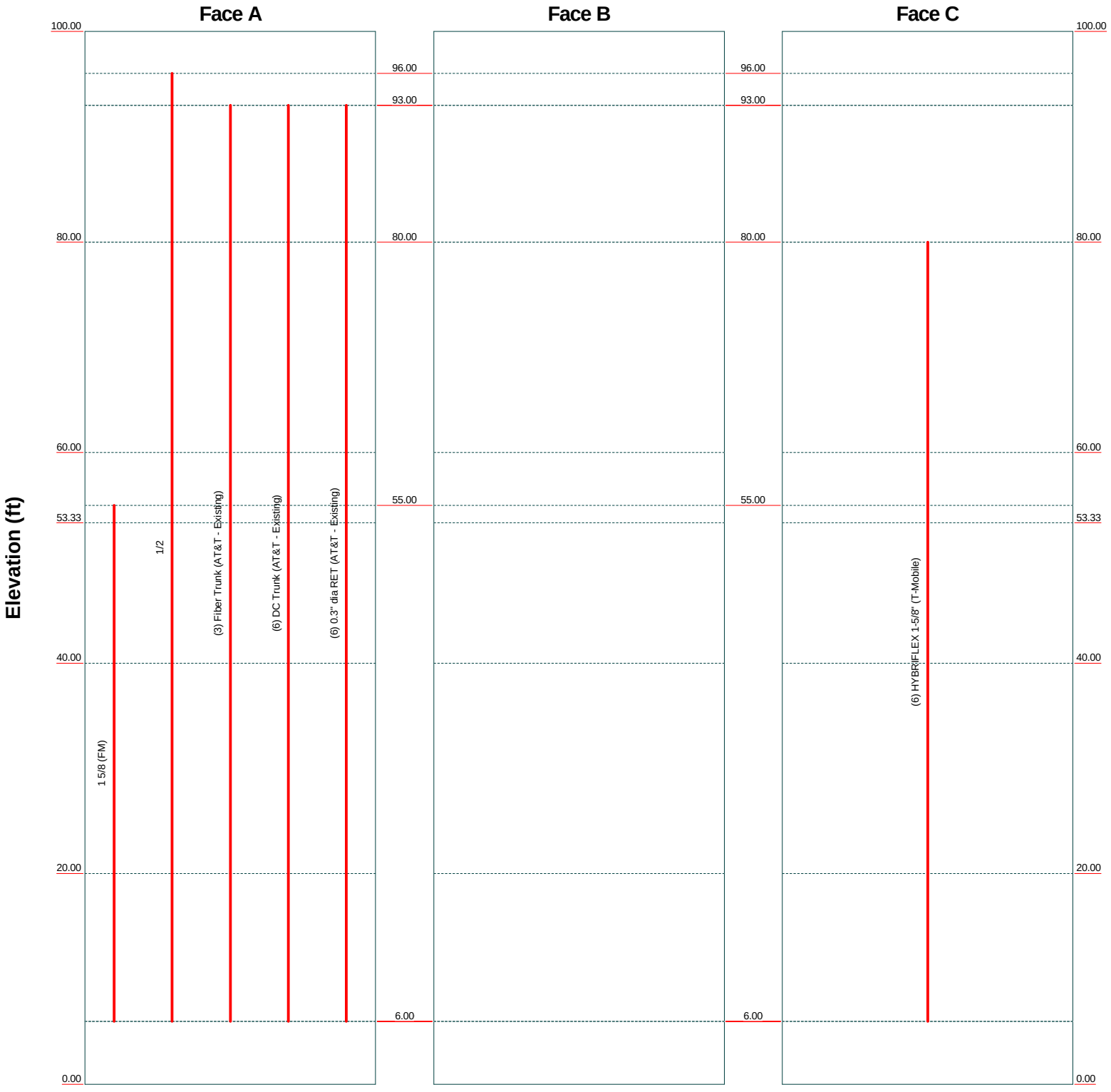
Job: ***20074.58 - CTFF703A***		
Project: ***100' Nudd Lattice - 303 Boxwood Lane, Danbury, CT***		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA-222-G	Date: 12/09/21	Scale: NTS
Path:		Dwg No. E-7

Feed Line Distribution Chart
0' - 100'

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



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Job: ***20074.58 - CTFF703A***		
Project: ***100' Nudd Lattice - 303 Boxwood Lane, Danbury, CT***		
Client: T-Mobile	Drawn by: TJL	App'd:
Code: TIA-222-G	Date: 12/09/21	Scale: NTS
Path:		Dwg No. E-7

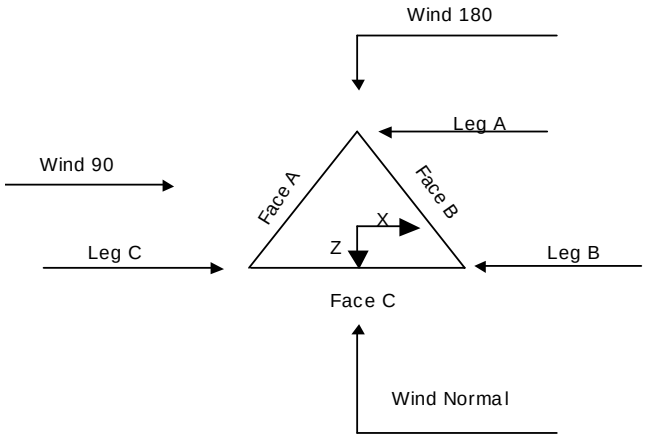
Tower Input Data

The main tower is a 3x free standing tower with an overall height of 100.00 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 3.50 ft at the top and 7.50 ft at the base.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Basic wind speed of 93 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56 pcf.
A wind speed of 50 mph is used in combination with ice.
Temperature drop of 50 °F.
Deflections calculated using a wind speed of 60 mph.
3/4" dia SR used for sections T3 & T4 to account for 5/8" SR with 1/4" bar.
Tension only take-up is 0.0313 in.
A non-linear (P-delta) analysis was used.
Grouted pipe f'_c is 5 ksi.
Pressures are calculated at each section.
Stress ratio used in tower member design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

	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



Triangular Tower

Tower Section Geometry

Tower Section	Tower Elevation ft	Assembly Database	Description	Section Width ft	Number of Sections	Section Length ft
T1	100.00-80.00			3.50	1	20.00
T2	80.00-60.00			3.50	1	20.00
T3	60.00-53.33			3.50	1	6.67
T4	53.33-40.00			3.50	1	13.33
T5	40.00-20.00			3.50	1	20.00
T6	20.00-0.00			5.50	1	20.00

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	100.00-80.00	3.33	TX Brace	No	Yes	0.0000	0.0000
T2	80.00-60.00	3.33	TX Brace	No	Yes	0.0000	0.0000
T3	60.00-53.33	3.34	TX Brace	No	Yes	0.0000	0.0000
T4	53.33-40.00	3.33	TX Brace	No	Yes	0.0000	0.0000
T5	40.00-20.00	6.67	X Brace	No	No	0.0000	0.0000
T6	20.00-0.00	6.67	X Brace	No	No	0.0000	0.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Leg Type	Leg Size	Leg Grade	Diagonal Type	Diagonal Size	Diagonal Grade
T1 100.00-80.00	Pipe	P2.5x.276	A500-50 (50 ksi)	Solid Round	5/8	A36 (36 ksi)
T2 80.00-60.00	Grouted Pipe	P2.5x.276	A500-50 (50 ksi)	Solid Round	5/8	A36 (36 ksi)
T3 60.00-53.33	Grouted Pipe	P3x.3	A500M-61 (61 ksi)	Solid Round	3/4	A36 (36 ksi)
T4 53.33-40.00	Grouted Pipe	P3x.3	A500M-61 (61 ksi)	Solid Round	3/4	A36 (36 ksi)
T5 40.00-20.00	Grouted Pipe	P5x.258	A500-42 (42 ksi)	Equal Angle	L2x2x3/16	A36 (36 ksi)
T6 20.00-0.00	Grouted Pipe	P5x.258	A500-42 (42 ksi)	Equal Angle	L2 1/2x2 1/2x3/16	A36 (36 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 100.00-80.00	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T2 80.00-60.00	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)
T3 60.00-53.33	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)	Equal Angle		A36 (36 ksi)
T4 53.33-40.00	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	No. of Mid Girts	Mid Girt Type	Mid Girt Size	Mid Girt Grade	Horizontal Type	Horizontal Size	Horizontal Grade
T1 100.00-80.00	None	Solid Round		A572-50 (50 ksi)	Equal Angle	L1 1/2x1 1/2x3/16	A36 (36 ksi)
T2 80.00-60.00	None	Single Angle		A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)
T3 60.00-53.33	None	Single Angle		A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)
T4 53.33-40.00	None	Single Angle		A36 (36 ksi)	Double Equal Angle	2L1 1/2x1 1/2x3/16	A36 (36 ksi)

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Secondary Horizontal Type	Secondary Horizontal Size	Secondary Horizontal Grade	Inner Bracing Type	Inner Bracing Size	Inner Bracing Grade
T4 53.33-40.00	Equal Angle	L2 1/2x2 1/2x5/16	A36 (36 ksi)	Equal Angle		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 100.00-80.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T2 80.00-60.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T3 60.00-53.33	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T4 53.33-40.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T5 40.00-20.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000
T6 20.00-0.00	0.00	0.0000	A36 (36 ksi)	1	1	1	36.0000	36.0000	36.0000

Tower Section Geometry *(cont'd)*

Tower Elevation ft	Calc K Single Angles	Calc K Solid Rounds	K Factors[1] 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
100.00-80.00				1	1	1	1	1	1	1
T2	Yes	Yes	1	1	1	1	1	1	1	1
80.00-60.00				1	1	1	1	1	1	1
T3	Yes	Yes	1	1	1	1	1	1	1	1
60.00-53.33				1	1	1	1	1	1	1
T4	Yes	Yes	1	1	1	1	1	1	1	1
53.33-40.00				1	1	1	1	1	1	1
T5	Yes	Yes	1	1	1	1	1	1	1	1
40.00-20.00				1	1	1	1	1	1	1
T6 20.00-0.00	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 100.00-80.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T2 80.00-60.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T3 60.00-53.33	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T4 53.33-40.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T5 40.00-20.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1
T6 20.00-0.00	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1	0.0000	1

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 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
T2 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
T3 60.00-53.33	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 53.33-40.00	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
T5 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
T6 20.00-0.00	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 100.00-80.00	Flange	0.7500 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T2 80.00-60.00	Flange	0.7500 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T3 60.00-53.33	Flange	0.7500 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T4 53.33-40.00	Flange	1.0000 A325N	4	0.5000 A325N	0	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.7500 A325N	1
T5 40.00-20.00	Flange	1.0000 A325N	6	0.6250 A325N	1	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0
T6 20.00-0.00	Flange	1.5000 A36	4	0.6250 A325N	1	0.5000 A325N	0	0.5000 A325N	0	0.6250 A325N	0	0.5000 A325N	0	0.6250 A325N	0

Grouted Pipe Properties

Size	F_y ksi	A_s in^2	A_c in^2	Wt plf	E_c ksi	E_m ksi	F_{ym} ksi
P2.5x.276 (GR)	50	2.2535	4.2383	16.498	4031	35064	58
P3x.3 (GR)	55	3.0159	6.6052	24.023	4031	36062	64
P5x.258 (GR)	42	4.2999	20.0058	56.310	4031	44002	62

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Face Offset in	Lateral Offset (Frac FW)	#	# Per Row	Clear Spacing in	Width or Diameter in	Perimeter in	Weight plf
1 5/8 (FM)	A	No	No	Ar (CaAa)	55.00 - 6.00	0.0000	0.3	1	1	1.9800	1.9800		1.04
1/2	A	No	No	Ar (CaAa)	96.00 - 6.00	0.0000	0.32	1	1	0.5800	0.5800		0.25
Fiber Trunk (AT&T - Existing)	A	No	No	Ar (CaAa)	93.00 - 6.00	0.0000	0.25	3	3	0.4000	0.4000		1.00
DC Trunk (AT&T - Existing)	A	No	No	Ar (CaAa)	93.00 - 6.00	0.0000	0.22	6	6	0.4000	0.4000		0.11
0.3" dia RET (AT&T - Existing)	A	No	No	Ar (CaAa)	93.00 - 6.00	0.0000	0.18	6	3	0.3000	0.3000		0.00
HYBRIFLEX 1-5/8" (T-Mobile)	C	No	No	Ar (CaAa)	80.00 - 6.00	1.0000	-0.3	6	6	1.9800	1.9800		1.90

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight K
T1	100.00-80.00	A	0.000	0.000	7.948	0.000	0.05
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
T2	80.00-60.00	A	0.000	0.000	11.960	0.000	0.08
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	23.760	0.000	0.23
T3	60.00-53.33	A	0.000	0.000	4.319	0.000	0.03
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	7.924	0.000	0.08
T4	53.33-40.00	A	0.000	0.000	10.611	0.000	0.07
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	15.836	0.000	0.15
T5	40.00-20.00	A	0.000	0.000	15.920	0.000	0.10
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	23.760	0.000	0.23
T6	20.00-0.00	A	0.000	0.000	11.144	0.000	0.07
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	16.632	0.000	0.16

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	100.00-80.00	A	1.658	0.000	0.000	41.096	0.000	0.42
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
T2	80.00-60.00	A	1.617	0.000	0.000	60.411	0.000	0.60
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	63.880	0.000	1.05
T3	60.00-53.33	A	1.583	0.000	0.000	20.728	0.000	0.21
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	21.237	0.000	0.35
T4	53.33-40.00	A	1.553	0.000	0.000	45.987	0.000	0.49
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	42.323	0.000	0.68
T5	40.00-20.00	A	1.486	0.000	0.000	67.075	0.000	0.69
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	63.105	0.000	1.00
T6	20.00-0.00	A	1.331	0.000	0.000	43.859	0.000	0.42
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	43.539	0.000	0.65

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
T1	100.00-80.00	-0.9659	-2.3961	-1.2757	-3.2238
T2	80.00-60.00	2.9415	2.1675	1.6847	0.0808
T3	60.00-53.33	2.6754	1.7983	1.5757	-0.0515
T4	53.33-40.00	2.0410	0.9725	0.9438	-0.3306
T5	40.00-20.00	2.4041	1.0200	2.1359	-0.7374
T6	20.00-0.00	2.1978	0.8421	2.4950	-0.6553

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T1	2	1/2	80.00 - 96.00	0.6000	0.4243
T1	9	Fiber Trunk	80.00 - 93.00	0.6000	0.4243
T1	10	DC Trunk	80.00 - 93.00	0.6000	0.4243
T1	11	0.3" dia RET	80.00 - 93.00	0.6000	0.4243
T2	2	1/2	60.00 - 80.00	0.6000	0.4331
T2	9	Fiber Trunk	60.00 - 80.00	0.6000	0.4331
T2	10	DC Trunk	60.00 - 80.00	0.6000	0.4331
T2	11	0.3" dia RET	60.00 - 80.00	0.6000	0.4331
T2	14	HYBRIFLEX 1-5/8"	60.00 - 80.00	0.6000	0.4331
T3	1	1 5/8	53.33 - 55.00	0.6000	0.4199
T3	2	1/2	53.33 - 60.00	0.6000	0.4199
T3	9	Fiber Trunk	53.33 - 60.00	0.6000	0.4199
T3	10	DC Trunk	53.33 - 60.00	0.6000	0.4199
T3	11	0.3" dia RET	53.33 - 60.00	0.6000	0.4199
T3	14	HYBRIFLEX 1-5/8"	53.33 - 60.00	0.6000	0.4199

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice
T4	1	1 5/8	40.00 - 53.33	0.6000	0.2922
T4	2	1/2	40.00 - 53.33	0.6000	0.2922
T4	9	Fiber Trunk	40.00 - 53.33	0.6000	0.2922
T4	10	DC Trunk	40.00 - 53.33	0.6000	0.2922
T4	11	0.3" dia RET	40.00 - 53.33	0.6000	0.2922
T4	14	HYBRIFLEX 1-5/8"	40.00 - 53.33	0.6000	0.2922
T5	1	1 5/8	20.00 - 40.00	0.6000	0.5545
T5	2	1/2	20.00 - 40.00	0.6000	0.5545
T5	9	Fiber Trunk	20.00 - 40.00	0.6000	0.5545
T5	10	DC Trunk	20.00 - 40.00	0.6000	0.5545
T5	11	0.3" dia RET	20.00 - 40.00	0.6000	0.5545
T5	14	HYBRIFLEX 1-5/8"	20.00 - 40.00	0.6000	0.5545
T6	1	1 5/8	6.00 - 20.00	0.6000	0.6000
T6	2	1/2	6.00 - 20.00	0.6000	0.6000
T6	9	Fiber Trunk	6.00 - 20.00	0.6000	0.6000
T6	10	DC Trunk	6.00 - 20.00	0.6000	0.6000
T6	11	0.3" dia RET	6.00 - 20.00	0.6000	0.6000
T6	14	HYBRIFLEX 1-5/8"	6.00 - 20.00	0.6000	0.6000

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight K
(2) OPA-65R-LCUU-H4	A	From Leg	3.00	0.0000	98.00	No Ice	5.94	3.36	0.06
(AT&T - Existing)			0.00			1/2" Ice	6.28	3.66	0.10
			0.00			1" Ice	6.62	3.97	0.14
(2) OPA-65R-LCUU-H4	B	From Leg	3.00	0.0000	98.00	No Ice	5.94	3.36	0.06
(AT&T - Existing)			0.00			1/2" Ice	6.28	3.66	0.10
			0.00			1" Ice	6.62	3.97	0.14
(2) OPA-65R-LCUU-H4	C	From Leg	3.00	0.0000	98.00	No Ice	5.94	3.36	0.06
(AT&T - Existing)			0.00			1/2" Ice	6.28	3.66	0.10
			0.00			1" Ice	6.62	3.97	0.14
SBNHH-1D65A	A	From Leg	3.00	0.0000	98.00	No Ice	5.88	3.86	0.04
(AT&T - Existing)			0.00			1/2" Ice	6.25	4.22	0.08
			0.00			1" Ice	6.62	4.57	0.12
SBNHH-1D65A	B	From Leg	3.00	0.0000	98.00	No Ice	5.88	3.86	0.04
(AT&T - Existing)			0.00			1/2" Ice	6.25	4.22	0.08
			0.00			1" Ice	6.62	4.57	0.12
SBNHH-1D65A	C	From Leg	3.00	0.0000	98.00	No Ice	5.88	3.86	0.04
(AT&T - Existing)			0.00			1/2" Ice	6.25	4.22	0.08
			0.00			1" Ice	6.62	4.57	0.12
(2) RRUS-11	A	From Leg	2.00	0.0000	98.00	No Ice	2.57	1.07	0.05
(AT&T - Existing)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-12	A	From Leg	2.00	0.0000	98.00	No Ice	3.15	1.29	0.06
(AT&T - Existing)			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS-32	A	From Leg	2.00	0.0000	98.00	No Ice	3.31	2.42	0.08
(AT&T - Existing)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14

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
(2) RRUS-32	A	From Leg	2.00	0.0000	98.00	No Ice	3.31	2.42	0.08
(AT&T - Existing)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-E2	A	From Leg	2.00	0.0000	98.00	No Ice	3.15	1.29	0.06
(AT&T - Existing)			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
(2) RRUS-11	B	From Leg	2.00	0.0000	98.00	No Ice	2.57	1.07	0.05
(AT&T - Existing)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-12	B	From Leg	2.00	0.0000	98.00	No Ice	3.15	1.29	0.06
(AT&T - Existing)			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS-32	B	From Leg	2.00	0.0000	98.00	No Ice	3.31	2.42	0.08
(AT&T - Existing)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
(2) RRUS-32	B	From Leg	2.00	0.0000	98.00	No Ice	3.31	2.42	0.08
(AT&T - Existing)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-E2	B	From Leg	2.00	0.0000	98.00	No Ice	3.15	1.29	0.06
(AT&T - Existing)			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
(2) RRUS-11	C	From Leg	2.00	0.0000	98.00	No Ice	2.57	1.07	0.05
(AT&T - Existing)			0.00			1/2" Ice	2.76	1.21	0.07
			0.00			1" Ice	2.97	1.36	0.09
RRUS-12	C	From Leg	2.00	0.0000	98.00	No Ice	3.15	1.29	0.06
(AT&T - Existing)			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
RRUS-32	C	From Leg	2.00	0.0000	98.00	No Ice	3.31	2.42	0.08
(AT&T - Existing)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
(2) RRUS-32	C	From Leg	2.00	0.0000	98.00	No Ice	3.31	2.42	0.08
(AT&T - Existing)			0.00			1/2" Ice	3.56	2.64	0.10
			0.00			1" Ice	3.81	2.86	0.14
RRUS-E2	C	From Leg	2.00	0.0000	98.00	No Ice	3.15	1.29	0.06
(AT&T - Existing)			0.00			1/2" Ice	3.36	1.44	0.08
			0.00			1" Ice	3.59	1.60	0.11
DC6-48-60-18-8F Surge	A	From Leg	0.00	0.0000	98.00	No Ice	0.00	1.91	0.02
Arrestor			0.00			1/2" Ice	0.00	2.10	0.04
(AT&T - Existing)			0.00			1" Ice	0.00	2.29	0.06
DC6-48-60-18-8F Surge	B	From Leg	0.00	0.0000	98.00	No Ice	0.00	1.91	0.02
Arrestor			0.00			1/2" Ice	0.00	2.10	0.04
(AT&T - Existing)			0.00			1" Ice	0.00	2.29	0.06
DC6-48-60-18-8F Surge	C	From Leg	0.00	0.0000	98.00	No Ice	0.00	1.91	0.02
Arrestor			0.00			1/2" Ice	0.00	2.10	0.04
(AT&T - Existing)			0.00			1" Ice	0.00	2.29	0.06
12' Boom Starmount	A	From Leg	1.50	0.0000	97.00	No Ice	15.00	8.00	0.47
(AT&T - Existing)			0.00			1/2" Ice	21.00	11.00	0.68
			0.00			1" Ice	26.00	14.00	0.88
Mount Mods	A	From Leg	1.50	0.0000	97.00	No Ice	5.00	5.00	0.12
(AT&T - Existing)			0.00			1/2" Ice	8.00	8.00	0.15
			0.00			1" Ice	11.00	11.00	0.18
12' Boom Starmount	B	From Leg	1.50	0.0000	97.00	No Ice	15.00	8.00	0.47
(AT&T - Existing)			0.00			1/2" Ice	21.00	11.00	0.68
			0.00			1" Ice	26.00	14.00	0.88
Mount Mods	B	From Leg	1.50	0.0000	97.00	No Ice	5.00	5.00	0.12
(AT&T - Existing)			0.00			1/2" Ice	8.00	8.00	0.15
			0.00			1" Ice	11.00	11.00	0.18

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
12' Boom Starmount	C	From Leg	1.50	0.0000	97.00	No Ice	15.00	8.00	0.47
(AT&T - Existing)			0.00			1/2" Ice	21.00	11.00	0.68
			0.00			1" Ice	26.00	14.00	0.88
Mount Mods	C	From Leg	1.50	0.0000	97.00	No Ice	5.00	5.00	0.12
(AT&T - Existing)			0.00			1/2" Ice	8.00	8.00	0.15
			0.00			1" Ice	11.00	11.00	0.18
PR-900	B	From Leg	0.50	0.0000	96.00	No Ice	6.35	6.35	0.04
			0.00			1/2" Ice	11.43	11.43	0.05
			0.00			1" Ice	16.51	16.51	0.06
Pirod 12' T-Frame Sector	A	From Leg	1.00	0.0000	89.00	No Ice	13.60	13.60	0.47
Mount (1)			0.00			1/2" Ice	18.40	18.40	0.60
(Empty)			0.00			1" Ice	23.20	23.20	0.73
Pirod 12' T-Frame Sector	B	From Leg	1.00	0.0000	89.00	No Ice	13.60	13.60	0.47
Mount (1)			0.00			1/2" Ice	18.40	18.40	0.60
(Empty)			0.00			1" Ice	23.20	23.20	0.73
Pirod 12' T-Frame Sector	C	From Leg	1.00	0.0000	89.00	No Ice	13.60	13.60	0.47
Mount (1)			0.00			1/2" Ice	18.40	18.40	0.60
(Empty)			0.00			1" Ice	23.20	23.20	0.73
6810 4 Bay	B	From Leg	1.00	0.0000	65.00	No Ice	28.90	28.90	0.43
			0.00			1/2" Ice	34.00	34.00	1.01
			0.00			1" Ice	39.10	39.10	1.60
AIR32	A	From Face	2.00	0.0000	83.00	No Ice	6.51	4.71	0.13
(T-Mobile - Existing)			-3.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR32	B	From Face	2.00	0.0000	83.00	No Ice	6.51	4.71	0.13
(T-Mobile - Existing)			-3.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
AIR32	C	From Face	2.00	0.0000	83.00	No Ice	6.51	4.71	0.13
(T-Mobile - Existing)			-3.00			1/2" Ice	6.89	5.07	0.18
			0.00			1" Ice	7.27	5.43	0.23
APXVAARR18-43	A	From Face	2.00	0.0000	83.00	No Ice	14.67	6.16	0.13
(T-Mobile - Existing)			0.00			1/2" Ice	15.18	6.62	0.22
			0.00			1" Ice	15.71	7.09	0.31
APXVAARR18-43	B	From Face	2.00	0.0000	83.00	No Ice	14.67	6.16	0.13
(T-Mobile - Existing)			0.00			1/2" Ice	15.18	6.62	0.22
			0.00			1" Ice	15.71	7.09	0.31
APXVAARR18-43	C	From Face	2.00	0.0000	83.00	No Ice	14.67	6.16	0.13
(T-Mobile - Existing)			0.00			1/2" Ice	15.18	6.62	0.22
			0.00			1" Ice	15.71	7.09	0.31
AIR6449	A	From Face	2.00	0.0000	83.00	No Ice	5.65	2.42	0.10
(T-Mobile - Proposed)			3.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
AIR6449	B	From Face	2.00	0.0000	83.00	No Ice	5.65	2.42	0.10
(T-Mobile - Proposed)			3.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
AIR6449	C	From Face	2.00	0.0000	83.00	No Ice	5.65	2.42	0.10
(T-Mobile - Proposed)			3.00			1/2" Ice	5.96	2.64	0.14
			0.00			1" Ice	6.26	2.87	0.18
Radio 4449 B71 B12	A	From Face	2.00	0.0000	83.00	No Ice	1.64	1.29	0.07
(T-Mobile - Existing)			0.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	B	From Face	2.00	0.0000	83.00	No Ice	1.64	1.29	0.07
(T-Mobile - Existing)			0.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11
Radio 4449 B71 B12	C	From Face	2.00	0.0000	83.00	No Ice	1.64	1.29	0.07
(T-Mobile - Existing)			0.00			1/2" Ice	1.80	1.44	0.09
			0.00			1" Ice	1.97	1.59	0.11

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
4460 B25+B66	A	From Face	2.00	0.0000	83.00	No Ice	2.56	1.98	0.11
(T-Mobile - Proposed)			0.00			1/2" Ice	2.76	2.16	0.13
			0.00			1" Ice	2.97	2.34	0.16
4460 B25+B66	B	From Face	2.00	0.0000	83.00	No Ice	2.56	1.98	0.11
(T-Mobile - Proposed)			0.00			1/2" Ice	2.76	2.16	0.13
			0.00			1" Ice	2.97	2.34	0.16
4460 B25+B66	C	From Face	2.00	0.0000	83.00	No Ice	2.56	1.98	0.11
(T-Mobile - Proposed)			0.00			1/2" Ice	2.76	2.16	0.13
			0.00			1" Ice	2.97	2.34	0.16
10-ft T-Frame	A	From Face	1.00	0.0000	82.00	No Ice	13.60	13.60	0.38
(T-Mobile - Existing)			0.00			1/2" Ice	17.50	17.50	0.53
			0.00			1" Ice	21.40	21.40	0.68
10-ft T-Frame	B	From Face	1.00	0.0000	82.00	No Ice	13.60	13.60	0.38
(T-Mobile - Existing)			0.00			1/2" Ice	17.50	17.50	0.53
			0.00			1" Ice	21.40	21.40	0.68
10-ft T-Frame	C	From Face	1.00	0.0000	82.00	No Ice	13.60	13.60	0.38
(T-Mobile - Existing)			0.00			1/2" Ice	17.50	17.50	0.53
			0.00			1" Ice	21.40	21.40	0.68

Tower Pressures - No Ice

$G_H = 0.850$

Section Elevation ft	z ft	K_Z	q_z psf	A_G ft^2	Face	A_F ft^2	A_R ft^2	A_{leg} ft^2	Leg %	C_AA_A In Face ft^2	C_AA_A Out Face ft^2
T1	90.00	0.959	18	74.792	A	2.445	12.397	9.583	64.57	7.948	0.000
100.00-80.00					B	2.445	12.397		64.57	0.000	0.000
					C	2.445	12.397		64.57	0.000	0.000
T2 80.00-60.00	70.00	0.892	17	74.792	A	2.445	12.397	9.583	64.57	11.960	0.000
					B	2.445	12.397		64.57	0.000	0.000
					C	2.445	12.397		64.57	23.760	0.000
T3 60.00-53.33	56.67	0.84	16	25.290	A	0.802	4.999	3.891	67.07	4.319	0.000
					B	0.802	4.999		67.07	0.000	0.000
					C	0.802	4.999		67.07	7.924	0.000
T4 53.33-40.00	46.67	0.795	15	50.543	A	4.679	9.991	7.776	53.01	10.611	0.000
					B	4.679	9.991		53.01	0.000	0.000
					C	4.679	9.991		53.01	15.836	0.000
T5 40.00-20.00	30.00	0.701	13	99.283	A	7.220	18.574	18.574	72.01	15.920	0.000
					B	7.220	18.574		72.01	0.000	0.000
					C	7.220	18.574		72.01	23.760	0.000
T6 20.00-0.00	10.00	0.7	13	139.283	A	10.818	18.574	18.574	63.19	11.144	0.000
					B	10.818	18.574		63.19	0.000	0.000
					C	10.818	18.574		63.19	16.632	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 100.00-80.00	90.00	0.959	5	1.6583	80.319	A	2.445	43.792	20.639	44.64	41.096	0.000
						B	2.445	43.792		44.64	0.000	0.000
						C	2.445	43.792		44.64	0.000	0.000
T2 80.00-60.00	70.00	0.892	5	1.6171	80.182	A	2.445	43.013	20.364	44.80	60.411	0.000
						B	2.445	43.013		44.80	0.000	0.000
						C	2.445	43.013		44.80	63.880	0.000
T3 60.00-53.33	56.67	0.84	5	1.5833	27.051	A	0.802	14.890	7.411	47.23	20.728	0.000
						B	0.802	14.890		47.23	0.000	0.000
						C	0.802	14.890		47.23	21.237	0.000
T4 53.33-40.00	46.67	0.795	4	1.5529	53.993	A	4.679	33.537	14.676	38.40	45.987	0.000
						B	4.679	33.537		38.40	0.000	0.000
						C	4.679	33.537		38.40	42.323	0.000
T5 40.00-20.00	30.00	0.701	4	1.4858	104.242	A	7.220	39.224	28.496	61.36	67.075	0.000
						B	7.220	39.224		61.36	0.000	0.000
						C	7.220	39.224		61.36	63.105	0.000
T6 20.00-0.00	10.00	0.7	4	1.3312	143.726	A	10.818	38.984	27.464	55.15	43.859	0.000
						B	10.818	38.984		55.15	0.000	0.000
						C	10.818	38.984		55.15	43.539	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	90.00	0.959	8	74.792	A	2.445	12.397	9.583	64.57	7.948	0.000
100.00-80.00					B	2.445	12.397		64.57	0.000	0.000
					C	2.445	12.397		64.57	0.000	0.000
T2 80.00-60.00	70.00	0.892	7	74.792	A	2.445	12.397	9.583	64.57	11.960	0.000
					B	2.445	12.397		64.57	0.000	0.000
					C	2.445	12.397		64.57	23.760	0.000
T3 60.00-53.33	56.67	0.84	7	25.290	A	0.802	4.999	3.891	67.07	4.319	0.000
					B	0.802	4.999		67.07	0.000	0.000
					C	0.802	4.999		67.07	7.924	0.000
T4 53.33-40.00	46.67	0.795	6	50.543	A	4.679	9.991	7.776	53.01	10.611	0.000
					B	4.679	9.991		53.01	0.000	0.000
					C	4.679	9.991		53.01	15.836	0.000
T5 40.00-20.00	30.00	0.701	5	99.283	A	7.220	18.574	18.574	72.01	15.920	0.000
					B	7.220	18.574		72.01	0.000	0.000
					C	7.220	18.574		72.01	23.760	0.000
T6 20.00-0.00	10.00	0.7	5	139.283	A	10.818	18.574	18.574	63.19	11.144	0.000
					B	10.818	18.574		63.19	0.000	0.000
					C	10.818	18.574		63.19	16.632	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	0.05	0.75	A	0.198	2.601	18	1	1	9.564	0.45	22.74	C
100.00-80.00			B	0.198	2.601		1	1	9.564			
			C	0.198	2.601		1	1	9.564			
T2	0.31	1.13	A	0.198	2.601	17	1	1	9.564	0.66	33.06	C
80.00-60.00			B	0.198	2.601		1	1	9.564			
			C	0.198	2.601		1	1	9.564			
T3	0.10	0.51	A	0.229	2.501	16	1	1	3.703	0.22	33.46	C
60.00-53.33			B	0.229	2.501		1	1	3.703			
			C	0.229	2.501		1	1	3.703			
T4	0.22	1.26	A	0.29	2.322	15	1	1	10.633	0.52	38.69	C
53.33-40.00			B	0.29	2.322		1	1	10.633			
			C	0.29	2.322		1	1	10.633			
T5	0.33	2.48	A	0.26	2.408	13	1	1	17.882	0.75	37.47	C
40.00-20.00			B	0.26	2.408		1	1	17.882			
			C	0.26	2.408		1	1	17.882			
T6 20.00-0.00	0.23	2.65	A	0.211	2.56	13	1	1	21.232	0.80	39.76	C
			B	0.211	2.56		1	1	21.232			
			C	0.211	2.56		1	1	21.232			
Sum Weight:	1.24	8.78						OTM	154.36 kip-ft	3.40		

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	0.05	0.75	A	0.198	2.601	18	0.8	1	9.075	0.44	21.76	C
100.00-80.00			B	0.198	2.601		0.8	1	9.075			
			C	0.198	2.601		0.8	1	9.075			
T2	0.31	1.13	A	0.198	2.601	17	0.8	1	9.075	0.64	32.15	C
80.00-60.00			B	0.198	2.601		0.8	1	9.075			
			C	0.198	2.601		0.8	1	9.075			
T3	0.10	0.51	A	0.229	2.501	16	0.8	1	3.542	0.22	32.65	C
60.00-53.33			B	0.229	2.501		0.8	1	3.542			
			C	0.229	2.501		0.8	1	3.542			
T4	0.22	1.26	A	0.29	2.322	15	0.8	1	9.697	0.49	36.62	C
53.33-40.00			B	0.29	2.322		0.8	1	9.697			
			C	0.29	2.322		0.8	1	9.697			
T5	0.33	2.48	A	0.26	2.408	13	0.8	1	16.438	0.71	35.53	C
40.00-20.00			B	0.26	2.408		0.8	1	16.438			
			C	0.26	2.408		0.8	1	16.438			
T6 20.00-0.00	0.23	2.65	A	0.211	2.56	13	0.8	1	19.068	0.73	36.66	C
			B	0.211	2.56		0.8	1	19.068			
			C	0.211	2.56		0.8	1	19.068			
Sum Weight:	1.24	8.78						OTM	147.95 kip-ft	3.23		

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	0.05	0.75	A	0.198	2.601	18	0.85	1	9.197	0.44	22.01	C
100.00-80.00			B	0.198	2.601		0.85	1	9.197			
			C	0.198	2.601		0.85	1	9.197			
T2	0.31	1.13	A	0.198	2.601	17	0.85	1	9.197	0.65	32.38	C
80.00-60.00			B	0.198	2.601		0.85	1	9.197			
			C	0.198	2.601		0.85	1	9.197			
T3	0.10	0.51	A	0.229	2.501	16	0.85	1	3.582	0.22	32.86	C
60.00-53.33			B	0.229	2.501		0.85	1	3.582			
			C	0.229	2.501		0.85	1	3.582			
T4	0.22	1.26	A	0.29	2.322	15	0.85	1	9.931	0.50	37.14	C
53.33-40.00			B	0.29	2.322		0.85	1	9.931			
			C	0.29	2.322		0.85	1	9.931			
T5	0.33	2.48	A	0.26	2.408	13	0.85	1	16.799	0.72	36.01	C
40.00-20.00			B	0.26	2.408		0.85	1	16.799			
			C	0.26	2.408		0.85	1	16.799			
T6 20.00-0.00	0.23	2.65	A	0.211	2.56	13	0.85	1	19.609	0.75	37.43	C
			B	0.211	2.56		0.85	1	19.609			
			C	0.211	2.56		0.85	1	19.609			
Sum Weight:	1.24	8.78						OTM	149.55 kip-ft	3.27		

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	0.42	2.59	A	0.576	1.821	5	1	1	34.354	0.35	17.74	C
100.00-80.00			B	0.576	1.821		1	1	34.354			
			C	0.576	1.821		1	1	34.354			
T2	1.66	3.01	A	0.567	1.828	5	1	1	33.558	0.48	23.77	C
80.00-60.00			B	0.567	1.828		1	1	33.558			
			C	0.567	1.828		1	1	33.558			
T3	0.56	1.15	A	0.58	1.818	5	1	1	11.692	0.15	22.64	C
60.00-53.33			B	0.58	1.818		1	1	11.692			
			C	0.58	1.818		1	1	11.692			
T4	1.17	3.01	A	0.708	1.777	4	1	1	32.066	0.30	22.82	C
53.33-40.00			B	0.708	1.777		1	1	32.066			
			C	0.708	1.777		1	1	32.066			
T5	1.69	4.39	A	0.446	1.981	4	1	1	32.995	0.45	22.28	C
40.00-20.00			B	0.446	1.981		1	1	32.995			
			C	0.446	1.981		1	1	32.995			
T6 20.00-0.00	1.08	4.65	A	0.347	2.18	4	1	1	34.784	0.42	20.76	C
			B	0.347	2.18		1	1	34.784			
			C	0.347	2.18		1	1	34.784			
Sum Weight:	6.57	18.80						OTM	105.47 kip-ft	2.15		

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	0.42	2.59	A	0.576	1.821	5	0.8	1	33.864	0.35	17.54	C
100.00-80.00			B	0.576	1.821		0.8	1	33.864			
			C	0.576	1.821		0.8	1	33.864			
T2	1.66	3.01	A	0.567	1.828	5	0.8	1	33.068	0.47	23.58	C
80.00-60.00			B	0.567	1.828		0.8	1	33.068			
			C	0.567	1.828		0.8	1	33.068			
T3	0.56	1.15	A	0.58	1.818	5	0.8	1	11.531	0.15	22.47	C
60.00-53.33			B	0.58	1.818		0.8	1	11.531			
			C	0.58	1.818		0.8	1	11.531			
T4	1.17	3.01	A	0.708	1.777	4	0.8	1	31.130	0.30	22.36	C
53.33-40.00			B	0.708	1.777		0.8	1	31.130			
			C	0.708	1.777		0.8	1	31.130			
T5	1.69	4.39	A	0.446	1.981	4	0.8	1	31.551	0.44	21.81	C
40.00-20.00			B	0.446	1.981		0.8	1	31.551			
			C	0.446	1.981		0.8	1	31.551			
T6 20.00-0.00	1.08	4.65	A	0.347	2.18	4	0.8	1	32.620	0.40	19.99	C
			B	0.347	2.18		0.8	1	32.620			
			C	0.347	2.18		0.8	1	32.620			
Sum Weight:	6.57	18.80						OTM	104.08 kip-ft	2.11		

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	0.42	2.59	A	0.576	1.821	5	0.85	1	33.987	0.35	17.59	C
100.00-80.00			B	0.576	1.821		0.85	1	33.987			
			C	0.576	1.821		0.85	1	33.987			
T2	1.66	3.01	A	0.567	1.828	5	0.85	1	33.191	0.47	23.63	C
80.00-60.00			B	0.567	1.828		0.85	1	33.191			
			C	0.567	1.828		0.85	1	33.191			
T3	0.56	1.15	A	0.58	1.818	5	0.85	1	11.572	0.15	22.51	C
60.00-53.33			B	0.58	1.818		0.85	1	11.572			
			C	0.58	1.818		0.85	1	11.572			
T4	1.17	3.01	A	0.708	1.777	4	0.85	1	31.364	0.30	22.48	C
53.33-40.00			B	0.708	1.777		0.85	1	31.364			
			C	0.708	1.777		0.85	1	31.364			
T5	1.69	4.39	A	0.446	1.981	4	0.85	1	31.912	0.44	21.93	C
40.00-20.00			B	0.446	1.981		0.85	1	31.912			
			C	0.446	1.981		0.85	1	31.912			
T6 20.00-0.00	1.08	4.65	A	0.347	2.18	4	0.85	1	33.161	0.40	20.18	C
			B	0.347	2.18		0.85	1	33.161			
			C	0.347	2.18		0.85	1	33.161			
Sum Weight:	6.57	18.80						OTM	104.42 kip-ft	2.12		

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 ft²	F K	w plf	Ctrl. Face
T1	0.05	0.75	A	0.198	2.601	8	1	1	9.564	0.19	9.46	C
100.00-80.00			B	0.198	2.601		1	1	9.564			
			C	0.198	2.601		1	1	9.564			
T2	0.31	1.13	A	0.198	2.601	7	1	1	9.564	0.28	13.76	C
80.00-60.00			B	0.198	2.601		1	1	9.564			
			C	0.198	2.601		1	1	9.564			
T3	0.10	0.51	A	0.229	2.501	7	1	1	3.703	0.09	13.93	C
60.00-53.33			B	0.229	2.501		1	1	3.703			
			C	0.229	2.501		1	1	3.703			
T4	0.22	1.26	A	0.29	2.322	6	1	1	10.633	0.21	16.10	C
53.33-40.00			B	0.29	2.322		1	1	10.633			
			C	0.29	2.322		1	1	10.633			
T5	0.33	2.48	A	0.26	2.408	5	1	1	18.132	0.31	15.74	C
40.00-20.00			B	0.26	2.408		1	1	18.132			
			C	0.26	2.408		1	1	18.132			
T6 20.00-0.00	0.23	2.65	A	0.211	2.56	5	1	1	21.526	0.33	16.72	C
			B	0.211	2.56		1	1	21.526			
			C	0.211	2.56		1	1	21.526			
Sum Weight:	1.24	8.78						OTM	64.37 kip-ft	1.42		

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 ft²	F K	w plf	Ctrl. Face
T1	0.05	0.75	A	0.198	2.601	8	0.8	1	9.075	0.18	9.06	C
100.00-80.00			B	0.198	2.601		0.8	1	9.075			
			C	0.198	2.601		0.8	1	9.075			
T2	0.31	1.13	A	0.198	2.601	7	0.8	1	9.075	0.27	13.38	C
80.00-60.00			B	0.198	2.601		0.8	1	9.075			
			C	0.198	2.601		0.8	1	9.075			
T3	0.10	0.51	A	0.229	2.501	7	0.8	1	3.542	0.09	13.59	C
60.00-53.33			B	0.229	2.501		0.8	1	3.542			
			C	0.229	2.501		0.8	1	3.542			
T4	0.22	1.26	A	0.29	2.322	6	0.8	1	9.697	0.20	15.24	C
53.33-40.00			B	0.29	2.322		0.8	1	9.697			
			C	0.29	2.322		0.8	1	9.697			
T5	0.33	2.48	A	0.26	2.408	5	0.8	1	16.688	0.30	14.93	C
40.00-20.00			B	0.26	2.408		0.8	1	16.688			
			C	0.26	2.408		0.8	1	16.688			
T6 20.00-0.00	0.23	2.65	A	0.211	2.56	5	0.8	1	19.362	0.31	15.43	C
			B	0.211	2.56		0.8	1	19.362			
			C	0.211	2.56		0.8	1	19.362			
Sum Weight:	1.24	8.78						OTM	61.70 kip-ft	1.35		

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	0.05	0.75	A	0.198	2.601	8	0.85	1	9.197	0.18	9.16	C
100.00-80.00			B	0.198	2.601		0.85	1	9.197			
			C	0.198	2.601		0.85	1	9.197			
T2	0.31	1.13	A	0.198	2.601	7	0.85	1	9.197	0.27	13.48	C
80.00-60.00			B	0.198	2.601		0.85	1	9.197			
			C	0.198	2.601		0.85	1	9.197			
T3	0.10	0.51	A	0.229	2.501	7	0.85	1	3.582	0.09	13.68	C
60.00-53.33			B	0.229	2.501		0.85	1	3.582			
			C	0.229	2.501		0.85	1	3.582			
T4	0.22	1.26	A	0.29	2.322	6	0.85	1	9.931	0.21	15.46	C
53.33-40.00			B	0.29	2.322		0.85	1	9.931			
			C	0.29	2.322		0.85	1	9.931			
T5	0.33	2.48	A	0.26	2.408	5	0.85	1	17.049	0.30	15.13	C
40.00-20.00			B	0.26	2.408		0.85	1	17.049			
			C	0.26	2.408		0.85	1	17.049			
T6 20.00-0.00	0.23	2.65	A	0.211	2.56	5	0.85	1	19.903	0.32	15.76	C
			B	0.211	2.56		0.85	1	19.903			
			C	0.211	2.56		0.85	1	19.903			
Sum Weight:	1.24	8.78						OTM	62.37 kip-ft	1.37		

Force Totals

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Leg Weight	6.48					
Bracing Weight	2.30					
Total Member Self-Weight	8.78			1.27	-2.09	
Total Weight	18.34			1.27	-2.09	
Wind 0 deg - No Ice		0.00	-7.47	-513.04	-2.09	1.83
Wind 30 deg - No Ice		3.67	-6.35	-439.97	-256.84	2.06
Wind 60 deg - No Ice		6.32	-3.65	-252.68	-441.94	1.74
Wind 90 deg - No Ice		7.34	0.00	1.27	-511.59	0.95
Wind 120 deg - No Ice		6.46	3.73	258.42	-447.49	-0.09
Wind 150 deg - No Ice		3.67	6.35	442.51	-256.84	-1.11
Wind 180 deg - No Ice		0.00	7.29	509.16	-2.09	-1.83
Wind 210 deg - No Ice		-3.67	6.35	442.51	252.66	-2.06
Wind 240 deg - No Ice		-6.46	3.73	258.42	443.31	-1.74
Wind 270 deg - No Ice		-7.34	0.00	1.27	507.41	-0.95
Wind 300 deg - No Ice		-6.32	-3.65	-252.68	437.76	0.09
Wind 330 deg - No Ice		-3.67	-6.35	-439.97	252.66	1.11
Member Ice	10.02					
Total Weight Ice	46.75			4.52	-9.36	
Wind 0 deg - Ice		0.00	-4.14	-278.08	-9.36	0.95
Wind 30 deg - Ice		2.05	-3.56	-239.31	-150.14	0.95
Wind 60 deg - Ice		3.55	-2.05	-136.08	-252.90	0.70
Wind 90 deg - Ice		4.11	0.00	4.52	-290.92	0.26

Load Case	Vertical Forces K	Sum of Forces X K	Sum of Forces Z K	Sum of Overturning Moments, M_x kip-ft	Sum of Overturning Moments, M_z kip-ft	Sum of Torques kip-ft
Wind 120 deg - Ice		3.58	2.07	145.83	-254.10	-0.25
Wind 150 deg - Ice		2.05	3.56	248.36	-150.14	-0.69
Wind 180 deg - Ice		0.00	4.10	285.74	-9.36	-0.95
Wind 210 deg - Ice		-2.05	3.56	248.36	131.42	-0.95
Wind 240 deg - Ice		-3.58	2.07	145.83	235.38	-0.70
Wind 270 deg - Ice		-4.11	0.00	4.52	272.20	-0.26
Wind 300 deg - Ice		-3.55	-2.05	-136.08	234.18	0.25
Wind 330 deg - Ice		-2.05	-3.56	-239.31	131.42	0.69
Total Weight	18.34			1.27	-2.09	
Wind 0 deg - Service		0.00	-3.11	-213.49	-1.22	0.76
Wind 30 deg - Service		1.53	-2.65	-183.06	-107.31	0.86
Wind 60 deg - Service		2.63	-1.52	-105.06	-184.40	0.72
Wind 90 deg - Service		3.06	0.00	0.70	-213.40	0.40
Wind 120 deg - Service		2.70	1.56	107.80	-186.71	-0.04
Wind 150 deg - Service		1.53	2.65	184.46	-107.31	-0.46
Wind 180 deg - Service		0.00	3.04	212.22	-1.22	-0.76
Wind 210 deg - Service		-1.53	2.65	184.46	104.88	-0.86
Wind 240 deg - Service		-2.70	1.56	107.80	184.28	-0.72
Wind 270 deg - Service		-3.06	0.00	0.70	210.97	-0.40
Wind 300 deg - Service		-2.63	-1.52	-105.06	181.97	0.04
Wind 330 deg - Service		-1.53	-2.65	-183.06	104.88	0.46

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	1.2D+1.6W (pattern 1) 0 deg - No Ice
4	1.2D+1.6W (pattern 2) 0 deg - No Ice
5	0.9 Dead+1.6 Wind 0 deg - No Ice
6	1.2 Dead+1.6 Wind 30 deg - No Ice
7	1.2D+1.6W (pattern 1) 30 deg - No Ice
8	1.2D+1.6W (pattern 2) 30 deg - No Ice
9	0.9 Dead+1.6 Wind 30 deg - No Ice
10	1.2 Dead+1.6 Wind 60 deg - No Ice
11	1.2D+1.6W (pattern 1) 60 deg - No Ice
12	1.2D+1.6W (pattern 2) 60 deg - No Ice
13	0.9 Dead+1.6 Wind 60 deg - No Ice
14	1.2 Dead+1.6 Wind 90 deg - No Ice
15	1.2D+1.6W (pattern 1) 90 deg - No Ice
16	1.2D+1.6W (pattern 2) 90 deg - No Ice
17	0.9 Dead+1.6 Wind 90 deg - No Ice
18	1.2 Dead+1.6 Wind 120 deg - No Ice
19	1.2D+1.6W (pattern 1) 120 deg - No Ice
20	1.2D+1.6W (pattern 2) 120 deg - No Ice
21	0.9 Dead+1.6 Wind 120 deg - No Ice
22	1.2 Dead+1.6 Wind 150 deg - No Ice
23	1.2D+1.6W (pattern 1) 150 deg - No Ice
24	1.2D+1.6W (pattern 2) 150 deg - No Ice
25	0.9 Dead+1.6 Wind 150 deg - No Ice
26	1.2 Dead+1.6 Wind 180 deg - No Ice
27	1.2D+1.6W (pattern 1) 180 deg - No Ice
28	1.2D+1.6W (pattern 2) 180 deg - No Ice
29	0.9 Dead+1.6 Wind 180 deg - No Ice
30	1.2 Dead+1.6 Wind 210 deg - No Ice

Comb. No.	Description
31	1.2D+1.6W (pattern 1) 210 deg - No Ice
32	1.2D+1.6W (pattern 2) 210 deg - No Ice
33	0.9 Dead+1.6 Wind 210 deg - No Ice
34	1.2 Dead+1.6 Wind 240 deg - No Ice
35	1.2D+1.6W (pattern 1) 240 deg - No Ice
36	1.2D+1.6W (pattern 2) 240 deg - No Ice
37	0.9 Dead+1.6 Wind 240 deg - No Ice
38	1.2 Dead+1.6 Wind 270 deg - No Ice
39	1.2D+1.6W (pattern 1) 270 deg - No Ice
40	1.2D+1.6W (pattern 2) 270 deg - No Ice
41	0.9 Dead+1.6 Wind 270 deg - No Ice
42	1.2 Dead+1.6 Wind 300 deg - No Ice
43	1.2D+1.6W (pattern 1) 300 deg - No Ice
44	1.2D+1.6W (pattern 2) 300 deg - No Ice
45	0.9 Dead+1.6 Wind 300 deg - No Ice
46	1.2 Dead+1.6 Wind 330 deg - No Ice
47	1.2D+1.6W (pattern 1) 330 deg - No Ice
48	1.2D+1.6W (pattern 2) 330 deg - No Ice
49	0.9 Dead+1.6 Wind 330 deg - No Ice
50	1.2 Dead+1.0 Ice+1.0 Temp
51	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
52	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
53	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
54	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
55	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
56	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
57	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
58	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
59	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
60	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
61	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
62	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
63	Dead+Wind 0 deg - Service
64	Dead+Wind 30 deg - Service
65	Dead+Wind 60 deg - Service
66	Dead+Wind 90 deg - Service
67	Dead+Wind 120 deg - Service
68	Dead+Wind 150 deg - Service
69	Dead+Wind 180 deg - Service
70	Dead+Wind 210 deg - Service
71	Dead+Wind 240 deg - Service
72	Dead+Wind 270 deg - Service
73	Dead+Wind 300 deg - Service
74	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
T1	100 - 80	Leg	Max Tension	13	14.88	-0.11	0.06
			Max. Compression	18	-29.77	-0.11	-0.07
			Max. Mx	14	-7.11	0.47	0.02
			Max. My	2	-6.92	0.01	-0.48
			Max. Vy	14	0.78	-0.26	-0.02
			Max. Vx	2	-0.79	0.01	0.26
		Diagonal	Max Tension	22	6.88	0.00	0.00
		Horizontal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	42	-5.97	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	50	-5.22	-0.02	0.00
			Max. My	30	-5.58	0.00	0.00
			Max. Vy	50	0.02	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-3.03	0.00	0.00
			Max. Mx	50	-2.93	-0.02	0.00
			Max. My	30	-2.94	0.00	0.00
			Max. Vy	50	0.02	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
T2	80 - 60	Leg	Max Tension	13	60.65	-0.22	0.06
			Max. Compression	18	-79.42	-0.28	-0.17
			Max. Mx	17	-67.34	-0.39	0.04
			Max. My	5	24.88	-0.01	0.41
			Max. Vy	34	0.19	0.23	-0.17
			Max. Vx	2	0.27	-0.03	0.28
		Diagonal	Max Tension	26	8.84	0.00	0.00
		Horizontal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-8.27	0.00	0.00
			Max. Mx	50	-5.78	0.02	0.00
			Max. My	30	-6.19	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	20	-6.72	0.00	0.00
			Max. Mx	50	-5.65	0.02	0.00
			Max. My	30	-5.96	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
T3	60 - 53.33	Leg	Max Tension	29	77.21	-0.00	-0.44
			Max. Compression	18	-100.43	-0.52	-0.30
			Max. Mx	14	-88.44	-0.62	-0.06
			Max. My	26	-56.65	-0.16	-0.61
			Max. Vy	6	-0.13	-0.27	0.35
			Max. Vx	26	-0.14	-0.00	-0.46
		Diagonal	Max Tension	26	10.75	0.00	0.00
		Horizontal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-11.27	0.00	0.00
			Max. Mx	50	-8.10	0.02	0.00
			Max. My	30	-8.53	0.00	-0.00
			Max. Vy	50	0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-9.68	0.00	0.00
			Max. Mx	50	-6.89	0.02	0.00
			Max. My	30	-7.31	0.00	-0.00
			Max. Vy	50	0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
T4	53.33 - 40	Leg	Max Tension	29	114.90	0.00	0.50
			Max. Compression	18	-140.83	-1.87	-1.08
			Max. Mx	37	-136.00	1.92	-0.92
			Max. My	2	-139.71	0.03	2.14
			Max. Vy	6	-1.24	-1.26	0.81
			Max. Vx	26	-1.38	0.01	-1.60
		Diagonal	Max Tension	26	11.80	0.00	0.00
		Horizontal	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-11.42	0.00	0.00
			Max. Mx	50	-7.29	0.02	0.00
			Max. My	30	-7.46	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	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
		Secondary Horizontal	Max Tension	29	0.09	0.00	0.00
			Max. Compression	18	-2.04	0.00	0.00
			Max. Mx	50	-0.85	-0.02	0.00
			Max. My	30	-0.95	0.00	0.00
			Max. Vy	50	0.03	0.00	0.00
			Max. Vx	30	-0.00	0.00	0.00
		Top Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-10.85	0.00	0.00
			Max. Mx	50	-7.64	0.02	0.00
			Max. My	30	-8.05	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
		Bottom Girt	Max Tension	1	0.00	0.00	0.00
			Max. Compression	18	-5.96	0.00	0.00
			Max. Mx	50	-3.90	0.02	0.00
			Max. My	30	-4.21	0.00	-0.00
			Max. Vy	50	-0.02	0.00	0.00
			Max. Vx	30	0.00	0.00	0.00
T5	40 - 20	Leg	Max Tension	26	124.98	-1.37	0.04
			Max. Compression	18	-136.61	1.51	0.00
			Max. Mx	18	-134.54	2.16	0.00
			Max. My	30	-5.69	-0.26	2.58
			Max. Vy	18	0.25	2.16	0.00
			Max. Vx	30	0.35	-0.26	2.58
		Diagonal	Max Tension	5	3.19	0.00	0.00
			Max. Compression	22	-3.86	0.03	-0.00
			Max. Mx	26	-0.94	0.06	-0.01
			Max. My	26	1.10	-0.03	0.02
			Max. Vy	55	-0.02	0.04	-0.00
			Max. Vx	26	-0.01	0.00	0.00
T6	20 - 0	Leg	Max Tension	29	121.85	-0.99	0.00
			Max. Compression	18	-135.94	0.69	0.00
			Max. Mx	18	-134.74	1.11	0.00
			Max. My	30	-7.56	-0.08	1.67
			Max. Vy	42	-0.16	-0.83	-0.00
			Max. Vx	30	0.29	-0.08	1.67
		Diagonal	Max Tension	9	1.49	0.00	0.00
			Max. Compression	6	-1.68	0.00	0.00
			Max. Mx	18	-0.30	0.08	0.00
			Max. My	30	-0.06	0.06	0.02
			Max. Vy	55	-0.03	0.06	0.00
			Max. Vx	30	-0.00	0.00	0.00

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg C	Max. Vert	34	136.42	8.05	-4.39
	Max. H_x	34	136.42	8.05	-4.39
	Max. H_z	13	-121.70	-7.08	3.84
	Min. Vert	13	-121.70	-7.08	3.84
	Min. H_x	13	-121.70	-7.08	3.84
	Min. H_z	34	136.42	8.05	-4.39
Leg B	Max. Vert	18	137.11	-7.95	-4.60
	Max. H_x	45	-121.19	6.96	4.03

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Leg A	Max. H_z	45	-121.19	6.96	4.03
	Min. Vert	45	-121.19	6.96	4.03
	Min. H_x	18	137.11	-7.95	-4.60
	Min. H_z	18	137.11	-7.95	-4.60
	Max. Vert	2	136.40	0.23	9.17
	Max. H_x	16	7.10	0.85	0.50
	Max. H_z	2	136.40	0.23	9.17
	Min. Vert	29	-121.72	-0.23	-8.05
	Min. H_x	40	7.10	-0.83	0.50
	Min. H_z	29	-121.72	-0.23	-8.05

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	18.34	0.00	0.00	1.31	-2.15	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	22.01	-0.00	-11.94	-838.29	-2.61	2.98
1.2D+1.6W (pattern 1) 0 deg - No Ice	22.01	0.00	-8.98	-562.25	-2.60	2.80
1.2D+1.6W (pattern 2) 0 deg - No Ice	22.01	0.00	-9.53	-736.45	-2.60	2.21
0.9 Dead+1.6 Wind 0 deg - No Ice	16.51	-0.00	-11.94	-834.38	-1.94	2.96
1.2 Dead+1.6 Wind 30 deg - No Ice	22.01	5.87	-10.17	-719.01	-418.66	3.37
1.2D+1.6W (pattern 1) 30 deg - No Ice	22.01	4.39	-7.61	-480.80	-281.10	3.16
1.2D+1.6W (pattern 2) 30 deg - No Ice	22.01	4.70	-8.15	-633.02	-369.00	2.48
0.9 Dead+1.6 Wind 30 deg - No Ice	16.51	5.87	-10.17	-715.67	-415.82	3.34
1.2 Dead+1.6 Wind 60 deg - No Ice	22.01	10.11	-5.83	-413.16	-720.96	2.83
1.2D+1.6W (pattern 1) 60 deg - No Ice	22.01	7.55	-4.36	-275.79	-483.00	2.66
1.2D+1.6W (pattern 2) 60 deg - No Ice	22.01	8.11	-4.68	-363.94	-635.69	2.07
0.9 Dead+1.6 Wind 60 deg - No Ice	16.51	10.11	-5.83	-411.39	-716.53	2.82
1.2 Dead+1.6 Wind 90 deg - No Ice	22.01	11.74	-0.00	1.56	-834.65	1.54
1.2D+1.6W (pattern 1) 90 deg - No Ice	22.01	8.78	-0.00	1.57	-559.57	1.44
1.2D+1.6W (pattern 2) 90 deg - No Ice	22.01	9.41	-0.00	1.56	-735.35	1.10
0.9 Dead+1.6 Wind 90 deg - No Ice	16.51	11.74	0.00	1.17	-829.66	1.53
1.2 Dead+1.6 Wind 120 deg - No Ice	22.01	10.34	5.97	421.49	-729.91	-0.13
1.2D+1.6W (pattern 1) 120 deg - No Ice	22.01	7.78	4.49	283.47	-490.86	-0.13
1.2D+1.6W (pattern 2) 120 deg - No Ice	22.01	8.26	4.77	370.58	-641.72	-0.13
0.9 Dead+1.6 Wind 120 deg - No Ice	16.51	10.34	5.97	418.94	-725.51	-0.13

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
1.2 Dead+1.6 Wind 150 deg - No Ice	22.01	5.87	10.17	722.17	-418.61	-1.79
1.2D+1.6W (pattern 1) 150 deg - No Ice	22.01	4.39	7.61	483.94	-281.08	-1.70
1.2D+1.6W (pattern 2) 150 deg - No Ice	22.01	4.70	8.15	636.17	-368.96	-1.35
0.9 Dead+1.6 Wind 150 deg - No Ice	16.51	5.87	10.17	718.01	-415.80	-1.79
1.2 Dead+1.6 Wind 180 deg - No Ice	22.01	0.00	11.67	831.06	-2.60	-2.98
1.2D+1.6W (pattern 1) 180 deg - No Ice	22.01	0.00	8.72	556.30	-2.59	-2.80
1.2D+1.6W (pattern 2) 180 deg - No Ice	22.01	0.00	9.37	732.61	-2.59	-2.21
0.9 Dead+1.6 Wind 180 deg - No Ice	16.51	0.00	11.67	826.32	-1.94	-2.97
1.2 Dead+1.6 Wind 210 deg - No Ice	22.01	-5.87	10.17	722.19	413.42	-3.37
1.2D+1.6W (pattern 1) 210 deg - No Ice	22.01	-4.39	7.61	483.96	275.90	-3.16
1.2D+1.6W (pattern 2) 210 deg - No Ice	22.01	-4.70	8.15	636.19	363.78	-2.48
0.9 Dead+1.6 Wind 210 deg - No Ice	16.51	-5.87	10.17	718.03	411.93	-3.34
1.2 Dead+1.6 Wind 240 deg - No Ice	22.01	-10.34	5.97	421.52	724.75	-2.83
1.2D+1.6W (pattern 1) 240 deg - No Ice	22.01	-7.78	4.49	283.49	485.69	-2.66
1.2D+1.6W (pattern 2) 240 deg - No Ice	22.01	-8.26	4.77	370.60	636.56	-2.07
0.9 Dead+1.6 Wind 240 deg - No Ice	16.51	-10.34	5.97	418.96	721.67	-2.82
1.2 Dead+1.6 Wind 270 deg - No Ice	22.01	-11.74	-0.00	1.57	829.49	-1.54
1.2D+1.6W (pattern 1) 270 deg - No Ice	22.01	-8.78	-0.00	1.57	554.41	-1.45
1.2D+1.6W (pattern 2) 270 deg - No Ice	22.01	-9.41	-0.00	1.56	730.20	-1.10
0.9 Dead+1.6 Wind 270 deg - No Ice	16.51	-11.74	0.00	1.18	825.82	-1.53
1.2 Dead+1.6 Wind 300 deg - No Ice	22.01	-10.11	-5.83	-413.18	715.78	0.14
1.2D+1.6W (pattern 1) 300 deg - No Ice	22.01	-7.55	-4.36	-275.80	477.83	0.14
1.2D+1.6W (pattern 2) 300 deg - No Ice	22.01	-8.11	-4.68	-363.96	630.52	0.14
0.9 Dead+1.6 Wind 300 deg - No Ice	16.51	-10.11	-5.83	-411.41	712.68	0.14
1.2 Dead+1.6 Wind 330 deg - No Ice	22.01	-5.87	-10.17	-719.03	413.46	1.79
1.2D+1.6W (pattern 1) 330 deg - No Ice	22.01	-4.39	-7.61	-480.81	275.91	1.70
1.2D+1.6W (pattern 2) 330 deg - No Ice	22.01	-4.70	-8.15	-633.03	363.81	1.35
0.9 Dead+1.6 Wind 330 deg - No Ice	16.51	-5.87	-10.17	-715.68	411.94	1.79
1.2 Dead+1.0 Ice+1.0 Temp	50.42	-0.00	-0.00	5.15	-10.49	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	50.42	0.00	-4.14	-291.89	-10.54	1.01
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	50.42	2.05	-3.56	-251.17	-158.52	1.03

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
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	50.42	3.55	-2.05	-142.66	-266.53	0.76
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	50.42	4.11	-0.00	5.16	-306.49	0.29
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	50.42	3.58	2.07	153.67	-267.76	-0.25
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	50.42	2.05	3.56	261.46	-158.51	-0.73
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	50.42	0.00	4.10	300.77	-10.52	-1.01
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	50.42	-2.05	3.56	261.48	137.46	-1.03
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	50.42	-3.58	2.07	153.69	246.71	-0.76
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	50.42	-4.11	-0.00	5.17	285.44	-0.29
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	50.42	-3.55	-2.05	-142.65	245.48	0.25
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	50.42	-2.05	-3.56	-251.17	137.44	0.73
Dead+Wind 0 deg - Service	18.34	0.00	-3.11	-216.59	-2.14	0.77
Dead+Wind 30 deg - Service	18.34	1.53	-2.65	-185.63	-110.07	0.87
Dead+Wind 60 deg - Service	18.34	2.63	-1.52	-106.29	-188.49	0.73
Dead+Wind 90 deg - Service	18.34	3.06	-0.00	1.30	-217.99	0.40
Dead+Wind 120 deg - Service	18.34	2.70	1.56	110.24	-190.83	-0.03
Dead+Wind 150 deg - Service	18.34	1.53	2.65	188.23	-110.06	-0.47
Dead+Wind 180 deg - Service	18.34	0.00	3.04	216.48	-2.14	-0.77
Dead+Wind 210 deg - Service	18.34	-1.53	2.65	188.23	105.78	-0.87
Dead+Wind 240 deg - Service	18.34	-2.70	1.56	110.25	186.55	-0.73
Dead+Wind 270 deg - Service	18.34	-3.06	-0.00	1.30	213.71	-0.40
Dead+Wind 300 deg - Service	18.34	-2.63	-1.52	-106.29	184.21	0.03
Dead+Wind 330 deg - Service	18.34	-1.53	-2.65	-185.63	105.78	0.47

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX	PY	PZ	PX	PY	PZ	% Error
	K	K	K	K	K	K	
1	0.00	-18.34	0.00	0.00	18.34	0.00	0.000%
2	0.00	-22.01	-11.94	0.00	22.01	11.94	0.000%
3	0.00	-22.01	-8.98	-0.00	22.01	8.98	0.000%
4	0.00	-22.01	-9.53	-0.00	22.01	9.53	0.000%
5	0.00	-16.51	-11.94	0.00	16.51	11.94	0.000%
6	5.87	-22.01	-10.17	-5.87	22.01	10.17	0.000%
7	4.39	-22.01	-7.61	-4.39	22.01	7.61	0.000%
8	4.70	-22.01	-8.15	-4.70	22.01	8.15	0.000%
9	5.87	-16.51	-10.17	-5.87	16.51	10.17	0.000%
10	10.11	-22.01	-5.83	-10.11	22.01	5.83	0.000%
11	7.55	-22.01	-4.36	-7.55	22.01	4.36	0.000%
12	8.11	-22.01	-4.68	-8.11	22.01	4.68	0.000%
13	10.11	-16.51	-5.83	-10.11	16.51	5.83	0.000%
14	11.74	-22.01	0.00	-11.74	22.01	0.00	0.000%
15	8.78	-22.01	0.00	-8.78	22.01	0.00	0.000%
16	9.41	-22.01	0.00	-9.41	22.01	0.00	0.000%
17	11.74	-16.51	0.00	-11.74	16.51	-0.00	0.000%
18	10.34	-22.01	5.97	-10.34	22.01	-5.97	0.000%
19	7.78	-22.01	4.49	-7.78	22.01	-4.49	0.000%
20	8.26	-22.01	4.77	-8.26	22.01	-4.77	0.000%

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX K	PY K	PZ K	PX K	PY K	PZ K	% Error
21	10.34	-16.51	5.97	-10.34	16.51	-5.97	0.000%
22	5.87	-22.01	10.17	-5.87	22.01	-10.17	0.000%
23	4.39	-22.01	7.61	-4.39	22.01	-7.61	0.000%
24	4.70	-22.01	8.15	-4.70	22.01	-8.15	0.000%
25	5.87	-16.51	10.17	-5.87	16.51	-10.17	0.000%
26	0.00	-22.01	11.67	-0.00	22.01	-11.67	0.000%
27	0.00	-22.01	8.72	-0.00	22.01	-8.72	0.000%
28	0.00	-22.01	9.37	-0.00	22.01	-9.37	0.000%
29	0.00	-16.51	11.67	-0.00	16.51	-11.67	0.000%
30	-5.87	-22.01	10.17	5.87	22.01	-10.17	0.000%
31	-4.39	-22.01	7.61	4.39	22.01	-7.61	0.000%
32	-4.70	-22.01	8.15	4.70	22.01	-8.15	0.000%
33	-5.87	-16.51	10.17	5.87	16.51	-10.17	0.000%
34	-10.34	-22.01	5.97	10.34	22.01	-5.97	0.000%
35	-7.78	-22.01	4.49	7.78	22.01	-4.49	0.000%
36	-8.26	-22.01	4.77	8.26	22.01	-4.77	0.000%
37	-10.34	-16.51	5.97	10.34	16.51	-5.97	0.000%
38	-11.74	-22.01	0.00	11.74	22.01	0.00	0.000%
39	-8.78	-22.01	0.00	8.78	22.01	0.00	0.000%
40	-9.41	-22.01	0.00	9.41	22.01	0.00	0.000%
41	-11.74	-16.51	0.00	11.74	16.51	-0.00	0.000%
42	-10.11	-22.01	-5.83	10.11	22.01	5.83	0.000%
43	-7.55	-22.01	-4.36	7.55	22.01	4.36	0.000%
44	-8.11	-22.01	-4.68	8.11	22.01	4.68	0.000%
45	-10.11	-16.51	-5.83	10.11	16.51	5.83	0.000%
46	-5.87	-22.01	-10.17	5.87	22.01	10.17	0.000%
47	-4.39	-22.01	-7.61	4.39	22.01	7.61	0.000%
48	-4.70	-22.01	-8.15	4.70	22.01	8.15	0.000%
49	-5.87	-16.51	-10.17	5.87	16.51	10.17	0.000%
50	0.00	-50.42	0.00	0.00	50.42	0.00	0.000%
51	0.00	-50.42	-4.14	-0.00	50.42	4.14	0.000%
52	2.05	-50.42	-3.56	-2.05	50.42	3.56	0.000%
53	3.55	-50.42	-2.05	-3.55	50.42	2.05	0.000%
54	4.11	-50.42	0.00	-4.11	50.42	0.00	0.000%
55	3.58	-50.42	2.07	-3.58	50.42	-2.07	0.000%
56	2.05	-50.42	3.56	-2.05	50.42	-3.56	0.000%
57	0.00	-50.42	4.10	-0.00	50.42	-4.10	0.000%
58	-2.05	-50.42	3.56	2.05	50.42	-3.56	0.000%
59	-3.58	-50.42	2.07	3.58	50.42	-2.07	0.000%
60	-4.11	-50.42	0.00	4.11	50.42	0.00	0.000%
61	-3.55	-50.42	-2.05	3.55	50.42	2.05	0.000%
62	-2.05	-50.42	-3.56	2.05	50.42	3.56	0.000%
63	0.00	-18.34	-3.11	-0.00	18.34	3.11	0.000%
64	1.53	-18.34	-2.65	-1.53	18.34	2.65	0.000%
65	2.63	-18.34	-1.52	-2.63	18.34	1.52	0.000%
66	3.06	-18.34	0.00	-3.06	18.34	0.00	0.000%
67	2.70	-18.34	1.56	-2.70	18.34	-1.56	0.000%
68	1.53	-18.34	2.65	-1.53	18.34	-2.65	0.000%
69	0.00	-18.34	3.04	0.00	18.34	-3.04	0.000%
70	-1.53	-18.34	2.65	1.53	18.34	-2.65	0.000%
71	-2.70	-18.34	1.56	2.70	18.34	-1.56	0.000%
72	-3.06	-18.34	0.00	3.06	18.34	0.00	0.000%
73	-2.63	-18.34	-1.52	2.63	18.34	1.52	0.000%
74	-1.53	-18.34	-2.65	1.53	18.34	2.65	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00002173
2	Yes	4	0.00000001	0.00013770
3	Yes	4	0.00000001	0.00003101
4	Yes	4	0.00000001	0.00003042
5	Yes	4	0.00000001	0.00049327
6	Yes	4	0.00000001	0.00003133
7	Yes	4	0.00000001	0.00003278
8	Yes	4	0.00000001	0.00003143
9	Yes	4	0.00000001	0.00028273
10	Yes	4	0.00000001	0.00003271
11	Yes	4	0.00000001	0.00003399
12	Yes	4	0.00000001	0.00003284
13	Yes	4	0.00000001	0.00001299
14	Yes	4	0.00000001	0.00003055
15	Yes	4	0.00000001	0.00003242
16	Yes	4	0.00000001	0.00003072
17	Yes	4	0.00000001	0.00016749
18	Yes	4	0.00000001	0.00002925
19	Yes	4	0.00000001	0.00003091
20	Yes	4	0.00000001	0.00002834
21	Yes	4	0.00000001	0.00045888
22	Yes	4	0.00000001	0.00003100
23	Yes	4	0.00000001	0.00003245
24	Yes	4	0.00000001	0.00003076
25	Yes	4	0.00000001	0.00018892
26	Yes	4	0.00000001	0.00003266
27	Yes	4	0.00000001	0.00003398
28	Yes	4	0.00000001	0.00003279
29	Yes	4	0.00000001	0.00001297
30	Yes	4	0.00000001	0.00003130
31	Yes	4	0.00000001	0.00003277
32	Yes	4	0.00000001	0.00003141
33	Yes	4	0.00000001	0.00028279
34	Yes	4	0.00000001	0.00009779
35	Yes	4	0.00000001	0.00003102
36	Yes	4	0.00000001	0.00002995
37	Yes	4	0.00000001	0.00048185
38	Yes	4	0.00000001	0.00003063
39	Yes	4	0.00000001	0.00003245
40	Yes	4	0.00000001	0.00003081
41	Yes	4	0.00000001	0.00016904
42	Yes	4	0.00000001	0.00003266
43	Yes	4	0.00000001	0.00003391
44	Yes	4	0.00000001	0.00003282
45	Yes	4	0.00000001	0.00001294
46	Yes	4	0.00000001	0.00003109
47	Yes	4	0.00000001	0.00003247
48	Yes	4	0.00000001	0.00003086
49	Yes	4	0.00000001	0.00019013
50	Yes	4	0.00000001	0.00003761
51	Yes	4	0.00000001	0.00035753
52	Yes	4	0.00000001	0.00036580
53	Yes	4	0.00000001	0.00037199
54	Yes	4	0.00000001	0.00036927
55	Yes	4	0.00000001	0.00036602
56	Yes	4	0.00000001	0.00036892
57	Yes	4	0.00000001	0.00037123
58	Yes	4	0.00000001	0.00036476
59	Yes	4	0.00000001	0.00035649
60	Yes	4	0.00000001	0.00035633
61	Yes	4	0.00000001	0.00035925
62	Yes	4	0.00000001	0.00035704

63	Yes	4	0.00000001	0.00001720
64	Yes	4	0.00000001	0.00001763
65	Yes	4	0.00000001	0.00001799
66	Yes	4	0.00000001	0.00001762
67	Yes	4	0.00000001	0.00003723
68	Yes	4	0.00000001	0.00001762
69	Yes	4	0.00000001	0.00001799
70	Yes	4	0.00000001	0.00001763
71	Yes	4	0.00000001	0.00001720
72	Yes	4	0.00000001	0.00001750
73	Yes	4	0.00000001	0.00003080
74	Yes	4	0.00000001	0.00001750

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	5.157	67	0.4408	0.0701
T2	80 - 60	3.311	67	0.4197	0.0661
T3	60 - 53.33	1.677	67	0.3209	0.0518
T4	53.33 - 40	1.244	67	0.2786	0.0425
T5	40 - 20	0.590	67	0.1649	0.0232
T6	20 - 0	0.128	67	0.0660	0.0052

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
98.00	(2) OPA-65R-LCUU-H4	67	4.970	0.4407	0.0698	118893
97.00	12' Boom Starmount	67	4.876	0.4406	0.0697	118893
96.00	PR-900	67	4.783	0.4404	0.0696	118893
89.00	Pirod 12' T-Frame Sector Mount (1)	67	4.132	0.4368	0.0685	54042
83.00	AIR32	67	3.582	0.4275	0.0671	34777
82.00	10-ft T-Frame	67	3.491	0.4252	0.0668	32458
65.00	6810 4 Bay	67	2.045	0.3499	0.0572	9433

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
T1	100 - 80	19.688	18	1.6840	0.3518
T2	80 - 60	12.640	18	1.6027	0.3372
T3	60 - 53.33	6.402	18	1.2235	0.2493
T4	53.33 - 40	4.752	18	1.0627	0.1986
T5	40 - 20	2.253	18	0.6292	0.0895
T6	20 - 0	0.488	18	0.2522	0.0200

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
98.00	(2) OPA-65R-LCUU-H4	18	18.973	1.6833	0.3518	30315
97.00	12' Boom Starmount	18	18.616	1.6829	0.3517	30315
96.00	PR-900	18	18.259	1.6822	0.3517	30315
89.00	Pirod 12' T-Frame Sector Mount (1)	18	15.772	1.6683	0.3494	13779
83.00	AIR32	18	13.673	1.6327	0.3428	8869
82.00	10-ft T-Frame	18	13.327	1.6237	0.3412	8283
65.00	6810 4 Bay	18	7.807	1.3345	0.2797	2436

Bolt Design Data

Section No.	Elevation ft	Component Type	Bolt Grade	Bolt Size in	Number Of Bolts	Maximum Load per Bolt K	Allowable Load per Bolt K	Ratio Load / Allowable	Allowable Ratio	Criteria
T1	100	Leg	A325N	0.7500	4	3.72	29.82	0.125 ✔	1	Bolt Tension
T2	80	Leg	A325N	0.7500	4	15.16	29.82	0.508 ✔	1	Bolt Tension
T4	53.33	Leg	A325N	1.0000	4	28.72	53.01	0.542 ✔	1	Bolt Tension
		Secondary Horizontal	A325N	0.7500	1	2.44	15.77	0.155 ✔	1	Member Bearing
T5	40	Leg	A325N	1.0000	6	20.42	53.01	0.385 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	3.19	7.83	0.408 ✔	1	Member Bearing
T6	20	Leg	A36	1.5000	4	30.25	57.65	0.525 ✔	1	Bolt Tension
		Diagonal	A325N	0.6250	1	1.49	7.83	0.190 ✔	1	Member Bearing

Compression Checks

Leg 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	100 - 80	P2.5x.276	20.00	3.33	43.3 K=1.00	2.2535	-29.77	88.43	0.337 [1] ✔
T2	80 - 60	P2.5x.276 (GR)	20.00	3.33	43.3 K=1.00	2.2535	-79.42	96.20	0.826 [1] ✔
T3	60 - 53.33	P3x.3 (GR)	6.67	3.34	35.2 K=1.00	3.0159	-100.43	148.57	0.676 [1] ✔
T4	53.33 - 40	P3x.3 (GR)	13.33	1.67	17.6 K=1.00	3.0159	-140.83	160.63	0.877 [1] ✔
T5	40 - 20	P5x.258 (GR)	20.03	6.68	42.7	4.2999	-136.60	198.12	0.690 [1]

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T6	20 - 0	P5x.258 (GR)	20.03	6.68	K=1.00 42.7 K=1.00	4.2999	-135.94	198.12	✔ 0.686 [1] ✔

[1] P_u / ϕP_n controls

Diagonal Design Data (Compression)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T5	40 - 20	L2x2x3/16	7.69	3.68	114.1 K=1.02	0.7150	-3.86	11.67	0.331 [1] ✔
T6	20 - 0	L2 1/2x2 1/2x3/16	9.79	4.69	115.2 K=1.01	0.9020	-1.68	14.53	0.116 [1] ✔

[1] P_u / ϕP_n controls

Horizontal 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	100 - 80	L1 1/2x1 1/2x3/16	3.50	3.26	128.2 K=0.96	0.5273	-5.97	7.19	0.830 [1] ✔
T2	80 - 60	2L1 1/2x1 1/2x3/16	3.50	3.26	85.7 K=1.00	1.0547	-8.27	23.22	0.356 [1] ✔
T3	60 - 53.33	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3 K=1.00	1.0547	-11.27	23.51	0.480 [1] ✔
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3 K=1.00	1.0547	-11.42	23.51	0.486 [1] ✔

[1] P_u / ϕP_n controls

Secondary Horizontal 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 $\frac{P_u}{\phi P_n}$
T4	53.33 - 40	L2 1/2x2 1/2x5/16	3.50	2.94	96.0 K=1.33	1.4600	-2.44	29.11	0.084 [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	100 - 80	L1 1/2x1 1/2x3/16	3.50	3.26	128.2 K=0.96	0.5273	-3.03	7.19	0.422 [1] ✔
T2	80 - 60	2L1 1/2x1 1/2x3/16	3.50	3.26	85.7 K=1.00	1.0547	-6.72	23.22	0.290 [1] ✔
T3	60 - 53.33	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3 K=1.00	1.0547	-9.68	23.51	0.412 [1] ✔
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3 K=1.00	1.0547	-10.85	23.51	0.462 [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 $\frac{P_u}{\phi P_n}$
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3 K=1.00	1.0547	-5.96	23.51	0.254 [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	100 - 80	P2.5x.276	20.00	3.33	43.3	2.2535	14.88	101.41	0.147 [1] ✔
T2	80 - 60	P2.5x.276 (GR)	20.00	3.33	43.3	2.2535	60.65	101.41	0.598 [1] ✔
T3	60 - 53.33	P3x.3 (GR)	6.67	3.34	35.2	3.0159	77.21	165.57	0.466 [1] ✔
T4	53.33 - 40	P3x.3 (GR)	13.33	1.67	17.6	3.0159	114.90	165.57	0.694 [1] ✔
T5	40 - 20	P5x.258 (GR)	20.03	6.68	42.7	4.2999	124.98	162.54	0.769 [1] ✔
T6	20 - 0	P5x.258 (GR)	20.03	6.68	42.7	4.2999	121.86	162.54	0.750 [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

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	100 - 80	5/8	4.83	4.50	345.8	0.3068	6.88	9.94	0.692 [1]
T2	80 - 60	5/8	4.83	4.50	345.8	0.3068	8.84	9.94	0.889 [1]
T3	60 - 53.33	3/4	4.83	4.43	283.6	0.4418	10.75	14.31	0.751 [1]
T4	53.33 - 40	3/4	4.83	4.43	283.5	0.4418	11.80	14.31	0.824 [1]
T5	40 - 20	L2x2x3/16	7.69	3.68	74.0	0.7150	3.19	23.17	0.138 [1]
T6	20 - 0	L2 1/2x2 1/2x3/16	9.79	4.69	74.1	0.9020	1.49	29.22	0.051 [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 $\frac{P_u}{\phi P_n}$
T1	100 - 80	L1 1/2x1 1/2x3/16	3.50	3.26	85.7	0.5273	0.52	17.09	0.030 [1]
T2	80 - 60	2L1 1/2x1 1/2x3/16	3.50	3.26	85.7	1.0547	1.38	34.17	0.040 [1]
T3	60 - 53.33	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3	1.0547	1.74	34.17	0.051 [1]
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3	1.0547	2.44	34.17	0.071 [1]

[1] P_u / ϕP_n controls

Secondary 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 $\frac{P_u}{\phi P_n}$
T4	53.33 - 40	L2 1/2x2 1/2x5/16	3.50	2.94	50.6	1.4600	2.44	47.30	0.052 [1] ✔

[1] P_u / ϕP_n controls

Top Girt Design Data (Tension)

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u K	ϕP_n K	Ratio $\frac{P_u}{\phi P_n}$
T2	80 - 60	2L1 1/2x1 1/2x3/16	3.50	3.26	85.7	1.0547	1.38	34.17	0.040 [1] ✔
T3	60 - 53.33	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3	1.0547	1.74	34.17	0.051 [1] ✔
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3	1.0547	2.44	34.17	0.071 [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 $\frac{P_u}{\phi P_n}$
T4	53.33 - 40	2L1 1/2x1 1/2x3/16	3.50	3.21	84.3	1.0547	2.37	34.17	0.069 [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	100 - 80	Leg	P2.5x.276	2	-29.77	88.43	33.7	Pass
T2	80 - 60	Leg	P2.5x.276 (GR)	59	-79.42	96.20	82.6	Pass
T3	60 - 53.33	Leg	P3x.3 (GR)	119	-100.43	148.57	67.6	Pass
T4	53.33 - 40	Leg	P3x.3 (GR)	137	-140.83	160.63	87.7	Pass
T5	40 - 20	Leg	P5x.258 (GR)	192	124.98	162.54	76.9	Pass
T6	20 - 0	Leg	P5x.258 (GR)	213	121.86	162.54	75.0	Pass
T1	100 - 80	Diagonal	5/8	10	6.88	9.94	69.2	Pass
T2	80 - 60	Diagonal	5/8	70	8.84	9.94	88.9	Pass
T3	60 - 53.33	Diagonal	3/4	124	10.75	14.31	75.1	Pass
T4	53.33 - 40	Diagonal	3/4	148	11.80	14.31	82.4	Pass
T5	40 - 20	Diagonal	L2x2x3/16	205	-3.86	11.67	33.1 40.8 (b)	Pass

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T6	20 - 0	Diagonal	L2 1/2x2 1/2x3/16	217	-1.68	14.53	11.6 19.0 (b)	Pass
T1	100 - 80	Horizontal	L1 1/2x1 1/2x3/16	51	-5.97	7.19	83.0	Pass
T2	80 - 60	Horizontal	2L1 1/2x1 1/2x3/16	75	-8.27	23.22	35.6	Pass
T3	60 - 53.33	Horizontal	2L1 1/2x1 1/2x3/16	129	-11.27	23.51	48.0	Pass
T4	53.33 - 40	Horizontal	2L1 1/2x1 1/2x3/16	153	-11.42	23.51	48.6	Pass
T4	53.33 - 40	Secondary Horizontal	L2 1/2x2 1/2x5/16	154	-2.44	29.11	8.4 15.5 (b)	Pass
T1	100 - 80	Top Girt	L1 1/2x1 1/2x3/16	4	-3.03	7.19	42.2	Pass
T2	80 - 60	Top Girt	2L1 1/2x1 1/2x3/16	63	-6.72	23.22	29.0	Pass
T3	60 - 53.33	Top Girt	2L1 1/2x1 1/2x3/16	66	-9.68	23.51	41.2	Pass
T4	53.33 - 40	Top Girt	2L1 1/2x1 1/2x3/16	141	-10.85	23.51	46.2	Pass
T4	53.33 - 40	Bottom Girt	2L1 1/2x1 1/2x3/16	144	-5.96	23.51	25.4	Pass
							Summary	
						Leg (T4)	87.7	Pass
						Diagonal (T2)	88.9	Pass
						Horizontal (T1)	83.0	Pass
						Secondary Horizontal (T4)	15.5	Pass
						Top Girt (T4)	46.2	Pass
						Bottom Girt (T4)	25.4	Pass
						Bolt Checks	54.2	Pass
						RATING =	**88.9**	**Pass**

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Subject:	FOUNDATION ANALYSIS
Location:	Danbury, CT
Rev. 2: 12/9/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 20074.58

Pier and Mat Foundation Analysis:

Input Data:

Tower Data

Overturning Moment =	$OM := 843 \cdot ft \cdot kips$	(User Input from tnxTower)	
Shear Force =	$S_t := 12 \cdot kip$	(User Input from tnxTower)	
Axial Force =	$WT_t := 22 \cdot kip$	(User Input from tnxTower)	
Max Compression Force =	$C_t := 137 \cdot kip$	(User Input from tnxTower)	
Max Uplift Force =	$U_t := 122 \cdot kip$	(User Input from tnxTower)	
Tower Height =	$H_t := 100 \cdot ft$	(User Input)	
Tower Width =	$W_t := 7.5 \cdot ft$	(User Input)	
Tower Position on Foundation (1=offset, 2=centered) =	$Pos_t := 2$	(User Input)	

Footing Data:

Overall Depth of Footing =	$D_f := 7.0 \cdot ft$	(User Input)	
Length of Pier =	$L_p := 4.25 \cdot ft$	(User Input)	
Extension of Pier Above Grade =	$L_{pag} := 0.25 \cdot ft$	(User Input)	
Diameter of Pier =	$d_p := 2.0 \cdot ft$	(User Input)	
Thickness of Footing =	$T_f := 3.0 \cdot ft$	(User Input)	
Width of Footing =	$W_f := 14.5 \cdot ft$	(User Input)	

Material Properties:

Concrete Compressive Strength =	$f_c := 4000 \cdot psi$	(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)	
Allowable Soil Bearing Capacity =	$q_s := 10000 \cdot psf$	(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)	(UBC-1997 Fig 23-2)
Coefficient of Friction Between Concrete =	$\mu := 0.45$	(User Input)	

Pier Reinforcement:

Bar Size =	$BS_{pier} := 8$	(User Input)	
Bar Diameter =	$d_{bpier} := 1.0 \cdot in$	(User Input)	
Number of Bars =	$NB_{pier} := 8$	(User Input)	
Clear Cover of Reinforcement =	$Cvr_{pier} := 3 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pier} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Diameter of Tie =	$d_{Tie} := 4 \cdot in$	(User Input)	

Pad Reinforcement:

Bar Size =	$BS_{top} := 6$	(User Input)	(Top of Pad)
Bar Diameter =	$d_{btop} := 0.750 \cdot in$	(User Input)	(Top of Pad)
Number of Bars =	$NB_{top} := 15$	(User Input)	(Top of Pad)
Bar Size =	$BS_{bot} := 8$	(User Input)	(Bottom of Pad)
Bar Diameter =	$d_{bbot} := 1.000 \cdot in$	(User Input)	(Bottom of Pad)
Number of Bars =	$NB_{bot} := 15$	(User Input)	(Bottom of Pad)
Clear Cover of Reinforcement =	$Cvr_{pad} := 3.0 \cdot in$	(User Input)	
Reinforcement Location Factor =	$\alpha_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Coating Factor =	$\beta_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Concrete Strength Factor =	$\lambda_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)
Reinforcement Size Factor =	$\gamma_{pad} := 1.0$	(User Input)	(ACI-2008 12.2.4)

Calculated Factors:

Pier Reinforcement Bar Area = $A_{bpier} := \frac{\pi \cdot d_{bpier}^2}{4} = 0.785 \cdot in^2$

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

Pad Bottom Reinforcement Bar Area = $A_{bbot} := \frac{\pi \cdot d_{bbot}^2}{4} = 0.785 \cdot in^2$

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

Load Factor = $LF := 1$

Stability of Footing:

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

Adjusted Soil Unit Weight = $\gamma_s := if(Bouyancy = 1, \gamma_{soil} - 62.4pcf, \gamma_{soil}) = 120 \cdot pcf$

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

$P_{pt} := K_p \cdot \gamma_s \cdot (D_f - T_f) + c \cdot 2 \cdot \sqrt{K_p} = 1.44 \cdot ksf$

$P_{top} := if[n < (D_f - T_f), P_{pt}, P_{pn}] = 1.44 \cdot ksf$

$P_{bot} := K_p \cdot \gamma_s \cdot D_f + c \cdot 2 \cdot \sqrt{K_p} = 2.52 \cdot ksf$

$P_{ave} := \frac{P_{top} + P_{bot}}{2} = 1.98 \cdot ksf$

$T_p := if[n < (D_f - T_f), T_f, (D_f - n)] = 3 \cdot ft$

$A_p := W_f \cdot T_p = 43.5 \cdot ft^2$

Ultimate Shear = $S_u := P_{ave} \cdot A_p = 86.13 \cdot kip$

Weight of Concrete = $WT_c := \left[\left(W_f^2 \cdot T_f\right) + (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4} L_p\right)\right] \cdot \gamma_c = 100.621 \cdot kip$

Weight of Soil Above Footing = $WT_{s1} := \left[\left[W_f^2 - (3) \cdot \left(\frac{d_p^2 \cdot \pi}{4}\right)\right] \cdot \left(\left|L_p - L_{pag} - n\right|\right)\right] \cdot \gamma_s = 96.4 \cdot kip$

Weight of Soil Wedge at Back Face = $WT_{s2} := \left[\frac{(D_f - n)^2 \cdot \tan(\Phi_s)}{2} \cdot W_f\right] \cdot \gamma_s = 24.612 \cdot kip$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

Tower Offset = $X_{t1} := \left[\frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{2}\right]$ $X_{t2} := \frac{W_f}{2} - \frac{(W_t \cdot \cos(30 \cdot deg))}{3}$

$X_t := if(Pos_t = 1, X_{t1}, X_{t2}) = 5.085$

$X_{off1} := \frac{W_f}{2} - \left[\frac{(W_t \cdot \cos(30 \cdot deg))}{3} + X_t\right] = 0$ $X_{off2} := 0$

$X_{off} := if(Pos_t = 1, X_{off1}, X_{off2})$ $X_{off} = 0 \cdot ft$

Total Weight = $WT_{tot} := 0.9WT_c + 0.75WT_{s1} = 162.9 \cdot kip$

Resisting Moment = $M_r := (WT_{tot}) \cdot \frac{W_f}{2} + 0.9WT_t \cdot \left(\frac{W_f}{2} - X_{off}\right) + 0.75\left(S_u \cdot \frac{T_p}{3}\right) + 0.75WT_{s2} \cdot \left[W_f + \frac{(D_f - n) \cdot \tan(\Phi_s)}{3}\right] = 1681 \cdot kip \cdot ft$

Overturning Moment = $M_{ot} := OM + S_t \cdot (L_p + T_f) = 930 \cdot kip \cdot ft$

Foundation has undercut toe per Fred A. Nudd dwg 96-4992-1

Factor of Safety Actual = $FS := \frac{M_r}{M_{ot}} = 1.81$

Factor of Safety Required = $FS_{req} := 1$ $OverTurning\_Moment\_Check := if(FS \geq FS_{req}, "Okay", "No Good")$

OverTurning_Moment_Check = "Okay"

Shear Capacity in Pier:

Shear Resistance of Pier = $S_p := \frac{P_{ave} \cdot A_p + \mu \cdot WT_{tot}}{FS_{req}} = 159.415 \cdot kips$

$Shear\_Check := if(S_p > S_t, "Okay", "No Good")$

$Shear\_Check = "Okay"$

Bearing Pressure Caused by Footing:

Total Load = $Load_{tot} := WT_c + WT_{s1} + WT_t = 219 \cdot kip$

Area of the Mat = $A_{mat} := W_f^2 = 210.25$

Section Modulus of Mat = $S := \frac{W_f^3}{6} = 508.1 \cdot ft^3$

Maximum Pressure in Mat = $P_{max} := \frac{Load_{tot}}{A_{mat}} + \frac{M_{ot}}{S} = 2.872 \cdot ksf$

$Max\_Pressure\_Check := if(P_{max} < 0.75q_s, "Okay", "No Good")$

$Max\_Pressure\_Check = "Okay"$

Minimum Pressure in Mat = $P_{min} := \frac{Load_{tot}}{A_{mat}} - \frac{M_{ot}}{S} = -0.789 \cdot ksf$

$Min\_Pressure\_Check := if[(P_{min} \geq 0) \cdot (P_{min} < 0.75q_s), "Okay", "No Good"]$

$Min\_Pressure\_Check = "No Good"$

Distance to Resultant of Pressure Distribution = $X_p := \frac{P_{max}}{\frac{P_{max} - P_{min}}{W_f}} \cdot \frac{1}{3} = 3.792$

Distance to Kern = $X_k := \frac{W_f}{6} = 2.417$

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

Eccentricity = $e := \frac{M_{ot}}{Load_{tot}} = 4.246$

Adjusted Soil Pressure = $P_a := \frac{2 \cdot Load_{tot}}{3 \cdot W_f \cdot \left(\frac{W_f}{2} - e\right)} = 3.352 \cdot ksf$

$q_{adj} := if(P_{min} < 0, P_a, P_{max}) = 3.352 \cdot ksf$

$Pressure\_Check := if(q_{adj} < 0.75q_s, "Okay", "No Good")$

$Pressure\_Check = "Okay"$

Concrete Bearing Capacity:

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

Bearing Strength Between Pier and Pad = $P_b := \Phi_c \cdot 0.85 \cdot f_c \cdot \frac{\pi \cdot d_p^2}{4} = 999.78 \cdot kips$ (ACI-2008 10.14)

$Bearing\_Check := if\left(P_b > LF \cdot C_t, "Okay", "No Good"\right)$

Bearing_Check = "Okay"

Shear Strength of Concrete:

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

$\phi_c := 0.85$ (ACI 9.3.2.5)

$d := T_f - Cvr_{pad} - d_{bbot} = 32 \cdot in$

$FL := LF \cdot \frac{C_t}{W_f^2} = 0.652 \cdot ksf$

$V_{req} := FL \cdot \left(X_t - .5 \cdot d_p - d\right) \cdot W_f = 13.4 \cdot kips$

$V_{Avail} := \phi_c \cdot 2 \cdot \sqrt{f_c \cdot psi} \cdot W_f \cdot d = 599 \cdot kip$ (ACI-2008 11.2.1.1)

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

Beam_Shear_Check = "Okay"

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

Critical Perimeter of Punching Shear = $b_o := \left(d_p + d\right) \cdot \pi = 14.7$

Area Included Inside Perimeter = $A_{bo} := \frac{\pi \cdot \left(d_p + d\right)^2}{4} = 17.1$

Required Shear Strength = $V_{req} := FL \cdot \left(W_f^2 - A_{bo}\right) = 126 \cdot kips$

Available Shear Strength = $V_{Avail} := \phi_c \cdot 4 \cdot \sqrt{f_c \cdot psi} \cdot b_o \cdot d = 1210.6 \cdot kip$ (ACI-2008 11.11.2.1)

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

Punching_Shear_Check = "Okay"

Steel Reinforcement in Pad:

Required Reinforcement for Bending:

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

Maximum Moment in Pad = $M_{max} := 352 \cdot kip \cdot ft$ (User Input)

Design Moment = $M_n := \frac{LF \cdot M_{max}}{\phi_m} = 391.111 \cdot kips \cdot ft$

$$\beta := \begin{cases} 0.85 & \text{if } 2500 \cdot psi \le f_c \le 4000 \cdot psi \\ 0.65 & \text{if } f_c > 8000 \cdot psi \\ \left[0.85 - \left[\frac{\left(\frac{f_c}{psi} - 4000\right)}{1000}\right] \cdot 0.5\right] & \text{otherwise} \end{cases} = 0.85 \quad \text{(ACI-200810.2.7.3)}$$

$b_{eff} := W_t \cdot \cos(30 \cdot deg) + d_p = 101.942 \cdot in$

$A_s := \frac{M_n}{(f_y \cdot d)} = 2.444 \cdot in^2$

$a := \frac{A_s \cdot f_y}{\beta \cdot f_c \cdot b_{eff}} = 0.423 \cdot in$

$A_s := \frac{M_n}{f_y \cdot \left(d - \frac{a}{2}\right)} = 2.461 \cdot in^2$

$\rho := \frac{A_s}{b_{eff} d} = 0.00905 \cdot in$

Required Reinforcement for Temperature and Shrinkage:

$$\rho_{sh} := \begin{cases} .0018 & \text{if } f_y \geq 60000 \cdot psi \\ .0020 & \text{otherwise} \end{cases} = 0.0018$$ (ACI-2008 7.12.2.1)

Check Bottom Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 2.9 \cdot in^2$$

$$As_{prov} := A_{bbot} \cdot NB_{bot} = 11.8 \cdot in^2$$

$$Pad\_Reinforcement\_Bot := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Bot = "Okay"

Check top Bars:

$$As := if\left(\rho \geq \rho_{sh}, A_s, \rho_{sh} \cdot \frac{b_{eff}}{2} \cdot d\right) = 2.9 \cdot in^2$$

$$As_{prov} := A_{btop} \cdot NB_{top} = 6.6 \cdot in^2$$

$$Pad\_Reinforcement\_Top := if\left(As_{prov} > As, "Okay", "No\ Good"\right)$$

Pad_Reinforcement_Top = "Okay"

Developement Length Pad Reinforcement:

Bar Spacing =

$$B_{sPad} := \frac{W_f - 2 \cdot Cvr_{pad} - NB_{bot} \cdot d_{bbot}}{NB_{bot} - 1} = 10.93 \cdot in$$

Spacing or Cover Dimension =

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

Transverse Reinforcement Index =

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

$$L_{dbt} := \frac{3 \cdot f_y \alpha_{pad} \cdot \beta_{pad} \cdot \gamma_{pad} \cdot \lambda_{pad}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \frac{c + k_{tr}}{d_{bbot}}} \cdot d_{bbot} = 23.7 \cdot in$$

Minimum Development Length =

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

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

Available Length in Pad =

$$L_{Pad} := \frac{W_f}{2} - \frac{W_t}{2} - Cvr_{pad} = 39 \cdot in$$

$$Lpad\_Check := if\left(L_{Pad} > L_{dbt}, "Okay", "No\ Good"\right)$$

Lpad_Check = "Okay"

Steel Reinforcement in Pier:

Area of Pier = $A_p := \frac{\pi \cdot d_p^2}{4} = 452.39 \cdot in^2$

$A_{smin} := 0.01 \cdot 0.5 \cdot A_p = 2.26 \cdot in^2$ (ACI-2008 10.8.4 & 10.9.1)

$A_{sprov} := NB_{pier} \cdot A_{bpier} = 6.28 \cdot in^2$

$Steel\_Area\_Check := if\left(A_{sprov} > A_{smin}, "Okay", "No Good"\right)$

Steel_Area_Check = "Okay"

Bar Spacing In Pier = $B_{sPier} := \frac{d_p \cdot \pi}{NB_{pier}} - d_{bpier} = 8.425 \cdot in$

Diameter of Reinforcement Cage = $Diam_{cage} := d_p - 2 \cdot Cvr_{pier} = 18 \cdot in$

Maximum Moment in Pier = $M_p := S_t \cdot \left(L_p\right) \cdot LF = 612 \cdot in \cdot kips$

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

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

$\left(D \;\; N \;\; n \;\; P_u \;\; M_{xu}\right) = (24 \;\; 8 \;\; 8 \;\; 182.621 \;\; 612)$

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

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

$\left(\phi P_n \;\; \phi M_{xn} \;\; f_{sp} \;\; \rho\right) = \left(699.325 \;\; 2.344 \times 10^3 \;\; -16.111 \;\; 0.014\right)$

$Axial\_Load\_Check := if\left(\phi P_n \geq P_u, "Okay", "No Good"\right)$

Axial_Load_Check = "Okay"

$Bending\_Check := if\left(\phi M_{xn} \geq M_{xu}, "Okay", "No Good"\right)$

Bending_Check = "Okay"

Development Length Pier Reinforcement:

Available Length in Foundation:

$L_{pier} := L_p - Cvr_{pier} = 48 \cdot in$

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

Tension: (ACI-2008 12.2.3)

Spacing or Cover Dimension =

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

Transverse Reinforcement =

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

$L_{dbt} := \frac{3 \cdot f_y \cdot \alpha_{pier} \cdot \beta_{pier} \cdot \gamma_{pier} \cdot \lambda_{pier}}{40 \cdot \sqrt{f_c \cdot psi} \cdot \left(\frac{c + k_{tr}}{d_{bpier}}\right)} \cdot d_{bpier} = 23.72 \cdot in$

Minimum Development Length =

$L_{dh} := \frac{1200 \cdot d_{bpier}}{\sqrt{\frac{f_c}{psi}}} \cdot .7 = 13.282 \cdot in$ (ACI 12.2.1)

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

$L_{db} := \max\left(L_{dbt}, L_{dbmin}\right) = 23.717 \cdot in$

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

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

Compression: (ACI-2008 12.3.2)

$L_{dbc1} := \frac{.02 \cdot d_{bpier} \cdot f_y}{\sqrt{f_c \cdot psi}} = 18.974 \cdot in$

$L_{dbmin} := 0.0003 \cdot \frac{in^2}{lb} \cdot \left(d_{bpier} \cdot f_y\right) = 18 \cdot in$

$L_{dbc} := if\left(L_{dbc1} \geq L_{dbmin}, L_{dbc1}, L_{dbmin}\right) = 18.974 \cdot in$

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

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Section 1 - Site Information

Site ID: CTFF703A
Status: Final
Version: 8
Project Type: Anchor
Approved: 12/8/2021 12:53:59 PM
Approved By: Pratik.Patil30@T-Mobile.com
Last Modified: 12/8/2021 12:53:59 PM
Last Modified By: Pratik.Patil30@T-Mobile.com

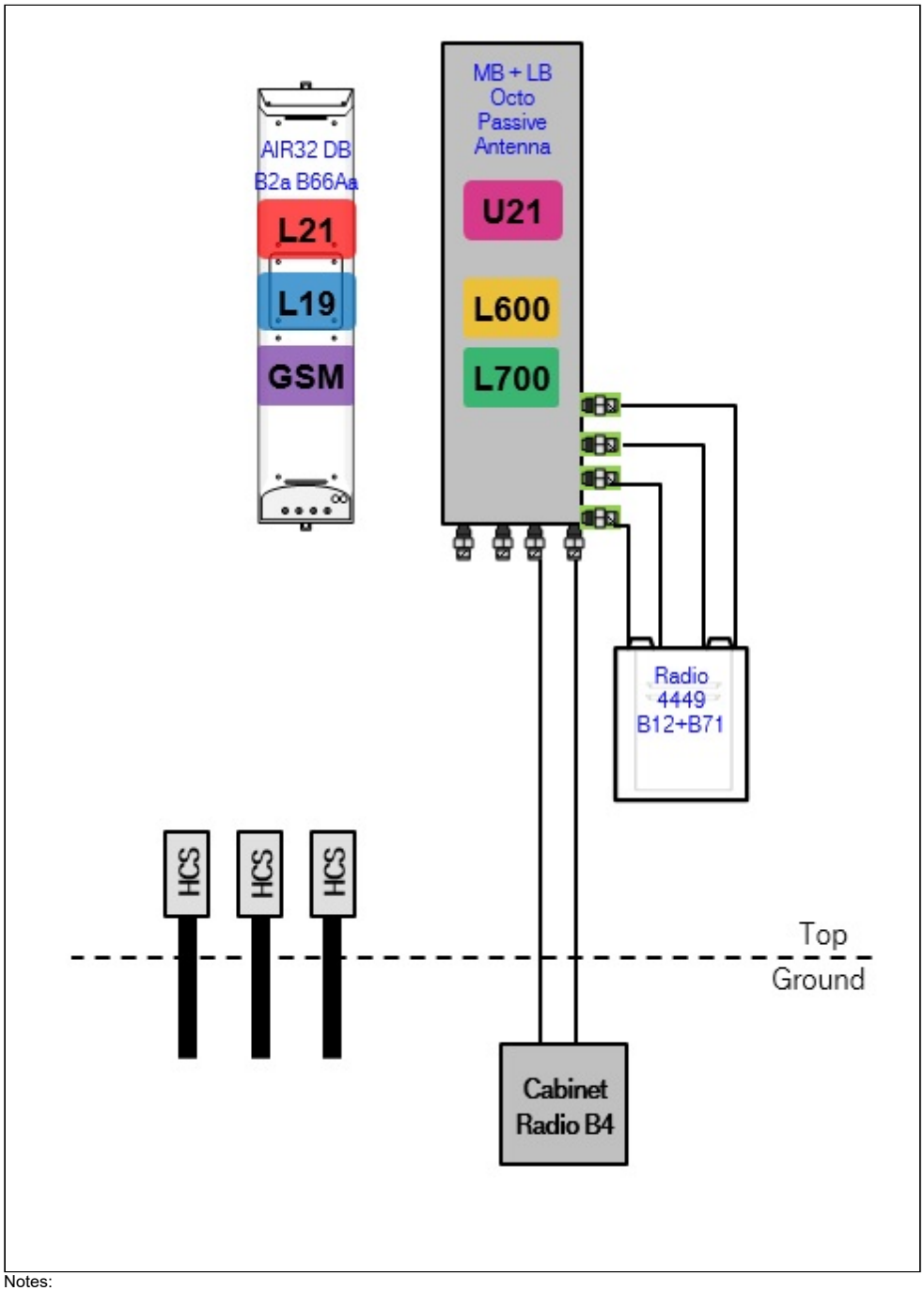
Site Name: CT703/WCSU ET
Site Class: Self Support Tower
Site Type: Structure Non Building
Plan Year: 2021
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: State of Connecticut

Latitude: 41.39472156
Longitude: -73.48666590
Address: 303 Boxwood Lane
City, State: Danbury, CT
Region: NORTHEAST

RAN Template: 67D5A997DB Outdoor			AL Template: 67D5997DB_2xAIR+1OP (U21 Market)	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 0	**TMA Count:** 0	**RRU Count:** 6

Section 2 - Existing Template Images

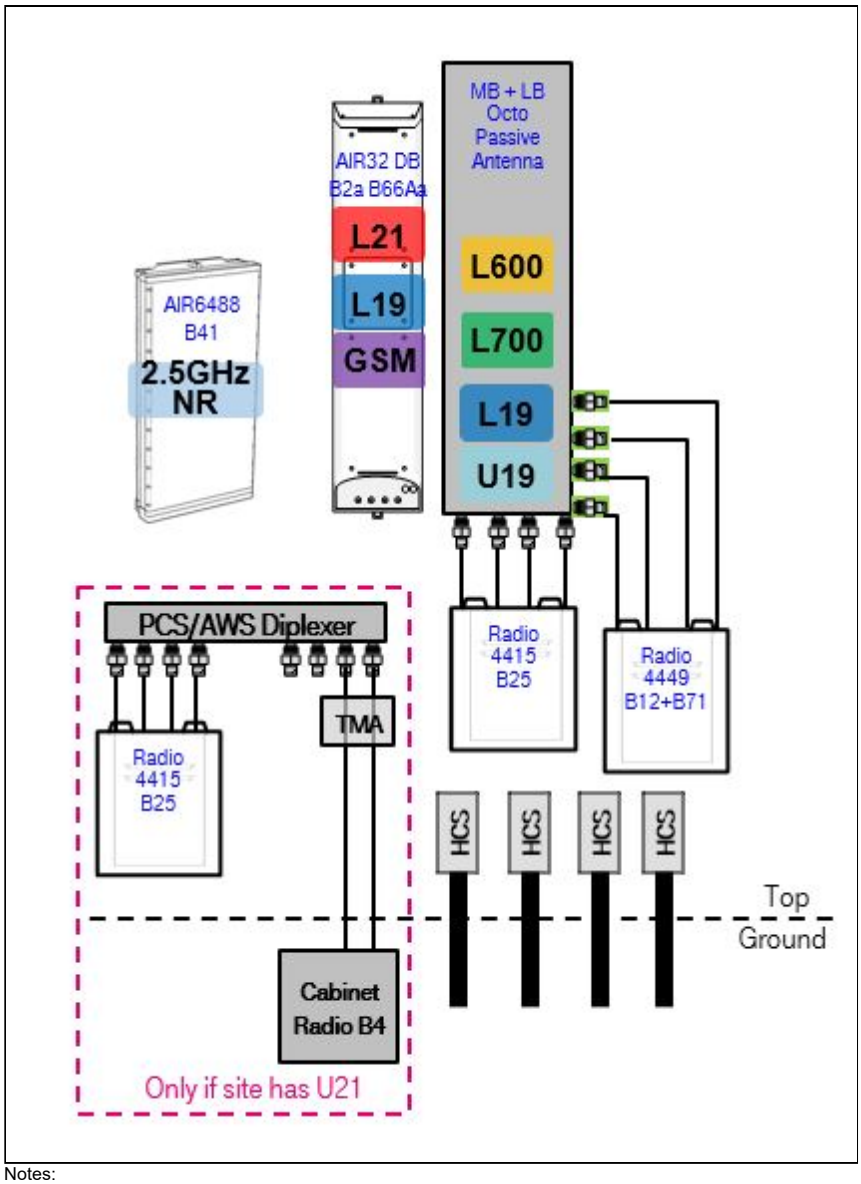
67D92DBL_1xAIR+1OP (U21 Market).jpg



Notes:

Section 3 - Proposed Template Images

67D5997DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 67D92DBL Outdoor

Enclosure	1
Enclosure Type	RBS 6102
Baseband	DUW30 (U2100); DUW30; DUG20 (G1900); BB 5216 (L2100, L1900); BB 6630 (L700, L600, N600)
Hybrid Cable System	Ericsson 9x18 HCS *Select Length*; Ericsson 6x12 HCS *Select Length & AWG* **(x 3)**
Multiplexer	XMU
Radio	RU22 **(x 6)** (U2100)

Proposed RAN Equipment

Template: 67D5A997DB Outdoor

Enclosure	1	2	3
Enclosure Type	RBS 6102	Enclosure 6160 AC V1	B160
Baseband	DUW30 (U2100); DUW30; DUG20 (G1900); BB 6648 (L2100, L1900); BB 6630 (L700, L600, N600)	BB 6648 (L2500, N2500)	
Hybrid Cable System	Ericsson 6x12 HCS *Select Length & AWG* **(x 3)**	Ericsson Hybrid Trunk 6/24 4AWG 100m **(x 3)**; PSU 4813 vR4A (Kit)	
Radio	RU22 **(x 6)**		
Transport System		CSR IXRe V2 (Gen2)	

RAN Scope of Work:

Existing cabinet radios for U2100 will become dark. U2100 will move to new tower-mounted Radio 4460

Replace BB 5216 for L2100/L1900 with (1) BB6648 in existing cabinet RBS 6102.

Remove the XMU.

Add (1) Enclosure 6160.

Add (1) Battery Cabinet B160.

**Add (1) iXRe Router to new Enclosure 6160.

**Add (1) BB6648 for L2500 and N2500 (MMBB- Mixed Mode Baseband) to new Enclosure 6160.

**Add (1) PSU4813 Voltage Booster to new Enclosure 6160.

Remove all coaxial lines.

Remove the 9X18 HCS.

**Add (3) 6X24 HCS. There will be (1) 6X12 and (1) 6x24 HCS per sector. DC and Fiber Pairs will be reallocated among A&L Equipment. Length of new HCS to be determined.

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Section 6 - A&L Equipment

Existing Template: 67D92DBL_1xAIR+1OP (U21 Market)
Proposed Template: 67D5997DB_2xAIR+1OP (U21 Market)

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro								
Antenna	**1**	**2**				**3**			
Antenna Model	Empty Antenna Mount (Empty mount)	RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	30	30				30			
M. Tilt	0	0				0			
Height	83	83				83			
Ports		**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.		L700 L600 N600	L700 L600 N600		U2100	L2100	L2100	L1900 G1900	L1900 G1900
Dark Tech.									
Restricted Tech.									
Decomm. Tech.									
E. Tilt									
Cables		Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**		1-5/8" Coax - 125 ft. **(x2)**	Fiber Jumper		Fiber Jumper	
TMAs					Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners									
Radio		Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)						
Sector Equipment									

Unconnected Equipment:

Scope of Work:

Remove AIR21 B2A/B4P from Position 1.
Move GSM to AIR32 DB in Position 3.

Replace LB Dual in Position 2 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.
Move Coaxial Lines and AWS TMA for U2100 from Position 1 to Position 2, and connect them to two Mid-Band Ports of LB/MB Octo.

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	30		30				30			
M. Tilt	0		0				0			
Height	83		83				83			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	U2100 L1900	U2100 L1900	L2100	L2100	G1900 L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables	Fiber Jumper **(x2)**	Fiber Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper
TMAs										
Diplexers / Combiners										
Radio			Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)				
Sector Equipment										

Unconnected Equipment:

Scope of Work:

*** L600 Scope of Work ***

Remove AIR21 B2A/B4P from Position 1.

Move GSM to AIR32 DB in Position 3.

Replace Low-Band Dual in Position 2 with (1) Low-Band/Mid-Band Octo.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in Position 2 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

***

*** Anchor Scope of Work ***

Install AIR6449 B41 for L2500 and N2500 in Position 1.

**Add (1) Radio 4460 B25+B66 for L1900 2nd Carrier and U2100 to Position 2 near antenna.

Remove coaxial lines and AWS TMA for U2100.

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

***

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 2 (Existing) view from behind

Coverage Type	A - Outdoor Macro								
Antenna	**1**	**2**				**3**			
Antenna Model	Empty Antenna Mount (Empty mount)	RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	150	150				150			
M. Tilt	0	0				0			
Height	83	83				83			
Ports		**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.		L700 L600 N600	L700 L600 N600		U2100	L2100	L2100	L1900 G1900	L1900 G1900
Dark Tech.									
Restricted Tech.									
Decomm. Tech.									
E. Tilt									
Cables		Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**		1-5/8" Coax - 125 ft. **(x2)**	Fiber Jumper		Fiber Jumper	
TMAs					Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners									
Radio		Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)						
Sector Equipment									

Unconnected Equipment:

Scope of Work:

Remove AIR21 B2A/B4P from Position 1.
Move GSM to AIR32 DB in Position 3.

Replace LB Dual in Position 2 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.
Move Coaxial Lines and AWS TMA for U2100 from Position 1 to Position 2, and connect them to two Mid-Band Ports of LB/MB Octo.

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	150		150				150			
M. Tilt	0		0				0			
Height	83		83				83			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	U2100 L1900	U2100 L1900	L2100	L2100	G1900 L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables	Fiber Jumper **(x2)**	Fiber Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper
TMAs										
Diplexers / Combiners										
Radio			Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)				
Sector Equipment										

Unconnected Equipment:

Scope of Work:

*** L600 Scope of Work ***

Remove AIR21 B2A/B4P from Position 1.

Move GSM to AIR32 DB in Position 3.

Replace Low-Band Dual in Position 2 with (1) Low-Band/Mid-Band Octo.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in Position 2 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

***

*** Anchor Scope of Work ***

Install AIR6449 B41 for L2500 and N2500 in Position 1.

**Add (1) Radio 4460 B25+B66 for L1900 2nd Carrier and U2100 to Position 2 near antenna.

Remove coaxial lines and AWS TMA for U2100.

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

***

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 3 (Existing) view from behind

Coverage Type	A - Outdoor Macro								
Antenna	**1**	**2**				**3**			
Antenna Model	Empty Antenna Mount (Empty mount)	RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	270	270				270			
M. Tilt	0	0				0			
Height	83	83				83			
Ports		**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.		L700 L600 N600	L700 L600 N600		U2100	L2100	L2100	L1900 G1900	L1900 G1900
Dark Tech.									
Restricted Tech.									
Decomm. Tech.									
E. Tilt									
Cables		Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**		1-5/8" Coax - 125 ft. **(x2)**	Fiber Jumper		Fiber Jumper	
TMAs					Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners									
Radio		Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)						
Sector Equipment									

Unconnected Equipment:

Scope of Work:

Remove AIR21 B2A/B4P from Position 1.
Move GSM to AIR32 DB in Position 3.

Replace LB Dual in Position 2 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.
Move Coaxial Lines and AWS TMA for U2100 from Position 1 to Position 2, and connect them to two Mid-Band Ports of LB/MB Octo.

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	270		270				270			
M. Tilt	0		0				0			
Height	83		83				83			
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**
Active Tech.	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	U2100 L1900	U2100 L1900	L2100	L2100	G1900 L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables	Fiber Jumper **(x2)**	Fiber Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper
TMAs										
Diplexers / Combiners										
Radio			Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)				
Sector Equipment										

Unconnected Equipment:

Scope of Work:

*** L600 Scope of Work ***

Remove AIR21 B2A/B4P from Position 1.

Move GSM to AIR32 DB in Position 3.

Replace Low-Band Dual in Position 2 with (1) Low-Band/Mid-Band Octo.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in Position 2 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

***

*** Anchor Scope of Work ***

Install AIR6449 B41 for L2500 and N2500 in Position 1.

**Add (1) Radio 4460 B25+B66 for L1900 2nd Carrier and U2100 to Position 2 near antenna.

Remove coaxial lines and AWS TMA for U2100.

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

***

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Section 7 - Power Systems Equipment

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

	Proposed Power Systems Equipment
Enclosure	1
Enclosure Type	Enclosure 6160 AC V1

CENTEK engineering

Centered on Solutions℠

Structural Analysis Report

Antenna Mount Analysis

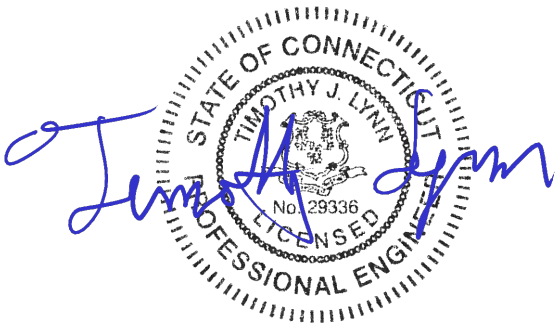
T-Mobile Site #: CTFF703A

303 Boxwood Lane
Danbury, CT

Centek Project No. 20074.58

~~Date: May 20, 2019~~
Rev 1: December 9, 2021

Max Stress Ratio = 31.7%



Prepared for:

T-Mobile USA
35 Griffin Road
Bloomfield, CT 06002

Table of Contents

CENTEK engineering

Centered on Solutions℠

December 9, 2021

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

Re: Structural Letter ~ Antenna Mount
T-Mobile – Site Ref: CTFF703A
303 Boxwood Lane
Danbury, CT 06811

Centek Project No. 20074.58

Dear Mr. Reid,

Centek Engineering, Inc. has reviewed the T-Mobile antenna installation at the above referenced site. The purpose of the review is to determine the structural adequacy of the existing mount, consisting of three (3) 10-ft (SitePro: LTF10-3XX) T-Frames to support the equipment configuration. The review considered the effects of wind load, dead load and ice load in accordance with the 2015 International Building Code as modified by the 2018 Connecticut State Building Code (CTBC) including ASCE 7-10 and ANSI/TIA-222-G *Structural Standards for Steel Antenna Towers and Supporting Structures*.

The loads considered in this analysis consist of the following:

- T-Mobile:
  T-Frames: Three (3) RFS APXVAARR18_43 panel antennas, three (3) Ericsson AIR32 panel antennas, three (3) Ericsson AIR6449 panel antennas, three (3) Ericsson 4449 remote radio units and three (3) Ericsson 4460 remote radio units mounted on three (3) T-Frames with a RAD center elevation of 83-ft +/- AGL.

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

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

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

Respectfully Submitted by:

Timothy J. Lynn, PE
Structural Engineer

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

Section 2 - Calculations

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

Subject: TIA-222-G Loads

Location: Danbury, CT

Rev. 1: 12/9/21

Prepared by: T.J.L. Checked by: C.F.C.
Job No. 20074.58

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

Wind Speeds

Basic Wind Speed: $V := 93$ mph (User Input - 2018 CSBC Appendix N)

Basic Wind Speed with Ice: $V_i := 50$ mph (User Input per Annex B of TIA-222-G)

Input

Structure Type = Structure_Type := Lattice (User Input)

Structure Category = SC := II (User Input)

Exposure Category = Exp := C (User Input)

Structure Height = $h := 100$ ft (User Input)

Height to Center of Antennas = $z_{Ant} := 83$ ft (User Input)

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

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

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

$K_a := 1.0$ (User Input)

Gust Response Factor = $G_H = 0.85$ (User Input)

Output

Wind Direction Probability Factor =

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

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

Importance Factors =

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

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

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

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

$$K_{iz} := \left(\frac{z_{Ant}}{33}\right)^{0.1} = 1.097$$

$$t_{iz} := 2.0 \cdot t_i \cdot I_{ice} \cdot K_{iz} \cdot K_{zt}^{0.35} = 1.645$$

Velocity Pressure Coefficient Antennas =

$$Kz_{Ant} := 2.01\left(\left(\frac{z_{Ant}}{zg}\right)\right)^{\frac{2}{\alpha}} = 1.217$$

Velocity Pressure w/o Ice Antennas =

$$qz_{Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V^2 \cdot I_{Wind} = 22.903$$

Velocity Pressure with Ice Antennas =

$$qz_{ice.Ant} := 0.00256 \cdot K_d \cdot Kz_{Ant} \cdot V_i^2 \cdot I_{Wind} = 6.62$$

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Subject:	TIA-222-G Loads
Location:	Danbury, CT
Rev. 1: 12/9/21	Prepared by: T.J.L. Checked by: C.F.C. Job No. 20074.58

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	Ericsson AIR32		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 56.6$	in	(User Input)
Antenna Width =	$W_{ant} := 12.9$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.7$	in	(User Input)
Antenna Weight =	$WT_{ant} := 133$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 4.4$		
Antenna Force Coefficient =	$Ca_{ant} = 1.28$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 5.1$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 127$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 3.4$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 85$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6.7$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 49$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 5$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 36$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 6352$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 5273$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 171$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 171$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

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

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 4.7$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 110$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 1.9$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 45$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 6$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 41$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 2.9$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 20$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 5632$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 4401$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 143$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 143$	lbs

Development of Wind & Ice Load on Antennas

Antenna Data:

Antenna Model =	RFSAPXVAARR18-43		
Antenna Shape =	Flat		(User Input)
Antenna Height =	$L_{ant} := 72$	in	(User Input)
Antenna Width =	$W_{ant} := 24$	in	(User Input)
Antenna Thickness =	$T_{ant} := 8.5$	in	(User Input)
Antenna Weight =	$WT_{ant} := 132$	lbs	(User Input)
Number of Antennas =	$N_{ant} := 1$		(User Input)
Antenna Aspect Ratio =	$Ar_{ant} := \frac{L_{ant}}{W_{ant}} = 3.0$		
Antenna Force Coefficient =	$Ca_{ant} = 1.22$		

Wind Load (without ice)

Surface Area for One Antenna =	$SA_{antF} := \frac{L_{ant} \cdot W_{ant}}{144} = 12$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antF} = 286$	lbs
Surface Area for One Antenna =	$SA_{antS} := \frac{L_{ant} \cdot T_{ant}}{144} = 4.3$	sf
Total Antenna Wind Force =	$F_{ant} := qz_{Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{antS} = 101$	lbs

Wind Load (with ice)

Surface Area for One Antenna w/ Ice =	$SA_{ICEantF} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (W_{ant} + 2 \cdot t_{iz})}{144} = 14.3$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantF} = 98$	lbs
Surface Area for One Antenna w/ Ice =	$SA_{ICEantS} := \frac{(L_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz})}{144} = 6.2$	sf
Total Antenna Wind Force w/ Ice =	$Fi_{ant} := qz_{ice.Ant} \cdot G_H \cdot Ca_{ant} \cdot K_a \cdot SA_{ICEantS} = 42$	lbs

Gravity Load (without ice)

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

Gravity Loads (ice only)

Volume of Each Antenna =	$V_{ant} := L_{ant} \cdot W_{ant} \cdot T_{ant} = 1 \times 10^4$	cu in
Volume of Ice on Each Antenna =	$V_{ice} := (L_{ant} + 2 \cdot t_{iz})(W_{ant} + 2 \cdot t_{iz}) \cdot (T_{ant} + 2 \cdot t_{iz}) - V_{ant} = 9536$	cu in
Weight of Ice on Each Antenna =	$W_{ICEant} := \frac{V_{ice}}{1728} \cdot Id = 309$	lbs
Weight of Ice on All Antennas =	$W_{ICEant} \cdot N_{ant} = 309$	lbs

Development of Wind & Ice Load on RRUS's

RRUS Data:

RRUS Model = Ericsson 4449

RRUS Shape = Flat (User Input)

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

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

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

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

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

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

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

Wind Load (without ice)

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

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 32$ lbs

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

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 25$ lbs

Wind Load (with ice)

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

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 14$ lbs

Surface Area for One RRUS w/ Ice = $SA_{ICERRUSS} := \frac{(L_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz})}{144} = 1.7$ sf

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

Gravity Load (without ice)

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

Gravity Loads (ice only)

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

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2061$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 67$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 67$ lbs

Development of Wind & Ice Load on RRUS

RRUS Data:

RRUS Model = Ericsson 4460

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 = $N_{RRUS} := 1$ (User Input)

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 = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSF} = 50$ lbs

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

Total RRUS Wind Force = $F_{RRUS} := qz_{Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{RRUSS} = 38$ lbs

Wind Load (with ice)

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

Total RRUS Wind Force w/ Ice = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSF} = 20$ 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 = $Fi_{RRUS} := qz_{ice.Ant} \cdot G_H \cdot Ca_{RRUS} \cdot K_a \cdot SA_{ICERRUSS} = 17$ lbs

Gravity Load (without ice)

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

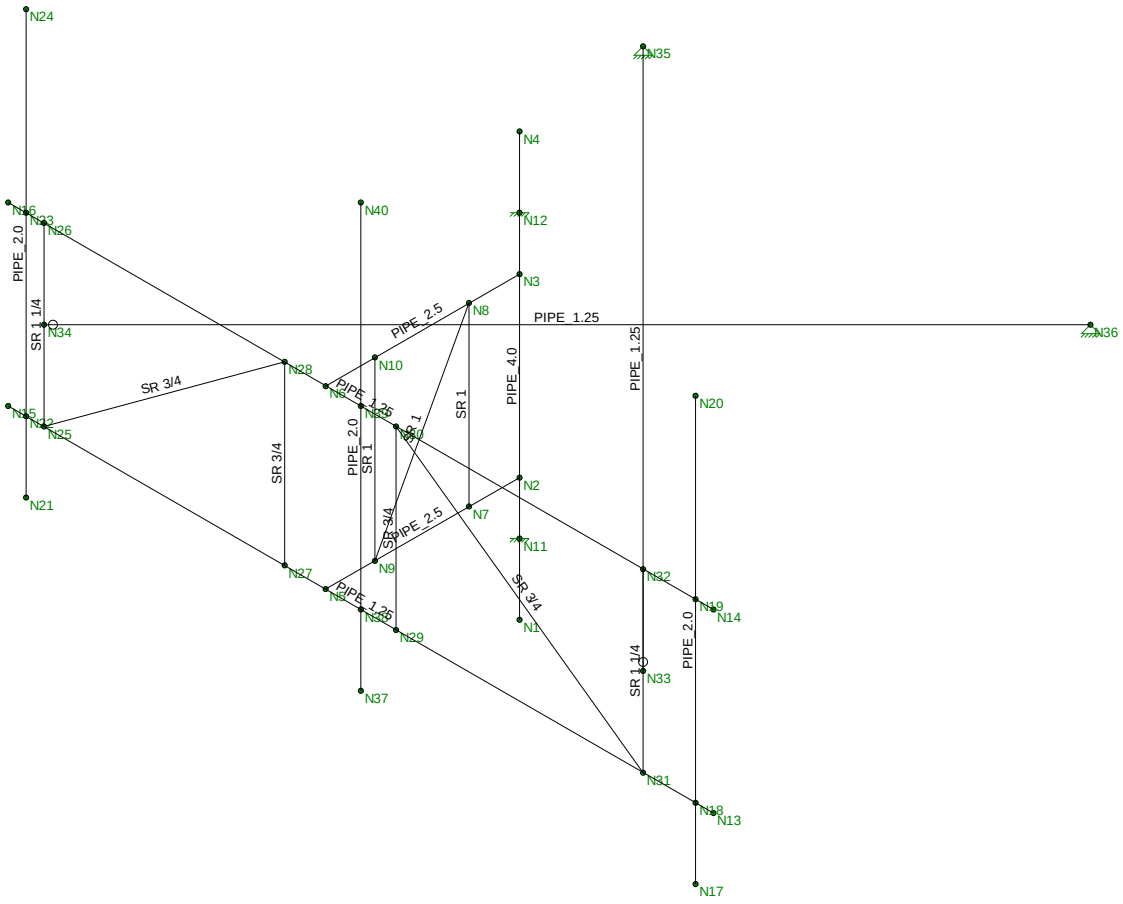
Gravity Loads (ice only)

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

Volume of Ice on Each RRUS = $V_{ice} := (L_{RRUS} + 2 \cdot t_{iz})(W_{RRUS} + 2 \cdot t_{iz}) \cdot (T_{RRUS} + 2 \cdot t_{iz}) - V_{RRUS} = 2966$ cu in

Weight of Ice on Each RRUS = $W_{ICERRUS} := \frac{V_{ice}}{1728} \cdot Id = 96$ lbs

Weight of Ice on All RRUSs = $W_{ICERRUS} \cdot N_{RRUS} = 96$ lbs



Envelope Only Solution

Centek		
TJL	CTFF703A - Mount	Dec 9, 2021 at 3:45 PM
20074.58	Member Framing	Mount.r3d

(Global) Model Settings

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

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

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

(Global) Model Settings, Continued

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

Hot Rolled Steel Properties

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

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	(E) Pipe 4" Std	PIPE_4.0	Column	Pipe	A53 Grade B	Typical	2.96	6.82	6.82	13.6
2	(E) Pipe 1.25" Std	PIPE_1.25	Beam	Pipe	A53 Grade B	Typical	.625	.184	.184	.368
3	(E) Pipe 2.0" Std.	PIPE_2.0	Column	Pipe	A53 Grade B	Typical	1.02	.627	.627	1.25
4	(E) Pipe 2.5" Std	PIPE_2.5	Beam	Pipe	A53 Grade B	Typical	1.61	1.45	1.45	2.89
5	(E) SR1-1/4	SR 1 1/4	Column	BAR	A36 Gr.36	Typical	1.227	.12	.12	.24
6	(E)SR1	SR 1	Column	BAR	A36 Gr.36	Typical	.785	.049	.049	.098
7	(E)SR5/8	SR 5/8	Column	BAR	A36 Gr.36	Typical	.307	.007	.007	.015
8	(E)SR3/4	SR 3/4	Column	BAR	A36 Gr.36	Typical	.442	.016	.016	.031
9	(E) Stabilizer	PIPE_1.25	Beam	Pipe	A53 Grade B	Typical	.625	.184	.184	.368
10	(P) Antenna Mast	PIPE_2.0	Beam	Pipe	A53 Grade B	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) Pipe 4" Std	6			Lbyy						Lateral
2	M2	(E) Pipe 2.5" Std	2.75			Lbyy						Lateral
3	M3	(E) Pipe 2.5" Std	2.75			Lbyy						Lateral
4	M4	(E) Pipe 1.25" Std	10	Segment	Segment	Lbyy						Lateral
5	M5	(E) Pipe 1.25" Std	10	2.75	2.75	2.75	2.75	2.75				Lateral
6	M6	(E)SR1	2.5			Lbyy						Lateral
7	M7	(E)SR1	2.833			Lbyy						Lateral
8	M8	(E)SR1	2.5			Lbyy						Lateral
9	M9	(E) Pipe 2.0" Std.	6			Lbyy						Lateral
10	M10	(E) Pipe 2.0" Std.	6			Lbyy						Lateral
11	M11	(E) SR1-1/4	2.5			Lbyy						Lateral
12	M12	(E) SR1-1/4	2.5			Lbyy						Lateral
13	M13	(E)SR3/4	2.5			Lbyy						Lateral
14	M14	(E)SR3/4	2.5			Lbyy						Lateral
15	M15	(E)SR3/4	4.234			Lbyy						Lateral
16	M16	(E)SR3/4	4.301			Lbyy						Lateral
17	M17	(E) Stabilizer	10.5			Lbyy						Lateral
18	M18	(E) Stabilizer	10.503			Lbyy						Lateral
19	M19	(E) Pipe 2.0" Std.	6			Lbyy						Lateral

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
1	M1	N1	N4			(E) Pipe 4" Std	Column	Pipe	A53 Grade B	Typical
2	M2	N6	N3			(E) Pipe 2.5" Std	Beam	Pipe	A53 Grade B	Typical
3	M3	N5	N2			(E) Pipe 2.5" Std	Beam	Pipe	A53 Grade B	Typical
4	M4	N16	N14			(E) Pipe 1.25" Std	Beam	Pipe	A53 Grade B	Typical
5	M5	N15	N13			(E) Pipe 1.25" Std	Beam	Pipe	A53 Grade B	Typical
6	M6	N8	N7			(E)SR1	Column	BAR	A36 Gr.36	Typical
7	M7	N8	N9			(E)SR1	Column	BAR	A36 Gr.36	Typical
8	M8	N9	N10			(E)SR1	Column	BAR	A36 Gr.36	Typical
9	M9	N17	N20			(E) Pipe 2.0" Std.	Column	Pipe	A53 Grade B	Typical
10	M10	N21	N24			(E) Pipe 2.0" Std.	Column	Pipe	A53 Grade B	Typical
11	M11	N31	N32			(E) SR1-1/4	Column	BAR	A36 Gr.36	Typical
12	M12	N25	N26			(E) SR1-1/4	Column	BAR	A36 Gr.36	Typical
13	M13	N27	N28			(E)SR3/4	Column	BAR	A36 Gr.36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(...	Section/Shape	Type	Design List	Material	Design ...
14	M14	N29	N30			(E)SR3/4	Column	BAR	A36 Gr.36	Typical
15	M15	N25	N28			(E)SR3/4	Column	BAR	A36 Gr.36	Typical
16	M16	N31	N30			(E)SR3/4	Column	BAR	A36 Gr.36	Typical
17	M17	N34	N36			(E) Stabilizer	Beam	Pipe	A53 Grade B	Typical
18	M18	N33	N35			(E) Stabilizer	Beam	Pipe	A53 Grade B	Typical
19	M19	N37	N40			(E) Pipe 2.0" Std.	Column	Pipe	A53 Grade B	Typical

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	-.25	0	0	
2	N2	0	1.5	0	0	
3	N3	0	4	0	0	
4	N4	0	5.75	0	0	
5	N5	0	1.5	2.75	0	
6	N6	0	4	2.75	0	
7	N7	0	1.5	0.716667	0	
8	N8	0	4	0.716667	0	
9	N9	0	1.5	2.05	0	
10	N10	0	4	2.05	0	
11	N11	0	.75	0	0	
12	N12	0	4.75	0	0	
13	N13	5.5	1.5	2.75	0	
14	N14	5.5	4	2.75	0	
15	N15	-4.5	1.5	2.75	0	
16	N16	-4.5	4	2.75	0	
17	N17	5.25	.5	2.75	0	
18	N18	5.25	1.5	2.75	0	
19	N19	5.25	4	2.75	0	
20	N20	5.25	6.5	2.75	0	
21	N21	-4.25	.5	2.75	0	
22	N22	-4.25	1.5	2.75	0	
23	N23	-4.25	4	2.75	0	
24	N24	-4.25	6.5	2.75	0	
25	N25	-4	1.5	2.75	0	
26	N26	-4	4	2.75	0	
27	N27	-0.583333	1.5	2.75	0	
28	N28	-0.583333	4	2.75	0	
29	N29	1	1.5	2.75	0	
30	N30	1	4	2.75	0	
31	N31	4.5	1.5	2.75	0	
32	N32	4.5	4	2.75	0	
33	N33	4.5	2.75	2.75	0	
34	N34	-4	2.75	2.75	0	
35	N35	-2.924621	3	-4.674621	0	
36	N36	3.424621	2.75	-4.674621	0	
37	N37	.5	.5	2.75	0	
38	N38	.5	1.5	2.75	0	
39	N39	.5	4	2.75	0	
40	N40	.5	6.5	2.75	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N12	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N11	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N36	Reaction	Reaction	Reaction			
4	N35	Reaction	Reaction	Reaction			

Member Point Loads (BLC 2 : Dead Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	Y	-.066	.5
2	M19	Y	-.066	5.5
3	M10	Y	-.067	.5
4	M10	Y	-.067	5.5
5	M19	Y	-.074	3.75
6	M9	Y	-.052	.5
7	M9	Y	-.052	5.5
8	M19	Y	-.109	2

Member Point Loads (BLC 3 : Ice Load)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	Y	-.155	.5
2	M19	Y	-.155	5.5
3	M10	Y	-.086	.5
4	M10	Y	-.086	5.5
5	M19	Y	-.067	3.75
6	M9	Y	-.072	.5
7	M9	Y	-.072	5.5
8	M19	Y	-.096	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	X	.021	.5
2	M19	X	.021	5.5
3	M10	X	.018	.5
4	M10	X	.018	5.5
5	M19	X	.012	3.75
6	M9	X	.01	.5
7	M9	X	.01	5.5
8	M19	X	.017	2

Member Point Loads (BLC 5 : Wind X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	X	.051	.5
2	M19	X	.051	5.5
3	M10	X	.043	.5
4	M10	X	.043	5.5
5	M19	X	.025	3.75
6	M9	X	.023	.5
7	M9	X	.023	5.5
8	M19	X	.038	2

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

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	Z	.049	.5
2	M19	Z	.049	5.5
3	M10	Z	.025	.5
4	M10	Z	.025	5.5
5	M9	Z	.021	.5
6	M9	Z	.021	5.5

Member Point Loads (BLC 7 : Wind Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M19	Z	.143	.5
2	M19	Z	.143	5.5
3	M10	Z	.064	.5
4	M10	Z	.064	5.5
5	M9	Z	.055	.5
6	M9	Z	.055	5.5

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M10	X	.002	.002	0	0
2	M19	X	.002	.002	0	0
3	M9	X	.002	.002	0	0
4	M18	X	.002	.002	0	0
5	M17	X	.002	.002	0	0
6	M1	X	.002	.002	0	0
7	M2	X	.002	.002	0	0
8	M3	X	.002	.002	0	0
9	M8	X	.002	.002	0	0
10	M7	X	.002	.002	0	0
11	M6	X	.002	.002	0	0

Member Distributed Loads (BLC 5 : Wind X)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M10	X	.002	.002	0	0
2	M19	X	.002	.002	0	0
3	M9	X	.002	.002	0	0
4	M18	X	.002	.002	0	0
5	M17	X	.002	.002	0	0
6	M1	X	.002	.002	0	0
7	M2	X	.002	.002	0	0
8	M3	X	.002	.002	0	0
9	M8	X	.002	.002	0	0
10	M7	X	.002	.002	0	0
11	M6	X	.002	.002	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M4	Z	.002	.002	0	0
2	M5	Z	.002	.002	0	0
3	M15	Z	.002	.002	0	0

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

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
4	M13	Z	.002	.002	0	0
5	M16	Z	.002	.002	0	0
6	M14	Z	.002	.002	0	0
7	M12	Z	.002	.002	0	0
8	M11	Z	.002	.002	0	0
9	M18	Z	.002	.002	0	0
10	M17	Z	.002	.002	0	0
11	M1	Z	.002	.002	0	0
12	M6	Z	.002	.002	0	0

Member Distributed Loads (BLC 7 : Wind Z)

	Member Label	Direction	Start Magnitude[k/ft,F,ksf]	End Magnitude[k/f..	Start Location[ft,%]	End Location[ft,%]
1	M10	X	.007	.007	0	0
2	M19	X	.007	.007	0	0
3	M9	X	.007	.007	0	0
4	M18	X	.007	.007	0	0
5	M17	X	.007	.007	0	0
6	M1	X	.007	.007	0	0
7	M2	X	.007	.007	0	0
8	M3	X	.007	.007	0	0
9	M8	X	.007	.007	0	0
10	M7	X	.007	.007	0	0
11	M6	X	.007	.007	0	0

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Gra...	Joint	Point	Distrib..	Area(...	Surfa...
1	Self Weight	DL		-1						
2	Dead Load	None					8			
3	Ice Load	None					8			
4	Wind with Ice X	None					8	11		
5	Wind X	None					8	11		
6	Wind with Ice Z	None					6	12		
7	Wind Z	None					6	11		

Load Combinations

	Description	Solve	P...	S...	B...	Fa...	BLC	Fact...	BLC	Fa...	BLC	Fa...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	1.2D + 1.6W (X-dir...	Yes	Y		1	1.2	2	1.2	5	1.6														
2	0.9D + 1.6W (X-dir...	Yes	Y		1	.9	2	.9	5	1.6														
3	1.2D + 1.0Di + 1.0...	Yes	Y		1	1.2	2	1.2	3	1	4	1												
4	1.2D + 1.6W (Z-dire...	Yes	Y		1	1.2	2	1.2	7	1.6														
5	0.9D + 1.6W (Z-dire...	Yes	Y		1	.9	2	.9	7	1.6														
6	1.2D + 1.0Di + 1.0...	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	N12	max	-.133	6	1	6	-.556	2	.492	6	-.111	6	-.024	6
2		min	-.511	1	.412	2	-1.514	6	.171	2	-.962	1	-.24	1
3	N11	max	.14	6	.795	3	1.4	3	.528	3	.152	6	.168	2
4		min	-.187	5	.305	5	.555	5	.191	5	-.607	2	-.026	6
5	N36	max	.164	4	.013	3	-.008	3	0	6	0	6	0	6
6		min	-.003	3	.01	5	-.224	4	0	1	0	1	0	1
7	N35	max	.003	2	.021	4	.02	2	0	6	0	6	0	6
8		min	-.272	4	.009	2	-.213	4	0	1	0	1	0	1
9	Totals:	max	0	6	1.814	6	0	3						
10		min	-.662	1	.77	2	-.838	4						

Envelope Joint Displacements

	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
1	N1	max	0	5	0	5	0	6	0	5	0	6	1.699e-06	5
2		min	0	6	0	1	0	1	-3.034e-07	6	0	1	0	6
3	N2	max	0	2	0	5	0	5	1.187e-05	5	4.32e-04	2	-1.838e-05	6
4		min	0	6	0	3	-.001	3	-2.186e-06	3	-1.084e-04	6	-7.293e-05	1
5	N3	max	0	1	0	2	.001	6	6.182e-05	3	6.849e-04	1	3.951e-05	5
6		min	0	6	0	6	0	2	-9.403e-06	5	7.92e-05	6	-1.799e-05	6
7	N4	max	0	5	0	5	0	6	3.034e-07	6	0	6	0	6
8		min	0	6	0	1	0	1	0	1	0	1	-1.699e-06	4
9	N5	max	.079	2	-.012	2	0	5	2.055e-03	6	3.268e-03	2	-8.192e-04	5
10		min	-.03	6	-.03	6	-.002	3	8.381e-04	2	-1.112e-03	6	-1.79e-03	3
11	N6	max	.151	1	-.012	2	.002	6	1.999e-03	6	5.882e-03	1	-6.653e-04	5
12		min	.023	6	-.032	6	0	2	6.594e-04	2	7.419e-04	6	-1.718e-03	3
13	N7	max	.01	2	-.001	5	0	5	4.208e-04	3	1.771e-03	2	-2.762e-04	5
14		min	-.004	6	-.004	3	-.002	3	1.571e-04	5	-6.952e-04	6	-4.934e-04	3
15	N8	max	.02	1	-.002	5	.001	6	5.97e-04	3	3.459e-03	1	-1.137e-04	5
16		min	.003	6	-.005	3	0	2	2.139e-04	5	5.491e-04	6	-4.413e-04	3
17	N9	max	.052	2	-.005	2	0	5	1.461e-03	6	3.129e-03	2	-6.588e-04	5
18		min	-.02	6	-.014	6	-.002	3	5.925e-04	2	-1.164e-03	6	-1.348e-03	3
19	N10	max	.1	1	-.006	2	.002	6	1.375e-03	6	5.943e-03	1	-4.721e-04	5
20		min	.016	6	-.016	6	0	2	4.815e-04	2	8.668e-04	6	-1.286e-03	3
21	N11	max	0	6	0	6	0	6	0	6	0	6	0	6
22		min	0	1	0	1	0	1	0	1	0	1	0	1
23	N12	max	0	6	0	6	0	6	0	6	0	6	0	6
24		min	0	1	0	1	0	1	0	1	0	1	0	1
25	N13	max	.078	2	-.099	5	.002	6	5.435e-03	4	1.211e-03	1	-1.317e-03	5
26		min	-.032	6	-.21	3	-.131	1	-4.363e-04	1	-2.857e-03	5	-2.643e-03	3
27	N14	max	.152	1	-.099	5	.126	5	8.835e-03	4	1.18e-03	1	-1.308e-03	5
28		min	.023	6	-.211	3	-.145	1	-5.173e-04	1	-3.931e-03	5	-3.091e-03	1
29	N15	max	.08	2	.105	1	.106	2	5.475e-03	4	2.667e-03	5	-1.093e-03	5
30		min	-.028	6	.037	5	-.035	6	1.369e-03	2	3.356e-04	6	-2.292e-03	1
31	N16	max	.151	1	.107	1	.238	4	9.254e-03	4	3.939e-03	4	-1.101e-03	5
32		min	.022	6	.036	5	.063	6	1.479e-03	2	5.977e-04	3	-2.979e-03	1
33	N17	max	.051	2	-.095	5	-.014	6	5.325e-03	4	1.211e-03	1	-1.298e-03	5
34		min	-.058	6	-.202	3	-.16	4	-4.362e-04	1	-2.857e-03	5	-2.626e-03	3
35	N18	max	.078	2	-.095	5	0	6	5.435e-03	4	1.211e-03	1	-1.317e-03	5
36		min	-.032	6	-.202	3	-.127	1	-4.363e-04	1	-2.857e-03	5	-2.642e-03	3
37	N19	max	.152	1	-.095	5	.114	5	8.835e-03	4	1.18e-03	1	-1.308e-03	5

Envelope Joint Displacements (Continued)

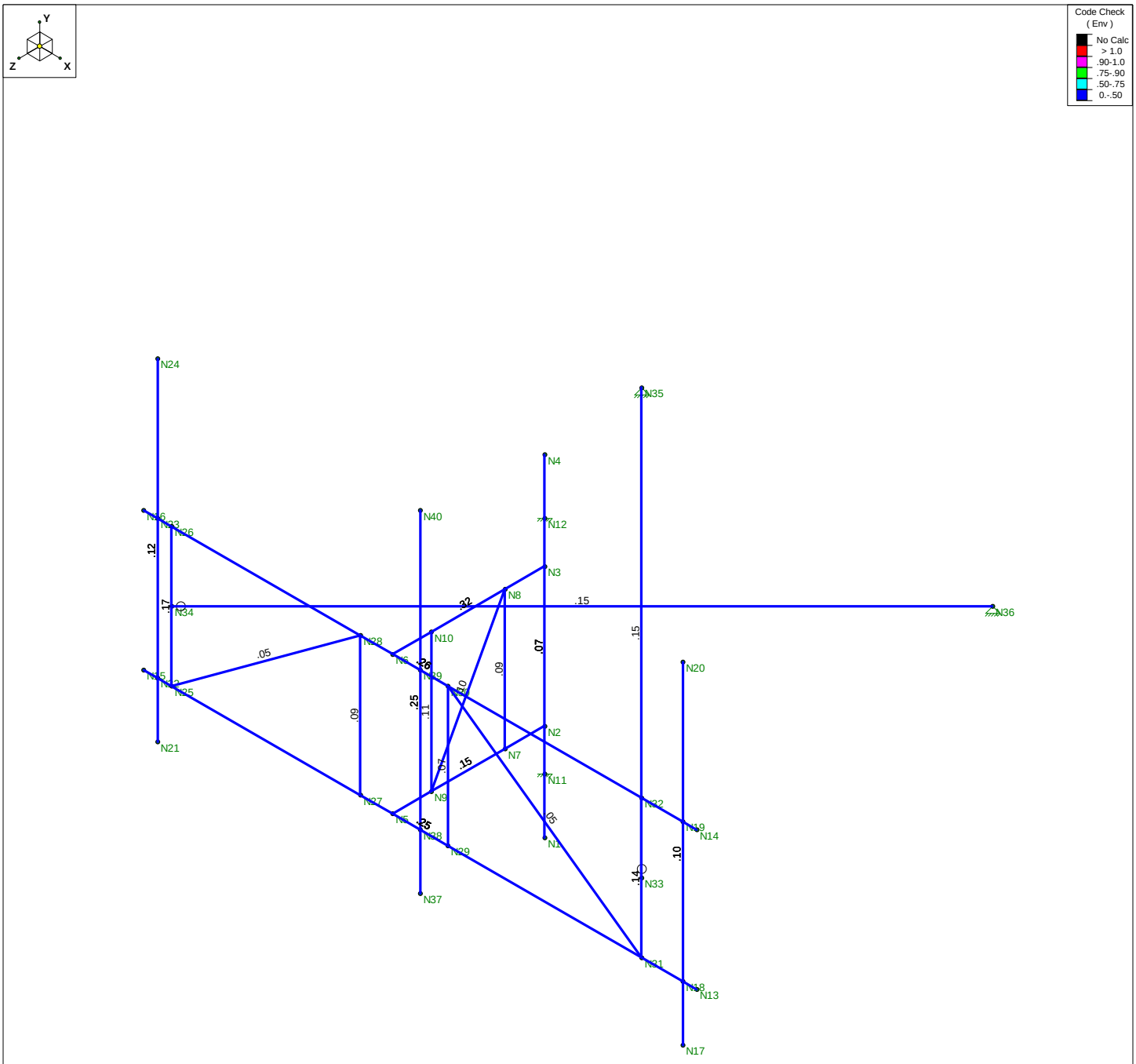
	Joint		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotatio...	LC	Z Rotation [rad]	LC
38		min	.023	6	-.202	3	-.142	1	-5.173e-04	1	-3.931e-03	5	-3.09e-03	1
39	N20	max	.263	1	-.095	5	.418	4	1.059e-02	4	1.18e-03	1	-1.598e-03	5
40		min	.085	6	-.202	3	-.157	1	-5.179e-04	1	-3.931e-03	5	-3.906e-03	1
41	N21	max	.056	2	.098	1	.085	2	5.347e-03	4	2.667e-03	5	-1.075e-03	5
42		min	-.046	6	.033	5	-.069	6	1.368e-03	2	3.354e-04	6	-2.202e-03	1
43	N22	max	.08	2	.098	1	.101	2	5.475e-03	4	2.667e-03	5	-1.093e-03	5
44		min	-.028	6	.033	5	-.036	6	1.369e-03	2	3.354e-04	6	-2.292e-03	1
45	N23	max	.151	1	.098	1	.226	4	9.254e-03	4	3.939e-03	4	-1.102e-03	5
46		min	.022	6	.033	5	.06	6	1.479e-03	2	5.977e-04	3	-2.98e-03	1
47	N24	max	.273	1	.098	1	.549	4	1.13e-02	4	3.939e-03	4	-1.392e-03	5
48		min	.069	6	.033	5	.136	3	1.481e-03	2	5.977e-04	3	-4.43e-03	1
49	N25	max	.08	2	.091	1	.097	2	4.912e-03	4	2.182e-03	5	-1.449e-03	5
50		min	-.028	6	.03	5	-.037	6	1.306e-03	2	1.812e-04	6	-2.569e-03	1
51	N26	max	.151	1	.09	1	.214	4	9.113e-03	4	4.214e-03	4	-7.189e-04	5
52		min	.022	6	.03	5	.058	6	1.494e-03	2	6.343e-04	3	-2.609e-03	1
53	N27	max	.079	2	-.003	2	.02	2	2.008e-03	6	2.776e-03	2	-3.286e-04	5
54		min	-.029	6	-.025	6	-.01	6	8.749e-04	2	-1.071e-03	6	-1.527e-03	1
55	N28	max	.151	1	-.003	2	.037	1	2.576e-03	4	4.653e-03	1	-7.184e-04	5
56		min	.022	6	-.025	6	.008	6	7.814e-04	2	1.105e-03	6	-1.403e-03	1
57	N29	max	.079	2	-.031	5	.004	6	1.816e-04	3	2.917e-03	2	-1.505e-03	5
58		min	-.03	6	-.068	3	-.04	2	-5.436e-04	5	-1.042e-04	6	-3.198e-03	3
59	N30	max	.151	1	-.031	5	.004	6	3.751e-03	4	3.433e-03	1	-1.49e-03	5
60		min	.023	6	-.068	3	-.052	1	-2.197e-04	2	-4.998e-04	6	-3.25e-03	3
61	N31	max	.078	2	-.082	5	-.005	6	3.876e-03	4	1.236e-03	1	-1.073e-03	5
62		min	-.032	6	-.175	3	-.116	1	-3.35e-04	1	-1.232e-03	5	-2.952e-03	1
63	N32	max	.152	1	-.082	5	.077	5	8.687e-03	4	1.156e-03	1	-1.602e-03	5
64		min	.023	6	-.175	3	-.131	1	-5.867e-04	1	-3.889e-03	5	-2.825e-03	3
65	N33	max	.116	2	-.082	5	.007	6	6.453e-03	4	1.196e-03	1	-1.061e-03	5
66		min	-.01	6	-.175	3	-.122	1	-5.141e-04	1	-2.56e-03	5	-2.447e-03	1
67	N34	max	.116	1	.09	1	.117	1	7.05e-03	4	3.193e-03	4	-1.077e-03	5
68		min	.002	6	.03	5	.003	6	1.451e-03	2	5.146e-04	6	-2.413e-03	1
69	N35	max	0	6	0	6	0	6	6.146e-03	4	1.335e-02	4	5.095e-04	5
70		min	0	1	0	1	0	1	1.633e-03	2	-2.392e-03	6	-5.195e-03	1
71	N36	max	0	6	0	6	0	6	6.917e-03	4	1.378e-02	4	4.167e-04	3
72		min	0	1	0	1	0	1	3.542e-03	2	2.331e-03	6	-1.899e-03	5
73	N37	max	.052	2	-.022	5	.006	5	2.73e-04	3	3.398e-03	2	-1.404e-03	5
74		min	-.059	6	-.048	3	-.021	1	-1.416e-03	5	-4.255e-04	6	-2.911e-03	3
75	N38	max	.079	2	-.022	5	.002	6	2.731e-04	3	3.398e-03	2	-1.423e-03	5
76		min	-.03	6	-.048	3	-.021	2	-1.133e-03	5	-4.255e-04	6	-2.942e-03	3
77	N39	max	.151	1	-.022	5	.001	6	3.23e-03	4	4.223e-03	1	-1.326e-03	5
78		min	.023	6	-.048	3	-.029	1	-1.264e-04	2	-2.963e-04	6	-3.228e-03	1
79	N40	max	.286	1	-.022	5	.191	4	7.779e-03	4	4.223e-03	1	-1.618e-03	5
80		min	.095	6	-.049	3	-.033	2	-1.266e-04	2	-2.963e-04	6	-4.95e-03	1

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

	Memb...	Shape	Code Check	L...	LC	Sh...	L...	Dir	...phi*P...	phi*Pn...	phi*Mn y-y [k-ft]	phi*...	Cb	Eqn
1	M2	PIPE_2.5	.317	2....	1	.112	2....		3 47.672	50.715	3.596	3.596	1....	H1..
2	M4	PIPE_1.25	.262	4....	3	.233	4....		3 19.565	19.688	.801	.801	2....	H1..
3	M19	PIPE_2.0	.254	3.5	4	.047	3.5		5 20.867	32.13	1.872	1.872	1....	H1..
4	M5	PIPE_1.25	.253	4....	3	.275	4....		6 16.292	19.688	.801	.801	1	H1..

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

	Memb...	Shape	Code Check	L...	LC	Sh...	L...	Dir	...	phi*P...	phi*Pn...	phi*Mn y-y [k-ft]	phi*...	Cb	Eqn
5	M12	SR 1 1/4	.169	1....	5	.034	1....		4	24.476	39.761	.828	.828	1....	H1...
6	M3	PIPE 2.5	.154	2....	1	.103	.6...		3	47.672	50.715	3.596	3.596	1....	H1...
7	M17	PIPE 1.25	.151	5....	4	.007	1...		4	2.618	19.688	.801	.801	1....	H1...
8	M18	PIPE 1.25	.150	5....	4	.007	0		4	2.617	19.688	.801	.801	1....	H1...
9	M11	SR 1 1/4	.141	1....	4	.039	0		4	24.476	39.761	.828	.828	1....	H1...
10	M10	PIPE 2.0	.117	3.5	4	.041	3.5		4	20.867	32.13	1.872	1.872	3....	H1...
11	M8	SR 1	.111	0	3	.029	0		1	11.923	25.447	.424	.424	2....	H1...
12	M7	SR 1	.100	2....	6	.011	2....		6	9.593	25.447	.424	.424	2....	H1...
13	M9	PIPE 2.0	.100	3.5	4	.035	3.5		4	20.867	32.13	1.872	1.872	1....	H1...
14	M6	SR 1	.094	2.5	3	.017	0		1	11.923	25.447	.424	.424	2....	H1...
15	M13	SR 3/4	.091	2.5	6	.025	0		4	3.899	14.314	.179	.179	2....	H1...
16	M14	SR 3/4	.073	2.5	4	.019	0		5	3.899	14.314	.179	.179	2....	H1...
17	M1	PIPE 4.0	.066	4....	6	.133	5		1	83.098	93.24	10.631	10....	2....	H1...
18	M16	SR 3/4	.049	0	6	.005	0		1	1.317	14.314	.179	.179	2....	H1...
19	M15	SR 3/4	.046	0	6	.007	0		1	1.36	14.314	.179	.179	2....	H1...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Centek		
TJL	CTFF703A - Mount	Dec 9, 2021 at 3:45 PM
20074.58	Unity Check	Mount.r3d

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Section 1 - Site Information

Site ID: CTFF703A
Status: Final
Version: 8
Project Type: Anchor
Approved: 12/8/2021 12:53:59 PM
Approved By: Pratik.Patil30@T-Mobile.com
Last Modified: 12/8/2021 12:53:59 PM
Last Modified By: Pratik.Patil30@T-Mobile.com

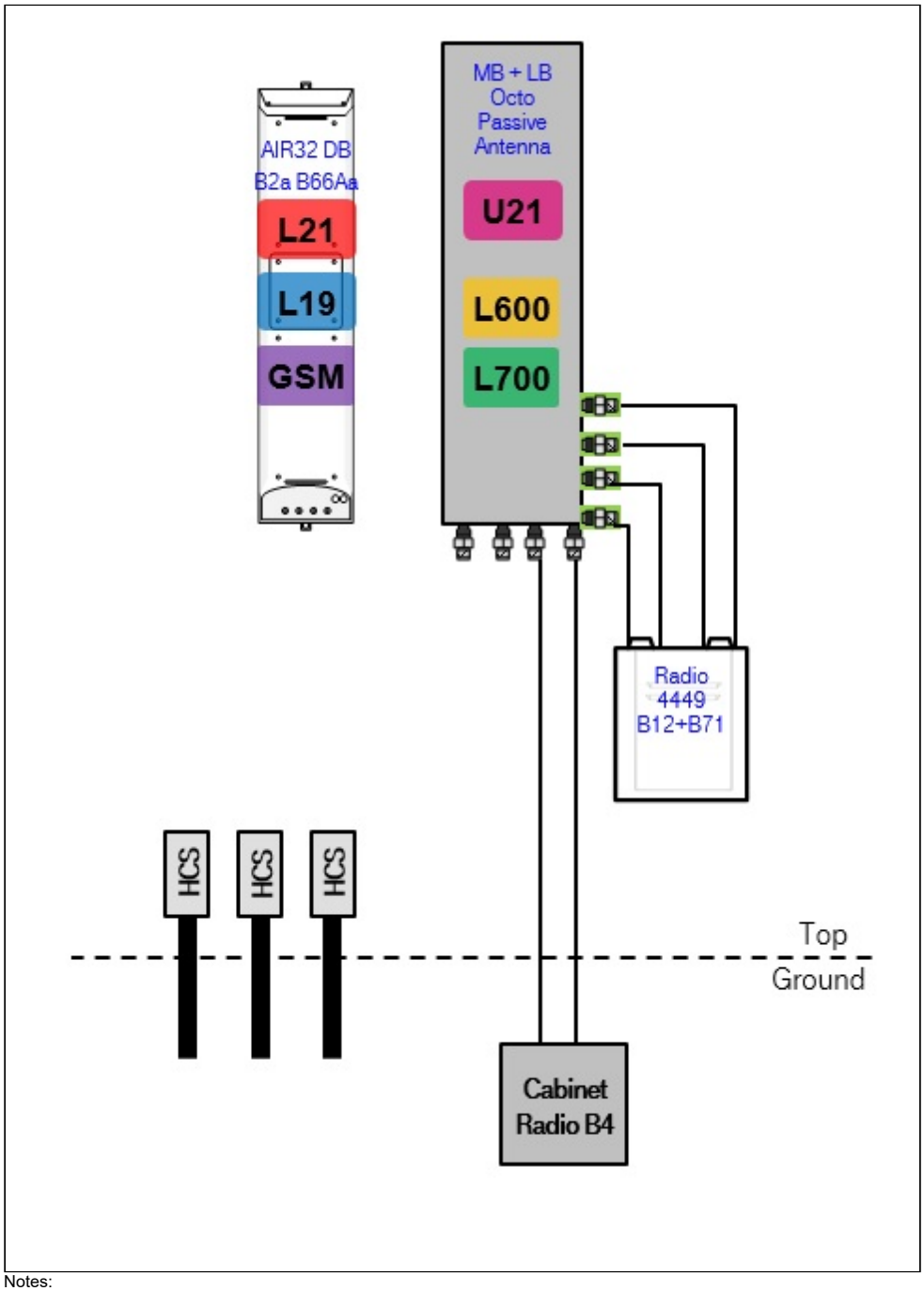
Site Name: CT703/WCSU ET
Site Class: Self Support Tower
Site Type: Structure Non Building
Plan Year: 2021
Market: CONNECTICUT CT
Vendor: Ericsson
Landlord: State of Connecticut

Latitude: 41.39472156
Longitude: -73.48666590
Address: 303 Boxwood Lane
City, State: Danbury, CT
Region: NORTHEAST

RAN Template: 67D5A997DB Outdoor			AL Template: 67D5997DB_2xAIR+1OP (U21 Market)	
Sector Count: 3	**Antenna Count:** 9	**Coax Line Count:** 0	**TMA Count:** 0	**RRU Count:** 6

Section 2 - Existing Template Images

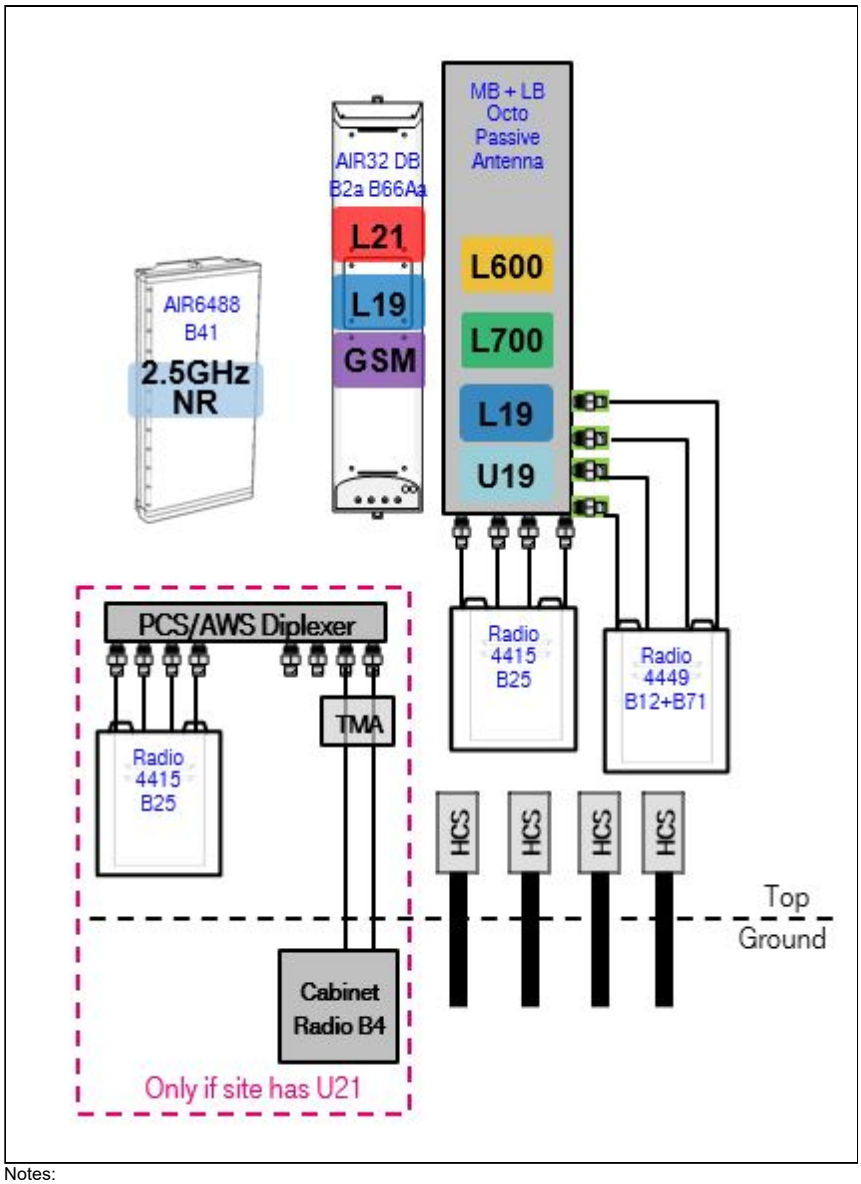
67D92DBL_1xAIR+1OP (U21 Market).jpg



Notes:

Section 3 - Proposed Template Images

67D5997DB_2xAIR+1OP.JPG



Notes:

Section 4 - Siteplan Images

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Section 5 - RAN Equipment

Existing RAN Equipment

Template: 67D92DBL Outdoor

Enclosure	1
Enclosure Type	RBS 6102
Baseband	DUW30 (U2100); DUW30; DUG20 (G1900); BB 5216 (L2100, L1900); BB 6630 (L700, L600, N600)
Hybrid Cable System	Ericsson 9x18 HCS *Select Length*; Ericsson 6x12 HCS *Select Length & AWG* **(x 3)**
Multiplexer	XMU
Radio	RU22 **(x 6)** (U2100)

Proposed RAN Equipment

Template: 67D5A997DB Outdoor

Enclosure	1	2	3
Enclosure Type	RBS 6102	Enclosure 6160 AC V1	B160
Baseband	DUW30 (U2100); DUW30; DUG20 (G1900); BB 6648 (L2100, L1900); BB 6630 (L700, L600, N600)	BB 6648 (L2500, N2500)	
Hybrid Cable System	Ericsson 6x12 HCS *Select Length & AWG* **(x 3)**	Ericsson Hybrid Trunk 6/24 4AWG 100m **(x 3)**; PSU 4813 vR4A (Kit)	
Radio	RU22 **(x 6)**		
Transport System		CSR IXRe V2 (Gen2)	

RAN Scope of Work:

Existing cabinet radios for U2100 will become dark. U2100 will move to new tower-mounted Radio 4460

Replace BB 5216 for L2100/L1900 with (1) BB6648 in existing cabinet RBS 6102.

Remove the XMU.

Add (1) Enclosure 6160.

Add (1) Battery Cabinet B160.

**Add (1) iXRe Router to new Enclosure 6160.

**Add (1) BB6648 for L2500 and N2500 (MMBB- Mixed Mode Baseband) to new Enclosure 6160.

**Add (1) PSU4813 Voltage Booster to new Enclosure 6160.

Remove all coaxial lines.

Remove the 9X18 HCS.

**Add (3) 6X24 HCS. There will be (1) 6X12 and (1) 6x24 HCS per sector. DC and Fiber Pairs will be reallocated among A&L Equipment. Length of new HCS to be determined.

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Section 6 - A&L Equipment

Existing Template: 67D92DBL_1xAIR+1OP (U21 Market)
Proposed Template: 67D5997DB_2xAIR+1OP (U21 Market)

Sector 1 (Existing) view from behind

Coverage Type	A - Outdoor Macro								
Antenna	**1**	**2**				**3**			
Antenna Model	Empty Antenna Mount (Empty mount)	RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	30	30				30			
M. Tilt	0	0				0			
Height	83	83				83			
Ports		**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.		L700 L600 N600	L700 L600 N600		U2100	L2100	L2100	L1900 G1900	L1900 G1900
Dark Tech.									
Restricted Tech.									
Decomm. Tech.									
E. Tilt									
Cables		Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**		1-5/8" Coax - 125 ft. **(x2)**	Fiber Jumper		Fiber Jumper	
TMAs					Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners									
Radio		Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)						
Sector Equipment									

Unconnected Equipment:

Scope of Work:

Remove AIR21 B2A/B4P from Position 1.
Move GSM to AIR32 DB in Position 3.

Replace LB Dual in Position 2 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.
Move Coaxial Lines and AWS TMA for U2100 from Position 1 to Position 2, and connect them to two Mid-Band Ports of LB/MB Octo.

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 1 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	30		30				30			
M. Tilt	0		0				0			
Height	83		83				83			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	U2100 L1900	U2100 L1900	L2100	L2100	G1900 L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables	Fiber Jumper **(x2)**	Fiber Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper
TMAs										
Diplexers / Combiners										
Radio			Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)				
Sector Equipment										

Unconnected Equipment:

Scope of Work:

*** L600 Scope of Work ***

Remove AIR21 B2A/B4P from Position 1.

Move GSM to AIR32 DB in Position 3.

Replace Low-Band Dual in Position 2 with (1) Low-Band/Mid-Band Octo.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in Position 2 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

***

*** Anchor Scope of Work ***

Install AIR6449 B41 for L2500 and N2500 in Position 1.

**Add (1) Radio 4460 B25+B66 for L1900 2nd Carrier and U2100 to Position 2 near antenna.

Remove coaxial lines and AWS TMA for U2100.

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

***

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 2 (Existing) view from behind

Coverage Type	A - Outdoor Macro								
Antenna	**1**	**2**				**3**			
Antenna Model	Empty Antenna Mount (Empty mount)	RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	150	150				150			
M. Tilt	0	0				0			
Height	83	83				83			
Ports		**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.		L700 L600 N600	L700 L600 N600		U2100	L2100	L2100	L1900 G1900	L1900 G1900
Dark Tech.									
Restricted Tech.									
Decomm. Tech.									
E. Tilt									
Cables		Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**		1-5/8" Coax - 125 ft. **(x2)**	Fiber Jumper		Fiber Jumper	
TMAs					Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners									
Radio		Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)						
Sector Equipment									

Unconnected Equipment:

Scope of Work:

Remove AIR21 B2A/B4P from Position 1.
Move GSM to AIR32 DB in Position 3.

Replace LB Dual in Position 2 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.
Move Coaxial Lines and AWS TMA for U2100 from Position 1 to Position 2, and connect them to two Mid-Band Ports of LB/MB Octo.

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 2 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	150		150				150			
M. Tilt	0		0				0			
Height	83		83				83			
Ports	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Active Tech.	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	U2100 L1900	U2100 L1900	L2100	L2100	G1900 L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables	Fiber Jumper **(x2)**	Fiber Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper
TMAs										
Diplexers / Combiners										
Radio			Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)				
Sector Equipment										

Unconnected Equipment:

Scope of Work:

*** L600 Scope of Work ***

Remove AIR21 B2A/B4P from Position 1.

Move GSM to AIR32 DB in Position 3.

Replace Low-Band Dual in Position 2 with (1) Low-Band/Mid-Band Octo.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in Position 2 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

***

*** Anchor Scope of Work ***

Install AIR6449 B41 for L2500 and N2500 in Position 1.

**Add (1) Radio 4460 B25+B66 for L1900 2nd Carrier and U2100 to Position 2 near antenna.

Remove coaxial lines and AWS TMA for U2100.

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

***

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 3 (Existing) view from behind

Coverage Type	A - Outdoor Macro								
Antenna	**1**	**2**				**3**			
Antenna Model	Empty Antenna Mount (Empty mount)	RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	270	270				270			
M. Tilt	0	0				0			
Height	83	83				83			
Ports		**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**
Active Tech.		L700 L600 N600	L700 L600 N600		U2100	L2100	L2100	L1900 G1900	L1900 G1900
Dark Tech.									
Restricted Tech.									
Decomm. Tech.									
E. Tilt									
Cables		Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)**		1-5/8" Coax - 125 ft. **(x2)**	Fiber Jumper		Fiber Jumper	
TMAs					Generic Twin Style 1B - AWS (AtAntenna)				
Diplexers / Combiners									
Radio		Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)						
Sector Equipment									

Unconnected Equipment:

Scope of Work:

Remove AIR21 B2A/B4P from Position 1.
Move GSM to AIR32 DB in Position 3.

Replace LB Dual in Position 2 with (1) LB/MB Octo.
Replace RRUS11 B12 with (1) Radio 4449 B71+B12 for L600 and L700.
Move Coaxial Lines and AWS TMA for U2100 from Position 1 to Position 2, and connect them to two Mid-Band Ports of LB/MB Octo.

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Sector 3 (Proposed) view from behind

Coverage Type	A - Outdoor Macro									
Antenna	1		2				3			
Antenna Model	Ericsson - AIR6449 B41 (Active Antenna - Massive MIMO)		RFS - APXVAARR18_43-U-NA20 (Octo)				Ericsson - AIR32 KRD901146-1_B66A_B2A (Octo)			
Azimuth	270		270				270			
M. Tilt	0		0				0			
Height	83		83				83			
Ports	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**
Active Tech.	L2500 N2500	L2500 N2500	L700 L600 N600	L700 L600 N600	U2100 L1900	U2100 L1900	L2100	L2100	G1900 L1900	L1900
Dark Tech.										
Restricted Tech.										
Decomm. Tech.										
E. Tilt										
Cables	Fiber Jumper **(x2)**	Fiber Jumper **(x2)**	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Coax Jumper **(x2)** Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper	Fiber Jumper
TMAs										
Diplexers / Combiners										
Radio			Radio 4449 B71+B85 (At Antenna)	SHARED Radio 4449 B71+B85 (At Antenna)	Radio 4460 B25+B66 (At Antenna)	SHARED Radio 4460 B25+B66 (At Antenna)				
Sector Equipment										

Unconnected Equipment:

Scope of Work:

*** L600 Scope of Work ***

Remove AIR21 B2A/B4P from Position 1.

Move GSM to AIR32 DB in Position 3.

Replace Low-Band Dual in Position 2 with (1) Low-Band/Mid-Band Octo.

Replace RRUS11 B12 with (1) Radio 4449 B71+B85 for L600, L700, and N600 in Position 2 at antenna, and connect its ports to the Low-Band ports of the Octo antenna.

***

*** Anchor Scope of Work ***

Install AIR6449 B41 for L2500 and N2500 in Position 1.

**Add (1) Radio 4460 B25+B66 for L1900 2nd Carrier and U2100 to Position 2 near antenna.

Remove coaxial lines and AWS TMA for U2100.

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

***

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

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

CTFF703A_Anchor_8

Print Name: Preliminary (RFDS_Corrections)
PORs: Anchor_Phase 3

Section 7 - Power Systems Equipment

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

	Proposed Power Systems Equipment
Enclosure	1
Enclosure Type	Enclosure 6160 AC V1

EBI Consulting

environmental | engineering | due diligence

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

T-Mobile Existing Facility

Site ID: CTFF703A

CT703/WCSU ET
303 Boxwood Lane
Danbury, Connecticut 06811

January 6, 2022

EBI Project Number: 6222000086

Site Compliance Summary	
Compliance Status:	**COMPLIANT**
Site total MPE% of FCC general population allowable limit:	**66.65%**

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

January 6, 2022

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

Emissions Analysis for Site: CTFF703A - CT703/WCSU ET

EBI Consulting was directed to analyze the proposed T-Mobile facility located at **303 Boxwood Lane** in **Danbury, 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 303 Boxwood Lane in Danbury, 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) 4 LTE channels (PCS Band - 1900 MHz) were considered for each sector of the proposed installation. These Channels have a transmit power of 60 Watts per Channel.

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

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

8) 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.

9) 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.

10) 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.

11) 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.

12) 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.

13) 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.

14) The antennas used in this modeling are the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR18_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector A, the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR18_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson AIR 32 for the 1900 MHz / 1900 MHz / 2100 MHz channel(s) in Sector B, the Ericsson AIR 6449 for the 2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz channel(s), the RFS APXVAARR18_43-U-NA20 for the 600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz channel(s), the Ericsson

AIR 32 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.

15) The antenna mounting height centerline of the proposed antennas is 83 feet above ground level (AGL).

16) 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.

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

T-Mobile Site Inventory and Power Data

Sector:	A	Sector:	B	Sector:	C
Antenna #:	1	Antenna #:	1	Antenna #:	1
Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449	Make / Model:	Ericsson AIR 6449
Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 2500 MHz / 2500 MHz / 2500 MHz	Frequency Bands:	2500 MHz / 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):	83 feet	Height (AGL):	83 feet	Height (AGL):	83 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 A1 MPE %:	**22.05%**	Antenna B1 MPE %:	**22.05%**	Antenna C1 MPE %:	**22.05%**
Antenna #:	**2**	Antenna #:	**2**	Antenna #:	**2**
Make / Model:	RFS APXVAARR18_43-U-NA20	Make / Model:	RFS APXVAARR18_43-U-NA20	Make / Model:	RFS APXVAARR18_43-U-NA20
Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz	Frequency Bands:	600 MHz / 600 MHz / 700 MHz / 1900 MHz / 2100 MHz
Gain:	11.95 dBd / 11.95 dBd / 12.35 dBd / 14.85 dBd / 15.55 dBd	Gain:	11.95 dBd / 11.95 dBd / 12.35 dBd / 14.85 dBd / 15.55 dBd	Gain:	11.95 dBd / 11.95 dBd / 12.35 dBd / 14.85 dBd / 15.55 dBd
Height (AGL):	83 feet	Height (AGL):	83 feet	Height (AGL):	83 feet
Channel Count:	9	Channel Count:	9	Channel Count:	9
Total TX Power (W):	380 Watts	Total TX Power (W):	380 Watts	Total TX Power (W):	380 Watts
ERP (W):	9,043.63	ERP (W):	9,043.63	ERP (W):	9,043.63
Antenna A2 MPE %:	**8.19%**	Antenna B2 MPE %:	**8.19%**	Antenna C2 MPE %:	**8.19%**
Antenna #:	**3**	Antenna #:	**3**	Antenna #:	**3**
Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32	Make / Model:	Ericsson AIR 32
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:	15.35 dBd / 15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd	Gain:	15.35 dBd / 15.35 dBd / 15.85 dBd
Height (AGL):	83 feet	Height (AGL):	83 feet	Height (AGL):	83 feet
Channel Count:	8	Channel Count:	8	Channel Count:	8
Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts	Total TX Power (W):	360 Watts
ERP (W):	12,841.53	ERP (W):	12,841.53	ERP (W):	12,841.53
Antenna A3 MPE %:	**7.79%**	Antenna B3 MPE %:	**7.79%**	Antenna C3 MPE %:	**7.79%**

Site Composite MPE %	
Carrier	**MPE %**
T-Mobile (Max at Sector A):	38.02%
AT&T	13.13%
WCXI (WCSU)	15.5%
Site Total MPE % :	66.65%

T-Mobile MPE % Per Sector	
T-Mobile Sector A Total:	38.02%
T-Mobile Sector B Total:	38.02%
T-Mobile Sector C Total:	38.02%
Site Total MPE % :	66.65%

T-Mobile Maximum MPE Power Values (Sector A)

T-Mobile Frequency Band / Technology (Sector A)	# Channels	Watts ERP (Per Channel)	Height (feet)	Total Power Density (μW/cm²)	Frequency (MHz)	Allowable MPE (μW/cm²)	Calculated % MPE
T-Mobile 2500 MHz LTE 1C & 2C Traffic	1	11044.63	83.0	66.97	2500 MHz LTE 1C & 2C Traffic	1000	6.70%
T-Mobile 2500 MHz LTE 1C & 2C Broadcast	1	1074.06	83.0	6.51	2500 MHz LTE 1C & 2C Broadcast	1000	0.65%
T-Mobile 2500 MHz NR Traffic	1	22089.26	83.0	133.94	2500 MHz NR Traffic	1000	13.39%
T-Mobile 2500 MHz NR Broadcast	1	2148.13	83.0	13.03	2500 MHz NR Broadcast	1000	1.30%
T-Mobile 600 MHz LTE	2	470.03	83.0	5.70	600 MHz LTE	400	1.43%
T-Mobile 600 MHz NR	1	1253.40	83.0	7.60	600 MHz NR	400	1.90%
T-Mobile 700 MHz LTE	2	515.37	83.0	6.25	700 MHz LTE	467	1.34%
T-Mobile 1900 MHz LTE	2	1832.95	83.0	22.23	1900 MHz LTE	1000	2.22%
T-Mobile 2100 MHz UMTS	2	1076.77	83.0	13.06	2100 MHz UMTS	1000	1.31%
T-Mobile 1900 MHz GSM	4	1028.30	83.0	24.94	1900 MHz GSM	1000	2.49%
T-Mobile 1900 MHz LTE	2	2056.61	83.0	24.94	1900 MHz LTE	1000	2.49%
T-Mobile 2100 MHz LTE	2	2307.55	83.0	27.98	2100 MHz LTE	1000	2.80%
						Total:	**38.02%**

• 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:	38.02%
Sector B:	38.02%
Sector C:	38.02%
T-Mobile Maximum MPE % (Sector A):	38.02%
Site Total:	66.65%
Site Compliance Status:	**COMPLIANT**

The anticipated composite MPE value for this site assuming all carriers present is **66.65%** of the allowable FCC established general population limit sampled at the ground level. This is based upon values listed in the Connecticut Siting Council database for existing carrier emissions.

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